

Fire in Tunnel Collaborative Project: Year 1, 2 report Data Dataset

Dataset available at: <https://doi.org/10.7910/DVN/V6E9S0>

(This dataset supports report **Fire in Tunnel Collaborative Project**)

This U.S. Department of Transportation-funded dataset is preserved by the Center for Advanced Infrastructure and Transportation (CAIT) in the CAIT Dataverse, which is a part of the Harvard Dataverse repository (<https://dataverse.harvard.edu/>), and is available at <https://doi.org/10.7910/DVN/V6E9S0>

The related final report **Fire in Tunnel Collaborative Project**, is available from the National Transportation Library's Digital Repository at <https://rosap.ntl.bts.gov/view/dot/60844>.

Metadata from the Harvard Dataverse Repository record:

Dataset Persistent ID: doi:10.7910/DVN/V6E9S0

Publication Date: 2022-03-24

Title: Year 1, 2 report Data

Author:

- Negar Elhami-Khorasani (University at Buffalo)
- Anthony Tessari (University at Buffalo)

Description: Extreme fire events in tunnels may have catastrophic consequences, which include loss of life, structural damage, and major socioeconomic impacts due to service disruptions. In this report, a traveling fire model for a railway tunnel is established to evaluate the evolution of temperatures considering fire spread between train cars. Uncertainties in the amount of fuel, ventilation velocity, tunnel slope, ignition point, and criteria for fire spread are incorporated to capture distributions of fire temperature and duration in the tunnel. The generated demand fire scenarios are used to quantify the potential damage to a concrete tunnel lining in terms of the volume of concrete that would require replacement after a fire event. A finite element modeling approach is developed to incorporate the effects of concrete spalling on the structural response. Further, realistic soil conditions and overburden pressures are modelled and verified using soil-specific simulation software and analytical solutions. The evolution of moments during the heating and cooling phases of a fire are modelled and the results demonstrate the importance of capturing the cooling phase during both simulation and experimental testing. Small-scale element testing of concrete spalling is performed at the New Jersey Institute of Technology, which considers concrete mixtures with polypropylene (PP) and steel fibers, and demonstrates the effectiveness of the PP fibers. Four large-scale concrete slabs are tested using the large furnace at the University at Buffalo. Three test specimens contain fiber reinforcement, which prevented spalling during testing. The last specimen did not contain fibers, and the specimen experienced significant spalling during the heating phase. Evolution of temperature within the cross section, displacements of the four concrete slabs, and damage in terms of cracking, spalling, and reduced strength are reported. The outcomes of this report provide insight on the likelihood of fire damage to the concrete liner of railway tunnels.

Subject: Engineering

Depositor: Stiesi, Ryan

Deposit Date: 2022-03-24

Recommended citation:

Negar Elhami-Khorasani; Anthony Tessari, 2021, "Year 1, 2 report Data", <https://doi.org/10.7910/DVN/V6E9S0>, Harvard Dataverse, V1

Dataset description:

This dataset contains 1 .zip file collection, described below.

Fire in Tunnel Collaborative Project_Data.zip:

- Table 2.12-2.15.csv
- Figure 5.4.csv
- Figure 5.29.csv
- Figure 5.28d.csv
- Figure 5.28c.csv
- Figure 5.28b.csv
- Figure 5.28a.csv
- Figure 5.26.csv
- Figure 3.9.csv
- Figure 3.7.csv
- Figure 3.4-3.5.csv
- Figure 3.11.csv
- Figure 2.7.csv
- Figure 2.26.csv
- Figure 2.25c.csv
- Figure 2.25b.csv
- Figure 2.25a.csv
- Figure 2.24.csv
- Figure 2.21.csv
- Figure 2.20.csv
- Figure 2.2.csv
- Figure 2.11.csv

The .csv, Comma Separated Value, file is a simple format that is designed for a database table and supported by many applications. The .csv file is often used for moving tabular data between two different computer programs, due to its open format. The most common software used to open .csv files are Microsoft Excel and RecordEditor, (for more information on .csv files and software, please visit <https://www.file-extensions.org/csv-file-extension>).

National Transportation Library (NTL) Curation Note:

As this dataset is preserved in a repository outside U.S. DOT control, as allowed by the U.S. DOT's Public Access Plan (<https://ntl.bts.gov/public-access>) Section 7.4.2 Data, the NTL staff has performed *NO* additional curation actions on this dataset. NTL staff last accessed this dataset at <https://doi.org/10.7910/DVN/V6E9S0> on 2022-04-11. If, in the future, you have trouble accessing this dataset at the host repository, please email NTLDataCurator@dot.gov describing your problem. NTL staff will do its best to assist you at that time.