

## **Introduction**

Qubra is a startup which aims to connect communities by improving affordable ground transportation options in New York City by acquiring retired school and city buses to offer shuttle services in neighborhoods which are currently sparsely connected by the MTA subway. Qubra's scheduling team has reached out to our group to analyze the traffic flow in Queens and Brooklyn and provide advice on planning the routes in these regions.

## **Email Response to Client**

Dear Ms. Kido,

We are certainly interested in your startup idea and are glad that we had an opportunity to chat with you in regards to some preliminary solutions. It is true that there is no easy way to get from Queens to Brooklyn, which is a set up for a great investment opportunity. To take your recently acquired buses and shuttles to create new routes in the city is an effective use of resources. To give you a sense of what we can provide, we will go ahead and send you a short analysis of New York City's traffic flow using MTA turnstile data.

What is interesting is that the creation of new routes from Queens to Brooklyn can directly change the traffic flow that we notice on a day to day basis. With this in mind, we can also build analytics that monitor the traffic patterns and fine tune the routes that the shuttles take.

Thank you for reaching out. We will be in touch.

Best,

Metis Consulting, Inc.

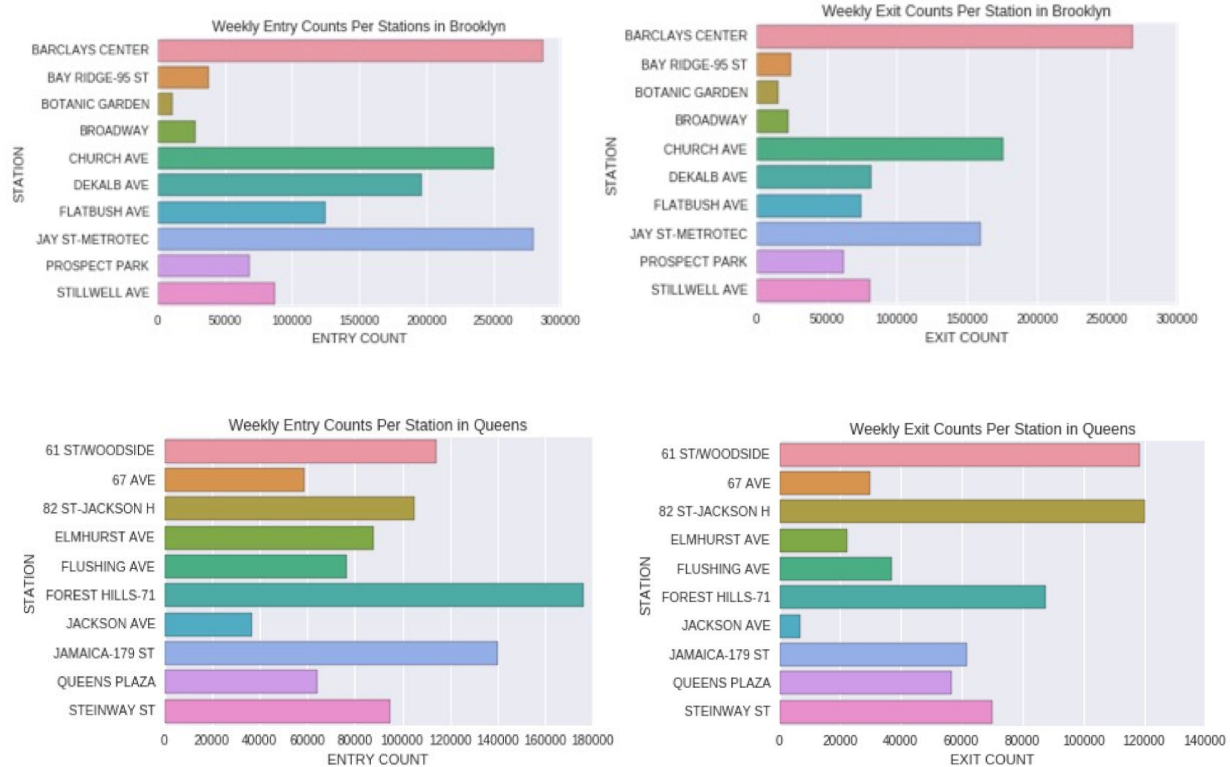
## **Our Data Set**

Subway turnstile data for New York City is provided by MTA. This data keeps track of, in general, six audits per day of each turnstile, in each station, in New York City. These audits contain information regarding the number of entries and exits recorded at that turnstile. We utilized a sample of the data from September 19, 2015 through November 6, 2015 to analyze foot traffic patterns and determine areas with high demand.

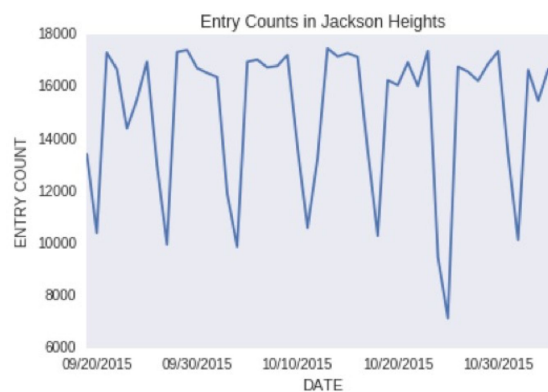
## **Preliminary Results**

For this quick analysis, we considered a sample of 48 consecutive days in 2015. We could apply the information provided regarding the number of people entering a station to make predictions about patterns in ridership in that station. This is pertinent to our client because the more people there are exiting a certain station, the more people there would be looking for ground transportation to reach their destination.

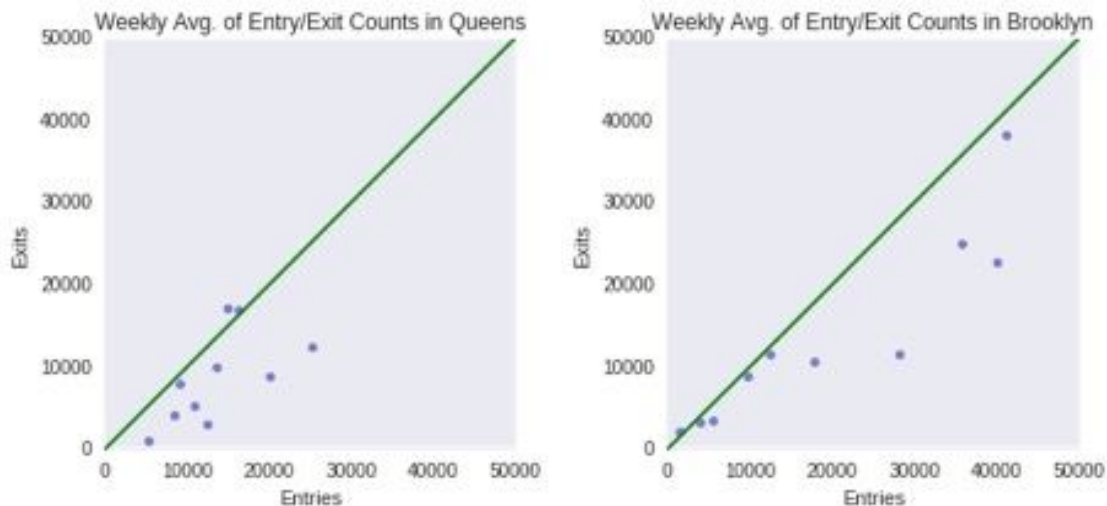
The following bar graphs show a sample of the weekly number of entries and exits in ten stations from Brooklyn and ten stations from Queens. As we can see, certain stations like 61 Street/Woodside in Brooklyn and Forest Hills in Queens have significantly higher populations moving through them and should be a priority when planning transfers and connections of lines. Routes with less populous stops could have fewer lines visiting them and fewer buses running those lines.



The line graph below shows day to day entry information for the Jackson Heights station, which is a connecting station. The line graph shows a significant decrease in the number of entries on weekends, which suggests that the weekday commuters should be the top priority targets:



The scatter plots below map entry counts to exit counts for each of our stations in both Queens and Brooklyn. These plots show inconsistency in the data. We expect the number of entries to match with the number of exits, but that is not the case. One reason for this discrepancy may be the fact that many stations allow commuters to exit without going through turnstiles. Many subway riders exit through exit doors as rates are fixed and they are not required to swipe through the turnstile during exit.



## Next Steps

Given a larger sample of data and more time for analysis, we can hone our analysis of the best possible ground transportation routes. With more information regarding the number of vehicles in stock, driver shifts, we can put together efficient schedules for your lines and routes.

In our preliminary examination of this data set, we focused on the daily station data to characterize overall station traffic, however further analysis could give further insights. By examining the entry and exit numbers at stops in a given four hour period, we can get better estimates of how many people are traveling between particular stops -- as opposed to commuting to third locations -- and when. This demand data can help inform the feasibility of bus lines between individual stops, as well as the optimum times for those buses to run.

This analysis need not be exclusive to Brooklyn-Queens transit options and further investigation of the data may find other, less obvious gaps elsewhere in the system that Qubra can serve.

Similar analysis of MTA bus ridership data would both further inform our characterization of overall Brooklyn-Queens transit demand and the potential competition from existing bus routes.

**Project:** Benson

**07.08.16**

**Team 5:** Derek Updegraff, John Huynh, Mark Shin, Saniya Jesupaul

Integrating Google Maps data can also help us gain additional insights about about the feasibility and benefits of bus transportation between these areas. By comparing the travel time between stops by car and public transit at different times of day, we can get a sense of how much time a direct bus line would save commuters vs existing subway and bus transportation.

An examination of Uber and Lyft surge fares and wait times at various Brooklyn and Queens stops throughout the week, we can gain further information on the overall transit demand in these areas. Higher surge fares would indicate more unserved transit demand -- particularly if accompanied by long wait times.

All these data sets, of course, would also help inform evaluation of possible bus routes other than Brooklyn-Queens.

## **Conclusion**

We are glad to have had the opportunity to help your startup and contribute to the community of transportation services in New York. Once we obtain working data sets from other sources, we can work to provide a more in depth analysis of traffic patterns. We look forward to discussing future enhancements for this project.