

FasterForward One Step Further with the MTA

Prepared for: Larry Sharpe for NY Governor

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EXECUTIVE SUMMARY

Objective

To provide greater focus on the MTA's ability to service customers while simultaneously increasing capacity.

Goals

- 1) Support the Byford Plan and limit wasteful capital spending by instituting a five member board to prevent scope creep on large capital projects.
- 2) Increase subway system capacity while maintaining a safe operating safety culture.
- 3) Allow the MTA to economize its business practices in order to pay its debts, pensions, operations, and maintenance costs.
- 4) Retain system working knowledge and workforce by providing progression plans for capital expenditures.

Some history

For more than a century the New York City subways have operated as a mostly safe and reliable transportation method for its residents, visitors and world leaders alike. In its conception, the subway system was comprised of a city-owned segment which began operation in 1932 as well as two privately owned companies which eventually merged. The system was brought under the control of the New York City Transit Authority in 1953 along with busses and streetcars and, in 1967, was rechristened the MTA.

Fares were initially set at a nickel which was sufficient enough to fund both the operation and expansion of the subways. Despite inflation, which should have led to increases in fares, the city's government opposed allowing operators to increase their rates accordingly. After unification in 1932, the fare remained at a nickel until 1948 when it was doubled to a dime – a necessary move considering inflation had eliminated the system's capacity for self-funding. Fares continued to rise with inflation as well as construction costs for expansion. Currently, a one-time fare on the system is \$2.62 cents which is more than double what the inflation adjusted nickel fare was in 1913, \$1.27. (*Bureau of Labor Statistics*). Some of this differential can be accredited to the operation of a larger system overall.

Two of the three predecessor systems, Brooklyn-Manhattan Transit Corporation (BMT) and Independent Subway System (IND) used similar specifications for train dimensions and power. Both of these systems ran on 600V of power and used cars that are 10 feet wide. The third system, called the Interborough Rapid Transit Company (IRT) used a 625V power system and cars that were 8 feet 8

inches wide. Car lengths varied by company with BMT and IRT systems using an average 50 foot length while the IND system used 60 foot. (*MTA Engineering drawings pictured on www.nycsubway.org*). System differences are maintained to this day with the old IRT lines retaining numbers while BMT and IND lines use letters.

Mass transit ridership peaked in the 1950s and the system expansion was stymied as Robert Moses opposed mass transit expansion in favor of automobiles. (*Caro, 1974*). To stem operations costs, the city closed and tore down elevated subway lines which consolidated passenger traffic to the underground lines; however, the system continued to hemorrhage money as operating costs increased and ridership declined.

In an effort to overhaul and renew the system, several aggressive plans were proposed in 1968 and into the '70's. The initial attempt, "Program for Action", proposed several expansions including the long delayed 2nd Avenue line. This line, originally planned to begin operation in the 1920s, had been halted due to the market crash of 1929 and the Great Depression that ensued.

Although the "Program for Action" reported success at the five-year mark in 1973, it had several major issues. The program was capital expenditure heavy and included many items that were not in the original plan that was published in 1968. In spite of lacking plans for restorative or preventative maintenance, the "Program" was deemed so successful, that the city added additional goals and expenditures in 1973, including a requirement for all cars to have air conditioning by 1980 (*www.nycsubway.org*).

In 1973, graffiti on rail cars exploded and the MTA continued to lack funds or a have a comparable answer to removing spray paint from the cars. This led to further declines in ridership as the subway and mass transit were seen as unsafe. The following year, the MTA affirmed that the "Program" would continue despite warnings from the bond market that the NYC debt was unwelcome and financial troubles could arise.

New York City's financial crisis was in full swing and, in 1975, debt for many of the City's agencies was considered unmarketable, including the MTA. Work on the tunnel for the Second Avenue line was halted and restarted after the crisis and, ultimately, many lines were consolidated and train lengths were cut indiscriminately with no regard to traffic loads. (*Feinman, 2012*)

Subway fares in the 1970s continued to be a political hot button issue as fares were considered too high for low-income riders, yet too low to support necessary repairs. In the late 1970s, Federal funds were used to bring about several system improvements, which resulted in an increase in ridership by 1978. Crime also rose in conjunction with this increased passenger count and reports from this era indicated over 250 felonies a day were being committed on the MTA in 1979. (*Feinman, 2012*) Some of this is attributable to the NY Transit Police, which was a significantly older and understaffed

organization that operated independently from the NYPD. The system safety improved dramatically in the 1990s after they increased staff for the transit force and integrated it into the NYPD in 1995.

The last decade

Revenues have continually increased for the MTA over the past 10 years for both fares and tolls.

Revenues Actual (\$M)	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Farebox	4,241	4,350	4,586	4,999	5,079	5,507	5,709	5,961	6,050	6,172
Toll	1,274	1,332	1,417	1,502	1,491	1,645	1,676	1,809	1,870	1,912
Other	449	461	491	510	564	754	682	689	688	653
Capex reimburs	-	-	-	-	-	-	-	-	-	-
Total revenues	5,964	6,143	6,494	7,011	7,134	7,906	8,067	8,459	8,608	8,737

**Source: MTA budgets 2009 to 2018*

Expenditures have continually exceeded revenues over the past 10 years with the “gap” between revenues and expenditures widening

Expenses Actual (\$M)	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Labor expenses	6,652	6,913	6,933	7,236	7,663	7,999	8,581	8,733	9,234	9,373
Non-labor Expense	2,553	2,611	2,636	2,704	2,533	2,894	3,008	3,101	3,169	3,503
Depreciation & Pensions	3,182	3,083	3,167	3,785	3,960	4,108	4,322	3,544	3,798	4,020
Total Ops Liability w/o Adj.	12,373	12,594	12,717	13,722	14,216	15,046	15,956	15,414	16,252	16,947
Net deficit before Subsidies & Debt Svc	(6,410)	(6,451)	(6,222)	(6,711)	(7,082)	(7,140)	(7,889)	(6,955)	(7,644)	(8,210)

**Source: MTA budgets 2009 to 2018*

Excluding the past year, net deficits narrowed over the previous 10 years thanks to increased subsidies. The 2nd Avenue Subway increased borrowing and, as a result, were able to show growth in their net surplus. The adjustment for “Conversion To Cash for Non-Cash Liabilities” was changed in 2010 from below the “Net Deficit after Subsidies and Debt Service” line to be above the line for Debt Service. This reflects a change in how items such as unused balances on MetroCards are accounted for on the income statement.

Actuals (\$M)	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Dedicated taxes and NY/Local Subsidies	4,078	4,137	4,914	5,151	5,492	5,898	6,375	6,596	6,666	6,416
Net deficit after Subsidies	(2,332)	(2,314)	(1,308)	(1,560)	(1,590)	(1,242)	(1,514)	(359)	(978)	(1,794)
Debt Service (excl service contract bond)	(1,516)	(1,404)	(1,781)	(1,934)	(2,058)	(2,299)	(2,249)	2,373	2,459	2,525
Net deficit after Debt Servicing	(3,848)	(3,718)	(3,089)	(3,494)	(3,648)	(3,541)	(3,763)	2,014	1,481	731
Conversion to cash: Non-Cash Liability adj	3182	3083	3166	3785	3959	4109	4322	-3543	-3798	-4021
Net deficit after Non-Cash Liabilities	(666)	(635)	77	291	311	568	559	(1,529)	(2,317)	(3,290)

Source: MTA Budgets 2009 to 2018

The system uses debt to make itself appear more profitable through net cash balances at the end of the statement largely being positive.

	2009	2009	2010	2011	2012	2013	2014	2015	2016	2017
Conversion to Cash Basis: GASB acct	-56	-54	-67	-38	-90	-86	-50	0	0	0
Conversion to Cash Basis: Other	490	556	20	-117	-290	-396	-496	-661	-594	173
Cash Balance before prior year	-232	-133	30	137	-68	86	15	150	-232	-127
Adjustments	0	0	0	0	0	0	0	0	0	0
Prior Year Carry-over	495	263	130	160	297	229	314	330	480	248
Net Cash balance	263	130	160	297	229	314	329	480	248	121

The Byford Plan (aka “Fast Forward”)

The new current corporate plan for the MTA entitled “Fast Forward: The Plan to Modernize NYCT”, or, more commonly known as the Byford Plan, involves huge capital expenditures. Current estimates are between \$19 to \$43 *billion* dollars. This plan does not provide estimates or proposals for new sources of funding for the expenditures.

With some efforts already underway in 2018, the Byford Plan places much of its focus on modernization of subway and transit infrastructure. These measures include replacing signal components, cleaning drainage systems, replacing friction pads to prevent broken rails, and installing new continuous welded rail. The plan also encouraged changing bus routes to better serve customers, making subway attendants visible, and improving HR processes within the MTA.

The Byford Plan also calls out for revamping 1950’s bus routes that mirror streetcar routes which were rapidly going extinct. In 2016 the lines were re-evaluated in the way of declining ridership and some buses were traveling at an average of 2 miles *per hour* along some routes. A target date to complete this redesign is set for 2021. (*Village Voice*, 4/25/18)

A request to introduce a new method of fare payment requiring the use of RFID cards, similar to those used in Europe, has also been included. On October 25, 2017, the MTA awarded Cubic Transportation Systems a contract to replace the MetroCard with a non-contact fare payment system. (*Cubic Corp. Press Release*)

Additional Initiatives

Governor Cuomo announced an enhanced subway cars and an Enhanced Station initiative. (*NY Governor Press Release*, 7/18/16). With a cost of \$932 million, the plan offered open ended subway cars to allow for additional passenger capacity, digital reader boards and wider car doors. For the Enhanced Station initiative, improved wayfinding, digital boards including countdown clocks and USB charging outlets had also been proposed.

In 2019, the Carnarsie tunnel will be closed to allow for 18 months of repair work. (*MTA Press Release, 7/25/16*) This tunnel, which serves the L train, is one of the most heavily used crossings into Manhattan. In order to accommodate passengers across the East River, the MTA will use busses and ferries. (*NYT, 4/3/18*)

The L train plan, released on July 20, 2018, required 79% of the existing passengers from the L train to take other subway systems: 32% of those passengers were reassigned to the J/M/Z trains, 35% to the G trains, 26% E/M routes and 7 trains, and the remaining 12% to the A/C lines (*MTA, 7/20/18*). Approximately 17% of the passengers are expected to use a rapid transit bus routes and the remaining 4% will most likely use a new Brooklyn ferry. (*MTA*)

A path forward

Over two dozen recommendations have been developed to help Governor Sharpe improve service, reduce disruptions, and put the MTA on a path to profitability. We will first review the large-scale improvements we are recommending, including:

- Increase subway system capacity
- Institute a Project Scope Control Board
- Retain system working knowledge and provide workforce progression plans for capital projects.

After reviewing these large-scale improvements, we will examine a number of more modest recommendations, including:

- Communications-Based Train Controls
- the Second Avenue Subway
- the L Line shutdown
- Various project & process changes

Then we will examine funding, and a number of other recommendations.

- New Sources of Funding
- A new line of business -- Freight
- Additional Recommendations

Increasing subway system capacity while maintaining a safe operating culture.

The plans to shutdown the L train in 2019 has caused a large uproar in Brooklyn and Manhattan. It requires new ferry and bus routes and largely reduce 14th Street to bus traffic only. The implementation of Communications-based train controls (CBTC) on the 7 has been fraught with numerous delays and errors. That particular train has been shut down for short periods of time to work on the system. The Byford project aims to increase subway system capacity safely by allowing

further automation and being able to rapidly respond to trains if they are traveling too closely to one another. The record for one-day passenger traffic on the system was set in the 1940s and the one year count record was met in the following decade. These systems were largely run by people communicating over radio with magnetic boards and manual switches. Modern technology should allow the MTA to operate the subway system safely and at similar capacities as these earlier times.

We have identified two key issues that are holding the MTA back:

- First, subway car operators received superior training in comparison to the standards of today. Much of the mechanical and technical training was removed from their programs in the early 1990s as a cost saving measure. Although this worked in the short term, it resulted in an MTA workforce largely unfamiliar with the mechanical and electrical components of the system. If workers are capable of identifying issues on rolling stock without taking outages or assisting work crews with troubleshooting, the MTA has a better chance of keeping trains moving as well as reducing outages.
- The other major consideration is signal “grade time”, the time allotted for a driver to pass the next signal without triggering a fail safe interlock. This grade time is often poorly calibrated, causing signals to take longer to clear, which ultimately leads to MTA staff being trained at less than optimal speeds. In addition to acknowledging the major overhaul necessary to improve the signaling system, it should also be noted that the MTA does a poor job maintaining calibration on the system they have. This is a critical preventative maintenance item that ensures the subway systems operate smoothly. The MTA should give this work a higher priority on overnight maintenance work lists than it currently does.

Institute a Project Scope Control Board

As previously mentioned, in 1904 the subway fare was originally set at a nickel. That same nickel is worth \$1.27 today once adjusted for inflation and is actually about half the cost of a current one-time ride. The subway in 1904 was an entirely private enterprise with no subsidies or taxes helping pay for station improvements, rolling stock or system expansion. While it would be nice to return to that circumstance, it is incredibly unlikely due to the massive debt and pension overhang that has been created.

Debt servicing and pension payments continue to grow and, subsequently, take more money out of the MTA. This includes the debt assumed to facilitate Phase 1 of the Second Avenue subway. It is highly likely that this debt servicing will eventually crush the MTA’s finances without growth in passenger traffic. Growth is expected to be slow as the organization continues to experience severe delays in

service and some lines that were to be equipped with CBTC systems have yet to be upgraded accordingly.

The MTA must consider using design-build contracts for major capital projects. A typical baseline estimate for design-build project is similar to a design-bid-build project of similar size and scope. Much of the savings occurs in the frequency of change orders and the costs associated with them. These will be lower as the contractor will know the majority of project work upfront and can bring in their team of construction experts for constructability reviews in the preliminary phases of design. Projects managed in this fashion will foster more interaction between client and contractor as there is less need to make project tasks confidential for bidding purposes.

The institution of a Project Scope Control Board will reduce costs by eliminating quick off-hand decisions that could expand the project scope. It will also demand full documentation of additions including estimates for budget, time to completion, and additional features or goals of the scope addition. This process is currently lacking in both MTA projects of the distant past and those undertaken more recently.

Ideally, this board would include the Mayor, Governor, Attorney General, and both Comptrollers. A “No” vote from both Comptrollers will automatically override the remaining votes. This will ensure fiscal responsibility and fight the unnecessary scope expansions that lead to higher costs.

Retain system working knowledge and provide workforce progression plans for capital projects.

Project managers and engineers are currently hired specifically for large capital projects. Although most of these individuals come from within the MTA, it is rare for them to return to their previous department upon completion of the project. Project managers and engineers often leave the MTA to work for contracting firms that provide services to the organization. These services are billed back to the MTA at much higher rates and salaries than when the contractor was an actual MTA employee. This common scenario has proven detrimental to MTA’s ability to complete large capital projects on time and on budget.

In order to encourage retention of these individuals, we recommend that hiring contracts stipulate bonuses be paid following the successful completion of their project. If incentive bonuses are paid over time but have claw-back provisions, the contractor firm will simply pay the claw-back as part of the cost of doing business. The claw-back payment is then rolled up into the firm’s overhead charge that it bills to the MTA. This makes it possible for the MTA to pay the same incentive bonus twice—once to the employee and once to the contractor firm. Choosing to withhold payment until the end eliminates this double payment and incentivises the employee to remain with the MTA until the end of the project.

A good project manager, project engineer or project inspector is not necessarily one with a college degree. Project management requires a number of skills that may also be learned through the trades and the opportunity to participate directly in capital projects. A personnel development plan should be made available to individuals working on capital construction crews so they can receive project management training and ultimately have the opportunity to promote to inspector, engineer or manager. A project manager who has risen through the ranks of a construction crew would have a good grasp of labor relations, project task durations and crew size projections. It is unclear if this pathway exists today but we believe it could greatly help employee retention as well.

Communication-based Train Communications

The Byford Plan specifically calls for a communications-based train control (CBTC) system that uses state-of-the-art signals and modernized interlocks. This is to allow trains to run closer together with better reliability to increase subway capacity.

Recommendation: All new CBTC signal technology must be backwards compatible with the systems already in place.

Recommendation: If there is funding allocated for lines already outfitted with CBTC systems, it should be shifted to lines in the Bronx and Upper West Side of Manhattan for the second 5-year plan.

Recommendation: The Byford Plan called for ultra-wideband technology that would require the US Federal Communications Commission (FCC) to assign specific bandwidths to train or transit signaling. Due to the uncertainty surrounding whether or not the FCC will comply with such a request, the project should proceed using wired technologies.

Recommendation: Use the lessons learned on the 7 Train to perform upgrades to the CBTC system and switches on the rest of the lines.

Recommendation: Ensure that the MTA's buses used for all new routes can accommodate disabled passengers, particularly in the winter.

Recommendation: Require MTA to communicate future road closure plans three months in advance.

Recommendation: Based on the current executive summary for expenditures, we propose that all funding raised by the new fare-for-hire tax be used only on qualified Byford Plan (Subway Action Plan) projects. We propose the Cuomo enhancement projects be cancelled and the funds allocated to providing subway accessibility for disabled passengers. These taxes and subsidies were earmarked for subway improvements and, as such, should only be used for subway improvements. Ancillary projects, IT, and maintenance projects should be separately funded with operations dollars.

Recommendations concerning the Second Avenue Subway

Overages were common during the most recent term of the Second Avenue subway construction. The project was budgeted for \$3.8 billion and was completed at \$5.5 billion- \$1.7 billion (44.8%) over budget and 5 years late. In its early stages, the project received \$1.3 billion in subsidies from the federal government, who then requested the MTA push the completion back another year, to 2014. The Cuomo administration engaged in a number of vanity projects which contributed to increased costs without providing better service for customers or conditions for workers. (*NYT, 2018*)

The Regional Plan Association, a regional planning think tank, faulted the MTA for failing to plan appropriately for Phase 2 of construction. One such example can be seen in the choice to dismantle and ship the boring machine used for Phase 1 to Indianapolis upon completion of the Phase 1 tunnel. (*MTA PR, 7/25/12*) The *New York Times* reported Phase 2 staffing had just began- a year after Phase 1 was put into service. Preliminary design work for Phase 2 will be completed by the end of 2018 with tunneling and construction contracts put up for bidding by the end of 2019. At the end of this, MTA reports the early project estimate is \$6 billion dollars with completion possible in 2029. In December of 2016, when he was asked for a timeframe relative to the completion of Phase 2, Cuomo responded with, "You are unbelievable!". (*Kate Hinds, 12/23/16*)

Recommendation: Require MTA to plan fluidly for success. A go / no-go gate must be established during the end design of Phase 2 to proceed with Phase 3 and prospectively Phase 4. This must be transparent *and* have clear statistics with regards to revenue prior to approving Phase 2 for construction.

Although the Second Avenue subway can provide better transit alternatives on the East Side, the costs are astronomical when compared to other subways around the world. As a *New York Times* investigation found, many projects have too much manpower assigned due to union negotiations between contracting firms and the union themselves. The MTA is only responsible for funding and management of scope.

It is impossible to break personnel connections between MTA, the three main construction contracting firms, and its many unions. Moreover, it is wholly possible to slow the revolving door between a position at MTA and contract firms through hiring practices and contract terms. The MTA should strive to hire project engineers and project managers who want to do large capital projects to better New Yorker's lives rather than to capture fringe benefits and larger paychecks at contracting firms.

Recommendation: Toughen contract terms for hiring project engineers, project managers and portfolio managers when they are assigned to work on capital expenditure projects over \$500 million dollars. Bonuses and/or salary increases should only be paid upon project completion.

Building a subway underneath buildings and utilities with little knowledge of above grade structures is difficult. In his “Lessons Learned” presentation to CityLaw, Dr. Michael Horodniceanu, President of MTA Capital Construction, presented several take-aways from Phase 1 of the Second Avenue project. (*CityLaw Presentation, 4/6/17*) One particular recommendation made by Horodniceanu, was to perform a full survey of the areas being impacted by construction while in the planning stages; one that included both above and below grade infrastructure.

Recommendation: Large capital projects should be fully surveyed prior to any design work being performed. This includes underground utilities, MTA facilities, all aboveground structures and future development plans from the City, property owners and utilities.

This project also suffered from over-optimism in its beginning stages because alternative plans were not investigated and developed. The risks taken led to major issues and easy solutions were not readily available and a recommendation for a design-construct contract rather than design-bid-build was given. A design-construct contract is one in which the contractor’s scope of work includes both the design and construction of the project. An optimal situation when compared to the design-bid-build contract which allows one contractor to design the project while a completely different contractor may draft the construction plan.

Recommendation: The MTA should strongly consider design-construct contracts for megaprojects. This method can reduce change orders as most information is discovered by both client and contractor at the same time. Change orders are minimized during construction as the construction crews have access to and the ability to impact the design plans early on which provides the opportunity to fully assess the constructability prior to picking up the first tool.

The MTA has started preliminary surveys of the Phase 2 route. Considering this route has been in place for over 100 years, one would expect the MTA to have good knowledge of the above ground buildings and buried utilities. Unfortunately, when this system was originally built, this was not done and there is not enough accurate information available, which has stalled the work Phase 2 until 2018.

Recommendation: The MTA preliminary survey of the Phase 3 route should commence once a “go” recommendation is received from previously proposed go/no-go meeting in the prior Phase 2. Some of this work can be performed in-house by MTA engineers and construction staff without additional direct funding of Phase 3 or 4. Aboveground buildings on the routes could be surveyed in conjunction with the already approved bus rerouting project.

Recommendations concerning the L Line shutdown

In April 2019, for a period of 18 month, the L Line will be shut down to facilitate a massive repair project in the Canarsie Tunnel to address damage from hurricane Sandy in 2012. This project is budgeted for \$477 million and is funded by Federal Emergency Management Agency (FEMA)

derived relief funds approved in 2013. The current plan includes extending trains on alternate subway routes which will turn 14th Street into a 17 hour busway (*NY Post* 6/25/18). Also proposed are additional bike lanes, pedestrian areas, and an MTA ferry between Manhattan and Brooklyn.

Recommendation: Ensure that the MTA has fully surveyed the route in Brooklyn and Manhattan and assure they can accommodate large bus transits for turn radiuses and property damage. MTA should have a contingency plan in place for larger numbers of smaller busses or the double decker pilot program busses to be used in lieu of longer busses. The MTA planned ahead by starting the bus routes on January 9, 2019, which will allow for critical testing prior to the 2019-20 winter, when the tunnel will be out of service. (*curbed.com* 7/24/17) Considering the MTA plans to run buses every 2.5 minutes during morning rush and 3.5 minutes during evening rush, they must analyze the bottleneck created, which will require 80 buses an hour to cross the Williamsburg Bridge.

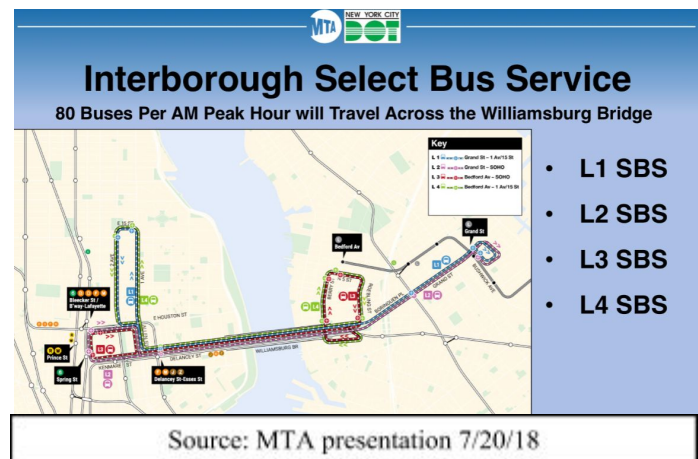
Recommendation: MTA should hold a “Lessons Learned” meeting in late March to evaluate bus route services prior to the Canarsie Tunnel shutdown in April. Recommended changes should be communicated and implemented prior to the Tunnel shutdown in late April 2019.

Recommendation: Follow through on the cost savings measures outlined for future years in 2020 through 2022 in the 2019 proposed budget.

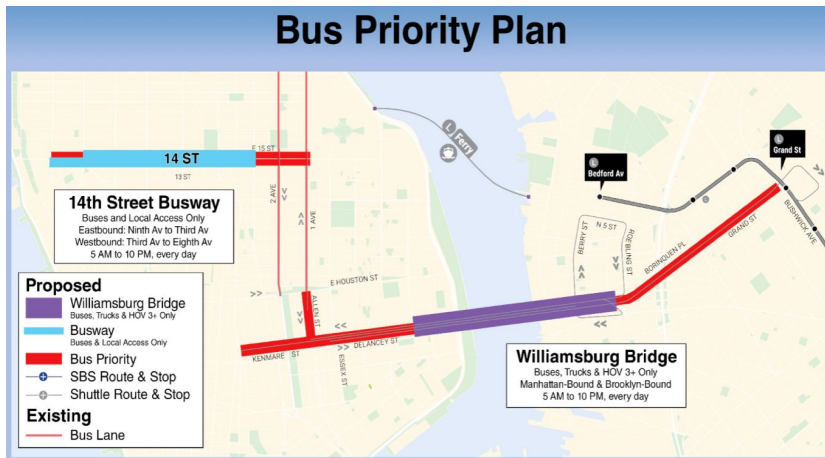
Increased reliability on the 7 and L trains should provide some additional dollars for funding other projects. A cost savings plan should be forced onto the LIRR to narrow loss margins to bring them closer to the North-Metro margin losses. This will increase revenues by \$50 to \$70 million per year and assist with payback on the signal upgrades.

Recommendation: The MTA should collaborate with union representatives to define the size of crews used by contractors instead of leaving the task solely up to the contractors. Contractors will be encouraged to have clearly defined crew sizes and roles and responsibilities assigned for each worker which will result in better bids. Estimators can factor in each task as well as the person(s) required to perform it.

Recommendation: Accelerate bus route and stop location changes, a process must be completed prior to beginning significant signal work on the subway. This plan requires busses to bear the brunt of passenger traffic from reduced subway operations and completing these changes by the end of 2020



will accommodate the signal work on the first 5-year plan subways. This signal work is currently slated to start no earlier than 2020.



Source: MTA presentation 7/20/18

Recommendation: Begin a standardized process for converting streets to busways to accommodate the Byford Plan and enable changing signals, technology upgrades and other necessary underground work in Manhattan.

Recommendation: Eliminate renovations at the Port Authority Bus Terminal unless it is absolutely necessary to accommodate double decker busses if they are selected for use by the MTA. The bus terminal is currently operating at sufficient capacity for bus traffic with minimal disruption to traffic flows.

On October 25, 2017, Cubic Transportation Systems (CTS) was awarded a contract by MTA to replace the MetroCard system. The CTS system is currently used in London for their fare payment transactions.

Recommendation: Fully commit to the non-contact method of fare payment as awarded to Cubic in 2017. This non-contact method should be designed with a coordinating driver display and beta-tested prior to purchasing new rolling stock in large numbers.

Project & Process Changes

Recommendation: Large capital projects should be fully surveyed prior to any infrastructure design work being contracted. This will include underground utilities, MTA facilities, all aboveground structures as well as future development plans from the City, private property owners and utility companies.

Recommendation: Require MTA to plan for success by establishing go / no-go gates to be reviewed during the end design of Phase 2 to proceed with Phase 3 and prospectively Phase 4. This process will be transparent and have clear, publicly available statistics with regards to revenue to approve Phase 2 for construction.

Recommendation: Toughen contract terms for hiring project engineers, project managers and portfolio managers when they are assigned to work on capital expenditure projects over 500 million dollars. As previously mentioned, bonuses and/or salary increases will only be paid upon project completion.

Recommendation: Follow new scheduling plans to abbreviate the time necessary to complete the repairs and upgrades; this will also bring down labor costs. (App. III)

Engineering headcount irregularities

In 2018 the MTA plans to spend \$250 million on the Byford Plan and early projections are \$192 million for 2019 and \$150 million in subsequent years. Currently, the plan projects the MTA will operate at a cash neutral position for 2018 and 2019, but likely face deficits starting in 2020 through 2022. (*MTA 2019 Preliminary Budget, pg. I-6*) They have failed to forecast revenue growth in subway fares, a measure typically taken to be conservative with future demands, due to the direct relationship revenue increases have with increased operating costs, and additional overtime.

The 2018 budget was approved with an unplanned increase in headcount by 25 engineers; this was in opposition to the 2016 budget which outlined headcounts to remain flat through 2019. All of the new engineers are assigned to general capital projects (MTACC), a department that serves as a catch-all for engineers assigned to smaller tasks. Instead, we suggest these engineers be assigned to the Subway Action Plan which was deemed large enough to have its own budget line items. This headcount should be reflected in updated figures once engineers are assigned because the MTACC budget is currently operating at double the size originally forecasted in the 2016 budget. The Lower Manhattan projects group has continued to run in 2018 despite being scheduled to closed out in 2016. Spending plans include 9 engineers for the 7 line extension project through 2021 which would leave 15 positions that were improperly budgeted for those specific projects. It would be prudent to find out what other projects this segment is working on because, to date, further 7 line extensions are shelved. (*MTA 2016, MTA 2018 Adopted Budget, pg VI-27*)

Overhead at the MTA Headquarters has increased at regular intervals and cost roughly \$350 million a year through 2015 when it jumped to \$603 million; the budget for 2018 expected to hit \$723 million in 2018. This significant jump in headcount is associated with many capital projects, including the 2nd Avenue Subway; however, costs have not been alleviating by the completion of work. MTA management must account for these costs in the budget and they should clearly define which overhead is assigned to capital projects in distinct line items.

The Long Island Railroad (LIRR) has had steadily increasing loss margins over the past 10 years, losses that persist in spite of population growth on Long Island. Although gross revenues have

remained flat, operating costs have increased. The MTA is progressing through an upgrade plan on the LIRR to upgrade switches, clear vegetation and replace utility poles; a plan that is supposed to make the line more efficient but comes at a cost of \$132 million over a the course of five years.

LIRR	Actuals										Budget				
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021		
Ops Revenue	546	558	606	645	693	710	751	768	785	787	791	794	797		
Ops Expense	1160	1131	1135	1223	1307	1452	1355	1376	1453	1617	1671	1798	1962		
Depreciation	307	319	316	317	333	325	325	334	338	341	343	346	350		
OPEB Liability Adj	60	65	75	80	45	75	85	90	88	90	93	96	99		
GASB 68 Pension	NA	NA	NA	NA	NA	NA	-31	-12	0	4	0	-7	-24		
Environmental	0	0	3	0	0	6	0	-2	0	2	2	2	2		
Net w/o debt svce	-982	-957	-923	-982	-978	-1148	-986	-1018	-1095	-1262	-1317	-1442	-1615		
Margin losses	-180%	-172%	-152%	-152%	-141%	-162%	-131%	-133%	-139%	-160%	-166%	-182%	-208%		

The Metro-North line (MNR) receives only \$56 million for electrical upgrades and kiosks however its margin losses are half of the LIRR.

Metro-North RR	Actuals										Budget					Forecasts				
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021							
Ops Revenue	542	574	615	639	681	712	740	769	798	824	828	846	831							
Ops Expense	891	920	960	981	1118	1237	1195	1230	1310	1339	1385	1409	1440							
Depreciation	248	219	214	223	230	232	231	236	236	247	247	247	247							
OPEB Liability Adj	44	46	57	56	58	58	56	57	58	58	58	58	58							
GASB 68 Pension	NA	NA	NA	NA	NA	NA	-26	-10	-7	4	0	-7	-24							
Environmental	5	4	4	0	2	2	4	4	2	4	4	4	4							
Net w/o debt svce	-646	-615	-620	-621	-726	-817	-721	-748	-800	-827	-865	-865	-893							
Margin losses	-119%	-107%	-101%	-97%	-107%	-115%	-97%	-97%	-100%	-100%	-104%	-102%	-107%							

Recommendation: We must follow through on the cost-saving measures outlined for future years 2020 through 2022 in the 2019 proposed budget. Increased reliability on the 7 and L trains should provide some additional dollars for funding other projects. A cost savings plan should be implemented for the LIRR in order to narrow loss margins to bring them closer to the North-Metro margin losses. Not only will this increase revenues by \$50 to \$70 million per year, it will also assist with payback on the signal upgrades.

Cash flow profile for “Fast Forward” from 2018 to 2021

The cashflow profile for the MTA relies on the new fare-for-hire tax that will be implemented in 2019. “This is expected to generate \$415 million in 2019 and \$435 million thereafter, providing \$342 million in 2019, \$301 million in 2020 and \$300 million annually thereafter to maintain the level of effort started with the Subway Action Plan. Another \$50 million is earmarked for outer borough transportation projects and any remaining funds from the surcharge – currently expected to be \$23 million in 2019 and \$85 million per year thereafter – will be distributed directly to the MTA.” – *MTA 2019 Preliminary Budget I-1*. Given this new tax, the MTA has elected to spend the surplus on a number of IT and other ancillary projects that would normally be funded through operations dollars.

Recommendation: Based on the current executive summary for expenditures, we propose all funding raised by the new fare-for-hire tax be used only on qualified Byford Plan (Subway Action Plan)

projects. We propose the Cuomo enhancement projects be cancelled and the funds re-allocated to provide subway accessibility for disabled passengers. These taxes and subsidies were earmarked for subway improvements and should only be utilized for such upgrades. Ancillary projects, IT and maintenance projects must be funded through operations dollars.

Funding

Funding proposals that have been suggested other candidates and Governor Cuomo alike include congestion pricing, raising taxes, and potentially fare hikes- funding to operate and maintain a transit system of this size is a gargantuan effort (App. I).

Recommendation: A revolutionary funding source can be created, based on leasing express lines during commonly reduced capacity hours. This will plan for decommissioned stations to be used as unloading gates similar to airlines and logistics companies that help build and then lease airport gates. (App. II). Trucks will drop off at a stop in the outer boroughs (Pelham Bay Park/Middletown Road, Phase I) which will enable connections to rail and shipping in later phases and create a pipeline of goods across New York State. Partnering with logistics companies and online retailers such as UPS, DHL, USPS, FedEx, Amazon or WalMart could potentially increase their reach into Manhattan and other parts of New York City, save them money on parking tickets, and cut down on truck congestion in Manhattan.

Additional Recommendations

The Cuomo administration engaged a number of vanity projects which increased costs without providing better service for customers or conditions for workers, including special subway tile for three new stations and \$4.5 million for specialized artwork that was commissioned for those stations. (NYT, 2018)

Recommendation: The MTA should no longer pay for commissioned artwork that is a permanent fixture in subway stations. Private foundations or the artists themselves can and will donate artwork for the MTA's use.

Recommendation: Follow the current pilot project for glass-roofed double decker buses. If bus ridership increases, the financial net deficit with bus revenue will be reduced. (App. I)

Recommendation: Allow NYDOT to have strict enforcement policies for busway access; a measure necessary because of the increase in bussing while the subway lines are under construction. Traffic

delays beyond what is expected will cause breakdowns in the efficiency of this system.

Recommendation: Continue to follow the Byford plan for HR, management retraining, worker training, mentoring and other human resources innovations.

Recommendation: Continue to follow the Byford plan for improvements for disabled passengers' accessibility. The Cuomo station enhancement program funds should be diverted into this program and paying for disabled passenger accessibility should take priority over aesthetic improvements that do not generate revenue. Elevator improvements are also critical infrastructure component for these passengers.

Recommendation: Continue to follow the Byford plan for improving preventative maintenance, reducing track fires, improving subway station cleanliness, and utilizing internal engineering resources for capital projects.

Recommendation: Continue to follow the Byford plan for pilot programs for busses, technology, and real time route analysis.

Recommendation: Continue to support the Byford Plan's efforts to improve service and be environmentally friendly.

Recommendation: Continue the modernization efforts for project management, procurement and construction.

Summary

The MTA is a vital part of New York City life and one of its selling points over other major metropolitan areas of the United States. The management board is responsible to changing priorities of both Albany and City Hall. The "Fast Forward" plan put forth by Andy Byford identifies and addresses many shortcomings in the MTA system today. While capital investment is necessary to bring the system back into good working order, proper project controls must be implemented so projects can be completed on time and on budget with minimal disruptions to services that city residents require.

The MTA must be open to new lines of business including the transportation of freight on unutilized lines during overnight hours. This can reduce shipping costs for logistics companies as well as consumers and result in fewer semi-tractors with 53' trailers attempting to navigate city streets.

Without new revenues, the MTA will continue to require more and more subsidies from taxpayers that are more and more frustrated with higher construction costs.

The City needs the MTA to work. The question is, can the MTA work for the city?

APPENDIX I

The Need for New Funding

Funding for these plans will be a major concern. Under our plan, the MTA would be receiving no toll revenues from bridge and tunnel traffic entering the city. It would also have lower maintenance costs. The companies that received the naming rights would be responsible for the maintenance. We expect the MTA to lose \$2 billion in revenue and \$600 million in operating costs from eliminating tolls. According to MTA's financials, the bridge and tunnel division is its largest source of profitable revenue, meaning there is \$1.4 billion dollars to compensate for.

Governor Cuomo proposed selling corporate naming rights to subway stations in 2017. Within this plan, 72 stations (out of 424) were proposed, with rights being sold for \$600k per station per year. Although the plan was not implemented by the MTA, the standards, terms and conditions were written with that specific purpose in mind. To participate in this option, businesses and organizations would a new subway partnership council at the rate \$250k per year. In Philadelphia, SEPTA station naming rights were sold for \$1 million per year, a significantly higher amount than the MTA's proposed price. While this may generate some business interest, it will not allow for the level of exposure that bridges and tunnels do. Selling naming rights for subway stations at sports arenas would be a logical solution, as long as the team received a small portion of the concession and was the same business or a complementary business of the one named on the stadium.

Estimated Income: \$15 million per year at \$2 million for Mets, \$3 million for Yankees, and \$5 for Madison Square Garden/Penn Station and Atlantic Ave/Barclays.

Offering naming rights for a bridge in the New York City area would be difficult. It is difficult to find a current pricing deal for commercial buildings; naming rights are often tied to ownership stakes or leasing agreements in the buildings. The richest sports stadium naming rights deal, Citi Field, was brokered on a long-term lease for \$20 million a year; MetLife was close behind at \$18 million a year. Given that media impressions for bridges and tunnels are higher than ballparks and subway stations, it is safe to assume that naming rights for bridges and tunnels could be worth 1.5 times those prices. Naming rights would also require less City funding to maintain the structure and could grant the lessee the right to procure their own materials and contractors to perform the work. Private industry could maintain and repair bridges safely at lower costs than the MTA provides currently due to lower overhead, lower procurement costs, and potentially better quality.

Estimated income: \$360 million per year at \$30 million per bridge or tunnel. Add an additional \$30 million per year for naming rights of Tappan Zee bridge to be contributed to the MTA.

The division with the worst margins can be seen within the bussing system. Transit bus ridership declined by 5.6% in 2017 from 2016 and MTA bus ridership declined by 2.8%. The prior year, it

declined 2.3% which follows nationally declining trends in the utilization of buses since 2009; loss margins have increased over the past 10 years as ridership has continued to decline.

MTA Bus	Actuals							Budget							Forecasts	
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021			
Ops Revenue	226	235	200	201	225	234	233	234	237	240	241	242	242			
Ops Expense	581	633	544	541	581	663	674	717	727	773	785	776	792			
Deprecation	36	40	40	46	49	49	50	57	54	54	54	54	55			
OPFB Liability Adj	55	61	96	100	100	105	61	64	100	100	100	100	100			
GASB 68 Pension	NA	NA	NA	NA	NA	NA	-12	-6	115	46	45	40	31			
Environmental	2	4	2	2	2	1	0	0	0	0	0	0	0			
Net w/o debt svce	-448	-508	-482	-489	-506	-595	-540	-598	-759	-734	-743	-729	-735			
Margin losses	-198%	-214%	-241%	-243%	-225%	-265%	-232%	-256%	-320%	-306%	-308%	-301%	-304%			

**Source MTA 2010 to 2018 budgets*

The Byford Plan asks for additional capital to purchase new buses. The current pilot project with glass roofed double decker buses appears promising. If bus utilization rates increase, the net deficit to the system as a whole will be reduced and double decker buses would create additional tourism opportunities to take in the Manhattan skyline without the worry of bad weather. New routes based on current residents' needs, instead of the 1930's streetcar routes, should also increase bus utilization rates. This brings total savings and conventional new revenue to \$500 million per year. This is still \$900 million short

Estimated net reduction: \$100 million per year upon implementation of new routes and bus capabilities. .

APPENDIX II

A New Business Line

Current business on MTA subways is limited to passenger traffic which is mostly due to material handling methods and costs incurred in the creation of the system in the early 1900s. New business opportunities and technologies will allow the MTA to provide freight transportation services on subway lines. This would enable cost-savings for consumers as well as additional profit for the MTA with limited investment. A program that manages MTA subway routes similarly to how airports manage gates and concourse construction could also provide capital and revenue to the MTA.

Shipments from internet retailers have increased dramatically since the last recession in 2008, resulting in more large commercial vehicles being on roads intended for residential access. The logistics can be daunting even for giants like FedEx and UPS in densely populated areas of cities where roads were originally laid out for horse drawn carriages rather than large motor vehicles.

Amazon, FedEx and UPS have been experimenting with manned and unmanned pick up locations. These locations are largely lockers that can be opened with a special code provided to the recipient who can then pick up the package at their convenience. Innovations like this will allow shipping companies to upcharge for home delivery to offset the most expensive segment of the logistics business. These systems have limited viability in densely populated cities because of the difficulty in allocating lockers and receiving facilities in areas easily accessible to semi-trucks.

As previously pointed out, shipping small to medium sized packages on the subway would provide a beneficial solution for these facilities while reducing the number of 53' long trailers from city streets. Shipping individual boxes would be inefficient and take too much time for loading and unloading. One possible option could utilize small size conex boxes which could be loaded at existing logistic company facilities, routed to an MTA yard for loadout, then delivered to retrofitted subway stations. These retrofits would require small gangways off the platform and cars to be retrofitted with compact hydraulic lifts to assist with loading. A gang breaking area would be built to take out packages and offload for delivery topside for either disbursement onto smaller shipping vans for home delivery or on-site pickup/locker service.

Conex boxes with 10' and 20' lengths are nearly suitable for transit on NYC subway. The current IRT car has a width of 8'9.5", a height of 8'1.9" above the truck (7' ceiling for passengers) and varying lengths but typically 51'4". A 10' and 20' long conex box is 8' wide and 8'6" tall (*Falcon Structures*); the taller height will prove problematic when crossing the Harlem River because the tubes are not large enough to safely accommodate an additional 4" clearance. (*Gates, 1915*) The ceiling height varies from station to station, with most exceeding the 8'2" height of the subway car. Loading and unloading equipment would be built into the areas above the passenger platforms and include gangways capable of accommodating loading and unloading of containers. A modified conex

box could easily be specified with a roof height of 6'6" or 7' to accommodate tube transit. A forty foot box could be used but would prove more difficult as they would require stations to be exclusive to a given logistics company to allow for the increased load / unload time. Multiple 10' or 20' layouts could accommodate different companies on the same run to the city.

Nighttime would be the ideal time for moving the freight for several obvious reasons. The MTA subway system is not currently operating at sufficient capacity for passengers; implementation of this freight system would encourage additional revenue by utilizing abandoned stations already on the main line. Loading and unloading operations could be interrupted for a number of reasons and cause delay, however, passenger traffic on the 6 train slows in the evening with an express route in the Bronx that is unused after the evening rush. This unused express line would provide quick access to the tunnel across the Harlem river as well as provide a "slack" space for trains to wait to cross the tunnel when passenger trains are moving through.

The initial pilot project would focus on constructing a loading facility at the Middletown Road yard in the Bronx; this location would be fed by a short-haul from a new loading dock at Pelham Bay Park. Then merchandise would be transported to Middletown Road throughout the day (2 stops). Loading equipment could be purchased to allow the MTA to load the boxes. MTA would only assume responsibility for cross docking the goods. Logistics companies would be responsible for loadout from there. In the event boxes cannot be offloaded from the platforms to the conex loading/unloading area, MTA could refuse loading at the Middletown Road yard to prevent abandonment of packages on the subway lines.

Three currently abandoned stations would be retrofitted for use to load/unload conex boxes including: 18th Street, Worth Street, and the South Ferry loop. These stations are currently in good condition and already allow for some topside access. The South Ferry station will likely require extensive renovations as it currently has lower ceilings than the other two but would provide cheaper freight rates into the tip of Manhattan in comparison to those presently available. Necessary station renovations would be paid for by the logistics companies as part of the lease agreement. Leasing agreements, similar to those used between airlines and logistics companies, often require logistics companies to pay for a portion or all of the construction of gates as a stipulation for the leasing rights to that gate.

Contracts between the logistics companies and the MTA would be negotiable; one example of such a negotiation could require the MTA move the conex boxes from the yard to a given station within a specific time frame. As previously mentioned, the MTA is not responsible for the contents inside the box unless the box is opened as a result of MTA. The logistics company may put company logos on the box to aid with identification, branding and advertising. The gangways at the stations for loading and unloading boxes are owned by MTA but could be leased to the logistics companies much like gates at an airport and the logistics companies would be responsible for the staffing of the

loading/unloading areas as well as ensuring security and safety in their cross docking areas. Surface loading and unloading facilities could be leased individually or shared with others, but retail pickup locations would only be leased to individual logistics companies. Surface loading and unloading facilities for trucks inside NYC metro could be used by logistics companies or customers receiving large amounts of light freight such as produce, meat, and plants. These customers would be responsible to move goods from the loading dock.

New gates at existing airports are constructed with funds provided by the companies that want the additional gates. The airlines front the cost of the gate construction in return for reduced gate leases for a set period of years, typically 10 years. After 10 years have passed, the gate returns to a full leased rate for the incumbent airline or can be leased to other airlines. In this manner, freight handling facilities at the yard and stations in the city could be funded and installed with minimal risk or inconvenience to the taxpayer; construction would occur at stations that are unused but in otherwise good condition.

Estimate: \$2 billion in construction for 4 facilities and equipment. Revenues expected to range from \$900 million to \$1.2 billion per year based on successful implementation and boxes shipped. Upon retirement of leasing obligations to shippers, revenues expand to \$1.4 billion to \$1.6 billion depending on leasing rates for facilities.

APPENDIX III

A New Construction Plan

The MTA subway will require system shutdowns on nights and weekends to perform signal repairs which will require 5 years of this pattern to complete the first part of the plan. Assuming a 10 hour crew shift on weeknights as well as two overlapping 10 hour shifts on each weekend day, a total of 23,400 crew hours of work over 260 weeks would be required. The reasoning behind using 10 hours rather than 12 hours is that each weeknight will require 1 hour of mobilization/set-up at the start of work and 1 hour of demobilization/tear-down at the end of the work. In accordance with labor laws, time incurred beyond forty hour is billed at time-and-a-half during the week, and double time on the weekends; the time paid out at this high of a rate would be more justifiable if the entire shift was worked with no demobilization.

Constant setup and teardown activities for construction projects are costly and if that same amount of work is performed over shorter periods of time there are fewer setup/teardowns, which results in a more consistent and efficient work environment for MTA construction crews. Surface facilities to accommodate workers will hinder traffic for fewer days and the surface facilities can be placed in roads closed to regular traffic. This will allow other city streets to more easily accommodate overflow traffic from a particular Avenue or Street being closed.

Using three 8-hour shifts in a 24-hour operation can reduce the project duration from 260 weeks to 140 weeks by eliminating multiple setup/teardown activities. This shift schedule would save the MTA money as some construction work would be performed at the normal rate rather than 100% at overtime or double overtime rates as suggested by the Byford plan. We expect this will save between 2% and 5% of total labor costs of the original baseline estimate.

If the bus plan can be implemented successfully, shutdowns for the 5-year plan should occur over the low ridership weeks for 3.5 years. For the past 3 years, the slowest months for MTA subway ridership are January, February, July, August and September. We propose two time frames when specific subway lines are shut down for work. Unenergized construction for signals (e.g. new conduit installation, demo unpowered/unused systems) would be performed in January and February with demo/pull and checkout work being performed in July, August and September. The same amount of work is being completed but with only 2 mobilizations and demobilizations each year. Surface work would be installed during the fall and torn down in spring if they are no longer needed. Ideally the first lines to receive work are the F, M, R, and G lines; these lines have some existing infrastructure and are close to other independently operated lines. Work should be performed in a coordinated manner so that passengers have project-related bus routes immediately nearby and other subway options within 6.

Cost savings are estimated between \$300 million to \$1 billion and depend upon overtime calculations, mobilization charges, increased productivity and the successful implementation of MTA defined crew

sizes for capital projects. This assumes a baseline estimate of \$19 billion for the entire subway portion of the project plan. Please click [here](#) to refer to a sample generic schedule for project work.

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