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GOVERNANCE:

Improved Policies, Practices, and Training Can Enhance Capital Project Management

Audit Report OIG-A-2014-009 | July 15, 2014



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REPORT HIGHLIGHTS

Why We Did This Review

In FY 2012, Amtrak reported spending about \$921.8 million to improve infrastructure and equipment. From FY 2009 through FY 2012, the four-year average for capital expenditures was about \$1.2 billion. The most recent five-year financial plan shows that the company's capital project needs exceed the level of funding anticipated.

Capital projects are used to maintain the infrastructure and equipment required to support reliable and safe passenger rail service. In FY 2012, infrastructure improvements included bridge replacements, information technology initiatives, and concrete tie replacements. Equipment improvements included overhauls of various types of locomotives and rail cars. Given the importance of these projects, we assessed the adequacy of capital management practices and processes.

Our work focused on the Engineering and Mechanical departments, which spent more than 85 percent of capital project funds for FY 2012. Our audit objective was to determine the adequacy of the policies, procedures, and practices used by these two departments to manage capital projects.

For more information, contact David R. Warren, Assistant Inspector General, Audits, 202-906-4600.

For the full report, see www.amtrakoig.gov/reading-room

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What We Found

Using a best practices comparative analysis methodology, we identified opportunities to improve capital project management activities in cost estimating, scheduling, and project oversight.

The Engineering department did not consistently employ best practices in managing projects. Three of the five projects we reviewed encountered overruns and delays that forced the company to reprogram funds between programs and departments, and to delay or forgo other projects. For example, a cost estimate did not accurately forecast project costs; personnel did not ensure that schedules were developed to accomplish a project's objectives; and the oversight of replacement projects was informal and inconsistent.

The Mechanical department's project management practices for equipment overhauls have similar weaknesses in cost estimating, scheduling, and project oversight. Data on the hours expended on overhauls from FY 2009 through FY 2012 shows that the department's project management practices have not improved the efficiency of overhauls: an overhaul completed during FY 2012 required up to 28 percent more average labor hours to complete than an overhaul completed in FY 2009.

Overall, the company's management controls for project implementation are weak. This has contributed to ineffective and inefficient project implementation in the Engineering and Mechanical departments and creates a similar risk in other departments. There is an absence of policies, procedures, and training for project management. This condition, coupled with weaknesses we previously noted in justifying the need for capital investments, creates a high-risk environment for the effective stewardship over capital project resources. These weaknesses could ultimately affect the company's ability to meet its strategic goals — particularly the financial excellence goal.

Recommendations


We recommend that the President and Chief Executive Officer take actions to improve the company's capital project management practices including the development of company-wide policies and procedures for project management and a training program in project management. The President and Chief Executive Officer agreed to the recommended actions.

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Memorandum

To: Joseph Boardman
President and Chief Executive Officer

From: Tom Howard 

Date: July 15, 2014

Subject: *Governance: Improved Policies, Practices, and Training Can Enhance Capital Project Management* (Audit Report OIG-A-2014-009)

This report provides the results of our audit of the practices used by the Engineering and Mechanical departments to manage capital projects.¹ According to the most recent five-year financial plan, the company's capital project needs exceed the level of funding anticipated.² As you know, the company's Fiscal Year (FY) 2015 budget request stated that current investment levels leave the railroad vulnerable to a more extensive, more costly, and far more damaging failure than previously seen; capital support levels have fallen; and the likelihood of major infrastructure failure has grown. The request also stated that the company could have completed some projects more efficiently if the company knew with certainty that its projects were funded in advance, and that the company has put off major capital programs to renew aging bridges and tunnels, in some cases for decades.

In our September 2013 report on the process of planning capital projects,³ we identified a number of opportunities for improvement in developing project proposals, selecting projects, and evaluating project outcomes. We understand that the company is addressing these issues. This report focuses on the company's effectiveness and efficiency in managing projects after they are initiated.

¹ A capital project costs at least \$50,000 and has an estimated useful economic life of more than one year, according to Amtrak policy.

² FY 2014 Budget and Business Plan, FY 2015 Budget Request Justification, FY 2014–2018 Five Year Financial Plan, April 2014.

³ Amtrak Office of Inspector General (OIG), *Corporate Governance: Planned Changes Should Improve Amtrak's Capital Planning Process, and Further Adoption of Sound Business Practices Will Help Optimize the Use of Limited Capital Funds*, OIG-E-2013-020, September 27, 2013.

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Our audit objective was to determine the adequacy of the policies, procedures, and practices used by the Engineering and Mechanical departments to manage capital projects. For additional details on our scope and methodology, see Appendix A.

OPPORTUNITIES TO IMPROVE POLICIES, PROCEDURES, PRACTICES, AND TRAINING FOR PROJECT MANAGEMENT ACTIVITIES

Our work focused primarily on the Engineering and Mechanical departments: these two departments accounted for more than 85 percent of the reported \$921.8 million expended in FY 2012.⁴ We compared the company's policies, procedures, and practices with best practices and identified a number of opportunities for improvement. According to best practices, the success of a project largely depends on sound practices in three key areas: cost estimating, scheduling, and project oversight. Project oversight includes efforts to track, review, and regulate project progress and performance. The opportunities for improvement we identified are summarized in Figure 1.

Figure 1. Opportunities for Improvement	
Engineering	
Best Practices	Observed Practices
Organizations similar to Amtrak that we used as a benchmark reprogram on average about 3% of their capital budgets. When developing capital budgets, these organizations grouped similar projects together as a program.	The Engineering department reprogrammed about 15% of its annual budget for federally funded projects. The department budgets and manages at the project level. In FY 2014, Amtrak proposed to budget and manage at the program level.
Cost estimates should be continually updated with actual data as they become available and should be revised to reflect changes.	The cost estimate for a bridge project did not accurately or reliably forecast project costs, and it was not updated despite several cost increases. Construction costs were about 46% percent higher than estimated, and \$7 million was reprogrammed from other capital projects.
Successful projects have a reliable schedule that defines when work will occur, how long it will take, and how each activity relates to the others.	Although the contract statement of work for a project to modernize the systems that monitor train activity required three schedules to manage project progress, none were developed.
Project managers should track, review, and regulate progress and performance; identify areas in which changes to the plan are required; and initiate changes.	The project oversight of replacement programs performed by company personnel was informal and inconsistent. Oversight efforts focused on the expenditure of funds and not on progress and performance.

⁴ FY 2013 audited financial records were not available at the time of this report.

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Mechanical	
Best Practices	Observed Practices
Recurring production processes should grow more efficient over time.	The data on overhauls performed by department employees showed that the process became less efficient from FY 2009 through FY 2012: completing an overhaul required an average of 28% more labor hours, in FY 2012. There were also large variations in the hours needed to perform overhauls.
Cost estimates should be developed using established methods and reliable data.	Cost estimates for overhauls did not adequately forecast the cost and hours expended. To cover anticipated out-of-scope work, officials build additional hours into their cost estimates.
Successful projects have a reliable schedule that defines when work will occur, how long it will take, and how each activity relates to the others.	Overhaul project schedules did not define when tasks occurred or the time required. The department's methods to record activities did not provide the data necessary to determine the elements of the schedule that need adjustment.
Project oversight should include the processes required to track, review, and regulate the progress and performance of the project.	A formal, defined project oversight process was not developed to assess the progress of active overhaul projects or measure the success of overhauls. Also, prior to FY 2013, foremen did not consistently monitor the hours and costs charged to an overhaul.

Source: The best practices are derived from our review of the Government Accountability Office's (GAO) *Cost Estimating and Assessment Guide* and *Schedule Assessment Guide, A Guide to the Project Management Body of Knowledge*, and the *Defense Manufacturing Management Guide for Program Managers*.⁵ The reprogramming benchmark and observed practices are a result of OIG analysis.

Opportunities exist to improve project management policies and procedures, training, and accountability

The management control weaknesses summarized in Figure 1 above and discussed in the latter sections of this report limited the effectiveness and efficiency of capital project management. Three factors contributed to the management control weaknesses discussed in this report: policies and procedures to govern project management were inadequate, training for project managers and foremen was informal, and accountability for project results was lacking.

⁵ GAO, *Cost Estimating and Assessment Guide*, GAO-09-3SP, March 2009; GAO *Schedule Assessment Guide*, GAO-12-120G, May 2012; Project Management Institute, *A Guide to the Project Management Body of Knowledge* (PMBOK Guide), Fourth Edition, 2008; Defense Acquisition University, *Defense Manufacturing Management Guide for Program Managers*, October 16, 2012.

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Policies and procedures for project management need to be strengthened

The company does not have overall company-wide policies and procedures to govern project management. Because there is no company-wide project management policy, each department decides how projects will be managed. Currently, each project manager or foreman has a unique method to conduct oversight of projects and overhauls. Some departments have developed policies and procedures related to project management. Policies and procedures are a key element of a sound internal control environment to ensure that capital projects of all types are completed efficiently and effectively.

Similarly, our capital planning report identified a lack of company-wide guidance on how to develop sound project proposals.⁶ Consequently, the management controls for capital projects are limited from project inception through completion. The company is in the process of revising its capital project selection process. The Assistant Vice President of Financial Planning is developing a plan to adopt sound business practices in reviewing and ranking projects, as well as independently reviewing and validating proposals.

In the absence of overall guidance, the Engineering department has developed internal project control procedures for capital construction projects valued at more than \$3 million and involving third-party contractors. However, project managers are not formally required to use these procedures. Although these procedures cover a number of areas—such as project execution and closeout—they do not address cost estimating. In addition, the procedures need to be improved to more effectively address project initiation and planning. The internal project control procedures were applicable to one of the five Engineering department projects we reviewed—the bridge replacement.

Although our work focused on the Engineering and Mechanical departments, other departments may have similar project management weaknesses to those stated in Figure 1, particularly because there are no company-wide policies and procedures for project management or training programs for project managers.

⁶ OIG-E-2013-020, September 27, 2013.

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Training for project managers and foremen can be improved

There is no company-wide training program in project management; therefore, the departments did not provide formal project management training to project managers and foremen. A senior official of the Engineering department stated that most of its project managers were not trained; they rely on what they have learned on the railroad over the years and their judgment and experience. A back shop superintendent in the Mechanical department explained that most foremen have never received project management training and would likely benefit from such training. We noted that the Engineering department started an initiative to develop a training program for project managers. Currently, the department is focusing on obtaining external resources to improve project management at the most at-risk projects.

Prior OIG reports noted that outdated processes in human capital management, training, and employee development hinder the company's ability to perform effectively.⁷ The company agreed with our recommendations and is in the process of taking a variety of corrective actions.

Enhanced accountability for controlling costs and schedules needed

The Engineering and Mechanical departments do not have a formal process to hold project managers and foremen accountable for completing their projects within budget and schedule. The two departments shared a common approach to annual project assessments. The goal of both departments, according to senior officials, is to expend available capital funding, but at the end of the year they do not assess whether the projects were completed within budget and on schedule. The departments do not review individual projects for efficiency because they view the projects and overhauls as an overall annual effort—not project by project.

In a prior report, we recommended that the Finance department build the capability to conduct post-completion reviews of projects as required by company policy.⁸ This new

⁷ Amtrak OIG, *Human Capital Management: Lack of Priority Has Slowed OIG-Recommended Actions To Improve Human Capital Management, Training, and Employee Development Practices*, OIG-E-11-04, July 8, 2011; Amtrak OIG, *Training and Employee Development*, E-09-06, October 26, 2009; Amtrak OIG, *Human Capital Management*, E-09-03, May 15, 2009.

⁸ OIG-E-2013-020.

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company effort could provide useful data to the two departments, but both departments will need to use the data effectively to promote accountability.

Capital project expenditures

From FY 2009 through FY 2012, the four-year average for capital expenditures was about \$1.2 billion, as reported by the company. In FY 2012, the company reported expending about \$921.8 million for infrastructure and equipment improvements that were critical to operations. These funds came from various sources:

- \$669.2 million from an annual Federal Railroad Administration grant
- \$121.6 million from state and local governments and other sources
- \$83.8 million from the Railroad Rehabilitation and Improvement Financing Program
- \$25.7 million from a Department of Homeland Security grant
- \$17.2 million from Amtrak revenues
- \$4.3 million from an American Recovery and Reinvestment Act of 2009 grant

Infrastructure improvements included bridge replacements, information technology initiatives, and yearly replacement projects along the Northeast Corridor. Equipment improvements included overhauls of various types of locomotives and rail cars. For more information on FY 2012 capital expenditures, see Appendix B.

Opportunities to improve Engineering department capital project management

Overall, capital project cost and schedule data shows cost overruns and significant reprogramming, an inaccurate and unreliable cost estimate, schedule delays, and inconsistent management of replacement projects. Three of the five projects we judgmentally selected for review experienced overruns and delays that caused the company to reprogram funds and delay or forgo other projects. The five projects were for interlocking replacement, concrete tie replacement, surfacing replacement, an information technology upgrade, and bridge replacement; they ranged in value from \$4.3 million to \$149.7 million.

The department did not consistently use best practices in managing these projects. For example, we identified a cost estimate that did not accurately or reliably forecast project

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costs, project schedules that were not developed, and project oversight that was inconsistently performed.

Trends show cost overruns and significant reprogramming of funds

Of the department's 404 projects, funded from a Federal Railroad Administration grant, 172 were over budget (43 percent) in FY 2012. These overages led to reprogramming funds from other projects. In FY 2012, the department reprogrammed about \$56.4 million (15 percent) of its \$365 million annual grant budget. When considering all funding sources, the department reprogrammed \$76.3 million and received an additional \$32.4 million from other departments to cover its activities.

Organizations similar to Amtrak that we used as a benchmark reprogram an average of about 3 percent of their capital budgets. When developing capital budgets, these organizations grouped similar projects together as one line item in the budget and allowed the individual departments to manage each line item as a program. The Engineering department budgets and manages at the project level. In FY 2014, Amtrak proposed to budget and manage at the program level.

The cost estimate was not updated for a bridge replacement project

We reviewed a project to replace a 100-year-old bridge crossing the Niantic River in Connecticut. It was awarded in January 2010 and completed in May 2013. The purpose of the project was to improve speed and reliability along the Northeast Corridor.

The cost estimate for the project did not accurately or reliably forecast project costs. In November 2005, the Engineering department's original cost estimate was \$67.7 million.⁹ In June 2009, the department's final update of the cost estimate for construction, Engineering department labor, and construction management was \$96.8 million; however, as of June 2013, the final project cost was \$149.8 million—\$53 million (54.8 percent) more than the June 2009 cost estimate. Despite several increases throughout the project, the Engineering department did not update its cost estimate after June 2009.

According to best practices, cost estimates should be continually updated with actual data as it becomes available. Such updates help project managers to mitigate cost overruns and schedule changes.

⁹ The Final Design Replacement of the Niantic River Bridge, Engineers Cost Estimate, November 4, 2005.

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The department's cost estimate for the bridge replacement contained three main components: construction, Engineering department labor, and construction management services. During project execution, costs increased in each of these areas, as shown in Figure 2.

*Figure 2. Niantic Bridge Replacement:
 Reported Project Costs, Estimate vs. Actual*
 (dollars in millions)

	Estimate (June 2009)	Actual (June 2013)	Overage	Percent Over
Construction	\$81.5	\$118.6	\$37.1	45.5%
Engineering Department Labor	10.3	22.0	11.7	113.6
Construction Management Services	5.0	9.2	4.2	84.0
Totals	\$96.8	\$149.8	\$53.0	54.8%

Source: OIG analysis of Amtrak data

- **Construction costs.** The department estimated that the construction portion of the project would cost \$81.5 million. However, when the contract was awarded in January 2010, it was valued at \$104.7 million—\$23.2 million (28.5 percent) more than the cost estimate. The department did not update the cost estimate in the project file to reflect the actual contract award amount.

Also, the contract was modified 26 times, increasing the contract value by \$13.9 million (13.3 percent), but the department did not update its estimate in the project file to reflect these increases. Overall, construction costs for the bridge replacement increased from the June 2009 estimate of \$81.5 million to \$118.6 million (up 45.5 percent), as of June 2013.

- **Labor costs.** The Engineering department estimated that its labor costs for this project would be \$10.3 million; however, these costs increased by \$11.7 million (113.6 percent). The department did not update these cost increases in the project file. Most of the \$11.7 million increase occurred in April 2013 for track work required to complete the project, according to the project manager. When compiling his estimate for the FY 2013 budget, the project manager had significantly underestimated the amount of track work necessary to complete the project.

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To fund this increase, the department had to reprogram \$7.1 million from other Engineering department projects. The \$7.1 million reprogramming was a portion of a larger reprogramming request for 27 projects totaling \$33.5 million to cover expanded project scopes. Funding for the reprogramming was reportedly made available from 87 other projects in the department that were delayed due to scheduling changes.

- **Construction management services.** In October 2007, the Engineering department entered into a contract for construction management services valued at about \$5 million. The department expected construction to start in October 2008 and be completed in October 2011, but funding constraints and other issues delayed the start of construction for 16 months (until February 2010). During these 16 months, the department contracted for construction management services to support the department and the design team, and for assistance with design changes and permitting. Because of the delay in starting the project and retaining the construction management services, the cost for these services nearly doubled to \$9.2 million (an increase of 84 percent).¹⁰ The department did not update these increases in the project file.

In our September 2013 report on Amtrak's capital planning process, we identified a similar overrun in a project with an unreliable cost estimate.¹¹ We reported that a Marketing department project cost estimate was not sufficiently documented and not comprehensive. This project was \$35 million over budget.

- **Funding sources to cover cost increases.** The 16-month delay in the construction of the bridge also impacted the planned source of some of the Engineering department's funding for the project. In 2009, the department budgeted \$100 million in American Recovery and Reinvestment Act of 2009 funding for the project; however, in June 2010, this amount was reduced to \$60 million because the department decided it would not be able to expend the funds by the act's mandated deadline. The company could have received a waiver to expend the funds; we previously reported that the company received waivers that allowed the completion of 86 projects after the deadline had passed.¹² To complete the

¹⁰ This cost is correct as of June 30, 2013, and does not reflect any increases after that time.

¹¹ OIG-E-2013-020.

¹² Amtrak OIG, *American Recovery and Reinvestment Act: Infrastructure Improvements Achieved but Less than Planned*, 908-2010, June 22, 2011.

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bridge project, the department changed the source of funding to its annual capital grant funds—thereby reducing the amount of funds available for other capital projects. In FY 2012, the company had to forgo its planned \$40 million track-laying machine program because of insufficient funding.

The American Recovery and Reinvestment Act of 2009 and Federal Railroad Administration grant agreements required the department to provide monthly capital project status reports to the Federal Railroad Administration. However, these reports did not compare project costs to the department's cost estimate. The reports provide information only on then-current fiscal year activities.

Schedules were not developed for the electrification and traffic project

The Engineering department did not ensure that schedules were developed for the Centralized Electrification and Traffic Control project, which was intended to modernize and replace aging equipment with server-based systems that monitor and control train activity along the Northeast Corridor. Centralized Electrification and Traffic Control facility locations did not have back-up capability; server-based systems will allow for easy back-up in a disaster.

Although the February 2008 contract required the development of specific project schedules, the Engineering department did not require the contractor to develop them and did not hold the contractor accountable for not doing so. Best practices show that successful projects have reliable schedules that define when work will occur, how long it will take, and how each activity relates to the others. The lack of required project schedules has limited the ability of the project manager to ensure a successful project outcome.

Six months after the contract was signed, the contractor approached the Engineering department to discuss concerns over its ability to meet the project's milestones. However, the department instructed the contractor to continue work and did not require it to develop the schedules to help ensure that the project would meet the required deadlines. In March 2011, the department took over scheduling duties from the contractor due to the severity of the project delays, according to the project manager. Also, the project manager and contracting officer have been meeting with the contractor regularly to discuss performance and project progress.

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In March 2013, the department developed a project schedule that shows the baseline finish dates compared to the current finish dates for project tasks, but this schedule falls short of the requirements provided in the statement of work. The current schedule does not establish the number of activities required, the work breakdown structure, and the logical sequence of events. The lack of these items prevented the project manager from measuring project progress against required milestones. As of April 3, 2014, the project was almost three years behind schedule.

Further, our capital project planning report also reviewed this project to determine whether sound business practices were used in developing the project proposal.¹³ Our report stated that the department developed cost and schedule estimates during the planning stage, but the report did not evaluate the implementation of these estimates. This report shows that the schedule implementation did not follow best practices.

Inconsistent management of replacement projects

The Engineering department's oversight of infrastructure replacement projects was informal and inconsistent. The department contracted for the bridge replacement and electrification and traffic projects, but used Engineering department labor to perform the infrastructure replacement projects. The three projects we reviewed are part of the company's yearly replacement programs along the Northeast Corridor:

- replacing concrete ties along the right of way¹⁴
- replacing an interlocking in Maryland
- replacing surface stone to support rail in the Mid-Atlantic and New England

Best practices state that project oversight should include the processes required to track, review, and regulate the progress and performance of the project. We noted that project managers had very different approaches to overseeing these projects. For example, two project managers communicated regularly with personnel in the field regarding their projects. These project managers were familiar with the status of their projects—costs, schedule, and progress.

¹³ OIG-E-2013-020.

¹⁴ A previous OIG report reviewed this program and found that Amtrak had taken positive steps to proactively minimize the risk of manufacturing defects in concrete ties. Amtrak OIG, *American Recovery and Reinvestment Act: Amtrak Has Taken Positive Steps to Safeguard Funds Used for Concrete Tie Replacement Program*, OIG-E-2013-017, September 19, 2013.

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Another project manager was typically not scheduled to work while work was being performed.¹⁵ This project manager provided oversight by reviewing reports in a corporate system, Web Work Element Explorer. He stated that his responsibilities are to manage the project funding, establish work element numbers, update project information, review invoices, and approve material purchases. He also stated that the actual labor force is managed by the individual groups responsible for the interlocking replacement, such as communication and signals and track. This interlocking project started in July 2009 and was scheduled to be completed in September 2012, but funding constraints caused delays and staff furloughs. The current estimated completion date is September 2014—a two-year delay. Also, over the past two years, project costs have exceeded budget allotments. In FY 2012, the department allotted \$300,000 for this project, but FY 2012 expenditures were \$357,250. In FY 2013, the department allotted \$2,300,000 for this project, but expenditures were \$2,948,790. For this current fiscal year, the department allotted \$500,000 and has spent \$899,303 as of January 2014. According to a department project status report, \$282,000 of the cost increase was to install an unplanned access road.

Opportunities to improve Mechanical department capital project management and increase efficiency of overhauls

Our review of five projects, valued at a total of \$48.7 million, raises questions about whether the Mechanical department's project management practices for equipment overhauls has helped to improve the efficiency of overhauls. Data on the reported number of hours expended on overhauls from FY 2009 through FY 2012 shows that the department has become less efficient: an overhaul required up to 28 percent more average labor hours to complete in FY 2012 than in FY 2009.¹⁶ We recognize that other factors can impact the amount of hours expended on overhauls, such as changes in the scope of work and aging equipment. However, we noted that cost estimates did not reflect project variations, overhaul schedules were not sufficiently detailed to measure progress, and project oversight was not geared toward ensuring the efficient completion of the overhaul projects. Best practices state that the success of a project largely depends on sound practices in cost estimating, scheduling, and project oversight.

¹⁵ Interlockings are typically performed from Friday night through Monday morning. The project manager is on a Monday-to-Friday schedule that does not overlap.

¹⁶ The calculation of average labor hours included those hours the company reportedly incurred completing 14 different types of overhauls. We included only those types of overhauls that were performed in all four years FY 2009–FY 2012.

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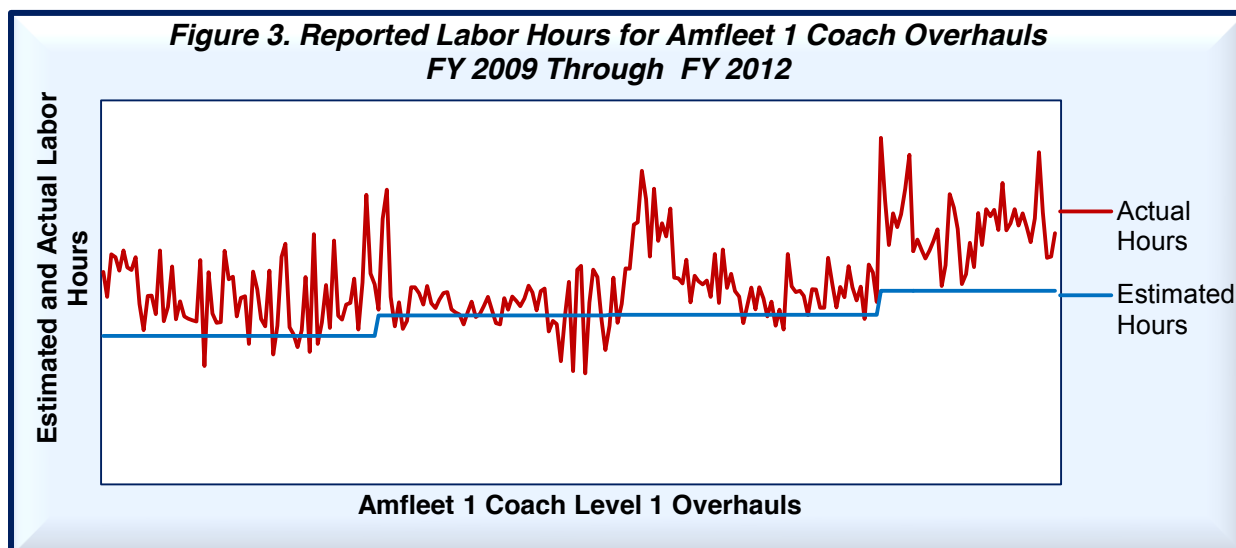
The Mechanical department overhauls locomotives, passenger cars, and food service cars. An overhaul typically consists of the complete rebuilding of heating, ventilation, and air conditioning units; brake valves; door operators; and system-critical components. It also includes heavy cleaning of carpeted surfaces and replacing seat cushions. Department employees complete the overhauls in the company's three back shops in Beech Grove, Indiana; Bear, Delaware; and Wilmington, Delaware.

Overhaul data shows costs have increased

Mechanical department data on equipment overhauls performed from FY 2009 through FY 2012 shows that the cost of performing the same type of overhaul on the same model of equipment has increased year after year. Best practices state that recurring production processes should grow more efficient over time. The department's data on equipment overhauls shows that the process has become less efficient. Completing an overhaul in FY 2012 required an average of 28 percent more labor hours than it did in FY 2009. Some of the increases in the hours necessary to complete these overhauls are likely contributable to changes in the overhaul scopes of works and aging equipment. However, the department considers these increases and anticipates out-of-scope work when developing its estimates for the coming year.

For example, the number of hours required to complete the same type of overhaul on 237 of the same model of equipment (Amfleet 1 Coach) had increased by 37 percent from FY 2009 through FY 2012. The increases in actual hours expended on this type of overhaul for this model of equipment outpaced the increases to the hours budgeted. As shown in Figure 3, the hours expended to complete each Amfleet 1 Coach Level 1 overhaul fluctuated significantly during the period reviewed. During this time, the average labor hours to complete these overhauls increased by 37 percent; the labor hours expended on these overhauls varied from 34 percent less than to 95 percent more than the estimate. All 44 overhauls completed in FY 2012 required more than the estimated hours to complete.

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Source: OIG analysis of Amtrak data from its Work Management System

A senior official stated that their goal was to stay on budget for their programs and their department as a whole. He stated that the focus is not on individual project performance, but on completing the number of overhauls scheduled for the year. Overhaul data, for the years we reviewed, showed that the back shops were generally within five percent of annual budget estimates and that scheduled overhauls were typically completed.

Cost estimates did not reflect project variations

The cost estimates the department developed did not adequately forecast the costs or hours expended to complete overhauls. The department develops annual cost estimates for each type of overhaul planned. To develop these cost estimates, personnel used their institutional knowledge and the prior-year data on the costs and hours incurred. Personnel also considered increases to the scope of work for the coming fiscal year, the estimated capital funding that will be available, and any anticipated out-of-scope work.

To cover anticipated out-of-scope work, two superintendents and one assistant superintendent told us that they built additional hours into their cost estimates. However, these cost estimates were not an adequate predictor of the company's costs and hours to perform overhauls. Best practices state that cost estimates should use established methods and reliable data.

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The department's data on equipment overhauls showed great variability when compared to the department's estimates. For example, in FY 2012, the department estimated that it would take 1,950 hours to overhaul a Superliner 2 Transition Sleeper Dormitory Level 2. However, of the 10 overhauls completed, 2 were under budget, and 8 were over budget—ranging in total hours from 1,846 hours up to 2,746 hours. Because of these variations, we question the usefulness of historical data in developing overhaul cost estimates.

Schedules were not sufficiently detailed

Mechanical department project schedules did not define when and how long tasks will occur, which limited the ability of project managers to measure progress or promote accountability. When performing overhauls, the three back shops use Maintenance Analysis Program books to track the progress of each overhaul;¹⁷ however, these books do not identify the amount of time it takes to complete specific tasks. Best practices show that an attribute of successful projects is a reliable schedule that defines when and how long work will occur and how each activity relates to the others.

The department's use of the Maintenance Analysis Program books does not provide the data necessary for an analysis of the schedule to identify elements of the schedule that need adjustment. Moreover, the department process does not require this type of analysis. Without a reliable schedule that spells out the expected and actual time necessary to complete overhaul tasks and projects, the Mechanical department does not have the data needed to evaluate the efficiency of operations.

Project oversight was informal and inconsistent

The Mechanical department does not have a formal, defined oversight process to assess the progress of active overhaul projects or to measure their success. Best practices state that project oversight consists of the processes required to track, review, and regulate the progress and performance of the project; to identify any areas in which changes to the plan are required; and to initiate the corresponding changes. We noted that prior to FY 2013, foremen did not consistently monitor the hours and costs incurred during an overhaul. During and after overhaul projects, foremen review the books to see which tasks were completed on a specific piece of equipment. However, they had no basis or

¹⁷ The Maintenance Analysis Program book includes all of the tasks needed to complete an overhaul.

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process to assess whether the work was performed efficiently or whether outside factors affected project performance—such as parts availability or quality.

Department personnel enter the costs and hours expended during an overhaul into the company's Work Management System,¹⁸ but they do not use the system to analyze trends or identify areas for improvement. The limited information available on the Maintenance Analysis Program book and the limited use of the Work Management System prevents management from effectively assessing the performance of individual equipment overhauls. At the back shop in Bear, Delaware, when foremen were aware of the hours expended to conduct an overhaul, they participated in informal, undocumented discussions with their crews to emphasize the importance of staying within established budgets. Although such discussions could potentially improve the performance on successive overhauls, the overhaul data from FY 2009 through FY 2012 demonstrates that improvements are not being realized.

Strategic Planning—the Beech Grove Pilot Program

The department is developing a strategic plan to safely create and deliver industry-leading, competitive mechanical services for rolling stock assets in North America for their internal and external business partners and customers. The back shop at Beech Grove is the pilot program. The goal is to position Beech Grove as a best-in-class rail equipment maintenance facility serving Amtrak and its business partners with a commitment to on-time delivery and continuously improving safety and quality craftsmanship at a competitive price. The department established a Beech Grove Improvement Committee to implement the strategic plan. This committee recently identified eight strategic initiatives designed to ensure execution of the plan. This committee developed action plans for four strategic initiatives and is in the process of executing the action plans.

¹⁸ The Work Management System is the Mechanical department system for payroll, work scheduling, and maintenance recording.

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CONCLUSION AND RECOMMENDATIONS

Overall, the company's management controls for project implementation are weak. This has contributed to ineffective and inefficient project implementation in the Engineering and Mechanical departments and creates a similar risk in other departments. There is an absence of policies, procedures, and training for project management. This condition, coupled with weaknesses we previously noted in justifying the need for capital investments, creates a high-risk environment for the effective stewardship over capital project resources. These weaknesses could ultimately affect the company's ability to meet its strategic goals—particularly the financial excellence goal.

This report identifies various opportunities to improve the company's capital project management practices. We recommend that the President and Chief Executive Officer take the following actions:

1. Designate a senior executive to develop company-wide policies and procedures for project management that are consistent with the best practices discussed in this report.
2. When the company-wide policies are developed, require each department to develop project management policies that are consistent with the overall policy, and to tailor the policies to their specific activities.
3. Direct the Chief Human Capital Officer to lead an effort with the appropriate departmental executives to develop a project management training program.

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MANAGEMENT COMMENTS AND OIG ANALYSIS

In his response to the draft report, the President and Chief Executive Officer agreed with our recommendations. He stated that the company is in the process of developing a corporate-wide Project Management Office. In addition, he has directed the Chief Financial Officer and the Vice President of Operations, working in concert with the Chief Human Capital Officer, to develop an action plan showing specific goals, objectives, and milestones addressing our findings by September 30, 2014. Once reviewed, Amtrak management will provide us the action plan. We will monitor the plan's development and review the plan as part of our regular recommendation follow-up process. The actions taken and promised meet the intent of our recommendations.

For the complete response, see Appendix C.

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Appendix A

SCOPE AND METHODOLOGY

The scope of our work focused on project management practices and procedures in the Engineering and Mechanical departments. We reviewed the extent to which company-wide project management policies exist, and we analyzed reported capital project spending for FY 2012.¹⁹ Our audit objective was to determine the adequacy of the policies, procedures, and practices used by the Engineering and Mechanical departments to manage capital projects. In June 2012, staff from our Washington office initiated work to identify criteria and to research company policies and procedures. Staff from our Philadelphia office conducted fieldwork from September 2012 through April 2014.

Our overall methodology was to conduct a comparative analysis between the best practices of private- and public-sector organizations and the two Amtrak departments. These two departments accounted for about 85 percent of the company's FY 2012 capital project spending.

To identify best practices and provide a framework for our review, we researched GAO's *Cost Estimating and Assessment Guide* and *Schedule Assessment Guide*, which provide standards and guidelines for project management in estimating and scheduling.²⁰ To identify standards and guidelines for project management and oversight, we researched a publication used by private organizations—Project Management Institute's, *A Guide to Project Management Body of Knowledge* (PMBOK Guide), Fourth Edition (2008). These publications are recognized as generally accepted sources of best practices in project management. To identify standards and guidelines for production processes, we researched the Defense Acquisition University's, *Defense Manufacturing Management Guide for Program Managers*, October 16, 2012. For additional information and standards, we reviewed Amtrak's Policy No. 8.37.0, *Capital Programming*, December 4, 2009, which describes the requirements and limitations for capital programming, reprogramming, and closing out projects. This policy is currently being revised. To determine the average percentage of comparative organizational annual capital budget reprogramming, we used information contained in a prior OIG

¹⁹ FY 2013 audited financial records were not available at the time of this report.

²⁰ GAO-09-3SP and GAO-12-120G.

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report.²¹ Based on our prior work, we considered the average reprogramming amount to be a best practice. To identify industry expectations for efficient manufacturing and service processes, we researched generally accepted manufacturing and production efforts focused on improving efficiency and eliminating wasted expenses.

We focused our review on the two departments with the highest capital project expenditures. The two departments have different methods for overseeing and conducting capital projects.

- To conduct our analysis of project management practices in the Engineering department, we selected five projects as case studies for our comparative analysis. To review a cross-section of the department's capital projects, we selected active FY 2013 projects varying in size, amount, and performance responsibility. Contractors performed two of these projects, and departmental labor performed three. The projects ranged in value from \$4.3 million to \$149.7 million and were for interlocking replacement, concrete tie replacement, surfacing replacement, information technology upgrade, and bridge replacement. We conducted interviews with senior directors, directors, project managers, and construction managers. We discussed policies, procedures, and practices as they related to cost estimating, scheduling, and project oversight. We obtained financial data for budget and actual figures for each project and interviewed financial personnel. We reviewed the production schedules and analyzed the project results. Also, we discussed and analyzed the cost for project management oversight, and we obtained, reviewed, and discussed the Project Status Report for each project. We gathered and analyzed data to capture the department's management process and its results as it relates to estimating, scheduling, and oversight. We reviewed project documentation and contractual agreements related to project management.
- To conduct our analysis of project management practices in the Mechanical department, we judgmentally selected five projects for equipment overhauls of the Amfleet, Superliner, and an engine locomotive. The total value of the five projects was \$48.7 million. Department employees conducted the equipment overhauls. We conducted interviews with senior directors, superintendents, assistant superintendents, budget managers, general foremen, and foremen. We obtained four years of data for FY 2009 through FY 2012—such as budget and

²¹OIG-E-2013-020.

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actual amounts, variances for labor hours and materials, and total overall costs. We reviewed Maintenance Analysis Program books for the five overhaul projects selected. We then analyzed the data from the Work Management System to look for efficiency trends in performance and accuracy in cost estimations. Based on the interviews, we developed graphs and charts to demonstrate production results for the department. We then reviewed and analyzed those results to show the production trends.

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

The report focused on the company's management controls, as well as Engineering and Mechanical departments' management controls for project management. We reviewed the company's overall policies for overseeing the implementation of capital projects. We also conducted a detailed review of the Engineering and Mechanical departments' internal controls for project management. The results of that review are discussed in this report.

Computer-processed data

During our review of Engineering department reprogramming actions, we obtained data on FY 2012 projects. The data showed the project budget before reprogramming, the amount of the reprogramming, and the project budget after the reprogramming. For FY 2012, we also obtained capital funding by source, capital spending by department, and capital budgets and actuals for all company projects. We did not verify this data. However, because the data came from Amtrak's financial management system, we relied on the work of the company's independent public accountant, which stated that the company's financial statements for FY 2012 were free of misstatement. We determined that the data were sufficiently reliable for our objectives and conclusions.

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During our review of Mechanical department equipment overhauls, we obtained four years of data on costs and labor hours from the Work Management System. We did not assess the overall reliability of the system's data, but we did match the data to source documentation for the five projects we reviewed in detail. We determined that there were no inconsistencies between the system's data and the source documents. Therefore, the data were sufficiently reliable for our objectives and conclusions.

Prior reports

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

- *Corporate Governance: Planned Changes Should Improve Amtrak's Capital Planning Process, and Further Adoption of Sound Business Practices Will Help Optimize the Use of Limited Capital Funds* (OIG-E-2013-020, September 27, 2013)
- *American Recovery and Reinvestment Act: Amtrak Has Taken Positive Steps to Safeguard Funds Used for Concrete Tie Replacement Program* (OIG-E-2013-017, September 19, 2013)
- *Asset Management: Integrating Sound Business Practices into its Fleet Planning Process Could Save Amtrak Hundreds of Millions of Dollars on Equipment Procurements* (OIG-E-2013-014, May 28, 2013)
- *Human Capital Management: Lack of Priority Has Slowed OIG-Recommended Actions To Improve Human Capital Management, Training, and Employee Development Practices* (E-11-04, July 8, 2011)
- *American Recovery and Reinvestment Act: Infrastructure Improvements Achieved but Less than Planned* (908-2010, June 22, 2011)
- *Assessment of Project Risks Associated with Key Engineering Projects* (912-2010, May 14, 2010)
- *Training and Employee Development* (E-09-06, October 26, 2009)
- *Human Capital Management* (E-09-03, May 15, 2009)

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We also reviewed the following reports from GAO:

- *Federal Courthouses: Recommended Construction Projects Should Be Evaluated under New Capital – Planning Process* (GAO-13-263, April 11, 2013)
- *GAO Schedule Assessment Guide: Best Practices for Project Schedules* (GAO-12-120G, May 2012)
- *GAO Cost Estimating and Assessment Guide: Best Practices for Developing and Managing Capital Program Costs* (GAO-09-3SP, March 2009)

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Appendix B

FY 2012 CAPITAL EXPENDITURES

The following table shows FY 2012 capital expenditures by department.

<i>Reported FY 2012 Spending By Department</i> (dollars in millions)		
	Amounts	Percent of Total
Engineering	\$465.3	50.5%
Mechanical	325.5	35.3
Information Technology	35.0	3.8
Emergency Management and Corporate Security	29.7	3.2
Transportation	24.1	2.6
Marketing and Production Management	21.2	2.3
Other departments*	21.0	2.3
Totals	\$921.8	100.0%
* Other departments include Procurement, Chief Financial Officer, and Real Estate among others		

Source: OIG analysis of Finance department data

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Appendix C

**COMMENTS FROM AMTRAK'S PRESIDENT AND
 CHIEF EXECUTIVE OFFICER**

NATIONAL RAILROAD PASSENGER CORPORATION
 60 Massachusetts Avenue, NE, Washington, DC 20002
 tel (202) 906-3960, fax (202) 906-2850

Memo

Date June 26, 2014
 To Tom Howard
 Inspector General


 From Joseph H. Boardman
 Department President and CEO
 Subject Governance: Improved Policies,
 Practices and Training Can Enhance
 Capital Project Management (Draft
 Audit Report, Project No. 011-
 2012)
 cc DJ Stadtler
 Jerry Sokol
 Barry Melnkovic
 Eleanor Acheson
 William Herrmann
 Bernard Reynolds
 Rod Gibbons
 Bruce R. Pohlot
 Mario Bergeron
 Matthew Gagnon
 Melantha Paige
 Peggy Reid

Message This is in response to the Office of Inspector General's draft report entitled "*Governance: Improved Policies, Practices, and Training Can Enhance Capital Project Management*" which was issued June 2, 2014.

We agree that an efficient and robust project management function is critical to Amtrak. While we currently have policies and procedures in place to manage our capital projects, we agree that they are not adhered to consistently across the company, and as pointed out in your report do not always align to best practices. We are currently in the process of developing a corporate-wide Project Management Office (PMO) to improve Amtrak's cost estimating, scheduling and project oversight. The corporate-wide PMO will report to the Chief Financial Officer. We will utilize a professional services firm to manage the search for internal and external candidates and will evaluate the Project Management Institute (PMI) and other related professional organizations as external training vendors. I am confident the creation of this Office will significantly improve our capital project management.

Concurring with your recommendation to take actions to improve the Company's capital management practices, I have directed the Chief Financial Officer and the Vice President of Operations, working in concert with the Chief Human Capital Officer, to analyze the above referenced OIG report and respond back to me with an action plan showing specific goals, objectives and milestones for addressing the OIG's findings by September 30, 2014. Once I have received and reviewed the plan, I will provide it to the OIG within 14 days.

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*Governance: Improved Policies, Practices and Training Can Enhance Capital Project Management
(Draft Audit Report, Project No. 011-2012)
June 26, 2014
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We thank you for your time and effort in developing the recommendations identified within your report. A formalized Project Management Program is critical towards driving increased efficiency and ensuring that we have the information needed to make sound business decisions.

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Appendix D

ABBREVIATIONS

FY	Fiscal Year
GAO	Government Accountability Office
OIG	Office of Inspector General

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Appendix E

TEAM MEMBERS

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Ed Stulginsky, Deputy Assistant Inspector General, Audits

Matthew Simber, Senior Director, Audits

Todd Kowalski, Audit Manager

Walter Beckman, Senior Auditor

Thelca Constantin, Senior Auditor

OIG MISSION AND CONTACT INFORMATION

Amtrak OIG's Mission

The Amtrak OIG's mission is to provide independent, objective oversight of Amtrak's programs and operations through audits, inspections, evaluations, 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 OIG Reports and Testimony

Available at our website: www.amtrakoig.gov.

To Report Fraud, Waste, or Abuse

Report suspicious or illegal activities to the OIG Hotline (you can remain anonymous):

Web: www.amtrakoig.gov/hotline

Phone: 800-468-5469

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