

GAO

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

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TRANSPORTATION INFRASTRUCTURE

Central Artery/Tunnel Project Faces Continued Financial Uncertainties



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Resources, Community, and
Economic Development Division

B-271688

May 10, 1996

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

Dear Mr. Chairman:

At a cost of over \$1 billion a mile, the Central Artery/Tunnel project—an Interstate Highway System project in Boston, Massachusetts—is one of the largest, most complex, and most expensive highway construction projects ever undertaken. Although \$4.7 billion in federal and state funds has been obligated, this sum is less than half of the more than \$10 billion that will likely be needed to complete the project. To date, about 86 percent of the funding for the Central Artery/Tunnel project has come from federal sources.

In response to your concerns about the increasing costs of this project and the uncertainties associated with its financing, we evaluated (1) the estimated total cost of the Central Artery/Tunnel project and (2) the Commonwealth of Massachusetts' plans for financing it.

Results in Brief

Massachusetts' official estimate of the total cost of the Central Artery/Tunnel project, as updated in January 1996, is \$7.8 billion. However, that estimate excludes over \$1 billion in costs that were included in previous estimates and does not account for the effects of inflation. Our analysis shows that the project's costs would total \$10.4 billion if the excluded costs and the effects of inflation were considered. Moreover, the \$10.4 billion assumes that the state will be 100 percent successful in meeting the aggressive cost containment goals established in 1995 for the project. It is too early to tell whether the state will meet all of its cost containment goals, and the results to date have been mixed. Closely monitoring the project's cost performance is important because the total costs could exceed \$11 billion if historic patterns of cost growth, rather than the project's cost containment goals, prevail.

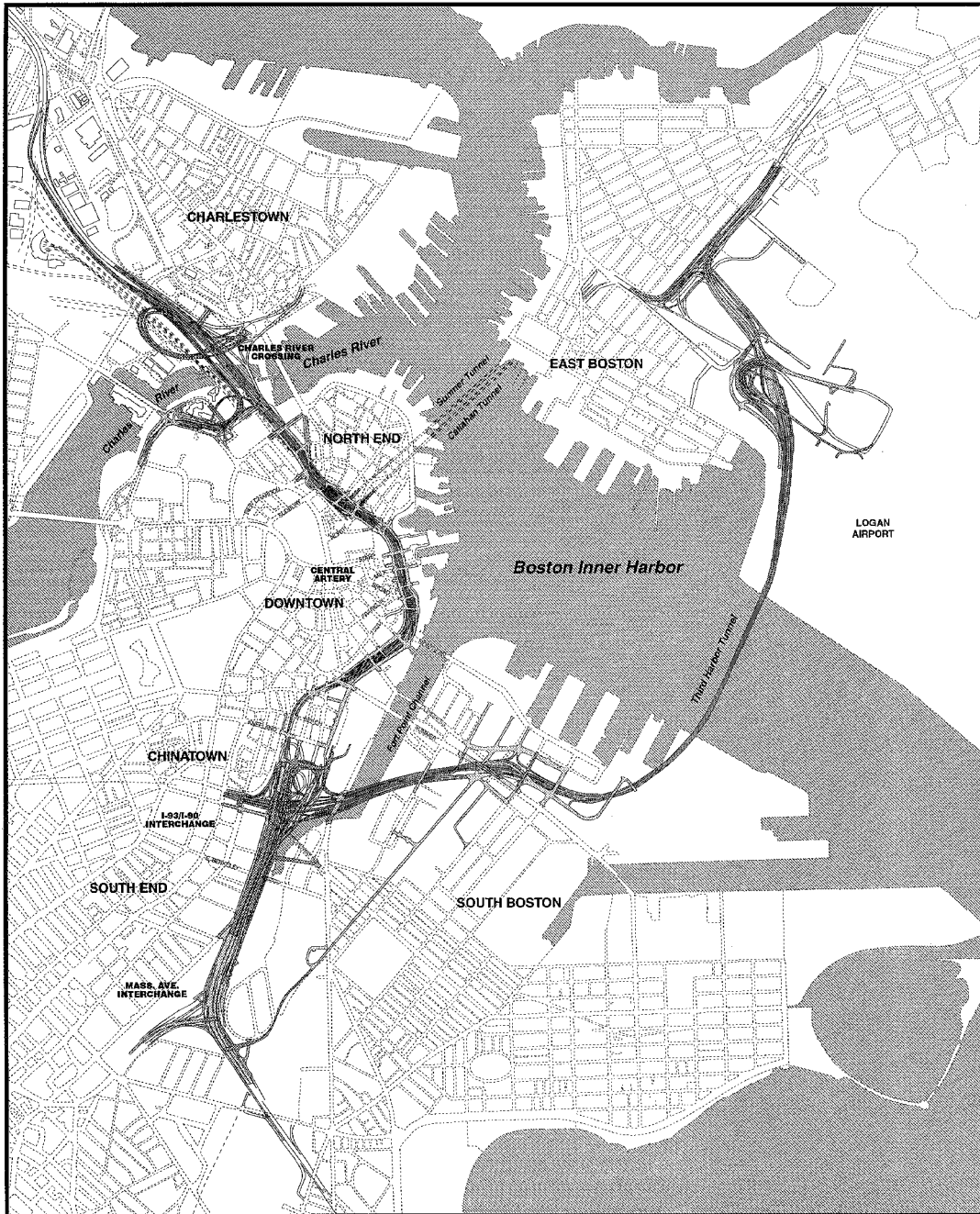
Massachusetts plans to finance the Central Artery/Tunnel project with federal and state funds; however, this funding may not be sufficient to complete the project as scheduled by 2004. Massachusetts plans, subject

to the approval of the Secretary of Transportation, to award over \$3 billion in contracts in fiscal years 1996 and 1997 and to pay for the contracts over a period of several years. However, when the bills come due, funding may not be available to pay them. The state's finance plan has identified funding shortfalls of up to \$1.9 billion—shortfalls that could increase if the project does not meet its cost containment goals. While Massachusetts has identified several options for covering the shortfalls, it has not yet selected a plan. If the Secretary is to approve these contracts, it is critical that a plan be developed to ensure that funding is available to pay the bills.

Background

The Central Artery/Tunnel project will build or reconstruct about 7.5 miles of urban highways in Boston—about half of them underground. The project will (1) extend Interstate 90 east, mostly in tunnels, through South Boston, under Boston Harbor (through the Ted Williams Tunnel) 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. Tunneling through a densely populated urban area like downtown Boston will entail numerous and complex construction challenges. The Central Artery/Tunnel project will burrow close to buildings and subway tunnels, often with only a few feet to spare. The project's construction plans include underpinning the existing elevated Central Artery structure so that it continues to carry traffic—as well as supporting the railroad tracks leading into the city's main train station—while underground highways are built directly below.

Figure 1: Map of the Central Artery/Tunnel Project



Source: Massachusetts Highway Department.

The project is managed by the Massachusetts Highway Department (MHD). Day-to-day design and construction activities are managed by a management consultant—a joint venture of Bechtel/Parsons Brinckerhoff, under contract with MHD. The Federal Highway Administration (FHWA) approves and oversees the expenditure of 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.

Construction began in 1991. The project attained its first major construction milestone with the opening of the Ted Williams Tunnel to commercial traffic in December 1995. As of April 1996, the project was about 70 percent designed and 20 percent constructed; construction of the underground Central Artery had begun, and a revised Charles River crossing was being designed. The project is scheduled to be completed in phases by 2004.

As of March 1, 1996, \$4.7 billion had been obligated for the Central Artery/Tunnel project—\$4.1 billion in federal funds (86 percent) and about \$650 million in state funds (14 percent). Most federal funding has come from the Interstate Construction Program, which was established in 1956 to provide the states with federal funding to cover 90 percent of the costs of building the Interstate Highway System. MHD estimates that federal funding will, when the project is completed, cover between 74 and 86 percent of the project’s total costs depending on the amount of federal funds provided for the project in the future. Appendix I provides more detailed information on the Central Artery/Tunnel project’s obligations to date.

State’s Official Estimate Understates Project’s Total Costs

According to our analysis, the estimated cost of the Central Artery/Tunnel project is \$10.4 billion when costs that were excluded from the official estimate and the effects of inflation are considered. In addition, costs could exceed the \$10.4 billion estimate if the state does not meet the aggressive cost containment goals established for the project.

Excluded Costs and Inflation

MHD’s \$7.8 billion cost estimate, released in July 1995 and updated in January 1996, excludes over \$1 billion in costs for the project. According to MHD, the estimate includes the costs of building the tunnels, viaducts, and surface roadways that make up the Central Artery/Tunnel project but excludes about \$600 million for items that are not needed to directly

design and construct tunnels, viaducts, and surface roadways. These items include surface restoration, environmental mitigation, relocation of Amtrak and commuter rail tracks, toll booths, and maintenance facilities. In addition, the estimate excludes \$255 million in costs incurred prior to 1991. MHD believes that excluding these costs is appropriate because, in 1991, FHWA directed the state to prepare its estimate on the basis of the remaining costs only. Finally, the estimate excludes costs that could be paid for by state agencies other than MHD. For example, MHD has excluded the \$180 million cost of designing and constructing the interchange at Logan International Airport because it believes this interchange primarily benefits airport users and thus should be funded by the Massachusetts Port Authority, the airport operator. MHD has also excluded over \$200 million in costs for connecting roadways to Massachusetts Turnpike Authority facilities, such as the Sumner and Callahan tunnels, and believes the Authority should contribute to these costs. The costs excluded from the official estimate were included in cost estimates in the past.

To begin addressing the issue of contributions from other state agencies, Massachusetts enacted legislation in 1995 requiring that the Massachusetts Port Authority and Massachusetts Turnpike Authority each contribute \$100 million toward the costs of the Ted Williams Tunnel and authorizing \$400 million in additional state bonds that will be used for the project (see apps. III and IV). The legislation also directed state agencies to conduct a study to determine the amount of any additional contributions from the Massachusetts Port and Turnpike authorities. The results of this study are due in December 1996.

MHD's cost estimate also does not account for the effects of inflation. Rather, the estimate represents expenditures incurred prior to August 1994 at their value in the year they were incurred and expenditures expected after that date in August 1994 dollars. MHD officials stated that excluding the effects of inflation from the cost estimate was consistent with prior practices and federal requirements for estimating costs for the Interstate Construction Program.¹ FHWA and MHD agreed to use a future inflation rate of 3.35 percent a year as the basis for the funding scenarios contained in the project's finance plan. Including the costs of inflation on awarded and unawarded contracts would increase the \$7.8 billion estimate by about \$1.2 billion. MHD officials stated that inflation has been below 3.35 percent for the last 2 years and that they would seek FHWA's concurrence for using an inflation assumption of between 2 percent and 2.75 percent in the near

¹Since the final Interstate Cost Estimates were prepared in 1991, FHWA has not had a requirement for the states to prepare cost estimates for projects, nor guidelines for how such estimates should be prepared.

future. Our analysis of MHD's cost estimate is discussed further in appendix II.

Cost Containment

When costs that were excluded from the official estimate and the effects of inflation are considered, the estimated cost of the Central Artery/Tunnel project is \$10.4 billion. However, this cost figure also assumes that the state will meet the aggressive cost containment goals established for the design and construction phases of the Central Artery/Tunnel project. The costs of the project could increase further if these goals are not met—if historic patterns of cost growth prevail, the project's total costs could exceed \$11 billion.

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. As we reported in June 1995, although officials estimated that these refinements had, on average, increased the project's construction cost estimates by 18 percent, MHD's cost estimate assumed zero cost growth during the design of future construction projects.² To control increases in construction costs during the design process, MHD initiated a "design-to-cost" program in March 1995. FHWA and MHD officials stated that this is the first time such a program has been used in the state's highway program.

Under the design-to-cost program, contractors design their segments of the project within an agreed construction cost baseline budget. The design contractor is required to submit periodic interim products 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 contract), 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. Project officials and contractors told us that the program has generally made them much more cost-conscious. They said this has been particularly helpful on a large project like the Central Artery/Tunnel project in which multiple state, local, and federal agencies review—and can influence—the project's designs.

Experience with this design-to-cost program has been limited, and the results have been mixed. As of April 30, 1996, only 5 of the project's 15 awarded design contracts included agreed baseline budgets. One design contractor had not agreed to participate in the program because MHD and

²Central Artery/Tunnel Project (GAO/RCED-95-213R, June 2, 1995)

the contractor could not agree on a baseline budget.³ On one design contract, for the construction of viaducts and ramps north of the Charles River, the contractor was able to reduce an initial cost estimate by over \$22 million by reducing the number of ramps and taking other measures. However on another contract, for the construction of part of a tunnel in the underground Central Artery, the contractor's estimate of the construction costs for two segments exceeded the \$427 million baseline budget for those two segments by about \$50 million. This increase occurred, in part, because the contractor identified additional reinforcement and structural steel requirements in the tunnel. MHD's management consultant is still evaluating the contractor's submittal and has asked the contractor to prepare an offsetting savings plan, which has not yet been completed. It is uncertain at this time whether it will be possible to reduce the estimated construction costs in line with the baseline budget.

For construction, MHD's cost estimate budgets a 7-percent contingency for cost growth on future construction projects. This rate is far lower than the 16-percent average cost growth on completed contracts and nearly 20-percent average cost growth on ongoing contracts that we reported in June 1995. MHD does not have a formal program or specific strategies for holding construction cost growth to 7 percent. Officials told us they expect to limit cost growth to 7 percent by closely monitoring proposed contract change orders.

While FHWA supports the state's cost containment initiatives, it has questioned using these assumptions as the basis for the project's cost estimate. For example, FHWA raised concern about the lack of specific strategies for holding construction cost growth to 7 percent. FHWA recommended that the state budget construction cost growth contingencies of 10 percent rather than 7 percent during the construction phase, and 10 percent rather than 0 percent during the design phase. MHD declined to accept these recommendations; FHWA officials have stated that they cannot compel the state to change its cost estimate for the project. Since January 1996, MHD has prepared a monthly management report at FHWA's request to monitor and compare the project's cost performance against the official estimate.

³Of the nine remaining awarded design contracts, eight included a design-to-cost contract provision, and MHD hopes to conclude negotiations for a baseline budget in the next 6 months. The other contract was being negotiated. Project officials said they plan to include all remaining seven unawarded design contracts in the design-to-cost program.

We reported in June 1995 that if the construction cost estimates for the remaining design contracts increased at the historic 18-percent rate, the project's total costs could increase by over \$300 million. If the cost estimates for the remaining construction contracts increased at a rate of 16 to 20 percent, the project's total costs could increase by more than \$400 million. While only experience will show by how much costs actually increase during the design and construction phases, the project still faces several risks that could increase its costs. For example, much of the construction work remaining on the project is underground tunneling. FHWA and state officials agree this work is inherently risky, given the uncertainties of underground work in a densely populated urban area. In addition to technical challenges, MHD's plan for a new Charles River crossing faces a lawsuit from the city of Cambridge and others that alleges, among other things, that MHD and FHWA did not comply with legal requirements for preserving parklands.⁴ While the suit is pending, the risks of schedule delays and cost increases remain.

Project Faces Financing Uncertainties

The available state and federal funding may not be sufficient to complete the Central Artery/Tunnel project as scheduled by 2004. Although the amount of federal funding that will be available in fiscal year 1998 and beyond is not known, shortfalls exist under the funding scenarios modeled in Massachusetts' February 1996 finance plan. While the finance plan discusses options for addressing the shortfall, none has been selected to date. The state faces challenges to both maintain its commitment to its statewide road and bridge improvement program and build the Central Artery/Tunnel project.

Future Federal Funding Is Uncertain

To date, most federal funding for the Central Artery/Tunnel project has come from the Interstate Construction Program, the program begun in 1956 to build the Interstate Highway System (see app. I). Generally, this program provided 90 percent of the cost of Interstate projects to the states; this funding was based on the states' estimates of the costs of completing those projects. The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) authorized federal highway program spending through fiscal year 1997 and provided the final Interstate Construction Program apportionments, including \$2.55 billion for Massachusetts to complete the Central Artery/Tunnel project. Massachusetts received its final Interstate Construction Program

⁴23 U.S.C. §138.

apportionment in fiscal year 1995,⁵ after the state expends its funds for this program, it will draw on its funds for other federal highway programs—such as the National Highway System Program and the Bridge Program—to finance both the Central Artery/Tunnel project and the statewide highway and bridge improvement program. The funding that will be available to Massachusetts after fiscal year 1997 will not be known until the Congress reauthorizes the federal-aid highway program.

In December 1994, MHD prepared a finance plan at FHWA's request. This plan stated that the available funding from federal and other sources would be sufficient to complete the project by 2004. However, as we reported in June 1995, this plan understated the project's costs and projected future federal funding levels that might not be realized in the current budget environment. Furthermore, the plan assumed that Massachusetts would gain access to over \$700 million of its federal highway program's unobligated balance—funding that is not available under current law.⁶ We reported that under other financing scenarios, Massachusetts could experience a shortfall of over \$2 billion. In June 1995, FHWA asked MHD to prepare a new finance plan and, among other things, include all costs for the project excluded from the cost estimate, include the effects of inflation, and model more conservative estimates of future federal funding.

MHD's revised plan, dated February 1996, provides three scenarios for the project's cost and three scenarios for future funding. On the cost side, the plan does not provide a total figure for the project; instead, remaining costs are presented. Under the "middle cost" scenario, which MHD considers the best approximation of the project's future needs, the remaining costs of the project, from July 1995 to completion, would be \$5.8 billion. According to our analysis, this would equate to a total cost for the project of \$10.2 billion. FHWA asked MHD to use the middle cost scenario as the basis for the funding scenarios in the finance plan.

The finance plan models three possible future funding scenarios:

⁵Although Massachusetts will not receive new Interstate Construction Program apportionments in fiscal years 1996 and 1997, an equity adjustment provision of ISTEA—hold harmless—preserves the states' historic funding. For Massachusetts and other states, this adjustment includes recognition of past Interstate Construction Program funding.

⁶In the federal highway program, an "unobligated balance" is the difference between the money a state is apportioned and the money it is allowed to obligate. Subject to certain limitations, these balances can build up over time. MHD's December 1994 finance plan assumed that to finance the project between October 1994 and September 1997, Massachusetts would spend the \$707 million that had built up over time, as well as the funds apportioned to it each year. However, current law contains no provision that would allow Massachusetts to spend its unobligated balances in this manner.

- The “low funding” scenario assumes that Massachusetts will receive the same share of the Federal Highway Trust Fund’s receipts that it has received since fiscal year 1992, adjusted to exclude the influence of the \$2.55 billion Interstate Construction Program apportionment that it received under ISTEA. FHWA asked MHD to model this funding scenario in December 1995. MHD believes this scenario is unnecessarily conservative because it would substantially reduce Massachusetts’ current federal funding at a time when Highway Trust Fund receipts are increasing. Under this scenario, Massachusetts would receive about \$450 million a year.
- The “middle funding” scenario assumes that Massachusetts will receive \$657 million in fiscal years 1998, 1999, and 2000 and \$450 million a year thereafter. It also assumes that Massachusetts will gain access to \$638 million of its unobligated balance. MHD considers this the most likely future funding scenario.
- The “high funding” scenario assumes that Massachusetts will receive the same funding each year after fiscal year 1997 that it expects to receive in fiscal year 1997—about \$730 million. This funding level would include recognition of Massachusetts’ Interstate Construction Program funding under ISTEA. The high funding scenario also assumes that Massachusetts will gain access to \$638 million of its unobligated balance.

Each scenario makes assumptions about how much federal and state funding will be made available for the Central Artery/Tunnel project and how much will go to other state transportation projects. Another possible federal funding scenario that FHWA originally asked Massachusetts to analyze but that was later excluded from the finance plan is the return-to-origin approach. Under this scenario, states’ contributions to the highway account of the Highway Trust Fund would be returned to them in the form of annual federal-aid highway apportionments. According to FHWA’s Office of Fiscal Services, between fiscal years 1998 and 2005, Massachusetts would receive an average of about \$395 million a year under a return-to-origin funding formula.⁷

⁷FHWA told us that Massachusetts would receive between \$370 million and \$415 million a year. FHWA’s range depends on what assumptions are made about Massachusetts’ share of the Highway Trust Fund’s receipts relative to other states’ shares. Massachusetts’ share has been declining in recent years, and the \$370 million figure assumes that the decline will continue at the current rate through 2005, while the \$415 million figure assumes that Massachusetts’ share will remain at its current level. The \$395 million figure represents the approximate average of the two estimates. MHD officials believe that FHWA’s methodology is flawed and that Massachusetts’ average contribution between 1998 and 2005 will be about \$463 million a year. The principal difference between the two estimates lies in the assumptions made about future growth in Highway Trust Fund receipts. FHWA uses a Department of the Treasury index, which estimates that future receipts will grow between 1.5 and 1.7 percent a year between 1998 and 2005, while MHD uses a figure of 3.5 percent. MHD’s figure represents the annual growth in vehicle miles traveled projected in the U.S. Department of Transportation’s 1993 biannual report on the condition and status of the nation’s highways and bridges.

Shortfalls Exist Under All Funding Options

Shortfalls in available funding exist between fiscal year 1996 and fiscal year 2000 or 2001 under all of the funding scenarios compared with the middle cost scenario in MHD's February 1996 finance plan. These shortfalls occur in large measure because of Massachusetts' plans to accelerate the project's construction and begin numerous projects within a short period of time. To accomplish this, Massachusetts plans to make extensive use of advance construction.

In a traditionally financed federal-aid highway project, all the funds needed for a contract are obligated at the start of a contract and then outlayed as the contractor's bills come in over the several years required to build the project. Advance construction allows a state to obtain federal approval to begin a project and to select a later fiscal year to obligate all the federal funds needed for the project. This approach allows a state to begin more projects in a single year than it could under the traditional financing approach.⁸ Under FHWA's advance construction regulations, revised in July 1995, a state using advance construction is no longer required to obligate all of the federal funds needed for a project in a single fiscal year. Rather, it can do so over a several-year period as needed to match the contractor's billings. This revision allows a state to begin many more projects concurrently and depend on future funding to pay the bills.

To meet the project's construction schedule, Massachusetts will use advance construction to begin numerous projects concurrently, most of these in fiscal years 1996 and 1997, and to pay for them over several years. Specifically, Massachusetts plans to award 26 contracts, totaling \$3.7 billion, in this manner—including contracts totaling over \$2 billion in fiscal year 1996. According to MHD, this strategy will save \$1 billion in total costs for the project and 5 years in construction time. The Secretary of Transportation must approve these contracts. According to the FHWA Administrator, the Secretary can do so only if the funding to pay the bills can reasonably be expected to be available.

However, when the bills come due, the needed funding may not be available. Under all of the funding scenarios in the finance plan (compared with the middle cost scenario), a shortfall in available funding would exist between fiscal year 1996 and fiscal year 2000 or 2001. For example, under the low funding scenario, the state would experience relatively small

⁸An advance construction project must meet the same federal requirements and be processed in the same manner as other federal-aid highway projects. However, the state cannot receive federal reimbursement until the project is formally converted to a federal-aid project. Until conversion occurs, FHWA's approval of an advance construction project does not constitute a commitment of federal funds.

shortfalls in fiscal years 1996 and 1997 of \$36 million and \$13 million, respectively. These shortfalls would grow to between \$510 million and \$746 million a year in fiscal years 1998 through 2000, for a cumulative shortfall of \$1.9 billion.

Table 1 shows the projected cumulative shortfalls that would occur under the finance plan scenarios, as well as the return-to-origin scenario. If the assumption that Massachusetts would gain access to its unobligated balances were removed from the middle funding and high funding scenarios, shortfalls of over \$1 billion would exist. While the projected shortfalls would be less if Massachusetts gained access to its unobligated balances, the state would still face funding shortfalls under all scenarios (see apps. III and IV).

Table 1: Cumulative Shortfalls Expected Under Various Central Artery/Tunnel Project Financing Scenarios: Fiscal Years 1996 Through 2000/2001

Dollars in millions		
Funding scenario	Shortfall—without access to unobligated balances	Shortfall—with access to unobligated balances
MHD's low funding	(\$1,912)	(\$1,274)
MHD's middle funding	(\$1,336)	(\$698)
MHD's high funding	(\$1,050)	(\$432)
Return-to-origin	(\$2,059)	(\$1,394)

Note 1: The cumulative shortfalls shown above are from fiscal year 1996 through fiscal year 2000 under the low and high funding scenarios and from fiscal year 1996 through fiscal year 2001 under the middle and return-to-origin scenarios. The reason the shortfall period is shorter under the low funding scenario than it is under the middle funding scenario is that the middle funding scenario assumes that the project will receive a smaller share of the total federal funds available to Massachusetts in fiscal year 2001 and later. This is because other state transportation projects are assumed to receive a greater share of the total available funds in those years under the middle funding scenario.

Note 2: The data in table 1 reflect our calculations based on data in MHD's finance plan. MHD's finance plan does not calculate the effect of the state's gaining access to the unobligated balances under the low funding scenario, compare the effects of gaining and not gaining access to the unobligated balances on annual surpluses or shortfalls, or measure annual surpluses and shortfalls under the high funding scenario.

Note 3: The return-to-origin scenario uses the figures developed by FHWA's Office of Fiscal Services and assumes that Massachusetts receives an average of \$395 million a year. MHD's return-to-origin analysis assumes that the state would receive \$463 million a year, which is not dissimilar to the low funding scenario. The return-to-origin scenario above also assumes the same level of state funding for the Central Artery/Tunnel project and the same distribution of federal funding between the project (71 percent) and the state's other transportation projects (29 percent) as are assumed for the low funding scenario.

Source: MHD's Central Artery/Tunnel project finance plan, February 1996; FHWA's Office of Fiscal Services; and our analysis.

Options for Addressing the Shortfall Have Not Been Selected

The state's finance plan identifies several options to address the shortfall, including short-term financing, extending the project's schedule, reducing the project's scope, and reducing the funding for other state transportation projects. MHD considers short-term financing to be the most viable option. For example:

- The state is studying the feasibility of establishing a metropolitan highway system in Boston. This approach could lead to the issuance of toll-financed revenue bonds to help finance the Central Artery/Tunnel project.
- MHD believes that funding received by the project in 2002 and later could be utilized. While less than \$200 million in new obligations will remain to be incurred by the end of fiscal year 2002, MHD's finance plan assumes that the Central Artery/Tunnel project will continue to receive one-half or more of the federal funds apportioned to Massachusetts between fiscal years 2002 and 2005. As a result, the finance plan shows that the project will build funding surpluses of as much \$1.8 billion during that period. According to MHD's finance plan, these funds could then be used to repay the debt incurred during the peak construction period in order to cover funding shortfalls.

Although another option would be to extend the completion of the project, MHD stated that extending the project's schedule by 4 to 12 years would increase the project's total costs from \$840 million to nearly \$2 billion. Another option, reducing the project's scope, would have significant adverse effects on traffic flow, air quality, and the project's schedule, according to MHD. Finally, the option of reducing funding for other state transportation projects would defer needed roadway and bridge repairs and reverse the state's commitment to a \$400 million annual statewide construction program, exclusive of the Central Artery/Tunnel project. As of May 1996, MHD had not selected a specific strategy for financing the shortfalls.

Even if Massachusetts does not choose to reduce the funding for other statewide transportation projects, the state faces significant challenges to both maintain its \$400 million annual statewide road and bridge improvement program and build the Central Artery/Tunnel project. Between fiscal year 1992 and fiscal year 1995, the federal contribution to the statewide road and bridge program was over \$200 million a year. MHD's finance plan shows that the federal contribution could be reduced to \$130 million a year by 1998. Massachusetts officials told us that the state is committed to maintaining a \$400 million annual statewide construction

program and would increase the state's funding in the future if necessary to make up for the reduction in federal funds.

Observations

Neither Massachusetts' official cost estimate for the Central Artery/Tunnel project nor the state's finance plan provides a complete picture of the project's total costs. Although Massachusetts plans to rely more on state resources to finance the project in the future, the source of the funding should not be a factor in deciding whether or not to report an expected expenditure as a cost. A full disclosure of the project's total costs provides the only basis for the Congress, state leaders, and the public to understand the extent of the federal and state investment in the Central Artery/Tunnel project. Full disclosure is also the only means of providing a consistent baseline for measuring changes in the cost of the project over time.

The state's cost containment initiatives demonstrate that the state is serious about containing costs on this project. However, assuming a 100-percent success rate for the state's cost containment initiatives may not be realistic. It allows little room for anything to go wrong, just at the time when the inherently risky underground tunneling work in downtown and South Boston is just beginning. Including larger contingencies in the official estimate, such as those recommended by FHWA, could provide a more realistic picture of the project's cost and a sounder basis for ensuring the availability of adequate financing. Closely monitoring the project's cost performance is essential to containing further cost increases and avoiding further uncertainties in the project's financing. Moreover, experiences with the cost containment program, both positive and negative, could be shared with other state highway agencies.

Massachusetts and FHWA have come a long way toward developing a credible and realistic finance plan since Massachusetts issued its first plan in December 1994. However, it is important that FHWA and the state agree on a plan for financing the substantial funding shortfalls expected under all potential funding scenarios as soon as possible. The seeds of this shortfall will, in large measure, be planted in this fiscal year and the next when the state begins extensively using advance construction contracting. If the Secretary is to approve these contracts, it is critical that a clear plan for financing the shortfalls be developed.

Agency Comments and Our Evaluation

We provided copies of a draft of this report to FHWA and the Commonwealth of Massachusetts for their review and comment. We met

with FHWA officials, including the Associate Administrator for Program Development, and with state officials, including the Secretary of the Executive Office of Transportation and Construction and MHD's Central Artery/Tunnel project manager. Both FHWA and Massachusetts offered technical comments to clarify and amplify the information presented in this report, and we have incorporated those comments throughout the report as appropriate. Massachusetts also provided us with a written statement presenting its views on the project's finances and other issues (see app. V).

FHWA agreed with the report's findings. FHWA stated that it agreed that the estimated total costs of the project are \$10.4 billion. In a letter to MHD dated April 30, 1996, sent after we obtained agency comments, FHWA stated that it expected Massachusetts to fully disclose the total estimated cost of the project in the next update of the finance plan, due on October 1, 1996.

To address projected funding shortfalls, FHWA stated that, as a condition of further approval of advance construction contracts, it would require Massachusetts to demonstrate that unencumbered bonding authority or third party financing exists to cover the entire amount of a contract at the time of the contract's award. This condition—also included in FHWA's letter to the state—will require that new legislation be enacted in Massachusetts in the near future to provide financing for the more than \$3 billion in contracts being issued in the current and next fiscal years. FHWA said that it would require the state to demonstrate the availability of unencumbered bonding authority or third party financing on a contract-by-contract basis, rather than provide an overall plan for covering the shortfalls. Nevertheless, we believe that if the appropriate state legislation is enacted in time to meet the project's contracting requirements, this action could provide assurance that funding to cover the shortfalls will be available when the bills come due.

Massachusetts disagreed with our observations, maintaining that it faces no greater financial uncertainty than any other state because, until the Congress acts, no state knows what federal-aid highway funding will be available to it after fiscal year 1997. While we agree that all states face this uncertainty, no other state faces the challenge of financing over \$5 billion in costs for a highway project. In addition, while Massachusetts' finance plan modeled the effect of lower federal aid levels after fiscal year 1997, substantial funding shortfalls exist under all funding scenarios, and a plan for financing those shortfalls has not been selected.

In commenting on our report, Massachusetts disagreed that the finance plan should provide a total cost figure for the project. The state said that the total costs of the project can be calculated from the information contained in the finance plan. However, even if state and federal decisionmakers or the public had ready access to the finance plan, the total costs of the project would not be readily apparent from reading the plan. We found that to determine the total costs of the project, we had to analyze several sources of information within the plan and discuss them with MHD. Furthermore, after we obtained agency comments, Massachusetts stated in its May 6, 1996, reply to FHWA's letter that requiring a total cost estimate in the finance plan represented a significant change in FHWA's position. Massachusetts' response did not indicate whether the state's next finance plan would disclose the project's total cost.

Massachusetts also disagreed with our observation that it is important to develop a plan for financing the shortfalls at this time. The state said that neither such a plan nor an updated finance plan should be developed until the state's study on additional contributions from the Massachusetts Port and Turnpike authorities was completed in December 1996. Massachusetts said that the demonstrated commitment on the part of the state to finance the project, as shown by its seeking third party financing and developing other financing options in the finance plan, provide sufficient assurance that funding will be available to cover projected future funding shortfalls. While we recognize the state's commitment to finance the project, we continue to believe that additional actions, such as those outlined in FHWA's letter, are needed since the Secretary must approve the state's extensive use of advance construction.

Scope and Methodology

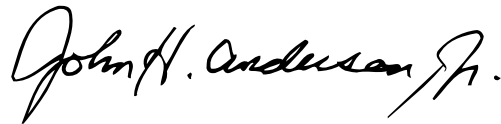
To prepare this report, we analyzed the July 1995 cost estimate and the February 1996 and earlier versions of the finance plan for the Central Artery/Tunnel project. We reviewed supporting documentation and discussed cost and financing issues with officials at FHWA's headquarters in Washington, D.C., and, in Boston, Massachusetts, at FHWA's Massachusetts Division Office, the state's Executive Office of Administration and Finance, and MHD's Central Artery/Tunnel project office. We discussed cost containment measures with project officials and five design firms participating in MHD's design-to-cost program and obtained and analyzed related documentation. 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. We also obtained and reviewed state legislation and discussed it with officials at

the state legislature, the Massachusetts Turnpike Authority, the Massachusetts Port Authority, and the Massachusetts Bay Transportation Authority. We performed our work from October 1995 through April 1996 in accordance with generally accepted government auditing standards.

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; and the Administrator, Federal Highway Administration. We will 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 VI.

Sincerely yours,



John H. Anderson, Jr.
Director, Transportation and
Telecommunications Issues

Contents

Letter	1
Appendix I Obligations for the Central Artery/Tunnel Project as of March 1, 1996	20
Appendix II GAO's Analysis of the Central Artery/Tunnel Project's Costs	21
Appendix III Financing for the Central Artery/Tunnel Project Under the Low Funding/Middle Cost Scenario	22
Appendix IV Financing for the Central Artery/Tunnel Project Under the Modified Middle Funding/Middle Cost Scenario	24

Appendix V		26
Comments From the	GAO Comments	29
Commonwealth of		
Massachusetts		
Appendix VI		31
Major Contributors to		
This Report		
Table	Table 1: Cumulative Shortfalls Expected Under Various Central Artery/Tunnel Project Financing Scenarios: Fiscal Years 1996 Through 2000/2001	12
Figure	Figure 1: Map of the Central Artery/Tunnel Project	3

Abbreviations

GAO	General Accounting Office
FHWA	Federal Highway Administration
MHD	Massachusetts Highway Department

Obligations for the Central Artery/Tunnel Project as of March 1, 1996

Dollars in millions

Source of funds	Obligations	Percentage of total obligations
Federal funds		
Interstate Construction Program	\$3,662.8	
National Highway System Program	194.6	
Bridge Program	145.3	
Other programs	84.1	
Total federal funds	\$4,086.8	86.2%
State funds		
State matching funds	623.4	
Additional state funds	31.9	
Total state funds	\$655.3	13.8%
Total	\$4,742.0	100.0%

Note: Numbers may not add because of rounding.

Source: Central Artery/Tunnel Project Office, Massachusetts Highway Department (MHD).

GAO's Analysis of the Central Artery/Tunnel Project's Costs

Dollars in millions	
Item	Cost
Official estimate^a	\$7,780
Excluded costs	
Expenditures prior to 1991	255
Connections to Massachusetts Turnpike Authority facilities	230
Logan Airport interchange	180
Other exclusions	574
Total excluded costs	\$1,239
Inflation^b	
Awarded contracts	136
Unawarded (future) contracts	1,017
Total inflation	\$1,153
Development of air rights^c	\$225
Total	\$10,397

^aMHD's cost estimate for the Central Artery/Tunnel project comprises assumptions about the cost of labor and materials. We did not examine these assumptions.

^bMHD's cost estimate does not account for the effects of inflation. Rather, the estimate represents expenditures incurred prior to August 1994 at their value in the year they were incurred and expenditures expected after that date in August 1994 dollars. Our analysis assumes an inflation rate of 3.35 percent a year. This assumption was agreed to by the Federal Highway Administration (FHWA) and MHD as part of the middle cost scenario for the funding scenarios in the project's February 1996 finance plan.

^cMHD's estimate deducts \$225 million from the project's total cost estimate. This deduction represents the sale of air rights—proceeds the state expects to receive from the development of property acquired for the project. In its July 1995 review of MHD's cost estimate, FHWA stated that "the credit deduction for the sale of air rights is not considered an appropriate deduction in the cost estimate" and that "the amount and timing of any air rights credit is uncertain." We are unaware of any precedent for a state's taking such proceeds as a credit for a project's cost. While such proceeds might appropriately be recognized as a source of financing, the \$225 million that Massachusetts identifies will not be realized until 2004, when the Central Artery/Tunnel project's expenditures will largely be completed.

Source: Central Artery/Tunnel Project Office, MHD, and our analysis.

Financing for the Central Artery/Tunnel Project Under the Low Funding/Middle Cost Scenario

Dollars in millions			
	Fiscal year		
	1996	1997	1998
Obligations	\$854.6	\$961.3	\$1,257.2
Funding			
Federal	\$589.0	\$518.0	\$320.0
State	130.0	130.0	130.0
State bonds ^a		300.0	100.0
Massachusetts Turnpike Authority ^a	100.0		
Massachusetts Port Authority ^a			100.0
Total funds	\$819.0	\$948.0	\$650.0
Surplus/shortfall			
Annual	(\$35.6)	(\$13.3)	(\$607.2)
Cumulative	(\$35.6)	(\$48.9)	(\$656.1)

**Appendix III
 Financing for the Central Artery/Tunnel
 Project Under the Low Funding/Middle Cost
 Scenario**

Fiscal year							
1999	2000	2001	2002	2003	2004	2005	Total
\$1,196.3	\$959.9	\$437.1	\$311.1	\$113.6	(\$191.5)	(\$265.0)	\$5,634.6
\$320.0	\$320.0	\$320.0	\$320.0	\$320.0	\$320.0	\$320.0	\$3,667.0
130.0	130.0	130.0	100.0	100.0	85.0	85.0	1,150.0
							400.0
							100.0
							100.0
\$450.0	\$450.0	\$450.0	\$420.0	\$420.0	\$405.0	\$405.0	\$5,417.0
(\$746.3)	(\$509.9)	\$12.9	\$108.9	\$306.5	\$596.5	\$670.0	
(\$1,402.3)	(\$1,912.3)	(\$1,899.4)	(\$1,790.6)	(\$1,484.1)	(\$887.6)	(\$217.6)	(\$217.6)

Note: MHD modeled this scenario at FHWA's request.

^aLegislation approved in Massachusetts in 1995 provided \$400 million in state bonds that will be used for the Central Artery/Tunnel project. It also provided for contributions of \$100 million from the Massachusetts Turnpike Authority and \$100 million from the Massachusetts Port Authority.

Source: MHD's February 1996 finance plan and our analysis.

Financing for the Central Artery/Tunnel Project Under the Modified Middle Funding/Middle Cost Scenario

Dollars in millions			
	Fiscal year		
	1996	1997	1998
Obligations	\$854.6	\$961.3	\$1,257.2
Funding			
Federal	\$589.0	\$518.0	\$506.0
State	130.0	130.0	130.0
State bonds ^a		300.0	100.0
Massachusetts Turnpike Authority ^a	100.0		
Massachusetts Port Authority ^a			100.0
Massachusetts Bay Transportation Authority ^a			
Total funds	\$819.0	\$948.0	\$836.0
Surplus/shortfall			
Annual	(\$35.6)	(\$13.3)	(\$421.2)
Cumulative	(\$35.6)	(\$48.9)	(\$470.1)

**Appendix IV
 Financing for the Central Artery/Tunnel
 Project Under the Modified Middle
 Funding/Middle Cost Scenario**

Fiscal year							
1999	2000	2001	2002	2003	2004	2005	Total
\$1,196.3	\$959.9	\$437.1	\$311.1	\$113.6	(\$191.5)	(\$265.0)	\$5,634.6
\$466.0	\$466.0	\$225.0	\$225.0	\$225.0	\$225.0	\$225.0	\$3,670.0
130.0	130.0	130.0	100.0	100.0	85.0	85.0	1,150.0
							400.0
							100.0
100.0							200.0
80.0							80.0
\$776.0	\$596.0	\$355.0	\$325.0	\$325.0	\$310.0	\$310.0	\$5,600.0
(\$420.3)	(\$363.9)	(\$82.1)	\$13.9	\$211.5	\$501.5	\$575.0	
(\$890.4)	(\$1,254.3)	(\$1,336.4)	(\$1,322.5)	(\$1,111.0)	(\$609.5)	(\$34.5)	(\$34.5)

Note: MHD's middle funding scenario assumes that the state gains access to \$638 million of its unobligated balances. Because there is no provision in current law that would afford Massachusetts or any other state such access, we have removed this assumption from the analysis. MHD views the middle cost/middle funding scenario as the most likely when access to unobligated balances is assumed.

^aLegislation approved in Massachusetts in 1995 provided \$400 million in state bonds that will be used for the Central Artery/Tunnel project. It also provided for contributions of \$100 million from the Massachusetts Turnpike Authority and \$100 million from the Massachusetts Port Authority. The middle funding scenario assumes that future legislation and/or agreements will authorize additional contributions—above and beyond those contained in the 1995 legislation—of \$100 million from the Massachusetts Port Authority and \$80 million from the Massachusetts Bay Transportation Authority.

Source: MHD's February 1996 finance plan and our analysis.

Comments From the Commonwealth of Massachusetts

Note: GAO comments supplementing those in the report text appear at the end of this appendix.



William F. Weld
Governor

Argeo Paul Cellucci
Lieutenant Governor

James J. Kerasiotes
Secretary and MBTA Chairman

The Commonwealth of Massachusetts
Executive Office of Transportation and Construction
Ten Park Plaza, Boston MA 02116-3969
Office of the Secretary

May 1, 1996

Ms. Phyllis F. Scheinberg
Associate Director, Transportation
and Telecommunications
United States General Accounting Office
Washington, D.C. 20548

Dear Ms. Scheinberg:

Thank you for the opportunity to review and comment on your proposed report on the Central Artery Tunnel Project. As suggested in your transmittal letter dated April 17, 1996, a meeting was held on Wednesday, April 24, 1996 at which Massachusetts officials provided detailed comments to members of your staff. As you know we have provided extensive, detailed comments which correct conclusions which we find to be inaccurate, correct factual errors which we believe have been made or add facts which we believe are important in reaching conclusions on the subject matter involved.

The Central Artery/Tunnel Project in Boston is not only the largest public infrastructure project in the United States, it is the most technologically and logistically complex program of highway construction ever undertaken in this country, requiring the use of the most advanced building techniques. The financial management dimensions of this Project are equally complex given a schedule that encompasses multiple state and federal funding cycles.

Much of your report deals with these financial aspects of the Project. While it is not my intent to restate the points that have been previously made to your staff about the contents of this report, I would like to highlight a few issues.

One request which I reiterate in the hope that it is made before publication: change the title.

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See comment 1.

Appendix V
Comments From the Commonwealth of
Massachusetts

Page Two

May 1, 1996

See comment 2.

The theme of your report, as the title implies is whether or not there is uncertainty associated with the future funding for the Project. In reality, the Central Artery Project and Massachusetts highway program in general faces no more uncertainty than the programs of every other state awaiting Congressional action on post-ISTEA funding levels. In this era of federal budget balancing and deficit reduction, all federally funded programs (defense, education, environmental, social etc.) "face continued financial uncertainties."

See comment 2.

In our Finance Plan for the Central Artery Project, we have acknowledged these realities and have provided sound financial strategies for dealing with cuts in future federal highway funding of between 12% and 46%.

See comment 3.

With respect to state funding, Massachusetts continues to demonstrate the willingness and ability to provide additional funding for the Project. In 1995, as noted in your report, the Massachusetts Legislature passed a bill authorizing \$600M in additional funding for the Project. The Legislature further directed that a financial feasibility study be completed by December of 1996 to review the capabilities of the State to provide additional funding. As outlined in our Finance Plan, this additional state funding will reduce the federal share of this Project from the current 85% level to between 60% and 70%.

We are realistic but optimistic about future federal highway funding levels and equally pragmatic but positive about future state highway funding capacity. Every day we are focusing our efforts on achieving our construction plans and our financial plans.

As this report correctly points out, the Secretary of Transportation must approve upcoming construction contracts and can only do so if the funding to pay the bills can be reasonably expected to be available. The CA/T Project has to-date committed over \$2.5B in construction contracts and has at no time done so by asking state or federal officials to award now and hope money is available later.

See comment 4.

The CA/T Project Finance Plan, currently under review by FHWA, clearly demonstrates a strategy for having funding available when necessary. "Certainty" can only be applied to these strategies by future congressional action and upon completion of the State legislatively required study.

Appendix V
Comments From the Commonwealth of
Massachusetts

Page Three

May 1, 1996

We are pleased that GAO has acknowledged the Project's aggressive costs containment initiatives, particularly the innovative design-to-cost program. This and other cost control and management programs have saved state and federal taxpayers millions of dollars.

We expect that GAO will continue to be involved in reviewing various aspects of this Project. We welcome this oversight as an additional means of insuring that taxpayers dollars are being spent as effectively and efficiently as possible.

I would like to re-state our invitation to GAO to review the cost elements of this Project which are driven by compliance with federal requirements. We would also welcome the opportunity to further review with you the unique cost containment and construction management techniques being employed on the Project.

Thank you for your professionalism during this review and for the opportunity to provide these additional comments.

Sincerely,



James J. Kerasiotes
Secretary

The following are GAO's comments on the Commonwealth of Massachusetts' letter dated May 1, 1996:

GAO Comments

1. Massachusetts disagreed with our observations and asked us to consider additional information to clarify and amplify information in the report and to better reflect its views on certain issues. For example, Massachusetts asked us to present its estimates of the cost and schedule savings resulting from its use of advance construction contracting and its disagreement with FHWA's analysis of future state contributions to the Highway Trust Fund. We incorporated these and other comments throughout the report as appropriate. However, we do not believe that these changes constitute a basis for modifying our observations about the project.
2. We believe that the title of the report is accurate. We agree with Massachusetts that all federally funded programs face uncertainties because of the federal budget climate. We also agree that all states face uncertainty in their highway programs, since no state knows what federal highway funding it will receive after fiscal year 1997 until the Congress reauthorizes ISTEA. But we disagree that Massachusetts faces no greater financial uncertainty in its highway program than any other state. No other state faces the challenge of financing over \$5 billion in costs for a highway project in the next 5-6 years or plans to use advance construction contracting as extensively. While Massachusetts has modeled the effects of lower federal aid levels after fiscal year 1997 in its finance plan, substantial funding shortfalls exist under all funding scenarios, and uncertainties exist about how those shortfalls will be financed because a plan for financing them has not been selected.
3. We were not able to verify from the information in the finance plan that the federal share for the project will be reduced to between 60 and 70 percent. After we received Massachusetts' letter, we asked MHD for supporting documentation. MHD's analysis shows that the remaining federal share depends on assumptions about future federal funding and ranges from 74 percent under the low funding scenario to 86 percent under the high funding scenario.
4. While we recognize the commitment on the part of the state to finance the project, substantial funding shortfalls exist even under the finance plan's more optimistic funding scenarios. Therefore, we believe the prudent strategy is to select a financing strategy as soon as possible. This

Appendix V
Comments From the Commonwealth of
Massachusetts

is particularly important, since the Secretary must approve the state's extensive use of advance construction.

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