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Office of the  
Inspector General  
Commonwealth of Massachusetts

**Gregory W. Sullivan**  
Inspector General

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A Big Dig Cost Recovery  
Referral: Waterproofing  
Mismanagement by  
Bechtel/Parsons  
Brinckerhoff in East  
Boston

March 2005

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The Commonwealth of Massachusetts  
Office of the Inspector General

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March 2005

Dear Chairman Amorello:

I am forwarding for your review the most recent findings from my Office's continuing review of potential Big Dig cost recovery cases. These findings refer to poor construction management by the joint venture of Bechtel/Parsons Brinckerhoff (B/PB).

Specifically, my Office found that B/PB failed to properly manage waterproofing installation both before and during construction of the East Boston Toll Plaza and Facilities contract. This is similar to the ongoing waterproofing issues that have led to some of the leaks in the underground artery tunnel discussed by the State Auditor in a November 2004 report. Without the proper application of waterproofing material, leaking will occur. In this case, the most serious leaks occurred because one contractor failed to install waterproofing altogether and five years later, when B/PB gave the waterproofing work to another contractor, this contractor improperly installed the waterproofing. These failures added nearly \$1 million to project costs and may cause the Massachusetts Turnpike Authority to incur added operations and maintenance costs.

Under B/PB's watch, one contractor was paid to install waterproofing but never did. Several years later, another contractor was paid 20 times more to improperly install the waterproofing. B/PB did not identify these problems. A visit to the site by staff from this Office last year found that water leaks and water intrusion continues to plague the Toll Plaza.

I recommend that the matter discussed in this report be referred for cost recovery and that B/PB be pursued for the repair of any damage that has occurred to date due to water intrusion, for its share of these cost increases, and for any future remediation of water intrusion. My staff is available to assist you in any continuing examination of this or any other issue. Thank you.

Sincerely,

A handwritten signature in black ink that reads "Gregory W. Sullivan".

Gregory W. Sullivan  
Inspector General

cc: Attorney General Tom Reilly

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## ***Introduction***

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This report by the Office of the Inspector General (Office) concerns a potential cost recovery case against the manager of the Central Artery/Tunnel Project (CA/T Project), Bechtel/Parsons Brinckerhoff (B/PB). Cost recovery is the process by which owners may file claims against design and construction management professionals for costs associated with possible errors, omissions, or other deficient practices.

This Office has issued eleven reports [See Appendix A] concerning CA/T Project cost recovery and potential cost recovery issues. This report deals specifically with nearly \$1 million in water leak and waterproofing contract modifications to the C07C1 (East Boston Toll Plaza and Facilities) contract. This Office finds that B/PB is responsible for these added costs.

The East Boston Toll Plaza and Facilities contract consisted of the I-90 Toll Plaza Support Building, the North Pedestrian Tunnel, the West Pedestrian Tunnel, the Egress Tunnel Toll Plaza Pedestrian Tunnel, and the Ramp Egress Tunnel Toll Support Building.

The Massachusetts Turnpike Authority (Turnpike Authority) awarded Barletta Engineering Corporation (Barletta) the East Boston Toll Plaza contract for a low bid of \$7.3 million. Barletta received a notice to proceed with the work in November 1999. As of June 2004, the value of the East Boston Toll Plaza contract had increased to approximately \$18.6 million from contract modifications. This is an increase of \$11.3 million or 153 percent from the original contract cost.

This contract receives no federal funding. Instead, it is supported entirely with state taxpayer dollars. In previous cost recovery referrals regarding this contract, this Office found that faulty trench drains and poor paving management may have cost the taxpayers as much as \$12 million between the Toll Plaza contract and other East Boston contracts.

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## ***Findings***

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According to CA/T Project documents, water leaks were observed throughout the East Boston Toll Plaza contract area between January 2000 and December 2004. This Office has found that these leaks resulted from the improper application of waterproofing material.

In 1995, the C07A1 (I-90 Bird Island Flats Tunnel) contractor, the joint venture of Modern Continental Construction Corporation and Obayashi Corporation (Modern/Obayashi) built the foundation for the East Boston Toll Plaza Support Building. However, Modern/Obayashi failed to apply waterproofing material on portions of the foundation of the Toll Plaza Support Building.

In 1999, Barletta Engineering won the contract for completing the construction of the Support Building and the rest of the Toll facility. After Barletta discovered that Modern/Obayashi failed to apply waterproofing to all parts of the foundation, B/PB gave Barletta the job of applying the missing waterproofing. However, project documents indicate that Barletta applied a waterproofing material that had been rejected by B/PB technical staff. As project manager, B/PB allowed these errors to occur and failed to correct them.

After the completion of the East Boston Toll Plaza contract, leaks continued to plague the Toll Plaza facilities. In February 2004, staff from this Office visited the Support Building and the Toll Plaza. Staff found water leaks, pooling of water, corrosion damage from water leaks, odors, and electrical equipment subject to water intrusion. In addition, B/PB told staff from this Office that the underground pedestrian tunnels are rarely used by Toll Plaza staff due to the water problems. In the future, these conditions could create operations and maintenance issues and added costs. These are costs that would not have occurred had waterproofing adequately been applied on the foundation of the Toll Plaza Support Building.



This series of errors raises the following questions that need to be answered through the continuing cost recovery process:

- Why did Modern/Obayashi fail to install waterproofing on all portions of the foundation?
- Why didn't B/PB, as the project manager, identify this failure when it first occurred?
- Why didn't B/PB ensure that Barletta applied the correct waterproofing material and in accordance with manufacturer's specifications?
- Why hasn't B/PB required Barletta to fix the leaks that have occurred since the completion of the East Boston Toll Plaza contract?
- Why didn't B/PB initiate a cost recovery action against Modern/Obayashi and/or Barletta?

***Finding 1: B/PB mismanagement cost the taxpayers nearly \$1 million.***

Modern/Obayashi built the Toll Plaza Support Building foundation in 1995. According to the contract specifications, the foundation of the Toll Plaza Support Building should have been waterproofed. The Massachusetts building code requires underground structures subject to possible water intrusion to be waterproofed. A 1991 geotechnical report prepared for B/PB by a B/PB subconsultant dealing with the design planning for the East Boston portion of the project stated that waterproofing would be needed for these underground structures.

Modern/Obayashi did not waterproof all the walls as required. This Office could not identify any contract documents that suggested that Modern/Obayashi had approval to omit portions of the waterproofing. B/PB did not identify this failure during foundation construction. B/PB is responsible for inspecting the work being done to ensure compliance with the applicable contract and building code requirements, such as the

application of waterproofing material. B/PB failed to ensure that these inspections were completed under the I-90 Bird Island Flats Tunnel contract.

The lack of waterproofing was not identified until 2000 when Barletta began to excavate around the foundation of the Support Building in order to construct the Toll Plaza. When Barletta unearthed the Support Building foundation, the contractor discovered that portions of the foundation had not been waterproofed.

To correct this problem, B/PB issued a \$403,000 contract modification (Modification 32 – all parts) to Barletta in the summer of 2000. The modification called for application of waterproofing material to the foundation. The estimated cost of the modification is 20 times the original cost of the 1995 waterproofing estimate of \$20,000. Since the East Boston Toll Plaza contract receives no federal funding, this contract modification was paid for entirely by Massachusetts taxpayers and tollpayers.

In addition to the \$403,000 contract modification, there have been 12 other East Boston Toll Plaza contract modifications valued at more than \$500,000 that deal with leak repairs, waterproofing, and water intrusion issues.<sup>1</sup>

***Finding 2: B/PB mismanagement continued during the waterproofing installation.***

Barletta submitted Bituthene Low Temperature, a waterproofing material, for approval by B/PB. B/PB technical staff reviewed the use of Bituthene Low Temperature and Bituthene 3000, another waterproofing material. However, while this review was still ongoing, other B/PB field staff instructed Barletta to begin using Bituthene 3000. It wasn't until after the waterproofing was completed, that B/PB technical staff concluded their review and rejected the use of the Bituthene 3000 and approved the use of Bituthene Low Temperature.

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<sup>1</sup> These additional modifications include numbers: 002, 015, 047, 052, 063, 069, 113, 114, 128, 131, 145, and 164.

CA/T Project documents are unclear, confusing, and appear incomplete concerning the waterproofing of the Toll Plaza foundation. Field engineer daily reports state that Bituthene 3000 and Bituthene Low Temperature were the materials used for waterproofing of the foundation. However, project billing documents reflect that Bituthene 5000 and 3000 were purchased. In addition, billing documents do not reveal the purchase of Bituthene Low Temperature.

### **The waterproofing may be ineffective**

Information from the manufacturer states that Bituthene 3000 should be applied “only in dry weather and at air and surface temperatures of 40°F and above.” The installation process for Bituthene 5000 also requires air temperatures of 40°F and above. According to contract documents, Barletta installed the waterproofing material between December 28, 2000 and February 2, 2001. The National Oceanic and Atmospheric Administration’s Climatic Data Center reports that the ambient temperature for the 38-day installation period averaged 28°F. Therefore, Barletta installed the material contrary to the manufacturer’s specifications and B/PB made no attempt to correct this error. According to engineers consulted by this Office, it is commonly known in the industry that if manufacturer’s specifications are not followed when applying this material the waterproofing material could fail and water intrusion may result.

Even though Barletta used a material that B/PB’s technical staff rejected and despite the fact that Barletta applied the material contrary to the manufacturer’s specifications, B/PB field staff approved the work and payment to Barletta. When questioned about this approval or sign-off, the B/PB staff person who approved the payment stated that his job was simply to ensure that Barletta’s submitted costs seemed reasonable. He stated that he had no responsibility to verify that Barletta performed the work adequately or that other B/PB staff verified the application of and quality of the waterproofing.

***Finding 3: B/PB failed to determine responsibility for the missing waterproofing.***

Following the discovery that waterproofing had not been applied to portions of the foundation in 2000, CA/T Project documents indicate both the Turnpike Authority and B/PB called for an investigation. This Office identified several CA/T Project documents concerning this investigation including:

- E-mail communications from B/PB field staff and B/PB management asking if B/PB had given permission for the omission of the waterproofing and questioning if B/PB was “liable” for any of the added costs. In both cases, the communications did not contain a response.
- Documents for the \$403,000 contract modification for waterproofing work performed by Barletta state: “...the reason(s) for the apparent omission of this work is currently being reviewed by the Project and a determination is pending.”

Even though project documents called for an investigation, four years later, this Office found no evidence that an investigation had been completed.

There is no evidence that Modern/Obayashi or another contractor has been backcharged<sup>2</sup> for omitting the full application of waterproofing to the foundation. Backcharging of a contractor is a B/PB construction management responsibility. This issue had not been identified previously for cost recovery.

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<sup>2</sup> A backcharge is when an owner or manager charges back to a contractor costs that appear to have been caused by the contractor because of an error, omission, or any other reason.

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## ***Conclusion***

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B/PB's management of the East Boston Toll Plaza waterproofing and water leak issues was substandard. B/PB failed to identify when Modern/Obayashi did not apply waterproofing to portions of the foundation as required by contract specifications. B/PB then failed to ensure that Barletta used appropriate waterproofing materials and applied these materials according to the manufacturers' specifications. For both the I-90 Bird Island Flats Tunnel and East Boston Toll Plaza contracts, B/PB did not exercise adequate management or quality control over the waterproofing work. Finally, B/PB failed to assign responsibility for the inadequate application of waterproofing and for water leaks to the appropriate contractors.

Therefore, this Office recommends that cost recovery be pursued against B/PB for the nearly \$1 million in cost increases identified in this report, for the repair of any damage that has occurred due to water intrusion, and for any future remediation of water intrusion. In addition, this Office recommends that further examination be performed to determine whether an opportunity exists to backcharge the contractors involved with the waterproofing for any of the added contract costs or necessary remediation work.

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## **Appendix A**

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### **Cost recovery related reports:**

- 1) *A Big Dig Cost Recovery Referral: Paving Mismanagement by Bechtel/Parsons Brinckerhoff.* January 2005.
- 2) *A Big Dig Cost Recovery Referral: Trench Drain Failures Led to Cost Increases.* November 2004.
- 3) *A Big Dig Cost Recovery Referral: Poor Contract Oversight by Bechtel/ Parsons Brinckerhoff May Have Led to Cost Increases.* February 2004.
- 4) *A Big Dig Cost Recovery Referral: Contract Mismanagement by Bechtel/ Parsons Brinckerhoff May Have Increased Big Dig Costs.* December 2003.
- 5) *Proposal to Pursue Big Dig Cost Recovery: Ceiling Installation in the Ted Williams Tunnel.* October 2003.
- 6) *A Recommendation for Cost Recovery Against the Big Dig's Management Consultant: Grout Heave-Related Contractor Claims on the C11A1 Contract.* February 2003.
- 7) *A History of Central Artery/Tunnel Project Finances 1994-2001: Report to the Treasurer of the Commonwealth.* March 2001.
- 8) *A Review of the Central Artery/Tunnel Project Cost Recovery Program.* December 2000.
- 9) *Statutorily Mandated Reviews of Central Artery/Tunnel Project Building Construction Contracts 1997-1999.* December 1999.
- 10) *A Review of the Central Artery/Tunnel Project's use of Anchor Bolts on the C05B1 Tunnel Finishes Contract.* December 1998.
- 11) *Statutorily Mandated Reviews of Central Artery/Tunnel Project Building Construction Contracts 1994 - 1996.* December 1996.