

# **COVID19 IMPACTS ON TRANSPORTATION**

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

April 14, 2020



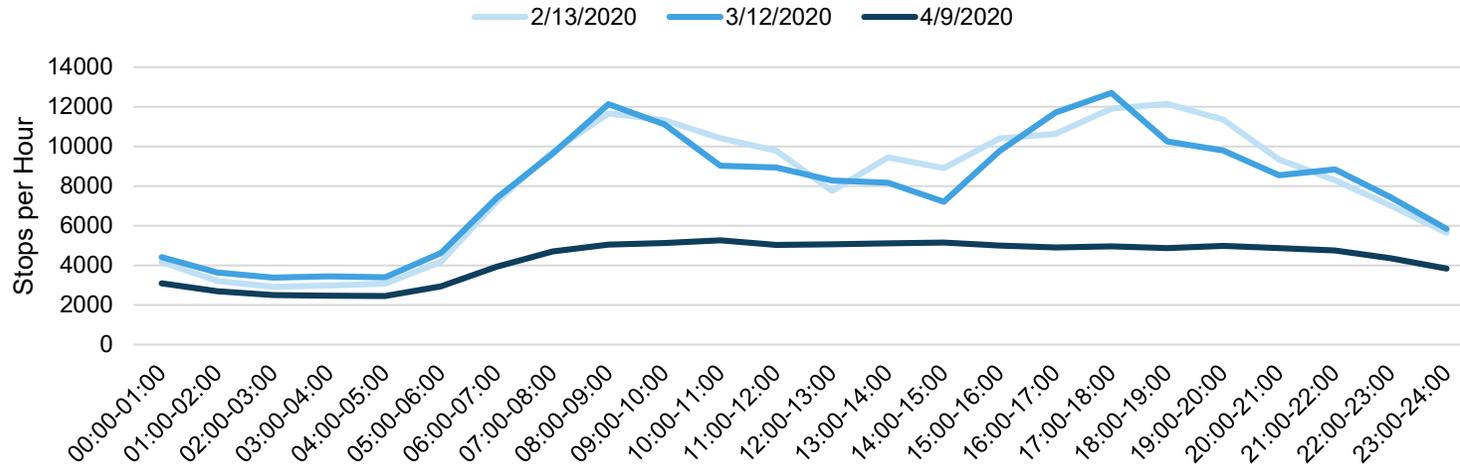
- The NYC Department of City Planning's Transportation Division is compiling data to help understand the effects of COVID19 on the transportation network. This is our third weekly report.
- This week's report includes the following information:
  1. Executive Summary
  2. Subway service and ridership
  3. Employment
  4. COVID19 cases
  5. Automobiles
  6. 311 data
  7. COVID19 timeline
- We will be expanding the content of these weekly reports as new data become available to us, and are prioritizing work around understanding how subway travel trends relate to the economic and employment landscape.
- 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.

- Subway ridership levels are extremely low when compared against pre-COVID levels.
- Subway system capacity has also been substantially reduced, through service changes and with any social distancing enforcement.
- The most profound changes in subway ridership can be seen in the Manhattan Central Business District.
- Generally, the further a station is from the Manhattan Core, the less extreme the decline in subway ridership has been.
- Subway stations in neighborhoods with high concentrations of residents and workers in healthcare see the most activity relative to pre-COVID19.
- Some neighborhoods in the city with the lowest decline in subway ridership also show the highest numbers of confirmed positive COVID19 cases.
- Traffic speeds are up, and total vehicle miles traveled are down. Collisions, injuries, and fatalities have also plummeted. However, the number of collisions per VMT has actually increased in the city.

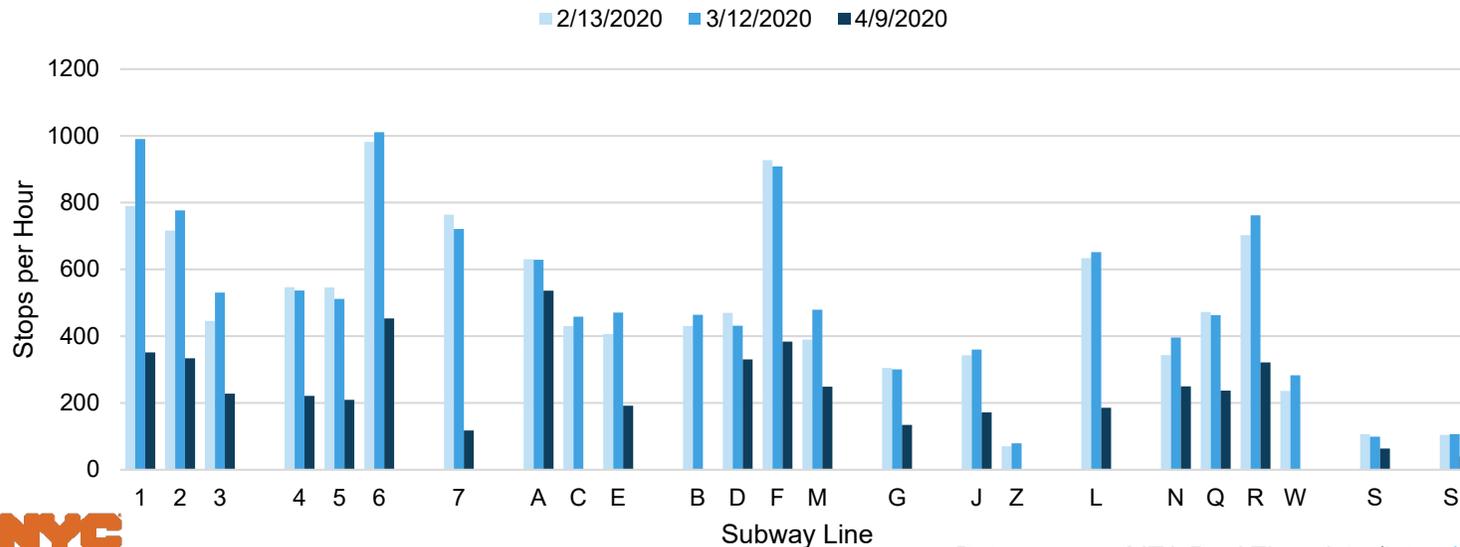
# Subway

# System Service Changes

## System-wide Weekday Service Change by Hour



## Weekday Peak Hour Service Change

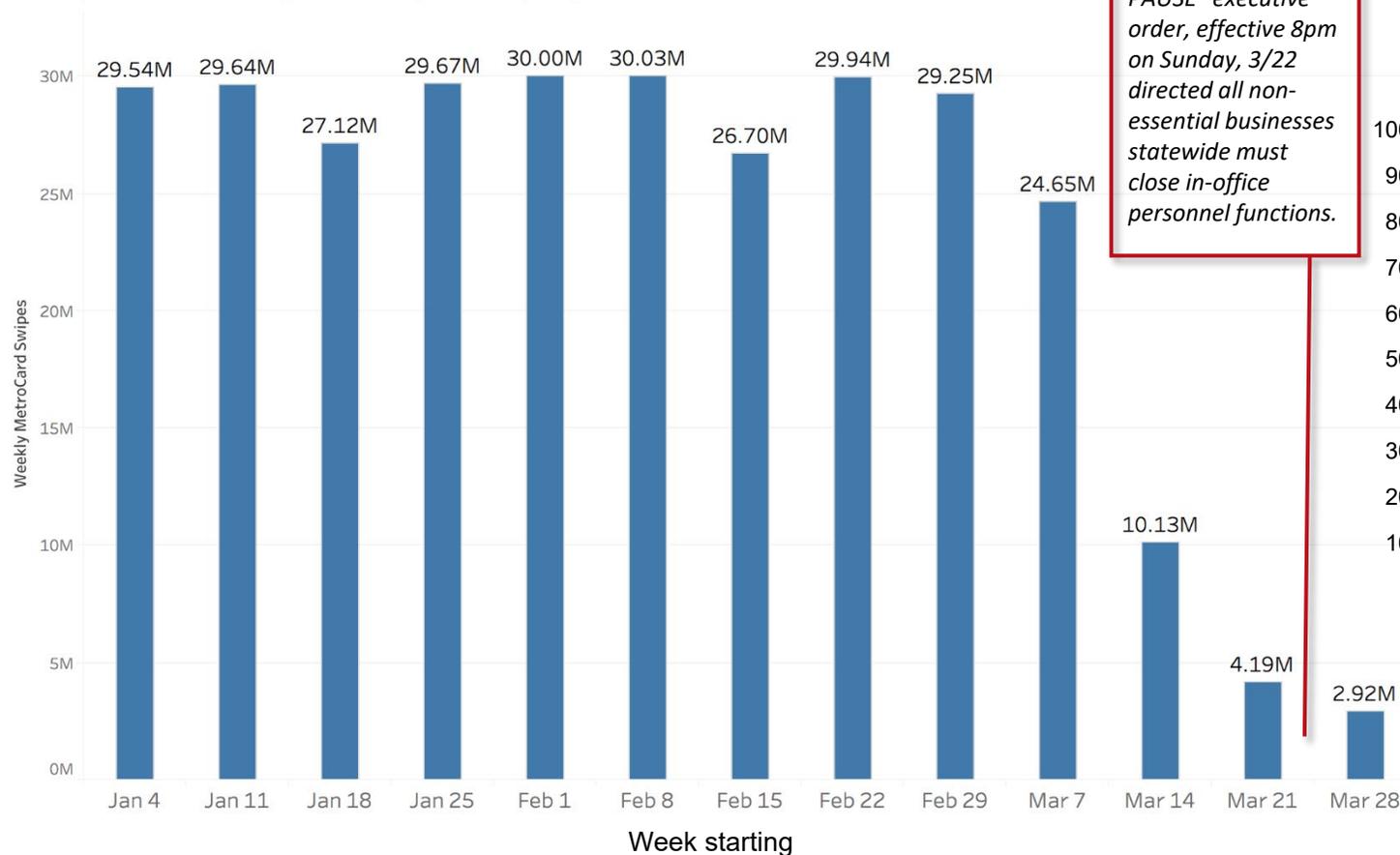


- MTA Subway started operating the essential service on March 25, 2020.
- The weekday peak hour services have been cut down to about 50% capacity.
- Stops per hour signifies the aggregated number of stops made by every train running (in the system on the top chart, and broken down by line, in the bottom chart)

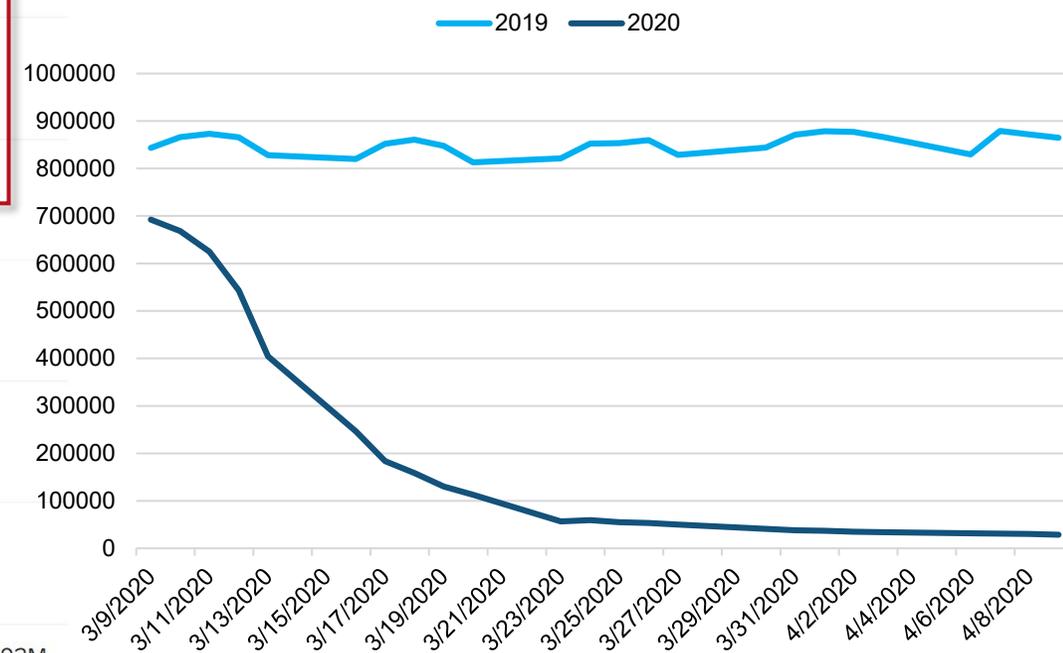
# System-wide Ridership Changes

- The citywide percent change of MetroCard swipes during Mar 28 –Apr 3 vs weekly average of Jan 4- Feb 28 is **-89.94%**.
- There were still more than 4 million subway trips taken during the week of March 21-27 and **more than 2 million subway trips in the week of March 28-Apr 3**.
- Trips to and from the Manhattan Central Business District have plummeted.

Weekly MetroCard Swipe Trends (Jan 4 - Apr 3)

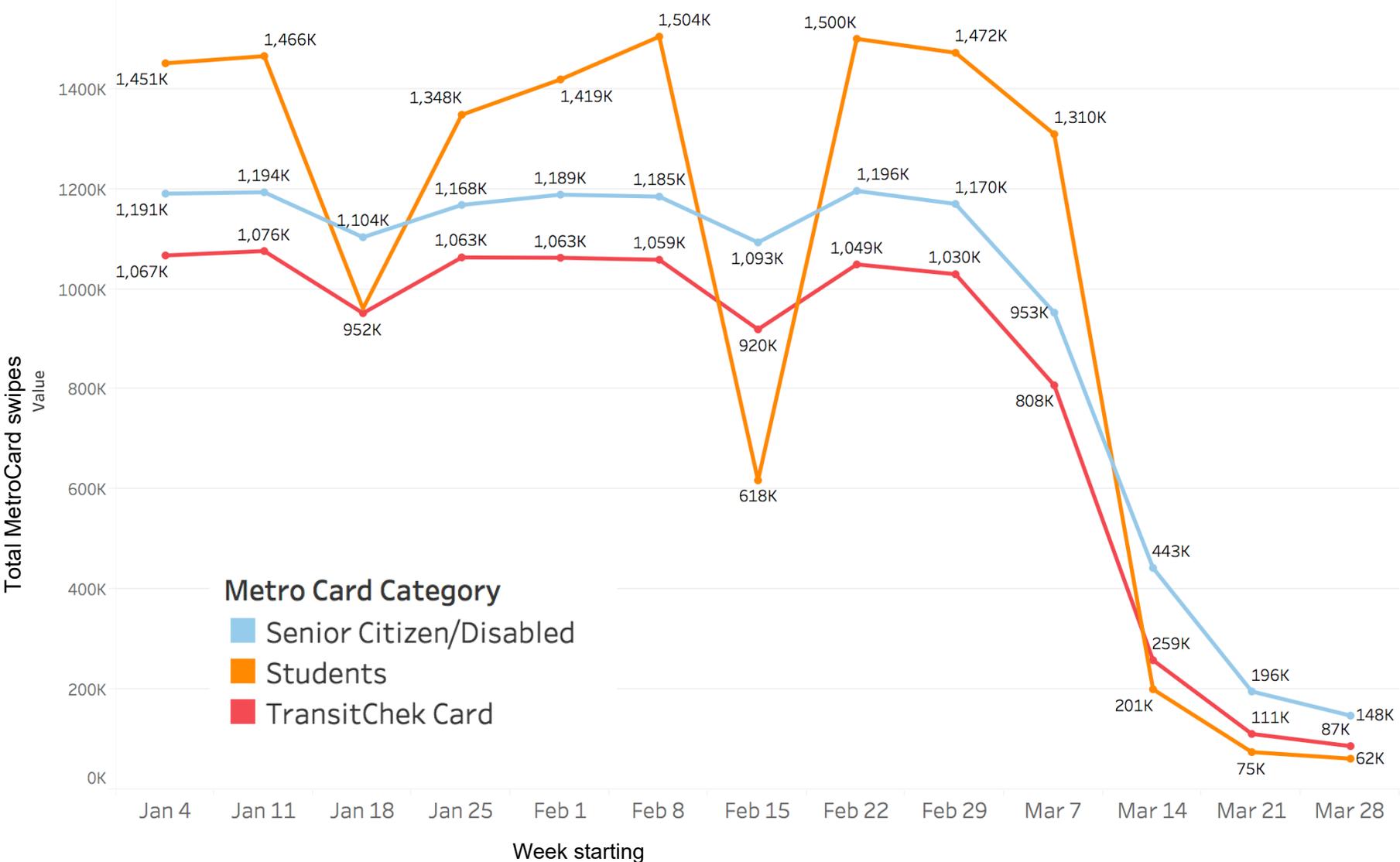


Manhattan CBD PM Peak Subway Station Entries



Interactive dashboard link:  
<https://public.tableau.com/profile/dcptransportation#!/vizhome/MetroCardSwipes/PercentChange> Data sources: MTA Fare Data (<http://web.mta.info/developers/fare.html>) MTA Turnstile data (<http://web.mta.info/developers/turnstile.html>)

# MetroCard Swipes by Card Type: TransitChek/ Students/ Senior & Disabled



Reduced-fare cards for senior citizens, people with disabilities, and students, as well as TransitChek Cards, all saw declines in use starting the week of February 29<sup>th</sup>, with the steepest declines starting the week of March 14<sup>th</sup>, when the PAUSE\* went into effect.

Public schools closed starting Monday, March 16<sup>th</sup>, but student MetroCard swipes began declining in the weeks leading up to closure.

TransitChek Card swipe trends show the workforce starting to reduce travel prior to the PAUSE.

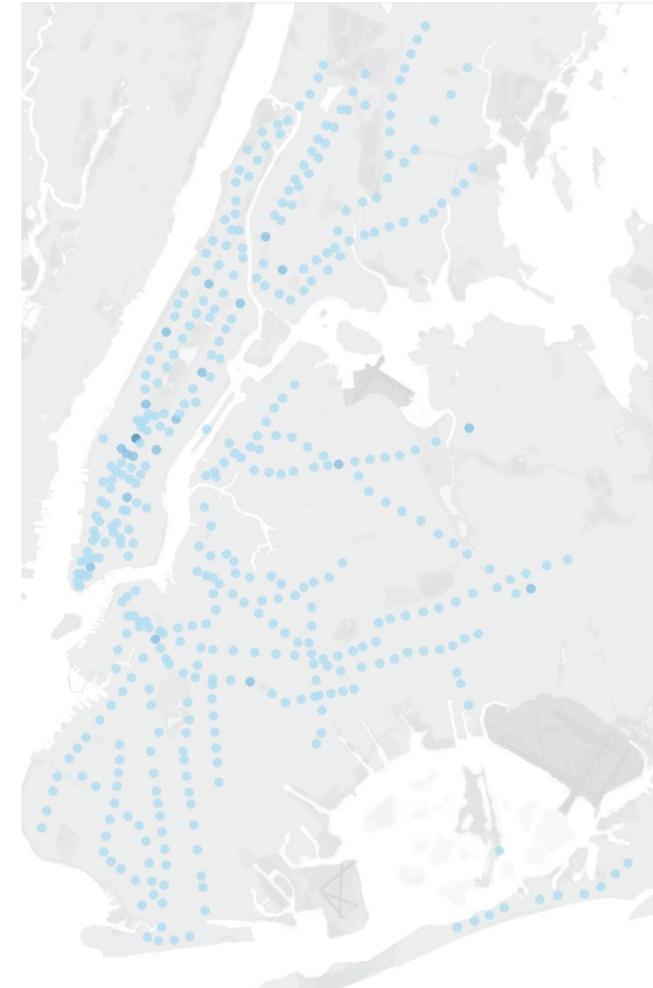
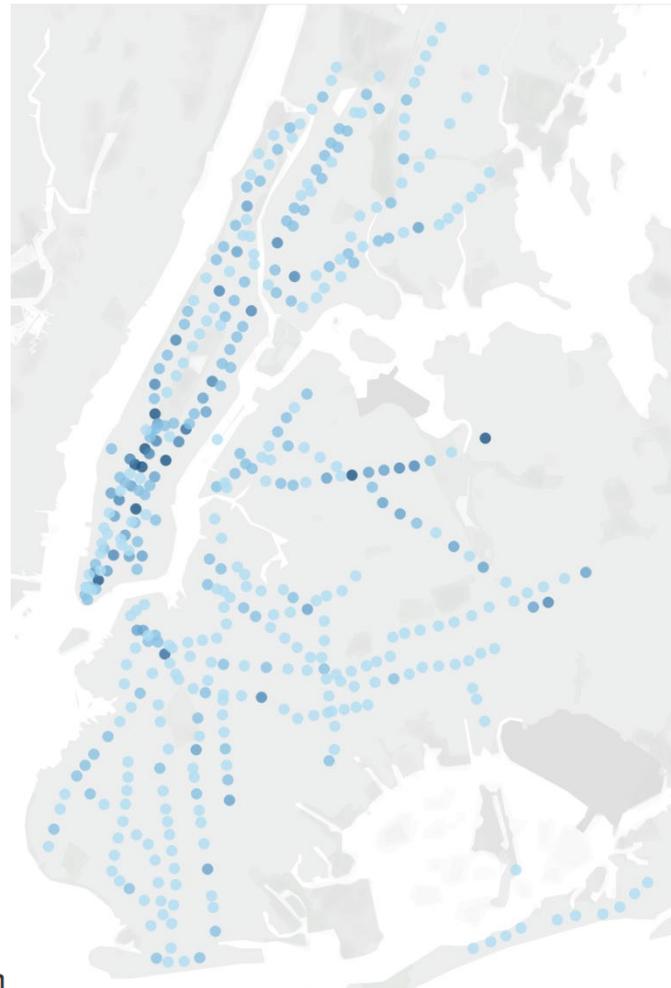
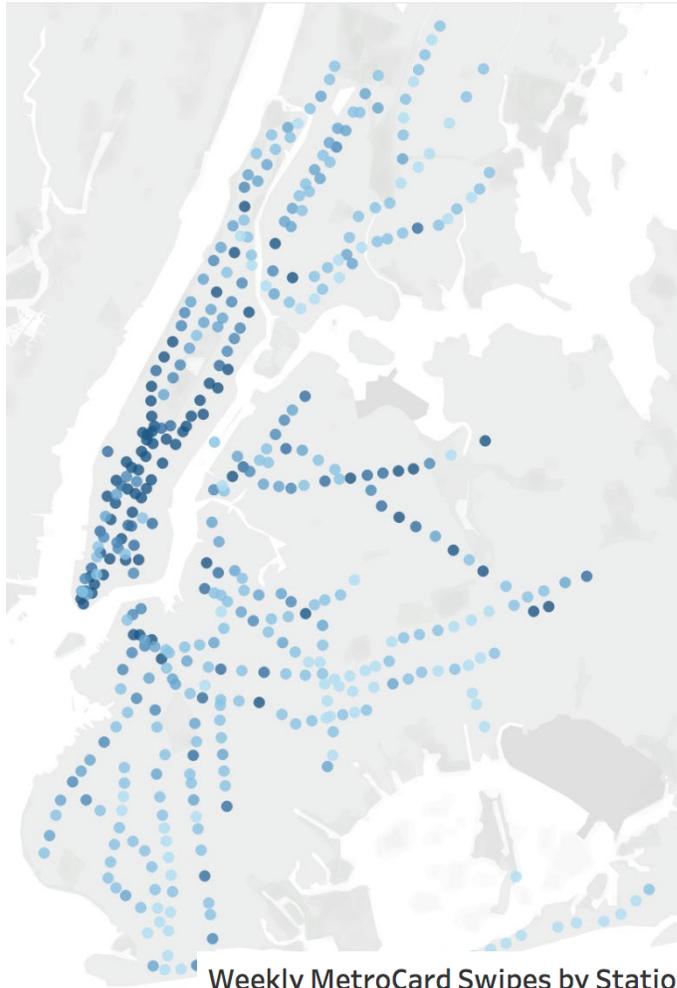
Interactive dashboard for these and other types of MetroCard swipes: <https://public.tableau.com/profile/dcpttransportation#!/vizhome/MetroCardSwipes-CardTypes/CardTypes?publish=yes>

# MetroCard Swipes: Week of Jan 4-10 vs Mar 14-20 vs Mar 28-Apr 3

January 4-10 2020

March 14-20 2020

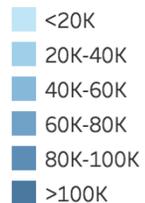
March 28-April 3 2020



March 14-20, the first week of public school closures, still saw substantial ridership compared to two weeks later, with the stay at home order in place.

An [interactive dashboard](#) allows you to explore statistics associated with individual stations. Note that you can toggle to adjust the date.

Weekly MetroCard Swipes by Station

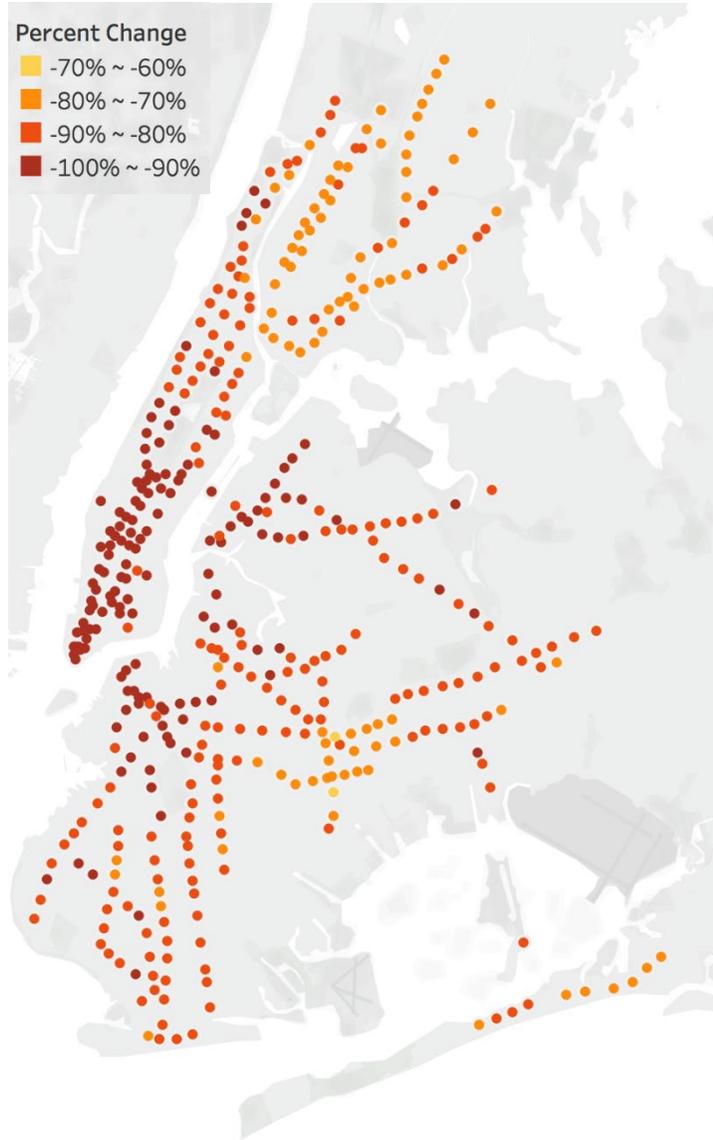


# MetroCard Swipe Change Jan/Feb 2020 vs Mar 28-Apr 3 2020

## 15 stations with most and least dramatic declines in ridership

Station (Route)	Perc Change	Station (Route)	Perc Change
Central Park North (110 St) (2 3)	-99.86%	Alabama Av (J)	-66.99%
Aqueduct Racetrack (A)	-98.79%	New Lots Av (L)	-68.44%
5 Av/53 St (E M)	-98.14%	New Lots Av (3)	-70.18%
Prince St (R W)	-98.03%	Far Rockaway - Mott Av (A)	-70.35%
Eastern Pkwy - BK Museum (2 3)	-97.52%	Van Siclen Av (3)	-70.59%
Franklin St (1)	-97.33%	Livonia Av (L)	-70.76%
18 St (1)	-96.93%	Beach 60 St (A)	-71.16%
Canal St (1)	-96.85%	Gun Hill Rd (5)	-71.24%
28 St (R W)	-96.82%	Sutter Av (L)	-71.54%
Spring St (C E)	-96.79%	Mt Eden Av (4)	-71.55%
Cortlandt St (1)	-96.66%	138 St - Grand Concourse (4 5)	-72.36%
Wall St (2 3)	-96.62%	Junius St (3)	-72.44%
8 St - NYU (R W)	-96.62%	Rockaway Av (3)	-72.53%
Spring St (6)	-96.61%	E 105 St (L)	-72.55%
47-50 Sts - Rockefeller Ctr (B D F M)	-96.57%	Wakefield - 241 St (2)	-72.75%

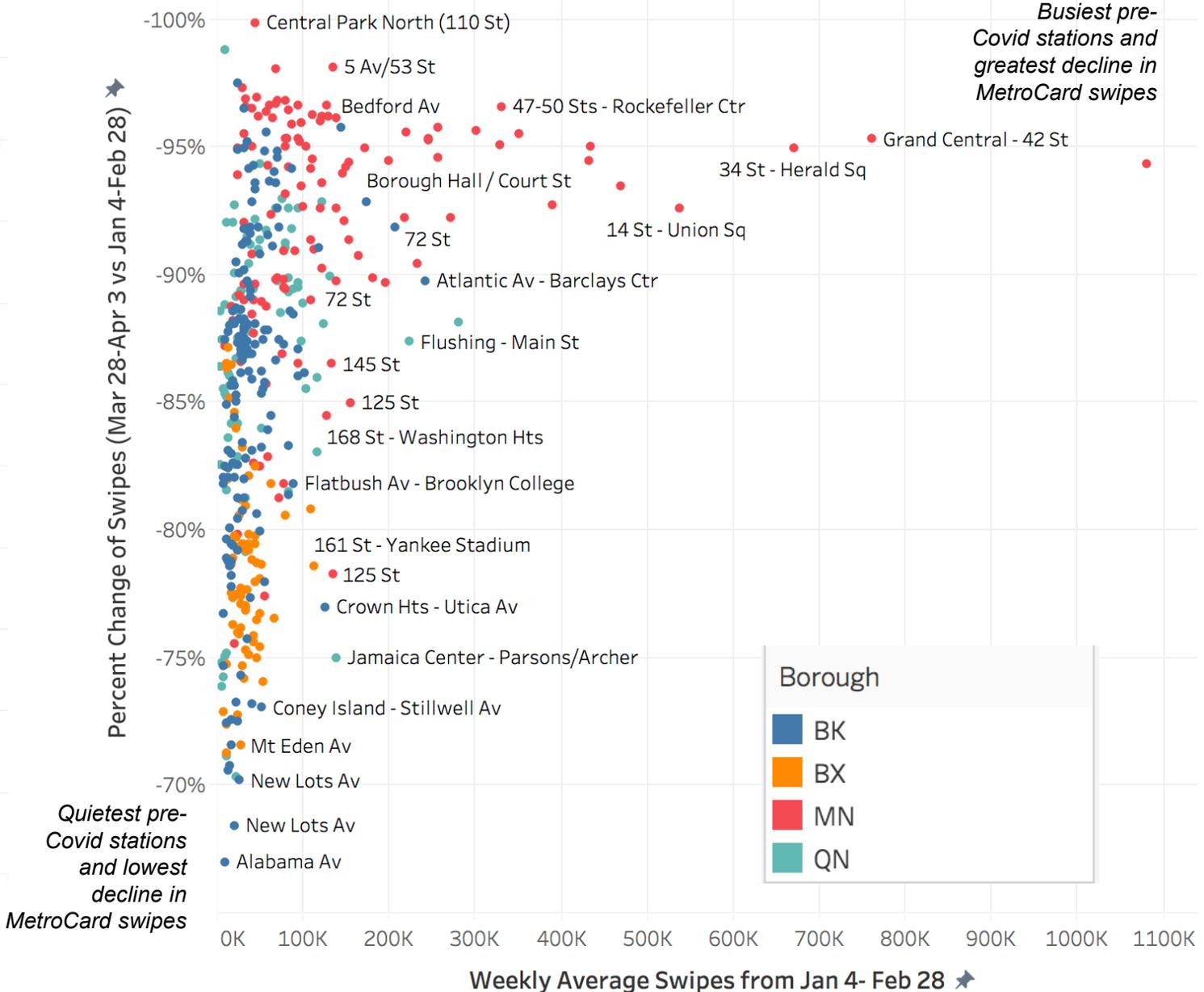
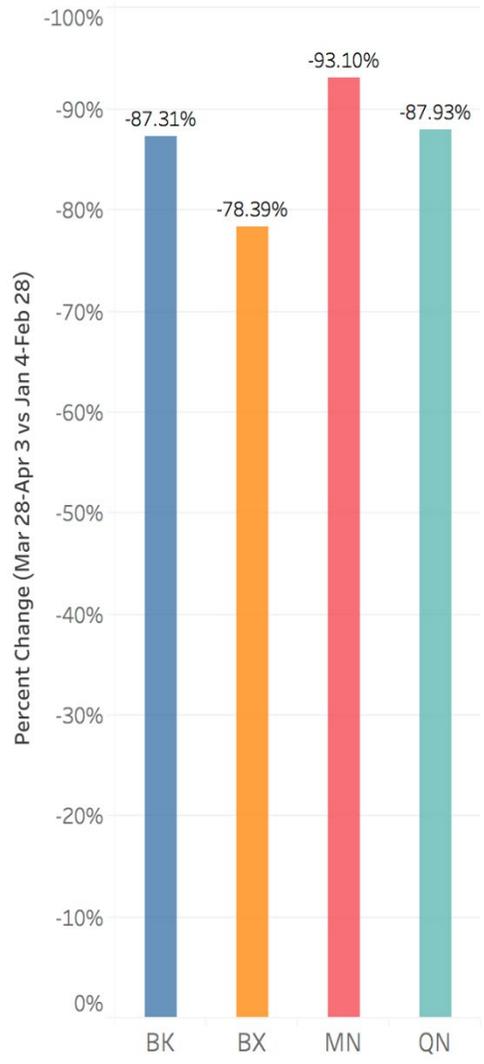
## Pct Change of Swipes (Mar 28 to Apr 3 2020 vs. Weekly Average of Jan 4 to Feb 28 2020).



- The week of March 28, the second week where 100% of the nonessential workforce was required to stay home, every subway station in the system saw MetroCard swipe declines of at least 70%.
- Outer borough stations experienced a less dramatic decline in ridership than Manhattan Core stations
- The Bronx, eastern Brooklyn and the Rockaways in particular still show a relatively high number of riders compared to pre-PAUSE.

Interactive dashboard link:  
<https://public.tableau.com/profile/dcptransportation#!/vizhome/MetroCardSwipes/PercentChange>  
 Data sources: MTA Fare Data  
<http://web.mta.info/developers/fare.html> April 14, 2020

# Degrees of Ridership Change by Station Activity



The scatter plot compares the average station activity with the scale of its ridership decline.

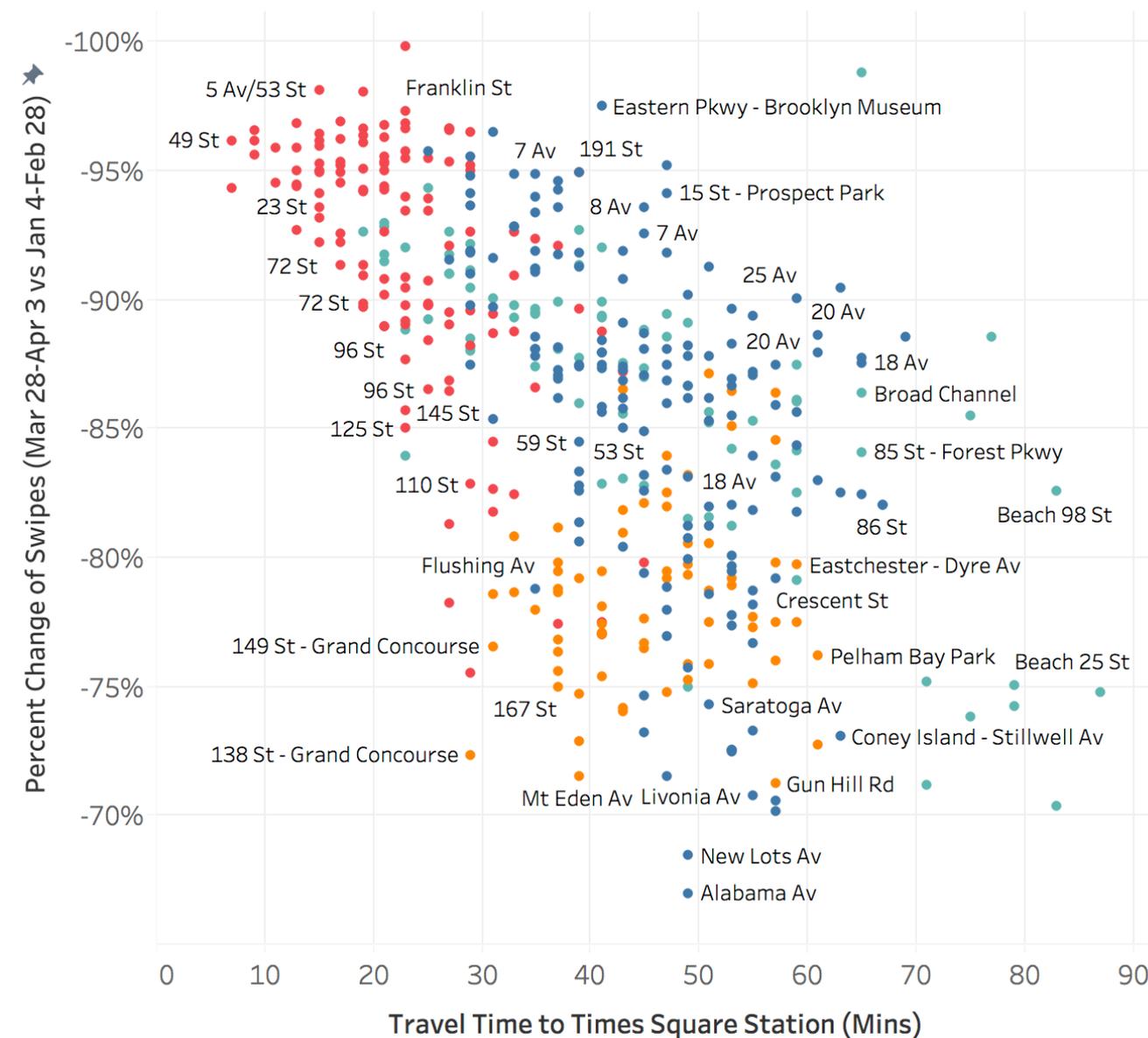
Overall, busier stations saw more dramatic declines, particularly in the central business districts.

In the Bronx, relatively quiet stations on average saw less dramatic declines; a greater share of its riders continued riding.

Change is measured by comparing the weekly average of January 4 – February 28<sup>th</sup> against the week of March 28-Apr 3.



# MetroCard Swipes Percent Change by Distance to The Core



The scatter plot shows the relationship between ridership declines, and distance to the Manhattan Core (travel time to Times Square, under normal AM peak subway schedules)

The stations furthest from the Core have generally seen the least amount of ridership decline.

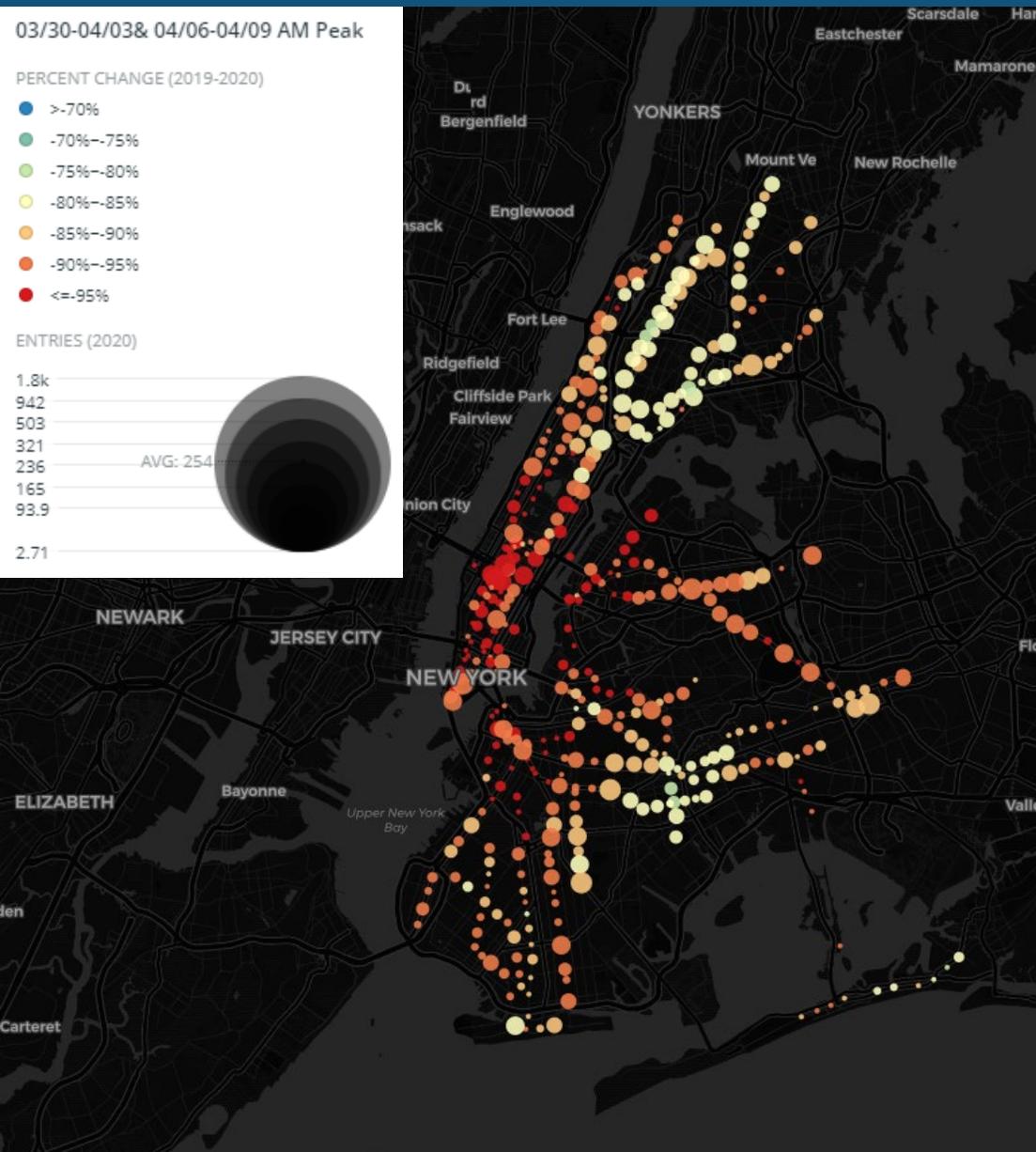
Change is measured by comparing the weekly average of January 4 – February 28<sup>th</sup> against the week of March 28 – April 3.

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

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



# AM Peak Weekday Turnstile Data: Mar 30-Apr 9 2020 vs 2019



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

- The largest AM peak ridership declines are observed in the Manhattan Core and Inner Ring, and along the B/Q and E train lines.

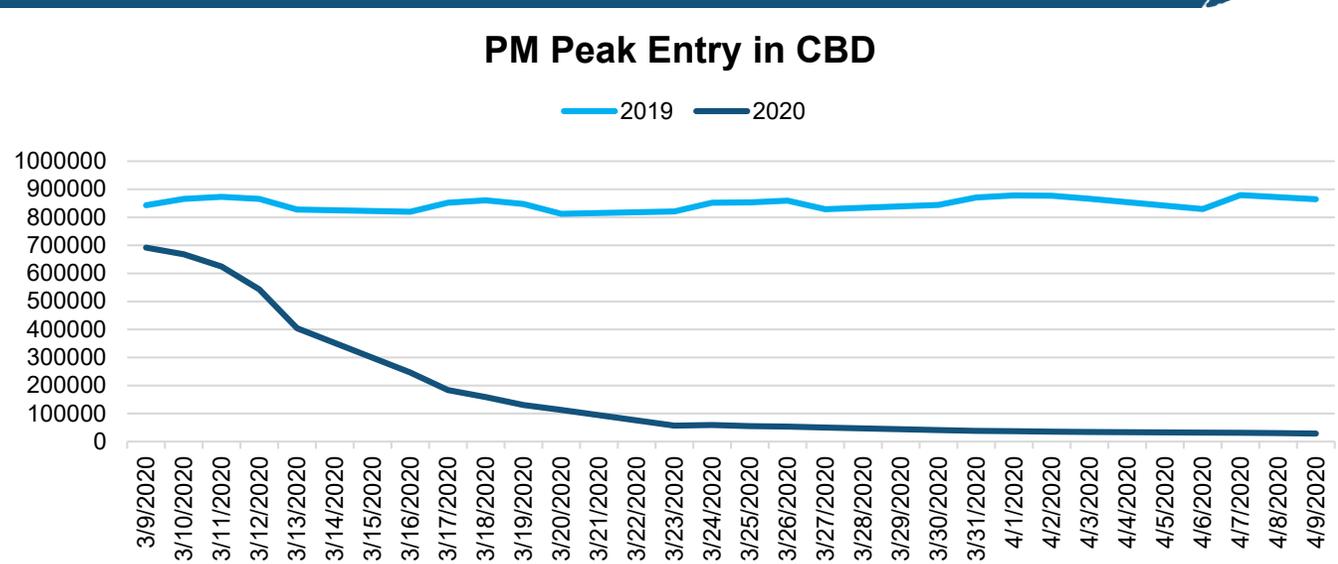
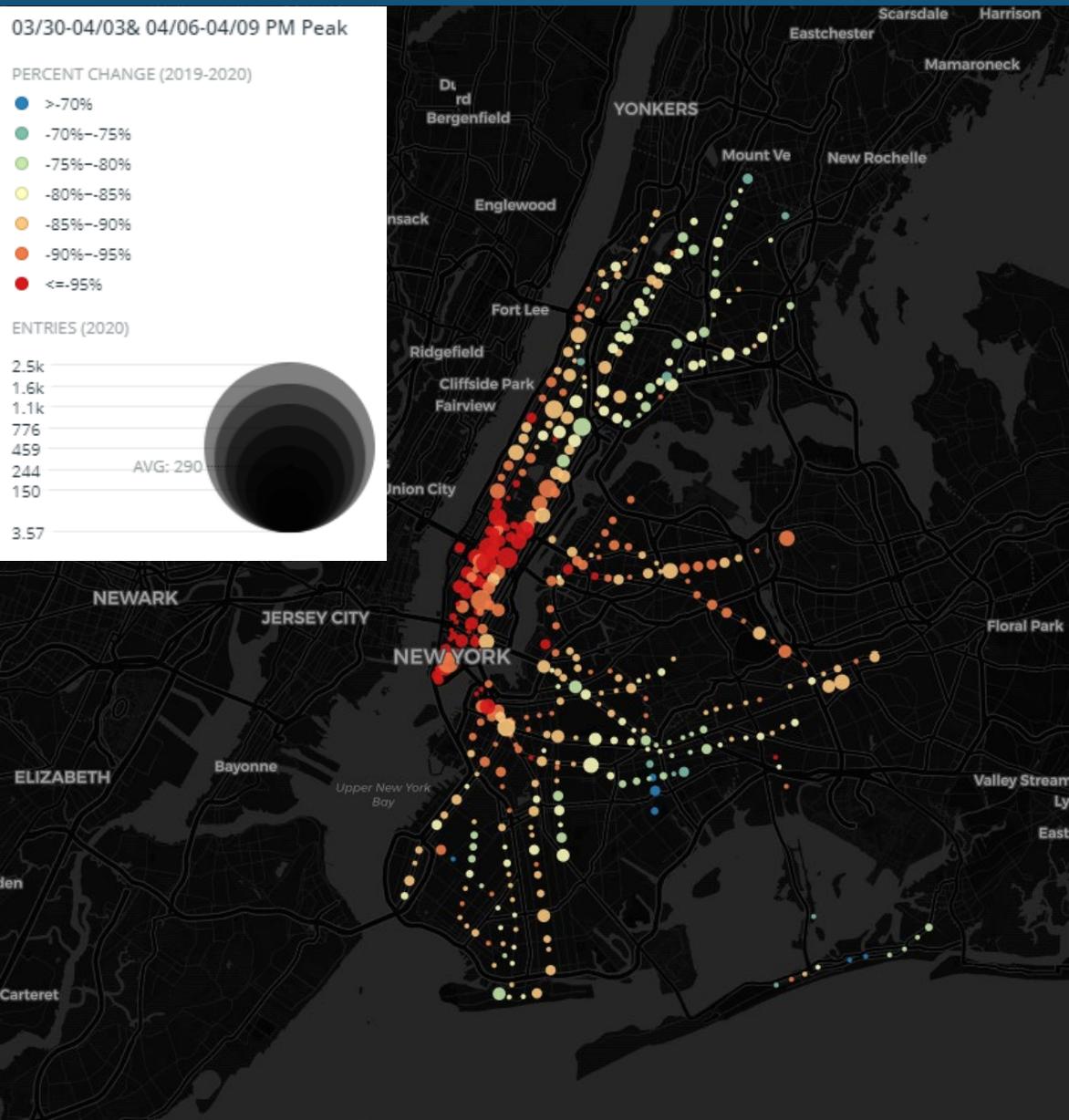
### Turnstile Data:

- MTA turnstile data map compares weekday ridership during the last week of March and first week of April in 2019 vs those same weeks in 2020. It considers riders only travelling during the AM peak 4-hour travel window\*.
- Size is the actual ridership during the last week of March 2020 and the color is the percent change.
- MetroCard Swipe/Fare data is the cleaned weekly ridership data provided by MTA for each station. Although turnstile data is also published by MTA, it is the raw cumulative entry register data for each turnstile recorded every 4 hours. Turnstile data can be affected by broken turnstile, maintenance, register reset, etc. and thus **requires extra caution when using the data.**

\*the 4-hour window of aggregated data varies by station but the map reflects whichever window encompassed the typical morning peak.

Data sources: MTA Turnstile data (<http://web.mta.info/developers/turnstile.html>)

# PM Peak Weekday Turnstile Data: Mar 30-Apr 9 2020 vs 2019



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

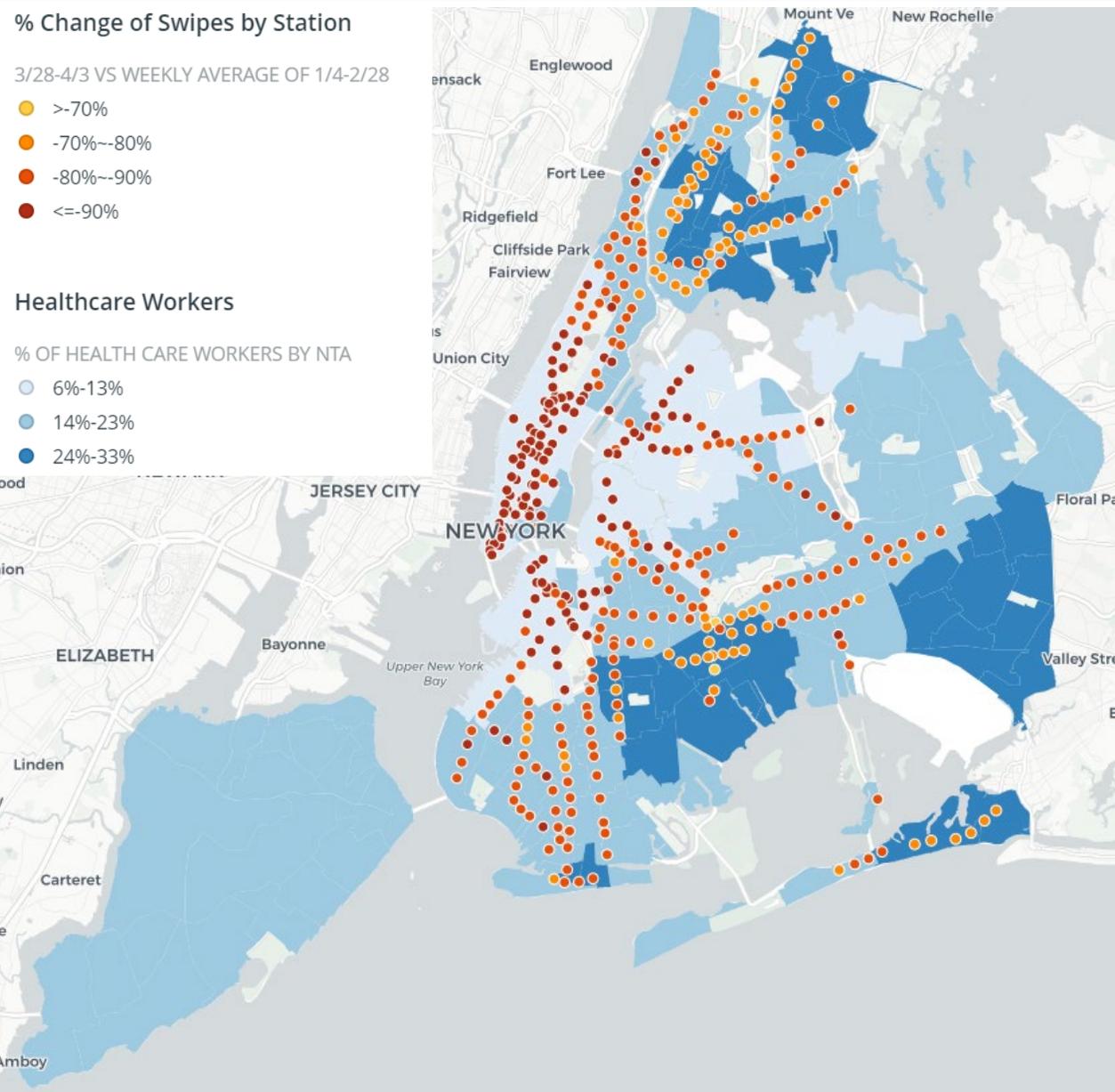
- The CBD area has seen the largest decreases in weekday entries during the PM peak 4-hour window\*. The ridership has dropped approximately 97%.
- However, the CBD stations remain to have the highest ridership across the city, with about 30,000 entries per 4 hours in total in the PM peak.

\*the 4-hour window of aggregated data varies by station but the map reflects whichever window encompassed the typical morning peak.

Data sources: MTA Turnstile data (<http://web.mta.info/developers/turnstile.html>)

# Workforce

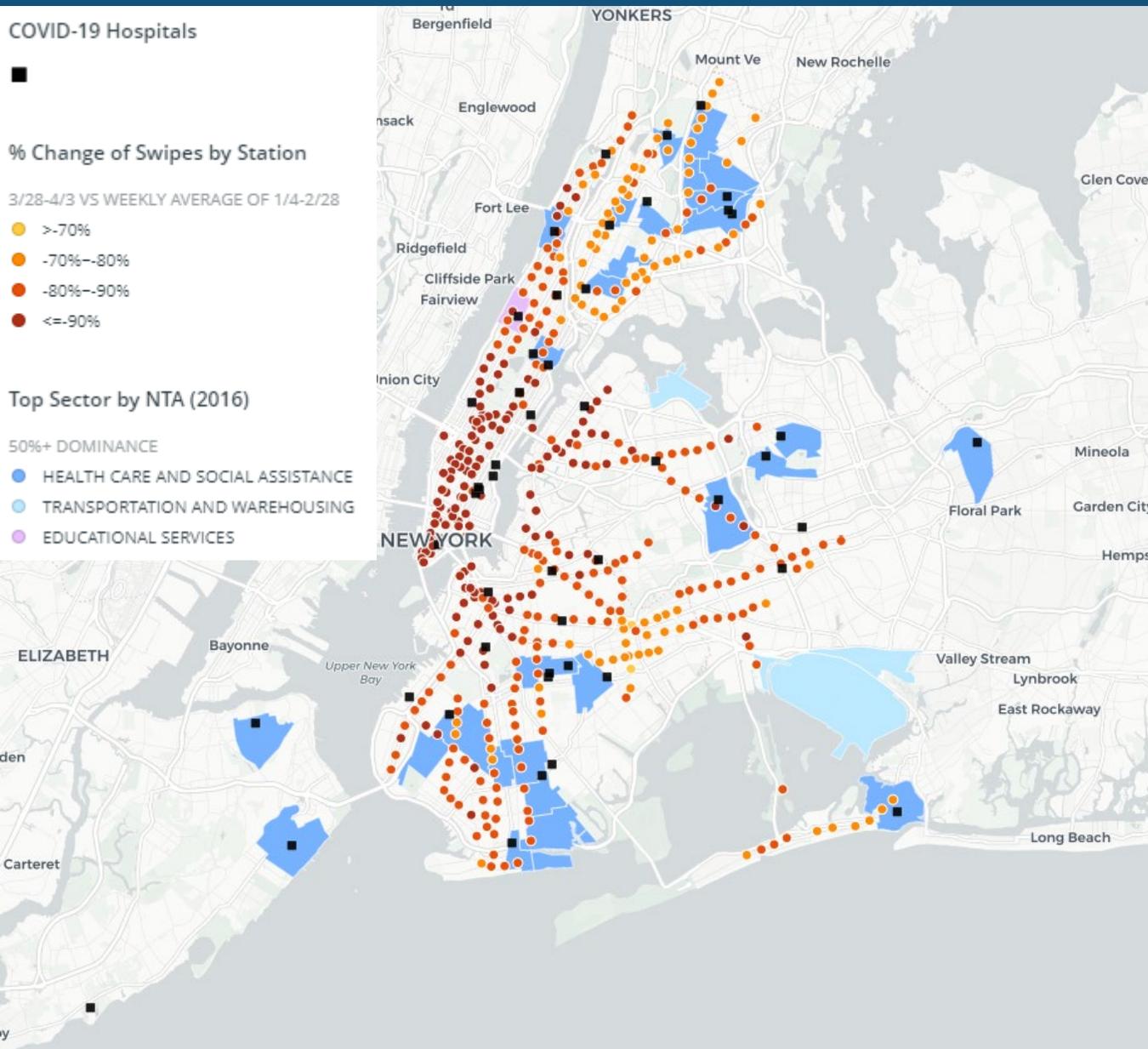
# MetroCard swipes and where healthcare workers live



- We're beginning to explore the economic and demographic landscape of where subway ridership is relatively high.
- Certain neighborhoods of the city have particularly high rates of the workforce employed in essential industries.
- Parts of the Bronx, eastern Queens, and eastern Brooklyn have up to a third of all workers employed in healthcare. These areas coincide with areas where subway ridership declines have been less dramatic.
- Healthcare workers may be employed in hospitals, or may be continuing to report to work at nursing homes, as home health aides, or in other medical settings.

Data sources: MTA Fare Data (<http://web.mta.info/developers/fare.html>); 2014-2018 ACS, healthcare & social assistance workers over total employed civilians over 16 years old Table number: S2403INDUSTRY BY SEX FOR THE CIVILIAN EMPLOYED POPULATION 16 YEARS AND OVER

# MetroCard Swipes and Healthcare Jobs – place of work



- This map shows neighborhoods where more than half of the jobs within the neighborhood are within a single sector. Most of these are in healthcare or social assistance.
- These neighborhoods contain or are near hospitals that are currently accepting suspected COVID19 patients.
- As essential workers continue to travel to work, subway ridership declines have been extreme, but still less pronounced, in many of these neighborhoods.

**% Change of Subway Swipes by Dominant Sectors in NTAs**



Data sources: MTA Fare Data (<http://web.mta.info/developers/fare.html>); DCP Housing Economic Development division, QCEW 2016 (3rd Quarter), geocoded private, non-headquartered firms

# MetroCard swipes and where food service workers live

## % Change of Swipes by Station

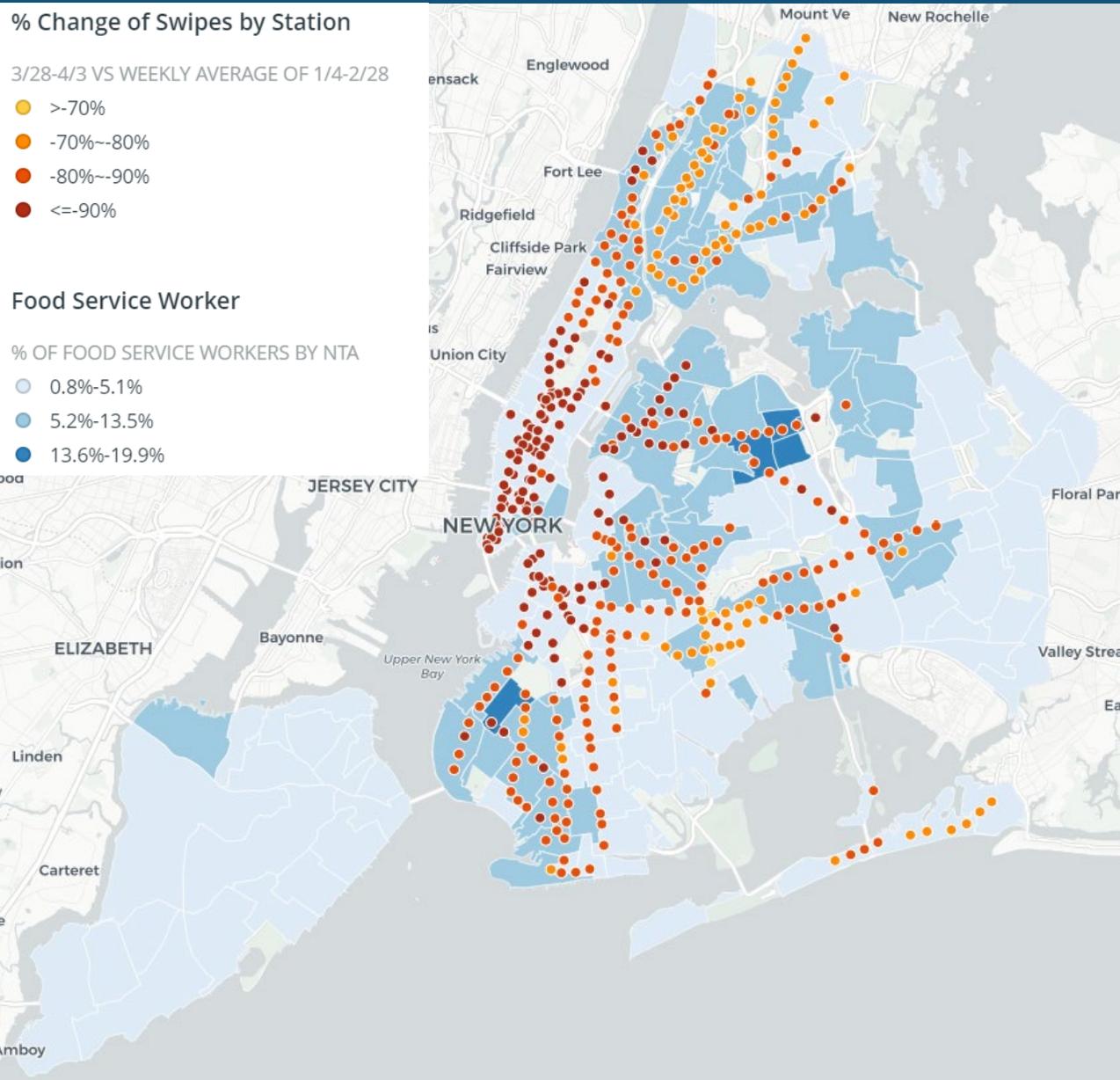
3/28-4/3 VS WEEKLY AVERAGE OF 1/4-2/28

- >-70%
- -70%--80%
- -80%--90%
- <=-90%

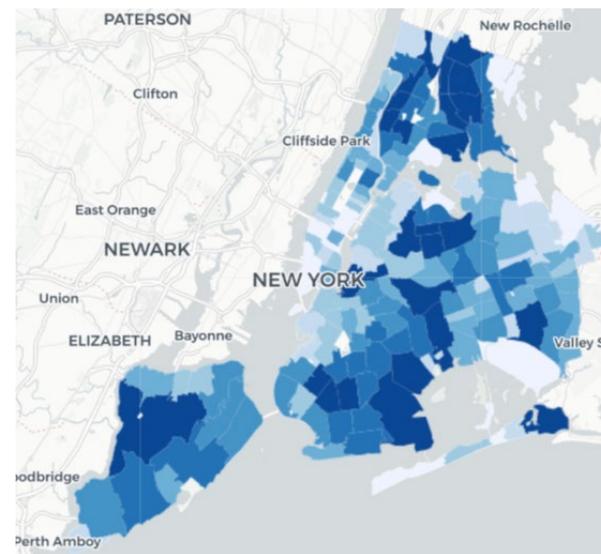
## Food Service Worker

% OF FOOD SERVICE WORKERS BY NTA

- 0.8%-5.1%
- 5.2%-13.5%
- 13.6%-19.9%



- Areas where concentrations of food workers live do not appear to be connected with higher rates of subway ridership under the pandemic.
- Nevertheless, we do see concentrations of food workers in the same neighborhoods as, or adjacent to, concentrations of confirmed positive COVID19 cases.
- Corona, Queens and Borough Park, Brooklyn are particularly notable. More detail is shown in a subsequent slide.



## Positive Tests by ZCTA (4/13)



# COVID19 cases

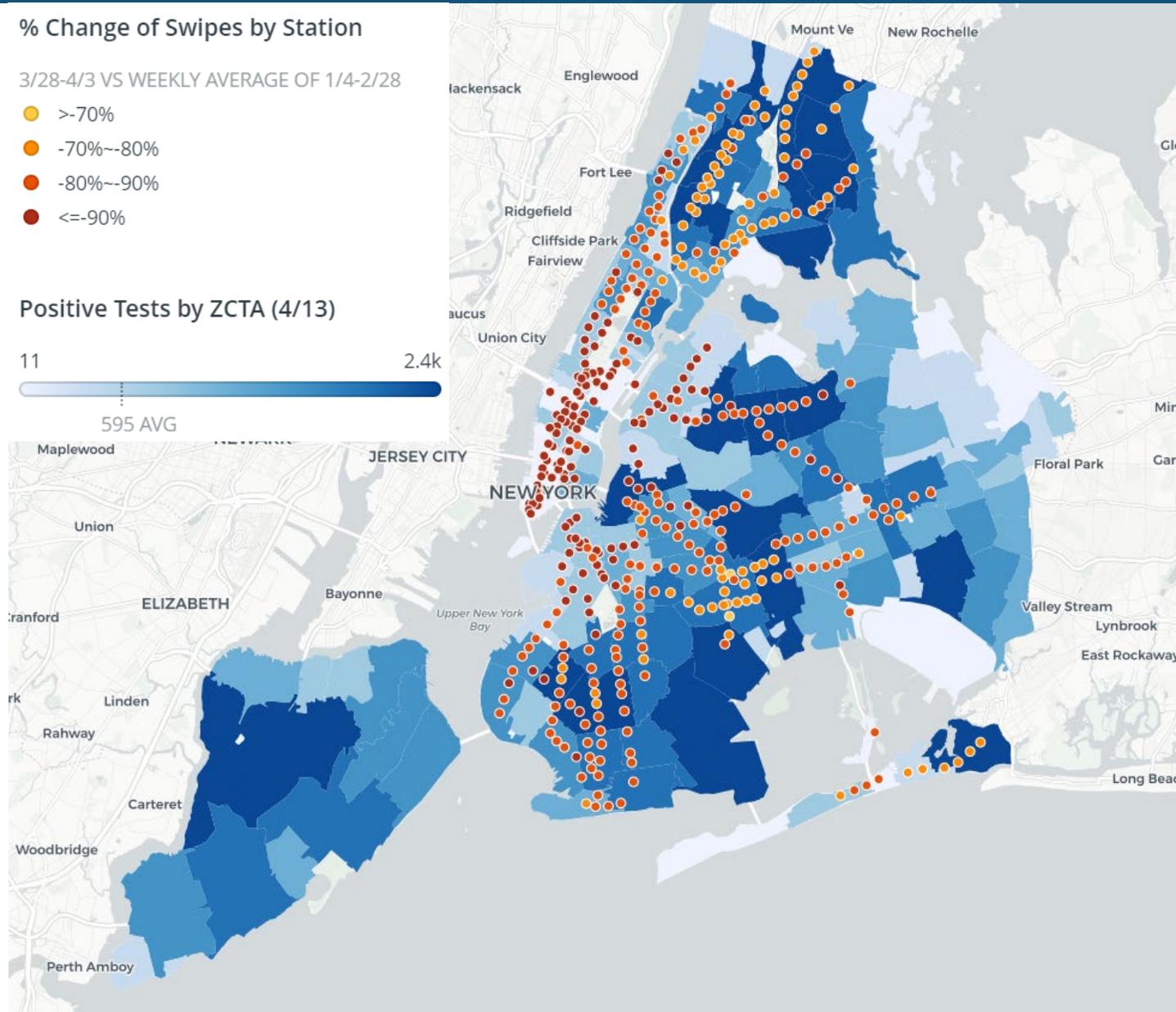
# Transit Ridership and COVID19 Positive Tests

## % Change of Swipes by Station

3/28-4/3 VS WEEKLY AVERAGE OF 1/4-2/28

- >-70%
- 70%~-80%
- 80%~-90%
- <=-90%

## Positive Tests by ZCTA (4/13)



- Some neighborhoods in the city with the lowest decline in subway ridership also show the highest numbers of confirmed positive COVID19 cases.
- Areas with the highest number of confirmed cases (shown in dark blue) and the least change in ridership (shown in lighter orange) include Borough Park and East New York in Brooklyn, and the Morris Heights and Williamsbridge areas in the Bronx.

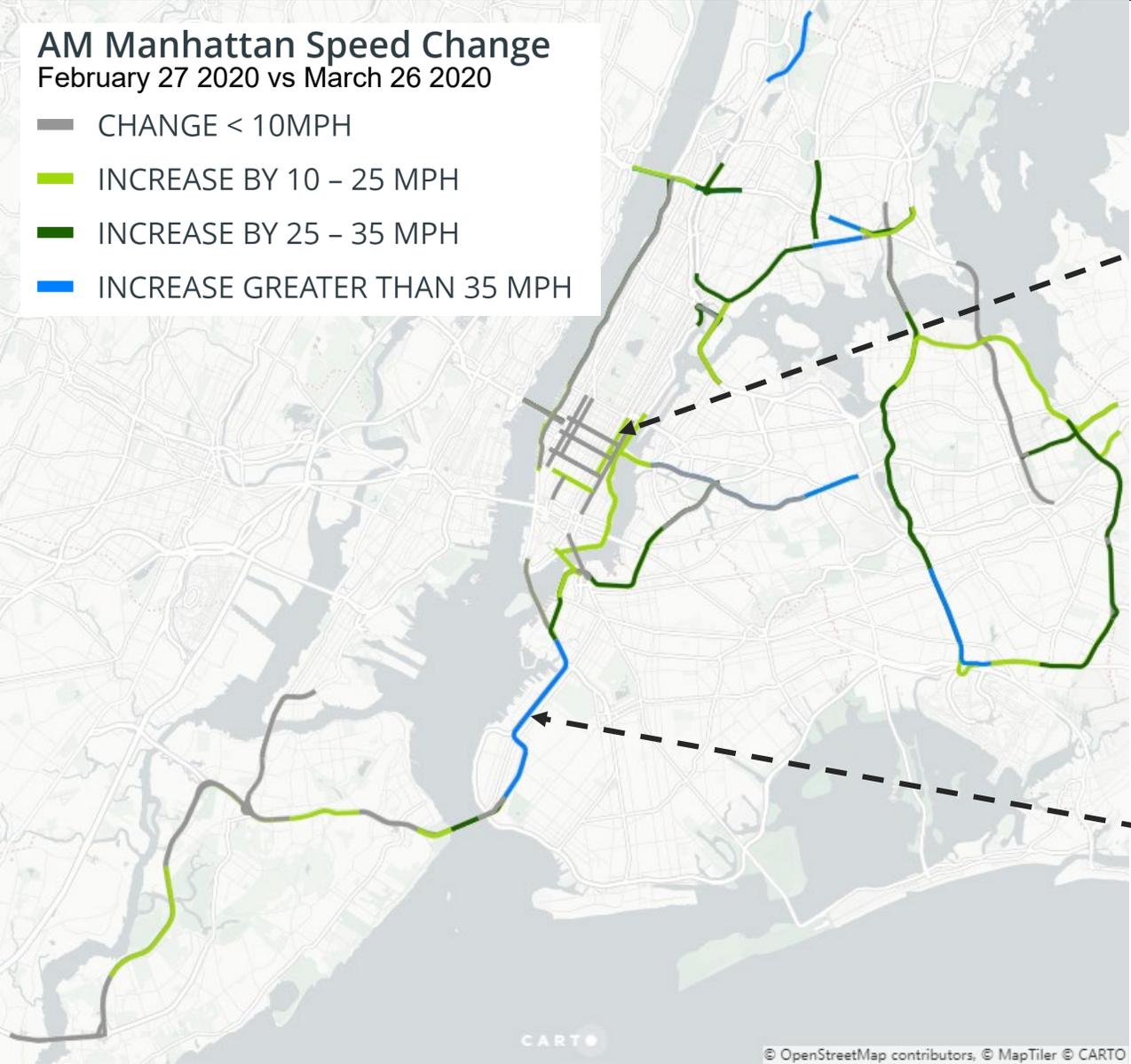
Interactive map: [Transit Ridership and COVID19 Positive Tests](#)

# Automobiles

# NYC AM Peak Road Speed Change

## AM Manhattan Speed Change February 27 2020 vs March 26 2020

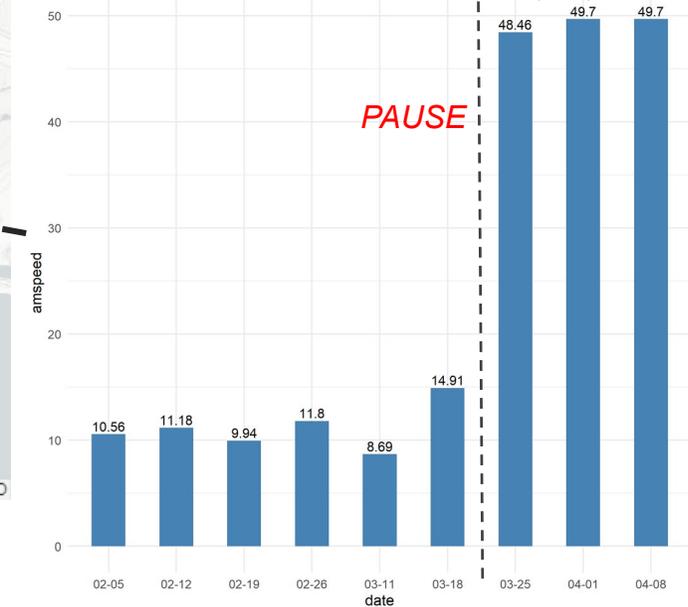
- CHANGE < 10MPH
- INCREASE BY 10 - 25 MPH
- INCREASE BY 25 - 35 MPH
- INCREASE GREATER THAN 35 MPH



### MN 2<sup>nd</sup> Ave btwn 57<sup>th</sup> and 23<sup>rd</sup> streets (SB)



### BK BQE btwn N7<sup>th</sup> and 9<sup>th</sup> streets (NB)



## AM Peak (6:30-9:30)

Since the stay at home order was put in place, there has been an average 57% increase in speeds\* for the roads shown on the map.

Manhattan's 2<sup>nd</sup> Avenue speeds averaged more than 21mph on April 7 2020 versus only 8mph one year ago.

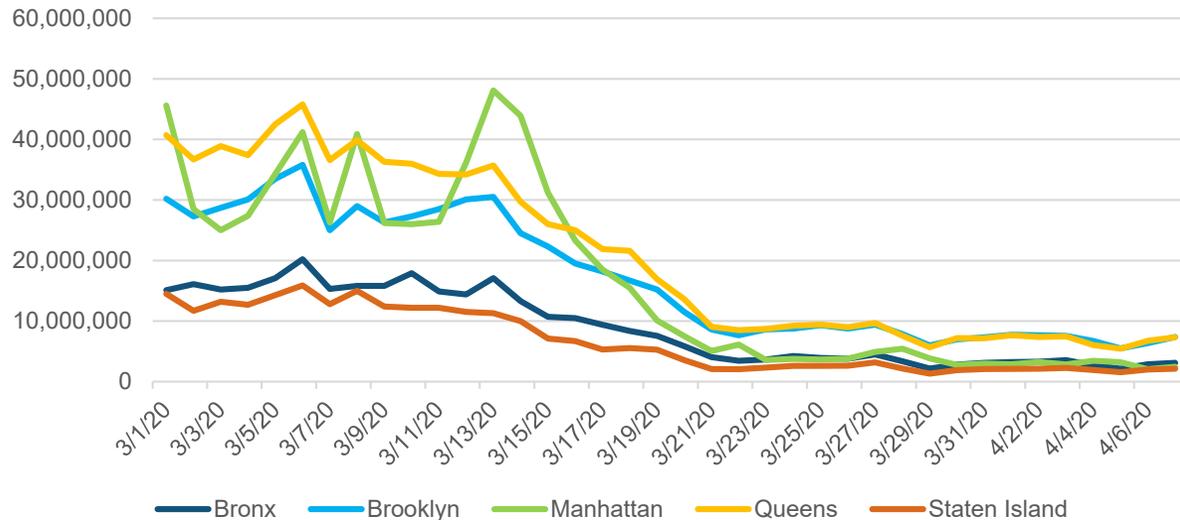
Speeds on the BQE jumped from about 15mph to nearly 50mph pre- and post-PAUSE (3/22/2020).

\* $(\text{Weighted speed} = \frac{\text{Sum}(\text{speed } 1\text{st} * \text{length } 1\text{st} + \dots + \text{speed } n\text{th} * \text{length } n\text{th})}{\text{Sum}(\text{length } 1 + \dots + \text{length } n\text{th})})$

Data Source: NYC DOT

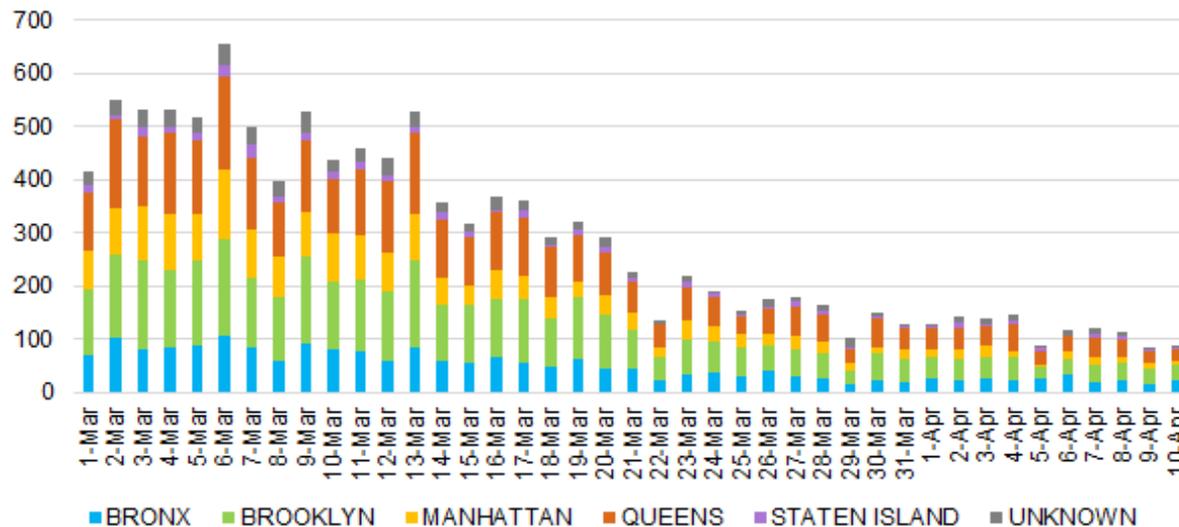
# Motor Vehicle Collisions- March 1st to April 10<sup>th</sup> 2020

### Daily Vehicle Miles Traveled (VMT)



Data source: StreetLight Data

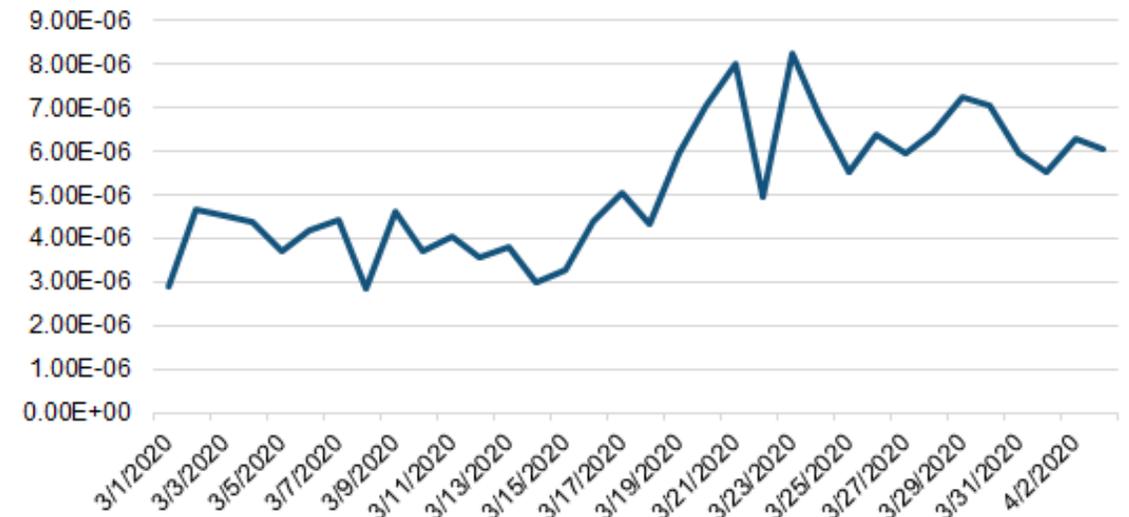
### Number of Motor Vehicle Collisions by Borough



Data source: NYPD Motor Vehicle Collisions (<https://data.cityofnewyork.us/Public-Safety/Motor-Vehicle-Collisions-Crashes/h9gi-nx95>)

- There were significant declines in vehicle miles travelled (VMT) as the City and State progressively enacted stay-at-home measures.
- The VMT peak after Friday, March 13 may reflect people leaving the city in their cars.
- Although numbers of motor vehicle collisions, injuries and fatalities have plummeted since mid-March, the number of collisions per VMT has actually increased in NYC.

### Number of Motor Vehicle Collisions Per VMT (Mar 1<sup>st</sup> to Apr 3<sup>rd</sup>)

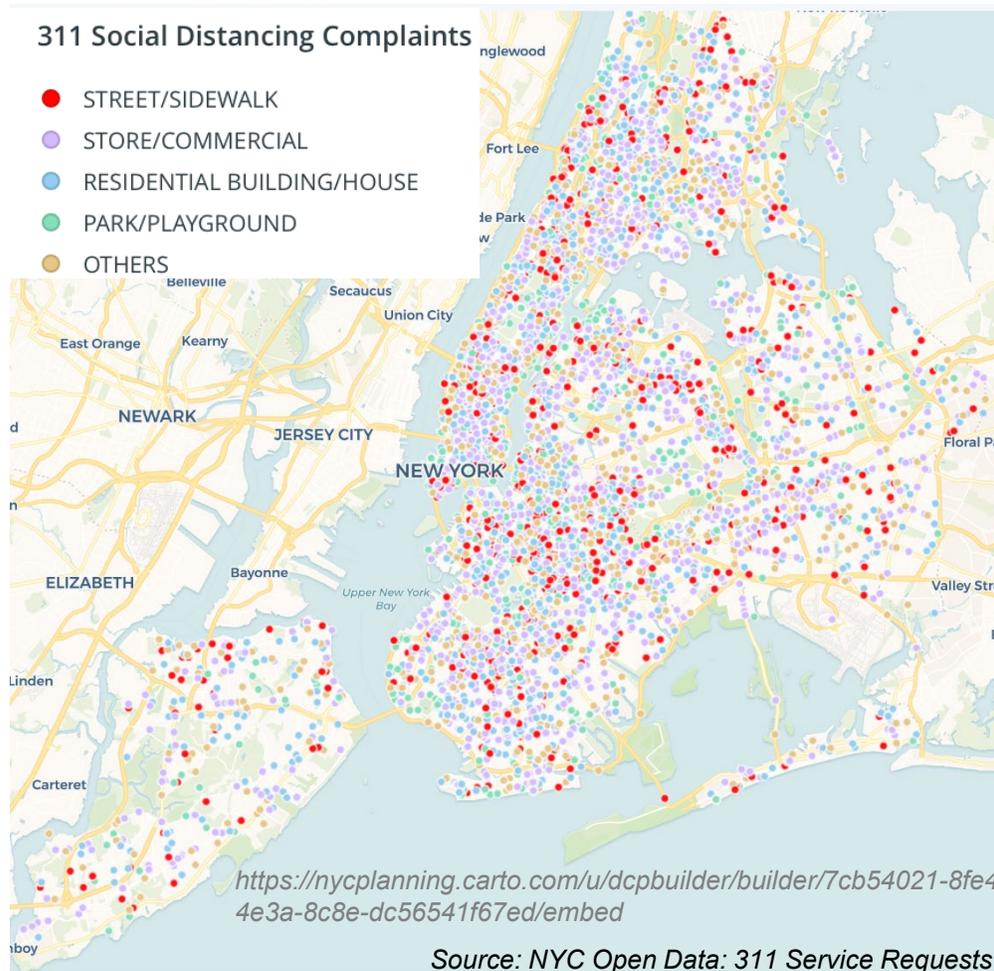
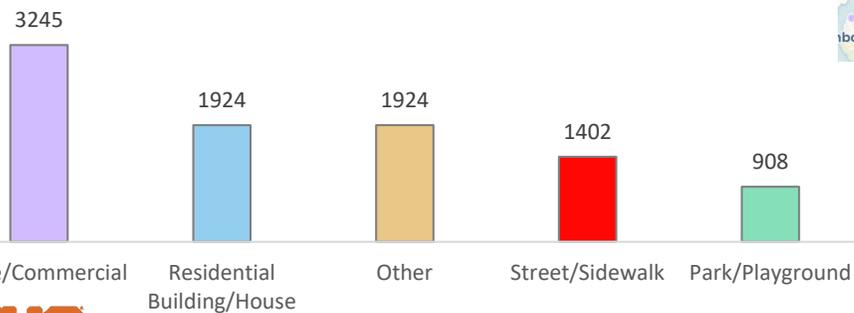


# 311 Data

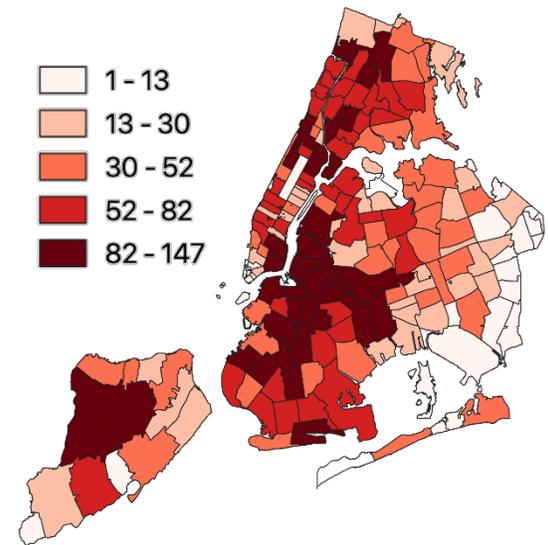
# 311 Service Complaints: March 28<sup>th</sup> through April 11<sup>th</sup> 2020

- "Social Distancing" was the most common complaint (9403 records) out of all 311 service complaints during this time period.
- But 311 calls have never been evenly distributed across the city. Some neighborhoods are more frequent 311 callers than others.
- Midtown Manhattan, portions of Brooklyn and Queens along the East River, and parts of south Brooklyn appear to have a higher share of 311 calls related to social distancing than to other issues.
- 311 calls related to streets/sidewalks comprise about 15% of all social distancing complaints.

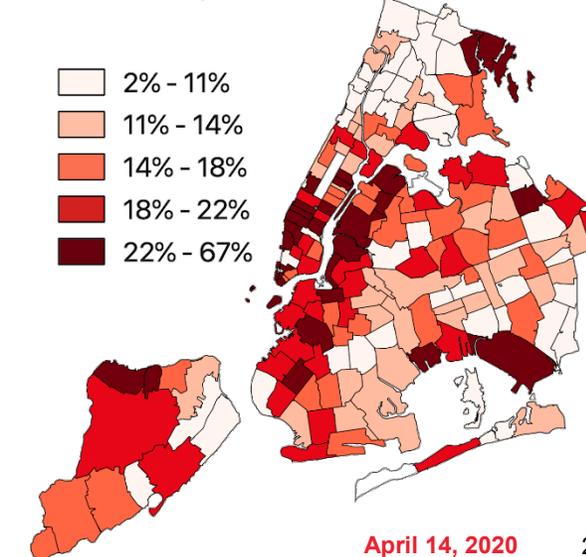
311 Social Distancing Complaints by Location Type



## 311 Social Distancing Complaints



## % of all 311 calls that are Social Distancing Complaints



# Timeline



# New York COVID-19 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 3<sup>rd</sup>, 2020: Second confirmed case <https://www.businessinsider.com/new-york-second-coronavirus-case-attorney-law-firm-grand-central-2020-3?r=US&IR=T>
- 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-vmjdxjudbnlrljekashqs3hfou-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 9<sup>th</sup>: **NYU** announces **suspension of in-person classes**, moving all classes online effective Wednesday 3/11 <https://www.nydailynews.com/new-york/ny-nyu-coronavirus-online-instruction-20200310-jov5akxr4ngwjhxtv4zrz2ypea-story.html>
- 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 16<sup>th</sup>: **Columbia University** reduces to **essential staff** and operations only <https://preparedness.columbia.edu/news/update-covid-19-0>
- 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 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>