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INDEPENDENT STATE AUDITOR'S REPORT ON CERTAIN ACTIVITIES OF THE CENTRAL ARTERY/THIRD HARBOR TUNNEL WATER LEAK AND CEILING COLLAPSE COST AND MANAGEMENT ISSUES SEPTEMBER 2004 THROUGH NOVEMBER 2006

OFFICIAL AUDIT REPORT

JULY 30, 2007

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The Central Artery/Third Harbor Tunnel (CA/T) Project is a major 7.5-mile interstate highway Project designed to significantly reduce traffic congestion in downtown Boston through the construction of an eight-to 10-lane underground Central Artery, a four-lane underwater tunnel that crosses Boston Harbor, and a commercial traffic by-pass road through South Boston. CA/T construction, which began in 1991, was 98% complete as of September 2006. Construction extends from the I-93 Massachusetts Avenue Interchange in the south, to beyond the Leonard P. Zakim Bunker Hill Bridge over the Charles River in the north, and from the Massachusetts Turnpike interchange by the Fort Point Channel in the west, under Boston Harbor via the Ted Williams Tunnel to Logan International Airport and Route 1A in the east.

In 1989, CA/T Project management estimated that the Project, as then configured, would cost $4.4 billion and would be completed in 1998. The Project's cost estimate and completion date has been the subject of much controversy over the years due to the number of revisions made to these estimates. As of September 2006, CA/T Project officials estimate the total cost of the Project to be $14.625 billion. Subsequent to the completion of our fieldwork, the Project cost estimate was increased to $14.798 billion.

This interim report reviewed the adequacy of financial management controls to ensure that the Project recovers all water leak and deficient tunnel ceiling repair costs due the state. To date, the Office of the State Auditor has issued 21 interim reports identifying significant inaccurate, unnecessary, excessive, and avoidable project costs, as well as available savings opportunities.

Our review of the adequacy of the Project's financial management controls to ensure that the recently reported tunnel water leak and ceiling collapse repair costs due the state are recovered indicates that a system is now in place to identify those costs. However, although the Project has paid significant water leak and ceiling collapse repair costs, none of these costs have been recovered by the CA/T Project to date. Also, the Project has, to date, elected to forgo the recovery of certain overhead type costs associated with the water leak repair initiatives, including special studies, contract administration, legal, management oversight, and law enforcement expenditures. Additionally, although the Massachusetts Attorney General has filed a civil suit charging negligence against 15 companies involved in the design and construction of the tunnel ceiling, the total recoverable repair costs have not yet been determined.

Because the Project is rapidly coming to a close and key personnel are leaving, timelines should be formalized as to when Project water leak collection activity will end and the cases referred to the Office of the Attorney General for action. In addition, Project

officials should recover all of its overhead-type costs associated with the water leak and tunnel ceiling collapse issues.

INTRODUCTION

Background

The Central Artery/Third Harbor Tunnel (CA/T) Project is a major 7.5-mile interstate highway project designed to significantly reduce traffic congestion in downtown Boston through the construction of an eight-to 10-lane underground Central Artery, a four-lane underwater tunnel that crosses Boston Harbor, and a commercial traffic by-pass road through South Boston. CA/T Project construction, which began in 1991, was 98% complete as of September 2006. Construction extends from the I-93 Massachusetts Avenue Interchange in the south, to beyond the Leonard P. Zakim Bunker Hill Bridge over the Charles River in the north, and from the Massachusetts Turnpike interchange by the Fort Point Channel in the west, under Boston Harbor via the Ted Williams Tunnel to Logan International Airport and Route 1A in the east.

In 1984, the Massachusetts Highway Department (MHD) awarded a contract to the joint venture of Bechtel/Parsons Brinkerhoff (B/PB) to manage CA/T Project design and construction activities. B/PB had responsibility for project management, preliminary design, final design management, procurement, construction management and environmental services. The Massachusetts Turnpike Authority (MTA) assumed management of the CA/T Project under state law enacted in March 1997.

In 1989, CA/T Project management estimated that the Project, as then configured, would cost $ 4.4 billion and would be completed in 1998. The Project's cost estimate and completion date has been the subject of much controversy over the years due to the number of revisions made to these estimates. As of September 2006, CA/T Project officials estimate the total cost of the Project to be $14.625 billion. Subsequent to the completion of our fieldwork, the Project cost estimate was increased to $14.798 billion.

This interim report reviewed the adequacy of management controls to ensure that the Project recovers all water leak and deficient tunnel ceiling repair costs due the state. To date, the OSA has issued 21 interim reports identifying significant inaccurate, unnecessary, excessive, and avoidable project costs, as well as available savings opportunities.

Water Leaks and Tunnel Ceiling Collapse Issues

On September 15, 2004 in the northbound section of the I-93 CA/T tunnel, a large water leak occurred, causing extensive flooding and traffic disruptions. Further investigation discovered that there were two types of water leaks prevalent throughout the tunnels that have been subsequently categorized as slurry wall leaks and roof/wall interface leaks. Slurry wall leaks have high flow rates and take place due to defects in the wall construction (see Appendix III). Roof/wall interface leaks, also referred to "chronic low-level leaks," are low-volume water leaks that generally result in dampness or dripping (see Appendix IV). Project officials have estimated the cost of the ongoing effort to repair both types of water leaks to be approximately $30 million.

On July 10, 2006, several concrete ceiling panels collapsed in the I-90 section of the CA/T tunnel, killing a passenger in a vehicle and drawing attention to the methods used to anchor concrete ceiling panels to the tunnel roof (see Appendix V). Bolts and epoxy were the two anchoring devices used to hold the ceiling panels in place. This tragedy drew even more scrutiny to the Project and further agitated already concerned motorists. Although no total estimate of the cost to the taxpayer for the faulty tunnel ceiling panel collapse currently exists, based on data obtained from the Project, the total cost estimate as of May 2007 could be at least $87 million. (see Appendix II)

Both the former Governor of the Commonwealth and Project officials agreed that the responsible parties would be identified and made to pay for any deficient work. The responsible parties could include the Project management consultant, the design and construction contractors, and any companies that provided faulty materials to the Project. In connection with the ceiling collapse issue, the former Governor also ordered that an independent engineering firm perform an immediate safety inspection of the Project and in August 2006 demanded the resignation of the chairman of the MTA.

Previous Inadequate Waterproofing Issues Identified and Reported by the Office of the State Auditor

On November 18, 2004 the Office of the State Auditor (OSA) reported (No. 2003-0510-3C4) that a review of the CA/T Project's waterproofing practices for underground structures revealed that the surface preparation, installation, and contractor quality control activities were inadequate and that at least $10 million should be recovered from the responsible parties. A draft of that report was submitted to the CA/T Project Cost Recovery Team for action in February 2004. In February 2005,

the Cost Recovery Team was dissolved, and its activities were assumed by the Attorney General's Office. (See Audit Results section of this report for further discussion of the Project's water leak cost recovery activities.)

Management Controls Associated with the Recovery of Water Leak and Tunnel Ceiling Collapse Repair Costs.

In response to the OSA's inquiry about what specific financial management controls are in place to ensure that the Project recovers all water leak and tunnel ceiling collapse repair costs due the state, the Project advised us that administrative and cost control programs support management objectives for properly allocating and recovering costs associated with the repair, remediation or reconstruction of defectively performed work. Specifically, the Project reported that CA/T's policies identify and support a system of frequent inspection, identification, and documentation of work deficiencies and that follow-up is conducted at regular progress meetings with the installation contractor to ensure that any deficient conditions are corrected. In the event the installation contractor does not remedy the condition, CA/T could elect to have another contractor correct the work. The correcting contractor would be compensated by CA/T, and the offending contractor notified that a backcharge would be initiated to recover the remedial costs.

Section 508 of the Resident Engineering Manual and Project Directive No. 62, titled "Construction Contracts Backcharge Resolution Plan," provides backcharge policy guidelines, establishes a tracking database, and provides detailed procedures to be followed in the resolution of backcharges. Other administrative processes that support the backcharge process include:

- Use of deficiency reports to identify and monitor defective work.
- Completion of work/punchlist items that must be completed before substantial or final contract closeout is allowed.
- Retention of contract progress payments.
- Use of negotiated credit contract modification or the issuance of unilateral charge orders.
- Use of global settlement at the time of contract closeout that would include the backcharge credits due.
- Withholding of contract retainage on open contracts.
- Invoicing of contractors for backcharges on closed contracts.

- Invoking of warranty and liability provisions of the contract.
- As a last resort, seeking of recovery in court for the costs associated with deficiencies, latent conditions, and other design and construction defects.

Audit Scope, Objectives, and Methodology

Our audit, which is ongoing, included an evaluation of the management controls in place and actions taken to ensure that the Project recovers all tunnel water leak and deficient tunnel ceiling repair costs due the state. In order to accomplish these objectives, we employed several audit tests and procedures during our examination. We reviewed applicable laws, regulations, and internal operating policies and procedures and Federal Highway Administration and other related reports and interviewed cognizant Project and management consultant officials. We also reviewed the State Attorney General's Office Cost Recovery Agreement with the Project. In addition, we reviewed contract modifications and amendments, cost records, correspondence files, and other documents, including internal reports and external consultant studies relative to the issue. Our examination was made in accordance with applicable generally accepted government auditing standards for performance audits.

AUDIT RESULTS

RECOVERY OF TUNNEL WATER LEAK AND CEILING COLLAPSE COSTS: A COSTLY AND LENGTHY PROCESS

Our review of the adequacy of the Central Artery/Third Harbor Tunnel (CA/T) Project's management controls to ensure that all tunnel water leak and ceiling collapse repair costs due the state are recovered indicates that a system is now in place to identify those costs. However, although the Project has paid for significant water leak and ceiling collapse repair costs, none of these costs have been recovered by the CA/T Project to date. Also, the Project has elected to forgo the recovery of certain overhead type costs associated with the water leak repair initiatives, including special studies, contract administration, legal, management oversight and law enforcement expenditures. Additionally, although the Massachusetts Attorney General has filed a civil suit charging negligence against 15 companies involved in the design and construction of the tunnel ceiling, the total recoverable repair costs have not yet been determined.

Because the Project is rapidly coming to a close and key personnel are leaving, timelines should be formalized as to when Project water leak collection activity will end and legal action initiated. The water leak and ceiling collapse cost recovery efforts are discussed below.

a. Recoverability of Water Leak Costs

The recoverability of water leak repair costs currently being monitored by the CA/T Project total approximately $29.6 million. To ensure that the Project maintains its construction schedule, water leak repairs are often made by a third party, which is reimbursed by the Project before recovery action is taken against the original contractor. Although the Project has paid for the completed repairs, no costs have been recovered to date. The Project estimates that it will absorb only approximately $2.7 million of the repair charges and that the remainder will be recovered or disposed of as follows:

Summary of Water Leak Costs	Amount (In millions)
Backcharges to the responsible contractor	$13.6
Potential recoveries from insurance proceeds	3.2
Contractor's claim for reimbursement to be rejected as not having merit	10.1
Repair costs the Project acknowledges it will absorb	2.7
Total	$29.6

Source: CA/T Project provided document

Each of these actions is discussed below, and a more detailed breakdown of the water leak repair costs by I-93 and I-90 mainline tunnels is included as Appendix I.

Backcharges to the Responsible Contractor

CA/T provided us with a schedule that showed that approximately $13.6 million of the $29.6 million in estimated Project-wide tunnel water leak repair costs were backchargable costs that would be recovered from the contractors that should have performed the original work satisfactorily. We reviewed approximately $11 million, or 81% of the actual and potential backcharges, to determine the likelihood that these backcharges would be reimbursed to the CA/T Project by the responsible contractors. Our review indicated that in almost every case, the contractors were of the opinion that they had no responsibility for paying the backchargable amounts and that, to date, the CA/T Project has recovered none of the backcharges. How much of the $13.6 million will be ultimately accepted by the contractors as their responsibility versus how much will be challenged by the contractor and submitted as a claim against the Project is unknown at this time. However, as pointed out in the Office of the State Auditor report No. 2002-0510-3C1, dated July 22, 2002, CA/T settlements of over $2.9 billion in past contractor proposed claims showed that the Project settled these claims for $1.4 billion, or 49.4% of the proposed claim amount. Using the historical 49.4% settlement rate if the contractors reject these backcharges in total, the Project could expect to recover only approximately $7 million of that amount.

Potential Recoveries from Insurance Proceeds

Project officials plan to recover approximately $3.2 million of water leak repair costs through its Owner Controlled Insurance Program (OCIP). During 2004, the Project identified water-leak-related damage to fireproofing materials throughout the I-93 Tunnel with an estimated repair cost of $2 million and to a 1,000-foot electrical cable in a vent building with an estimated repair cost of $1.2 million.

The Project has notified its insurance carriers that it plans to submit a formal claim for each of these issues once the actual repair costs are determined. Each insurance claim has a $250,000 deductible. Assuming the claims are fully accepted and paid by the insurance carriers, the Project will recover only $2.7 million.

Contractor's Claims for Reimbursement to Be Rejected as Not Having Merit

The Project estimates that approximately $10.1 million of potential contractor water leak repair costs claims will be submitted but rejected by the Project as having no merit. Approximately $5 million of that amount has been formally submitted to date. As discussed above, the Project has been settling contractor claims historically at the rate of 49.4%. If history prevails, the Project could be exposed to additional water leak repair costs of approximately $5.1 million under this category.

Repair Costs That the Project Acknowledges It Will Absorb

The Project acknowledges that it is responsible for approximately $2.7 million of the water leak repair cost charges, or about 9% of the $29.6 million of the total water leak repair bill. According to Project officials, these were unavoidable costs due to construction scheduling and contractual issues.

Other Potentially Recoverable Costs

The Project has incurred, but has elected to forgo the recovery of, certain costs associated with the water leak problem, including special studies and CA/T overhead costs such as added contract administration, legal, management oversight and law enforcement expenditures. The Project advised us that it did not have an estimate of these costs readily available. However, as noted in our review of the ceiling collapse cost recovery efforts, such costs are being accumulated and should be considered in recovery efforts.

Legal Efforts to Recover Costs

In 2003, the Massachusetts Turnpike Authority (MTA) established a Cost Recovery Team to recover unnecessary Project costs incurred through faulty Project management, design, or construction. In February 2005, in an attempt to enhance its cost recovery efforts, the Project entered into an agreement that transferred the management, direction, and supervision of the cost recovery effort to the Massachusetts Office of the Attorney General. In connection with the current water leak problems discussed in this report, none of the $30 million in water leak repair costs have been referred to the Office of the Attorney General for follow-up action. The Project Director advised us that the Office of the Attorney General

will be asked to act on the water leak issue only after all other contractual remedies, such as Project backcharge negotiations, settlements, etc., are exhausted.

Conclusion

Although the Project acknowledges that it is responsible for approximately $2.7 million, or 9%, of the $29.6 million identified as water leak repair costs, that amount could reach as high as $15.2 million, or 51%, depending upon the outcome of the actions described above should contractor claims continue to be settled at the Project's historical settlement rate. Moreover, in connection with water leak costs, the Project had elected not to pursue the recovery of certain CA/T overhead and special study costs associated with the water leak problem because it considers these costs to be part of the Project's routine management oversight activity.

b. Recoverability of Ceiling Collapse Costs

On July 10, 2006, several concrete ceiling panels collapsed in the I-90 section of the CA/T tunnel, killing a passenger in a vehicle and drawing attention to the methods used to anchor concrete ceiling panels to the tunnel roof. The Commonwealth enacted emergency legislation giving the former Governor the authority to conduct a safety and engineering inspection of the tunnels and to close any deemed unsafe for travel. The former Governor also demanded the resignation of the Chairman of the MTA, which occurred in August 2006.

The former Governor immediately initiated a "stem to stern" safety review of the Project utilizing the services of an outside nationally recognized engineering firm. Although no total estimate of the cost to the taxpayer for the faulty tunnel ceiling panel collapse currently exists, based on data obtained from the Project, the total cost could be at least $87 million. This estimate includes inspection, design, and repair costs and at least $14 million for other damages, such as lost toll revenue and police detail expenditures. How much of this cost will be recoverable from the contractors and insurance companies is unknown at this time. The estimate also does not include any costs associated with the wrongful death lawsuit filed by the family of the deceased motorist.

Because of the recentness of this problem and the number of investigations underway as to which party or parties are responsible, we were told by the Project Director that it is too early

for the Project to provide a definitive estimate of the amount of repair costs that would be recoverable and from whom. Ongoing federal investigations include the National Transportation Safety Board, the U.S. Attorney's Office, and the Department of Transportation's Office of the Inspector General. State-initiated reviews include the "stem to stern" independent engineering review requested by the former Governor. Moreover, a Grand Jury is currently investigating the tunnel ceiling collapse for criminal wrongdoing and, according to the Massachusetts Attorney General, that investigation is still ongoing. Also, the former Massachusetts Attorney General filed a civil suit (No. 06-4933-BLS1) in late November 2006 against 15 companies involved in the design and construction of the tunnel ceiling, charging that their negligence led to the collapse.

The former Governor anticipated that cost recoveries based on flawed workmanship and design would be achieved, but progress on that matter rests on the outcome of the above investigations.

Conclusion

The CA/T Project is rapidly coming to a close, and key personnel have and will continue to leave the Project. Consequently, it is imperative that Project officials fully identify and document all known water leak and ceiling collapse costs immediately and diligently pursue action to recoup those costs at the earliest possible time.

Recommendation

Project officials should identify specific timeframes for ending Project collection activity and referring the case to the Office of the Attorney General for recovery of the water leak costs. Project officials should also recover all of its overhead type costs associated with the water leaks and tunnel ceiling collapse issues.

Auditee's Response

The CA/T Project Director advised us that the MTA agrees with our assessment that an adequate system is in place to identify water leak and ceiling repair costs and concurs that the Commonwealth should continue to pursue recovery of appropriate costs from responsible parties. Further, the Project Director stated that the MTA continues to work closely with the

Office of the Attorney General in pursuit of CA/T Project-related cost recoveries and that it was supporting all relevant federal and state investigations.

Auditor's Reply

We are pleased that the Project is working closely with the Office of the Attorney General in pursuit of CA/T-related cost recoveries. For that reason, we believe that a decision should be made by the Project as to when the long-standing water leak cost recovery problems discussed in this report should be referred. As we indicate in this report, thus far none of the $30 million water leak repair costs have been referred to the Attorney General for action, and no timeline has been established by the Project for doing so.

Because the Project is rapidly coming to a close and key personnel are leaving, we again recommend that Project officials identify specific timelines as to when Project collection activity on the $30 million water leak repair costs will end and the cases referred to the Office of the Attorney General for follow-up action to recover the water leak costs. In addition, Project officials should recover all of its overhead-type costs associated with the water leaks and tunnel ceiling collapse issues.

APPENDIX I

CA/T Tunnel Leak Repair Cost Status

(In Millions)

	Estimated Total Cost Exposure	Potential Claims Without Merit	Potential Backcharge Recoveries	Potential OCIP Insurance Recoveries	Project Exposure
I-93 Tunnel Leak Repair Cost Status	$26.6	$9.7	$13.0	$3.2	$0.7
I-90 Tunnel Leak Repair Cost Status	3.0	0.4	0.6	-	2.0
Totals	$29.6	$10.1	$13.6	$3.2	$2.7

Source: CA/T Project provided document.

APPENDIX II

Estimated Cost of I-90 Ceiling Collapse

As of May 2007

Stem to Stern Audit		$20,000,000
Tunnel Repairs:		
CA/T	$43,730,000	
Executive Office of Transportation	$9,756,783	
Total Tunnel Repair Costs		$53,486,783
Lost Toll Revenue	$7,700,000	
Police Details	$5,800,000	
Total Other Costs		$13,500,000
Total Estimated Costs		$86,986,783

Source: CA/T Project provided documents.

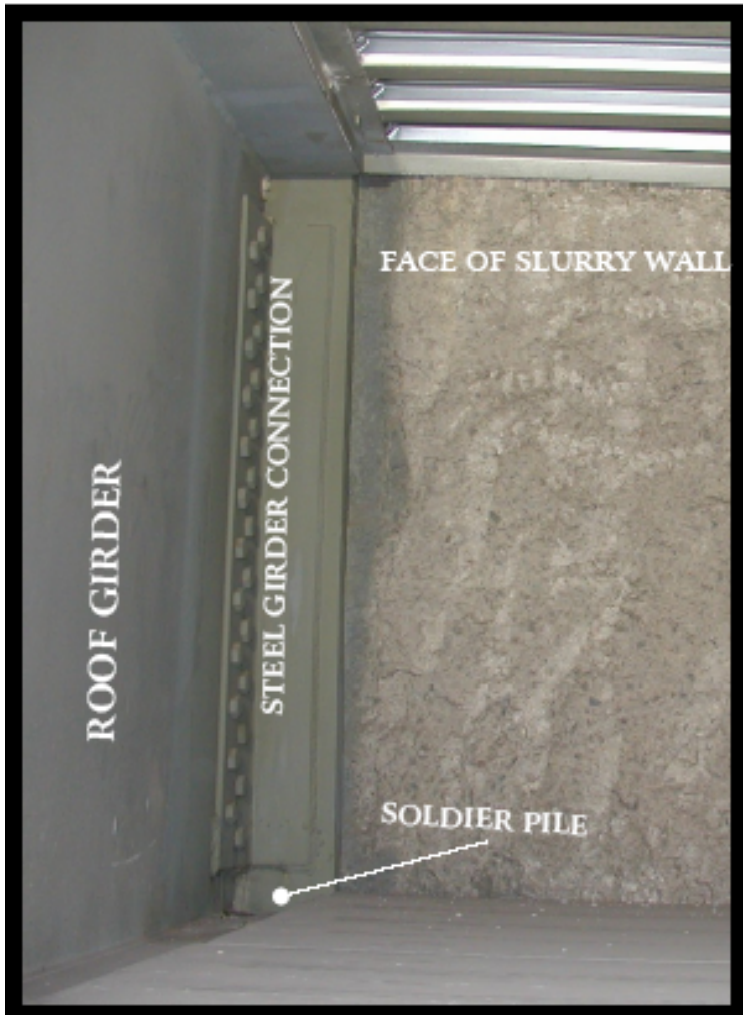
APPENDIX III

Slurry Wall Breach

APPENDIX IV

Low-Volume Water Leaks

DRY BAY END



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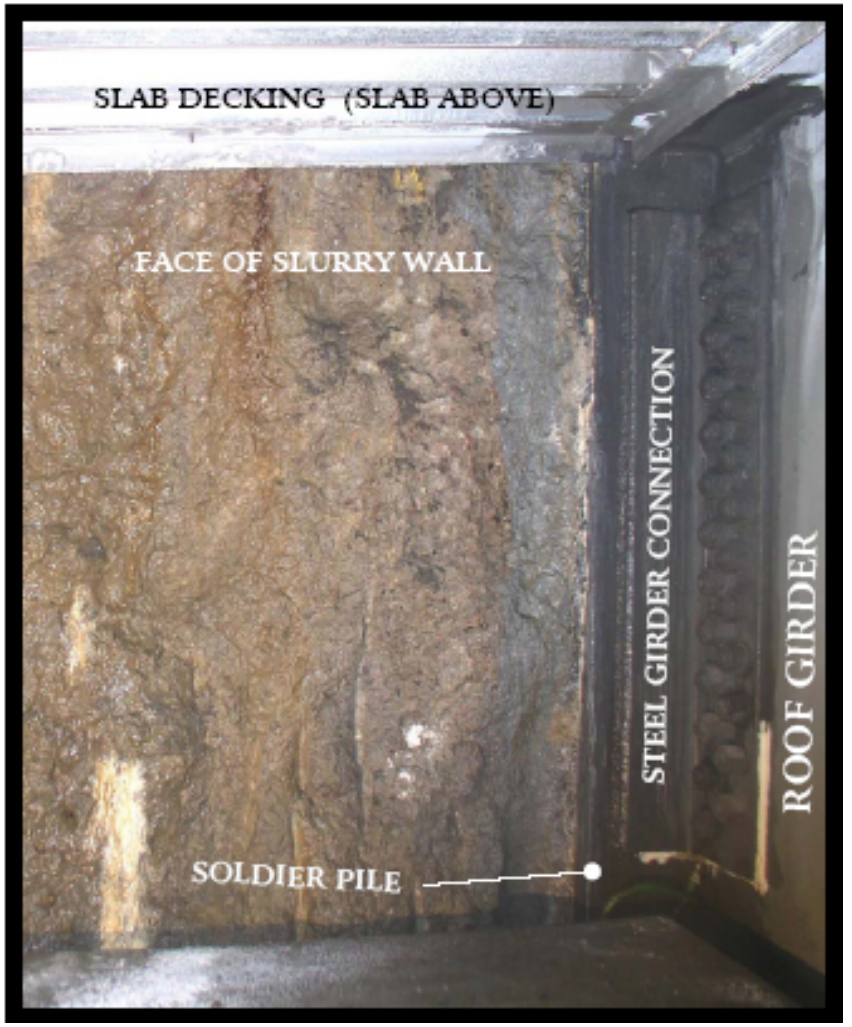

APPENDIX V

Interstate 90 Tunnel Ceiling Collapse