

# **COVID19 IMPACTS ON TRANSPORTATION**

Produced by the NYC Department of City Planning's Transportation Division

May 19, 2020



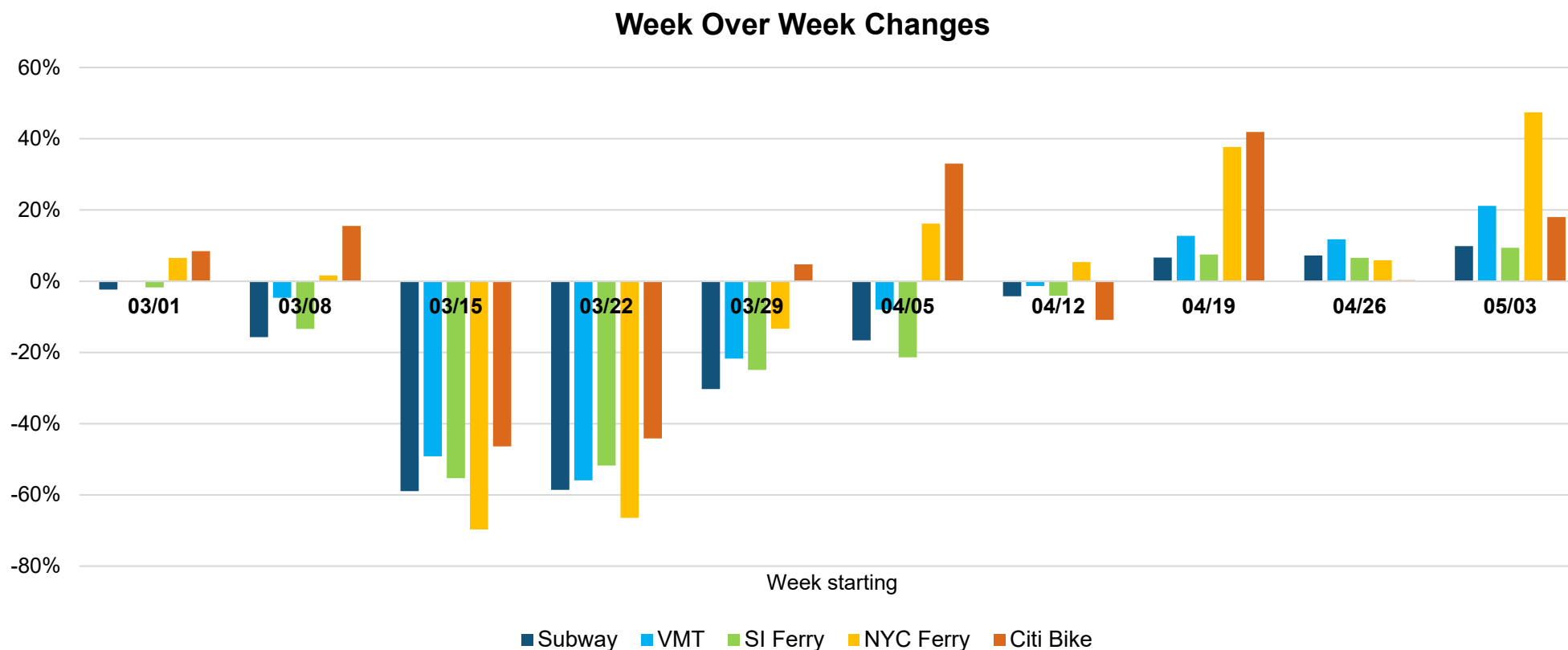
- The NYC Department of City Planning's Transportation Division is compiling data to help understand the effects of COVID19 on the transportation network. This is our eighth weekly report.
- This week's report includes the following information:
  1. Executive Summary
  2. Citywide Trend: Increasing Travel
  3. Subway
  4. Ferry
  5. Citi Bike
  6. Pre-COVID19 Workforce and Commuting
  7. Timeline and Appendix
- We continue to expand the content of these weekly reports as new data become available to us, and are prioritizing work around understanding how mobility trends relate to the economic and employment landscape. We have moved much of the material from previous weeks into an appendix, which is no longer attached to this report.
- This report may serve to help in pandemic response and longer-term recovery. We are eager for feedback in how to make this more useful. Feel free to reach out to Laura Smith ([lsmith@planning.nyc.gov](mailto:lsmith@planning.nyc.gov)) with questions or comments, or if you would like to see this week's appendix slides.

- Subway ridership continues its third week of increases, and **total MetroCard swipes during the week of May 2 – May 8 were higher than each of the previous five weeks.** Almost every station in the system continues to see increasing ridership over the previous week, and the **growth rate is increasing.**
- Staten Island Ferry's ridership is on average **90 percent lower** than the same time last year. The lowest ridership date this year was Monday, April 13<sup>th</sup>. As of Monday, May 11<sup>th</sup> 2020, ridership was **52 percent higher** than it was on its lowest date.
- **There are fewer Citi Bike trips under the PAUSE than there were pre-PAUSE, and peak hour spikes in ridership are less pronounced.** Common weekend origin/destination pairings have dropped off substantially under the PAUSE, but remain more prevalent than weekday trips. These, too, appear to remain oriented around recreation.
- Looking at pre-COVID19 employment data, **subway is the predominant transportation mode for Manhattan-Core-bound commute trips between 8am-9am, followed by rail.** Rail trips make up a much higher share of core-bound commute trips than commute trips to other places of work. **Finance and Insurance makes up 8% of total employment citywide but comprises 15% of core-bound rush-hour subway commuters.**
- *Professional Services and Management, Healthcare and Social Assistance, and Finance and Insurance* had the highest numbers of workers working at home, while *Real Estate and Arts, Entertainment, and Recreation* had the highest percentages of workers who worked at home. **Post-pandemic work-from-home tendencies will likely vary substantially from earlier patterns.**
- We expect to see a greater share of people arriving to the core via personal automobile once workers return to their places of work in larger numbers. **Parking availability will be a major factor in how many commuters will be able to shift modes, at least temporarily.**

# Citywide Trend: Increasing Travel

# Citywide Trend: Increasing Travel

- More than eight weeks into New York City's Stay at Home order, and seven weeks into analysis of travel under the PAUSE, we're now seeing steady increases in transportation ridership.
- As we begin to prepare for an unPAUSE and a return to work for more New Yorkers, we're trying to get a better understanding of what's behind the current increases in travel in order to help us anticipate travel in the coming weeks and months.

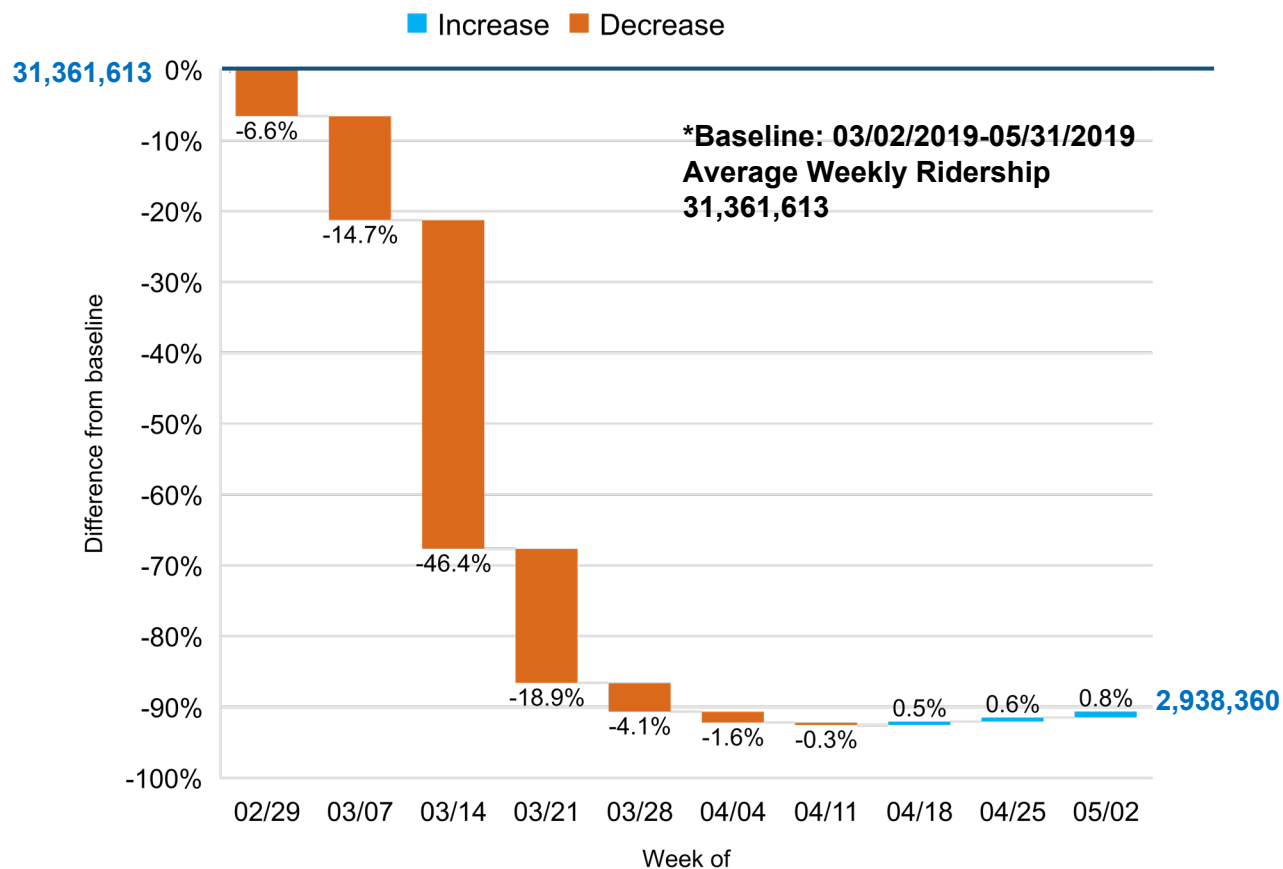


Note: 1. Subway data is released on a Sat-to-Fri weekly basis, not the same Sun-to-Sat week period as the other modes are. 2. VMT week-over-week change is not available for the week starting from 03/01.

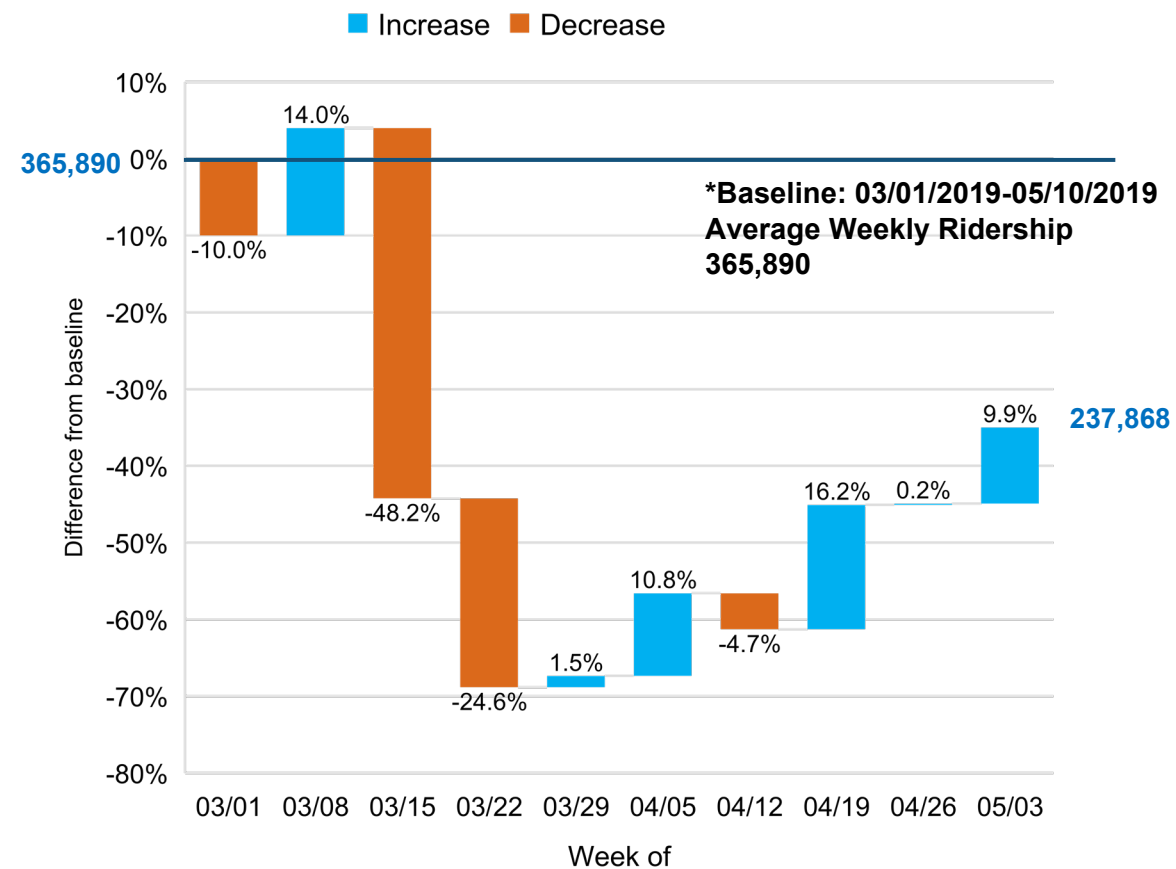
# Citywide Trend: Increasing Travel

- Fluctuations for subway and Citi Bike ridership are presented in more detail below. While notable, and representing thousands of riders, the recent increases in subway ridership represent a small fraction of typical ridership.
- This is contrasted by Citi Bike ridership, which was only about 35% less than the baseline during March to May, 2019.

### Subway Weekly Ridership Change from Baseline\*



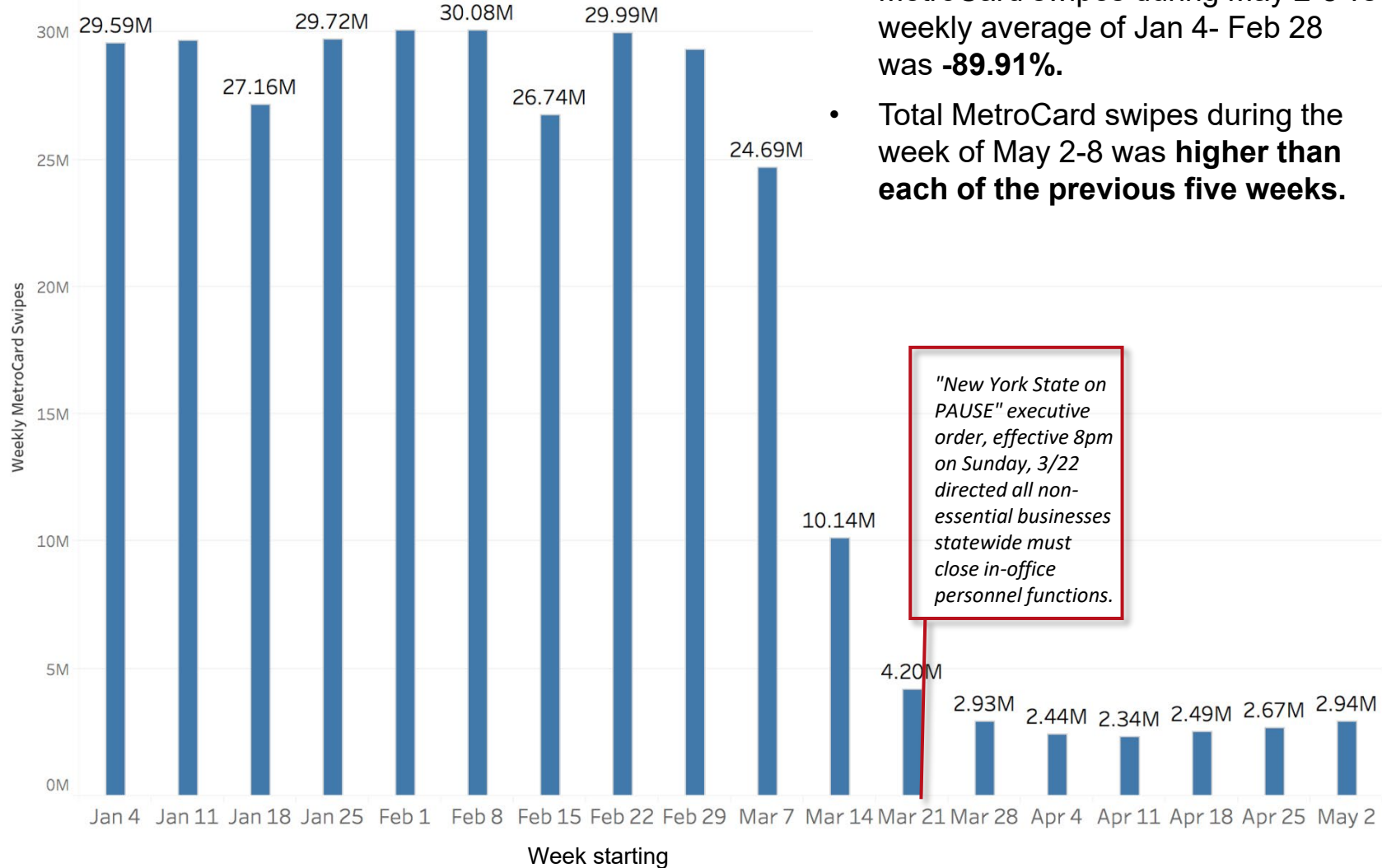
### Citi Bike Weekly Ridership Change from Baseline\*



# Subway

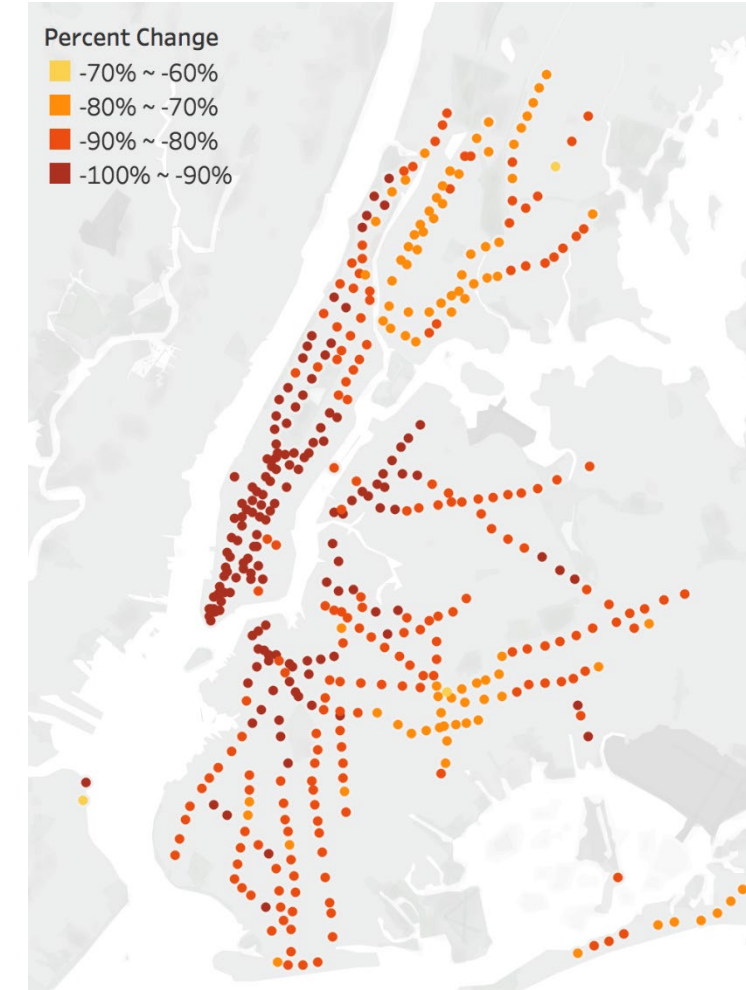
# Subway System-wide Ridership Changes

Weekly MetroCard Swipe Trends (Jan 4 - May 8)



- The citywide percent change of MetroCard swipes during May 2-8 vs weekly average of Jan 4- Feb 28 was **-89.91%**.
- Total MetroCard swipes during the week of May 2-8 was **higher than each of the previous five weeks.**

Percent Change of Swipes (May 2-8 2020 vs. Weekly Average of Jan 4 to Feb 28 2020)



Interactive dashboard link:

<https://public.tableau.com/profile/dcptransportation#!/vizhome/MetroCardSwipes/PercentChange>

Data sources: MTA Fare Data (<http://web.mta.info/developers/fare.html>)

May 19, 2020

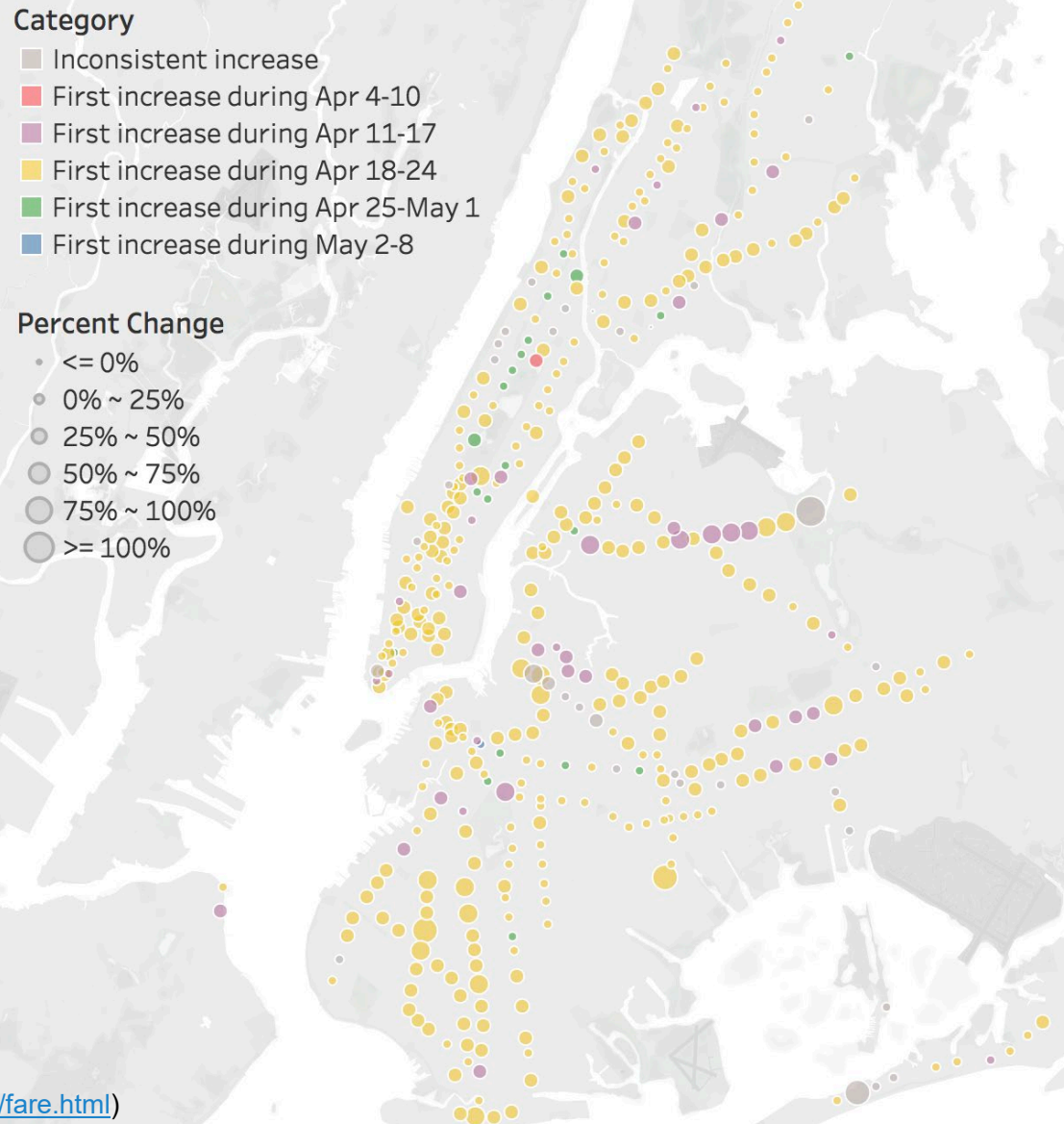


# MetroCard Swipe Change May 2-8 vs Apr 25-May 1 2020

15 stations with most and least dramatic changes in ridership between weeks of April 25<sup>th</sup> and May 2<sup>nd</sup> 2020

Station (Route)	Percent Change	Station (Route)	Percent Change
Beach 105 St (A S)	61.22%	E 143 St - St Mary's St (6)	-20.44%
Mets - Willets Point (7)	42.61%	Cathedral Pkwy (1)	-7.50%
W 8 St - NY Aquarium (F Q)	33.06%	Beach 98 St (A S)	-6.38%
5 Av/59 St (N W R)	27.77%	Aqueduct Racetrack (A)	-5.08%
28 St (R W)	27.52%	137 St - City College (1)	-4.57%
72 St (B C)	24.57%	103 St (1)	-4.44%
Harlem - 148 St (3)	23.42%	138 St - Grand Concourse (4 5)	-3.06%
69 St (7)	23.21%	116 St - Columbia University (1)	-3.05%
Rector St (1)	23.03%	Brook Av (6)	-2.26%
High St (A C)	22.66%	23 St (C E)	-0.43%
111 St (J)	22.45%	Longwood Av (6)	0.34%
82 St - Jackson Hts (7)	22.30%	Canarsie - Rockaway Pkwy (L)	0.45%
Lorimer St (J M)	21.88%	Allerton Av (2 5)	1.21%
145 St (3)	21.77%	Cypress Av (6)	1.61%
103 St - Corona Plaza (7)	20.97%	Flushing Av (G)	1.78%

## Percent Change in MetroCard Swipes (May 2-8 2020 vs April 11-17 2020)



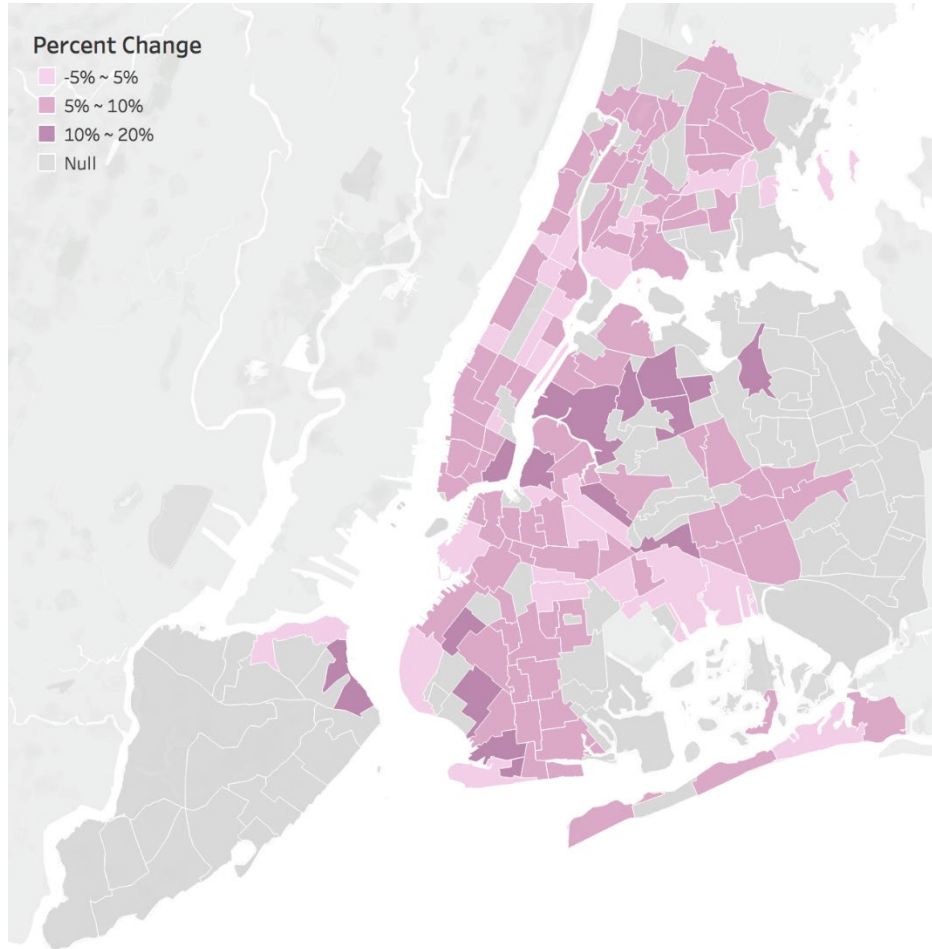
- Almost every station in the system continues to see increasing ridership over the previous week, and the growth rate is increasing.
- Whereas last week we reported that stations along the 7 line in Queens made up half of the top 15 stations showing the greatest increases in ridership, this week's greatest changes are more evenly distributed.

Interactive dashboard link:  
<https://public.tableau.com/profile/dcptransportation#!/vizhome/MetroCardSwipes-IncreasingTrends/IncreaseTrends>

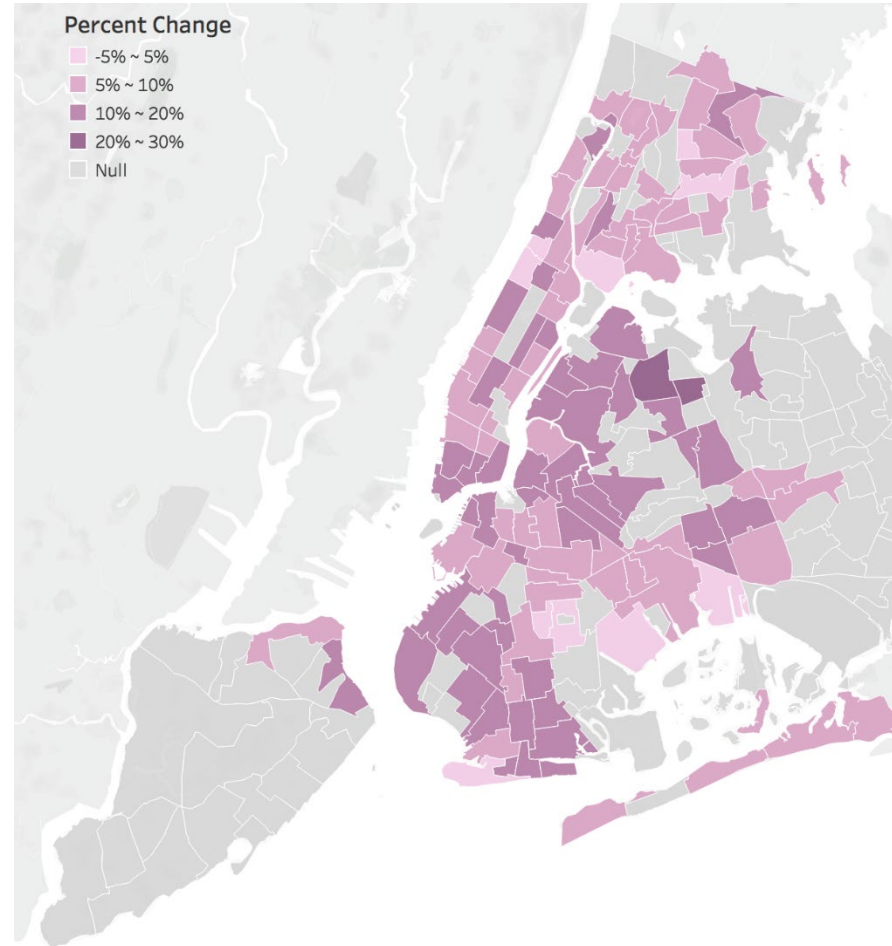
# MetroCard Swipe Change by Neighborhood and Station Over Previous Week



**Percent Change of MetroCard Swipes by Neighborhood  
(Apr 25-May 1 vs. Apr 18-24)**



**Percent Change of MetroCard Swipes by Neighborhood  
(May 2-8 vs. Apr 25-May 1)**



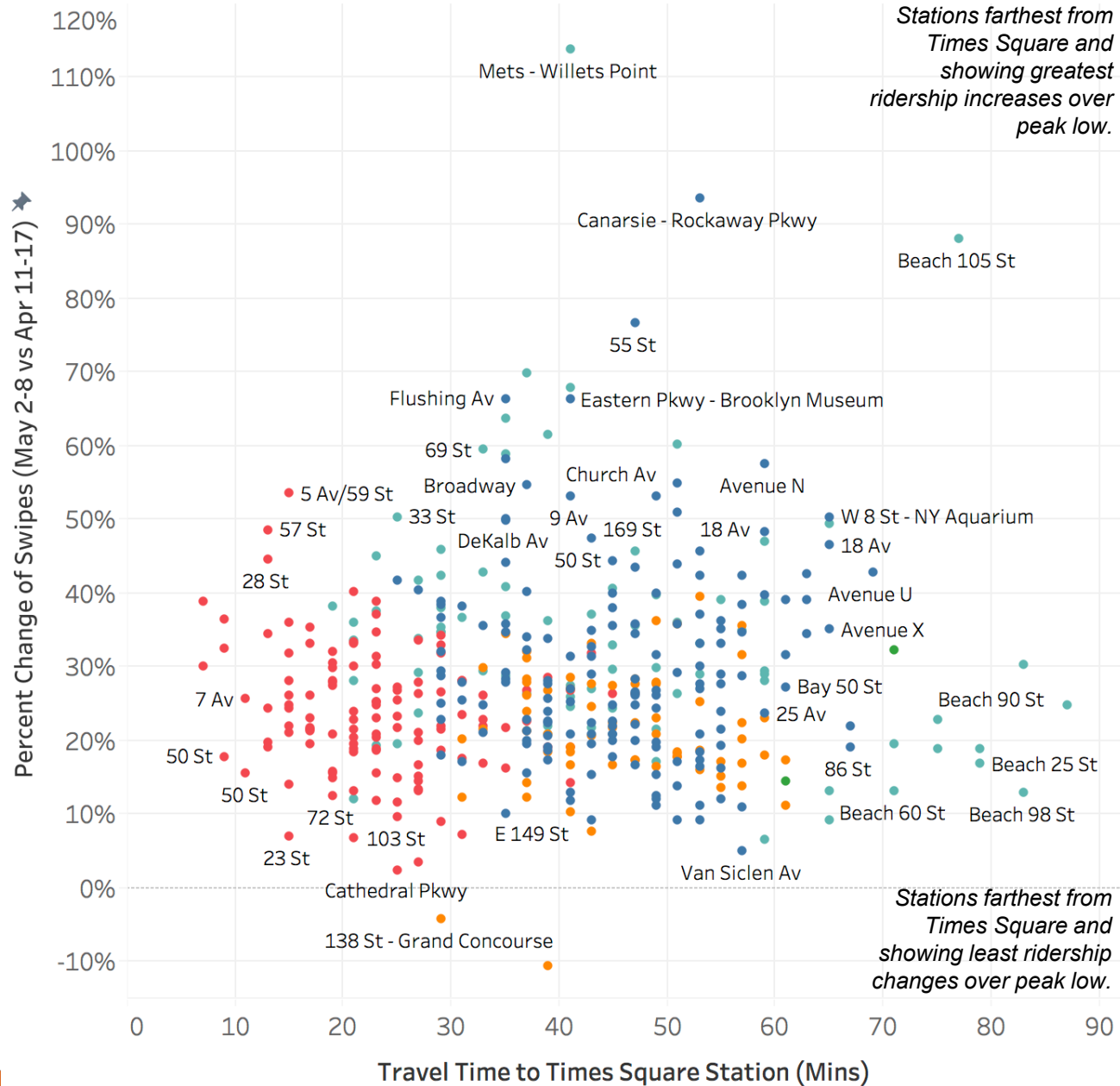
- Aggregating station level changes to the neighborhood (NTA) level, we see areas in darkest purple showing the greatest increases in ridership over the previous week.
- Neighborhoods with substantial increases the week of April 25<sup>th</sup> continued, or even accelerated, their rates of increase the following week.

Interactive dashboard links:  
<https://public.tableau.com/profile/dcptransportation#!/vizhome/MetroCardSwipes-NTAs/NTAmap>

*Note: stations with unusual activity levels due to construction or renovations were removed from this analysis*

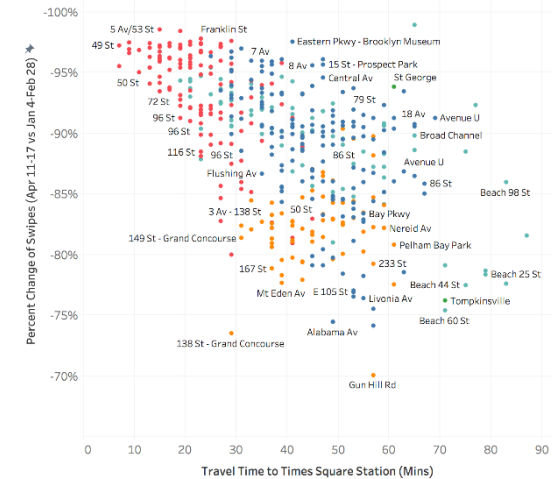
Data sources: MTA Fare Data  
(<http://web.mta.info/developers/fare.html>)

# MetroCard Swipes Percent Change by Distance to The Core



- The scatter plot shows the relationship between ridership increases since the week of April 11-17, when total overall ridership was at its lowest, and distance to the Manhattan Core (travel time to Times Square, under normal AM peak subway schedules).
- While there was an correlation between ridership decreases and station distance from Times Square immediately post PAUSE order (see scatter plot below), there is no clear relationship between ridership increases and distance from Times Square.

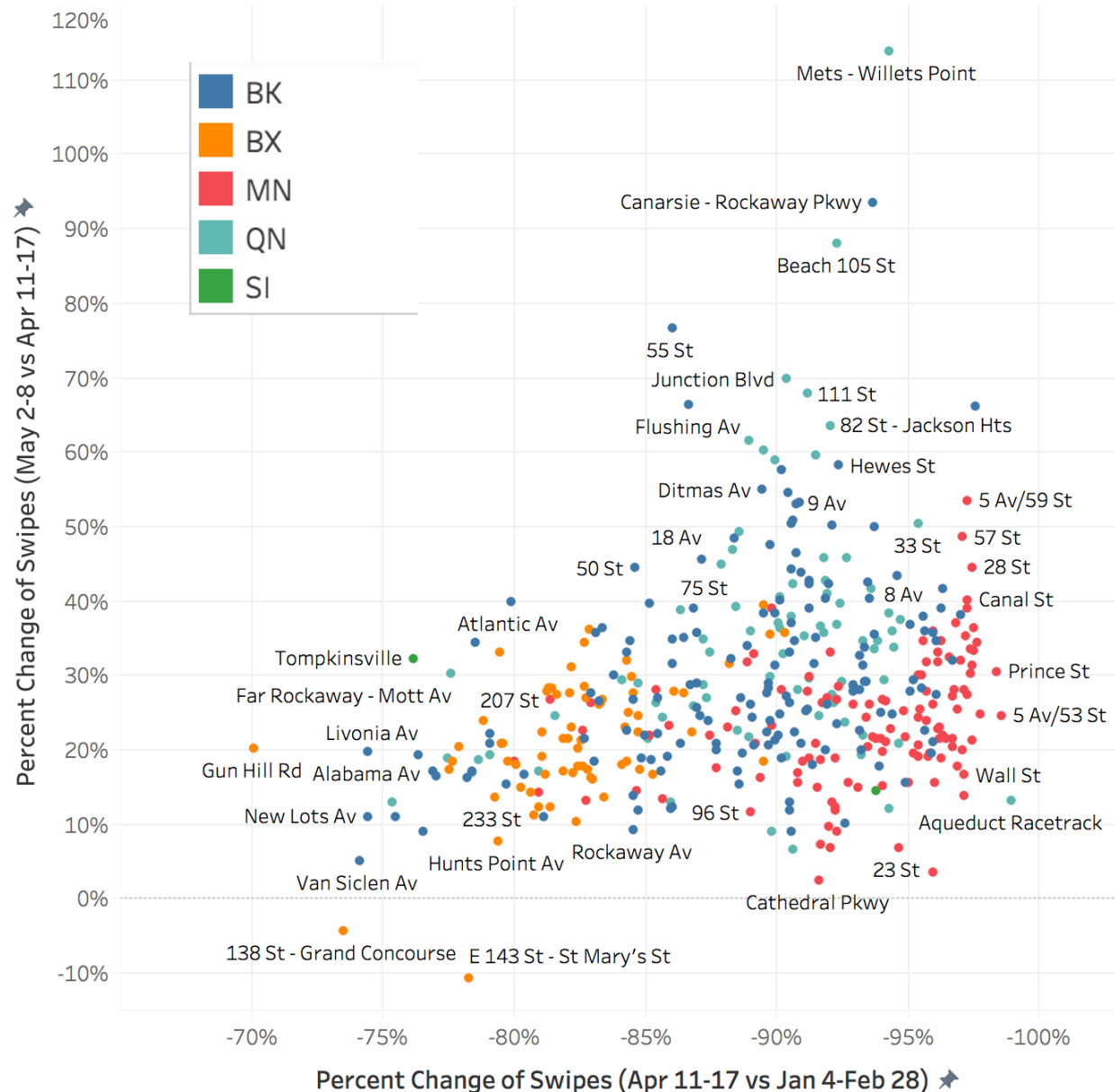
*Shown on right is change in weekly average swipes: pre-COVID to peak low, from April 28<sup>th</sup> 2020 weekly report:*



<https://public.tableau.com/profile/dcptrans-transportation#!/vizhome/MetroCardSwipes-Distance/Dashboard1>

Data sources: MTA Fare Data  
<http://web.mta.info/developers/fare.html>

# MetroCard Swipes Percent Change by Distance to The Core



- The scatter plot shows the relationship between initial ridership declines through the week of April 11<sup>th</sup>, and recovering ridership trends from April 11<sup>th</sup> through the week of May 2<sup>nd</sup>.
- With several notable exceptions rising towards the top of the scatter plot and largely found in Brooklyn and Queens, most stations have seen recoveries of up to about 40% over their peak low, regardless of the extent of their initial decline.

<https://public.tableau.com/profile/dcptransportation#!/view/home/MetroCardSwipes-Distance/Dashboard1>

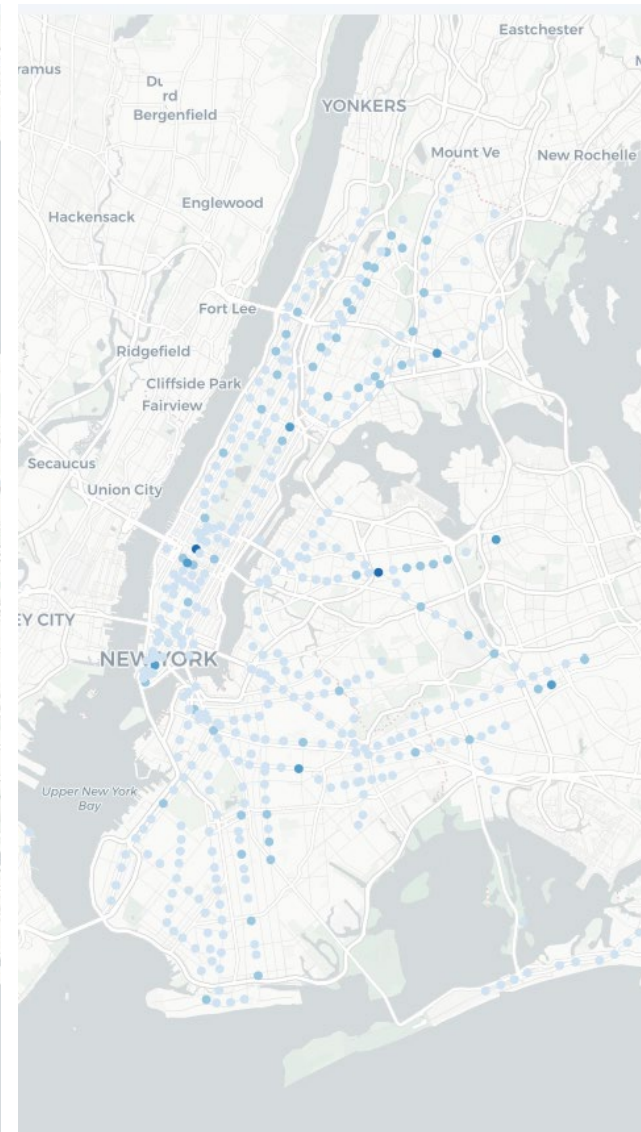
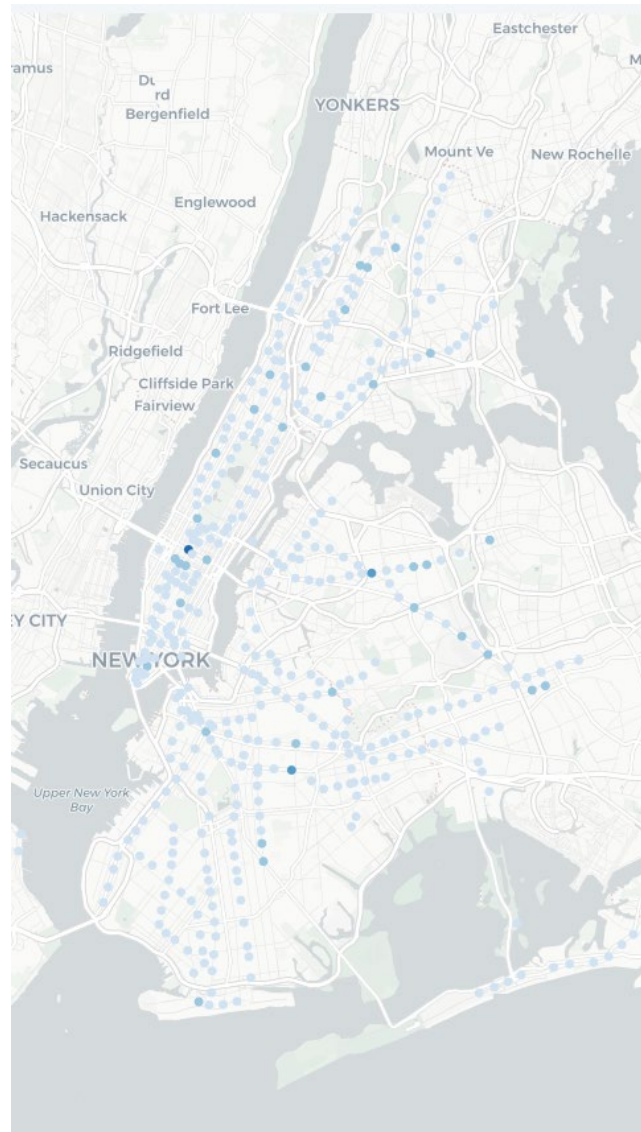
Data sources: MTA Fare Data  
<http://web.mta.info/developers/fare.html>

# Weekday AM Peak Turnstile Data

03/11-05/31 2019

04/14-04/17 2020

05/11-05/14 2020



**AM peak hour trips generally indicate where people are commuting from:**

- The largest AM peak ridership declines were observed in the Manhattan Core and Inner Ring, and along the B/Q and E train lines.
- The peak low week of April 14<sup>th</sup> shows only a handful of stations with AM peak ridership of more than 1000 people.
- The week of May 11<sup>th</sup>, the most recent data available, shows increases across the city

WEEKDAY AM PEAK AVERAGE

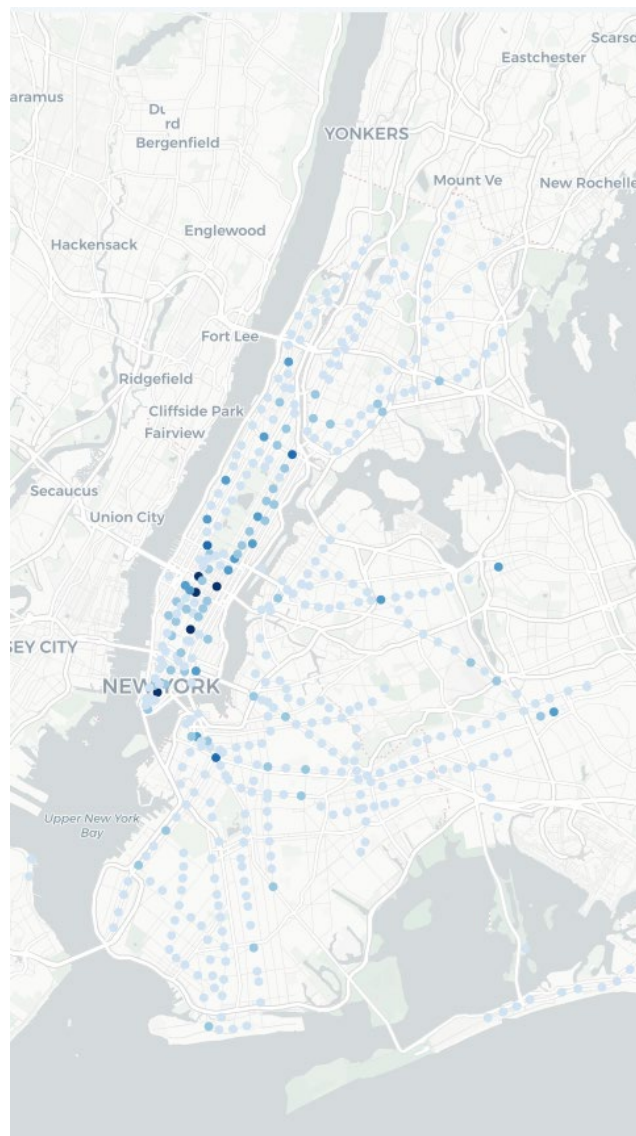
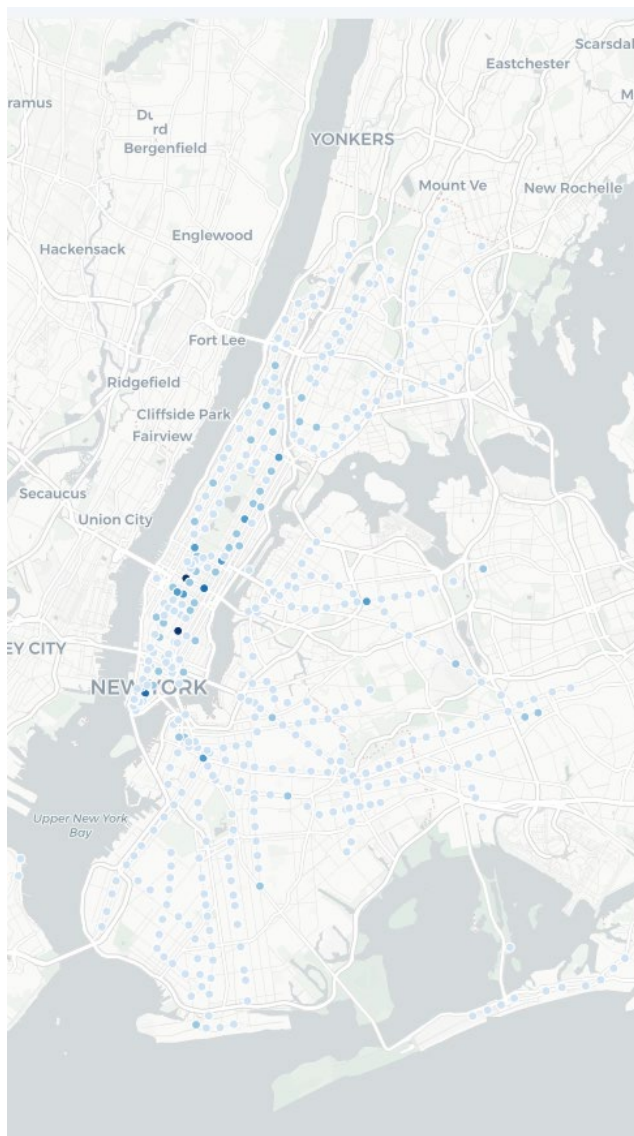
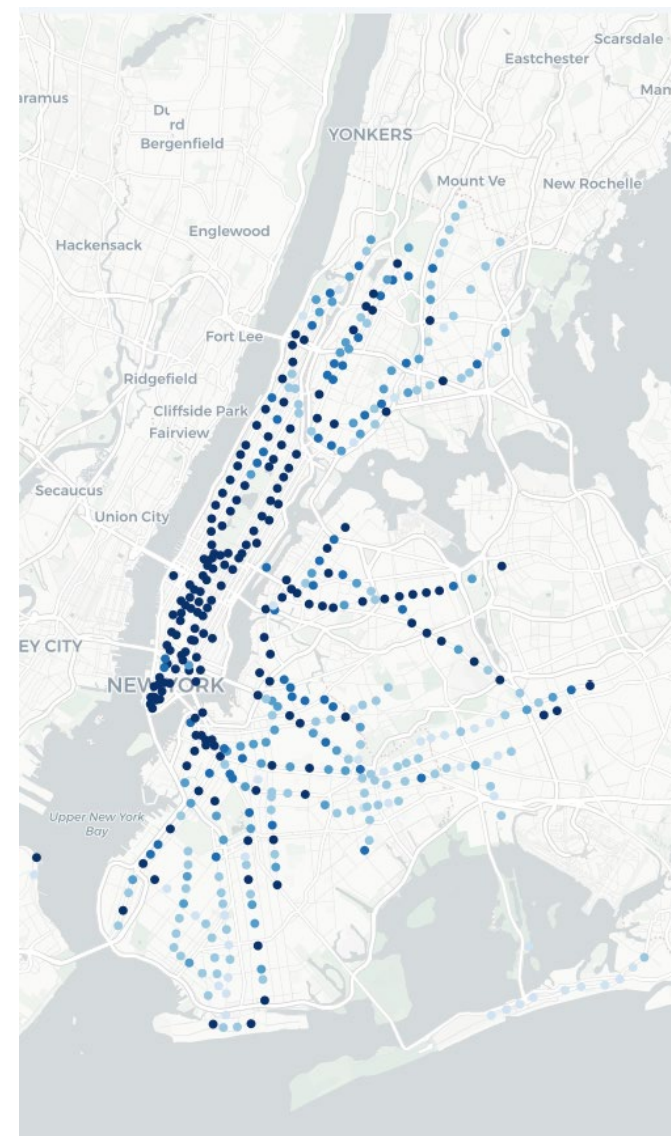
- 0-500
- 501-1000
- 1001-1500
- 1501-2000
- >2000

# Weekday PM Peak Turnstile Data

03/11-05/31 2019

04/14-04/17 2020

05/11-05/14 2020



**PM peak hour trips generally indicate where people are commuting to:**

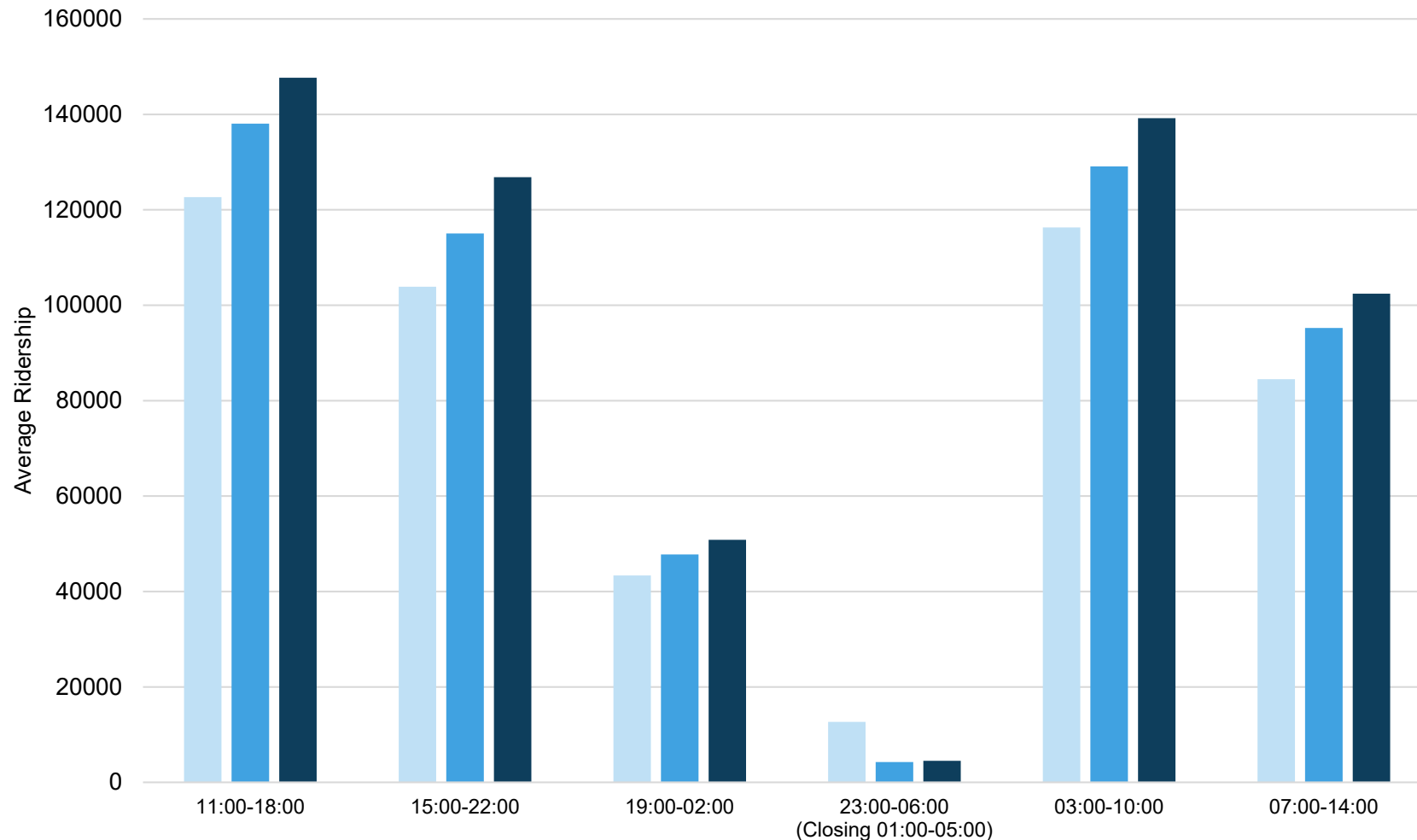
- The largest PM peak ridership declines were observed in the Manhattan Core, where the majority of jobs are located.
- The peak low week of April 14<sup>th</sup> shows some Manhattan Core activity, and some larger transit hubs in Brooklyn and Queens.
- The week of May 11<sup>th</sup>, the most recent data available, shows dramatic ridership increases across much of Manhattan, Downtown Brooklyn, Jackson Heights, Flushing, and Jamaica.

WEEKDAY PM PEAK AVERAGE

- 0-500
- 501-1000
- 1001-1500
- 1501-2000
- >2000

## Effect of Early Morning Subway Closure

■ Avg of 4/29 and 4/30   ■ Avg of 5/6 and 5/7   ■ Avg of 5/13 and 5/14



- The MTA announced full subway shut downs from 1am to 5am beginning May 6.
- As a result of the shutdowns, we see a dip in ridership between 11pm and 6am, the only window of time available for analysis that encompasses the 1am-5am shutdown period.
- The graph to the left also illustrates the overall increase in ridership during all other travel periods available for analysis.

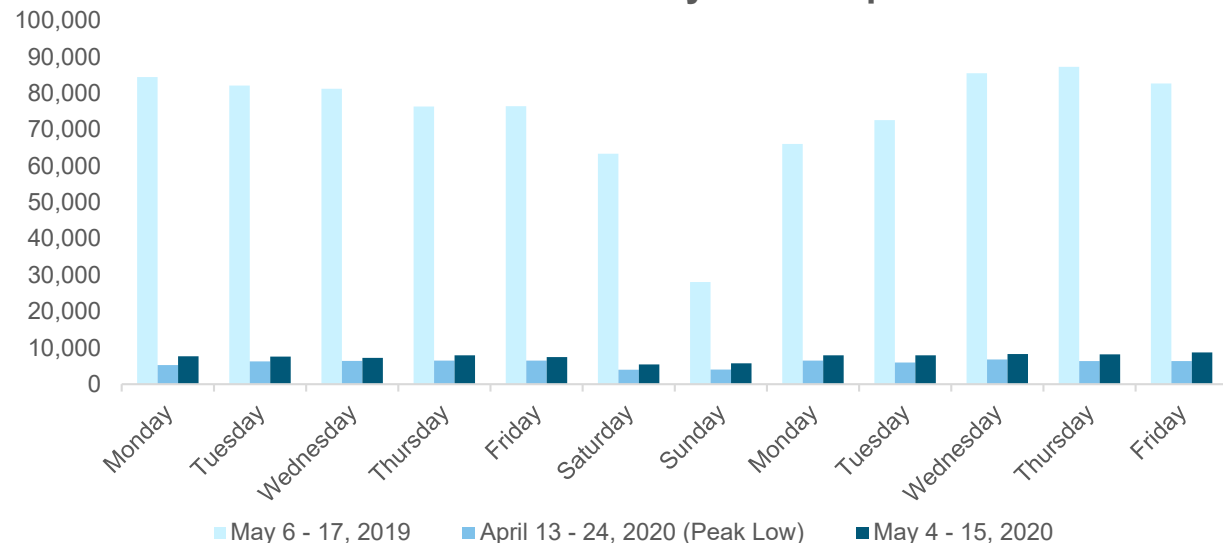
*Note, overlapping periods of subway ridership is due to the discrepancies of how data are released for each station.*

# Ferry

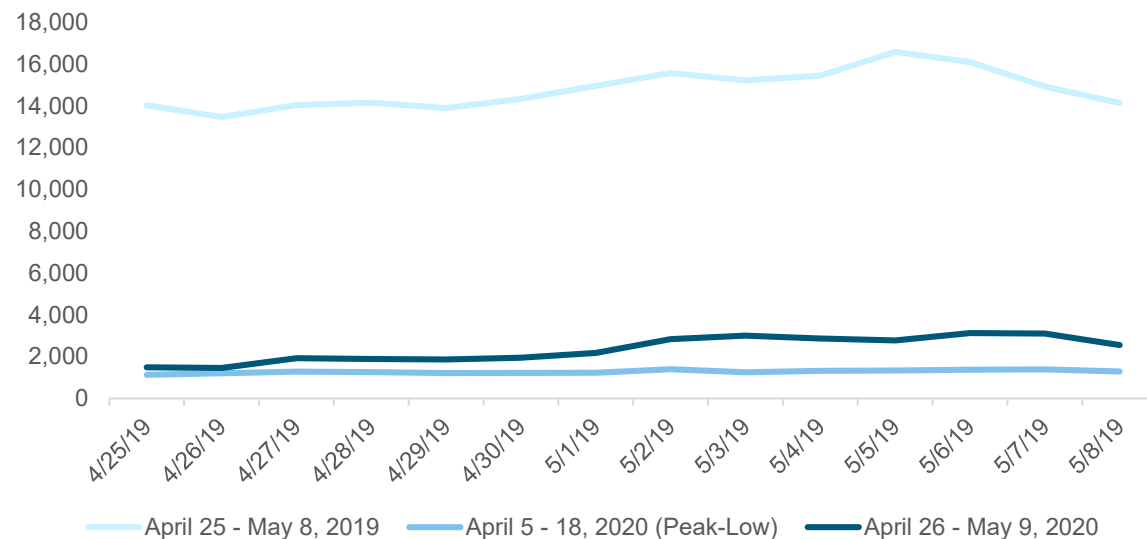


# Staten Island Ferry & NYC Ferry Ridership

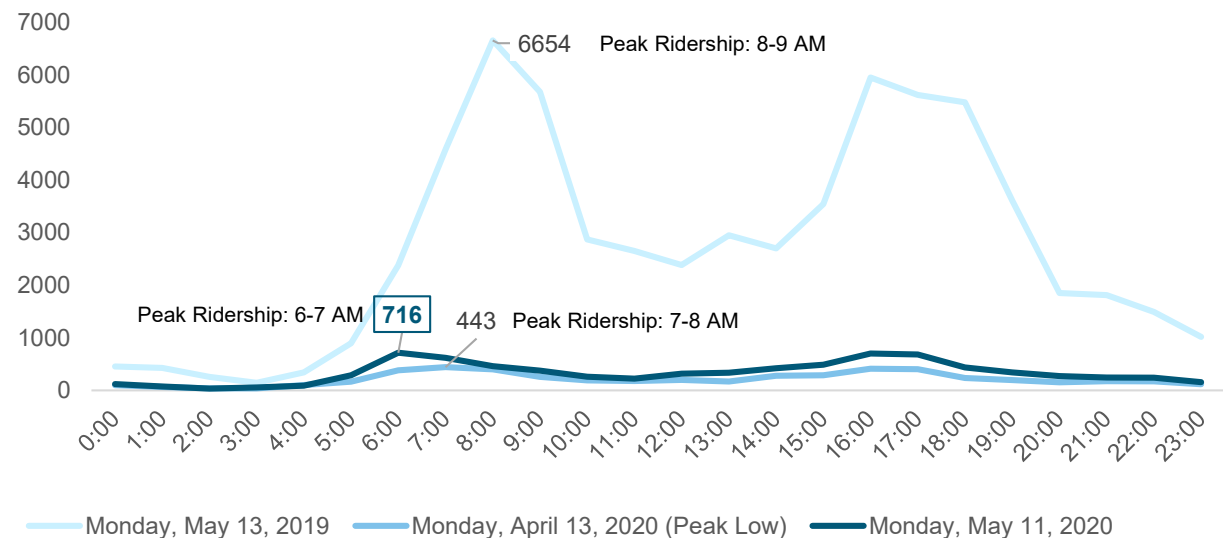
## Staten Island Ferry Ridership



## NYC Ferry Ridership: 7-day Rolling Average



## Staten Island Ferry Total Ridership by Trip Time



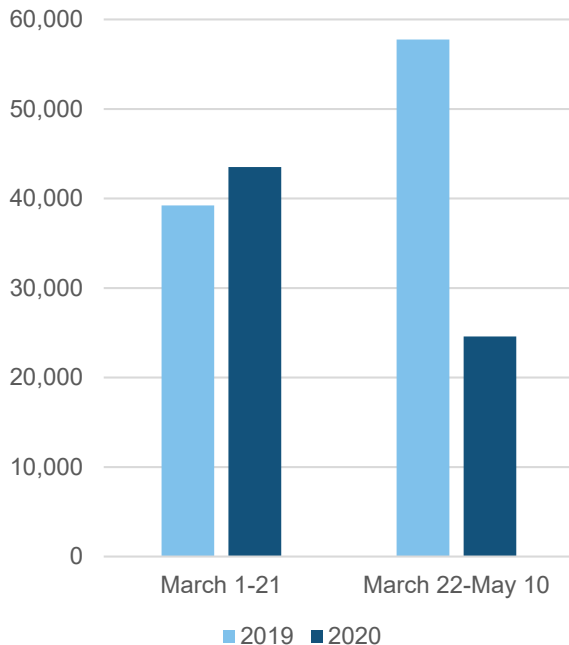
- **For NYC Ferry and the Staten Island Ferry, the peak low weekday travel in 2020 occurred on the week of April 13<sup>th</sup>.**
- The NYC Ferry's and the Staten Island Ferry's ridership has been increasing gradually since their peak low points.
- **Monday, May 18<sup>th</sup>** – NYC Ferry implemented an additional **temporary reduction in service** for the PAUSE period and **Permanently reconfigured three routes** (The Lower east Side, South Brooklyn, and Soundview).
- Staten Island Ferry's ridership is on average **90 percent lower** than the same time last year. The lowest ridership date this year was Monday, April 13<sup>th</sup>. As of Monday, May 11<sup>th</sup> 2020, ridership was **52 percent higher** than it was on its lowest date.
- **Peak commute times** for the Staten Island Ferry has gotten **earlier** as the **PAUSE period continues**.

# Citi Bike

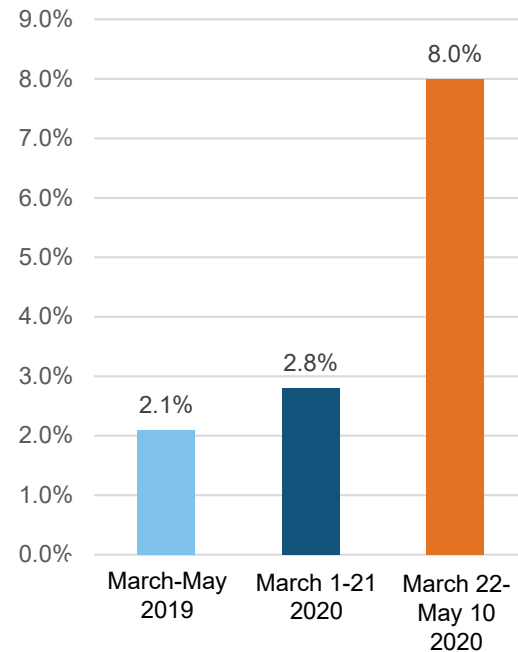
# Citi Bike Trip Characteristics

- Total trips are substantially lower during the PAUSE than they were over the same time period in 2019. At the same time, the decline in Citi Bike ridership is far less dramatic than the declines seen in most other modes.
- The percent of total trips with the same origin and destination increased 4x during the PAUSE, but average trip duration has increased, implying more, but longer, circular trips.
- Morning peak hour and late afternoon trip durations have seen the greatest increase in total duration. This is occurring also in the context of reduced automobile traffic.

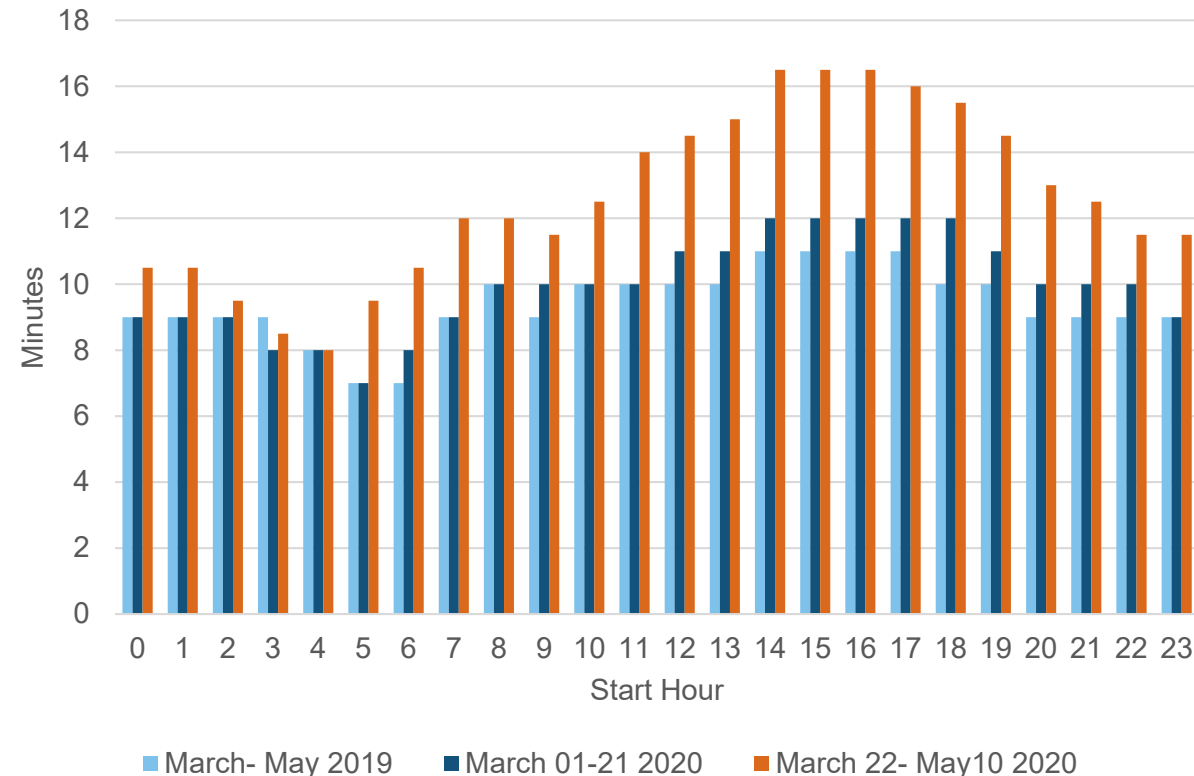
March 01- May 10, 2019 vs 2020  
Daily Citi Bike trips



Percent of trips with the same origin and destination



Average Trip Duration By Time of Day



# Common Origin/Destination Pairings - Weekday

Origin Destination Average Daily Trips >10

## Weekdays

March - May 2019

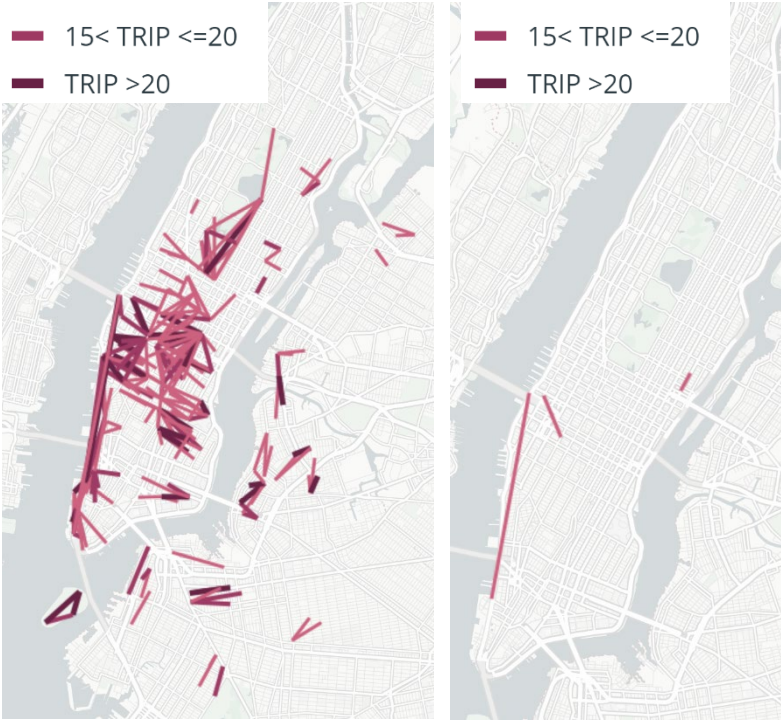
March 23-May 10 2020

DAILY TRIP

- 10 < TRIP <= 15
- 15 < TRIP <= 20
- TRIP > 20

DAILY TRIP

- 10 < TRIP <= 15
- 15 < TRIP <= 20
- TRIP > 20



## Weekends

March - May 2019

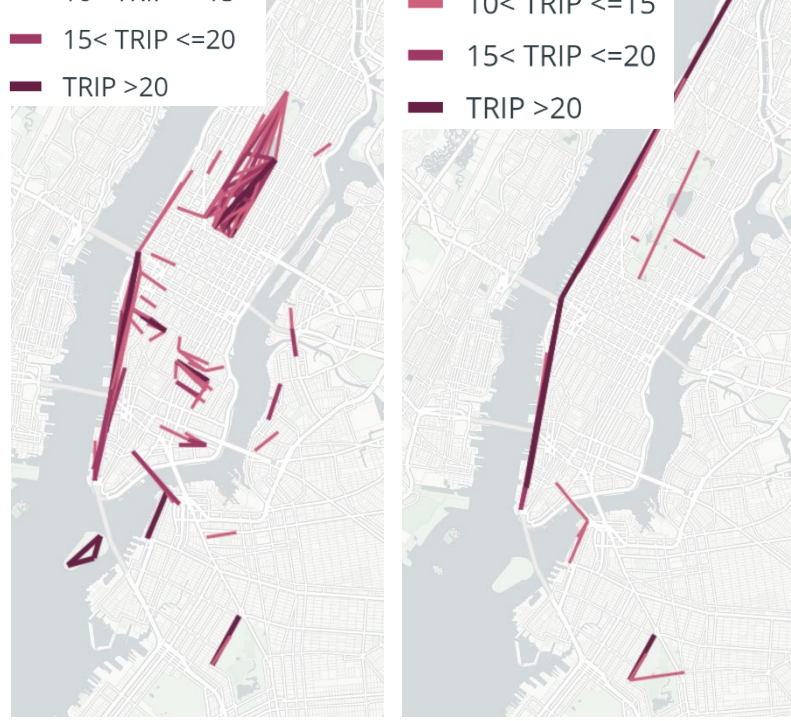
March - May 2020

DAILY TRIP

- 10 < TRIP <= 15
- 15 < TRIP <= 20
- TRIP > 20

DAILY TRIP

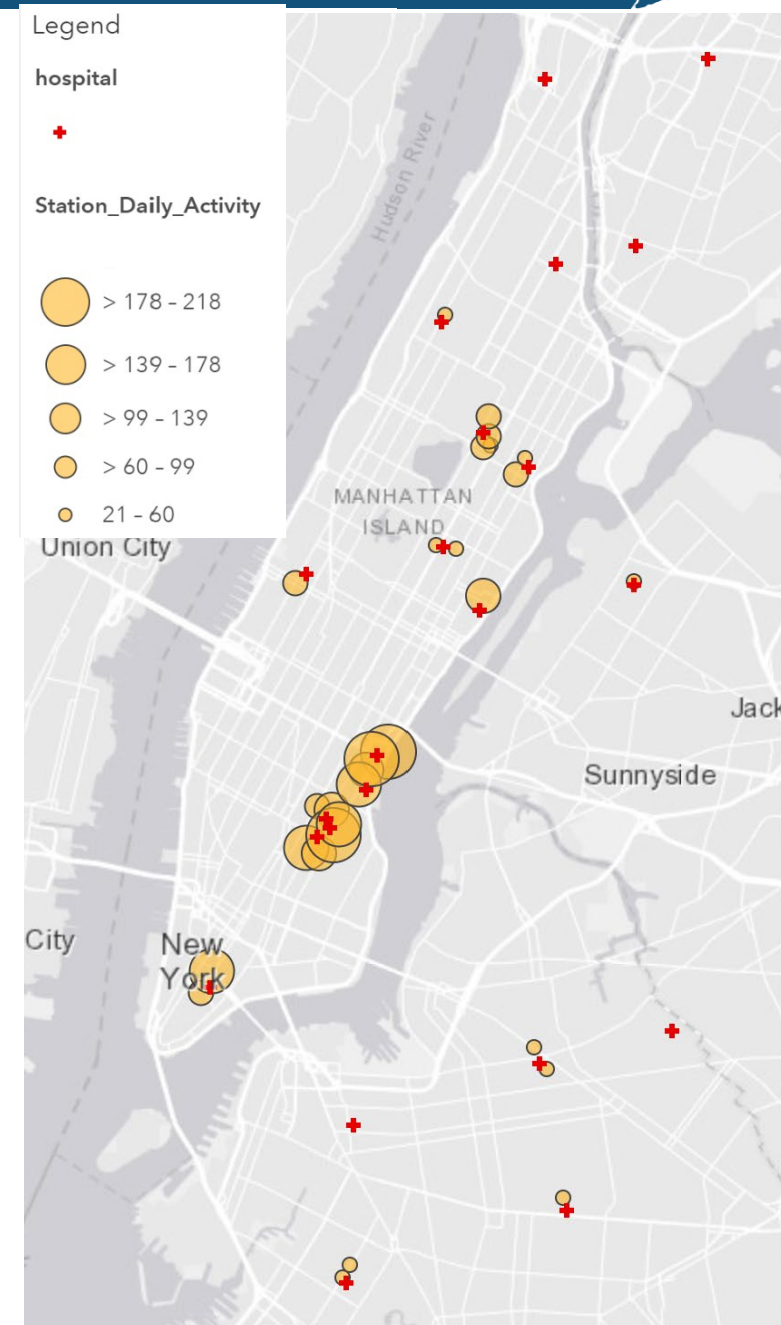
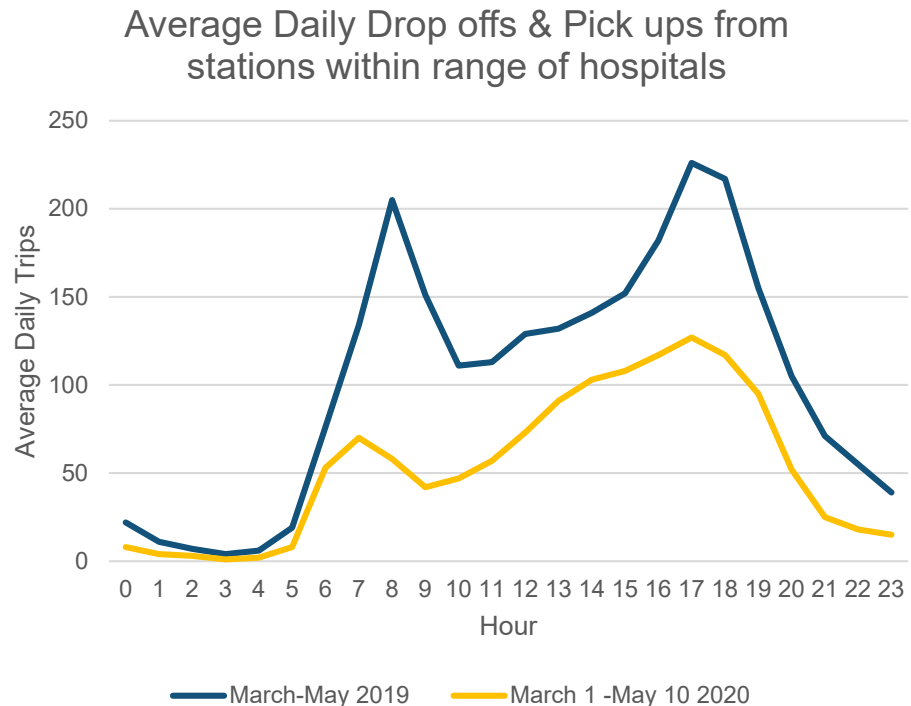
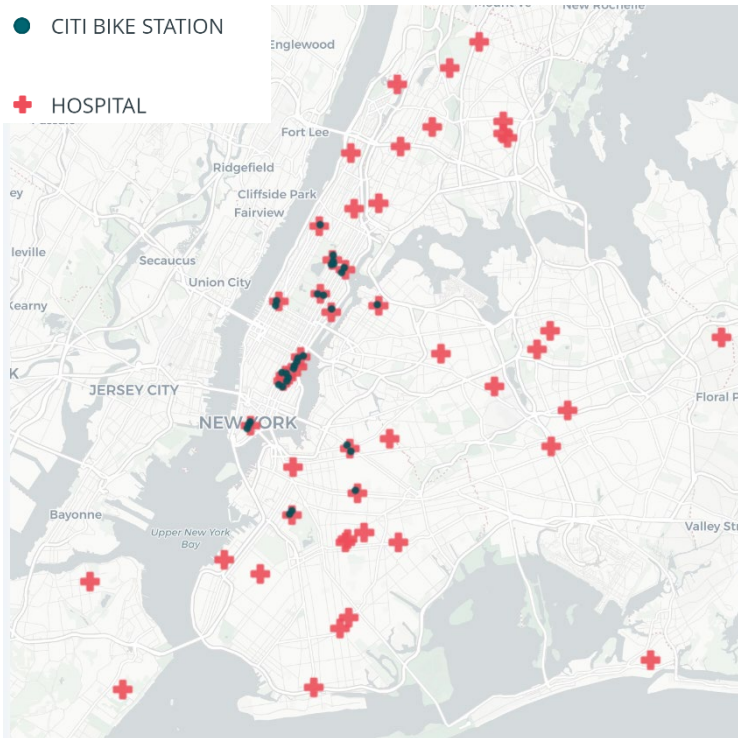
- 10 < TRIP <= 15
- 15 < TRIP <= 20
- TRIP > 20



- Recurrent O/D pairings were common on weekdays through the Spring of 2019, with common routes across midtown Manhattan, along the west side, in Brooklyn Heights, Fort Greene, Williamsburg, and Long Island City.
- Since the PAUSE, almost all but the west side routes have disappeared from common weekday pairings.
- Under normal conditions, weekend Citi Bike ridership routes appear more recreation- and entertainment-based.
- Common weekend origin/destination pairings have dropped off substantially under the PAUSE, but remain more prevalent than weekday trips. These, too, appear to remain oriented around recreation.

# COVID19 Hospital Station Activity Analysis

- We assumed a 1000' walk distance threshold to find a Citi Bike for any journey that starts or ends at a hospital. There are 32 Citi Bike stations in range.
- The average number of daily Citi Bike drop-offs and pick-ups was much lower throughout March-May 10th 2020 vs March-May 2019, and the morning peak has shifted from 8am to 7am. The distribution of trips across the day is also much smoother than it was over the same period in 2019.



# Pre-COVID19 Workforce and Commuting



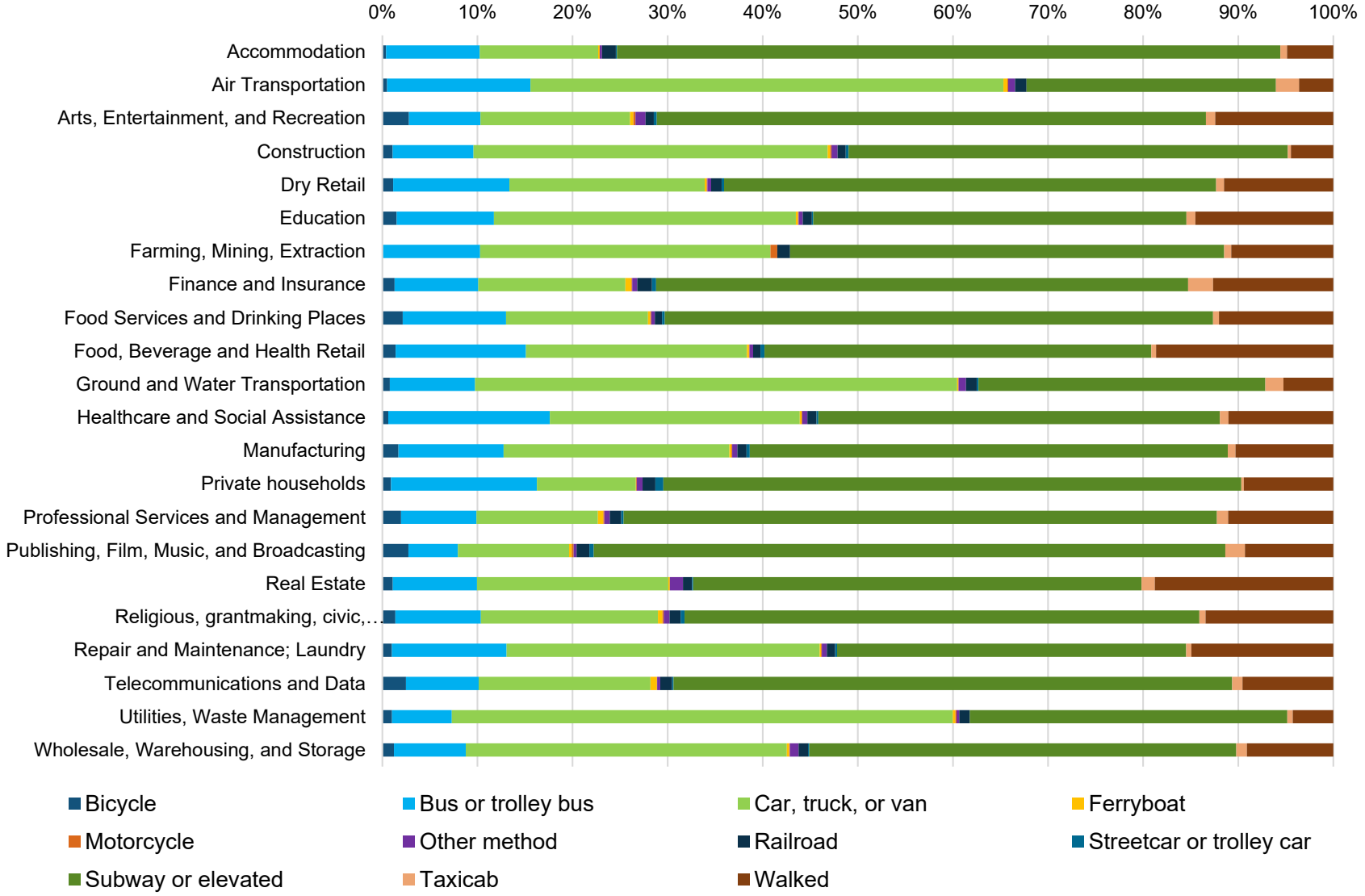
Looking at how workers commuted pre-COVID19 may help inform our planning around a shift from PAUSE to “GO”.

- Pre-COVID19, how did commutes vary by different economic sectors? What sectors tend to commute by what modes? And to where?
- What industries tend to cluster in the Manhattan Core, where transportation capacity constraints may be most pronounced?
- Who will the first wave of commuters post-PAUSE be? Based on past patterns, what are their commute preferences likely to be?
- What economic sectors are best able to continue teleworking?

# Pre-COVID19 Commute Mode by Industry



**Means of Transportation to Work by Industry**  
(Universe: Workers who didn't work at home)

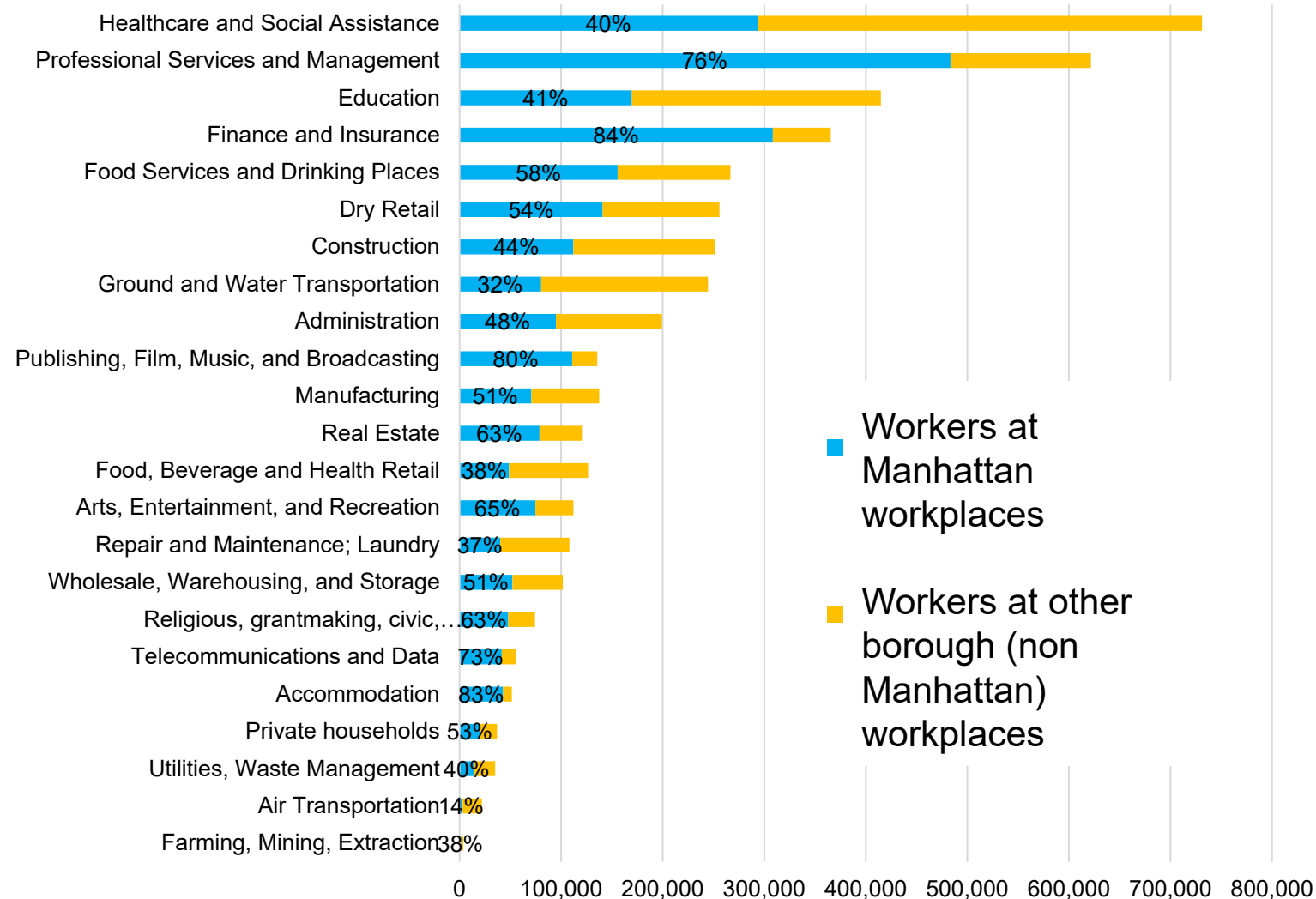


- Subway is the primary commute mode for most industries, except **Air Transportation, Ground and Water Transportation, and Utilities, Waste Management**, which are predominated by Auto.
- **Healthcare and Social Assistance** has the highest percentage of workers commuting by bus.



- According to ACS PUMS data, **Healthcare and Social Assistance** is the largest employment sector in NYC, with more than 750,000 workers. Forty percent of these workers work in Manhattan.
- **Finance and Insurance (84%)**, **Accommodation (83%)**, **Publishing, Film, Music and Broadcasting (80%)**, and **Professional Services and Management (76%)** have the highest percentages of workers commuting to Manhattan; whereas **Air Transportation (14%)**, and **Ground and Water Transportation (32%)** have the least.

## Workers by Industry by Place of Work

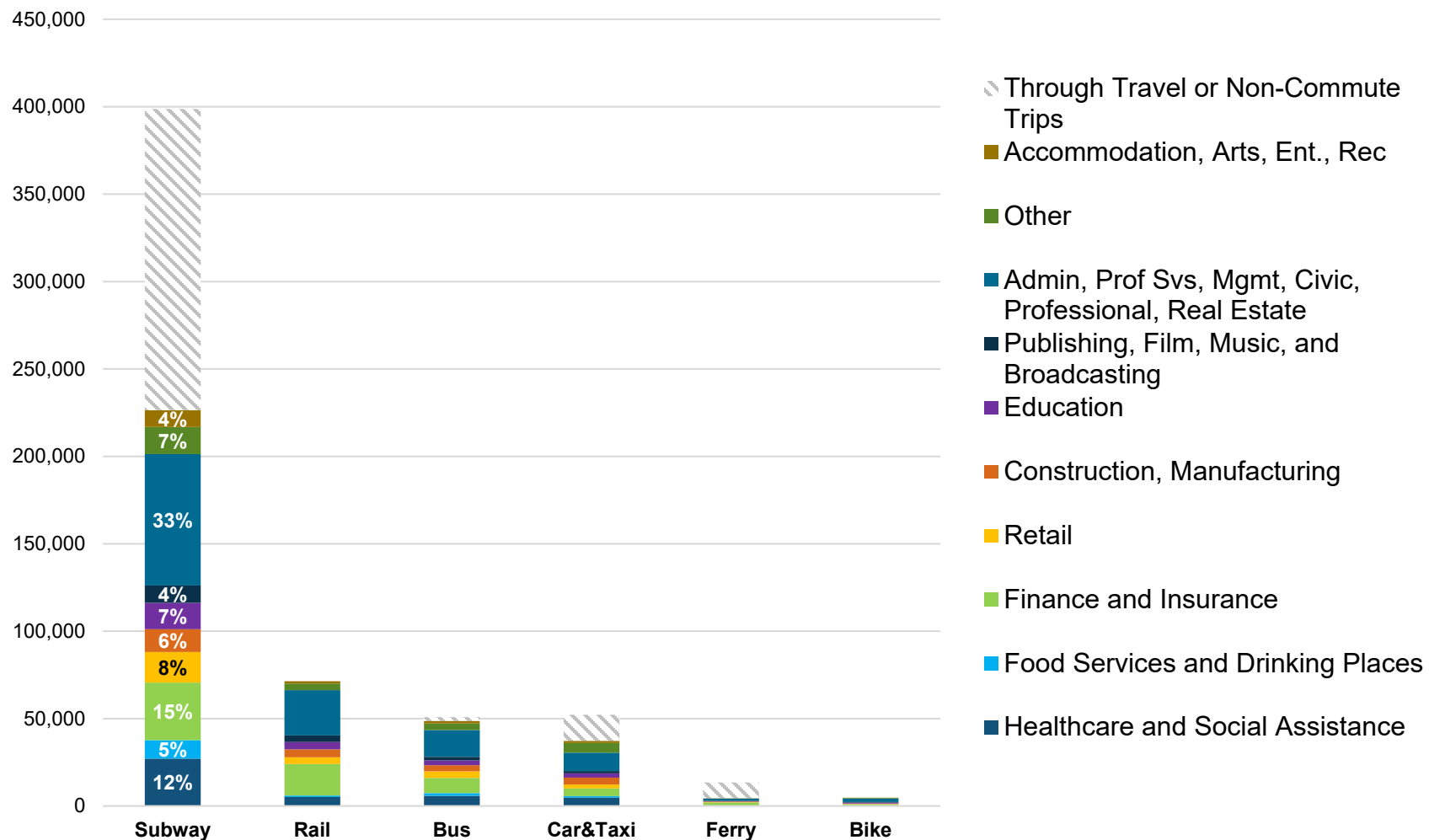


Data source: 2014-2018 PUMS.

Note: Universe is all workers in NYC, who lived in the region (CT, NJ, NY, PA).

# Manhattan Core Bound Commute by Mode and Industry

**Peak Hour Manhattan Core Bound Commute by Mode and Industry**  
(Universe: Workers who didn't live in Manhattan Core)



\*Through travel and non-commute trips are not included in the percentage calculation.

Data sources: 2014-2018 PUMS; 2017 LEHD; NYMTC 2018 Hub-bound Travel Data

Methodology: PUMS county-level commute flows during peak hour are generated and broken down by mode and industry. Results are further adjusted by LEHD block-level employment totals to represent Core-bound commute from outside.)

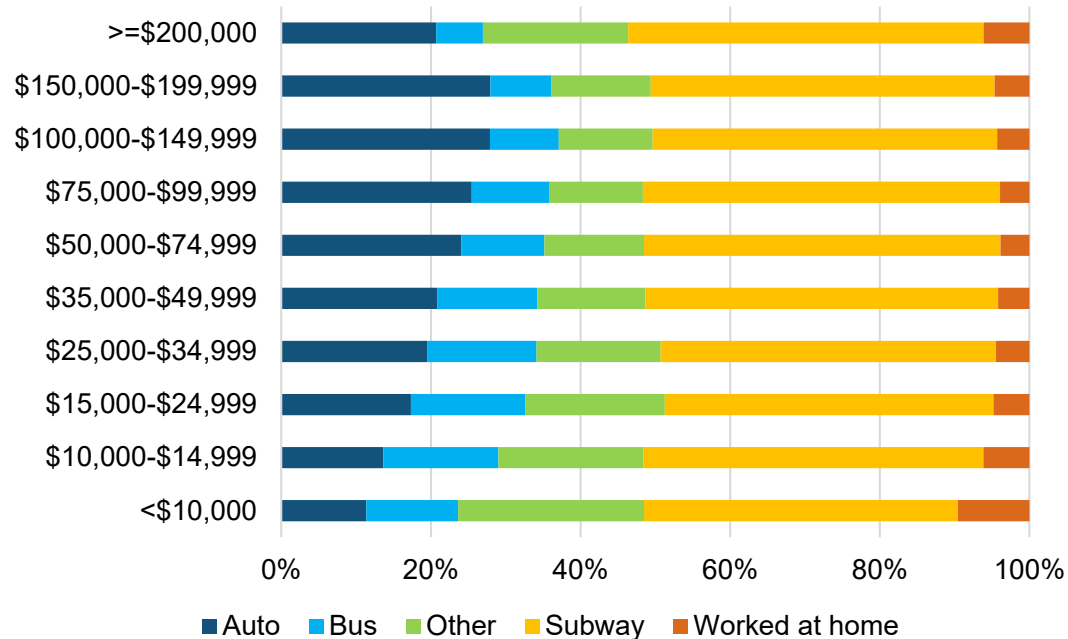
- The Manhattan Core is defined as Manhattan south of 60<sup>th</sup> street.
- Subway is the predominant transportation mode for Manhattan-Core-bound commute trips between 8am-9am, followed by rail. Rail trips make up a much higher share of core-bound commute trips than commute trips to other places of work.
- Although **Healthcare and Social Assistance** makes up 18%\* of total employment in NYC, it comprises only 12% of peak hour Core-bound subway commuters (healthcare peak commute periods are before 8am). In comparison, **Finance and Insurance** makes up 8%\* of total employment citywide but comprises 15% of core-bound rush-hour subway commuters.

\*Data sources: 2017 LEHD

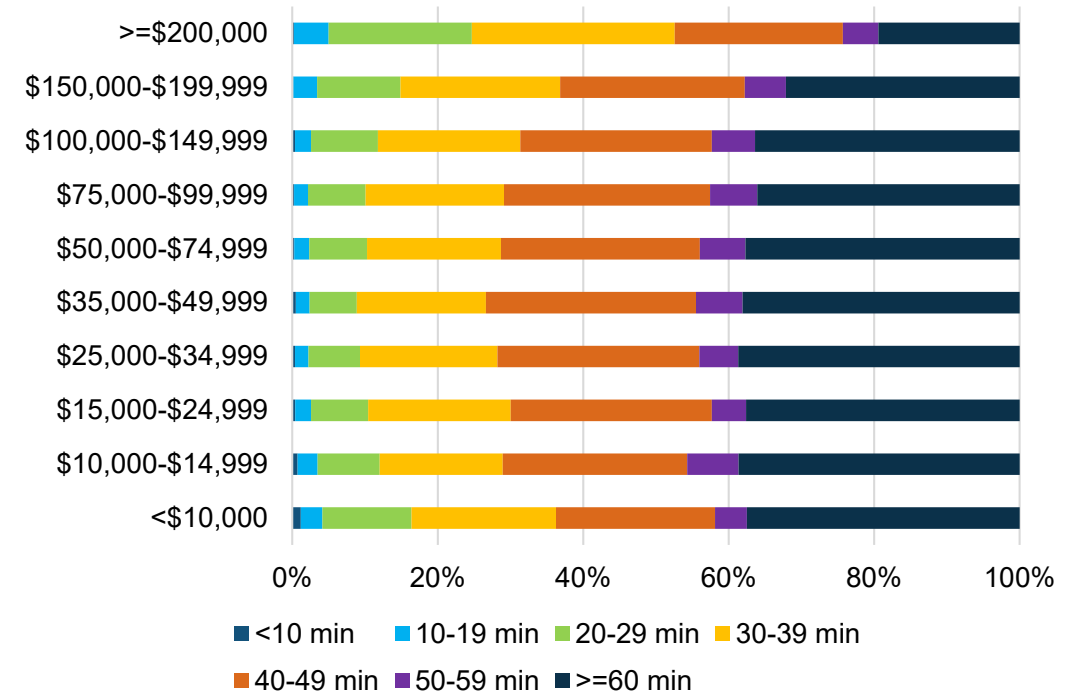
# Commute Mode, Travel Time and Household Income

- PUMS data suggest that the percentage of commuting by automobile usually increases with an increased household income, except the highest income bracket. In contrast, lower income commuters are more likely commute by bus. Share of commuting by subway seems to be insensitive to household income.
- Among all Manhattan-bound transit commuters, commuters with middle household income levels tend to have the longest travel time. Commuters in the highest household income bracket seem to have the shortest median travel time.

### Means of Transportation to Work by Household Income



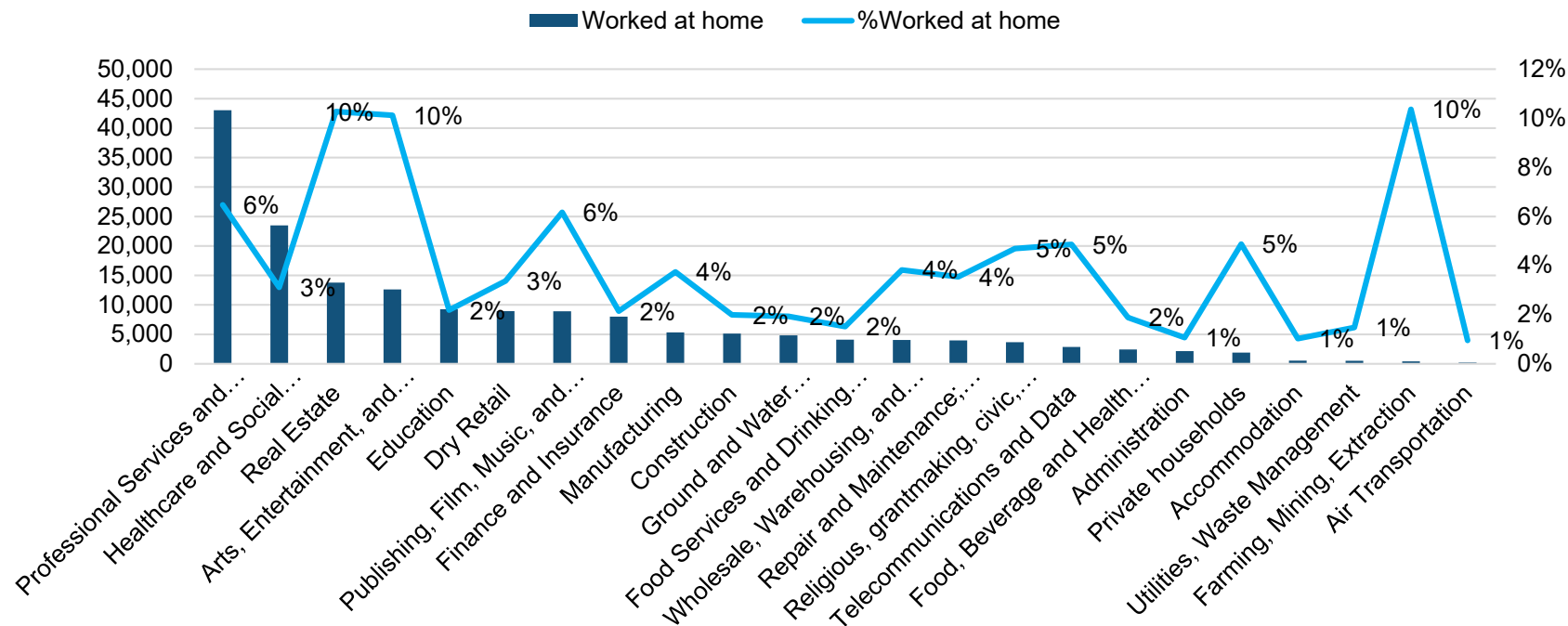
### Manhattan Bound Transit Commuters by Travel Time and Household Income



# Pre-COVID19 Working at Home by Industry

- **Professional Services and Management, Healthcare and Social Assistance, and Finance and Insurance** had the highest numbers of workers working at home, while **Real Estate** and **Arts, Entertainment, and Recreation** had the highest percentages of workers who worked at home.
- Post-pandemic work-from-home tendencies will likely vary substantially from earlier patterns.

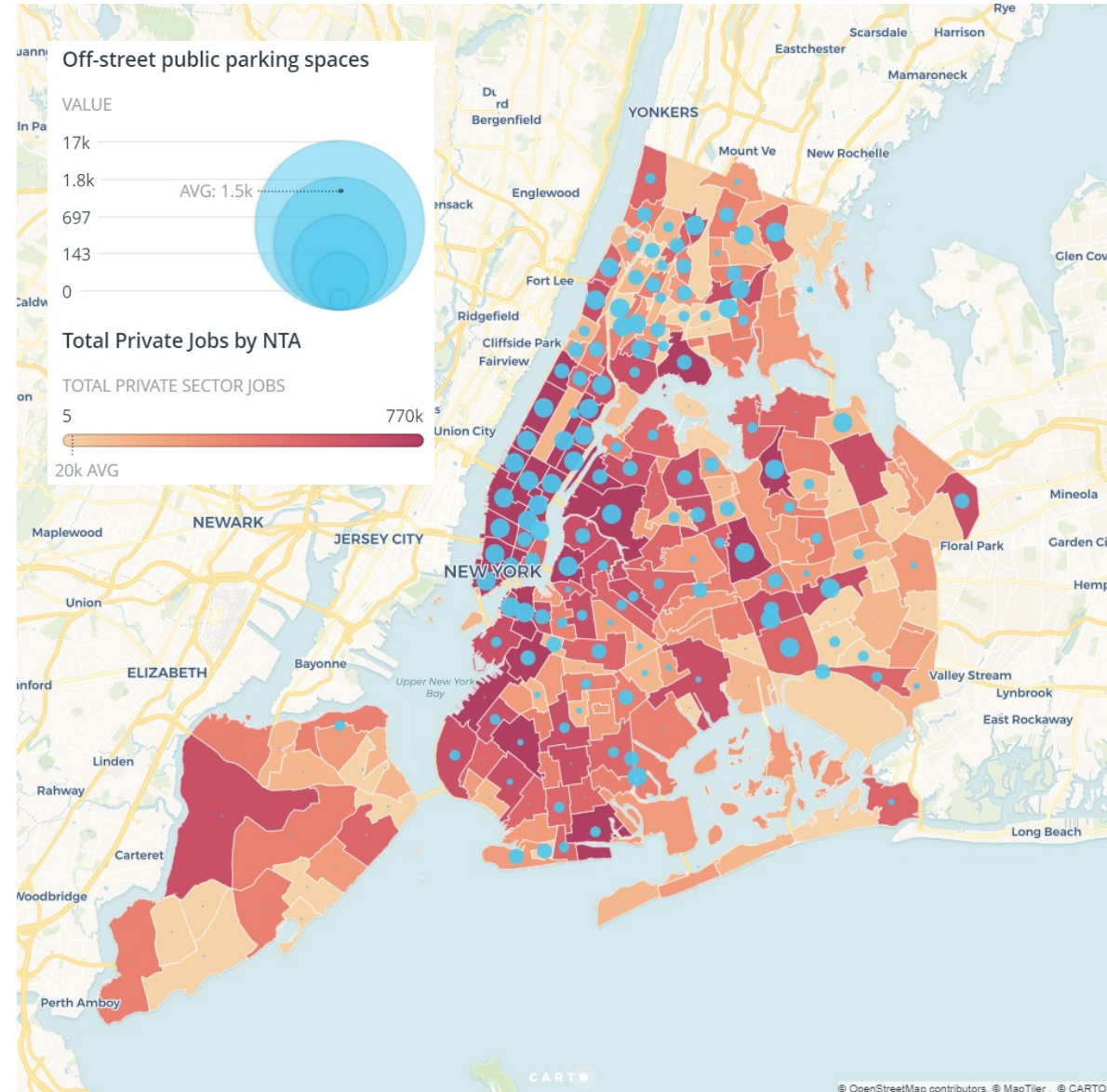
Workers Who Worked at Home by Industry



Industry	Worked at home	%Worked at home
Professional Services and Management	43,042	6%
Healthcare and Social Assistance	23,498	3%
Real Estate	13,786	10%
Arts, Entertainment, and Recreation	12,613	10%
Education	9,269	2%
Dry Retail	8,940	3%
Publishing, Film, Music, and Broadcasting	8,918	6%
Finance and Insurance	8,016	2%
Manufacturing	5,344	4%
Construction	5,120	2%
Ground and Water Transportation	4,820	2%
Food Services and Drinking Places	4,105	2%
Wholesale, Warehousing, and Storage	4,041	4%
Repair and Maintenance; Laundry	3,974	4%
Religious, grantmaking, civic, professional, and similar organizations	3,660	5%
Telecommunications and Data	2,857	5%
Food, Beverage and Health Retail	2,433	2%
Administration	2,156	1%
Private households	1,893	5%
Accommodation	532	1%
Utilities, Waste Management	527	1%
Farming, Mining, Extraction	406	10%
<b>Grand Total*</b>	<b>170,161</b>	<b>3.7%</b>

# Pre-COVID19 Jobs and Parking Capacity

- The map on the right shows the total number of private jobs by neighborhood (NTA) along with the total number of DCA-licensed “public” off-street parking spaces in that neighborhood.
- We expect to see a greater share of people arriving to the core via personal automobile once workers return to their places of work in larger numbers.
- Parking availability will be a major factor in how many commuters will be able to shift modes, at least temporarily.
- As of 2017, Manhattan has approximately 2.3 million jobs, 1.15M of which are considered “essential” under the PAUSE. There are approximately 150,000 public parking spaces in Manhattan, many of which are typically occupied by resident-owned cars.



# Timeline



# New York COVID19 Pandemic Timeline

- March 1<sup>st</sup>, 2020: **First confirmed case** in New York (Manhattan healthcare worker) <https://www.wsj.com/articles/first-case-of-coronavirus-confirmed-in-new-york-state-11583111692>
- March 5<sup>th</sup>, 2020: Mayor De Blasio says that a virus fears shouldn't keep New Yorkers off the subway <https://www.nydailynews.com/coronavirus/ny-coronavirus-bill-de-blasio-coronavirus-subway-20200305-vmjdxjudbndlrjekashqs3hfou-story.html>
- March 7<sup>th</sup>, 2020: Governor Cuomo **declares state of emergency** <https://www.nytimes.com/2020/03/07/nyregion/coronavirus-new-york-queens.html>
- March 8<sup>th</sup>, 2020: City and State implement **new travel guidelines**, asking sick people to stay off transit <https://www.nbcnewyork.com/news/local/nyc-issues-new-commuter-guidelines-to-combat-coronavirus-spread/2317584/>
- March 10<sup>th</sup>, 2020: Governor Cuomo declares **containment zone in New Rochelle** from March 12<sup>th</sup> through 25<sup>th</sup> <https://www.nytimes.com/2020/03/10/nyregion/coronavirus-new-york-update.html>
- March 11<sup>th</sup>, 2020: Governor Cuomo announces **closures of CUNY and SUNY schools** from March 12<sup>th</sup>-19<sup>th</sup>, moving to online classes after that for the rest of the semester
- March 12<sup>th</sup>, 2020: Governor Cuomo announces **restrictions on mass gatherings**, directing events with more than 500 people to be cancelled or postponed and any gathering with less than 500 people in attendance to cut capacity by 50 percent. In addition, only medically necessary visits would be allowed at nursing homes. **Broadway theaters** were also shut down effective that night. <https://www.governor.ny.gov/news/during-novel-coronavirus-briefing-governor-cuomo-announces-new-mass-gatherings-regulations>
- March 15<sup>th</sup>, 2020: **NYC school closures announced.** <https://www.nytimes.com/2020/03/15/nyregion/nyc-schools-closed.html> DeBlasio announces the **closure of schools, bars, and restaurants** (except takeout/delivery) effective the morning of the 17<sup>th</sup> <https://www.nytimes.com/2020/03/15/nyregion/new-york-coronavirus.html>
- March 18<sup>th</sup>: Governor Cuomo announces that **50% of non-essential employees** must work from home
- March 19<sup>th</sup>: The Governor announces that **75% of non-essential employees** must work from home. <https://www.thestreet.com/lifestyle/health/ny-governor-cuomo-workers-must-stay-h>
- March 20<sup>th</sup>: Governor Cuomo announces **statewide stay at home rules**, effective the evening of the 22<sup>nd</sup>. **100% of non-essential workers** must stay home. <https://www.npr.org/sections/coronavirus-live-updates/2020/03/20/818952589/coronavirus-n-y-gov-cuomo-says-100-of-workforce-must-stay-home>, travel on transit only when necessary
- March 23<sup>rd</sup>: NYC Ferry modifies weekday service
- March 25<sup>th</sup>: MTA announces service reduction to **Essential Service** plan <https://abc7ny.com/6047040/>
- March 27<sup>th</sup>: The Governor halts **non-essential construction** <https://thecity.nyc/2020/03/cuomo-calls-off-non-essential-construction-statewide.html>
- March 30<sup>th</sup>: Staten Island Ferry reduces service to every hour
- April 30<sup>th</sup>: Governor Cuomo announces **impending overnight subway shutdowns** from 1:00 am – 5:00 pm for enhanced sanitization procedures. <https://www.nytimes.com/2020/04/30/nyregion/subway-close-cuomo-coronavirus.html>
- May 6<sup>th</sup>: Nightly 1am-5am subway shutdown begins