REPORT SUMMARY

FTA Report No. 0235
November 2022

FTA RESEARCH
FEDERAL TRANSIT ADMINISTRATION

REVIEW OF SPECIFICATIONS AND GUIDELINES FOR RAIL TUNNEL REPAIR AND REHABILITATION

Background

After the Washington Metropolitan Area Transit Authority (WMATA) L'Enfant Station accident in 2015, in which electric arcing of a circuit due to prolonged moisture from tunnel leakage caused a passenger train to stop in the smoke-filled tunnel resulting in a passenger fatality, the National Transportation Surface Board (NTSB) issued two recommendations directed at the Federal Transit Administration (FTA). Delays in evacuations from the passenger train in the tunnel were caused by the smoke in the tunnel, failed ventilation fan components, and delayed emergency egress under less-than-desirable conditions (lighting and walkways). The two recommendations were:

- Recommendation R-16-01 – Issue regulatory standards for tunnel infrastructure inspection, maintenance, and repair, incorporating applicable industry consensus standards into those standards.
- Recommendation R-16-02 – Issue regulatory safety standards for emergency egress in tunnel environments.

Objectives

This research was conducted to assist in the development of industry voluntary standards and/or recommended practices for the repair and rehabilitation of transit rail tunnels. It also includes a condition-based rating system for tunnels as a tool for evaluation for rehabilitation and guidelines for a tunnel inventory database.

Findings and Conclusions

The transit industry should consider establishing a rating system, standard evaluation procedures, and a prioritization method for system components, including tunnels, and can use various current sources for condition assessments and repair methods.

Findings of the study include the following:

- **Finding 1:** The transit industry should consider establishing a rating system, standard evaluation procedures, and a prioritization method for system components, including tunnels. A rating system and condition assessment procedures will provide numerical justification and prioritization for repairs or rehabilitation. A comprehensive prioritization method may consider effectiveness, a risk-based analysis, and capital funding and staffing programs to accomplish tunnel preservation goals and serve as a training tool for new personnel. This finding fulfills National Safety Plan objectives to manage the safety risks and safety hazards within public transportation systems and can also assist transit agencies that receive federal financial assistance in implementing transit asset management for their capital assets used to provide public transportation.

- **Finding 2:** Based on the comparison of two condition assessment methods, NCHRP Report 816 can be adapted to develop condition assessments for rail transit tunnels. The report provides a process for prioritizing needs using an overall measure of effectiveness calculated using a risk-based urgency score and developing capital funding and staffing programs to accomplish tunnel preservation goals.
- **Finding 3:** Tunnel inspection and repair methods can be adapted to transit applications using various sources such as FHWA's *Technical Manual for Design and Construction of Road Tunnels – Civil Elements*, AWSD1.1/D1.1 for structural steel repairs, AASHTO specifications for repair of steel fastening systems, and sources identified in FTA's *Rail Tunnel Design, Construction, Maintenance and Rehabilitation*. This would provide standards or recommended practices for identifying, characterizing, and repairing typical defects in transit tunnel systems.

Benefits

Study findings can support future FTA efforts in providing guidance to the industry on minimum guidelines for rail tunnel repair and rehabilitation practices. The report discusses how transit agencies can perform condition assessment calculations to support their transit asset management program and how to prioritize and measure the effectiveness of preservation actions.

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Project Information

This project was performed by the Transportation Technology Center, Inc. under contract with the Center for Urban Transportation Research in support of FTA's Standards Development Program. For more information, contact FTA Project Manager Raj Wagley at (202) 366-5386 or Raj.Wagley@dot.gov.

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