2.2 ON-STREET PARKING REGULATIONS AND STREET WIDTHS

In June of 2008, the study team walked all streets in the study area to inventory all on-street parking regulations to provide baseline existing conditions that could be used in future analyses or activity.

There are a wide variety of on-street regulations in the area – 36 different regulation types were found. Alternate side parking, metered parking (especially on Church Avenue), no standing regulations, bus stops, truck loading areas, and authorized parking restrictions all exist within the area. Regulations cover either a specific time of the day or a specific day of the week. The most common form of curbside regulations is alternate side parking, which is necessary for street cleaning once or twice per week.

On-street parking is permitted within the study area, except at locations where the traffic flow would be adversely affected, particularly during the AM and PM peak periods, or where curb space is needed for trucks and/or other authorized vehicles (such as police, fire, or transit vehicles). See Table 2-D for a list of the different curb regulations and Figure 2-O for their locations.

Additional, highly localized observed conditions found within the study area appear in Appendix B.

TABLE 2-D: KEY TO ON-STREET PARKING REGULATIONS				
#	*type*	*day*	*time*	*Exemptions*
1	No Parking	Anytime		
2	No Parking	Tu	9:30am-11:00am	
3	No Parking	We	9:30am-11:00am	
4	No Parking	Mo	11:30am-1:00pm	
5	No Parking	Tu	11:30am-1:00pm	
6	No Parking	We	11:30am-1:00pm	
7	No Parking	Th	11:30am-1:00pm	
8	No Parking	Fr	11:30am-1:00pm	
9	No Parking	Mo,Th	9:30am-11:00am	
10	No Parking	Tu,Fr	9:30am-11:00am	
11	No Parking	Mo,We,Fr	12:00am-3:00am	
12	No Parking	Tu,Th,Sa	12:00am-3:00am	
13	No Parking	Mo-Fr	8:00am-6:00pm	
14	No Parking	Mo-Sa	8:00am-7:00pm	
15	No Parking	School Days	7:00am-4:00pm	
16	No Parking	School Days	7:00am-4:00pm	Except Board of Education
17	No Parking	School Days	8:00am-6:00pm	Except Faculty Vehicles
18	No Parking	Mo-Sa	7:00am-7:00pm	
19	No Parking	Mo-Sa	7:30am-8:00am	
20	No Parking	Mo-Sa	8:00am-8:30am	
21	1 Hour Parking	Mo-Sa	8:00am-7:00pm	
22	1 Hour Parking	Mo-Sa	8:30am-7:00pm	
23	1 Hour Parking	Mo-Sa	10:00am-7:00pm	
24	2 Hour Parking	Mo-Sa	8:00am-7:00pm	
25	2 Hour Parking	Mo-Sa	9:00am-7:00pm	
26	2 Hour Parking	Mo-Sa	10:00am-7:00pm	
27	No Standing	Anytime		
28	Bus Stop -- No Standing	Anytime		
29	No Standing	Mo-Fr	7:00am-10:00am	
30	No Standing	School Days	7:00am-4:00pm	
31	No Standing	Mo-Fr	4:00pm-7:00pm	
32	No Standing	Mo-Sa	4:00pm-7:00pm	
33	No Standing	Mo-Fr	7:00am-4:00pm	Except Trucks Loading and Unloading
34	No Standing	Mo-Sa	6:00am-4:00pm	Except Trucks Loading and Unloading
35	No Standing			Except Authorized Vehicles (none posted)
36	No Standing			Except Authorized Vehicles (NYPD Permits Only)
37	unsigned			used by official NYPD vehicles
38	unsigned			

FIGURE 2-O: ON-STREET PARKING REGULATIONS

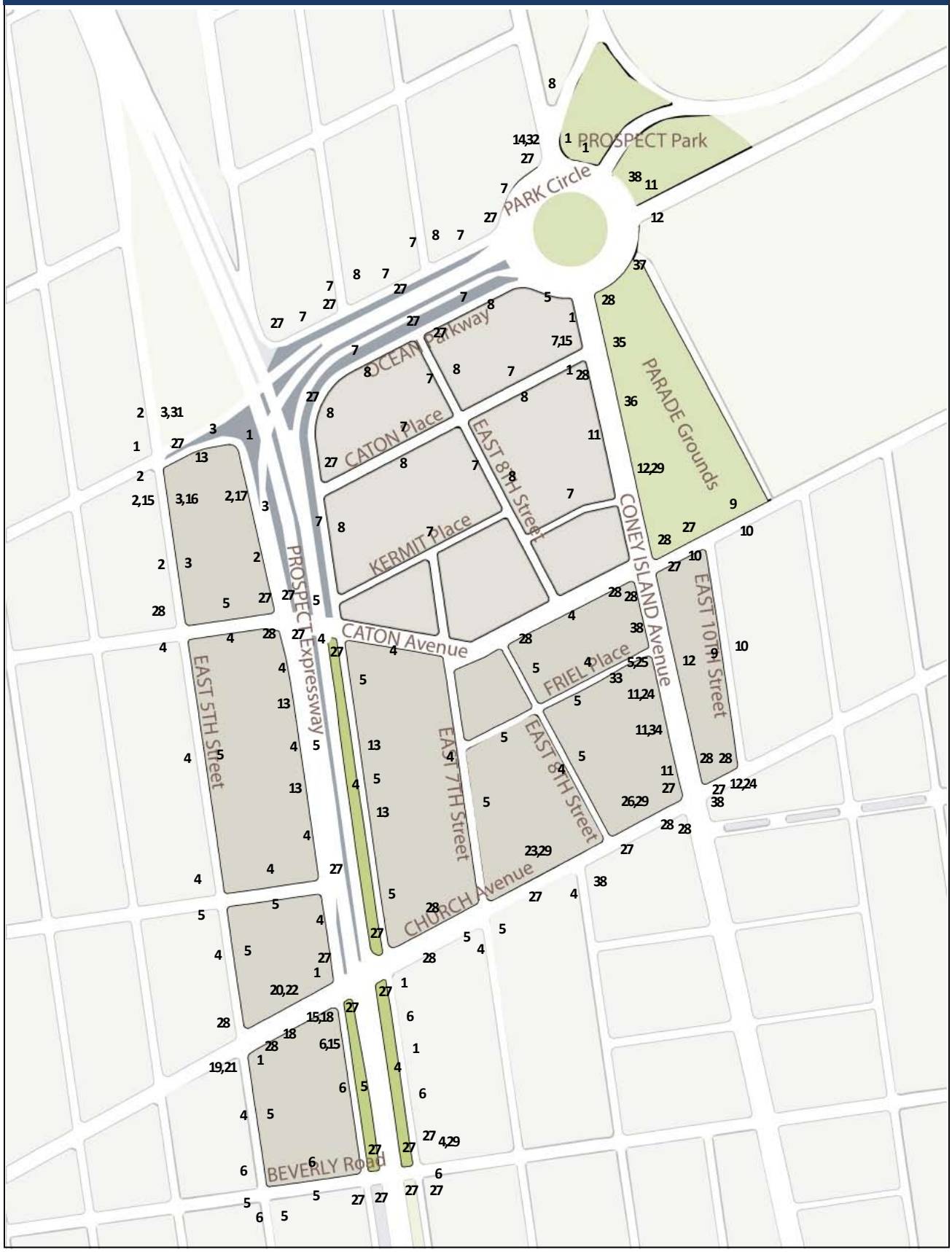
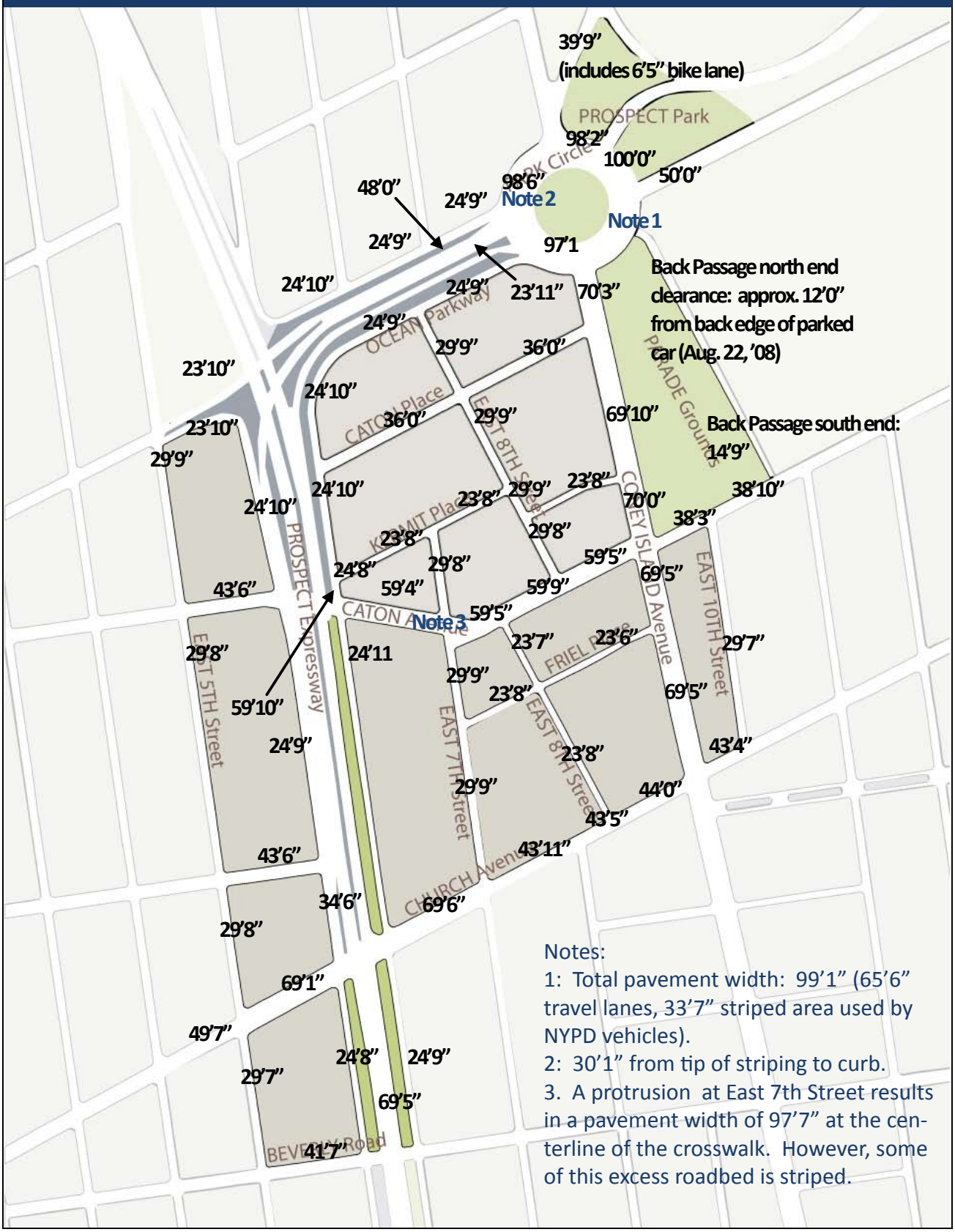


FIGURE 2-P: STREET WIDTHS



Notes:
1: Total pavement width: 99'1" (65'6" travel lanes, 33'7" striped area used by NYPD vehicles).
2: 30'1" from tip of striping to curb.
3. A protrusion at East 7th Street results in a pavement width of 97'7" at the centerline of the crosswalk. However, some of this excess roadbed is striped.

Street Widths

In August of 2008, the study team walked all streets in the study area to measure the widths of their street beds from curb to curb. This was done to provide data that the study team and the Technical Advisory Committee could use for developing alternative bicycle, pedestrian and equestrian path alignments throughout the study area, if desired.

Figure 2-P provides the street widths for each block, which should be regarded as accurate to within 3 to 6 inches.

Of note are the following observations:

- *Caton Place is unusually wide for a side street.* At 36 feet, the Caton Place roadbed is over 6 feet wider than standard side streets in the study area and fully 50 percent wider than Friel Place, Kermit Place and the segment of East 8th Street south of Caton Avenue. Motor vehicles are not using Caton Place in abundance – AM and PM peak hour eastbound volumes near Coney Island Avenue in May 2006 were 41 and 42 respectively. (See Section 3.2.)

- *Park Circle's roadbed ranges from 97 to 100 feet wide.* This is approximately 20-25 feet wider than the six-lane Brooklyn-Queens Expressway is in the trench bracketed by Hicks Street. The circle's exceptionally wide paved perimeter represents both an unusually large impediment and an equally large opportunity for imaginative new uses that could coexist with motor vehicles.

Additional notes about street widths within the study area appear in Appendix B.

2.3 CYCLIST AND VEHICULAR TRAFFIC DATA

In July of 2008, the DCP Transportation Division conducted bicycle and pedestrian counts along Ocean Parkway between Church Avenue and Park Circle. Most of these counts were exclusively of bicyclists, but pedestrians were also counted at the Sherman Overpass and a vehicular count was conducted at the flyover to determine the traffic split between vehicles heading to Fort Hamilton Parkway and to Ocean Parkway.

The counts were conducted over four 2-hour periods:

- A weekday AM peak (7:30am-9:30am)
- A weekday midday (12:00pm-2:00pm)
- A weekday PM peak (5:00pm-7:00pm)
- A Sunday morning (9:15am-11:15am)

The results of the counts are grouped by location, and then analyzed as a whole. Figure 2-Q shows the five locations discussed in this section.

Church Avenue and Ocean Parkway/Prospect Expressway

This intersection marks the southern limit of the Prospect Expressway. As discussed in Section 2.0, several factors inhibit the ability of cyclists move from north to south through the intersection, such as the switch of the bicycle path between the east and west malls and incomplete signage.

An analysis of the count data yields several noteworthy results:

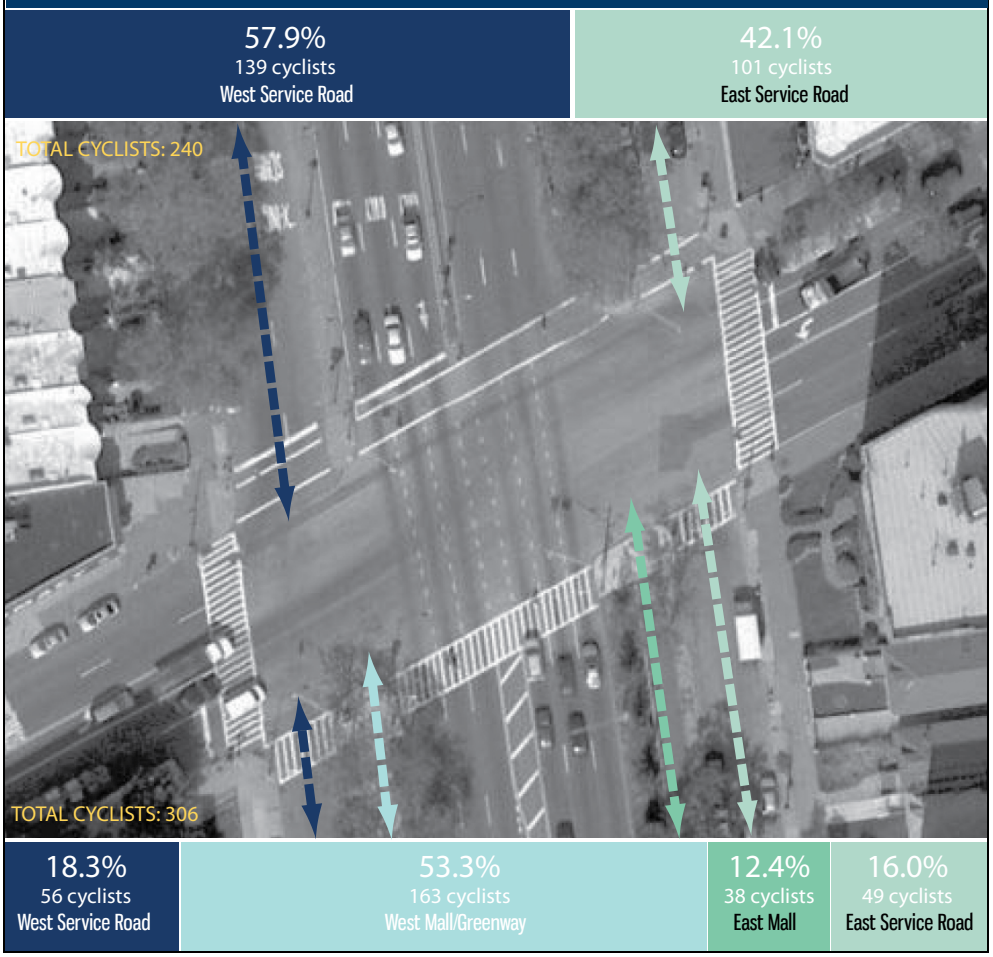
- *A significant portion of bicycle traffic is coming from Church Avenue.* Some cyclists passed completely though the intersection from east to west or west to east, but others turned onto Ocean Parkway, either northbound or southbound.
    - Of the 347 cyclists counted during the four count periods in the western half of the intersection, 136 (or 39.1 percent) were coming from or going to Church Avenue west of the intersection.
    - Of the 326 cyclists counted during the four count periods in the eastern half of the intersection, 173 (or 53.1 percent) were coming from or going to Church Avenue east of the intersection.[13]

- *Bicycle traffic is heavier during peak periods, but peak-directional flows are ambiguous.* An understandable assumption would be that more northbound cyclists use the intersection in the morning and more southbound use it in the evening. However, this is not the case. For example, in the AM peak south of Church Avenue, 46 cyclists traveled northbound along Ocean Parkway and 30 southbound. In the PM peak 59 traveled northbound and 59 southbound. (All data includes cyclists going to and from Church Avenue.) If traffic only along the west side of Ocean Parkway is considered (including the bikeway and the adjacent service road and sidewalk), peak directional flows were nonexistent: 24 northbound cyclists and 22 southbound in the AM peak and 49 northbound and 48 southbound in the PM peak.

- *Most cyclists are using the bikeway south of Church Avenue, but a significant minority is not.* Figure 2-R above breaks down the percentages of all north-south cyclists on Ocean Parkway during the combined 8 hours of counts (AM, midday, PM, Sunday). Some of the cyclists on the service roads, especially the eastern one, continued north of Church Avenue. The 38 cyclists on the east mall are there even though pavement markings explicitly prohibit cycling on this part of the parkway.

- *North of Church Avenue, most cyclists are not using the greenway.* For the eastern service road – the one portion of Ocean Parkway which still runs continuously to Park Circle – the combined total of cyclists from all four count periods was 139. Of these, 64 (46.0 percent) used the greenway, while 75 (54.0 percent) used either the street or the eastern (residential) sidewalk.[14]

FIGURE 2-R: BREAKDOWN OF N-S CYCLISTS BY PATHWAY ON OCEAN PARKWAY



[13]Adding up the cyclists from the western and eastern halves of the intersection would greatly overestimate the total number of cyclists at this location, since many cyclists crossed between both halves of the intersection. The intent of this count was not to measure east-west traffic, but the findings clearly warrant further investigation of bicycle traffic along Church Avenue at a later date.

[14]A discrepancy of one cyclist exists between the combined total (138) and the split between greenway and street (139).

- *A significant minority of cyclists is using the western service road.* A total of 101 cyclists were counted on the west service road, compared to 139 on the eastern one, despite the fact that the west road is truncated at Fort Hamilton Parkway; the east road has separate bikeway while the west road does not; an exit from the Prospect Expressway empties onto the service road just north of Church Avenue, and the western service road reverses direction at Caton Avenue, meaning that all cyclists using the entire stretch of the western service road will be riding contraflow for some part of their journey. The counts did not attempt to track the cyclists on this part of the parkway, so some of them may be entering the west service road from Albemarle Road or Caton Avenue. Others might get to the north end of the service road and loop onto the flyover pedestrian walkway.

- *Some bicyclists ignored the striped crosswalks and crossed in a straight north-south line to and from the malls south of Church Avenue.* Out of the 163 total north-south cyclists counted on the greenway south of Church Avenue, 49 of them (or 30.1 percent) kept going due north as if the greenway were continuing in a straight line, either turning east onto the unstriped crosswalk along the northern edge of the intersection or proceeding north. On the east side of the parkway, 40 more cyclists took advantage of one of the curb cuts that empty in to the non-crosswalk described in Section 2.0. Many of these cyclists proceeded directly from north to south, despite the fact that bicycling is forbidden on the east mall south of Church Avenue.

Caton Avenue and Ocean Parkway (East Service Road)

This intersection marks the eastern endpoint of a mostly-Class 2 striped on-street bicycle lane to Sunset Park and Bay Ridge. The striping, however, ends at Ocean Parkway's west service road instead of proceeding across the overpass to the Class 1 bikeway along the western edge of the east service road. (The Prospect Expressway is in an open cut below and between the perimeter service roads.) Bicycle lanes exist between both the eastbound and westbound lanes and their respective parking lanes.

Caton Avenue is a two-way, two-lane road officially designated by NYCDOT as a local truck route, meaning that any truck with an origin or destination within Brooklyn is permitted to use this road. It is heavily used by trucks.[15]

Based on the count data, the following observations can be made:[16]

- *Most cyclist traffic came from, went to, or passed through the intersection via Caton Avenue.* Of the 261 cyclists counted during weekday count periods, 198 (75.9 percent) had at least one origin or destination on Caton Avenue, a higher ratio than at Church Avenue.

- *Most cyclists were avoiding the Ocean Parkway bikeway, especially north of Caton Avenue.* See Table 2-E. Fewer cyclists were on the whole breadth of the eastern Ocean Parkway Service road (including the bikeway) south of Caton, resulting in a relative increase in the proportion of on-bikeway cyclists. However, on both sides of Caton Avenue, bikeway users were in the minority.

Ambiguous curb cuts at Caton Avenue and Ocean Parkway eastern

[15]New York City Traffic Rules and Regulations, http://www.nyc.gov/html/dot/downloads/pdf/trafrule.pdf, page 73.

[16]Sunday counts data for this intersection is incomplete.

TABLE 2-E: CYCLIST USE OF BICYCLE PATH AT OCEAN PKWY AND CATON AVE, JULY 2008		
Count period	*Total cyclists north of Caton Avenue/ total using bikeway (percent)*	*Total cyclists south of Caton Avenue/ total using bikeway (percent)*
AM Peak (7:30am-9:30am)	66 / 13 (19.7%)	47 / 15 (31.9%)
Midday (12:00pm-2:00pm)	31 / 6 (19.4%)	18 / 5 (27.8%)
PM Peak (5:00pm-7:00pm)	54 / 19 (35.2%)	45 / 23 (51.1%)
TOTAL	*151 / 38 (25.2%)*	*110 / 43 (39.1%)*

- *Only 28 of the above cyclists traveled straight along the bikeway through the intersection. As discussed in Section 2.0, no striped crosswalk exists here. The existing crosswalk striping traversing the other three sides of the intersection implicitly directs bicyclists onto the residential sidewalk, across Caton Avenue, and back to the greenway, even though a legal bicycle path lies both to the north and south of Caton Avenue. The awkward location of the curb cuts at this intersection – they are not quite aligned either north-south or east-west (see photo below) – only adds additional uncertainty.*

Fort Hamilton Parkway/Ocean Parkway Flyover

This multipurpose overpass above the Prospect Expressway consists of three elements: a four-lane westbound-only road which splits into a two-lane ramp to the tail end of the southbound Prospect Expressway, allowing motorists to travel south on Ocean Parkway; and a two-lane ramp to the beginning of Fort Hamilton Parkway, which continues as a two-lane, one-way street until west of Dahill Road, where it becomes bidirectional. (A traffic signal marks the beginning of the parkway, at its intersection with East 5th Street.) The third element is a pedestrian and bicycle overpass between a linear park east of Fort Hamilton Parkway and East 5th Street, and the westbound stub of Ocean Parkway at East 7th Street.

Along with measuring bicycle and pedestrian traffic on the overpass, this was the sole location where vehicular counts were conducted – the study team wanted to obtain both general traffic volumes and what the split was between Ocean Parkway- and Fort Hamilton Parkway-bound traffic. Based upon these counts, the following observations can be made:

- *The flyover has excess capacity.* Even during peak periods, four travel lanes are not necessary to process the amount of traffic using the flyover. The peak 15-minute period observed was at the Fort Hamilton Parkway ramp between 8:30 and 8:45am. During that time, 95 vehicles used the ramp. This is about one vehicle per 9.5 seconds. Even if the red signal at East 5th Street were to last for 60 seconds, ample room exists for the queuing of six to seven cars. A more typical range of 40 to 80 vehicles per 15 minutes was observed on each of the two ramps during weekdays, or about one vehicle per 11 to 22 seconds. It should be noted, though, that this is only an average. Much of the traffic entering the flyover does so in platoons, due to traffic signals in Park Circle. Sunday morning traffic levels per ramp were in the 20-30 vehicle range per 15 minutes.

- *Except for the AM peak, slightly more traffic was destined for Ocean Parkway than Fort Hamilton Parkway*, as is seen in Table 2-F below. Coincidentally, AM and PM peak volumes were identical for the Fort Hamil-

ton Parkway ramp, which allows a baseline comparison with the expected shift towards higher Ocean Parkway-bound (i.e. southbound) volumes in the PM peak.

TABLE 2-F: TRAFFIC VOLUMES ON FLYOVER, JULY 2008			
Count period	*Total motor vehicles on flyover*	*To Fort Hamilton Parkway*	*To Ocean Parkway*
AM Peak (7:30am-9:30am)	969	545 (56.2%)	424 (43.8%)
Midday (12:00pm-2:00pm)	877	401 (45.7%)	476 (54.3%)
PM Peak (5:00pm-7:00pm)	1,122	545 (48.6%)	577 (51.4%)
Sunday (9:15am-11:15am)	379	167 (44.1%)	212 (55.9%)

TABLE 2-G: CYCLISTS USING FLYOVER PEDESTRIAN PATH VS. ROADWAY, JULY 2008			
Count period	*Total cyclists*	*Via pedestrian path*	*Via roadway*
AM Peak (7:30am-9:30am)	40	26 (65.0%)	14 (35.0%)
Midday (12:00pm-2:00pm)	33	20 (60.6%)	13 (39.4%)
PM Peak (5:00pm-7:00pm)	56	37 (66.1%)	19 (33.9%)
Sunday (9:15am-11:15am)	33	14 (42.4%)	19 (57.6%)

- *A significant fraction of cyclists were using the flyover road itself instead of the parallel pedestrian overpass immediately north of the flyover roadway.* See Table 2-G. Most of these 65 on-road cyclists were traveling with the flow of traffic to Fort Hamilton Parkway, but 10 of them were riding from Fort Hamilton Parkway contraflow. Three of the 65 cyclists went down the ramp to Ocean Parkway, meaning that for a brief period they were on the Prospect Expressway, a highly risky maneuver which may have its allure in the fact that the expressway ends and the west mall greenway begins one block to the south of the offramp's merge with mainline traffic. Regardless, the fact that 40 percent of cyclists bypass the pedestrian walk indicates a latent demand for a pathway more conducive to cycling.

Sherman Overpass and western Park Circle

The Sherman Overpass provides a bicycle- and pedestrian-only north-south link one block west of Park Circle. It makes landfall at the southeast corner of East 8th Street and the Ocean Parkway east service road to the south and then, from south to north, crosses over the following:

- the Ocean Parkway east service road (eastbound traffic, one lane);
- Exit 5 of the Prospect Expressway (eastbound traffic, two lanes);
- the Fort Hamilton Parkway/Ocean Parkway flyover (westbound traffic, four lanes), and
- the severed segment of the Ocean Parkway west service road which provides access to the Prospect Expressway and Prospect Avenue (westbound traffic, one lane).

This cyclist eventually veered left onto the ramp to Ocean Parkway via the Prospect Expressway.

A cyclist rides contraflow from Fort Hamilton Parkway.

The overpass makes its northern landfall at the northwest corner of the Ocean Parkway west service road and Sherman Street, immediately west of a small unnamed park.

Although the overpass's purpose is partially to keep people from making the hazardous ground-level crossing of the eight lanes of traffic listed above, a significant minority of pedestrians and the majority of cyclists are crossing at street level anyway. See Table 2-H.

While 42 cyclists (41.2 percent) were counted on the overpass, 60 (58.8 percent) crossed at street level. The pedestrian ratio is somewhat more favorable to the overpass – 195 to 147 (57.0 percent to 43.0 percent), but a significant minority stayed on the ground. Excluding people whose origins or destinations are affected by the one-block difference, crossing at street level is simply faster and more direct. The overpass is positioned west of Park Circle, requires two hairpin turns (one at each onramp), and is not level. While the western edge of Park Circle largely lacks crosswalks, none of the above conditions apply to crossing at street level.

A breakdown of overpass vs. street-level cycling by direction, though, offers an important clue about cyclists' choices to use one path over the other, as is seen in Table 2-I. The ratio of northbound vs. southbound cyclists using the overpass (27 northbound, 15 southbound) is markedly different than those crossing at street level (22 northbound vs. 38 southbound). At its western edge, Park Circle traffic runs southbound. It is possible that some cyclists use the overpass instead of attempting to ride against the flow of traffic making along the circle perimeter. However, a larger sample size would be needed to corroborate this.

TABLE 2-H: USE OF SHERMAN OVERPASS VS. GROUND-LEVEL CROSSING, JULY 2008

Count period	*Cyclists using Sherman Overpass*	*Cyclists crossing at street level*	*Pedestrians using Sherman Overpass*	*Pedestrians crossing at street level*
AM Peak (7:30am-9:30am)	5 (33.3%)	10 (66.7%)	49 (62.0%)	30 (38.0%)
Midday (12:00pm-2:00pm)	10 (50.0%)	10 (50.0%)	48 (53.9%)	41 (46.1%)
PM Peak (5:00pm-7:00pm)	22 (64.7%)	12 (35.3%)	63 (67.0%)	31 (33.0%)
Sunday (9:15am-11:15am)	5 (15.2%)	28 (84.8%)	35 (43.8%)	45 (56.2%)

TABLE 2-I: CYCLIST USE OF SHERMAN OVERPASS VS. GROUND-LEVEL CROSSING BY DIRECTION, JULY 2008				
Count period	*NB cyclists using Sherman Overpass*	*SB cyclists using Sherman Overpass*	*NB Cyclists crossing at street level*	*SB Cyclists crossing at street level*
AM Peak (7:30am-9:30am)	4 (80.0%)	1 (20.0%)	6 (60.0%)	4 (40.0%)
Midday (12:00pm-2:00pm)	8 (80.0%)	2 (20.0%)	4 (40.0%)	6 (60.0%)
PM Peak (5:00pm-7:00pm)	11 (50.0%)	11 (50.0%)	5 (41.7%)	7 (58.3%)
Sunday (9:15am-11:15am)	4 (80.0%)	1 (20.0%)	7 (25.0%)	21 (75.0%)

Between two-thirds and four-fifths of cyclists traveled in the same direction as traffic on each of the one-way service roads, as Table 2-J shows. This consistency across both time and service road is particularly striking when considering how different the two service roads are. The east service road provides an unbroken connection to Ocean Parkway to the south. It has a Class 1 bike lane that in theory would invite bidirectional use. Yet at the parkway's northern end, this doesn't seem to be the case. The west service road is cut off by the Prospect Expressway; vehicular traffic turns onto the also-truncated south end of Prospect Avenue.

Cyclists and pedestrians wanting to continue along Ocean Parkway and avoid contraflow traffic could use the Sherman Overpass to get from the western to eastern service roads, but as Table 2-I shows, they are not doing so in great numbers. An origin-destination study of cyclists through the area was not done, but most of them appear to be continuing west along the flyover pedestrian walkway. Whether some of them were heading west into Sunset Park or down towards Ocean Parkway is unknown. Roughly identical amounts of cyclists were counted along each service road over the 8 hours of counts (164 eastbound, 152 westbound).

TABLE 2-J: CYCLIST TRAVEL ALONG OCEAN PARKWAY SERVICE ROADS BY DIRECTION, JULY 2008				
Count period	*Ocean Parkway east service road, with traffic*	*Ocean Parkway east service road, contraflow*	*Ocean Parkway west service road, with traffic*	*Ocean Parkway west service road, contraflow*
AM Peak (7:30am-9:30am)	45 (78.9%)	12 (21.1%)	23 (67.6%)	11 (32.4%)
Midday (12:00pm-2:00pm)	14 (70.0%)	6 (30.0%)	17 (68.0%)	8 (32.0%)
PM Peak (5:00pm-7:00pm)	24 (61.5%)	15 (38.5%)	33 (67.3%)	16 (32.7%)
Sunday (9:15am-11:15am)	42 (77.8%)	12 (22.2%)	35 (79.5%)	9 (20.5%)

Park Circle

Cyclists have seven different locations to enter or exit Park Circle, making it a complicated location to analyze. They are:

1. Coney Island Avenue
2. Ocean Parkway northbound/eastbound service road
3. Ocean Parkway westbound service road
4. Prospect Park Southwest
5. Prospect Park
6. Parkside Avenue
7. The "back passage" through the Parade Grounds, which passes west of the athletic fields and east of the police station house en route to Caton Avenue between East 10th Street and Stratford Road.

Vehicles may also use the Fort Hamilton Parkway/ Ocean Parkway flyover between the two service roads, and Exit 5 of the Prospect Expressway brings traffic into the circle.

Figures 2-S through 2-V provide an overview of the counts results by time of day. Figure 2-W is a composite of all four 2-hour count periods (7:30am-9:30am weekday, 12:00pm-2:00pm weekday, 5:00pm-7:00pm weekday and 9:15am-11:15am Sunday), along with the percentages of cyclists using each access point to and from Park Circle. Since 790 were counted entering the circle and 856 were counted leaving it, the data in Figure 2-W has been proportionally balanced to an estimate of 823 cyclists entering and leaving the circle., and should be regarded as accurate to within 4 percent.[17]

Prospect Park clearly acts as the circle's "engine," generating more than twice the bicycle activity as the roadway next most heavily used by cyclists, Prospect Park Southwest

With the exception of Parkside Avenue, the weekday counts also show a moderate but consistent peak directional shift. AM traffic flows tend to favor "inbound" (i.e. towards Downtown Brooklyn and Manhattan) movement, while PM traffic flows are more "outbound." See Table 2-K.

[17]Thirty-three additional cyclists were added to the total amount entering the circle in proportion percentage of the 790 cyclists counted which entered the circle from each roadway. The inverse was done for cyclists leaving the circle.

TABLE 2-K: PEAK-DIRECTIONAL WEEKDAY CYCLIST TRAFFIC THROUGH PARK CIRCLE, JULY 2008

Count period	*To Downtown Brooklyn*	*From Downtown Brooklyn*
AM Peak (7:30am-9:30am)	243 (55.9%)	192 (44.1%)
PM Peak (5:00pm-7:00pm)	234 (47.2%)	262 (52.8%)

In general, there appears to be a bias towards Downtown Brooklyn-bound traffic – midday flows were lighter than peak traffic but more heavily skewed inbound by 123 to 83 (59.7 percent to 40.3 percent.) Note the contraflow traffic on the Ocean Parkway westbound service road actually surpasses the amount of cyclists riding with the flow of traffic.

* Cyclist traffic for one 15-minute interval – from 8:00am to 8:15am – was not counted. An estimate for this period was determined by calculating the average movements for the other seven 15-minute intervals.

FIGURE 2-S: PARK CIRCLE AM BICYCLE TRAFFIC FLOWS, JULY 2008

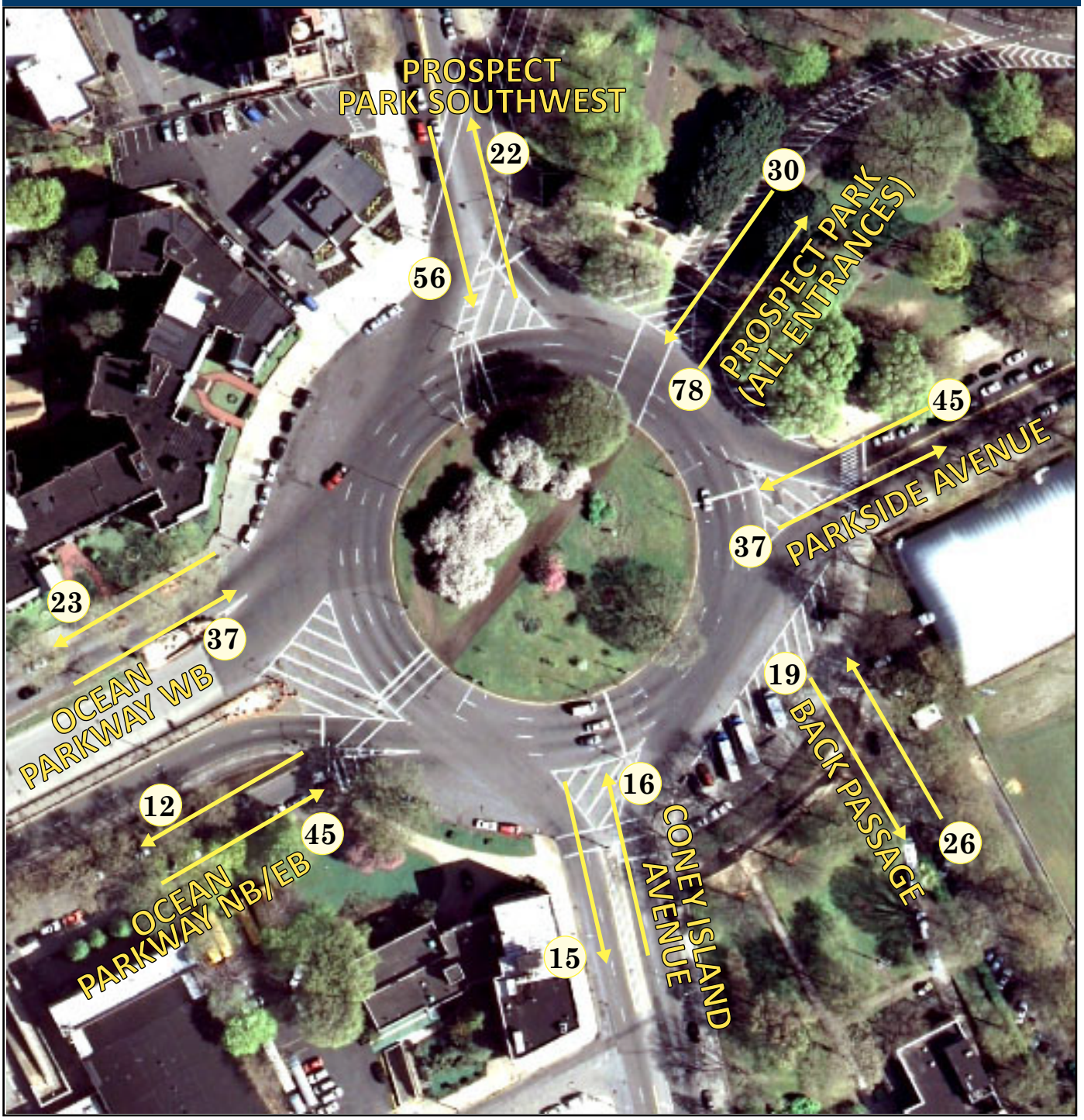


FIGURE 2-T: PARK CIRCLE MIDDAY BICYCLE TRAFFIC FLOWS, JULY 2008

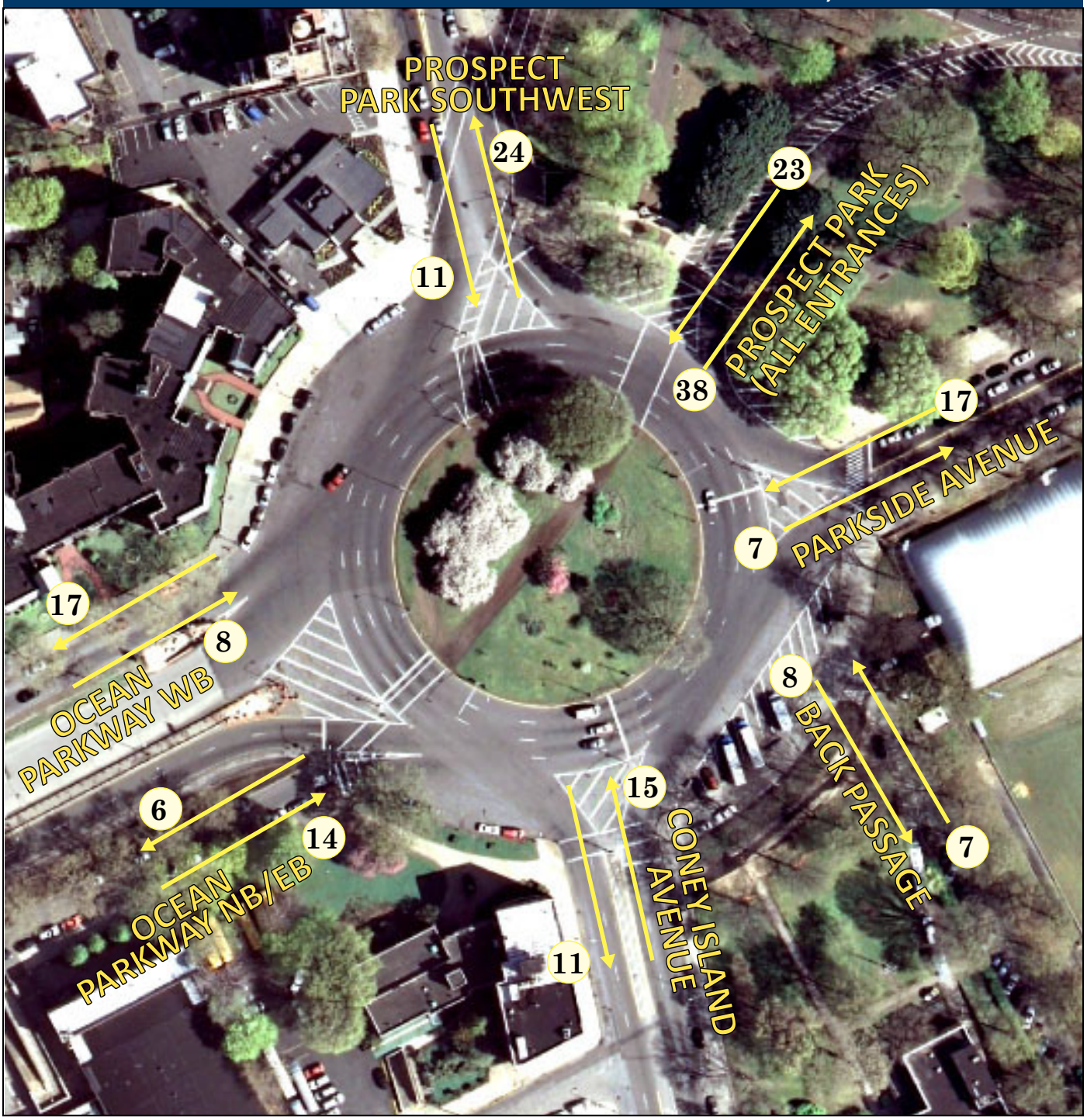


FIGURE 2-U: PARK CIRCLE PM BICYCLE TRAFFIC FLOWS, JULY 2008

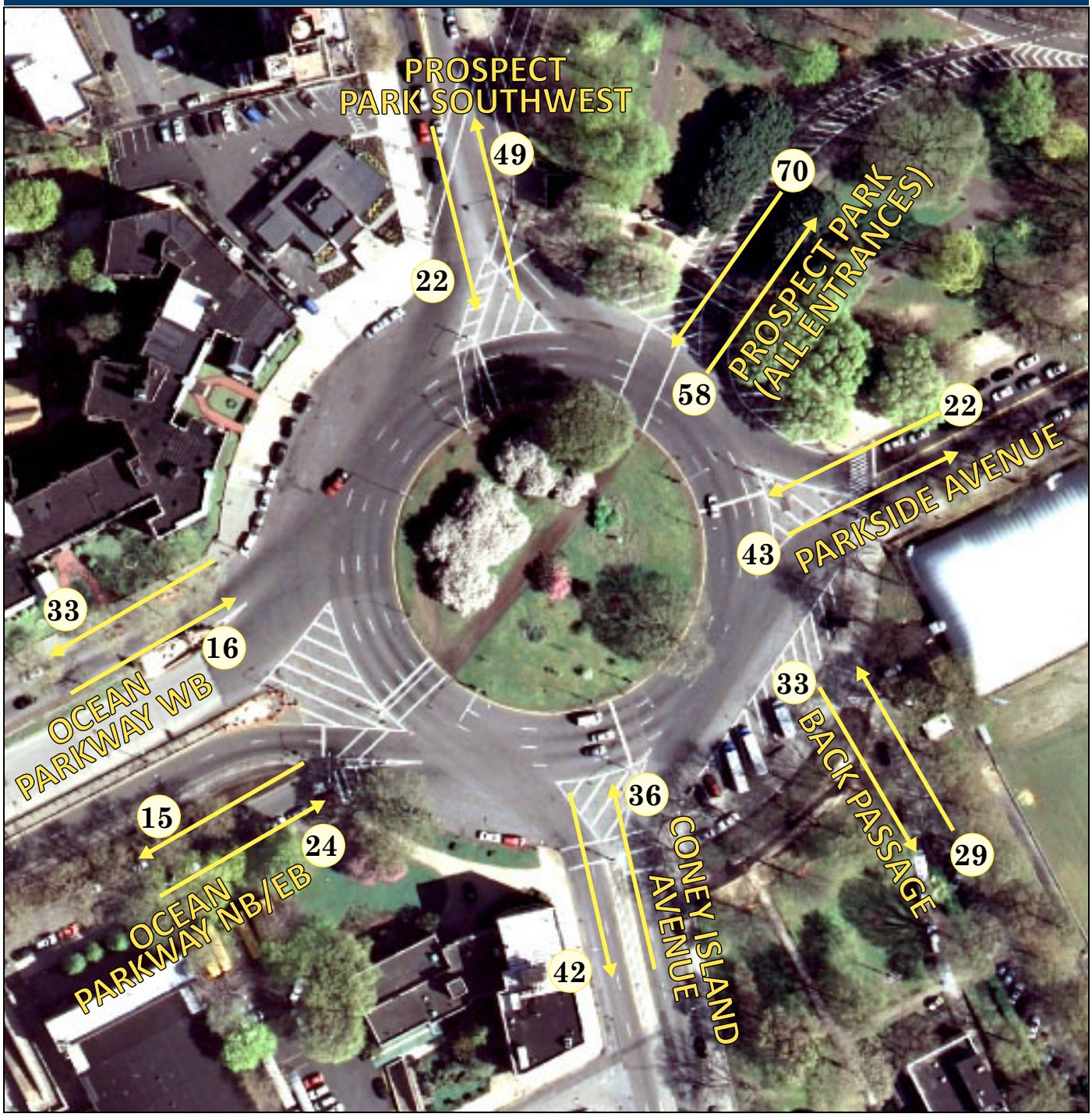


FIGURE 2-V: PARK CIRCLE SUNDAY AM BICYCLE TRAFFIC FLOWS, JULY 2008

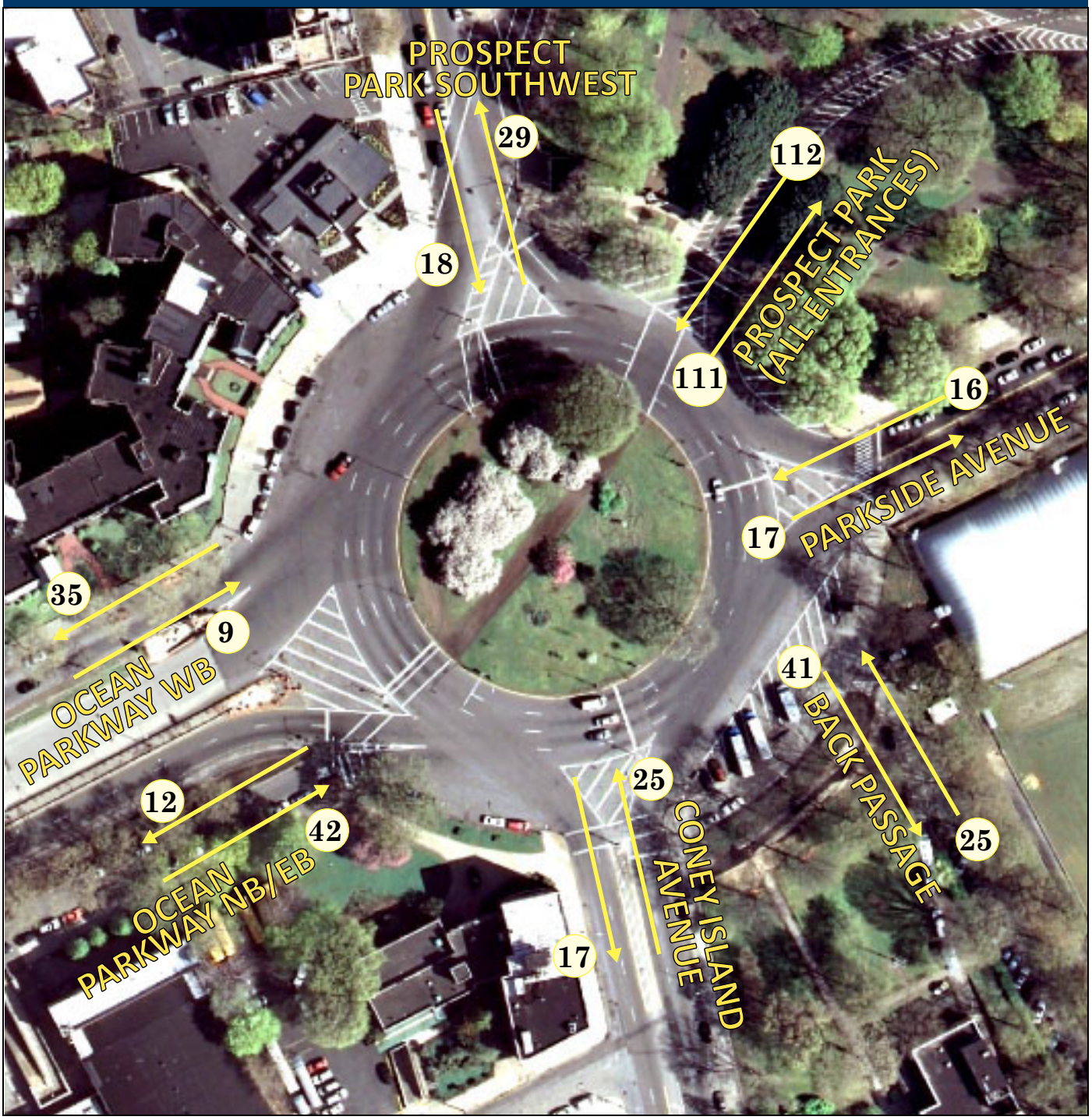
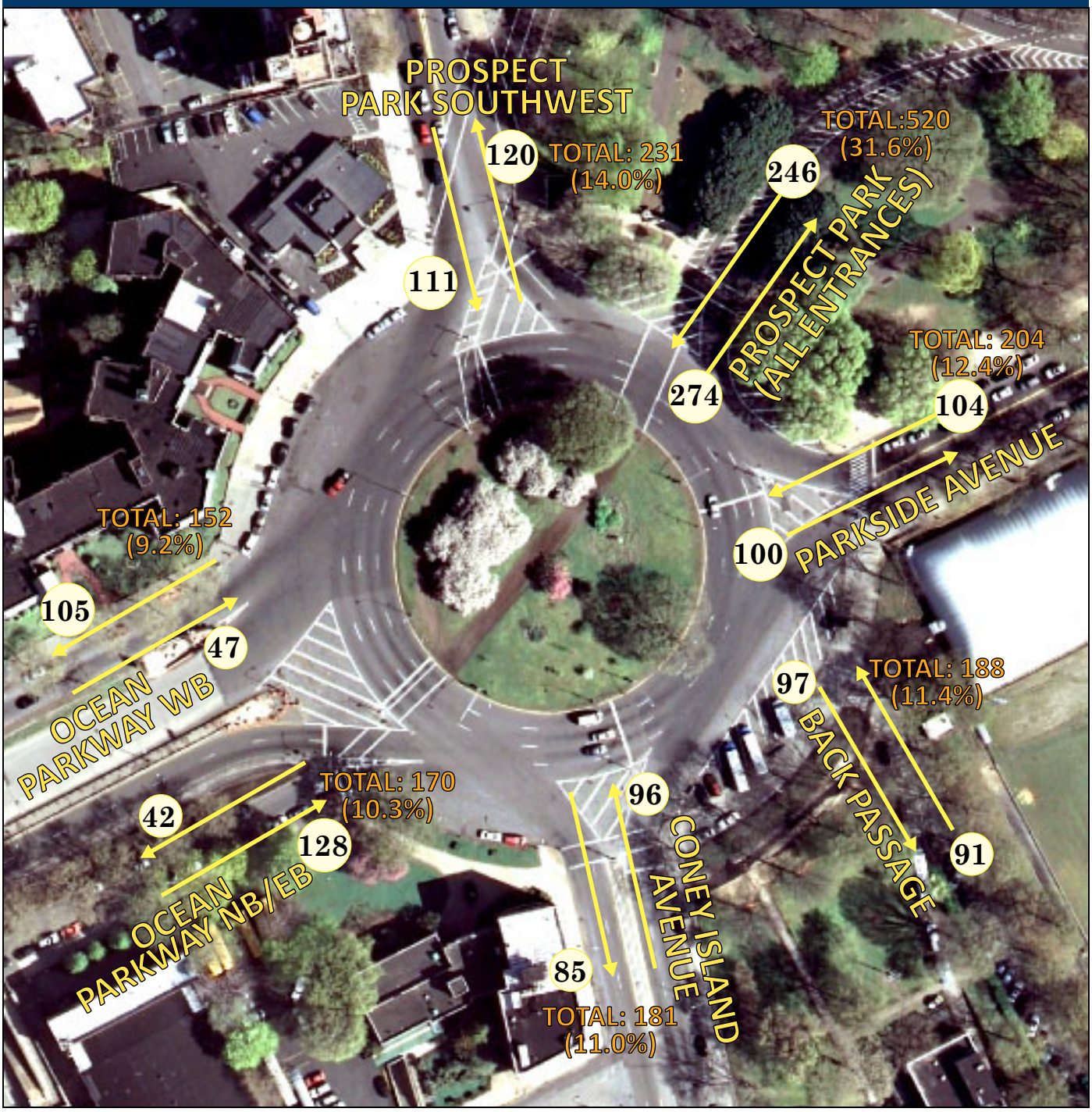


FIGURE 2-W: PARK CIRCLE TOTAL ADJUSTED 8 HOUR BICYCLE TRAFFIC FLOWS AND PERCENTAGES OF TOTAL MOVEMENTS, JULY 2008



The total traffic levels shown in Figure 2-W are notable for several reasons:

1) Prospect Park itself dominates cyclist traffic through the circle. It is the primary destination and origin – or is at least a conduit for cyclists who are heading to or from points beyond the park boundaries.

2) Aside from Prospect Park, bicycle traffic to and from the other roadways was fairly evenly distributed, although it consistently increased counterclockwise from the Ocean Parkway westbound service road.

3) When balanced across all 8 hours of counts, bicycle traffic in each direction was fairly evenly distributed by roadway. If the two Ocean Parkway service roads are regarded as a matching pair, 175 cyclists were counted heading eastbound and 147 westbound. Such volumes could be considered light. Forty-five cyclists were counted during Ocean Parkway's peak 2-hour bicycle flow (eastbound in the AM peak on the parkway's east service road), or an average of one cyclist every 2 minutes and 40 seconds.

4) Although the Ocean Parkway westbound service road had the smallest share of cyclists, bicycle volumes were nearly equal to the northbound/eastbound service road, which ostensibly is supposed to be the one with the greenway.

5) The back passage through the Parade Grounds carried more bicycle traffic than Coney Island Avenue. This passage, which is slanted at northwest-to-southeast angle, may be regarded as a more attractive option for cyclists from easterly Caton Avenue and Victorian Flatbush than Coney Island Avenue, despite the avenue's relatively low traffic volumes north of Church Avenue.

6) Prospect Park Southwest was the roadway with the most bicycle traffic. This may be due to it providing an easily navigable route for commuters headed to Park Slope and ultimately Downtown Brooklyn or Lower Manhattan, or for cyclists wishing to reach more northerly areas in Prospect Park. This roadway is flanked to the east by a wide, mostly uninterrupted sidewalk that runs almost continuously to Bartel-Pritchard Square.

Based upon the above data, bicycle access to and from the park should be a primary consideration when developing design recommendations for Park Circle that would be conducive to cyclists.

2008 NYCDOT Traffic Counts

In May of 2008, the New York City Department of Transportation (NYCDOT) conducted automatic traffic recording device (ATR) counts throughout the northern half of the study area.

AM and PM peak-hour traffic flows are shown in Figures 2-X and 2-Y. Note that this is not a snapshot of a specific hour. All data is averaged from two dates: Wednesday, May 14 and Thursday, May 15, 2008. Furthermore, the peak hour traffic volumes were averaged for both of these days, regardless of whether the peak fell at the same time on both days. In general, peak flows occurred between 8:00am and 9:00am and between 5:00pm and 6:00pm, but considerable fluctuation occurred during these two days. All volumes are averages and rounded to the nearest whole number.

One set of traffic volumes shows a large discrepancy between two intersections: the ATRs on Coney Island between Park Circle and Caton Avenue. It is exceedingly unlikely that Kermit Place, Caton Place and traffic from the police station on the east side of Coney Island Avenue is causing such an imbalance. Until this discrepancy can be explained, it should be assumed that the larger volumes are correct. Utility work at the northern edge of Coney Island Avenue was taking place at least as early as the summer of 2008; if it started in mid-May or earlier, it is possible that some traffic was diverted away from where the ATRs could record it.

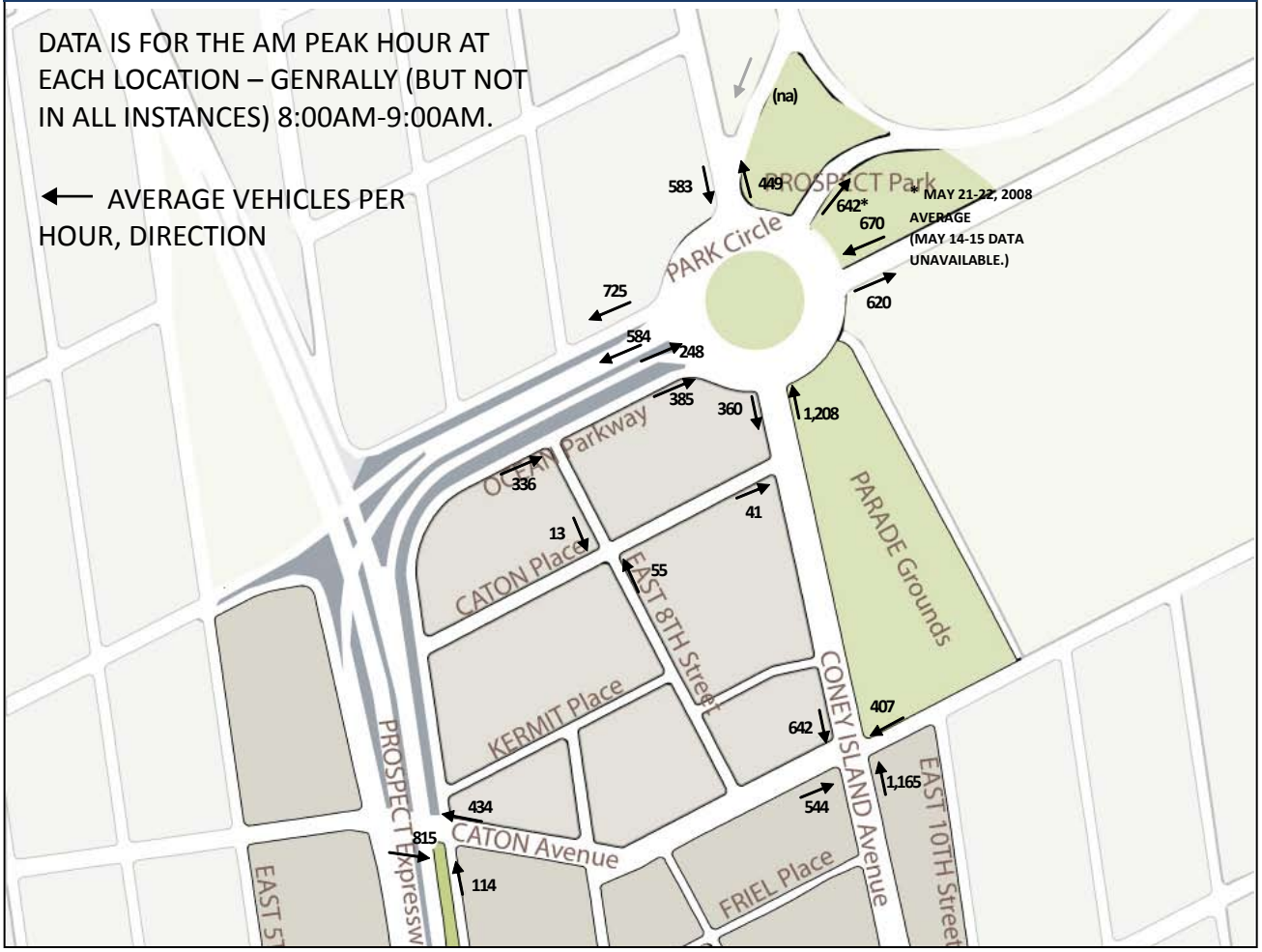
Notwithstanding this discrepancy, a brief analysis follows of the volumes counted by three major concentrations of ATRs.

Caton Avenue/Ocean Parkway east service road
A pronounced imbalance between westbound and eastbound traffic existed throughout the day on Caton Avenue. Eastbound traffic was greater than westbound by a more than two-to-one margin. This may be due in part to the presence of the one-way westbound flyover to Fort Hamilton Parkway and Ocean Parkway to the north. Some of the eastbound Caton Avenue traffic was clearly turning north onto the Ocean Parkway east service road. In the PM peak 949 vehicles traveled eastbound on Caton Avenue at Ocean Parkway, but only 650 were counted to the east at Coney Island Avenue. Meanwhile, northbound traffic on the service road was 91 south of Caton Avenue but 272 at East 8th Street to the north.

Caton Avenue/Coney Island Avenue
Greater daylong eastbound Caton Avenue volumes continued to exist here, but by a considerably smaller margin than at Ocean Parkway. In the AM peak the eastbound-to-westbound Caton Avenue traffic ratio was 815 to 434 at Ocean Parkway, but 544 to 407 at Coney Island Avenue. Coney Island Avenue traffic showed a pronounced and expected emphasis towards northbound travel in the AM peak and southbound in the PM, though the discrepancy between the two directions was wider in the PM.

Park Circle
Traffic on both the Ocean Parkway northbound/eastbound service road and Exit 5 of the Prospect Expressway was relatively light. The Exit 5 ramp had conspicuously low volumes. At its peak – on a day not used in Figures 2-X and 2-Y due to it falling on the week prior to Memorial Day – 344 vehicles used the exit in one hour, or less than one vehicle per 10 seconds. Volumes during most of the day were closer to half that amount. The flyover and Ocean Parkway westbound service road both recorded higher volumes, though as noted in Issue

FIGURE 2-X: AVERAGE AM PEAK HOUR TRAFFIC FLOWS, MAY 14-15, 2008 (NYCDOT)

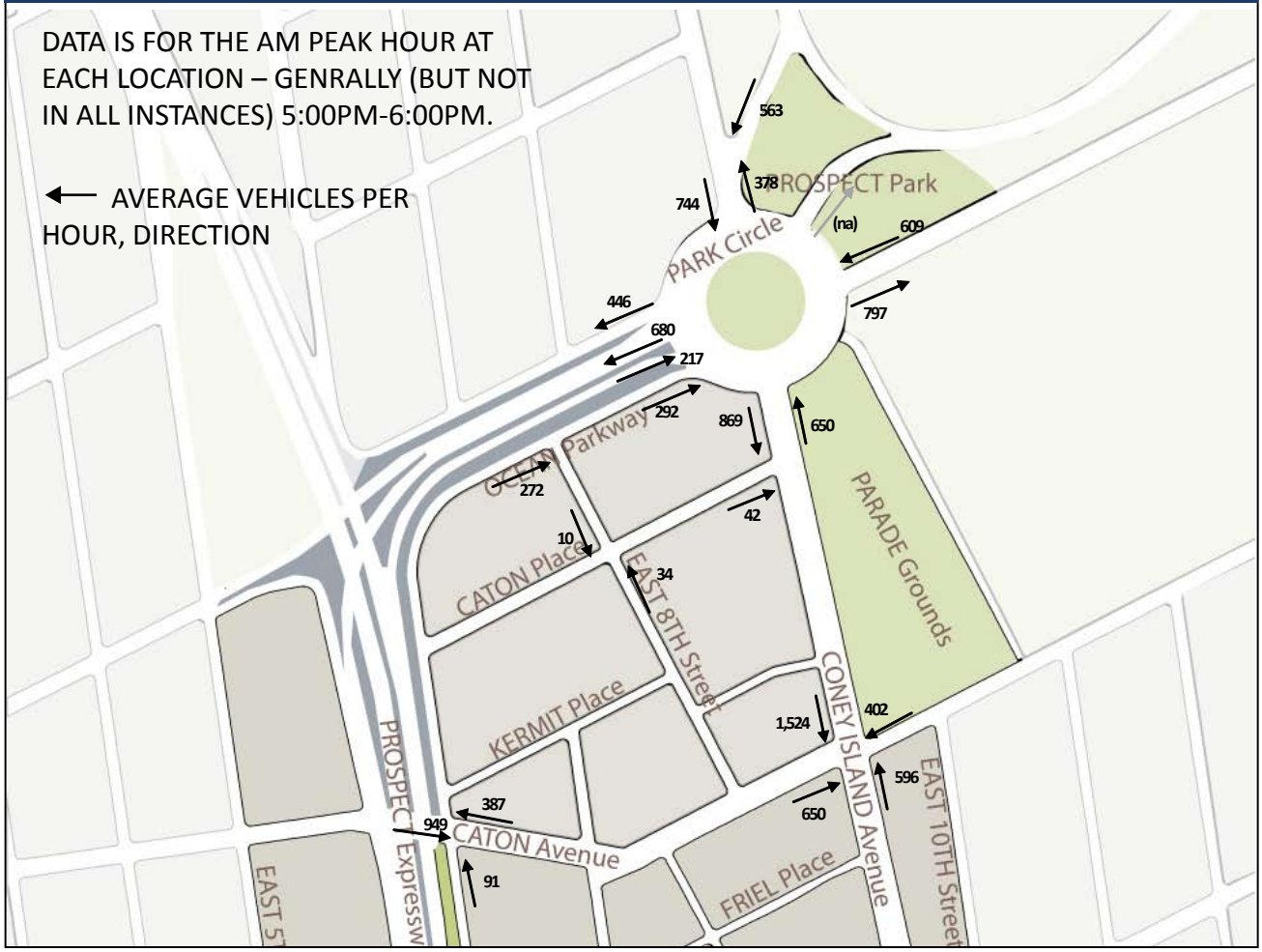


7 of Chapter 2, these volumes do not fully use the four lanes on the flyover while the more heavily used westbound service road makes do with one lane. Much of the westbound service road traffic is headed towards an onramp to the Prospect Expressway to the north.
Though a noticeable slant towards northbound traffic occurs in the AM peak and southbound traffic in the PM peak, southbound traffic volumes on Prospect Park Southwest are consistently greater than northbound ones. This may be due to easy access to the northbound Prospect Expressway.

The entrance and exit to and from Prospect Park Drive is only open in the peak direction. Six hundred forty-two vehicles entered the drive in the AM peak while 563 exited in the PM. The exit has three striped motor vehicle lanes, but as discussed in Section 2.0 a bidirectional bike lane immediately parallels these traffic lanes. With a modest increase in green signal time for exiting traffic.existing volumes may not require three lanes of roadbed.

Compared to other roads counted in the study area, volumes on Parkside Avenue are relatively equal throughout the day in both directions, though total 24-hour volumes slightly favor eastbound traffic.

FIGURE 2-Y: AVERAGE PM PEAK TRAFFIC FLOWS, MAY 14-15, 2008 (NYCDOT)



2.4 ACCIDENT DATA

Accident data, provided by the New York State Department of Motor Vehicles, (NYSDMV) provides one measurement of how safe specific roads are.

Since 2002, the NYSDMV has only provided data for "reportable accidents." These are accidents which result in at least one of the following three conditions: 1) a death, 2) an injury, or 3) property damage valued at more than $1,000 which affects at least one person.[18] Accidents which do not meet these thresholds are not included in the data contained in this section.

Accidents on the Prospect Expressway itself are not included in the following data.

One exception was made to allow accident data technically outside the study area to be included. Accidents at the intersection of Coney Island Avenue and Church Avenue include data from Coney Island Avenue between Church Avenue and Albemarle Road because Albemarle Road's western endpoint is approximately 65 feet south of Church Avenue. The three roads can safely be considered part of the same intersection.

Figure 2-Z shows all total reportable accidents within the study area for the 3 years from January 1, 2005 to December 31, 2007, and Figure 2-AA is a similar graphic showing only accidents involving pedestrians and bicycles. A total of 235 reportable accidents resulted in 248 injuries within the study area during the three year period – an average of three accidents every 2 weeks.

Almost a third of these accidents and injuries occurred at the intersection of Church Avenue, the Prospect Expressway and Ocean Parkway. For such a hectic intersection, the amount of cyclists involved in reportable accidents is fairly low, at two. However, 10 pedestrians were involved in these incidents over the same period – four more than at the next most frequent location.

One block to the south is the intersection of Beverly Road and Ocean Parkway, which is effectively in a three-way tie with Park Circle and Coney Island Avenue/Caton Avenue as the second most accident-prone location in the study area. This intersection is more typical of those along the length of Ocean Parkway, with the bikeway on the west mall and pedestrian walk on the east mall.

While specific point-by point accident data is not available for Ocean Parkway and Church Avenue or Beverly Road, at Park Circle we are able to get a more fine-grained picture of just where the accidents are happening, as seen in Figure 2-AB.[19]

[18]State of New York Department of Motor Vehicles, Police Accident Report Manual, with Truck and Bus Supplement, p.2. http://www.nydmv.state.ny.us/forms/p33Part01.pdf

[19]Specific location data also was not available for Ocean Parkway and Caton Avenue, making it difficult to determine how many of these accidents occurred closer to the western or eastern service road.

FIGURE 2-Z: TOTAL REPORTABLE ACCIDENTS/INJURIES, 2005-2007

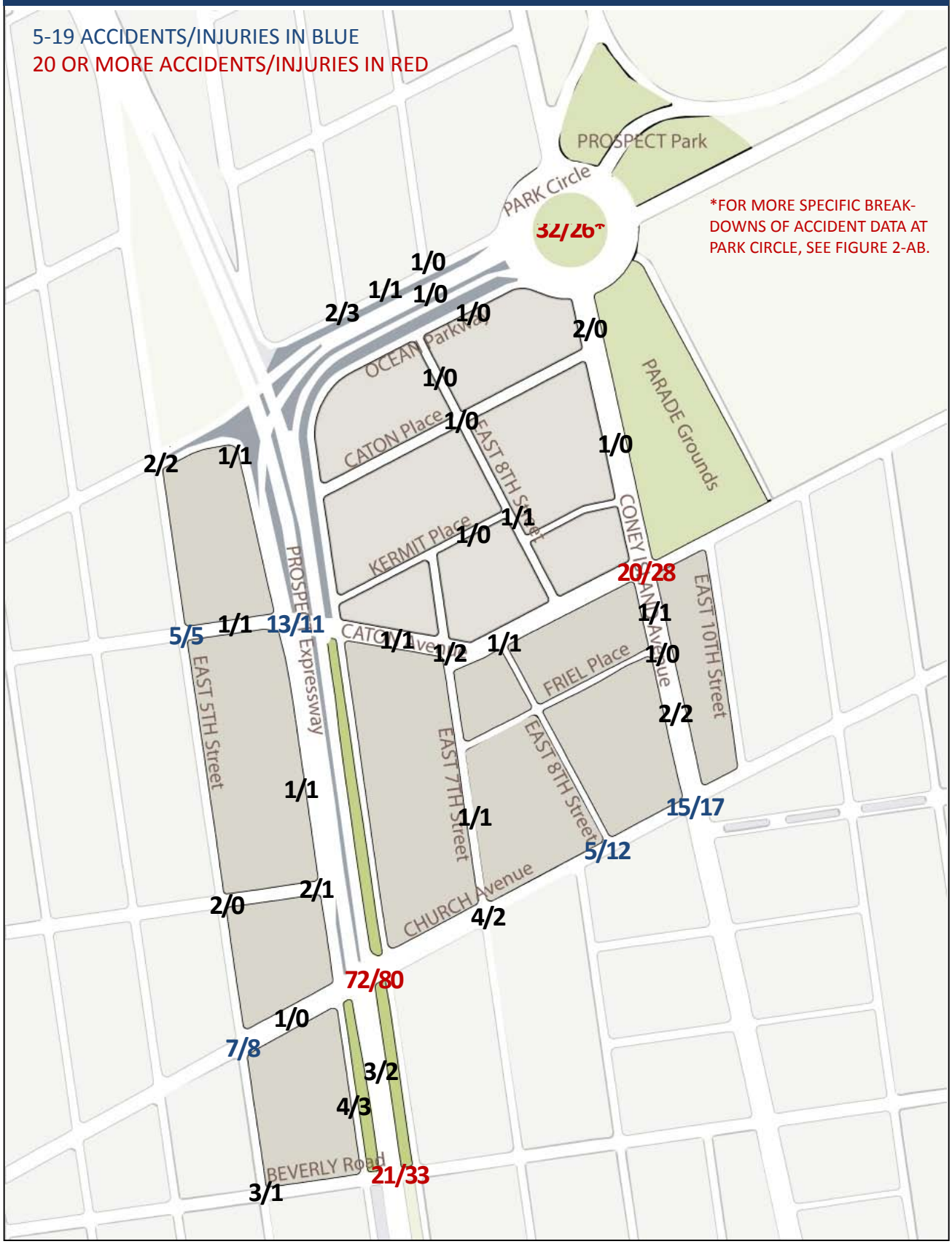


FIGURE 2-AA: TOTAL REPORTABLE PEDESTRIAN/BICYCLE ACCIDENTS, 2005-2007

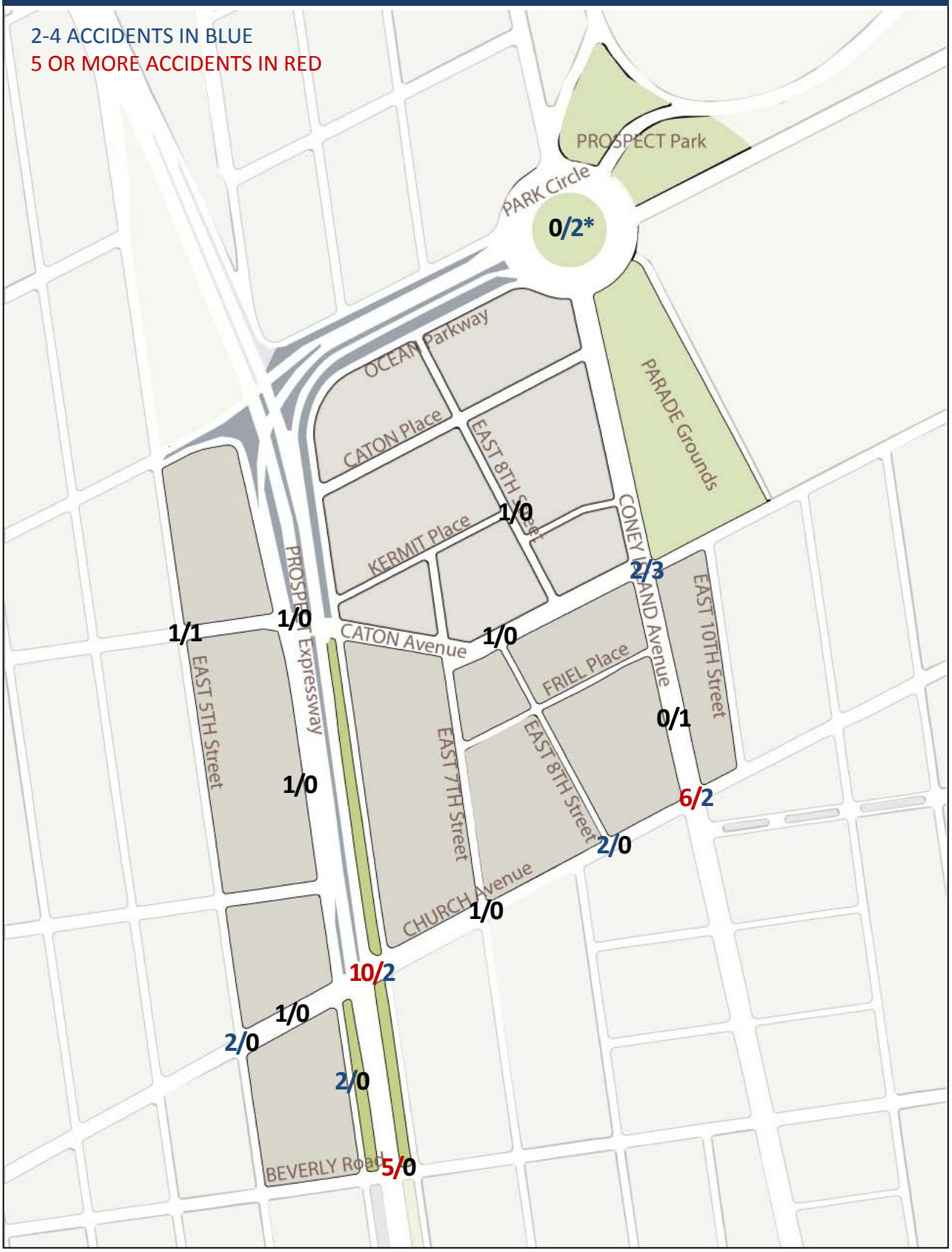
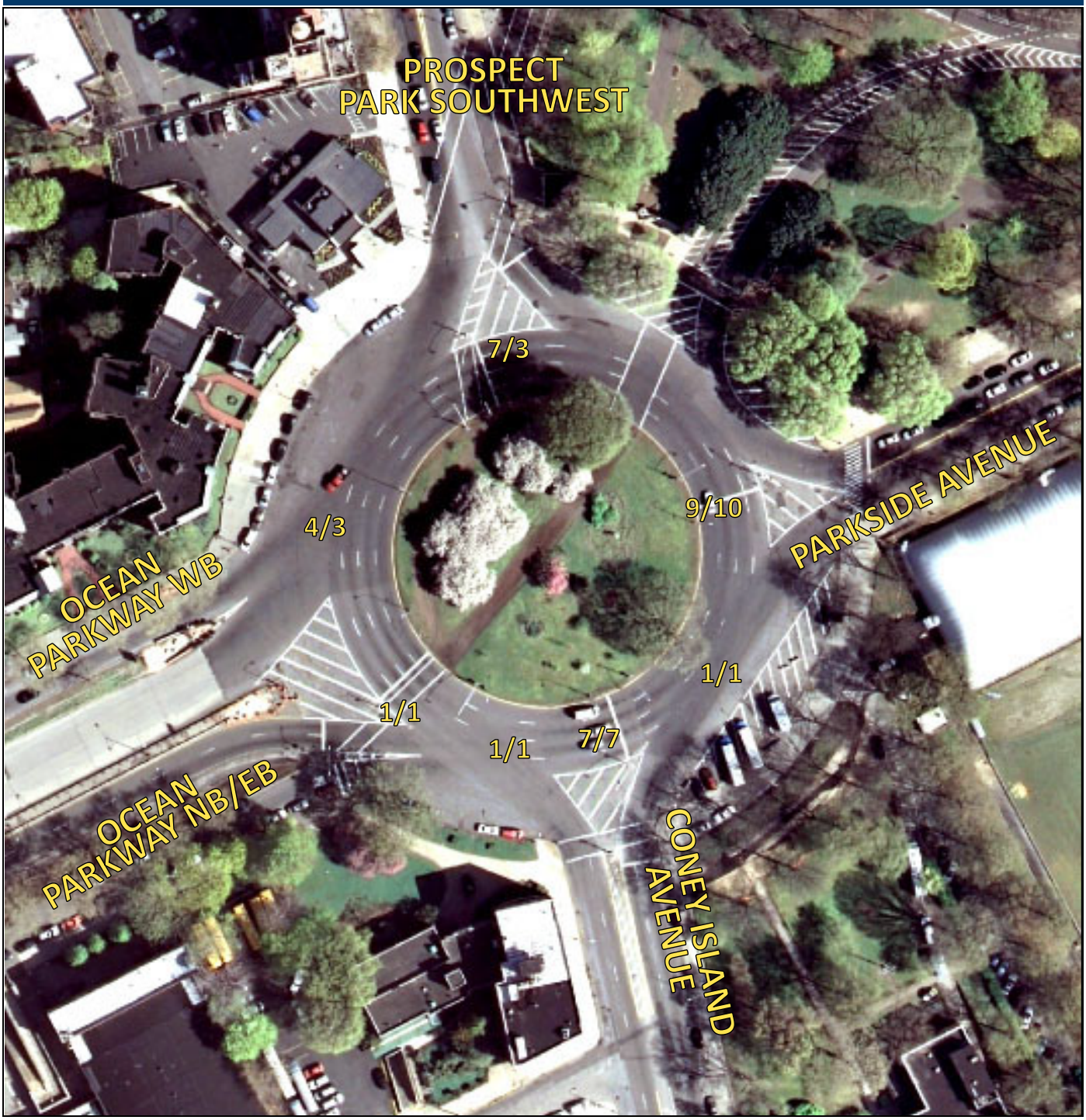


FIGURE 2-AB: DISTRIBUTION OF REPORTABLE ACCIDENTS THROUGHOUT PARK CIRCLE, 2005-2007 (ACCIDENTS/INJURIES)



During this period, one cyclist was involved in a reportable accident at Prospect Park Southwest, and another had a reportable accident between Coney Island Avenue and Parkside Avenue.

More reportable accidents took place at Parkside Avenue than at any of the other locations throughout the circle, although both Coney Island Avenue and Prospect Park Southwest also had several. Of note is that more accidents took place at the westbound service road than the northbound/eastbound one.

2.5 LEVEL OF SERVICE (LOS) ANALYSIS

As part of this study, DCP conducted LOS analyses for three intersections

- Ocean Parkway and Beverly Road
- Ocean Parkway and Church Avenue/Prospect Expressway
- East 5th and the western endpoint of the Fort Hamilton Parkway flyover ramp

The operation of signalized intersections within the study area was analyzed applying the methodologies presented in the 2000 *Highway Capacity Manual* (HCM2000). These procedures evaluate signalized intersections for average delay per vehicle and LOS.

The capacity analysis methodology separates an intersection approach into lane groups on the basis of the movements occurring during each signal phase. The lane groups are then analyzed to determine the specific vehicular capacity and LOS. This analysis requires the following input parameters: intersection geometry, lane utilization, number of travel lanes, width of travel lanes, on-street parking conditions, locations of bus stops, number of buses stopping per hour, vehicle turning movements, vehicle classification, conflicting pedestrian movements, traffic signal cycle length, and allocation of green time.

The operating characteristics of signalized intersections can be estimated and evaluated by analyzing capacity and performance. The capacity of an intersection represents the throughput of a facility (i.e., the maximum number of vehicles that can be served in one hour). Capacity analysis results in the volume-to-capacity ratio (v/c ratio), which presents the proportion of capacity (supply) utilized by the existing traffic volume (demand). High v/c ratios (>0.85) indicate some traffic congestion, and low v/c ratios (<0.60) indicate smooth traffic flow.

The performance of an intersection is based on the estimated average delay time (i.e., the average stopped time per vehicle) for each vehicle utilizing a roadway segment. Delay time is determined by the capacity of a lane group, the amount of green time allotted to a lane group, and the signal cycle length. Delay time is the factor which determines the LOS for a lane group.

Short delays receive a good LOS while long delays receive a poor LOS. For example, an average delay of up to 10 seconds per vehicle corresponds to LOS A, while an average delay of 45 seconds corresponds to LOS D. Table 2-L describes the LOS definitions for signalized intersections.

TABLE 2-L: LEVEL OF SERVICE DEFINITIONS FOR SIGNALIZED INTERSECTIONS	
flow quality	*description*
A	Describes operation with very low delay, i.e., less than or equal to 10 seconds per vehicle. This occurs when progression is extremely favorable and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.
B	Describes operation with delay in the range of >10-20 seconds per vehicle. This generally occurs with good progression and/or short cycle lengths. More vehicles stop than for LOS A, causing higher levels of average delay.
C	Describes operation with delay in the range of >20-35 seconds per vehicle. These higher delays may result from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant at this level, although some may still pass through the intersection without stopping.
D	Describes operation with delay in the range of >35-55 seconds per vehicle. At level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, longer cycle lengths, or high v/c ratios. Many vehicles stop and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.
E	Describes operation with delay in the range of >55-80 seconds per vehicle. This is considered to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are frequent occurrences.
F	Describes operation with delay in excess of 80.0 seconds per vehicle. This is considered to be unacceptable to most drivers. This condition often occurs with saturation, i.e., when arrival flow rates exceed the capacity of the intersection. It may also occur at high v/c ratios below 1.00 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.
Source: *Highway Capacity Manual,* Transportation Research Board, National Research Council, Washington, DC, 2000	

Both Ocean Parkway intersections were analyzed "as is" – no alterations to any of the roadways at these intersections were analyzed. However, since two of the long-term recommendations in Section 3.3 propose removing a travel lane from the flyover, the potential exists for removing or converting one of the two travel lanes which currently feed into Fort Hamilton Parkway. In this instance, an LOS analysis was done of East 5th Street/Fort Hamilton Parkway both as is and how it would function with only one lane bringing traffic to the parkway from Park Circle.

Table 2-M summarizes the LOS analysis for the East 5th Street/Fort Hamilton Parkway intersection under existing conditions and with the proposed lane reduction.

Data for the Ocean Parkway and Beverly Road/ Church Avenue intersections are available upon request.

TABLE 2-M: EXISTING VS. PROPOSED LEVEL OF SERVICE COMPARISON: EAST 5TH STREET/FORT HAMILTON PARKWAY FLYOVER			
Intersection	*Volumes*	*v/c ratio and delay time*	*LOS*
E. 5th Street/ Fort Hamilton Parkway/ flyover as is (with 2 lanes)	AM PEAK HOUR: E.5: 195 thru 80 right FHP: 10 left 350 thru	 E.5: 0.44 14.0 second delay FHP: 0.25 11.3 second delay	 E.5: B B FHP: B B
	MD PEAK HOUR: E.5: 165 thru 150 right FHP: 10 left 200 thru	 E.5: 0.53 15.4 second delay FHP: 0.16 10.7 second delay	 E.5: B B FHP: B B
	PM PEAK HOUR: E.5: 515 thru 235 right FHP: 15 left 330 thru:	 E.5: 0.56 14.3 second delay FHP: 0.27 11.5 second delay	 E.5: B B FHP: B B
E. 5th Street/ Fort Hamilton Parkway/ flyover (with 1 lane)	AM PEAK HOUR: E.5: 195 thru 80 right FHP: 10 left 350 thru	 E.5: 0.44 14.0 second delay FHP: 0.48 14.4 second delay	 E.5: B B FHP: B B
	MD PEAK HOUR: E.5: 165 thru 150 right FHP: 10 left 200 thru	 E.5: 0.53 15.4 second delay FHP: 0.31 12.3 second delay	 E.5: B B FHP: B B
	PM PEAK HOUR: E.5: 515 thru 235 right FHP: 15 left 330 thru	 E.5: 0.56 14.3 second delay FHP: 0.51 14.9 second delay	 E.5: B B FHP: B B