

5. PROBLEM IDENTIFICATION

5.1 OVERVIEW

Based on the study's principles, goals, and objectives, as well as the quantitative data and qualitative input documented above, the deficiencies in the current surface transit network can be summarized into six primary categories: bus operations/reliability, areas underserved by service transit, overlapping bus routes, passenger experience, fare collection, and problematic intersections. Each issue is described below.

5.2 BUS OPERATIONS/RELIABILITY

Significant bus service operates in the Study Area, with many routes running on frequent headways. Operations are hindered by heavy traffic volumes and conflicting curbside demands, which degrade service reliability. As shown above, schedules for three primary routes achieve an 80% on-time rate, for a Level of Service of "D". Focus group attendees and survey respondents confirmed that without bus service that reliably takes the same amount of time each trip, they will not use buses as their primary mode (reflecting U.S. Census Journey to Work data that shows only 3% of residents in the Study Area commute by bus). Key routes that were identified as unreliable include the B61 and B41. Intersections noted for significant delays include Flatbush Avenue / Atlantic Avenue / 4th Avenue and Flatbush Avenue / Livingston Street.

5.3 UNDERSERVED AREAS

While bus accessibility is generally available throughout the study area, there are some areas that could be considered underserved. Focus groups, field surveys, and GIS analysis identified several of these areas. This assessment does not take into account the availability of subway service within these areas. The focus is on the strength of the surface transit system rather than on the strength of the system as a whole.

Figure 54 shows the weighted density of bus stops in the Study Area. Green areas indicate locations with a higher density of bus stops. This map assigns a higher weight to bus stops that have more than one route. This means that if there are four bus routes at a given stop, then that stop is counted as four stops instead of just one. This weighting system more accurately represents the availability of service because a stop that is used by four bus routes gives riders more service options and therefore affords them more mobility than a stop that is only used by one bus route. In addition, the number of bus routes at a particular stop is an indication of the frequency that buses arrive at the station. This map indicates that DUMBO (including the ferry landing), the waterfront and parallel to the new Brooklyn Bridge Park, and Fort Greene are potentially underserved by surface transit. DUMBO and the waterfront are both areas that have been identified in focus group sessions and traveler surveys as areas that need additional service.

5.4 OVERLAPPING SERVICE

While the 17 bus routes that serve Downtown Brooklyn are important and necessary because they serve a variety of neighborhoods throughout Brooklyn, problems arise when they converge in Downtown. Figure 55 shows the bus route density within the Study Area. Green portions of the map have a higher density of bus routes, while red portions are farther from current bus routes. This map clearly indicates that there is a concentration of bus lines along Flatbush Avenue, Fulton Street, and Livingston Street, and around Cadman Plaza, which is indicative of overlapping routes in certain stretches of Downtown. Overlapping service is an issue for surface transportation as a high density of bus routes competing with each other and other modes for lane space often leads to bus congestion and unreliable service.

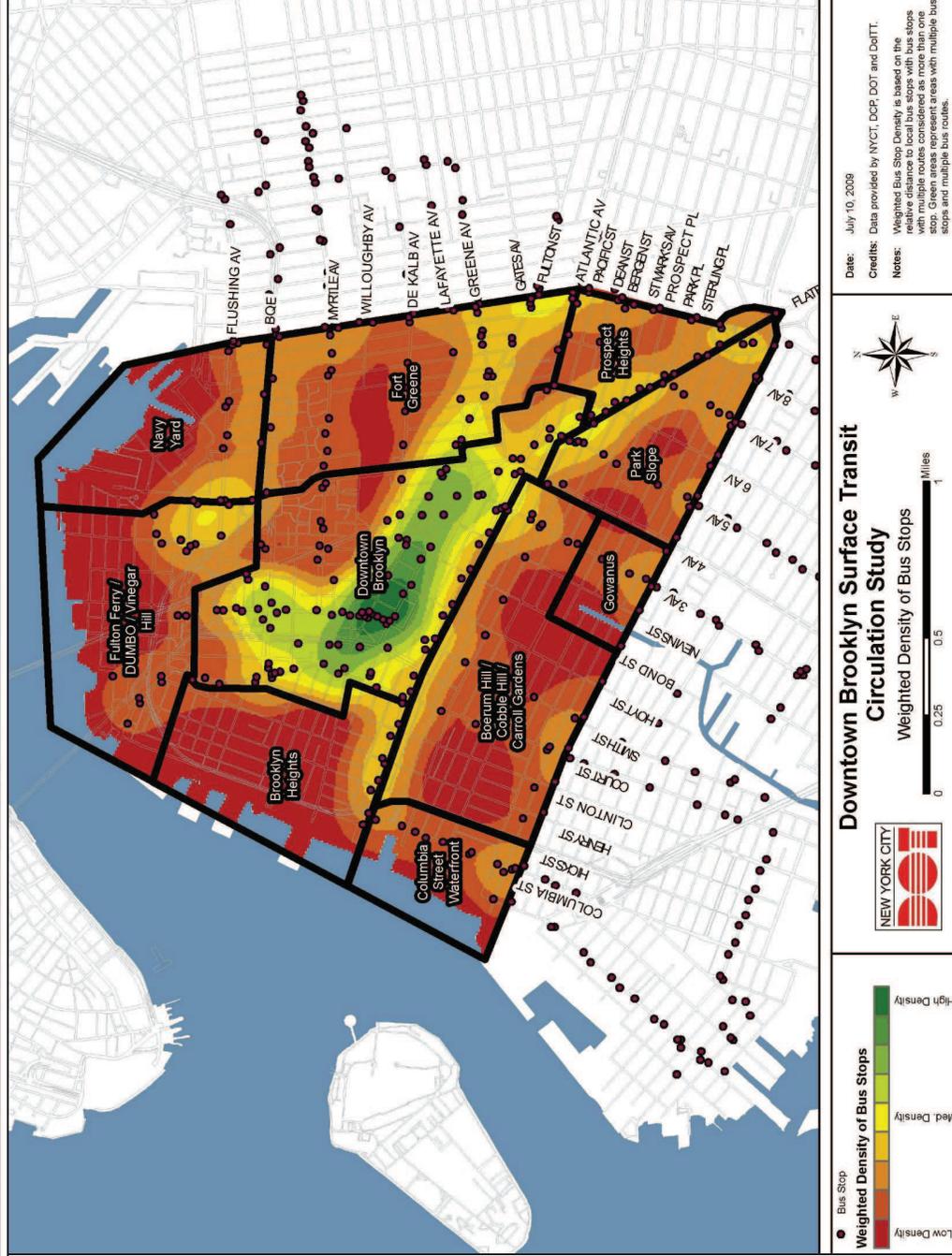


Figure 54 - Weighted Bus Stop Density

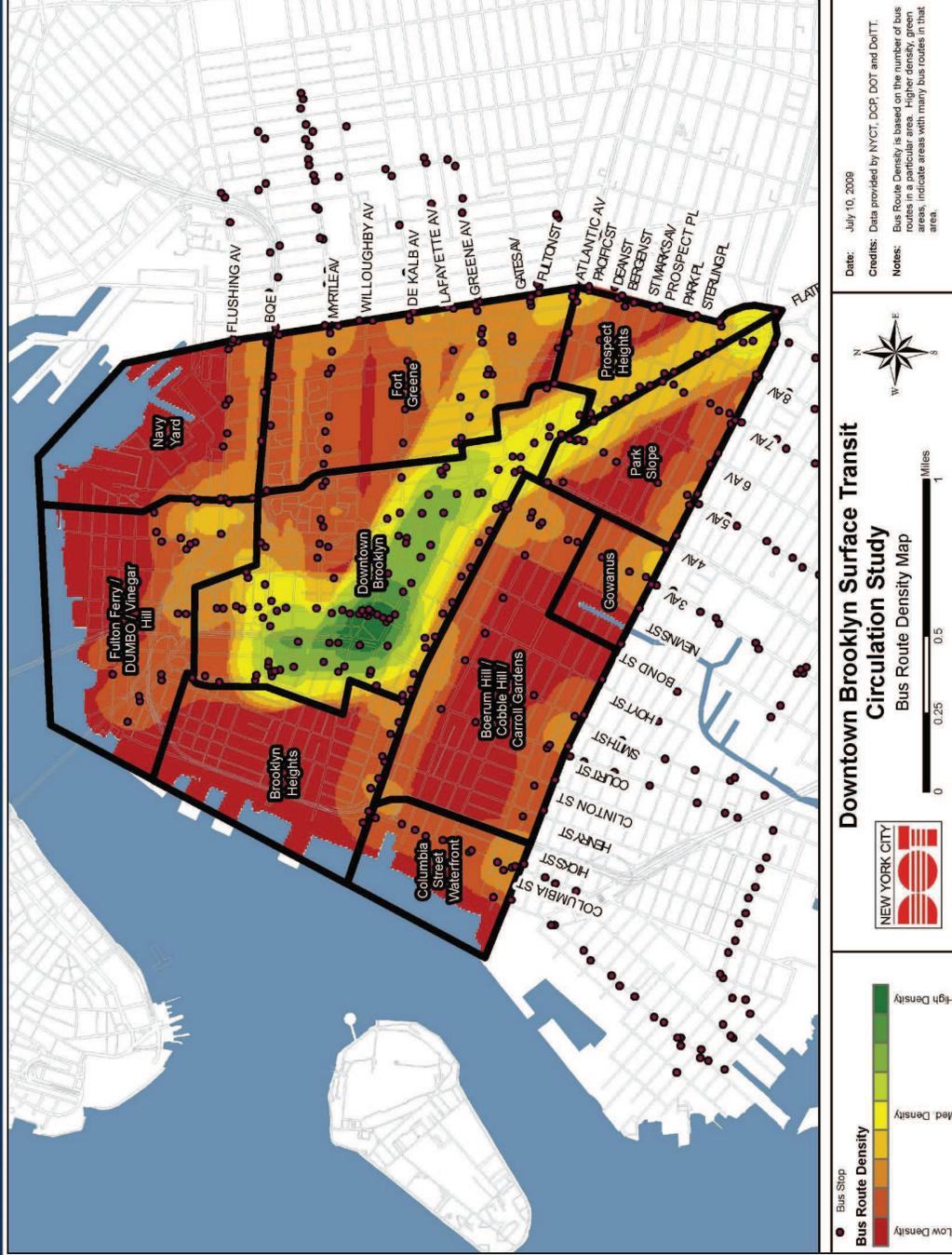


Figure 55 - Bus Line Density

5.5 PASSENGER EXPERIENCE

According to Census data, the Study Area’s resident population is aging. This was confirmed at the focus groups, where residents told the Project Team that aging residents are more comfortable riding the bus than many other modes (subway, bike, and frequently walking). Memories of pleasant bus trips, comfortably sitting while watching the neighborhood pass by the window were recounted. However, the bus is currently perceived by many of these potential riders as overcrowded, unreliable, and confusing. Additionally, waiting conditions at bus stops were reported to be uncomfortable as many stops do not include shelters or benches (Figure 56). Uncertainty about whether the posted schedule is still in effect was also noted.



Figure 56 - Flatbush Avenue / Atlantic Avenue Bus Stop

5.6 FARE COLLECTION

During field observations and focus groups sessions, several issues arose with the method of fare collection for the surface transit system. Transaction time using the MetroCard aboard the buses cause higher dwell times at high traffic bus stops. The *Transit Capacity and Quality of Service Manual* suggests that passenger service time for dipping the MetroCard is about 4.2 seconds per passenger.¹⁶ High volume and high dwell times have been identified at several bus stops, including those along Livingston Street, specifically at Smith Street, and Flatbush Avenue at Atlantic Avenue. In addition to high dwell times the placement of Ticket Vending Machines (TVM) has also been identified as a problem. TVM are only located in subway stations, below street levels. Surface transit users are unable to buy new MetroCards, refill MetroCards, or check their MetroCard balance. As a result, potential bus users are discouraged from using the system.

5.7 PROBLEMATIC INTERSECTIONS

Vehicular Congestion and Level of Service Issues

One of the key issues raised at focus group, stakeholder, and public meetings is the level of vehicular congestion at multiple intersections within the Study Area. Based on data collected from previous studies,¹⁷ there are a number of congested intersections within each of the four corridors in the Core Study Area. At these intersections, the measure of vehicular congestion in terms of service delay, or Level of Service (LOS), is E or F. In general, LOS A, B, and C is considered “highly favorable to fair levels of traffic” while LOS E is considered at “the limit of acceptable delay” and LOS F is an “unacceptable” delay. Table 36 defines LOS delay according to the Transportation Research Board’s *Highway Capacity Manual, 2000*.

¹⁶ Transit Capacity and Quality of Service Manual, 2nd Edition, 2004.

¹⁷ In particular the *Atlantic Yards Arena and Redevelopment Project EIS Final Environmental Impact Statement, Chapter 12: Traffic and Parking* prepared for Empire State Development corporation and published in November, 2006, and the *Adams Street High School EIS*, prepared by AKRF and published in 2006,

Table 36 - LOS Criteria for Signalized Intersections

LOS	Delay (seconds)
A	≤ 10.0
B	> 10.0 and ≤ 20.0
C	> 20.0 and ≤ 35.0
D	> 35.0 and ≤ 55.0
E	> 55.0 and ≤ 80.0
F	>80.0

This report defines LOS E and F as “congested.” Based on this definition, the primary **congested** areas in the four corridors for which data was previously published include those listed on the following pages.

Jay Street/Adams Street/Cadman Plaza Corridor (Figure 57)

Congested Signalized Intersections:

- Adams Street/Tillary Street intersection LOS F (AM and PM peak)
- Livingston Street/Boerum Place LOS E/F (PM Peak 5-6pm)
- Atlantic Avenue/Court Street LOS E/F (Saturday 4-5pm)
- Atlantic Avenue/Boerum Place LOS E/F (Weekdays 12-1pm, Saturday 4-5pm)
- Atlantic Avenue/Smith Street LOS E/F (Weekdays 8am-1pm and 5-6pm, Saturday 4-5pm)

Congested Lanes:

- Tillary Street/Adams Street Eastbound Left Lane LOS F (AM Peak) and LOS E (PM Peak)
- Tillary Street/Adams Street Westbound Through Lane LOS E (AM and PM Peak)
- Tillary Street/Jay Street Eastbound Left Lane LOS E (AM Peak)
- Tillary Street/Jay Street Westbound Left Lane LOS E (AM Peak)
- Willoughby Street/Jay Street Westbound Left, Through and Right Lanes LOS F (AM and PM Peak)
- Fulton Street/Adams Street Northbound Left Lane LOS E (PM Peak)

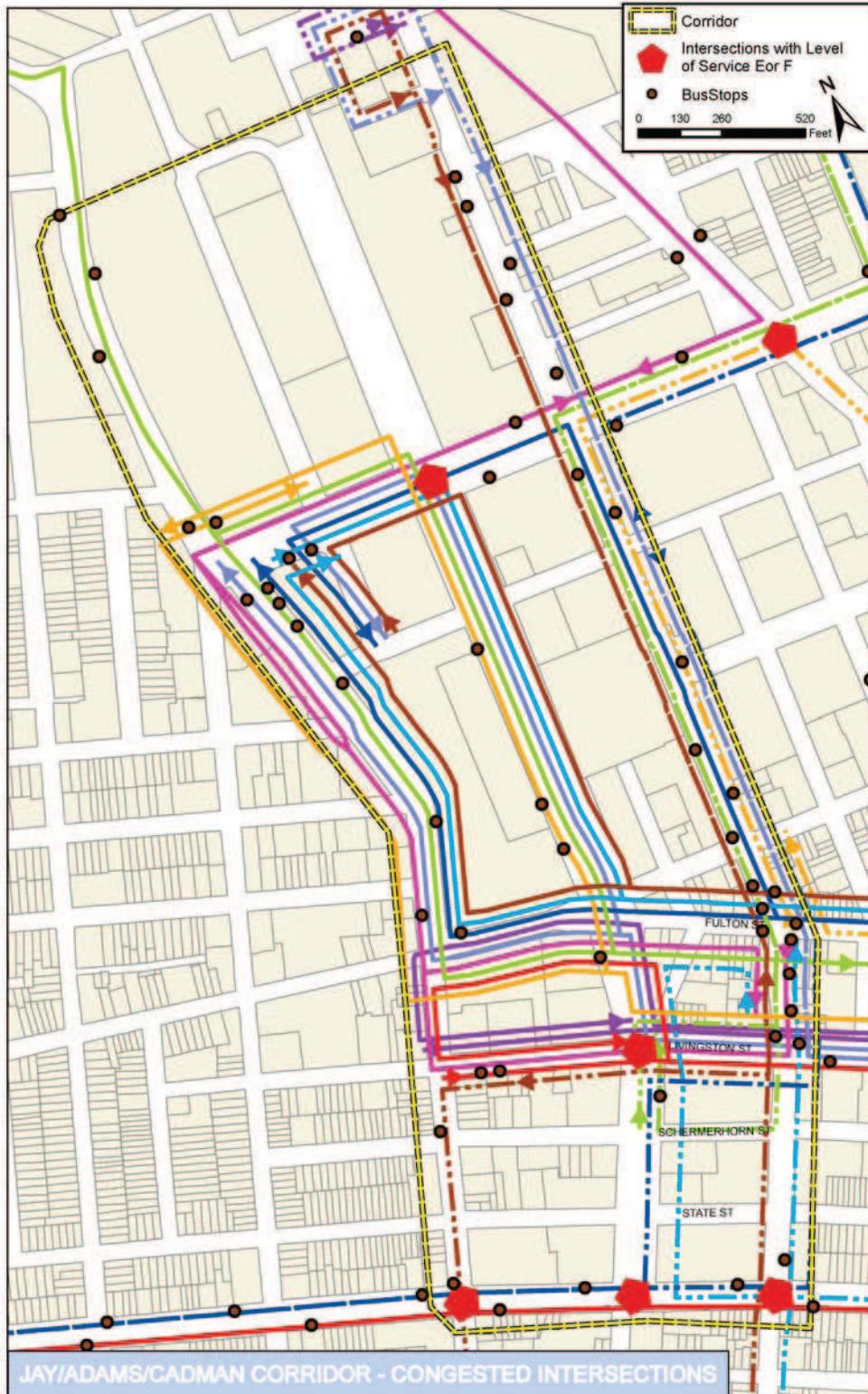


Figure 57 - Jay Street / Adams Street / Cadman Plaza Corridor - Critical Intersection LOS

Fulton Street/Livingston Street Corridor

Only a limited amount of existing data was available for the Livingston/Fulton corridor. This data is currently being collected as part of a separate task. When completed, it will be included with this information.

Atlantic Avenue Corridor (Figure 58)

Congested Signalized Intersections:

- Atlantic Avenue/Hoyt Street LOS E/F (Weekdays 5-6PM, Saturday 4-5pm)
- Atlantic Avenue/Bond Street LOS E/F (Weekdays 8am-6pm, Saturday 4-5pm)
- Atlantic Avenue/Nevins Street LOS E/F (Weekdays 8-9am and 5-6pm, Saturday 1-5pm)
- Atlantic Avenue/3rd Avenue LOS E/F (Weekdays 8-9am, Saturday 1-5pm)
- Atlantic Avenue/4th Avenue LOS E/F (Weekdays 8-9am and 5-8pm, Saturday 1-5pm)
- Atlantic Avenue /5th Avenue LOS E/F (Weekdays 8-9am and 5-8pm, Saturday 1-2pm)
- Atlantic Avenue/S. Portland LOS E/F (Weekdays 5-8pm, Saturday 1-5pm)



Figure 58 - Atlantic Avenue Corridor - Critical Intersection LOS

Flatbush Avenue Corridor (Figure 59)

Congested Signalized Intersections:

- Flatbush Avenue/Tillary Street LOS F (Weekdays 8am-8pm, Saturday 1-5pm)
- Flatbush Avenue /Myrtle Street LOS E/F (Weekdays 8am-11pm, Saturday 1-5pm)
- Flatbush Avenue/Willoughby Street LOS E/F (Weekdays 8am-8pm, Saturday 1-5pm)
- Flatbush Avenue/DeKalb Avenue LOS E/F (Weekdays 8am-8pm, Saturday 1-5pm)
- Flatbush Avenue/Fulton Street LOS E/F (Weekdays 8-9am and 5-11pm, Saturday 4-5pm)
- Flatbush Avenue/Livingston Street LOS E/F (Weekdays 8-9am and 5-6pm)
- Flatbush Avenue/Lafayette Avenue LOS E/F (Weekdays 8-9am and 5-8pm, Saturday 4-5pm)
- Flatbush Avenue/4th Avenue LOS E/F (Weekdays 5-6pm)
- Flatbush Avenue/Atlantic Avenue LOS E/F (Weekdays 8-9am)
- Flatbush Avenue/5th Avenue LOS E/F (Weekdays 8-9am and 7-11pm, Saturday 1-2pm)
- Flatbush Avenue/Dean Street LOS E/F (Weekdays 7-8pm and Saturday 1-5pm)

Congested Lanes:

- Flatbush Avenue /Tillary Street Eastbound Left Lane LOS F (AM and PM Peak)
- Flatbush Avenue /Tillary Street Eastbound Through and Right Lane LOS E (AM Peak)
- Flatbush Avenue /Tillary Street Northbound Left Lane LOS F (AM and PM Peak)
- Flatbush Avenue/Tillary Street Southbound Left Lane LOS F (AM Peak) and E (PM Peak)
- Flatbush Avenue /Willoughby Street Eastbound Left Lane LOS F (AM and PM Peak)
- Flatbush Avenue /Willoughby Street Northbound Left Lane LOS F (AM and PM Peak)



Figure 59 - Flatbush Avenue Corridor - Critical Intersection LOS

Pedestrian Safety

Three intersections in the Study Area have been identified as problematic to pedestrians, with potential bus riders stating they cannot reach bus stops at these locations due to safety concerns. These areas have been identified from both field observation and results from focus group sessions. Each area is detailed in the following pages.

The first area is the intersection around Atlantic Avenue / Flatbush Avenue / 4th Avenue. The geometry of this intersection is complicated with both Atlantic Avenue and Flatbush Avenue heavily travelled streets with lengthy pedestrian crossings with limited pedestrian refuge.

Figure 60 shows a satellite photograph with transit services in the area. The crossing distance for pedestrians across Flatbush Avenue can be as much as 115 feet and the pedestrian crossing distance across Atlantic Avenue can be as much as 130 feet. Atlantic Terminal draws a significant number of pedestrians and the B41 bus stop in the middle of the intersection is one of the busiest bus stops in the area during both the morning and evening peak periods.

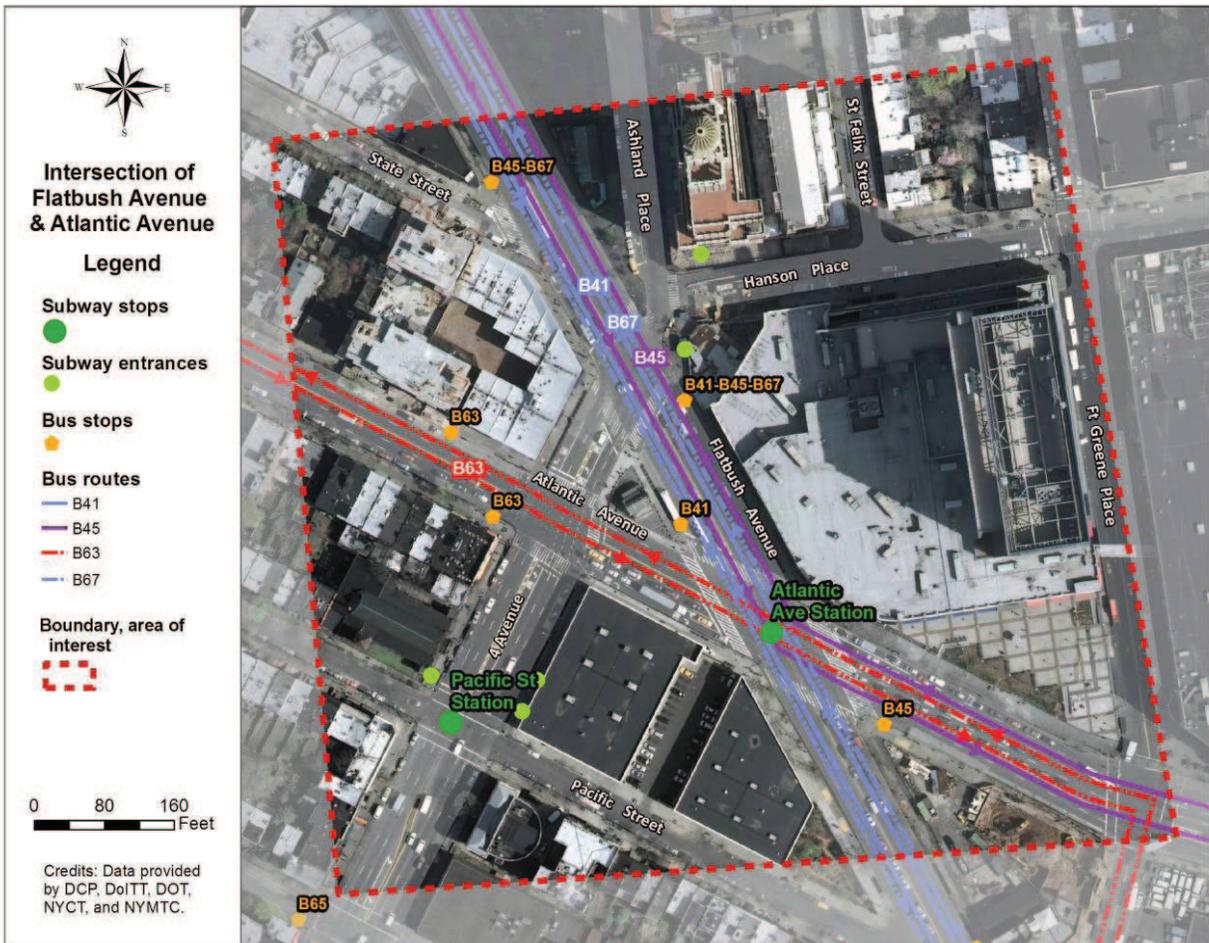


Figure 60 - Flatbush Avenue / Atlantic Avenue

The second area identified as a problematic intersection with pedestrian safety concerns is the system of intersections around Fulton Street / Smith Street / Jay Street; Fulton Street / Boerum Place; Livingston Street / Smith Street; and Livingston Street / Boerum Place.

Figure 61 shows a satellite photograph of the area and its 15 bus routes. Bus boardings and alightings in this area are the highest in the entire Study Area in both the morning and evening peak periods. In addition traffic congestion along Livingston Street creates difficult crossings for pedestrians. The 15 different bus routes that travel the area cause bus congestion and potential bus delays.

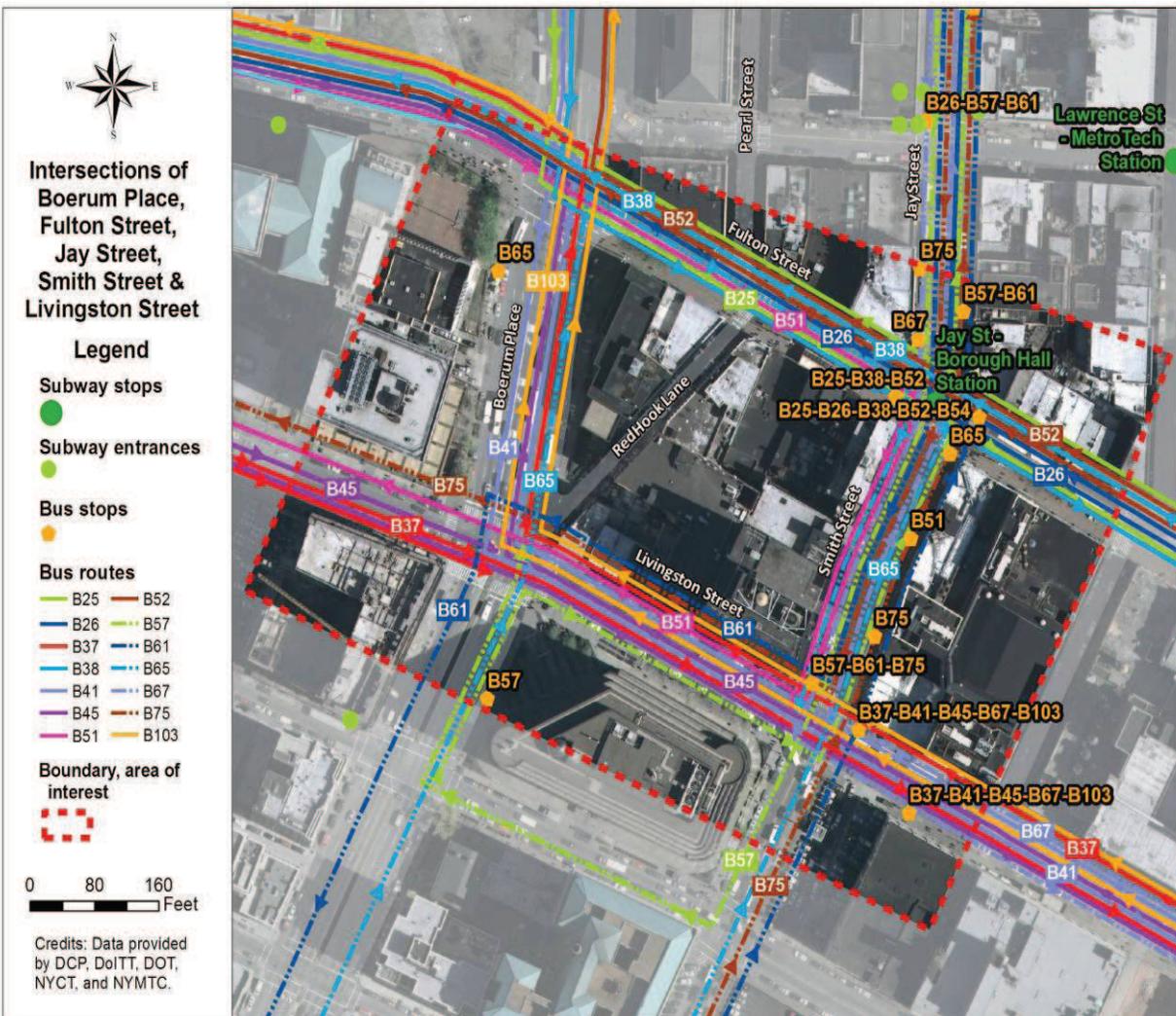


Figure 61 - Boerum Place / Fulton Street / Jay Street / Livingston Street / Smith Street

The area around Cadman Plaza is the third area identified as a problematic intersection with pedestrian concerns.

Figure 62 shows the satellite photographs of this area. Cadman Plaza is the layover point for most bus routes that terminate in the Downtown Brooklyn Study Area. As a result, numerous buses park along Cadman Plaza West causing potential traffic interference and additional bus / pedestrian conflicts.

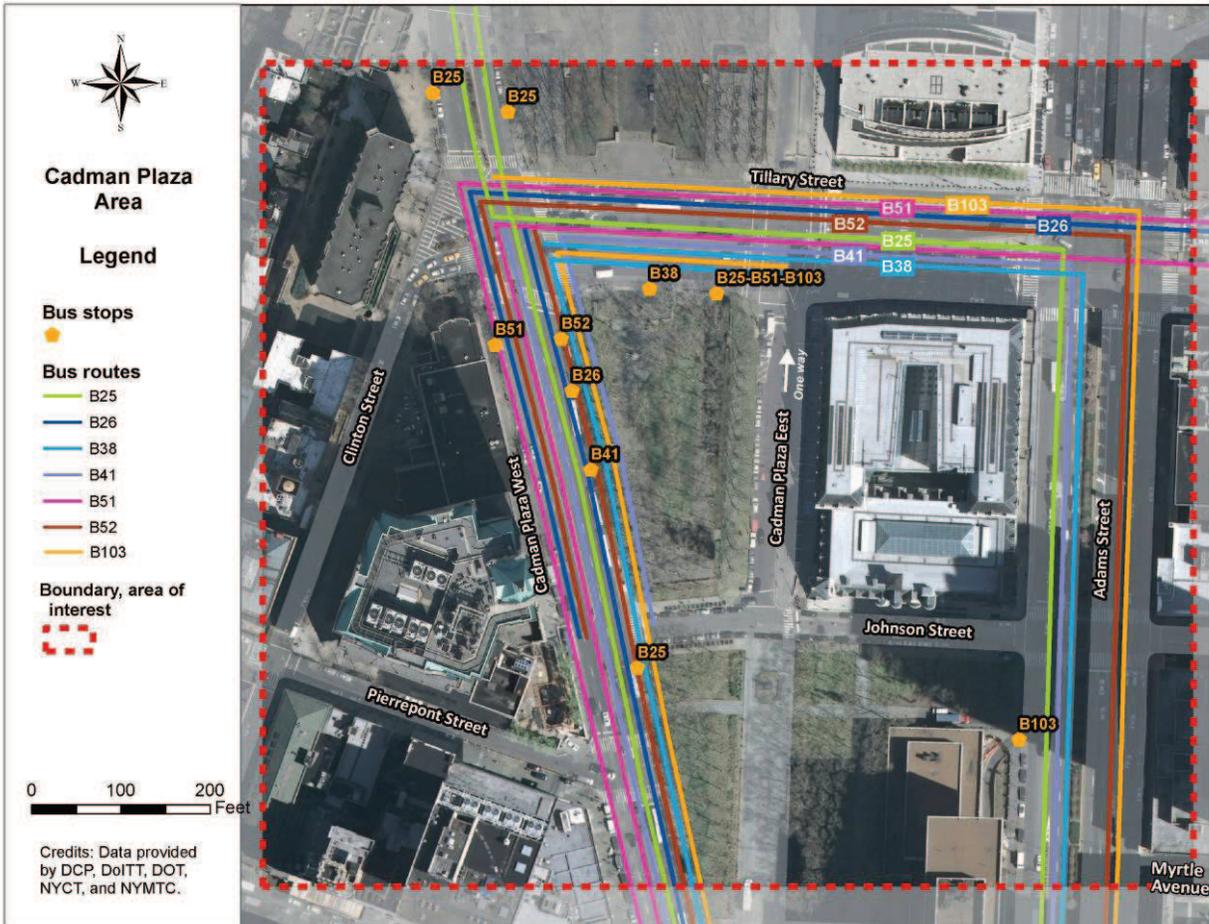


Figure 62 - Cadman Plaza

6. CONCLUSION

This report provides a framework for developing a series of alternatives to improve surface transit circulation in Downtown Brooklyn. The initial findings support the observation that short term and long term solutions are needed to improve the surface transit system. Issues that need to be addressed include level of service, safety, reliability and congestion issues at intersections and along corridors in the short run, as well as to identify longer term solutions that reduce the overlap of bus routes within, improve efficiency and lead to a more integrated and sustainable transit system.

The report identifies a number of surface transit and corridor-level deficiencies related to Downtown Brooklyn surface transit service. The findings indicate that while the level of service is high in the Core Study Area, problems exist with overlapping bus routes, service reliability, vehicular congestion issues, turning conflicts, and passenger comfort. As neighborhoods around downtown continue to develop and grow, particularly the Fulton Ferry/DUMBO/Vinegar Hill neighborhood and the area around Brooklyn Bridge Park, new surface transit service is needed to address their current lack of transit options. The report provides evidence that while bus routes extend into most neighborhoods, surface transit options diminish considerably away from the Core Study Area.

The next step in this process is to develop feasible short and long-term solutions to the key problems identified in the report and to work with NYCDOT and the public to build consensus on the most viable alternatives.