New York City Department of Transportation

Willoughby Street Pedestrian Priority

Existing Conditions Report

Final Issue | January 5, 2015

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

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1 Introduction

1.1 Project Background

Over the past 20 years Downtown Brooklyn in New York City has become an increasingly successful and vibrant area that supports a broad mix of uses and attracts world-class businesses and institutions. Stimulated in part by the Downtown Brooklyn Rezoning of 2004 and leveraging unparalleled transit access, the area has undergone a transformation, with $9 billion of private investment and $300 million in public improvements underway. Several parcels have been redeveloped with education, office, and residential uses, while retail uses, always a popular attraction in Downtown Brooklyn, are beginning to command premium rents.

As redevelopment has intensified the uses on parcels throughout the area, and ridership at local subway stations has increased, pedestrian activity continues to grow. Future redevelopment will likely continue this trend. In support of this enhanced vibrancy at the street level, the City continues its efforts to make Downtown Brooklyn a comfortable place for pedestrians, as both an economic driver and means to efficient transportation.

The Willoughby Street Pedestrian Priority Streetscape project, Task Order #12 under the Engineering Services Agreement (ESA) contract between Arup and the New York City Department of Transportation (NYCDOT), focuses on creating new conceptual street designs for three key blocks in the heart of Downtown Brooklyn. These blocks include Willoughby Street between Pearl and Jay Streets, and Pearl Street between Fulton Street and the Brooklyn Renaissance Plaza pedestrian walkway. A primary aim of the project is to create a design that better reflects the site's existing pedestrian activity and anticipates future demand through a more pedestrian-friendly environment. Given these characteristics, a particular focus of the project will be exploring designs that prioritize pedestrians while allowing multiple modes to share roadway space—a concept often referred to as "Pedestrian Priority" streets or spaces.

This project will build on recent improvements to the adjacent Willoughby Plaza, which was transformed from a standard city block and service road to a vibrant pedestrian plaza in 2006.[1] In 2008, NYDOT's Brooklyn Borough Commissioner's Office and Capital Program Management division developed high-level planning concepts for the remainder of Willoughby Street, from the Willoughby Plaza to Fort Greene Park. The block of Willoughby Street west of Jay Street, which includes the project site, was identified to be a high priority for pedestrian-focused improvements due to the state of existing infrastructure, lack of walkability, and relatively poor economic performance.

This Existing Conditions Report, the first deliverable of the Willoughby Street Pedestrian Priority Streetscape project, documents existing conditions related to

[1] Initially using temporary materials, the plaza was reconstructed as a permanent plaza in 2012.

mobility within the site, including transit, pedestrians, vehicles, and cycling, as well as conditions associated with general character and the environment. These conditions include the quality of pedestrian gathering areas, landscape, hardscape, availability of sunlight, noise, views, and safety. Key issues and opportunities related each of these conditions are identified. Finally, a review of five pedestrian priority and shared streets precedents from other cities in the United States are included. These precedents help provide a basis for understanding how different types of design treatments can support pedestrian activity within public areas.

1.2 Goals and Objectives

Following initial meetings with project stakeholders, including adjacent property owners, business owners, Community Board 2, and other City agencies, six key project goals and objectives were identified to help inform and guide the street design process. These goals and objectives include:

1. **Create a safe, comfortable, and convenient walking environment for all users.** Improvements to the pedestrian environment should accommodate users of all ages and abilities.
2. **Support and enhance economic and retail vitality.** Investment in streetscape improvements helps to attracts businesses to an area, increases property values, and supports local revitalization efforts. Pedestrian-priority treatments can be particularly beneficial to retail businesses, as making streets comfortable places to linger can increase retail sales.
3. **Improve street aesthetics and visual quality.** The character and design of the streetscape are determining factors of the success of the corridor. In order to foster an environment for people to visit and gather, aesthetics and visual quality of the street should be enhanced.
4. **Accommodate all legitimate mobility and access needs, including goods deliveries and passenger drop offs, but place a priority on pedestrian needs.** Goods deliveries and passenger drop-offs are essential for adjacent restaurant, retail, office and educational uses to function; however loading demands need not be a defining characteristic of the street design. Instead, pedestrian movement will be prioritized while allowing for necessary drop offs and loading.
5. **Design for sustainability, maintainability, and resiliency.** Design strategies should be created to help the corridor grow stronger and more vibrant while facing economic, environmental and social challenges. Infrastructure that manages storm water will help to create an area that is for resilient from flooding and other severe weather events. The consideration of the design's maintenance features should be considered early in the design process to reduce maintenance cost and improve safety.
6. **Integrate project area into existing streetscape and facilitate connections with surrounding activity centers, such as Willoughby Plaza, Fulton Street Mall, MetroTech, and Columbus Park.** The project site is within one of Downtown Brooklyn's key crossroads and has the opportunity to better link neighboring activity centers in a manner that is more efficient, comfortable, and enjoyable.

1.3 Project Site and Adjacent Uses

Located in the heart of Downtown Brooklyn, the project site, shown in Figure 2, includes Pearl Street between Fulton Street and the Brooklyn Renaissance Plaza pedestrian walkway, and Willoughby Street between Pearl and Jay Streets.

Directly to the north of the project site is a parcel occupied by the Brooklyn Renaissance Plaza, a hotel and office complex which is managed by Muss Development. The New York Marriott at the Brooklyn Bridge is a major tenant. At the southern boundary of the project site a pedestrian walkway provides an important east-west connection between Adams and Jay Streets is adjacent to the study area. Spanning the plaza, a pedestrian bridge connects the Marriott to the Hotel Addition Tower located at the Pearl Street terminus.

The west side of Pearl Street north of Willoughby Street is defined by the 13-story, 345 Adams Street building. The building has a lobby with dual access from Adams Street and Pearl Street. The building is occupied by New York City municipal tenants, including the Department of Finance, Administration for Children's Services, and the Board of Elections. There are a number of restaurants on the first two floors of the 345 Adams Street building with frontage on Adams Street and/or Willoughby Plaza and limited back of house services along Pearl Street. These include Hill Country Barbeque Market, Panera Bread, Pot Belly's sandwiches, Orange Leaf frozen yogurt, and Rocco's Tacos.

The east side of Pearl Street north of Willoughby Street is defined by Brooklyn Friends School, ASA Institute, and the rear of an 14-story building that fronts at 370 Jay Street. Brooklyn Friends School occupies a historic building that was originally constructed for the Brooklyn Law School, which currently serves roughly 600 elementary and middle school students. The ASA Institute is a college that offers associate degrees and professional certificates. Both buildings front onto Pearl Street, which acts as the primary access for students, parents and staff.

370 Jay Street was formerly occupied by MTA-New York City Transit and is under refurbishment to be re-occupied by NYU's new Center for Urban Studies and Progress (CUSP). NYU's building sits atop the Jay Street - MetroTech subway station, and much of the building's first floor is comprised of an atrium that provides access to the subway below. To the building's rear, Pearl Street provides access for the buiding's loading dock and basement parking. Construction is planned to begin in late 2014 or early 2015, and when completed will be occupied with retail, classroom, and business incubators by 2017.

Along Willoughby Street are various small business, restaurants and food chains including, Blimpie, Buffalo Boss, Conway Stores, and the Community Financial Service Center. The section of Willoughby Street between Pearl Street and Jay Street also functions as the de-facto back-of-house for Fulton Mall. Toward the west, Willoughby Street transitions into the pedestrianized Willoughby Plaza, which is lined by Shake Shack and Hill Country Barbeque Market. Pearl Street between Fulton Street and Willoughby Street has no active retail entrances.

Figure 1: Willoughby Plaza, directly adjacent to the project site

Figure 2: Map of project area within Downtown Brooklyn

Site History

In the first half of the twentieth century, this section of Downtown Brooklyn was a neighborhood of mixed-use, low-rise buildings surrounded by elevated rail, shown in Figure 3. Willoughby Street ran uninterrupted from the East River waterfront in the west to Fort Greene Park in the east; while Pearl Street ran from Fulton Street to the East River waterfront to the north. The Fulton Street Elevated ran adjacent to the site above today's Fulton Mall, and the Myrtle Avenue Elevated existed at the northern edge of our study area where the Renaissance Plaza pedestrian walkway is today. Both provided direct transit access to Manhattan via the Brooklyn Bridge.

To accommodate a shift towards vehicular mobility in the 1950s, the Brooklyn-Queens Expressway, Cadman Plaza and Adams Streets were constructed. With the construction of Adams Street south from the Brooklyn Bridge, Willoughby Street was severed from the west. Meanwhile, the construction of superblocks of court and city buildings to the north after 1950 turned Pearl Street into the two block dead-end it is today.

When Downtown Brooklyn was rezoned by the City in 2004, the rezoning action enabled the de-mapping of Pearl Street between Fulton and Willoughby Streets within the project site, as well as Red Hook Lane to the south of the project site. The de-mapping, however, is incomplete, and further action would have to be taken to develop the streets as private sites. At this time, Red Hook Lane may have a higher likelihood of being disposed of the City for development, while Pearl Street is more likely to remain as a public street.

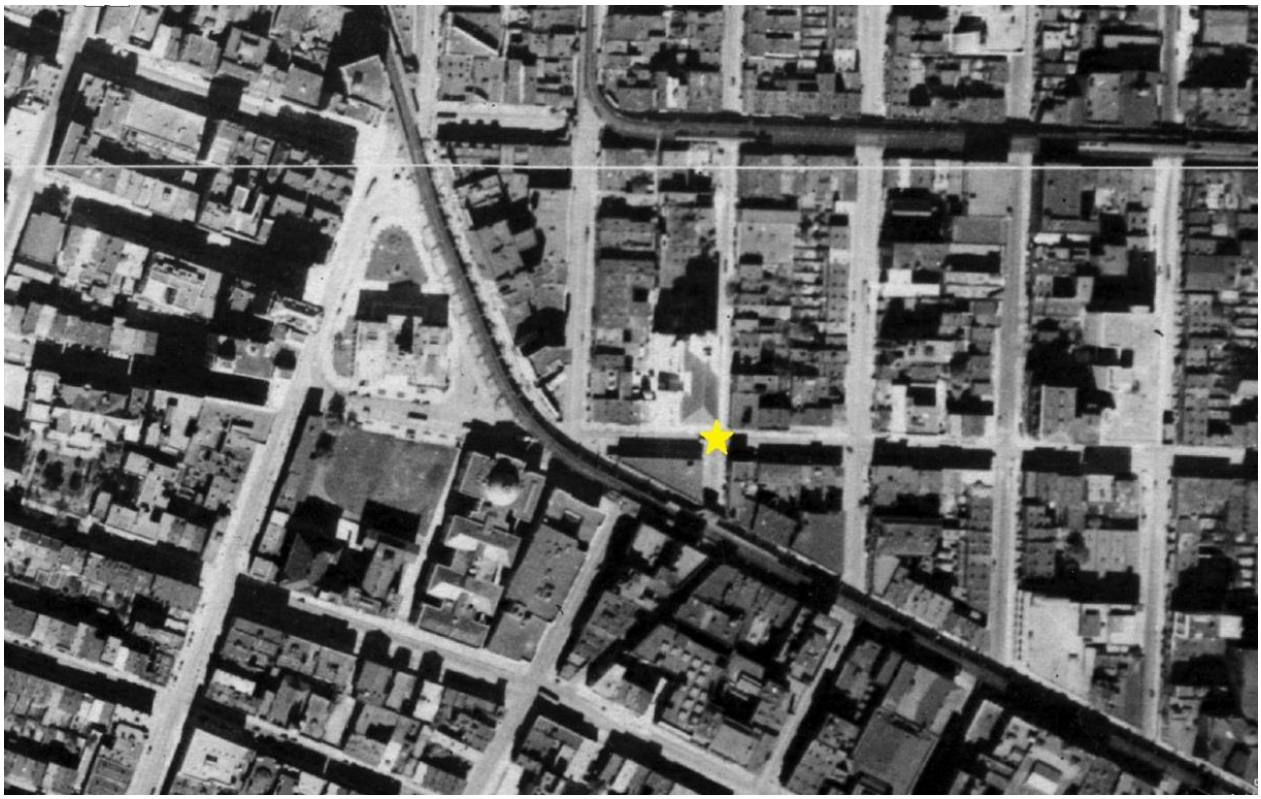


Figure 3: 1924 Brooklyn aerial[2]. Yellow star denotes intersection of Willoughby & Pearl Streets

[2] http://maps.nyc.gov/doitt/nycitymap/

Surrounding Area

Beyond the project site and adjacent uses, shown in Figure 4, the surrounding area includes numerous civic and educational uses, such as courthouses, Brooklyn Law School, and the rest of the NYU School of Engineering campus. Downtown Brooklyn is one of the most robust retail and commercial activity centers in New York City that now attracts significant upscale retailers along Fulton Street. Renowned educational institutions, great public transit connections, and a quickly growing downtown residential community all contribute to a mixed-use urban environment that is becoming among the most vibrant in New York City.

Nearby residential districts are predominantly defined by row housing, while high-rise residential is increasingly being added to the nearby housing market, especially to the south and east of the site. The economics of the development and construction market appear to favor high-rise residential within the areas recently re-zoned for increased height. While the Marriot Hotel, just north of Pearl Street, was for many years the only new hotel in Downtown Brooklyn, today, interspersed within the new residential high-rises, five new hotels have been constructed recently in the Downtown core.

To the northeast of our project area, the Metrotech office and educational center provides 3.7 million square feet of work space and houses an estimated 22,000 jobs[3]. Occupants include FDNY, National Grid, Empire Blue Cross, and New York University (NYU) School of Engineering. Other areas containing office space include the downtown Court Street corridor, which has historically housed offices related to the courts and other Borough services, as well as some dedicated buildings in the surrounding district such as the NYCT offices at Livingston Plaza to the south of our project area.

In addition to the NYU campus housed within MetroTech, several other educational facilities are located nearby, including the new Brooklyn Law School building, the NYC College of Technology, St. Francis College, Long Island University, and independent K-12 schools Packer Collegiate and St. Ann's in Brooklyn Heights.

Nearby institutional uses include the government uses housed in the court buildings, Borough Hall, the Municipal building, and the large US Post Office at Cadman Plaza.

Public realm amenities are managed by three BIDS—the MetroTech BID, Fulton Mall Improvement Association, and Court-Livingston-Schermerhorn BID—all of which are operated by the Downtown Brooklyn Partnership (DBP). Each BID is a defined area that is funded by an additional business tax to fund projects within the BID's boundaries, shown in Figure 5. The BID provides services such as cleaning streets and sidewalks, providing security, making capital improvements, construction of pedestrian and streetscape enhancements, and marketing of the area.

[3] http://www.forestcity.net/properties/mixed_use/property_listing/Pages/metrotech_center.aspx

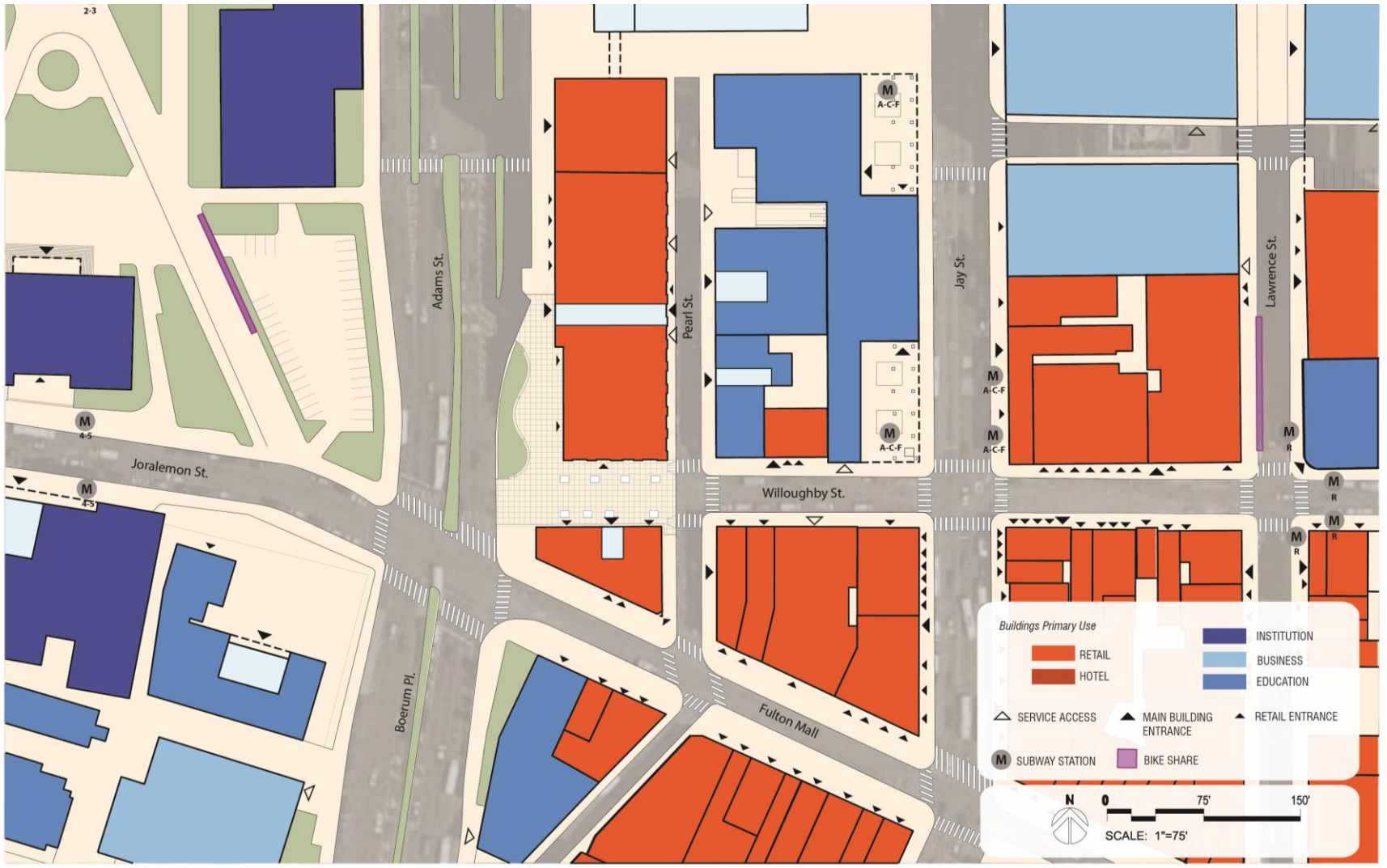


Figure 4: Map of Adjacent Land Use

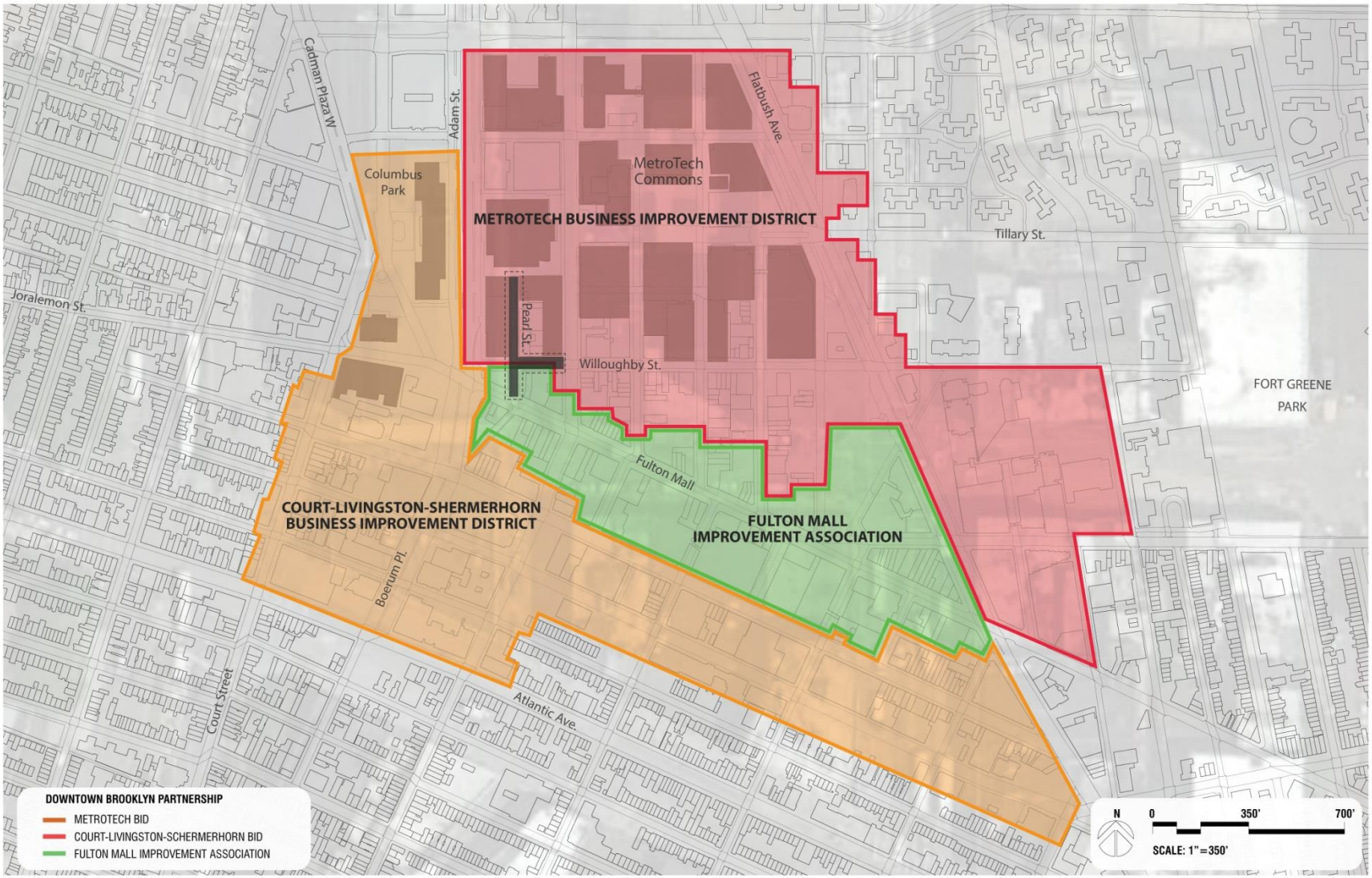


Figure 5: Map of Downtown Brooklyn Partnership and associated Business Improvement District

2 Existing Conditions: Mobility

The following section describes qualitative observations made during six site visits, as well as a quantitative analysis of pedestrian and vehicular activity. Observations on transit access; pedestrian, bicycle, and vehicular mobility; parking and loading are included. Interviews were conducted with local stakeholders, which further informed these observations. The quantitative analysis of pedestrian and vehicular activity is based on traffic counts, and further analysed to better understand key pedestrian and vehicle movements within the site.

2.1 Transit

The Court Street-Borough Hall and the Jay Street-MetroTech stations are located near the study area and therefore heavily influence pedestrian traffic. The subway system is the primary mode of transportation within New York City, averaging 5.5 million weekday rides in 2013.

Court Street-Borough Hall station is located 500 feet to the west of the project site and is the third busiest station in Brooklyn servicing the 2/3, 4/5 and R lines[4]. Station access entrances are clustered at the Brooklyn Borough Hall Park along Joralemon and Court Street. Pedestrian traffic between the station and project site primarily travels through Willoughby Plaza and the Adams Street signalized pedestrian crossing. This was observed as particularly popular thoroughfare for pedestrians on route to nearby government agencies, educational institutes, local businesses and Fulton Mall.

Jay Street-MetroTech station is located in the project site and is the second busiest subway station in Brooklyn, servicing the A/C, F and R lines. The station has multiple points of entries dispersed along Jay Street at the intersections of Myrtle Promenade, Willoughby Street, and Fulton Mall; and along Willoughby Street at the intersections of Lawrence and Bridge Street. Two entrances are located underneath the 370 Jay Street building at the northern and southern corners on Jay Street. The southern entrance, shown in Figure 6, generates traffic directly onto Willoughby Street within the project site. The northern entrance generates pedestrian traffic along the Renaissance Plaza pedestrian walkway, some of which has been observed to use Pearl Street as thoroughfare.

There are some 14 bus lines serving downtown Brooklyn, shown in Figure 7, all but one of which are within three blocks of the project site. Fulton Street Mall, located towards the south of the project site, is a bus mall with bus stops located along its length. This substantial level of bus service in close proximity to the project site is assumed to contribute significantly to pedestrian activity.

[4] Source for all MTA ridership statistics:
http://web.mta.info/nyct/facts/ridership/ridership_sub.htm

Figure 6: Jay St-MetroTech Station entrance with 370 Jay Street on Willoughby Street

Figure 7: Transportation within Downtown Brooklyn

2.2 Pedestrians

Substantial pedestrian volumes were identified in the project site and surrounding area, which is indicative of nearby subway stations, high-rise office and hotel development, civic and educational uses, and Fulton Street Mall. Despite high pedestrian volumes, significant sidewalk congestion was not observed, except at the northwest corner of Willoughby and Jay Streets near the subway entrance; however, pedestrians often walk in the street and mid-block crossings were also common. This type of behaviour can be indicative of low vehicular traffic volumes, high sidewalk congestion, or sidewalk clutter.

Pedestrian movement and volumes reflect the current environment, which is unwelcoming and confusing for many pedestrians. The appearance of a dead end at the northern terminus of Pearl Street likely discourages many pedestrians from using this as an access route, despite its connection for pedestrians to the Renaissance Plaza pedestrian path. The area lacks wayfinding signage directing pedestrians to nearby subway entries and other notable destinations.

Pedestrian movement is also impeded due to sidewalk clutter which decreases pedestrian comfort and make the sidewalk seem more crowded. Figure 8 shows Willoughby Street with an A-frame advertisement, a sidewalk shed, commercial garbage receptacles and other items that occupy the sidewalk space; Figure 9 shows retail garbage on the sidewalk.

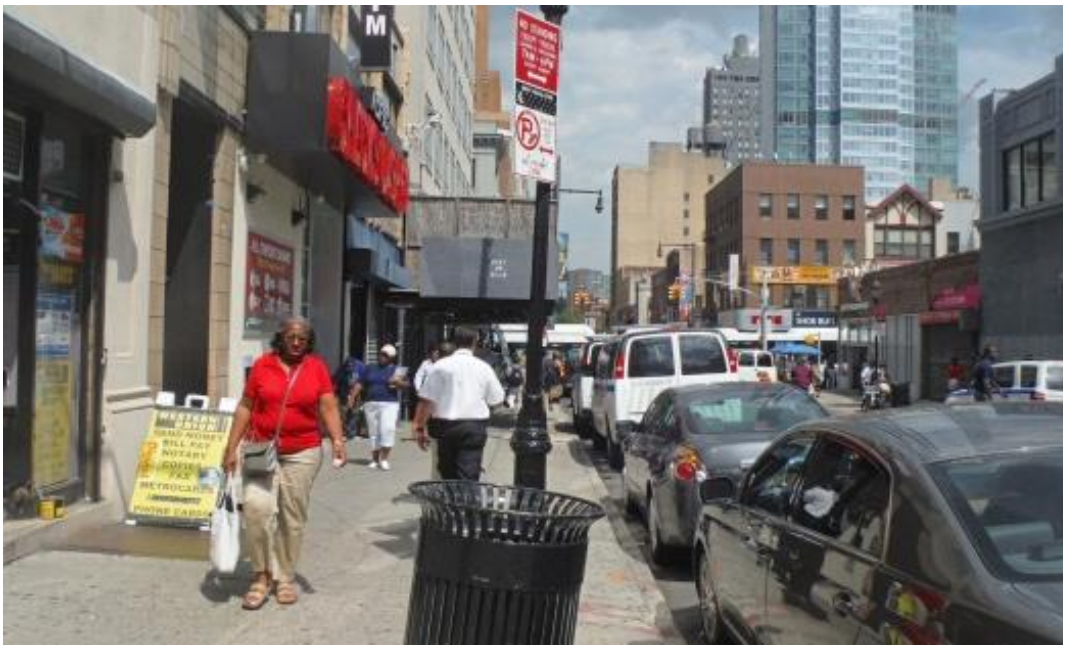


Figure 8: Pedestrians walking along Willoughby Street

Though the existing pedestrian infrastructure is adequate for the existing demand, as the population of Downtown Brooklyn continue to grow, pedestrian mobility will become increasingly inhibited. Further, as nearby retail uses, shown in Figures 8 and 9, continue to transition and draw larger customer bases significant additional pedestrian volumes should be anticipated. Reconstruction of the project

site into a more pedestrian-friendly environment would help to accommodate anticipated growth and better drive customers to adjacent businesses.

Figure 9: Transitioning retail uses along Willoughby Street

Pedestrian Volumes and Desire Lines

American Traffic Information (ATI) undertook an existing conditions pedestrian survey on June 10, 2014. The survey involved counting the number of pedestrians crossing at the following locations:

- Intersection of Pearl Street and Willoughby Street;
- Intersection of Jay Street and Willoughby Street;
- Midblock along Willoughby Street, between Pearl Street and Jay Street;
- Midblock along Pearl Street, between Willoughby Street and Fulton Street; and
- Midblock along Pearl Street, between Willoughby Street and the dead end.

Figure 10 shows the location of the pedestrian count surveys. The pink circles represent counts taken at intersection crossings and orange circles represent counts taken midblock at informal street crossings.

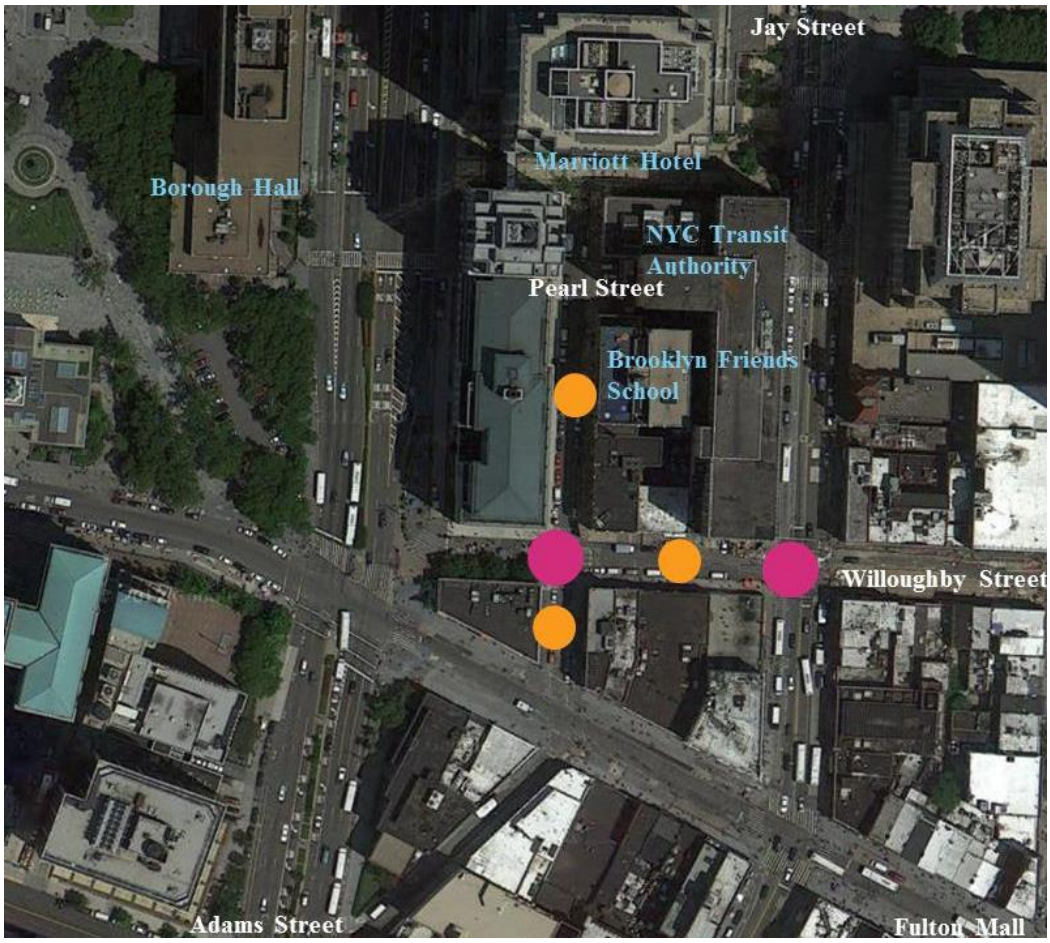


Figure 10: Location of pedestrian survey

The survey was undertaken over three different time periods:

- AM: 7:00–9:00;
- Midday: 12:00–2:00; and
- PM: 5:00–7:00.

These times were chosen to capture the peak periods during the day and also to understand how pedestrian volumes varied during the day at the various crossing locations. The pedestrian counts were undertaken in 15-minute intervals for each two-hour peak period.

The next six figures show pedestrian peak hour volumes during the different peak periods through the day, along with the corresponding main desire lines for that peak period. “Desire lines” represent the heaviest pedestrian flows for each survey period.

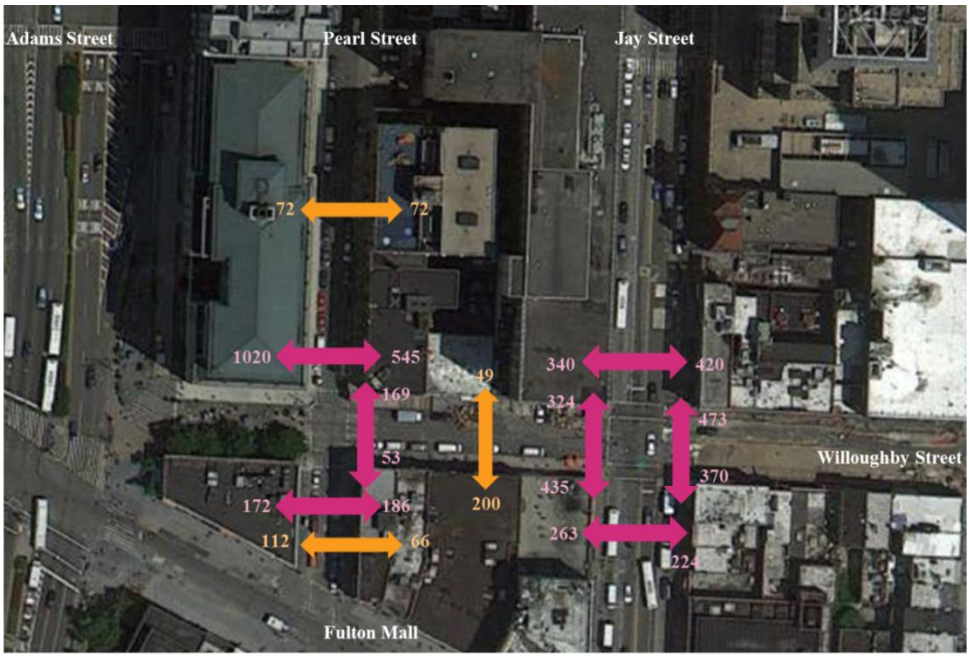


Figure 11: AM peak hour pedestrian volumes

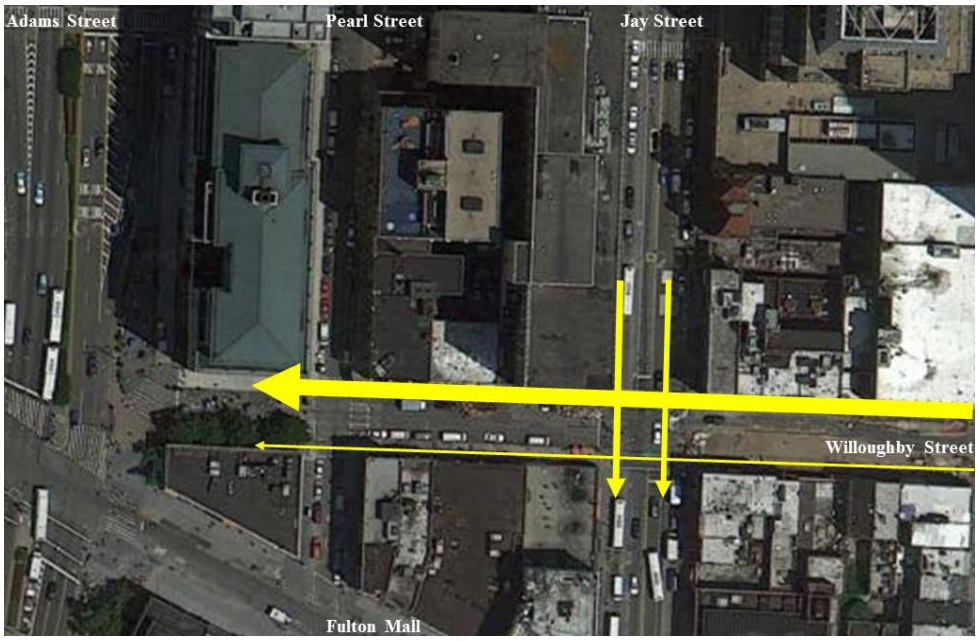


Figure 12: AM peak period main desire lines

In the morning, the most significant pedestrian volumes are seen crossing west from the north-east corner of Willoughby and Pearl Street, towards Willoughby Plaza. A much larger proportion of pedestrians were observed traveling west on the northern side of Willoughby Street, towards Willoughby Plaza, compared to the southern side of Willoughby Street.

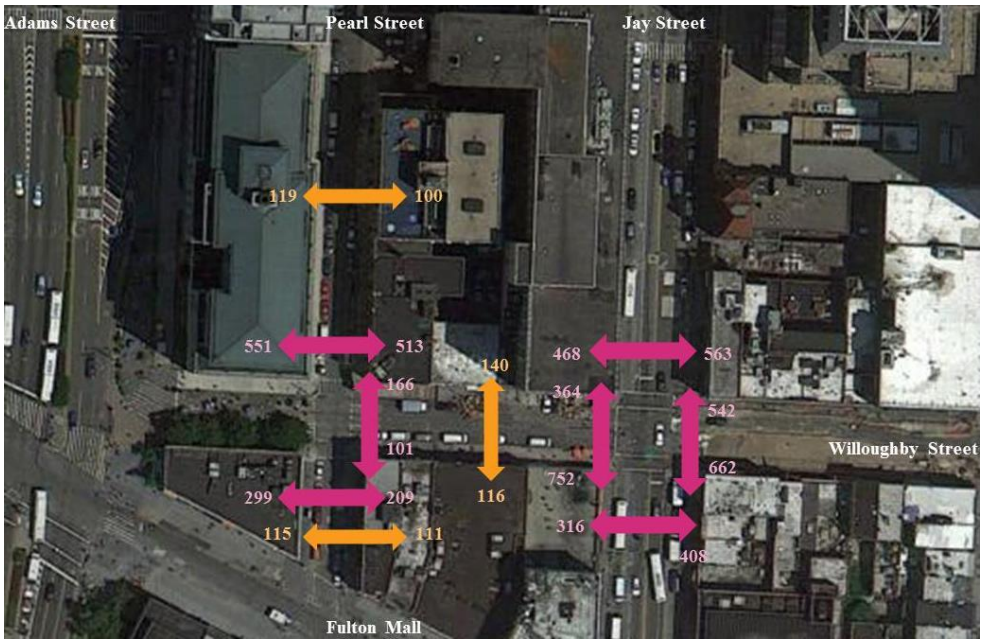


Figure 13: Midday peak hour pedestrian volumes

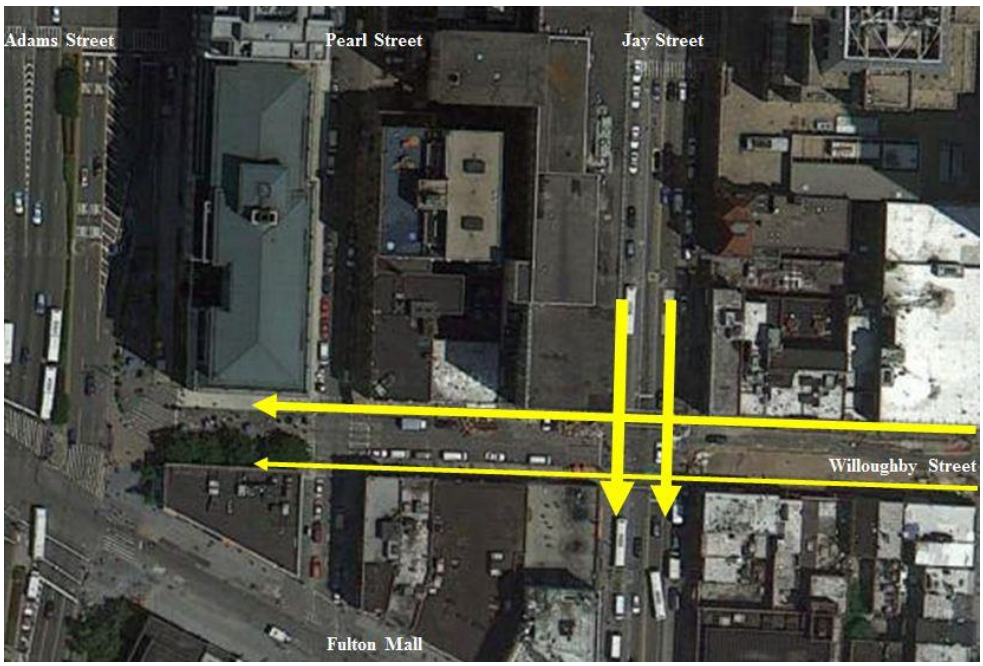


Figure 14 Midday peak period main desire lines

During midday peak hour, the most significant pedestrian volumes are seen crossing south from the corner north-east and north-west intersections of Willoughby and Jay Streets. The Midday peak period is similar to the pedestrian desire lines from the AM peak period, with the main pedestrian flow towards Willoughby Plaza.

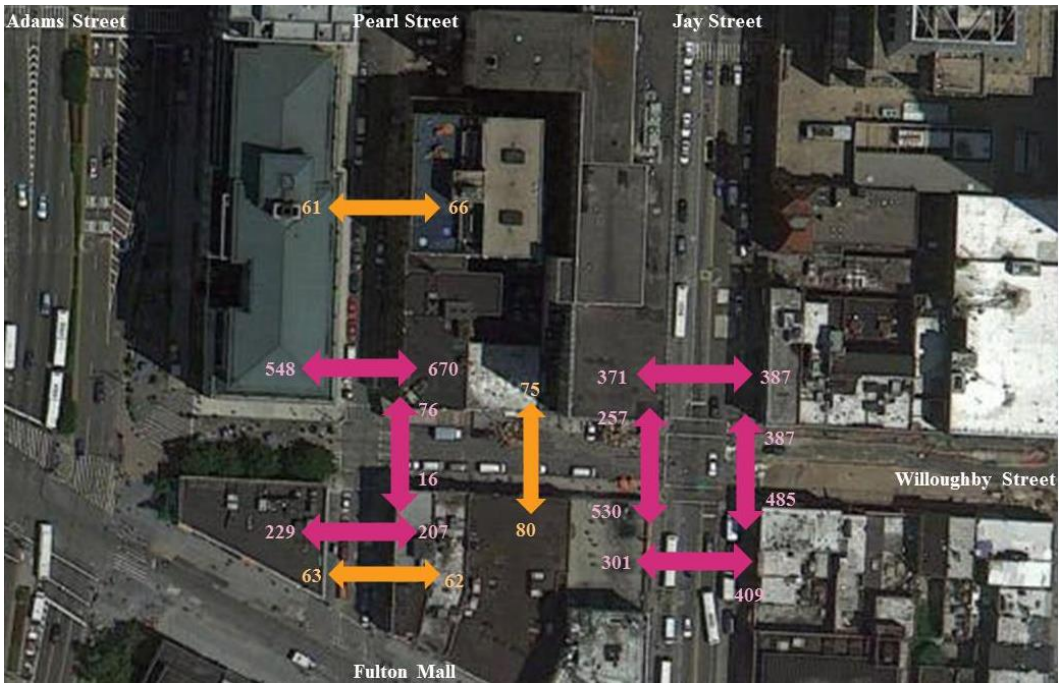


Figure 15: PM peak hour pedestrian volumes

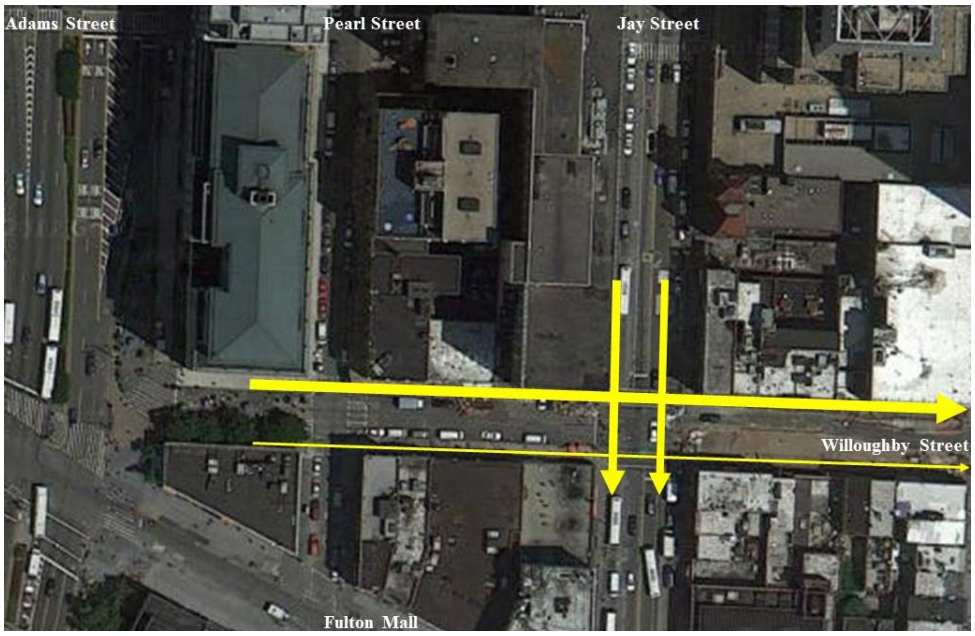


Figure 16: PM peak period main desire lines

During the PM peak the primary desire line is the reverse of the AM peak period, showing more pedestrians walking from Willoughby Plaza and heading eastbound along Willoughby Street. A larger proportion of pedestrians were observed traveling east on the northern side of Willoughby Street, towards Willoughby Plaza, compared to the southern side of Willoughby Street.

During all three peak periods, there is a strong pedestrian flow southbound along Jay Street. This movement is believed to belong to pedestrians accessing Fulton

Mall. The relatively high number of midblock crossings indicated by the data suggests that pedestrians feel comfortable and desire to cross mid-block, due to the low vehicle volumes and the configuration of Willoughby Plaza.

2.3 Vehicles

Just outside the project site major streets, such as Flatbush Avenue, Adams Street, Jay Street, and Atlantic Avenue, channel vehicular traffic on and off the bridges to Manhattan and provide access to the BQE. Therefore, much of the traffic within the project site is slow-moving and local in nature, destined for pedestrian pick-up/drop-off, service or deliveries.

Because Fulton Street is a bus-only corridor, vehicles can only access the project site via Red Hook Lane onto Pearl Street. Drivers wishing to reach the project site have to turn right on Red Hook Lane via Adams Street northbound, which is an indirect route not readily apparent to drivers unfamiliar with the area. From Red Hook Lane, vehicles typically cross Fulton Street to one-way Pearl Street, turning east onto one-way Willoughby Street and exiting onto two-way Jay Street. The northern portion of Pearl Street dead-ends before the Renaissance Plaza requiring vehicles perform a three-point turn to exit via Willoughby Street. As a result of this unusual geometry and the lack of destinations within the study area for vehicles, traffic volumes are low.

2.3.1 Comparing Pedestrian and Vehicular Volumes

Currently, pedestrians far outnumber vehicles at all times of the day. The highest vehicle volumes are at the intersection of Willoughby Street and Jay Street, while the intersection of Willoughby Street and Pearl Street experiences a minimal share of vehicular traffic at all times of the day. The following figures show the pedestrian and vehicle volume comparison at these locations (blue=pedestrians and red=vehicles).

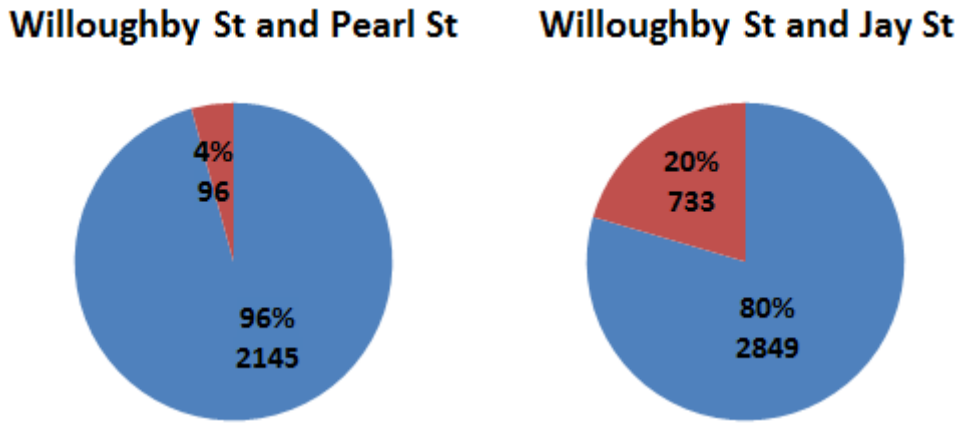


Figure 17 AM pedestrian and vehicle volume comparison

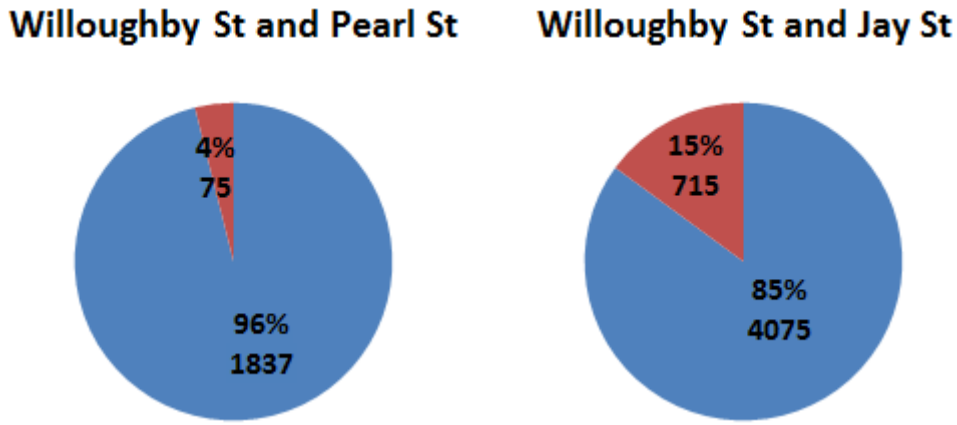


Figure 18 Midday pedestrian and vehicle volume comparison

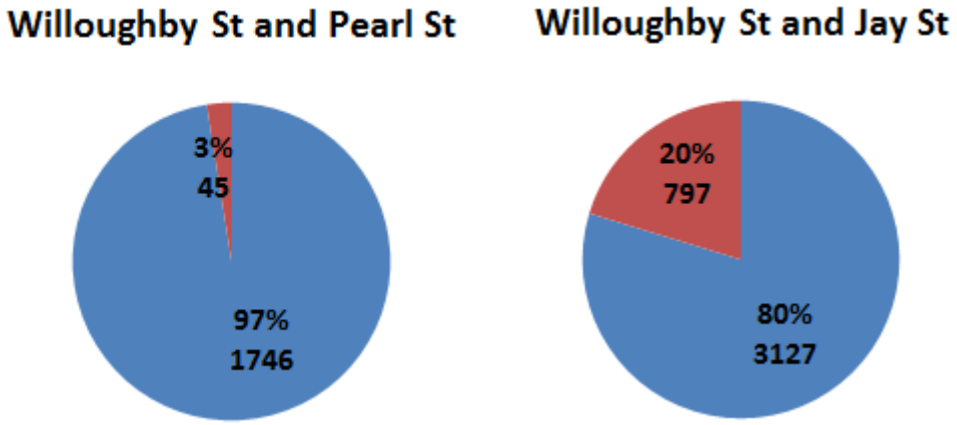


Figure 19: PM pedestrian and vehicle volume comparison

Vehicular Volumes and Intersection Level of Service

The vehicular observations, similar to the pedestrian study, include Willoughby Street from Pearl Street to Jay Street and the segments of Pearl Street from the Fulton Mall to its terminus. Willoughby Street is a one-way local street that connects Pearl Street to Flatbush Avenue and Fort Greene Park. Willoughby is one-way eastbound from Pearl to Jay Street and one-way westbound to the east of Jay. Within the study area, Willoughby has a single travel lane, with commercial loading/overnight parking on both sides, and is lined by many local service retail businesses.

Pearl Street is a low-volume local street. From the Fulton Mall to Willoughby Street, Pearl Street is one-way northbound with a single travel lane and authorized agency on-street parking on both sides. Pearl Street is two-way from Willoughby until it ends one block to the north. The roadway here primarily serves as access to buildings on the block. Jay Street is a major north-south street with one travel lane in each direction, bike lanes, on-street parking, and serves several MTA bus routes.

American Traffic Information (ATI) undertook an existing conditions vehicular survey on June 10, 2014. The analysis focuses on traffic conditions at two intersections:

- Willoughby and Jay Streets (signalized)
- Willoughby and Pearl Streets (unsignalized)

For each intersection, traffic volumes were collected for the morning (AM), mid-day (MD), and afternoon (PM) peak periods.

Additional volumes of drop-offs and pick-ups from the Brooklyn Friends School were observed using a time lapse video of Pearl Street from September 30, 2014, provided by NYCDOT. Only vehicles that entered onto Pearl Street and made a pick-up or drop-off at the Brooklyn Friends School were counted as a part of the additional volumes. The traffic volumes used in the analysis are the combined volumes from the June 10, 2014 and additional September 30, 2014 counts.

Traffic volumes were observed by class (auto, truck, bus, and taxi/limo); however the following figures show the overall total peak hour traffic volumes.

Figure 20: AM peak hour traffic volumes

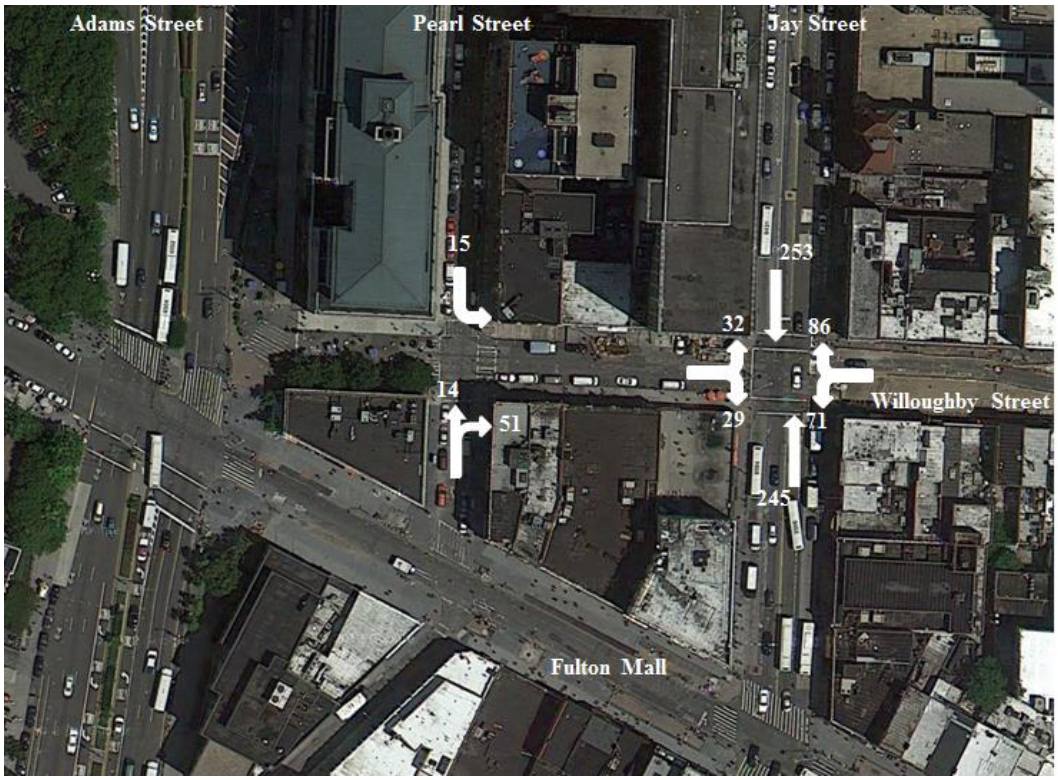


Figure 21: Midday peak hour traffic volumes

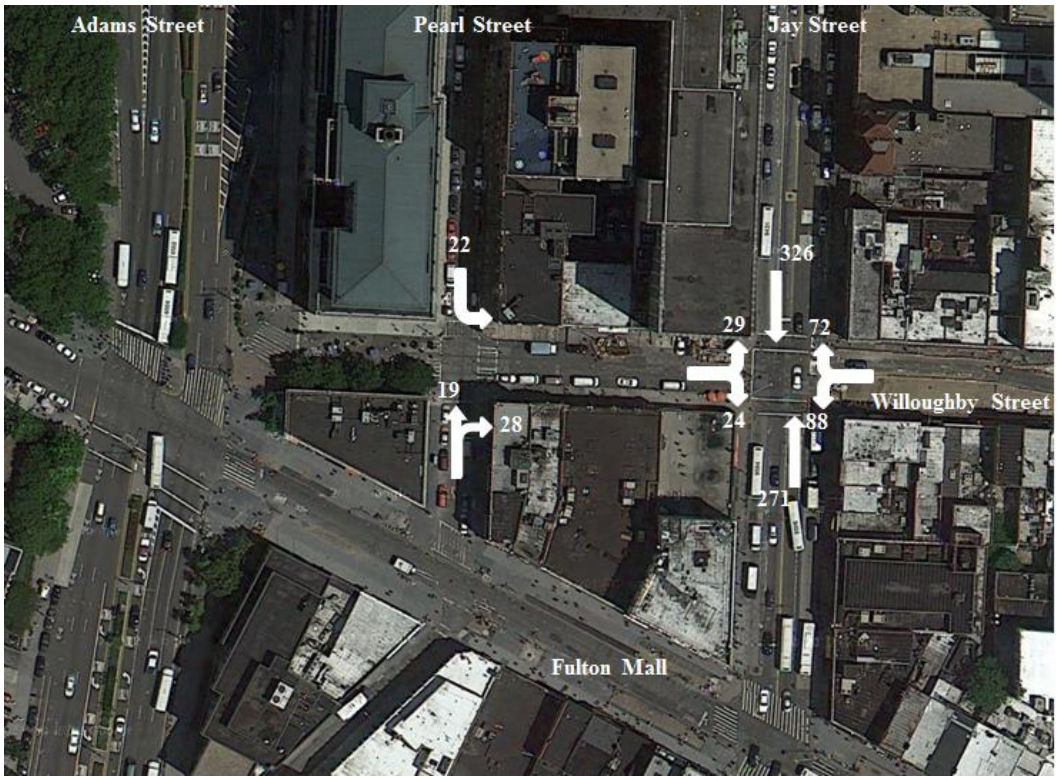


Figure 22: PM peak hour traffic volumes

Analysis Methodology

Traffic operations at the study intersections were analyzed using methodologies contained in the *2000 Highway Capacity Manual* (HCM)[5]. The HCM provides analysis methods and equations that estimate the peak hour delay and level-of-service (LOS) experienced by vehicles at signalized and unsignalized (i.e., stop-controlled) intersections. Inputs to the HCM intersection calculations include peak hour traffic and pedestrian volumes, intersection geometrics (number of lanes), traffic signal timing parameters, and other data such as pedestrian volumes and the percentage of trucks.

LOS is a qualitative measure of the effect of a number of factors, including speed and travel time, traffic interruptions, freedom to maneuver, driving comfort, and convenience. LOS is designated A through F from best to worst, which covers the entire range of traffic operations that might occur. LOS A through E generally represent traffic volumes at less-than-roadway capacity, while LOS F represents over-capacity and/or forced flow conditions. These conditions are described for intersections in Table 1.

[5] Transportation Research Board, 2000

Table 1: Intersection LOS criteria

LOS	Signalized Intersections	Two-Way and All-Way Stop-Controlled Intersections
A	Delay of 0 to 10 seconds. Most vehicles arrive during the green phase and do not stop at all.	Delay of 0 to 10 seconds. Gaps in traffic are readily available for drivers exiting the minor street.
B	Delay of 10 to 20 seconds. More vehicles stop than with LOS A, but many drivers still do not have to stop.	Delay of 10 to 15 seconds. Gaps in traffic are somewhat less readily available than with LOS A, but no queuing occurs on the minor street.
C	Delay of 20 to 35 seconds. The number of vehicles stopping is significant, although many still pass through without stopping.	Delay of 15 to 25 seconds. Acceptable gaps in traffic are less frequent, and drivers may approach while another vehicle is already waiting to exit the side street.
D	Delay of 35 to 55 seconds. The influence of congestion is noticeable, and most vehicles have to stop.	Delay of 25 to 35 seconds. There are fewer acceptable gaps in traffic, and drivers may enter a queue of one or two vehicles on the side street.
E	Delay of 55 to 80 seconds. Most, if not all, vehicles must stop and drivers consider the delay excessive.	Delay of 35 to 50 seconds. Few acceptable gaps in traffic are available, and longer queues may form on the side street.
F	Delay of more than 80 seconds. Vehicles may wait through more than one cycle to clear the intersection.	Delay of more than 50 seconds. Drivers may wait for long periods before there is an acceptable gap in traffic for exiting the side streets, creating long queues.

Source: ***Highway Capacity Manual*** **(Transportation Research Board, 2000)**

Analysis Findings

As shown in Table 2, the LOS results are all LOS C or better, which indicate that traffic conditions in the study area are within acceptable operating standards. The Willoughby/Jay intersection has a slightly worse LOS than the Willoughby/Pearl intersection given the higher traffic and pedestrian volumes and heavy vehicle percentages of ten percent or higher. These findings are consistent with field observations.

Table 2: LOS analysis

	Existing LOS / Delay		
Intersections	AM	MD	PM
Willoughby / Jay	C / 24.7	C / 32.8	C / 28.2
Willoughby / Pearl	A / 7.4	A / 6.9	A / 7.1

2000 HCM for Signals and Unsignalized Intersections

Unsignalized LOS is reported for the worst side-street approach

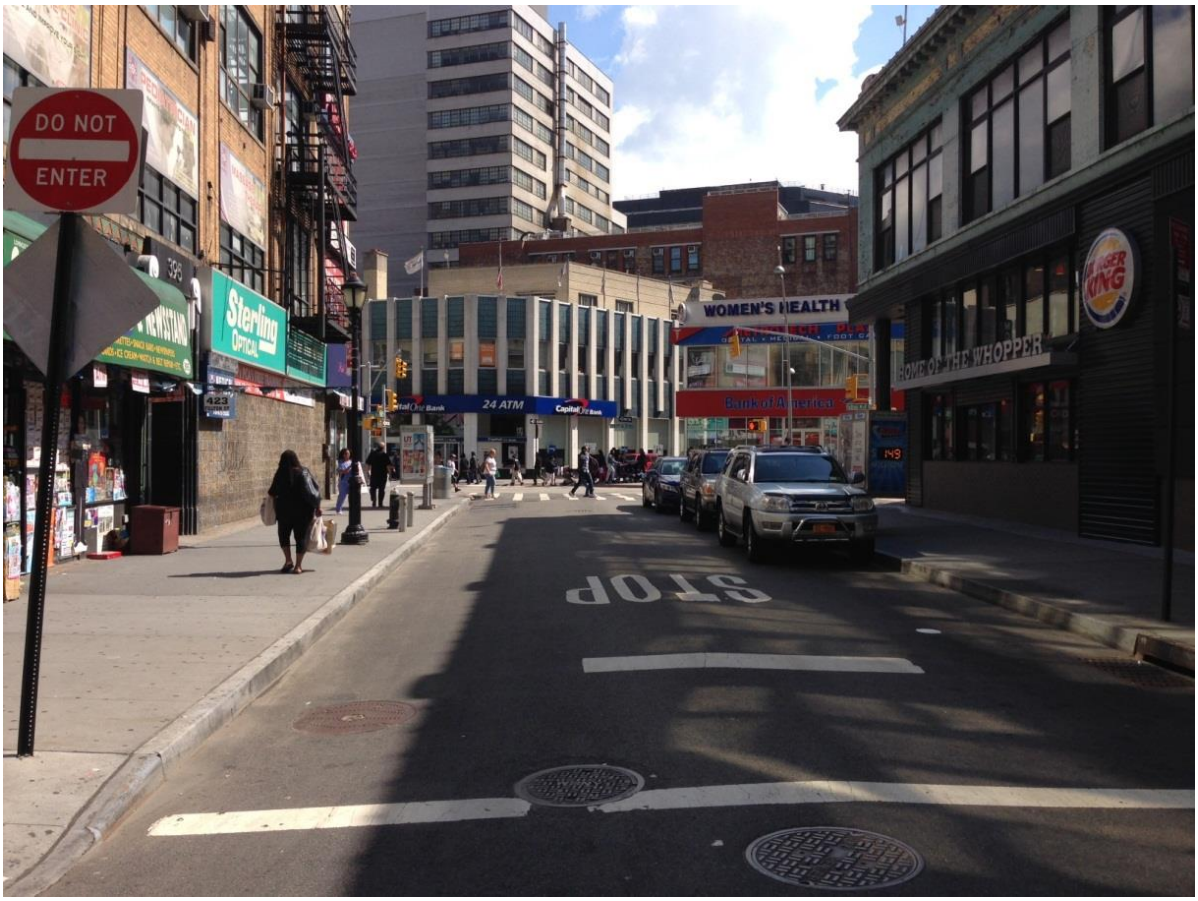


Figure 23: Pearl Street approach to Willoughby Street, looking south towards Fulton Street Mall

Crash History

Crash history from 2008 – 2012 was examined at the following intersections:

- Pearl Street, Red Hook Lane and Fulton Street;
- Willoughby Street and Jay Street;
- Pearl Street and Willoughby Street; and
- Pearl Street and Renaissance Plaza.

During 2008 – 2012, none of the above four intersections experienced any fatalities. The intersections of Pearl Street, Red Hook Lane and Fulton Street, and Pearl Street and Renaissance Plaza showed zero incidents during the five year period.

The intersection of Willoughby Street and Jay Street shows a total of 32 injuries occurring during 2008 – 2012, with 2 severe injuries. The following tables show in detail the severity of injuries and the number of injuries occurring during 2008 – 2012.

Table 3: Willoughby Street and Jay Street injury severity 2008 – 2012

Severity	Pedestrian	Bike	Motor Vehicle
Severe	0	1	1
Moderate	4	0	1
Minor	11	2	11
Unknown	1	0	0
Total	16	3	13

The majority of the pedestrian injuries, a total of 3 out of 16, occurred between 6:00pm and 9:00pm.

Table 4: Willoughby Street and Jay Street injury by year

Year	Pedestrian	Bicyclist	Motor Vehicle
2008	2	0	5
2009	5	1	4
2010	4	0	1
2011	4	2	2
2012	1	0	1
Total	16	3	13

The intersection of Pearl Street and Willoughby Street shows 1 minor incident occurring in 2011 for a motor vehicle.

The average number of people killed or severely injured (KSI) in a five year period at Brooklyn intersections where KSIs were reported is 2.13[6]. With two severe injuries (one cyclist and one driver), the safety at Willoughby and Jay Streets is roughly on par with the Borough-wide average, however, improved safety at the intersection of Willoughby and Jay Streets should be a focus in the street redesign. While most pedestrian accidents were categorized as "minor," pedestrian safety should also be improved and may indicate that pedestrians exiting the adjacent subway station are at risk. With no accidents reported in the remainder of the project site, however, indicates the safety has not been an issue, despite frequent mid-block crossings.

Parking and Drop-Off Activity

On-Street Parking

According to the signed regulations, Pearl Street is a no standing zone with exceptions for Board of Elections and Department of Finance vehicles at designated locations. Department of Finance vehicles are permitted toward the southeastern end and Board of Elections vehicles are permitted toward the west

[6] New York State Department of Transportation/New York State Department of Motor Vehicles Accident Database

end of Pearl Street. The signed regulations identify Willoughby Street as a "No Permit Zone."

Despite signs to the contrary, many vehicles park along Pearl Street, as shown in Figure 24. During several site visits, Pearl Street was found to be unlawfully occupied by private vehicles and governmental bodies not sanctioned for the location (District Attorney and Police Department Vehicles were observed). Vehicles were also observed parked in the no standing area in front of the Brooklyn Friends School and ASA Institute, and in the middle of the intersection alongside the Willoughby Plaza. It has been identified by user groups that illegally parked vehicles become obstacles to the daily functioning of the street.

Figure 24: Placard parking on Pearl Street

Off-Street Parking

The adjacent New York Marriott at the Brooklyn Bridge Hotel has a 1,100 space parking garage. Garage access is located at Adams Street and Jay Street towards the north of the study area. Nearby off-street parking is available in numerous other facilities in Downtown Brooklyn.

School Drop-Offs

The Brooklyn Friends School is located within the study area and fronts the northern portion of Pearl Street as shown in Figure 25. Though many students arrive by foot or transit some parents to use their vehicles for pick-up and drop off their children. Many of the parents who drive their children to school drop them off on Willoughby Street, with students walking the short distance to the school entrance on Pearl Street. The parents of younger children often drive all the way to the entrance on Pearl Street and make a difficult U-Turn or three-point turn when leaving. This situation, combined with illegal parking, can make for a car dominated and chaotic environment on Pearl Street. Peak drop-off times are 7:30-8:30 in the morning, and 2:45-3:30 in the afternoon. For field trips, Brooklyn Friends School utilizes buses that load passengers on Adams Street.

Figure 25: Parents and children on Pearl Street outside Brooklyn Friends School

Loading & Unloading

The northern portion of Pearl Street terminates into the Marriott's Renaissance Plaza. At present, vehicles utilize the 370 Jay Street building's driveway for U-turn maneuvers before exiting out to Jay Street via Willoughby Street.

The northern portion of Pearl Street is the location of many service elevators of the surrounding buildings. The elevator to the New York Marriott at the Brooklyn Bridge tower is located toward the north of Pearl Street. 370 Jay Street building's elevator stack, shown in Figure 26, is located opposite toward the north, this access will be particularly critical in the near future during the construction stages as NYU-CUSP reoccupy the building.

Figure 26: 370 Jay Street loading dock at the end of Pearl Street

345 Adams Street building has a number of restaurants including Hill Country Barbeque Market, Panera, Orange Leaf, and the soon to be opened Rocco's Tacos. Most of these businesses front onto Adams Street with back of house functions on Peal Street. Typical behavior is that vehicles park on Adams Street and load directly into the establishment as per the regulations, however there are some exceptions. The Rocco's Tacos location, under construction at the time of observation, had been observed loading from Pearl Street due to low volumes and ease of access. Hill Country Barbeque Market has been observed loading from Willoughby Street and then hand-carting goods into the establishment. Hungry Jacks located south of the 345 Adams Street building, has been observed loading from vehicles parked along Willoughby Plaza.

Figure 27: 370 Jay Street building loading access along Willoughby Street

With the conversion of Fulton Street Mall into a pedestrian-oriented street with a dedicated busway in 1973, retail loading for businesses on the north side of Fulton Street was shifted to Willoughby Street. Business fronting on Willoughby Street, such as Blimpie and Buffalo Boss, also use Willoughby Street for loading. 370 Jay Street has a service entrance on Willoughby Street, shown in Figure 27, which will be converted into active frontage when NYU-CUSP occupies the building.

2.4 Cycling

Significant levels of cycling traffic were not observed during morning, afternoon, and evening observations during the month of July; however, stakeholders identified a demand for bike parking, which suggests that many local building users use bicycles to access the area. Heavy bicycle traffic is instead more common just outside the study area on Adams and Jay Streets, which both have dedicated bike paths and connect cyclists with the Brooklyn and Manhattan Bridges. Willoughby Street is not an optimal cycling route because Willoughby Plaza inhibits cycling movement and therefore disrupts the potential for east-west connections through the project site. Similarly, Pearl Street dead-ends into the Renaissance Plaza pedestrian path that, although doesn't expressly prohibit cyclists, has high pedestrian activity that makes cycling difficult.

CitiBike has two docking stations nearby the study area. The first is located west of the study area adjacent to Borough Hall, on the corner of Adams Street and Joralemon Street. The second CitiBike docking station is located two blocks east of the site, at the northeast corner of Willoughby Street and Lawrence Street.

Bike Parking

Brooklyn Friends School provides private bike parking to staff and students on-site. Anecdotally, biking has been identified as popular means of transport for parents, students and staff. Bike parking is available to the commercial tenants

occupied in the upper floors of the 345 Adams Building and the New York Marriott at the Brooklyn Bridge Hotel[7]. Bikes parked ad hoc to the construction scaffolding indicate a need for additional parking shown in Figure 28.

Figure 28: Existing bike parking in the study area

[7] Applies to commercial office buildings with at least one freight elevator http://www.nyc.gov/html/dot/html/bicyclists/bikesinbuildings.shtml

3 Existing Conditions: Character and Environment

This section describes observations of the character and environment of the project site and surrounding area, including general character, pedestrian gathering areas and public open space, landscape/hardscape, views and view corridors, availability of sunlight, noise, and safety. The observations were further informed by interviews conducted with local stakeholders.

3.1 General Character

Despite many positive characteristics of the adjacent area, the street character of project site itself is degraded. Crowded with parking at the curbs, trash storage on the sidewalks, a cacophony of traffic signals and signs (see Figure 29), and without trees, the space does not perform well for passenger vehicles, service operations, pedestrians, or bicyclists. This is reflected in the relatively under-optimized utilization of the commercial space, although that is beginning to change with the introduction of Willoughby Plaza to the immediate west of the site.

Figure 29: Sign clutter at Willoughby and Pearl Streets

In the immediate vicinity of the project site, there are significant built assets, as well as some structures not currently utilized at the highest and best uses of the existing zoning. The large 345 Adams Street building on the west side of Pearl

Street has the potential to be renovated, restored, and upgraded. 370 Jay Street on the west side of Jay Street is going through with renovations that will restore, and upgrade the building with new educational and retail programming. However, on the south side of Willoughby Street are a collection of lower scale buildings that are occupying sites that may be considered for development at a much greater scale. Pearl Street between Willoughby and Fulton Streets is currently de-mapped, so a development on this site may (or may not) include the small triangle building currently housing Shake Shack. This building may have some historic significance and could play a role as a pavilion-like structure within a larger development plan for the area.

3.2 Architecture

The three blocks that constitute the project site present a range of architectural conditions.

The buildings facing the northern section of Pearl Street are significant assets. 345 Adams Street, a 13-story building constructed in the mid-1920s was recently rehabilitated on its lower two floors. The renovation has restored the original Renaissance style building by opening the arched windows along the façade to their original height, and restored mouldings and lighting details. Given that the building is located on a uniquely narrow block, 345 Adams Street reveals itself in all three sides. Currently the ground floor houses various active restaurants along Adams and Willoughby Streets. However, active uses of this building do not yet extend along Pearl Street. The retail spaces, now inactive, could play a role in potential future developments.

The seven-story building at 375 Pearl Street, now occupied by Brooklyn Friends School but originally designed as the Brooklyn Law School, is a beautiful, well maintained Art Deco building constructed in 1928. Its limestone ground floor is composed of various ornamental features including tile sunburst patterns and detailed reliefs along the main entrance.

While now in a dilapidated condition, the former 370 Jay Street at 370 Jay Street was once seen as an example of post-war modernism. Recently acquired by NYU, the building is being renovated to become a contemporary, energy efficient, high-tech structure. This new construction is expected to revitalize the surrounding spaces that have been unused for years, and will improve the public environment for the daily commuters of the A-C-F lines, also located at this address.

While the rest of the architecture along Willoughby and the south section of Pearl Street include currently underutilized 1 - 2 story retail buildings, recent new developments in the area are expected to affect changes to these structures. In particular, the block bounded by Pearl, Willoughby, Jay, and Fulton Streets may experience new development. Together with the pedestrian-oriented public realm designs for Willoughby and Pearl Streets, the project area is expected to become an active and vibrant place for public use in the near future.

3.3 Pedestrian Gathering Areas and Public Open Space

Pedestrians gather at nearby Willoughby Plaza, which has become a popular public space since its construction using temporary materials in 2006, with a capital build-out in 2013. The Plaza's adjacent restaurant uses, such as Shake Shack and Hill Country Barbeque Market, spill into the plaza, which contains fixed and movable seating for the general public. Pedestrians also gather along Willoughby near restaurant uses, such as the Blimpie sandwich shop and the newly opened Buffalo Boss. Along Pearl Street, pedestrians dwell in front of the recessed lobbies, particularly of the Brooklyn Friends School, shown in Figure 30, the ASA Institute building and 345 Adams Street.

Figure 30: Pedestrians mingling outside of Brooklyn Friends School on Pearl Street

In addition to Willoughby Plaza, the surrounding area includes a notable number of publicly accessible green spaces. Fort Greene Park at the eastern terminus of the Willoughby view corridor provides for a range of passive and active outdoor recreation options. Midway along the same corridor, the proposed new Willoughby Square Park promises to provide new, high-quality outdoor public space. Columbus Park and Cadman Plaza Park to the west of the site, provide significant green space; however, they are currently underutilized as such. The southern end of Columbus Park, closest to the project site, is currently used as a parking lot.

And farther to the west of our project site, the city has recently proposed the creation of the "Brooklyn Strand" a linear outdoor public space that will connect Joralemon Street to the northern edge of Brooklyn Bridge Park shown in Figure 31. At the western terminus of Joralemon Street, an underpass beneath the BQE

provides one of the few direct access points to the Brooklyn Bridge Park. Since Joralemon Street is the western extension of Willoughby, this east/west axis, bookmarked by major outdoor recreational spaces and punctuated by other parks suggests the potential for a new “Green Connection.”

Figure 31 Green connections in Downtown Brooklyn

3.4 Landscape/Hardscape

As noted previously, there is an absence of trees on the six blocks of sidewalks within the project area. Brooklyn Friends School has small, well-maintained planters along the front of their building; the only green relief for that section of Pearl Street. At the terminus of Pearl Street, along the Marriott's Renaissance Plaza there are elevated landscaped features with trees maintained by the Marriott Hotel. The new Willoughby Plaza maintained mature trees and planted additional ones creating an appealing pedestrian environment shown in Figure 32.

The paving material throughout the study area is primarily asphalt roadways with concrete sidewalks and granite or steel-faced concrete curbs.

Pearl Street shaded by buildings

To the east, busy Adams Street

To the west, noisy Jay Street

Mature Trees along Willoughby Plaza providing shade

Figure 32: Collage of views depicting the local character

3.5 Views and View Corridors

Figure 33 shows a view corridor east along Willoughby Street. The Prison Ship Martyrs' Monument provides the street with a view of an important landmark, drawing the eye east toward Fort Greene Park. Consistent lighting and banner standards contribute some sense of order to an otherwise "messy" streetscape. Looking west, Willoughby Plaza establishes a pedestrian-oriented environment, with the street trees on the south side creating a more intimate scale. Views terminate across Adams Street at the Brooklyn Law School.

Figure 33: Looking east on Willoughby Street towards Fort Greene Park

Views north up Pearl Street from Willoughby Street do not present an attractive or inviting image. Trash bags, dumpsters and service doors dominate the view, as shown in Figure 34. The south façade of the Marriott presents a monolithic wall at the terminus of Pearl Street, providing no indication of any reason to walk to the end of the street. On the north end of Pearl Street, the loading dock at the NYU building occupies an extended section and dominates the views looking south from the end of Pearl Street. The gate at the end of Pearl Street similarly serves to send a visual cue that the midblock pedestrian crossing is disconnected from Pearl Street. Views south at the intersection of Willoughby and Fulton Streets look through to the Fulton Street retail corridor, which terminates at the corner of Fulton and Pearl Streets.

Figure 34: Unattractive views looking north on Pearl Street

3.6 Availability of Sunlight

Pearl Street is flanked on either side by tall buildings such as the historic 345 Adams Street, New York Marriott at the Brooklyn Bridge Hotel, 370 Jay Street and the Brooklyn Friends School. The north-south orientation of the street results in Pearl Street being in constant shadow. In contrast, Willoughby Street is flanked by low 1-2 story buildings toward the south side which ensures generous daylight exposure to the street. Mature street trees along Willoughby Plaza thrive in these conditions.

3.7 Source of Noise Pollution

The study area is located between two busy streets, Jay Street and Adams Street which are the primary sources of noise. Jay Street, to the east is classified as a minor arterial street and to the west Adams Street is classified as a primary arterial street. The built form along Jay Street and Adams Street buffers noise creating a quiet refuge along Pearl Street. However, the presence of loud exhaust fans at the northern end of Pearl Street was noted during one site visit and may detract from the otherwise peaceful nature of the street. There is also minimal periodic noise from delivery vehicles and during school pick-up/drop-off times.

Willoughby Street is more exposed to noise from traffic and connects to the activity on Fulton Street. A lack of trees and soft surfaces results in the noise not being diffused.

3.8 Perception of Safety

Willoughby Street is in a state of transition. Along Willoughby Street many buildings do not activate street life and do not offer passive surveillance and a sense of safety. On street level there is a lack of engaging land uses and a lack of active store frontages.

The present condition of the entrance to the Jay Street-MetroTech subway station is a particular example; it has poorly lit atriums, lacks active street frontages and lacks an overall perception of safety. There are plans to rectify this condition in the plans for the NYU-CUSP refurbishment of the building.

Despite these degraded conditions, actual crime level is not high within the project site as shown in Figure 35. Over the last three months crime activity has occasionally occurred on the surrounding study area, specifically along Fulton Street Mall between Adam and Jay Street and at the intersection of Jay St. and Willoughby St. These crimes include ten grand larcenies and one felony assaults.[8]

[8] New York City Police Department, New York City Crime Map, August 2104, available at http://maps.nyc.gov/crime/

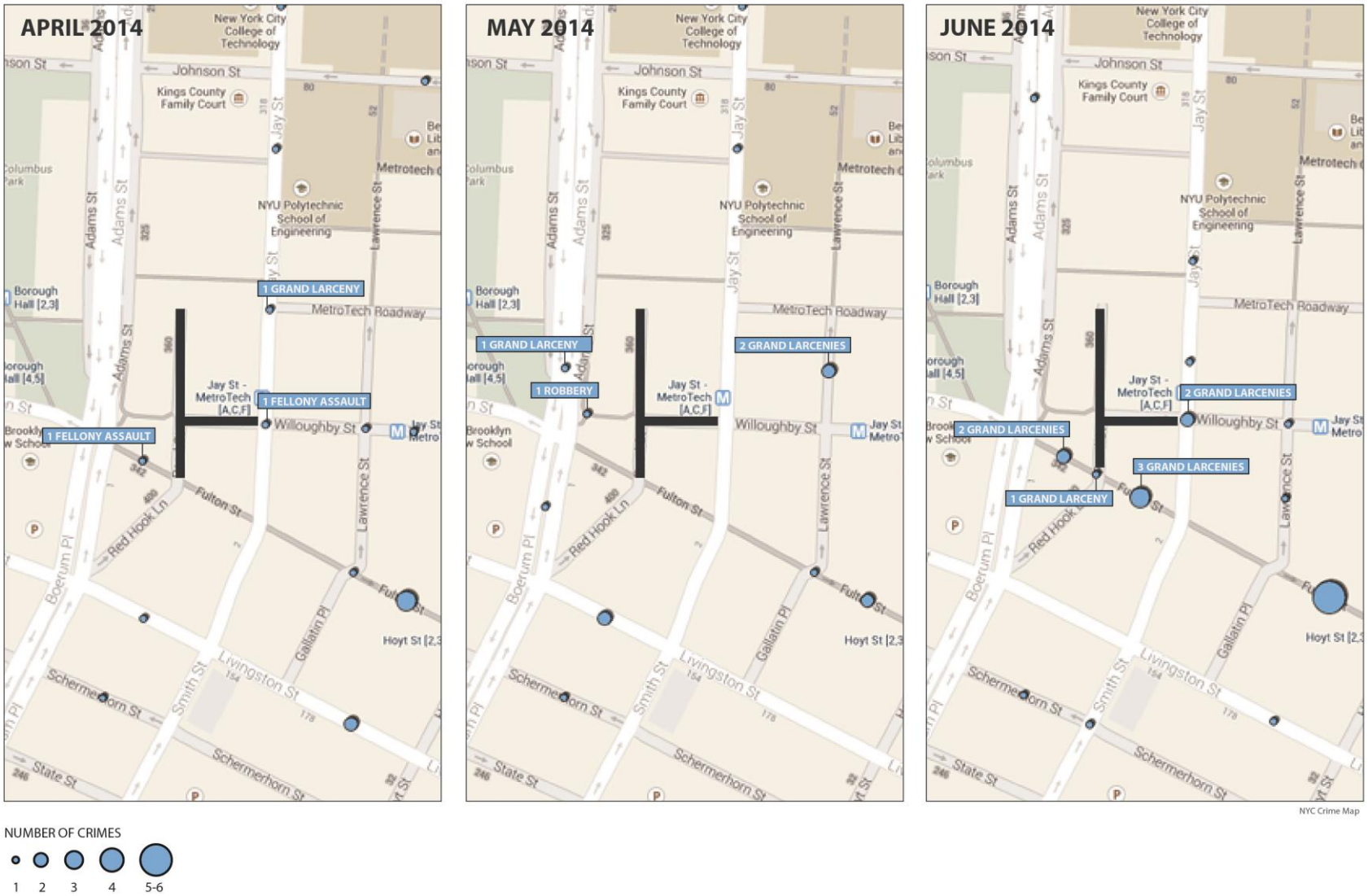


Figure 35 Crime levels over the past 3 months (source: New York City Police Department, New York City Crime Map, August 2014)

4 Key Issues and Opportunities

Through pedestrian and vehicular analyses, site observations and stakeholder interviews, several key issues and opportunities emerged. An understanding of these issues will allow for a more informed development of conceptual design alternatives. Key issues and opportunities are as follows:

Mobility

- Pedestrians already dominate mobility patterns within the site; providing a safe and more attractive environment will likely further enhance mobility and access.
- There is an opportunity to incorporate public art features and wayfinding elements as a means place making and provide an ease of navigation.
- Cycling activity is primarily local, and consists of cyclists accessing uses within the project site. There appears to be an unmet demand for bike parking, and the expansion of bike parking within the street may further encourage bicycle usage.
- Crash data indicate a safe environment for all modes and the ability for all modes to share space. The need for loading and waste pick-up at adjacent uses will need to be carefully considered in the project design.
- The dead-end nature of Pearl Street poses both an issue and opportunity for the project design, as it can emphasize the street as a public open space that prioritizes pedestrians, but can make necessary loading and unloading difficult.
- Illegal vehicular parking is a significant issue and project design should reinforce parking restrictions or consider eliminating the provision of parking altogether.
- Although full pedestrianization of the project area is infeasible due to loading and drop-off requirements, “pedestrian only” periods where the space is closed to vehicles should be explored.

Character & Environment

- Because the surrounding area is in transition and development has been happening at a brisk pace in recent years, the project will need to consider both the existing and potential future environment surrounding the site.
- The success of Willoughby Plaza as a public open space can be leveraged to reimagine the project site as a space more equitably shared by all modes.
- Chairs and tables in the Willoughby Plaza are often used to capacity and pedestrians were noted gathering within the project site without a place to sit, which both indicate a potential unmet demand for seating.

- Visual appearance of the existing site is somewhat degraded and surrounding uses have great potential of benefitting from a reconstructed street with more thoughtful streetscape design and amenities.
- The project site has tremendous potential for leveraging views and connection to Fort Greene Park, as well as supporting the "Brooklyn Strand" concept that will use a series of green spaces to connect Borough Hall with the northern end of Brooklyn Bridge Park.
- With the presence of Brooklyn Friends School and their expressed need for more play space, treatments that safely accommodate children at play should be considered.
- Tall buildings that produce significant shade along Pearl Street, and which may produce significant shade along Willoughby Street following future potential development, will affect landscaping opportunities.
- Opportunities for enhanced lighting for aesthetics and to ensure appropriate lighting levels should be explored.

5 Pedestrian Priority Streets

In tandem with research, analysis, and observations associated with existing project site conditions, a review of relevant precedents was undertaken to help inform conceptual design for the project area. Precedent research focused on "pedestrian priority streets" implementation, as the project site was previously identified as a pilot project for this type of street design. This approach is cited in NYCDOT's Street Design Manual as a pilot application.

5.1 What is a pedestrian priority street?

A pedestrian priority street is a street that allows all users – pedestrians, bicyclists, and vehicles – to move within the same space, but where pedestrian movement is prioritized, as shown in Figure 36. Pedestrian priority streets, sometimes called shared streets, often provide a pedestrian priority zone where vehicles are allowed but must yield to pedestrians, challenging the common concept that streets should be designed primarily for automobiles. These street environments encourage visual and personal communication between pedestrians and motorists to avoid conflicts, promoting slow vehicular speeds and relatively unconstrained pedestrian movement.

Pedestrian priority and shared streets have been adopted across an incredibly wide spectrum of street types and densities throughout the world. In places like Copenhagen, Denmark, these streets have been part of the urban fabric for generations. In the Netherlands, many northern cities have moved to strip away devices such as curbs, signs, road markings, traffic signals and other vehicle oriented design elements to an approach that presents the vehicle as a guest in the roadway. In more dense cities such as Seoul, Korea and Tokyo, Japan, pedestrian priority streets have become the primary design basis for a number of areas characterized by heavy pedestrian traffic, significant ground floor retail and low vehicle movements. In the United Kingdom, Australia and the United States, shared spaces have been created around residential streets, short retail corridors and in very active areas. Because non-traditional street design methods are employed, special attention must be paid to accessibility by people with disabilities, particularly the visually impaired, so that safety is provided for all users.

Streets are often described as the largest and most prevalent public spaces in cities but their value to the pedestrian is often restricted given limited space allocation within the overall right of way. Pedestrian priority streets propose to redefine the streetscape and apportion the majority of space to the major user group – pedestrians. Through great urban design, these streets can become an extension and expansion of the city's open space, putting people first and creating a vibrant public realm.

Figure 36: Shared street in Copenhagen, Denmark

5.2 Pedestrian Priority /Shared Street Precedents

5.2.1 Winthrop Street in Cambridge, MA

Figure 37: Winthrop Street Photo & Aerial

Winthrop Street was a neglected street located in the Harvard Square neighborhood of Cambridge, Massachusetts. With narrow sidewalks and low traffic volumes, pedestrians would often overflow into the street. Additionally, the street was not ADA compliant. In 2007 as part of the Harvard Square Improvement Project, the City of Cambridge turned Winthrop Street into a shared street by removing curbs, designing flush surfaces with unique pavers, and installing bollards to the define space and planters to enhance the pedestrian environment, seen in Figure 37. The City's Traffic Regulations designate a shared street as "a public right-of-way without a designated sidewalk, where users are permitted to use the entire public right-of-way" shown in Figure 38. The space is

regulated with a speed limit of 10 mph with vehicles and bicycles yielding to pedestrians. Its success as a pedestrian-oriented street led restaurant owners along the street to ask the city to close the street to traffic for a portion of each day to accommodate outdoor seating

Table 5: Winthrop Street Characteristics

Element	Description
Dimensions	The shared section of Winthrop Street, a one-way street between John F. Kennedy Street and Eliot Street, is 320 feet and 30 feet wide.
Context	Winthrop Street's proximity to the world renowned Harvard University, as well as the regional shopping area Harvard Square, makes it an attractive destination for residents and visitors alike.
Land uses	The streets adjacent to the site have a diverse mix of land uses including institutional, as it is located in the heart of the Harvard University. Winthrop Street itself has mostly commercial uses with the exception of Winthrop Square, a passive park with benches and mature, large shade trees, at the northeast corner.
Ground floor	Ground floor uses include small businesses and restaurants with outdoor seating, including Shake Shack. A large commercial property currently occupied by large format retailer Staples is located on the southern side of the eastern end of the street. Activity from Winthrop Square spills over into the street.
Landscape	The street is lined with planters containing small trees and flowers.
Pavement Treatments	When entering from John F. Kennedy Street, the roadway ramps up to side walk grade to sit flush with the sidewalk. The curbs and markings were eliminated and the street is laid with a continuous brick surface. A gray brick denotes the roadway while sidewalks are red brick. The sidewalk has bollards and long planters to provide a protected zone for pedestrians who do not want to share space with vehicles.
Street Furniture	Street furniture is limited to the chairs and tables (with umbrellas) for patrons of the restaurants on the street. Pedestrian scale street lamps line the street.
Access	Signage at the entrance of the street reads "Shared Street 10 MPH – Street closed 11AM-2AM", meaning Winthrop Street is open to vehicle traffic from 2am-11am.
Intersection	The intersection with John F. Kennedy Street is not signalized but there are "laddered" crosswalks and signs reminding drivers that vehicles must stop for pedestrians in the crosswalk. Additionally curb extensions enhance pedestrian safety by shortening the crossing distances. At the opposite end of Winthrop Street, there are no safe crossings over Eliot Street. Pedestrians must walk north to Mt. Auburn Street or south towards Bennett Street.
Parking	There is no parking along Winthrop Street. Limited metered parking is available on the adjacent streets.
Loading	Loading is permitted along Winthrop Street between 2 am – 11am. Loading activities are separate to that of the shared street use.
Maintenance	Winthrop St is maintained by Cambridge Department of Public Works. Street-cleaning is the major maintenance requirement.

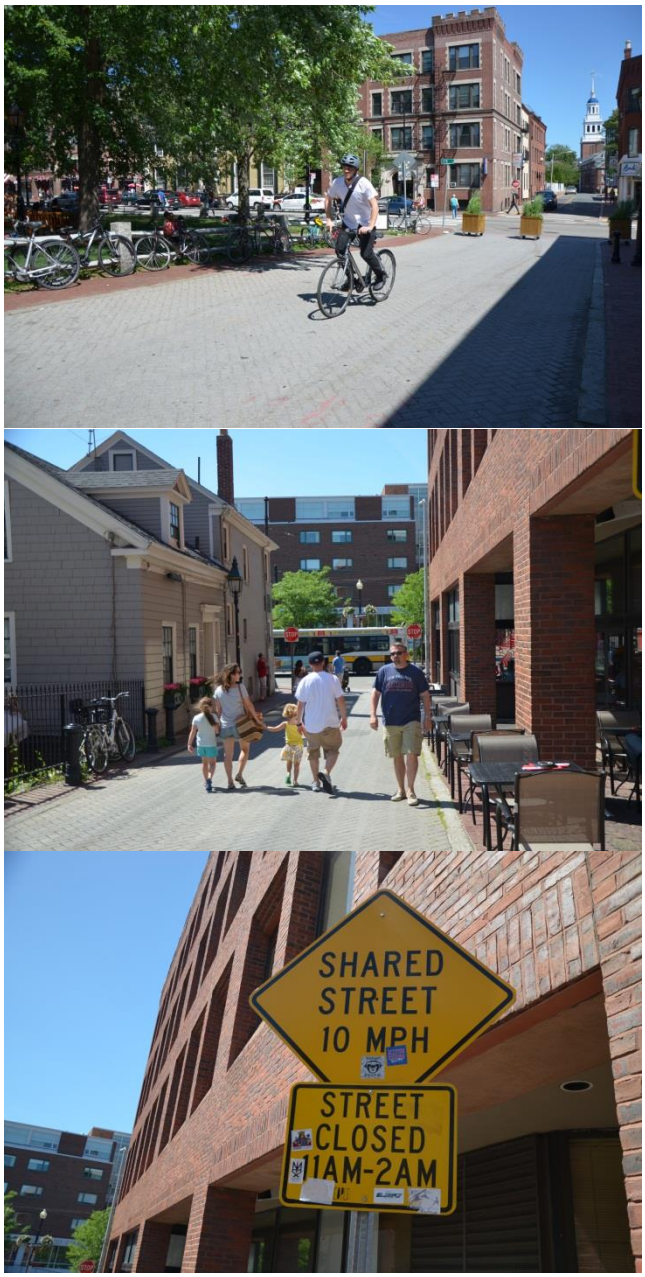


Figure 38 Winthrop Street, Cambridge, MA

5.2.2 165th Street, Jamaica, Queens, NY

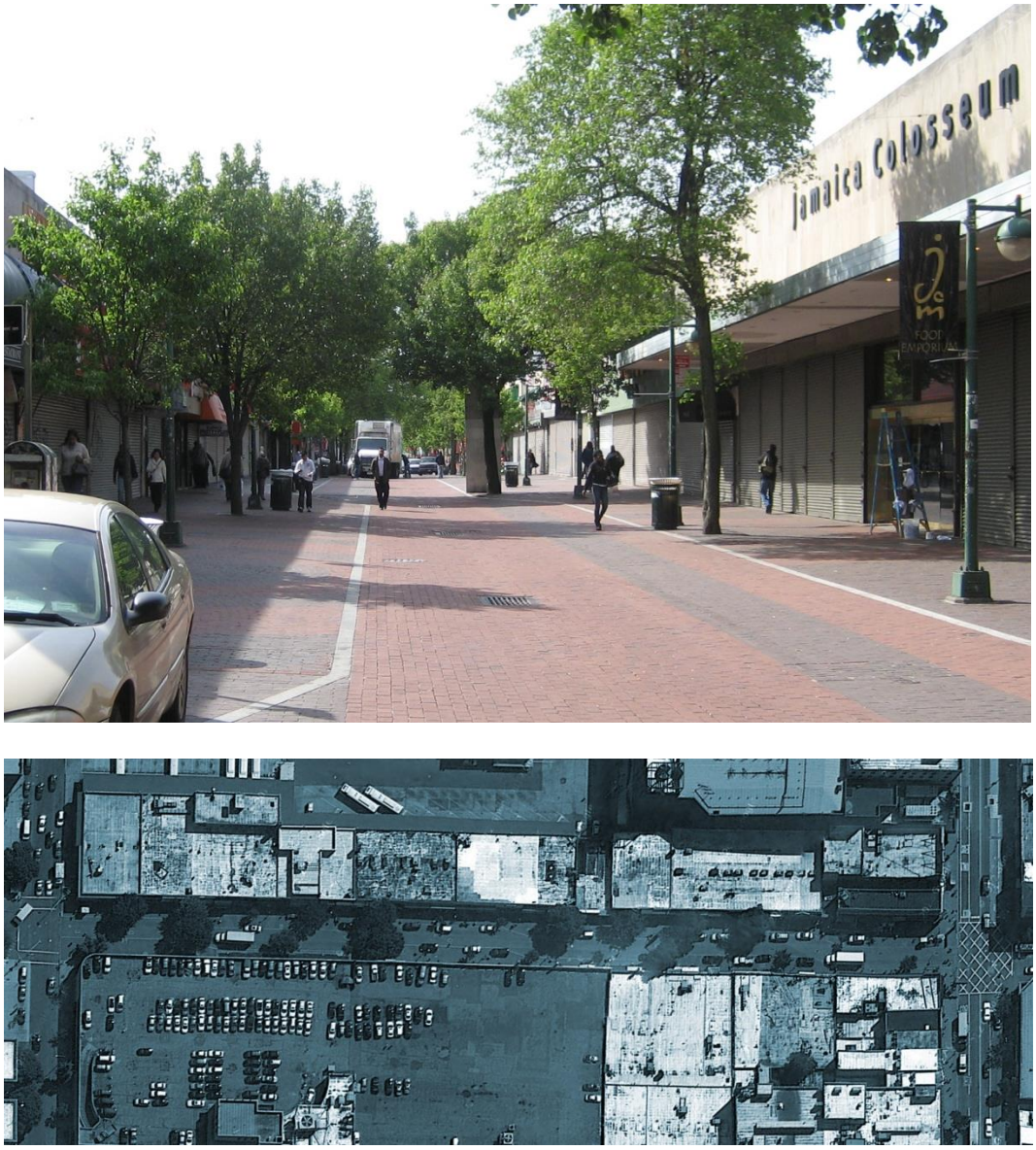


Figure 39: 165th Street Photo & Aerial

In order to strengthen Jamaica as a viable commercial center, 165th Street was redesigned in the 1970s to function as a pedestrian priority street. Specifically, the idea was to transform this street from a local retail area serving customers from Queens into "shopping hub" that would attract visitors from all of New York City. To better support this economic development objective, 165th Street was closed to regular vehicular traffic for one long block and narrowed to one lane, though still accommodating deliveries to businesses. Prior to its redevelopment, 165th Street functioned as a normal two-way street with one lane of traffic in each direction. The street now has many small to medium size retail uses, as well an indoor shopping mall, Jamaica Colosseum, at one end. The project used different paving and lighting standards, and included new street trees and furniture to enhance the

public realm. This pedestrian mall is managed by the 165th Street Mall Improvement Association.

Table 6: 165th Street Characteristics

Element	Description
Dimensions	The shared section of 165th Street, a one-way street between Jamaica Avenue and 89th Street, is 840 feet and 60 feet wide.
Context	165th Street is located in the borough of Queens in New York City, in Jamaica's Central Business District. This area is a main shopping corridor for local residents. The shared street is located ½ mile north-east of Jamaica Center Station, which serves the E, J & Z subway lines, and 1 mile north-east of Jamaica Station, serving the Long Island Rail Road, a commuter railroad.
Land uses	Adjacent land uses are mainly commercial and office, though there are a number of institutional uses as well such as a library and a post office.
Ground floor	The street functions as a pedestrian mall comprised of small to medium size apparel stores (160 in total) including Jimmy Jazz, Sports World, and Foot Locker. The indoor mall, Colosseum Mall, anchors the northern end of the shared street, and has additional vendors, as well as rooftop parking. Jamaica Bus Terminal, a major bus terminal, is located nearby.
Landscape	Mature street trees line the shared street at regular intervals.
Pavement Treatments	Markings were eliminated and the street is laid with a continuous brick surface. Curbs are indicated by long paving blocks which separate the vehicular roadway (maroon brick) from the pedestrian space (gray brick). While helpful at delineating space, the specific type of pavers being used present maintenance challenges as they often come loose and create tripping hazards, thereby requiring replacement.
Street Furniture	The space features distinctive pedestrian-scaled lampposts, which were recently upgraded by NYCDOT. The shared street lacks places to sit. Large art sculptures are placed on the edge of the sidewalk.
Access	Signage at the entrance of the street reads "No thru traffic – Except deliveries this block". Closed to traffic, except for emergency vehicles, from 12pm-6pm, 7 days a week. Deliveries occur before noon, as NYPD often barricades the entrance to prohibit access.
Intersection	At the entrance at Jamaica Avenue, a signalized intersection with box line markings reinforces to the driver that they are approaching a shared area. Signage along Jamaica Avenue indicates that turns onto the shared portion of the street are prohibited. The terminus of the shared portion at 89th Avenue features a signalized intersection including crosswalks with pedestrian signals.
Parking	There is no parking along 165th Street. This street is completely closed off to vehicular traffic. Metered parking along adjacent streets is provided between 8:30am – 7pm, with the exception of Sundays. There is parking available on the roof of the Colosseum Mall.
Loading	Commercial delivery loading and unloading is permitted along 165th Street outside the streets closure times of 12PM-6PM.

Element	Description
Maintenance	165th Street is maintained by the City of New York City in partnership with the 165th Street Mall Improvement Association; the local Business Improvement Districts (BID). Although the paving blocks create a unique streetscape distinct from adjacent streets, the maintenance of the pavers has been deemed an issue. Under traffic loading, some of the paving blocks have become loose, creating an uneven surface and a trip hazard.

Figure 40 165th Street, Jamaica, Queens, NY

5.2.3 Exhibition Road, Kensington, London

Figure 41: Exhibition Road Photo & Aerial

Exhibition Road has served as a key destination in London since the Great Exhibition of 1851. Institutions such as the Natural History Museum, Victoria and Albert Museum, Science Museum, National Art Library and Royal Albert Hall attract more than 11 million visitors each year, creating large amounts of pedestrian traffic. In 2003 the City decided to create a shared street to better accommodate all users and to de-clutter the street. In 2011, the Exhibition Road project was completed, transforming the street into shared public space designed to entice visitors, students, and local workers. The previous design was dominated by fast-moving traffic and limited pedestrians to narrow sidewalks with few places to cross the street. Removed boundaries and clear rights of way have encouraged drivers to be more cautious, increasing pedestrian safety along Exhibition Street. Slowed vehicular traffic has resulted in a much improved

pedestrian environment and an overall revitalization; attractive storefronts, cafes with outdoor seating and other new additions have created a pleasing public space which is widely regarded as a major success.

Table 7: Exhibition Road Characteristics

Element	Description
Dimensions	The shared section of Exhibition Road, a two-way street between Kensington Road and Thurloe Street, is .49 miles long and 88 feet wide.
Context	Exhibition Road lies to the south of London's Hyde Park and other popular destinations including major cultural institutions. Close to the heart of London, Exhibition Road can be accessed by transit users via any of the four Tube stations that are in its vicinity, as well as bus stops located along the road.
Land uses	The area surrounding Kensington Road has a rich diversity of land uses including commercial, institutional, recreational and residential.
Ground floor	Ground floor uses include restaurants, housing, retail, museums, and educational and religious institutions.
Landscape	The lack of curbs, the irregular placement of trees, car and bike parking, street furniture and other fixed objects necessitates cautious driving while ensuring a vibrant streetscape for pedestrians.
Pavement Treatments	Exhibition Road is marked by a distinct diamond pattern made from contrastingly colored granite pavers . There are no markings or grade differences to separate pedestrians from vehicles, though the drainage channels do provide some demarcation for the visually impaired
Street Furniture	Many cafés have their own outdoor seating areas for patrons along the sidewalk, but there are also public benches staggered along the street, especially near the entrances to major destinations Street lights are located on the sides of the road in the southern segment and located in the middle in the northern segment. Bike racks, bike sharing stations, and car parking "bays" are dispersed in a random fashion along the corridor. At various points along the street are large sculptures and other public art installations.
Access	Exhibition Road is a two-way road with a 20 mile per hour speed limit on vehicles and few if any of the normal vehicular traffic cues. This forces drivers to pay more attention and helps foster a more pedestrian friendly environment.
Intersection	Along the corridor, Exhibition Road is intersected by five other roadways, all of which allow vehicular traffic. Exhibition road features short, wide dividers before intersections; these dividers serve to separate areas where driving is not permitted (such as sides of the road with outdoor seating or street lights) from areas where vehicles may travel. Pedestrian crossings are lightly marked and signalized at intersections.
Parking	Parking is only allowed at marked parking bays along Exhibition Road. Only special permit holders have access to use these bays. No visitor parking is offered along Exhibition Road.
Loading	Loading and unloading, including picking up and dropping off passengers is permitted, but only between the two lines of delineator tactile paving located four meters from the building line on both sides of the road.

Element	Description
Maintenance	Exhibition Rd is maintained by the local borough council, the Royal Borough of Kensington and Chelsea. The large granite pavers set with regularly spaced expansion and contraction joints have proved to be a very durable surface with only street cleaning required.

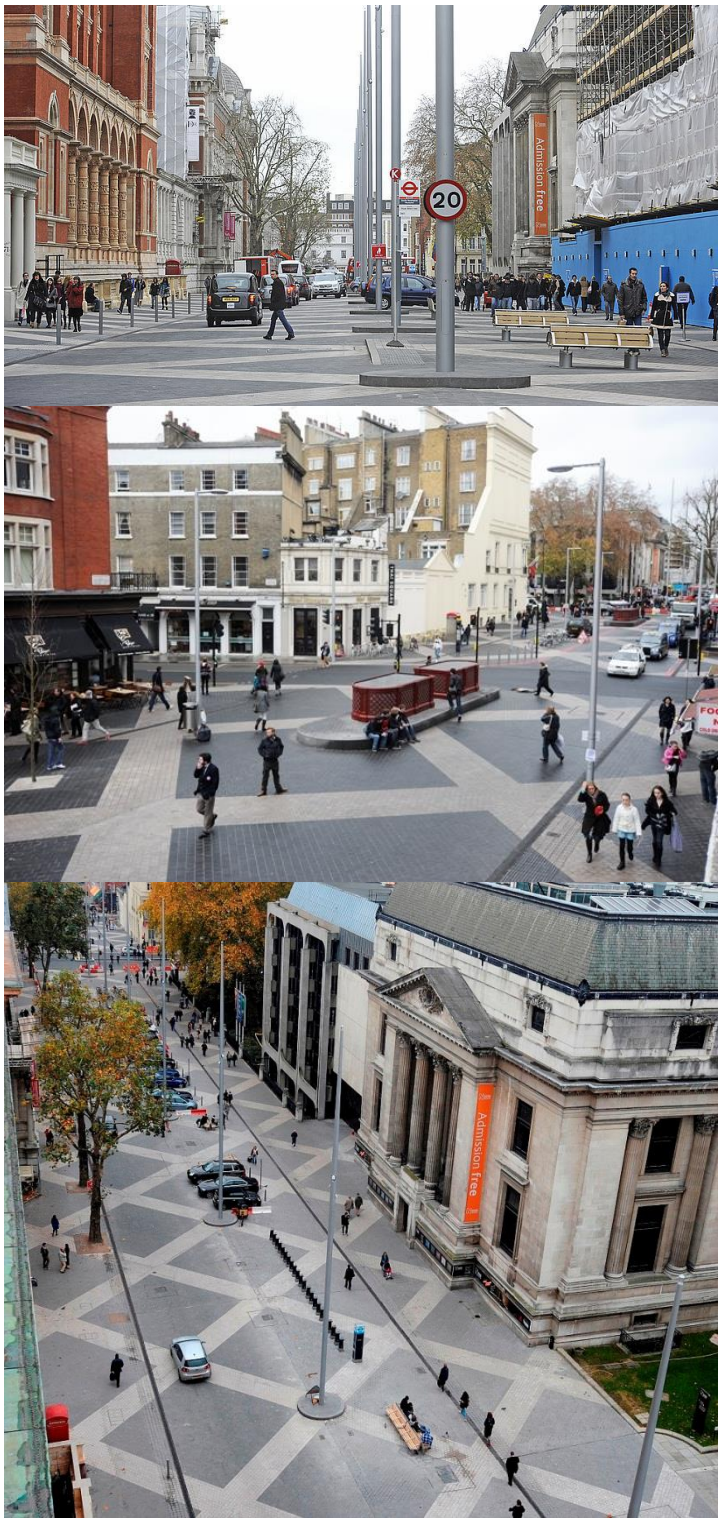


Figure 42 Exhibition Road, Kensington, London

5.2.4 Festival Streets – Davis & Flanders Street, Portland, OR

Figure 43: Festival Streets Photo[9] & Aerial

In 2006 the City of Portland completed construction on the Chinatown Streetscape Improvements Project which included a redesigned and renovated block-long section of Davis Street between 3rd and 4th Avenues. This renovation was prompted by the community's concerns over a lack of public space in the neighborhood. Through this streetscape planning process Davis Street was one location of two locations[10] identified by the city to receive improvements to material type and quality, as well as upgrades to the features on the street and sidewalk. The new design featured curbless streets closed to vehicular traffic for

[9] Photo source: Flickr-Fai Chong
[10] Flanders Street between 3rd and 4th Avenues also received the "Festival Street" improvements.

special occasions and intended to function as a public space. Davis Street has regular two-way traffic operations with on-street parking but this "festival street" can easily be blocked off for events. Although pedestrians cross freely, vehicles do have the right of way. The project was a partnership between the Portland Development Commission and the Portland Office of Transportation.

Table 8: Festival Street Characteristics

Element	Description
Dimensions	The shared section of Davis Street, a two-way street between 3rd Avenue and 4th Avenue is 230 feet long and 50 feet wide.
Context	Located in Portland's Chinatown neighborhood, the street is designed to convert into 'festival streets' to accommodate seasonal events.
Land uses	Adjacent land uses are predominantly low-rise commercial development (1-2 levels) including entertainment and retail. There are also residential and community services uses, as well as a number of surface parking lots.
Ground floor	Ground floor uses along Davis Street feature a travel agent, a language school, and restaurants with decorative facades and outdoor seating.
Landscape	Distinctive landscaped planters with sculptural elements are used to narrow access and calm traffic. There are Gateway elements to help announce entrance into a new space.
Pavement Treatments	The roadway ramps up and sits flush with the side walk. There are no curbs or markings. The majority of the street is paved with large concrete pavers. The roadway is distinguished with a border of darker granite pavers with concrete bollards. The space is ADA compliant using tactile paving indicating the change from the sidewalk to the roadway.
Street Furniture	Street furniture includes distinctive pedestrian-scaled lampposts consistent with the neighborhood and decorative bike racks.
Access	Davis Street provides two-way access with no restrictions for vehicular access. However, sculptural landscape and planters funnel traffic to a one-way access. Vehicles are restricted during seasonal events making the street a pedestrian-only zone.
Intersection	Intersections feature curb extensions to reduce crossing distances, consistent with the rest of the neighborhood. There are no dedicated pedestrian crossings over 3rd or 4th Avenues
Parking	Metered parking is located on both sides of the street between the sculptural landscape planters. There is no parking is permitted between 10pm-3am on Friday and Saturday. Additional metered parking spaces are provided adjacent to Davis Street, with these parking spaces also adhering to the same no parking restrictions from 10pm-3am on Friday and Saturday.
Loading	Loading is permitted on adjacent 3rd Avenue and 4th Avenue.
Maintenance	Davis Street is maintained by the City of Portland. On the first phase of the project, Flanders Festival Street, the City had problems with pavers in the wheel path of the traffic showing spalling. For the second phase, the new installed pavers[11] were durable and they have had no incidents of spalling or cracking.

[11] New pavers sat on a new bedding of a lean concrete base and ASTM C33 coarse multi-grained sand with a 1/8" joint between pavers sealed with heavy-duty joint sand stabilizer.

Figure 44 Festival Streets, Portland, OR

5.2.5 Wall Street - Asheville, North Carolina

Figure 45: Wall Street Photo[12] & Aerial

Wall Street in Asheville, North Carolina was originally a delivery alley for the buildings on Patton Avenue. Over time, the narrow, one-way street with slow speeds and low volumes gained a pedestrian friendly reputation. Then, in the late 1980s, the City of Ashville included Wall Street as part of a larger program to preserve its historic buildings. The streetscape improvements included new cobblestone paving and moving the utilities underground. A few years later metered on-street parking was added help further lower driving speeds. Wall Street now includes 69,000 square feet of retail shops and restaurants, appealing to both locals and tourists. The improvements have transformed Wall Street into a

[12] Photo source: Pinterest-FunkyVilleUSA

quaint destination with heavy pedestrian traffic and a healthy mix of retail destinations.

Table 9: Wall Street Characteristics

Element	Description
Dimensions	The shared section of Wall Street, a one-way street between Otis Street and Battery Park Avenue, is 730 feet long and 38 feet wide.
Context	Wall Street is located in the Downtown Asheville Historic District. Asheville's civic center lies a block to the south.
Land uses	Adjacent land uses are a mix of commercial and retail on ground floor with residential and offices above. Wall Street is part of the Downtown Asheville Historic District, featuring historic architecture. Government buildings with landscaped plazas are located to the west across Otis Street.
Ground floor	Ground floor uses include pub restaurants and boutique retail. A parking garage anchors the western end of Wall Street, which features a rock climbing wall on the façade of the structure.
Landscape	Mature trees line the northern side of the road, at regular intervals. Planter boxes buffer café seating areas.
Pavement Treatments	The roadway ramps up and sits flush with the side walk. Red brick pavers, granite cobble sets and permanent bollards along the street distinguish the sidewalk and roadway spaces. The roadway is pigmented concrete and the sidewalk is constructed of concrete pavers.
Street Furniture	Bollards separate sidewalk and roadway areas. Public benches and trash receptacles line the street; café furniture spills out onto the street. There are distinctive pedestrian-scaled lampposts consistent with the neighborhood and decorative bike racks. Bronze sculptures and graphic street murals are found throughout the neighborhood.
Access	Wall Street is one-way with metered parking. The average speed is 20 mph. Signage marks distinct areas for parking, loading and emergency services.
Intersection	There are no dedicated pedestrian crossings at either intersection. Connection to Wall Street is difficult; pedestrians must walk a block in either direction to a dedicated crossing. At Battery Park Avenue to the north the streetscape is furnished with curb extensions.
Parking	The majority of the street serves as a through traffic street for private vehicles and is dedicated as a Fire Lane. Two dedicated disabled parking spaces are provided before it intersects with Battery Park Avenue - one near the middle of the street and one at the end of the street. Parking dedicated for residential and retail users is available just outside of the area. These parking spaces are indented away from the main roadway to comply with the street's Fire Lane regulation.
Loading	Spaces are dedicated as Loading Zones toward the northern end of the street. Loading is limited to 30 minutes.
Maintenance	Wall Street is maintained by the City of Asheville. The pigmented concrete roadway has cracked in some areas and been patched with asphalt and some of the cobble sets have become loose.

Figure 46 Wall Street, Asheville, NC

5.2.6 Cady's Alley, Washington DC

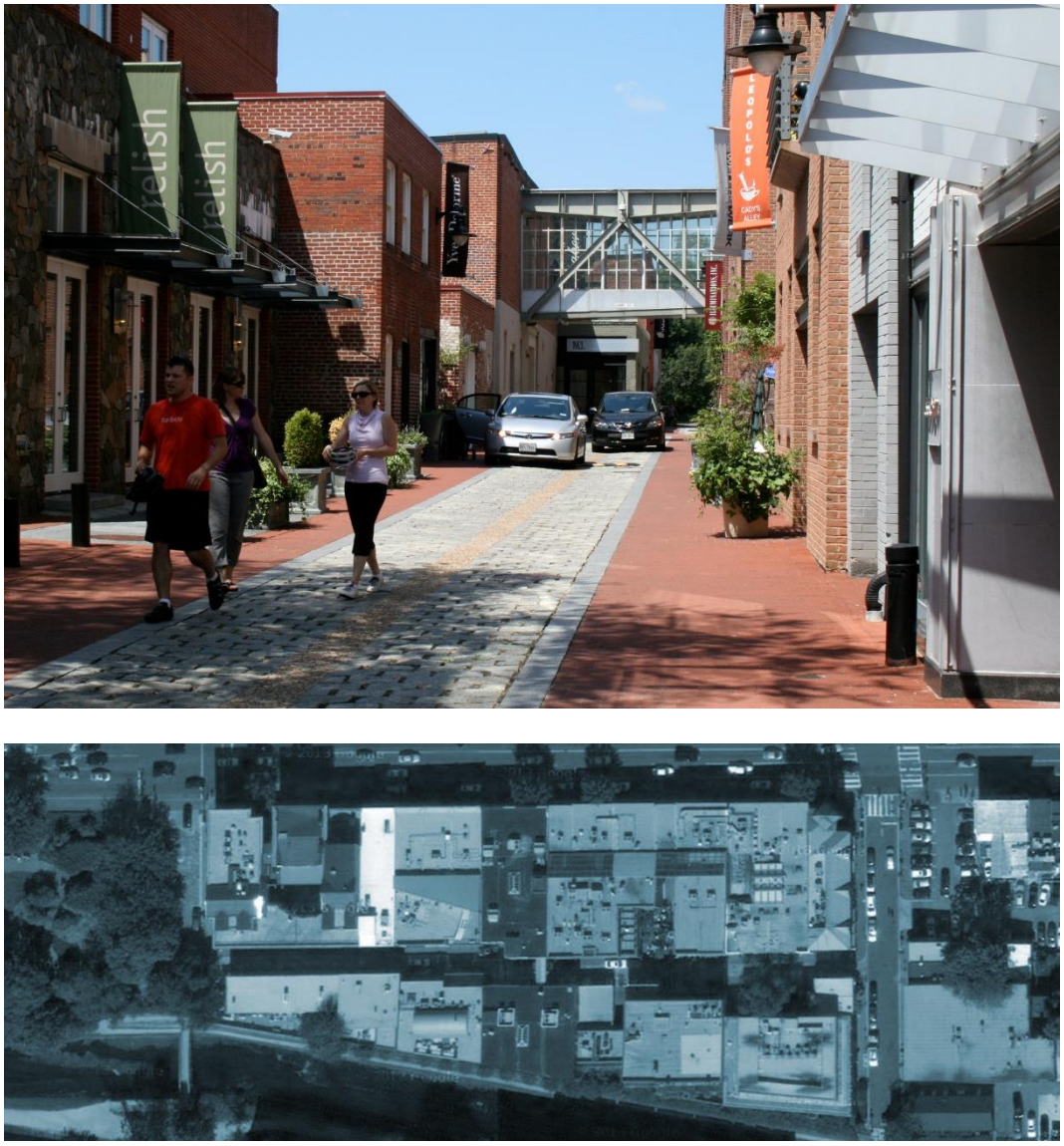


Figure 47: Cady's Alley Photo[13] & Aerial

For many years, Cady's Alley functioned primarily as a service alley for businesses along M Street in Washington D.C.'s Georgetown neighborhood. By the 1980's the street had become largely neglected until a local developer had ideas for improvements. The developer repurposed the alley by building out the adjacent parcels to the alley's edge and converting them to include front entrances for retail and restaurants at a pedestrian scale. Even with the new design, the alley continues to allow deliveries and other service needs. In 2005, the project received a prestigious AIA Honor Award for Urban Design.

[13] Photo source: Flickr – Eric Fidler

Table 10: Cady's Alley Characteristics

Element	Description
Dimensions	Cady's Alley, a one-way shared street between 33rd Street NW and 34th Street NW, parallel to M Street. It is 500 feet long and 22 feet wide.
Context	Washington, D.C.'s historic Georgetown neighborhood, immediately north of the Potomac River, is home to the distinguished university of the same name and some of the most desirable residential properties in the city. This neighborhood is a main commercial and entertainment district in the region that attracts both local visitors and tourists.
Land uses	Adjacent land uses include high-end retail, bars and restaurants, as well as residential uses to the north of the site. The alley is the internal circulation of a 120,000-square-foot retail and residential redevelopment comprising of low-rise, 2-3 story buildings. Access to the Francis Scott Key Memorial park and the Chesapeake and Ohio Canal Towpath trail is located to the west.
Ground floor	Ground floor uses include boutique design shops, furniture stores, and high-end retail. Cafés and restaurants spill out into the alleyway.
Landscape	Planters are used along the alley to define the spaces.
Pavement Treatments	The roadway ramps up and sits flush with the sidewalk. The alley is paved with decorative red brick along the building edge and historic granite Belgian blocks along the roadway. The curb lines are distinguished with long granite pavers.
Street Furniture	Bollards, retaining walls, and concrete planters protect alcove spaces between the buildings which become spill out spaces for adjacent cafés.
Access	Cady's Alley is a one-way street. There are no restrictions for vehicular access.
Intersection	There are no designated pedestrian crossings or treatments at the adjoining, low volume, streets. To the west, continuous street treatment extends the public realm to the park.
Parking	Public Parking is not allowed along the laneway.
Loading	Loading provisions are provided away from the main roadway via indented spaces between buildings. Signage indicating when loading is allowed is limited.
Maintenance	Caddy's Alley is maintained by developer, EastBanc and real estate investors, Jamestown Properties. Some of the long granite pavers distinguishing the roadway have become loose under the wheel tracks of heavy goods vehicles.

Figure 48 Cady's Alley, Washington, D.C.

5.2.7 Other Precedents Considered:

- 16th Street Pedestrian and Transit Mall, Denver, Colorado
- Nicolette Mall, Minneapolis, Minnesota
- State Street, Madison, Wisconsin
- Rockefeller Center, New York, New York
- Jefferson Street, Fisherman's Wharf, San Francisco, California

- Third Street Promenade, Santa Monica, California
- Lynn and Pearl Street, Columbus, Ohio
- Basque Block, Boise, Idaho
- Urban Lounge, St Gallen, Switzerland
- St. Catherine Street, Montreal, Canada

Appendix A

Turning Movement and

Pedestrian Crosswalk Counts

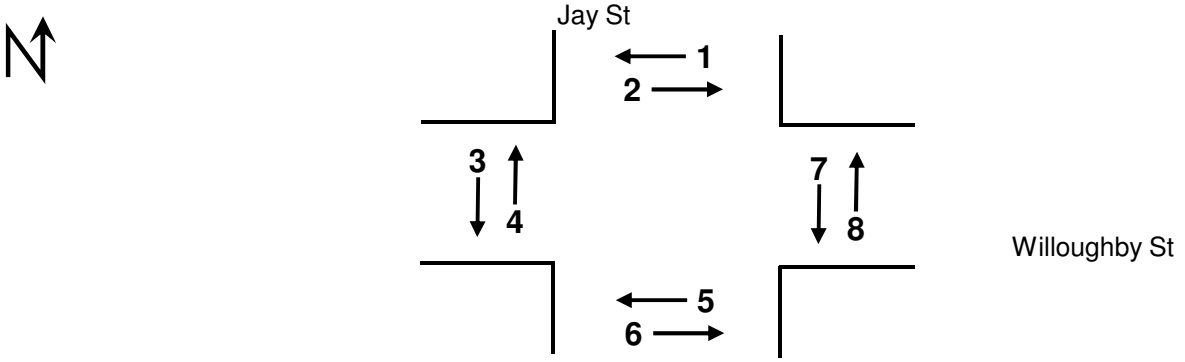
AMERICAN TRAFFIC INFORMATION, INC.

ATI #14084

PEDESTRIAN CROSSWALK COUNTS

Location: #1) Willoughby St & Jay St

Surveyors: _____ **Weather:** _____ **Date:** 6/10/2014



Time End	Movement Number											
	1	2	3	4	5	6	7	8	9	10	11	12
7:15	20	41	18	16	14	26	27	42				
7:30	30	38	60	32	28	21	35	46				
7:45	43	76	67	32	30	42	59	55				
8:00	65	79	74	42	27	63	56	99				
8:15	59	96	81	61	40	40	58	77				
8:30	88	114	108	88	79	57	107	116				
8:45	93	109	134	92	59	48	88	119				
9:00	100	101	112	83	85	79	117	161				
12:15	114	112	172	143	73	92	159	115				
12:30	99	98	127	76	98	117	194	132				
12:45	130	160	178	88	79	121	207	143				
13:00	98	106	189	85	73	82	125	138				
13:15	104	155	217	102	109	119	183	140				
13:30	136	142	168	89	55	86	147	121				
13:45	119	141	150	120	77	85	131	148				
14:00	120	141	133	115	96	105	144	157				
17:15	108	83	147	71	85	94	135	94				
17:30	84	104	122	74	67	109	143	99				
17:45	101	103	165	47	86	108	90	110				
18:00	78	97	96	65	63	98	117	84				
18:15	90	94	103	70	59	62	113	83				
18:30	103	85	114	70	64	73	133	60				
18:45	61	80	91	57	44	68	137	65				
19:00	102	59	103	68	67	77	100	55				

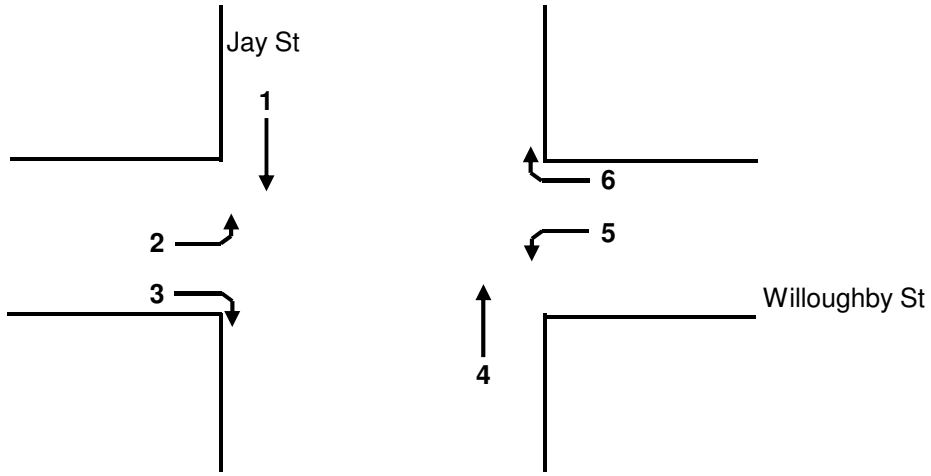
TURNING MOVEMENT COUNTS

ATI

Location: #1) Willoughby St & Jay St

Surveyors: _____ **Weather:** _____ **Date:** 6/10/2014

Sketch



Classes
Car
Taxi
Truck
Bus

Time End	Class	Movement Number 1	2	3	4	5	6	7	8	9	10	11
7:15 AM	Car	26	0	1	83	3	8					
	Taxi	5	0	0	15	0	1					
	Truck	3	0	1	9	3	1					
	Bus	4	0	0	7	0	0					
7:30 AM	Car	18	0	1	72	6	3					
	Taxi	3	1	0	14	1	3					
	Truck	6	1	0	8	1	0					
	Bus	5	0	0	7	0	1					
7:45 AM	Car	29	3	3	73	6	6					
	Taxi	2	1	1	11	2	3					
	Truck	4	1	0	6	2	2					
	Bus	4	0	0	7	0	0					
8:00 AM	Car	28	13	11	70	5	15					
	Taxi	3	0	1	10	4	1					
	Truck	6	0	0	6	1	3					
	Bus	8	0	0	8	0	0					
8:15 AM	Car	28	5	6	70	9	5					
	Taxi	7	0	1	12	1	2					
	Truck	4	0	0	7	1	2					
	Bus	6	0	0	8	1	0					
8:30 AM	Car	30	11	8	68	13	9					
	Taxi	7	1	1	10	3	1					
	Truck	4	2	1	9	3	0					
	Bus	6	0	0	7	3	1					

Location: #1) Willoughby St & Jay St **Date:** 6/10/2014

Time End	Class	Movement Number 1	2	3	4	5	6	7	8	9	10	11
8:45 AM	Car	28	4	6	57	7	4					
	Taxi	5	0	0	8	1	1					
	Truck	3	0	0	7	0	2					
	Bus	9	0	0	7	5	1					
9:00 AM	Car	43	17	7	52	20	13					
	Taxi	11	0	0	8	3	4					
	Truck	8	0	0	4	2	1					
	Bus	4	0	0	4	2	2					
12:15 PM	Car	47	2	4	48	15	11					
	Taxi	12	0	1	7	3	5					
	Truck	3	0	1	4	1	3					
	Bus	5	0	0	2	0	0					
12:30 PM	Car	46	4	11	40	15	11					
	Taxi	9	0	2	9	5	1					
	Truck	2	0	1	8	1	1					
	Bus	4	0	0	3	0	0					
12:45 PM	Car	49	2	13	35	15	11					
	Taxi	12	2	0	14	2	0					
	Truck	2	1	0	2	3	2					
	Bus	4	0	0	4	0	0					
1:00 PM	Car	41	3	9	39	15	17					
	Taxi	14	0	0	12	1	1					
	Truck	1	0	0	5	1	0					
	Bus	7	0	0	4	0	0					
1:15 PM	Car	51	6	6	48	18	28					
	Taxi	9	0	2	5	1	2					
	Truck	4	0	1	6	1	2					
	Bus	3	0	0	2	0	0					
1:30 PM	Car	38	8	4	51	14	17					
	Taxi	14	0	1	6	0	2					
	Truck	3	0	0	5	0	2					
	Bus	5	0	0	3	0	0					
1:45 PM	Car	36	6	7	46	13	14					
	Taxi	12	2	3	6	1	2					
	Truck	2	1	0	2	1	0					
	Bus	3	0	0	3	1	0					

Location: #1) Willoughby St & Jay St **Date:** 6/10/2014

Time End	Class	Movement Number 1	2	3	4	5	6	7	8	9	10	11
2:00 PM	Car	48	7	3	47	15	15					
	Taxi	14	1	2	9	1	0					
	Truck	5	0	0	3	5	2					
	Bus	6	0	0	3	0	0					
5:15 PM	Car	51	7	5	49	18	20					
	Taxi	19	0	0	16	5	3					
	Truck	4	1	0	5	2	0					
	Bus	7	0	0	2	0	0					
5:30 PM	Car	67	1	3	49	13	18					
	Taxi	12	0	0	14	11	4					
	Truck	7	0	1	4	1	0					
	Bus	5	0	0	4	0	0					
5:45 PM	Car	53	7	3	48	17	11					
	Taxi	16	0	1	14	3	1					
	Truck	2	0	0	3	0	0					
	Bus	8	0	0	4	0	0					
6:00 PM	Car	45	6	5	37	15	12					
	Taxi	17	0	0	18	3	1					
	Truck	5	0	0	1	0	2					
	Bus	8	0	0	3	0	0					
6:15 PM	Car	53	1	8	44	16	8					
	Taxi	18	0	0	27	2	3					
	Truck	1	0	0	4	0	1					
	Bus	6	0	0	4	0	0					
6:30 PM	Car	55	2	3	45	8	10					
	Taxi	21	0	0	19	5	1					
	Truck	4	0	0	2	0	0					
	Bus	8	0	0	3	0	0					
6:45 PM	Car	55	4	4	36	18	12					
	Taxi	20	0	1	18	3	1					
	Truck	2	0	0	3	1	1					
	Bus	7	0	0	4	0	0					
7:00 PM	Car	48	1	2	51	13	14					
	Taxi	22	1	2	20	4	1					
	Truck	2	0	0	3	0	0					
	Bus	4	0	0	3	0	0					

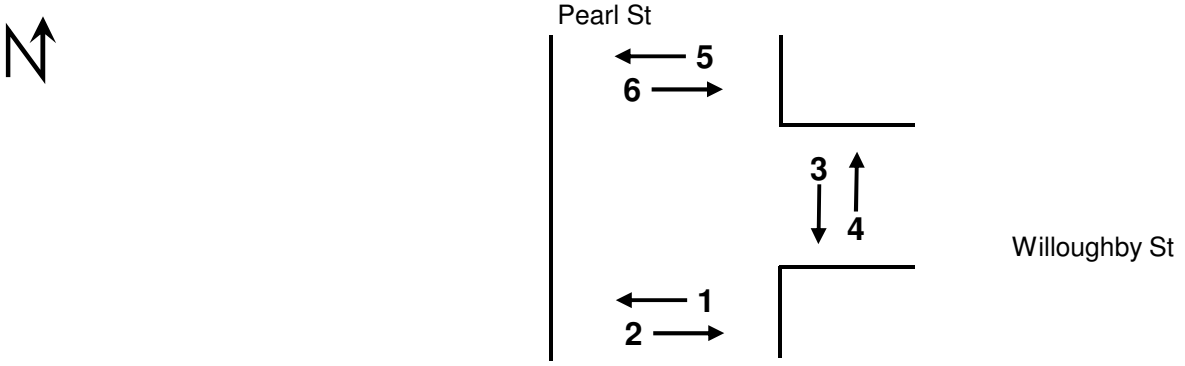
AMERICAN TRAFFIC INFORMATION, INC.

ATI #14084

PEDESTRIAN CROSSWALK COUNTS

Location: #2) Willoughby St & Pearl St

Surveyors: _____ **Weather:** _____ **Date:** 6/10/2014



Time End	Movement Number											
	1	2	3	4	5	6	7	8	9	10	11	12
7:15	13	10	2	5	74	37						
7:30	8	12	1	8	83	46						
7:45	23	24	4	30	144	90						
8:00	35	39	8	41	158	92						
8:15	41	22	14	43	159	125						
8:30	43	51	20	57	299	175						
8:45	44	64	10	43	309	137						
9:00	44	49	9	26	253	108						
12:15	65	47	24	34	131	111						
12:30	81	60	16	36	151	116						
12:45	75	58	27	50	155	141						
13:00	48	54	33	49	156	119						
13:15	65	40	26	51	132	152						
13:30	85	43	26	34	132	140						
13:45	101	70	16	32	131	102						
14:00	78	57	8	41	103	131						
17:15	53	51	5	24	132	228						
17:30	72	55	5	23	161	186						
17:45	45	53	6	17	123	132						
18:00	59	48	0	12	132	124						
18:15	53	27	4	11	121	101						
18:30	42	38	2	12	106	87						
18:45	40	22	3	14	85	90						
19:00	26	37	4	16	155	168						

AMERICAN TRAFFIC INFORMATION, INC.

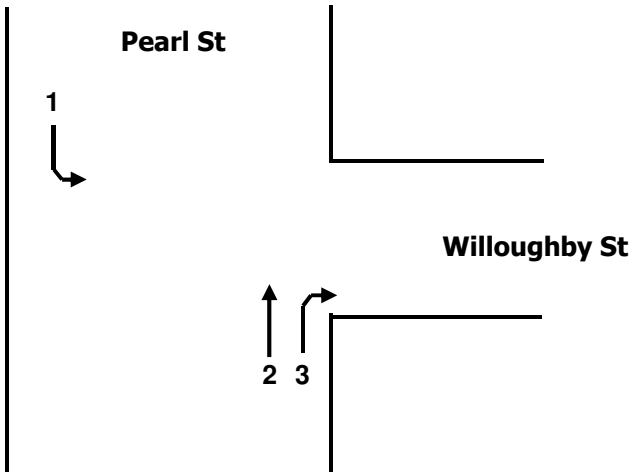
TURNING MOVEMENT COUNTS

ATI #14084

Location: #2) Willoughby St & Pearl St

Surveyors: _____ **Weather:** _____ **Date:** 6/10/2014

Sketch



Classes
Car
Taxi
Truck
Bus

Time End	Class	Movement Number 1	2	3	4	5	6	7	8	9	10	11	12
7:15 AM	Car	1	0	1									
	Taxi	0	0	0									
	Truck	0	0	2									
	Bus	0	0	0									
7:30 AM	Car	0	0	2									
	Taxi	0	0	0									
	Truck	0	0	0									
	Bus	0	0	0									
7:45 AM	Car	3	5	4									
	Taxi	0	0	0									
	Truck	1	0	2									
	Bus	0	0	0									
8:00 AM	Car	9	12	8									
	Taxi	0	0	0									
	Truck	0	0	0									
	Bus	0	0	0									
8:15 AM	Car	5	11	6									
	Taxi	0	0	0									
	Truck	0	0	3									
	Bus	0	0	0									
8:30 AM	Car	11	7	9									
	Taxi	0	0	0									
	Truck	0	0	2									
	Bus	0	0	0									

Location: #2) Willoughby St & Pearl St **Date:** 6/10/2014

Time End	Class	Movement Number 1	2	3	4	5	6	7	8	9	10	11	12
8:45 AM	Car	4	4	5									
	Taxi	0	0	0									
	Truck	0	0	0									
	Bus	0	0	0									
9:00 AM	Car	7	4	11									
	Taxi	0	0	0									
	Truck	0	0	0									
	Bus	0	0	0									
12:15 PM	Car	2	4	2									
	Taxi	0	0	0									
	Truck	0	0	1									
	Bus	0	0	0									
12:30 PM	Car	1	8	12									
	Taxi	0	0	0									
	Truck	0	0	0									
	Bus	0	0	0									
12:45 PM	Car	4	2	11									
	Taxi	0	0	0									
	Truck	0	0	1									
	Bus	0	0	0									
1:00 PM	Car	3	0	12									
	Taxi	0	0	0									
	Truck	0	0	1									
	Bus	0	0	0									
1:15 PM	Car	5	2	13									
	Taxi	0	0	1									
	Truck	0	0	0									
	Bus	0	0	0									
1:30 PM	Car	3	2	12									
	Taxi	0	0	1									
	Truck	0	0	2									
	Bus	0	0	0									
1:45 PM	Car	3	4	10									
	Taxi	0	0	0									
	Truck	0	0	1									
	Bus	0	0	0									

Location: #2) Willoughby St & Pearl St **Date:** 6/10/2014

Time End	Class	Movement Number 1	2	3	4	5	6	7	8	9	10	11	12
2:00 PM	Car	4	0	7									
	Taxi	0	0	1									
	Truck	0	0	0									
	Bus	0	0	0									
5:15 PM	Car	4	4	7									
	Taxi	0	0	0									
	Truck	0	1	0									
	Bus	0	0	0									
5:30 PM	Car	0	1	3									
	Taxi	0	0	0									
	Truck	0	0	1									
	Bus	0	0	0									
5:45 PM	Car	4	1	8									
	Taxi	0	0	0									
	Truck	0	0	0									
	Bus	0	0	0									
6:00 PM	Car	1	1	7									
	Taxi	0	0	0									
	Truck	0	0	2									
	Bus	0	0	0									
6:15 PM	Car	2	2	9									
	Taxi	0	0	0									
	Truck	0	0	0									
	Bus	0	0	0									
6:30 PM	Car	2	0	6									
	Taxi	0	0	0									
	Truck	0	0	0									
	Bus	0	0	0									
6:45 PM	Car	3	1	5									
	Taxi	0	0	1									
	Truck	0	0	0									
	Bus	0	0	0									
7:00 PM	Car	0	0	7									
	Taxi	0	0	0									
	Truck	0	0	0									
	Bus	0	0	0									

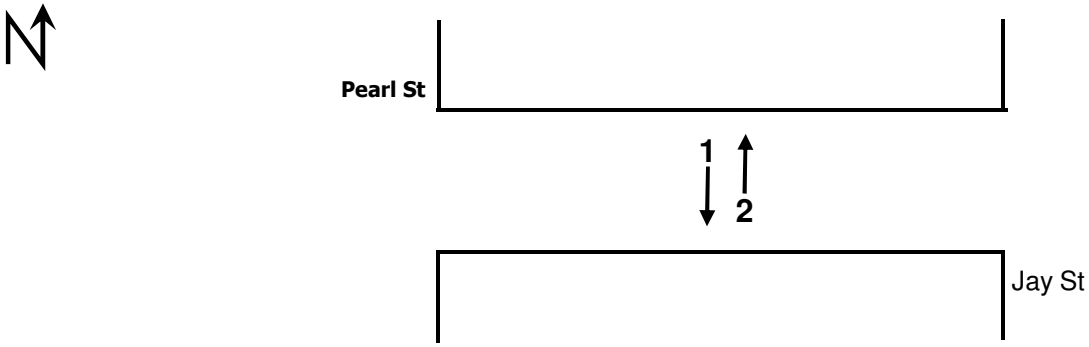
AMERICAN TRAFFIC INFORMATION, INC.

ATI #14084

PEDESTRIAN CROSSWALK COUNTS

Location: Loc #3 Willoughby bet Pearl St & Jay St

Surveyors: _____ **Weather:** _____ **Date:** 6/10/2014



Time End	Movement Number											
	1	2	3	4	5	6	7	8	9	10	11	12
7:15	9	7										
7:30	15	8										
7:45	35	10										
8:00	34	7										
8:15	41	9										
8:30	35	7										
8:45	63	16										
9:00	61	17										
12:15	29	22										
12:30	18	28										
12:45	30	35										
13:00	26	26										
13:15	36	42										
13:30	21	28										
13:45	28	31										
14:00	31	39										
17:15	30	12										
17:30	21	17										
17:45	13	22										
18:00	16	24										
18:15	15	9										
18:30	10	13										
18:45	14	14										
19:00	6	9										

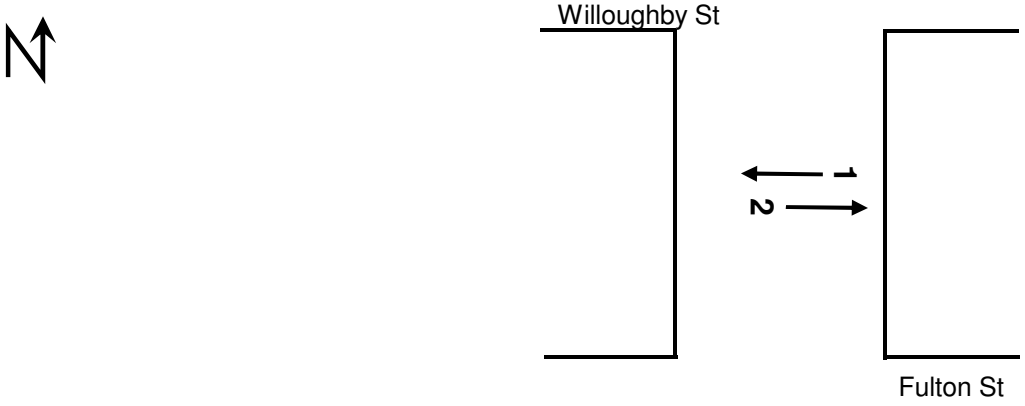
AMERICAN TRAFFIC INFORMATION, INC.

ATI #14084

PEDESTRIAN CROSSWALK COUNTS

Location: Loc #4 Pearl St bet Fulton St & Willoughby St

Surveyors: _____ **Weather:** _____ **Date:** 6/10/2014



Time End	Movement Number											
	1	2	3	4	5	6	7	8	9	10	11	12
7:15	10	1										
7:30	22	4										
7:45	11	10										
8:00	14	16										
8:15	28	15										
8:30	26	18										
8:45	28	16										
9:00	30	17										
12:15	13	14										
12:30	22	19										
12:45	24	20										
13:00	32	37										
13:15	31	24										
13:30	28	30										
13:45	19	28										
14:00	18	24										
17:15	14	17										
17:30	22	18										
17:45	13	15										
18:00	14	12										
18:15	9	7										
18:30	12	7										
18:45	7	3										
19:00	7	7										

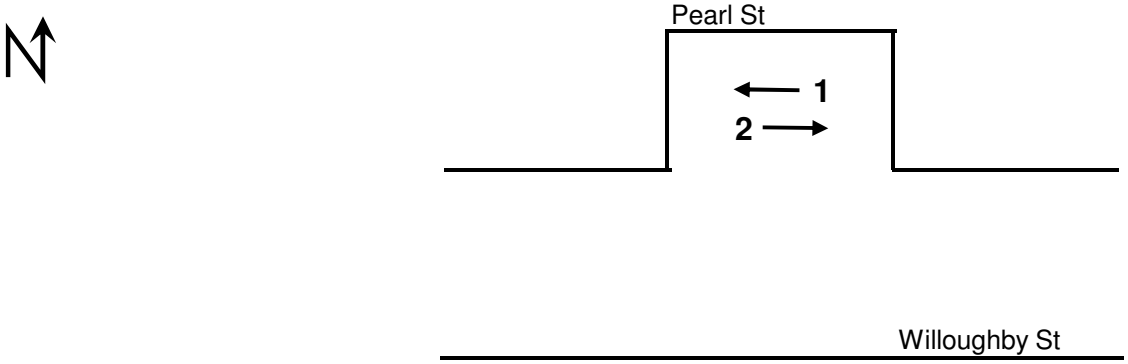
AMERICAN TRAFFIC INFORMATION, INC.

ATI #14084

PEDESTRIAN CROSSWALK COUNTS

Location: Loc #5 Pearl St bet Willoughby St & Pedestrian Str Dead End

Surveyors: _____ **Weather:** _____ **Date:** 6/10/2014



Time End	Movement Number											
	1	2	3	4	5	6	7	8	9	10	11	12
7:15	10	6										
7:30	11	8										
7:45	12	6										
8:00	26	28										
8:15	17	27										
8:30	13	8										
8:45	16	9										
9:00	25	7										
12:15	41	33										
12:30	21	17										
12:45	29	26										
13:00	28	24										
13:15	34	27										
13:30	18	20										
13:45	25	19										
14:00	23	14										
17:15	17	20										
17:30	20	19										
17:45	11	18										
18:00	13	9										
18:15	6	10										
18:30	9	6										
18:45	8	4										
19:00	5	3										