

**GAO**

Report to the Chairman, Subcommittee  
on Transportation and Related Agencies,  
Committee on Appropriations, House of  
Representatives

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July 1997

# TRANSPORTATION INFRASTRUCTURE

## Progress on and Challenges to Central Artery/Tunnel Project's Costs and Financing



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**Resources, Community, and  
Economic Development Division**

B-275370

July 17, 1997

The Honorable Frank R. Wolf  
Chairman, Subcommittee on Transportation  
and Related Agencies  
Committee on Appropriations  
House of Representatives

Dear Mr. Chairman:

The Central Artery/Tunnel project in Boston, Massachusetts—one of the largest, most complex, and most expensive highway construction projects ever undertaken—is well under way, with contracts worth nearly \$8 billion either completed or awarded. Construction began in 1991, and the project is expected to be substantially completed in December 2004. As of February 1997, federal funds accounted for \$4.7 billion (about 82 percent) of the \$5.7 billion obligated for the project, with the remainder coming from state funds. The level of future federal funding for the project depends upon the amount provided under the next federal highway program authorization; the current authorization expires on September 30, 1997.

In response to your concerns about the need to monitor the costs of this project and the uncertainties associated with its financing, we evaluated (1) the estimated cost of the project and (2) Massachusetts' plans for financing it.

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**Results in Brief**

As of March 1997, Massachusetts had estimated that the total cost of the Central Artery/Tunnel project was \$10.8 billion—\$400 million more than the \$10.4 billion estimate contained in its September 1996 finance plan. This increase occurred primarily because of growth in the project's estimated construction costs. Costs actually increased by more than \$400 million, but the state assumed in its \$10.8 billion cost estimate that the increases would be partly offset by savings, primarily from the project's owner-controlled insurance program. However, the state also assumed that most of these insurance savings—\$778 million—would not be realized until 2017, long after construction is completed. As a result, the project's total funding needs through 2004, when the project is scheduled to be completed, are \$11.6 billion—\$778 million more than the project's \$10.8 billion cost estimate. Furthermore, uncertainties exist about whether

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the savings projected by the state in the insurance program will be achieved.

The state's \$10.8 billion cost estimate also depends on achieving the aggressive cost containment goals established for the project. While the state has made some progress in its cost containment program, officials acknowledge that it has ambitious goals that will be difficult to meet. If current trends in the project's construction costs continue, further cost increases of some magnitude seem likely. As a result, the project's cost could increase between \$100 million and \$500 million.

Massachusetts has implemented a plan to finance its share of the project's cost, including a strategy to finance funding shortfalls. The state's December 1996 feasibility study identified a funding gap of \$1.8 billion to \$2.3 billion between fiscal years 1998 and 2002, depending on the federal funds provided. However, unless additional savings are implemented, this shortfall could be about \$450 million higher than expected because the feasibility study does not include cost increases that occurred through March 1997.<sup>1</sup> Furthermore, funding shortfalls could be an additional \$100 million to \$500 million more if the state does not meet its cost containment goals for construction.

To finance the shortfalls, the state plans to borrow \$1.7 billion through a combination of revenue bonds issued by the Massachusetts Turnpike Authority and grant anticipation notes—short-term notes issued by the state to borrow against future federal funds—as authorized by legislation passed in 1997. However, this plan may be insufficient to meet the project's financing needs because it substantially covers the funding shortfalls only under the best case funding scenario modeled in the feasibility study. In addition, while the financial markets will decide whether the use of grant anticipation notes is feasible, uncertainties exist about the use of these notes because the amount proposed by Massachusetts is unprecedented and relies on borrowing against federal funds that may not be authorized until after the next federal highway authorization expires, sometime around 2003. If Massachusetts' plan to address shortfalls is not sufficient, the state may have to borrow additional funds. This additional borrowing could make it difficult to stay within the state's limits on the issuance of new debt. The state imposed these limits on itself to constrain the growth of state debt in order to improve its credit ratings.

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<sup>1</sup>As noted above, the amount of cost increases was greater than the \$400 million increase in the state's estimate for the project's total cost because increases have been partially offset with savings, and most of the savings attributable to the project's insurance program will not be realized until 2017.

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## Background

The Central Artery/Tunnel project, an Interstate Highway System project in Boston, Massachusetts, will build or reconstruct about 7.5 miles of urban highways—about half of them underground. As shown in figure 1, the project will (1) extend Interstate 90 east, mostly in tunnels, through South Boston, under Boston Harbor (through the Ted Williams Tunnel), and to East Boston and Logan International Airport; (2) replace the Central Artery—an elevated portion of Interstate 93 through downtown Boston—with an underground roadway; and (3) replace the I-93 bridge over the Charles River.

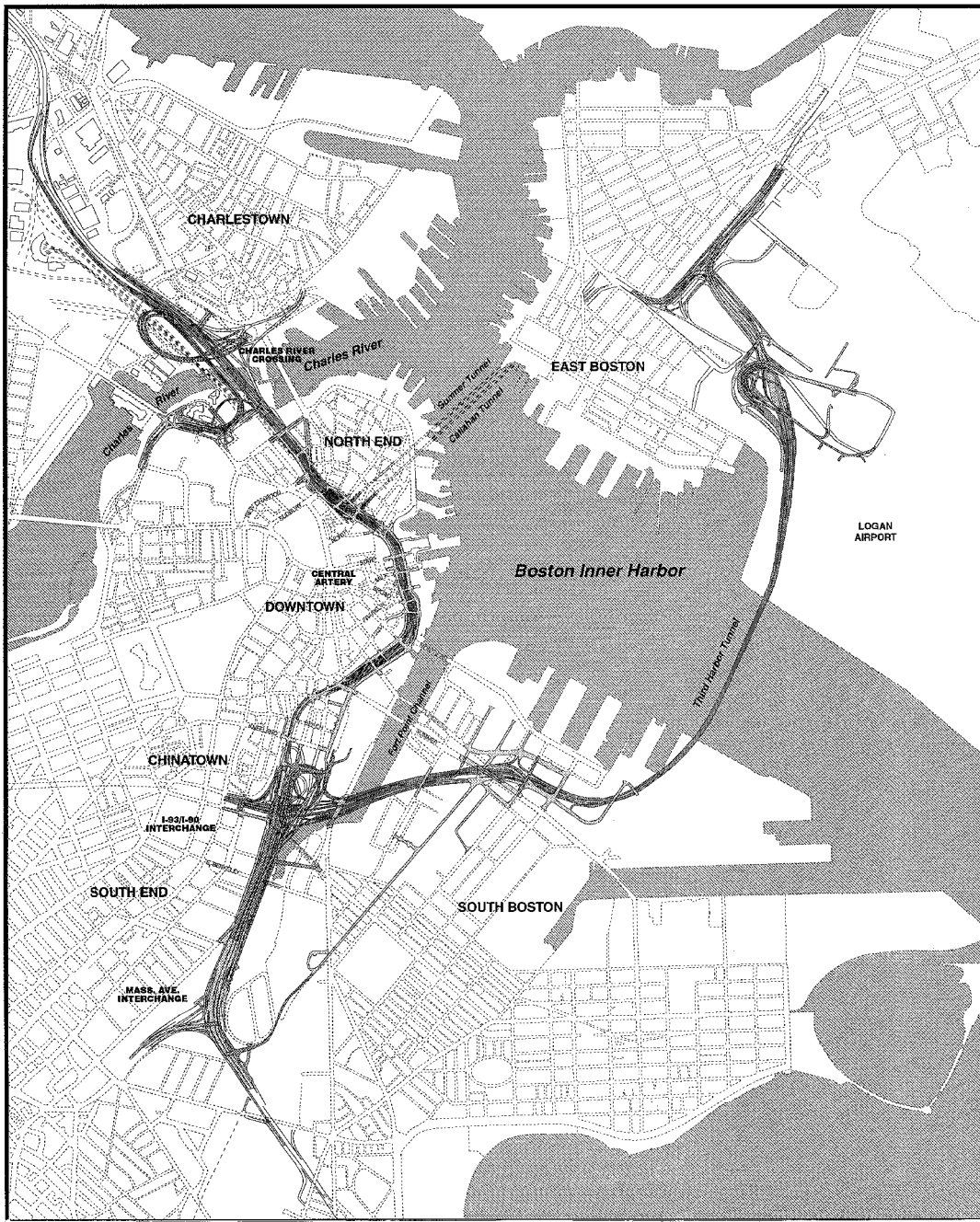
The project is currently managed by the Massachusetts Highway Department (MHD).<sup>2</sup> Day-to-day design and construction activities are managed by a management consultant—a joint venture of Bechtel/Parsons Brinckerhoff—under contract with MHD. Federal funds are authorized under the Intermodal Surface Transportation Efficiency Act of 1991, which expires on September 30, 1997. The Federal Highway Administration (FHWA) approves and oversees the expenditure of the project's federal funds. For example, FHWA reviews the project's design plans and construction specifications and determines whether they meet applicable safety and quality standards and are eligible for federal funding.

Massachusetts periodically prepares finance plans detailing the remaining estimated cost of the project and the sources of funds the state plans to use to finance this cost. Since March 1996, the state has also prepared monthly project management reports. These reports, which present the estimated cost of the project on the basis of current costs and savings, are used to identify trends, manage the project on a total-cost basis, and monitor the progress of cost containment goals. In 1995 the Secretary of Transportation announced that FHWA would require states to prepare finance plans for federally assisted highway projects with an estimated total cost of \$1 billion or more, and FHWA has requested that Massachusetts prepare a plan annually or more frequently if events warrant. FHWA has no requirements for states to prepare total cost estimates for projects nor standards for how such estimates should be prepared.

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<sup>2</sup>The Massachusetts Turnpike Authority will assume ownership and management of the Central Artery/Tunnel project under a state law approved in Mar. 1997. The Authority and MHD are currently drafting an agreement delineating the roles, responsibilities, and terms of an eventual transfer.

Figure 1: Map of the Central Artery/Tunnel Project



Source: Massachusetts Highway Department.

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In December 1996, the state released a study (referred to as the feasibility study) addressing options for financing the state's share of the Central Artery/Tunnel project. In March 1997, a state law conveyed ownership of certain roadways and tunnels in downtown Boston, including those comprising much of the Central Artery/Tunnel project, to the Massachusetts Turnpike Authority and authorized the Authority to issue revenue bonds to help finance the project's construction and other costs. To provide further financing for the project, Massachusetts' May 1997 transportation bond bill authorized the state to issue short-term notes to be repaid with future federal funding.

During the last 12 months, the project has progressed toward completion at a faster rate than at any time in its history. In June 1997, MHD estimated that about 90 percent of the project was designed and more than 26 percent was constructed. The Ted Williams Tunnel opened to commercial traffic in 1995 and to passenger vehicles on a limited basis during 1996. The tunnel's permanent connections to the Massachusetts Turnpike are under construction and will open to all traffic in 2001 (see fig. 2).

Figure 2: The Ted Williams Tunnel



Source: MHD.



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As shown in figure 3, work on the tunnels that will replace the above-ground Central Artery is under way, with 6 of the 10 principal construction contracts awarded as of April 1997. The northbound and southbound Central Artery tunnels are scheduled to open to traffic in 2002 and 2003, respectively. After 2002, the pace of construction should slow considerably, as demolition of the elevated Central Artery, surface restoration, and street improvements take place. The project is scheduled to be substantially completed in December 2004.

As of March 1, 1997, \$5.7 billion had been obligated for the Central Artery/Tunnel project. Contracts for a larger amount—\$7.7 billion—had been completed or awarded as of March 31, 1997. To accomplish this level of contract activity, Massachusetts has made extensive use of advance construction, which allows it to begin many projects concurrently by obligating federal funds over several years. For example, although \$2.1 billion in contracts will be awarded in fiscal year 1997, only \$180 million will be obligated, consistent with FHWA's regulations. The remainder will be obligated over a 5-year period. Appendix I provides additional information on federal and state obligations for the Central Artery/Tunnel project and Massachusetts' use of advance construction.

Figure 3: Construction of the Underground Central Artery



Source: MHD.

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## State Estimates the Total Cost at \$10.8 Billion, but Funding Needs Are Higher

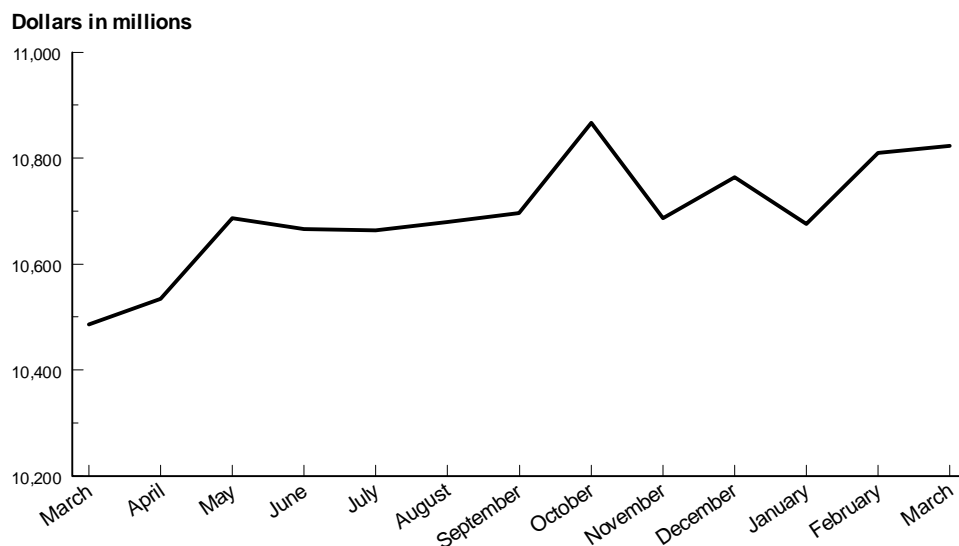
As of March 1997, Massachusetts estimated that the total cost of the Central Artery/Tunnel project was \$10.8 billion—\$400 million more than the \$10.4 billion estimate contained in the state's most recent finance plan of September 1996. Increases occurred primarily in the project's estimated construction costs and were partly offset by savings. However, a substantial portion of the estimated savings are expected to come from the project's insurance program but will not be realized until long after construction is completed. Because these savings will not be available as the project incurs costs, the project will require total funding of \$11.6 billion through 2004, when it is scheduled to be completed. Furthermore, uncertainties exist as to whether the insurance savings projected by the state will be achieved.

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## Rising Costs Partially Offset by Savings

Overall, Massachusetts estimates that the cost of the Central Artery/Tunnel project has increased from about \$10.4 billion to \$10.8 billion over the last 12 months. Although the estimated cost actually increased by more than this amount, the state has found savings to partially offset this growth.

**Figure 4: Central Artery/Tunnel Cost Estimates, March 1996 to March 1997**



Notes: These figures have been adjusted to exclude credits for "air rights"—proceeds the state expects to receive from developing property acquired for the project's construction that will become excess at the end of the project. At FHWA's request, MHD's September 1996 finance plan changed how air rights were treated in earlier plans from a credit to the cost of the project to a source of revenue. However, the state's monthly project management reports through March 1997 continued to treat air rights as a credit to the project's cost. Project officials stated that future finance plans would continue the practice of treating air rights as a revenue source rather than a cost credit, and in May 1997, the Central Artery/Tunnel project manager told us that the state planned to revise its monthly cost-reporting system to treat air rights in the same fashion.

According to the September 1996 finance plan, the project's \$10.4 billion total cost estimate reflected project costs as of June 1996 and included recognition of future insurance savings totaling about \$226 million. Those savings were taken in November 1996.

Source: GAO's analysis of MHD's data.

**The largest increase in the project's estimated cost was for construction—the largest cost component of the Central Artery/Tunnel project. Between March 1996 and March 1997, estimated construction costs increased by about \$500 million, a 7.4-percent increase. While a number of factors contributed to the increased construction costs, about \$278 million occurred because bids on construction contracts were higher than projected. Most of these increases occurred on two large-dollar contracts—totaling nearly \$800 million—awarded in January and**

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March 1997. On one contract for segments of the tunnels to replace the above-ground Central Artery, state and FHWA officials stated that several factors contributed to the increase, including the complexity of integrating the new tunnel with the existing Boston Harbor tunnels while sustaining traffic, and noise mitigation measures that were costlier than expected. On another contract for tunneling for the I-90 underground connection to the Ted Williams Tunnel at Fort Point Channel, state and FHWA officials said that complex tunneling techniques never before used to this extent in the United States contributed to higher-than-expected bids. State and FHWA officials expressed confidence that the circumstances experienced on these two contracts were unique and that remaining contracts would not experience the same types of cost increases.

Two other categories of cost increases resulted in about \$230 million in additional construction costs. First, estimates of construction costs prepared during the design phase were more than the amount budgeted. Second, actual and estimated costs of changes to awarded construction contracts exceeded the amount budgeted for such changes.

The project has also achieved savings to offset cost increases; the largest savings have come in the project's owner-controlled insurance program. While contractors in a construction project traditionally purchase their own insurance and add the cost of their premiums to the contract, the Central Artery/Tunnel project purchased "wrap-up" insurance that provides workers' compensation insurance, general liability insurance, and other coverage for all contractors and subcontractors working on the project. Wrap-up insurance programs generally result in lower total insurance costs for a number of reasons, including the elimination of redundant insurance services and profit margins associated with the purchase of insurance by each contractor and subcontractor.

Since December 1994, the estimated cost of the insurance program has been reduced by over \$700 million. These estimated savings result from, among other things, a better-than-expected safety record and lower-than-expected accident claims on the project. Most of the estimated insurance savings are attributable to anticipated refunds which, along with other insurance related funds, will earn interest until all claims are paid, at which time these remaining funds will be returned to MHD. Project officials estimate that MHD will receive these proceeds, including refunds and related interest, in 2017—13 years after construction is completed. According to project officials, standard industry practice is to assume that claims are paid over a 13-year period after the project is completed.

## Project's Total Funding Needs Are \$11.6 Billion

The state's \$10.8 billion estimate of the project's total cost includes a credit to the cost of the project of \$778 million, which represents the receipt of insurance proceeds. However, these funds will not be available until 2017 and thus cannot be used to help pay for the cost of the project. As a result, the project's total funding needs during the period of construction will be \$778 million greater than the \$10.8 billion total cost estimate, or about \$11.6 billion. (See table 1.) FHWA stated that while the insurance proceeds would not be available for use in meeting the Central Artery/Tunnel project's costs, they could be used for other federally eligible transportation projects in Massachusetts.

**Table 1: Central Artery/Tunnel Project's Total Cost and Funding Needs**

Dollars in millions			
Obligations and cost	Data as of September 1996 finance plan	Data as of March 1997	Change
Obligations through fiscal year 1996	\$5,169 (estimated)	\$5,081 (actual)	(\$88)
Estimated obligations fiscal year 1997 through 2004	5,979	6,523	544
<b>Total estimated obligations through 2004</b>	<b>\$11,148</b>	<b>\$11,604</b>	<b>\$456</b>
<b>Insurance proceeds in 2017</b>	<b>722</b>	<b>778</b>	<b>56</b>
<b>Total (net) project cost</b>	<b>\$10,426</b>	<b>\$10,826</b>	<b>\$400</b>

Source: MHD.

## Insurance Savings May Not Be Realized

Although Massachusetts' cost estimate assumes that insurance proceeds will be received in 2017, the insurance program may not continue in its present form until that time. According to industry representatives and officials on other transportation projects with wrap-up insurance policies, most workers' compensation claims are filed within 2 years after construction ends. Industry and project officials also said that within 18 months to 5 years after construction ends, the liability for satisfying any further claims is frequently transferred to a reinsurer or another party who manages the claims until they are paid. The state estimates that workers' compensation and general liability claims payments after 2006 will total about \$28 million; however, it also assumes that the insurance trust accounts will carry over \$300 million until 2017 and accumulate interest during that period. In particular, the state credits to the cost of the project about \$226 million, representing interest accumulated between 2006 and 2017. However if the liability were sold to a reinsurer, these proceeds

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would be largely unavailable to the project, and the total estimated cost of the project would rise from the state's \$10.8 billion estimate to about \$11.1 billion.

In commenting on a draft of this report, MHD stated that it has decided at this time not to use a reinsurer and to retain the funds until 2017. However, it noted that this decision would need to be made in consultation with FHWA in about 2004, nearer to the end of the project.

In addition, the state's assumptions have other uncertainties. Estimated savings from the project's insurance program stem in part from estimates of lower-than-expected accidents and claims. In 1992, the cost estimates of the workers' compensation component of the wrap-up insurance program were established on the basis of a 75-percent "loss ratio;" that is, the value of claims paid was expected to total 75 percent of premiums. However, over the last 4 years, the actual loss ratio has been about 30 percent. As a result, the project has reduced its assumptions about the insurance loss ratio from 75 percent to 55 percent. Although experience has been somewhat limited to date on wrap-up insurance for large construction projects, project officials stated that large programs tend to end with loss ratios of 45 percent to 55 percent.

While only future experience will demonstrate whether the state's accident and claims assumptions are correct, it should be noted that the Central Artery/Tunnel project is only 26-percent complete, and the project is beginning 6 years of underground tunneling in the congested downtown area. This construction will be complex; it will, for example, require maintaining highway traffic on the existing Central Artery's elevated structure directly above tunnel construction and maintaining rail and subway operations below and near tunnel construction. In the coming years, the number of contractor personnel and the level of construction activity in the downtown area will greatly increase. If loss claims were to increase, and if the loss ratio were 65 percent, rather than the 55 percent assumed in the cost estimate, the project's cost would increase by about \$56 million.

Project officials stated that the project has completed 18 months of the 6-year construction schedule and that accidents and claims have decreased during that time. Officials expressed confidence that the state's assumptions will hold and believed that if that is the case, it may be possible to reduce the estimated cost of the insurance program even more.

## Construction Costs Could Increase Further If Cost Containment Goals Are Not Realized

While MHD is aggressively pursuing its cost containment goals, the project is not meeting these goals. Unless additional offsetting savings are found, it will be difficult to avoid increases in the cost of the project. We estimate that these increases could add between about \$100 million and \$500 million to the cost of the project if current trends continue.

In 1995, MHD established an overall goal of holding the cost of changes to the project's construction contracts to 10.7 percent or less of the contracts' estimated bid prices. This overall goal was based on two assumptions: (1) holding cost growth on contracts awarded after November 1994 to an average of 7 percent of the awarded bid price and (2) holding cost growth on contracts awarded through November 1994 to about 25 percent of the awarded bid price—the average amount that was being experienced on those contracts at that time. Cost increases above MHD's goals have occurred on contracts awarded both before and after November 1994. As of December 1, 1996, cost growth on awarded contracts totaled 17.4 percent of contract bid prices, rather than the project's 10.7-percent goal, as shown in table 2.

**Table 2: Percentage Increase in Costs on Awarded Central Artery/Tunnel Project Construction Contracts, as of December 1, 1996**

Dollars in millions				
Contracts	Number of contracts	Cumulative awarded contract price	Percent cost growth goal	Percent actual cost growth
Contracts awarded through November 1994	36	\$1,108	25.0	28.4
Contracts awarded after November 1994	28	1,571	7.0	9.7
<b>All awarded contracts</b>	<b>64</b>	<b>\$2,678</b>	<b>10.7</b>	<b>17.4</b>

Source: GAO's analysis of MHD's data.

As table 2 shows, the contracts awarded after November 1994 have experienced much lower growth in costs (9.7 percent) than the contracts awarded through November 1994 (28.4 percent). MHD and FHWA officials believe that the cost performance of contracts issued after November 1994 is a more meaningful indicator of the effect of MHD's cost containment efforts than the performance of contracts issued before that date because MHD did not have a cost containment program in effect until 1995. As of December 1, 1996, 49 construction contracts had not been awarded. If those contracts experience the same 9.7-percent cost growth as the



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contracts awarded after November 1994 (instead of the 7-percent goal), the cost of the project would increase by about \$100 million.

However, it may not be possible to limit the growth in contract costs to the 9.7 percent experienced on the 28 contracts awarded after November 1994 because those contracts have not been in effect for very long. As of December 1, 1996, only 5 of the 28 contracts, valued at less than \$10 million, had been completed, while 11 contracts (accounting for about 70 percent of the \$1.6 billion cost of the 28 contracts) were less than 25-percent complete. Nevertheless, almost one-half of the 28 contracts had already exceeded the 7-percent cost containment goal. For example, one contract that MHD awarded in 1995 to construct the underground Central Artery is 22-percent complete and will not be finished until 2000. However, MHD estimates that this contract had already exceeded its bid price by 13 percent as of December 1, 1996.

While we cannot predict the total cost increase on all construction contracts, we believe that it will be difficult to meet the goals set in 1995 and to avoid increases in the cost of the project. For example, assuming that awarded construction contracts experience no further cost growth after December 1, 1996, costs for the remaining 49 unawarded contracts could increase by only 5.7 percent if the cost containment goal of 10.7 percent is to be met. If, however, the unawarded contracts experience the same 17.4-percent growth experienced by the awarded contracts, as shown in table 2, the total cost of the project would rise by about \$500 million.

State officials agreed that the project has ambitious cost containment goals that will be difficult to meet. However, they stated that the existing goals are essential to provide designers and contractors with an incentive to control contract changes and restrict cost growth. They believe that any relaxation of the goals would deprive state managers of the leverage needed to control costs and that ultimately such a relaxation would become a self-fulfilling prophecy, resulting in even further cost increases.

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### MHD Is Taking Steps to Reduce Costs, but Options for More Savings May Be Limited

Since our May 1996 report,<sup>3</sup> MHD has analyzed the reasons for cost increases and developed strategies to reduce the cost of construction contracts. For example, MHD now requires firms bidding on Central Artery/Tunnel construction contracts to include a bid of the cost and time

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<sup>3</sup>Transportation Infrastructure: Central Artery/Tunnel Project Faces Continued Financial Uncertainties (GAO/RCED-96-131, May 10, 1996).

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associated with removing unanticipated underground obstructions. MHD officials stated that this estimate allows them to obtain a competitive price at the outset of a contract for unknown factors rather than face negotiated change orders and delays after a contract is awarded. The project's construction managers stated that, although it is still too early to assess measurable results, some of these initiatives could reduce the cost and number of contract changes, primarily by avoiding delays in these contracts.

MHD has also made progress in reducing estimated construction costs during the design process. During the design of a highway, bridge, or tunnel, preliminary design concepts are refined into detailed plans and specifications, and preliminary construction cost estimates can increase. MHD stated in 1995 that preliminary cost estimates, on average, increased 18 percent. To control cost increases, MHD initiated a "design-to-cost" program in 1995. Under this program, contractors design their segments of the project within an agreed baseline budget for construction costs. The design contractor must periodically submit progress estimates as well as a final design. If the estimate in any of the submittals exceeds the agreed baseline budget (assuming that MHD has not requested changes to the agreed baseline budget), the contractor is required to redesign the project—at the contractor's own expense—so that the estimated construction cost falls within the baseline budget.

The design-to-cost initiative is intended to result in no growth in the estimated cost of construction during the design phase. An MHD analysis shows that, as of April 1997, estimated construction costs under this program have increased in total by about 4 percent, compared with the historical 18-percent rate.<sup>4</sup> As of April 1997, MHD required design contractors to find cost reductions on four contracts to reduce estimated cost increases by \$60 million. The Deputy Project Manager for Design stated that contractors' plans have resulted in reductions of about \$44 million of this \$60 million and that he is confident that the remainder will be recouped as well.

While MHD has made some progress in containing costs, options for further savings may be limited. For example, as of March 1997, only four principal construction contracts—two for the Route 1A interchange at Logan International Airport and two for the underground Central Artery—were

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<sup>4</sup>Experience with the design-to-cost program has been limited to date because, as of Nov. 1996, only 10 contracts had progressed through the final design point in the design-to-cost program. Eight of these 10 contracts had their original baseline budgets established late in the design process. Generally, cost growth would be more likely to occur earlier in the design process.

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early in the design stage, where greater opportunities exist for significant scope reductions or changes. MHD is redesigning the scope of one of the Route 1A interchange contracts to reduce its costs by about \$56 million.

With limited opportunity to reduce the project's scope, the state is looking for other ways to cut costs. For example, MHD has proposed that the amount currently budgeted for inflation in unawarded contracts be reduced from 3.35 percent to 2.35 percent, on the basis of recent inflation rates in the Boston area. This lower inflation rate would reduce estimated project costs by about \$140 million. FHWA officials are reviewing this proposal. MHD is also reducing the estimated cost of the project by moving certain costs out of the project's budget. For example, in 1996, MHD reassigned about \$20 million in costs from the Central Artery/Tunnel project to the statewide road and bridge program. These costs were associated with project contracts for temporary structures at the Charles River and the replacement of an existing bridge connecting to the project's Interstate 90/93 interchange. Project officials stated that these costs were more appropriately reflected as statewide transportation expenditures because they would have been incurred whether or not the Central Artery/Tunnel project was built. Officials said that they are considering assigning some other project costs to the statewide program.

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## State's Plan for Financing Project May Be Insufficient

While the level of future federal funding is uncertain until the federal highway program is reauthorized, Massachusetts' plan for financing the state's share of the Central Artery/Tunnel project identified funding shortfalls. To address these shortfalls, the state has implemented a plan to borrow \$1.7 billion through Massachusetts Turnpike Authority revenue bonds backed by toll increases and short-term grant anticipation notes to be repaid with future federal funds. However, this plan may not be sufficient because (1) shortfalls may be greater than modeled in the state's plan and (2) while the financial markets will decide whether the use of grant anticipation notes is feasible, uncertainties exist about the use of these notes because the amount proposed by Massachusetts is unprecedented and relies on borrowing against federal funds that may not be authorized until the next federal highway authorization expires, sometime around 2003.

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## Funding Shortfalls Exist Under All Scenarios

The state's December 1996 feasibility study identified a project funding shortfall of \$1.8 billion to \$2.3 billion from fiscal years 1998 through 2002. The study referred to this as the "interim" shortfall because the project's

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needs outstrip sources of funds during the accelerated construction years. According to the study, from fiscal years 2003 to 2005, construction needs subside and a funding surplus of \$1.6 billion reduces the project's "total" funding shortfall to about \$200 million to \$700 million.

The shortfall ranges are due to uncertainty about future federal funding. While the feasibility study modeled two potential federal funding scenarios, shortfalls could be greater or smaller under other possible federal funding scenarios. For example, under several of the reauthorization proposals introduced in the Congress during 1997, the project's funding shortfalls in fiscal years 1998 through 2002 would range from \$1.6 billion to \$2.5 billion. Details of the various funding scenarios are discussed in appendix II.

In addition to federal funding, the feasibility study identified the state sources of funding that were expected as of December 1, 1996. These sources included (1) about \$1 billion in state funds to match federal funds and to pay for the portions of the project funded exclusively by the state; (2) a \$200 million contribution from the Massachusetts Port Authority; and (3) \$400 million in state bonds, which was authorized in 1995, and which will be assumed by the Massachusetts Turnpike Authority. The feasibility study's assumptions are shown in table 3.

**Table 3: Feasibility Study Analysis of Central Artery/Tunnel Project Funding, as of December 1, 1996 (Fiscal Years 1997 Through 2005)**

Dollars in millions			
Obligations and sources of financing	Fiscal years 1997-02 "interim shortfall"	Fiscal years 2003-05 "surplus"	Fiscal years 1997-2005 "total shortfall"
Obligations	\$5,696	\$283	\$5,979
<b>Sources of financing</b>			
Federal			
- High-funding scenario	2,435	675	3,110
- Low-funding scenario	1,916	675	2,591
State bonds	800	240	1,040
Mass. Port Authority	200	0	200
Mass. Turnpike Authority	100	0	100
State bonds to be assumed by Mass. Turnpike Authority	400	0	400
<b>Total sources of financing</b>			
- High-funding scenario	<b>3,935</b>	<b>915</b>	<b>4,850</b>
- Low-funding scenario	<b>3,416</b>	<b>915</b>	<b>4,331</b>
<b>Proceeds</b>			
Air rights proceeds	0	255	255
Insurance proceeds	0	722	722
<b>Total proceeds</b>	<b>0</b>	<b>\$977</b>	<b>\$977</b>
<b>Surplus/(shortfall)</b>			
- High-funding scenario	<b>(\$1,761)</b>	<b>\$1,609</b>	<b>(\$152)</b>
- Low-funding scenario	<b>(\$2,280)</b>	<b>\$1,609</b>	<b>(\$671)</b>

Note: This table excludes a \$50 million contribution from the Massachusetts Bay Transportation Authority, which was included in the feasibility study's high-funding scenario but is not being pursued by the project at this time.

Source: GAO's analysis of the feasibility study.

## Funding Shortfalls Could Be Greater Than Anticipated

The funding shortfalls could be higher than expected because the shortfall estimate in the feasibility study reflects the obligation estimate used in the September 1996 finance plan. Since that time, construction and other cost increases have raised the project's funding requirements by about \$450 million through March 1997. While some of those increases were offset by insurance savings in the total cost estimate, most insurance savings will not be realized until 2017, long after the project is completed. Thus, the cost increases that occur during construction will still need to be funded. Furthermore, shortfalls may be \$100 million to \$500 million greater if the state's cost containment goals for construction are not met.

State officials acknowledged that these goals are ambitious and that it will be difficult to meet them.

The state could reduce the shortfall through additional savings. However, the \$1.6 billion surplus between fiscal years 2003 and 2005, which the feasibility study used to calculate the total shortfall through 2005, will be smaller than reported. According to the September 1996 finance plan, the surplus funds accrued between fiscal years 2003 and 2005 will be moved to the peak construction period through short-term financing. However, as shown in table 2, nearly \$1 billion of this surplus is revenues from the development of air rights—proceeds the state expects to receive from developing property acquired for the project's construction that will become excess at the end of the project—and savings from the project's insurance program. As mentioned earlier, the state assumes that the insurance savings will not be realized until 2017. In addition, air rights revenues will be largely unavailable to the project until after 2005. This is because about half the property expected to be available will not be ready for development until late 2004.

In commenting on a draft of this report, the state confirmed that insurance and air rights proceeds would not be used to help finance the project's debt and stated that future finance plans would clarify that proceeds are expected to be received after 2005. FHWA stated that while these proceeds will not be available to meet the Central Artery/Tunnel project's funding needs, they could be used for other transportation-related purposes in Massachusetts.

### Plan for Addressing Shortfalls Is in Place, but It May Not Be Sufficient

State legislation enacted in 1997 authorized \$1.7 billion in state borrowing to address the funding shortfalls identified in the December 1996 feasibility study. Specifically, under legislation enacted in March and May of 1997, the following will occur:

- The Massachusetts Turnpike Authority will contribute \$700 million by December 31, 1998, through revenue bonds backed by toll increases. On July 1, 1997, the Authority Board voted to increase one-way tolls on the Sumner, Callahan, and Ted Williams Tunnels—effective July 10, 1997—including increased tolls on passenger vehicles from \$1 to \$2. An

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additional \$1 increase is planned in 2002 on these facilities as well as increases on the Massachusetts Turnpike's Boston Extension.<sup>5</sup>

- The state will issue up to \$1 billion in short-term grant anticipation notes, to be repaid with future federal highway funds.

The authorized funding will substantially meet the funding shortfall identified by the feasibility study under the "high" federal funding scenario. However, additional state funding will be needed if federal funding is lower than the high funding scenario. Furthermore, the state's funding will not cover the \$450 million in additional funding needs through March 1997 discussed previously or the additional funding that may be needed if MHD does not meet its goals to contain construction costs.

The financial markets will ultimately decide whether the use of grant anticipation notes is feasible. There is limited precedent for the use of such notes, especially in amounts of this magnitude. While grant anticipation notes have been used in other states, they have been issued for a substantially lower amount.<sup>6</sup>

In addition, using grant anticipation notes to borrow \$1 billion will require Massachusetts to borrow against federal funds that may not be authorized until after the next federal highway authorization expires, sometime around 2003. The feasibility study assumed that all federal funds for the project from fiscal years 1998 through 2002 would be needed to pay for the project and that funding would not exceed costs until 2003. The study further assumed that, during the surplus fiscal years from 2003 through 2005, the project would have \$283 million in funding requirements and receive about \$675 million in federal funds. (See table 3.) Therefore, in order to borrow \$1 billion or more in grant anticipation notes, Massachusetts would have to repay the notes using federal funds beyond the likely 5- to 6-year duration of the next highway authorization bill and beyond the scheduled end of the project.

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<sup>5</sup>According to the Turnpike Authority's chief financial officer, the enacted and planned toll increases will be sufficient for the Authority to make the required \$700 million contribution and assume the \$400 million in state bonds authorized in 1995 (see table 2). The state has also proposed an additional \$300 million contribution from the Turnpike Authority at the end of the project, if necessary. According to the chief financial officer, if this contribution is needed, the Turnpike Authority may have to raise tolls again.

<sup>6</sup>For example, Pennsylvania issued \$450 million in short-term notes over a 5-year period, from 1986 to 1991. The notes—from 3 to 6 years in duration—were issued as general obligation notes and backed by the full faith and credit of the state. Pennsylvania used its Interstate Construction Program funds to pay the notes and state legislation gave these principal payments first priority in the state's use of those funds.

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According to officials at three bond rating agencies, uncertainties associated with the availability and timing of future federal funds means that the financial markets will almost certainly demand some form of state backup in the event that federal funds are not available to repay the notes. This demand may entail some difficulties for the state. Massachusetts already has one of the highest debt burdens in the nation and has put both statutory and administrative measures in place, such as limits on the issuance of new debt, to constrain the growth of state debt in order to improve its credit ratings. These limits restrict the state's flexibility in issuing additional debt, and Massachusetts has emphasized the need to stay within those limits as part of any solution to financing the Central Artery/Tunnel project. For example, the Massachusetts Deputy Secretary for Administration and Finance told us that the state is attempting to structure an issuance of grant anticipation notes that would not require it to guarantee the notes with the full faith and credit of the state. State legislation also exempts the notes from the state's statutory debt ceiling.

According to state officials, there is no contingency plan for financing the project should the combination of revenue bonds and grant anticipation notes prove insufficient. However, the feasibility study described several potential sources of state funds, including additional state borrowing—subject to the debt ceiling—or further toll increases. The study also described other sources, such as gasoline taxes, taxes generated from increased property values, and the diversion of state funds from other projects, but explained that these options do not appear feasible or practical.

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## Conclusions

The Central Artery/Tunnel project faces numerous and complex challenges in constructing tunnels through a densely populated downtown urban area, within a few feet of buildings and subway tunnels, while keeping automobile and rail traffic flowing. In addition to these technical obstacles, Massachusetts faces the challenges of controlling costs and paying for the project.

Massachusetts is to be commended for establishing aggressive management goals and for making progress in controlling the cost of the Central Artery/Tunnel project. By managing the project on a total-cost basis, monitoring progress against that goal, developing action plans to control costs and schedules, and holding contractors accountable for cost increases, the state has shown that it is serious about cost containment.



Despite the state's efforts, the project's estimated costs have been rising, and opportunities to produce more savings may be limited. To maintain total project costs at about \$11 billion, the state would not only have to meet but exceed its aggressive cost containment goals. State officials acknowledged that these are ambitious goals that will be difficult to meet. If current trends continue, further cost increases of some magnitude seem likely. We support the project's adhering to its cost containment goals as a means of holding down costs. But these goals form the basis for the state's cost estimate and its finance plan. Decoupling the existing goals from the project's cost estimate and revising that estimate to more closely reflect the project's actual experience with its cost containment program would provide a more realistic basis for securing needed financing.

While future federal funding remains an uncertainty, Massachusetts has made progress in the last 12 months by restructuring its public institutions to bring the resources of the state to bear on financing the project. However, a number of challenges remain to be overcome before a plan that is sufficient to meet the financing needs of the Central Artery/Tunnel project is in place. While Massachusetts could borrow additional funds to meet funding shortfalls, it will be constrained by its statutory and administrative debt limits. These constraints on the state, the magnitude of the shortfalls, and the likelihood of additional costs of some magnitude are likely to require Massachusetts to reassess its financing plans, particularly once federal funding for the next 5 to 6 years is established through reauthorization of the federal highway program.

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## Recommendations

To provide a more realistic estimate of the cost and financing of the Central Artery/Tunnel project, we recommend that the Secretary of Transportation direct the Administrator, Federal Highway Administration, when FHWA requests the Commonwealth of Massachusetts to prepare a new Central Artery/Tunnel project finance plan, to include in that plan (1) a revised estimate of the project's costs and funding needs that more closely reflects the state's actual experience with its cost containment program and (2) a contingency plan for financing the project if costs increase further or if the sources of financing are not sufficient.

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## Agency Comments and Our Evaluation

We provided copies of a draft of this report to the Department of Transportation and the Massachusetts Executive Office of Transportation and Construction. We met with FHWA officials, including the Associate Administrator for Program Development, and with state officials, including

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the Chief Financial Officer of the Massachusetts Turnpike Authority and officials from MHD's Central Artery/Tunnel Project Office.

While FHWA and the state generally agreed with the information contained in this report, they disagreed with the estimate in our draft report that the project would cost \$11.1 billion and our recommendation to revise the estimate of the project's cost to more closely reflect the state's actual experience with its cost containment program. Specifically, FHWA and the state contended that (1) while FHWA has no standards for states to follow in preparing estimates for total project costs, they believed that all costs incurred and proceeds generated by the project should be considered in calculating "total cost" regardless of when they occur, even years after the project is complete and (2) most of the state's estimates of insurance savings affect only the total cost estimate and do not reduce the project's total funding needs. We revised the report to present the state's total cost estimate of \$10.8 billion and to delineate the differences between the total cost estimate and the project's total funding needs of \$11.6 billion. We continue to believe, however, that uncertainties remain over whether the insurance savings projected by the state for 2017 will be realized.

FHWA and the state also disagreed with our recommendation to revise the project's cost estimate to more closely reflect the state's actual experience with its cost containment program. While recognizing the difficulty of meeting the goals, they stated that decoupling the goals from the estimate as we recommend would send the wrong message to the project's contractors and deprive state managers of the leverage needed to control costs. While we commend Massachusetts for adhering to its aggressive cost containment goals, we also believe that the state's cost estimate—an estimate that forms the basis for financing the project when significant shortfalls are projected—should recognize reasonably expected costs based on current available information about the state's experience with its cost containment program. We have therefore retained our recommendation.

Both FHWA and Massachusetts offered technical comments to clarify and amplify the information presented in the draft report. We have incorporated those comments throughout the report as appropriate. In addition, MHD provided a letter presenting additional views on the progress of its cost and schedule containment initiatives (see app. IV).

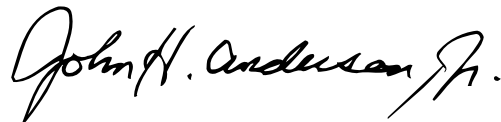
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The scope and methodology used in preparing this report are presented in appendix III. We performed our work from November 1996 through June 1997 in accordance with generally accepted government auditing standards, but we did not independently verify the data obtained from MHD's database.

As arranged with your office, unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days after the date of this letter. At that time, we will send copies to the cognizant congressional committees; the Secretary of Transportation; the Administrator, Federal Highway Administration; and other interested parties. We will also make copies available to others on request.

Please call me at (202) 512-2834 if you or your staff have any questions. Major contributors to this report are listed in appendix V.

Sincerely yours,

A handwritten signature in black ink that reads "John H. Anderson, Jr." The signature is written in a cursive style with a large initial 'J' and a distinct 'A'.

John H. Anderson, Jr.  
Director, Transportation Issues

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**Abbreviations**

GAO	General Accounting Office
FHWA	Federal Highway Administration
ISTEA	Intermodal Surface Transportation Efficiency Act
MHD	Massachusetts Highway Department

# Obligations and the Use of Advance Construction on the Central Artery/Tunnel Project

As of March 1, 1997, \$5.7 billion had been obligated for the Central Artery/Tunnel project. About \$4.7 billion, or 82.5 percent, of those funds came from federal sources, while \$1 billion, or 17.5 percent, came from state sources, as shown in table I.1.

**Table I.1: Federal and State Obligations for the Central Artery/Tunnel Project**

Dollars in millions	
Source of funds	Obligations
<b>Federal funds</b>	
Interstate Construction Program	\$3,940
National Highway System Program	254
Bridge Program	181
Surface Transportation Program	283
Other programs	60
<b>Total federal funds</b>	<b>\$4,718</b>
<b>Total state funds</b>	<b>\$1,003</b>
<b>Total obligations</b>	<b>\$5,720</b>

Note: Numbers may not add due to rounding.

Source: Central Artery/Tunnel Project Office, MHD.

## Advance Construction

As of April 1, 1997, about \$8 billion in contracts for the Central Artery/Tunnel project had either been awarded or had been completed. To accomplish this rate of contract activity, Massachusetts made extensive use of advance construction, particularly during fiscal year 1997. Advance construction allows a state to begin many more projects concurrently than under a traditionally financed highway project. With advance construction, under FHWA's July 1995 regulations, a state may begin a project and obligate federal funds in phases over the several years required to build the project.

Massachusetts plans to award 28 contracts totaling \$4.2 billion in this manner. As of April 1, 1997, about \$3 billion of this \$4.2 billion had been awarded. As table I.2 shows, the bulk of this contracting activity occurred in fiscal year 1997. In fact, during a 6-month period between October 1996 and March 1997, nearly \$1.7 billion in contracts were awarded.

**Appendix I  
Obligations and the Use of Advance  
Construction on the Central Artery/Tunnel  
Project**

**Table I.2: Central Artery/Tunnel Project Advance Construction Plan (as of September 1996 Finance Plan)**

Dollars in millions

Advance construction contracts awarded			Obligations by fiscal year								
Fiscal year	Number	Total value	1995-96	1997	1998	1999	2000	2001	2002	2003	2004
1995	3	\$451	\$152	\$299							
1996	5	740	69	104	\$221	\$209	\$101	\$28	\$5	\$3	
1997	10	2,136		180	496	676	587	187	10		
1998	6	511			24	96	159	110	59	44	\$19
1999	1	93				3	8	21	30	26	5
2000	2	185					3	20	71	81	10
2001	1	115						42	60	13	
<b>Total</b>	<b>28</b>	<b>\$4,231</b>	<b>\$221</b>	<b>\$583</b>	<b>\$741</b>	<b>\$984</b>	<b>\$858</b>	<b>\$408</b>	<b>\$234</b>	<b>\$166</b>	<b>\$34</b>

Note: Numbers may not add due to rounding.

Source: GAO's analysis of MHD's data.

According to MHD, this advance construction strategy will save \$1 billion in the total cost of the project and 5 years in construction time. In May 1996, we reported that while Massachusetts was relying on future funding to pay the bills, substantial funding shortfalls existed in those years and Massachusetts did not have a plan for financing the project.<sup>7</sup> Since that time the Federal Highway Administration has required the state to provide either full funding or to provide state legislative contract authorizations for the full value of all awarded contracts. Massachusetts has since authorized state legislative contract authorizations for the full value of all awarded contracts, although it plans to rely on federal funds, Massachusetts Turnpike Authority bonds, and other sources as the ultimate source of financing.

<sup>7</sup>Transportation Infrastructure: Central Artery/Tunnel Project Faces Continued Financial Uncertainties (GAO/RCED-96-131, May 10, 1996)

# Future Federal Funding Scenarios for the Central Artery/Tunnel Project

Future federal funding for Massachusetts will not be resolved until the Congress reauthorizes the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991. However, we modeled six funding scenarios on the basis of several current reauthorization proposals and assumptions in the state's December 1996 feasibility study to estimate the apportionments that Massachusetts could receive under the reauthorized federal aid highway program.<sup>8</sup> Estimated annual apportionments under all scenarios are lower than Massachusetts' average annual apportionments of \$831 million under ISTEA. These scenarios are the following:

- The ISTEA Integrity Restoration Act (H.R. 674), or STEP 21, assumes that each state will receive at least 95 percent of the revenues it contributes to the Highway Trust Fund. Since Massachusetts has traditionally received more in federal highway aid than it pays in federal highway taxes, this proposal reduces federal funding to an average of \$393 million per year.
- The Surface Transportation Authorization and Regulatory Streamlining Act (S. 532), or STARS 2000, assumes that Massachusetts' average annual apportionments will be reduced to \$432 million.
- The "low" funding scenario in the feasibility study reduces Massachusetts' apportionments immediately to \$450 million per year.
- The "high" funding scenario in the feasibility study assumes that Massachusetts' apportionments will be reduced incrementally from \$600 million per year from fiscal years 1998 to 2001 to \$450 million per year thereafter.
- The administration's proposal for the National Economic Crossroads Transportation Efficiency Act of 1997 (S. 468), or NEXTEA, retains the ISTEA framework and assumes that Massachusetts will receive an average of \$580 million per year, ranging from \$650 million in 1998 to about \$560 million in 2000 and beyond.
- The ISTEA Reauthorization Act of 1997 (S. 586), or ISTEA Works, also retains the basic structure of ISTEA and assumes that average annual apportionments for Massachusetts would equal \$656 million.<sup>9</sup>

Table II.1 shows the effect of each scenario on the financing for the Central Artery/Tunnel project. In modeling the scenarios for fiscal years 1997 to 2005, we used the assumptions contained in the feasibility study, including obligation and state funding amounts, air rights proceeds, and savings from the insurance program as shown in table 2. All scenarios

<sup>8</sup>We selected reauthorization proposals for which FHWA estimates of average annual state apportionments were available.

<sup>9</sup>FHWA also provided state-by-state estimates for H.R. 1609. Under this bill, Massachusetts' average annual apportionments would be the same as those under S. 586, or \$656 million per year.



**Appendix II  
 Future Federal Funding Scenarios for the  
 Central Artery/Tunnel Project**

assume that the state is authorized to obligate the entire amount of its apportionment each year. In practice, states' obligational authority has historically been less than the amount of the apportionment.

**Table II.1: Comparison of Various Federal Funding Scenarios for Massachusetts and the Effect on Funding for the Central Artery/Tunnel Project**

<b>Scenario</b>	<b>Average annual Massachusetts apportionment</b>	<b>Interim surplus (shortfall)</b>	<b>Total surplus (shortfall)</b>
STEP 21	\$393	(\$2,460)	(\$936)
STARS 2000	\$432	(\$2,338)	(\$756)
Feasibility study "low"	\$450	(\$2,280)	(\$671)
Feasibility study "high"	fiscal year 1998-01 \$600 after fiscal year 2001 \$450	(\$1,761)	(\$152)
NEXTEA	\$580	(\$1,860)	(\$60)
ISTEA Reauthorization Act	\$656	(\$1,637)	\$281

Source: GAO's analysis of FHWA and state data.

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# Scope and Methodology

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To determine the estimated costs of the Central Artery/Tunnel project, we analyzed the monthly management reports issued by MHD from March 1996 to March 1997 and selected cost data on construction contracts as of December 1, 1996. We met with MHD and management consultant officials to discuss the monthly reports and to determine the basis for MHD's cost containment goals for the design and construction phases and MHD's methodology for measuring progress against those goals. We also discussed our methodology for measuring MHD's progress against its cost containment goals with project officials, who generally agreed with our methodology. We discussed cost containment strategies and progress with officials at MHD's Central Artery/Tunnel project office and obtained and analyzed related documentation.

In assessing MHD's success in achieving its cost containment goals, we included scope changes in our calculation of growth in construction costs because these costs represent actual increases or decreases to total construction costs that if removed would not be accounted for in our analysis of growth in construction costs. We excluded the total value of scope transfers from our calculation of changes to awarded construction contract values. However, we captured this value as a separate line item under unawarded contracts in order to account for this source of cost increases within the total costs of the construction contracts.<sup>10</sup>

To determine savings from the wrap-up insurance program, we reviewed insurance cost estimates from the inception of the program through March 1997 and discussed the program and its estimated savings with FHWA, MHD, and project officials, as well as the project's insurance broker Sheppard, Riley, Coughlin. We also discussed various aspects of wrap-up insurance programs with industry officials at Liberty Mutual, Sedgwick James, Inc., the Workers' Compensation Rating and Inspection Bureau of Massachusetts, and officials at other transportation projects with similar insurance programs, including the Los Angeles County Metropolitan Transportation Authority, the Metropolitan Atlanta Rapid Transit Authority, the Washington Metropolitan Area Transit Authority, and the New Jersey Turnpike Authority.

To determine the Commonwealth of Massachusetts' plans for financing the project, we analyzed the September 1996 finance plan and the December 1996 feasibility study. We reviewed supporting documentation—including additional funding scenarios for which

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<sup>10</sup>According to project officials, the majority of scope transfers into awarded construction contracts initially came from unawarded construction contracts.

state-by-state estimates were available—and discussed financing issues with officials at FHWA’s headquarters in Washington, D.C., and at FHWA’s Massachusetts Division Office in Boston, Massachusetts; the state’s Executive Office of Administration and Finance; MHD’s Central Artery/Tunnel project office; the Massachusetts Port Authority; and the Massachusetts Turnpike Authority; and with rating agency officials at Moody’s Investors Service, Standard & Poor’s, and Fitch Investors Service, Inc., in New York. We also reviewed Massachusetts’ statewide transportation plan and discussed it with officials at FHWA and at the state’s Executive Office of Transportation and Construction in Boston. In addition, we obtained and reviewed state legislation and discussed it with officials at the state legislature, the Massachusetts Turnpike Authority, and the Massachusetts Port Authority.

We performed our work from November 1996 through June 1997 in accordance with generally accepted government auditing standards. However, we did not independently verify the reliability of MHD’s data in its Oracle database, which we used to analyze MHD’s progress in achieving its cost containment goals.

# Letter From the Massachusetts Highway Department



Massachusetts Highway Department  
Central Artery/Tunnel

July 8, 1997

John Anderson  
Director of Transportation Issues  
General Accounting Office  
441 G Street NW  
Washington, D.C. 20545

Dear Mr. Anderson:

Thank you for the opportunity to provide additional comments on your Draft Report regarding the Central Artery/Tunnel Project, following a productive working meeting with your staff in June. I want to supplement your report with a discussion of the project's continuing cost and schedule containment initiatives. Because of these initiatives we are holding our scheduled 2004 completion date in the face of the enormous challenges -- in our case, unprecedented challenges -- inherent in working in the heart of a major city.

Controlling schedule is one of our most potent cost-control weapons. In the more than two years since developing our most recent Master Schedule, we have focused on mitigating the schedule impact of project changes. In the process we have identified 25 separate initiatives to preserve our I-90 opening schedule, and 65 initiatives to meet our I-93 schedule and project completion in 2004. The I-90 initiatives -- including revised staging and sequencing and use of innovative technologies -- have successfully held the original December 2001 opening date, despite project changes that could have meant several months of delay.

In the I-93 corridor, we have successfully held the 2004 completion date despite a major construction resequencing change in the Dewey Square Tunnel area. The key elements of the I-93 program are to begin demolishing the existing elevated highway earlier than was planned two years ago, and striving to open the northbound lanes of the underground expressway earlier than originally anticipated.

In the context of this ongoing schedule containment process, we continue to implement a series of programs and initiatives designed for early identification and resolution of cost issues. Top managers meet bi-weekly to target critical issues regarding cost and schedule. Our value engineering program has resulted in \$478 million in savings during design, and continues to produce cost saving ideas now that we are in construction. This aggressive cost and schedule control program will continue throughout the rest of the project. Moreover, design will be virtually complete by the end of this year, with 85 percent of the construction cost committed and vendors contractually obligated to meet their budgets and schedules and the project's

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**Appendix IV  
Letter From the Massachusetts Highway  
Department**

John Anderson  
Page 2

milestones. We are reaching the peak of construction on a stronger footing than ever before in terms of meeting our cost and schedule goals, which makes our financial projections solid and reliable.

Thank you once again for the opportunity to add these comments to your report.

Sincerely,

MASSACHUSETTS HIGHWAY DEPARTMENT

  
Peter M. Zuk  
Project Director

# Major Contributors to This Report

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**Resources,  
Community, and  
Economic  
Development Division  
Washington, D.C.**

Stephen M. Brown  
Steve Cohen  
Gary L. Jones  
Phyllis F. Scheinberg  
Sara Vermillion

---

**Boston,  
Massachusetts**

Linda Choy  
Teresa Dee  
Lena Natola

---

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