## CITI BIKE TAKES NEW YORK



Lily Gordon-Koven & Nolan Levenson

Rudin Center for Transportation Management and Policy NYU Robert F. Wagner Graduate School of Public Service March 2014



Rudin Center for Transportation 295 Lafayette Street, New York, NY 10012 Web: nyúrudincenter.com Twitter: @nyurudin Facebook: facebook.com/NYURudinCenter

Email: rudin.center@nyu.edu

Thanks to Stephanie Levinsky from NYCDOT, Justin Ginsburgh from NYC Bike Share LLC, and Justin Tyndall from the Rudin Center.

Editor: Sarah M. Kaufman All photos by Nolan Levenson All maps created and designed by Lily Gordon-Koven

### Contents

Citi Bike Takes New York	5
Cycling in New York City	5
Citi Bike Launches	7
Expanding the Network	8
Connecting to Transit	11
Shortening the Last Mile	16
Activity Hubs	21
Rebalancing	27
A New, Flexible Mode	29
Figures and Tables	30
References	31

## **Executive Summary**

New York City implemented its bikeshare system, Citi Bike, in May 2013. With more than 6.5 million trips taken by the end of February 2014, the system is well-used. Its daily ridership is equivalent to one of the city's most popular bus routes. Rather than serve as just a recreational mode, Citi Bike has become an integral part of New York City's transportation network.

This report analyzes key aspects of Citi Bike:

- Citi Bike is built on **station density**, with almost 20 stations per square mile.
- Citi Bike provides a "last mile" solution for many transit commuters -- almost 3/4 of all Citi Bike stations are within 1/4 mile of a subway station.
- The most used stations are near **major transportation hubs**, including Grand Central, Penn Station, and the World Trade Center.
- The system's greatest challenge is its success-- it has so much use that it struggles to **rebalance** bikes at high-demand stations.

Our analysis focuses on the relationship between Citi Bike and New York City's subway system. It is the first analysis based on current Citi Bike station locations and their activity levels, with data from NYCDOT, and the connection to the subway network. We found that Citi Bike complements New York City's dense street grid and expansive subway system. Seventy-four percent of Citi Bike stations are within a five minute (quarter mile) walk of a subway station entrance. The average distance between Citi Bike station and subway entrance is 934 feet.

Citi Bike's density and connections to transit are compared with two other bikeshare systems: Capital Bike Share in Washington, DC and Divvy Bikes in Chicago. While Citi Bike has 19.7 bike share stations per square mile, Capital Bike Share has 4.37 stations per square mile and Divvy has 6.8 stations per square mile. The differences in station density and connection to transit suggest that Citi Bike promotes short, last-mile trips.

As Citi Bike grows, more New Yorkers will be able to access the new network, expanding the capacity and accessibility of the transportation system. Communities across the city, from Harlem to Greenpoint, are requesting stations in their neighborhoods. The system's expansion can serve more New Yorkers by increasing their daily mode choices. New Yorkers will benefit from improved mobility and additional transportation options.

#### Citi Bike Takes New York

Citi Bike has become a vital element of the city's transportation network, providing a new flexible mode for many New Yorkers. Trips that were once 20-minute walks are now 5-minute bike rides, and places previously inaccessible by public transit are now linked to the network.

In its first six months of operation, Citi Bike riders took more than 6 million trips, and by early January, nearly 100,000 riders spent \$95 to become annual members.

## Cycling in New York City

Cycling in New York City is not a new phenomenon. Bicycle messengers and delivery people have been staples of New York City for decades. Before the advent of the automobile, bicycles were a common mode of transportation. During the early 1900's, women who were prohibited from driving used bicycles to travel - famous suffragist Susan B. Anthony once said that the bicycle had "done more to emancipate women then anything else in the world."

Some of New York City's first bike lanes were implemented in midtown Manhattan in 1980 by Mayor Ed Koch. The lanes garnered public backlash and were removed after one month. Cyclists were banned from Midtown. This situation remained largely unchanged for more than two decades.

Today, the bicycle network has flourished. Led by former New York City Transportation Commissioner Janette Sadik-Khan and the Department of Transportation, the city expanded its bicycle facilities to nearly 600 miles by the end of the Bloomberg administration.

Bicycling recently reached one percent modeshare in New York City. Attention to bicycle-automobile and bicycle-pedestrian collisions from the police and legal sectors continues to grow. Recent cases have yet to create a clear legal precedent.

Attention from other industries grows as more New Yorkers choose to bicycle. Hotels are creating their own bike share programs and lending bicycles to guests. Meanwhile, web and smartphone application developers are using data from the Department of Transportation to build apps and websites that make biking in New York City easier. These apps include NYC Bike Map 2013, Ride the City, and New York Bike, which help riders find the bike routes and bike shops.

As a result of the new lanes and tools to navigate them, bicycle commuting doubled between 2007 and 2011. Likewise, screenline counts of riders at bridge crossings increased 186 percent between 2000 and 2013. The bike lane expansion has received criticism from some local residents, however, a 2012 New York Times poll showed that sixty-six percent of New Yorkers think bike lanes are a good idea. The Prospect Park West bicycle lane created large public debate and a lawsuit, despite evidence showing improved traffic safety.

As part of the expanding bike infrastructure, the New York City Department of City Planning conducted a bike share feasibility study in 2009. The city issued a request for proposals in November 2010 and ultimately selected NYC Bike Share, a newly formed subsidiary of Alta Bicycle Share, in September 2011. With funding from Citigroup and underwriting from Goldman Sachs Urban Investment Group, outreach and planning began.

New York City Department of Transportation staff conducted 159 multilingual outreach meetings and more than 200 additional stakeholder meetings to engage residents and community groups in the planning process. Using a new online tool called "Shareabouts," the city solicited more than 10,000 station location suggestions and 60,000 comments (pictured below).



#### Citi Bike Launches

After several delays, including one related to equipment damage caused by Superstorm Sandy, Citi Bike launched in May 2013 with 330 stations and 5,000 bikes in the lower half of Manhattan and pockets of Brooklyn, including Williamsburg and downtown Brooklyn. By launch day, 16,000 people already signed up as annual members.

Annual Citi Bike memberships cost \$95 and provide members an unlimited number of 45 minute rides. Rides longer than 45 minutes result in overage charges ranging from \$2.50 for an additional 25 minutes to over \$9.00 for additional time. Seven day passes are available for \$25 and 24-hour passes are available for \$9.95. NYCHA residents and credit union members qualify for discounted \$60 annual memberships. Prior to launch day, DOT and NYC Bike Share staff held events to introduce New Yorkers to the system.



Despite the uptake in the system, there were serious criticisms of Citi Bike. Residents in Fort Greene, Brooklyn, for example, expressed concerns over the loss of on-street parking and the degradation of the historic aesthetic of their neighborhood caused by the blue bikes. Neighborhood groups objected to the locations of bikeshare stations, and some were relocated.

Author Delia Ephron wrote in the New York Times that the color of the bicycles disrupted the natural palate of New York City. Still, Citi Bike has an average of almost 30,000 trips per day, a statistic comparable to the ridership of the busiest local New York City Transit bus routes.

Geographically, the system covers some of the city's major commercial business districts and residential areas, allowing riders to travel short distances from work to home or between meetings.

### **Expanding the Network**

Why does Citi Bike work? New York's densely populated center already encourages residents, workers, and tourists to walk or take transit to get around the city. New York City, famed for its density and walkability, lends itself well to a tightly knit web of bike share stations. The density of bikeshare stations that helps riders find and return bikes is the main element in the system's success.

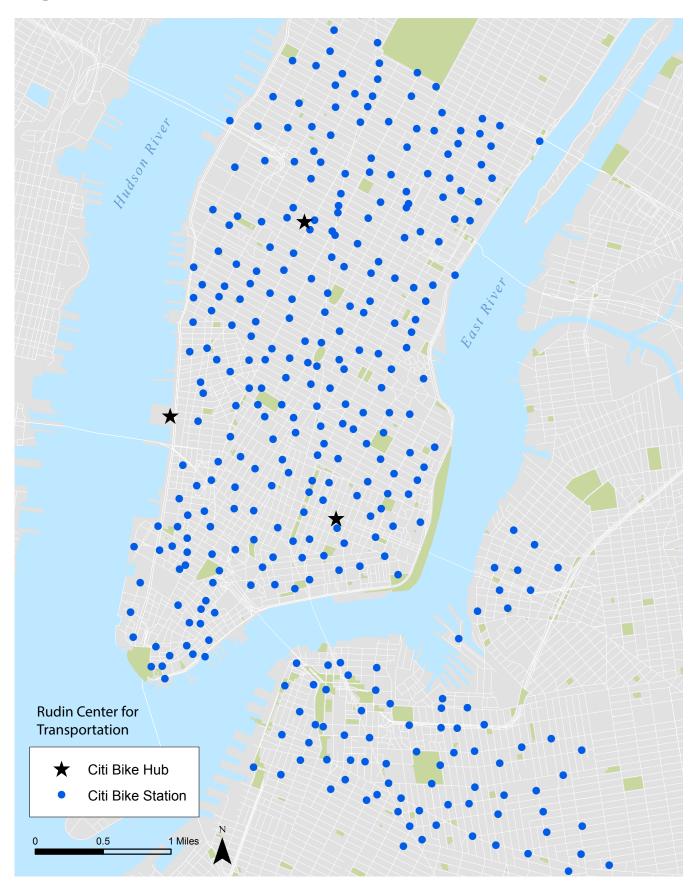
For a fuller understanding of the system's success, we looked at the geographic relationship to New York City's subways. Serving 5.4 million riders every weekday with over 700 miles of track, the subway extends far beyond Citi Bike's geographic reach. However, the subway carries millions each day, many of whom use Citi Bike to cut down on travel time by biking, rather than walking or taking a bus or taxi, the "last mile" to their destination. In analyzing the busiest stations, we found a strong connection between existing transit infrastructure and hubs and Citi Bike's use.

Citi Bike presents a quick alternative to walking, taking a cab, or waiting for a crosstown bus.

Subway lines primarily run North-South along the center of Manhattan on Lexington Avenue, Broadway, 6th Avenue, 7th Avenue, and 8th Avenue, leaving the far east and west sides without immediate subway access. Meanwhile, Citi Bike stations blanket the southern half of the island from east to west and 59th Street to Battery Park. This enables multidirectional travel; for crosstown travellers, Citi Bike presents a quick and relatively inexpensive alternative to walking, taking a cab, or a crosstown bus. New York City's buses are the slowest in the nation; a mile-long bus trip across 34th Street could take more than 20 minutes but a Citi Bike cuts the same trip down to 10 minutes or less, depending on the rider.

This solution to the last mile problem is only made possible by the ease of access between bike and public transit. Seventy-two percent of Citi Bike stations, 237 of 330, are within ¼ mile or a five minute walk of a **subway station centerpoint**; twenty-five percent are within 500 feet; eight percent are within 200 feet; and three percent are within 100 feet.

Figure 1. Citi Bike Stations and Hubs



A close analysis of **subway station entrances** highlights Citi Bike station locations. Seventy-four percent all Citi Bike stations, 243 of 330, are within ¼ mile of a subway station **entrance** (vs. centerpoint); thirty-eight percent are within 500 feet; sixteen percent are within 200 feet; and ten percent are within 100 feet. In other words, the stations within a five minute walk of a subway entrance have the capacity to hold approximately 8,500 Citi Bikes (more bikes than the system currently has).

Within the geographic extent of Citi Bike stations there are 158 subway stations, roughly 2.1 Citi Bike stations for every subway station. The proximity of Citi Bike stations to subway entrances encourages short trips and enables multimodal trips without the hassle of securing a private bicycle, time spent walking, money spent on a taxi or car service, and with the added benefit of providing exercise.

Figure 2. Citi Bike Stations within 1/4 Mile of a Subway Entrance



Through our spatial analysis, we examined both subway station centerpoints and subway station entrances. Subway station entrances provide a more accurate analysis by showing where people walk into the stations; however, entrance information was not available for Chicago or Washington, DC's rail systems. For true comparisons, we used station centerpoints as well as station entrances.

#### Connecting to Transit

To put the system's density in perspective, we examined the density and relationship to transit of two comparable bikeshare programs, Divvy in Chicago and Capital Bikeshare in Washington, DC. Chicago's Divvy bike share also launched in spring 2013 and is operated by Alta Bicycle Share. The system includes 300 stations and 3,000 bikes and is owned by the Chicago Department of Transportation. The geographic extent of Divvy stations currently overlaps with 85 "El" train stations; there are 3.5 Divvy stations for every El station.

While Chicago's system has also been very successful and plans to extend to 475 stations to become the largest system in the country, it does not have the same relationship to transit that Citi Bike does. While seventy-two percent of all Citi Bike stations are within a five minute walk of a subway station, forty-one percent of all Divvy stations are within 1/4 mile of an El station. Twenty percent are within 500 feet of an El station; nine percent are within 200 feet; and two percent are within 100 feet.

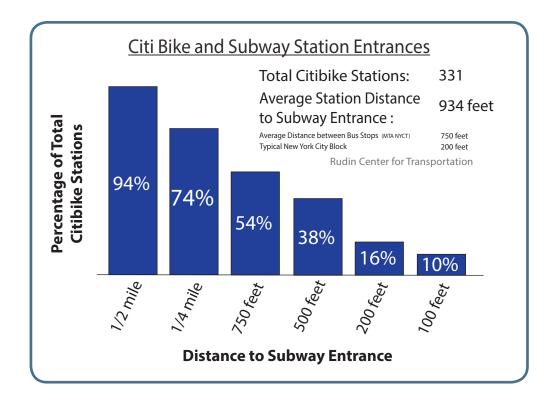
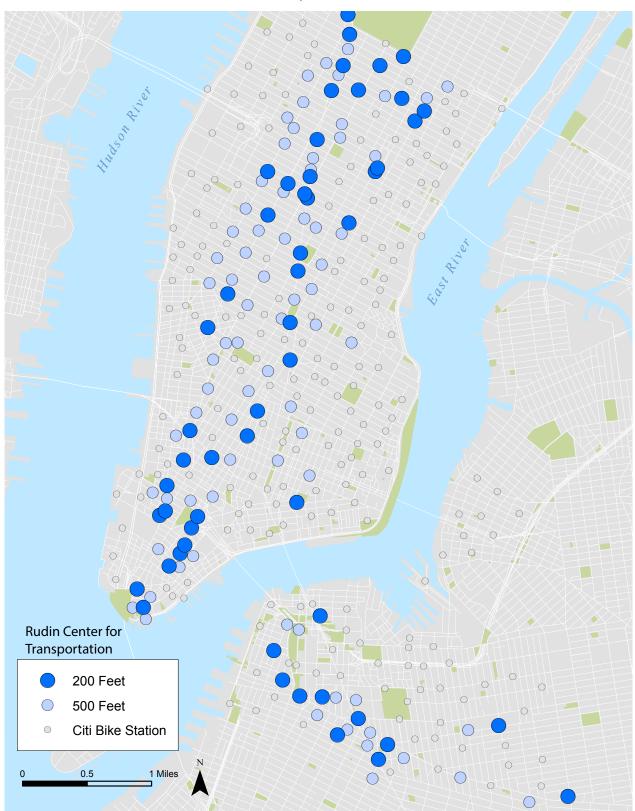
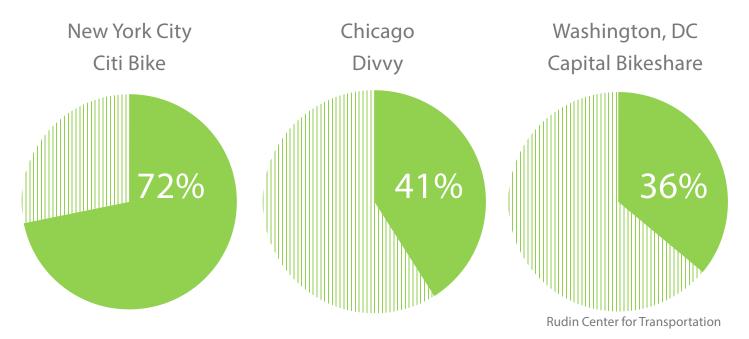


Figure 3. Citi Bike Stations within 200 and 500 Feet of Subway Entrance

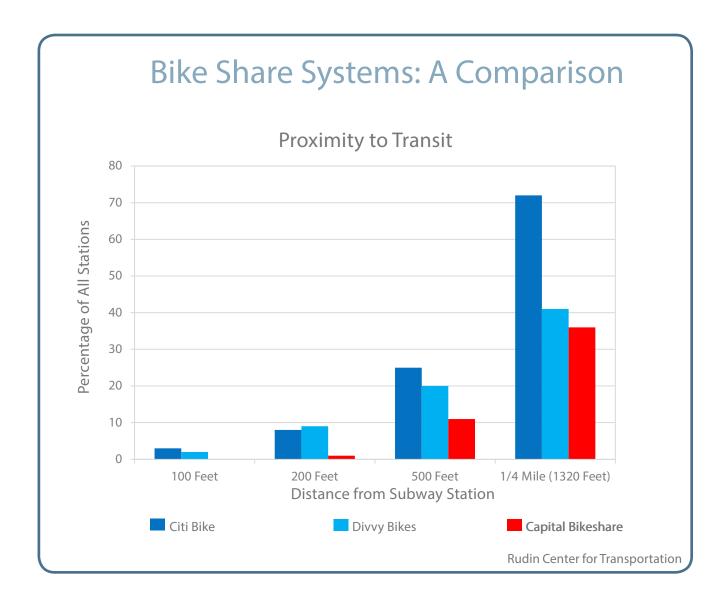


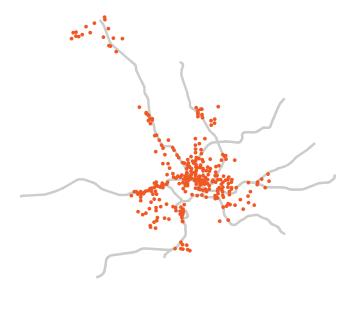
#### Percentage of bike share stations within a 5 minute walk of a heavy rail (subway or El) station centerpoint



Capital Bikeshare in Washington, DC opened in 2010 and has been heralded as one of the country's most successful systems. The system is also operated by Alta Bicycle Share and was the largest bike share program in the country before Citi Bike opened. The system includes 308 stations and roughly 2,500 bikes spread through the District; Montgomery County, Maryland; Arlington County, Virginia, and Alexandria, Virginia. The geographic extent of Capital Bikeshare overlaps with 59 WMATA metro stations; there are 5.2 bike share stations for every one Metro station.

Capital Bikeshare's expansion in 2012 and 2013 into adjacent counties allows the system to cover more ground, but diminishes the capacity of riders to connect to transit. A map of Capital Bikeshare, Divvy, and Citi Bike at the same scale shown on page 15 shows the diverging densities of the three systems. In Washington, 111 of 308 Capital Bikeshare stations, thirty-six percent, are within quarter-mile walk from a Metro station. Eleven percent of all stations are within 500 feet of a Metro station; one percent of stations are within 200 feet of a Metro station; and only one Capital Bikeshare station, less than 0.01 percent of all stations, is within 100 feet of a Metro station.





## Washington, DC Capital Bikeshare

308 Stations

2,500 Bikes

70.45 Miles<sup>2</sup> Station Coverage

4.37 Stations/Mile<sup>2</sup>



## Chicago **Divvy Bikes**

300 Stations

3,000 Bikes

**44.12** Miles<sup>2</sup> Station Coverage

6.8 Stations/Mile<sup>2</sup>

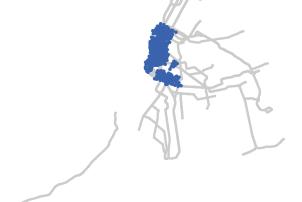


330 Stations

**5,000** Bikes

16.75 Miles<sup>2</sup> Station Coverage

19.7 Stations/Mile<sup>2</sup>



Three maps above produced at equal scales with bike share systems and rail transit lines to illustrate system coverage and density.





## Shortening The Last Mile

Citi Bike's extension of the transportation network is especially evident in areas with moderate subway access where residents and workers walk ten or fifteen minutes to access transit. On Manhattan's far west side, subways are accessed on 6th, 7th, and 8th Avenues on the 1/2/3, A/C/E, and F/M trains.

Citi Bike can cut down on trip times for New Yorkers. Accessing the Citi Bike station at 27th Street and 11th Avenue and riding to Penn Station at 33rd Street and 8th Avenue, a distance of 0.8 miles, turns a 16 minute walk into a 6 minute bike ride.

In Fort Greene, Williamsburg, the East Village, and even Midtown, Citi Bike reduces travel times for people commuting and for people taking local trips to a meeting, lunch date, or even the grocery store. The following maps illustrate the connections Citi Bike is making in neighborhoods not directly located on subway lines. For commuters, bike share has the potential to reduce commuting times.

Figures 4-7 on the subsequent pages illustrate how Citi Bike extends the reach of transit in New York City by shortening trips from neighborhoods in Manhattan and Brooklyn and connecting workers and residents to some of the city's largest transit hubs. Connections to Grand Central Terminal, Penn Station, and Atlantic Avenue-Barclays Center connect riders to 14 subway lines as well as Amtrak, MetroNorth, Long Island Rail Road, and New Jersey Transit.

#### Legend for following neighborhood maps

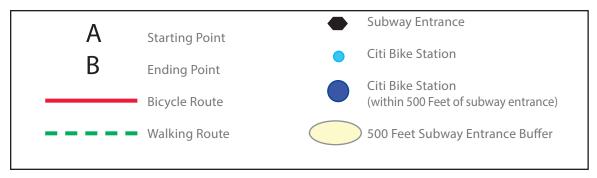
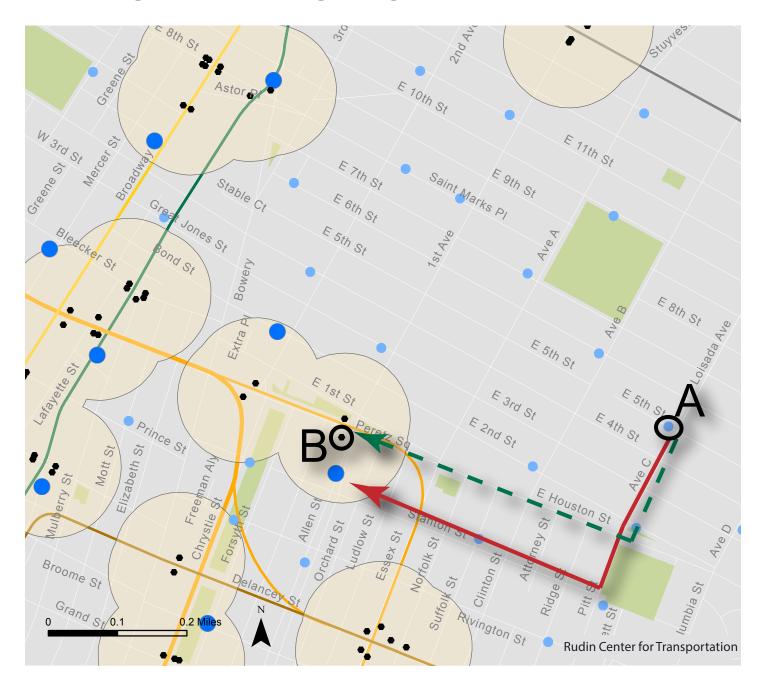
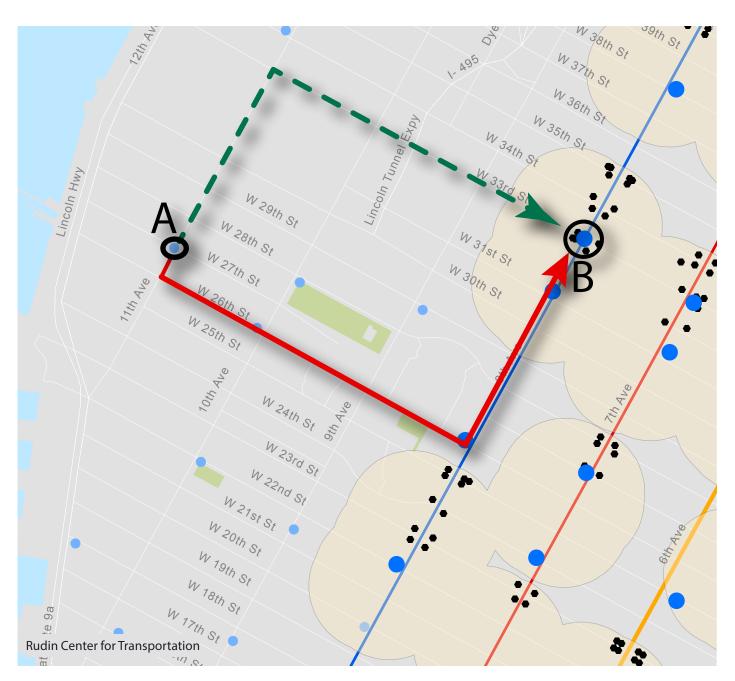


Figure 4. East Village Neighborhood Connections



East 5th Street & Avenue C to 2nd Avenue F 0.7 miles 14 minutes walking 4 minutes biking

Figure 5. Chelsea Neighborhood Connections



West 27th Street & 11st Avenue to
34th Street-Penn Station (A/C/E, Amtrak, NJT, LIRR)

0.8 miles

16 minutes walking

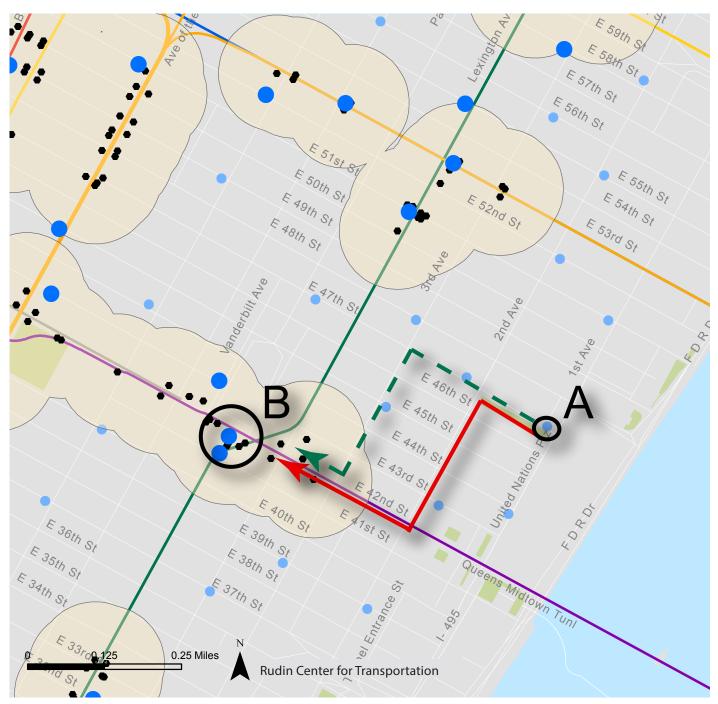
6 minutes biking

Figure 6. Fort Greene Neighborhood Connections



**Adelphi Street & Myrtle Avenue to** Atlantic Avenue-Barclays Center (2/3/4/5/B/D/N/Q/R, LIRR) 0.9 miles 17 minutes walking 7 minutes biking

Figure 7. East Midtown Neighborhood Connections



East 47th Street & 1st Avenue to
42nd Street-Grand Central Station (4/5/6/7/S, MetroNorth)

0.7 miles

14 minutes walking

5 minutes biking

## **Activity Hubs**

Citi Bike's density, cost, and integration with diverse modes of travel contribute to the system's adoption as a regular mode choice by New Yorkers, not just for leisure or recreation, but as an integral part of their commuting patterns. This integration becomes evident through an analysis of the system's busiest stations. Figures 8 and 9 highlight stations with more than 35,000 trip starts and ends between July 1 and December 1, 2013.

The busiest stations are adjacent to transit hubs, including those surrounding Grand Central Station, Pennsylvania Station, and the Port Authority Bus Terminal. Together, these transit hubs carry more than a million passengers in and out of the city each day from the surrounding regions via New Jersey Transit Buses and Commuter Rail, Long Island Rail Road, MetroNorth Railroad, and Amtrak. In Midtown, Union Square, Flatiron, SoHo, and Downtown, the busiest stations are linked not only to commuter rail lines but also to the city's subways as well.

Table 1.	Top 10	Stations:	<b>Trip Starts</b>
----------	--------	-----------	--------------------

7/1/2013 - 12/1/2013 (Total)

Trips
78,224
47,297
46,045
44,224
41,406
38,507
37,325
36,733
34,211
33,954

#### Table 2. Top 10 Stations: Trip Ends

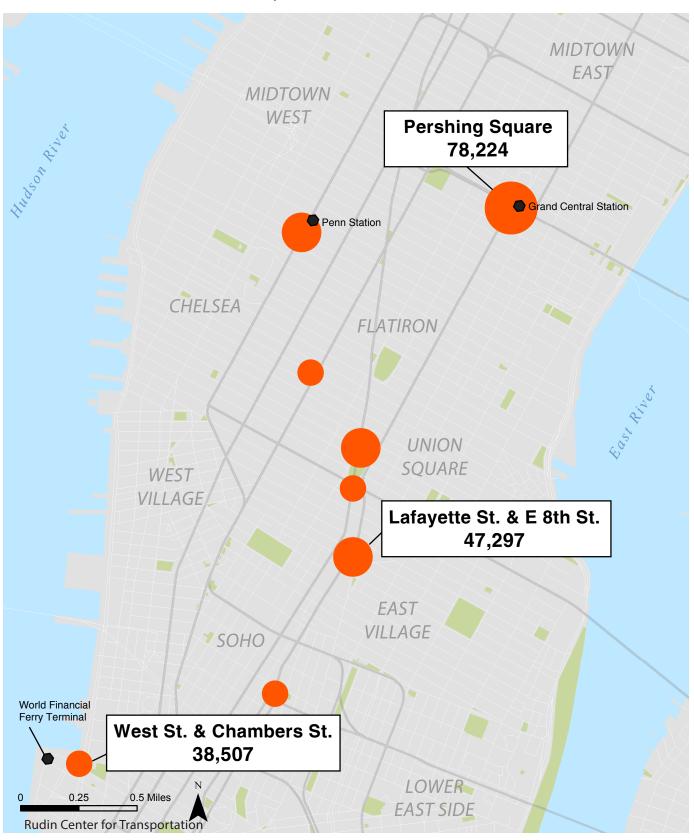
7/1/2013 - 12/1/2013 (Total)

Station	Trips
Pershing Square (Grand Central)	57,795
E 17 St & Broadway (Union Square)	50,756
Lafayette St & E 8 St (Astor Place)	46,775
8 Ave & W 31 St (Penn Station)	42,377
W 21 St & 6 Ave	40,522
West St & Chambers St	39,387
Cleveland PI & Spring St	36,686
Broadway & E 14 St (Union Square)	36,229
Broadway & E 22 St	35,492
Broadway & W 60 St	35,225

#### Figure 8. Active Start Stations:

Stations with over 35,000 starts

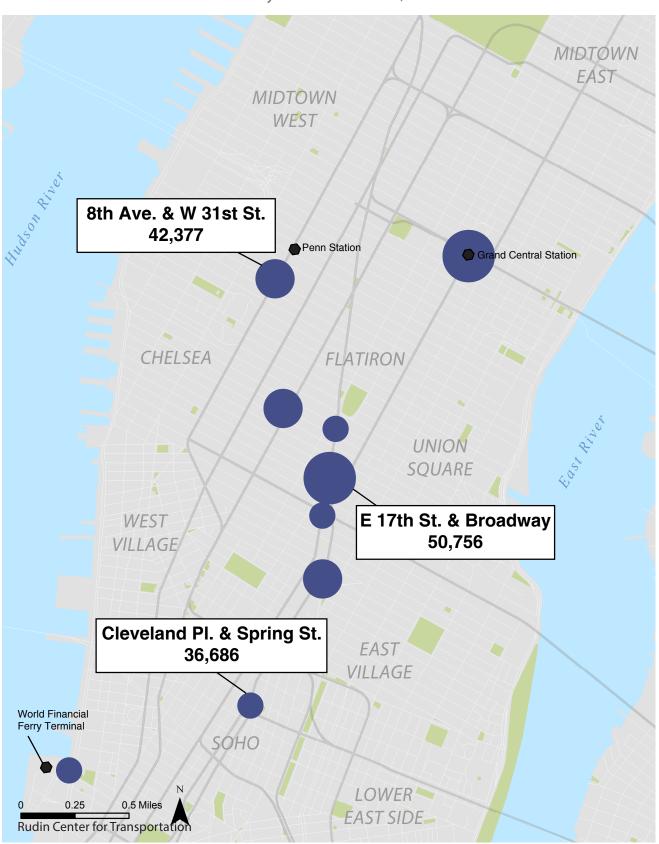
July 1 - December 1, 2013



#### Figure 9. Active End Stations:

Stations with over 35,000 ends

July 1 - December 1, 2013



The bike-mass transit commuting patterns are apparent when studying the busiest stations in the morning and evening rush hours. Figures 10 and 11 show the 25 stations with the most trip starts in the morning and the 25 stations with the most trip ends in the evening. The similar clustering of stations show that riders are starting their days in one place and returning to comparable locations in the evening. These maps also reveal one of the system's greatest challenges: rebalancing.

#### Commuting Patterns: Where are people riding to and from?

# Table 3. Top 10 Stations: Total Morning Rush Hour Trip Starts

7/1/2013 - 12/1/2013

Station	Trips
Pershing Square (Grand Central)	25,367
8 Ave & W 31 St (Penn Station)	17,724
W 41 St & 8 Ave	13,144
E 43 St & Vanderbilt Ave	12,458
8 Ave & W 33 St	11,930
W 33 St & 7 Ave	10,734
Lafayette St & E 8 St (Astor Place)	8,175
Barclay St & Church St	8,098
W 38 St & 8 Ave	7,607
W 31 St & 7 Ave	7,441

Table 4.

Top 10 Stations: Total Evening Rush

Hour Trip Ends

7/1/2013 - 12/1/2013

Station	Trips
Pershing Square (Grand Central)	20,536
8 Ave & W 31 St (Penn Station)	17,453
W 41 St & 8 Ave	13,479
Lafayette St & E 8 St (Astor Place)	13,216
E 17 St & Broadway	13,069
W 33 St & 7 Ave	12,526
West St & Chambers St	11,221
8 Ave & W 33 St	10,807
Barrow St & Hudson St	10,530
W 21 St & 6 Ave	10,485

Morning Rush Hour: start time 6-10am, weekdays only Evening Rush Hour: start time 4-8pm, weekdays only

Figure 10. Morning Bike Share Rush Hour



Figure 11. Evening Bike Share Rush Hour



## Rebalancing

Citi Bike's popularity has created such a demand that stations often lack bikes or are completely full, making it hard to take or park a Citi Bike. Rebalancing is the process of redistributing bikes between 'attractive' and 'repulsive' stations. As commuters ride to work in the morning, 'repulsive' stations empty out and leave few to no bikes. Conversely, 'attractive' stations in busy neighborhoods fill up, leaving no place for riders to dock their bikes. Stations that are full or empty are considered to be an "outage."

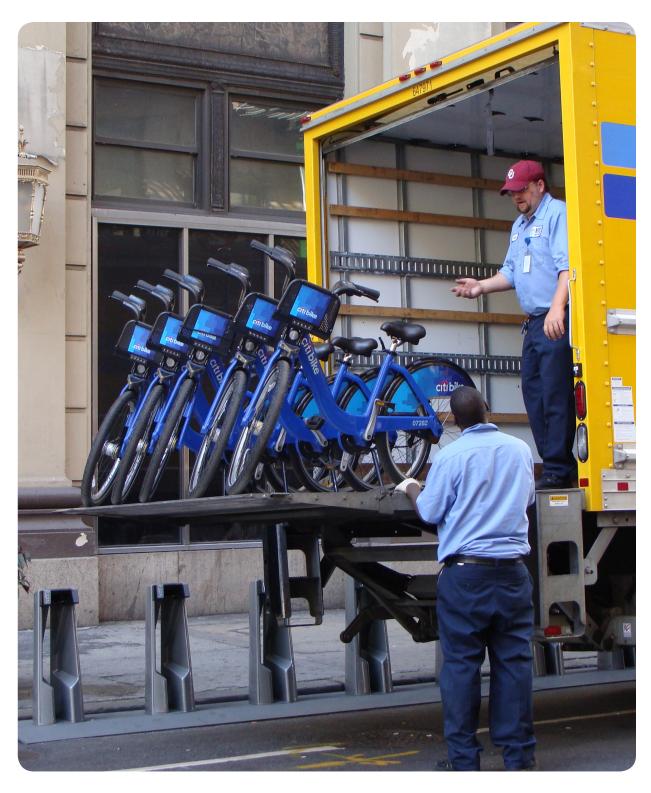
Under contract with the City, NYC Bike Share faces financial penalties when adjacent station outages occur for more than one hour. To avoid outages, dozens of rebalancing teams shuttle bikes between full and empty stations using big box trucks, sprinter vehicles, and bicycle trailers.

New smartphone apps built by 'civic hackers' mitigate these issues by helping Citi Bike riders find stations with open docks or available bikes. These apps include the official Citi Bike app as well as NYC Bikes, Availabike, and NYC Bike Share.

Despite the varied forms of rebalancing, Citi Bike still struggles to meet demand for riders. Although the main bike warehouse is in Sunset Park, Brooklyn, Citi Bike opened three hubs near Penn Station, Pier 40, and Delancey Street where broken bikes can be repaired and working bikes can be staged for vehicle pickup. This proximity shortens the travel distances of rebalancing vehicles, avoiding the potentially hour-long trip from Sunset Park to Midtown, which could exceed the one-hour outage limit.

While surveyed users expressed frustration with bike distribution, officials at the City's Department of Transportation believe commuters are tweaking their schedules and destinations to ensure easier access to bikes and docks during the morning and evening rushes.

The system's success has created its greatest challenge: Rebalancing bikes



Workers unload a moving-truck full of Citi Bikes near Penn Station

## Citi Bike: A New, Flexible Mode of Mobility

As Citi Bike riders seek the warmth of spring, many ask when the system will expand to meet the needs of more riders – those who live throughout the five boroughs and beyond – and ease the rebalancing difficulties. Representatives from the City's Department of Transportation note that significant time has elapsed since they conducted initial public outreach and staff would need to revisit sites and possibly hold new public meetings.

System expansion would also require new funding sources and a possible discussion of additional private partners. Additionally, Citi Bike mechanics continue to repair equipment and bicycles damaged by Superstorm Sandy; NYC Bikeshare representatives report that it costs \$800 to repair a bicycle and \$1150 to purchase a new one.

New York City's density and rich transit network are keys to the system's strength; however, thoughtful planning and oversight from city administrators and staff built a system with a density to match its surroundings. Strong marketing and wayfinding make finding stations and noticing bikes easy and the relatively low cost gives the system the opportunity to unite New Yorkers across income brackets, something New York's diverse transportation network already encourages.

The integration of Citi Bike into New Yorkers' daily travel routines, and the commuting patterns that contribute to rebalancing woes, demonstrate the ability of transportation systems to reinforce one another. The addition of Citi Bike to the New York landscape means more choices - of mode, destination, and payment - for visitors and residents.

## **Figures**

1. Citi Bike Stations and Hubs	9
2. Citi Bike Stations within 1/4 Mile of Subway Entrance	10
3. Citi Bike Stations within 200 and 500 Feet of Subway Entrance	12
4. East Village Neighborhood Connections	17
5. Chelsea Neighborhood Connections	18
6. Fort Greene Neighborhood Connections	19
7. East Midtown Neighborhood Connections	20
8. Active Start Stations	22
9. Active End Stations	23
10. Morning Bike Share Rush Hour	25
11. Evening Bike Share Rush Hour	26
Tables	
1. Top 10 Stations: Trip Starts	21
2. Top 10 Stations: Trip Ends	21
3. Top 10 Stations: Morning Rush Hour Trip Starts	24
4. Top 10 Stations: Evening Rush Hour Trip Ends	24

#### References

- 1. NYCDOT. "NYC BikeShare: Designed by New Yorkers." 2012
- 2. NYCDOT. "Suggestion Archive." New York City Bikeshare. a841-tfpweb.nyc.gov/bikeshare/suggestion-archive/
- 3. Grynbaum, Michael M. & Connelly, Marjorie. "Most New Yorkers Say Bikes Lanes are a Good Idea." The New York Times. August 21, 2012.
- 4. Open Plans. "NYC Bike Share Map." openplans.org/case-study/nyc-bike-share-map/
- 5. Bernstein, Andrea. "Survey: 64% of CitiBike Users Unhappy About Full or Empty Docks." Transportation Nation. October 2013.
- 6. Sandler, Ross. "No Dedicated Lane in Court for Bike Riders." City Land. March 5, 2014.

Data Sources: NYCDOT, NYC Open Data, Chicago Data Portal, DC Data Catalog, US Census

Before the launch of Citi Bike, a "last mile" analysis was conducted by Steven Romalewski on the Spatiality Blog (spatialityblog.com) on May 14, 2012, using the proposed station locations. That analysis can be found here: http://spatialityblog.com/2012/05/14/citibikenyc firstlastmile quantified/

#### About the Rudin Center for Transportation

The Rudin Center for Transportation at NYU's Wagner Graduate School of Public Service school aims to strengthen our understanding of all modes of transportation through research, public forums, and educational programs. The Center draws upon faculty, students, and visiting scholars at NYU. Current areas of inquiry include:

- The flow of people, goods and information in and through New York City
- Information technology and transportation systems
- Inequality and access to employment
- Urban bike share systems
- The future of supercommuting

The Rudin Center for Transportation was named in recognition of a gift from civic leader Lewis Rudin and receives support from leading firms in transportation, finance, and communications. The director of the Center is Mitchell L. Moss, Henry Hart Rice Professor of Urban Policy and Planning.



Rudin Center for Transportation 295 Lafayette Street, Second Floor New York, NY 10012

Website: nyurudincenter.com

Twitter: @nyurudin

Facebook: facebook.com/NYURudinCenter

Email: rudin.center@nyu.edu