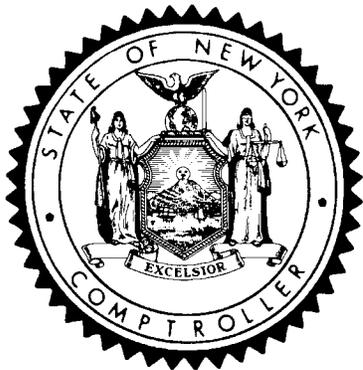


***State of New York
Office of the State Comptroller
Division of Management Audit
and State Financial Services***

**PORT AUTHORITY OF NEW YORK
AND NEW JERSEY**

**TUNNEL MAINTENANCE AND
INSPECTION PROGRAM**

REPORT 98-S-71



H. Carl McCall
Comptroller



State of New York Office of the State Comptroller

Division of Management Audit and State Financial Services

Report 98-S-71

Mr. Lewis M. Eisenberg
Chairman
Port Authority of New York and New Jersey
One World Trade Center
New York, NY 10048

Dear Mr. Eisenberg:

The following is our audit report on the Port Authority of New York and New Jersey's tunnel maintenance and inspection program.

This audit was performed according to the State Comptroller's authority as stated in Section 7071 of the Unconsolidated Laws of New York. We list major contributors to this report in Appendix A.

*Office of the State Comptroller
Division of Management Audit
and State Financial Services*

May 24, 2000

Executive Summary

Port Authority of New York and New Jersey Tunnel Maintenance and Inspection Program

Scope of Audit

The mission of the Port Authority of New York and New Jersey (Authority) is to identify and meet the critical transportation infrastructure needs of the bi-state region's businesses, residents and visitors: providing the highest quality, most efficient transportation and port commerce facilities and services that move people and goods within the region, provide access to the rest of the nation and to the world, and strengthen the economic competitiveness of the New York-New Jersey metropolitan region. The Authority operates the Holland and Lincoln tunnels, which provide vehicular links between New York and New Jersey under the Hudson River. The Holland Tunnel, which has two tubes, was opened to traffic in 1927; the larger Lincoln Tunnel was opened in three stages in 1937 (center tube), 1945 (north tube), and 1957 (south tube). In 1998, a total of 17.3 million and 21.2 million vehicles passed through the Holland and Lincoln tunnels, respectively. The Authority's Tunnels, Bridges and Terminals Department (TB&T) is responsible for operating the tunnels.

The Holland and Lincoln tunnel facilities include a variety of buildings, located on both the New York and New Jersey sides of the Hudson River. These buildings contain a system of ventilator fans and air shafts that circulate clear air throughout the length of the tunnels. The air in each tunnel is moved by a number of blowing and exhaust fans. The tunnel facilities undergo regular inspections and rehabilitation so that their structural soundness, safety, and efficiency will be maintained despite heavy use.

The Authority, in consultation with outside engineering resources, has developed requirements for the inspection and maintenance of its tunnel facilities. The tunnels' critical components — e.g., its duct systems, electrical systems, and air testing devices — are inspected on varying frequencies that can range anywhere from daily to annually by Authority staff; and their structural integrity is inspected every two years, usually by outside consultants. The Authority sets the number of staff hours for the annual structural inspection program and the corrective repair work routines at each tunnel. Work orders are used to document the work assigned to the tunnels' 162 maintenance staff, whose salaries in 1998 totaled almost \$8.5 million.

Our audit addressed the following questions regarding the Authority's tunnel maintenance and inspection program during the period of April 1, 1997 through May 31, 1999:

- ! Is the program functioning satisfactorily in terms of the Authority's own requirements and operating procedures?
-

! Does TB&T have an effective system for monitoring the productivity of the staff assigned to maintain and inspect the tunnels?

Audit Observations and Conclusions

We found TB&T does not have adequate internal control and recordkeeping systems as they relate to the tunnel maintenance and inspection program. We experienced extraordinary delays in obtaining records and reports we requested for the audit. We found the records we eventually received, whether they were used by TB&T to substantiate work done or to keep track of deficiencies found and facilities in need of repair, to be of poor quality, with missing and outdated information. TB&T officials need to implement an internal control system that enables them to properly manage the tunnel inspection and maintenance program. (See pp. 5-10)

The Authority has established criteria and procedures for the required tunnel inspections and follow-up repairs. However, we found that TB&T has not repaired some cited deficiencies for as long as six years, and has not identified or reported other needed repairs. As of April 1999, there were 67 outstanding biannual inspection repair recommendations, including 31 repairs that had been recommended to be made during the period of 1993-96. We visually confirmed several of these conditions, accompanied by TB&T staff, which included severely cracked and bulged exterior brick walls in the Holland Tunnel ventilation buildings. We also noted conditions in these same buildings that have not been reported, such as holes in steel girders, and overdue electrical transformer inspections. TB&T officials must take action to ensure that deficiencies are identified and corrected timely. (See pp. 11-17)

We also found that management has not established an effective system for monitoring the productivity of the maintenance staff. At the Lincoln Tunnel, work orders could not be produced to substantiate the work reportedly performed. At the Holland Tunnel, the work orders were incomplete or missing essential information; yet supervisors had certified these work orders as completed. TB&T officials need to investigate the reason(s) for the incomplete, incorrect, and missing work orders; and develop an action plan for addressing these problems, including the need for proper supervisory oversight. (See pp. 19-21)

Comments of Authority Officials

Authority officials indicate that the tunnels have and will continue to be maintained in a safe and efficient manner to ensure patron access and safety. They added they are open to recommendations to strengthen their program and have taken action to implement most recommendations included in this report.

Contents

Introduction	Background	1
	Audit Scope, Objectives and Methodology	2
	Response of Authority Officials	3
<hr/>		
Internal Control System	Control Environment	5
	Communications	7
	Control Activities	7
	Monitoring	8
	Recommendation	10
<hr/>		
Tunnel Inspections	Biannual Inspections	11
	Annual Inspections	15
	Recommendations	17
<hr/>		
Work Orders and Staff Productivity	19
	Recommendations	21
<hr/>		
Appendix A	Major Contributors to This Report	
<hr/>		
Appendix B	Comments of Authority Officials	

Introduction

Background

The mission of the Port Authority of New York and New Jersey (Authority) is to identify and meet the critical transportation infrastructure needs of the bi-state region's businesses, residents and visitors: providing the highest quality, most efficient transportation and port commerce facilities and services that move people and goods within the region, provide access to the rest of the nation and to the world, and strengthen the economic competitiveness of the New York-New Jersey metropolitan region. The Authority develops, operates, and maintains facilities and transportation systems to strengthen the region's economy, to encourage the uninterrupted flow of people and goods, and to provide a high-quality, customer-oriented transportation service that is fast, efficient, reliable, and integrated with other regional transportation systems.

The Authority operates two tunnel facilities: the Holland and Lincoln tunnels. The tunnels provide vehicular links between New York and New Jersey under the Hudson River. The Holland Tunnel links lower Manhattan around Canal Street to Jersey City, and the Lincoln tunnel links midtown Manhattan to Weehawken, New Jersey. The Holland Tunnel, which has two tubes, was opened to traffic in 1927, followed by the Lincoln Tunnel, which has three tubes and opened in three stages in 1937 (center tube), 1945 (north tube), and 1957 (south tube). In 1998, a total of 17.3 million and 21.2 million vehicles passed through the Holland and Lincoln tunnels, respectively. The Authority's Tunnels, Bridges and Terminals Department (TB&T) is responsible for operating and maintaining the tunnels.

The tunnel facilities include a variety of structures, such as ventilation buildings, service buildings, and ancillary structures (e.g., retaining walls, protective structures, and pump rooms) that are located in both New York and New Jersey. The Holland Tunnel, for example, has four ventilation buildings (two on each side of the Hudson River). The buildings contain a system of ventilator fans and air shafts to circulate clear air throughout the length of the tunnel. This air is moved by numerous blowing and exhaust fans. Tunnel facilities are to undergo regular inspection and rehabilitation so that their soundness, safety, and efficiency will be maintained despite heavy use.

New York State Law does not stipulate specific inspection, repair, or maintenance requirements for tunnels. However, the Authority, in consultation with outside engineering resources, has established requirements for ensuring that the structural integrity of its tunnels, related buildings, and other property is maintained. For example, tunnel inspections include a comprehensive type performed every two years, as well as regular annual routine inspections. The comprehensive inspections are usually conducted by consulting engineers. The Authority's Quality Assurance Division engineers

working within the Engineering Department participate in the hiring of the consultants, review their work, and are responsible for ensuring that any serious structural deficiencies discovered during inspections are repaired immediately. The Authority has also established a system for monitoring and reporting on inspection results and for resolving any deficiencies found during the inspections. The Authority's TB&T Structural Integrity Unit (SIU) is responsible for reviewing reports of the inspectors' findings and conclusions and their recommendations for remedial repair work.

TB&T has 162 maintenance employees assigned to conduct regular inspections, repairs, and maintenance at the two tunnels on a daily basis: 83 at the Holland and 79 at the Lincoln. At each tunnel, TB&T also employs 13 and 12 supervisors respectively, including a chief maintenance supervisor, who reports to the General Manager at each facility. Personal service costs in 1998 totaled nearly \$8.5 million (\$4,237,000 for the Holland; \$4,224,000 for the Lincoln).

Audit Scope, Objectives and Methodology

We reviewed the Authority's tunnel maintenance and inspection program for the period of April 1, 1997 through May 31, 1999. The objectives of our performance audit were to determine whether the Authority's program is functioning satisfactorily according to its own requirements and operating procedures, and whether the Authority has established an effective system for monitoring the productivity of the staff assigned to maintain and inspect the tunnels. To accomplish these objectives, we reviewed the Authority's requirements and procedures for inspecting and maintaining both tunnels, examined inspection reports from outside consultants and work orders issued for each facility, and interviewed TB&T and facility officials. We also verified the types of inspections to be performed, and reviewed the manner in which the deficiencies observed by inspectors have been resolved. We toured the facilities to observe the state of repair of the reported deficiencies.

We conducted our audit in accordance with generally accepted government auditing standards. Such standards require that we plan and perform our audit to adequately assess those Authority operations within the audit scope. Further, these standards require that we understand the Authority's internal control structure and compliance with those laws, rules and regulations that are relevant to the operations included in our audit scope. An audit includes examining, on a test basis, evidence supporting transactions recorded in the accounting and operating records and applying such other auditing procedures as we consider necessary in the circumstances. An audit also includes assessing the estimates, judgments, and decisions made by management. We believe that our audit provides a reasonable basis for our findings, conclusions and recommendations.

We use a risk-based approach to select activities for audit. We focus our audit efforts on those activities we have identified through a preliminary survey as having the greatest probability for needing improvement. Consequently, by design, we use finite audit resources to identify where and how improvements can be made. We devote little audit effort reviewing operations that may be relatively efficient or effective. As a result, we prepare our audit reports on an “exception basis.” This report, therefore, highlights those areas needing improvement and does not address activities that may be functioning properly.

Response of Authority Officials

Draft copies of this report were provided to Authority officials for their review and comment. Their comments have been considered in preparing this report and are included as Appendix B.

Within 90 days after final release of this report, we request that the Chairman of the Port Authority of New York and New Jersey report to the Governor, the State Comptroller, and leaders of the Legislature and fiscal committees, advising what steps were taken to implement the recommendations contained herein, and where recommendations were not implemented, the reasons therefor.

Internal Control System

An organization's internal control system integrates the activities, plans, attitudes, policies, and efforts of the entity's board of directors, managers, and staff working together to provide reasonable assurances that the entity will achieve its mission and objectives. We identified material weaknesses in several components of TB&T's internal control system (Control Environment, Communications, Control Activities, and Monitoring) as it relates to the Authority's maintenance and inspection program.

Control Environment

The Control Environment component comprises the overall attitude, awareness, and actions of management concerning the importance of internal controls. Key elements in a good environment are ethical values, integrity, and management attitude. To address the issue of ethical values, management should encourage leadership by example, commitment to excellence, respect for authority, etc. On the other hand, integrity must be demonstrated by everyone in the organization; and management should encourage it by establishing methods for reporting ethical violations, by enforcing disciplinary practices for all ethical violations, etc. Management should also demonstrate its support for good internal control by emphasizing the value of external audits and other independent evaluations.

We believe TB&T officials have not demonstrated such support as it relates to the tunnel maintenance and inspection program. In our attempt to review the work order documentation for the Lincoln Tunnel, the Lincoln Tunnel General Manager (General Manager) misrepresented to our auditors the condition of the work order documentation. Two weeks before a scheduled January 27, 1999 meeting with the General Manager, auditors had asked TB&T management to make work order documentation available at the meeting. The request was made in advance to facilitate the collection process. At the meeting, the General Manager stated that he did not know where the work order documentation for 1997 and 1998 was stored. He claimed that it could have been stored at the facility or at a remote warehouse location in Yonkers, New York. When the auditors asked him for the work order documentation for September 1998, he provided the same answer. Finally, auditors asked for the work order documentation for the week prior to the meeting or for the day before the meeting; but, in both instances, the General Manager repeated the same answer. Subsequently, TB&T management informed us that, because of a printer malfunction, no work order documentation was available for the Lincoln Tunnel from September 1998 to February 1999, when the problem had been fixed. They said the General Manager had not informed them of this problem until we started our inquiries. They did not explain why they could not locate the documentation prior to September 1998.

We also experienced extraordinary delays in obtaining other records and reports we had requested for the audit, such as Ventilation Reports, which list data for such things as traffic levels, and carbon monoxide levels that are monitored on a daily basis; Finished Schedules, which are summary documents that list the tasks to be performed and staff assignments for a given day; and information generated by the Authority's Maintenance Management Information System (MMIS), designed to guide supervisors in estimating time requirements for each task. All of these materials should have been readily available, since the facilities are required to create them as part of their daily operations; they did not need to be specially prepared for our audit. However, we received the Ventilation Reports from the Lincoln Tunnel after waiting for 63 days, and from the Holland Tunnel after a wait of 35 days. It also took 47 days to obtain the Finished Schedules for the Lincoln Tunnel, and the same number of days to get the information about work orders from both tunnels that were already stored in the MMIS.

We also requested TB&T officials to provide us with work space at the tunnel facilities. On-site presence is necessary to conduct our "field audit" effectively. Our requests were denied. TB&T officials required us to work instead at the Authority's offices in the World Trade Center. They told us there was no available room at the facilities and refused to accommodate us, despite the apparent availability of space left vacant by the retirements of the Physical Plant Managers of both facilities, which coincided with the start of our audit. This space remained vacant for at least four months, at which point both positions were filled.

We were also denied permission to perform unannounced floor checks of the maintenance staff while accompanied by TB&T supervisory personnel. TB&T management denied our request, alluding to unidentified "security risks." However, we had made our requests after supervisory staff had taken us on tours of both tunnels. TB&T officials never specified the security risks that would have existed if we had performed floor checks of the maintenance staff while accompanied by their supervisors, that had not existed when we toured the same facilities at the beginning of the audit. Moreover, TB&T officials asked our auditors to leave the facilities on two occasions — in both cases, after the auditors had requested permission to conduct floor checks while accompanied by supervisory staff. TB&T officials finally conditionally agreed to floor checks, if we provided advance notice to the General Managers, who would assign supervisory staff to accompany us. Floor checks are generally unannounced; advance notice could compromise the value of the floor checks. We believe the attitude of TB&T management toward independent external auditors does not support a strong control environment in the tunnel maintenance operation.

Communications

The Communications component of a good internal control system refers to the exchange of useful information between and among people and organizations to support decisions and coordinate activities. It consists of methods and records established to identify, capture, and exchange information in a form and time frame that enables people in an organization to carry out their responsibilities effectively. In the case of the tunnel maintenance and inspection program, information captured by work order documentation is at the center of its communications system. We found TB&T's internal control system to be weak in this area.

In general, we found the maintenance and inspection records we reviewed — whether they were used to substantiate work done or to keep track of deficiencies found and in need of repair — to be of poor quality, with missing or outdated information. We believe that the maintenance and inspection information communicated in the documents we reviewed does not provide TB&T management or its staff with the level of accuracy they need to carry out their responsibilities effectively.

TB&T management responded that they found it difficult to accept our finding that the communications component of the internal control system is weak without an assessment of the roles played by timekeeping, scheduling and other sources of management information. We believe, however, that the maintenance and inspection records are the core of the tunnel maintenance communications system, and conclude that their poor quality greatly hinders the exchange of useful information.

Control Activities

Another component of an internal control system is Control Activities, which include both manual and automated tools that can prevent or reduce the risks that could affect the entity's objectives and mission. A key element of this component is documentation.

Documentation serves as evidence that can substantiate decisions, actions, transactions, or systems. It also creates a history that can guide an entity in making subsequent decisions, and can be a very valuable tool in self-evaluations and external or internal audits, allowing management to trace the entire life cycle of any transaction. Because a material amount of documentation is missing or incomplete, as described in the prior report section on "Control Environmental" and the section of this report entitled, "Work Orders and Staff Productivity," we found that TB&T management lacks such ability to trace the entire life cycle of transactions regarding the maintenance and inspection of its tunnels.

TB&T management responded that our conclusion was based on a relatively small judgmental sample, and therefore, it is not valid. We disagree. While we examined a judgmental sample of Holland Tunnel work orders, there was

no work order documentation available for the Lincoln Tunnel from September 1998 to February 1999. This degree of unavailable records, together with the significant deficiencies we found in those records we examined, leads us to conclude that there is material weaknesses in the Control Activities component of TB&T's internal control system.

Monitoring

Another key component of internal control is Monitoring, the review of the entity's activities and transactions that will enable management to determine the quality of the entity's performance over time and to determine whether the controls currently in place are effective. Everyone, from the Authority's Board of Commissioners (Board) to the staff level, is responsible for monitoring; but an individual's position in the organization will determine the focus and extent of his or her monitoring responsibilities. We believe the Board needs timely, accurate, and relevant information to provide adequate oversight of TB&T's inspections and maintenance activities. The Board also needs mechanisms for monitoring management's actions, and for determining whether the controls it has authorized are being implemented. Based on the results of our audit, we conclude that the Board does not get all the information it needs to adequately govern TB&T's tunnel inspection and maintenance program. Considering the significance of these tunnels to the region's economy, the Board also does not pursue a monitoring role that is sufficiently assertive.

In July 1987, the Legislature passed, and the Governor signed into law, the New York State Governmental Accountability, Audit and Internal Control Act (Act). The Act required the implementation of internal controls and reviews of internal control systems throughout State government, including the State's public authorities and public benefit corporations. The Act expired January 1999, but was replaced with a new similar law in September 1999. Also, in February 1999, the New York State Comptroller issued the "Standards for Internal Controls in New York State Government." Such internal controls are intended to safeguard assets, check the accuracy and reliability of accounting data, promote operational efficiency, and encourage adherence to prescribed managerial policies.

Pertaining specifically to public authorities and public benefit corporations, the Internal Control Act stated that the governing boards should establish and maintain guidelines for a system of internal controls, and should make available to each officer and employee a clear statement of the generally-applicable management policies and standards with which they are expected to comply. The governing boards should also establish and maintain a system of internal controls and a program of internal control review that are supposed to identify both internal control weaknesses and the actions needed to correct them.

Based on our audit, we conclude that the Board has not implemented a system of internal control that would enable TB&T to manage the inspection and maintenance program in the Authority's tunnels in a prudent, businesslike manner, providing public accountability. We found that management overrides established policies and procedures. For example, as discussed later in this report, work orders could not be produced at the Lincoln Tunnel to substantiate the work reportedly performed, and at the Holland Tunnel, the work orders were incomplete or missing essential information; yet supervisors had certified these work orders as completed.

We identified other conditions that hinder the Board's ability to govern TB&T's tunnel inspection and maintenance program effectively. The conditions we identified should have been "red flags" to the Board, indicating a need for further investigation. Considering that TB&T management does not provide the Board with tunnel maintenance and inspection reports, and has not always made Board members aware of important issues requiring their immediate attention, we believe the Board does not have enough information to govern this program effectively.

We found many weaknesses in TB&T's internal control system; but we have highlighted only those that were the most likely to have a significant negative impact. Our findings regarding this system are intended to focus the Board's attention on matters that require its immediate attention. We did not intend to relate or to determine the impact of our findings on the structural integrity of the tunnels or on the safety of the public using the Authority's facilities. We believe that Authority management is better qualified to make such assessments, while the Board takes corrective actions to improve the internal control system.

Recommendation

1. Implement an internal control system that enables TB&T to properly manage its tunnel inspection and maintenance program.

(TB&T officials stated the MMIS provides the necessary controls for the Tunnels, Bridges and Terminals Department to properly manage the tunnel inspection and maintenance program.

Auditors' Comments: TB&T officials did not address the MMIS deficiencies we identified, nor did they address the specific control components in their response to our recommendation.)

Tunnel Inspections

The Authority has procedures for uncovering structural integrity deficiencies in its tunnels. These procedures establish tunnel-inspection requirements for each type of structure, specify the inspection to be performed (e.g., structures, safety systems, air and exhaust systems, roadways, etc.), define frequency requirements, provide for a system that documents, monitors, and reports on inspection results, and plan for the resolution of any deficiencies observed by the inspectors. However, we found that TB&T lacks procedures for ensuring that deficiencies have been corrected. TB&T has not repaired some cited deficiencies for as long as six years, and has not identified or reported other needed repairs.

Biannual Inspections

Every two years, a Comprehensive Periodic Structural Integrity Inspection Program (Comprehensive Program) is used to inspect the structural integrity of the Holland and Lincoln tunnels. This biannual inspection, which was last performed in May 1998, is usually conducted by outside consultants. The Quality Assurance Division (QAD) is responsible for making sure the biannual inspections are conducted, high-priority repairs have been made, and all other uncorrected deficiencies are classified as immediate, priority, routine-priority, or routine and corrected accordingly.

QAD submits the final report of the biannual inspection findings, conclusions, and recommendations to the Structural Integrity Unit (SIU) for disposition. On a quarterly basis, the SIU is required to follow up at the facilities with the Project Managers, who are responsible for on-site tracking of the inspectors' recommendations until they are completed, and then to update its quarterly Structural Integrity Repair List (List). SIU staff maintain the List in the Structural Integrity Information Management System (SIIMS), a database containing all of the recommendations for repairs that have been identified during the biannual and other inspections.

As of April 1999, SIIMS contained 67 outstanding biannual report recommendations from the period of 1993 to 1998. Of these, 31 recommendations have been outstanding since between 1993 and 1996 and involve projects for which the completion dates have been extended. In May 1999, to gauge the status and severity of the conditions cited in these 31 recommendations, we joined SIU engineers and the appropriate Maintenance Unit Specialists in visits to some locations noted in the recommendations. We observed the following:

New Jersey River Ventilation Building (Report B2-93.1) - The 1993 biannual report recommended that SIU "remove severely cracked and bulged exterior brick masonry at location noted (all exterior brick facade) in report and replace." As of April 1999, this project was listed as being in the design

phase. The original recommended date of completion was June 1, 1994, but the completion date listed in April 1999 was July 31, 1999. The only comments noted on the List referred to the revised completion date and a need for a reinspection on April 26, 1995. There were no other indications that SIU had followed up on this recommendation. In fact, we visually confirmed that there were still severe cracks in the masonry, and that the exterior was bulging. The conditions were such that TB&T staff had bolted straps to secure the building's facade. We noticed that one of these straps was loose, and bricks that were supposed to be behind the facade were missing. SIU engineers advised us that weather changes cause freezing and thawing, resulting in the bulging-out condition. In response to our draft report, Authority officials state that, "the bulging brick poses no hazard to the structural integrity of the exterior walls."

New Jersey River Ventilation Building (Report B2-93.1) - The 1993 biannual report recommended that SIU "seal wide cracks at the brick encasement to exterior steel column at the 3rd floor." It said "these cracks extend to the full height of the column between the floors." The recommended date of completion was June 1, 1994, but, as of April 1999, the scheduled date of completion was listed as July 31, 1999. We observed that the cracks were approximately six feet long and three inches wide. The only comments on the List referred to a memo dated November 28, 1994, and a requirement for a reinspection on April 26, 1995. There were no other indications that SIU had followed up on this requirement. Authority officials responded that the cracks pose no hazard.

New Jersey River Ventilation Building, first-floor blower stack (Report B2-93.1) - The 1993 biannual report recommended that SIU "remove delaminated concrete from exterior of blower stack lining at 1st floor and patch." The recommended date of completion was June 1, 1995, but, as of April 1999, the scheduled date was July 31, 1999. During our visit, we confirmed that the walls had not been repaired. In fact, the SIU engineer who accompanied us, was able to pull off loose stones from the walls. Authority officials responded to our draft report that this condition poses no hazard.

New Jersey Land Ventilation Building, all exterior walls (Report B2-93.1) - The 1993 biannual report recommended that SIU "remove severely cracked and bulged exterior brick masonry at locations noted in report." During our site visit, we observed that these cracks appear to be severe and that the masonry is bulging.

New Jersey Land Ventilation Building, fourth floor (Report B2-93.1) - The 1993 biannual report recommended that SIU "remove cracked brick encasement from columns at 3 locations on 4th floor. Clean and paint steel

columns and provide new encasement.” The recommended date of completion was June 1, 1995; but, as of April 1999, the scheduled date of completion was July 31, 1999. During our site visit, we observed that these repairs had, in fact, been made; however, according to the List, this project was still in the design phase.

New York Approach Roadways to Lincoln Tunnel (Report B3-94.2) - The 1993 biannual report recommended that SIU “repair spalled concrete girders in spans 4, 6 and 8 at the BT Ramp W 99 over 9th Avenue, Dyer Avenue and 10th Avenue.” The report also noted that this repair had been “recommended as a Priority Repair in the 1992 Biennial Report, but has not been performed.” This project is listed as being in the construction phase, with a recommended date of completion of March 1, 1996; but the scheduled date of completion was March 31, 1999. It appeared during our visit that SIU engineers had corrected the deficiency.

During our May 1999 visit, we also noticed the following conditions in the Holland Tunnel’s New Jersey ventilation buildings that had not been cited on the List or in any other routine inspection report we were made aware of:

- ! Holes in steel girders throughout the buildings, apparently a result of years of rust and deterioration, and debris falling from the cracked ceiling above the site of some of the electrical transformers for the tunnel’s electrical system. (TB&T officials assured us that, even though concrete has fallen from the steel beams and rust damage is evident in some locations, there is still no serious threat to the structural integrity of the beams or to public safety.)
- ! Inspection tags on the electrical transformer meters with an inspection-due date of April 1997. No new tags were found that would indicate such inspections had taken place. (No explanation was provided by officials.)
- ! Evidence of a water leak from an unidentified location that had allowed a large pool of water to collect around an electric motor used to operate a ventilating fan for the tunnel. (Officials explained that the water found in the pump room came from a roof leak, but that it poses no threat to the electric fan operation.)
- ! Missing louvers in the fan room that had allowed pigeons to enter along with rain and snow that could cause damage to the nearby electrical equipment and machinery. (Officials told us that the louvers will be replaced when the buildings are renovated and the conditions in the fan room will be monitored to determine if the missing louvers contributed to any damage to the equipment.)

-
- ! Dirty floors, scattered debris, and pigeon droppings throughout the buildings — particularly in the pump room area, where we saw the remains of a dead pigeon (first noticed during our walk through months earlier).

In other locations, we noticed:

- ! Deterioration of the concrete covering steel beams. One site of deterioration was under the overhead roadway, at one of the ramps used for passenger bus traffic from the Authority's bus terminal to the Lincoln Tunnel. (Officials indicated this was not a serious threat to the structural integrity of the beams or a danger to bus traffic.)
- ! Exposure of a signal control box to possible illegal use, rain damage, or vandalism. The control box is used to control the traffic lights from the Authority's bus terminal ramp approach to the Lincoln Tunnel. (Officials agreed to investigate this situation.)

We discussed these observations with TB&T officials who told us they were aware of the conditions we found. They claim that the necessary repairs for the Holland Tunnel ventilation buildings had been delayed because of "litigation and negotiations currently going on" to determine who has control of the pier on which the buildings are located. They told us that the pier in question is owned by a private developer who does not allow the Authority to bring the necessary equipment onto the property so that repairs can be made or buildings can be rehabilitated. The officials claimed that, under the court's orders, the Authority had negotiated the terms of the sale of the pier with the developer; but on the scheduled closing date the developer decided not to sell the property and took his case back to court.

TB&T officials assured us that if the structural integrity of the buildings were in question, they would enter the property and perform the necessary repairs to secure the buildings despite the developer's restrictions. They advised us that, as soon as they can get control of the property, they will let contracts to rehabilitate the buildings completely. In the meantime, they said, TB&T engineers had secured the buildings, pending the anticipated rehabilitation. Moreover, SUI engineers claim they are monitoring the conditions the Structural Maintenance Specialists had observed during their annual inspections. Regarding the inaccuracies we found in the List, SIU engineers claim that the Project Managers have not been submitting timely and correct information that could be used to keep the List updated.

In their response to our draft report, PA officials further explained that the List is not "real time." That it takes approximately 4-6 weeks to update its

information. This does not explain why some of the items included in the List used by us for the site visits, dated April 1999, only contained information dating back to 1995. We believe TB&T should make sure that the List contains current information about the status of the conditions reported.

Despite TB&T officials' explanations, our findings show that management officials have neglected the cited conditions since they were first identified six years ago, and have not placed the necessary priority on rehabilitation of the ventilation buildings. The explanation of "litigation and negotiations currently going on" does not appear to be supported by our observations that some repairs have been made to the ventilation building in question. It also does not explain the lack of proper cleaning, the inadequate reporting of follow up on recommendations, or the conditions we observed that are not included in any inspection report. (Authority officials responded that design documents for the rehabilitation of the Holland Tunnel Ventilation Building in New Jersey are 100 percent complete, as they pursue ownership of the property.)

Annual Inspections

One Structural Maintenance Specialist is assigned to each TB&T facility to perform the required annual routine structural maintenance inspections. These inspections are performed in accordance with procedures published in the Authority's Structural Integrity Routine Inspection Program for each tunnel, which describe routine steps inspectors are to follow when identifying, reporting, and monitoring structural deficiencies that need repair. Existing inspection procedures and rosters of inspection routines were last updated in January 1993, for the Lincoln Tunnel and in September 1993, for the Holland Tunnel.

The Structural Maintenance Specialist produces a Deficiency Report that lists all deficiencies found, and notes those that require immediate attention and repair. This report is reviewed by the Maintenance Unit Supervisor, who determines which items can be repaired by facility maintenance staff and then sends it for review to SIU, which is supposed to identify any problems that relate to the structural integrity of the tunnel. The SIU engineers review these reports, which list the type, location, and severity of the defects found in various components, and develop recommendations for repairing the deficiencies, prioritizing them as immediate, priority, routine-priority, or routine. Deficiencies that can be taken care of by the facility maintenance staff are usually handled with a work order. If a significant amount of work is required, the engineers pass the recommendations on to TB&T's Project Management Group (PMG). The PMG, which is responsible for completing the project, assigns a number to each project and forwards it to TB&T's design group.

The Authority has specified the number of staff hours required to perform the annual structural inspection program at each tunnel, as well as the number of staff hours available for service and corrective repair work routines. The SIU is responsible for ensuring that annual routine inspections scheduled for both tunnel structures are performed when required. SIU engineers examine the results of such inspections to determine whether anything extraordinary was uncovered. If there is a major discovery, the engineers visit the site and verify the conditions cited on the Deficiency Report; but most routine maintenance inspections usually lead to work orders for corrective and preventive maintenance. The Authority has established rosters that contain required annual structural inspection routines at pre-determined frequencies, inspection procedures for gathering information by checklist, the number of staff and the total number of staff hours required to perform the routines, and reporting forms for implementing the program. The annual structural inspection workload (inspection hours and routines) is allocated on a weekly basis to distribute the workload evenly and to accommodate other routines that should be performed at specific times of the year.

The Deficiency Report and a copy of any non-routine work orders are to be retained in the facility's Structural Integrity files. Annotated with the work order number and facility comments, the report is to be transmitted to the SIU, which determines whether the remaining items need either immediate attention and repair, major repair or rehabilitation, or further investigation. The SIU uses SIIMS for tracking these recommendations and their resolution, and for routinely storing, retrieving, and maintaining the Deficiency Reports. It also maintains a database of priority repairs identified in these reports. The facility usually sends reports of corrections to SIIMS, indicating the work order number.

Our audit found that the SIU could not document that the required annual inspection routines had been performed in 1997 at the Lincoln Tunnel for the bus ramp (#8017), blower duct north tube (#8202), and the exhaust duct north tube (#8203). The fact that the bus ramp inspection (#8017) could not be documented may explain why our previously described observation of poor conditions at the bus ramps had not been reported in any Deficiency Report. It is possible that such a routine inspection was never done.

Since the SIU lacks procedures for ensuring that corrections have actually been made, as indicated in facility reports, TB&T has no assurance that all deficiencies cited in the Deficiency Reports are being addressed or that the SIU is carrying out its responsibility to ensure that the facility makes the repair. Deficiencies that are not repaired may become a serious structural integrity problem, creating the risk of serious injury to those who use the tunnel facilities.

Recommendations

2. Take actions necessary (including legal) to obtain unlimited access to the pier, so that rehabilitation of the Holland Tunnel's New Jersey ventilation buildings may begin while the decision over control of the property is being made.

(Authority officials indicated they will continue their efforts to acquire the property while conducting inspections to ensure that the structural integrity of the buildings is maintained.)

3. Require that SIU engineers document their efforts to monitor the status of all outstanding deficiencies identified in annual and biannual inspections.

(Authority officials agreed to take steps to strengthen their monitoring procedures.)

4. Verify that Project Managers at the tunnel facilities are following up on recommended corrections of deficiencies.

(Authority officials feel that the status reports submitted by the Project Managers to the SIU provide adequate confirmation they are following up on the remediation of deficiencies. They indicated, however, that they will expand the comment field to allow more extensive remarks relative to the status of the remediation effort.)

Recommendations (Cont'd)

5. Enforce the requirement that Project Managers submit quarterly status reports to the SIU on a timely basis. Authorize the SIU to take corrective action(s) that will address any patterns of late reporting or failing to report.

(Authority officials agreed to this recommendation.)

6. Take action to ensure that adequate documentation for all required annual inspection routines are maintained, as well as copies of work orders that authorize corrective work.

(Authority officials stated they will review the process in an effort to improve the quality of the recordkeeping.)

Work Orders and Staff Productivity

A work order is used to authorize and document work assigned to maintenance staff. The Authority sets the number of staff hours that are to be spent on the annual structural inspection program and the corrective repair work routines at each tunnel. Work orders are to indicate the task to be performed, materials to be used, and actual number of hours spent on completing the task; and must be signed off by the employee performing the work. Estimates of the number of work hours needed to complete a task have been developed by the Authority's professional engineering staff based on manufacturers' instructions and industry standards. They are known only to supervisors, who are required to compare the time estimates for the job with the actual time worked. If the amount of actual time regularly exceeds the amount of estimated time, supervisors are expected to investigate the reasons.

Each day's completed work orders are attached to the Finished Schedule, which is initialed by the Maintenance Unit Supervisor, certifying the accuracy and completeness of the information submitted by the maintenance staff. Properly-completed work orders are not only documented evidence of the work performed by the maintenance staff; they also can be used to support supervisory oversight of the maintenance staff performance and quality of work the staff have performed. In 1998, a total of 30,439 work orders were issued at the Holland and Lincoln tunnels (19,496 and 10,943, respectively). Of these, 23,495 work orders (77 percent) were reported completed.

TB&T groups work orders into four classifications: Preventive Maintenance (PM - performed on a predictable/recurring basis); Corrective Maintenance (CO - performed on a one-time basis to repair failed equipment); Emergency (EM - performed to cover urgent situations that must be addressed immediately); and Standing (ST - performed to cover work that is not considered equipment-specific). We were informed that 80 percent of the PM work orders and 90 percent of the CO work orders are currently being completed by TB&T's maintenance staff at both tunnels. However, based upon our review of work orders, we find no support for this conclusion.

Our review of the Finished Schedules for ten judgmentally-selected days in September 1998 found that 1,238 work orders were issued for the Holland Tunnel; and that 1,050 of these were reported as completed, while 188 were canceled. However, our review of the 1,050 "completed" work orders found that just 426 were actually completed - - 230 were blank (the work orders did not contain any information about the work done) and 394 were missing. Furthermore, our examination of the 426 completed work orders revealed

that 81 either had not been signed or had not been dated. In addition, 84 had not been reported accurately on the Finished Schedule. The 624 missing or blank work orders made it impossible for us to determine whether staff hours had been reported accurately.

We noted that the 230 blank work orders that had been certified as completed lacked the scheduled date, start date, actual number of hours worked, date of completion, and/or employee signature. For another six work orders, the staff did not provide an adequate report of the actual hours worked; they reported that they had worked more hours than they actually did. Additionally, actual hours listed on 84 work orders did not agree with those listed on the Finished Schedule, which had been accepted and subsequently certified by the supervisors. Finally, the actual number of hours required to complete the work on 178 work orders differed from the amount of time originally estimated for completion of the jobs. None of these work orders included explanations from the supervisors for the large variances between the estimated and actual number of hours worked. (We could not perform a similar review for the Lincoln Tunnel, because we were told that all work orders for September 1998 were missing.)

Because of the absence of work orders at the Lincoln Tunnel and the lack of documented evidence of supervisory review of completed work orders at the Holland Tunnel, we attempted to test the accuracy of the hours reported on the Finished Schedules. We attempted to compare certain staff hours reported on the Finished Schedules with the hours the tunnel lanes were reported closed. The closings are recorded on the tunnels' ventilation reports, which list various types of information for monitoring purposes and are maintained every day for each tunnel. A computer database is used to compile information for the Holland Tunnel's Ventilation Reports; however, when we asked to review this database, we were informed that it was not accurate and that we should rely on the manually-kept information listed in the daily reports of both tunnels.

Our review of the daily reports found one instance in which staff had claimed that they worked a regular schedule of eight hours in the Holland Tunnel, yet the report for that day indicated that the tunnel had been closed for maintenance work for just five hours. The crew had started its shift at 11 p.m., waited one hour for the tunnel to close, then worked for five hours in two lanes. They did not account for the remaining two hours of the shift. We found five other instances in which an employee claimed he worked more hours than would have been possible (total additional time of 9 hours and 15 minutes) because the tunnel had not been closed for that length of time. At the Lincoln Tunnel, we found 14 occasions (totaling 99 hours and 10 minutes) on which similar claims had been made. TB&T officials attributed these differences to the "prep time" required to perform vehicle

safety inspections, load the truck, and clean up the vehicles. Although some prep time is necessary, it appeared to us that the amounts were excessive. TB&T has no standard for prep time.

Recommendations

7. Investigate the reason(s) for the incomplete, incorrect, and missing work orders we identified; and develop an action plan for addressing these problems, including the provision for proper supervisory oversight.

(Authority officials agreed to take steps to ensure proper supervisory oversight. Additionally, they reported that the Lincoln Tunnel management has secured space in the administration building to store work order documentation.)

8. Require maintenance staff to report only the actual time worked on the task(s) listed in the work orders. Establish a standard for time spent preparing the equipment, waiting to get access to the tunnels, etc. This and other auxiliary time not specifically devoted to complete the work order tasks should be accounted for separately.

(Authority officials disagreed with this recommendation. They do not see any benefit for separating these components or developing standards to measure these items.

Auditors' Comments: A key component of workforce management is the use of productivity standards. By analyzing variances from such standards, management can identify inefficiencies that require attention. If preparation time, travel time, and tunnel access time is not accounted for separately, the number of variables that affect the time to complete tasks could make it next to impossible to identify situations that deviate from the standard.)

Recommendations (Cont'd)

9. Implement a system for adequately monitoring maintenance staff productivity. Make periodic comparisons between actual time worked and the estimated number of hours established for specific tasks. Analyze the reasons for variances.

(Authority officials indicated that steps are being taken to make significant improvements in monitoring maintenance staff productivity.)

10. Review and correct data stored on the data base that compiles information regarding the Holland Tunnel's ventilation reports.

(Authority officials responded that enhancements will be made to the database and the General Maintenance Supervisor will review the reports to ensure their accuracy and completeness.)

Major Contributors to This Report

Frank J. Houston
Abraham C. Markowitz
Santo Rendon
Charles R. Johnson
Kezia Chacko
Victoria R. Saks
Unal Sumerkan
Debra Wolrich
Abe Fish
Marc Geller
Marticia Madory

THE PORT AUTHORITY OF NY & NJ



February 25, 2000

CHARLES F. McCLAFFERTY
CHIEF FINANCIAL OFFICER

ONE WORLD TRADE CENTER, 67E1
NEW YORK, NY 10048

(212) 435-7738
(973) 961-6600 X7738

Mr. Frank J. Houston
Audit Director
State of New York
Office of the State Comptroller
Division of Management Audit &
State Financial Services
270 Broadway, 19th Floor
New York, NY 10007

*Ref.: Office of the State Comptroller – Draft Report on the
Port Authority’s Tunnel Maintenance and Inspection Program,
dated January 10, 2000*

Dear Mr. Houston:

We appreciate the opportunity to respond to the referenced draft report forwarded to Mr. Lewis M. Eisenberg, Chairman of The Port Authority of New York and New Jersey, by your letter of January 10, 2000

While we believe that our tunnel maintenance and inspection program is one of the best in the world, we remain open to any recommendations which will strengthen it. However, it should be noted that our inspection and maintenance routines adhere to strict professional engineering standards and incorporate equipment manufacturers’ specifications and industry best practices. Since our tunnels provide a vital link to the region’s transportation infrastructure, it is of the utmost importance to maintain these structures in a state of good repair. The Port Authority’s tunnels have and will continue to be maintained in a safe and efficient manner to ensure patron access and safety. Within that context, our comments follow relative to specific statements contained in the draft report:

Executive Summary, Scope of Audit, Page 1, Paragraph 1

“The mission of the Port Authority of New York and New Jersey (authority) is to serve the people of the New York-New Jersey metropolitan region in the areas of aviation, interstate transportation, world trade, and port and regional development.”

The Port Authority’s mission should be restated as follows:

“To identify and meet the critical transportation infrastructure needs of the bi-state region’s businesses, residents and visitors: providing the highest quality, most efficient transportation and port commerce facilities and services that move people and goods within the region, provide access to the rest of the nation and to the world, and strengthen the economic competitiveness of the New York-New Jersey metropolitan region.”

Executive Summary, Scope of Audit, Page 1, Paragraph 2

“The air in each tunnel is moved by 42 blowing fans and 42 exhaust fans . . .”

The auditors’ statement only applies to the Holland Tunnel. The three tubes of the Lincoln Tunnel are served by 37 intake fans and 43 exhaust fans.



Executive Summary, Scope of Audit, Page 1, Paragraph 3

“The Authority has established its own requirements for the inspection and maintenance of its tunnel facilities.”

This statement omits the fact that Port Authority requirements for inspection and maintenance routines were developed in consultation with outside engineering resources to ensure compliance with equipment manufacturers’ specifications and industry best practices.

Executive Summary, Scope of Audit, Page 1 Paragraph 3

“The Tunnels’ critical components e.g., its duct systems, electrical systems, and air testing devices – are inspected annually by Authority staff.”

This statement is not true. Components of the tunnels’ critical systems are inspected and preventive maintenance routines are scheduled for those same components on varying frequencies that can range anywhere from daily to annual periods, dependent upon the equipment manufacturers’ specifications and industry best practice. For example, booster pumps are inspected and tested on a weekly basis.

Executive Summary, Audit Observations and Conclusions, Page 1, Paragraph 2

“We found that TB&T has neglected to repair some cited deficiencies for as long as six years, and has not identified or reported other needed repairs. As of April 1999, there were 67 outstanding biannual inspection repair recommendations, including 31 repairs that had been recommended to be made during the period of 1993-96. We visually confirmed several of these conditions, accompanied by TB&T staff, which included severely cracked and bulged exterior brick walls in the Holland Tunnel ventilation buildings.”

The design work for the New Jersey Land and River Ventilation Buildings, where the majority of the 31 repairs need to be made, is 100% complete. Unfortunately, the repair work cannot commence until ongoing property litigation and negotiations between the Port Authority and the private entity that owns the land and pier structures have been resolved.

It should be noted that Engineering Department staff have periodically re-inspected the deficiencies since they were initially identified. In this manner, the condition of the deficiencies has been properly monitored and evaluated in terms of any adverse changes that may have required remedial action prior to the commencement of the repair work. It is important to note that none of the deficiencies seen by the auditors pose any serious threat to the structural integrity of the ventilation buildings.

Executive Summary, Audit Observations and Conclusions, Paragraph 2

“We also noted conditions in these same buildings that have not been reported, such as holes in steel girders, and overdue electrical transformer inspections.”

The auditors’ statement that holes in girders have gone unreported is not accurate. Insignificant deterioration and corrosion which includes section loss or a hole may not be explicitly identified in engineering inspections; but it would be included in a general category. When judged by the professional engineer performing the inspection that they pose no harm to the structural integrity of the structure, they are categorized as in need of routine repair. Secondary members, such as bracing, also fall into this category. Bracing members around the evase stacks do exhibit corrosion with minor section loss, which is caused by age and moisture exposure. Again, these repairs would be handled as routine and are included in major capital projects.



Introduction, Background, Page 1, Paragraph 4

“The inspections include a comprehensive type performed every two years, as well as regular annual routine inspections.”

This statement does not distinguish between the various inspections scheduled by the Quality Assurance Division (QAD) as noted below:

Tunnels – inspected every two years;
Buildings & Miscellaneous Structures – inspected every six years;
Signs & Lighting Structures – inspected every three years.

Furthermore, QAD monitors the disposition of outstanding priority recommendations as part of the inspection process, reassessing their criticality during subsequent scheduled inspections and establishing intermediate inspection cycles when necessary. The Structural Integrity Repair List is updated quarterly by the Structural Integrity Unit and is used to monitor the disposition of all priority recommendations until they are completed.

Control Environment, Page 5, Paragraph 3

“We were denied permission to perform unannounced floor checks of the maintenance staff.”

The auditors were offered access to all areas of the facility, provided that they notify the facility’s General Manager in advance in order to arrange for an appropriate escort. This invitation remained open for the duration of the auditors’ fieldwork. It was explained early in the audit process that due to facility security and safety concerns, the auditors would need to schedule facility visits in advance with each General Manager.

Communications, Page 6, Paragraph 1

“In the case of the maintenance and inspection program, information captured by work order documentation is the center of its communications system.”

The auditors’ focus on work order information as a central point of their analysis did not take into consideration the other sources of management information employed in planning, managing, and controlling tunnel maintenance activities. Without an assessment of the roles played by timekeeping, scheduling, and other electronic maintenance management information in the overall internal control structure, we find it difficult to accept the auditors’ finding that the internal control system is weak.

Internal Control System, Assessing and Managing Risk, Page 6

“TB&T has not performed any risk assessment of the management of its tunnel maintenance and inspection program; nor has it performed any audits of its maintenance and inspections operations. Our audit of this program was the first one done that we were made aware of.”

We advised the auditors that the Maintenance Management Evaluation Division, which has dedicated engineering staff, has performed hundreds of maintenance audits at the Holland and Lincoln Tunnels for close to 40 years. On a biennial cycle, the mechanical and electrical maintenance routines of both tunnels have been evaluated and remedial actions have been taken. This division is at the core of our program of assessing and managing risk on an ongoing basis.

Internal Control, Control Activities, Page 7, Paragraph 1

“Because a material amount of documentation is missing or incomplete, we found that the TB&T management lacks such ability to trace the entire life cycle of transactions regarding the maintenance and inspection of its tunnels.”

The auditors’ statement is based on a relatively small judgmental sample, and therefore, it is not valid. The Port Authority provided the auditors with thousands of pages of reports, years of electronic records containing tens of thousands of work orders and schedules, and countless memoranda, contracts, authorization papers and Board items. As an example, we provided a description of our process for structural integrity inspections (paraphrased by the auditors on page 9) and then fully substantiated the audit trail of documentation on as many immediate and priority repairs as they chose to review. For example, the auditors found that the Structural Integrity Unit (SIU) could not document that three required inspection routines at the Lincoln Tunnel had been performed in 1997. However, over 400 annual inspection routines are reviewed and documented by SIU staff. It should be noted that one of the routines cited by the auditors as missing does exist and the remaining two routines were deferred since those areas were being inspected by the Quality Assurance Division as part of a more comprehensive inspection program. In our opinion, unavailable documents for only 2 out of nearly 100 Lincoln Tunnel routines is not a material amount.

Tunnel, Inspections, Page 9

“We found that TB&T lacks procedures for ensuring that deficiencies have been corrected. TB&T has neglected some deficiencies for as long as six years.”

Deficiencies, regardless of their lack of severity, are not neglected by TB&T. Deficiencies are classified into one of the three following categories: immediate, priority, or routine. Deficiencies classified as immediate are remediated at the time of inspection by a contractor or in-house resources. Priority deficiencies are tracked quarterly by the Structural Integrity Unit until they are completed. With respect to routine deficiencies, these items are included in intermediate inspection cycles to ensure that these conditions do not pose a threat to the structural integrity of the affected structures.

Biannual Inspection, Page 10, Paragraph 1

“The conditions were so severe that the TB&T staff had bolted straps to secure the building facade.”

The auditors’ statement that “the conditions were so severe” is an assessment that the auditors are not qualified to make. The auditors are not professional engineers and, therefore, can not determine the severity of a condition and its impact on the structural integrity of a structure.

In describing another condition in the same building (same page, third paragraph), the auditors state that they “confirmed that the walls were falling apart . . .” This statement might lead one to believe that this condition has compromised the integrity of the structure. Again, the auditors are not qualified to make such a judgment. In fact, these two conditions cited by the auditors do not impose a threat to the structural integrity of the building.

Biannual Inspections: (Pages 9 –12)

All Holland and Lincoln Tunnel priority conditions and the following conditions visited by the auditors have been evaluated by the Quality Assurance Division and the Structural Integrity Unit:



New Jersey Ventilation Building (Report B2-93.1), Page 10

- **Cracked and bulging exterior brick.** Corner cracks were strapped with steel plates as a precautionary measure. The bulging brick poses no hazard to the structural integrity of the exterior walls. Therefore, the fact that these deficiencies have not been repaired has no impact on the structural integrity of the structure. If these deficiencies had been judged to make the structure unsound, other interim measures would have been taken to stabilize the condition until more extensive repairs could have been made.
- **Cracked brick column encasement.** This deficiency poses no hazard to the structural integrity of the columns. In fact, brick encasement which was in danger of falling to the interior floors below was removed at the direction of the Structural Integrity Unit. The remaining areas were judged to be structurally sound.

New Jersey River Ventilation Building, First-Floor Blower Stack (Report B2-93.1), Page 10

- **Loose blower stack spall.** A small spall existed at the base of one evase stack that was removed by the Structural Integrity Unit. These conditions are minor and pose no hazard to the structural integrity of the building.

Holland Tunnel's Ventilation Buildings, Page 11

- **Holes in steel members.** Bracing members around the evase stacks exhibit corrosion with minor section loss, which is caused by age and moisture exposure. This level of deterioration is insignificant and poses no threat to the structural integrity of the steel girders.
- **Missing louvers.** Over time, cracked and deteriorated louvers have been removed. As a general rule, missing louvers will not have an adverse impact on the structural integrity of a building. The conditions in the fan room will be periodically monitored to determine if the missing louvers have contributed to any damage to the electrical equipment and machinery.

Bus Terminal Ramp to Lincoln Tunnel, Page 12

- **Deteriorated concrete encasement.** Loose encasement had been removed during a previous inspection cycle. The remaining encasement was judged to be intact and structurally sound; thereby posing no danger to bus traffic.

Biannual Inspections, Page 12, Paragraph 5

"SIU engineers claim that the Project Managers have not been submitting timely and correct information that could be used to keep the List updated."

The SIU engineers advised the auditors that the information shown on the "List" is not 'real time' because there is normal processing time (approximately 4-6 weeks) associated with the collection, review, updating and verification of the information shown on the "List".



Biannual Inspections, Page 13, Paragraph 1

“Our findings show that management officials have neglected the cited conditions since they were first identified six years ago, and have not placed the necessary priority on rehabilitation of the ventilation buildings.”

This statement contradicts the fact that the architectural and structural rehabilitation of the Holland Tunnel Ventilation Buildings in New York has already been completed; and that design documents for the ventilation buildings in New Jersey are 100% complete with funds budgeted for the construction, as we continue to pursue ownership of the property.

Work Orders and Staff Productivity, Page 16, Paragraph 3

“We were informed that 80 percent of the PM work and 90 percent of the CO work orders are currently being completed by TB&T’s maintenance staff at both tunnels. Management at both tunnels claim that they do not have sufficient staff to complete all of the work that has been identified on their respective rosters. However, based upon our review of work orders, we find no support for this conclusion.”

The auditors’ comments reflect a basic misunderstanding of our approach to maintenance at the tunnels. By no means is the preventive maintenance roster designed or intended to be completed at the 100 percent level. Maintenance management standards for many industries suggest that the preventive maintenance completion rates achieved at our tunnels may approach the optimal staffing levels required to ensure an ongoing state of good repair, while leaving the capacity to address unforeseen problems and emergency situations. The preventive maintenance program is established with a nine-tiered priority system that identifies those items that are of greatest importance and those that may be canceled or rescheduled because of their relative insignificance. The management statement about insufficient staffing that was cited by the auditors was not intended to assert that the tunnels are understaffed, but rather that less than 100 percent completion of preventive work is our intention. The auditors’ review of work orders for one month without an effort to link information to timekeeping records or spot inspections of activity does not provide a formidable basis for drawing conclusions about staff productivity.

Work Orders and Staff Productivity, Page 17, Paragraph 2

“The actual number of hours required to complete the work on 178 work orders differed from the amount of time originally estimated for completion of the jobs.”

This is especially true for corrective work orders where the estimate is based on the initial inspection. In these situations it is understandable how the estimated time requirements could vary from the actual time required to correct the situation. In certain other cases, preventive maintenance activity may have been combined with a corrective work activity, but not appropriately reflected as two separate actions. This would cause a significant variance between the estimated hours and the actual hours worked which would have been a combination of both corrective and preventive maintenance work. As we identify alternatives to a new Maintenance Management Information System (MMIS) application in the next 18 months, we will also develop a better strategy for monitoring these variances.



Work Orders and Staff Productivity, Page 17, Paragraph 4

“Our review of the daily reports found one instance in which staff had claimed that they worked a regular schedule of eight hours in the Holland Tunnel, yet the [ventilation] report for that day indicated that the tunnel had been closed for maintenance work for just five hours.”

While lane closures are reflected in the Ventilation Report for each tunnel, the primary purpose of this report is to log the activities of the Tunnel System Controller, who is responsible for operation of the tunnel ventilation system and monitoring air quality in the tunnels. The Ventilation Report was not designed with the intention of tracking maintenance labor activity. The productivity and activity of tunnel maintenance staff should not be based on information shown in this report since there are work activities that take place outside of a closed lane.

The situation cited by the auditors occurred during the overnight washing operation at the Holland Tunnel. In addition to the five hours allocated to the task of performing the washing operation, preparation time would have been required on the tour to perform vehicle safety inspections, load the wash truck with cleaning solution, load the flush truck with clean water, change and adjust brushes, etc. Time would have also been required at the end of the tour for shift break-down activities and vehicle clean-up. These typical preparation and break-down activities could easily explain the difference in the labor time reported for maintenance staff and the amount of time indicated in the Ventilation Report for lane closures.

Tunnel Inspections – Annual Inspections, Page 14

“Since the SIU lacks procedures for ensuring that corrections have actually been made, as indicated in facility reports, the TB&T has no assurance that all deficiencies cited in the Deficiency Reports are being addressed or that the SIU is carrying out its responsibility to ensure that the facility makes the repair. Deficiencies that are not repaired may become a serious structural integrity problem, creating the risk of serious injury to those who use the tunnel facilities.”

As mentioned earlier, all immediate deficiencies are remediated at the time of inspection by an outside contractor or in-house resources. Furthermore, the dispositions of all priority recommendations are tracked by the Structural Integrity Unit on a quarterly basis until they are completed. In addition, the Quality Assurance Division (QAD) monitors the disposition of outstanding priority recommendations as part of the inspection process, re-assessing their criticality during subsequent scheduled inspections and establishing intermediate inspection cycles where required.

Moreover, the statement that outstanding recommendations may pose a risk of serious injury to our patrons challenges the judgement of the professional engineers who perform these inspections. We do not believe that the auditors have the professional background, education, or work experience to evaluate structural integrity risks. Moreover, such an inference ignores the fact that all outstanding recommendations have undergone re-inspection through QAD as part of scheduled biennial and facility condition surveys to ensure that unrepaired deficiencies do not become serious structural problems.



RESPONSES TO THE AUDIT RECOMMENDATIONS

Recommendation #1: *“Implement an internal control system that enables TB&T to properly manage its tunnel inspection and maintenance program.”*

The Maintenance Management Information System (MMIS) provides the necessary controls for the Tunnels, Bridges and Terminals Department to properly manage the tunnel inspection and maintenance program. MMIS is a comprehensive system that is based upon preventive maintenance planning and activity, and a dedication to maintaining assets in a state of good repair. MMIS is comprised of two critical components: the equipment list and the preventive maintenance (PM) benchmarks. The PM benchmarks are the templates of the preventive maintenance work to be performed. They define the type of preventive maintenance work to be performed, the equipment being maintained, the work order description and task, the resource assignment, and the frequency of the work to be performed. MMIS automatically schedules individual PM work orders for each occurrence based upon the specified frequency. Each PM is assigned a unique benchmark number. For each PM benchmark work order occurrence, MMIS assigns a sequential work order number associated (linked) to that specific PM benchmark.

Maintenance work is divided into four classifications: preventive maintenance, corrective maintenance, emergency work, and standing work. The standing work orders provide a comprehensive mechanism to capture tunnel maintenance hours related to the tunnels' life-safety and ventilation systems.

We recognize that any system must be maintained in order to ensure its effectiveness as an internal control system. At the time that MMIS was implemented in 1992 and throughout the management of the system since that time, careful consideration has been given to the data collection process. The Tunnels, Bridges and Terminals Department has taken a very proactive approach to enhancing the value of this management tool through a program which has provided for the comprehensive re-engineering of the maintenance roster at each facility.

At the stage of developing PM benchmarks, work order frequencies and estimated work hours are developed by professional engineering staff based upon manufacturers' instructions and industry standards. These benchmarks are periodically reviewed by maintenance management to ensure the effectiveness of the preventive maintenance program.

Recommendation 2: *“Take actions necessary (including legal) to obtain unlimited access to the pier, so that rehabilitation of the Holland Tunnel's New Jersey ventilation buildings may begin while the decision over control of the property is being made.”*

Based on the judgement of engineering staff that there has not been any appreciable change in the noted deficiencies, no additional inspections or interim repairs are required at this time. However, the Port Authority will continue its efforts to acquire the property while conducting inspections at the appropriate intervals to ensure that the structural integrity of the buildings is maintained.

Recommendation 3: *“Require that SIU engineers document their efforts to monitor the status of all outstanding deficiencies identified in annual and biannual inspections.”*

In order to strengthen the monitoring of outstanding deficiencies identified during annual inspections, facility staff will now submit a quarterly report to the Structural Integrity Unit (SIU) documenting the



status of work orders that have been issued to correct deficiencies. These reports will be used by SIU staff to monitor and document the status of outstanding items. This additional step has been added to the maintenance inspection flow process. In addition, the status of deficiencies categorized as priority by the SIU whose disposition is effected through the Operating Major Work Program will now be included in the Structural Integrity Repair List. The inclusion of these deficiencies in the Structural Integrity Repair List will ensure that their status is monitored and documented on a quarterly basis. As noted earlier, SIU currently monitors and documents the disposition of priority deficiencies identified in biennial inspections on a quarterly basis until they are completed.

Recommendation 4: *“Verify that Project Managers at the tunnel facilities are following up on recommended corrections of deficiencies.”*

The status reports that are submitted by Project Managers on a quarterly basis to the Structural Integrity Unit to update the Structural Integrity Repair List provide adequate confirmation that Project Managers are following up on the remediation of deficiencies. The “List” captures the project and/or contract code, the scheduled completion date and the recommended date of completion which has been assigned by the Quality Assurance Division. The comment field will be expanded so as to allow more extensive remarks relative to the status of the remediation effort.

Recommendation 5: *“Enforce the requirement that Project Managers submit quarterly status reports to the SIU on a timely basis. Authorize the SIU to take corrective action(s) that will address any patterns of late reporting or failing to report.”*

Current procedures require Project Managers to submit quarterly status information to the Structural Integrity Unit (SIU) within 30 days of the close of each quarter. The SIU will closely monitor this reporting deadline to ensure compliance. If a pattern of late reporting or failure to report should develop, SIU staff will notify appropriate senior staff of the Tunnels, Bridges and Terminals Department.

Recommendation 6: *“Take action to ensure that adequate documentation for all required annual inspection routines are maintained, as well as copies of work orders that authorize corrective work.”*

Documentation on annual inspection routines is currently maintained at each facility. However, during the next ninety days, we will review this process in an effort to improve the quality of recordkeeping. It should be noted that copies of work orders that authorize corrective work are currently maintained with the appropriate section’s completed work order packages. These packages were available to the auditors for review.

Recommendation 7: *“Investigate the reason(s) for the incomplete, incorrect, and missing work orders we identified; and develop an action plan for addressing these problems, including the provision for proper supervisory oversight.”*

We have improved our procedures to ensure proper supervisory oversight. As a result of the deficiencies noted during the audit, tunnel maintenance supervisors have been instructed to check all work orders for completeness and accuracy against time cards. The maintenance supervisors must now also verify this work against the finished schedule.



In addition, General Supervisors will also conduct weekly checks of the work orders completed by their respective sections, while the Physical Plant Manager will conduct a monthly ten percent sample audit of the work orders processed by the entire unit. To improve the accessibility of work orders, the Lincoln Tunnel management has designated secure space in the administration building to store work orders, as outlined in the Port Authority's records retention manual.

Recommendation 8: "Require maintenance staff to report only the actual time worked on the task(s) listed in the work orders. Establish a standard for time spent preparing the equipment, waiting to get access to the tunnels, etc. This and other auxiliary time not specifically devoted to complete the work order tasks should be accounted for separately."

All costs to perform a job must be tracked in the specific work order, inclusive of preparation time, travel time, and tunnel access time. There is no reasonable way to separate preparation time from a work order, as the time requirements are a function of the work being performed. There are many variables that affect the time available to perform direct maintenance activity in the tunnels. Traffic flow, capital construction, weather, and equipment availability all affect tunnel access and it is unrealistic to establish a standard for tunnel access.

The readiness and availability of equipment, as well as other activities required to prepare for a tunnel maintenance tour, depend on variables such as the availability of the tools needed to accomplish the scheduled tasks and, if necessary, the coordination of crafts or contractors. Travel time can vary based on the conditions at the facility and depend in many situations on tunnel access. We do not believe that the separation of these costs would serve any benefit since they are a component of the work being performed. In addition, it would be difficult to develop standards against which to measure these items.

Recommendation 9: "Implement a system for adequately monitoring maintenance staff productivity. Make periodic comparisons between actual time worked and the estimated number of hours established for specific tasks. Analyze the reasons for variances."

As a result of this audit, the frequency of periodic field inspections of maintenance work by the General Maintenance Supervisors and the Physical Plant Managers has been increased from monthly to weekly as a means of better monitoring productivity.

The Maintenance Management Information System (MMIS) currently provides the ability to analyze actual versus estimated hours. The estimates associated with routines are changed by General Maintenance Supervisors, if specific trends occur. We periodically compare actual time worked to estimates for specific tasks and determine the reasons for variances. Moreover, we believe the next version of the MMIS will improve this management capability. Additionally, the tunnels are scheduled to begin another comprehensive review of routines and maintenance procedures, beginning with the Holland Tunnel. As part of our regular management of the MMIS, PM work orders will be assessed over a three-year period at the two tunnels, to compare estimated hours and actual hours worked to ensure the validity and accuracy of the estimates contained in the system. Adjustments will be made to the benchmark work orders as needed. This effort will also include an analysis of every periodic and standing work order to determine its need and accuracy. We anticipate that significant changes will be made to our current program as a result of these undertakings. We expect that this initiative will be completed by the third quarter of this year.



Recommendation 10: "Review and correct data stored on the data base that compiles information regarding the Holland Tunnel's Ventilation reports."

The data base that compiles information reflected in the Holland Tunnel's ventilation reports has been upgraded as part of our Y2K compliance initiative. We also anticipate that minor enhancements to the database will be implemented during the first quarter of 2000. The General Maintenance Supervisor for the Electrical/Mechanical Section reviews these reports to ensure their accuracy and completeness.

Please be advised that the issues and concerns raised in this audit will be taken into consideration as we look to strengthen the manner in which we document our controls over the tunnel maintenance and inspection program. As always, we appreciate the work performed by your staff and look forward to working with them in the future.

Should you have any questions concerning our comments, please contact Mr. Kenneth Philmus, Director of the Tunnels, Bridges and Terminals Department at (212) 435-4400.

Sincerely,

Charles F. McClafferty
Chief Financial Officer

cc: Hon. Lewis M. Eisenberg, PANY/NJ
Robert E. Boyle, PANY/NJ
Robert V. Barnes, NYS/DOB
Ernesto Butcher, PANY/NJ
Mary B. Labate, NYS/DOB
Kenneth Philmus, PANY/NJ
Andrea Zaretzi, NYS/Oversight Committee