

MTA Turnstile Analysis



An exploratory data analysis done for WTWY International
by Alik Ziker



Objectives and Motivation

The motivation behind this EDA was to assist WTWY International and their survey teams, so that they can increase turnout for their annual gala and increase their potential donor base.

The objectives of this analysis were to:

1. Determine the subway station with the most foot traffic over the summer months using the most current data
2. Investigate whether the time of day and day of the week would influence ridership
3. Deliver a location, day of the week, and time of day that WTWY International should send their survey teams to maximize visibility



Datasets, Tools and Methods

-NYC turnstile data was provided by the MTA website:

<http://web.mta.info/developers/turnstile.html>

-Data was filtered, cleaned, aggregated, and visualized through a combination of resources including:





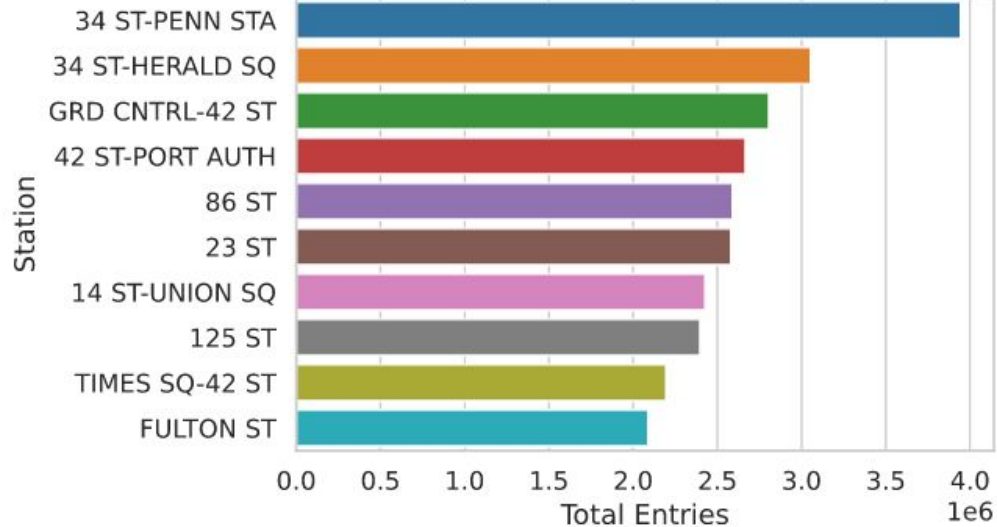
Datasets, Tools and Methods

Key assumptions:

- A single turnstile would not see more traffic than 1 person per second in any 24 hour period
- No duplicate entries were used, with rows labelled as recovery entries being eliminated in that situation
- Subway users jumping the turnstile (thus not being counted in our data) would not factor into which station sees the most traffic

Key Results

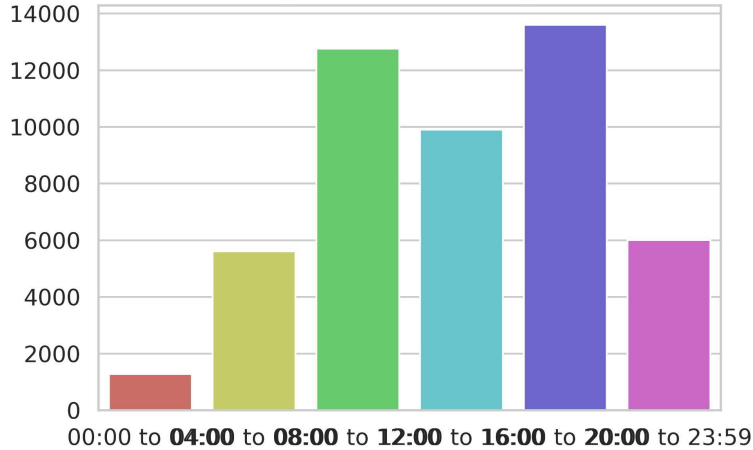
Busiest New York Subway Stations for Summer 2021



Key Results

Mean # of Entries

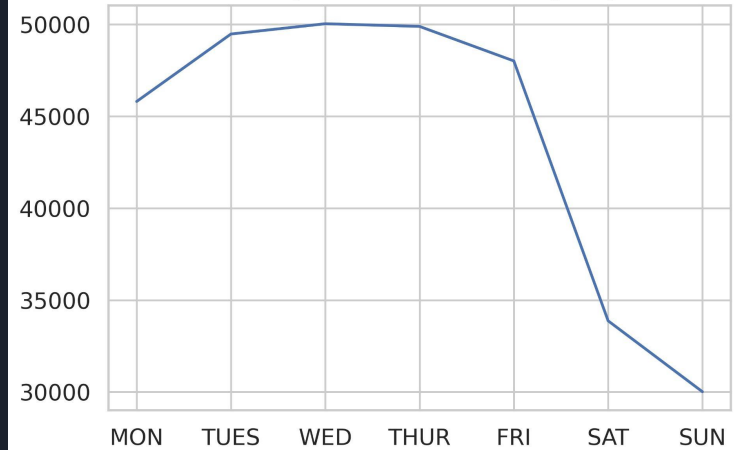
Wednesday at Penn ST Subway Turnstiles



Time of Day

Mean # of Entries

Weekly Traffic at Penn ST by Day



Day of Week

Recommendations for Team Placement





Conclusions

- Penn Station saw the highest volume of users from 5/29/21 - 8/28/21
- Specific to Penn Station, Wednesday from 4-8pm was the busiest time of the week, and thus would be an opportune time for survey teams to be deployed
- The ideal location for survey teams would be on the MTA connecting concourse, with one team placed by the A/C/E entrance, and the other near the 1/2/3 entrance

Possible Further Analysis

- Foot traffic as a function of square footage of station
- Including riders of other transportation (Amtrak, busses , etc.) in traffic considerations





Photo Acknowledgements

<https://www.amtrak.com/stations/nyp>

<http://web.mta.info/lirr/AlternateRoute/PennStation.htm>

https://en.wikipedia.org/wiki/New_York_City_Subway_map

Historical MTA Rider Data

| Annual Subway Ridership | | | | | | | | | | | |
|--|----|------|------------|------------|------------|------------|------------|------------|------------------|-----------|----|
| Station (alphabetical by borough) | * | Boro | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2019-2020 Change | 2020 Rank | |
| Times Sq-42 St (N,Q,R,W,S,1,2,3,7)/42 St (A,C,E) | | M | 66,359,208 | 64,531,511 | 64,815,739 | 65,060,656 | 65,020,294 | 20,341,240 | -44,679,054 | -68.7% | 1 |
| Grand Central-42 St (S,4,5,6,7) | | M | 46,737,564 | 46,121,509 | 44,928,488 | 45,207,849 | 45,745,700 | 13,162,826 | -32,582,874 | -71.2% | 2 |
| 34 St-Herald Sq (B,D,F,M,N,Q,R,W) | | M | 39,541,865 | 39,000,352 | 39,672,507 | 39,111,312 | 39,385,436 | 12,826,841 | -26,558,595 | -67.4% | 3 |
| 14 St-Union Sq (L,N,Q,R,W,4,5,6) | | M | 35,320,623 | 34,289,822 | 34,557,551 | 33,124,407 | 32,385,260 | 10,830,712 | -21,554,548 | -66.6% | 4 |
| Fulton St (A,C,J,Z,2,3,4,5) | | M | 21,671,684 | 25,162,937 | 26,838,473 | 27,719,115 | 27,715,365 | 8,855,302 | -18,860,063 | -68.0% | 5 |
| 34 St-Penn Station (1,2,3) | | M | 28,309,160 | 27,741,367 | 26,034,238 | 25,968,950 | 25,967,676 | 8,103,809 | -17,863,867 | -68.8% | 6 |
| 34 St-Penn Station (A,C,E) | | M | 26,147,434 | 25,183,869 | 24,366,500 | 24,857,456 | 25,631,364 | 8,010,472 | -17,620,892 | -68.7% | 7 |
| 59 St-Columbus Circle (A,B,C,D,1) | | M | 23,299,666 | 23,203,443 | 22,929,203 | 22,991,014 | 23,040,650 | 7,618,925 | -15,421,725 | -66.9% | 8 |
| 74-Broadway (7)/Jackson Hts-Roosevelt Av (E,F,M) | | Q | 17,224,537 | 17,301,839 | 17,095,073 | 16,994,358 | 17,077,862 | 7,523,538 | -9,554,324 | -55.9% | 9 |
| Flushing-Main St (7) | | Q | 19,082,391 | 19,257,879 | 18,746,832 | 17,799,862 | 17,568,837 | 6,944,923 | -10,623,914 | -60.5% | 10 |
| Lexington Av (N,R,W)/59 St (4,5,6) | | M | 21,407,792 | 21,000,635 | 17,888,188 | 16,955,204 | 16,760,813 | 6,273,480 | -10,487,333 | -62.6% | 11 |
| Chambers St (A,C)/WTC (E)/Park Pl (2,3)/Court St (4,5,6) | | M | 19,623,616 | 20,349,660 | 20,927,141 | 21,636,146 | 20,820,549 | 5,930,847 | -14,889,702 | -71.5% | 12 |
| 47-50 Sts-Rockefeller Center (B,D,F,M) | | M | 18,469,446 | 18,086,203 | 17,471,620 | 17,289,384 | 18,604,810 | 5,826,100 | -12,778,710 | -68.7% | 13 |
| Lexington Av-53 St (E,M)/51 St (6) | | M | 20,479,923 | 19,929,405 | 18,940,774 | 18,585,755 | 18,957,465 | 5,718,725 | -13,238,740 | -69.8% | 14 |
| Atlantic Av-Barclays Ctr (B,D,N,Q,R,2,3,4,5) | 13 | B | 13,690,678 | 13,818,168 | 13,571,093 | 13,807,282 | 13,939,794 | 5,474,265 | -8,465,529 | -60.7% | 15 |
| 42 St-Bryant Pk (B,D,F,M)/5 Av (7) | | M | 16,220,605 | 16,934,142 | 16,594,289 | 16,056,128 | 17,213,702 | 5,405,394 | -11,808,308 | -68.6% | 16 |
| 86 St (4,5,6) | | M | 20,890,828 | 20,337,593 | 14,277,369 | 13,486,510 | 13,537,308 | 5,155,496 | -8,381,812 | -61.9% | 17 |
| 14 St (F,M,1,2,3)/6 Av (L) | | M | 16,121,318 | 16,118,952 | 15,187,056 | 15,002,214 | 14,736,035 | 5,057,029 | -9,679,006 | -65.7% | 18 |
| Canal St (J,N,Q,R,W,Z,6) | | M | 15,094,135 | 15,274,896 | 16,285,516 | 15,995,877 | 15,861,864 | 4,881,373 | -10,980,491 | -69.2% | 19 |
| West 4 St-Washington Sq (A,B,C,D,E,F,M) | | M | 14,147,148 | 13,955,067 | 13,849,130 | 13,446,383 | 14,063,633 | 4,503,429 | -9,560,204 | -68.0% | 20 |
| 72 St (1,2,3) | | M | 13,341,361 | 13,257,766 | 12,749,746 | 12,879,887 | 12,379,560 | 4,498,641 | -7,880,919 | -63.7% | 21 |
| 14 St (A,C,E)/8 Av (L) | | M | 14,763,727 | 14,572,075 | 14,153,266 | 14,324,670 | 14,239,275 | 4,463,227 | -9,776,048 | -68.7% | 22 |
| 96 St (1,2,3) | | M | 13,008,596 | 12,700,397 | 11,948,981 | 11,702,401 | 11,628,887 | 4,293,386 | -7,335,501 | -63.1% | 23 |
| Jamaica Center-Parsons-Archer (E,J,Z) | | Q | 12,622,977 | 12,470,914 | 11,604,228 | 10,681,269 | 10,010,419 | 4,284,646 | -5,725,773 | -57.2% | 24 |
| Broadway-Lafayette St (B,D,F,M)/Bleecker St (6) | | M | 12,666,868 | 12,405,639 | 11,956,465 | 11,414,999 | 12,455,155 | 4,062,645 | -8,392,510 | -67.4% | 25 |