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When the *Going* Gets Tough

The complexity of commuting to Manhattan in a post-quarantine/pre-vaccine environment and potential solutions for knowledge companies in the short-term.

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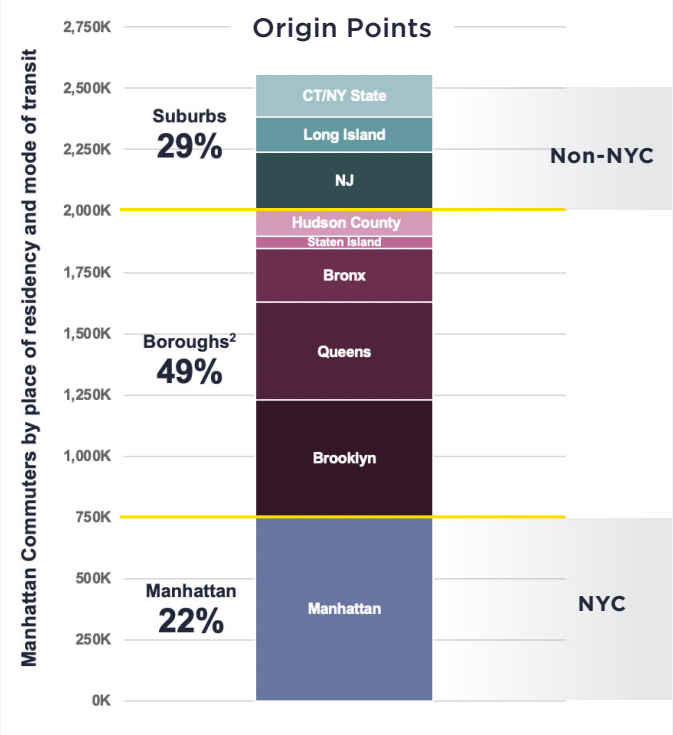
Early in the COVID-19 pandemic, the CDC made recommendations on practicing social distancing to reduce the spread of the virus. Those recommendations are now considered formal guidelines that should be adhered to by all and one of the core tenets is to maintain a 6-foot distance from others when outside your home ("6-ft. Halo").

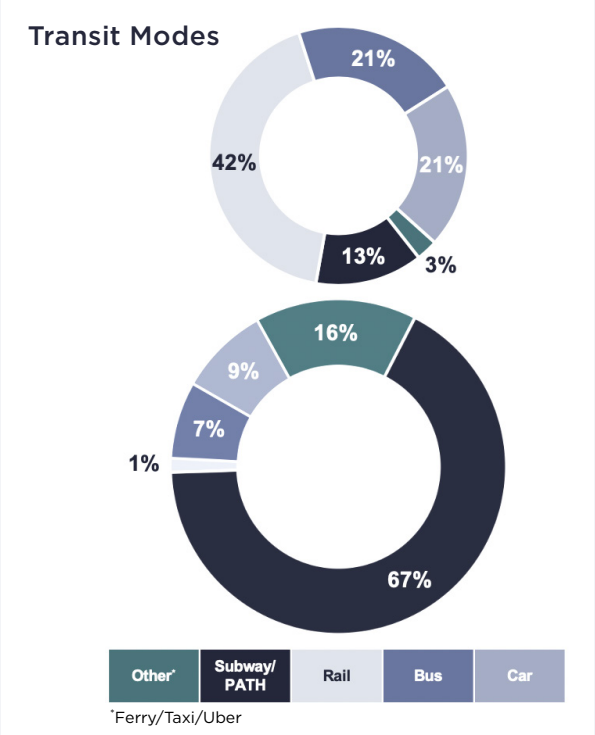
While this guideline feels almost normal in our personal lives as we infrequently leave our homes for essential services, it is fast becoming a critical building block for employers trying to navigate a "safe" and sustainable workplace for employees as they return to the office. Organizations are already exploring the possibility of short-term de-densification and/or dividing their workforce into "teams" to lessen proximity. However, while solving for the workspace is a crucial stepping stone in transitioning employees back to work safely, it begs one critical question that must be addressed first and foremost:

How can you maintain any social distance while commuting in a mass-transit dependent market such as Manhattan?

Of Manhattan's daily 2.6 million workers, 71% commute in from somewhere off the island. As a result, New York's vehicular bridges and tunnels commonly have hour-plus delays, and that's with only 12% of Manhattan workers commuting via car. 76% of Manhattan workers rely on subway/PATH, rail or bus as their main form of transportation, representing a population of close to 2 million people per day. The primary method of transit is the subway system, with approximately 1.3 million commuters daily, and likely another 400,000 using subway as a secondary mode (e.g., take the LIRR to Penn Station and ride E subway to office)[1]. Considering how these 1.7 million workers will commute in a manner that is compliant with social distancing recommendations rapidly pushes the subway system beyond capacity.

Manhattan Workers



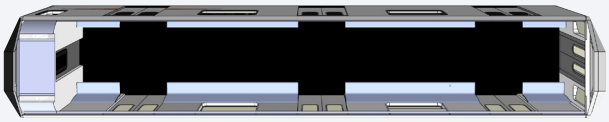


[2]We view Hudson County as the 6th borough of Manhattan based heavy subway (PATH) use and proximity

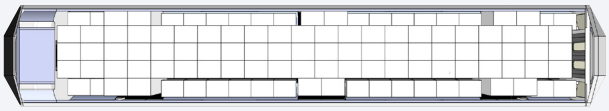
At max capacity on a subway car, you can be within 6 ft of 14 people at any one time, making mask adherence and product efficacy critical.

The New York subway system is a collection of different train lines that range in size (individual cab dimensions and number of cars per train vary). While a common subway train with 10 cars could previously move up to 2,000 people at one time, with social distancing, that number reduces to 200, which is the same as one single car at max capacity.[3] The graphic below shows that the maximum number of people you can fit within a subway car while maintaining 6 feet of distance is approximately 20 people, a mere 10% of the standard max capacity.[4]

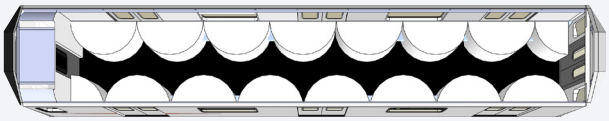
Empty R-142 Train



Peak - 176 to 188 People



Socially Distant - 20 to 24 People



Take, for instance, the L train that enters Manhattan via the 14th Street tunnel. The peak transit period for people using this line en route to Manhattan is between 8 a.m. and 9 a.m., with approximately 23,987 passengers traveling aboard 19 trains.[5] Assuming a perfectly even distribution of 157 people per car, this results in an individual being within 6 feet of slightly less than 9 people.[6] This density actually increases on the 2, 3, 4 and 5 express trains, where there are over 9 people within 6 feet.[7] Considering this is an evenly distributed estimate, the figures of density and proximity will be uncomfortably high for many commuters.

So, what can an organization do to protect employees?

First an important caveat – We (Savills) are not urban planners and are not attempting to instruct the MTA or New York on how to run the subway system. We are also not epidemiologists or doctors and cannot comment on practices designed to keep people safe. We are leading experts in commute and workforce strategy. Our goal is to demonstrate that a return to normalcy is going to put public transit commuters in close proximity and that companies will have to think creatively about their short-term location strategy to keep employees safe and happy. A lot of this planning is for pre-vaccine solutions as, long term, development and mass inoculation is likely the only path back to "normal."

For many organizations, continued expansion of work-from-home policies will persist during this pre-vaccine period. For others, infrastructure and regulatory reasons may force some employees back to the office far faster. The strategy will be more difficult for organizations that fall in between, where it isn't "essential" that employees return to the office, but where these companies value the power of in-person collaboration and the innovation it creates. These organizations face complex decisions regarding short-term location strategy as they weigh productivity and innovation against employee safety.[8]

Below, we explore four options that maintain social distancing by adjusting the commute demand curve and altering peak timing as well as increasing the number of trains. These examples use the L train entering Manhattan with a peak of 23,987 passengers between 8 a.m. and 9 a.m., and all aim to maintain 6 feet of distance between riders.[9]

Creating Distance on the Subway

	Option 1: Reduce # of Commuters	**Option 2:** Increase Train Frequency	**Option 3:** Change Workday	**Option 4:** Hybrid Approach
Scenario	If subway capacity is held constant and the number of riders is adjusted.	If the population of peak commuters is held constant but the number of trains can be increased.	If the MTA supports peak train frequency over an extended period, the duration of time to move peak commuters.	If commute times are staggered and trains run at peak frequency from 5-10 a.m.
Explanation	You need to reduce L 8-9 a.m. commuters to 22% of the normal total. (This result is similar across all major subway lines.)	You would need 149 L trains (1,192 train-cars) to arrive every 40 seconds from 8-9 a.m. There are only 212 R143 subway cars in service today.	It would take 14 hours to move L commuters to Manhattan and 15.25 hours to move 4 and 5 train commuters south of 86th street.	The spacing would allow for 40% of commuters to travel to work at a safe distance over the 5-hour morning window.[10]
Output	Limit to 1 in 5 current L commuters.	5.5 times the total number of L trains in an hour.	14 hours of sustained peak train frequency.	Elongating peak periods increases commuters to 40%.

A lot of the calculations above adhere to a 6-foot distance that will be nearly impossible to maintain, even with reduced commuter populations. These numbers assume everyone on the train is perfectly spaced out and does not account for how people enter or exit or even the logistics of maintaining the right scale on each train across every subway line. Options 2 and 3 are not only logistically complex, the additional cost of supporting extra trains is hard to envision, considering the MTA's increased financial burden of $8.5 billion based on decreased ridership.[11] The only practical option is to limit the number of commuters to keep New Yorkers safe.

Beyond the risk of actual infection is the mental/emotional impact of commuting in a post-quarantine/pre-vaccine period. Riding a subway, even if riders could be well-spaced, with 20 people all wearing masks and gloves, is not going to be a pleasant experience, and that assumes all riders comply. In other markets, these risks will simply lead to more employees driving, but for Manhattan workers the constraints of traffic in combination with the exorbitant costs and capacity limitations of parking make wide-scale driving impossible. Approximately 300,000 Manhattan workers use a car – if merely 1 in 7 mass transit users decided to drive to Manhattan, it would double the scale of Manhattan car commuters.

For companies looking for a short-term solution, a major determinant will be where current employees reside:

The distribution of an organization's workforce varies significantly by industry and prevalent occupation. Let's use an example of two employee groups, both in their 30s with bachelor's degree or higher:

- Financial analysts within the banking industry: **40% suburbs** and **7% Brooklyn**
- Music producers within the entertainment industry: **24% suburbs** and **26% Brooklyn**[12]

These residential distributions change by industry, occupation, place of birth and age. Even where a company is located in Manhattan will affect the residential patterns, with submarkets such as Penn Station and Downtown higher in concentration of New Jersey workers while Midtown South often has the largest population of Brooklyn workers.[13]

Understanding a company's current residential distribution will greatly inform short-term location strategy mitigation decisions. Below we have supplied two examples of companies with either a large suburban or borough population with a potential short-term mitigation option:

	Significant Suburban Population	High Boroughs Population
Scenario	The suburban office markets in locations such as Northern New Jersey have been hurt by urbanization trends with widespread availability rates of class A space of close to 25% and class A rents hovering around $30/sf.[14] Low cost of real estate, and high rate of car ownership and use, make logistics easier for getting employees to centralized location.	The boroughs are large geographic areas where vehicular traffic is already problematic with rush-hour highway speeds of 7 mph.[15] Exploring secondary borough sites or even Manhattan via bicycle, e-bike or other last-mile commute vehicles would greatly limit public-transit usage and avoid traffic.
Output	Leveraging suburban sites as landing spots to keep suburban commuters from entering Manhattan daily could lessen demand and enable employees to commute via automobile directly to an office. For companies that currently do not have these sites, but that do have large suburban populations, a potential short-term lease using limited capital could be exercised to get people back in an office environment before a vaccine is available.[16]	Companies with large residential populations in these areas could explore funding alternate commuting devices (pending liability concerns), especially those that are electric, if longer distances are required. The biggest constraint will be around storage for devices during the day, but bike rooms have become a staple of modern office buildings and there are many solutions that could be explored to find space to accommodate bikes and scooters.
Justifica-tions	Considering a population where an average employee is paid $75,000 and their value to the organization is 5 times compensation, even a 5% productivity bump associated with getting an employee back in the office would justify spending $20,000 per employee per year.	

These are just a few high-level ideas that could be adjusted, depending on how critical it is to get employees back in the office and on an organization's residential distribution. The scenarios listed above do not have to be definitive in the placement of an employee, as creating safe movement between sites of the course of weeks could be beneficial for knowledge transfer. For example, companies with existing sites may explore a waterfall approach, where roles currently located in suburban sites increase work from home to allow for landing space for Manhattan-working suburban commuters. Ultimately, adjacency analyses would need to be conducted to determine the right skills and functions to occupy the limited roles that commute into Manhattan. Alternatively, instead of investing in a short-term secondary office, providing funding for home-office solutions that enable an employee to more effectively work from home could also be explored.

What is clear is that our return to normal commute patterns when restrictions are lifted will be uncomfortable and potentially unsafe for employees. Organizations that can be proactive during this period may be able to leverage the benefits of in-person collaboration while also keeping employees safe, but it will require a well-thought-out plan to execute successfully.

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[1] *American Community Survey 2018.*

[2] *Ins and Outs of NYC Commuting.*

[3] *The most common subway car design is the R142 which is a length of 51.3ft and a width of 8.6ft. Netting out lost space there is roughly 375 sqft of space and a max capacity of 176-188 people per subway car (depending on layout). The R142 is assigned to the 2, 4 and 5 lines and has over 1,000 train-cars in service. With 1.99/sf per person at max capacity and a halo of 28sq/ft (6ft halo distance = 3ft radius, π*32) that equates to 14.2 people with 6 feet.*

[4] *3D Warehouse.*

[5] *NYMTC's Hub Bound Travel Data Report (2016).*

[6] *The L train uses the R143 train which is slightly larger than the R142 with dimensions of 60.21 by 9.77 creating a rough usable square footage of 500sq feet. With 157 people within 500 feet you get 3.18 per square foot or 8.8 people within a foot halo.*

[7] *The 2, 3, 4 and 5 trains most commonly leverage the R142 train with roughly 375sq feet of usable space.*

[8] *A wide-spread return to previous commute peaks could prove to be very dangerous, especially considering studies that point to the subway as a major driver in the devastating spread of the virus in New York City (MIT).*

[9] *The L line provides one of the most straightforward cases for commutation constraints in the subway system based on its single track/single tunnel route, being enabled with end to end CBTC (Computer Based Train Control), and having one of the shortest end-to-end transit times in the system.*

[10] *Running at peak capacity for an extended period could push past what the subway system can physically support.*

[11] *NY Times: 'The Worst Case Scenario' Subway faces its biggest crisis.*

[12] *Census.*

[13] *LEHD.*

[14] *Savills Northern NJ Office Report Q4-2019.*

[15] *Currently over 900,000 commuters use a car to reach a boroughs office. With no traffic conditions one can drive the 6.7 miles from after the Verrazano bridge to the Brooklyn Bridge via the BQE in about 8 minutes. On an average Tuesday morning at 8:30am this same drive can take up to 55 minutes with an average speed of 7mph.*

[16] *Additionally, suburban workers could be offered private transport to Manhattan of employees from dense and convenient residential pockets. This would limit those people from driving into the city and could create a safer way, at least in perception, to enter Manhattan surrounded by familiar faces.*