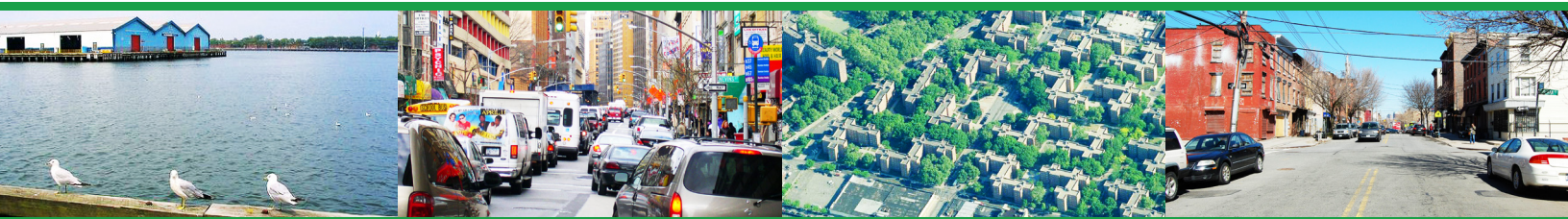


BROOKLYN STREETCAR FEASIBILITY STUDY



TRANSIT DEMAND TECHNICAL MEMORANDUM



TABLE OF CONTENTS

1.0	TRANSIT DEMAND.....	1-1
1.1	EXECUTIVE SUMMARY.....	1-1
1.2	PROJECT AND ANALYSIS OBJECTIVES	1-1
1.3	METHODOLOGY.....	1-1
1.4	PEER NEIGHBORHOODS	1-4
	<i>Peer Neighborhoods – Initial List.....</i>	<i>1-4</i>
	<i>Final Peer Neighborhoods for Analysis</i>	<i>1-7</i>
	<i>Peer 1: Bus Only.....</i>	<i>1-9</i>
	<i>Peer 2: One Subway Line.....</i>	<i>1-12</i>
	<i>Peer Neighborhoods Not Chosen For Further Analysis.....</i>	<i>1-14</i>
	<i>Mode Shares and Ridership</i>	<i>1-18</i>
1.5	TRANSIT DEMAND PROJECTIONS	1-19
	<i>Red Hook Transit Ridership.....</i>	<i>1-19</i>
	<i>Future Developments.....</i>	<i>1-23</i>
1.6	SUMMARY OF DEMAND.....	1-25
	<i>Focus Area.....</i>	<i>1-25</i>
	<i>Study Area.....</i>	<i>1-25</i>
1.7	ADDITIONAL FACTORS FOR CONSIDERATION	1-26



FIGURES

Figure 1-1: Streetcar Demand Methodology	1-2
Figure 1-2: Streetcar Ridership from Future Developments	1-3
Figure 1-3: Red Hook and Nine Evaluated Peer Neighborhoods	1-5
Figure 1-4: Red Hook Transit – Focus Area	1-8
Figure 1-5: Wallabout Transit	1-9
Figure 1-6: East Flatbush Transit.....	1-10
Figure 1-7: Hunt's Point Transit	1-11
Figure 1-8: Bedford-Stuyvesant Transit	1-12
Figure 1-9: Greenpoint Transit.....	1-13
Figure 1-10: East Elmhurst Transit	1-14
Figure 1-11: Soundview Transit	1-15
Figure 1-12: Cypress Hill Transit	1-16
Figure 1-13: Middle Village Transit	1-17
Figure 1-14: Study Area Subway Buffers by Block Group	1-22
Figure 1-15: Focus Area Projections	1-25
Figure 1-16: Study Area Projections	1-26

TABLES

Table 1-1: Projected Transit Boardings.....	1-1
Table 1-2: Red Hook Profile	1-8
Table 1-3: Wallabout Profile (Final Peer Neighborhood for Analysis #1)	1-9
Table 1-4: East Flatbush Profile (Final Peer Neighborhood for Analysis #2)	1-10
Table 1-5: Hunt’s Point Profile (Final Peer Neighborhood for Analysis #3)	1-11
Table 1-6: Bedford-Stuyvesant Profile (Final Peer Neighborhood for Analysis #4)	1-12
Table 1-7: Greenpoint Profile (Final Peer Neighborhood for Analysis #5)	1-13
Table 1-8: East Elmhurst Profile.....	1-14
Table 1-9: Soundview Profile	1-15
Table 1-10: Cyprus Hills Profile	1-16
Table 1-11: Middle Village Profile	1-17
Table 1-12: Transit Demand Factors.....	1-18
Table 1-13: Peer Mode Shares.....	1-19
Table 1-14: Red Hook Bus Boardings	1-20
Table 1-15: Projected Transit Boardings.....	1-23
Table 1-16: Development Trip Generation – Focus Area	1-24
Table 1-17: Development Trip Generation – Study Area.....	1-24
Table 1-18: Comparison of Streetcar Factors	1-27

1.0 TRANSIT DEMAND

1.1 Executive Summary

Future demand for higher capacity transit service in Red Hook was projected based on current transit service using a multi-step methodology. Existing met and unmet demands (existing transit riders and those not currently riding, respectively) were first determined using available information and travel patterns in peer New York City neighborhoods. Future demand was based on the calculated existing demands, current transit level of service, and proposed increase in transit level of service. The projection also considers any future additional demands generated by planned developments within Red Hook and the areas directly between Red Hook and Downtown Brooklyn. Table 1-15 presents the number of new riders attributable to streetcar by applying the difference between the two neighborhood types to current transit boardings. The table also presents the number of boardings generated by new developments within the Focus Area and Study Area. In total, these factors combine for a total projected number of boardings of 5,521 from the Focus Area and 12,544 from the Study Area.

**Table 1-1:
Projected Transit Boardings**

	TOTAL CURRENT TRANSIT BOARDINGS	NEW RIDERS	BOARDINGS FROM PLANNED DEVELOPMENTS WITH STREETCAR	TOTAL BOARDINGS WITH PLANNED DEVELOPMENTS AND STREETCAR
Focus Area	3,852	474	1,195	5,521
Study Area	9,902	1,218	1,424	12,544

1.2 Project and Analysis Objectives

One component of determining the feasibility of a potential streetcar servicing Red Hook is to project the number of anticipated riders. This demand will help set the context for the initiative, providing one factor of “benefit” to compare against “cost.” Existing met and unmet demands (existing transit riders and those not currently riding, respectively) were first determined using available information and travel patterns in peer New York City neighborhoods. Future demand was based on the calculated existing demands, current transit level of service, and proposed increase in transit level of service. The projection also considers any future additional demands generated by planned developments within Red Hook and the areas directly between Red Hook and Downtown Brooklyn.

1.3 Methodology

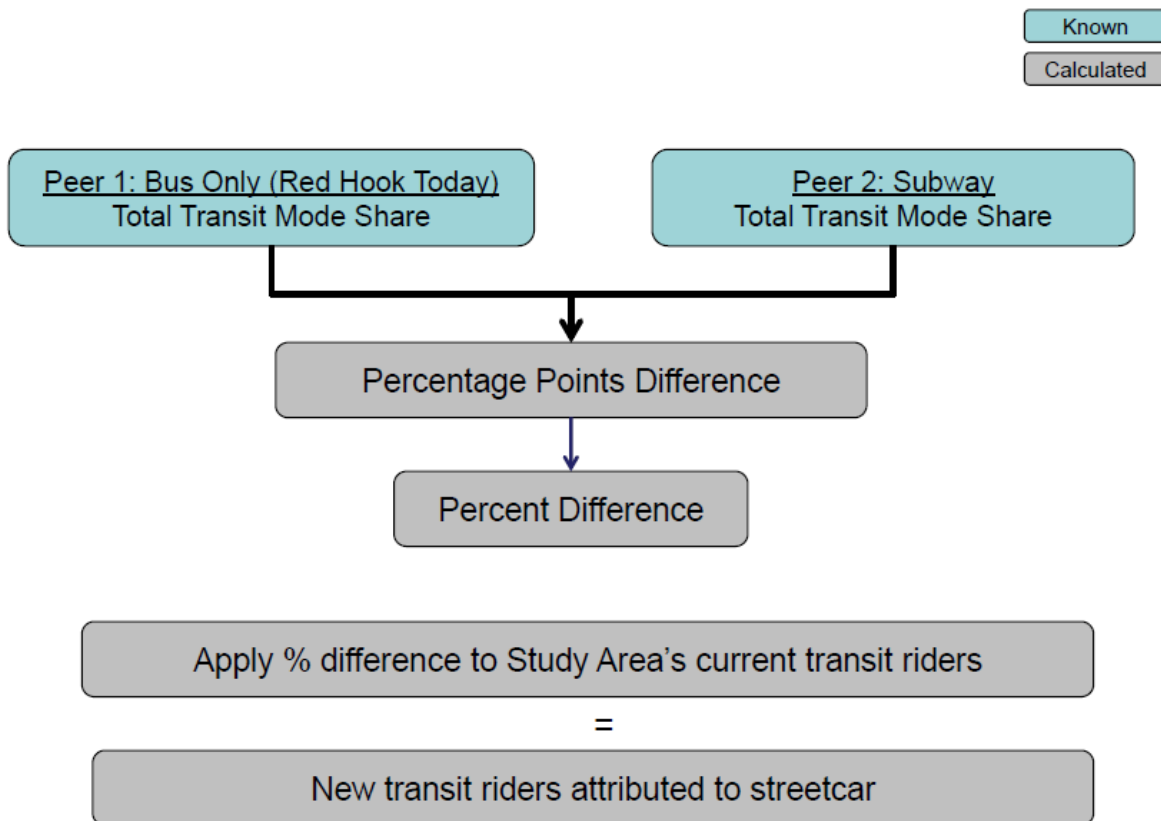
Existing unmet transit demand estimates were generated through a multi-step process. To begin, the Focus Area was compared to similar New York City neighborhoods. These neighborhoods fell into two categories: (1) ones that, like Red Hook, have bus transit only; and (2) ones with rail transit comparable to the level of connecting service that would be provided by a streetcar in Red Hook (for example, neighborhoods served only by the crosstown G subway line). Since New York City currently is not served by streetcar, Peer 2 neighborhoods were chosen based upon the next most comparable service. A list of nine potential neighborhoods was evaluated with NYCDOT and



narrowed down to a final list of five places most similar to Red Hook in terms of demographics, travel patterns, land use, and proximity to one of New York City’s three main Central Business Districts (Midtown Manhattan, Lower Manhattan, and Downtown Brooklyn).

To better understand current transit use in each neighborhood and to define comparable conditions, transit Journey To Work mode share¹ was calculated per neighborhood. Peer 1 neighborhoods were compared to Red Hook to gain a sense of where Red Hook ranks within the “bus only” neighborhood boardings and percentage of residents commuting to work by each mode (“work mode shares”). Transit boardings and mode shares for Peer 2 neighborhoods indicate the potential transit demand streetcar service in Red Hook would generate. The difference in boardings and mode shares between Peer 1 neighborhoods (including Red Hook) and Peer 2 neighborhoods is indicative of the unmet demand that results from not having rail connections within a New York City neighborhood. A graphic showing the steps underpinning this analysis is shown in Figure 1-1.

Figure 1-1: Streetcar Demand Methodology

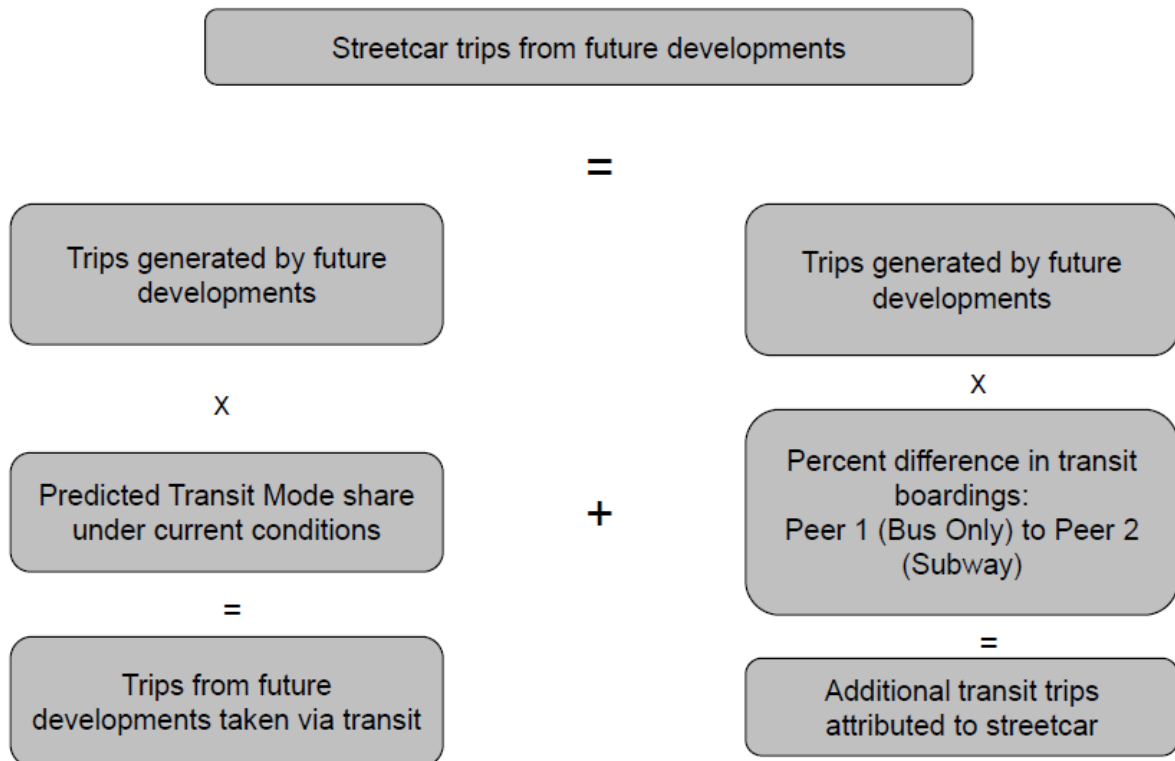


¹ The percentage of people who reported that they rode transit to work, as documented in the 2000 US Census.

Future transit demand also takes into account potential new riders residing within developments anticipated to open within the next five years. Demand for these riders is calculated based on the trip generation characteristics of anticipated commercial and residential developments within the Focus Area and Study Area, based on input from the Department of City Planning (DCP).

A streetcar in Red Hook would also be used by residents and employees of the larger Study Area. The Study Area was identified after initial streetcar alignments that could connect Red Hook to Downtown Brooklyn along Columbia Street and Atlantic Avenue were identified. Similar to the process undertaken to compute transit demand in the Focus Area, projections for the Study Area calculated current transit boardings and applied to it the percent difference from Peer 1 to Peer 2. Although the Study Area is served by multiple bus and subway routes, a new streetcar service is not expected to cause riders to shift from an existing quick and direct transit route. Instead, only boardings on the B61 were included, as they represent future streetcar riders traveling between Red Hook and Downtown Brooklyn with faster or more direct options. Future Study Area developments and transit trip generation were also computed. A flow chart showing how the analysis of future developments was undertaken is presented in Figure 1-2.

Figure 1-2: Streetcar Ridership from Future Developments





1.4 Peer Neighborhoods

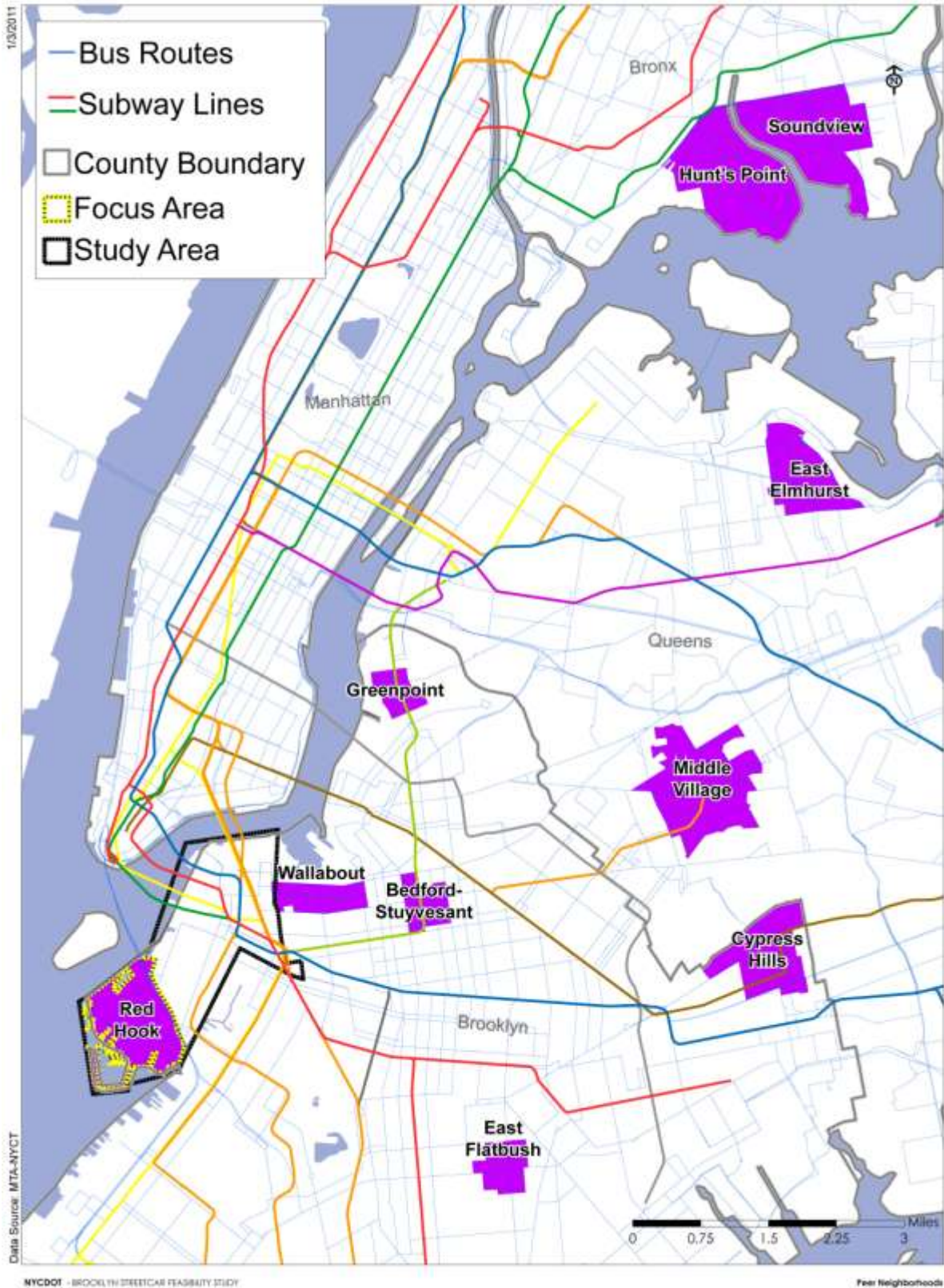
PEER NEIGHBORHOODS – INITIAL LIST

Peer neighborhoods with a) bus service only; and b) one indirect subway line were chosen for initial analysis. Neighborhoods in New York City can be quite large. Therefore, each peer neighborhood was narrowed and defined at the block group level to provide a finer grain of detail for analysis. Given the density of transit in Manhattan, there are no neighborhoods of comparable demographics and levels of service there for this analysis. Conversely, the low density of Staten Island excluded it from comparison to Red Hook. Focusing on the boroughs of Brooklyn, Queens, and the Bronx, the team utilized maps of bus and subway service plus demographic information to create an initial list of nine potential peers.

Table 1-2 to Table 1-11 present the transportation and socioeconomic data for Red Hook and the nine evaluated neighborhoods.

Figure 1-3 presents Red Hook and the nine evaluated peer neighborhoods.

Figure 1-3: Red Hook and Nine Evaluated Peer Neighborhoods





Peer 1 – Bus Only

These peers represent neighborhoods with no subway service:

- Wallabout, Brooklyn – Bound by the East River to the north, Myrtle Avenue to the south, Ashland Place to the west, and Kent Avenue/Taffe Place to the east, this neighborhood is just northeast of Downtown Brooklyn. The area surrounds the Navy Yard and has an industrial context that is similar to Red Hook.
- East Flatbush, Brooklyn – Located between the 3/4 and 2/5 subway lines, this neighborhood has high bus use and a population size that is similar to Red Hook.
- East Elmhurst, Queens – Located north of the 7 train, north of the Grand Central Parkway, this neighborhood has a racial makeup that is similar to Red Hook.
- Hunt's Point, Bronx – This peninsula east of Bruckner Boulevard and south of Soundview is industrial in nature, but with a growing residential population.
- Soundview, Bronx – This neighborhood surrounding Soundview Park is similar in size to Red Hook, and a comparable percent of its residents take the bus to work.

Peer 2 – One Subway Line

These peers include neighborhoods that are served by just one subway line that provides limited service compared to most of the City's subway system. A half-mile (10-minute walking distance) was identified around each subway station to define each neighborhood as being within walking distance of the subway. While many New York City districts are served with one subway line, care was taken to choose neighborhoods comparable to Red Hook. For example, Bay Ridge in south Brooklyn has the R line, but it is not demographically similar to Red Hook.

- Bedford-Stuyvesant, Brooklyn – This neighborhood is close to Downtown Brooklyn and has a high rate of households without a vehicle. The portion of Bedford-Stuyvesant under study is within a half-mile radius around the Myrtle Avenue G station.
- Greenpoint, Brooklyn – This neighborhood is most comparable to Red Hook. Greenpoint, like Red Hook, is a peninsula that feels cut off from the surrounding neighborhood, retains an industrial waterfront, but also has a growing population attracted to the area's lower rents. The portion of Greenpoint under study is within a half-mile radius around the Greenpoint Avenue G station.
- Cypress Hills, Queens – The J/Z lines, before the 2010 service changes, were considered routes with a lower level of service than the rest of the system because there were not as many transfer opportunities and there was no direct route to Midtown. Cypress Hills along the J/Z line includes the Cypress Hills, Crescent Street, and Norwood Avenue stations.
- Middle Village, Queens – This area surrounds the Metropolitan Avenue M station.

Peer Neighborhood Analysis

Travel patterns and population characteristics were analyzed in order to narrow down the list of peer neighborhoods to those most comparable to Red Hook. Transit propensity indicators² were identified from the 2000 Census (the most recent year that this information is available at the block group level), including population size, race, vehicle availability, and mode share. To project these

² Transit propensity indicators are measures of the relative demand for transit.

numbers to a more recent date, borough-wide growth rates from the 2006-2008 American Community Survey were applied to the 2000 block group data.

Travel times and distances to each of the city's three main Central Business District (CBDs) were calculated from a central address in each area. Google Transit mapped the transit travel time to each of the CBD centers:

- Downtown Brooklyn: 201 Joralemon Street
- Lower Manhattan: 11 Wall Street
- Midtown Manhattan: 620 8th Avenue

FINAL PEER NEIGHBORHOODS FOR ANALYSIS

The final five neighborhoods chosen as peers include:

- Peer 1 – Bus Only
 - Wallabout
 - East Flatbush
 - Hunt's Point
- Peer 2 – Subway (with station)
 - Bedford-Stuyvesant (Myrtle Avenue G station)
 - Greenpoint (Greenpoint Avenue G station)

Peer 1 neighborhoods were chosen because they had similar commute modal shares (auto and/or transit), travel time to a CBD, and vehicles with no households³. Peer 2 neighborhoods were chosen because they are served by the G train, which is the most comparable service to a streetcar currently found in New York City. A typical subway provides a high level of service – it has its own right-of-way with stations that are underground and weather-protected – whereas bus has a lower level of service. A streetcar falls somewhere in between the two. It has better stations and amenities than a bus, but it typically operates in mixed traffic, making it slower than a subway. The G train is perceived as a less direct subway route because it does not travel to the Lower Manhattan or Midtown Manhattan CBD's; it also has less off-peak service than most other New York City subway lines (though more than streetcar service may provide).

³ Data points that are similar to Red Hook are highlighted in yellow in Tables 1-1 to 1-10.

TASK 1-3

TRANSIT DEMAND ANALYSIS: TECHNICAL MEMORANDUM



Table 1-2: Red Hook Profile

Focus Area and Study Area		
Population	Focus Area	Study Area
Total Population	9,916	80,297
Mode Share ⁴	Focus Area	Study Area
Transit	61%	72.5%
Bus	18.1%	4.7%
Streetcar	0%	0.4%
Subway	42%	96.7%
Railroad	0.9%	1.5%
Ferry	0%	0%
Car	15.4%	10.8%
Walk	17.3%	12.2%
Bike	7.2%	1.9%
Other	3.5%	8%
Focus Area		
Distance From:	Miles	Minutes (Transit)
Downtown Brooklyn	2	20
Lower Manhattan	4.5	35
Midtown Manhattan	7	55
Race		
White	24.9%	
Black	44.9%	
American Indian	1.5%	
Asian	0.3%	
Hawaiian/Pacific Islander	0%	
Other	22.9%	
Two or more races	1.9%	
Vehicles Availability		
Households with no vehicle	81.5%	

Data Source: US Census 2000, American Community Survey 2006-2008

Figure 1-4: Red Hook Transit – Focus Area



⁴ Totals may not equal 100% due to rounding.

PEER 1: BUS ONLY

Table 1-3: Wallabout Profile (Final Peer Neighborhood for Analysis #1)		
Population		
Total Population	16,332	
Mode Share		
Transit	52.6%	
Bus	19.2%	
Streetcar	0%	
Subway	33.7%	
Railroad	0.2%	
Ferry	0%	
Car	19%	
Walk	24.3%	
Bike	2.6%	
Other	2.5%	
Distance From:		Minutes (Transit)
	Miles	
Downtown Brooklyn	1.5	25
Lower Manhattan	3.3	35
Midtown Manhattan	5.3	40
Race		
White	19.6%	
Black	55.4%	
American Indian	0.3%	
Asian	1.1%	
Hawaiian/Pacific Islander	0%	
Other	18.1%	
Two or more races	1.8%	
Vehicles Availability		
Households with no vehicle	79%	

Data Source: US Census 2000, American Community Survey 2006-2008

Figure 1-5: Wallabout Transit



TASK 1-3

TRANSIT DEMAND ANALYSIS: TECHNICAL MEMORANDUM



Table 1-4: East Flatbush Profile (Final Peer Neighborhood for Analysis #2)		
Population		
Total Population	11,921	
Mode Share		
Transit	66.9%	
Bus	20.8%	
Streetcar	0.9%	
Subway	42.5%	
Railroad	3%	
Ferry	0%	
Car	23.9%	
Walk	5.1%	
Bike	0.6%	
Other	4.1%	
Distance From:	Miles	Minutes (Transit)
Downtown Brooklyn	5	40
Lower Manhattan	7.3	45
Midtown Manhattan	9.5	65
Race		
White	1.8%	
Black	88.9%	
American Indian	0.6%	
Asian	0.7%	
Hawaiian/Pacific Islander	0%	
Other	1.2%	
Two or more races	1.1%	
Vehicles Availability		
Households with no vehicle	57.1%	

Data Source: US Census 2000, American Community Survey 2006-2008

Figure 1-6: East Flatbush Transit



Table 1-5: Hunt's Point Profile (Final Peer Neighborhood for Analysis #3)

Population		
Total Population	11,794	
Mode Share		
Transit	53.8%	
Bus	13%	
Streetcar	0%	
Subway	37.2%	
Railroad	3.2%	
Ferry	0%	
Car	34.9%	
Walk	14.9%	
Bike	0%	
Other	4.6%	
Distance From:	Miles	Minutes (Transit)
Downtown Brooklyn	12	65
Lower Manhattan	11.5	62
Midtown Manhattan	8.4	58
Race		
White	27.9%	
Black	33%	
American Indian	0.1%	
Asian	0.9%	
Hawaiian/Pacific Islander	0%	
Other	52.1%	
Two or more races	2.4%	
Vehicles Availability		
Households with no vehicle	72.6%	

Data Source: US Census 2000, American Community Survey 2006-2008

Figure 1-7: Hunt's Point Transit



PEER 2: ONE SUBWAY LINE

Table 1-6: Bedford-Stuyvesant Profile (Final Peer Neighborhood for Analysis #4)		
Population		
Total Population	14,481	
Mode Share		
Transit	68.4%	
Bus	20.2%	
Streetcar	0%	
Subway	47%	
Railroad	1.2%	
Ferry	0%	
Car	20.8%	
Walk	5.6%	
Bike	2.3%	
Other	5.1%	
Distance From:	Miles	Minutes (Transit)
Downtown Brooklyn	2.5	20
Lower Manhattan	4.5	30
Midtown Manhattan	6	35
Race		
White	11.1%	
Black	61.9%	
American Indian	0.3%	
Asian	0.2%	
Hawaiian/Pacific Islander	0%	
Other	20.6%	
Two or more races	1.6%	
Vehicles Availability		
Households with no vehicle	75.3%	

Data Source: US Census 2000, American Community Survey 2006-2008

Figure 1-8: Bedford-Stuyvesant Transit



Table 1-7: Greenpoint Profile (Final Peer Neighborhood for Analysis #5)

Population		
Total Population	10,492	
Mode Share		
Transit	65%	
Bus	6.1%	
Streetcar	0%	
Subway	57%	
Railroad	0.5%	
Ferry	0%	
Car	18.5%	
Walk	12.7%	
Bike	2.7%	
Other	3.2%	
Distance From:	Miles	Minutes (Transit)
Downtown Brooklyn	4.5	30
Lower Manhattan	5	35
Midtown Manhattan	5.3	25
Race		
White	88.4%	
Black	1.6%	
American Indian	0%	
Asian	6%	
Hawaiian/Pacific Islander	0%	
Other	7.2%	
Two or more races	1.1%	
Vehicles Availability		
Households with no vehicle	62.5%	

Data Source: US Census 2000, American Community Survey 2006-2008

Figure 1-9: Greenpoint Transit



PEER NEIGHBORHOODS NOT CHOSEN FOR FURTHER ANALYSIS

Table 1-8: East Elmhurst Profile		
Population		
Total Population	18,961	
Mode Share		
Transit	48.4%	
Bus	16.6%	
Streetcar	0%	
Subway	29.5%	
Railroad	2.2%	
Ferry	0%	
Car	38.8%	
Walk	7.8%	
Bike	1.4%	
Other	3.9%	
Distance From:		Minutes (Transit)
	Miles	
Downtown Brooklyn	9.6	75
Lower Manhattan	10.5	70
Midtown Manhattan	7.6	55
Race		
White	19%	
Black	53%	
American Indian	0.3%	
Asian	2.7%	
Hawaiian/Pacific Islander	0%	
Other	20.1%	
Two or more races	1.5%	
Vehicles Availability		
Households with no vehicle	76.3%	

Data Source: US Census 2000, American Community Survey 2006-2008

Figure 1-10: East Elmhurst Transit



Table 1-9: Soundview Profile		
Population		
Total Population	10,871	
Mode Share		
Transit	53.6%	
Bus	20.3%	
Streetcar	0.6%	
Subway	32.3%	
Railroad	0.6%	
Ferry	0%	
Car	36.7%	
Walk	4.7%	
Bike	0.1%	
Other	2.8%	
Distance From:		Miles
		Minutes (Transit)
Downtown Brooklyn	13.6	70
Lower Manhattan	12.8	65
Midtown Manhattan	9.7	60
Race		
White	15.7%	
Black	47.3%	
American Indian	0.2%	
Asian	0.4%	
Hawaiian/Pacific Islander	0.3%	
Other	32.9%	
Two or more races	2.7%	
Vehicles Availability		
Households with no vehicle	57.2%	

Data Source: US Census 2000, American Community Survey 2006-2008

Figure 1-11: Soundview Transit



Table 1-10: Cyprus Hills Profile		
Population		
Total Population	12,685	
Mode Share		
Transit	62.6%	
Bus	9.5%	
Streetcar	0.8%	
Subway	50.8%	
Railroad	0.8%	
Ferry	0.1%	
Car	26.2%	
Walk	6.9%	
Bike	0%	
Other	3.8%	
Distance From:	Miles	Minutes (Transit)
Downtown Brooklyn	6.6	40
Lower Manhattan	8.5	45
Midtown Manhattan	10	55
Race		
White	22.9%	
Black	16.4%	
American Indian	0.6%	
Asian	9.8%	
Hawaiian/Pacific Islander	0%	
Other	44.3%	
Two or more races	3.4%	
Vehicles Availability		
Households with no vehicle	52.6%	

Data Source: US Census 2000, American Community Survey 2006-2008

Figure 1-12: Cypress Hill Transit

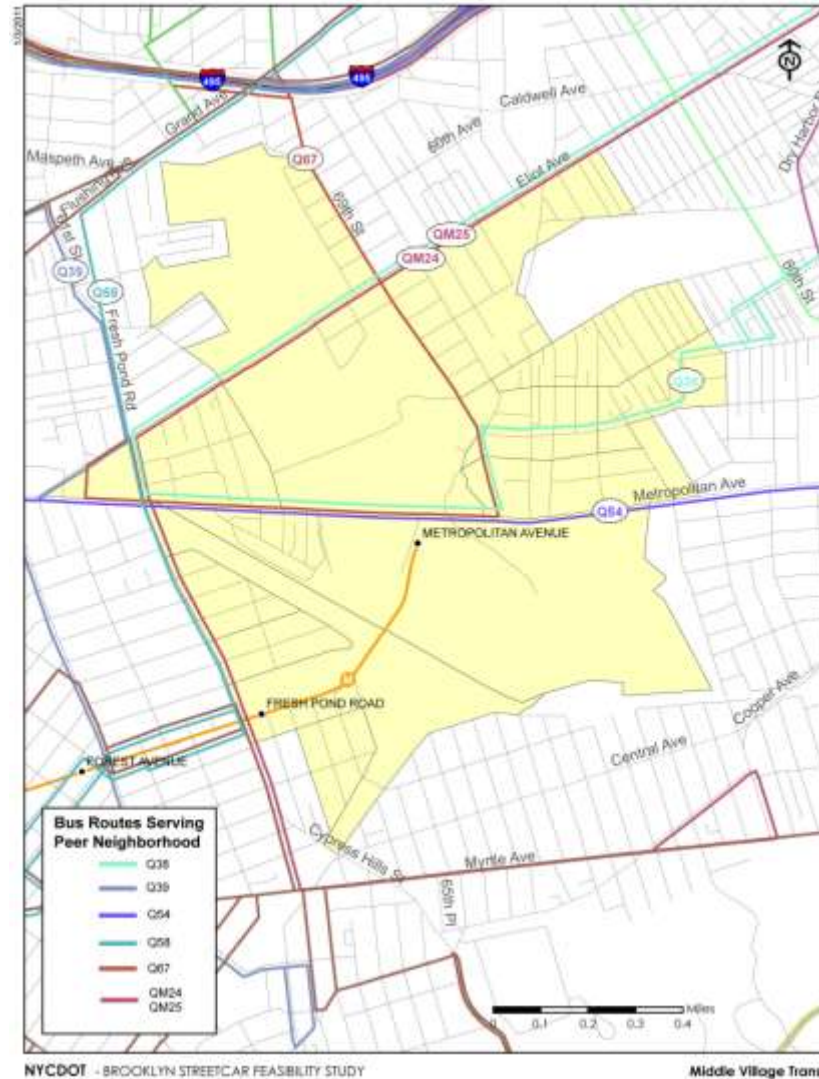


**Table 1-11:
Middle Village Profile**

Population		
Total Population	17,154	
Mode Share		
Transit	44.6%	
Bus	15.1%	
Streetcar	0.2%	
Subway	28.5%	
Railroad	0.6%	
Ferry	0%	
Car	46.9%	
Walk	4.4%	
Bike	0.6%	
Other	2%	
Distance From:	Miles	Minutes (Transit)
Downtown Brooklyn	6.5	60
Lower Manhattan	7.7	55
Midtown Manhattan	7.8	60
Race		
White	92.4%	
Black	.35%	
American Indian	0.1%	
Asian	3.1%	
Hawaiian/Pacific Islander	0.1%	
Other	3.75%	
Two or more races	0.7%	
Vehicles Availability		
Households with no vehicle	26.6%	

Data Source: US Census 2000, American Community Survey 2006-2008

Figure 1-13: Middle Village Transit





MODE SHARES AND RIDERSHIP

Journey to Work commute mode share⁵ for each neighborhood was used to provide a complete picture of transit usage in each neighborhood (see Table 1-12).

Table 1-12:
Transit Demand Factors

PEER NEIGHBORHOOD	POPULATION	TOTAL LABOR FORCE	LABOR FORCE TRANSIT SHARE
PEER 1 NEIGHBORHOODS			
Wallabout	16,332	4,049	52.9%
East Flatbush	11,921	6,370	63.3%
Hunt's Point	11,794	2,477	50.2%
Peer Total	40,047	12,896	57.5%
PEER 2 NEIGHBORHOODS			
Bedford-Stuyvesant	14,481	3,570	67.2%
Greenpoint	10,492	5,946	63.1%
Peer Total	24,973	9,516	64.6%
RED HOOK			
	10,346	2,416	60.1%

Data Source: US Census 2000, American Community Survey 2006-2008

Peer 1/Peer 2 Mode Shares

The mode shares between Peer 1 and Peer 2 neighborhoods reflect a range of projected ridership for a new streetcar. Streetcars attract riders who currently drive, take the subway, or take the bus. Investment in a streetcar also demonstrates an agency's commitment to transit, which in turn helps to increase overall transit use. The total transit use in Peer 1 neighborhoods is 57.5 percent and in Peer 2, 64.6 percent.

Ridership Projections

Table 1-13 presents the projected ridership based on the difference in total transit mode share between the Peer 1 and Peer 2 neighborhoods. The difference in Peer 1 and Peer 2 total transit mode share is 7.1 percentage points (64.6-57.5); this represents a 12.3 percentage difference between the Peer 1 and Peer 2 neighborhoods (7.1/57.5).

⁵ Percentage of commuters who reported they travel to work by each mode as documented in the 2000 US Census.

**Table 1-13:
Peer Mode Shares**

PEER NEIGHBORHOODS	TOTAL TRANSIT TRIPS %
Peer 1	57.5%
Peer 2	64.6%
Percentage Points Difference	7.1
Percent Difference	12.3%
RED HOOK	TOTAL TRANSIT TRIPS %
Existing	60.1%
Projected Future Transit Share	67.5%

Data Source: US Census 2000, American Community Survey 2006-2008

1.5 Transit Demand Projections

The Peer Neighborhood analysis from the previous section illustrates how transit ridership could be expected to change in the Focus and Study Areas. The 12.3 percent difference will next be applied to the existing Focus Area and Study Area transit boardings and future developments.

RED HOOK TRANSIT RIDERSHIP

Bus and subway boardings, in combination with Census data, were utilized to understand current travel patterns and obtain a baseline number for transit boardings in the Focus Area and Study Area.

Bus Ridership – Focus Area

Focus Area bus boardings on the B61 and the former B77 were computed. The B77 was included as the B61 data was collected after service restructuring of that route in January 2010 but before the B61 began incorporating the old B77 route in June 2010. Thus the B61 data did not include stops on Lorraine Street, Court Street, or Otsego Street.

Bus Ridership – Study Area

After initial streetcar alignments that could connect Red Hook to Downtown Brooklyn along Columbia Street and Atlantic Avenue were identified, it was possible to determine which sections of the larger Study Area could experience increased transit demand attributable to a new streetcar. Although the Study Area is served by multiple bus and subway routes, a new streetcar service is not expected to cause riders to shift from an existing quick and direct transit route. Instead, only boardings on the B61 were included, as they represent future streetcar riders traveling between Red Hook and Downtown Brooklyn with faster or more direct options. B61 boardings for the entire Study Area were calculated up to the point where the bus turns off Atlantic Avenue onto Smith Street, as that area is within a very short walking distance of Borough Hall, the major employment area of Downtown Brooklyn. Anyone living north of Atlantic Avenue is an assumed walk trip. Typically those living within a 10-minute walk distance of a major destination will choose to walk. However, while several B61 stops along Atlantic Avenue are within a 10-minute walk of Borough Hall, boardings on the B61 demonstrate that the public perceives this walk distance as much farther than 10 minutes, likely due to the long blocks along Atlantic Avenue. A total of 1,295 boardings, or 23.7 percent of all



B61 boardings, occurred along Atlantic Avenue. These boardings were included as they are potential streetcar riders. Although one of the preliminary alignment alternatives (Atlantic Avenue east of Boerum Place) would replicate current B63 bus service rather than B61 service along Atlantic Avenue, demand from existing B63 riders was not estimated, as counting both B61 and B63 riders would not accurately inform streetcar demand, which would draw from one but not both bus ridership bases, depending upon which alignment is chosen. At this stage, a Downtown Brooklyn (B61) alignment was chosen for transit demand analysis purposes. If the Atlantic Avenue alignment (B63) is instead advanced, the analysis should be updated utilizing the methodology employed here.

A summary table of bus boardings is shown in Table 1-14.

Table 1-14:
Red Hook Bus Boardings

BUS ROUTE	DESCRIPTION	DAILY BUS BOARDINGS
Red Hook Focus Area		2,738
B61	Red Hook-Downtown Brooklyn	1,816
B77	Park Slope-Red Hook (discontinued June 2010)	922
Study Area		4,564
B61	Red Hook- Downtown Brooklyn	3,142
B77	Park Slope-Red Hook (discontinued June 2010)	922

Data Source: MTA-NYCT

Subway Boardings – Focus Area

The Focus Area does not include a subway station; however, many residents are within walking distance of the Smith and 9th Street F and G station just east of the Focus Area boundary. In order to avoid double counting bus riders who transferred to the subway, bus transfers (582) were subtracted from Smith & 9th Street average daily boardings (4,579). Thus a total of 3,997 non-transferring riders board daily at this subway station.

The catchment area of the Smith and 9th Street station includes neighborhoods beyond the Focus Area. To calculate the number of the total Smith and 9th Street station riders who live in the Focus Area, Census block group population numbers were calculated for the half-mile buffer surrounding the subway station. A total of 17,796 people live in that buffer area. The block groups that are both within the half-mile subway buffer as well as within the Focus Area boundary contain 4,959 residents, or 27.9 percent of the total. By applying that same percentage of Smith and 9th Street station daily riders, an estimated total of 1,114 people using the station are assumed to originate from the Focus Area.

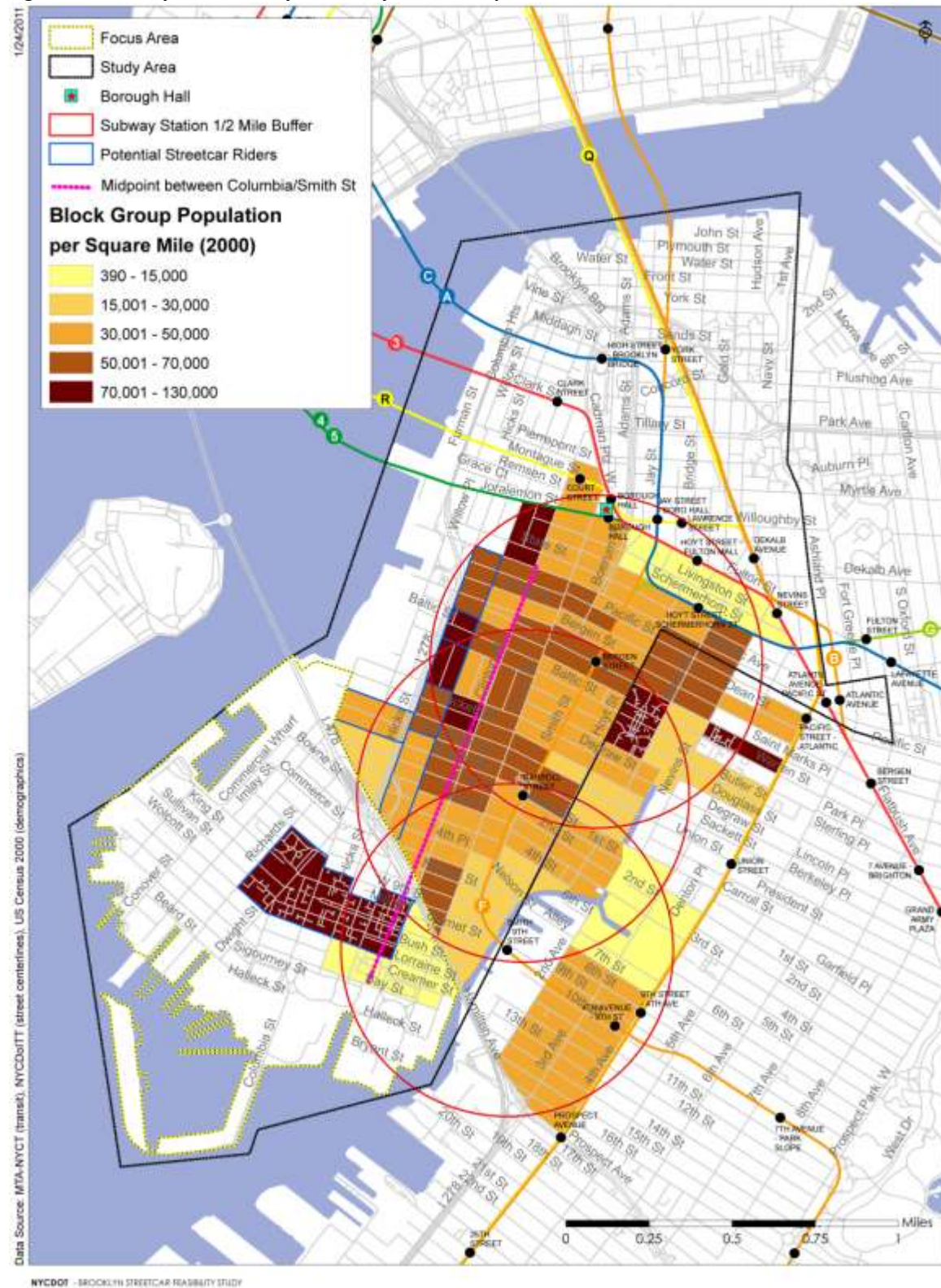
Subway Boardings – Study Area

The Study Area contains numerous subway stations; however, only three are relevant to the understanding of a potential future streetcar. Those three stations are Smith and 9th Street, Bergen Street, and Carroll Street, along the F-G lines. Any stations north of Bergen Street are too close to Downtown Brooklyn to attract streetcar ridership to Downtown Brooklyn. In total, 23,937 riders board the three subway stations daily (this is net of bus transfers at Smith and 9th Street station; no transfers were recorded at Carroll Street or Bergen Street stations). The residential population within a half-mile buffer of the three stations totals 59,223. As shown in Figure 1-14, there is

considerable overlap between the subway buffers and the study area; however, it cannot be assumed that residents living along the F-G line within the Study Area will be future streetcar riders as there is no time incentive to switch. Similarly, as described above in the Study Area bus boardings section, anyone living north of Atlantic Avenue is likely walking to Downtown Brooklyn today and is not anticipated to switch modes.

Only residents of those block groups west of approximately Clinton Street (halfway between most of the F/G subway line at Smith Street and Columbia Street) and south of Atlantic Avenue were counted as subway riders coming from the Study Area and are considered potential streetcar riders. A total of 13,220 people are residents of this area, representing 22.3 percent of total boardings. Thus 5,338 riders who board the subway are attributed to this area.

Figure 1-14: Study Area Subway Buffers by Block Group



Projected Transit Ridership

Table 1-15 presents the number of new riders attributable to streetcar by applying the 12.3 percent difference between Peer 1 and Peer 2 neighborhoods to current transit boardings. Based on this methodology, a streetcar in the Study Area would serve a demand of 1,218 new riders.

**Table 1-15:
Projected Transit Boardings**

	BUS BOARDINGS	SUBWAY BOARDINGS	TOTAL CURRENT TRANSIT BOARDINGS	% INCREASE DUE TO STREETCAR	NEW RIDERS	TOTAL TRANSIT WITH STREETCAR
Focus Area	2,738	1,114	3,852	12.3%	474	4,326
Study Area	4,564	5,338	9,902		1,218	11,120

Data Source: MTA-NYCT (current transit ridership)

FUTURE DEVELOPMENTS

Several developments are currently approved or going through approval processes in Red Hook. This demand is not attributable to a future streetcar, as these developments are already in the approval process. The new Red Hook residents and employees associated with these new developments will be potential streetcar customers, and thus their demand is included in the demand projection. A list of developments was collected with input from DCP. A variety of resources were used to compute trip generation from these developments.⁶ Trip generation rates vary by land use and take into account both work and non-work trips.

New developments are assumed to exhibit the same modal splits as current uses. Thus the transit mode share for Peer 1 neighborhoods with only bus service (57.5 percent) has been applied to the total number of trips generated by each development. This number represents the number of people who would take transit should options remain the same as they are today. Similar to the previous analysis of Study Area subway riders who might be potential streetcar riders, only Study Area developments west of the Clinton Street area representing the midpoint between Columbia Street and the F/G service corridor were included. As this area today has no subway service, it falls within the Peer 1: Bus Only category, thus the 57.5 percent transit mode share is applicable. Once the transit mode share under current conditions was calculated, a second factor was applied – the 12.3 percent transit increase that a streetcar would bring about.

Focus Area Developments

In the Focus Area, six parcels are under development. The largest development, at 160 Imlay Street, includes 153 residential units. An additional 13 units are planned for other sites. Additionally, 15,000 square feet of office space and 5,000 square feet of community facilities are planned within the Focus Area. Developments included in demand projections are expected to be completed within a five-year period (by 2015).

⁶ Sources include: CEQR Technical Manual, Atlantic Yards Arena and Redevelopment Project FEIS (2006), The Jamaica Plan FEIS (2007), Downtown Brooklyn Development FEIS (2004), Brooklyn Bridge Park FEIS (2005).



In total, developments in the Focus Area are projected to generate 1,850 daily trips. Trip generation rates include both work and non-work trips; thus, there is no need to interpolate from commute trips to total trips. The rates used here are 8.075 trips per dwelling unit, 18 trips per 1,000 gross square feet of commercial space, and 48 trips per 1,000 gross square feet of community facilities. Table 1-16 calculates total typical daily trips generated by each development, the number of transit trips, and trips induced because of streetcar.

Table 1-16:
Development Trip Generation – Focus Area

ADDRESS	DESCRIPTION	DAILY TRIP RATE	TOTAL TRIPS	TRANSIT (57.5%)	STREETCAR INCREASE (12.3%)	TOTAL TRANSIT
160 Imlay St	153 residential units	8.075 per unit	1,235	710	87	797
164 Beard St	4 residential units	8.075 per unit	32	19	2	21
440 Van Brunt St	1 residential unit, 9,000 sf office	8.075 per unit 18 per 1,000 sf	170	98	12	110
216 Conover St	6,000 sf office	18 per 1,000 sf	108	62	8	70
141 Dwight St	5,000 sf community facilities	48 per 1,000 sf	240	138	17	155
96 Lorraine St	8 residential units	8.075 per unit	65	37	5	42
TOTAL			1,850	1,064	131	1,195

Data Source: DCP (development data)

Study Area Developments

An additional five developments are slated within the Study Area west of Clinton Street. People in those developments are anticipated to be streetcar riders. These developments include 44 new residential units (Table 1-17).

Table 1-17:
Development Trip Generation – Study Area

ADDRESS	DESCRIPTION	DAILY TRIP RATE	TOTAL TRIPS	TRANSIT (57.5%)	STREETCAR BOOST (12.3%)	TOTAL TRANSIT
Study Area						
245 Hamilton Ave	20 residential units	8.075 per unit	162	93	11	105
671 Henry St	5 residential units	8.075 per unit	40	23	3	26
151 Carroll St	8 residential units	8.075 per unit	65	37	5	42
56 Strong Pl	3 residential units	8.075 per unit	24	14	2	15
25-33 Carroll St	8 residential units	8.075 per unit	65	37	5	42
Plus Focus Area						
160 Imlay St	153 residential units	8.075 per unit	1,235	710	87	797
164 Beard St	4 residential units	8.075 per unit	32	18	2	21
440 Van Brunt St	1 residential unit, 9,000 sf office	8.075 per unit 18 per 1,000 sf	170	98	12	110
216 Conover St	6,000 sf office	18 per 1,000 sf	108	62	8	70
141 Dwight St	5,000 sf community facilities	48 per 1,000 sf	240	138	17	155
96 Lorraine St	8 residential units	8.075 per unit	65	37	5	42
TOTAL			2,206	1,268	156	1,424

Data Source: DCP (development data)

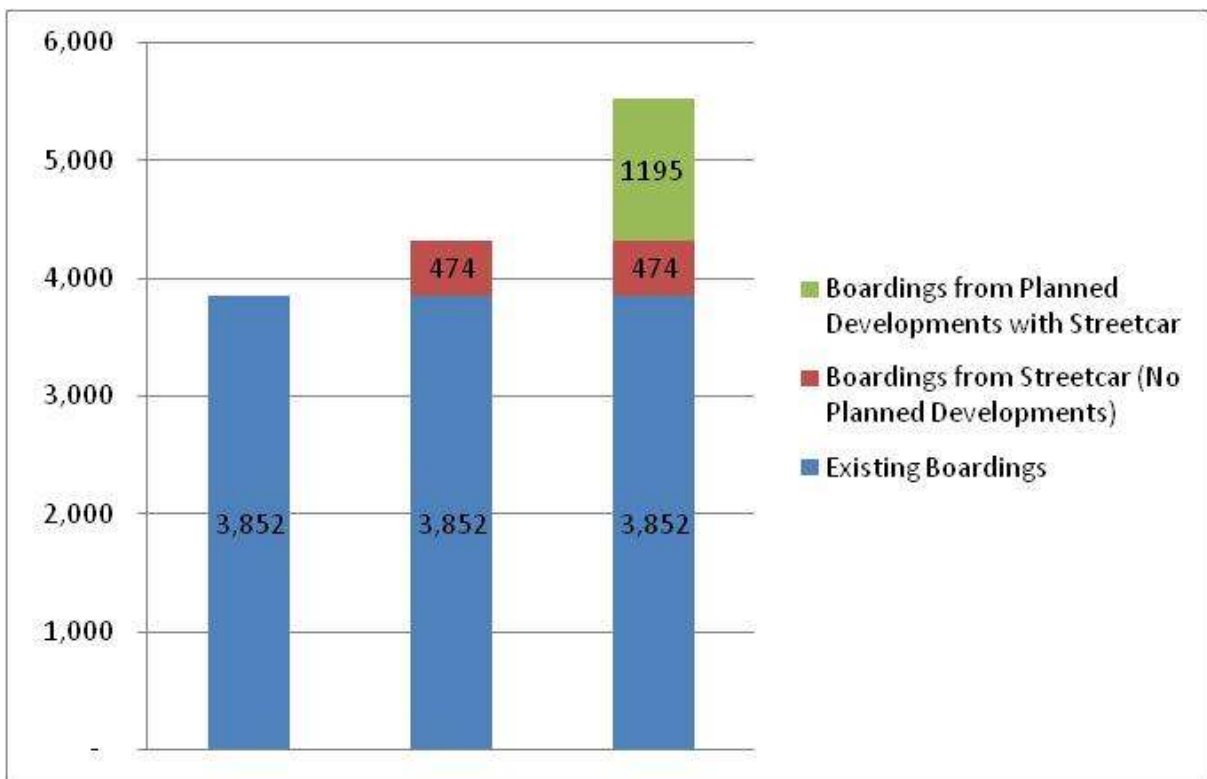
1.6 Summary of Demand

Based upon the peer neighborhood analysis, transit mode change in the Study Area and Focus Area, and new developments, the following ranges of streetcar demand are projected.

FOCUS AREA

Figure 1-15 displays how transit ridership will increase in the Focus Area due to streetcar alone, as well as with future developments.

Figure 1-15: Focus Area Projections

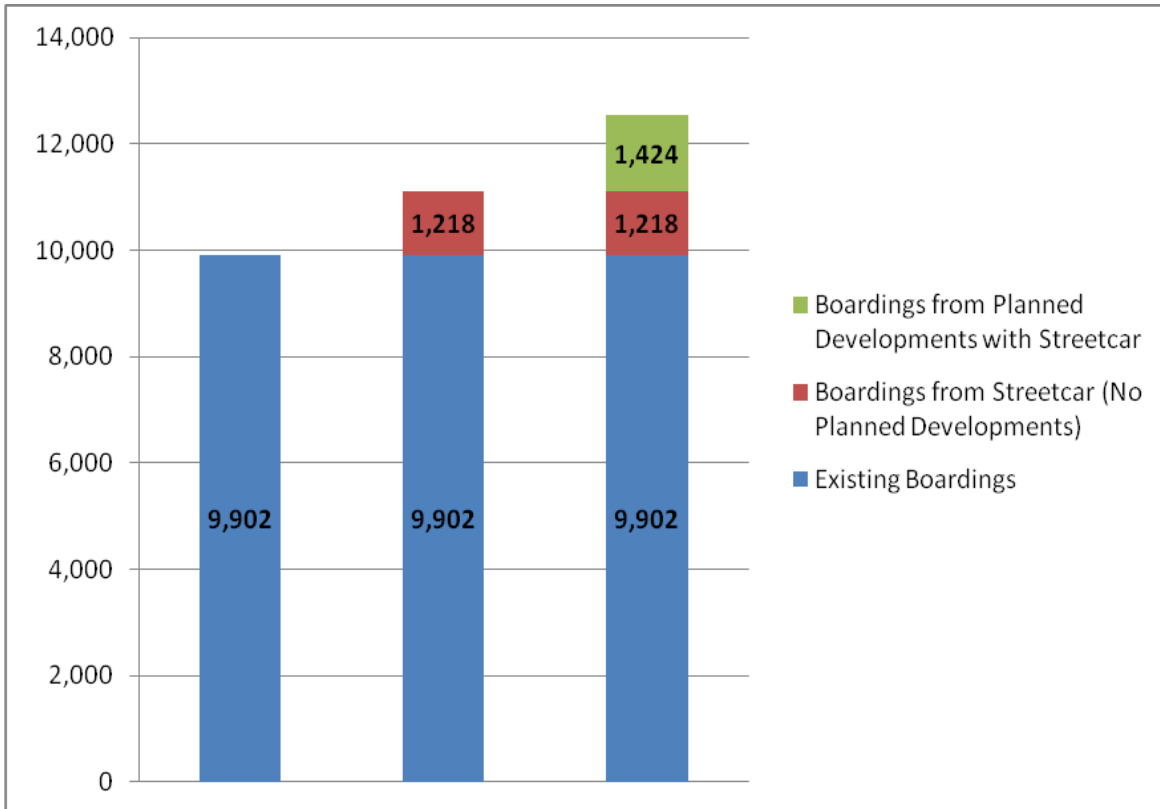


Data Source: MTA-NYCT (existing boardings)

STUDY AREA

Figure 1-16 displays how transit ridership will increase in the Study Area due to streetcar alone, as well as with future developments.

Figure 1-16: Study Area Projections



Data Source: MTA-NYCT (existing boardings)

1.7 Additional Factors for Consideration

Ridership demand reflects the various forms a streetcar can take, as well as surrounding factors that can encourage transit use. These well-known factors include:

1. Intensity of land use (within walking distance) - including both residential and employment density
2. Mix of land use - residential, employment, retail, and recreational
3. Travel time (speed of service)
4. Frequency of service
5. Fares
6. Connectivity to a broader network
7. Legibility and information
8. Comfort

Each of these factors and how they are influenced by streetcar development are summarized in Table 1-18. While there is no direct mathematical relationship between these individual factors and ridership, they have collectively proven to be key factors in attracting ridership to all types of transit. Specifically, cities that have implemented an integrated land use and transportation planning process with streetcar service and the elements listed in Table 1-18 have recorded ridership increases of 12-20%. Toronto’s streetcar ridership was 15% higher than a previously operated bus

route. Seattle’s ridership increased by 19% between its first and second years of operation when coupled with development of a mixed use, walkable neighborhood for the street car to serve (see Peer Review report for complete details of peer system ridership).

Table 1-18: Comparison of Streetcar Factors		
FACTOR	HOW IT INFLUENCES RIDERSHIP	SOURCES
Intensity of Land Use	Density is the most direct influence on transit ridership – the greater the intensity of land use, the greater the ridership.	Boris S. Pushkarev and Jeffrey M. Zupan (1977), <i>Public Transportation and Land Use Policy</i> , Indiana University Press (Bloomington). Robert Cervero, et al (2004), <i>Transit-Oriented Development in the United States: Experience, Challenges, and Prospects</i> , TCRP Report 102, Transit Cooperative Research Program, Transportation Research Board
Mix of land uses	Different land uses have different demand patterns. Mixing land uses ensures steady ridership through the day, rather than directional peaking.	Marya Morris (1996), <i>Creating Transit-Supportive Land-Use Regulations</i> , Planning Advisory Service Report No. 468, American Planning Association
Travel Time	Riders are attracted to transit services that more closely match auto travel times.	Phil Goodwin (1992), “Review of New Demand Elasticities With Special Reference to Short and Long Run Effects of Price Changes,” <i>Journal of Transport Economics</i> , Vol. 26, No. 2, May 1992. John F. Kain and Zvi Liu (1999), “Secrets of Success,” <i>Transportation Research A</i> , Vol. 33, No. 7/8, Sept./Nov. 1999
Frequency and Span of Service	Frequent services reduce wait times and allow riders to make trips without planning. Services with a longer service span are attractive to more types of trips. Longer evening service ensures riders who work late or attend events in the evening will be able to get home.	TRL (2004), <i>The Demand for Public Transit: A Practical Guide</i> , Transportation Research Laboratory, Report TRL 593



Table 1-18:		
Comparison of Streetcar Factors		
FACTOR	HOW IT INFLUENCES RIDERSHIP	SOURCES
Fares	High fares discourage ridership. Lower fares encourage ridership.	Todd Litman (2004), "Transit Price Elasticities and Cross-Elasticities," <i>Journal of Public Transportation</i> , Vol. 7, No. 2
Connectivity to a Broader Network	Connecting to regional services provides greatly enhanced mobility and enhances the productivity of the overall system.	TRL (2004), <i>The Demand for Public Transit: A Practical Guide</i> , Transportation Research Laboratory, Report TRL 593
Legibility and Information	The easier it is to understand a transit system, the more occasional riders will use it. Real time information has been proven to increase ridership by as much as 5%.	Robert G. Stanley and Robert Hyman (2005), <i>Evaluation Of Recent Ridership Increases</i> , TCRP Research Results Digest 69, Transportation Research Board
Comfort	Roomier seats, ample room for standees, and a less "rocky ride" contribute to rider comfort and to patronage.	TRL (2004), <i>The Demand for Public Transit: A Practical Guide</i> , Transportation Research Laboratory, Report TRL 593