

ACQUISITION AND PROCUREMENT: NEW JERSEY HIGH-SPEED RAIL IMPROVEMENT PROGRAM HAS COST AND SCHEDULE RISKS

Audit Report OIG-A-2015-012 | June 17, 2015



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Office of Inspector General



Memorandum

To:DJ Stadtler, Jr.Executive Vice President/Chief Operations Officer

D. IR. Warren

From: David R. Warren Assistant Inspector General, Audits

Date: June 17, 2015

Subject:Acquisition and Procurement: New Jersey High-Speed Rail ImprovementProgram Has Cost and Schedule Risks (Audit Report OIG-A-2015-012)

This report provides the results of our audit of the New Jersey High-Speed Rail Improvement Program (the program). Amtrak (the company) initiated the construction program to upgrade its rail infrastructure to support higher maximum train speeds, increase capacity, and improve service reliability over a 23-mile section of track between Trenton and New Brunswick, New Jersey. In August 2011, the Federal Railroad Administration (FRA) awarded the company a \$449.95 million grant to fund the program. The grant funds are part of the American Recovery and Reinvestment Act of 2009. Spending authority for the grant funds provided by the Act expires in June 2017. Under the grant agreement, the company is responsible for any additional costs incurred to complete the program beyond the expiration of the grant funds or the agreement.

The program is managed by the Engineering department, within the Operations department, and includes six components with multiple construction projects and program services¹ and contingency components. The projects are being performed by contractors and company personnel. We conducted this audit to determine whether cost and schedule risks exist for the program. For additional details on our scope and

¹ The program services component funds program management services performed by company and contractor personnel—such as developing implementation plans for cost and schedule, developing cost estimates, and establishing a method to measure performance.

methodology, see Appendix A. For the geographic location of the construction program, see Appendix B.

SUMMARY OF RESULTS

Some progress has been made in completing the program; however, significant unmitigated risks jeopardize the company's ability to complete the program by June 2017 within the amount of the grant.

Based on data as of February 28, 2015, we estimate that the cost to complete the program will exceed the amount of the grant by \$83.14 million as follows:

- \$46.71 million to complete two of the original projects that were deferred
- \$29.73 million in estimated cost overruns to complete the program
- \$6.70 million in anticipated cost overruns to complete the catenary, structure, and track work that has not been included in the estimate to complete the program

The amount of the cost overrun is likely to increase as work progresses because there are no contingency funds to absorb project cost increases, and about 60 percent of the grant funds remain to be spent over the next 27 months.

For the same reasons, the program's schedule estimates for completing the projects are highly optimistic and may not be achievable by June 2017 when the grant funding expires. If any of the projects are not completed by that date, the company will have to identify other funding sources to complete the program regardless of whether all the grant funds have been expended.

The program's cost and schedule problems are directly attributable to weaknesses in program management and oversight. We have previously reported on gross mismanagement of funds and resources by the former Deputy Chief Engineer, Section Improvements. Further cost and schedule estimates for the program were not sufficiently detailed, and accountability and oversight responsibilities were fragmented. The company is aware of these weaknesses and recently took action to strengthen the program management team, but additional action is needed to identify opportunities to reduce costs and achieve schedule estimates.

The Chief Operations Officer agreed with our recommendations to finalize a risk mitigation plan and to provide senior management information on program management variances from cost and schedule estimates. While the actions cited are

improvements in project planning and reporting, additional actions are needed to meet the intent of our recommendations. Specifically, we continue to believe that the mitigation plan should identify additional funding sources for work that will not be completed by the June 2017 deadline, and that senior management needs information on cost and schedule progress more frequently than monthly to help ensure the effective and efficient use of the grant funds prior to expiration.

Estimate of Cost to Complete the Program Exceeds the Grant Funding

Managed by the Engineering department's Deputy Chief Engineer, Capital Construction, the program has six major construction components, and each component consists of multiple projects. The components include upgrading and improving the catenary, power, structures, track, and signal systems. Some portion of work on each of the components is ongoing or has been completed, but for three components, most of the work remains to be done. For example, work on the two largest components—the catenary upgrades and frequency converter—is still in the early stages.

Table 1 shows the program's revised budget, estimate to complete, and expenditures as of February 28, 2015, for each of the six construction components, as well as the program services and contingency components. All of the contingency funds originally in the budget have been spent or allocated to ongoing programs. Also, the program management services budget estimate has been reduced by \$11.50 million; those funds have also been spent or allocated to other program components.

The program management team reports that the current estimate to complete exceeds the grant amount by \$29.73 million. Further, other program costs not included in the current cost estimate and the estimated cost of deferred projects bring the program cost to \$83.14 million more than the grant funding. If the current estimate holds true and the company retains the responsibility for the deferred projects, the company will have to identify other funding sources to meet the grant requirements, thus putting additional unplanned demand on its capital budget.

Table 1. Program Cost Estimates and Expenditures, as of 2/28/2015 (\$ in millions)

	Revised Budget	Estimated	Change from Revised Budget		Expenditures		
Component	Oct. 2013	Cost at Complete	Amount	Percent	Actual	Remaining	
Catenary Upgrades	\$143.37	\$215.16	\$71.79	50.1%	\$63.02	\$152.14	
Frequency Converter	74.87	79.09	4.22	5.6	4.59	74.50	
Track Upgrades	39.06	38.15	(0.91)	(2.3)	16.30	21.85	
Signal Upgrades	66.05	75.88	9.83	14.9	64.30	11.58	
Structure Upgrades	12.90	15.75	2.85	22.1	10.92	4.83	
Substation	14.82	15.09	0.27	1.8	14.58	0.51	
Program Services	52.06	40.56	(11.50)	(22.1)	17.26	23.30	
Contingency ^a	46.82	-	(46.82)	(100.0)	-	-	
Total	\$449.95	\$479.68	\$29.73	6.6%	\$190.97	\$288.71	
Program Funding Cost Increases							

Projected Cost Overrun	\$29.73
Funds not Included in Current Cost Estimate	6.70
Deferred Projects	
Access Improvements to New York Penn Station	31.64
Second Substation	15.07
Total	\$83.14

Source: OIG analysis of Engineering department data

Note: ^a Contingency funds have been allocated to components for which the estimated cost to complete is greater than the revised budget.

Program Cost Has Been Continually Underestimated

The initial program budget estimate prepared in April 2011 underestimated the program's cost. The company had a short time to prepare the grant application because FRA issued the Notice of Funding Availability on March 16, 2011, and applications were due no later than April 4, 2011. As a result, the cost estimate for the grant application was developed without project designs and complementary construction cost estimates, according to the former Senior Program Director. As the program management team began to develop designs and cost estimates, it became apparent that the program cost estimate exceeded the grant amount and could not be accomplished

by June 2017. As a result, the company reassessed and modified the program's scope of work to stay within the grant funding amount of \$449.95 million. The modifications involved deferring work on two projects—one to construct a second substation (estimated cost of \$15.07), and another to improve access to New York Penn Station (estimated cost of \$31.64 million). For the location of these sites, see Appendix B.

In addition, the company modified the plans for installing a new constant tension catenary wiring system over 23 miles of track. The modification involved reducing the area that would receive the constant tension system to 14 miles, and using a fixed catenary system on the other 9 miles. The difference between constant tension and fixed is how the systems accommodate for changes in weather: constant tension automatically compensates for changes and fixed does not. In addition to some reductions in planned signal work, this modification reduced the estimated costs.

As a result of those modifications, the company's October 2013 cost estimate was within the grant funding of \$449.95 million. Subsequently, FRA approved the company's request to modify the plans for the catenary system and to defer work on the two projects. Completing the deferred projects is a grant condition. The company and FRA have been negotiating whether the company will be required to complete the deferred projects. According to the Deputy Chief Engineer, Capital Construction, the company and FRA have orally agreed to remove the requirement to complete the second substation project from the grant, and they are discussing the access project.

Despite the program management team's efforts to adjust the program's scope, the October 2013 revised budget estimate was also underestimated. That estimate was more detailed than the original; however, when developing the estimate, the program management team did not inspect the entire 23 miles of track. Subsequently, a full inspection identified the need for additional changes to the design and scope of projects, which increased program costs. For example, the cost estimate for the signals component increased by about \$12 million because about half of the signal huts had to be constructed on raised platforms instead of the planned level platforms. The change was needed to address environmental issues that would have been identified by a full inspection of the construction areas. For a picture of a signal hut on a raised platform, see Appendix C.

The most recent estimate (February 2015) of the cost to complete the program exceeds the grant amount by \$29.73 million. The largest cost increase is in the catenary component. The estimated cost of the catenary upgrades at completion (\$215.16 million as of February 2015) is \$71.79 million more than the October 2013 budget

(\$143.37 million). Costs increased because the work is behind schedule and requires additional resources to complete the remaining work. For example, the program purchased a second wire train to complete the wiring within schedule. In addition, as discussed below, the program management team has identified additional costs that are not included in the estimate and there is risk of further cost growth.

Additional Cost Growth is Likely, and the Schedule is at Risk

Additional cost increases above the February \$479.68 million estimate are likely, and completion of all work by June 2017 when the grant funds expire is in jeopardy. As discussed below, the risk exists that current estimates to complete the work could be exceeded. Program management officials are aware of these risks and are developing plans to mitigate them.

Potential Cost Increases

Several areas of potential additional cost increases have been identified, and there are other potential areas for cost increases. The program management team has identified about \$6.70 million of costs in the catenary, structures, and track components that are not included in the February 2015 cost to complete estimate. These costs were not included because sufficient information was not available at that time to make an estimate. This work includes:

- About \$2.50 million for catenary upgrades. The increased cost is for the purchase and installation of 56 additional support foundations for the fixed catenary work. In May 2014, the program management team conducted a field survey to assess the quality of existing structures and identified the need for additional foundations. The field survey determined that 56 support foundations needed to be replaced. In March 2015, a change order was initiated to add this work to the catenary upgrade budget. The change order agreement was delayed until the design was completed so negotiations on the cost of the work could be started with the contractor. The negotiations are ongoing, and the program management team estimates the cost to be about \$2.50 million.
- About \$2 million for structures upgrades. The increased cost is to reimburse New Jersey Transit for the conductors it used to ensure safety when the temporary platforms could not be used to offload passengers at one station

during a track outage². The program management team initially planned to use temporary platforms at two stations served by New Jersey Transit while a track was out of service. However, a temporary platform was installed only at one station because the contractor did not provide the second platform by the date required. As a result, several temporary bridges along the platform had to be constructed so passengers could get on and off the trains. From June to November 2014, New Jersey Transit had conductors at each temporary bridge to assist passengers. The program management team expects New Jersey Transit to bill for the conductor's time and estimates the cost to be about \$2 million.

 About \$2.20 million for track upgrades. This increased cost is for work associated with repositioning a track. A contractor is performing a study to determine the effect of the track work on drainage and the access road. In addition, the old interlocking³ where the track repositioning work will be done may require some upgrades. The program management team estimates that this additional work will cost about \$2.20 million more than the current budget for track upgrades.

An area for potential additional cost increases involves the catenary upgrade component. The program management team estimates it will cost about \$152.1 million to complete the remaining catenary work. A major portion of the remaining work involves completing the foundations (\$41.5 million), erecting the poles (\$23.8 million), and wiring the tracks (\$47.1 million). As discussed later, delays associated with completing the foundations could lead to further cost increases. In addition, the estimated cost for the wiring is based on estimated production rates for crews to remove the old wiring and replace it with new wiring. However, the accuracy of these estimates will not be known until wiring begins in June 2016.

The second area for potential additional cost increases involves constructing the frequency converter component. Most of the work is being done under two contracts awarded in September 2014 for \$66.6 million—Contract A for \$43.6 million, and Contract B for \$23 million. The former Deputy Chief Engineer, Section Improvements recommended a 10 percent contingency or about \$4 million for Contract A because the frequency converter is a highly specialized power generator station being built on property that the company does not own. However, the recommended funding was not

² A track outage is the time period when no trains are operating on the tracks so construction can occur.

³ An interlocking allows trains to move from one track to another.

included in the estimate because all contingency funds have been allocated to cover cost increases in other program components. Thus, there is no available funding for any potential change orders or cost increases associated with completing this work.

Potential Schedule Risks

There is a risk that all the catenary upgrade work may not be completed before the grant expires. Prior to January 2015, a schedule had not been developed showing the number of catenary foundations that had to be completed weekly to keep the project on schedule. As of February 28, 2015, contractor personnel had drilled 409 of 1,116 (36.6 percent) foundations, but only 186 have been filled with concrete. That task is performed by company personnel. The new program management team recognized that the mixed workforce of contractor and company personnel has increased the complexity of scheduling and completing construction tasks. The team is concerned that the current mix of contractor and company personnel will not complete the catenary work before the grant expires. One mitigation strategy being considered is to rely on contractors to perform the catenary work and to use company personnel to provide oversight and worker protection. For a picture of a drilled and concreted foundation, see Appendix C.

Further, the wiring work schedule has slipped because of delays in the delivery of equipment⁴ and some materials needed to perform the work. A new wire train was initially scheduled to be delivered by a contractor in November 2014. However, the delivery date has slipped by 13 months because a December 2014 inspection identified a number of instances where the contractor did not meet the design specifications. The refurbished wire train was initially scheduled to be delivered by a contractor in November 2015. However, the delivery date has slipped to February 2016 because of delays in finding a qualified contractor to perform the work. In addition, from October 2014 to April 2015, delivery of some materials needed to build assemblies to perform the wiring work was delayed by design changes. As a result of these delays, the wiring work is now scheduled to be completed in mid-April 2017, which leaves a two-month period to absorb any further delays before the grant expires in June 2017.

Program Management Weaknesses

In a December 2014 investigative report, we found improper hiring, indications of favoritism, conflicts of interest, and gross mismanagement of resources by the former

⁴ The equipment includes purchasing a new wire train and refurbishing an existing wire train.

Deputy Chief Engineer, Section Improvements. As noted previously, cost and schedule estimates have been consistently inaccurate. Additionally, until January 2015, accountability and oversight of program management was fragmented and ineffective. For example, the former Deputy Chief Engineer, Section Improvements told us that he had full responsibility for successful implementation of the program but he did not have the authority to allocate resources when needed. In addition, the Deputy Chief Engineer for each technical discipline had financial responsibility for a portion of the program, but that responsibility was being executed at the lowest level by project field managers.

The Chief Operations Officer and the Chief Engineer stated that because of the weaknesses in program management and oversight, they were not aware of the magnitude of the program's cost and schedule overruns until early 2015. However, once they became aware of the weaknesses, they made changes to strengthen the program management team by assigning the program to the Deputy Chief Engineer, Capital Construction and appointing a new Senior Program Director to address the fragmented accountability issue, and requesting that a cost and schedule risk mitigation plan be developed. Further, the Deputy Chief Engineer, Capital Construction stated that he plans to strengthen project management by having his personnel attend project management training. Further, he noted that other actions are underway, including developing a mitigation plan to address cost and schedule overruns, resolving the status of deferred projects, and making the most efficient use of available track outages.

Conclusions and Recommendations

The company is aware that the program's management needs to be strengthened and has taken initial steps by strengthening the management team. Nevertheless, program oversight must be further strengthened, and risk mitigation plans must be finalized. There is a risk that additional funding will be needed beyond the amounts that have been identified. Also, schedule delays could result in the grant funding expiring before it is fully expended and projects are completed. Each of these events could require the company to identify other funding sources, to meet the grant requirements, thus putting additional unplanned demand on its capital budget.

If the known and potential cost increases and the status of deferred work can be mitigated by the program's end, it could lead to about \$83.14 million in funds put to better use by eliminating the need to use capital funds.

To help ensure that the program is completed efficiently and effectively, we recommend that the Chief Operations Officer direct the Deputy Chief Engineer, Capital Construction to take the following actions:

- 1. Finalize a risk mitigation plan that identifies actions to address potential cost increases, funding sources, and schedule risks to allow funds to be put to better use.
- 2. Develop and implement a program management oversight structure that will provide senior management biweekly information on program management variances from cost and schedule estimates, and mitigation plans to address them.

Management Comments and OIG Analysis

In commenting on a draft of this report, the Chief Operations Officer agreed with our recommendations. He also cited actions that they have taken or plan to take to address the recommendations. Our analysis of the cited actions is discussed below. Appendix D contains management's complete letter of comment.

- The company agreed with recommendation 1 to finalize a risk mitigation plan. The company believes its updated project risk register addresses the recommendation. While this register identifies actions to address the cost and schedule risks, it does not fully meet the intent of our recommendation. The project risk register does not identify additional funding sources that could be needed if all work is not completed when grant funds expire in June 2017. We continue to believe a mitigation plan is needed to identify additional funding sources.
- The company agreed with recommendation 2 to provide senior management information on program management variances from cost and schedule estimates. The company is working to incorporate their current reporting products into one comprehensive monthly report by October 30, 2015. The company noted that information is not routinely available to provide bi-weekly reports. Given the program's schedule slippages, cost increases and importance of meeting the June 2017 completion date we continue to believe bi-weekly reviews would be beneficial.

Appendix A

SCOPE AND METHODOLOGY

This report provides the results of our audit to determine whether cost and schedule risk exist in the New Jersey High-Speed Rail Improvement Program. The scope of our work was focused on reviewing program management and the accuracy of cost and schedule estimates. We met with officials from the Engineering and Procurement departments. We also met with officials from the FRA Office of Railroad Policy and Development. We conducted our audit work from May 2014 to April 2015 in Washington, D.C.; Lancaster and Philadelphia, Pennsylvania; and Trenton, New Jersey.

Our methodology to determine if the program was within budget and on schedule included reviewing and analyzing the grant agreement, Modified D-160 Plan, Cost Management Plan, program schedules, progress reports, and monthly earned value reports. We interviewed the former Deputy Chief Engineer, Section Improvements, and the Deputy Chief Engineers, Capital Construction, Communications and Signals, Electric Traction, Maintenance, and Track; the former and current senior program director and officials from the program management services contractor regarding the work completed to date. We visited the program site to observe completed and ongoing work.

Our methodology to assess the risks to completing the program within budget and on schedule by June 2017 included obtaining the end-of-the-month spending and cash-flow reports and Earned Value Performance Summaries from May 2014 through February 2015. Based on our review, we determined that the catenary upgrades and signal upgrades, which make up 46.54 percent of the program budget, held the greatest risk for two reasons:

- The catenary upgrades work was behind schedule, and expenditures were significantly lower than planned.
- Expenditures for signal upgrades were significantly higher than planned.

To determine the extent to which these risks exist, we used these reports to analyze actual expenditures, work completed, and budgeted amounts for work not yet started, as applicable. We compared the sum of actual and projected cost to budgeted amounts and conducted follow-up inquiries with the program directors of Communications and Signals and Electric Traction regarding any cost variances identified.

We conducted this performance audit in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objective. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Internal Controls

We reviewed the management controls used by the program to monitor whether it was within budget and on schedule. This work focused on the monthly earned value reports that compared the planned work and budget to the completed work and actual funding for the following program components: catenary upgrades, frequency converter design and construction, substation, program services, signal upgrades, structure upgrades, and track upgrades. We did not review the Engineering department's overall system of controls for project management.

Computer-Processed Data

As part of our audit, we obtained and reviewed cost data as reported by the program from the company's system of record, Systems Applications and Programs. We did not assess the overall reliability of the systems data, but we did match data for the program components to source documentation. We determined that there were no inconsistencies between the system's data and the source documentation; therefore, the data were sufficiently reliable for our objective and conclusions.

Prior Reports

In conducting our audit, we reviewed the following Amtrak OIG Reports:

- Ethics Policy Violation (OIG-I-2015-506, April 15, 2015)
- Acquisition and Procurement: Gateway Program Projects Have Certain Cost and Schedule Risks (OIG-A-2015-002, December 19, 2014)
- Governance: Improved Policies, Practices, and Training Can Enhance Capital Project Management (OIG-A-2014-009, July 15, 2014)
- Acquisition and Procurement: Gateway Program's Concrete Casing Project Progressing Well; Cost Increases Will Likely Exceed Project Budget (OIG-A-2014-004, February 11, 2014)

Appendix B

LOCATION OF THE PROGRAM



Source: Amtrak New Jersey High-Speed Rail Improvement Program Office

Appendix C

PICTURES OF CATENARY FOUNDATIONS AND SIGNAL HUTS

Figure 1. Catenary Hole Drilled and Set with Rebar (left) and Hole Filled with Concrete (right)



Source: Amtrak OIG, October 16, 2014



Figure 2. Signal Hut on Raised Platform

Source: Amtrak OIG, October 16, 2014

Appendix D

MANAGEMENT COMMENTS

NATIONAL RAILROAD PASSENGER CORPORATION 60 Massachusetts Avenue, NE, Washington DC 20002

ecutive Vice President,

Memo

Date June 12, 2015

David R. Warren, Assistant To Inspector General

Department

From

Chief Operations Officer Operations Draft Audit Report, Project No. 009-Subject 2014, "Acquisition And Procurement: New Jersey High-Speed Rail Improvement Program Has Cost And Schedule Risk", April 22nd 2015 R. Bitar ce S. Naparstek

J.D. Rago C. Crump

The attached memorandum will serve as the official management response to Office of Inspector General Draft Report 009-2014 "Acquisition And Procurement: New Jersey High-Speed Rail Improvement Program Has Cost And Schedule Risk" dated April 22nd, 2015.

Recommendation 1:

Develop a risk mitigation plan that identifies actions to address potential cost increases, funding sources, and schedule risks to allow funds to be put to better use.

Management agrees with the OIG's recommendation regarding the development of a risk mitigation plan however we believe that this requirement is encompassed within the program's already developed "Project Risk Register (PRR)." The PRR is consistent with industry standard project management practice where high level project staff judgmentally weighs risk. The PRR considers the probability of the risk element weighing it against its potential effect on cost and schedule. These risk elements are evaluated on a quarterly basis and maintained in a color-coded tracking spreadsheet. The spreadsheet captures the most current risk categorization against the prior period's ranking allowing the team to track mitigation progress. The PRR is also reviewed on a monthly basis with FRA grant staff.

Please refer to the latest version of the Project Risk Register attached to this memorandum. We believe this development and maintenance of the PRR in its current form meets the recommendation of the OIG.

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Recommendation 2:

Develop and implement a program management oversight structure that will provide senior management biweekly information on program management variances from cost and schedule estimates, and mitigation plans to address them.

Management agrees with the OIG's recommendation that that there is a need to produce consistent, accurate and concise information in a comprehensive report. The program management team currently produces:

- a. Earned Value/Business Report
- b. "High Profile" Report (Progress Report with additional information)

Each of these reports is comprehensive and based on monthly financial closing information. We do not however believe additional information is available to support a bi-weekly report of relevant substance. We are undertaking an effort to incorporate the information included in both the "Earned Value/Business Report" into the monthly progress report to avoid confusion in content and distribution. The project Management Team will make a sample of this report available to the OIG by October 30th 2015.

Appendix E

ABBREVIATIONS AND ACROYNMS

- FRA Federal Railroad Administration
- OIG Office of Inspector General
- the company Amtrak
- the program New Jersey High-Speed Rail Improvement Program

Appendix F

OIG TEAM MEMBERS

Michael Kennedy, Senior Director

Todd Kowalski, Senior Audit Manager

Walter Beckman, Senior Auditor

Thelca Constantin, Senior Auditor

Shelly Joseph, Contractor

OIG MISSION AND CONTACT INFORMATION

Mission	The Amtrak OIG's mission is to provide independent, objective oversight of Amtrak's programs and operations through audits and investigations focused on recommending improvements to Amtrak's economy, efficiency, and effectiveness; preventing and detecting fraud, waste, and abuse; and providing Congress, Amtrak management and Amtrak's Board of Directors with timely information about problems and deficiencies relating to Amtrak's programs and operations.			
Obtaining Copies of Reports and Testimony	Available at our website: <u>www.amtrakoig.gov</u> .			
Reporting Fraud, Waste, and Abuse	Report suspicious or illegal activities to the OIG Hotline (you can remain anonymous):Web:www.amtrakoig.gov/hotline Phone:800-468-5469			
Contact Information	Tom Howard Inspector General			
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