

PMOC MONTHLY REPORT

Second Avenue Subway Phase 1 (MTACC-SAS) Project

Metropolitan Transportation Authority

New York, New York

Report Period November 1 to November 30, 2015



PMOC Contract No. DTFT6014D00017

Task Order No. 2, Project No. DC-27-5287, Work Order No. 1

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

TABLE OF CONTENTS

TABLE OF CONTENTS	2
THIRD PARTY DISCLAIMER.....	3
REPORT FORMAT AND FOCUS.....	3
MONITORING REPORT	3
1.0 PROJECT STATUS.....	3
a. Procurement	3
b. Construction.....	3
c. Quality Assurance and Quality Control (QA/QC).....	10
2.0 SCHEDULE DATA.....	13
3.0 COST DATA.....	22
4.0 RISK MANAGEMENT	27
5.0 ELPEP	30
6.0 SAFETY AND SECURITY.....	31
7.0 ISSUES AND RECOMMENDATIONS.....	32

APPENDICES

APPENDIX A – ACRONYMS

APPENDIX B – TABLES

Table 1 - Summary of Schedule Dates

Table 2 - Schedule Contingency

Table 3 –Schedule Milestone Comparison

Table 4 - Project Budget/Cost

Table 5 - Estimate at Completion

Table 6 - Allocation of Current Working Budget to Standard Cost Categories

Table 7 - Core Accountability Items

THIRD PARTY DISCLAIMER

This report and all subsidiary reports are prepared solely for the Federal Transit Administration (FTA). This report should not be relied upon by any party, except FTA or the project sponsor, in accordance with the purposes as described below.

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 November 2015, 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 83.5% 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 November 30, 2015, 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 has been delayed until year end.

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

- **Entrance 1 (GL 13-14, Southwest Corner 2nd Ave. and 94th St.)**
 - **Basement and Mezzanine Levels (ongoing work)**
 - HVAC duct installation;
 - Electrical conduit;
 - Plumbing system installation; and,
 - Framing for porcelain ceramic wall tile.
 - **Street Level (ongoing work)**
 - Escalator installation ;
 - ConEd manhole installation; and,
 - Utility installation (sewer, water mains, gas pipe, valves, and catch basin).
- **Entrance 2 (GL 13-14, Northeast Corner 2nd Ave. and 94th St.)**
 - **Street Level (ongoing work)**
 - Utility work (removal of ConEd ducts, gas connections, duct installation);
 - Deck and deck beam removal; and,
 - Backfill.
 - **Mezzanine Level (ongoing work)**
 - Installation of escalators;
 - Conduit installation; and,
 - Wire pull.
- **Entrance 3 (CL 21-23, West side 2nd Ave between 95th and 96th St.)**
 - **Street Level (ongoing work)**
 - Conduit installation
 - Installation of new communication manhole
 - Installation of piles to support sewer line
 - Backfill area to street level
 - Build elevator structural frame
 - Build elevator enclosure frame base
 - Installation of escalators
 - **Mezzanine Level (ongoing work)**
 - Wire pulling
 - Installation of granite base (**ongoing work**)
 - Installation of HVAC duct
- **Ancillary 1 (Gridline 8-9.5, Northeast corner 2nd Ave. and 93rd St.)**
 - **Street Level (ongoing activities)**
 - Installation of stone cladding
 - Installation of power and lighting conduit
 - Installation of plumbing pipe

- **Mezzanine Level (ongoing work)**
 - Wet pipe sprinkler installation
 - Power and lighting conduit installation
 - Plumbing pipe installation
- **Invert Level (ongoing work)**
 - Gratings and support installation
- **Ancillary 2 (GL 28-29.5, Southwest corner 2nd Ave. and 97th St.)**
 - **Street Level (ongoing work)**
 - Panel boards installation
 - Installation of steel stairs
 - Power and lighting conduit installation
 - Installation of stone cladding
 - Axial fan installation
 - **Mezzanine Level (ongoing work)**
 - Power and lighting conduit installation
 - Plumbing pipe installation
 - **Invert Level (ongoing work)**
 - Conduit routing
 - Form/Placement of damper curb (completed)
 - Plumbing pipe installation

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

The focus of the work effort remains at Area 5 and the progress at Entrance #1.

- **Area 5 (Reconstruction includes mezzanines and the deck plaza roof)**
 - In Area 5, pre-inspections and final inspections by NYCT user groups continued in Mezzanines #1 - #4 and began in the Back of House (BOH) areas of the 6th Mezzanine;
 - At the 6th Mezzanine, the porcelain wall and beam tile cladding installation is nearing completion and installation of ceiling panels continued;
 - Arts-N-Design artwork is well underway on the 6th Mezzanine and will begin in Entrance #1 on December 7, 2015;
 - Insulation of the heat tracing system was completed;
 - The turnstiles for fare collection will be installed on the 6th Mezzanine in December 2015; and,
 - In the Traction Elevator Shafts, all 4 elevators are complete with the exception of connection of the communication cables.
- **Entrances (#1, #2, #3, and #4)**
 - At Entrance #1, installation of the storefront system and installation of the finish ceiling along the escalator incline continued;
 - Installation of the exterior granite facing at Entrance #1 will begin in December 2015;
 - At the Entrance #2 elevator shaft, the roof installation began the week of November 29, 2015;

- NYCT Elevator & Escalator group began inspections of the Entrance #2 Elevator;
 - At the new Entrance #4, it has been discovered that the entrance canopy is too close to the existing building for the surrounding railing to work. A design alternative is being prepared.; and,
 - Installation of stair treads and exterior granite facing began at Entrances #3 & #4.
- **Platforms**
 - Glazing of the operable window panels is complete in the G3 Platform Lobby; and,
 - The fire rated curtain wall installation in the elevator lobbies is being completed and the fire rated curtain wall for the 6th Mezzanine has been delivered.
 - **Site**
 - At the Plaza, the granite pavers will be delivered in January 2016; and,
 - Street paving along East 63rd St. and 3rd Ave. began November 24, 2015.

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 contractor continued working on punch list items, correcting the deficiencies to the architectural finish along the escalator incline at Entrance #2.

It remains to be seen if similar corrective work will also be required on the Entrance #1 incline finish. This concrete is currently being placed.

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

- **Ancillary #2**
 - 2 Cooling Towers have been set in place on the roof;
 - The installation of the channel supports for the architectural terra cotta building stone continued;
 - Fan silencers have been positioned in the Fan Room. Fan delivery is scheduled for the week of December 6, 2015; and,
 - The contractor is continuing with sub-basement and basement level FPR electrical work.
- **Entrance #2**
 - The corrective concrete finish work has been completed and work preparations are continuing for delivery of incline escalator trusses the week of December 13, 2015.
- **Ancillary #1**
 - Through November 2015, the final 5th Floor walls erection and floor placement was approximately 30% complete; and,

- MEP work continued in the sub-basement and basement FRP rooms.
- **Cavern Mezzanine (Public, North and South)**
 - At the North & South Mezzanine, MEP installation in Fan/Chiller rooms is ongoing. Installation of the C1A ceiling panels is approximately 99% complete in the North Mezzanine.
 - In the Public Mezzanine, installation of W30 Wall porcelain tiles continues and painting of the framing at the service carrier continues.
 - Installation of the tactile platform edge is approximately 80% complete.
- **Platform**
 - Installation of service carriers continues and is approximately 60% complete.
 - Installation of the tactile platform edge is approximately 80% complete.
 - Installation of the platform service carriers continues and is approximately 60% complete
- **Entrance #1**
 - At Entrance #1, lowering of the MCT Arch Form was completed in the escalator incline.
 - On the outside, Entrance #1 walls have been completed and placement of the slabs is ongoing.
- **Entrance #3 (Elevator Bank)**
 - Erection of formwork, installing rebar and placing concrete walls above grade continued.
- **Schedule**
 - The forecast for completing energization of permanent power continues to be February 29, 2016.
 - The Substantial Completion date based on the Update #32 continues to be February 17, 2017. The Project Scheduler has advised that acceleration is forecast to improve this date to November 2016.
 - Contract acceleration is being proposed by an increase in manpower and work duration (2 shifts, 7 days a week). This acceleration has not yet begun.

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

- **General**
 - The 87th St. shaft remains open to allow the C6 contractor access to the lower levels for equipment delivery.
- **Cavern (Public, North & South Mezzanines)**
 - The contractor began the W30 wall erection.
 - The silencers for the fans have been installed. Factory Acceptance Tests (FAT) for the fans is underway.
 - MEP work continues on the 1st, 2nd, and 3rd Upper Mezzanines.
 - The chillers have been assembled on both the north and south mezzanines. Connection of the pumps and installation of the piping is ongoing.
 - Wiring to switchgear is ongoing in both the north and south Facility Power Rooms (FPR).
 - Installation of the C1A ceiling has begun in the south mezzanine.
 - The Station Service Center (SSC) has been delivered.
- **Entrance #1**
 - The FAT for the escalators has been completed and delivery is pending. The MPT for the area around E. 83rd St. will have to be modified and approved by NYDOT to allow for the long truss sections to be placed at the site.
- **Entrance #2**
 - The lower incline escalators installation continues.
 - The street level kiosk for the ADA Elevator will be delivered December 13, 2015.
- **Ancillary #1**
 - Wall erection and slab placement at Ancillary #1 continued above street level. This work is progressing slowly.
 - MEP work continued in the FPR.
- **Ancillary #2**
 - Waterproofing walls, and slab construction continued in Ancillary #2. The contractor is utilizing 2 shifts because this work has also been progressing slowly.
- **Platform**
 - Installation of the mezzanine to platform escalators and machine room work is complete.
 - Installation of the over the track ceiling is approximately 90% complete.
 - Installation of water mist system is continuing under the platform.

- Installation of the porcelain tile track wall cladding continues on both the north and south tracks and is approximately 90% complete.
- **Site**
 - Installation of the gas line was completed between E. 82nd and E. 84th Streets along Second Ave.
- **Schedule and C6 Coordination**
 - Energization of permanent power continues to be forecast to be energized in February 2016;
 - Of the 33 milestone rooms designated to be turned over to the C6 contractor, the Project Office has reported that 28 have been turned over and “conditionally” accepted. Four of the final 5 areas are shafts and the final area is the SCC; and,
 - The contractor is preparing the requested acceleration schedule to insure that this contract is substantially complete to allow revenue service by the end of 2016. The contractor has advised that they are working extended hours in the FPRs and are increasing the electrician manpower count to 70 at the site.

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

- **63rd Street Station**
 - Network FIAT and FIST is still ongoing (MR-223D, MR-223E, MR-223F and MR-223G); and,
 - On the S1/G3 and S2/G4 tracks, guard rails and protective boards are being installed.
- **72nd Street Station**
 - Installation of signal equipment and conduit is ongoing;
 - Pulling of signal cables in Zone 10 is ongoing;
 - Pulling of fiber optic and copper cables between communication rooms is ongoing (AWO);
 - Installation of rack to rack wiring, plug couplers, and dressing of the wires in the racks in the Relay Room is ongoing; and,
 - Installation of equipment in the traction power substation (TPSS) is ongoing.
- **86th Street Station**
 - Re-installation of the epoxy floor in TPSS is in progress and projected to be completed by December 7, 2015; and,
 - Coordination ongoing for the installation of rack steel in 1200.
- **96th Street Station**
 - Installation of racks and ladder trays in Relay room completed; and,
 - Installation of plug couplers and rack to rack wiring ongoing.

▪ **Tunnel/Track Work**

- Tunnel (Zone 1: 98th St. to 104th St.) – The contractor has completed pulling of all fiber, communication, power, and signal cables and the installation of tracks, third rail, and wayside equipment;
- 96th St. Station Area (Zone 5: 93rd St. to 98th St.) – S1/S2 tracks, third rails, cables, and the wayside equipment have been installed. Installation of protection board and 500 mcm cable to negative rail is ongoing.
- Crossover (Zone 6: 92nd St. to 94th St.) – Special track work (crossover) has been completed. Installation of third rail, protection board, and wayside is in progress.
- Tunnel (Zone 2: 87th St. to 92nd St.) – Installation of the S1 and S2 tracks and third rails have been completed. All signal cables have been pulled. The contractor needs Zone 11 rooms, conduits, and trays installed in order to complete the installation of the fiber and communication cables.
- 86th St. Station Area (Zone 11: 83rd St. to 87th St.) – Track installation will start after the completion of Zone 11 and is forecasted to be completed May 2, 2016.
- Tunnel (Zone 10: 73rd St. to 87th St.) – Pulling of S1/S2 signal cables is ongoing. Track installation forecasted to start after completion of Zone 8 with completion scheduled for April 10, 2016.
- Crossover (Zone 8: 72nd St. to 73rd St.) – Pulling of cables has been completed. Installation of S1 and S2 tracks and the SWP 132A-2 crossover is ongoing, with completion projected for December 30, 2015.
- 72nd St. Station Area (Zone 7: 69th St to 72nd St.) – Pulling of cables has been completed. S1 and S2 track installation has been completed.
- Crossover (Zone 4: 68th St. to 70th St.) – Pulling of cables has been completed. Installation of S1 and S2 tracks and the SWP-132A-1 crossover is ongoing, with completion projected for December 4, 2015.
- Tunnel (Zone 3: 3rd Ave. to 68th St.) – G3/S1 and G4/S2 tracks, third rail, protection board, wayside equipment, and cables have been installed.

▪ **Testing and Commissioning**

- Contractor continues to hold coordination meetings with 63rd, 72nd, 86th, and 96th Systems Integration Managers; and,
- Updated Systems Test Plans Volume 3 Rev. 14 was submitted and will continue to be submitted monthly.

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

Status:

During November 2015, 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:

Project Quality Manual (PQM): The SAS Quality Manager prepared Revision 3 to the PQM that reflects the new MTACC QO checklist requirements and other changes that have occurred since the last revision was issued. The PMOC is completing its review of the Final Draft and will return comments to the SAS Quality Manager in December 2015.

Concerns and Recommendations:

Discussed under each Contract Package.

Contract Package C2B	
Status:	Through November 30, 2015, a total of 137 NCRs have been issued. Ninety (90) have been closed and 47 NCRs are still open. In November 2015, four new NCRs were written and one was closed. Thirty-two (32) of the open NCRs are for concrete that was out-of-specification.
Observation:	Bi-weekly Quality Management Meetings, as suggested by the PMOC, are still being held. Submittal of Daily Inspection Reports is 3 weeks behind.
Concerns and Recommendations:	Thirteen (13) of the open 15 non-concrete NCRs have been open more than five months. The contractor has established closure dates that are not realistic. The PMOC recommends that a realistic schedule for closure of the open NCRs be established. The contractor should then make an effort to meet these dates. The PMOC also recommends that a concrete statistical analysis be performed and submitted.
Contract Package C3	
Status:	Through November 30, 2015, a total of 122 NCRs have been issued. Ninety-eight (98) have been closed and 24 are still open. In November 2015, 3 new NCRs were written and none were closed.
Observation:	Eighteen (18) of the open 19 NCRs are due to concrete that was out of specification.
Concerns and Recommendations:	The PMOC has no concerns at this time.
Contract Package C4C	
Status:	Through November 30, 2015, a total of 196 NCRs have been issued. One hundred forty-four (144) have been closed and 52 NCRs are still open. In November 2015, four NCRs were written and 34 were closed.
Observation:	One hundred sixty-five (165) of the 196 NCRs are for concrete that was out of specification. Three of the four NCRs generated in November

	were for concrete. Submittal of Daily Inspection Reports is current.
Concerns and Recommendations:	The PMOC encouraged the contractor to close concrete NCRs that had an approved statistical analysis and 32 of the 34 closed NCRs in November were for concrete. Thirty-seven (37) of the remaining 52 open NCRs are for concrete that was out of specification. The PMOC recommends that another concrete statistical analysis be performed and submitted.
Contract Package C5C	
Status:	Through November 30, 2015, 145 NCRs have been issued. Sixty-seven (67) have been closed and 78 NCRs are still open. In November 2015, two new NCRs were written and one was closed.
Observation:	Submittal of Daily Inspection Reports is one week behind. Thirty-seven (37) of the 78 NCRs that are open are for concrete that is out of specification.
Concerns and Recommendations:	The PMOC continues to recommend that the contractor establish a schedule for closing the 41 non-concrete NCRs and recommends that a concrete statistical analysis be performed and submitted.
Contract Package C6	
Status:	Through November 31, 2015, a total of 43 NCRs have been issued. Thirty-four (34) NCRs have been closed and nine are still open. In November 2015, one new NCR was written and none were closed. Entry of Daily Inspection Reports into CMS is current.
Observation:	The contractor submitted Waiver #23 to extend the time of concrete placement from 90 minutes to 120 minutes. The Designer of Record did not approve this waiver and subsequently requested the contractor to prepare and submit an analysis of the concrete strength. Based on the results of the analysis, 15 concrete NCRs have been closed. Four of the nine open NCRs are for concrete that is out of specification.
Concerns and Recommendations:	The PMOC has no concerns.

2.0 SCHEDULE DATA

Status:

The Integrated Project Schedule (IPS) is a management level schedule that integrates all ten construction packages along with design, procurement, startup, and other support activities. IPS Update #112 was received on December 4, 2015 and is based on a Data Date of November 1, 2015. This update includes the “.XER” schedule files for the IPS and contractor source schedules.

IPS Update #112 forecasts the completion of all construction and NYCT Pre-Revenue Training & Testing activities on November 28, 2016, with approximately 24 work days (WD) or 33 calendar days (CD) of contingency, resulting in a forecast Revenue Service Date (RSD) of December 30, 2016.

MTACC is currently working through a broad based schedule acceleration initiative for the SAS program to achieve the start of pre-revenue testing by September 1, 2016 and revenue service by December 30, 2016. IPS Update #112 does not include any elements of this initiative. Update #112 reflects the progress of the work through October 31, 2015. MTACC is developing detailed acceleration plans and anticipates significant improvement to the substantial completion date and changes to the critical paths as schedule acceleration plans are finalized.

Schedule contingency based on IPS Update #112 is summarized as follows:

	Dates	Contingency (CD)	
MTACC Completion	11/28/2016	33	MTACC Contingency
MTACC RSD	12/30/2016	184	Additional Contingency
ELPEP Threshold	7/3/2017	240	Minimum ELPEP Contingency
FTA RSD	2/28/2018	457	TOTAL

Observations:

Project Critical Path:

IPS Update #112 identifies two independent float paths with 0 WD of schedule float. Consistent with previous reports, the PMOC considers each of these float paths to be “critical”.

1st Critical Path (TF=0): This period SAS’s Critical/Longest path involves communications system installation and testing. The path is initiated by equipment installation in Communications Room MR475A at the 96th Street Station. This work has started, but progress appears to be impacted by incomplete room turnover by the 96th Street Station contractor and its inability to achieve C2B MS #8. Following installation of equipment, FIAT and FIST testing at 96th Street Station will be the primary work activities through February 16, 2016. Systems’ testing of communications throughout the project is forecast to continue through September 23, 2016, followed by NYCT Pre-Revenue Testing and Phase 1 construction complete on November 28, 2016.

2nd Critical Path (TF=0): The 2nd Critical Path begins with installation of tunnel ventilation fans located in Ancillary #1 at the 72nd Street Station. Installation work is forecast to complete

on June 30, 2016 and is followed by TSSM testing and final acceptance, forecast for completion on November 28, 2016. Several schedule activities appear to have become “stacked” with C4C Substantial Completion, Commissioning & Turn Over of the TSSM System, 72nd Street Station FSIT Completed; Ready for SAS Revenues Service Testing and Pre-Revenue Testing by NYCT all completing on November 28, 2016. The scheduled concurrent performance of several of these activities appears to be very optimistic and may be artificially shortening this float path.

Secondary Paths: Other secondary float paths of significance to the project include:

+4 WD: This path involves installation of track and railroad signal systems. The path starts with fiber optic cable installation between 72nd and 86th Streets, which has a finish-to-finish relationship with track installation in Zone 7. Subsequent work involves track installation in Zones 8, 10 and 11. After track installation is completed on June 30, 2016, signal system testing is forecast to start and extend through September 20, 2016, at which time this path joins the TF=0 path and allows the start of NYCT Pre-Revenue Testing on September 26, 2016.

+4 WD: This path involves installation and testing of the fire alarm system at the 86th Street Station. The path is initiated by the submission and approval of fire alarm system riser diagrams and layouts, which were modified by C6, AWO #35. This AWO was negotiated and approved in late 2014. The delay in executing this work is excessive and representative of the schedule risk involving late changes in project scope. Fire alarm system installation is forecast for completion on April 15, 2015, followed by local FIAT and FIST testing, forecast for completion on July 8, 2016. This path then joins the TF=0 path and allows the start of the Combined Station & System Fire Alarm Testing (SIT) and Final System Integration Test-Fire Alarm (SIT) which is scheduled to complete on September 22, 2016 and allows the start of Pre-Revenue Testing by NYCT on September 26, 2016.

+6 WD: This path represents installation and testing of permanent power equipment at the 86th Street Station. Following the forecast “Permanent Power Available” date of March 31, 2016, the path follows component and system testing of mechanical and electrical equipment throughout the station. The “Permanent Power Available” date experienced a 21 CD delay this period and a 13 WD reduction in schedule float.

After permanent power is available, field testing of communications equipment at 86th Street (FIAT) is able to start. This is followed by FIST testing of all communication equipment at 86th Street and network testing between 96th Street and 72nd Street (SIST), forecast to complete on April 20, 2016. At this time, this path merges with the TF=0 path and allows complete testing of communication systems forecast for completion on September 23, 2016 and followed by NYCT Pre-Revenue Testing.

+7 WD: This path represents the supply of permanent power at the 96th Street Station. Completion of equipment installation, evaluation of the impact of the coordination study and Con Ed Commissioning activities result in a forecast “Power Available” date of January 5, 2016. The path then follows component and system testing of mechanical and electrical equipment throughout the station; joins the TF=0 path and allows the start of FIAT testing for all communication equipment at 96th Street

Station on January 14, 2016. Subsequent communication system testing is forecast to complete on September 23, 2016 and is followed by NYCT Pre-Revenue Testing.

- +7 WD:** This path involves delivery, installation and testing of CCTV by the C6 Contractor at the 63rd Street Station. This path is initiated by delivery of equipment, apparently changed via C6, AWO #17. This AWO was negotiated and approved in 2014 and the subsequent delay in equipment procurement is not explained.

Installation work is forecast to complete on January 15, 2016, with all FIAT, FIST and FSIT testing forecast to complete on September 15, 2016. Completion of communication system testing at 63rd allows the start of NYCT Pre-Revenue Testing on September 26, 2016.

- +8 WD:** This path involves installation and testing of fire alarm equipment at the 96th Street Station. This work is on a TF=15 float path, however, its start is controlled by the C2B achievement of Milestones # 7A, 7B and 7C, which are on a TF=8 float path and forecast for completion on February 28, 2016. IPS Update #112 indicates the delay to the achievement of these milestones is a result of the schedule impact of C2B, AWO # 154. As of this update, AWO #154 has not been approved by MTACC, although the AWO Log indicates it was negotiated on July 15, 2015.

Installation of fire alarm equipment is forecast for completion on March 4, 2016. Completion of subsequent FIAT, FIST, SIST and FSIT testing are required a precedents to completion of communications system testing at 96th Street Station on September 5, 2016 which then allows the start of NYCT Pre-revenue Testing on September 26, 2016.

- +11 WD:** This path involves installation of utility connections and site restoration activities adjacent to Entrance #1 at the 96th Street Station. This work is currently forecast to run continuously from October 1, 2015, through November 11, 2016. Completion of this work controls the C2B Substantial Completion date, which ties directly to the Phase 1 Completion date of November 28, 2016.

- +13 WD:** This path represents installation, third party testing, and inspection and acceptance by ConEd required for permanent power at the 72nd Street Station. Following the "Permanent Power Available" date of February 11, 2016, FIAT testing of all communication equipment at 72nd Street can start, followed by FIST and FSIT testing, with completion of all communications system testing at 72nd Street forecast for September 8, 2016. This allows the start of NYCT Pre-Revenue Testing on September 26, 2016.

- +14 WD:** This path involves installation of axial fans for tunnel ventilation followed by installation and testing of station lighting in Ancillary 2 at the 96th Street Station. Completion of fan installation is forecast for January 12, 2016, and installation and testing of lighting completion is forecast for May 4, 2016 and is followed by architectural construction throughout Ancillary #2. Completion of this work is forecast for November 8, 2016 and then ties to the C2B Substantial Completion date of November 11, 2016.

- +16 WD:** This path involves installation and testing of PACIS at the 72nd Street Station. Installation is forecast for completion on April 8, 2016. FIAT, FIST, SIT and FSIT

testing is forecast to complete on June 23, 2016, followed by completion of communications system testing at 72nd Street on September 6, 2016, ultimately allowing the start of NYCT Pre-Revenue Testing on September 26, 2016.

+26 WD: This path involves installation of utility connections and site restoration activities between 95th and 99th Streets at the 96th Street Station site. This work is currently forecast to run continuously from November 2, 2015 through October 21, 2016. Completion of this work ties directly to the C2B Substantial Completion date of November 11, 2016.

Milestone Summary: For contracts actively under construction, an evaluation of reported progress for IPS schedule milestones includes:

1. Status of Milestones completed this update period (10/01/15 to 10/31/15):

Pkg.	MS	Description	UD #111 Date	UD #112 Status
C5C	7	Turnover of Signal Rooms	10/08/15	08/17/15A
C5C	7A	Room-to-Room Conduit Ready	10/08/15	08/17/15A
C5C	8	Turnover of Signal Rooms	10/08/15	08/17/15A
C5C	8A	Room-to-Room Conduit Ready	10/08/15	08/17/15A
Note: Milestone achievement reported as part of Update #112, however Actual Finish dates in schedule pre-date this period.				

2. Milestones scheduled for completion during the next update period (11/01/15 to 11/30/15):

Pkg.	MS	Description	UD #112 Date	UD #112 Float
C4C	7B	Complete Work Ancillary #1	11/13/15	201
C2B	8A	Full access to Traction Power Rooms	11/16/15	11
C2B	8B	Full access to Traction Power Rooms	11/16/15	149
C2B	8C	Full access to Traction Power Rooms	11/16/15	149
C5C	6	Turnover of Comms. Rooms	11/18/15	12
C5C	6A	Room-to-Room Conduit Ready	11/18/15	32
C4C	12	Full access at Station Service Centers	11/20/15	60
C2B	6B	Full access to Comms Rooms & Closets	11/30/15	3
C2B	6C	Full access to Comms Rooms & Closets	11/30/15	3

3. Milestones with unusual schedule variances, generally defined as a forecast date change approximately equal to or exceeding the duration of the reporting period (30 CD) are listed in the following table:

Pkg.	MS	Description	UD #111	UD #112	Variance
C2B	7A	Full access to Signals Rooms	12/15/15	02/26/16	73
C2B	7B	Full access to Signals Rooms	12/15/15	02/26/16	73
C2B	7C	Full access to Signals Rooms	12/15/15	02/26/16	73
C2B.	6B	Full access to Comms. Rooms & Closets	10/16/15	11/30/15	45
C2B	6C	Full access to Comms Rooms & Closets	10/16/15	11/30/15	45
C6	5C	Complete all 63rd St. Station work	06/14/16	07/21/16	37
C3	SS	Substantial Completion	03/22/16	04/27/16	36
C5C	SS	Substantial Completion	09/23/16	10/28/16	35
C5C	11	Full access at Station Service Centers	12/03/15	01/06/16	34
C2B	9	Full access to Station Service Centers	11/19/15	12/21/15	32
C6	5A	Complete LAN - 63rd St. Station	11/16/15	12/16/15	30
C6	5B	Complete WAN - 63rd St. Station	11/16/15	12/16/15	30
C4C	7B	Complete Work Ancillary #1	10/15/15	11/13/15	29
C5C	6	Turnover of Comms. Rooms	10/23/15	11/18/15	26
C5C	6A	Room-to-Room Conduit Ready	10/23/15	11/18/15	26

4. Milestones with unusual float variances, generally defined as a forecast date change approximately equal to or exceeding the duration of the reporting period are listed in the following table:

Pkg.	MS	Description	UD #111	UD #112	Variance
C2B	7C	Full access to Signals Rooms	63	30	-33
C6	5C	Complete all 63rd St. Station work	119	92	-27
C3	SS	Substantial Completion	179	153	-26
C5C	SS	Substantial Completion	46	20	-26
C5C	11	Full access @ Station Service Center(s)	81	59	-22
C2B	9	Full access to Station Service Centers	267	245	-22
C6	5A	Complete LAN - 63rd St. Station	199	177	-22
C6	5B	Complete WAN - 63rd St. Station	199	177	-22

Source Schedule Comparison:

The following compares substantial completion dates in IPS #112 and the most recent contractor schedule updates furnished by MTACC.

	Contractor		IPS #112	
	Update	Substantial Completion	Substantial Completion	PMOC Comments
C2B	34 (11/01/15) Preliminary	12/30/16	11/11/16	<u>Progress Mtg. #84:</u> Construction progress cannot be determined based on the six week Look-Ahead schedule. Numerous critical activity start and completion dates have not been status. Schedule slippage continues.
C4C	32 (11/01/15)	02/17/17	11/28/16	<u>Progress Mtg. #61:</u> Delay due to concrete finish corrective work @ the Entrance #2 escalator incline arch and walls. This work is complete, however it is yet to be determined if the same procedure will be required to the finish in Entrance #1. Placement of this concrete arch and walls has not begun as of 11/19/15.
C5C	20R (11/01/15)	11/28/16	10/28/16	Longest continuous path extends through establishment of permanent power and subsequent follow-on testing & commissioning activities.
C6	39 (11/01/15) Preliminary	03/07/17	11/28/16	<u>Progress Mtg. #42:</u> Contractor critical path continues to be driven by police radio system installation. MTACC considers parallel installation of equipment and cable pulling a more reasonable approach that will reduce this path.

“Earned Value” Analysis:

In an effort to corroborate the IPS forecast, the PMOC has reviewed schedule performance to date to develop performance metrics that can assist in evaluating CPM schedule forecasts.

In its periodic reports to the FTA, the 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 a variance in planned vs actual schedule performance.

October 2015 is the latest month for which this information is available.

Value Earned		October-15				Contract Comp Date	Est. Completion Date
Contract \$ (x100K)	Plan	Actual	Plan Month for ES \$	Mo. Ahead (+) or Behind (-)			
C2B	\$324	\$314	\$267	Jan-15	-6.5	12/22/15	7/5/16
C3	\$176	\$176	\$166	Jul-13	-24.9	5/13/14	5/28/16
C4C	\$258	\$247	\$183	Jan-15	-7.1	9/16/16	4/16/17
C5C	\$208	\$171	\$130	Apr-15	-3.6	5/31/16	9/15/16
C6	\$261	\$225	\$180	Mar-15	-4.7	8/18/16	1/5/17
TOTAL	\$1,227	\$1,133	\$927	Feb-15	-5.6	12/30/16	6/16/17

This analysis indicates that the C4C (72nd Street Station) Contract will be the last project to complete. In accordance with schedule logic, NYCT Pre-Revenue Testing can only start after completion of all contract work. Consequently, if 63 CD for Pre-Revenue Testing (reference IPS) is added to the April 16, 2017 C4C completion date, this analysis suggests RSD will be achieved on or about June 18, 2017.

ELPEP/SMP Compliance: The MTACC considers the IPS and the associated schedule management procedures to be in compliance with the ELPEP and Schedule Management Plan, based on the following matrix:

- Forecast Revenue Service Date (RSD) and minimum schedule contingency:
 - ELPEP Requirement: February 28, 2018 (RSD); and,
 - ELPEP Requirement: 240 CD (measured against February 28, 2018).
- Minimum Allowable Float - Real Estate Acquisition;
 - ELPEP Requirement: 60 CD; and,
 - Current Forecast: All Real Estate takings are complete as of November 1, 2011, with the last “Title Vesting” occurring on October 25, 2011.
- Minimum Allowable Secondary Float Path;
 - ELPEP Requirement: Minimum 25 Calendar Days (approximately 18 WD) of schedule float for all secondary “near-critical” paths;
 - Numerous secondary float paths with Total Float (TF) <= 25 CD. Many of these paths have multiple subsidiary paths branching off the independent paths; and,
 - Compliance with this requirement is not consistent with maintaining the project budget.
- Secondary Schedule Mitigation (critical path compression);
 - ELPEP Requirement: 125 CD; and,

- MTACC is pursuing an overall “acceleration initiative” that will result in the start of NYCT Pre-Revenue Testing on September 1, 2017.

Concerns and Recommendations:

Based on the PMOC’s review of IPS Update #112:

- An increasing number of critical or near-critical paths are controlled by scope changes and/or unresolved AWOs. MTACC has acknowledged that scope changes implemented during the later portion of the construction phase as a major risk to timely project completion;
- Update #112 of the IPS contains a significant increase in the number of near critical paths, generally increasing the risk of subsequent project delay;
- Four of twelve milestones (33%) forecast to complete this update by IPS update #111 were actually completed;
- Nine of the remaining thirty-two active schedule milestones are forecast for completion during the next update period;
- Sixteen milestones exhibited excessive month-to-month schedule variances. All of these variances were delays to milestone achievement;
- Eight of the remaining thirty-two milestones exhibited excessive float variances, all of which reduced the schedule float available;
- The current schedule update period (October 1 through October 30, 2015) precedes the announcement of MTACC’s schedule acceleration initiative. This update will be used as a baseline against which future acceleration efforts will be measured. It is anticipated these acceleration efforts will be included in the next IPS update (#113);
- Significant variances are noted in contract completion dates and contract-level critical paths with corresponding information contained in the IPS. In the opinion of the PMOC, in two instances MTACC’s “optimism” about overcoming delays cited by contractors is not substantiated. MTACC mitigations discussed in the previous schedule update have not been implemented in Update #112; and,
- Consequently, the PMOC concludes that the IPS Update #112 forecast of all construction complete by September 26, 2016 is over-optimistic and the more realistic forecast would be estimated as November 26, 2016. After accounting to NYCT Pre-Revenue Testing and current schedule contingency, RSD would be forecast no earlier than January 26, 2017.

3.0 COST DATA

Based upon financial expenditures reported by the MTACC through November 30, 2015, SAS Phase 1 is approximately 83.5% complete. The completion status of the individual construction contracts through November 30, 2015, 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) – 85.0%;
- C26013 (86th Street Station) – 100%;
- C26008 (86th Street Station) – 99.6%;
- C26012 (86th Street Station) – 64.8%;
- C26006 (63rd Street Station) – 94.7%;
- C26007 (72nd Street Station) – 99.9%;
- C26011 (72nd Street Station) – 73.4% ; and,
- C26009 (Systems) – 69.5%.

Aggregate Construction percentage complete:

- 100% of all construction has been bid;
- 100% of all construction is under contract;
- 88.6% of base contract construction (excluding AWOs) is complete; and
- 89.4% of all construction is complete.

Based upon cost data received from the MTACC for the period through November 30, 2015:

- Value of construction in place this period = \$61,761,667;
- Estimated value of construction remaining = \$107,046,692 (base contract only);
- Target construction completion = November 28, 2016; and,
- Number of months remaining = 12.

Soft Cost expenditures (not including real estate, OCIP, etc.) reported this period by the MTACC totaled \$4.2M; expenditures were spread through all of the project management and technical support categories. 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 associated with the acceleration has not been included in this analysis.

Cost Growth: The value of AWOs reported by the MTACC/NYCT in November 2015 is summarized as follows:

	<u>Executed AWOs</u>	<u>AWO Exposure</u>
Nov-15	\$209,217,676	\$258,620,440
Oct-15	\$205,888,848	\$251,481,952
Δ	\$3,328,828	\$7,138,488
Δ	1.62%	2.84%

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

Const. Pkg.	AWO Exposure			
	Nov-15	Oct-15	Period Δ	Changes this Period
Completed 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	\$44,204,965	\$39,798,947	\$4,406,018	Net increase based on revised estimates for AWO #s 122, 133, 149, 171, 172, 173, 182, and, 188, and initial estimates for AWO #s 193, 194, 196 through 202.
C3	\$36,744,963	\$36,432,896	\$312,067	Net increase based on revised estimates for AWO #s 159, 235, 239, 243, 244, 245, 248, 249, 250, 251, 252, 253 and, initial estimates for AWO #s 259, 260, and 261.
C4B	\$1,325,639	\$1,325,639	\$0	No change reported this period.
C4C	\$32,844,064	\$33,010,799	-\$166,736	Net decrease based on revised estimates for AWO #s 147, 167, 191 and initial estimates for AWO #s 185, 187, and 189.
C5B	\$26,332,365	\$26,332,365	\$0	No change reported this period.
C5C	\$9,734,083	\$9,650,219	\$83,864	Net increase based on revised estimates for AWO #s 6, 27, 47, 52, 61, 79, 92, 110, 111, 134, 139, 140 and initial estimates for AWO #s 23, 24, 59, 83, 86, 88, 105, 131, and,135.
C6	\$12,206,834	\$9,703,560	\$2,503,274	Net increase based on revised estimates for AWO #s 29, 98, 123, 140 and initial estimates for AWO #s 127, 128, 133, 137, 143, 145, 149, and, 152.
	\$258,620,440	\$251,481,952	\$7,138,488	

The changes in Executed AWO Value are summarized as follows:

Const. Pkg.	Executed AWOs			
	Nov-15	Oct-15	Period Δ	Changes this Period
Completed 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	\$27,871,561	\$27,600,388	\$271,173	Increase is based on execution of AWO #s 35, 133, 164, 165, 182, 194, and, 196 through 202.
C3	\$24,265,988	\$23,926,119	\$339,869	Increase is based on execution of AWO #s 240, 245, 246, 253, and, 255.
C4B	\$1,325,639	\$1,325,639	\$0	No change reported this period.
C4C	\$28,140,247	\$27,372,861	\$767,386	Increase is based on execution of AWO #s 87, 88, 101, 152, 154, 184, and, 185.
C5B	\$19,406,813	\$19,181,413	\$225,400	Increase is based on execution of AWO #s 52, 64, 70, and, 98.
C5C	\$4,995,439	\$3,355,439	\$1,640,000	Increase is based on execution of AWO # 14.
C6	\$7,984,462	\$7,899,462	\$85,000	Increase is based on execution of AWO # 98.
	\$209,217,676	\$205,888,848	\$3,328,828	

As of November 30, 2015, 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	\$44,204,965	13.62%	\$27,871,561	8.59%
C26006 (3)	94.71%	\$176,450,000	\$36,744,963	20.82%	\$24,265,988	13.75%
C26007 (4B)	99.93%	\$447,180,260	\$1,325,639	0.30%	\$1,325,639	0.30%
C26011 (4C)	73.36%	\$258,353,000	\$32,844,064	12.71%	\$28,140,247	10.89%
C26013 (5A)	100.00%	\$34,070,039	\$6,525,471	19.15%	\$6,525,471	19.15%
C26008 (5B)	99.63%	\$301,860,000	\$26,332,365	8.72%	\$19,406,813	6.43%
C26012 (5C)	64.84%	\$208,376,000	\$9,734,083	4.67%	\$4,995,439	2.40%
C26009(6)	69.51%	\$261,900,000	\$12,206,834	4.66%	\$7,984,462	3.05%
TOTAL TO DATE		\$2,674,814,299	\$258,620,440	9.67%	\$209,217,676	7.82%

To date, \$2,371,728,533 (88.7%) worth of all base contract construction work has been completed. As a percentage of work completed, the AWO exposure for these contracts is 10.9% and the executed AWO percentage is 8.8%.

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 \$270 million, which is reasonably close to the \$262 million adjusted AWO Budget currently maintained in the MTACC CWB.

MTACC maintains an AWO forecast at completion that includes input from its Risk Registers. The MTACC AWO EAC Forecast through November 30, 2015, is \$323,000,000; a \$3,000,000 increase from the previous month's forecast. 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 November 30, 2015, reported by 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	\$1,139,498,774	\$1,139,498,774
Soft Cost Forecast to Complete	\$221,477,428	\$239,634,428
AWO Exposure	\$240,321,139	\$320,000,000
Total Contingency	\$174,888,360	\$77,052,499
Reserved Contingency	\$160,000,000	\$77,052,499
Available Contingency	\$14,888,360	
	Transfer from Reserved Contingency	\$82,947,501

Notes:

- (1) AWO Exposure @ Completion incorporates MTACC “risk-informed” forecast through September 2015;
- (2) Total Contingency = budget balance after forecast expenditures;
- (3) Final Contingency Balance reflects current forecast transfer of \$82,947,501 from Reserved Contingency ; and,
- (4) Minimum Available Contingency required by ELPEP is approximately \$45,000,000 (100% Construction Bid, 85% Construction Complete).

Conclusions based upon this analysis include:

- The project can be completed within the current MTACC CWB of \$4.451 billion;
- Current forecast indicates it will be necessary to utilize approximately 60% of funds from the “Executive” or “Reserved” Contingency in order to cover forecast project costs; and,
- Current available contingency of approximately \$175 million is greater than ELPEP-required minimum.

ELPEP/CMP Compliance: The SAS Project Team maintains an EAC for all construction costs, which are updated monthly. Revision #10 of the Project Cost Estimate, which includes a complete forecast of remaining soft costs has been prepared and incorporated into the project CWB. It is the opinion of the PMOC that SAS Phase 1 is in substantial compliance with the metrics, deliverables, and intangible 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

Major risks challenging the SAS Project Team at this time are primarily schedule related. During November 2015, MTACC restated and emphasized its goal of achieving the December 30, 2016 RSD. MTACC's tangible commitment to this effort is included in several risk mitigation strategies discussed later in this section.

Observation and Analysis:

MTACC has refined its approach to risk management by identifying two broad categories of risk associated with schedule performance and timely achievement of the RSD.

1. Major technical risks which include any design or construction problem directly affecting the successful installation of a project component. The SAS has demonstrated the capacity to successfully manage and resolve risks of this nature. Specific risks currently include.

- a. **Delays to fire alarm testing & commissioning.**

- Mitigation Strategies/Actions:**

- Designate an experienced MTACC staff member as the project-wide individual responsible for fire alarm issues. This individual will lead the identification and resolution of remaining technical issues, coordinate NYCT staff inspections and corrective actions, and ensure that project reporting accurately depicts Station/Systems activities to complete testing and commissioning; and,
 - Develop and pre-negotiate contract allowance items for typical fire alarm adjustments that will inevitably be identified during final installation/testing such as adding devices, relocating devices, adding shrouds, etc. This will expedite completion removing the need to negotiate new change orders at the very end of the construction. Develop a scope, estimate, etc., to be in position to issue an RFP by December 30, 2015.

- b. **Delayed installation of Water Mist System issue (Buy America) at 72nd and 86th Street Stations**

- Mitigation Strategies/Actions:**

- Revise the schedule model logic requirement that water mist system be installed and functional in the TPSS room in order to operate the TPSS. This is not required and logic will be changed to show the water mist system must be operational 30 days prior to fire alarm test completion;
 - Fragnets are being developed showing all interrelated activities so the Project can evaluate opportunities for improvement and monitor progress;
 - Securiplex design has been expedited. Evaluate opportunities for subsequent equipment fabricate and delivery acceleration; and,
 - Expedite the disposition and removal of existing Marioff equipment.

c. Risk: Delay in providing Traction Power – 86th Street Station

Mitigation Strategies/Actions:

- The 86th Street Traction Power room has been damaged due to a water line leak. The Project has asked the Contractor to develop a schedule for completing the Traction Power rooms. Overtime hours may be used in his approach. The current plan is to have all four Traction Power rooms available by September 2016;
- Fragnets have been developed showing all interrelated activities. Fragnets capture the work that suffered one month delay in starting installation. Fragnets are continually updated; and,
- There is an opportunity to accelerate traction power equipment installation (6.5 months installation period as opposed to 9.5 months).

d. Risk: Delay in completing communications equipment & cabling installation at 86th Street Station

Mitigation Strategies/Actions:

- Accelerate completion of this work by working double shifts to assure work can be completed in the September 2015 to January 2016 time frame.

2. Organizational and systematic risks that may impact a large number of issues.

a. Risk: Owner-driven design/scope changes (during construction)

Mitigation Strategies/Actions:

- Reduce the number of change orders needing to be addressed during construction by deferring those changes not involving life safety or otherwise directly impacting revenue service;
- Improve the efficiency (amount of time) for change order processing by assigning MTACC personnel to be responsible for changes on each open contract and to provide additional support to CM's to expedite completion of required tasks within the process; and
- Procure an on-call contractor to do minor work Station/System (painting, patching, added signage, etc.) that existing contractors do not want to do.

b. Risk: Delays due to NYCT TA Resource (labor) availability

Mitigation Strategies/Actions:

- Work with NYCT and agree on dedicated NYCT resources to be located at site;
- NYCT subsequently agreed to provide a dedicated staff of 30 that will be located adjacent to the Community Information Center, and report to one manager who will be responsible for coordinating their activities;
- Enhance technical support for NYCT testing and inspection tasks. Database to document and support NYCT observations has been created. It is based on the EDMS system and includes latest contract documents, contract sketches, etc.; and,

- Hire a Code Consultant to augment NYCT Code Compliance Staff. A site tour was recently held with potential proposers. A contract is expected to be awarded by early December 2015.

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 generally decreases, the next major “phase” of work generally involves testing and commissioning. The following table summarizes the contractors’ progress in developing test procedures with acceptance criteria that is necessary to perform the actual equipment testing and acceptance.

Test Procedure Document Status

Procedure		LEVEL 2 (FAT)			LEVEL 3/4 (FIAT)			LEVEL 5 (FIST)			LEVEL 6 (FSIT/SIT)		
		Required	Submitted	Approved	Required	Submitted	Approved	Required	Submitted	Approved	Required	Submitted	Approved
63rd Street	Test Documents	12	12	11	39	21	15	9	4	2	11	3	2
	Percent Completed	-	100%	92%	-	54%	38%	-	44%	22%	-	27%	18%
96th Street	Test Documents	22	22	20	55	29	22	17	6	0	14	3	1
	Percent Completed	-	100%	91%	-	53%	40%	-	35%	0%	-	21%	7%
72nd Street	Test Documents	21	21	19	57	31	24	14	5	0	14	2	1
	Percent Completed	-	100%	90%	-	54%	42%	-	36%	0%	-	14%	7%
86th Street	Test Documents	21	21	19	54	21	16	14	3	0	14	1	1
	Percent Completed	-	100%	90%	-	39%	30%	-	21%	0%	-	7%	7%

Note: FAT (Factory Acceptance Test), FIAT (Field Installation Acceptance Test), FIST (Facility Integrated Systems Test), FSIT (Final System Integration Test), SIT (Systems Integration Test)

This tabulation generally indicates that greater attention needs to be directed towards the approval process associated with the submittal of the procedures.

Conclusions

MTACC has used the risk management process to assist in identifying potential cost/schedule risks to the project and develop 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 September 17, 2015. The next ELPEP Quarterly Review Meeting with MTACC, FTA-RII, SAS and the ESA project, and the PMOC is scheduled for December 17, 2015. 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 PMP;
- **Schedule Management Plan (SMP):** MTACC's position is that the SAS management processes remain ELPEP compliant. The PMOC is developing comments to MTACC's recently submitted Schedule Management Plan, Revision 2, dated October 2015;

Cost Management Plan (CMP): Comments on the ESA/SAS Cost Management Plan (CMP) were received on June 2, 2015. MTACC expects to set up a working meeting 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

- **ELPEP Requirements:** 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 gives 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 October 31, 2015, a total of 11,776,193 construction hours have been logged on the project with 100 lost time and 171 recordable incidents documented. The total hours and incidents equates to a Lost Time Rate (LTR) of 1.69 and a Recordable Rate (REC) of 4.63. 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 for the last twelve months.

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 inputted into the data base. Status meetings are held quarterly with the FTA and the PMOC in order to provide updates.

7.0 ISSUES AND RECOMMENDATIONS

Schedule Acceleration Initiative: MTACC's recently announced schedule acceleration initiative results in the establishment of September 1, 2016, as a new intermediate milestone at which time all construction installation and testing activities are to be completed and NYCT Pre-Revenue Testing is scheduled to commence. With respect to this initiative, the PMOC has the following concerns:

- NYCT Pre-Revenue Testing is currently forecast to start on September 1, 2016. All construction and testing is forecast to be complete prior to September 1, 2016. In terms of the IPS, MTACC's schedule acceleration initiative can be described as a 26 CD compression of the current schedule.

The PMOC is concerned over the additional costs that will be incurred by this initiative. If the current IPS is accurate, this initiative will achieve 26 CD of schedule improvement. The PMOC questions the "benefit vs cost" consequences of the initiative.

- The PMOC is concerned over the MTACC's ability to achieve its schedule initiative goals

As of this writing, MTACC continues to develop a comprehensive schedule acceleration plan. This is a complicated undertaking, involving five (5) prime contractors, numerous subcontractors and significant participation by internal MTA departments. The PMOC is concerned that the time required to develop an overall acceleration plan may compromise MTACC's ability to execute the plan.

MTACC has emphasized direct communication between contractor and MTACC executive managers as a method to resolve "big picture" problems. The PMOC notes that this communication has not been sufficient to minimize contractors' posturing and promote open and collaborative resolution of problems, particularly schedule delay issues. Achieving this level of cooperation is considered a key element of any schedule acceleration initiative.

Schedule Performance: As part of its schedule review, the PMOC evaluates:

- Milestone Performance
- IPS Comparison with Source Schedules
- Earned Schedule Analysis

These analyses generally conclude the IPS to be somewhat optimistic with respect to its forecast of a Revenue Service Date (RSD) and do not indicate any significant trend in schedule improvement over the past six-month period. MTACC's "acceleration initiative" has to overcome generally negative schedule performance as well as improve schedule performance to achieve its overall goal.

APPENDIX A – ACRONYMS

ARRA	American Recovery and Reinvestment Act
AWO	Additional Work Orders
CBH	Circuit Breaker House
CCM	Consultant Construction Manager
CD	Calendar Days
CIL	Certiifiable 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
FAT	Factory Acceptance Test
FFGA	Full Funding Grant Agreement
FIAT	Field Installation Acceptance Test
FIST	Facility Integrated Systems Test
FSIT	Final System Integration Test
FTA	Federal Transit Administration
GO	General Outage
IPS	Integrated Project Schedule
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
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
SIT	Systems Integration Test
SMP	Schedule Management Plan
SSC	Station Service Center
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
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	November 28, 2016	October 2017
Revenue Service	February 28, 2018	December 30, 2016	February 2018

A = Actual

Table 2 - Schedule Contingency

IPS Update #	104	107	108	109	110	111	112
Data Date	3/1/15	6/1/15	7/1/15	8/1/15	9/1/15	10/1/15	11/1/15
	Contingency (CD)						
RSD=12/30/2016							
Risk Mitigated	38	45	50	50	38	33	33
Risk Realized	38	45	50	50	38	33	33
RSD=02/28/2018							
Risk Mitigated	461	469	474	474	462	457	457
Risk Realized	461	469	474	474	462	457	457

Table 3 – Schedule Milestone Comparison

Pkg	MS	Description	Dates			Variance		Sch. Float 112	Float Δ
			Adjusted	UD#111	UD#112	Contract	Month		
C2B	6B	Full access to Comms Rooms & Closets	08/21/14	10/16/15	11/30/15	-466	45	3	2
C2B	6C	Full access to Comms Rooms & Closets	08/21/14	10/16/15	11/30/15	-466	45	3	2
C2B	7A	Full access to Signals Rooms	08/21/14	12/15/15	02/26/16	-554	73	8	-10
C2B	7B	Full access to Signals Rooms	08/21/14	12/15/15	02/26/16	-554	73	8	-15
C2B	7C	Full access to Signals Rooms	08/21/14	12/15/15	02/26/16	-554	73	30	-33
C2B	8A	Full access to Traction Power Rooms:	08/21/14	10/30/15	11/16/15	-452	17	11	1
C2B	8B	Full access to Traction Power Rooms:	08/21/14	10/30/15	11/16/15	-452	17	149	-11
C2B	8C	Full access to Traction Power Rooms:	08/21/14	10/30/15	11/16/15	-452	17	149	-11
C2B	9	Full access to Station Service Centers	11/21/14	11/19/15	12/21/15	-395	32	245	-22

Pkg	MS	Description	Dates			Variance		Sch. Float 112	Float Δ
			Adjusted	UD#111	UD#112	Contract	Month		
C2B	10	Complete all remaining Comms, Signal , & Traction Power work	09/21/14	01/04/16	01/05/16	-471	1	113	-1
C2B	SS	Substantial Completion	12/22/15	11/11/16	11/11/16	-325	0	11	0
C3	SS	Substantial Completion	05/13/14	03/22/16	04/27/16	-715	36	153	-26
C4C	7A	Complete Work in all Comms. Rooms		03/16/16	03/16/16		0	177	2
C4C	7B	Complete Work Ancillary #1		10/15/15	11/13/15		29	201	-21
C4C	12	Full access @ Station Service Center(s)	08/28/14	11/13/15	11/20/15	-449	7	60	15
C4C	SS	<i>Substantial Completion w/o Ent. #1</i>	<i>11/13/15</i>	<i>11/23/16</i>	<i>11/28/16</i>	-381	5	1	-5
C4C	SS	<i>Substantial Completion - Ent. #1</i>	<i>10/07/16</i>	<i>09/16/16</i>	<i>09/15/16</i>	22	-1	52	1
C5C	6	Turnover of Comm. Rooms	03/24/15	10/23/15	11/18/15	-239	26	12	-5
C5C	6A	Room-to-Room Conduit Ready	03/24/15	10/23/15	11/18/15	-239	26	32	-16
C5C	7	Turnover of Signal Rooms	02/25/15	10/08/15	8/17/2015A	-173	-52		
C5C	7A	Room-to-Room Conduit Ready		10/08/15	8/17/2015A		-52		
C5C	8	Turnover of Signal Rooms	02/25/15	10/08/15	8/17/2015A	-173	-52		
C5C	8A	Room-to-Room Conduit Ready	02/25/15	10/08/15	8/17/2015A	-173	-52		
C5C	11	Full access @ Station Service Center(s)	03/24/15	12/03/15	01/06/16	-288	34	59	-22
C5C	15	Comp. Permanent Power		03/10/16	03/31/16		21	69	-12
C5C	SS	Substantial Completion	05/31/16	09/23/16	10/28/16	-150	35	20	-26
C6	2A	Complete LAN - 96th St. Station	05/18/15	03/01/16	03/03/16	-290	2	103	-2
C6	2B	Complete WAN - 96th St. Station	05/18/15	03/01/16	03/03/16	-290	2	103	-2
C6	3A	Complete LAN - 86th St. Station	07/18/15	03/31/16	04/20/16	-277	20	79	-14
C6	3B	Complete WAN - 86th St. Station	07/18/15	03/31/16	04/20/16	-277	20	79	-14
C6	4A	Complete LAN - 72nd St. Station	02/18/15	03/16/16	03/17/16	-393	1	113	-1
C6	4B	Complete WAN - 72nd St. Station	02/18/15	03/16/16	03/17/16	-393	1	113	-1
C6	5A	Complete LAN - 63rd St. Station	04/18/14	11/16/15	12/16/15	-607	30	177	-22
C6	5B	Complete WAN - 63rd St. Station	04/18/14	11/16/15	12/16/15	-607	30	177	-22
C6	5C	Complete all 63rd St. Station work	04/18/14	06/14/16	07/21/16	-825	37	92	-27
C6	SS	Substantial Completion	08/18/16	11/28/16	11/28/16	-102	0	0	0

Table 4 - Project Budget/Cost 

	FFGA			FFGA Amend	MTA Current Working Budget (CWB)		Expenditures as of November 30, 2015	
	\$ 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	3,716.199	70.54
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	3,716.199	70.54
Total Federal	1,350.693	27.75	1,063.942	1,373.893*	1,350.693	24.60	1,130.963*	21.47
Total FTA share	1,300.000	96.25	990.049	1,3000.000	1,300.000	23.68	1,130.963*	21.47
5309 New Starts share	1,300.000	100	990.049	1,3000.000	1,300.000	23.68	1,057.070	20.07
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	2,585.236	49.07
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 5 - Estimate at Completion

Category	Current Working Budget	EAC Forecast
Total Construction	\$2,674,814,299	\$2,994,814,299
Engineering Services Subtotal	\$622,862,000	\$684,157,000
Third Party Expenses	\$554,086,273	\$562,086,000
TA Expenses	\$131,160,085	\$132,890,202
Contingency	\$468,077,343	
Total	\$4,451,000,000	\$4,373,947,501

Table 6 - 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 (September, 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 7 - 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	\$175 million	\$45 million
	Total Contingency (Allocated plus Unallocated)	\$555.554 million	\$175 million (September 2015)	\$45 million
Schedule	Revenue Service Date	June 30, 2014	December 30, 2016	February 28, 2018
Total Project Percent Complete	Based on Expenditures	83.5%		
	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.	
Date of Next Quarterly Meeting:		TBD		

* MTACC's Current Working Budget

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

Schedule data based upon IPS Update #111; Data Date = 11/1/2015

Financial data based upon MTACC reporting through 11/30/2015