

**WORKING IN THE DARK:**  
**IMPLEMENTATION OF THE METROPOLITAN  
TRANSPORTATION AUTHORITY'S CAPITAL PLAN**

**Citizens Budget Commission**

**October 2009**



## FOREWORD

Founded in 1932, the Citizens Budget Commission (CBC) is a nonprofit, nonpartisan civic organization devoted to influencing constructive change in the finances and services of New York State and New York City governments. A major activity of the Commission is conducting research on the financial and management practices of the State and City.

All research by the CBC is overseen by a committee of its Trustees. This report was prepared under the auspices of the Transportation Committee, which we chair. The other members of the Committee are: Cathy A. Bell, Lawrence B. Buittenwieser, Herman R. Charbonneau, Kenneth D. Gibbs, Brian T. Horey, James L. Lipscomb, Andrew S. Lynn, Robinson Markel, Lester Pollack, Alfredo S. Quintero, David T. Schiff, Mark E. Strauss, Howard Wilson, and James L. Lipscomb, ex-officio.

For the past two years, the Committee's work has focused on analyzing the Metropolitan Transportation Authority's effectiveness at managing its five-year capital plans. The analyses are based on the examination of the capital projects scheduled by the MTA for work in the three-year period from January 2005 to December 2007. The report concludes that the Authority should improve its capacity to manage mega-projects and technology improvements and commit to an improved, publically available management information system for tracking capital projects.

The report was researched by Selma Mustovic, Senior Research Associate, and written by Selma Mustovic and Charles Brecher, Director of Research and Executive Vice President. Research Intern Louis Cholden-Brown provided critical research support in the early stages of the project. The authors and the Committee thank Hilary D. Ring, Director of Government Affairs of the Metropolitan Transportation Authority, for making available to us briefing reports prepared for the monthly meetings of the Authority's Capital Program Oversight Committee and for facilitating communication with other senior staff of the Authority. The authors and the Committee are also grateful to Eric Rothman, President of HR&A Advisors, Inc., and Nabil N. Ghaly, former Chief Signal Engineer and the Program Officer for Signals and Systems in New York City Transit, who reviewed a preliminary draft of the paper and offered their perspective. We thank them for their cooperation and for their helpful comments in the course of research for the paper, though that does not mean they necessarily endorse the views presented within it.

The research was made possible by generous support from the J.M. Kaplan Fund.

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## INTRODUCTION AND SUMMARY

The Metropolitan Transportation Authority (MTA) plays a critical role in making New York City's economy function effectively. Of the 3.6 million people who arrive each weekday in Manhattan's unique central business district, more than half rely on the MTA's subways, buses and other facilities. New York City cannot sustain its dense labor market without its mass transit operations.

Keeping the subways, buses and commuter trains running involves far more than paying the workers who operate them. Mass transit services are capital intensive, and the MTA requires large capital investments in order to maintain its operations. Since 1982 the MTA has had a series of five-year capital plans that have grown from \$7.7 billion in 1982-1986 to \$22.6 billion in the current 2005-2009 period and proposed to be \$28.1 billion for 2010-2014. These investments are intended to bring the systems to a state of good repair after years of neglect, keep them in a state of good repair once the neglect is overcome, and expand and enhance operations.

Given the large, ongoing capital investments, the amount of borrowing needed to sustain them and the cost of this borrowing that is passed along to riders in the form of transit fares, it is reasonable for the public to ask how well the MTA spends this money. Do the projects in each five-year plan get implemented in accord with the budget and timetable in the plan?

This report seeks to address those questions through an examination of capital projects scheduled by the MTA for work in the three-year period from January 2005 to December 2007. This includes 798 projects with combined costs of \$18.6 billion. The projects are divided among programmatic categories including communication and signal systems, stations, replacement of rolling stock, the "mega-projects" managed by the MTA's Capital Construction Company,<sup>1</sup> and other projects involving structures, shops and yards. We ask whether these projects were started on time, whether the planned work progressed in accord with the initial schedule, and whether the projects stay within the initial budget.

### Findings

After intensive data collection efforts and interaction with MTA senior staff, we come to three conclusions:

- *The MTA board does not provide the public, or even collect for itself, sufficient information to determine whether the projects in the five-year plan are progressing in accord with the plan.* Available reports do not cover all the projects in the plan, do not correspond to items and categories in the plan for covered items, and do not relate consistently to project milestones other than start and completion.
- *The limited information available for the projects indicates the MTA encounters significant delays in work of all types with major problems in the mega-projects and signal and communication projects, but notable delays also in less complex work such as the replacement of subway cars.* Of the five mega-projects, only the South Ferry Terminal has progressed substantially in accord with schedule; three others are delayed by at least one year, and the Fulton Street Transit Center is currently set for

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<sup>1</sup> The mega-projects are East Side Access, Second Avenue Subway, Flushing Line Extension, Fulton Street Transit Center, and South Ferry Terminal.

completion in 2014, five years behind schedule. Among the more troubled communications projects are those for public address/customer information services on the A Division (delayed over four years until 2010) and completion of the Automatic Train Supervision System on the A Division (more than three years behind plan). Replacement of 1,280 subway cars scheduled for completion in March 2008 was delayed eight months.

- *Many projects are completed close to initial cost estimates, but cost estimates are problematic for some mega-projects, and some important signal and communication projects are seriously over budget.* The cost of the Fulton Street Transit Center is nearly 90 percent above the initial estimate, and the South Ferry terminal is 24 percent above the initial estimate; the other mega-projects are running 6 to 15 percent above initial estimates. Communication projects with large cost increases include Automatic Train Supervision (35 percent), customer information service on the Canarsie Line (55 percent), and computer based train control on the Canarsie Line (51 percent). In contrast, costs were only 4 percent above initial estimates for the replacement of subway cars and for 11 completed contracts covering the rehabilitation of 31 subway stations.

## Recommendations

These findings have important implications for the MTA's future capital investments. Its current five-year plan ends this year; a new five-year plan has been proposed by the Board for State approval for the 2010-2014 period. As the new plan progresses, three important changes should be made:

1. *The MTA should commit to an improved management information system for tracking capital projects and to greater transparency in informing the public about the status of its capital projects.* The public should know how its money is being used. More information should be assembled centrally, it should be kept in a consistent format with clear milestones for assessing progress, and it should be made publicly available on the MTA's website.
2. *The MTA should improve its capacity to manage mega-projects and improvements in signaling and communications systems.* These are the areas of greatest delays and cost increases, and they account for \$5.7 billion and \$2.8 billion, respectively, in the proposed 2010-2014 capital plan. New procedures and an expanded pool of personnel with relevant expertise are urgently needed within the agency to manage these new projects effectively.
3. *The next five-year plan should be based on a realistic assessment of what can be accomplished.* At the end of the 2000-2004 plan fully 365 projects costing over \$4.8 billion, or more than one-quarter of the total plan, had not reached the stage expected when the plan was approved. Much of the work undertaken during the 2005-2007 period examined was for projects in the previous five-year plan. It is likely that a similar proportion of the work included in the current 2005-2009 plan will have to be extended into future years. The new plan for 2010-2014 should be more realistic in anticipating the new work that can be accomplished and the funding needed to support it.

The remainder of this report is divided into four sections. The first describes the information now made available by the MTA on the implementation of its capital projects, the shortcomings of these documents, and ways to improve accountability and transparency through better information. The second section uses the limited data available to assess the MTA's record in having projects progress "on time" in accord with its initial five-year plan. The third uses the available data to assess how well

the MTA performs in implementing its projects in accord with its budget targets. The last section suggests that the MTA has been too ambitious in formulating its five-year capital plans and should be more realistic in assembling projects for its 2010-2014 plan.

## THE NEED FOR BETTER INFORMATION

Imagine going to a railroad station and asking for a train schedule. In response you are given two pieces of paper; one has a list of times that trains have recently arrived at the station, the second indicates times in the future when trains are expected to depart from the station. When you ask for information about the times the planned departing trains might arrive at their destinations, you are advised to wait for upcoming announcements. After a long duration, two people provide information on the public address system; a representative of the railroad indicates where one or more of the expected trains now are and when they might eventually reach their destinations, then an “independent consultant” provides different projections of when the trains will reach their destinations. When a train finally arrives at your station, its arrival time is added to the first list of recently arrived trains.

This Kafkaesque scenario is an instructive analogy to the way in which the MTA monitors its capital projects. Three sets of reports each provide partial information, the three documents do not use common formats or categories that link the information consistently, and one set contains often contradictory information from the agency and its consultants.

**The five-year capital plan and its amendments.** The MTA’s five-year capital plan is the equivalent of the list of planned departure times for future trains. It is prepared at the start of a five-year period. It identifies the specific projects to be funded, the year in which they are to be started, and their estimated cost. It provides no information about when projects are expected to be completed or any interim milestones. The plan is amended periodically to reflect the addition or elimination of specific projects, changes in cost estimates for specific projects, and changes in the anticipated start dates for specific projects. Generally, the amendments do not alter the total amount to be spent in the five-year period.

The plan for the current 2005-2009 period received its required approval from the Capital Program Review Board (CPRB) in April 2005.<sup>2</sup> A set of amendments was proposed by the MTA in January 2006 and approved by the CPRB in March 2006. Another set of amendments was proposed by the MTA in April 2007, but rejected by the CPRB in July 2007. Another set of amendments was proposed by the MTA in July 2008. Since the CPRB has not taken action on those amendments within 90 days from their submission, they are regarded as the current version of the plan by the MTA and are posted on its website.

The projects identified in the plan are categorized in two ways – by “need” and “element.” The need categories are (1) state of good repair – needed to bring a part of the system to a state of good repair (for example, renovating a long neglected subway station), (2) normal replacement – needed to maintain regular replacement cycles for elements already in a state of good repair (for example, regular replacement of subway cars or the bus fleet), (3) system improvements – projects that upgrade the existing facilities (for example, improvements to public address and customer information systems), and (4) network expansions – projects that expand the system such as the extension of the Flushing line and new Second Avenue subway line. The 11 element categories are

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<sup>2</sup> The CPRB consists of appointees of the Governor, State Senate leader and State Assembly leader. In addition, the Mayor of the City of New York appoints a member who votes only on the New York City Transit portion of the capital plan.

types of facilities, including rolling stock, stations, and shops and yards;<sup>3</sup> the Capital Construction Company (CCC) is a separate element that includes the previously noted mega-projects.

**The four-year financial plan.** The MTA maintains a “rolling” four-year financial plan covering its operating and capital budgets for a current year and three future years. The plan is revised and reviewed by the MTA Board three times each year – in February, July and November.

The section of this plan relating to the capital budget is the equivalent of the list of train arrivals; for projects completed in the past year, it reports the actual month and year of completion, and for projects underway it indicates an expected month and year of completion.<sup>4</sup> These planned completion dates are revised in each quarterly update of the financial plan. The identification of the project in this list of completion dates generally corresponds to the identification of the project in the five-year plan, but some projects (departures) in the five-year plan may never be reported as completed (arrived), because they have been combined with other projects or dropped.

**Briefing material for the Capital Program Oversight Committee (CPOC).** The CPOC is a committee of the MTA Board charged with overseeing implementation of the capital plan. It meets monthly (except in August), and focuses on a different component of the capital plan at each meeting. The CCC projects are reviewed quarterly, and eight other categories of projects are reviewed approximately semi-annually.<sup>5</sup> The categories of projects for CPOC reviews overlap with, but do not correspond directly with, the categories used to describe projects in the five-year plan.

The briefing material that the MTA staff provides to the CPOC contains an overview of the status of the capital plan and more detailed information on the components of the plan under review at that meeting. The overview material covers two types of information – “commitments” and “completions.” Commitments are contracts awarded for work on projects and are presented as dollar amounts for each component of the program and for major projects for which commitments were made during the current year. Commitments are compared to the “goal” for that time period, with the goal reflecting the commitment amounts anticipated in the amended five-year plan.

Completions are a report on the status of projects scheduled (based on the last quarterly financial plan) for completion in the current year. For each program component and for individual “major” projects in that component, the dollar amount spent on projects completed and the forecast total cost of projects still to be completed is shown.

The more detailed information on projects in the component of the plan selected for more focused CPOC review at a particular meeting is the equivalent of periodic public address announcements in our train schedule analogy. The information comes from two sources – MTA staff and an Independent Engineering Consultant (IEC) engaged by the MTA to provide an independent review

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<sup>3</sup> The 11 element categories are: CCC, rolling stock, stations, track and structures, signals and communications, power, shops and yards, power, Staten Island Railway, bus company, interagency and miscellaneous.

<sup>4</sup> The plans also provide for each project a “project allocation;” this appears to be the estimated total cost for the project.

<sup>5</sup> The other categories are transit infrastructure and facilities, Long Island Railroad projects, bridge and tunnel projects, transit signals and systems, buses program, car procurement, transit stations, and MetroNorth projects. Since the Committee generally reviews only two categories at a given meeting, the semi-annual reviews are sometimes actually at longer intervals.

of project progress.<sup>6</sup> The MTA staff information consists of a somewhat more detailed listing by project of the commitment and completion data in the overview, and “exception reports” identifying projects with (a) delays greater than three months from previous targets for commitment or completion, and/or (b) estimated project cost increases greater than 10 percent for construction or 15 percent for design. The exception reports give a brief explanation for the delay and/or cost increase.

The material provided by the IEC consists of narrative reports on progress for the major projects it has been asked to assess. These projects do not always conform to the projects identified in the capital plan; the IEC report covers work under contracts issued that may include more than one project identified in the capital plan. For example, multiple station projects on the same subway line may be grouped together or multiple phases of a large project may be combined. If work is not proceeding according to plan, the IEC presents estimates of expected completion dates and total cost that may differ from those provided by the MTA staff.

This fragmented system for tracking capital projects has three important shortcomings. *First, the information is not readily available to the public.* The MTA considers all the documents described above to be public information, but only the financial plans and the latest amendment to the capital plan are available on its website. The CPOC material is distributed to Committee members and relatively few other interested parties at or after each monthly meeting, but is not made available on the MTA website or for more general distribution.

*Second, the information is incomplete and inconsistent.* Information is not provided for all projects in the initial five-year capital plan, and the identification and definition used to report information for a project is not consistent among the reports.

*Third, the information is inadequate to provide a complete picture of the status of projects relative to objectives in the initial plan and interim milestones.* Projects are not assigned significant milestones other than a commitment date and a completion date, and the delays in these milestones are not tracked relative to initial goals.

In order to provide its managers and the public with a tracking system that provides meaningful accountability, the MTA should modernize its information system. The key elements of a better system were identified in the recent report of the Ravitch Commission. They recommended the MTA develop a reporting methodology consistent with best practices among other government agencies with large capital budgets and noted: “Such reporting should provide on MTA’s website regular updated commitments and budgets for every capital project that costs over a certain minimum threshold, including explanations for major changes in cost and scope and regularly updated project milestones for all projects, including planned and actual starts, completions and reason for major changes in milestones.”<sup>7</sup>

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<sup>6</sup> The MTA introduced the function of the Independent Engineering Consultant in the mid-1980s. The Federal Transit Administration has a similar structure of independent engineering assessments of federal-grant funded projects. Other transit agencies in the nation have a function similar to MTA’s independent engineering consultant, including the Los Angeles County Metropolitan Transportation Authority and the Massachusetts Bay Transportation Authority. However, other agencies with large capital programs including the Port Authority of New York and New Jersey and the City of New York do not engage independent engineering consultants.

<sup>7</sup> Commission on Metropolitan Transportation Authority Financing, *Report to Governor David A. Paterson*, December 2, 2008, p. 15.

## SIGNIFICANT DELAYS FOR MAJOR PROJECTS

Even with (and likely in part because of) an inadequate reporting system, it is clear that many MTA capital projects encounter significant delays. In an effort to assess the magnitude of this problem, the CBC staff sought to track the “on time” performance of each of the 798 projects identified at the start of the initial 2005-2009 capital plan for which some work was scheduled in the three years of 2005-2007 inclusive.<sup>8</sup> The total estimated cost of these projects was about \$18.6 billion.

Of the 798 projects, 80 projects with an estimated cost of nearly \$1.9 billion were subsequently dropped from the capital plan. Among the remaining 718 projects, 272 had no planned or actual completion date and no actual commitment amount assigned to them in any of the available MTA documents. The status of these projects is unclear.

The remaining 446 projects were assigned a target completion date in the early phase of the capital plan. Of these, 212 were completed in the first three years of the plan, with 171 (about four of every five) completed within two months of their initial target completion date. However, 40 of the projects completed in this period were delayed more than two months.

For 235 projects, the target completion date assigned at or near the start of the five-year plan period is in 2008 or later. As of the end of 2007, 138 or 59 percent of these projects were reported to be on target for that completion date. Another 97 projects, or about two of every five, already had their completion date extended by more than two months beyond the initial target.

The narrative material in the CPOC briefings provides some indication of the nature of the delays and their sources. In the following subsections, the status of projects covered by CPOC reports in four major elements (mega-projects, stations, signals and communications, replacement of rolling stock) is described.

### **The Capital Construction Company (CCC) Mega-projects**

The CCC, a distinct agency within the MTA, is responsible for five large projects, each of which has experienced delays during the period analyzed:

1. East Side Access – a connection via tunnel of the Long Island Rail Road’s (LIRR) Main and Port Washington lines in Queens to Grand Central Station. The specific work planned to start in the 2005-2007 period had its completion time postponed from November 2010 to April 2012, and the completion date for the entire project has been postponed from August 2014 to February 2015.
2. Second Avenue Subway – a new subway line running under Second Avenue. The current project is the first phase running from 96<sup>th</sup> Street to 63<sup>rd</sup> Street. The specific work to be initiated in the 2005-2007 period had its completion date postponed from July 2010 to January 2011, and the completion date for the project has been delayed from June 2014 to June 2015.
3. Flushing Line (#7) Extension – an extension of the existing #7 line via tunnel from 42 Street to 11<sup>th</sup> Avenue and 34<sup>th</sup> Street. The design work in the 2005-2007 period encountered

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<sup>8</sup> This total includes 365 projects initially in the 2000-2004 capital plan, which were deferred for work until post-2004.

significant delays, and the planned completion date for the entire project has been postponed from June 2013 to November 2014.

4. Fulton Street Transit Center – a new terminal for multiple subway lines at the existing Fulton Street subway station. The initial completion date was to be July 2009, but the project has required extensive redesign and currently has an estimated completion date in 2014.
5. South Ferry Terminal – an enlarged and improved platform and entrances at the existing South Ferry subway station. The initial completion date was April 2009; despite delays in awarding some of the contracts, the project went into service on March 16, 2009, but it is not expected to be fully completed with respect to all contract requirements, including above ground landscaping, until at least December 2009.

The details of the changes in the work planned for the 2005-2007 period are described below.

*East Side Access.* The East Side Access (ESA) project was approved by the MTA in 2000, and during the 2000-2004 capital plan \$1.5 billion was planned to be committed to design the project, acquire real estate, begin digging the open cut in Queens and the tunnel in Manhattan. All of this work was not actually committed by the end of 2004, and \$735 million of these planned commitments were extended beyond the end of 2004. The un-started work included the Queens excavation and the Manhattan tunneling.

The initial 2005-2009 plan provided an additional \$1,150 million to continue work on the project. Negotiations with the federal government in 2006 led to a revised plan, and in early 2008 the MTA extended the planned completion date from August 2014 to February 2015. In the report prepared for the May 2009 CPOC meeting, the IEC wrote that the current expected completion date is “under pressure by delays in all three active project areas: Manhattan, Queens, and Harold Interlocking.”<sup>9</sup>

The work scheduled for the 2005-2007 period fell significantly behind schedule. Initial plans called for five major construction contracts to be awarded – two for work on tunnels and structures in Manhattan, two for open-cut and tunnel work in Queens, and one for the Harold Interlocking, a track and signal connection in Queens. The contracts for the Manhattan tunnel work and the Queens open-cut work were awarded as planned in 2006. Completion of the Queens open-cut was expected to be on time in October 2008, according to MTA work schedules as of April 2008, but the IEC questioned this noting that “the progress at this contract has been minimal and MTACCC decided to involve the contractor’s bonding company due to the contractor’s inability to progress the work... the IEC does not foresee a realistic substantial completion date earlier than December 2009.”<sup>10</sup> By the time the IEC prepared its report on the status of the ESA project in July 2008, the contractor had been defaulted and work had been stopped. The MTA claimed and received from the contractor’s bonding company the payment of the full bond and repackaged the remaining work. As of April 2009, the MTACCC had executed only two small emergency contracts for work that was necessary to keep the site safe and meet its obligations to outside parties. The new planned substantial completion date for the Queens work is not known, because the MTACCC had not yet awarded contracts for the remaining excavation and support of the open-cut and for the Northern Boulevard underpass.

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<sup>9</sup> Metropolitan Transportation Authority, Report prepared for the Capital Program Oversight Committee (CPOC) meeting, May 20, 2009.

<sup>10</sup> MTA, April 2008 CPOC meeting report.

Planned completion of the Manhattan work has been delayed from December 2009 to March 2012 due to slower than anticipated tunnel boring; the average daily rate has been about 25 feet rather than the anticipated 50 feet. Additional slippage has been caused by delays in obtaining blasting approvals from MNR. The other contracts were awarded (or will be awarded) roughly one-year behind the plan, and their completion dates have been extended even longer with Manhattan structures work expected to be completed in March 2012 rather than December 2009. In the May 2009 CPOC report, the IEC expressed concern over the reported delay of five months in the execution of the Manhattan structures work, and set its forecast of the completion date to August 2012.

*Second Avenue Subway.* The first proposal to build a subway along Second Avenue dates to 1929, and one of the subsequent plans that was developed in the 1960s resulted in the construction of several tunnel segments.<sup>11</sup> The project was aborted in the 1970s due to the city's financial crisis.

The current proposal for the Second Avenue Subway comprises several phases. Phase One was approved as part of the 2000-2004 plan. It runs from 96th to 63rd Street with new stations to be built at 96<sup>th</sup>, 86<sup>th</sup> and 72nd Streets and renovation of the existing station at Lexington Avenue and 63<sup>rd</sup> street. The initial estimated completion date was in 2013. The 2000-2004 plan allocated \$1,050 million to cover planning and design and to begin tunneling. Only \$256 million was actually committed, and \$795 million including all the funding for the tunneling (\$360 million) was carried forward. Another \$1,914 million was allocated in the 2005-2009 plan to further construction.

Contracts to be awarded in the 2005-2007 period were one for final design and one for tunnel construction. The design contract was scheduled to be awarded in April 2006 and completed in December 2008. The design contract was awarded as planned, but the completion date has been postponed from December 2008 to December 2009; the IEC is "concerned with the progress of the testing and commissioning requirements,"<sup>12</sup> and thinks that January 2011 is more realistic. The reasons for the delay are the repackaging of the construction contracts for the three new stations (72<sup>nd</sup>, 86<sup>th</sup>, and 96<sup>th</sup>) and the change in the scope of work on the 72<sup>nd</sup> Street Station from a three track station to a two track station. The modifications were made in April 2008 in order to provide cost savings.

The tunneling contract was awarded in March 2007 and expected to be completed in July 2010. The work on the tunneling contract has fallen behind schedule. The major cause is "unforeseen utilities and existing subsurface structures exposed during construction."<sup>13</sup> The MTA's planned completion date has been delayed from July 2010 to January 2011, but the IEC estimates that June 2011 is more realistic, because Additional Work Orders (AWO) are not being processed in a timely manner.<sup>14</sup>

*Flushing Line Extension.* The Flushing Line Extension was initially funded in the 2005-2009 plan with all contracts, totaling \$1,990 million, to be awarded in the first three years. The project included the tunnel and track extension, a station at 34<sup>th</sup> Street and Eleventh Avenue, and a "box" for a station to be completed in the future at 41<sup>st</sup> Street and Tenth Avenue.

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<sup>11</sup> MTA, <[http://www.mta.info/capconstr/sas/sas\\_history\\_1.htm](http://www.mta.info/capconstr/sas/sas_history_1.htm)> (August 26, 2009).

<sup>12</sup> MTA, May 2009 CPOC meeting report.

<sup>13</sup> MTA, April 2008 CPOC meeting report.

<sup>14</sup> MTA, May 2009 CPOC meeting report.

The initial plan called for a design contract to be awarded in April 2005 and to be completed in November 2006. A tunnel construction contract was to be awarded in July 2007 and completed in September 2012. The entire project with the new station was to be completed in June 2013.

The final design contract was awarded in April 2005. Due to uncertainties about the scope of the work for a Tenth Avenue station, the design contract is expected to remain open throughout construction in order to provide “design support services.”<sup>15</sup> Changes in the scope were considered after initial bidding in June 2007 for the tunnel contract yielded only one bidder. The MTA held private negotiations with the bidder and a contract was awarded in December 2007. The contract included less work on the Tenth Avenue station shell than initially planned in order to keep the cost close to anticipated amounts. In April 2008, the MTA instructed the designer to “freeze the design for the Tenth Avenue Station,” and to “design the necessary connections to the two tunnel tubes without the power communication and other equipment requirements to support an operating station.”<sup>16</sup> In September 2008, the Tenth Avenue Station was dropped from the project, and the required tunnel ventilation, which was originally planned to be provided through the Tenth Avenue Station shell, had to be redesigned. As a result, the design budget nearly doubled from \$55 million to \$107 million. However, the overall project cost has remained unchanged. The planned completion date for the tunnel remains September 2012, but the planned completion for the entire project was extended from June 2013 to November 2014. As of April 2009 the tunnel contract was reported on time by the MTA, and the IEC concurred.

*Fulton Street Transit Center.* This project was added to the 2000-2004 plan after the terrorist attacks on September 11, 2001. It was originally to be built at a cost of \$750 million supported by federal funding, with a planned completion in December 2007. Only \$124 million was allocated before 2005, for the rehabilitation of the 2 and 3 Line station and installation of new street stairs from the 4 and 5 Line platform, and for a portion of the project’s final design.

In 2005 the budget for the project was raised to \$847 million and planned completion was moved to October 2009. Three construction contracts were to be awarded in the 2005-2007 period. The contract for the Dey Street concourse, which will connect the Transit Center to the new PATH Terminal, was awarded in July 2005 and scheduled to be completed in November 2007. The contract for demolition of four buildings on the east side of Broadway was scheduled to be bid in November 2006, and to be completed in February 2007. The contract for the construction of the Transit Center was scheduled to be awarded in June 2007 and completed in June 2009.

The Dey Street concourse was completed a year later than originally planned, in November 2008. The delay was due to late completion of the hazardous material survey for the demolition of 189 Broadway. The demolition contract started in January 2007, two months later than planned, due to a delay in the removal of hazardous material, and it was completed seven months behind scheduled in September 2007.

The MTA put the Transit Center construction contract out for bids in June 2007, but it received only one bid, which far exceeded the budget. It began considering how to redesign the project by breaking it into several smaller packages. By mid-2008, the MTA signed off on one package, which consists of the Transit Center Building foundation and Corbin Building underpinning. This package

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<sup>15</sup> Ibid.

<sup>16</sup> MTA, April 2008 CPOC meeting report; July 2008 CPOC meeting report.

was advertised in mid-June 2008, and the bids were due August 14, 2008. The bid opening was delayed by about two months due to several modifications to the package, one of which was removing the Corbin Building underpinning. The contract was awarded in December 2008, with planned completion scheduled for August 2010. After award, MTACCC decided to put the Corbin Street underpinning back into the contract as an AWO. The IEC thinks that the bid could have fetched a lower price had the underpinning been included in it. A second package, which includes reconstruction of the A and C Line mezzanine, the J, M and Z Line vertical circulation improvements, and 4 and 5 Line rehabilitation work, was advertised on March 13, 2009. The bid period was extended from May 5, 2009 to June 2, 2009, in order to allow the contractors more time to prepare their proposals. The bulk of the construction work, which includes the Transit Center Building and Corbin Building restoration, has not yet been re-packaged, because the scope of the Transit Center Building is still under consideration.

*South Ferry Terminal.* The South Ferry Terminal was also added to the 2000-2004 plan after the attacks on September 11, 2001 with completion expected in April 2009. By the end of 2004 only about \$23 million had been spent for in-house preliminary engineering work.

In the 2005-2007 period four major contracts covering the entire project were scheduled to be awarded. A contract to design and build the “structural box” for the expanded station was to be awarded in February 2005 for completion in May 2007. A contract to design and furnish signal equipment was to be awarded in June 2006 and completed in February 2008. A contract for “finishes and systems” (which includes track switches for the new station, wall and floor tiling, sealing treatments, Federal American with Disabilities Act or ADA compliance requirements, communication, ventilations, electrical and water pumping systems) was to start in March 2007 and be completed in August 2008. The fourth contract, for landscaping above ground, was to start in December 2007 and be completed in September 2008.

The first three contracts were awarded on schedule. However, the work encountered delays related to leak management. In 2007 the operating division of the MTA responsible for the subway line (NYCT) found the leak management plan agreed to by the MTACCC and the contractor to be unacceptable. In October 2008 the consultant retained by MTACCC prepared an alternative plan, and implementing it caused delays. The delays in the work on the structural box caused delays in the signal and the “finishes and systems” contracts, because they required the leak issue to be satisfactorily managed. The station opened for service in March 2009, but as of May 2009 full completion of the contract work was not expected until at least September 2009. In addition, IEC has expressed concern that the revised leak management plan will not eliminate the leaks completely, putting its final approval into question.<sup>17</sup>

The MTA and New York City Department of Transportation signed an MOU in June 2008 for the scope of landscaping work in Battery Park. The final design for the intermodal connection between the reconstructed Ferry Terminal, bus service and the new subway station, as well as landscaping, utility work, bus stops, and canopies was completed in October 2008. The contract for landscaping work was awarded on April 6, 2009, with planned completion in December 2009. The IEC believes that planting and seeding will extend into spring 2010, and that substantial completion will be achieved in March 2010.<sup>18</sup>

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<sup>17</sup> MTA, February 2009 CPOC meeting report.

<sup>18</sup> MTA, May 2009 CPOC meeting report.

## Stations

The MTA rail network includes 468 subway stations, 124 LIRR stations and 120 MNR stations. The commuter railroad stations were brought to a state of good repair in previous capital plans. The current plan seeks to keep them in good condition; that effort includes repairing damaged elements, replacing worn and obsolete materials, upgrading mechanical systems and equipment, improving accessibility and extending the useful life of stations.

The subway stations have fared less well. In 2005 only 195 stations, or about four of every ten, were in a state of good repair. The MTA is seeking to bring more stations to a state of good repair by 2019, and the 2005-2009 plan makes some progress toward that goal by including rehabilitation work on 66 stations as well as other improvements.

As of 2005, the capital program included \$1.9 billion for 207 station projects scheduled for work between 2005 and 2007. About \$286 million was allotted to 44 MNR station projects, \$201 million to 24 LIRR projects, and more than \$1.4 billion to 137 subway station projects.<sup>19</sup> Many of these projects have encountered significant delays, as described below.

*Subway Stations.* Planned work on subway stations included two new passenger transfers linking the Jay St. and the Lawrence St. stations in Brooklyn and linking the Lexington line's Bleecker Street station and the 6<sup>th</sup> Avenue line's Broadway/Lafayette Street stations in Manhattan, the rehabilitation of 90 stations and replacement of 25 escalators at four stations.

A design contract for the Bleecker Street transfer project was awarded in July 2002 with the design to be completed by July 2004. The construction contract was originally to be awarded in July 2004, but the bidding was delayed due to legal challenges to property acquisition. The contract was advertised in October 2007. Bids were opened in February 2008, and the low bid submitted was \$94.4 million. The engineer's cost estimate at the time was \$53.4 million. The contract was awarded in July 2008 with the budget of \$133.3 million and planned completion date of November 2011. As of July 2009, the project was reported on schedule.

The contract for the Jay Street/Fulton Street transfer project was awarded in March 2007 with completion planned for March 2011. As of July 2009, the project was reported on time.

The MTA's public reports provide information on 73 stations being rehabilitated. Of these, 11 are projects for one station or station complex. Another 62 stations are spread among eight contracts for multiple stations on common subway lines. (See Table 1.)

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<sup>19</sup> In addition, \$5 million was allocated to two unspecified station rehabilitation projects. Some of the projects in each category are for fare collection improvements at stations rather than station rehabilitation or improvements.

**Table 1**  
**Change in Completion Date and Cost for Selected MTA Subway Station Projects**

	Award Date	Completion Date		Cost (\$ millions)		% of Planned Budget
		Initial	Latest	Planned	IEC Forecast	
<b>Single Stations</b>						
<u>Completed</u>						
Times Square Complex, Phase II	Dec-02	Jun-06	Sep-06	127.4	124.0	97%
West 8th St. & Neptune Stations (Q/B,F)	May-02	Oct-04	Dec-05	33.0	46.6	141%
Myrtle/Wyckoff Station Complex (M/L lines)	Dec-03	Sep-07	Feb-08	73.3	77.9	106%
Wall St. station rehabilitation (4,5 line)	Dec-05	May-09	Mar-08	47.2	43.8	93%
47th-50th St./Rockefeller Center	Oct-06	Sep-08	Sep-08	27.7	29.8	108%
Chambers St. (J,M lines)	Jul-07	Nov-08	Nov-08	23.9	21.9	92%
Chambers St. (1,2,3 line)	Sep-06	Jun-08	Apr-09	38.3	40.8	107%
<u>In Construction</u>						
96th St. (1,2,3 line)	May-07	Jun-08	Sep-10	95.6	97.9	102%
59th St./Columbus Circle	Dec-05	Jun-09	Mar-10	106.0	120.0	113%
<u>In Design</u>						
East 180th St. (WPR line)	Dec-03	Sep-08	Sep-09	44.4	65.8	148%
Times Square Shuttle	Oct-04	TBD	TBD	18.1	20.0	110%
<b>Multiple Stations</b>						
<u>Completed</u>						
Canarsie Line (4 stations)	Dec-04	Jun-07	Dec-06	46.7	46.2	99%
Jamaica Line (5 stations)	Dec-04	Apr-07	Apr-07	64.1	66.2	103%
White Plains Road Line (10 stations)	Dec-02	Apr-07	Apr-07	265.7	280.4	106%
Jerome (5 stations)	Dec-05	Jun-08	Dec-07	77.4	77.5	100%
<u>In Construction</u>						
Brighton Line (7 Stations)*	Oct-08	Jun-12	Jun-12	160.2	302.2	189%
<u>In Design</u>						
Pelham 6 line (10 stations)*	Jun-05	Jan-09	Sep-09	167.2	268.7	161%
Sea Beach (9 stations)	May-07	Sep-09	TBD	TBD	562.5	
West End Line (12 stations)*	May-07	Nov-08	TBD	181.8	254.0	

Source: Compiled by CBC staff from multiple monthly reports by MTA staff to the Capital Program Oversight Committee.

\* The project has been split into two smaller contracts. The cost estimates comprise contracts for all stations in the original project.

TBD indicated to be determined.

Among the single station projects, seven were completed. Of these, three were done on time. Work on the Wall Street station (4, 5 line) was begun in December 2005 and completed in March 2008, several months ahead of schedule. Work at the Rockefeller Center station was begun in October 2006 and completed on time in September 2008, but the scope of the work was significantly reduced. A design contract for the Chambers Street station (J, M lines) was awarded in August 2005 and completed two months late in June 2007; the construction contract was awarded in July 2007 and completed on time in November 2008.

Four other completed stations had serious delays. Work at the Times Square station begun in December 2002 was completed three months behind schedule in September 2006. Work on the Myrtle/Wyckoff station complex begun in December 2003 came in five months late in February 2008. Work on the West 8<sup>th</sup> Street and Neptune stations begun in August 2002 was completed 14 months late in December 2005. Work on the Chambers Street station (1, 2, 3 line) began in September 2006 and was completed about 10 months late in April 2009.

Work on the 96<sup>th</sup> Street station (1,2,3 line) has been delayed significantly. A design contract was awarded under the previous plan in January 2003, but award of the construction contract was delayed from the initial plan of March 2005 until May 2007 due to a lack of bidders. The work is now planned for completion in September 2010, about 27 months after the original completion date of June 2008.

The rehabilitation of the Columbus Circle station was contracted in December 2005; in July 2009 it was reported to be five months behind the scheduled completion date of June 2009, but the IEC anticipated that the completion will be delayed even further, until March 2010. The IEC expected delays because the construction contract was awarded before the design work was fully completed in order to meet the commitment schedule; completing the design at the later stage will delay the work.<sup>20</sup>

Rehabilitation of the East 180<sup>th</sup> Street station on the White Plains Road line has suffered extensive delays. Design work for the project, which includes a landmark building, was begun in the in the previous plan, but had not been completed. The construction contract award was planned for September 2008, but the IEC's forecast in July 2009 was no sooner than September 2009.

Work on the Shuttle station at Times Square was deferred indefinitely. Design work was begun under the previous plan in October 2004, but was never completed because the project was placed on hold.

Of the eight contracts involving multiple stations, four have been completed, one is in construction, and three were in design during the first three and a half years of the current plan. Award of construction contracts for two of the four projects in design was deferred until the next capital plan due to lack of funding, and one construction contract was awarded in October 2008.

Work on four Canarsie line stations begun in December 2004 was completed six months early in December 2006; the IEC commended the project as “a well-organized management and construction effort.”<sup>21</sup> Work on five stations on the Jamaica line also begun in December 2004 was

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<sup>20</sup> MTA, January 2009 CPOC meeting report.

<sup>21</sup> MTA, May 2007 CPOC meeting report.

completed on time in April 2007. A contract for ten stations on the White Plain Road line was awarded in December 2002 and completed as planned in April 2007. A contract for work on five stations on the Jerome Avenue line was awarded in December 2005. The project was completed six months ahead of schedule in December 2007.

Rehabilitation of seven stations on the Brighton line was included in the previous plan. A design contract was awarded in March 2002 and completed in November 2006, more than two years behind schedule. The construction contract was bid in 2007, but the low bidder withdrew in September 2007. The MTA decided to repackage the work as two contracts and awarded a contract for two stations in July 2008 and a contract for the remaining five stations in October 2008 with planned completion dates of October 2010 and June 2012, respectively. According to the July 2009 CPOC report, work on the two stations included in the first contract is proceeding on schedule, and work associated with the second contract is expected to be completed six months ahead of schedule, in December 2011. The IEC's forecasts are in line with the originally planned completion dates.

A contract for design for the rehabilitation of 10 stations on the 6 line in the Bronx was awarded in June 2005 with completion expected in May 2008 and award of a construction contract planned for January 2009. The design has been extended due to repackaging – the project has been split into two smaller construction contracts in order to “appeal to a larger segment of the contracting community.”<sup>22</sup> The first contract was awarded in July 2009, and the final design for the remaining five stations is expected to be completed in September 2009, three months behind the schedule set in mid-2008.

The Sea Beach line (4 line in Brooklyn) project involves work at nine stations. Design work for the project started in May 2007, and the construction contract was scheduled to be awarded in September 2009. The June 2008 CPOC report on the status of subway stations indicated that the MTA plans to “shelve the project documents until sometime in the 2010-2014 capital plan,”<sup>23</sup> due to the shortfall in the current capital plan. The construction contract is currently expected to be deferred to at least 2012.<sup>24</sup> In the meantime, the IEC reported in July 2009 that the design work has been suspended as the NYCT has taken a new approach, which is to “focus on extending the useful life of structure throughout the project area and balance other requirements based on available funding.”<sup>25</sup> The scope of the design consultant's work has been expanded to include an investigation into remaining useful life of structure, but the budget for design has not been increased. The results of the investigation were due in September 2009.

Design work for 12 stations on the West End line in Brooklyn (3 line) started in May 2007, as planned. Final design was forecast to be completed in July 2008 and the construction contract was scheduled to be awarded in November 2008. The scope of the project has since been changed to include windscreens and “other scope items.”<sup>26</sup> As a result, final design sign-off was anticipated in September 2009, more than a year later than originally planned. The January 2009 CPOC report indicates that the award of the construction contract has been deferred “until construction funding

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<sup>22</sup> MTA, July 2009 CPOC meeting report.

<sup>23</sup> MTA, June 2008 CPOC meeting report.

<sup>24</sup> MTA, January 2009 CPOC meeting report.

<sup>25</sup> MTA, July 2009 CPOC meeting report.

<sup>26</sup> MTA, June 2008 CPOC meeting report.

is available, assumed at this time to be in the 2010-2014 capital plan.”<sup>27</sup> The July 2009 CPOC report implies that the project has been divided into two smaller contracts, but no explanation is provided.<sup>28</sup>

The 73 stations for which information is available in MTA’s public reports represent only a part of the stations scheduled for work in the capital plan. The 2005 plan called for work on 88 stations in the 2005-2007 period; the 2007 amendments dropped two of those stations and added 16, indicating a net total 102 stations scheduled for rehabilitation and other improvements in the 2005-2007 period. Further complicating the picture, five stations in the public CPOC reports are not part of the plan. This suggests that 34 stations that should have work performed are not part of the public reports. Of those stations, 15 appear to have been funded prior to 2005. Of the other 19 stations not being tracked, 11 were scheduled for rehabilitation, five for disabled access improvements, and three for work on escalators.

*MNR Projects.* The major projects at MNR are design and construction of a new station at Yankee Stadium, rehabilitation of aspects of Grand Central Terminal (GCT), parking enhancements at eight stations, and the rehabilitation of an unspecified number of existing stations on each line.

The new Yankee Stadium station was originally in the previous plan at a cost of \$45 million, but the project was carried forward to the new plan period. A design and construction contract was awarded in May 2007 at an estimated cost of \$92 million with \$53 million from the MNR and \$39 million provided by the City of New York. The station opened for service on May 22, 2009, but contract work relating to non-operational aspects of the project was not due for completion until August 2009.

The planned work at GCT includes repairs to elevators, some exterior work and platform improvements, but the two largest projects are for leaks remediation (\$12.6 million) and train shed structural repairs (\$17 million). The leak project was initiated in the 1995-1999 capital plan with a design contract awarded in February 2000 and the design to be completed by July 2003. Design work was completed more than five years later than originally planned, in October 2008. By contrast, the train shed project, which includes repairs to the area holding trains under 45th to 59th Streets between Madison and Lexington Avenues, is ahead of schedule. A contract was awarded in August 2006 and work was completed in March 2009.

The MTA public reports do not indicate the status of the parking enhancement projects or of the station rehabilitation projects other than those on the Hudson Line and the Upper Harlem Line. With respect to Hudson Line stations, work on seven stations has been divided into three contract packages. The first contract for three stations (Hastings-on-Hudson, Dobbs Ferry, and Irvington) was awarded in December 2006 and completed in March 2008, two months behind the original schedule. The second package includes three stations (Philipse Manor, Scarborough and Ossining). It was awarded in July 2007 and is scheduled for completion in November 2010. The third contract, for Tarrytown station, had not yet been awarded, because there is not sufficient funding in the current plan.

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<sup>27</sup> MTA, January 2009 CPOC meeting report.

<sup>28</sup> MTA, July 2009 CPOC meeting report.

Work on overpasses at three Hudson Line stations that had been initiated in the previous plan was completed in March 2007. The contract had been awarded in October 2004, and completion was delayed three months.

A contract for work at 13 Upper Harlem Line stations was awarded in April 2005 and completed in December 2006. The completion date was five months behind the initial schedule.

*LIRR Projects.* The LIRR station projects include work at Penn Station on tracks and employee facilities, parking improvements at the Mineola Intermodal Center, rehabilitation of six stations, and platform improvements at Seaford station and the Broadway station on the Port Washington branch.

The MTA public reports relate only to the two platform improvement projects and two station rehabilitation projects (Atlantic Terminal and Rosedale station). The Seaford Station Platform project involves platform replacement, stair and elevator work, and ADA-compliant improvements. A design contract was awarded in March 2006 and completed in June 2007. A construction contract was awarded as scheduled in September 2007 with completion planned in April 2009. The March 2009 CPOC reported a five-month delay in completion due to the redesign of the platform planks. After a series of technical reviews it was determined that the precast and pre-stressed platform planks were below the tolerance level required by the changed platform's surface grade. No explanation is given for why the change to the surface grade was made.

The Broadway Station platform project demolishes and replaces the original concrete platforms and foundations, as well as makes ADA-compliant improvements. The contract was awarded in September 2005 with completion scheduled for September 2008. The project was reported to be eight months behind schedule as of February 2009. The delay is attributed to "work located in the bridge abutment area and completing the parking lot pavement,"<sup>29</sup> but no further explanation is provided in the IEC reports.

The Rosedale station project involves constructing a new platform and rehabilitating the station. It was initiated in December 2001 with completion planned for 2004. However, progress was delayed due to higher priority for the Jamaica station and Air Train projects, and problems with the quality of some precast concrete elements. A new schedule was established in January 2006 calling for completion in September 2007. Additional delays followed due to problems with the procurement of the elevator shaft and because of LIRR not making the necessary track outages. Completion was achieved in May 2008, or 41 months later than originally scheduled. The IEC commended LIRR on applying lessons learned during the project to other ongoing projects, "resulting in improved procurement practices, more thoughtful staging and planning, and implementation of additional quality assurance measures."<sup>30</sup>

The Atlantic Terminal improvements began in July 2002. The project was divided into two phases with the first to be completed in December 2004 and the second in July 2007. The first phase was completed in June 2006, and planned completion of the second phase was delayed to September 2009. The sources of the delays include a slower than planned pace of demolition, changes in the

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<sup>29</sup> MTA, September 2008 CPOC meeting report.

<sup>30</sup> MTA, September 2008 CPOC meeting report.

structural drawings for the entry pavilion, and “unforeseen conditions at the interface between the new entry pavilion and the adjacent building,”<sup>31</sup> which was constructed by a private developer under an agreement with LIRR. The most recent nine month delay was caused by the revocation of the contractor’s access to the site due to a scheduling conflict with New York City Department of Transportation’s reconfiguration of Hanson Place.<sup>32</sup>

## Replacement of Rolling Stock

Replacement of rolling stock is a major component of the capital program, accounting for about \$2.3 billion in planned commitments during the 2005-2007 period. Replacements were planned for subway cars, buses, MNR cars and LIRR cars.

*Subway cars.* The subway car fleet consists of 2,779 A Division and 3,575 B Division cars. The A Division cars are used on the numbered subway lines and shuttle services; they are somewhat smaller than the cars used on the B Division lines, which are identified by letters. All are scheduled to be replaced after 40 years of service.

In the 2005-2007 period the MTA was replacing B Division cars. The current replacement phase started in the 2000-2004 capital plan with a base order of 660 cars. That contract was awarded in October 2002. In addition to the base order, the contract contained two future option purchases; Option I was to purchase 620 cars and Option II was to procure between 380 and 420 cars.

The base order of 660 cars was originally scheduled to be completed by March 2008. It consists of 260 cars supplied by a contractor used in the past, and 400 cars supplied by a new contractor. The old contractor completed the delivery close to schedule in April 2008, while the delivery of new contractor’s order was eight months late. The new contractor attributed the delay in production to “issues with parts suppliers, quality, and closeout of documentation.”<sup>33</sup> The IEC thinks that the contractor bears responsibility for the delay, because it failed to verify that suppliers would be capable of providing equipment and material in a timely manner.

The 2005-2009 capital plan allocated \$1,162 million for Option I cars. Option I was exercised in August 2007 with planned completion in August 2009. The old contractor is supplying 260 cars, and the new contractor is supplying the other 360 cars. As of April 2009 completion was expected two months later than planned, and the IEC estimated that the delay will be closer to four months. The second Option was approved in November 2008 for an additional 382 cars. Deliveries are expected to be completed in May 2010, but the IEC cautioned that the completion date will be affected by the delay in the completion of Option I.

*Buses.* The MTA has a bus fleet of 4,578 vehicles, including standard, express, hybrid electric, and articulated buses. During the 2005-2007 period the MTA initially planned to order 650 standard buses. In 2005 a contract was awarded for 116 buses. In 2007 a contract was awarded for 284 buses, and a decision was made to defer the purchase of the remaining 250 buses until after 2007.

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<sup>31</sup> Ibid.

<sup>32</sup> MTA, March 2009 CPOC meeting report.

<sup>33</sup> MTA, March 2007 CPOC meeting report.

With respect to hybrid buses, the 2000-2004 plan allocated \$136 million for the purchase of 300 hybrid buses. In that period a contract for 200 buses at a cost of \$82 million was awarded, and \$54 million for the remaining 100 buses was carried forward. Available documents do not indicate whether this money had been spent on the buses in the 2005-2007 period.

The 2005-2009 plan included \$29 million for 56 express buses to be purchased in 2007. In 2006 \$15 million was committed; the remaining funds and \$2 million more were rescheduled to be spent in 2008. Information is not available to indicate how many buses are related to the \$15 million or why the total cost went up.

The 2005-2009 plan includes \$69 million for 112 articulated buses, with this money planned for commitment after 2007. However, there was \$16 million for 20 articulated buses carried forward from the 2000-2004 plan; there is no public information available on whether or not this was spent in the 2005-2007 period.

In addition to buses, the MTA maintains a variety of other vehicles including paratransit vehicles and service vehicles for buses and subways. Two major changes in the planned purchases for the 2005-2007 period were: (1) an acceleration in the purchase of paratransit vehicles from an initially planned total of 464 at a cost of \$33 million to 556, with no reported change in the cost, and (2) an increase in cost for the purchase of 19 locomotives from \$55 million to \$71 million due to a higher than expected bid.

*MNR.* The MNR has a fleet of cars which vary in age with the oldest dating to the 1960s, a second group of cars (M-3's) purchased in the early 1980s, and newer cars (M-7's) ordered beginning in 2002. During the 2005-2007 period funds were to be spent to do a "midlife remanufacture" on 142 M-3 cars, to complete the acquisition of 336 M-7 cars, and to initiate purchase of 300 new model cars (M-8's).

In 2006 the MTA decided to cancel the planned remanufacture of the M-3 cars. The project was foregone in favor of increasing "ongoing maintenance levels for the M-3's to be funded by its operating budget."<sup>34</sup> About one third of the funds from the M-3 project was reprogrammed to fund cost overruns in the M-7 project and the remainder was transferred to the Shops and Yards element category, which also was facing cost increases.

The M-7 project was awarded in 2002 under a joint contract between MNR and LIRR. The MNR contract consisted of three orders. The entire project was substantially completed in April 2006, one month later than originally scheduled. Minor modifications to armrests, which were developed to address instances of customer clothing catching, were scheduled to continue through the end of March 2008.

The contract for M-8 car procurement was awarded in August 2006. MNR and Connecticut Department of Transportation are jointly procuring the initial order of 210 cars and a first Option order of 90 cars. Option II could increase the total number of M-8 cars to 380. The base order and the Option I order are scheduled to be completed by December 2012. As of the November 2008 CPOC report, which is the last time there was an update on the status of the joint car procurement program, the IEC did not anticipate cost overruns or delays in completion schedule, even though

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<sup>34</sup> MTA, MTA 2005-2009 Capital Program, January 2006 Amendment, p. 17.

the contractor estimated a two-month slippage in delivery of the pilot cars scheduled for August 2009.

*LIRR.* Like the MNR, the LIRR has been replacing older cars with M-7 cars under a contract initially awarded in 2002. That contract called for 352 cars with the order to be completed by May of 2006. Actual completion was one month late. The original contract also had an option for another 158 cars. The 2005-2009 plan anticipated exercising that option, and in July 2005 the MTA ordered the cars. The order was completed in April 2007, two months behind the original schedule.

## **Signals and Communications**

The MTA's capital plans have been pursuing two major objectives for the signal and communication systems in the subways. First, the existing control and signal systems should be brought to a state of good repair; second new "state of the art" systems and applications are to be installed in order to improve the quality of service and increase capacity. Both are taking place over extended time frames, without a clear long-run plan, and with extraordinary delays.

*Signals.* The subways were built with a "block signal" system under which the tracks are divided into sections or blocks. Each block has a signal at its start which uses simple colored lights (green and red) to indicate to a train operator if it is clear to enter or dangerous to enter because it is occupied by another train. Mechanical devices called "trips" will deprive a train of power in a block occupied by another train unless special precautions are taken.

At certain points along the routes tracks are connected by sets of equipment called "interlockings." These are points at which trains may move from express to local tracks (and vice versa), from one line to another, or change direction at the terminal point of a line. The interlockings consist of movable sections of track, a device which makes the sections of track move, a control device which determines the position of the track, and a set of signals which indicate the position or direction of the track to the operator of an approaching train. Malfunctions of interlockings can be very dangerous, causing derailments and collisions.

The subway system has multiple interlockings on the A and B Divisions, but there are no track connections between the A and B Divisions used in customer service. Initially the control of interlockings was decentralized; each one had a control point or "tower" with a person assigned to it. During the 1960s control of interlockings was consolidated into 30 "master towers" at which staff controlled several interlockings located in the same general region.

Beginning in the mid-1990s an initiative was launched to consolidate control of all interlockings at one central point. This master control room (located at 54<sup>th</sup> street in Manhattan) would both have information about the location of trains from the block signal system and control all interlockings; these features would be used to guide the dispatch and routing of trains. The new control system was called Automatic Train Supervision (ATS) and was to be implemented in two stages – first the A Division and then the B Division. The A Division was selected for first implementation because its interlockings were in better condition; the B Division interlockings required significant work to be brought to a state of good repair.

A contract for ATS on the A Division was awarded in November 1997 with estimated completion in April 2005.<sup>35</sup> The work was largely accomplished prior to the current five-year plan, but the project was not completed until September 2008 – more than three years later than originally planned at an estimated cost 35 percent above what was budgeted at award.

The U.S. Department of Transportation (DOT) conducted an analysis of the ATS contract process and identified several problems that help explain the extensive delays:

- *Contractors.* The original ATS contract awarded in November 1997 was given to a US-based signal company familiar with NYCT and its operations. After 18 months of negotiations, it was determined that the contractor’s software development team could not meet major functional requirements in the contract. The contractor was defaulted in 1999, and NYCT contracted with a new joint venture team in September 2000. The new contract was given a 48-month duration, the remaining time left from the original contract timeframe, despite the fact that the software development company selected to be the lead in the new joint venture had no previous experience doing work for NYCT and was not familiar with its complex signaling system. The DOT report suggests that, “NYCT had not conducted a formal qualifications evaluation of the new JV (joint venture) partner to assess its NYCT-specific domain knowledge.”<sup>36</sup> Furthermore, the new JV partner’s systems integration team has a NY-based project management office, but its software development team resides overseas, which posed several challenges related to coordination.
- *NYCT Project Team.* NYCT had limited experience in managing large systems projects and made an effort to be systematic in its handling of the project by forming working group teams based on different areas of responsibility. Nevertheless, it underestimated the complexity of the ATS system. For instance, it relied on field inspectors who were used to conventional signal projects and did not have additional expertise in other fields involved in ATS, such as fiber optics and telecommunications work. As a result, NYCT project team had difficulty in conducting inspections and had to learn the proper operating procedures and protocols required by the associated operations departments for access and protection and working on live equipment. The DOT report notes that “there is a recent acknowledgment from NYCT management that NYCT may need to evaluate its current organizational structure for large systems projects.”<sup>37</sup>
- *Contract Documentation.* The DOT found that several key documents were never developed for the project, which resulted in disputes with the contractor during various stages of the contract about what is required to meet users’ needs and expectations. For instance, there were no specific functional requirements detailed in the specifications for the voice communications sub-system. Also missing from the documentation was a Concept of Operations document, which is a basis for user requirements. The DOT relates the failure to develop the necessary documentation to the existing NYCT-internal project management procedures and templates, which were written in the context of standard “brick and mortar” type projects. A project such as ATS required a systems engineering approach, which takes into account the needs of multiple stakeholders and interdisciplinary perspectives.

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<sup>35</sup> The #7 Flushing line is considered part of the A Division for most operating purposes; its cars and other features are the same as those for other A Division lines. However, for signaling and ATS purposes it is not considered part of the A Division and is not part of the first ATS contract.

<sup>36</sup> [http://www.fhwa.dot.gov/cadiv/segb/views/document/Sections/Section8/8\\_5\\_1.htm](http://www.fhwa.dot.gov/cadiv/segb/views/document/Sections/Section8/8_5_1.htm) (September 22, 2009).

<sup>37</sup> Ibid.

- *Testing, Review and Prototyping Activities.* NYCT did not monitor and audit the contractor's software development progress closely enough. Despite suggestions from the contractor that an NYCT engineer reside at their facility during the software development cycle, NYCT only visited the facility once prior to the Factory Acceptance Test. During that test it was discovered that the developers had misinterpreted how certain functions of the NYCT's signaling system operated, and that they had not progressed as far along as their status reports indicated. Addressing these issues resulted in a six month slippage in the project schedule.

The contractor was responsible for conducting a series of formal reviews at defined milestones, enabling the NYCT team to assess the contractor's work on the project relative to its technical and contractual requirements. The tight schedule, however, outweighed the importance of the technical reviews, and these reviews were omitted. Open issues were permitted to remain unresolved from one phase to the next, and some were addressed only at the close-out phase of the project, contributing to its delay.

In order to shorten the prototyping phase, NYCT also allowed the contractor to submit individual screens shot of power-point presentation images. Future users, who are expected to be able to navigate through multiple screens on their workstations, could not get a clear understanding of screen interactions from individual presentation screens. Real user experience scenarios were untried prior to Factory Acceptance Test, which led to a design that was awkward to use. Eventually, NYCT became concerned enough about this problem to issue AWOs to the contractor in order to correct it, adding to the project's duration and cost.

While experiencing these difficulties in modernizing A Division signals and controls, the MTA was planning how to modernize B Division signal and control systems and how to upgrade communication systems throughout the subways. This has led to a series of projects relating to (a) improvements in the interlockings on several B Division lines, (b) development of Computer Based Train Control (CBTC) on the Canarsie and Flushing lines, and (c) communication systems improvements requiring a fiber optic cable network.

*Interlocking and block signal improvements.* Work in the 2005-2007 period included five relatively large projects of this type.

1. Fifth Avenue and Lexington Avenue Interlockings. This project consists of the design, furnishing and installation of signaling equipment for two interlockings on the Queens Boulevard line. The signal system will be CBTC-ready. The Queensboro Plaza Master Tower will control the interlockings with the capability for automatic routing in an emergency by local control from the Fifth Avenue relay room.

The design phase started in June 2005. The award of the construction contract was originally planned for January 2008, but the contract was awarded one year later than planned, in January 2009. The reasons for the delay include field obstacles at the excavation of a new relay room at Fifth Avenue and the routing of the associated signal cables to this room. The Stations Department had to agree to relinquish space on the mezzanine floor to accommodate the new relay room excavation and other new equipment rooms, in exchange for the area from the existing tower, once it is made safe and ready for use. The MTA Real Estate had to approve the rerouting of the signal and communication cables via an abandoned escalator shaft. The IEC recommended that "in the future

more interdisciplinary coordination effort be made during the design process to ensure that all potential work in common areas is considered.”<sup>38</sup>

2. 71<sup>st</sup>/Continental Avenue, Union Turnpike and Roosevelt Avenue. This project rehabilitates the signal system for three interlockings on the Queens Boulevard line. The existing interlockings will be replaced with new relay-based interlockings, and new relay rooms will be built to house the new equipment. Additionally, the project includes the installation of a new double crossover between tracks south of 71<sup>st</sup> Avenue station and the reconfiguration of the existing single crossover into a double crossover south of 75<sup>th</sup> Avenue.

The design for the three interlockings started in July 2006. The planned award date for the construction contracts was delayed three months, from August to November 2008, due to the repackaging of the construction from two to three contracts – the design and furnish of equipment for 71<sup>st</sup> Avenue Union Turnpike interlockings; the installation of the equipment; and the design, furnish and installation for the Roosevelt Avenue interlockings. The IEC attributed the delay to the “inability of the Construction Manager’s office to provide in-house force account labor and TA labor estimates required for the new construction approach,”<sup>39</sup> and the poor attendance record of the office’s representatives at the project design meetings. In the April 2009 CPOC report, the IEC moved the estimated award date even further, to December 2010, citing the previously stated reasons.<sup>40</sup>

3. Bergen Street Interlocking Pilot. This was the first project to pilot Solid State Interlocking (SSI) technology with “the capability to monitor the performance of the system, increase reliability in interlocking operations and make available real-time equipment information to assist signal maintainers in troubleshooting failure conditions and supplying diagnostic data.”<sup>41</sup> This microprocessor-based technology replaced the old relay-based Bergen Street interlocking.

The contract for the project was awarded in July 2002 with planned completion in June 2005. By 2007 project completion was delayed to October 2008, more than three years late. The February 2007 CPOC report indicates that the Independent Safety Assessor had found anomalies with the system’s software and hardware, which then had to be redesigned. It is unclear when this finding was established, nor how much of a delay it caused in the completion of the project. The report indicates that the project had been plagued by a “water intrusion problem,” but it does not specify how much of the delay this issue was responsible for. The March 2008 CPOC report indicates the Assessor identified an additional hazard condition, which required the redesign of one circuit board. The contractor was facing a shortage of redesigned boards, which further delayed the completion of the project. In the April 2009 CPOC report the IEC noted that the redesigned software was ready for installation, but that it will not be possible to install and validate it until November 2009.<sup>42</sup> The IEC is concerned that the software manufacturer’s one-year warranty will be partially expired before the final software is validated, and recommends extending the warranty to one year after the validation. NYCT has stated that the funding required for additional scope of work under the extended warranty is not available, but that it will “piggyback the GO [General Order]” with another project that is planned for award before November 2009.<sup>43</sup> The software manufacturer agreed to

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<sup>38</sup> MTA, October 2007 CPOC meeting report.

<sup>39</sup> MTA, March 2007 CPOC meeting report.

<sup>40</sup> MTA, April 2009 CPOC meeting report.

<sup>41</sup> MTA, March 2007 CPOC meeting report.

<sup>42</sup> MTA, April 2009 CPOC meeting report.

<sup>43</sup> MTA, April 2009 CPOC meeting report.

begin the warranty at the date of installation, “provided they get the GO this year.”<sup>44</sup> The control panels have experienced “numerous failures”<sup>45</sup> since the Beneficial Use milestone had been reached in October 2008, resulting in system-wide operational delays. The IEC is concerned that the failure reports provided by the manufacturer of these panels do not identify the main cause of the failures, and recommends that the NYCT request from the manufacturer more detailed analysis that addresses this concern.

4. Concourse Line. This project replaced the old signal system with conventional fixed block technology from 205<sup>th</sup> Street in the Bronx to 145<sup>th</sup> Street in Manhattan. The scope of the project included the construction of a new Master Signal Tower at Bedford Park Boulevard Station and the construction of five Relay Rooms, one Central Instrument Room, and one Signal Power Room. Also added to the contract was the Canal Street signaling upgrade, which was needed to improve headway at Canal Street. The construction contract for the project was awarded in December 2002, with planned completion in April 2007. The project was completed five months ahead of schedule in November 2006.

5. 8<sup>th</sup> Avenue Line, three Interlockings. This project includes furnishing and installation of new fixed block signaling in the interlockings at Chambers Street, World Trade Center (WTC)<sup>46</sup>, and Canal Street. Two new Relay Rooms will be built, one on the Mezzanine level of Chambers Street to control the WTC and Chambers Street interlockings, and the other on Canal Street. New wayside signal, stop machines, and switches will replace the existing equipment. The contract was awarded in October 2006, with a completion date of April 2010. As of March 2009, the project was running on schedule. The IEC noted that interim construction activities for five of the seven major milestones on this project were delayed up to one month due to the unavailability of GOs, but that the NYCT and the contractor were discussing mitigation techniques to reduce the delay. One milestone, the WTC Relay Room, has already been reached in February 2009, and the IEC commended the project team for completing the work on time.

*Communications Based Train Control.* Another approach to modernizing the B Division lines is to install a completely new technology that replaces the block signals. This system, currently in operation in other systems around the world, is known as Communications Based Train Control (CBTC). It replaces block signals with computerized sensors placed along the tracks that detect when a train is present as well as its speed; this information is sent to additional computers installed in the trains and to a control center such as the ATS facility. The computer in the train uses the information from the sensors to adjust the train’s speed or stop it based on what is happening on the tracks ahead. CBTC systems allow trains to operate more safely than with block signals and with shorter headways (time between trains), thereby increasing the passenger handling capacity of the subways. CBTC also changes the role of the motorman; he or she is no longer essential to operating the train, but the MTA plans to keep a person on board to serve as a back-up for operations and safety.

In the 1990s, the MTA decided to begin converting to CBTC by testing it on the Canarsie (L) line. That line was in need of signal and interlocking replacements; in addition, it is not connected to any other lines, so its operations could be isolated from other routes for testing purposes. A contract for

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<sup>44</sup> Ibid.

<sup>45</sup> Ibid.

<sup>46</sup> The station name was retained even though the World Trade Center edifice is no longer there.

installation of CBTC on the Canarsie line was awarded in December 1999 with planned completion in December 2004. The project was substantially complete in December 2006, but full completion was postponed to an undetermined date by the IEC due to needed testing of the reliability of the system. In addition, a new contract is being issued for installation of CBTC equipment on additional subway cars for the Canarsie line; this contract also will include some credits to the MTA for work (removing old block signals) that could not be completed by the vendor because of the need to operate additional unequipped trains on the line.

The Flushing line (#7) is the second line scheduled for conversion to CBTC. Like the Canarsie line, it has no track connections to other lines, so its operations can be isolated and it can have a dedicated fleet of cars equipped with the CBTC equipment. Preliminary engineering for this project began in November 2003 with completion of that stage expected in January 2008. The 2005-2009 plan included \$257.2 million for a contract to be awarded in 2008 for installation of the sensors. However, this contract was postponed to March 2009 due to “funding availability.”<sup>47</sup> This project also requires installing CBTC equipment on 320 cars now used on the Flushing line and on new cars to be ordered for use on this line. Funds for the retrofitting are not in the current plan. An order for 46 new cars with CBTC was scheduled to be awarded in 2008; in November 2006 this planned order was increased to 117, and as of March 2009 it was expected to be awarded in October 2009. Since the installation of the CBCT equipment must be coordinated with car procurement, the award of the contract has been further postponed.

*Communications Systems.* The subways have multiple communication systems beyond the signals on the tracks. Stations are equipped with public address systems, telephone communications, closed circuit televisions, turnstiles that read and transfer Metrocard data, and vending machines that sell Metrocards using credit card verifications. These systems have been installed and modified at different times, and all rely on conventional copper wire for their connections.

The MTA is creating a fiber optic cable network (SONET – Synchronous Optical Network) to consolidate and enable enhancements to these systems. Creating this new communications infrastructure involves installing the SONET cables throughout the system and installing terminal boards (known as Systems Application Migration or SAM installations) at each station.<sup>48</sup> A contract for SONET cables throughout the A Division was awarded in summer 2000 with completion scheduled for February 2004. As of March 2009, substantial completion was expected in July 2009, more than five years later than planned. The IEC believes that completion will not be achieved by target date without a mitigation strategy with respect to testing of sites, which is proceeding at a slow rate.

Installation of SONET in the B Division began with a contract awarded in December 2004, with completion planned under a subsequent contract in March 2009. As of March 2009, completion was delayed until November 2009.

Installation of the SAM boards that make it possible to connect the stations to the SONET is being done in stages. A survey of the 468 stations to determine suitability was completed under the

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<sup>47</sup> MTA, October 2008 CPOC meeting report.

<sup>48</sup> SAM boards will connect station applications to the SONET. They do not connect the ATS system involving the block signals and interlocking controls to SONET. The MTA does not yet have a plan for how to connect the ATS to SONET.

previous plan. Design work was divided between two phases, both done internally at the MTA, covering 125 stations and 186 stations, respectively. (No design work was funded for the remaining 157 stations.) Design of the first 125 stations was completed in October 2005. Construction of the projects at 118 of these stations was begun under three separate contracts awarded in December 2004 (49 stations), December 2005 (26 stations) and August 2006 (43 stations). The three contracts were completed on time; two in June 2007 and one in September 2008. Design for the next 186 stations was begun in January 2006 with an expected completion in March 2008. The October 2008 CPOC report indicated that design had been completed for 142 stations; the remaining 44 stations are to have the SAM design incorporated as part of future station rehabilitation projects. A contract for construction of 52 of the latest 142 station designs was awarded in December 2006; it was reported to be on time for June 2009 completion as of March 2009. There is no plan or funding for construction of the remaining station designs. In sum, of 468 stations needing SAM installations, 170 have work completed or underway, 97 have been designed but have no funding for installation, and the remaining 201 have not been addressed yet.

In addition to improving current communications hardware, the MTA also plans to enhance its communications services through a new Public Address and Customer Information Service (PA/CIS) that uses the SONET and electrical signs to provide customers at each station with information about the expected arrival time of the next train and other useful information. A contract for a PA/CIS system on the Canarsie line's 24 stations (using the existing cable system and not SONET) was awarded in April 2003 with expected completion in August 2005; substantial completion was reported in December 2007, more than two years later than planned.

A contract for PA/CIS service at 156 stations on some A Division lines was awarded in September 2003 with completion expected in September 2006. Completion has been delayed because the system relies on SONET, and the SONET installations have been delayed. The MTA projects completion in December 2010, but the IEC forecasts a later completion of April 2011.<sup>49</sup>

Another separate communications project is intended to permit police, fire and emergency medical service two way radios to operate in the underground subway environment. A contract was awarded in December 1999 with expected completion in August 2004; substantial (but not full) completion was declared in October 2006.

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<sup>49</sup> MTA, April 2009 CPOC meeting report.

## SELECTED COST OVERRUNS

Delays are often associated with cost increases. But cost increases also arise for other reasons including changes in project scope, increases in materials costs, and unanticipated events on the construction site. To what extent are MTA projects subject to large increases, and what is behind such problems?

To get a preliminary answer to the first of these questions, the CBC staff analyzed the changes in anticipated cost for those projects with some work planned for the 2005-2007 period. As noted earlier, there were 798 such projects in 2005, but 80 were dropped from the plan by 2007. For the remaining 718 projects, we used the available data to identify the reported change in the planned commitments for the project. This figure typically represents the anticipated total project cost and reflects changes in anticipated total cost. However, the analysis for the 2005-2007 period likely understates the extent of cost increase over the life of a project. Most projects with some work in this period were not fully completed in this period, and costs could increase in subsequent years. In addition, if part of the work on the project was delayed beyond the span of the current plan (i.e., to after 2009), then the cost of contracts to be awarded in 2010 and after would no longer be counted as part of the cost in the current plan. Thus the analysis is a conservative estimate of the extent of cost increases over the entire life of a project.

As summarized in Table 2, the average change in planned commitments over the three year period was an increase of 3.7 percent. Communication and signal projects had an average increase of 13.7 percent, but most other categories show only modest increases.

**Table 2**  
**MTA Capital Program, Change in Planned Commitments by Project Category, 2005-2007**  
(\$ in millions)

Project Category	Number of Projects	Planned Commitments 2005	Planned Commitments 2007	Change	Percent Change
Rolling Stock	49	2,239.5	2,339.5	100.0	4.5%
Stations	186	1,859.8	1,860.3	0.5	0.0%
Track & Structures*	119	2,235.4	2,237.1	1.7	0.1%
Communications and Signals	66	1,573.7	1,789.5	215.8	13.7%
Shops and Yards	63	1,083.6	1,165.8	82.2	7.6%
Power	48	601.6	605.3	3.7	0.6%
Staten Island Railway	10	77.9	80.4	2.5	3.2%
CCC**	40	4,541.9	4,739.9	198.0	4.4%
Bus Company	3	244.7	246.1	1.4	0.6%
Interagency	36	1,684.3	1,660.0	(24.3)	-1.4%
Miscellaneous	98	590.0	625.1	35.1	5.9%
<b>Total</b>	<b>718</b>	<b>16,732.4</b>	<b>17,349.0</b>	<b>616.6</b>	<b>3.7%</b>

Sources: Metropolitan Transportation Authority, MTA 2000-2004 Capital Program (December 2005 and April 2007 Amendments); MTA 2005-2009 Capital Program (April 2005 and April 2007 Amendments).

\* Adjusted to include seven projects in the April 2007 Amendment to the 2005-2009 plan from Long Island Rail Road's Bridge category with combined commitments of \$168.2 million, which were not itemized in the April 2005 Amendment to the plan.

\*\* Adjusted to include three projects in the April 2007 Amendment to the 2005-2009 plan from the CCC Flushing Line Extension category with combined commitments of \$970.0 million, which were not itemized in the April 2005 Amendment to the plan.

For the reasons already noted, the data in Table 2 likely understate the extent of cost increases. In order to assess the issue more deeply (albeit less comprehensively), data from the CPOC reports can be used to trace the changes in anticipated costs for many larger projects. The changes in expected costs for the major projects in each of the categories analyzed in the previous section are summarized below.

### **CCC Megaprojects**

Each of the projects experienced significant increases:

East Side Access – Estimated costs increased 14 percent from \$6,350 million in the 2000-2004 plan to \$7,244 million as of early 2009.

Second Avenue Subway – Estimated cost for the work in the first phase of the project increased 13 percent from \$3,840 million in the 2000-2004 plan to \$4,347 million as of 2008.

Flushing Line Extension – Estimated cost increased 6 percent from \$1,990 million in early 2005 to \$2,100 million in 2008, and the scope of the project has been reduced to scale back plans for the Tenth Avenue station.

Fulton Street Transit Center – The initial cost estimate of \$750 million in the 2000-2004 plan has proven to be highly inaccurate. The most recent cost estimate is \$1.4 billion, nearly double the original estimate.<sup>50</sup> The initial part of the work for which contracts were awarded in the 2005-2007 period experienced a 20 percent cost increase to \$202 million during that period.

South Ferry Terminal - Estimated cost increased 24 percent from \$420 million in the 2000-2004 plan to a 2009 estimate of \$521 million.

### **Stations**

Because of the way the MTA reports, it is difficult or impossible to trace changes in estimated costs for many station projects. Initial estimates in a five-year plan may be divided among different components of a project, while reports for the CPOC cover awarded contracts that may include work on multiple stations. Based on the limited evidence, it appears that many station projects are completed at costs close to the estimate at the time contracts are awarded, but there are notable exceptions.

*Subway Stations.* The two subway transfer projects – Bleeker Street and Jay Street – show two different patterns. The Bleeker Street project has had major cost escalation. The initial estimates in the 2000-2004 plan are not for a single project covering the transfer and rehabilitation of the two stations. An estimate for the combined work at the time the project was put out for bid in 2007 was \$53.4 million; subsequent estimates rose to \$85.5 million, \$100 million, and then \$133.6 million in July 2009.

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<sup>50</sup> William Neuman, “Delivery Date for Transit Hub Is Set for 2014,” *The New York Times*, May 20, 2019, N.Y./Region section.

The Jay Street transfer project has a better record. The cost has risen modestly from \$164.1 million at the time of contract award in March 2007 to \$164.5 million in July 2009, but completion is not expected until 2011 so cost may rise further.

For subway station rehabilitations, the record is generally positive. Among the completed projects for which data is shown in Table 1, only one of the seven single station projects had a significant increase; the cost of the West 8<sup>th</sup> & Neptune station ended 41 percent higher than initially planned. Each of the four contracts for multiple stations ended at or close to budget.

*MNR Projects.* Among the MNR projects for which data is available, the new Yankee Stadium station has had the greatest cost escalation. The initial estimated cost in the 2000-2004 plan was \$45 million; the contract awarded in May 2007 was at \$92 million with \$39 million funded by the City of New York. The increase in MNR's budget from \$45 million to \$53 million is due to the agreement with the City for the MTA to share in the costs of some work that had been outside of the scope of the original project.<sup>51</sup>

The other active MNR station projects for which cost data are available are the two contracts for multiple stations; one for three stations on the Hudson Line, and the other for three stations on the Upper Harlem Line. The former was completed slightly under the contract award amount; the second is still under way, but reported as also under budget.

*LIRR Stations.* Data is available for four LIRR station projects. The two platform improvement projects (Seaford and Broadway) each have encountered delays, but are still reported as slightly under budget. The Rosedale station rehabilitation project was completed at a cost of \$3.9 million or 22 percent above the budgeted amount. The Atlantic Terminal improvements had an initial budget of \$97.8 million. Contracts for the first two phases of the project were awarded in 2006 at a combined budget of \$83.0 million, but the estimated actual cost of the project was \$102.5 million in March 2009. In addition, the LIRR has not yet estimated cost overruns associated with the most recent extension in the duration of the project.<sup>52</sup>

## **Replacement of Rolling Stock**

Several projects replacing rolling stock have experienced modest cost escalation. The initial award for replacement of 660 subway cars completed in 2008 is expected to be \$59 million or about 6 percent more expensive than the initial contract award amount; the second contract to replace 620 cars was \$16 million or about 1 percent above the award amount near its completion in 2009.

The MNR also had two contracts for car replacements. The first, completed in 2006, is estimated to have cost about \$30 million or 4 percent more than the initial contract award amount. The second, to be completed in 2012, is reported as being on budget. Similarly, the LIRR has two projects for replacement cars. Its initial contract for 352 cars completed in 2006 was completed within the initial budget of \$635 million. The second order for another 158 cars had its cost go up slightly from the capital plan estimate of \$358 million to the final project cost estimate of \$361 million.

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<sup>51</sup> MTA, November 2007 CPOC meeting report.

<sup>52</sup> MTA, March 2009 CPOC meeting report.

## Signals and Communications

As noted earlier, completion of the ATS system for the A Division was delayed three years and had a cost escalation of about 35 percent from \$162.8 million to \$219.5 million. Similar cost issues have plagued other projects for improvements in the signals for the B Division and for system-wide communications improvements.

The five major interlocking projects have cost increases as follows:

*5<sup>th</sup> Avenue and Lexington Interlockings* - The original planned budget for the project was \$102.7 million, and this was raised to \$127.8 million in the July 2008 Amendment to the Capital Plan. The contract was awarded in January 2009 at \$163.3 million, or 28 percent above the revised budget. The increased cost reflects increased design efforts, revised in-house force account estimates, and the addition of tunnel lighting upgrades. The IEC had previously noted that the initial cost estimate was not accurate, because it was based on an outdated internal labor estimate.

*71<sup>st</sup>/Continental Avenue, Union Turnpike and Roosevelt Avenue* – This contract is expected to be awarded in April 2010. The IEC noted that the MTA’s estimated cost of \$132.8 million was insufficient to cover all three interlockings. In response, the funding for the Roosevelt Avenue part of the project is being delayed to the next capital plan. In addition, the MTA decided to advertise the 71<sup>st</sup>/Continental Avenue and Union Turnpike interlockings as two separate contracts. The current budget for the all three interlockings is \$134.8 million, but the IEC’s estimated cost is \$138.9 million.<sup>53</sup>

*Bergen Street Interlocking Pilot* – This project was completed only slightly over budget – \$77.2 million versus \$76.9 million. However, the IEC noted that the warranty is insufficient and additional costs will be necessary to extend the warranty to cover a period after the software validation.

*Concourse Line* – A notable exception to the pattern, this project was completed five percent under budget.

*8<sup>th</sup> Avenue Line, three interlockings* – This project is still underway and scheduled for completion in 2010; it is reported to be running slightly over budget.

The MTA’s efforts to use CBTC have experienced significant cost escalation. The last two phases of the Canarsie line project increased 51 percent to nearly \$327.8 million from \$217.1 million. The estimated cost for the still-to-be initiated Flushing line project has increased 71 percent from \$265.5 million to \$453.6 million.

The projects related to improved communication systems are also proving more expensive than anticipated. The installation of SONET on the A Division cost 41 percent more than the initial contract award amounts – \$226.7 million versus \$161 million – and the contracts for work on the B Division are currently estimated to be 5 percent above the budget of \$274.4 million, or \$287.6 million. The PA/CIS project on the Canarsie line was completed at a cost of \$21.4 million, more than 50 percent above the contract award amount. The current contract for PA/CIS on 156 stations is reported to be 15 percent above the initial award amount, but the IEC projects even greater cost escalation.<sup>54</sup>

The police radio system project was completed at a cost of \$139.9 million, 21 percent above the initial contract award amount.

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<sup>53</sup> MTA, April 2009 CPOC meeting report.

<sup>54</sup> MTA, April 2009 CPOC meeting report.

## MORE REALISTIC FUTURE CAPITAL PLANS

The MTA's current capital plan spans the period 2005-2009. During much of 2009 the agency prepared a five-year plan for the period beginning in 2010. This plan was approved by the MTA Board in August 2009 and is under review by the CPRB. The scale and content of this plan should be informed by the experience in implementing recent plans.

The dollar figure used in describing capital plans is "commitments." It is an amount the MTA is authorized to make legal commitments to spend. It is not the actual expenditure of the funds. Rather it typically represents the signing of a contract for work on a project. The work is usually spread over a period of more than one year, and funds are paid out during the life of the contract with substantial sums withheld until the project is fully completed. Thus funds committed during the time span of a plan may not yield cumulative expenditures of that amount until several years later.

While the amounts authorized in the capital plans reflect only the initiation of work on a project in the plan's time period, rather than completion of project or some other milestone, the MTA has difficulty "committing" all the funds it is authorized to commit. The 2000-2004 plan authorized commitments totaling \$20.1 billion; yet at the end of 2004 only about \$15.1 billion had been committed. Fully \$5.1 billion or 25 percent of the total plan had not been committed in the planned time period. These commitment authorizations were carried forward and represented a substantial portion of the work the MTA anticipated accomplishing in the years after 2004.

The 2005-2009 plan is experiencing a similar pattern. At the end of the first eight months of 2009, the MTA had committed \$18.0 billion or 74 percent of the \$24.4 billion authorized.<sup>55</sup> Assuming that in the remaining four months of the year the agency commits at the same rate as in the first eight months (about \$3.0 billion), then nearly 20 percent or about \$4.8 billion in commitments will still remain to be made after the plan's time period has ended. Restated, the agency will still have about \$4.8 billion in work to initiate at the start of 2010 even without a new capital plan.

Recent experience with the federal stimulus funds allocated to the MTA under the American Recovery and Reinvestment Act of 2009 also raises questions about the MTA's ability to spend money in a timely manner. The MTA was awarded \$1.2 billion in stimulus funds, which were approved by the Congress and the President in February and intended to be used for "shovel-ready" projects. The MTA was to spend \$276 million for construction of the Second Avenue Subway, \$266 million for the Fulton Street Transit Center, and most of the remainder for the ongoing station rehabilitation projects.<sup>56</sup> According to the New York Building Congress, by August the MTA had not spent any federal stimulus money on the approved projects.<sup>57</sup> Since most of these projects had work underway (and typically behind schedule) when they received federal commitments, it is plausible that the ongoing work cannot be accelerated.

The substantial delays in making planned commitments likely understates the extent to which planned work is not accomplished in the expected time period. Commitments are higher than planned when the contracts that are awarded exceed their initial budget. As shown in previous sections of this report, such cost escalation happens often and consumes resources previously

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<sup>55</sup> MTA, September 2009 CPOC meeting report, page 2-7 and 2-11.

<sup>56</sup> MTA, MTA Stimulus Information <<http://www.mta.info/mta/stimulus.html>> (September 1, 2009).

<sup>57</sup> New York Building Congress, *New York City Construction Outlook*, April 22, 2009.

allocated to other projects. Thus many projects initially in a five-year plan must be dropped from the plan or postponed to subsequent plans in order to accommodate cost escalation for the projects that are launched. An overall commitment amount may reflect a smaller number of projects at the same total dollar figure. Thus the 20 percent postponement in planned commitments beyond the life of the five-year plan means that substantially more than 20 percent of the planned work is not launched on time.

In 2008 as part of an unsuccessful proposal for “congestion pricing” in the New York region, the MTA prepared a new six-year capital plan spanning the 2008-2013 period. It was intended to replace the last two years of the then-current plan and extend it four years forward. The plan sought to include enhancements to mass transit to accommodate the anticipated shift from autos to other modes as a result of the congestion pricing plan as well as to continue previous programs aimed at bringing the system to a state of good repair, complete network expansions underway including the five mega-projects, and to begin work on other capacity expansion projects including the second phase of the Second Avenue subway.<sup>58</sup> The 2008 draft capital plan was never brought before the MTA Board for a vote because the congestion pricing scheme failed to materialize.

In August 2009 the MTA released a preliminary capital plan for the 2010-2014 period, the next five-year cycle in its capital planning process. The plan calls for commitments totaling \$28.1 billion, a 24 percent increase from the total in the 2005-2009 plan. Funding sources in the plan are identified for only \$18.2 billion. The total includes more than \$5.7 billion for completion of the current mega-projects and for planning studies for other capacity expansion projects. Another \$2.8 billion is allocated for signal and communication improvements. Given the MTA’s past difficulty in sustaining progress on projects such as these, the planned increased pace of commitments can be questioned in terms of its realism.

The MTA’s recent capital planning raises issues beside the degree of realism. Sound planning requires reliable information on the current status and use of the system, usually taking the form of a needs assessment. Then, clearly stated priorities should guide decisions about the allocation of available resources among multiple needs. However, the MTA has a record of making allocation decisions that are not rooted in comprehensive needs assessments and explicit priorities.

Through 1999 the MTA completed regular needs assessments in conjunction with the preparation of its five-year capital plan. However, no update was conducted in 2004 for preparation of the 2005-2009 plan, nor was an update done as part of the preparation for the potential new plan in 2008. Finally in August 2009 the MTA released a new needs assessment in conjunction with the proposed 2010-2014 capital plan, but it has serious shortcomings. The new needs assessment does not fully disclose the system’s state of good repair investment needs and does not indicate the nature of the non-financial limits of the agency’s capacity to implement projects that meet those needs. Better and more open planning is needed.

In terms of priorities, the MTA leadership has long stated that its first priority is restoring the system to a state of good repair, and then keeping components in a state of good repair through programs of regular repair and replacement. In the plans spanning the 1982-1999 period this priority was evident; these objectives accounted for the bulk of the funds (72 percent) and relatively little was devoted to improvement and expansions. In the two most recent plans, expansion projects have

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<sup>58</sup> Metropolitan Transportation Authority, *Proposed Capital Plan 2008-2013*, February 2008.

represented nearly one-quarter of the total allocations and system improvements another significant piece; the share of the 2005-2009 plan reserved for state of good repair and regular replacement fell to 67 percent and more than \$7 billion was allocated to other goals.<sup>59</sup> The capital plan proposed for the 2010-2014 allocates only 64 percent for state of good repair and regular replacement projects, while expansion projects and system improvements account for 20 percent and 14 percent of the total, respectively.

Despite substantial investments in state of good repair projects, the system still is not in a state of good repair. The most recent assessment found that major needs remained and that the planned capital program spending would not achieve a state of good repair for many years. The LIRR had its cars, track, stations and most other components brought to a state of good repair by 1994, but its line structures will not be restored until about 2024. The MNR also has cars, track and other features in a state of good repair, but 15 percent of its line structures and about 5 percent of its stations will still not be fully restored by 2029. The mass transit facilities still require the most work. The bus fleet was restored in 1986 and subway cars and track by 1991. But most of the subway stations (386 out of 468) have at least one component that is not in state of good repair and the most recent assessment does not specify when all station components will be fully restored. The line structures will not reach a state of good repair until 2024, and the most neglected element is the signaling system, which is not expected to be restored until at least 2025.<sup>60</sup> The criteria for pacing the remaining state of good repair work are not made explicit by the MTA.

For the growing portion of the capital plan devoted to expansion and enhancements, the MTA also has not made explicit the criteria for selecting projects. Availability of funding from the City of New York was crucial in undertaking the Flushing line extension, rather than it being part of a long-run expansion plan developed by the MTA. The South Ferry and Fulton Terminal projects were part of a package of investments in Lower Manhattan developed after the September 11, 2001 terrorist attacks. In selecting new investments, the MTA seems to give little attention to projects that would increase capacity of current lines or the efficiency of operations.

The next five-year plan for the MTA should be rooted in a realistic assessment of what can be accomplished. While improvements in management practices can expand the MTA's ability to launch and implement capital projects, the failure to complete about one-fifth the anticipated work in each of the last two capital plans suggests more modest future goals are appropriate. In selecting how to use the limited resources, the planners should be guided by a comprehensive and transparent needs assessment and should be clear and explicit in setting criteria for how to achieve a state of good repair and how to select among options to expand capacity and efficiency.

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<sup>59</sup> See the summary of capital plans in Citizens Budget Commission, *How to Balance the MTA's Budget*, (June 2006) page 14, Table 4.

<sup>60</sup> Metropolitan Transportation Authority, *Twenty Year Capital Needs Assessment 2010-2029*, August 2009.

## **GLOSSARY OF TERMS**

A and B Divisions – The numbered and lettered subway lines, respectively

ADA – Americans with Disabilities Act

ATS – Automatic Train Supervision

AWO – Additional Work Order

Capital Commitments – Amounts authorized for awarding of contracts

CBTC – Computer Based Train Control

CCC – Capital Construction Company

CPOC – Capital Program Oversight Committee

CPRB – Capital Program Review Board

DOT – Department of Transportation

GO – General Order

IEC – Independent Engineering Consultant

JV – Joint Venture

LIRR – Long Island Rail Road

MNR – Metro-North Railroad

MTA – Metropolitan Transportation Authority

NYCT – New York City Transit

PA/CIS - Public Address and Customer Information Service

SAM – System Application Migration

SONET – Synchronous Optical Network

SSI – Solid State Interlocking

