

# **Office of the Inspector General**

**Commonwealth of Massachusetts**

## **Statutorily Mandated Reviews of Central Artery/Tunnel Project Building Construction Contracts 1997-1999**

**Robert A. Cerasoli  
Inspector General  
December 1999**



ROBERT A. CERASOLI  
INSPECTOR GENERAL

The Commonwealth of Massachusetts  
Office of the Inspector General

JOHN W. MCCORMACK  
STATE OFFICE BUILDING  
ROOM 1311  
TEL: (617) 727-9140  
FAX: (617) 723-2334  
  
MAILING ADDRESS:  
STATE HOUSE STATION  
P.O. BOX 270  
BOSTON, MA 02133

December 1999

His Excellency the Governor

The Honorable President of the Senate

The Honorable Speaker of the House of Representatives

The Honorable Chairman of the Senate Ways and Means Committee

The Honorable Chairman of the House Ways and Means Committee

The Honorable Chairman of the Senate Post Audit and Oversight Committee

The Honorable Chairman of the House Post Audit and Oversight Committee

The Directors of the Legislative Post Audit and Oversight Bureaus

The Secretary of Administration and Finance

Members of the General Court

*Omnibus ad quos praesentes literae pervenerint, salutem.*

In December 1996, I issued a report on the seven statutorily mandated reviews of Central Artery/Tunnel (CA/T) building projects completed by my Office between 1994 and 1996. Those seven reviews commented on a number of issues including large, unexplained increases in contract cost estimates, inadequate cost containment measures, and possible violations of state law. This report contains the four statutorily mandated CA/T building project reviews this Office has conducted since 1996.<sup>1</sup> These four reviews identified a number of issues including costly over-design, safety issues, compliance problems with state regulations, unclear contract specifications, and a continuing failure to apply rigorous cost containment measures on CA/T contracts.

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<sup>1</sup> This report also includes a Central Artery/ Tunnel (CA/T) Project response to a review letter included in the December 1996 report and a series of correspondence between this Office and the CA/T Project concerning the mandated review process itself.

The Commonwealth faces great challenges as it moves through the peak of CA/T construction where the potential for delays and cost overruns increases. Project management is aware of this potential and is committed to controlling Project costs.

I believe that these statutorily mandated reviews have assisted the Project in identifying problems and controlling costs, such as the case in which my Office took issue with the design of the East Boston toll plaza canopy. The Project redesigned the canopy for an estimated savings of over \$1 million.

In 1994, the Legislature first stipulated that no CA/T Project building construction contract could begin until my Office had completed a review. Specifically, Section 11 of Chapter 102 of the Acts of 1994 (the transportation bond bill) included the following language:

[The Massachusetts Highway Department] shall have jurisdiction over the selection of designers performing design services in connection with the ventilation of buildings, utility facilities and toll booths to be constructed as part of the Central Artery/Tunnel Project, and shall construct, control, supervise, or contract for said structures; provided, however, that no construction or contractual agreement for construction shall begin prior to the **review of the inspector general** of the commonwealth. [Emphasis added.]

The 1996 transportation bond bill contained similar language pertaining to CA/T-related buildings, but expanded this Office's responsibility significantly by directing that "no construction . . . shall begin prior to the review **and approval** of the inspector general of the commonwealth." (Section 67 of Chapter 205 of the Acts of 1996; emphasis added.)<sup>2</sup>

This Office's letters target issues at the heart of cost and performance, including the following recommendations to Project management:

- ◆ **Cost Containment:** Conduct cost containment reviews such as value engineering, claims avoidance reviews, constructability and peer reviews before the completion of the final design.
- ◆ **Life-cycle Costs:** Conduct life-cycle cost analyses to identify all costs, including operations and maintenance costs for a facility's expected useful life.

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<sup>2</sup> Section 16 of Chapter 11 of the Acts of 1997 approved by the Governor on May 16, 1997, exempted structures or building[s] integral to the operation of the Central Artery/Ted Williams Tunnel Project from the M.G.L. c.7, §39A definition of "capital facility project." As a result, CA/T buildings were exempted from the requirement, among other requirements, that the state's Division of Capital Asset Management and Maintenance (DCAM) certify a study prior to the commencement of design on the buildings.

Knowing these costs might help to identify inefficient design components and help in the planning for future operations expenses.

- ◆ **Cost Estimate Growth During Design:** Identify and explain all cost estimate increases that occur between the beginning of final design and the construction bid process.
- ◆ **Professional Practice:** Sign, stamp, and date design drawings in compliance with professional practice and the Massachusetts Code of Regulations.

As my Office completes each mandated review, I ensure that appropriate legislative and Project leaders are fully apprised, in writing, of this Office's concerns. My staff accords Project management ample opportunity to review and comment on the findings documented in every review; each of the Project's formal written responses appears in this report.

Although the Project has been generally responsive to this Office's concerns, we are not in accord on all matters. Project management disagrees with this Office's contention that the Project should apply cost-containment measures such as value engineering reviews and claims avoidance reviews to all significant Project contracts. Project management also disagrees with this Office's interpretation of the Massachusetts Code of Regulations and professional practice as it applies to the use of professional stamps on design drawings.

However, no topic of disagreement has caused this Office to withhold approval to proceed with construction. In some cases, such as the East Boston Toll Plaza Facility – Contract C07C1, Project management took appropriate corrective action after this Office provided review comments. Management made design changes that both reduced Project cost and in the opinion of this Office improved the safety and life span of the facility. In other cases, the problem was not sufficient to justify delaying the contract by withholding approval. Nevertheless, the Project is responsible for carefully considering all review findings and taking corrective action whenever possible.

CA/T Project management has cooperated with this Office to ensure that my staff can complete the mandated reviews in a thorough and timely manner. I will continue to keep you apprised of the results of these reviews and look forward to the continued cooperation and assistance of the Massachusetts Turnpike Authority.

Sincerely,

Robert A. Cerasoli  
Inspector General

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Note: All project response letters have been scanned and reformatted for electronic publishing. However, the text of the letters has not changed.

## Massachusetts Office of the Inspector General

**Address:**

Room 1311  
John McCormack State Office Building  
One Ashburton Place  
Boston, MA 02108

**Mailing Address:**

P.O. Box 270  
State House Station  
Boston, MA 02133

**Phone:**

(617) 727-9140  
(617) 523-1205 (MCPPO Program)  
(800) 322-1323 (confidential 24-hour hotline)

**Internet and Fax:**

[www.state.ma.us/ig/ighome.htm](http://www.state.ma.us/ig/ighome.htm)  
(617) 723-2334 (fax)

## **SECTION ONE**

### **Review of East Boston Toll Plaza Facility Contract C07C1**

**Final Approval Issued November 4, 1999**

**Note:** This Office originally reviewed the C07C1 bid package during the summer of 1998, issuing a preliminary review letter to the Project on September 22, 1998. The Project responded to this preliminary review by letter of November 12, 1998. Subsequent to the review, the CA/T Project opted to redesign elements of the toll facility. This Office re-initiated its review in September 1999 – one year later – after the Project had prepared the new bid package. This Office granted the Project approval to proceed with the contract by letter of November 4, 1999.

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The Commonwealth of Massachusetts  
Office of the Inspector General

ROBERT A. CERASOLI  
INSPECTOR GENERAL

JOHN W. MCCORMACK  
STATE OFFICE BUILDING  
ROOM 1311  
TEL: (617) 727-9140  
FAX: (617) 723-2334

MAILING ADDRESS:  
STATE HOUSE STATION  
P.O. BOX 270  
BOSTON, MA 02133

September 22, 1998

Peter M. Zuk, Project Director  
Central Artery/Tunnel Project  
One South Station; 4th Floor  
Boston, Massachusetts 02110

Dear Mr. Zuk:

We have initiated a statutorily mandated review of documents relating to the Central Artery/Tunnel (CA/T) Project's pending C07C1 – East Boston Toll Facility construction contract. As you know, no construction or contractual agreement for construction of structures covered by the statutory mandate may begin prior to the review and approval of the Inspector General.<sup>1</sup> This letter addresses issues resulting from our preliminary review.

The C07C1 contract consists of two toll plazas (one for eastbound and one for westbound traffic) and a toll administration building. The Project estimates the cost of this contract to be approximately \$10 million. The Project plans to award this contract by December 1998.

The Inspector General cannot grant final contract approval until the Office has reviewed the final bid package, all amendments issued during the bid phase, and the bid process itself. We have agreed, however, to complete as much of the review as possible before the bid process begins. In this way, the Project can consider and address this Office's comments without unnecessarily delaying the schedule.

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<sup>1</sup> Section 67 of Chapter 205 of the Acts of 1996 states in pertinent part:

[MassHighway] shall have jurisdiction over the selection of designers performing design services in connection with the ventilation of buildings utility facilities, and toll booths to be constructed as part of the central artery/third harbor tunnel project, and shall construct, control, supervise or contract [sic] said structures; provided, however, that no construction or contractual agreement for construction shall begin prior to the review and approval of the inspector general.

Although the final C07C1 bid package is not yet ready for review by this Office, we have reviewed the most recent plans, specifications, and estimates for this contract as well as pertinent Project files. Thus far, our review has revealed the following problems and concerns:

- 1) **Cost Containment:** During this and previous reviews conducted at the Legislature's direction, we have found inconsistencies between the Project's stated commitment to cost containment and its use – or apparent lack of use – of many of its own cost containment mechanisms.

For example, the Project performed no independent value engineering study of the toll facility design at any stage of the design process. Value engineering was performed in the early 1990's on generic Project design criteria, but not on this specific toll facility design. Granted, the Project did encourage the section design consultant (SDC) to consider a summary of value engineering proposals that were submitted by construction contractors and used by the Project on other contracts, but there is no evidence that the SDC used any of these value engineering suggestions.

The larger scale value engineering studies conducted earlier in the design process could not have been expected to address this relatively small portion of the overall Project design. Moreover, this is the only toll facility contract for the Project; the distinctive facility design is unique to the Project. (See illustration on page 5.) Because of its uniqueness, the toll facility may have merited a one-day value engineering review by an independent consultant. Project documents indicate that reviews such as these would cost less than \$10,000 if the consultant had recommended design changes to save ten percent of the estimated construction cost and if these changes were made, the Project might have saved almost \$1 million.

Because the design phase is more than 97 percent complete, the Project has missed the opportunity to conduct additional value engineering reviews during final design in most instances. However, some smaller design contracts remain. **This Office strongly recommends that the Project conduct a value engineering study for these remaining designs.** A study does not necessarily have to be done on small contracts. But some of the small design contracts share larger systemic issues such as roadway finishes, the last stage of Project construction. The Project should consider conducting a value engineering study on the smaller design contracts that share larger systemic issues to address common elements that are still being designed.

In addition to value engineering, the Project finance plans and Project procedures refer to "claims avoidance," and "constructability" reviews. Claims avoidance reviews are "designed to mitigate construction changes, claims, and/or disputes that may arise as a result of multiple prime contracts operating at a fast track construction pace in a large and historic metropolitan

environment.” According to the September 1996 Finance Plan,<sup>2</sup> the claims avoidance review:

- Identifies ambiguities and inconsistencies in the design before advertisement for bids.
- Eliminates obvious areas of potential changes, claims, and/or disputes.
- Ensures that the proper risk sharing posture is addressed and accounted for in the proposed construction bidding documents.
- Recommends corrective measures to prevent or mitigate exposure.

Project records show that the Project has not yet completed such a review for this contract. **We urge the Project to complete a claims avoidance review before the contract is awarded and forward a copy of the review to this Office.**

According to Project Procedures, a constructability review should be performed at various stages of design development including the final submission by the SDC. The Procedures state that the review addresses the following areas [quote]:

- Sufficient access for equipment.
- Most economical design for constructability/maintainability.
- Design taking advantage of construction technology.
- Ambiguities and inconsistencies.
- Coordination of access, staging and interfaces with adjacent and follow-on work.
- Design allowing optimum sequence of work activities.
- Consistency of design with contractor design elements including formwork, falsework, underpinning and excavation methods.
- Coordinating with existing features including utilities, pedestrian access, roadways and structures, and the maintenance of service of such features during construction.

The Project had not yet conducted this review. **This Office strongly recommends that the Project complete this constructability review before the contract is awarded and forward a copy of the review to this Office.**

- 2) **Overall Cost:** In 1993, the Project estimated that construction of the Toll Facility would cost \$5 million. The current cost estimate is nearly \$10 million (approximately \$408 per square foot). Project files we reviewed referenced no major design changes that would have been responsible for this cost

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<sup>2</sup> The 1998 Finance Plan did not refer to these reviews.

increase. Even if one assumes a 10 percent annual construction cost inflation factor, approximately \$3 million of the cost increase remains unexplained. This Office is aware that the Massachusetts Turnpike Authority and Massachusetts Port Authority had requirements that needed to be met in the design. This Office also knows that the Project's preliminary design called for certain costly aesthetic features, such as toll plaza canopies with an aeronautical design. According to a 1997 Project estimate, the canopy structure has the highest square foot cost of any other toll facility components (a matter that we discuss elsewhere in this letter), but this alone does not account for the high cost to design and construct the toll facility.

Furthermore, we note that the D007C – I-90 East Boston Toll Plaza and Facilities design contract has a value of more than \$2.1 million not including construction phase service and Project preliminary design costs. This Office questions the need to spend more than \$2 million to design a facility that will cost approximately \$10 million to build. This is much higher than the approximately 11 percent design to construction cost ratio we calculate for other Project contracts in East Boston.<sup>3</sup> Interestingly, when the Project awarded the \$2.1 million design contract in 1995, the Project estimated that construction of the toll facility would cost less than \$5.5 million – in other words, the design contract was at that time going to cost nearly 40 percent of the estimated construction cost. These facts suggest that the Project severely underestimated construction costs or paid more for the design than necessary or both.

The C07C1 contract has cost more to design and will cost more to construct than necessary. How much more is difficult to determine. This Office estimates that the Project could in the end spend at least ten percent more than necessary to design and construct the C07C1 contract. Regrettably, at this point in design development, it would probably not be cost effective to significantly alter the design or the Project schedule to accommodate major changes.

- 3) **Toll Plaza Canopy Cost:** We are particularly concerned by the cost of the toll plaza canopies, one element of the toll plaza design. In a November 1994 letter to the Project, this Office questioned the design and anticipated cost of the canopies. These canopies have a distinct design, not ordinarily seen for

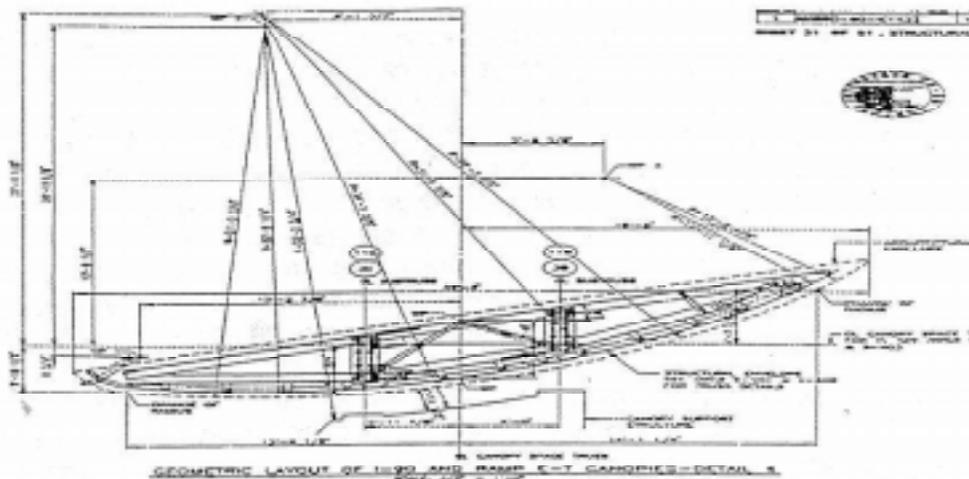
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<sup>3</sup> According to the Designer Selection Board's 1994 Guidelines for a City or Town Building Project, eight percent is a reasonable design cost for a building estimated to cost between \$5 million and \$10 million.

toll canopies or roofs, because of aesthetic considerations.<sup>4</sup> This Office believes that more money than necessary will be spent on these canopies. The Project has estimated that the toll facility will cost about \$10 million. Staff from this Office calculate that at least 20 percent or \$2 million of the total cost will be spent to construct these canopies. The canopy design is complex, involving multiple curves in the steel structure. The complexity of the design means higher construction costs and may be responsible for a large number of future change orders once construction begins.

In our opinion, more money than necessary will be spent on these canopies; simpler canopies could have been designed for savings of between \$250,000 and \$750,000. We do not question the importance of aesthetic considerations; nevertheless, a lack of adequate design review and the creation of a unique canopy design contributed to unnecessarily high costs.

*Final Design drawing prepared by the Section Design Consultant for the D007C – 190 - East Boston Toll Plaza and Facilities contract.*



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<sup>4</sup> The canopy is metal and is designed like an airplane wing with various complex curves. This design is not normally used for a roof structure. The design appears to have been selected on the basis of aesthetic considerations, since it serves no basic structural function. According to a November 1994 letter from the Project to this Office, "the canopy was an appropriate feature to highlight the 'gateway' to Boston through the Third Harbor Tunnel."

- 4) **Life-Cycle Cost Analysis (LFCA):** The Project did not prepare any LFCA for the toll booth facility. An LFCA identifies all costs for the acquisition, construction, operations, and maintenance of a facility during its expected useful life. According to Project staff, life-cycle costs are factored in during preliminary design when major design decisions are being made, thereby promoting more cost-effective designs.

In this case, it is unclear from Project records and Project staff whether any analysis has been done to estimate operations and maintenance costs during the expected useful life of the facility. For example, the toll booth canopies have a complex design in which a steel support system is covered with metal panels. Moisture build-up and ventilation for electrical and mechanical systems is of concern. Project documents suggest that the environment in the canopies, once constructed, might cause problems such as rusting and would be difficult to maintain. During our review, we discussed these concerns with Project staff and the canopy design has been changed to allow for better access into the canopies for inspection and maintenance purposes.

An LFCA should have been done to compare the maintenance costs of various design options, such as simpler canopy design versus the current canopy design, as well as to identify different construction materials that might reduce future maintenance expenses.

- 5) **Design Calculations:** Staff from this Office requested the design calculations relating to wind loads on the toll plaza canopies. An inspection of these extensive calculations revealed no evidence that these calculations were reviewed or checked by a senior architect or engineer at the design firm responsible for these calculations. The calculation worksheets have a signature line to confirm review of the calculations. These worksheets did not contain any review signatures. The worksheets did, however, contain the name of the person who did the calculations. According to the State Board of Registration of Engineering, this person was not a registered engineer in Massachusetts at the time that the calculations were completed.

Apparently, important and complicated calculations were left to an unregistered individual whose work was not approved by a registered professional. At the very least, the absence of a registered engineer's signature indicates sloppy practices by the SDC and lax oversight by the Project. The lack of a thorough review of wind load calculation creates a potential public safety hazard.

Moreover, the calculations appear not to have taken into account wind against the front (north) side of the canopies or the impact on wind loading of the size and weight of signage on the canopies. Signage design had not been completed at the time that the SDC completed the calculations we

reviewed. **This Office recommends that the SDC complete new calculations that incorporate signage and wind loads on the north side of the canopies.**

- 6) **Wind-Tunnel Testing:** According to Project staff, “a wind tunnel test was not warranted” because the canopy “is essentially a [flat] shed roof over a non-enclosed structure.” The Massachusetts Building Code (780 CMR 1611) does not require wind tunnel testing for a flat shed roof such as the one on the canopies. Engineering staff from this Office have concluded that since the canopies contain curves, the Building Code does require wind tunnel testing (780 CMR 1611.13).

This Office believes that wind tunnel testing would have given MassHighway and the Turnpike Authority a greater assurance that the canopies would not create any public safety and/or long-term maintenance cost issues. **We strongly recommend that the Project revisit the issue of wind testing and consider conducting a more thorough analysis.**

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This is one of the many reviews this Office has conducted and will continue to conduct under the mandates.<sup>5</sup> We have a responsibility to comment on Project actions and call your attention to matters that, if unresolved, could result in cost overruns, statutory violations, and potential fraud, waste, or abuse in the expenditure of public funds.

None of the issues that we have identified in the preliminary review of the C07C1 contract would so far cause this Office to withhold approval from the Project. However, we strongly recommend that the Project review the issues identified in this letter, remedy the problems as appropriate, and respond accordingly.

As mentioned previously in this letter, the Inspector General cannot grant final contract approval until we have reviewed the final bid package, all amendments issued during the bid phase, and the bid process itself. We look forward to receiving the relevant documents and will complete the final review as expeditiously as possible.

We want to thank Project staff for their continuing cooperation during our review. If you have any questions or concerns please do not hesitate to contact me (573-0070) or Chief Neil Cohen (573-0071).

Sincerely,

Wendy Haynes  
First Assistant Inspector General  
for Megaproject Oversight

cc: William S. Flynn, Deputy Project Director, Central Artery/Tunnel Project  
William J. Smith, Senior Counsel, Central Artery/Tunnel Project

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<sup>5</sup> This Office has conducted similar reviews pursuant to Section 11 of Chapter 102 of the Acts of 1994, and Section 115 of Chapter 273 of the Acts of 1994. Due to timing, none of this Office's reviews fell under the statutory mandate in Section 6 of Chapter 13 of the Acts of 1996.

## **Project Response**

### **Subject: East Boston Toll Facility – Contract C07C1**

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The Project responded to this Office's September 22, 1998 initial review of the C07C1 contract by letter dated November 12, 1998.

This Office was pleased to note that the Project planned to complete a number of cost containment reviews. However, this Office disagreed with the Project's position relative to a value engineering study. This Office believed that a value engineering study might have identified, for example, the complexity and high cost of the toll plaza canopy design that this Office's review later identified. The Project opted to redesign the canopy for potential savings of \$1.1 million. A value engineering study, performed earlier in the design process, might have enabled the Project to further cut costs.

Regarding this Office's other findings, although the Project response was informative, this Office stands by its review comments.

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Massachusetts Turnpike Authority  
Central Artery/Tunnel Project

November 12, 1998

Office of the Inspector General  
State House Station  
P.O. Box 270  
Boston, MA 02133

Attn: Ms. Wendy Haynes  
First Assistant Inspector General for  
Megaproject Oversight

Subject: Central Artery/Tunnel Project  
Review of Construction Contract C07C1  
East Boston Toll Facilities

Ref: OIG Letter dated September 22, 1998

Dear Ms. Haynes:

Thank you for your referenced letter regarding the statutorily mandated review of the documents for Construction Contract C07C1 - East Boston Toll Facilities.

In the opening paragraphs of your letter, you state "The C07C1 contract consists of two toll plazas (one for eastbound and one for westbound traffic).....", this is incorrect. Tolls are collected in the westbound direction only. There are two toll plazas, one for the mainline traffic coming from Route 1A and one for the traffic originating at Logan Airport.

Your letter discusses six specific topics in regards to the C07C1 contract; in responding, we will address each topic in the order in which they appear in your letter for ease of reference.

ITEM 1: Cost Containment. The Project remains committed to Cost Containment and has recently initiated a contract by contract review as part of this commitment. Contract C07C1 is one of the contracts undergoing such a review; therefore a separate value engineering study is not necessary. As a result of this exercise, the Management Consultant has identified \$1.9 Million in potential cost savings and is currently pursuing these ideas.



Massachusetts Turnpike Authority  
Central Artery/Tunnel Project

Ms. Wendy Haynes  
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As part of the standard review process of all SDC submittals, claims avoidance and constructability are topics addressed by all disciplines conducting the review. Further, a separate claims avoidance and constructability review will be scheduled after incorporation of the cost containment suggestions and we will furnish you a copy of the results of the review. The potential to save \$1 million on a \$10,000 Value Engineering study is highly speculative; however, the Project will review future designs for possible Value Engineering. The Project remains convinced that many applicable cost savings have been realized in previous projectwide Value Engineering studies.

ITEM 2: Overall Cost. It must be remembered that this contract is not for a single building, but rather for a number of separate and distinct structures each with special requirements. To compare the design fee to construction cost ratio of this contract to that of standard municipal building construction or to the roadway construction completed in East Boston is not reasonable. First, the design cost for vertical building construction is usually higher than for horizontal construction due to the number of disciplines involved, the number of specialized systems within the structure, and the amount of coordination required; and second, the cost of multiple structures each with its own access and laydown issues is bound to be more costly than a single municipal building. The design to construction cost ratio for this contract compares favorably with other complicated structures on the Project.

ITEM 3: Toll Plaza Canopy Cost. We concur with your concerns on the cost of the toll plaza canopies. This item has been the subject of a cost containment initiative implemented by the Management Consultant. The canopy, while retaining its distinctive shape as a gateway structure to the city, will be made less costly by constructing it of different materials. The projected savings is on the order of \$1.1 Million.

ITEM 4: Lifecycle Cost Analysis. As part of the initial design process the Project did develop a series of concept reports, structure type studies and systems studies which did utilize life cycle cost information in analyzing various components of the Project to aid in developing cost effective designs.

The project did consider maintenance costs of various designs in its preliminary design development. Long term durability, ease of maintenance, replacement and repair were all considered in developing the final recommendations for materials and systems to be used on the Project.



Massachusetts Turnpike Authority  
Central Artery/Tunnel Project

Ms. Wendy Haynes  
Page 3 of 3

ITEM 5: Design Calculations. We strongly disagree with your assessment of the design calculations. It is common practice in the consultant industry for unregistered but qualified engineers to perform calculations under the direction and guidance of a registered engineer. This is not indicative of sloppy practice by the SDC nor lax oversight by the Project.

The calculations reviewed by you were part of the SDC's 75% submittal and as such were not yet finalized. These calculations need not be signed and stamped by a registered engineer. The final calculations which include the loading resulting from signage and wind on the canopy structure were submitted on October 5, 1998 and have been signed and stamped by a registered engineer. All of the computation pages are signed as being checked by a registered engineer as well.

ITEM 6: Wind Tunnel Testing. It has been the Project's position since preliminary design that wind tunnel testing is not required for the canopy structure by the Building Code. Having conducted a thorough review of the computations, specifications, and drawings the Project is confident that the proposed structures do not pose any type of public safety or long-term maintenance issue. Our position on wind tunnel testing is therefore unchanged.

We trust the foregoing adequately addresses the items raised in your letter. The Project will be forwarding to you the formal bid package and all addenda so that you may complete your statutorily mandated review. Should you have any questions, please contact Mr. James Hughes of my staff at 951-6118.

Sincerely,

MASSACHUSETTS TURNPIKE AUTHORITY

Peter M. Zuk  
Project Director

PMZ/PFD/df

cc: MHD - M. Lewis, J. Hughes 01-4W-01

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The Commonwealth of Massachusetts  
Office of the Inspector General

ROBERT A. CERASOLI  
INSPECTOR GENERAL

JOHN W. MCCORMACK  
STATE OFFICE BUILDING  
ROOM 1311  
TEL: (617) 727-9140  
FAX: (617) 723-2334  
  
MAILING ADDRESS:  
STATE HOUSE STATION  
P.O. BOX 270  
BOSTON, MA 02133

November 4, 1999

Patrick J. Moynihan, Project Director  
Central Artery/Tunnel Project  
185 Kneeland Street; 10th Floor  
Boston, Massachusetts 02110

Dear Mr. Moynihan:

This Office has completed a statutorily mandated review of documents relating to the Central Artery/Tunnel (CA/T) Project's pending C07C1 – East Boston Toll Facility construction contract.<sup>1</sup> This letter addresses issues identified as a result of this review. As you know, no construction or contractual agreement for construction of structures covered by the statutory mandate may begin before the review and approval of the Inspector General. *By this letter, this Office grants final approval to the Project to proceed with this contract.*

This Office's review is based on information provided by the Project. The Project estimated the cost of the C07C1 contract to be approximately \$7.5 million. MassHighway opened bids for this contract on October 20, 1999. The apparent low bidder was Barletta Engineering Corporation with a bid of \$7.3 million. The Project plans to award this contract in November 1999.

The Project originally planned to bid this contract in October 1998 and award the contract in December 1998. The Project, however, decided to put the contract on hold and redesign certain elements of the toll facility. By letter of September 22, 1998, this Office submitted its preliminary review of the contract. This Office made a number of suggestions including one for the redesign of the toll booth canopy. The Project apparently heeded the advice and redesigned the canopy for an estimated saving of approximately \$1 million.

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<sup>1</sup> Section 67 of Chapter 205 of the Acts of 1996 states in pertinent part:

[MassHighway] shall have jurisdiction over the selection of designers performing design services in connection with the ventilation of buildings, utility facilities, and toll booths to be constructed as part of the central artery/third harbor tunnel project, and shall construct, control, supervise or contract [sic] said structures; provided, however, that no construction or contractual agreement for construction shall begin prior to the review and approval of the inspector general.

As part of the final review of C07C1, staff from this Office examined the revised plans, specifications, and estimates and all contract addenda, as well as pertinent Project files. Project staff also met with staff from this Office to discuss the contract and related matters. This Office has identified the following issues:

- **Life-Cycle Cost Analysis:** This Office's review of Project files disclosed no evidence that the Project completed a formal life-cycle cost analysis for the C07C1. As stated in previous reviews, properly conducted life-cycle cost analyses identify all costs for acquisition, construction, operations, and maintenance of a facility during its expected useful life. According to Project staff, life-cycle costs are factored in during preliminary design when major design decisions are being made, promoting more cost-effective designs with lower life-cycle costs. This Office commends these efforts but reiterates the importance of an analysis of operations and maintenance (O&M) costs. If the eventual owner and operator of the toll facility (in this case the Massachusetts Turnpike Authority) concluded, after a review of life-cycle costs, that projected O&M costs were too high, a further design review could have been undertaken. This design review might have determined if a reduction in O&M costs could have been achieved through design changes. Knowing potential O&M costs also allows the operator to prepare to finance these future expenses.
- **Composite Metal Cladding Panel System:** The redesign effort included substituting a composite metal cladding system for rainscreen cladding<sup>2</sup> on the exterior of the toll facility buildings and tollbooths. According to Project documents, staff had concerns about unclear cladding system drawings.<sup>3</sup> These concerns had not been fully addressed in the contract bid drawings. According to Project staff, these types of concerns are usually dealt with during the creation of shop drawings<sup>4</sup> after the construction contract has been awarded. This Office reminds the Project to ensure that the final designer and the construction contractor during the shop drawing process address all cladding concerns as well as any other design concerns.
- **Approval of Drawings:** This Office has brought the issue of unstamped and unsigned bid package drawings to the attention of the Project during previous reviews. According to Project staff, current Project practice permits staff to obtain stamps and signatures at the end of the bid process, after a contractor has been selected. This practice is inconsistent with professional practice in Massachusetts. The Massachusetts Board of Registration for Professional Engineers requires that drawings prepared by a registered engineer be stamped, signed and dated. According to 250 CMR 3.05 (3), when changes

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<sup>2</sup> Rainscreen cladding is a system of exterior aluminum (in this case) panels that weatherproofs the building.

<sup>3</sup> Project staff believed that drawings did not clearly identify sealant locations. Without proper sealing, the cladding system could allow water intrusion and fail causing damage to the underlying structure.

<sup>4</sup> Shop drawings are prepared by the construction contractor to detail methods such as fabrication, erection, and layout and may include items such as lists of materials, schedules, and catalog cuts.

are made to these drawings either during or after the bid process, the revised drawings should receive a new stamp, signature, and date. In this Office's view, all individual drawings that require an engineer's or architect's seal should have approval signatures and be stamped, signed and dated by a professional engineer or architect registered in Massachusetts *before* the construction bid package is made available to potential bidders. By so doing, the Project indicates clearly that the design is complete and that the engineers and designers stand behind their work.

This Office's review determined that 40 out of 227 drawings in the C07C1 bid drawings either had no professional seals or illegible seals. Also, 166 out of 227 drawings had undated signatures associated with professional stamps. Project staff stated that a letter would be sent to design firms drafting bid packages reminding them that legible seals must be included on all drawings. In response, the Project drafted a letter to be sent to all designers reminding them of the Massachusetts requirements for professional seals. This Office commends the Project's efforts to enforce these professional standards.

This Office also brought to the attention of Project staff 58 deficiencies in the Project drawings (i.e., missing and/or inconsistent information). Of particular concern to this Office were three drawings not drawn to the scale required by M.G.L. c.149. According to the designer, these drawings did not have to be drawn to scale because they were site plans.<sup>5</sup> This Office acknowledges that, as per industry practice, site plans need not be drawn to the required scale. However, industry practice calls for site plans to be labeled accordingly. These site plans were not labeled correctly as site plans. Moreover, since the drawings<sup>6</sup> contained construction details, they do not fit the industry definition of site plans and so should have been drawn to scale. This Office encourages the Project to correct the noted deficiencies and ensure that all drawings comply with Massachusetts's laws and regulations.

- **Design Cost:** By letter to the Project of September 22, 1998, this Office questioned the high design cost for the toll facility. The design contract has a current value of more than \$2.1 million not including the construction phase services to be provided by the designer. In 1998, the Project estimated construction to cost \$8.2 million. The most recent construction cost estimate was \$7.5 million (after redesign). When the Project awarded the \$2.1 million design contract in 1995, the estimated construction cost was \$5.5 million. This means that in 1995, the design contract was slated to cost nearly 40 percent of the estimated construction cost. This ratio of design to construction cost appeared high to this Office. The Project's November 12, 1998 response to this Office's preliminary contract review disagreed. However, explanations

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<sup>5</sup> Site plans outline the construction area including the building outlines, work area demarcation, and property limits.

<sup>6</sup> Drawing sheets: A-100, S-001, T-001 through T-005, C001, and U-001.

offered in the Project's letter did not change this Office's position that the cost ratio was high.

- **Cost Savings:** The Project estimated that redesign efforts saved nearly \$1.5 million. The Project changed the design of the tollbooth canopies, changed the exterior cladding system, and made a number of other minor changes to lower costs. This Office questions why the Project did not previously consider some of these cost savings. The Project should have considered redesign much earlier in the design process – long before the designer prepared the original bid package in 1998. An earlier look at possible cost savings could have saved more, would have had less of a schedule impact, and would have avoided last-minute redesign work.

This is one of the many reviews this Office has conducted and will continue to conduct under the mandates.<sup>7</sup> This Office has a responsibility to comment on Project actions and call your attention to matters that, if unresolved, could result in cost overruns, statutory violations, and potential fraud, waste, or abuse in the expenditure of public funds. None of the issues identified by this Office in the review of the C07C1 contract caused this Office to withhold approval from the Project for the commencement of this contract. However, this Office strongly recommends that the Project review the issues identified in this letter and respond to them accordingly.

This Office thanks Project staff for their assistance during this review. If you have any questions or concerns please do not hesitate to contact Wendy Haynes, First Assistant Inspector General for Megaproject Oversight.

Sincerely,

Robert A. Cerasoli  
Inspector General

cc: Senator Mark Montigny  
Representative Paul Haley  
Senator Robert Havern  
Representative Joseph Sullivan  
James Kerasiotes, Chairman, Massachusetts Turnpike Authority  
Kevin Sullivan, Secretary of Transportation  
Matthew Amorello, Commissioner, Massachusetts Highway Department  
William Flynn, Deputy Project Director  
John Gorman, Counsel

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<sup>7</sup> This Office has conducted similar reviews pursuant to Section 11 of Chapter 102 of the Acts of 1994, Section 115 of Chapter 273 of the Acts of 1994, and Section 67 of Chapter 205 of the Acts of 1996.

## **SECTION TWO**

### **Review of Ventilation Building No. 8 Contract C19E4**

**Final Approval Issued September 27, 1999**

**Note:** This Office originally reviewed the C19E4 bid package during the summer of 1998. During the review, Project management opted to redesign elements of the ventilation building. As a result, this Office did not issue a review letter at that time. This Office re-initiated its review during the summer of 1999 – approximately one year later – after the Project had prepared a new bid package. This Office granted approval to the Project by letter of September 27, 1999.

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The Commonwealth of Massachusetts  
Office of the Inspector General

ROBERT A. CERASOLI  
INSPECTOR GENERAL

JOHN W. MCCORMACK  
STATE OFFICE BUILDING  
ROOM 1311  
TEL: (617) 727-9140  
FAX: (617) 723-2334  
  
MAILING ADDRESS:  
STATE HOUSE STATION  
P.O. BOX 270  
BOSTON, MA 02133

September 27, 1999

Patrick J. Moynihan, Project Director  
Central Artery/Tunnel Project  
185 Kneeland Street; 10th Floor  
Boston, Massachusetts 02110

Dear Mr. Moynihan:

This Office has completed a statutorily mandated review of documents relating to the Central Artery/Tunnel (CA/T) Project's pending C19E4 – Ventilation Building No. 8 construction contract.<sup>1</sup> This letter addresses issues identified as a result of this review. As you know, no construction or contractual agreement for construction of structures covered by the statutory mandate may begin before the review and approval of the Inspector General. Although staff from this Office remains troubled by some of issues addressed in this letter, *this Office grants final approval to the Project to proceed with this contract.* This Office believes that to delay this contract pending resolution of the issues cited herein would unnecessarily increase the cost of the Ventilation Building No. 8, which has already experienced delays and cost increases. However, this Office will continue to address the issues discussed in this letter with Project management.

This Office's review is based on information provided by the Project. The Project estimated the cost of the C19E4 contract to be approximately \$14.6 million.<sup>2</sup> On September 14, 1999, Walsh Construction Co. of Illinois submitted a low bid of more than \$15.6 million. The Project plans to award this contract by the end of September 1999.

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<sup>1</sup> Section 67 of Chapter 205 of the Acts of 1996 states in pertinent part:

[MassHighway] shall have jurisdiction over the selection of designers performing design services in connection with the ventilation of buildings utility facilities, and toll booths to be constructed as part of the central artery/third harbor tunnel project, and shall construct, control, supervise or contract [sic] said structures; provided, however, that no construction or contractual agreement for construction shall begin prior to the review and approval of the inspector general.

<sup>2</sup> The Project revised its original estimate of \$16.6 million by bid addendum eight issued September 7, 1999.

As part of this review, staff examined the plans, specifications, and estimates and all contract addenda for this contract, as well as pertinent Project files. Project staff also met with staff from this Office to discuss the contract and related issues.

This Office has identified the following issues:

- **Access Restraints:** According to Project staff, the C19E4 construction schedule is dependent upon the progress and completion of work assigned to other construction contracts. Specifically, foundation work for Ventilation Building No. 8 has been assigned to contractors already working near the C19E4 contract area. C19E4 may experience delay if these other contracts fall behind schedule. After the notice-to-proceed is issued, the Project should ensure that other contractors or site access issues do not unduly impede the C19E4 contractor. Proper action, such as efficient site coordination and construction sequencing, will prevent costly delay claims and reduce the risk of change orders caused by additional mobilization and other delay-related costs incurred by the contractor.
- **Fleet Center Easement:** The Project advertised the C19E4 contract in the *Central Register* on September 23, 1998. Shortly thereafter, the Project withdrew the advertisement. The Project had learned that the design of Ventilation Building No. 8 interfered with an easement granted by MassHighway to the Fleet Center in 1993. The Project had to undertake a significant redesign of the vent building to avoid the easement. The Project re-advertised the contract in the *Central Register* on July 21, 1999. This Office continues to examine the easement issue and has requested additional information from the Project. However, this Office determined that it was not in the best interests of the Commonwealth to withhold approval from the Project to proceed with this contract. Doing so would unnecessarily increase costs and further delay the schedule.
- **Redesign Costs:** According to Project documents, the redesign of Ventilation Building No. 8 will cost approximately \$1.6 million. This is the cost for the designer to spend approximately eight months working on the redesign and preparing new plans, specifications and estimates. The added costs to the Commonwealth for B/PB staff to spend nearly a year of additional time on the C19E4 contract has not been quantified, to the knowledge of this Office. Staff from this Office estimate the added cost to the Project for the extra B/PB work to be at least \$160,000.<sup>3</sup>

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<sup>3</sup> This estimate is based on taking 10 percent of the estimated redesign costs of \$1.6 million. B/PB costs would include labor and overhead for the C19E4 authorized representative, peer reviewers, procurement staff, design and engineering staff, legal staff, and management. This Office believes the \$160,000 is a conservative estimate.

According to Project staff, design changes made to the ventilation building have offset the added design costs of \$1.6 million. As a result, Project staff has stated that the newly designed ventilation building may actually cost less than the original one despite the added design costs. This Office disagrees with the conclusion of Project staff. The following chart illustrates how current costs have exceeded the original estimate:

<b>Original Cost Estimate</b>	\$17,300,000	
<b>Low Bid for Contract (“new design”)</b>		\$15,677,000
<b>Redesign Costs</b>		1,600,000
<b>Scope Transfer (add-back)</b>		2,409,000
<b>B/PB Costs (estimated)</b>		160,000
<b>Total</b>	<b>\$17,300,000</b>	<b>\$19,846,000</b>

This chart shows the estimated cost of the C19E4 package to be \$2.5 million more than originally planned. Because of the delay caused by the redesign work, Project documents indicate that the Project transferred foundation work valued at more than \$2.4 million that was originally part of the C19E4 contract to other on-going contracts located at or near the C19E4 contract site.<sup>4</sup> By reducing the size of the ventilation building and transferring scope to other contracts the Projects suggests that the redesigned structure will actually cost less than planned. That is incorrect. In fact, the redesign -- necessitated by missteps in the planning process -- will cost \$2.5 million more.

- Cost Control Measures:** This Office questions why the Project did not previously consider some of the cost savings identified during the redesign effort, such as the elimination of some rooms (a kitchen and a dayroom, for example) and the simplification of the roof design. Based on a review of the redesign, staff from this Office has concluded that the cost savings from a value engineering effort could have been between \$500,000 and \$1 million. These savings would have reduced the original Project cost estimate for the building of \$17.3 million. However, the Project only considered redesign when it needed to reduce the size of the building to comply with the Fleet Center easement. These design changes should have been identified much earlier. The Project did have the benefit of an unofficial value engineering review for this contract. A team of both Project staff and outside engineers conducted this brief, informal review as part of a workshop during an engineering conference in Boston. The team used Ventilation Building No. 8 as the test

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<sup>4</sup> Project documents indicate that staff thought this scope transfer would also produce cost savings because contractors had already mobilized for foundation work on these other adjacent contracts. The Project believed that it would be less expensive to add work to a pre-existing foundation effort than re-initiating a foundation effort under a new contract.

case for the workshop. Project staff stated that they attached little value to the study and did not pursue any of the recommendations. This Office believes that some of the value engineering recommendations could have been pursued further. This Office believes that the Project should have considered redesign for cost control early in the design process in any case. Instead, it appears that cost control, in this instance, was only rigorously applied when an intervening event caused costs to increase. Cost consciousness should be the normal way of doing business and not just a response to unanticipated events.

- **Claims Avoidance Review:** According to Project staff, the Project did not conduct a formal claims avoidance review for the C19E4 contract. Project staff did state that staff conducted an “informal” review during the development of the contract specifications. Project documents indicate that Project staff should have undertaken this review when the Project prepared the bid package. Claims avoidance reviews are, according to Project documents, “designed to mitigate construction changes, claims, and/or disputes that may arise as a result of multiple prime contracts operating at a fast track construction pace in a large and historic metropolitan environment.” Aggressive cost control efforts should include claims avoidance reviews.
- **Unauthorized Design Work:** According to Project documents, the section design consultant (SDC) began the redesign of the ventilation building in September 1998 based on oral direction from Project staff. The Project did not authorize this redesign work through a written change order until December 1998. The design contract between the Project and the designer specifically states that: “The DEPARTMENT may . . . **by written change notice**, direct any change in the SERVICES and the general scope of this contract.” [Emphasis added in bold.] According to Project staff, the Project decided to redesign the ventilation building in September 1998. Written authorization should have been given to the SDC at that time. If Project staff were not prepared in September to provide full authorization, then written authorization for specific tasks should have been given.

Project staff has stated in the past that oral rather than written communications and work authorizations is a generally accepted practice. In this Office’s opinion, work authorizations to contractors should always be in writing. Undocumented oral direction is a poor management practice possibly resulting in increased costs because of miscommunication. In addition, oral directions deprive management of adequate documentation of Project activities, and may create conflict and contractor claims.

- **Life-Cycle Cost Analysis:** This Office’s review of Project files disclosed no evidence that the Project completed a formal life-cycle cost analysis for the C19E4 contract. As stated in previous reviews, properly conducted life-cycle cost analyses identify all costs for acquisition, construction, operations, and

maintenance of a facility during its expected useful life. According to Project staff, life-cycle costs are factored in during preliminary design when major design decisions are being made, promoting more cost-effective designs with lower life-cycle costs. This Office commends these efforts but reiterates the need to include an analysis of operations and maintenance (O&M) costs. If the eventual owner and operator of the ventilation building (in this case the Massachusetts Turnpike Authority) concludes that projected O&M costs are too high, a further design review could be undertaken to determine if O&M costs could be reduced through design changes. Knowing potential O&M costs also allows the operator to prepare for these future expenses.

- **Approval of Drawings:** The cover sheet for the drawings contained in the C19E4 bid package did not include all of the necessary approval signatures from MassHighway (Chief Engineer and Commissioner) and the Federal Highway Administration (Divisions Administrator).

Also, approximately 202 of the individual bid package drawings and 95 addenda drawings did not have one or more of the following: 1) a stamped seal from a professional engineer or architect registered in Massachusetts: 2) a signature or date included with a stamped seal: 3) a dated signature. According to Project staff, current practice allows for staff to obtain final approvals and stamps at the end of the bid process, after a contractor has been selected. This practice is inconsistent with professional practice in Massachusetts. The Massachusetts Board of Registration for Professional Engineers requires that drawings prepared by a registered engineer be stamped, signed and dated [see 250 CMR 3.05 (3)]. Also, according to the same regulation, when changes are made to these drawings either during or after the bid process, the revised drawings should receive a new stamp, signature, and date. In this Office's view, all individual drawings that require an engineer's or architect's seal should have approval signatures and be stamped, signed and dated by a professional engineer or architect registered in Massachusetts before the construction bid package is made available to potential bidders. By so doing, the Project indicates clearly that the design is complete and that the engineers and designers stand behind their work.

- **Fire Protection:** Staff from this Office discussed with Project staff a number of possible errors and inconsistencies in the design drawings. The fire protection drawings are an area of particular concern for this Office. For example, the designer did not properly identify changes to the fire protection system in contract addenda, the designer did not identify the location and type of fire extinguishers, and these drawings are not consistent with the fire protection designs of recently awarded ventilation building contracts (C01B1 - Ventilation Building No. 5 and C09A3 - Ventilation Building No. 1<sup>5</sup>). Project staff have

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<sup>5</sup> This Office conducted statutorily mandated reviews of both of these contracts.

been made aware of these concerns and have advised staff from this Office that appropriate corrections would be made.

This is one of the many reviews this Office has conducted and will continue to conduct under the mandates.<sup>6</sup> This Office has a responsibility to comment on Project actions and call your attention to matters that, if unresolved, could result in cost overruns, statutory violations, and potential fraud, waste, or abuse in the expenditure of public funds. None of the issues identified by this Office in the review of the C19E4 contract caused this Office to withhold approval from the Project for the commencement of this contract. However, this Office strongly recommends that the Project review the issues identified in this letter and respond to them accordingly. This Office also requests the Project's cooperation in the continuing review of the easement matter.

This Office thanks Project staff for their assistance during this review. If you have any questions or concerns please do not hesitate to contact Wendy Haynes, First Assistant Inspector General for Megaproject Oversight.

Sincerely,

Robert A. Cerasoli  
Inspector General

cc: Senator Mark Montigny  
Representative Paul Haley  
Senator Robert Havern  
Representative Joseph Sullivan  
James Kerasiotes, Chairman, Massachusetts Turnpike Authority  
Kevin Sullivan, Secretary of Transportation  
Matthew Amorello, Commissioner, Massachusetts Highway Department  
William Flynn, Deputy Project Director  
John Gorman, Counsel

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<sup>6</sup> This Office has conducted similar reviews pursuant to Section 11 of Chapter 102 of the Acts of 1994, Section 115 of Chapter 273 of the Acts of 1994, and Section 67 of Chapter 205 of the Acts of 1996.

## **Project Response**

**Subject: Ventilation Building No. 8 – Contract C19E4**

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The Project responded to this Office's review of the C19E4 contract by letter dated November 17, 1999.

This Office's review pointed out areas of concern and questioned some of the Project's decisions. The Project disagreed with or took issue with this Office's review comments. Although the Project response was informative, this Office stands by its review comments.

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Massachusetts Turnpike Authority  
Central Artery/Tunnel Project

November 17, 1999

Mr. Robert A. Cerasoli, Inspector General  
The Commonwealth of Massachusetts  
Office of the Inspector General  
State House Station  
P.O. Box 270  
Boston, MA 02133

Subject: Response to MA-OIG Letter of September 27, 1999  
C19E4 - Vent Building No.8

Dear Mr. Cerasoli:

The Central Artery/Tunnel (CA/T) Project is in receipt of the above-referenced letter pursuant to which the Office of the Inspector General (OIG) grants final approval to the Project to proceed with Contract C19E4. The OIG contends that there are issues related to the contract that while not so significant as to cause it to withhold its approval, were nonetheless of some concern. The Project takes this opportunity to address those issues.

**Access Restraints:** It has always been the Project's position that efficient site coordination and construction sequencing with adjacent interface contracts are necessary to prevent costly delay claims to contractors working in the C19E4 area. As always, the Project will endeavor to take all reasonable actions to ensure that the C19E4 contractor can proceed unimpeded.

**Fleet Center Easement:** As we explained to your staff, the original design of Vent Building No. 8 gave due deference to the scope of the easement between the Massachusetts Highway Department (MHD) and the Fleet Center and was not in violation of the same. In addition, the Project on numerous occasions gave the Fleet Center the opportunity to object to the original design during the lengthy design process and after each presentation by Project staff believed that assent was given by the Fleet Center's representatives. It was not until after the decision was complete, and the C19E4 contract advertised, that the Fleet Center first raised objections to the design. There was a difference of interpretation regarding the scope of the easement between MHD and the Fleet Center. To mitigate any impact on the Project schedule and to avoid the cost of protracted litigation, the Project decided to accommodate the Fleet Center's concerns and proceed with a modified decision.

**Redesign Costs:** The OIG's approval letter included a chart to illustrate how current costs, aggregated, allegedly exceed the original estimate and that chart is reproduced below. However, for reasons of accuracy, we have added columns for Project bid estimates and actual bid amounts and have presented and explained the variations between OIG and Project estimates.

	<u>Bid Estimate (9/98)</u>	<u>Bid Estimate (9/99)</u>	<u>MA-OIG</u>	<u>Actual Bid (9/99)</u>
Original Design Cost Estimate	\$17,300,000	-----	-----	-----
Revised Design Cost Estimate	-----	\$14,600,000	-----	-----
Low Bid for Contract (“new design”)	-----	-----	\$15,677,000	\$15,677,000
Redesign Costs	-----	1,277,581	1,600,000	1,277,581
Scope Transfer (add-back)	-----	1,600,000	2,409,000	1,600,000
B/PB Costs (estimated)	-----	-----	160,000	0
<b>Total</b>	<b>\$17,300,000</b>	<b>\$17,477,581</b>	<b>\$19,846,000</b>	<b>\$18,554,581</b>

- Redesign Costs: The \$1.6 million redesign cost that the OIG cites was based on a cost proposal that the Section Design Consultants (SDC) provided in December 1998. The actual final redesign cost incurred by the SDC was \$1,277,581.
- Scope Transfer (add-back): The Project is uncertain as to how the OIG arrived at its \$2.4 million cost figure when the Project estimates that a construction change order of \$1.6 million will be issued to the C19E1/C19E7 Contractor to install the foundation elements. The C19E4 foundation work was transferred to adjacent ongoing contracts C19E7 and C19E1 solely out of schedule considerations, not to deflate the cost of the C19E4 redesign.
- B/PB Costs (estimated): No additional B/PB costs were incurred in the redesign effort. The Project utilized existing resources, with no additional staff added or extended.

The combined actual redesign and as-bid construction costs exceed the original 1998 construction estimate by little more than 7%. Furthermore, this fast-track design effort resulted in no delays to the original Project schedule.

**Cost Control Measures**: MHD developed the space and use requirements for all vent buildings early in the Project based on anticipated building functions. When the Massachusetts Turnpike Authority (MTA) assumed responsibility for the management of the Project, the requirements for vent buildings were revisited. It was determined that eliminating certain rooms in Vent Building No. 8 would reduce cost without affecting the operations and needs of the MTA. The roof design was simplified out of cost and schedule considerations. Although these design changes could have been identified earlier they were identified and will result in a less costly vent building being built without adverse impact on functionality or schedule.

Regarding the value engineering review, Project staff did participate in a value-engineering workshop during a conference in Boston and did, along with outside engineers, use the Vent Building No. 8 design as a case study. None of these reviewers were previously involved in the design of the building. Project staff reviewed the report generated from the workshop and determined that most ideas lacked merit due to physical site limitations, cost limitations, or non-applicability to the structure. One idea to replace the rainscreen cladding with aluminum panels, did have merit but had already been recognized by the Project for its cost saving potential and implemented on vent building designs, including Vent Building No. 8.

**Claims Avoidance Review:** The Project is not required to perform a formal claims avoidance review, but does perform one on a case-by-case basis, as budgets allow and contract values necessitate. In developing the Special Provisions to Division 1 of the Contract Specifications, the Project Contract Team established access restraints, milestones, limitations of operations, liquidated damages, etc. to mitigate potential impacts to this contract and adjacent contracts.

**Life-Cycle Cost Analysis:** Although the Project did not complete a formal life-cycle cost analysis for C19E4 because the Project is not required to complete one, the Project's Operations & Maintenance (O&M) Group was intimately involved with each design submission and provided extensive review comments. The Group drew on its Project-wide O&M experience to promote a cost-effective decision with lower life-cycle costs.

Please note that the following three items are products of the fast-track design process.

**"Unauthorized" Design Work:** All redesign work was appropriately authorized. In order to support the fast-track nature of the redesign, verbal direction from the Project to the SDC was necessary. Reliance on written direction alone would have delayed progress, resulting in cost impacts and delays to the Project schedule. At the Project's request, the SDC proceeded with development of preliminary concepts in early October 1998. A Pending Change Notification (PCN) was approved shortly thereafter on October 24, followed by partial Contract Modification 14IA issued to the SDC on December 7.

**Approval of Drawings:** Of the 244 sheets in the Bid set, only three sheets were issued without a stamped seal (two of which were the Drawing Index) and four sheets were stamped but not signed. The vast majority of the drawings were stamped and signed by a professional engineer or architect registered in Massachusetts, though the seal was not necessarily hand-dated. Conformed contract documents will be issued with drawings containing all appropriate stamps, signatures, and dates.

**Fire Protection:** As discussed with OIG staff, the conformed contract documents will reflect the OIG's recommendations in this regard.

Should you have any questions, please contact John Gorman, CA/T Counsel at 951-6458.

Sincerely,  
MASSACHUSETTS TURNPIKE AUTHORITY

Patrick J. Moynihan  
CA/T Project Director

1999-2834M  
AD-2.4.2

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## **SECTION THREE**

### **Review of Ventilation Building No. 1 Contract C09A3**

#### **Final Approval Issued August 4, 1999**

**Note:** For both the C09A3 – Ventilation Building No.1 and C01B1 – Ventilation Building No. 5 contracts, this Office prepared preliminary and final reviews. The purpose of the preliminary review was to give the Project notice of problem areas either before or early in the bid process. The purpose of the final review was to reiterate significant concerns, identify issues arising from the bid process, and to grant or deny final approval for the Project to proceed with the award of the contract, since both contracts entered the bid process at approximately the same time, this Office completed a single joint preliminary review for these two contracts on March 23, 1999. The joint review and the Project’s response are contained in Section Five. This Section deals only with the final review for the C09A3 contract completed August 4, 1999.

As a result of the preliminary review, this Office informed the Project that, in this Office’s opinion, the Project was not complying with the public notice requirements of M.G.L. Chapter 149. By letter of May 14, 1999, the Project requested that this Office provide “technical assistance . . . to review and offer recommendations regarding the Project’s general compliance with the public notice requirements related to construction contracts.” By letter of August 9, 1999, this Office completed its technical assistance review as requested by the Project.

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The Commonwealth of Massachusetts

Office of the Inspector General

ROBERT A. CERASOLI  
INSPECTOR GENERAL

JOHN W. MCCORMACK  
STATE OFFICE BUILDING  
ROOM 1311  
TEL: (617) 727-9140  
FAX: (617) 723-2334

MAILING ADDRESS:  
STATE HOUSE STATION  
P.O. BOX 270  
BOSTON, MA 02133

August 4, 1999

Patrick Moynihan  
Project Director  
Central Artery/Tunnel Project  
185 Kneeland Street; 10th Floor  
Boston, MA 02110

Dear Mr. Moynihan:

This Office has completed a statutorily mandated review of documents relating to the Central Artery/Tunnel (CA/T) Project's pending C09A3 - Vent Building No. 1 (near South Station) construction contract.<sup>1</sup> *By this letter, this Office grants final approval to proceed with this contract.*

By letter of March 23, 1999, this Office forwarded to the Project its preliminary review comments for this contract. Staff from this Office subsequently met with Project staff to offer additional comments. Staff based this review on an examination of relevant project files, contract plans, specifications, estimates, and contract addenda provided by the Project. Project staff also provided a contract briefing.

The Project opened general bids for this contract on July 7, 1999. DeMatteo Construction Co. submitted the low bid at \$31.2 million. The Project estimated this contract to cost approximately \$38 million. This contract includes a ventilation building, an electrical substation, an emergency response station, a small replacement underground parking garage, and some ancillary electrical work. As you know, no construction or contractual agreement for construction of structures covered by the statutory mandate may begin before the review and approval of the Inspector General. This Office appreciates that the Project has considered and addressed many of our comments, as summarized below.

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<sup>1</sup> Section 67 of Chapter 205 of the Acts of 1996 states in pertinent part:

[MassHighway] shall have jurisdiction over the selection of designers performing design services in connection with the ventilation of buildings, utility facilities, and toll booths to be constructed as part of the central artery/third harbor tunnel project, and shall construct, control, supervise or contract [sic] said structures; provided, however, that no construction or contractual agreement for construction shall begin prior to the review and approval of the inspector general.

- **Access Restraints:** According to Project staff, the C09A3 construction schedule is dependent upon work assigned to other construction contracts. C09A3 may experience delay if other contracts fall behind schedule. After the notice-to-proceed is issued, the Project should ensure that other contractors or site access issues do not unduly impede the C09A3 contractor. Proper action will prevent costly delay claims and reduce the risk of change orders caused by additional mobilization and other delay-related costs incurred by the contractor.
- **Performance Specifications:** In Bid Alternate B for aluminum composite panels, the specifications state that the thickness of the panel would be “determined by performance requirements.” Under this provision, the construction contractor will make the final determination about, and draft specifications for, panel thickness. A minimum panel thickness should have been specified in the bid documents because thickness can affect the installation requirements, durability, and maintainability of the panel. In this Office’s view, the absence of complete panel specifications in the contract creates ambiguities that might lead to contractor claims and change orders. The recently released C19E4 – Vent Building No. 8 construction bid package does contain specifications for panel thickness. This Office knows of no compelling reason for not specifying a minimum panel thickness in all vent building contracts.
- **Filed Sub-bids:** Because of a lack of sub-bidders and the Project’s decision to reject those sub-bids significantly higher than the Project estimate for the work, the Project has allocated four sub-trade categories to the general contractor. The Project should ensure that the general contractor hires responsible subcontractors by verifying the subcontractor’s qualifications and by checking references.
- **Final Design Preparation:** B/PB staff prepared the final design drawings for the parking garage portion of the C09A3 contract even though B/PB is the design manager and construction manager for the Project. In this case, B/PB controlled the design from start to finish and will supervise the construction of the design. Even though other agencies and public employees on the Project must also approve the designs, the practice of B/PB completing final designs circumvents the Project’s system of checks and balances and undermines the system of accountability that has been established by the Project
- **Life-Cycle Cost Analysis:** According to Project staff, the Project did not complete a formal life-cycle cost analysis for the C09A3 contract. Properly conducted, a life-cycle cost analysis identifies all costs for acquisition, construction, operations, and maintenance of a facility during its expected useful life. According to Project staff, life-cycle costs are factored in during preliminary design when major design

decisions are being made, promoting more cost-effective designs with lower life-cycle costs. This Office commends these efforts but reiterates the need to include an analysis of operations and maintenance (O&M) costs. If the operator of the ventilation building (in this case the Massachusetts Turnpike Authority) concludes that projected O&M costs are too high, a further design review could be undertaken to determine if O&M costs could be reduced through design changes. Knowing potential O&M costs also allows the operator to prepare for these future expenses.

- **M.G.L. Chapter 149 requirements:** Legal staff from this Office determined that MassHighway failed to comply with sections of M.G.L. Chapter 149 concerning public notice requirements. For example, MassHighway failed to send updates to the *Central Register* listing recipients of the bid packages. By letter to the Project on April 20, 1999, this Office outlined its position. On May 14, 1999, the Project requested that this Office provide technical assistance to the Project to review compliance with public notice requirements. The Project has also agreed to begin sending updates to the *Central Register*.
- **Approval of Drawings:** The volumes of drawings contained in the C09A3 bid package did not include the necessary approval signatures from the Project and the Federal Highway Administration. Also, the individual drawings for the parking garage portion of C09A3 did not include stamps or signatures from a professional engineer registered in Massachusetts. According to Project staff, current practice allows for staff to obtain final approvals and stamps at the end of the bid process, after a contractor has been selected. In this Office's view, all individual drawings should have approval signatures and be stamped by a professional engineer registered in Massachusetts before the bid package is made available to potential bidders. By so doing, the Project indicates clearly that the design is complete and that the engineers and designers stand behind their work.

This is one of the many reviews staff from this Office has conducted and will continue to conduct under the mandates.<sup>2</sup> This Office has a responsibility to comment on Project actions and call your attention to matters that, if unresolved, could result in cost overruns, statutory violations, and increase the potential for fraud, waste, or abuse in the expenditure of public funds. This Office will gladly assist Project staff in dealing with these matters to help ensure that future contracts are not unnecessarily delayed.

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<sup>2</sup> This Office has conducted similar reviews pursuant to Section 11 of Chapter 102 of the Acts of 1994, and Section 115 of Chapter 273 of the Acts of 1994.

Patrick Moynihan  
August 4, 1999  
Page 4 of 4

This Office thanks Project staff for their continuing cooperation. If you have any questions or concerns please do not hesitate to contact Wendy Haynes, First Assistant Inspector General for Megaproject Oversight.

Sincerely,

Robert A. Cerasoli  
Inspector General

cc: James Kerasiotes, Chairman, Massachusetts Turnpike Authority  
Kevin Sullivan, Secretary of Transportation  
Matthew Amorello, Commissioner, Massachusetts Highway Department  
William Flynn, Deputy Project Director  
Hon. Mark Montigny, Chairman, Senate Ways and Mean Committee  
Hon. Paul Haley, Chairman, House Ways and Means Committee  
Hon. Robert Havern, Co-Chairman, Joint Committee on Transportation  
Hon. Joseph Sullivan, Co-Chairman, Joint Committee on Transportation

## **SECTION FOUR**

### **Review of Ventilation Building No. 5 Contract C01B1**

#### **Final Approval Issued August 11,1999**

**Note:** For both the C01B1 – Ventilation Building No. 5 contract and the C09A3 – Ventilation Building No. 1 contracts, this Office prepared preliminary and final reviews. The purpose of the preliminary review was to give the Project notice of problem areas either before or early in the bid process. The purpose of the final review was to reiterate significant concerns, identify concerns arising from the bid process, and to grant or deny final approval for the Project to proceed with the award of the contract, since both contracts entered the bid process at approximately the same time, this Office completed a single joint preliminary review for these two contracts on March 23, 1999. This joint review and the Project's responses are contained in Section Five. This Section only deals with the August 11, 1999 final review for the C01B1 contract.

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The Commonwealth of Massachusetts  
Office of the Inspector General

ROBERT A. CERASOLI  
INSPECTOR GENERAL

JOHN W. MCCORMACK  
STATE OFFICE BUILDING  
ROOM 1311  
TEL: (617) 727-9140  
FAX: (617) 723-2334

MAILING ADDRESS:  
STATE HOUSE STATION  
P.O. BOX 270  
BOSTON, MA 02133

April 7, 1999

Patrick Moynihan  
Project Director  
Central Artery/Tunnel Project  
185 Kneeland Street; 10th Floor  
Boston, MA 02110

Dear Mr. Moynihan:

This Office has completed a statutorily mandated review of documents relating to the Central Artery/Tunnel (CA/T) Project's pending C01B1 – Vent Building No. 5 (in South Boston) construction contract.<sup>1</sup> By letter of March 23, 1999, this Office forwarded to the Project its review comments for this contract. As part of the review, staff examined the plans, specifications, and estimates and all contract addenda for this contract as well as pertinent Project files. Project staff, also briefed staff from this Office on contract information and contract issues. This Office's review is based on information provided by the Project and Project staff.

The Project recently awarded the C01B1 contract to Walsh Construction Co. for \$30.8 million. As this Office has previously notified the Project, no construction or contractual agreement for construction of structures covered by the statutory mandate may begin prior to the review and approval of the Inspector General. *By this letter, this Office grants conditional approval to proceed with this contract.*<sup>2</sup> Final approval is contingent upon having all permits for this contract in place. This Office expects to receive copies of these permits as well. Final written approval will be issued to the Project upon receipt of the

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<sup>1</sup> Section 67 of Chapter 205 of the Acts of 1999 states in pertinent part:

[MassHighway] shall have jurisdiction over the selection of designers performing design services in connection with the ventilation of buildings, utility facilities, and toll booths to be constructed as part of the central artery/third harbor tunnel project, and shall construct, control, supervise or contract [sic] said structures; provided, however, that no construction or contractual agreement for construction shall begin prior to the review and approval of the inspector general.

<sup>2</sup> Conditional approval allows the Project to issue a Notice to Proceed (NTP) to the construction contractor so that the contractor can order long-lead materials, begin mobilization, perform site preparation, and other preliminary activity. The contractor should not begin work on the ventilation building itself until the outstanding permits have been obtained.

permits in question. This Office appreciates that the Project has considered and addressed our comments of March 23, 1999, which are summarized below.

The Project's practice of using change orders for significant construction and contract scope changes is a thematic concern of the statutorily mandated reviews conducted since 1994. This Office's comments highlight several areas where Project practices invite change orders to the construction contract – a costly and time consuming process. By incorporating the following comments, the Massachusetts Turnpike Authority and the Massachusetts Highway Department may minimize no-bid change orders on C01B1 and future contracts.

- **Permits:** According to Project staff, not all permits have been obtained for the C01B1 contract. Specifically, the Massachusetts Department of Public Safety and the City of Boston are withholding permits because of a disagreement relating to the use of different versions of the state building code. According to Project staff, these issues will be resolved shortly. This Office expects that the Project will obtain all necessary permits before construction work proceeds.
- **Access Restraints:** According to Project staff, the C01B1 construction contract is dependent upon work to be completed under other construction contracts. If the preparatory work is not completed, then this contract may be delayed. This Office recommends that the Project ensure that the C01B1 contractor is not issued a notice to proceed (NTP) until the construction site is accessible. After the NTP is issued, the Project must make every effort to ensure that the C01B1 contractor is not impeded by other contractors or site access issues. This will prevent costly delay claims and reduce the risk of change orders caused by additional mobilization and other delay-related costs incurred by the contractor.
- **Design changes:** According to Project staff, the Project may have to issue contract change orders, after the award of the contract, in order to make design changes. According to Project staff, the vent building louver<sup>3</sup> design may have to be changed in this manner. Apparently, this change has been under discussion for some time, but no decision about the change has been made yet. Any changes will be made through change orders to the construction contract. This Office believes that significant design alteration should not be left until the bid process or beyond. Such changes are not always avoidable, but they should be the exception not common practice. Change orders for design issues that arise during construction do not benefit from a competitive process. The Project has no assurance that it has received the best price for the work.

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<sup>3</sup> An opening fitted with horizontal slats to control airflow and to provide weather protection.

This Office strongly urges the Project to ensure that adequate and comprehensive design review, including cost control and constructibility reviews, is conducted in a manner to allow for contract changes to be made before bid packages are released to potential bidders.

- **Filed Sub-bids:** On February 23, 1999, MassHighway received filed sub-bids in 11 categories of work for the C01B1 contract. In nine of the 11 categories bids came in higher than Project estimates, bringing the total value of sub-bid work from the Project estimate of \$7.3 million to \$10.8 million, a 48 percent increase. This Office is concerned by the 48 percent difference between the Project estimate and the sub-bid amount. According to the Project's April 5, 1999 letter in response to this review, "the [office] estimate provided by the SDC [Section Design Consultant] did not include all the addenda issued during the bid period. The SDC has since submitted a revised estimate."

The Project should ensure that future Project estimates are as current as possible and include all addenda items. Changes after-the-fact can lead to confusion unrealistic bids, and an inefficient process overall.

This Office also notes that the general contract award of \$30.8 million was approximately 10 percent higher than the Project estimate. This difference was not as dramatic as the sub-bid difference, but still merits attention.

- **Life-Cycle Cost Analysis (LFCA):** It remains unclear from Project records and Project staff whether a complete LFCA has been prepared for the ventilation building in the C01B1 contract. An LFCA is conducted to identify all costs for acquisition, construction, operations, and maintenance of a facility during its expected useful life. According to Project staff, life-cycle costs are factored in during preliminary design when major design decisions are being made, promoting more cost-effective designs with lower life-cycle costs. This Office commends efforts so far, and reiterates the need to include an analysis of operations and maintenance (O&M) costs. If the operator of the ventilation building (in this case the Massachusetts Turnpike Authority) concludes that projected O&M costs are too high, a further design review could be undertaken to determine if O&M costs could be reduced through design changes.
- **M.G.L. Chapter 149 requirements:** During the course of this review legal staff from this Office determined that MassHighway failed to comply with sections of M.G.L. Chapter 149 concerning issues of public notice. For example, MassHighway failed to send updates to the *Central Register* listing recipients of the bid packages and failed to name the final designer in the Form for General Bid and Form for Sub-Bid. This Office is aware that the

Patrick Moynihan

April 7, 1999

Page 4 of 4

Project disagrees with our position concerning some issues of public notice in Chapter 149. This Office plans to address these issues with Project legal staff in the near future.

This is one of the many reviews staff from this Office has conducted and will continue to conduct under the mandates.<sup>4</sup> This Office has a responsibility to comment on Project actions and call your attention to matters that, if unresolved, could result in cost overruns, statutory violations, and potential fraud, waste, or abuse in the expenditure of public funds.

This Office strongly recommends that the Project address the issues identified in this letter and respond to them accordingly. This Office will gladly assist Project staff in dealing with these matters to help ensure that future contracts are not unnecessarily delayed.

This Office thanks Project staff for their continuing cooperation. If you have any questions or concerns please do not hesitate to contact Wendy Haynes, First Assistant Inspector General for Megaproject Oversight.

Sincerely,

Robert A. Cerasoli  
Inspector General

cc: James Kerasiotes, Chairman, Massachusetts Turnpike Authority  
Kevin Sullivan, Secretary of Transportation  
Matthew Amorello, Commissioner, Massachusetts Highway Department  
William Flynn, Deputy Project Director  
William Smith, Senior Counsel  
Hon. Mark Montigny, Chairman, Senate Ways and Mean Committee  
Hon. Paul Haley, Chairman, House Ways and Means Committee  
Hon. Robert Havern, Co-Chairman, Joint Committee on Transportation  
Hon. Joseph Sullivan, Co-Chairman, Joint Committee on Transportation

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<sup>4</sup> This Office has conducted similar reviews pursuant to Section 11 of Chapter 102 of the Acts of 1994, and Section 115 of Chapter 273 of the Acts of 1994.

## **Project Response**

**Subject: Ventilation Building No. 5 - Contract C01B1**

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By letter of July 27, 1999, the Project submitted to this Office a written response to this Office's April 7, 1999 letter granting conditional approval for the C01B1 contract. Based on this letter and discussions between Project staff and staff from this Office, this Office granted final approval by letter of August 11, 1999.

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Massachusetts Turnpike Authority  
Central Artery/Tunnel Project

July 27, 1999

Office of the Inspector General  
State House  
P.O. Box 270  
Boston, MA 02133

Attention: Mr. Robert A. Cerasoli  
Inspector General

Subject: Central Artery (I93)/Tunnel (I-90) Project  
C01B1, Vent Building No. 5  
Contract Document Revision

Reference: Chapter 205 Review Letter, dated April 7, 1999

Dear Mr. Cerasoli:

This letter is in response to the referenced review letter which comments further on six of the eleven findings contained in the original Chapter 205 Review letter dated March 23, 1999. The Project appreciates the cooperative spirit of your office in dealing with these issues and the conditional approval granted to proceed with this contract.

While the Project feels that no further comment beyond that in our April 5, 1999 response letter is necessary on the six issues discussed in your letter, we do feel that an update on the permit issues is warranted.

The disagreement between the permitting agencies over which edition of the Massachusetts State Building Code should apply to this contract has been resolved, it has been agreed by all parties that the fifth edition of the code will be used. Further, on May 12, 1999, a meeting was held with the Department of Public Safety, Boston Fire Department (BFD), the Section Design Consultant and the Project to resolve outstanding issues. At their meeting, the Section Design Consultant reviewed how it had addressed the BFD comments in the contract documents. Issues remaining to be resolved are location of fire hydrants during construction, emergency access during construction and review of the fire detection system by the new division of BFD conducting these reviews. These issues are expected to be resolved shortly and updated plans then submitted to BFD for its formal approval.

Should you have any questions or require further information on this matter, please contact Michael P. Lewis at 951-6034.

Sincerely,

MASSACHUSETTS TURNPIKE AUTHORITY

Patrick Moynihan  
Project Director

PJM/PFD/df

cc: M. Lewis 03-10-03  
EN-1.1.2  
1999-01533M

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The Commonwealth of Massachusetts

Office of the Inspector General

ROBERT A. CERASOLI  
INSPECTOR GENERAL

JOHN W. MCCORMACK  
STATE OFFICE BUILDING  
ROOM 1311  
TEL: (617) 727-9140  
FAX: (617) 723-2334

MAILING ADDRESS:  
STATE HOUSE STATION  
P.O. BOX 270  
BOSTON, MA 02133

August 11, 1999

Patrick Moynihan  
Project Director  
Central Artery/Tunnel Project  
185 Kneeland Street; 10th Floor  
Boston, MA 02110

Dear Mr. Moynihan:

By letter of April 7, 1999, this Office informed the Central Artery/Tunnel (CA/T) Project that it had completed a statutorily mandated review of documents relating to the Project's pending C01B1 – Vent Building No. 5 (in South Boston) construction contract.<sup>1</sup> This letter also granted conditional approval for the Project to proceed with this contract.<sup>2</sup> As this Office has previously notified the Project, no construction or contractual agreement for construction of structures covered by the statutory mandate may begin prior to the review and approval of the Inspector General. The Project subsequently awarded the C01B1 construction contract to Walsh Construction Co. for \$30.8 million.

This Office notified the Project that final approval was contingent upon the Project having all permits for the contract in place. At that time, Project staff informed this Office that not all permits had been obtained for the C01B1 contract. Specifically, the Massachusetts Department of Public Safety and the City of Boston withheld permits because of a disagreement relating to the use of different versions of the state building code.

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<sup>1</sup> Section 67 of Chapter 205 of the Acts of 1996 states in pertinent part:

[MassHighway] shall have jurisdiction over the selection of designers performing design services in connection with the ventilation of buildings, utility facilities, and toll booths to be constructed as part of the central artery/third harbor tunnel project, and shall construct, control, supervise or contract [sic] said structures: provided, however, that no construction or contractual agreement for construction shall begin prior to the review and approval of the inspector general.

<sup>2</sup> Conditional approval allows the Project to issue a Notice to Proceed (NTP) to the construction contractor so that the contractor can order long-lead materials, begin mobilization, perform site preparation, and other preliminary activity.

By letter of July 27, 1999, you informed this Office that the permit issue has been resolved and that only a few issues remain open with the Boston Fire Department (e.g., location of fire hydrants). This Office has reviewed your letter and is satisfied that the issue has been resolved. Accordingly, ***this Office grants final approval to the Project to proceed with construction on the C01B1 construction contract.***

This is one of the many reviews staff from this Office has conducted and will continue to conduct under the mandates.<sup>3</sup> This Office has a responsibility to comment on Project actions and call your attention to matters that, if unresolved, could result in cost overruns, statutory violations, and potential fraud, waste, or abuse in the expenditure of public funds.

This Office thanks Project staff for their continuing cooperation. If you have any questions or concerns, please do not hesitate to contact Wendy Haynes, First Assistant Inspector General for Megaproject Oversight.

Sincerely,

Robert A. Cerasoli  
Inspector General

cc: Senator Mark Montigny  
Representative Paul Haley  
Senator Robert Havern  
Representative Joseph Sullivan  
James Kerasiotes, Chairman, Massachusetts Turnpike Authority  
Kevin Sullivan, Secretary of Transportation  
Matthew Amorello, Commissioner, Massachusetts Highway Department  
William Flynn, Deputy Project Director  
John Gorman, Counsel

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<sup>3</sup> This Office has conducted similar reviews pursuant to Section 11 of Chapter 102 of the Acts of 1994, and Section 115 of Chapter 273 of the Acts of 1994, and Section 67 of Chapter 205 of the Acts of 1996.

## **SECTION FIVE**

### **Preliminary Joint-Review of Ventilation Building No. 1 – Contract C09A3 and Ventilation Building No. 5 – Contract C01B1**

**Preliminary Joint-Review Issued March 23, 1999.**

**Note:** For both the C09A3 and C01B1 contracts, this Office prepared preliminary and final reviews. The purpose of the preliminary review was to give the Project notice of problem areas either before or early in the bid process. The purpose of the final review was to reiterate significant concerns, identify concerns arising from the bid process, and to grant or deny final approval for the Project to proceed with the award of the contract. Since both contracts entered the bid process at approximately the same time, this Office completed a single joint preliminary review for these two contracts. This joint review and the Project's response are contained in this section. This Office's final reviews for the C09A3 and C01B1 contracts are found in Sections Three and Four, respectively.

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The Commonwealth of Massachusetts  
Office of the Inspector General

ROBERT A. CERASOLI  
INSPECTOR GENERAL

JOHN W. MCCORMACK  
STATE OFFICE BUILDING  
ROOM 1311  
TEL: (617) 727-9140  
FAX: (617) 723-2334

MAILING ADDRESS:  
STATE HOUSE STATION  
P.O. BOX 270  
BOSTON, MA 02133

March 23, 1999

Patrick Moynihan  
Project Director  
Central Artery/Tunnel Project  
185 Kneeland Street; 10th Floor  
Boston, MA 02110

Dear Mr. Moynihan:

We have initiated a statutorily mandated review of documents relating to the Central Artery/Tunnel (CA/T) Project's pending C01B1 – Vent Building No. 5 (in South Boston) and C09A3 – Vent Building No. 1 (near Fort Point Channel) construction contracts.<sup>1</sup> This letter addresses issues resulting from this Office's preliminary review. No construction or contractual agreement for construction of structures covered by the statutory mandate may begin prior to the review and approval of the Inspector General.

The Project estimates the cost of the C01B1 contract to be approximately \$30 million and the cost of the C09A3<sup>2</sup> contract to be approximately \$35 million. Both contracts contain a ventilation building and C09A3 also contains an electrical substation/emergency response station, a small parking garage, and some ancillary electrical work. The Project plans to award these contracts during the spring of 1999.

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<sup>1</sup> Section 67 of Chapter 205 of the Acts of 1996 states in pertinent part:

[MassHighway] shall have jurisdiction over the selection of designers performing design services in connection with the ventilation of buildings, utility facilities, and toll booths to be constructed as part of the central artery/third harbor tunnel project, and shall construct, control, supervise or contract [sic] said structures: provided, however, that no construction or contractual agreement for construction shall begin prior to the review and approval of the inspector general.

<sup>2</sup> The C09A3 construction contract is one of at least four construction contracts, valued at nearly \$700 million, designed under the D009A design contract. The D009A design contract included among other things, the I-93/I-90 northbound interchange, Fort Point Channel excavation support, and the Broadway bridge replacement.

As part of our review, we have examined the most recent plans, specifications, and estimates for these contracts as well as pertinent Project files. For each contract, the Project Engineer, Area Design Manager, and other staff briefed staff from this Office on background information and issues. Since the Project plans to issue additional addenda to the bid packages, we will review these addenda when they are made available to us.

As we have previously notified the Project, this Office cannot grant final contract approval until we have reviewed the final bid package, all addenda issued during the bid process and the bid process itself. This Office has agreed, however, to complete as much of the review as possible before the Project receives bids for the contracts in question. In this way, the Project can consider and address this Office's comments without delaying the bid award.

This Office has thus far identified the following:

- 1) **Design Costs:** The Commonwealth appears to have paid twice for the design of the U.S. Postal Service parking garage portion of the C09A3 contract.<sup>3</sup>

According to the final design contract, the final designer should have completed the garage design. According to Project staff, the Project thought it more "expeditious" for Bechtel/Parsons Brinckerhoff (B/PB) to complete the garage design work because of the looming deadline for the completion of the final design package. Apparently, the garage design had been delayed because of Postal Service design review and design changes. As a result, MassHighway issued a \$325,000 management change notice (MCN) to B/PB for the completion of the garage design. An MCN identifies changes in the scope, schedule and budget for the management consultant contract between MassHighway and B/PB.<sup>4</sup>

Based upon a review of change order records, this Office concludes that the Project had not deducted the cost of this garage design from the scope of the final design contract. It is likely then that the design fee paid to the final designer included the fee for the final design work. From this Office's review it appears that the Commonwealth has paid both the final designer and B/PB for the same design work.

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<sup>3</sup> This garage is a replacement for the current garage that the Project will need to demolish for construction purposes.

<sup>4</sup> See Project Procedure 215, Management Change Notices.

Finally, this Office is concerned by a statement in the MCN that the design was not included in *any* final design contract. Based on this Office's review, this statement is not true.<sup>5</sup> B/PB prepared this statement to explain why approvals from state managers and Federal Highway Administration officials were needed to add the design work to B/PB's own contract. The misleading information causes this Office to question the need for the MCN entirely.

- 2) **Final design preparation:** B/PB staff prepared the final design drawings for the parking garage portion of the C09A3 contract. B/PB staff had completed design work for other contracts as well. This Office believes that this practice undermines the system of accountability that had been established by the Project. B/PB is the design manager and construction manager for the Project. In cases where B/PB prepares preliminary designs, final designs, and construction management services, B/PB is in a position to review, critique, and approve its own work. Even though other agencies and public employees on the Project staff must also approve the designs, the practice of B/PB completing final designs circumvents the Project's system of checks and balances.

In addition, the completion of final designs is not a part of the most recent scope of services for B/PB (work program 14). This practice should be discontinued because of the lack of oversight and the lack of competitive procurement for these services.

- 3) **M.G.L. Chapter 149 requirements:** During the course of this Office's review, legal staff determined that MassHighway failed to comply with sections of M.G.L. Chapter 149 concerning issues of public notice. For example, MassHighway failed to send updates to the *Central Register* listing recipients of the bid packages and failed to name the final designer in the Form for General Bid and Form for Sub-Bid. This Office plans to address these issues with Project legal staff in the near future.
- 4) **Permits:** According to Project staff, not all permits have been obtained for both the C01B1 and C09A3 contracts. It is important to note that one permit is being delayed because of a possible building code violation.

This Office expects that the Project will obtain all necessary permits before the award of the construction contract. This Office may consider withholding final contract approval if relevant permits are not obtained.

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<sup>5</sup> The contract between the final designer and the Commonwealth contains 26 distinct services to be performed. The garage design was one of these services.

- 5) **Sole Source:** According to Project staff, the design for the C09A3 contract may require the contractor to purchase rain screen cladding as a sole source item. If this is the case, this Office expects that the Project will complete a detailed justification for this action **and provide a copy to this Office.**
- 6) **Cost Containment:** This Office is pleased to note that both the C01B1 and C09A3 contracts took advantage of cost saving ideas identified through value engineering and peer reviews. This Office's review, however, identified the lack of a claims avoidance review for the C09A3 contract. According to project procedures, claims avoidance reviews are "designed to mitigate construction changes, claims, and/or disputes that may arise as a result of multiple prime contracts operating at a fast track construction pace in a large and historic metropolitan environment." According to the September 1996 Finance Plan,<sup>6</sup> the claims avoidance review:
- a) Identifies ambiguities and inconsistencies in the design before advertisement for bids.
  - b) Eliminates obvious areas of potential changes, claims, and/or disputes.
  - c) Ensures that the proper risk sharing posture is addressed and accounted for in the proposed construction bidding documents.
  - d) Recommends corrective measures to prevent or mitigate exposure.

**This Office strongly recommends that the Project complete this claims avoidance review before the contract is awarded and forward a copy of the review to this Office.**

- 7) **Access Restraints:** According to Project staff, both the C01B1 and C09A3 construction contracts are dependent upon work to be completed under other construction contracts. If the preparatory work is not completed, then these two contracts may be delayed. This Office recommends that the Project ensure that the C01B1 and C09A3 contracts are not awarded until the construction sites are accessible. This will prevent costly delay claims and reduce the risk of change orders caused by additional mobilization and other delay-related costs incurred by the contractor.

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<sup>6</sup> The most recent Finance Plan (October 1998) did not refer to these reviews.

- 8) **Design changes during the bid process:** In both the C01B1 and C09A3 contracts, the Project has issued or plans to issue addenda relating to the bidding for alternate designs. The Project drafted these addenda because the potential exists for cost savings. As a result of the addenda, construction contract bidders may elect to submit bids for alternate design elements as specified by the Project. By permitting bidding on alternates the Project allows the market to decide which design would be more cost effective to construct. This Office supports such cost control efforts. However, this Office is concerned about the timing of the addition of these design alternates. According to Project staff, staff identified these alternates late in the design process and the alternates could not be incorporated into the final design package. This Office believes that significant design alteration should not be left until the bid process is already underway.

Although alternates may offer value, last-minute design changes (regardless of whether they are for cost savings) and bid package addenda could undermine the fairness of the bid process. Not all bidders have the resources to respond quickly to late design changes. Others may be discouraged from submitting bids for a seemingly incomplete design.

This Office strongly urges the Project to ensure that adequate and comprehensive design review is conducted in a manner to allow for contract changes to be made before bid packages are released to potential bidders. This Office believes that adequate cost control and constructibility reviews should be performed well in advance of bid package preparation. This Office remains concerned by the imprudence of changing contract designs during the bid process.

- 9) **Filed Sub-bids:** On February 23, 1999, MassHighway received filed sub-bids in 11 categories of work for the C01B1 contract. In nine of the 11 categories the bids received were higher than the Project estimate, bringing the total value of sub-bid work from the Project estimate of approximately \$7.3 million to \$10.8 million, a 48 percent increase. For masonry, electrical, miscellaneous and ornamental iron, and heating, ventilation, and air conditioning, the differences in the bid amount and the office estimate were each well over \$500,000. In the case of elevator work, the sub-bid amount was nearly \$200,000 higher than the \$150,000 Project estimated. Only one firm submitted a bid for elevator work.

This Office is concerned by the 48 percent difference between the Project estimate and the sub-bid amount. This Office suggests that the Project examine the reason for the discrepancies and ensure that the Project estimates are made in a timely manner. If estimates are allowed to age

because of bid schedule delays (e.g., bid addenda), estimates will be less accurate and budgeting becomes more difficult.

As you know, in the case where there is only one bidder or the lowest bid in a sub-bid category is much higher than a reasonable Project estimate, the Project may consider re-bidding these categories or using other measures allowed under M.G.L. c.149. We have been advised that the Project has chosen to reject the sub-bids for elevators and miscellaneous and ornamental iron. According to Project staff, this work will be re-bid at a later date.

- 10) **Approval of Drawings:** The volumes of drawings contained in the C09A3 bid package did not include the necessary approval signatures from the Project and the Federal Highway Administration (FHWA). Also, the individual drawings for the parking garage portion of C09A3 did not include stamps or signatures from a professional engineer registered in Massachusetts. This Office's position is that all individual drawings should be approved and stamped by a professional engineer registered in Massachusetts before the bid package is made available. Similarly, all volumes of drawings contained in a bid package should have all appropriate approval signatures *before* the bid package is made available to potential bidders.

According to Project staff, current practice allows for final approvals and stamps to be obtained at the end of the bid process, after a contractor has been selected. Using unapproved and unstamped drawings in a bid process may suggest to bidders that the Project expects design changes and change orders, and that maintaining the contract schedule overrides cost and quality control considerations. On future contracts, this Office strongly recommends that the Project have all relevant approvals, stamps, and signatures in place *before* the bid package is made available to potential bidders and the public.

- 11) **Life-Cycle Cost Analysis (LFCA):** It remains unclear from Project records and Project staff whether a complete LFCA has been prepared for the ventilation buildings and other facilities in the C01B1 and C09A3 contracts. An LFCA is conducted to identify all costs for acquisition, construction, operations, and maintenance of a facility during its expected useful life. According to Project staff, life-cycle costs are factored in during preliminary design when major design decisions are being made and this promotes more cost-effective designs with lower life-cycle costs.

This is one of the many reviews staff from this Office has conducted and will continue to conduct under the mandates.<sup>7</sup> This Office has a responsibility to comment on Project actions and call your attention to matters that, if unresolved, could result in cost overruns, statutory violations, and potential fraud, waste, or abuse in the expenditure of public funds.

**Some of the issues that we have identified in the preliminary review of the C01B1 or C09A3 contracts might cause this Office to consider withholding approval for the commencement of one or both of these contracts.** We strongly recommend that the Project review the issues identified in this letter and respond to them accordingly. We will gladly assist Project staff in dealing with these matters to help ensure that these contracts are not unnecessarily delayed.

We want to thank Project staff for their continuing cooperation. If you have any questions or concerns please do not hesitate to contact me.

Sincerely,

Wendy Haynes  
First Assistant Inspector General for  
Megaproject Oversight

cc: William Flynn, Deputy Project Director, Central Artery/Tunnel Project  
William J. Smith, Senior Counsel, Central Artery/Tunnel Project

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<sup>7</sup> This Office has conducted similar reviews pursuant to Section 11 of Chapter 102 of the Acts of 1994, and Section 115 of Chapter 273 of the Acts of 1994. Due to timing, only one other review, so far, has fallen under the statutory mandate in Section 6 of Chapter 13 of the Acts of 1996.

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## **Project Response**

**Subject: Ventilation Building No. 1 – Contract C09A3 and Ventilation Building No. 5 – Contract C01B1**

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By letter of April 5, 1999, the Project submitted to this Office a written response to the preliminary joint-review of contracts C01B1 and C09A3. This Office carefully reviewed the Project's comments and where appropriate clarified or modified its comments for the final review letter. For example, this Office accepts the Project's explanation that the scope for the garage design was removed from the final design contract and so the Commonwealth did not pay twice for the design work. However, the process of deleting the scope of work that eventually led to Project staff completing the design work is unclear. This Office also remains concerned that the process caused Project staff to become the designers of last resort for the garage. This Office reiterates its view that a conflict of interest develops when Project staff is responsible for both preliminary and final design as well as design oversight.

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Massachusetts Turnpike Authority  
Central Artery/Tunnel Project

April 5, 1999

Office of the Inspector General  
State House Station  
P. O. Box 270  
Boston, MA 02133

Attention: Ms. Wendy Haynes  
First Assistant Inspector General  
for Megaproject Oversight

Subject: Central Artery (I93)/Tunnel (I90) Project  
C01B1, Vent Building No. 5  
C09A3, Vent Building No. 1  
Contract Document Review

Reference: Chapter 205 Review Letter, dated March 23, 1999

Dear Ms. Haynes:

This letter is in response to the referenced review letter, which identifies eleven findings as a result of your review. The Project appreciated the timely and thorough review prepared by your office. The responses below follow the same numerical sequence as in your review letter for ease of reference.

1) Design Costs. The review contends that it appears the Commonwealth may have paid twice for the design of the USPS replacement parking garage (garage). The review states that the design of the garage was included in the original scope of the D009A Section Design Consultant (SDC) contract and that a review of the change order records did not indicate that this scope had been deleted. You also state your concern that the statement on the Management Change Notice (MCN) that this scope was not included in any SDC contract may not be correct.

The design of the garage was included in the original SDC scope, however, it was deleted as part of Contract Modification 16 negotiations. The Record of Negotiations for Mod 16 specifically excluded the demolition and reconstruction of the garage. The final proposal submitted by the SDC and accepted by the Project includes work for the demolition of the garage, but includes no job hours or costs for reconstructing the garage. Please refer to Attachment No.1. The Project accepted the deletion with the intent of having the USPS perform the design for its facility. However, USPS would not agree to perform the design. With time running out and the 9A SDC consumed with

support to several construction contracts, the decision was made to have B/PB perform the work so that the Project would avoid a schedule delay. In conclusion, the design was not paid for twice, and the statements on MCN that the work was not provided for elsewhere is correct.

2) Final Design Preparation. The review states concerns about B/PB personnel performing final design activities as B/PB may be in the position to review, critique and approve its own work. It further states that the completion of final design is not part of the most recent scope of services for B/PB.

In this case, the USPS and its consultant Metcalf & Eddy performed the “review, critique, and approve” role. Hence, the system of checks and balances was not violated but performed by the owner.

Regarding the IG’s contention that the completion of final designs is not listed in the Work Program 14 scope for the MC, this is simply not correct. Please refer to Section 2.1 of Work Program 14, which states “At the direction of the Department, the Consultant shall provide limited final design.”

3) MGL Chapter 149 Requirements. The review states that MHD failed to send updates to the *Central Register* listing the recipients of the bid packages and failed to name the final designer in the Form for General Bid and the Form for Sub-Bid.

With respect to your first issue relating to sending updates to the *Central Register*, we believe that this requirement is applicable to capital facility projects and that because of the definitional changes effected by St. 1997, c. 11, s.16 which removed Project buildings from the definition of “capital facility” these buildings are not subject to the provisions you describe.

With respect to your second issue relating to the inclusion of the final designer’s name on the Form for General Bid, we agree that the final designer’s name should have been included on the Form for General Bid and will include the final designer’s name in the future on such forms. We don’t believe that the omission in this case caused any actual harm, since the identity of the final designer can be easily determined by reviewing other documents in the bid package.

4) Permits. The review states that not all requisite permits have been obtained for the construction contracts and notes that one permit is being delayed because of a possible building code violation.

All permits have been obtained for the C09A3 contract. There are two permits outstanding on the C01B1 contract, the Consolidated Construction Certificate (CCC) and the Building Permit. Neither of these permits are needed until actual construction commences on the contracts.

Regarding the CCC for C01B1, draft, conditions have been included as provided to the Project by the City of Boston. The Project is currently in the process of finalizing the conditions and expects to complete this exercise shortly. It is not uncommon for the finalization of these conditions to extend beyond contract award, and thus the draft conditions are included in the bid documents to mitigate claims exposure.

Concerning the Building Permit, the issue here is not a code violation, but rather which edition of the Building Code should apply to the contract. This facility was under design during the period of transition from the fifth edition of the Building Code to the sixth edition. During this time, language in the Building Code considered both editions to be concurrently effective and allowed the end user or owner to choose which edition to use. The Project choose the fifth edition. During review of the final contract documents, the Boston Fire Department (BFD) noted that the design was not done in accordance with the sixth edition which was in effect at the time the review was conducted as the transition period had expired. The Project has written to the Department of Public Safety (DPS) requesting a ruling that the use of the fifth edition of the Building Code is appropriate for this facility. Refer to Attachment No. 2. This decision lies with DPS and not BFD. The Project is confident that DPS will rule favorably on its request and that both the CCC and the Building Permit will be obtained well in advance of the start of construction activities. In the unlikely event that DPS does not rule in the Project's favor, the Project will revise the design accordingly.

5) Sole Source. The review expresses concern that the C09A3 Contractor may have to purchase the rain screen cladding system as a sole source item and requests justification if this is the case.

This appears to be a misunderstanding. There are a number of manufacturers that can provide the rain screen cladding system for the building. Furthermore, both the 1B1 and 9A3 contracts contain alternate bids for the cladding. The successful bidder on the 1B1 contract selected the alternate to the rain screen.

6) Cost Containment. The review notes while a Claims Avoidance Review had been conducted for the C01B1 Contract, there was not one for the C09A3 Contract and recommended that one be conducted and a copy of it forwarded the OIG.

At the time the OIG's review was underway, the Project was conducting a number of Claims Avoidance Reviews. The one for C01B1 has been completed and furnished to the OIG. The review for C09A3 has been completed and recommendations contained in the review have been addressed. A copy of the review is included. Please refer to Attachment No. 3.

7) Access Restraints. The review notes that both the C01B1 and C09A3 contracts are dependent on work to be completed in other contracts and notes concern should that work in other contracts be delayed. The review further recommends that the award of the contracts not be made until the sites are accessible.

The Project is broken into a number of construction contracts all of which are dependant on other contracts in one manner or another. The Project recognizes the need for interface management and close attention to the needs of follow-on contracts. This is the reason that access restraints and interim milestones are carefully developed and included in all contracts. All of the contracts awarded to date have had these dependencies and interrelationships.

To wait to award contracts until construction sites are accessible would be imprudent and cause a significant extension to the Project schedule, thus incurring additional costs for escalation and longer periods of construction. By including access restraints and interim milestones in the construction

contracts, the Project is able to advertise and award contracts at the earliest possible time, avoiding costs associated with extended construction and allowing the contractors to make early submittals and place orders for long lead items without incurring schedule delays. With the proper development of access restraints and interim milestones, the risk of delay claims or additional mobilization is minimized.

8) Design Changes During the Bid Process. The review states that in both the C01B1 and C09A3 contracts, alternate designs were issued in addenda during the bid process and notes concern of changing contract designs during the bid process.

The Project recognizes that the decision to provide an alternative exterior cladding system was made late in the bid process. However, as this action did add an alternative for the cladding system originally in the contract and promoted competition, it was determined to be a prudent course to take. Further, all addenda developed during the course of the bidding process were carefully reviewed and approved by the Project and FHWA prior to being issued.

The Project agrees with your review that it is better if this type of change is identified earlier in the design process, but because of the potential cost savings and increased competition offered by the inclusion of an alternate cladding system, these addenda were issued. The Project will make every effort to complete all future cost containment and constructability reviews in advance of the bid period.

9) Filed Sub-Bids. The review notes that the filed sub-bids received on the C01B1 contract were higher than the Project's estimates in nine out of eleven categories resulting in the sub-bids being 48% above the Project's estimate. The review requests that the Project examine the discrepancies and ensure that estimates are made in a timely manner to avoid accuracy and budgeting difficulties.

The Project has conducted a detailed examination of the sub-bids received and found that the estimate provided by the SDC did not include all of the addenda issued during the bid period. The SDC has since submitted a revised estimate. The Project has completed an analysis of the revised estimate and the sub-bids and concluded that all of the sub-bids except the elevator sub-bid are either in line with the estimate or are validated by other bids received and are therefore acceptable. Please refer to Attachment No. 4. The elevator will be re-bid in the near future as noted in your review.

10) Approval of Drawings. The review notes that not all of the drawings in the bid package for the C09A3 contract contained signatures and stamps. The review recommended to the Project that all signatures and stamps be in place before the bid package is made available.

The Project strives to provide as complete a bid package as possible, including all stamps and signatures. At times there are some drawings with stamps and signatures missing in a bid package, however, in these instances it is usually the result of an SDC not completing its QA/QC on the document in question rather than the document being incomplete. In most cases, the documents in question are stamped and signed during the bid period.

Regarding the approval signatures on the cover sheet, in all cases the content of the bid package is

reviewed and approved by the Project and FHWA before it is made available to bidders. At times obtaining these signatures can be a lengthy process as signatories reside in different locations and may not be available. Here again, in most cases all of these signatures are obtained during the bid period.

Project policy requires that all signatures and stamps be included in the conformed contract prior to issuance to the contractor.

11) Life Cycle Cost Analysis. The review states that it is unclear whether a complete Life Cycle Cost Analysis was conducted for the C01B1 and C09A3 contracts.

As stated in your review, life cycle costs were factored into the designs for all of the Project's facilities during the preliminary design process when most of the major design decisions were made. During the early stages of the Project, the B/PB developed numerous Concept Reports dealing with items such as electrical systems, pavement systems, landscaping design, building architecture, corrosion control, exterior lighting, etc. these reports were used in the conceptual design development of all of the facilities that comprise the Project. As noted in your report, reviewing Life Cycle Costs during the early stages of design development allows for efficient decisions to be made and promotes cost effective designs with lower life cycle costs. Hence, life cycle cost analyses was not performed during the final design phase.

We trust the foregoing satisfactorily addresses the findings detailed in your Chapter 205 Review and your concurrence with these responses is requested. We request your approval of the 1B1 documents no later than April 7, 1999 so as to avoid delay and additional costs on this critical path contract. We further request your approval of the 9A3 documents no later than April 20, 1999. In order to facilitate your review of these materials we would be pleased to brief you on any aspect about which you desire additional information.

Should you have any questions or require further information on this matter, please contact Michael P. Lewis at 617-951-6034.

Sincerely,

MASSACHUSETTS TURNPIKE AUTHORITY

Patrick J. Moynihan  
Project Director

PJM/PFD/df

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1999-00943M

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## **SECTION SIX**

### **Review of Ventilation Building No. 3 Contract C17A3**

**Final Review Issued May 3, 1996**

**Note:** This Office's May 3, 1996 review letter for the C17A3 contract was included in this Office's December 1996 report relating to the mandated reviews. By letter of January 30, 1997 the Project responded to the Office's review. To ensure a fair hearing of the issues, this Office has chosen to include the Project's response in this report.

The C17A3 review was the last to be completed before the Legislature added the charge of approval to this Office's mandated review responsibility.

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# The Commonwealth of Massachusetts

## Office of the Inspector General

ROBERT A. CERASOLI  
INSPECTOR GENERAL

JOHN W. MCCORMACK  
STATE OFFICE BUILDING  
ROOM 1311  
TEL: (617) 727-8140  
FAX: (617) 723-2334

MAILING ADDRESS:  
STATE HOUSE STATION  
P.O. BOX 370  
BOSTON, MA 02133

May 3, 1996

Peter M. Zuk, Director  
Central Artery/Tunnel Project  
One South Station; Fourth Floor  
Boston, Massachusetts 02110

Dear Mr. Zuk:

My staff has conducted a statutorily mandated review of documents relating to the Central Artery/Tunnel (CA/T) Project's pending C17A3 – Vent Building No. 3 construction contract.<sup>1</sup> The Project opened the bids for this contract on April 30, 1996. The Project estimated this contract to cost approximately \$77 million. The vent building will be located on Atlantic Avenue between Russia Wharf and the Harbor Plaza buildings in downtown Boston. This is one of at least seven vent buildings the Project plans to construct to provide ventilation for the underground Central Artery roadway.

Our review of documents provided by the Project, including contract bid documents (plans, specifications, and estimates), construction contract documents, Division of Capital Planning and Operations (DCPO) certification documents, and Project right-of-way files has disclosed that MassHighway did not ensure the use of two important cost containment measures, and that the estimated Vent Building No. 3 contract cost increased significantly. In addition, we found that inadequate planning and a complicated right-of-way agreement have the potential to increase Project costs in the future. Our review identified the following concerns:

1) **Cost Increases:** Between June 1992 and December 1995 the estimated cost of this contract increased by \$28 million – approximately 60 percent – from \$49 million to \$77 million. The Project provided only a vague explanation for this staggering price change, stating that inflation and “future cost escalation” accounted for about one-third of the cost increase, the incorporation of a temporary slurry wall accounted for another one-third, and “design development and results from the differences between a conceptual plan and estimate vs. a detailed plan and estimate” accounted for the remaining one-third. According to Project staff interviewed by this Office, at the time the preliminary design study for Vent Building No. 3 was

Peter M. Zuk

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<sup>1</sup> Section 11 of Chapter 102 and Section 115 of Chapter 273 of the Acts of 1994 state in pertinent part:

[MassHighway] shall have jurisdiction over the selection of designers performing design services in connection with the ventilation of buildings, utility facilities and toll booths to be constructed as part of the Central Artery/Third Harbor Tunnel Project, and shall construct, control, supervise, or contract for said structures: provided, however, that no construction or contractual agreement for construction shall begin prior to the review of the inspector general of the commonwealth.

submitted to DCPO for certification, the Project did not have complete estimates for all projected costs and knew that costs would increase as “design development” continued.

I am troubled by the Project’s apparent disregard for this major statutory safeguard against waste in public construction. The Ward Commission found that inaccurate pre-design cost estimates contributed to waste in Massachusetts public construction projects.<sup>2</sup> The requirement that a certification study be prepared for public buildings at the pre-design stage constituted a critical component of the Ward Commission reforms and was aimed specifically at ensuring accurate cost estimates, among other necessary elements of cost-conscious design and construction. Accordingly, M.G.L. c.29, §7K requires that certification studies “provide an accurate estimate of the project requirements, cost and schedule.” DCPO’s *Guidelines for Studies of Building Projects Prepared for State Agencies, Building Authorities and Counties* further prescribes the form and content of study cost estimates.

Section 26B of Chapter 29 of the General Laws requires that before the Comptroller can authorize the expenditure of funds for the construction of Vent Building No. 3, the executive head of the agency administering this project must certify in writing that the construction work can be accomplished without substantial deviation from the study DCPO certified for the building. Current construction plans for Vent Building No. 3 deviate substantially from the study certified by DCPO in that the cost estimate for the building has increased by \$28 million – approximately 60 percent – from the estimate contained in the study. Please provide this Office with a copy of the statement MassHighway has or will submit to the Comptroller certifying that the construction of Vent Building No. 3 will be completed without substantial deviation from the 1992 study. Alternatively, please provide a copy of DCPO’s certification of any updated study containing the vent building’s significantly increased cost estimate.

2) **Claims Avoidance:** Project staff could not recall and did not provide documents by the date of this letter to show whether the Project performed a claims avoidance review for Vent Building No. 3 as required in Project Procedure 229. The claims avoidance review, which is intended to reduce the Project’s exposure to change orders, contractor claims, and contract

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<sup>2</sup> In Volume 7 of its 1980 final report to the Legislature, the Ward Commission noted:

Design projects with inadequate programs are often beset by costly program changes as the user agency tries to decide what it really wants. Changes in the scope, cost, or even function of a project can be made during design, sometimes on quite a large scale, without anyone having to justify or take responsibility for the changes. . . .

One of the major benefits of thorough and clear programming is in improved cost estimating. Cost estimates cannot be accurate when no program exists that adequately defines the project and the user’s needs. The preparation of an adequate program forces the user agency to articulate its needs; it creates a permanent record of these goals and needs to which the agency may be held, or to which later plans and estimates may be compared; and, finally, it vastly improves the initial cost estimates (conceptual estimates) that are made in the planning stages.

disputes, is required under MassHighway's contract with B/PB. MassHighway should ensure that B/PB performs this part of the Project's cost containment program for all future contracts.

3) **Value Engineering:** The Project did not conduct a specific value engineering study for this contract to identify potential cost savings.<sup>3</sup> Project staff interviewed by this Office have stated that recommendations from value engineering studies performed for other parts of the Project were applied to the Vent Building No. 3 design to generate some estimated savings. However, Project staff could not recall a specific dollar amount for the savings.

Value engineering, another essential element of the Project's cost containment effort, entails an objective review of a project's design and proposed construction methods in an attempt to meet all requirements for quality, reliability, safety, and aesthetics at the lowest possible construction or maintenance costs. As mentioned by this Office in previous Chapter 102 reviews, the cost and complexity of the Project's vent buildings merit separate value engineering studies. A study for a specific vent building would develop more specific recommendations than a study, which simply includes the vent building as one portion of the review. A value engineering study should have been conducted during final design because the potential for cost savings in the design of these multi-faceted buildings might have been significant. The September 1995 management study authorized by MassHighway and prepared by Peterson Consulting Inc. stated: "The value engineering process should also be expanded to include the final design process." I continue to recommend value engineering studies for future vent building designs.

4) **Inadequate Planning:** MassHighway has committed to develop "certain Public Amenities and Related Improvements," and develop, construct, and complete the Atlantic Avenue wharf to replace the existing wharf and retaining wall. However, the pending construction contract and contract drawings reviewed by this Office make no reference to wharf or retaining wall demolition, construction, or reconstruction or other site improvement efforts and Project staff have told this Office that, as yet, the Project has no firm plan for the award of this work. Current Project plans for improving the land near the vent building site should not be added to this vent building contract later as no-bid change order work. MassHighway's lack of planning could lead to added costs, schedule delays, and confusion later. I suggest that this work be performed under a separately bid contract that co-forms to all applicable state laws.

5) **Boston Edison Company:** The Project elected to build Vent Building No. 3 on the site of a Boston Edison substation, a decision which appears to have resulted in more than \$43 million in right-of-way and mitigation costs. This mitigation has included obtaining a new parcel of land for Boston Edison and constructing a new, enclosed substation for Boston Edison on that site. The Project has claimed that a net estimated savings of more than \$10 million in construction and other costs will accrue to the Project from this settlement. Project documents

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<sup>3</sup> MassHighway's February 1996 Financing Plan for the CA/T Project identifies value engineering as an important part of the Project's cost containment effort.

Peter M. Zuk  
May 3, 1996  
Page 4

are unclear as to how the savings were estimated. This Office intends to further analyze the accuracy of this savings estimate and complete a more thorough review of MassHighway's settlement with Boston Edison. I request that the Project provide full cooperation and assistance to my Office, including complete and timely access to Project files and Project staff.

In conclusion, for the contract in question MassHighway has neglected to fully perform at least two important cost containment reviews, and has not adequately explained a significant increase in the estimated contract cost. In addition, MassHighway should keep a close watch on the construction, mitigation, and right-of-way costs associated with its agreements with Boston Edison. MassHighway has already spent or has committed to spend \$43 million on these agreements and more expenses are likely to follow. The Federal Highway Administration has expressed concern about these costs. It is incumbent upon MassHighway to ensure that all Project expenditures are prudent and necessary.

This is one of the many reviews my staff has conducted and will continue to conduct under the mandate of the Acts of 1994. We have a responsibility to comment on Project actions and call your attention to matters that, if unresolved, could result in cost overruns, statutory violations, and other potential fraud, waste, or abuse in the expenditure of public funds. The decision as to whether and how these matters are resolved is yours.

Sincerely,

Robert A. Cerasoli  
Inspector General

cc: Secretary James J. Kerasiotes  
Commissioner Laurinda T. Bedingfield  
Deputy Director William Flynn  
Deputy Chief Counsel William Smith  
Hon. Stanley C. Rosenberg, Chairman, Senate Ways and Means Committee  
Hon. Robert A. Havern, Co-Chairman, Joint Committee on Transportation  
Hon. Thomas M. Finneran, Chairman, House Ways and Means Committee  
Hon. Thomas S. Cahir, Co-Chairman, Joint Committee on Transportation  
Commissioner Lark J. Palermo, Division of Capital Planning and Operations

## **Project Response**

### **Subject: Ventilation Building No. 3 – Contract C17A3**

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The Project responded to this Office's review of the C17A3 contract by letter dated January 30, 1997.

This Office's review pointed out areas of concern and questioned some of the Project's decisions. Although the Project response was informative, this Office stands by its review comments.

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January 30, 1997

Mr. Robert A. Cerasoli  
Office of the Inspector General  
John W. McCormack Building  
One Ashburton Place  
Boston, MA 02108

Dear Mr. Cerasoli:

I am writing in response to your May 3, 1996 letter on Central Artery/Tunnel Project Contract C17A3. Having taken care to examine each of your points in detail, we must respectfully disagree with your conclusions. I will address your concerns one by one.

### **1. Cost Increases**

You expressed two concerns about cost: The increase from the \$49 million estimate at 35 percent design to the \$77 million advertised value, and the fact that the final cost was different from the estimate approved by DCPO.

The 17A3 contract followed DCPO procedures at every stage. It is important to understand the process by which a contract progresses from design through final cost estimating and into construction. The preliminary estimate gives us a reference point for working toward an actual constructed cost, as DCPO is well aware. Significant development of the design of a building takes place after DCPO certification, which may result in changes to the original cost estimate. The early number included no allowance for escalation, the cost of construction contingency, and other indirect costs, as well as an additional element, the temporary slurry wall. In fact, direct costs increased just \$5.23 million, from \$49.27 million to \$54.5 million.

In accordance with our Memorandum of Agreement with DCPO, recertification by DCPO is required only if the building's total square footage changes. Square footage did not change on Vent Building No. 3. This understanding has remained consistent throughout the project as we have worked With DCPO on the design of all of our facilities.

For your information, on April 30, 1996, just prior to your May 3 letter, bids were opened on this contract. The low bid was \$72.4 million, or \$1 million below the office estimate and \$5 million below the advertised value.

## **2. Claims Avoidance**

You asserted that the project failed to perform a claims avoidance review for the 17A2 contract as required by Project Procedures. In this case, a decision was made to postpone the usual claims avoidance review, which our procedures call for at the 75 percent design level. Bid documents were insufficiently complete to make the exercise worthwhile and cost effective at that point. A claims avoidance review was conducted, however, during the contract formation period.

## **3. Value Engineering**

You alleged that the project failed to conduct a “specific value engineering study for this contract.” In fact 17A3 is the beneficiary of one of the most effective VE reviews conducted on the project to date.

VE works best at the design level, and on a project like ours--where contracts often share design standards and construction techniques--we study cost cutting proposals on a conceptual level that can be applied on several contracts. The value engineering study that was applied to the 17A3 contract--which underwent an unusually thorough design process because of interfaces with the MBTA and an historical building – involved the caps at the top of vent buildings’ ventilation stacks. By using all concrete for the caps instead of incorporating stainless steel, a saving of about \$254,000 was realized on 17A3. Project-wide savings on all vent buildings from this design change amount to about \$1.3 million.

## **4. Inadequate Planning**

You claimed that our planning of a wharf and retaining wall in the 17A3 area was “inadequate.” I strongly disagree. These improvements are not part of the 17A3 scope of work. They are the product of detailed planning and coordination with several entities having interests and activities on the waterfront, including the MBTA, Boston Edison, and abutters. The plan to construct the wharf and retaining wall grew out of existing arrangements with Boston Edison and the MBTA. The MBTA will build the wall and wharf under an inter-agency agreement now being developed.

## **5. Boston Edison Company**

You expressed doubts about the project’s estimate of \$10 million in net savings from a settlement negotiated with Boston Edison. We will be pleased to have you review the documentation supporting this savings at your convenience.

As a general comment, let me say that we welcome your inquiries to the extent that they help us manage the Central Artery/Tunnel Project more effectively and cost-efficiently. However, I find it necessary to ask that you consider the full context of our decisions as you examine them. Review and analysis of this project are as complex and challenging as design and construction, and we would be pleased to offer your staff whatever assistance that would be useful to better understand the way we design, estimate, and advertise contracts.

Should you have further questions, please contact Virginia Greiman of my legal staff at 951-6372.

Sincerely,

MASSACHUSETTS HIGHWAY DEPARTMENT

Peter M. Zuk  
Project Director

AD 2.4.2  
096-3620

cc: Secretary James J. Kerasiotes  
Commissioner Kevin J. Sullivan  
Deputy Project Director William Flynn  
Deputy Chief Counsel William Smith  
Hon. Stanley C. Rosenberg, Chairman, Senate Ways and Means Committee  
Hon. Robert A. Havern, Co-Chairman, Joint Committee on Transportation  
Hon. Joseph Sullivan, Co-Chairman, Joint Committee on Transportation  
Hon. Paul R. Haley, Chairman, House Ways and Means Committee  
Commissioner Lark J. Palermo, Division of Capital Planning and Operations

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## ***Appendix A***

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### **Review Process Summary**

This appendix deals with correspondence between the Project and this Office concerning the mandatory review process. The first of the four letters (November 6, 1996) was included in this Office's December 1996 report relating to the mandated reviews. Because it is an important element in the evolution of the review and approval process, the letter is again included in this report.

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The Commonwealth of Massachusetts  
Office of the Inspector General

ROBERT A. CERASOLI  
INSPECTOR GENERAL

JOHN W. MCCORMACK  
STATE OFFICE BUILDING  
ROOM 1311  
TEL: (617) 727-9140  
FAX: (617) 723-2334

MAILING ADDRESS:  
STATE HOUSE STATION  
P.O. BOX 370  
BOSTON, MA 02133

November 8, 1996

Peter M. Zuk, Director  
Central Artery/Tunnel Project  
One South Station; 4th Floor  
Boston, Massachusetts 02110

Dear Mr. Zuk:

Thank you for your letter of September 3, 1996 regarding section six of Chapter 205 of the Acts of 1996 which stipulates that no contractual agreement can begin for the construction of Central Artery/Tunnel (CA/T) Project ventilation buildings, utility facilities and toll booths prior to this Office's review and approval. We appreciate your commitment to keeping the Project on schedule and we look forward to working with you and your staff to ensure that this Office is able to fulfill its statutorily mandated review in a timely and responsible manner.

The purpose of this letter is twofold: (1) to advise you of the information we require in order to conduct a thorough review; and (2) to alert you to the types of issues that must be addressed before this Office will grant approval to proceed. Our ability to complete the reviews in a timely manner depends upon the Project's willingness to provide complete information and prompt access to staff. Without such cooperation and assistance, my staff will be unable to meet the Project's schedule.

In order to allow time for you to respond to our review, we plan to complete our review before the Project puts the contract out to bid. This will avoid contract addenda and delays while the Project incorporates our recommendations in the bid package. We also plan to monitor the bid process and eventual contract award.

To facilitate the review process, please provide the most recent list of all CA/T contracts that will require our review as well as the current bid-cycle schedule for these contracts. In addition, we will require the following information as soon as it is available for each contract subject to our review:

*Pre-advertisement*

- copy of the preliminary design feasibility study provided to the Division of Capital Planning and Operations (DCPO)
- copies of all signed DCPO and MassHighway feasibility certifications
- copies of all claims avoidance reviews
- copies of all value engineering studies
- copies of all constructability reviews
- copies of all associated mitigation agreements
- access to the project engineer
- access to the project engineer's files
- copies of all correspondence to and from the Federal Highway Administration (FHWA) regarding the approval and funding for the contract
- copy of plans, specification, and estimates and all draft bid package material

*Bidding*

- contract bid package including all addenda as prepared<sup>1</sup>
- proof of contract advertisement
- list of all firms/entities receiving the bid package
- minutes of the pre-bid meeting
- list of all pre-bid meeting attendees

*Bid award*

- copy of the notice of award for the reviewed contract

*Post award*

- change order and contract modification packages as requested

To date, this Office has completed seven statutorily mandated reviews of CA/T Project building contracts. We would like to take this opportunity to summarize the key findings and concerns identified in reviews completed to date:

1) **Cost Containment:** The Project should conduct a cost containment review prior to the completion of a final design, well before a construction contract goes out to bid. We have recommended that the Project perform a value engineering review during final design. Value engineering entails an objective review of a project's design and proposed construction methods

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<sup>1</sup> We request to be placed on the bidder's mailing list for all contract-related documents.

in an attempt to meet or exceed all requirements for quality, reliability, safety, and aesthetics at the lowest possible construction or maintenance costs. In our opinion, the cost and complexity of certain CA/T buildings and facilities merits individual value engineering studies. The Project has only conducted value engineering studies early in design or during preliminary design. Value engineering studies conducted during preliminary design might have touched generally upon CA/T building designs but a separate study during final design can address details and assumptions not available during preliminary design. The September 1995 management study prepared by Peterson Consulting at the request of MassHighway stated: "The value engineering process should also be expanded to include the final design process." We agree.

In addition to value engineering studies, this Office recommends that the Project conduct comprehensive claims avoidance reviews at the completion of final design. Claims avoidance reviews reduce the Project's exposure to change notices, contractor claims, and contract disputes. Although B/PB is contractually obligated to perform these reviews, B/PB has not reviewed every bid package. Proactive and aggressive cost containment will serve the best interests of the Project and the Commonwealth. MassHighway should ensure that B/PB performs both value engineering and claims avoidance reviews.

2) **Cost Changes:** Five of the seven reviews performed by this Office disclosed dramatic cost estimate increases during the period between Division of Capital Planning and Operations' (DCPO) design certification and the creation of the construction bid package. In most cases, the Project has been unable to satisfactorily justify these cost increases. For future building construction, we will expect the Project to identify and explain cost increases in writing. The Project has stated its commitment to controlling construction costs. Greater attention to cost escalations during design will help the Project achieve this goal.

3) **Mitigation Agreements:** Some contracts we reviewed included design elements for third party mitigation, such as a new electrical substation for Boston Edison. After reviewing contract documents, we did not understand what mitigation commitments the Project had mandated and why. MassHighway should clearly define these commitments before the award of a contract in order to avoid change notices and increased contract costs.

4) **DCPO Certification:** We have criticized the Project's failure to obtain certification or recertification – when costs or design elements change significantly – from DCPO for CA/T Project building designs. M.G.L. c.29, §7K requires DCPO certification before a state agency enters into a contract for any design or construction services for a state building. The intent of this certification is to ensure that the Commonwealth has adequately defined the scope and requirements of a facility before advancing to final design. The certification ensures that DCPO

has reviewed project costs and schedule and that the owner agency has appropriately identified its current and long-term needs. The owner agency must also certify that the design under review accurately reflects the needs of the agency. The DCPO certification requirement is a safeguard established as a result of the Ward Commission reforms instituted in the early 1980's in response to rampant corruption in public construction.

5) **Federal Funding:** In several cases, we have commented on apparent FHWA reluctance or refusal to approve certain design and mitigation elements. We expressed concern about the Commonwealth's liability for the entire cost of certain design and mitigation elements when FHWA approval is not received prior to the award of a construction contract. The Project should obtain FHWA approvals before the bid cycle begins and take every reasonable step to maximize FHWA funding.

6) **Change Notices:** In two instances, the Project has constructed public buildings through change notices (PCNs) to other construction contracts. We have consistently objected to the Project's practice of using change orders for significant construction and contract scope changes. MassHighway should know, well in advance, when the construction of a building will be necessary and should plan accordingly. MassHighway should not use PCNs to remedy inadequate planning. If MassHighway chooses to use PCNs, we expect MassHighway to prepare a written justification for the PCN and clearly define the scope of work for the contractor. We plan to review the change notices and contract modifications authorizing the construction of Project buildings.

We have also stated that under M.G.L. c.7, PCNs (which eventually become contract modifications) must include a fixed price, whenever possible, before final approval and before work can begin. Also, Chapter Seven requires that the contractor submit certified price and cost information for PCN negotiations.

7) **Modular Buildings:** In one case, we understood that the Project planned to use modular buildings for a temporary facility. MassHighway disagreed with our interpretation, stating that the planned buildings did not meet the statutory definition of a modular building. Nevertheless, this Office reiterates its position that M.G.L. c.149, §44E requires the procurement of modular facilities through the Commonwealth's competitive process. The Project should adhere to Chapter 149 when and if it has the need to procure modular buildings in the future.

Peter M. Zuk  
November 8, 1996  
Page 5

We look forward to receiving a revised timetable of CA/T building projects requiring approval by this Office. We will make every attempt to complete these upcoming reviews in a timely manner and look forward to working with you and your staff. My point of contact for these reviews will continue to be Neil Cohen, Deputy Chief for Contract Audit and Review.

Sincerely,

Robert A. Cerasoli  
Inspector General

cc: CA/T Project Oversight Coordination Commission  
Hon. Stanley C. Rosenberg, Chairman, Senate Ways and Means Committee  
Hon. Paul R. Haley, Chairman, House Ways and Means Committee  
Hon. Robert A. Havern, Co-Chairman, Joint Committee on Transportation  
Hon. Thomas S. Cahir, Co-Chairman, Joint Committee on Transportation  
James J. Kerasiotes, Secretary, Executive Office of Transportation and Construction  
Kevin J. Sullivan, Commissioner, Highway Department  
William Flynn, Deputy Project Director  
Lark J. Palermo, Commissioner, DCPO  
Virginia Grieman, Senior Project Counsel

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January 30, 1997

Robert A. Cerasoli  
Inspector General  
Room 1311  
One Ashburton Place  
Boston, MA 02108

**Re: Response to Statutorily Mandated Reviews of Central Artery/Tunnel Project  
Building Construction Contracts 1994 -1996 Report and  
Response to letter of November 8, 1996 concerning Statutorily Mandated  
Reviews and Request for Information**

Dear Mr. Cerasoli:

Thank you for your letter of November 8, 1996 and your recent Report dated December 1996, which consolidates the seven statutorily mandated reviews your Office has conducted pursuant to section six of Chapter 102 of the Acts of 1994. I would like to take this opportunity to not only summarize the Project's previous responses to the reviews, but also set forth our understanding as to the appropriate approach to the review and approval process required of the Inspector General under Section 67 of Chapter 205 of the Acts of 1996.

As indicated in your letter of November 8, 1996, in order to allow time for the Project to respond to your review, you plan to complete your review before the Project puts the contract out to bid. Pursuant to our statutory responsibilities as the Project manager, MHD is committed to completing CA/T building contracts in a timely and cost effective manner. We welcome early involvement and propose that your Office participate as a reviewing agency of all standard design submittals on contracts covered under the statute. Early involvement will not only expedite issue resolution but will be more cost effective. Reviewing all standard design submittals would be an alternative to providing the list of documents contained in page 2 of your November 8, 1996 letter. We look forward to discussing with you how this review process would be implemented.

In order to assure a timely and efficient process, we propose that your approval be obtained prior to the advertisement stage and that such approval will satisfy the Chapter 205 requirements. We propose that your Office do a post issuance review so that the Project can make any appropriate corrections in subsequent addenda. Access to Project Engineering files will be provided with reasonable advance notice and consideration of the availability of the individual.

In order to facilitate the review process, I have attached an updated listing of all CA/T contracts that your office is mandated to review. As you will note the next building contract subject to your Office's review is scheduled to be bid November 1997.

In response to the general concerns highlighted in your December 1996 Report as well as your letter of November 8, 1996, I have summarized below the Project's previous responses to your office on these matters.

**1. Cost Containment:** Your office states: "in our opinion, the cost and complexity of certain CA/T buildings and facilities merits individual value engineering studies...In addition to value engineering studies, this Office recommends that the Project conduct comprehensive claims avoidance reviews at the completion of final design..."

As we have stated in previous correspondence, the Project does not conduct value engineering for each Project facility. MHD worked closely with FHWA in deciding which facilities were appropriate for the Project's VE Program during Work Program 12. Although the VE Program is a cost containment tool that both MHD and FHWA have found useful, VE is one of many programs used in the Project's cost containment efforts. Other such programs that supplement the Project's cost containment efforts are peer reviews, claims avoidance reviews, construction lessons learned, constructability reviews and the employee cost containment suggestion program.

**2. Cost Changes:** Your office states: "Five of the seven reviews performed by this office disclosed dramatic cost estimate increases during the period between Division of Capital Planning and Operations; design certification and the creation of construction bid packages...For future building construction, we will expect the Project to identify and explain cost increases in writing..."

The Project has always responded to your office's comments, including those questioning cost increases, in writing. However, we reiterate that DCPO certification occurs during the preliminary stages when the design of a building is at a conceptual level. Significant development of the design of a building takes place after DCPO certification to get a contract to the construction bid package level, which in turn may result in changes to the original cost estimate.

**3. Mitigation Agreements:** Your office states: "...we did not understand what mitigation commitments the Project had mandated and why. MassHighway should clearly define these commitments before the award of a contract in order to avoid change notices and increased costs."

As we have previously informed your office, the Project maintains a comprehensive database to track and report on mitigation commitments pursuant to, in large part, statutorily required environmental documents such as the Project's Record of Decision and MEPA certifications. A list of commitments applicable to each contract is provided to

each selected section design consultant, who in turn works with the Project design staff to incorporate them into a contract's final Plans, Specifications, and Estimate (PS&E). As part of the PS&E, mitigation commitments are part of the cost estimate for each contract.

**4. DCPO certification:** Your office states: "We have criticized the Project's failure to obtain certification or recertification - when costs or design elements change significantly - from DCPO for CA/T Building contracts."

As we have previously informed your office, DCPO requires recertification when there is "substantial deviation" in a building's design. It is our understanding that DCPO interprets "substantial deviation" to mean a change in the building's total square footage. This understanding has remained consistent throughout the Project as we have worked with DCPO during the design of all of our facilities. This understanding is also consistent with the provisions of Section VII of Procedures for DCPO Control and Supervision of the Design of Building Projects Associated with the Central Artery/Tunnel Project.

**5. Federal Funding:** Your office states: "...The Project should obtain FHWA approvals before the bid cycle begins and take every reasonable step to maximize FHWA funding."

The Project works closely with FHWA at every step of a contract and makes every effort to maximize federal funding for every design and mitigation element that is included in a Project building contract. Specifically, your office has expressed its concerns that FHWA was not going to participate in the costs associated with the early opening of the Ted William's Tunnel. However, FHWA has agreed to maximum federal participation.

**6. Change Notices:** Your office states: "...the Project has constructed public buildings through changes notices (PCNs) to other construction contracts...MassHighway should not use PCNs to remedy inadequate planning. If MassHighway chooses to use PCNs, we expect MassHighway to prepare a written justification for the PCN and clearly define the scope of work for the contract...We have also stated that under MGL c.7, PCNs must include a fixed price, whenever possible, before final approval and before work can begin."

As the Project has previously advised your office on this matter, the Project determined in both the case of the interim State Police Facility and the temporary toll facility that it was more efficient and cost effective to have the current on site contractor construct these temporary facilities in order to facilitate the opening of the Ted Williams Tunnel. Before doing so, however, the Project reviewed carefully the legal standards by which adding change order work to ongoing contracts must be analyzed and determined that the Project was on sound legal ground proceeding with the work through a PCN and Contract Modification. In the event that the Project faces a similar situation on any future building contracts, the Project will again review the legal criteria for change order and proceed accordingly.

In response to your office's comments relative to MGL c. 7, the Project reiterates that it is our position that the chapter 7 provisions on which you rely do not apply to CA/T building

contracts. Nonetheless, we note that the Project's procedures for administering building contracts are consistent with the provision of c. 7.

**7. Modular Buildings:** Your office states: "...The Project should adhere to Chapter 149 when and if it has the need to procure modular buildings in the future."

As the Project has previously advised your office, MGL c. 149 44A provides a clear and precise definition of "Modular Building" which was carefully reviewed before the temporary toll facilities were added to the C07A1 contract. The C07A1 temporary toll facilities were trailers, not buildings, modular or otherwise, and therefore did not fall within the modular building requirements of c. 149.

The Project thanks you in advance for committing to completing your reviews of CA/T building contract in a timely manner. If you have any questions, my point of contact on this matter is Ginny Greiman of the Legal Department at 951-6372.

Sincerely,

MASSACHUSETTS HIGHWAY DEPARTMENT

Peter M. Zuk  
Project Director

AD - 2.4.2  
097-217

cc: Secretary James J. Kerasiotes  
Commissioner Kevin J. Sullivan  
Deputy Project Director William Flynn  
Senior Project Counsel Virginia A. Greiman  
Hon. Stanley C. Rosenberg, Chairman, Senate Ways and Means Committee  
Hon. Robert A. Havern, Co-Chairman, Joint Committee on Transportation  
Hon. Joseph Sullivan, Co-Chairman, Joint Committee on Transportation  
Hon. Paul R. Haley, Chairman, House Ways and Means Committee  
Commissioner Lark J. Palermo, Division of Capital Planning and Operations



The Commonwealth of Massachusetts  
Office of the Inspector General

ROBERT A. CERASOLI  
INSPECTOR GENERAL

JOHN W. MCCORMACK  
STATE OFFICE BUILDING  
ROOM 1311  
TEL: (617) 727-9140  
FAX: (617) 723-3334  
MAILING ADDRESS:  
STATE HOUSE STATION  
P.O. BOX 270  
BOSTON, MA 02133

April 29, 1997

Peter M. Zuk, Director  
Central Artery/Tunnel Project  
One South Station; 4th Floor  
Boston, Massachusetts 02110

Dear Mr. Zuk:

This letter responds to both of your January 30, 1997 letters regarding the so-called Chapter 102 reviews. One letter responded to our May 6, 1996 statutorily mandated review of the Vent Building No. 4 construction contract. The other letter responded to our November 8, 1996 letter and December 1996 report summarizing our responsibilities and findings, to date, for the statutorily mandated reviews [Chapter 205 of the Acts of 1996] of Central Artery/Tunnel (CA/T) building contracts.

We appreciate receiving your comments about the “appropriate approach to the review and approval process required of the Inspector General under Section 67 of Chapter 205 of the Acts of 1996.” We too are committed to seeing that the Project completes building construction in a timely and cost effective manner. We would like very much to complete our reviews in a timely manner so that they can have the greatest positive impact. Your letter suggested that this Office review all standard design submittals for the contracts covered under Chapter 205. We would appreciate the Project’s timely efforts to make these documents available for our review. We disagree, however, that these documents can replace the documents we have requested to review for each of the contracts covered under Chapter 205.

Additionally, you suggest that our review and approval of the contracts in question be completed prior to the advertisement stage of the contracts. Assuming we receive all of the documents we require in a timely manner, we will work to complete our review and grant tentative approval to contracts before they are advertised by the Project. As you are aware, it has been the Project’s practice to issue multiple contract addenda during the bid process. Our final approval could not be granted until all addenda have been received and reviewed by this Office. A grant of our approval, however, does not preclude us from continuing to review a contract after the contract is awarded.

We continue to be concerned that the Project has not aggressively pursued all available cost containment measures. Value engineering can and should be used at 75 percent design completion, or before, for large individual building contracts. Other cost containment tools such as claims avoidance reviews and peer reviews should be used, as well.

Your January 30, 1997 letter disputes some of our conclusions about Project actions regarding claims avoidance reviews, mitigation agreements, and force accounts by referring to Project documents. During our review, we requested all information relating or referring to the contract including claims avoidance and force account information. The Project did not provide the documents to which you now refer. If the Project does not produce a claims avoidance review or other information when requested, we justifiably conclude that the Project did not conduct a review. We, again, urge the Project to ensure that all information is provided when requested.

Thank you for your thoughtful responses and continuing cooperation and assistance. If you have any questions or concerns, please do not hesitate to contact me.

Sincerely,

Robert A. Cerasoli  
Inspector General

cc: James J. Kerasiotes, Secretary, Executive Office of Transportation and Construction  
Kevin J. Sullivan, Commissioner, Massachusetts Highway Department  
William Flynn, Deputy Director, Central Artery/Tunnel Project  
Hon. Stanley C. Rosenberg, Chairman, Senate Ways and Means Committee  
Hon. Paul R. Haley, Chairman, House Ways and Means Committee  
Hon. Robert A. Havern, Co-Chairman, Joint Committee on Transportation  
Hon. Joseph Sullivan, Co-Chairman, Joint Committee on Transportation  
Lark J. Palermo, Commissioner, Division of Capital Planning and Operations  
Virginia Greiman, Senior Counsel, Central Artery/Tunnel Project



June 11, 1997

Robert A. Cerasoli  
Inspector General  
Office of Inspector General  
One Ashburton Place  
John W. McCormack Building  
Boston, MA 02108

Dear Inspector General Cerasoli:

I am writing in response to your letter dated April 29, 1997 regarding the Chapter 205 reviews relative to the CA/T Project and procedures for facilitating your office's future reviews.

As stated in our January 30, 1997 letter, the Project believes that the most timely and cost effective approach to facilitate your office's review mandate is to participate at the design review level. This would give your office the opportunity to conduct an extensive review on an up-front and on-going basis, and thereby avoid delays during the bid and award process.

We understand that your office has concerns regarding this approach, but please be assured that it is not the Project's intent to limit the review conducted by your office. What the Project is proposing is an agreed to procedure for future reviews that will assure a thorough review conducted in a manner that avoids cost and schedule impacts.

We appreciate your commitment to conduct your reviews of CA/T Project contracts in a timely manner. Because addenda are sometimes issued shortly before bid opening, we want you to realize that you will need to commit time and resources so that bid dates do not slip. We are fully aware that the seven contract reviews that have been conducted by your office to date were in each instance conducted promptly and without delaying contract award. We also agree that timely submittal of Project documents is required for you to complete your reviews in a timely manner. Your commitment to making a conditional approval at the advertisement stage, and then promptly review all contract addenda so as not to delay contract award is greatly appreciated.

In your letter we note that you recommend that value engineering be used at, or before, 75 percent design completion for large individual design contracts. Please be reminded we conduct a peer review on selected design contracts which is similar to a value engineering review. In addition, we also recently obtained FHWA

concurrence of a SDC Value Engineering Incentive Program which awards designers for value engineering suggestions. Please be reminded that the FHWA participated fully in the development of the existing program which is a model for other FHWA transportation projects. We are proud of the Project's record on Value Engineering to date and we assure you that we are aggressively pursuing it and other cost containment measures.

I will have my staff schedule a meeting to discuss our proposal further, so that we can agree upon and document the Chapter 205 review process and schedule. In the interim, if you should have any questions or require additional information, please contact Ginny Greiman at 951-6372.

Sincerely,

MASSACHUSETTS HIGHWAY DEPARTMENT

Peter M. Zuk  
Project Director

AD-2.4.2  
097-1534

## ***Appendix B***

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### **Chapter 205 of the Acts of 1996**

SECTION 67. [MassHighway] shall have jurisdiction over the selection of designers performing design services in connection with the ventilation of buildings, utility facilities and toll booths to be constructed as part of the central artery/third harbor tunnel project, and shall construct, control, supervise or contract [sic] said structures; provided, however, that no construction or contractual agreement for construction shall begin prior to the review and approval of the inspector general.