

Muhammad Chhaidan, JunYong Hu, and Danny Weng

Ms. Stephanie Jean-Stern

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Final Paper Outline

I. Introduction

- Background Point: Explain how impactful the subway has been since its beginning. New York City subway ridership has doubled since its modern-day through of 1977, when the subways carried 917.2 million riders, to the recent peak of nearly 1.8 billion in 2015. One commonality stands out among a myriad of contributors to the growth in subway ridership.
- Background point: Talk about the current discussions made by the MTA. So far there has been all talk and no actions according to a New Times article written in 2017. Subway leader, Mr. Byford said he could upgrade most of the subway system in the next ten years, which would improve reliability and allow more trains to run closer together. Mr. Byford has offered an overview about how he would accelerate the signal work. Since 2017, no work has started.
- Background point: Mention our proposal. What do we have in mind. We plan to look at the issues of significant interest namely: Increasing train speed, using carbon as a replacement to make trains lighter, upgrading railway tracks, signaling and increasing space to cater for more passengers.

A. Background Point 1:

When improving the train system, the first thing that comes to mind is speed. Increasing the speed of the trains in efficiency and efficient way can make it appear for giant companies like the MTA.

B. Background Point 2:

With a significant rise in delays in the New York subway system, it is time to find permanent solutions and not just do minor repair work. Issues of immediate concerns are fixing the railway tracks and signaling.

C. Background Point 3:

The New York subway has been under heavy loading pressure. However, people whoever takes subway can easy find the carrying pressure of each train is very different. If we can adjust the carrying pressure of each train, the overall system carrying efficiency will be greatly improved.

Topic Statement + Claim: This report aims at finding solutions to upgrade the current New York Subway system.

II. Results of Research**A. Main Section 1: Improving the Speed of the Trains using Better Materials****Paragraph 1 Topic:**

In general, improving the speed of trains is the most efficient way to improve the train system. For example, the A trains tops out on 55 mph and takes 8 mins to get from 59th

St to 125th St. By increasing the speed of the train, it is capable to cut the time it takes by half. Some of the issues with the trains that the MTA have are the materials that make the train the drag coefficient of the trains. Although MTA trains like the A are made from stainless steel, which is lighter than steel, they are not as strong. There are still better alternatives out there. Also, trains after being constructed are left with the bare metal exposed leading to a high coefficient of friction.

Paragraph 2 Topic:

To address the alternative to the stainless steel, a recommendation is retrofit the front of the trains with a new more aerodynamic one. Something as simple as making the front more smooth looking can make the train cut through the air in a more efficient way reducing the drag force. Also, the material of the front can be made with composite material which is stronger and lighter than steel. Lastly, a coating can be applied to the bare material to aid in reducing friction. This will allow the train to accelerate faster at increasing speed.

B. Main Section 2: Improving Railway tracks and Signalling

Paragraph 1 Topic:

New York Subway tracks have been built for more than fifty years. Since its existence, there have been no records to show that there have been efforts to rebuild a new system. Records only show upgrades. Upgrades are good but some new strategies can be implemented. One example of an upgrade that was done by the MTA was to seal leaks that were caused by water to prevent corrosion of the tracks. Sealing was done by chemical grouting. This would help but only it is for a period of time. There needs to be

something that will have a longer life span. One way to do this is by having a smooth track with less or no joints across the entire system. In addition, continuous welded rail would be better than having a weld in small pieces.

Paragraph 2 Topic:

Signaling is currently the number one issue that the MTA is faced with. Delays that occur on a regular basis are blamed on signal problems. This issue is quite complex because it requires serious discussions with MTA and the government. This is so because the signals require a constant and certain amount of power supply to work. Any interruptions in the power can result in shutdowns, and surges in power can destroy electrical equipment. What should be noted is that the MTA is dependent on public utilities for power supply.

C. Main Section 3: Improving Space and Efficiency

Paragraph 1 Topic:

The plight of the New York subway is impossible to reconstruct because it has a huge and complex subway system. Improving the carrying efficiency of trains has become a more feasible method. One of the options is improving the train carrying capacity by doubling the length of the train and adjust the train stop method. After guiding the passengers into the correct compartment, the trains are alternately standing in the station. When the train arrives at station A, it will open the door of the first half. When the train arrives at the next station it will open the door of the second half. This means half of the train will always skip a station. Doubling the length of the train means that the carrying capacity is doubled directly. This method does not require extensive modifications to the

station and rails. All that needs to be done is to use the appropriate smart equipment on the train. This circumvented the difficulty of extending the New York subway.

Paragraph 2 Topic:

According to a Spectrum News article published by Jose Martinez, he mentions that: “It's going to be harder to find a seat on one of the city's busiest subway lines: the MTA has begun removing them from some trains. NY1 Transit Reporter Jose Martinez has the exclusive details”. Removing trains should not be a possible solution to provide adequate space. The MTA should be looking at alternatives. The second solution to increase space could be to make the space of the train more flexible. This will improve space utilization. One of the options is collecting passenger flow information by intelligently modifying the train compartment. Guide passengers into the corresponding compartment. Increase or decrease the number of train cars by analyzing passenger flow. Separate the corresponding cars at the corresponding stations. The other cars continue to move forward. This classification compartment method, greatly reducing the time to stop. In other words, this method improves the carrying capacity of the subway.

Conclusion

A. Provide a brief recap of the report:

Upgrading the current New York Subway system is an important challenge and frustration for many. Many years have passed and there have been empty promises. Some wonder if the MTA has an actual plan to upgrade the current system. However,

- as technology advances and with the introduction of new materials. It allows big companies like the MTA to improve their trains without scraping their old trains and just improve their older trains by adding a new aerodynamic front and a drag reduction coating.
- Signaling is currently the number one issue that the MTA is faced with. Delays that occur on a regular basis are blamed on signal problems. As a result, this issue should be given priority.
- Space has always been an issue. There is always a competition between passengers to see who will get an empty seat first. How can this issue be resolved? The answer is not to eliminate seats as proposed by the MTA but instead the length of trains can be doubled.

B. Discuss the implications of the topic; Why is it important?

This topic is important because upgrade to the current subway system could resolve the countless number of tensions between the MTA and passengers. For example, an upgrade to the current system could cause a significant decrease in the amount of time a train takes to reach from one point to the next. This is due to the proposed increase in speed.

C. What should your audience consider after reading the report?

Imagine one morning walking into a subway train and instead of taking an hour and a half to reach the City College of New York, the time is reduced to forty-five minutes with no delays. Upgrade to the current subway system can make this possible and a good relationship will be built between the MTA and customers. There should not be a job lost because of delays

every day, instead, the subway train system should be one that people desire to take. The word “HATE” should be erased from their minds.

D. What questions have been left unanswered in your research?

Our research is not perfect, however, we will look at prominent issues that cause delays in the New York Subway system and find practical solutions. Some solutions might be impossible but we want to try to make it work. If it works then we will have a long term solution rather than a short term.