# Proposal: NYC MTA's "Renewal" of 30 Subway Stations by 2020 using a data driven approach

**Problem Statement:**

The MTA is looking forward to renewing 30 subway stations by 2020 in order to attract more riders and improve the experience of current riders. The current plan is to shut down entire stations for an average of 6-12 months per station to expedite renovations. However, shutting down stations for long periods of time works against the goals of the renovations, by alienating current riders and taking massive financial losses. Based on our preliminary analysis of turnstile data at these 30 stations, we believe we can develop a plan for keeping these stations open during renovations. We can identify off-peak hours in which to work by station, selecting optimal days of the week and hours of the day.

**Preliminary Results:**

To demonstrate the power of our analysis we took a detailed look at one of the 30 stations with highest foot traffic, 28th Street Station. Our analysis determined which periods had the lowest foot traffic in order to select the best times for maintenance and renovations.
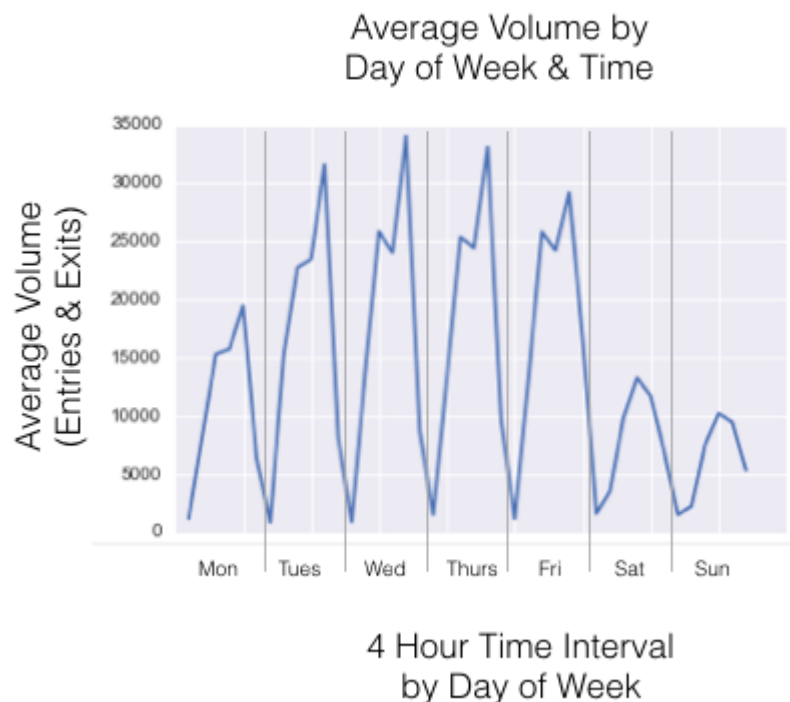


Fig. 1: Average Foot Traffic at 28th St. Station from September 2016

Ideal work periods can be determined by day of the week, time of day, and by unique interactions between day of the week and time of day. Figure 2 below illustrates the three best periods for maintenance work in each of these categories.

| | Rank #1 | Rank #2 | Rank #3 |
|---|---|---|---|
| Best Choice of Day | Sunday | Saturday | Monday |
| Best Time Periods | Midnight - 4 a.m. | 8 p.m. - Midnight | 4 a.m. - 8 a.m. |
| Best Times Overall | Tues, Midnight- 4 a.m. | Wed, Midnight-4 a.m. | Fri, Midnight-4 a.m. |

Fig. 2: Lowest foot traffic periods at 28th St. Station by day, time, and overall

An individual analysis for each station should be conducted because foot traffic patterns vary widely based on area the station is in (e.g. downtown, residential) and proximity to other stations.

Differences in low traffic times between stations will allow for construction and maintenance crews to work on many sites concurrently. This data also means that routine maintenance can also be scheduled well ahead of time, for the month, day, and hour when the station will be most empty.

**Next Steps**
We'd love to develop a grand system-wide implementation plan for all 30 stations satisfying four goals:
- Minimize revenue losses
- Mitigate risk of disrupting the customer experience
- Minimize cost for getting the work done
- Get the work done in a timely manner

In order to be able to put this proposal together, we need to collect the following additional data from your end:
- Tasks to be done at each of the 30 subway stations
- Estimated time to complete each task
- Number of workers
- Pay
    - Regular and overtime pay structure
    - Parameters that trigger overtime pay

Each station is different and we will need to do data analysis on all 30 stations to find the lowest volume days and times (see figure 3). We will also take a look at any seasonal trends.
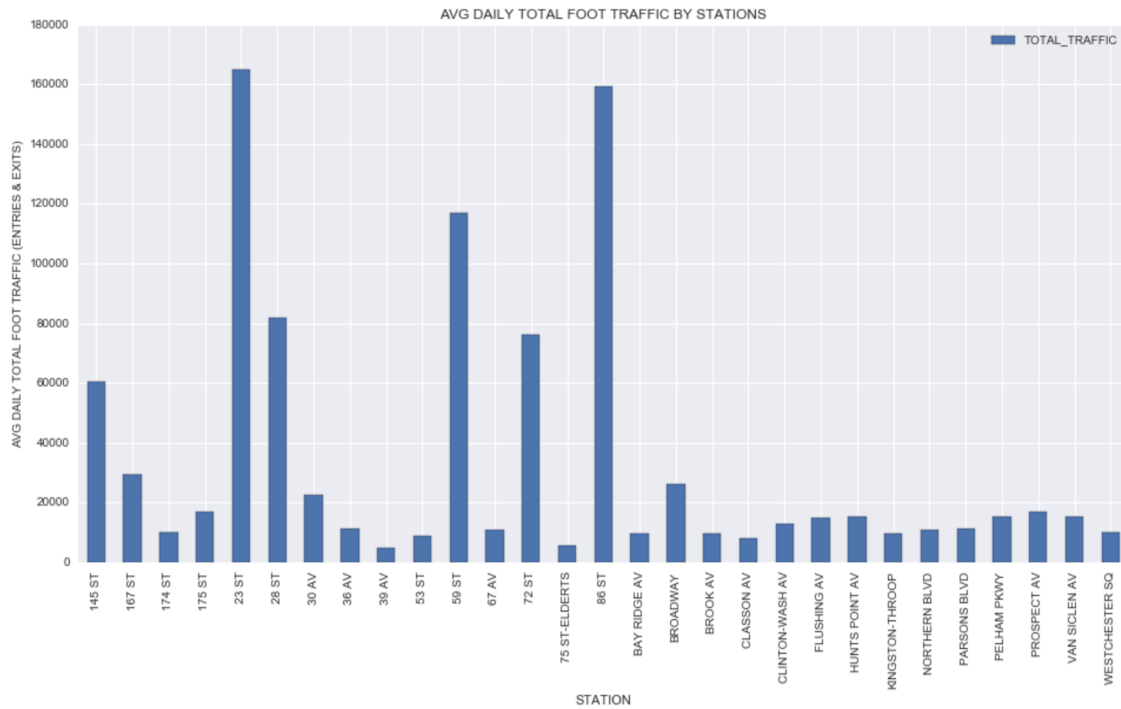
AVG DAILY TOTAL FOOT TRAFFIC BY STATIONS

Fig. 3: Foot Traffic of all 30 Stations with Planned Renovations

**Conclusion:**

We know we will be perfect partners for you in your quest to renew 30 subway stations by 2020 in the most efficient and cost-effective way, while keeping the stations open during the renovations.  We are excited to move forward with you on this project.