



RESEARCH FOUNDATION

RESEARCH FOR THE NFPA MISSION

PROJECT SUMMARY

Impact of Fixed Fire Fighting Systems on Road Tunnel Resilience, Ventilation, and Other Systems

Last Updated: 23 June 2016

Background: Fixed firefighting systems (FFFS) are being installed in many new road tunnels and as retrofits to existing tunnels both within the US and internationally. Although there are advantages to installing these systems for life safety, the impacts on the tunnel structure, ventilation systems or other systems, and on operations are not fully understood. If the use of FFFS stops or reverses fire development with enough reliability to define a design fire range lower than current suggested language in NFPA 502, Standard for Road Tunnels, Bridges, and Other Limited Access Highways, the installation and use of FFFS may mean that a tunnel could be built or retrofitted to meet the demands of a less onerous design fire, resulting in potentially millions of dollars in savings primarily by reducing ventilation and passive structural fire protection requirements.

Research Goal: The goal of this project is to perform a literature review and perform a gap analysis.

Project Tasks: The following are task for this project:

- 1) Collect existing data and knowledge about the performance of FFS, tunnel structure and ventilation system in tunnel fire incidents. Potential data sources include:
 - a. Full-scale test results performed by research agencies such as SP, NRC and IFAB
 - b. Available CFD modeling analyses.
 - c. Existing regulations or project-based decisions that some countries may already incorporate the tradeoffs.
 - d. Cost-benefit analysis performed for some projects.
 - e. Results of these sources are available in professional publications, the research agencies and tunnel authorities. Given the limited number of new road tunnels in the U.S., an international effort to collect data should occur. This should specifically include China, Japan, Australia, and European countries.
- 2) Analyze existing data and knowledge and document the knowledge gaps including the gaps around the possible impacts of the FFS on the ventilation system.
- 3) Develop a final report synthesizing the information gather in the completion of the previous tasks. The report should include recommendations for future research, to include pertinent information to be sought in future fire testing and/or modeling.

Implementation: This research program will be conducted under the auspices of the Research Foundation in accordance with Foundation Policies and will be guided by a Project Technical Panel who

will provide input to the project, recommend contractor selection, review periodic reports of progress and research results, and review the final project report.

Schedule: This is a one year project, the following is a tentative schedule:

June/July 2016	Project Kick-off Meeting
August 2016	Preliminary Report
November 2016	Draft Final Report
December 2016	Final Report