

PMOC MONTHLY REPORT

Second Avenue Subway Phase 1 (MTACC-SAS) Project

Metropolitan Transportation Authority

New York, New York

Report Period May 1 to May 31, 2016



PMOC Contract No. DTFT6014D00017

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

Urban Engineers of New York, D. P.C., 2 Penn Plaza, Suite 1103, New York, New York 10121

PMOC Lead: Charles A. Halboth, PE, 212-736-9100; cahalboth@urbanengineers.com

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
d. Readiness Revenue Operation	13
2.0 SCHEDULE DATA.....	13
3.0 COST DATA.....	24
4.0 RISK MANAGEMENT	29
5.0 ELPEP	30
6.0 SAFETY AND SECURITY	33
7.0 ISSUES AND RECOMMENDATIONS.....	34

APPENDICES

APPENDIX A – ACRONYMS

APPENDIX B – TABLES

Table 1 - Summary of Schedule Dates

Table 2 - Project Budget/Cost

Table 3 - Estimate at Completion

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

Table 5 - 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 May 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 88.9% 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 May 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. Closeout has slipped to June 30, 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:

- MS #14 activities had to be completed on or before May 31, 2016 and include:
 - Completion of all work required to perform Field Installation Acceptance Tests (L3/4) 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

Status: The milestone was not completed on May 31, 2016. The latest fragnet (data date 6/1/2016) shows the last activity to be completed on June 24, 2016.

- MS #15 activities had to be completed on or before May 31, 2016 and include:
 - Completion of all work required to perform Field Installation Acceptance Tests (L3/4) on the Tunnel Station Smoke Management (TSSM) system including, but not limited to:
 - Structural elements of the two Ancillary structures
 - Axial 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

Status: The milestone was not completed on May 31, 2016. The latest fragnet (data date 6/1/2016) shows the last activity to be completed on June 24, 2016.

- MS #16 activities had to be completed on or before May 31, 2016 and includes:
 - Completion of all work required to perform Field Installation Acceptance Test (L3/4) on 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

Status: The milestone was not completed on May 31, 2016. The latest fragnet (data date 6/1/2016) shows the last activity to be completed on June 24, 2016.

- MS #17 has to be completed on or before July 31, /2016.
 - The Contractor has to complete all work and complete and pass all tests through Simulated Integrated System Testing (L5a) for:
 - Fire suppression system
 - HVAC systems
 - In addition, the Contractor has to complete all work to bring the Clean Agent Inergen System on line

Status: The latest fragnet (data date 6/1/2016) shows the L5a test completion slipping to 8/7/2016.

- MS #18 has to be completed on or before July 31, 2016.
 - The Contractor has to complete all work required to perform Field Installation Acceptance Tests (L3/4) on all:
 - Escalators
 - Elevators
 - Powered up the auxiliary switch gear

Status: The latest fragnet (data date 6/1/2016) shows the last activity to be completed on August 8, 2016.

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;

- **General Construction Progress**

- In Area 5, the contractor continues with cleanup and responding to the NYCT inspection observation lists.
- At the 6th Mezzanine, the security fence and fare array has been installed.
- In the Traction Elevators 1- 4, controller tests are complete.
- HVAC Summer Mode Testing began. This test is dependent on outdoor temperatures.
- Installation of granite pavers on the 6th Mezzanine is complete with the exception of infills.
- The Tunnel & Station Smoke Management System (TSSM) is scheduled for completion June 24, 2016.
- While the Fire Alarm System is being completed, fire watches monitor the station.
- Level 3/4 testing of the hydraulic elevator (Entrance # 2) and the 4 traction elevators is scheduled for completion June 10, 2016.
- Pre-Testing continues for the escalator at Entrance #1.
- At the Platform Levels, the installation of several finish ceiling panels was deferred to allow C6 access for cable pulling etc. These panels are now being installed, with GOs required on the active track side.

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

Through May 31, 2016 the following milestones were scheduled to be accomplished:

- MS #18 – Complete Facility Power Distribution Testing.
- MS #19 – Start of TSSM (Tunnel & Station Smoke Management) Level 3/4 Testing at Ancillary #2.
- MS #21 – Start of HVAC Level 3/4 Testing at Ancillary #2.
- MS #23 – Start of Fire and Life Safety Systems Level 3/4 Testing.

The CCM Office has reported to the PMOC that these milestones have been achieved with the exception of:

- MS #21 – Work for this milestone is continuing. There is a 15 day grace period and this milestone is now forecast to be achieved June 10, 2016.

Upcoming or Near-Term Milestones are the following:

June 15, 2016

- MS #20 – Start of TSSM Level 3/4 at Ancillary #1.
- MS #22 – Start HVAC Level 3/4 Testing at Ancillary #1.

July 1, 2016

- MS #24 – Start of Water Mist Level 3/4 Testing excluding certain escalators (Entrance #1)

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

The first facility power feed was energized by ConEd on May 25, 2016, which was after the previous forecast date for permanent power of April 30, 2016.

Through May 31, 2016 the following milestones were to be accomplished:

- MS #16 – Complete Installation and Preparation for Level 3/4 Testing of HVAC Systems.
- MS #17 – Complete Installation and Preparation for Level 3/4 Testing of TSSM.
- MS #18 – Complete Installation and Preparation for Level 3/4 Testing of Fire & Life Safety Systems.

The CCM Office has reported to the PMOC that these milestones have been achieved with the exception of:

- MS #17 – The TSSM work will be complete the weekend of June 11-12, 2016.
- MS #18 – The water mist work will be complete on June 9, 2016.

Upcoming or Near-Term Milestones are the following:

August 31, 2016

- MS #19 – Complete Testing through Level 5B

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

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

▪ 63rd Street Station

- MS #14 Signal System buildout to allow Field Installation Acceptance Test (FIAT) to be completed by 5/30/2016. Work includes but not limited to:
 - Installation, wiring, and breakdown testing of all relays, ground detectors, transfer switches, and signal equipment.

Status: Milestone has been completed

- MS #16 Communication Systems buildout of all work and preliminary testing and pre-testing required to perform FIATs (L3/4) by 5/31/2016

Status: The milestone was not completed on 5/31/2016. The latest fragnet (data date 6/1/2016) shows the last activity to be completed on 6/27/2016.

- MS #16A Completion of all work and testing through Systems Integrated Testing (SIT) for the communication systems, except UHF SIT and Fire Alarm combined SIT by 6/30/2016

Status: The latest fragnet (data date 6/1/2016) shows SIT to be completed on 7/31/2016.

▪ 72nd Street Station

- MS #6 Completion of FIATs on the Traction Power system by 5/2/2016 to allow Con Edison high tension power testing and energization.

Status: The latest fragnet (data date 6/1/2016) shows FIAT to be completed on 6/13/2016.

- MS #11 Completion of all FIATs of the Signal System 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

Status: Milestone has been completed.

- MS #17 Completion of all work and preliminary testing and pre-testing required for FIATs on the Communication Systems except for the UHF SIT and Fire Alarm Combined SIT, by 6/13/2016.

Status: The latest fragnet (data date 6/1/2016) shows FIAT to be completed on 7/3/2016.

- MS #17A Completion of all work and testing through SIT of all communications systems except escalators, elevators, UHF and Fire Alarm Combined SIT by 8/29/2016.

Status: The latest fragnet (data date 6/1/2016) still shows a completion date of 8/29/2016.

▪ **86th Street Station**

- MS #8 Completion of all FIATs on the Traction Power system such that it is ready for Con Edison High Tension Power energization by 5/9/2016.

Status: The latest fragnet (data as date 6/1/2016) shows a completion date of 6/20/2016.

- MS #13 Completion of all FIATs of the Signal System by 7/18/2016. 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

Status: Milestone was completed.

- MS #18 Completion of all work and preliminary testing and pre-testing required to perform FIATs (L3/4) on the Communication Systems, except UHF Radio system by 6/27/2016.

Status: No change in completion date.

- MS #18A Completion of all work and testing through SIT of the communications systems, except escalators, elevators, UHF SIT and fire alarm combined SIT by 8/1/2016.

Status: No change in completion date.

▪ **96th Street Station**

- MS #12 Completion of FIATs on the Signal System by 6/23/2016. Work includes but not limited to:
 - Breakdown testing of all relays, ground detectors, transfer switches and other components in the relay rooms and wayside
 - Buildout and testing of Rail Transit Operations (RTO) tower and dispatch office

Status: Work in progress

- MS #19 Completion of all work and preliminary testing and pretesting required to perform FIATs on the communication systems, except for the UHF radio system by 6/20/2016

Status: Work in progress

- MS #19A Completion of work and testing through SIT of all communication systems, except escalators, elevators, UHF SIT and fire alarm combined SIT by 8/1/2016

Status: Work in progress.

- **Track and Third Rail**

- MS #10 complete installation of trackwork and third rail for the S1 and S2 tracks, including submittal of complete scans demonstrating a contractually compliant installation by 5/30/2016.

Status: Milestone has been completed

- **LAN / WAN**

- Milestone #20 completion of all work and testing through Final System Integrated Testing of all systems over the 72nd, 86th and 96th St. local area network and overall wide area network, such that the LAN and WAN is available for Final Systems Integrated Testing by the Station Contractors. Scheduled completion date is 6/6/2016.

Status: The latest fragnet (data date 6/1/2016) shows the last activity to be completed on 6/27/2016.

- **Pre-Revenue Training**

- Milestone #21 completion of all work and testing through Final Systems Integrated Testing of the Communication Systems including the UHF Radio, the work associated with room 7024 (72nd St. Station), and all other work required to start Pre-Revenue Service Training, except such work that is impacted by incomplete escalators and elevators. Schedule completion date is 9/30/2016.

Status: No change in completion date.

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

Status:

During May 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 still have not been received; and,
- Fourteen (14) nonconformance reports (NCRs) have been open for more than six months.

C5C: There are still 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;
- According to SAS C5C Quality Manager, there is insufficient supervision for all field activities;
- The electrical subcontractor's NCRs still require resolution;
- Record drawings at 50% completion have been delayed;
- Checklists for many work activities, e.g., electrical, mechanical, masonry, and plumbing, are not submitted or are incomplete;
- Check lists for many activities are not submitted on CMS; and,
- Work is progressing without Preparatory Phase Meetings being held according to the SAS C5C Quality Manager.

Contract Package C2B	
Status:	Through May 31, 2016, a total of 164 NCRs have been issued. One Hundred Thirty-Six (136) have been closed and 28 NCRs are open. In May 2016, one new NCR was written and 2 were closed. None of the NCRs closed in May were for concrete that was out-of-specification. Seventeen (17) of the 28 open NCRs are for concrete that was out-of-specification. Six of the 17 are more than six months old. The Grantee directed the contractor to prepare a statistical concrete analysis for these six.
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 12 non-concrete NCRs have been open more than six months. Several months ago, the PMOC had recommended that CTJV establish a target date for closure of each NCR. They have done this. However, every time the NCR log is issued, the dates continue to slip, thus they are unrealistic. The PMOC suggested that the SAS C2B and CTJV Quality Managers discuss each NCR and come up with realistic closure dates. In addition, the PMOC recommended that a column or two be added to the NCR Log describing what has to be done to close the NCR and who has the action.

Contract Package C3	
Status:	Through May 31, 2016, a total of 129 NCRs have been issued. One hundred twenty one (121) have been closed and 8 are still open. In May 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 May 31, 2016, a total of 230 NCRs have been issued. One hundred sixty-four (164) have been closed and 66 NCRs are still open. In May 2016, two (2) NCRs were written and one was closed.
Observation:	One hundred ninety-two (192) of the 230 NCRs are for concrete that was out of specification. Both of the NCRs generated in May 2016 were for concrete that exceeded the allowable time. Submittal of Daily Inspection Reports is two weeks behind.
Concerns and Recommendations:	Forty-nine (49) of the remaining 66 open NCRs are for concrete that was out of specification. The contractor is preparing a statistical concrete analysis that should enable about 22 of these NCRs to be closed in July 2016.
Contract Package C5C	
Status:	Through May 31, 2016, 189 NCRs have been issued. One Hundred twenty-five (125) have been closed and 64 NCRs are still open. In May 2016, five new NCRs were written and one was closed.
Observation:	Nine (9) of the 64 NCRs that are open are for concrete that is out of specification. Submittal of Daily Inspection Reports is two weeks behind.
Concerns and Recommendations:	The PMOC continues to recommend that the contractor establish a schedule for closing the 55 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 May 31, 2016, a total of 61 NCRs have been issued. Forty-one (41) NCRs have been closed and 20 are still open. In May 2016, one new NCR was written and none were closed.

Observation:	Fourteen of the open NCRs are for concrete that was placed beyond the 90 minute time limit.
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. Eight of the 14 open concrete NCRs will be closed in early June 2016. Submittal of Daily Inspection Reports is current.

Concerns and Recommendations:

Discussed under each Contract Package

d. Readiness for Revenue Operation

During May 2016, the FTA initiated a review of SAS's readiness for revenue operation. The readiness review will be conducted by the PMOC in accordance with OP 54, Readiness for Revenue Operation. This process will evaluate the adequacy, soundness and timeliness of the MTACC-SAS's: Systems Integration Testing; Project System Safety and Security Validation; Pre-Revenue Operation Plan and any required work-arounds; and Management Capacity and Capability. The PMOC commenced collection of project documents in early May 2015 and started interviewing key NYCT and SAS staff on May 24, 2016. Interviews are expected to be completed by mid-June 2016.

2.0 SCHEDULE DATA

Status:

The PMOC received updated P6 schedules for the four (4) active construction contracts on May 23, 2016. These schedules are updates of those included as part of each contract's "Schedule Acceleration Agreement". Each schedule has been updated through May 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.

Netpoint schedules for 72nd, 86th, and 96th Street Stations and the Systems Contract, with a data date of 6/1/16 were received on June 3, 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. The PMOC has tried to use both the Netpoint and P6 schedules in order to better understand the remaining schedule. However, there appear to be variances between these schedules, which only serve to further cloud the issue. It is possible the P6 schedules are not being fully supported and updated at this time, potentially explaining some variance.

Observations:

Based on information reviewed by the PMOC, the last construction work task required before RSD is the Level 6, 30 Day Fire Alarm Test. This test is required to be performed at each station, and there are no apparent dependencies or specified order of testing. As of this update, completion of this test, and the required predecessor activities, appear to be the schedule path

controlling the RSD. A summary of dates when this testing is scheduled (excerpted from the P6 schedules) is as follows:

Activity ID	Description	Constrained Finish	Float	Unconstrained Finish
CM63ST-260	Final system integration test - Fire Alarm (30 day test) 63 rd St. (FSIT)	10/28/16	-72	01/08/17
CM72ST-270	Final system integration test - Fire Alarm (30 day test) 72 nd St. (FSIT)	12/10/16	-115	04/04/17
CM96ST-285	Final system integration test - Fire Alarm (30 day test) 96 th St. (FSIT)	9/8/16	-22	09/30/16
CM86ST-730	Final system integration test - Fire Alarm (30 day test) 86 th St. (FSIT)	9/17/16	-31	10/18/16
The P6 schedule uses the C6 Substantial Completion Date as a finish milestone with a specified date of 12/12/16. Predecessor activities calculate float against this constraint. Negative (-) float is the amount of time beyond the scheduled completion actually needed to complete the project or portion of the project.				

The column “Unconstrained Finish” eliminates the constraint date discussed above and shows the actual calculated completion date of the Level 6 testing for each station. This table indicates that Level 6 testing at 86th and 96th Street Stations should be completed in accordance with the acceleration agreements and should pose no concern with respect to the start of revenue service. Completion of Level 6 testing at 63rd and 72nd Street Stations is currently forecast later than MTACC’s goal of a December 30, 2016 RSD.

Delays at 63rd Street Station involve final installation and testing of access control, CCTV, PACIS, Fire Alarm, and other elements of the communication system, followed by station integrated testing, tie-in and testing of existing vertical transportation systems and final systems integration testing.

Delays at 72nd Street involve delayed installation and subsequent testing of vertical transportation systems, followed by final systems integration testing.

In the absence of an integrated schedule for the whole project, remaining schedule contingency has been evaluated for each remaining construction contract, for the most optimistic and pessimistic cases identified:

	63rd St. Station	72nd St. Station	86th St. Station	96th St. Station	Pre- Revenue Test
MTACC all work complete (Optimistic)	10/28/16	12/10/16	09/17/16	09/08/16	09/01/16
Contingency (RSD=12/30/16)	63	20	104	113	120
MTACC all work complete (Pessimistic)	01/08/17	04/04/17	10/18/16	09/30/16	12/01/16
Contingency (RSD=12/30/16)	-9	-95	73	91	29
ELPEP Threshold	07/03/17	07/03/17	07/03/17	07/03/17	07/03/17
Contingency (RSD=07/03/17)	176	90	258	276	214
FTA RSD	02/28/18	02/28/18	02/28/18	02/28/18	02/28/18
Contingency (RSD=02/28/18)	416	330	498	516	454

Only the 63rd and 72nd Street Stations, under the pessimistic (late schedule dates) indicate a potential delay to the RSD of December 30, 2016.

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”. “Netpoint” schedules that provide a clearer indication of the work remaining, however may be lacking in certain detail.

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. Work includes exterior stone cladding, finish flooring, elevator at Entrance #3 construction, signage, and a variety of similar activities at all the entrances;
- The risk of street-level and architectural finish 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;
- Delays are indicated for all elements of the fire suppression system;
- Delays are indicated to the TSSM in both Ancillaries;
- HVAC delays are noted in both Ancillaries and both chiller rooms;
- A significant portion of FIAT (Level 2 and 3) testing is forecast to occur during May and June 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.

C3 – 63rd Street Station

- Remaining work (Station Contractor) includes cooling system testing, installation of communication room cooling equipment, TSSM testing, minor platform and sitework, UPS retesting, Inergen System testing, and water mist system acceptance.
- Remaining work (Systems Contractor) includes fire alarm system completion and testing, completion of access control, PACIS and CCTV systems, and completion of testing of all communication based systems through Level 5.

C4C – 72nd Street Station

- A significant amount of work remains to be completed in Ancillary #1. Almost all trades appear to have work remaining. Installation of TSSM fans and subsequent system testing appear to be the most critical.
- Communication equipment installation followed by fire system/integrated system testing appears to be the most critical path within this station.
- Several activities which are the first in a sequence of remaining work are being impacted by unresolved AWOs.
- The water mist system remains to be completed in multiple areas.
- At Entrance 1, escalator trusses have yet to be set in place. Major work remains to be performed before escalators 6, 7, and 8 are ready for service.
- Approximately one-half the activities in the P6 schedule are indicating TF=0 float paths. Over 90% of all activities in this schedule are indicating TF < 10. This schedule appears to have been manipulated to the point it is no longer producing meaningful forecasts.

C5C – 86th Street Station

- Ancillary #1 architectural construction is not forecast to complete until September 21, 2016. Follow-up MEP trades will have limited time available to complete their work within a dry building environment;
- Installation of the water mist system appears to have just started. All equipment has yet to be delivered;
- Ancillary #2 roofing is not forecast to be complete until December 2, 2016. Lack of a dry building enclosure may delay some MEP follow-on work;

- Completion of all construction, inspection, and testing for tunnel ventilation, water misters and vertical transportation appear to be the most schedule-critical work at this station; 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:

- This schedule forecasts the completion of all trackwork and third rail installation on June 9, 2016;
- This schedule forecasts the completion of all traction power FIAT on June 6, 2016; and,
- Remaining work consists mainly of communications equipment installation and connections within the 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)	Update (05/01/16)
15	Contract C26009 Access. Turn over communication room 5012 and lube oil room 2006.	03/15/16	03/15/16A	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	04/30/16A
17	Complete all work required for Con Edison to energize the Facility Power substations.	04/30/16	04/30/16	04/30/16A
18	Complete all work and testing required to complete permanent power distribution.	05/31/16	06/01/16	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	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	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	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	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	05/31/16
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	07/01/16

72nd Street				
MS	Description	Accel. Agreement	Update (04/01/16)	Update (05/01/16)
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	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	11/01/16

86th Street				
MS	Description	Accel. Agreement	Update (04/01/16)	Update (05/01/16)
15	Complete all work required for Con Edison to complete energization to provide permanent Facility Power.	04/30/16	05/02/16	05/18/16
16	Complete Installation and Preparation for Level 3/4 Testing of HVAC Systems	05/31/16	05/31/16	05/31/16
17	Complete Installation and Preparation for Level 3/4 Testing of TSSM	05/25/16	05/31/16	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	06/02/16
19	Complete all installation and testing – elevators and escalators	09/01/16	08/30/16	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)	Update (05/01/16)
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	04/30/16A
14	Complete Preparations and Installation of Electrical and Mechanical Systems to Start FIAT (Level 3,4) Testing	05/31/16	06/13/16	06/08/16
15	Complete all work required to commence FIAT (Level 3,4) on the TSSM system	05/31/16	05/26/16	05/31/16
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	05/31/16
17	Complete Level 5a Testing for HVAC, and Fire and Life Safety	07/31/16	07/28/16	07/27/16
18	Complete all work required to commence FIAT on all escalators and elevators	07/31/16	07/28/16	8/10/16

96th Street				
MS	Description	Accel. Agreement	Update (04/01/16)	Update (05/01/16)
19	Complete Level 5b Testing for All Systems; Complete ALL Work	08/31/16	08/30/16	09/08/16

Systems				
MS	Description	Accel. Agreement	Update (04/01/16)	Update (05/01/16)
6	72nd Street: Complete all installation and testing required for ConEd to inspect and start trip-checks.	05/02/16	04/25/16	03/14/16A
7	96th Street: Complete all installation and testing required for ConEd to inspect and start trip-checks.	04/04/16	03/22/16	03/22/16A
8	86th Street: Complete all installation and testing required for ConEd to inspect and start trip-checks.	05/09/16	05/08/16	06/03/16
9	Complete All Traction Power Installation and FIAT (Level 3/4) testing	06/27/16	06/27/16	07/06/16
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	06/09/16
11	Complete all Field Installation Acceptance Tests (FIAT) of the Signal System at 72nd Street.	05/23/16	04/23/16	05/15/16
12	Complete all Field Installation Acceptance Tests (FIAT) of the Signal System at 96th Street.	05/23/16	05/22/16	06/13/16
13	Complete all Field Installation Acceptance Tests (FIAT) of the Signal System at 86th Street.	07/18/16	07/17/16	08/08/16
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	05/21/16
15	Complete all remaining signal system work and testing required	05/23/16	05/07/16	05/29/16
16	63rd Comms. Systems: Complete all work and pre-testing required to perform Field Installation Acceptance Tests	05/31/16	05/31/16	07/02/16
17	72nd Comms. Systems: Complete all work and pre-testing required to perform Field Installation Acceptance Tests	06/13/16	06/13/16	07/13/16
18	86th Comms. Systems: Complete all work and pre-testing required to perform Field Installation Acceptance Tests	06/27/16	06/27/16	07/22/16
19	96th Comms. Systems: Complete all work and pre-testing required to perform Field Installation Acceptance Tests	06/20/16	06/20/16	07/21/16

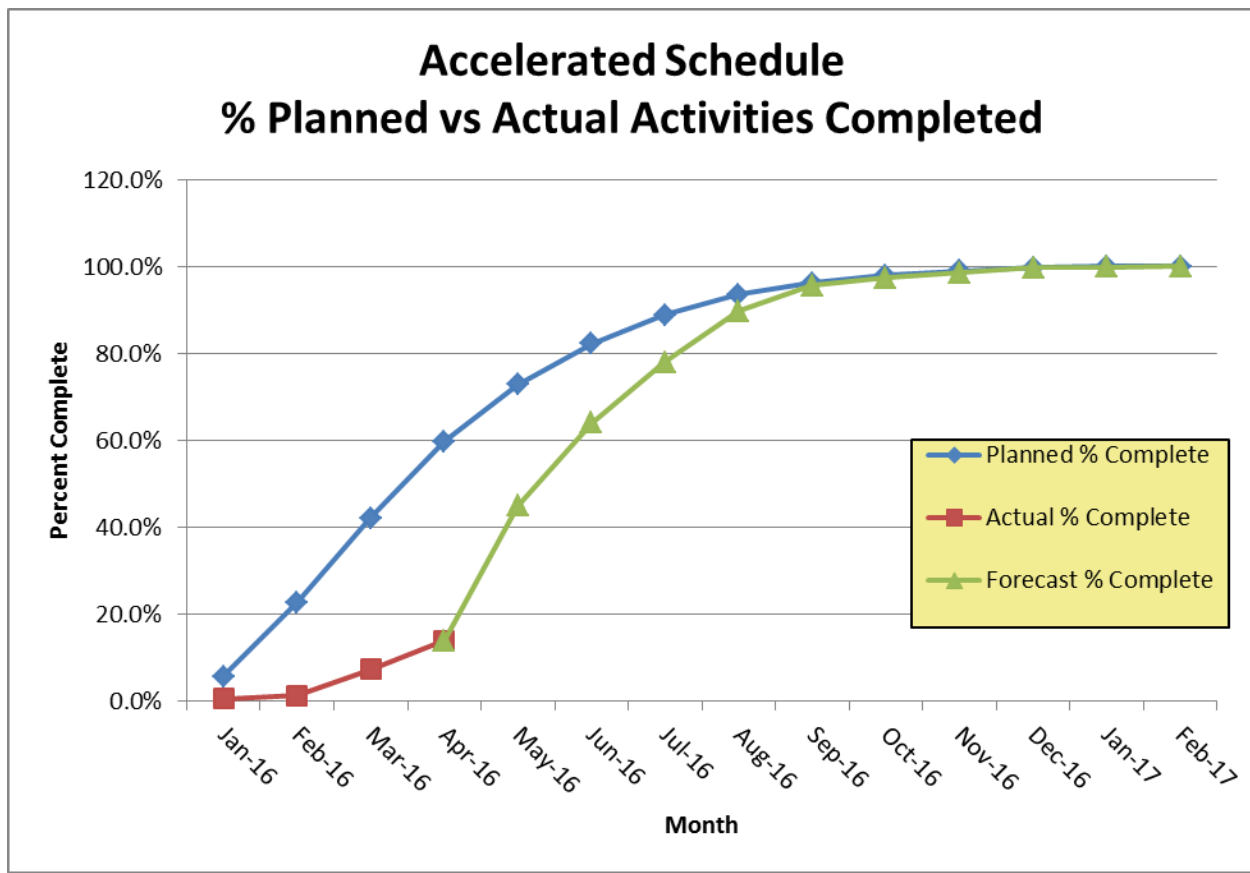
Systems				
MS	Description	Accel. Agreement	Update (04/01/16)	Update (05/01/16)
20	The Contractor shall complete all work and testing through Final Systems Integrated Testing of all systems over the Local Area Network (LAN) and overall Wide Area Network (WAN), such that the LAN/ WAN is available for Final Systems Integrated Testing by the Station Contractors.	06/06/16	06/06/16	06/27/16
21	Complete all other work required to start Pre-Revenue Service Training	09/30/16	09/30/16	10/28/16

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 percent 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%	
Apr-16	59.9%	14.0%	14.0%
May-16	72.9%		44.9%
Jun-16	82.2%		64.0%
Jul-16	89.0%		78.0%
Aug-16	93.6%		89.8%
Sep-16	96.2%		95.6%
Oct-16	97.9%		97.5%
Nov-16	99.0%		98.5%
Dec-16	99.8%		99.8%
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.

Based on March 2016 data,

- The variance between work originally planned to be complete and work actually complete was 34.9%;
- 24.4% of activities had to be completed in April 2016 in order to maintain the adjusted forecast that would successfully achieve all remaining work; and,
- 8.8% of all remaining activities were “scheduled” to be performed after September 1, 2016, the original goal for completion of all work.

Based on April 2016 data,

- The variance between work originally planned to be complete and work actually complete is 45.9%;
- 30.9% of all activities must now be completed in May 2016 in order to maintain the adjusted forecast that would successfully achieve all remaining work; and,
- 10.2% of all remaining activities are now “scheduled” to be performed after September 1, 2016, the original goal for completion of all work.

“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 April-16						Const. Comp Date	Est. Const. Complete Date
	Contract \$ (x100K)	Plan \$ Earned	Actual \$ Earned	Plan Month for Actual \$ Earned	Months Ahead (+) or Behind (-)		
C2B	\$324	\$324	\$297	May-15	-7.1	9/1/16	4/3/17
C3	\$176	\$176	\$171	Oct-13	-26.4	9/1/16	11/1/18
C4C	\$258	\$255	\$219	Apr-15	-8.6	9/1/16	5/18/17
C5C	\$208	\$202	\$177	Oct-15	-2.0	9/1/16	11/1/16
C6	\$261	\$253	\$217	Jul-15	-5.2	9/1/16	2/3/17
TOTAL	\$1,227	\$1,210	\$1,081	Apr-15	-8.2	9/1/16	5/5/17

Cost Variance = Plan \$ Earned – Actual \$ Earned

$$= \$1,210\text{M} - \$1,081\text{M} = \$129\text{M}$$

This summary level analysis suggests the following:

1. Had the work progressed according to baseline “plans”, an additional \$129M worth of original contract work would have been performed on or before April 30, 2016.
2. MTACC’s acceleration plan requires that \$129M of baseline construction be completed over the next 3 months. This does not include change order work or the value of the acceleration agreements.
3. Based on the data evaluated for the period ending April 30, 2016, the C2B, C4C, C5C and C6 contracts progressed at a satisfactory rate.
4. If NYCT pre-revenue testing and training can proceed concurrently with construction and construction at all stations achieves “substantial completion”, this analysis forecasts RSD will be achieved in the Spring of 2017.

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. Generally, the Netpoint schedules conform to the “early” (sometimes called planned) start and finish dates in the P6 schedules. In the opinion of the PMOC, this result can be an overly optimistic view of the schedule, which largely discounts the activity relationships fundamental to CPM scheduling.
2. Based upon schedule data reviewed by the PMOC:
 - a. Acceleration milestone forecast dates are generally being maintained. However some variances and delays are noted. A number of these delays involve the Systems Contract, which may involve a higher level of risk in achieving the RSD.
 - b. Significantly 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) for work performed in April 2016 achieved that required by the acceleration agreements. This level of production must be maintained for the next three months.
3. 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.
4. Based upon progress reported for activities associated with the acceleration milestones, the PMOC notes that:
 - a. C4C (72nd Street): Maintained schedule.
 - b. C5C (86th Street): Maintained schedule.
 - c. C2B (96th Street): Incidental slippages noted.
 - d. C6 (Systems): Slippages noted in 13 of 16 milestones. Slippages ranged in length from 2 weeks to approximately one month.
5. Potential discrepancies in duration of final integrated system testing (FIST) may be an area of concern. Early Netpoint schedules (reference DD=3/1/16) included a 30-day fire alarm test (Level 6) after completion of Level 5B testing and prior to RSD. This is consistent with the latest P6 schedule. The current Netpoint schedules do not fully include this testing. Of the eight Netpoint schedules received on June 3, 2016, only one includes this testing, which is only noted for 72nd Street Station.
6. 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.
7. Schedule variances involving the individual stations suggest the possibility of significantly different completion dates. MTACC may wish to consider a partial opening scenario if these variances become large.

3.0 COST DATA

Based upon financial expenditures reported by the MTACC through May 31, 2016, SAS Phase 1 is approximately 88.9% complete. The completion status of the individual construction contracts through May 31, 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) – 97.0%;
- C26013 (86th Street Station) – 100%;
- C26008 (86th Street Station) – 99.6%;
- C26012 (86th Street Station) – 90.7%;
- C26006 (63rd Street Station) – 97.4%;
- C26007 (72nd Street Station) – 99.9%;
- C26011 (72nd Street Station) – 86.7% ; and,
- C26009 (Systems) – 83.3%.

Aggregate Construction percentage complete:

- 100% of all construction has been bid;
- 100% of all construction is under contract;
- 94.4% of base contract construction (excluding AWOs) is complete; and,
- 94.9% of all construction is complete.

Based upon cost data received from the MTACC for the period through May 31, 2016:

- Value of construction reported in place this period = \$57,690,273;
- Estimated value of construction remaining = \$150,058,369 (base contract only);
- Target construction completion = September 1, 2016;
- Number of months remaining = 3.1; and,
- Avg. required construction expenditure to achieve target date = \$48,529,515/MO.

Soft Cost expenditures (not including real estate, OCIP, etc.) reported this period by the MTACC totaled \$6.1M; expenditures were spread through all of the project management and technical support categories. At forecast 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 May 2016 is summarized as follows:

	Executed AWOs	AWO Exposure
May-16	\$264,722,740	\$355,086,790
Apr-16	\$261,292,038	\$351,402,566
Δ	\$3,430,702	\$3,684,224
Δ	1.31%	1.05%

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

Const. Pkg.	AWO Exposure			
	May-16	Apr-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	\$61,128,060	\$59,195,482	\$1,932,578	Net increase is based on revised estimates for AWO #s 134, 146, 187, 222 and 225 and initial estimates for AWO #s 180, 181, 233, 237, 238, and 239.
C3	\$40,782,668	\$40,533,864	\$248,804	Net increase is based on revised estimates for AWO #s 93, 247, 260, 266, 272, 275, 278, 283, 285, 293, 294, 297, 299, 300, 302 and 303 and initial estimates for AWO # 303 through 307
C4B	\$ 1,325,639	\$1,325,639	\$0	No change reported this period.
C4C	\$68,463,504	\$66,906,970	\$1,556,534	Net increase is based on revised estimates for AWO #s 16, 43, 180, 183, 190, 206, 208, 211, 218, 234, 237, 238, 239 and 240 and initial estimates for AWO #s 192, 235, 236, 242, 243, 244, 245, 246, and 247.
C5B	\$26,280,122	\$26,280,122	\$0	No change reported this period.
C5C	\$30,446,214	\$30,765,404	-\$319,190	Net decrease is based on revised estimates for AWO #s 124, 133 and 167.
C6	\$31,433,056	\$31,167,559	\$265,497	Net increase is based on revised estimates for AWO #s 79, 117, 167, 170, 189 and 197 and initial estimates for AWO # 187.
Total	\$355,086,790	\$351,402,566	\$3,684,224	

The changes in Executed AWO Value are summarized as follows:

Const. Pkg.	Executed AWOs			
	May-16	Apr-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	\$51,020,750	\$49,550,183	\$1,470,567	Increase is based on execution of AWO #s 101, 109, 116, 144, 151, 154, 155, 160, 168, 176, 184, 185, 187, 190, 191, 203, 224, 227, 228, 231, and 238.
C3	\$28,392,888	\$28,078,288	\$314,600	Increase is based on execution of AWO #s 277, 279, 280, 282, 286, and 297.
C4B	\$1,325,639	\$1,325,639	\$0	No change reported this period.
C4C	\$33,942,584	\$32,741,399	\$1,201,185	Increase is based on execution of AWO #s 16, 25, 91, 115, 193, 198, 199, 221, 224, 226, 232, 239, 241, and 249.
C5B	\$21,586,813	\$21,586,813	\$0	No change reported this period.
C5C	\$7,682,254	\$7,714,904	-\$32,650	Decrease is based on execution of AWO #s 85 and 144.
C6	\$25,504,285	\$25,067,285	\$437,000	Increase is based on execution of AWO #s 79, 117, 167, 170, 189, and 197.
Total	\$264,682,740	\$261,292,038	\$3,390,702	

As of May 31, 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	\$61,128,060	18.83%	\$51,020,750	15.72%
C26006 (3)	94.71%	\$176,450,000	\$40,782,668	23.11%	\$28,392,888	16.09%
C26007 (4B)	99.93%	\$447,180,260	\$1,325,639	0.30%	\$1,325,639	0.30%
C26011 (4C)	73.36%	\$258,353,000	\$68,463,504	26.50%	\$33,942,584	13.14%

Contract / (Package)	% Complete	Award	Exposure		Executed	
			\$	% of Award	\$	% of Award
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	\$30,446,214	14.61%	\$7,682,254	3.69%
C26009(6)	69.51%	\$261,900,000	\$31,433,056	12.00%	\$25,544,285	9.75%
TOTAL TO DATE		\$2,674,814,299	\$355,086,790	13.28%	\$264,722,740	9.90%

To date, \$2,524,755,930 (94.4%) 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 \$340 million. MTACC maintains an AWO forecast at completion that includes input from its Risk Registers. The MTACC AWO EAC Forecast through April, 2016, is \$360,529,008. 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 May 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	\$1,185,378,498	\$1,185,378,498
Soft Cost Forecast to Complete	\$191,276,267	\$191,276,267
Add'l Soft Cost - Schedule Acceleration		\$15,000,000
AWO Exposure	\$299,046,313	\$360,529,008
Total Contingency	\$100,484,623	\$24,001,928
Reserved Contingency	\$100,484,623	\$24,001,928

Notes:

- (1) AWO Exposure @ Completion incorporates MTACC's latest "risk-informed" forecast through April 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).

- (4) Forecast soft costs to support MTACC's schedule acceleration have not been included in the CWB. Preliminary estimate of these costs reduced to \$15M this period.

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 30, 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.	The accelerated schedules for four (4) construction contracts have been fully implemented and the work is in progress.
2.	Design and scope changes requested by NYCT during the late stages of construction.	During the most recent three (3) periods, AWOs have been limited to those necessary to address issues affecting operations and the ability to open the stations.
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.
5.	MTACC's system testing and approval process has deviated from its Facilities System Test Program as a means of supporting the accelerated construction and testing schedule.	Compression of certain testing procedures may introduce a slightly higher risk of test failure and repetition. Preparation of test procedures and approval criteria appear to be lagging.
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.	The major remaining technical risks appear to involve completion of vertical transportation and communication systems installation and testing.
2.	Permanent facility power – all stations	
3.	Traction Power – all stations	
4.	Installation, testing, commissioning and acceptance of elevators and escalators.	
5.	Watermist system.	

Testing and commissioning of mechanical and electrical systems will be the major focus of the work effort over the upcoming months. The following table summarizes the SAS Project Team's progress during April and May 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)		
		Apr-16	May-16	Δ	Apr-16	May-16	Δ	Apr-16	May-16	Δ
63rd Street	Required	65	65	0	30	30	0	9	9	0
	Submitted	65	65	0	30	28	-2	6	9	3
	Approved	65	65	0	25	27	2	6	8	2
	% Complete	100%			90%			89%		
72nd Street	Required	55	55	0	26	26	0	13	13	0
	Submitted	55	48	-7	26	22	-4	7	7	0
	Approved	29	41	12	2	4	2	1	4	3
	% Complete	75%			15%			31%		
86th Street	Required	62	62	0	14	14	0	9	9	0
	Submitted	62	56	-6	2	4	2	0	0	0
	Approved	42	17	-25	0	2	2	0	0	0
	% Complete	27%			14%			0%		
96th Street	Required	61	61	0	13	13	0	8	8	0
	Submitted	59	56	-3	0	3	3	0	0	0
	Approved	44	50	6	0	1	1	0	0	0
	% Complete	82%			8%			0%		

This tabulation raises the following concerns:

- The completion % for approved Level 3/4 tests at 86th Street decreased from 68% reported last period to 27% reported this period. A negative variance of this magnitude suggests improvements are needed in both management and technical development and review functions.
- Approval of Level 3/4 procedures appears to be just in time to avoid delays to testing activities in the field.
- Progress is developing Level 5 and Level 6 procedures remains very limited.

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 several months. Significant improvements in preparation for systems testing and acceptance must be realized in order for the accelerated construction effort to deliver full value to the MTACC.

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. The 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):** FFGA was amended in March 2015. The PMOC has requested MTACC to update its CWB to reflect the adjusted value. To date, MTACC has declined to do so. 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; and,
- **Risk Mitigation Capacity Plan (RMCP) and Risk Management Plan (RMP):** MTACC's position is that the SAS management processes remain ELPEP compliant.

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 April 30, 2016, a total of 13,300,298 construction hours have been logged on the project with 101 lost time and 179 recordable incidents documented. The total hours and incidents equates to a Lost Time Rate (LTR) of 1.52 and a Recordable Rate (REC) of 4.21. 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 is clearly advancing the final elements of SAS construction and testing at a faster rate than would otherwise have been achieved through its schedule acceleration effort. However, all the work is not advancing at the same rate, and some problem issues are evident.

To date, MTACC has maintained an “all or nothing” approach to completing the project and the PMOC concurs with this approach as a means of maximizing total progress. However, if a December 30, 2016 RSD is the ultimate goal, PMOC recommends MTACC consider identifying “minimum requirements for each station opening” as a means of contingency planning should select elements fail to achieve schedule acceleration goals.

Schedule Acceleration Update: 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 and Training activities are scheduled to commence.

- MTACC appears to be working closely with NYCT operating groups to provide for their familiarization and participation in final testing and acceptance activities. Concerns remain regarding available schedule contingency in the case of test failure, rework, or end-user disapproval of the work involved.
- The analysis of schedule data presented by MTACC provides a mixed view of project progress. Milestone dates are apparently being met and the rate of construction progress has increased. However, some schedule variances are noted and specific elements of work may be lagging behind.
- 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 that the mechanical, electrical and systems work may be receiving priority attention at the expense of the other, currently less critical, architectural and general construction. The 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.

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 May 31, 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	3,955.503	75.10
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	3,955.503	75.10
Total Federal	1,350.693	27.75	1,063.942	1,373.893*	1,350.693	24.60	1,184.973	22.50
Total FTA share	1,300.000	96.25	990.049	1,3000.000	1,300.000	23.68	1,184.973	22.50
5309 New Starts share	1,300.000	100	990.049	1,3000.000	1,300.000	23.68	1,111.080	21.10
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	2,770.530	52.60
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	\$3,035,343,307.00
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	\$4,436,998,072

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 (March, 2016)
10	Guideway & Track Elements	\$612,404,000	\$195,346,781	\$189,310,484
20	Stations, Stops, Terminals, Intermodal	\$1,092,836,000	\$1,666,605,679	\$1,647,638,432
30	Support Facilities	\$0	\$0	\$0
40	Site Work & Special Conditions	\$276,229,000	\$793,118,232	\$876,979,834
50	Systems	\$322,707,000	\$250,379,966	\$212,867,395
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	\$1,186,897,730
90	Unallocated Contingency	\$555,554,000	\$544,441,174	\$55,806,125
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	\$39 million	\$45 million
	Total Contingency (Allocated plus Unallocated)	\$555.554 million	\$30 million (May 2016)	\$45 million
Schedule	Revenue Service Date	June 30, 2014	December 30, 2016	February 28, 2018
Total Project Percent Complete	Based on Expenditures	88.9%		
	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 5/30/2016