

PMOC MONTHLY REPORT

Second Avenue Subway Phase 1 (MTACC-SAS) Project

Metropolitan Transportation Authority

New York, New York

Report Period April 1 to April 30, 2016



PMOC Contract No. DTFT6014D00017

Task Order No. 2, Project No. DC-27-5287, Work Order No. 2

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Length of time on project: Five years on project for Urban Engineers

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THIRD PARTY DISCLAIMER

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For projects funded through the FTA's Full Funding Grant Agreement (FFGA) program, FTA and its Project Management Oversight Contractor (PMOC) use a risk-based assessment process to review and validate a project sponsor's cost, budget, and schedule. This risk-based assessment process is a tool for analyzing project development and management. Moreover, the assessment process is iterative in nature; any results of an FTA or PMOC risk-based assessment represent a "snapshot in time" for a particular project under the conditions known at that same point in time. The status of any assessment may be altered at any time by new information, changes in circumstances, or further developments in the project, including any specific measures a sponsor may take to mitigate the risks to project costs, budget, and schedule, or the strategy a sponsor may develop for project execution.

Therefore, the information in the monthly reports may change from month to month, based on relevant factors for the current month and/or previous months.

REPORT FORMAT AND FOCUS

This monthly report is submitted in compliance with the terms of the Federal Transit Administration (FTA) Contract No. DTFT6014D00017. Its purpose is to provide information and data to assist the FTA as it continually monitors the Grantee's technical capability and capacity to execute a project efficiently and effectively, and hence, whether the Grantee continues to be ready to receive federal funds for further project development.

This report covers the project management activities on the Second Avenue Subway (SAS) Phase 1 Project managed by MTACC. MTA is the Grantee and financed by the FTA FFGA.

MONITORING REPORT

1.0 PROJECT STATUS

During April, 2016, the MTACC continued advancing SAS Phase 1 to meet a Revenue Service Date (RSD) of December 30, 2016, within its Current Working Budget (CWB) of \$4.451 billion (exclusive of financing). The overall project is approximately 87.4% complete. Substantial Completion has been achieved on three of the eight active construction contracts. Progress in this reporting period is discussed below:

a. Procurement

Procurement of construction contractors for SAS – Phase 1 is complete. Three construction contracts are currently in the closeout process.

b. Construction

As of April 30, 2016, there are eight (8) active construction contracts on the SAS Phase 1 Project. Construction progress on the active contracts during this period includes:

Contract C-26005 (C2A) 96th Street Site Work and Heavy Civil

- Substantial Completion was achieved on November 5, 2013.

- Sign off of the final volume of the “As-Built” drawings was expected to be completed by the end of the 1st Quarter 2016. The contractor was delayed due to incorporation of the Department of Environmental Protection’s comments into the “As-Built” drawings. This is the only action left and closeout is now anticipated by May 31, 2016.

Contract C-26010 (C2B) 96th Street Station Civil, Architectural, and MEP

The following near term milestones are associated with activities that are being accelerated to achieve the December 30, 2016 Revenue Service Date:

- ConEd’s completion of the forth electrical feeds which provide facility power to the station.
 - Power distribution to the various rooms (breaker panels)

- Milestone #14 is ongoing and reported as on schedule. The work has to be completed on or before May 31, 2016 and includes:
 - Completion of all work required to perform Field Installation Acceptance Tests on all electrical and mechanical systems including but not limited to:
 - Permanent power to all equipment
 - Battery backup for the UPS system
 - Chilled water piping and equipment
 - Cooling towers and dry coolers
 - HVAC ductwork and insulation
 - Chillers
 - Air handling units
 - Fan coil units
 - Condenser water piping
 - Sump pump equipment
 - All work required to provide a controlled environment in rooms that house electrical and mechanical system equipment
 - Provide controlled environment through temporary means if equipment necessary to provide the controlled environment is unavailable due to testing

- Milestone #15 is ongoing and reported as on schedule. The work has to be completed by May 31, 2016 and includes:
 - Completion of all work required to perform Field Installation Acceptance Tests on Tunnel Station Smoke Management (TSSM) system including, but not limited to:
 - Structural elements of the two Ancillary structures
 - Fans
 - Variable Frequency Drives (VFDs)
 - All associated duct work
 - Dampers and supervisory panel and control cabinets,
 - Permanent power to all equipment
 - All work required to provide a controlled environment in rooms that house TSSM system equipment

- Provide controlled environment through temporary means if equipment necessary to provide the controlled environment is unavailable due to testing
- Milestone #16 is ongoing and reported as on schedule. The work has to be completed by May 31, 2016 and includes:
 - Completion of all work required to perform Field Installation Acceptance Fire and Life Safety Systems including, but not limited to:
 - Fire protection sprinklers,
 - Water mist system
 - Fire extinguishers,
 - Doors required to prevent the spread of fire
 - Dry fire standpipe
 - All work required to provide a controlled environment in rooms that house Fire and Life Safety system equipment
 - Provide controlled environment through temporary means if equipment necessary to provide the controlled environment is unavailable due to testing

Contract C-26006 (C3) 63rd Street Station Rehabilitation

- The focus of the work effort remains at Area 5 and the progress at Entrance #1;
- Work trains are being regularly scheduled on the inactive track for final trash removal and material delivery;
- **Area 5 (Reconstruction includes mezzanines and the deck plaza roof)**
 - In Area 5 the contractor continues with cleanup and responding to the NYCT inspection observation lists.
 - At the 6th Mezzanine, the ceiling panels and lighting are complete.
 - In the Traction Elevators 1-4, controller tests are scheduled for May 1, 2016.
 - Arts-N-Design artwork installation is complete on the 6th Mezzanine and is complete in Entrance #1.
 - Installation of granite pavers on the 6th Mezzanine is complete with the exception of infills.
- **Entrances (#1, #2, #3, and #4)**
 - At Entrance #1, the contractor is finalizing work in the Back-Of-House (BOH) area.
 - At the Entrance #2, testing has resumed.
 - At Entrances #3 and #4, the lighting levels are being checked.
- **Platforms**
 - The full height construction wall between the active and inactive platform has been removed for a “softer” demising barrier until full wall removal at the time of Revenue Service.
- **Site**
 - The Plaza renovation is complete.

Contract C-26007 (C4B) 72nd Street Station Cavern Mining and Lining

- Substantial Completion was achieved on January 14, 2014. Submittal of contract closeout documentation is ongoing;

- The punchlist items, including correcting the deficiencies to the architectural finish along the escalator incline at Entrance #2 are complete and the area has been turned back over to the C4C contractor; and,
- Similar corrective work will also be required on the Entrance #1 incline finish.

Contract C-26011 (C4C) 72nd Street Station – Station Finishes, MEP, Ancillary Buildings and Entrances

- **Ancillary #2**
 - Cable pulling at the street level EDR is 95% complete and the main cable pulling is complete at the 2nd floor;
 - Electrical work is complete in the Ancillary #2 basement & sub-basement FPRs;
 - ConEd inspection and testing was completed in the Sub-Basement and Basement FPRs in both Ancillaries #1 & #2; and,
 - Installation of pipe risers from the street to the roof Cooling Towers & Dry Coolers continues at Ancillary #2.
- **Entrance #2**
 - Installation of the escalator steps is approximately 50% complete at Entrance #2 and installation of the handrails continues.
- **Ancillary #1**
 - 2 Fan Motors have been delivered;
 - Concrete placement of the corner stair nears completion; and,
 - Installation of conduit risers from the street EDR to the 4th Floor Fan Control Room continues.
- **Cavern Mezzanine (Public, North and South)**
 - In the Public Mezzanine the W30 porcelain tile installation is complete with exception of the Arts-N-Transit panels; and,
 - In the North & South Mezzanines, installation of equipment devices, BMS (Building Management System) panels, etc. in the Fan/Chiller Rooms continues.
- **Platform**
 - Installation of the platform granite wall tiles at the stairs and escalators is complete with exception of infill at the doors;
 - Installation of drive machines for the Platform to Mezzanine elevator (Elevator #1) is complete; and,
 - Installation of conduit & lights in the platform service carriers continues.
- **Entrance #1**
 - The escalator conduit installation and light fixture installation was completed and approximately 90% of the scaffolding has been removed from the incline;
 - Installation of the escalators is scheduled to begin May 1, 2016; and,
 - On the outside at Escalator #12, components installation is ongoing.

- **Entrance #3 (Elevator Bank)**
 - 3 of the drive machines have been installed in the Elevator Machine Room for the traction elevators.
- **Schedule**
 - At the end of April 2016, the energization of 1 permanent power feed was accomplished by ConEd during a weekend outage. With this permanent power, the project can proceed to complete all equipment power and systems testing.

Contract C-26008 (C5B) 86th Street Station Cavern Mining and Lining

- Substantial Completion of all contract work was achieved on December 16, 2014.
- The architectural finish corrections at Entrance #2 and Entrance #1 escalator inclines has been completed and the areas turned back over to the C5C contractor.

Contract C-26012 (C5C) 86th Street Station Finishes, MEP Systems, Ancillary Buildings & Entrances

- **Cavern (Public, North & South Mezzanines)**
 - The porcelain tile on the W30 wall in the Public Mezzanine continues on the east wall. The west wall tile installation is complete except for the art panels.
 - All fans (north & south mezzanines) arrived at the site.
 - Installation of the transition ducts and silencers for the fans are complete in the north and south mezzanines.
 - Third Party Testing continued in the FPRs (Facility Power Room).
 - Installation of dampers continued in the north & south mezzanines.
- **Entrance #1**
 - Some rigging remains in place. The long escalators truss alignment and components installation continues.
- **Entrance #2**
 - At Escalators #8, #9 & #10 the alignment is complete. Removal of rigging is complete. Work platforms have been installed over the escalators for finishing out the escalator incline.
 - At the traction elevator installation of rails is underway.
- **Ancillary #1**
 - At Ancillary #1 the building fit-out is continuing, including electrical, ductwork, C6 conduit, etc; and,
 - At Ancillary #1 the Cooling Tower has been set in place; the Dry Cooler will be delivered in early May 2016.
- **Ancillary #2**
 - The structure erection continues above street level; and,
 - At Ancillary #2 the equipment for 3 rooms was delivered.
- **Platform**
 - Installation of platform granite pavers is complete with the exception of infill tiles. Granite tile installation at the platform on the

- escalators/stairways walls is complete with the exception of infill tiles at doors; and,
 - C6 has completed the trackwork on the southbound side and the contractor resumed Durasteel framing installation over the track.
- **Site**
 - Street restoration, along 2nd Ave. continues with backfilling of ductbanks.
- **Schedule**
 - ConEd began their “Trip Checks” at the site.
 - The plan remains for permanent power energization to be accomplished first in the South Mezzanine power rooms, with the north to follow.

Contract C-26009 (C6) Track, Power, Signals and Communication Systems

The Contractor’s current schedule indicates a Substantial Completion (SC) date of 12/12/2016. This is 2 weeks earlier than the revised SC date of 12/31/2016 and 9 weeks earlier than the December 2015 CPM update SC date of 2/21/2017. Near term acceleration milestones includes:

- **96th Street Station**
 - Signal System buildout to allow Field Installation Acceptance Test (FIAT) to be completed by 5/23/2016. Work includes but not limited to:
 - Breakdown testing of all relays, ground detectors, transfer switches and other components in the relay rooms and wayside
 - Power washing of rail
 - Cable pulling ongoing (data, telephone, communication)
 - Traction Power Substation buildout and FIATs to allow Con Edison high tension power testing and energization.
- **86th Street Station**
 - Signal System buildout to allow FIAT to be completed by 5/23/2016. Work includes but not limited to:
 - Breakdown testing of all relays, ground detectors, transfer switches and other components in the relay rooms and wayside
 - Signal System wide track circuit bulletin certification and code signal in-service acceptance
 - Traction Power Substation buildout and FIATs to be completed by 5/9/2026 to allow Con Edison high tension power testing and energization.
- **72nd Street Station**
 - Signal System buildout to allow FIAT to be completed by 5/23/2016. Work includes but not limited to:
 - Breakdown testing of all relays, ground detectors, transfer switches and other components in the relay rooms and wayside
 - Traction Power Substation buildout and FIATs to be completed to allow Con Edison high tension power testing and energization.
- **63rd Street Station**
 - Signal System buildout to allow FIAT to be completed by 5/23/2016. Work includes

but not limited to:

- Installation, wiring, and breakdown testing of all relays, ground detectors, transfer switches, and signal equipment
 - Communication Systems buildout to allow preliminary and pre-testing FIAT to be completed by 5/31/2016
 - Traction Power Substation buildout and FIATs to be completed by 6/27/2016 to allow Con Edison high tension power testing and energization.
- **Acceleration schedule**
 - Acceleration milestones have been established to have all work and testing through Final Systems Integrated Testing completed by 9/30/2016

c. Quality Assurance and Quality Control (QA/QC)

Status:

During April 2016, the Second Avenue Subway Quality Management team continued to conduct Quality Meetings and Quarterly Quality Oversight of the Contractor with CCM, MTACC, and PMOC participation. The Quality Management Team participated in the job progress meetings, monitored quality matters in the field for each construction contract, reviewed and provided comments for Quality Work Plans, and participated in Preparatory Phase Meetings for numerous construction processes.

Observations:

C2B: The C2B Contractor's Quality Manager has not met the dates he has committed to complete action items. Among the actions that keep slipping are:

- A Special Inspection Matrix has not been updated;
- Submittal of certifications from the Special Inspection Agency for completed work have not been received and;
- Eight (8) nonconformance reports (NCRs) have been open for more than ten months.

The Contractor's Corporate Quality Manager is now providing assistance to the contractor's Quality Manager. Some improvement has been noted but the 8 NCRs that have been open for more than 10 months is a serious issue.

C5C: There are many issues on this contract that affect Quality. These include:

- Submittals that have been returned for additional information have not been returned;
- Preparation of new submittals for approval has been delayed;
- The Quality Staff has been reduced from four to three;
- There is insufficient supervision for field activities;
- Performance of external Quality Audits are behind schedule;
- The electrical subcontractor's NCRs have not been processed for over three months;
- Record drawings at 50% completion has been delayed;
- Work is not ready for NYCT inspection;
- Check lists for many activities are not submitted on CMS; and,
- Work is progressing without Preparatory Phase Meetings being held.

Contract Package C2B	
Status:	Through April 30, 2016, a total of 163 NCRs have been issued. One Hundred Thirty-Four (134) have been closed and 29 NCRs are open. In April 2016, 13 new NCRs were written and 5 were closed. None of the NCRs closed in April were for concrete that was out-of-specification. Sixteen (16) of the 29 open NCRs are for concrete that was out-of-specification.
Observation:	Bi-weekly Quality Management Meetings, as suggested by the PMOC, are being held. Submittal of Daily Inspection Reports is still 2 weeks behind.
Concerns and Recommendations:	Eight (8) of the open 13 non-concrete NCRs have been open more than ten months. Based on the PMOC's suggestion, the contractor has established closure dates with the assistance of their Corporate Quality Director who is now actively involved in managing the quality effort. All of the projected dates are in May 2016. Each month, the dates continue to slip. The PMOC is concerned that the dates are not realistic. The PMOC has suggested to the Corporate Quality Director that he evaluate each open NCR and add a column to the NCR log with comments explaining what actions are being taken to close it.
Contract Package C3	
Status:	Through April 30, 2016, a total of 128 NCRs have been issued. One hundred eighteen (118) have been closed and 7 are still open. In April 2016, one new NCR was written and none were closed.
Observation:	Submittal of Daily Inspection Reports is current.
Concerns and Recommendations:	The PMOC has no concerns.
Contract Package C4C	
Status:	Through April 30, 2016, a total of 227 NCRs have been issued. One hundred sixty-three (163) have been closed and 64 NCRs are still open. In April 2016, three (3) NCRs were written and none were closed.
Observation:	One hundred eighty-four (184) of the 227 NCRs are for concrete that was out of specification. Two of the three NCRs generated in April 2016 were for concrete that was out of range for slump. Submittal of Daily Inspection Reports is current.
Concerns and Recommendations:	Forty-three (43) of the remaining 64 open NCRs are for concrete that was out of specification.
Contract Package C5C	
Status:	Through April 30, 2016, 181 NCRs have been issued. One Hundred twenty-one (121) have been closed and 60 NCRs are still open. In April 2016, four new NCRs were written and 47 were closed.

Observation:	Nine (9) of the 60 NCRs that are open are for concrete that is out of specification. The contractor prepared and submitted a concrete statistical analysis in April 2016. It was approved by the Engineer of Record and all 47 of the NCRs closed in April 2016 were for concrete that was out of specification. Submittal of Daily Inspection Reports is one week behind.
Concerns and Recommendations:	The PMOC continues to recommend that the contractor establish a schedule for closing the 51 non-concrete NCRs. The PMOC also recommends that effort be devoted to resolving the issues listed in the beginning of this section.
Contract Package C6	
Status:	Through April 30, 2016, a total of 60 NCRs have been issued. Forty-one (41) NCRs have been closed and 19 are still open. In April 2016, no new NCRs were written and none were closed.
Observation:	Fourteen of the open NCRs are for concrete that was placed beyond the 90 minute time limit. Submittal of Daily Inspection Reports is current.
Concerns and Recommendations:	The cause for the concrete NCRs that were placed beyond the 90 minute time limit was due to trucks that were delayed getting to the site due to heavy traffic. It is expected that about ten of the concrete NCRs will be closed in May 2016.

Concerns and Recommendations:

Discussed under each Contract Package.

2.0 SCHEDULE DATA

Status:

The PMOC received updated P6 schedules for the four (4) active construction contracts on May 2, 2016. These schedules are updates of those included as part of each contract's "Schedule Acceleration Agreement". Each schedule has been updated through April 1, 2016. MTACC is no longer maintaining an Integrated Project Schedule (IPS). The last IPS monthly update modeled the status of the project through February 1, 2016. Subsequent discussions will be based on the schedule for each individual construction contractor.

The lack of an integrated project schedule complicates the assessment of overall project contingency. Based on information presented at the March 23, 2016 C/S Meeting, the latest date identified by the fragnet schedules for the start of Pre-Revenue Service Activities is September 14, 2016. This date is controlled by LAN/WAN installation, testing and subsequent Level 5 Fire Alarm System testing. MTACC has also advanced its internal estimate of when it can achieve RSD. MTACC's internal target to commence revenue service is now December 1, 2016. This effectively adds 30 CD of schedule float if the published RSD of December 30, 2016 is used.

Based on the available schedule information, available schedule contingency is evaluated as follows:

	Dates	Contingency (CD)	
MTACC Construction, Testing Complete	09/01/16		
NYCT Pre-Revenue Training, Testing - 60 CD	11/01/16		
MTACC RSD- (REVISED TARGET)	12/01/16	30	MTACC Contingency
ELPEP Threshold	07/03/17	214	Additional Contingency
FTA RSD	02/28/18	240	Minimum ELPEP Contingency
		484	TOTAL

Observations:

Contract schedules in the “P6” format provide more detail regarding the work required to complete than the highly summarized “Netpoint” schedules. However, the value of the P6 schedules is also limited. Schedule float values cannot be relied upon as an indicator of schedule “criticality”. In some cases, float values exceed project remaining duration. In other cases, excessive use of constrained milestone date artificially increase negative float values.

C2B – 96th Street Station

- Substantial general and architectural construction remains at street level, station platform and mezzanine levels, Ancillary 2, Entrances 1, 2 and 3. The risk of street-level work impacting the RSD is low. While some of this work may be deferred until after RSD, a certain finish level is typically required for a station to be deemed acceptable for passenger use;
- A significant portion of FIAT (Level 2 and 3) testing is forecast to occur between June 6, 2016 and June 17, 2016. Concentration of this type of activity may stress available NYCT support resources;
- With the exceptions of minor architectural and site restoration, all installation and testing (through level 4) activities are forecast to complete before September 1, 2016; and,
- Development of equipment test and acceptance procedures, O & M Manuals and submittal of test results represent a very large number of activities within this schedule.

C4C – 72nd Street Station

- Availability of permanent power is forecast for April 30, 2016;
- Development of test procedures, O & M Manuals and submittal of test results represent a relatively few number of activities within this schedule. Development of equipment test and acceptance procedures is not included;

- Some finish construction activities such as painting, flooring, cleanup, elevator and escalator trim, and punchlist activities extend beyond September 1, 2016;
- Completion and turnover of fire protection systems does not occur until September 29, 2016;
- Testing of elevators is not completed until November 14, 2016;
- Entrance 1 escalator testing is not completed until November 14, 2016;
- Track drainage system testing is not complete until October 14, 2016;
- TSSM testing is not complete until October 12, 2016; and,
- PMOC assumes final O & M Manuals and systems training will not constrain NYCT Pre-Revenue Testing and the subsequent RSD. A number of these activities do not complete until November/December 2016.

C5C – 86th Street Station

- Availability of permanent power is forecast for May 2, 2016;
- Delivery of water mist system equipment will not be complete until May 4, 2016; installation of this system is forecast for completion on May 30, 2016;
- Ancillary 2 structural work is forecast to complete in late May 2016;
- Final inspections and punchlist work are all “planned to occur between October 10, 2016 and December 26, 2016;
- Development of equipment test and acceptance procedure are not included in this schedule;
- Limited interior and exterior architectural work, site restoration and system testing activities are forecast beyond September 1, 2016; and,
- This contractor appears to have interpreted the acceleration agreement to mean that inspection and punchlist activities may extend beyond September 1, 2016. The nature of these activities may create punchlist work potentially interfering with NYCT pre-revenue testing at the platform and mezzanine levels.

C6 – Systems:

- Activities within this schedule contain as much as -746 WD (nearly 3 years) of schedule float. This is based on the ongoing linkages to original contract milestones. It can be reasonably assumed this contractor is maintaining this schedule in anticipation of pursuing a significant post-construction equitable adjustment to its contract;
- Fire alarm testing; and,
- Installation and testing - police radio system.

The PMOC review indicates several potential issues with this schedule:

- This schedule appears to substantially comply with the acceleration agreement in that the planned completion of all virtually work is on or before September 1, 2016;

- Approximately 140 milestones have been added to the schedule, denoting the completion of work by other contractors on which C6 work is dependent; and,
- There are approximately 210 CD from the schedule data date of February 1, 2016, to the construction complete milestone of September 1, 2016. The fact that nearly 25% of the activities in this schedule have negative float values which exceed this value (negative float values extend to -735 WD) creates significant concern over the validity of this schedule.

A lack of consistency in construction schedule development has been previously noted and continues to limit schedule usefulness. A current example is the selective inclusion of equipment test and acceptance procedure development and improvement. The C2B schedule includes this work in great detail while it is almost completely absent from the C4C and C5C schedules.

Netpoint Summary Schedule:

The most recent “Netpoint” schedule provided to the PMOC had Data Dates in early April, 2016. Based on these schedules, critical or near-critical schedule issues include the following:

- Tunnel ventilation; 96th, 86th and 72nd Street Stations;
- Fire Alarm – Life Safety Installation; 96th and 72nd Street Stations;
- Vertical Transportation – Installation and Testing; 72nd Street Station;
- FIAT (Level 3-> 4) Testing; 96th, 86th and 72nd Street Stations;
- FIST (Level 5) Testing; 96th, 86th and 72nd Street Stations; and,
- FIAT (Level 3-> 4) Testing (LAN/WAN); 96th, 86th, 72nd and 63rd Street Stations.

Additional observations include:

- At 96th Street, significant delays to the start of FIAT (Level 3->4) Testing are indicated for all Fire Life Safety Systems. These schedules do not provide sufficient information to evaluate the cause of the delay;
- Permanent Power:
 - At 72nd Street, the availability of permanent power had been forecast for April 15, 2016. There appears to be a discrepancy between the Netpoint and P6 schedules.
 - At 86th Street, permanent power availability is indicated to be June 1, 2016, a discrepancy between the Netpoint and P6 schedules.
- The date when permanent power become available remains important as it is a necessary predecessor to the start of almost all FIAT (Level 3->4) Testing;
- At 72nd Street Station, timing of escalator installation and testing has become increasingly compressed in the Oct. /Nov. 2016 time period. The current schedule indicated the 48 hour operational test for escalators 6, 7 and 8 will not be completed in time to support MTACC’s December 1, 2016 target RSD;
- At 96th Street, the last Netpoint schedule received from MTACC (DD=3/21/16) indicates a significant improvement in testing and completion of most systems.

Completion of testing of HVAC systems control the completion of this schedule. The schedule seems to indicate delays to the development of test procedures for the UPS System and Ancillary 1. Schedule symbols in these fragnets are not included in the Legend; however they most closely represent the symbol for “delay”; and,

- Remaining architectural construction and sitework is not included in any of the schedules for the three new stations.

Milestone Summary: As a part of the “Schedule Acceleration Agreements”, MTACC established revised milestones with each contractor for the work involved. These milestones are summarized and updated in the following table:

72nd Street			
MS	Description	Accel. Agreement	Update (04/01/16)
15	Contract C26009 Access. Turn over communication room 5012 and lube oil room 2006.	03/15/16	03/15/16A
16	Summit all preliminary O&M manuals, and all procedures for FIAT, SIST and FIST tests.	04/30/16	05/01/16
17	Complete all work required for Con Edison to energize the Facility Power substations including.	04/30/16	04/30/16
18	Complete all work and testing required to complete permanent power distribution.	05/31/16	06/01/16
19	Complete all installations, controls, pretests, finishes and environmental controls for the TSSM rooms at Ancillary 2 to start FIAT (Levels 3/4) testing of the TSSM system at Ancillary 2.	05/31/16	05/30/16
20	Complete all installations, controls, pretests, finishes and environmental controls for the TSSM rooms at Ancillary 1 to start FIAT (Levels 3/4) testing.	06/15/16	06/16/16
21	Complete all installations and pretests for the HVAC rooms to start FIAT (Levels 3/4) testing (Ancillary 2)	05/31/16	05/31/16
22	Complete all installations and pretests for the HVAC rooms to start FIAT (Levels 3/4) testing (Ancillary 1)	06/15/16	06/15/16
23	Complete all work and pretests required to start FIAT (Levels 3/4) on the Fire and Life Safety systems.	07/01/16	07/01/16
24	Complete all work and pretests required to start FIAT (Levels 3/4) on the Water Mist Fire and Life Safety systems.	07/01/16	07/01/16
25	Complete all work and testing through FSIT (Levels 5a/b), including 2 weeks dedicated to performing FSIT over the WAN in coordination with the C26009 Contractor (Level 5b).	09/30/16	09/30/16
26	Complete all work and testing through FSIT (Levels 5a/b) for Escalators at Entrance 1 and Elevators at Entrance 3.	11/01/16	11/01/16

86th Street			
MS	Description	Accel. Agreement	Update (04/01/16)
15	Complete all work required for Con Edison to complete energization to provide permanent Facility Power.	04/30/16	05/02/16
16	Complete Installation and Preparation for Level 3/4 Testing of HVAC Systems	05/31/16	05/31/16
17	Complete Installation and Preparation for Level 3/4 Testing of TSSM	05/25/16	05/31/16
18	Complete Installation and Preparation for Level 3/4 Testing of Fire And Life Safety Systems	05/26/16	06/02/16
19	Complete all installation and testing – elevators and escalators	09/01/16	08/30/16
20	Complete all work and testing through FSIT, including 2 weeks dedicated to performing FSIT via WAN in coordination with the C26009 (Level 5b).	08/31/16	09/01/16

96th Street			
MS	Description	Accel. Agreement	Update (04/01/16)
12	Complete all Work required for Con Edison to energize the South Facility Power Substation at 96th Street.	02/29/16	02/29/16A
13	Provide permanent power to the communication rooms for Milestone 6, the signal rooms for Milestone 7, the traction power rooms for Milestone 8, the station service center for Milestone 9 and the other rooms for Milestone 10.	03/31/16	04/13/16
14	Complete Preparations and Installation of Electrical and Mechanical Systems to Start FIAT (Level 3,4) Testing	05/31/16	06/13/16
15	Complete all work required to commence FIAT (Level 3,4) on the TSSM system	05/31/16	05/26/16
16	Complete all work required to commence all FIAT (Level 3,4) on the Fire and Life Safety systems	05/31/16	05/31/16
17	Complete Level 5a Testing for HVAC, and Fire and Life Safety	07/31/16	07/28/16
18	Complete all work required to commence FIAT on all escalators and elevators	07/31/16	07/28/16
19	Complete Level 5b Testing for All Systems; Complete ALL Work	08/31/16	08/30/16

Systems			
MS	Description	Accel. Agreement	Update (04/01/16)
6	72nd Street: Complete all installation and testing required for ConEd to inspect and start trip-checks.	05/02/16	04/25/16
7	96th Street: Complete all installation and testing required for ConEd to inspect and start trip-checks.	04/04/16	03/22/16
8	86th Street: Complete all installation and testing required for ConEd to inspect and start trip-checks.	05/09/16	05/08/16
9	Complete All Traction Power Installation and FIAT (Level 3/4) testing	06/27/16	06/27/16

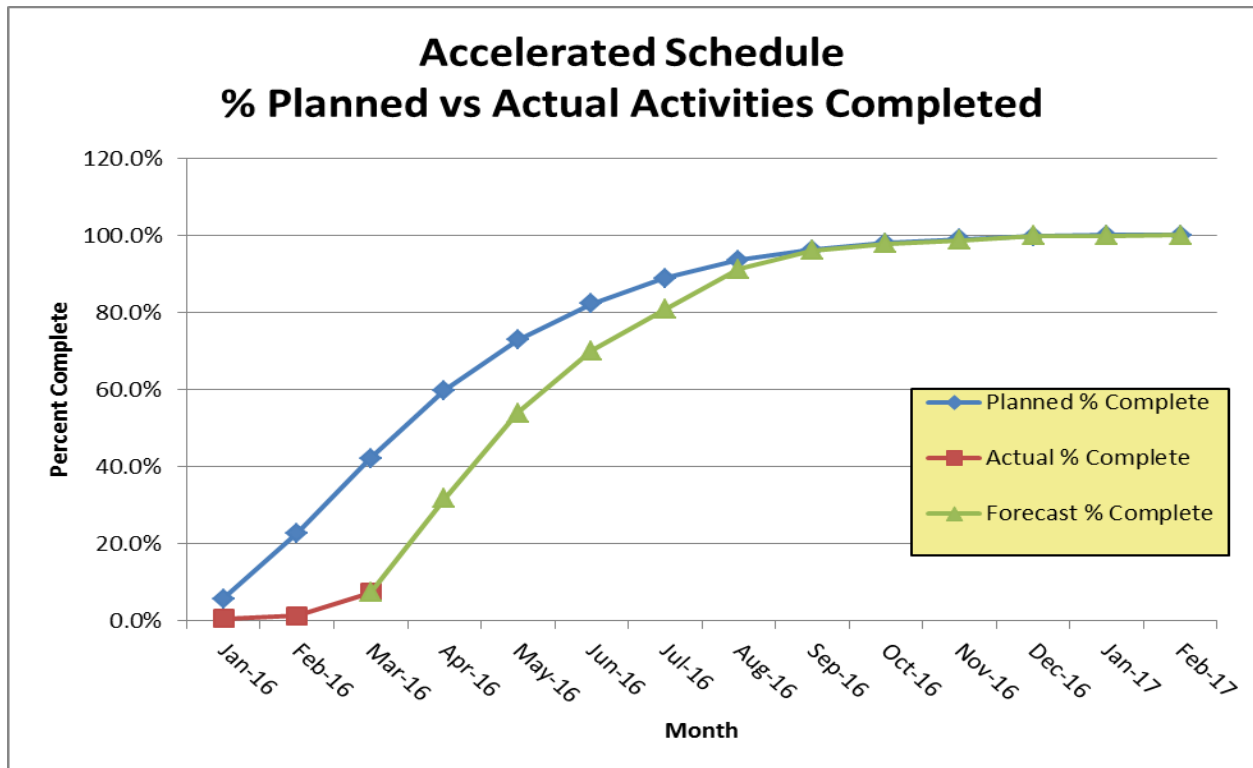
Systems			
MS	Description	Accel. Agreement	Update (04/01/16)
10	Complete installation of Trackwork and the Third Rail for Tracks S1 & S2 including submittal of complete scans demonstrating a contractually compliant installation.	05/30/16	05/27/16
11	Complete all Field Installation Acceptance Tests (FIAT) of the Signal System at 72nd Street.	05/23/16	04/23/16
12	Complete all Field Installation Acceptance Tests (FIAT) of the Signal System at 96th Street.	05/23/16	05/22/16
13	Complete all Field Installation Acceptance Tests (FIAT) of the Signal System at 86th Street.	07/18/16	07/17/16
14	Complete all Field Installation Acceptance Tests (FIAT) of the Signal System at 63rd Street and existing tie-in rooms at various locations.	05/30/16	05/25/16
15	Complete all remaining signal system work and testing required	05/23/16	05/07/16
16	63rd Comms. Systems: Complete all work and pre-testing required to perform Field Installation Acceptance Tests	05/31/16	05/31/16
17	72nd Comms. Systems: Complete all work and pre-testing required to perform Field Installation Acceptance Tests	06/13/16	06/13/16
18	86th Comms. Systems: Complete all work and pre-testing required to perform Field Installation Acceptance Tests	06/27/16	06/27/16
19	96th Comms. Systems: Complete all work and pre-testing required to perform Field Installation Acceptance Tests	06/20/16	06/20/16
20	The Contractor shall complete all work and testing through Final Systems Integrated Testing of all systems over the Local Area Network (LAN) and overall Wide Area Network (WAN), such that the LAN/ WAN is available for Final Systems Integrated Testing by the Station Contractors.	06/06/16	06/06/16
21	Complete all other work required to start Pre-Revenue Service Training	09/30/16	09/30/16

Activity Progress Monitoring:

Progress evaluation is a comparison of actual achievement versus planned achievement through a given time period. Using the acceleration schedules incorporated with each of the acceleration agreements, the PMOC has tabulated the number of activities forecast to be completed per month. Updated schedule provide actual activities achieved per month and revised forecasts for incomplete activities. Activity information is expressed in % complete to account for incidental activity additions and deletions.

Tabular and graphic summaries of this information follow:

Date	Planned % Complete	Actual % Complete	Forecast % Complete
Jan-16	5.7%	0.6%	
Feb-16	22.7%	1.3%	
Mar-16	42.2%	7.3%	7.3%
Apr-16	59.9%		31.7%
May-16	72.9%		54.0%
Jun-16	82.2%		70.1%
Jul-16	89.0%		80.8%
Aug-16	93.6%		91.2%
Sep-16	96.2%		96.2%
Oct-16	97.9%		97.8%
Nov-16	99.0%		98.8%
Dec-16	99.8%		99.9%
Jan-17	100.0%		100.0%
Feb-17	100.0%		100.0%



This very simple analysis indicates that, according to the updated contractor schedules, significantly fewer activities have been achieved by the four “accelerated” construction contracts than planned.

“Earned Value” Analysis:

In its periodic reports to the FTA, MTACC details the Budgeted Cost of Work Scheduled (BCWS) versus the Budgeted Cost of Work Performed (BCWP) for each active construction contract. At a summary level, the resulting “S-curves” compare planned versus actual performance and can provide insight into performance trends and schedule forecasts. For each active construction contract, the following table compares the planned vs. actual monthly level of achievement in terms of value earned by completed construction work. This “earned value” can be used to estimate the variance in planned vs actual schedule performance. January 2016 is the latest month for which this information is available.

Value Earned through - March-16							
	Contract \$ (x100K)	Plan \$ Earned	Actual \$ Earned	Plan Month for Actual \$ Earned	Months Ahead (+) or Behind (-)	Const. Comp Date	Est. Const. Complete Date
C2B	\$324	\$324	\$286	Apr-15	-8.1	9/1/16	5/3/17
C3	\$176	\$176	\$170	Sep-13	-27.4	9/1/16	03/1/17
C4C	\$258	\$255	\$211	Mar-15	-9.7	9/1/16	6/18/17
C5C	\$208	\$202	\$170	Aug-15	-4.1	9/1/16	1/1/17
C6	\$261	\$253	\$208	Jun-15	-6.2	9/1/16	3/5/17
TOTAL	\$1,227	\$1,210	\$1,044	Apr-15	-8.2	9/1/16	5/5/17

$$\begin{aligned} \text{Cost Variance} &= \text{Plan \$ Earned} - \text{Actual \$ Earned} \\ &= \$1,210\text{M} - \$1,044\text{M} = \$166\text{M} \end{aligned}$$

This summary level analysis suggests the following:

1. Had the work progressed according to baseline “plans”, an additional \$166M worth of original contract work would have been performed on or before March 31, 2016.
2. MTACC’s acceleration plan requires that \$166M of baseline construction be completed over the next 4 months. This does not include change order work or the value of the acceleration agreements.
3. If the current rate of progress can be maintained, the C4C, C5C and C6 contracts appear to be progressing at a rate that can achieve goal of the acceleration effort.
4. Based on current schedule assumptions, NYCT will require a minimum 2 months for pre-revenue testing after all construction is complete. This results in a forecast RSD of July 5, 2017, absent significant schedule improvement.

ELPEP/SMP Compliance: MTACC is no longer using the IPS “master schedule” approach to manage time on the project. The “Netpoint fragnet” system being used provides individual summarized schedule fragnets for select work on four remaining construction contracts. This

approach is not contained within the SAS Schedule Management Plan. It is the opinion of the PMOC that MTACC is not in compliance with its schedule management plan.

Concerns and Recommendations:

1. Schedule data reviewed by the PMOC is somewhat inconclusive. Based on data provided by MTACC:
 - a. Acceleration milestone forecast dates are being maintained.
 - b. Far fewer activities than forecast by the “acceleration schedules” are actually being completed.
 - c. The rate at which contractors are realizing base contract revenue (Burn Rate) has achieved a rate sufficient to complete the respective contracts on or around September 1, 2016 for the first time.
2. These observations suggest contractors may be concentrating on “accelerated” work associated with the milestones and neglecting other contract work. This scenario has been previously observed during earlier periods of schedule acceleration.
3. MTACC has focused its schedule acceleration efforts on operating systems, generally assuming there is always time to catch up on architectural and finish work. This approach should be reviewed periodically to be sure certain work has not been deferred so long that it cannot be completed without impact.
4. The total price due for each agreement is apportioned among new schedule milestones.
 - a. Contractors will complete the work for each milestone within 30 days of the date established in order to receive the milestone payment.
 - b. Contractors have a second chance to earn the milestone payment if the contractor is able to "catch-up" in time to meet the date required for pre-revenue training and testing.
 - c. If a contractor misses a milestone date (plus 30 days) and misses the pre-revenue service testing and training date (plus 30 days), the contractor will not be entitled to the milestone payment.
 - d. The MTA may decide to pay a contractor for an otherwise missed milestone if Revenue Service commences in or before December 2016.PMOC is concerned that payment terms are so favorable to the contractors that significant work may be deferred by a significant time, creating unforeseen impacts to system testing and the RSD.
5. Review of contractor “acceleration schedules” indicates varying degrees of schedule planning in the development of equipment and system testing procedures and acceptance criteria.
 - C2B – development of test procedures incorporated in schedule in detail.
 - C4C – development of test procedures not included in schedule.
 - C5C - development of test procedures not included in schedule.
 - C6 - development of test procedures not included in schedule.

The presence of a plan for this work provides some level of confidence the work will be completed in a timely manner, particularly when actual month-to-month progress appears limited.

3.0 COST DATA

Based upon financial expenditures reported by the MTACC through April 30, 2016, SAS Phase 1 is approximately 87.4% complete. The completion status of the individual construction contracts through April 30, 2016, also based upon reported expenditures through that date, is as follows:

- C26002 (Tunnel Boring) – 100.0%;
- C26005 (96th Street Station) – 100.0%;
- C26010 (96th Street Station) – 92.8%;
- C26013 (86th Street Station) – 100%;
- C26008 (86th Street Station) – 99.6%;
- C26012 (86th Street Station) – 85.3%;
- C26006 (63rd Street Station) – 96.9%;
- C26007 (72nd Street Station) – 99.9%;
- C26011 (72nd Street Station) – 83.5% ; and,
- C26009 (Systems) – 79.9%.

Aggregate Construction percentage complete:

- 100% of all construction has been bid;
- 100% of all construction is under contract;
- 93.1% of base contract construction (excluding AWOs) is complete; and,
- 93.6% of all construction is complete.

Based upon cost data received from the MTACC for the period through April 30, 2016:

- Value of construction reported in place this period = \$37,073,611;
- Estimated value of construction remaining = \$186,028,339 (base contract only);
- Target construction completion = September 1, 2016;
- Number of months remaining = 4; and,
- Avg. required construction expenditure to achieve target date = \$45,608,948/MO.

Soft Cost expenditures (not including real estate, OCIP, etc.) reported this period by the MTACC totaled \$2.76M; expenditures were spread through all of the project management and technical support categories. This lower-than-usual expenditure is partially due to the lack of any expense recorded against Construction Management. It also appears that additional MTA staff costs attributable to support of the schedule acceleration have yet to be charged to the project.

At current expenditure levels, the available budget should be sufficient through 2016. Significant expenditure beyond 2016 however, may require the transfer of additional funds from contingency. Any significant construction delays beyond December 2016 may also require additional contingency transfer.

Cost Growth: The value of AWOs reported by the MTACC/NYCT in April 2016 is summarized as follows:

	<u>Executed AWOs</u>	<u>AWO Exposure</u>
Apr-16	\$261,292,038	\$351,402,566
Mar-16	\$242,149,840	\$342,552,667
Δ	\$19,142,198	\$8,849,899
Δ	7.91%	2.58%

The changes in AWO Exposure for each construction contract are summarized as follows:

Const. Pkg.	AWO Exposure			
	Apr-16	Mar-16	Period Δ	Changes this Period
Complete Packages	\$47,612,118	\$47,612,118	\$0	Final values for Packages C1 and C5A as reported by MTACC.
C2A	\$47,615,409	\$47,615,409	\$0	No change reported this period.
C2B	\$59,195,482	\$59,240,668	-\$45,187	Net increase is based on revised estimates for AWO #s 121, 151, 178, 207, 215, 222, 224, 225, 228 and initial estimates for AWO #s 187, 203, 227, and 231.
C3	\$40,533,864	\$39,383,057	\$1,150,807	Net increase is based on revised estimates for AWO #s 190, 223, 260, 267, 271, 272, 275, 276, 277, 278, 279, 280, 282 through 291, and initial estimates for AWO # 292 through 302.
C4B	\$1,325,639	\$1,325,639	\$0	No change reported this period.
C4C	\$66,906,970	\$60,089,406	\$6,817,564	Net increase is based on revised estimates for AWO # 25, 80, 115, 118, 159, 160, 164, 182, 197, 210, 221 through 231 and initial estimates for AWO #s 23, 50, 199, 232, 233, 234, 237, 238, 239, and 240.
C5B	\$26,280,122	\$26,280,122	\$0	No change reported this period.
C5C	\$30,765,404	\$29,890,264	\$875,140	Net increase is based on revised estimates for AWO #s 6, 26, 33, 46, 79, 88, 90, 95, 96, 127, 133, and 150 and initial estimates for AWO #s 23, 48, 106, 124, 143, 161, 162, 167, and 168.
C6	\$31,167,559	\$31,115,984	\$51,575	Net increase is based on revised estimates for AWO #s 3, 46, 107, 131, 134, 135, 146, 171, 185, and 189 and initial estimates for AWO #s 162, 167, and 197.
	\$351,402,566	\$342,552,667	\$8,849,899	

The changes in Executed AWO Value are summarized as follows:

Const. Pkg.	Executed AWOs			
	Apr-16	Mar-16	Period Δ	Changes this Period
Complete Packages	\$47,612,118	\$47,612,118	\$0	Final values for Packages C1 and C5A as reported by MTACC.
C2A	\$47,615,409	\$47,615,409	\$0	No change reported this period.
C2B	\$49,550,183	\$35,122,183	\$14,428,000	Increase is based on execution of AWO #s 89, 145, 206, 207, 208, 214, 223, and 230.
C3	\$28,078,288	\$27,992,088	\$86,200	Increase is based on execution of AWO # 42, 92, 288.
C4B	\$1,325,639	\$1,325,639	\$0	No change reported this period.
C4C	\$32,741,399	\$30,089,999	\$2,651,400	Increase is based on execution of AWO #s 94, 160, 172, 173, 174, 194, 195, 207, 214, 216, 217, 220, 225, 229, and 230.
C5B	\$21,586,813	\$21,586,813	\$0	No change reported this period.
C5C	\$7,714,904	\$6,113,306	\$1,601,598	Increase is based on execution of AWO #s 21, 23, 25, 73, 85, 86, 105, 138, 144, and 150.
C6	\$25,067,285	\$24,692,285	\$375,000	Increase is based on execution of AWO #s 107, 131, 134, 171, and 185.
	\$261,292,038	\$242,149,840	\$19,142,198	

As of April 30, 2016, the status of Additional Work Orders (AWOs) for each construction contract on Phase 1 of the Second Avenue Subway Project is summarized as follows:

Contract / (Package)	% Complete	Award	Exposure		Executed	
			\$	% of Award	\$	% of Award
C26002 (1)	100.00%	\$337,025,000	\$41,086,647	12.19%	\$41,086,647	12.19%
C26005 (2A)	100.00%	\$325,000,000	\$47,615,409	14.65%	\$47,615,409	14.65%
C26010 (2B)	85.04%	\$324,600,000	\$59,195,482	18.24%	\$49,550,183	15.26%
C26006 (3)	94.71%	\$176,450,000	\$40,533,864	22.97%	\$28,078,288	15.91%
C26007 (4B)	99.93%	\$447,180,260	\$1,325,639	0.30%	\$1,325,639	0.30%
C26011 (4C)	73.36%	\$258,353,000	\$66,906,970	25.90%	\$32,741,399	12.67%
C26013 (5A)	100.00%	\$34,070,039	\$6,525,471	19.15%	\$6,525,471	19.15%
C26008 (5B)	99.63%	\$301,860,000	\$26,280,122	8.71%	\$21,586,813	7.15%
C26012 (5C)	64.84%	\$208,376,000	\$30,765,404	14.76%	\$7,714,904	3.70%
C26009(6)	69.51%	\$261,900,000	\$31,167,559	11.90%	\$25,067,285	9.57%
TOTAL TO DATE		\$2,674,814,299	\$351,402,566	13.14%	\$261,292,038	9.77%

To date, \$2,488,785,960 (93.1%) worth of all base contract construction work has been completed. As a percentage of work completed, the AWO exposure for these contracts is 14.1% and the executed AWO percentage is 10.5%.

The PMOC notes that total AWOs currently exceed the original AWO budget. The PMOC also notes that exposure values are not included in a significant number of logged AWOs. Based on current AWO trends, the final AWO value is estimated at approximately \$350 million. MTACC maintains an AWO forecast at completion that includes input from its Risk Registers. The MTACC AWO EAC Forecast through March, 2016, is \$359,227,269. This value is somewhat greater than the PMOC's AWO forecast and will be used as part of the overall contingency/EAC analysis.

Cost Contingency: Based upon the MTACC Current Working Budget, expenditures as of April 30, 2016, reported by the MTACC and the current AWO Exposure analyses, the PMOC has developed the following contingency analysis:

	Contingency Analysis	
	Current	@ Completion
Phase 1 Budget	\$4,451,000,000	\$4,451,000,000
Construction Awards	\$2,674,814,299	\$2,674,814,299
Soft Cost Expended	\$1,176,630,126	\$1,176,630,126
Soft Cost Forecast to Complete	\$200,024,639	\$200,024,639
Add'l Soft Cost - Schedule Acceleration		\$25,000,000
AWO Exposure	\$299,046,313	\$359,227,269
Total Contingency	\$100,484,623	\$15,303,667
Reserved Contingency	\$100,484,623	\$15,303,667

Notes:

- (1) AWO Exposure @ Completion incorporates MTACC's latest "risk-informed" forecast through March 2016
- (2) Total Contingency = Reserved Contingency = total budget balance after forecast expenditures;
- (3) Minimum Available Contingency required by ELPEP is approximately \$45,000,000 (100% Construction Bid, 85% Construction Complete).

Conclusions based upon this analysis include:

- (1) At the April 21, 2016 Quarterly Meeting with FTA, MTACC stated that "soft costs" to support the schedule acceleration effort could be as high as \$25M. This preliminary estimate may be conservative, however given the limited contingency remaining, PMOC recommends MTACC incorporate that additional \$708M of local funds committed through the amended FFGA into the project cost management system to cover potential additional costs in excess of available contingency.
- (2) Available contingency currently conforms to ELPEP limits.

ELPEP/CMP Compliance: The SAS Project Team maintains an EAC for all construction costs, which is updated monthly. Revision #10 of the Project Cost Estimate, which includes a complete forecast of remaining soft costs has been prepared, incorporated and updated as the project CWB. It is the opinion of the PMOC that SAS Phase 1 is in substantial compliance with the metrics, deliverables, and overall goals enumerated for Cost Management in the Enterprise Level Project Execution Plan (ELPEP), dated January 15, 2010 (Section IV. b, page 8), and as further described by the Cost Management Plan (CMP).

4.0 RISK MANAGEMENT

Status

The major risk challenging the SAS Project Team at this time is schedule; senior MTA management has advised that the current goal for construction completion and the start of Revenue Service is December 1, 2016. Secondary risk involves the possibility that additional schedule acceleration (or delay mitigation) costs could threaten the completion of the project within MTACC’s Current Working Budget of \$4.451B.

At this stage of the project, these risks are well understood by senior SAS managers and their mitigation is the focus of almost all project management activity. As such, regular monthly risk management meetings and reports are somewhat redundant and are not currently scheduled.

Observation and Analysis:

The goal of MTACC’s “schedule acceleration initiative” is to complete all third-party construction, testing, and acceptance activities by September 1, 2016. This will create additional time for NYCT operational testing and final “debugging” necessary for Revenue Service to start no later than December 30, 2016. The acceleration of the construction schedule can be considered a mitigation strategy directed at recovering time lost through previous delays and mitigating delays forecast by the project schedule and other project management tools.

Risks can be classified as either management and organizational risk or technical and coordination risk. Major risks within each of these categories are summarized as follows:

Management and Organizational Risks		
	Risk	Status
1.	MTACC’s ability to implement its schedule acceleration program through compression of construction schedules.	MTACC appears to have successfully avoided this risk.
2.	Design and scope changes requested by NYCT during the late stages of construction.	During March 2016, 48 new AWOs were executed. During April 2016, 43 new AWOs were executed. Preliminary review of these AWOs suggests they conform to the “operations and life safety” criteria noted by MTACC.
3.	Availability of NYCT staff to support testing, commissioning and final acceptance of work performed by SAS contractors	Additional NYCT staff to support testing and acceptance of the work have been and will be made available to support project needs.
4.	Availability of NYCT staff to conduct code compliance and final inspection of constructed facilities.	A consultant has been procured and will provide supplemental staff to support NYCT code compliance inspection activities. MTACC has noted this effort involves over 1400 individual rooms. At the March and April 2016 Cost & Schedule meetings, PMOC has requested documentation of the status of this effort. No information has been provided by MTACC to date.
5.	MTACC’s system testing and approval	The projects current method of referencing

Management and Organizational Risks		
Risk		Status
	process has deviated from its Facilities System Test Program as a means of supporting the accelerated construction and testing schedule.	tests as specific “Levels” is not defined in the Facilities Systems Test Program (FSTP) (Volume 1 –Management Plan). The FSTP also states that there will be a Systems Acceptance Phase (SAP) which will occur after substantial completion (completion of FAT, FIAT, SIST and FSIT). During this phase, the systems and subsystems will be operated to demonstrate that all interfaces and systems are functioning as designed and intended. After successful completion of this phase, acceptance certificates will be issued by NYCT. Schedules published by MTACC do not reflect the testing process as documented in the FSTP.
6.	MTACC’s ability to manage the change order process in a timely manner to avoid contractor delay.	PMOC has observed a general increase in the number of AWOs executed over the past several months. Additional resources have apparently had an impact on volume of AWOs processed.
Technical and Coordination Risks		
Risk		Status
1.	Critical communication systems: fire alarm system and police radio installation, testing, commissioning and acceptance.	Schedules made available by MTACC currently indicate these work elements will be completed in time to support the scheduled RSD.
2.	Permanent facility power – all stations	
3.	Traction Power – all stations	
4.	Installation, testing, commissioning and acceptance of elevators and escalators.	
5.	Watermist system.	

In addition to these risks, the PMOC considers the overall capability and readiness of the SAS Project Team (MTACC and its consultants and contractors) to implement an aggressive schedule acceleration initiative to be a significant risk.

As the number of field installation activities decreases, the next major “phase” of work involves system testing and commissioning. The following table summarizes the SAS Project Team’s progress during January and February 2016 in developing test procedures and acceptance criteria necessary for the performance of the actual equipment testing and acceptance.

		Level 3/4 (FIAT)			Level 5 (FIST)			Level 6 (FSIT/SIT)		
		Mar-16	Apr-16	Δ	Mar-16	Apr-16	Δ	Mar-16	Apr-16	Δ
63rd Street	Required	65	65	0	30	30	0	9	9	0
	Submitted	65	65	0	30	30	0	9	6	-3
	Approved	60	65	5	17	25	8	5	6	1
	% Complete	100%			83%			67%		
72nd Street	Required	60	55	-5	31	26	-5	13	13	0
	Submitted	39	55	16	24	26	2	4	7	3
	Approved	15	29	14	2	2	0	2	1	-1
	% Complete	53%			8%			8%		
86th Street	Required	60	62	2	14	14	0	9	9	0
	Submitted	39	62	23	0	2	2	0	0	0
	Approved	20	42	22	0	0	0	0	0	0
	% Complete	68%			0%			0%		
96th Street	Required	59	61	2	13	13	0	8	8	0
	Submitted	59	59	0	0	0	0	0	0	0
	Approved	41	44	3	0	0	0	0	0	0
	% Complete	72%			0%			0%		

This tabulation raises the following concerns:

- With the exception of 63rd Street, the level of completion of procedure development for each level is reasonably consistent across the contracts.
- Progress over the period represented by this table was limited.
- Progress in the development of testing and acceptance criteria and procedures has been and continues to be minimal at all three of the new SAS stations.
- Completion and approval of all test procedures is not a criterion restraining the start of testing at any level. However a large number of incomplete or unapproved test procedures increases the risk of delay significantly.

Conclusions

Significant risks remain for both the successful execution of MTACC's accelerated construction schedule as well as overall achievement of Revenue Service on December 30, 2016. Recent improvements in the rate of construction progress must be maintained throughout the next four months. Significant improvements in preparation for systems testing and acceptance must be achieved over the next several months in order for these efforts to be successful.

MTACC has effectively managed numerous cost/schedule risks over the construction phase of SAS. In many instances, MTACC has chosen to proactively manage the project schedule through directed acceleration at costs equal or less than costs that would be incurred by passive acceptance of commensurate delay costs. In these instances, the risk management process has been instrumental in identifying potential cost/schedule risks to the project and developing mitigation strategies. The PMOC anticipates use of this process will be an important component of MTACC's overall schedule acceleration initiative.

5.0 ELPEP

The most recent ELPEP Quarterly Review Meeting was held on March 3, 2016. The next ELPEP Quarterly Review Meeting with MTACC, FTA-RII, SAS and the ESA project, and the PMOC is scheduled for June 16, 2016. With respect to SAS, the current status of each of the main ELPEP components is summarized as follows:

- **Technical Capacity and Capability (TCC):** MTACC has resolved all remaining FTA/PMOC comments and has issued the final revised PMP. MTACC is not planning any further updates to the SAS PMP;
- **Schedule Management Plan (SMP):** MTACC's position is that the SAS management processes remain ELPEP compliant. The PMOC does not concur with this assessment. PMOC notes the ELPEP Conformance/Compliance checklist indicates the IPS is updated on a monthly basis. As noted at the March and April, 2016 Cost & Schedule Meetings, the SAS Project Team is no longer maintaining the IPS. Refer to Section 2.0 of this report for further discussion.
- **Cost Management Plan (CMP):** Comments on the ESA/SAS Cost Management Plan (CMP) were received on June 2, 2015. MTACC and the PMOC have held meetings to resolve remaining issues. MTACC's position is that the SAS management processes remain ELPEP compliant;
- **Risk Mitigation Capacity Plan (RMCP) and Risk Management Plan (RMP):** MTACC's position is that the SAS management processes remain ELPEP compliant; and,

The SAS Project Team has implemented the principles and requirements embodied in the ELPEP. The procedural changes triggered by the ELPEP have become an integral part of the management of the project and give the FTA/PMOC greater insight into the risk, cost, and schedule elements of the project.

6.0 SAFETY AND SECURITY

Each construction contractor continued implementation of the Safety Requirements as specified in Section 01 11 50 of the General Requirements.

As of March 31, 2015, a total of 12,758,777 construction hours have been logged on the project with 100 lost time and 179 recordable incidents documented. The total hours and incidents equates to a Lost Time Rate (LTR) of 1.57 and a Recordable Rate (REC) of 4.37. The LTR is below and the REC is above the US Bureau of Labor Statistics (BLS) national rates (Heavy & Civil construction) of 1.8 and 3.2 respectively. Although the REC is above the BLS national rate, it continues to show a downward trend.

Safety and Security Certification: Safety and Security Certification Requirements are specified in Section 01 77 12 of the General Requirements for each station and system contract. The certifiable elements of the SAS project have been identified and the subsequent breakdown of the certifiable elements into a list of certifiable items (CIL) has been completed. Technical Working Group (TWG) meetings are ongoing with each station contractor and the system contractor to review the test status of the certifiable items. Documentation supporting verification (Body of Evidences) of a certifiable item is being accumulated and entered into the database. Status meetings are held quarterly with the FTA and the PMOC in order to provide updates. Status meetings are held monthly with the PMOC in attendance and the FTA is briefed quarterly.

7.0 ISSUES AND RECOMMENDATIONS

Schedule Acceleration Initiative: MTACC’s schedule acceleration initiative results in the establishment of September 1, 2016, as a new intermediate milestone at which time most construction installation and testing activities are to be completed and NYCT Pre-Revenue Testing is scheduled to commence.

- The analysis of schedule data presented by MTACC provides a mixed view of project progress. Milestone dates are apparently being met, yet overall performance indicators suggest schedules are not being achieved.
- In managing this accelerated schedule, MTACC has chosen the traditional approach of focusing on the installation and testing of the mechanical and electrical systems; assuming that any remaining architectural construction can be completed at the end by applying as much labor as may be required.
- Data evaluated combined with general observation of the work sites suggests the mechanical, electrical and systems work may be receiving priority attention at the expense of the other, currently less critical, architectural and general construction. PMOC recommends MTACC periodically review the progress of remaining architectural construction as well as punchlist work to verify that sufficient progress is being made to provide satisfactory conditions in passenger spaces to allow opening or about the RSD.

Certification for Revenue Service: MTACC has revised significant elements of its Facilities Systems Test Program (FSTP) to support the goals of the accelerated schedule. Upon completion of all testing, the procedures followed, approvals received and documentation assembled is likely to be significantly different than that stipulated by the current plan. In that scenario, the PMOC questions what the responsible individuals or the MTA as an organization will reference as a baseline or standard against which it is “certifying” SAS, Phase 1 as being safe for revenue service.

Budget/Cost Management: Current forecasts indicate approximately \$15M of contingency available at the end of SAS Phase 1 construction. This forecast may underestimate certain remaining construction and post-construction risks.

In the amended FFGA (ref. page 2) MTACC Grantee agreed to contribute additional state and local funds in the amount of \$708,000,000 to ensure sufficient funds to complete the project.

The PMOC recommends that some or all of this local obligation be made available and incorporated into the project cost management system to ensure subsequent decisions can be made without constraint of available funding.

APPENDIX A – ACRONYMS

ARRA	American Recovery and Reinvestment Act
AWO	Additional Work Orders
BLS	Bureau of Labor Statistics
CBH	Circuit Breaker House
CCM	Consultant Construction Manager
CD	Calendar Days
CIL	Certifiable Items List
CMP	Cost Management Plan
CSSR	Contact Status Summary Report
CPRB	Capital Program Review Board
CWB	Current Working Budget
CY	Cubic Yards
DCB	Detailed Cost Breakdown
EAC	Estimate at Completion
ELPEP	Enterprise Level Project Execution Plan
FIAT	Field Installation Acceptance Test
FFGA	Full Funding Grant Agreement
FSIT	Final Systems Integrated Testing
FSTP	Facilities System Integrated Testing
FTA	Federal Transit Administration
GO	General Outage
IPS	Integrated Project Schedule
LAN	Local Area Network
LTR	Lost Time Rate
MO	Month
MPT	Maintenance and Protection of Traffic
MTA	Metropolitan Transportation Authority
MTACC	Metropolitan Transportation Authority – Capital Construction
N/A	Not Applicable
NYCT	New York City Transit
NYSPTSB	New York State Public Transportation Safety Board

OSS	NYCT Office of System Safety
PEP	Project Execution Plan
PMOC	Project Management Oversight Contractor (Urban Engineers)
PMP	Project Management Plan
PQM	Project Quality Manual
QA	Quality Assurance
RAMP	Real Estate Acquisition Management Plan
REC	Recordable Rate
RMCP	Risk Mitigation Capacity Plan
RMP	Risk Management Plan
ROD	Revenue Operations Date
ROW	Right of Way
RSD	Revenue Service Date
SAS	Second Avenue Subway
SCC	Standard Cost Category
SIST	Simulated Integrated System Testing
SMP	Schedule Management Plan
SSCC	Safety and Security Certification Committee
SSOA	State Safety Oversight Agency
SSPP	System Safety Program Plan
TBD	To Be Determined
TCC	Technical Capacity and Capability
TPSS	Traction Power Substation
TWG	Technical Working Group
WAN	Wide Area Network (WAN)
WBS	Work Breakdown Structure
WD	Work Days

APPENDIX B – TABLES

Table 1 - Summary of Schedule Dates

	FFGA (March 2015)	Forecast Completion	
		Grantee	PMOC
Begin Construction	January 1, 2007	March 20, 2007A	March 20, 2007A
Construction Complete	August, 2016	September 1, 2016	October 2017
Revenue Service	February 28, 2018	December 30, 2016	February 2018

A = Actual

Table 2 - Project Budget/Cost 

	FFGA			FFGA Amend	MTA Current Working Budget (CWB)		Expenditures as of April 30, 2016	
	\$ Millions	% of Total	Obligated (\$ Millions)	3/17/2015	\$ Millions	% of Total	\$ Millions	% of Total
Grand Total Cost	4,866.614	100	4,572.942	5,574.614	5,267.614	100	3,889.065	73.83
Financing Cost	816.614	16.78		816.614	816.614	15.50		
Total Project Cost	4,050.000	83.22	4,572.942	4,758.000	4,451.00	84.50	3,889.065	73.83
Total Federal	1,350.693	27.75	1,063.942	1,373.893*	1,350.693	24.60	1,180.877	22.42
Total FTA share	1,300.000	96.25	990.049	1,300.000	1,300.000	23.68	1,180.877	22.42
5309 New Starts share	1,300.000	100	990.049	1,300.000	1,300.000	23.68	1,106.984	21.02
Total FHWA share	50.693	3.75	73.893	73.893	50.693	0.96	73.893	1.40
CMAQ	48.233	95.15	71.433	71.433	48.233	0.88	71.433	1.35
Special Highway Appropriation	2.460	4.85	2.460	2.460	2.460	0.04	2.460	0.05
Total Local share	2,699.307	55.47	3,509.000**	3,384.107	3,509.000 **	63.92	2,708.188	51.41
State share	450.000	16.67	100.000		450.000	8.20		
Agency share	2,249.307	83.33	1,145.782		3,059.000	55.72		
City share	0	0			0	0		

* Obligated and expended amounts obtained from the Transportation Electronic Award Management (TEAM) system and MTACC's Grant Management Department.

** Current MTA Board approved budget.

Table 3 - Estimate at Completion

Category	Current Working Budget	EAC Forecast
Total Construction	\$2,674,814,299	\$3,034,041,568.00
Engineering Services Subtotal	\$622,862,000	\$681,088,115.00
Third Party Expenses	\$554,086,273	\$562,086,000.00
TA Expenses	\$131,160,085	\$158,480,650.00
Contingency	\$468,077,343	
Total	\$4,451,000,000	\$4,435,696,333

Table 4 - Allocation of Current Working Budget to Standard Cost Categories

Std. Cost Category (SCC)	Description	FFGA (January 2008)	FFGA Amended (March, 2015)	MTA's Current Working Budget (December, 2015)
10	Guideway & Track Elements	\$612,404,000	\$195,346,781	\$622,478,000
20	Stations, Stops, Terminals, Intermodal	\$1,092,836,000	\$1,666,605,679	\$1,277,642,000
30	Support Facilities	\$0	\$0	\$0
40	Site Work & Special Conditions	\$276,229,000	\$793,118,232	\$524,561,000
50	Systems	\$322,707,000	\$250,379,966	\$250,134,000
60	ROW, Land, Existing Improvements	\$240,960,000	\$281,500,000	\$281,500,000
70	Vehicles	\$152,999,000	\$0	\$0
80	Professional Services	\$796,311,000	\$1,026,608,168	\$1,185,742,929
90	Unallocated Contingency	\$555,554,000	\$544,441,174	\$308,942,010
Subtotal		\$4,050,000,000	\$4,758,000,000	\$4,451,000,000
Financing Cost		\$816,614,000	\$816,614,000	\$816,614,000
Total Project		\$4,866,614,000	\$5,574,614,000	\$5,267,614,000

Table 5 - Core Accountability Items

Project Status:		Original at FFGA	Current*	ELPEP**
Cost	Cost Estimate	\$4,050 million	\$4,451 million	\$4,980 million
Contingency	Unallocated Contingency	\$555.554 million	\$100 million	\$45 million
	Total Contingency (Allocated plus Unallocated)	\$555.554 million	\$100 million (April 2016)	\$45 million
Schedule	Revenue Service Date	June 30, 2014	December 30, 2016	February 28, 2018
Total Project Percent Complete	Based on Expenditures	87.4%		
	Based on Earned Value	N/A		
Major Issue		Status	Comments	
Construction Schedule Acceleration		Open	MTACC's decision to accelerate the construction schedule to allow NYCT pre-Revenue Testing to commence on 09/01/16 results in concerns over additional cost and the ultimate ability to achieve this goal.	
Construction Quality and Operational Readiness		Open	MTACC has deviated from established organizational and project procedures as part of its schedule acceleration effort. PMOC is concerned that these deviations may result in reduced construction quality and incomplete systems testing.	
Date of Next Quarterly Meeting:		TBD (Tentatively July 21, 2106)		

* MTACC's Current Working Budget

** Enterprise Level Project Execution Plan (ELPEP), reflecting median level of risk mitigation

Financial data based upon MTACC reporting through 4/30/2016