

Strategic Theme D: Infrastructure

Goal

The goal of Strategic Theme D is to improve the quality and efficiency of road infrastructure through the effective management of assets in accordance with user expectations and government requirements.

Overview

The purpose of the TC D5 meeting in Lyon was to progress each Work Group's activities for the preparation and presentation of reports at the World Road Congress in October 2019. The Technical Committee also met to make final preparations for its International Conference in Lyon, 3-5 October 2018.

1 October 2018

Mr Marc Tesson (Chair of TC D5) opened the meeting which was held at his office conference room at CETU (Centre of Tunnel Studies).

TC D5 currently has 160 members of which approximately 60 are full members.

Work Group Reports

Work Group 1 – Sustainable Operations

The main report is titled "Applying the RAMS Approach to Road Tunnel Operations". It has been sent to peer reviewers and comments have been received. A new chapter is being prepared to cover; What is RAMS? Why the RAMS approach should be used for road tunnels; When should the RAMS approach be applied.

Approval of the final version of the report will be sought from TC D5.

- The Work Group has made significant contributions to the upgrade of the Road Tunnels Manual.
- Technical Watch report on LEDs in road tunnels was prepared for PIARC's Routes/Roads magazine.

Work Group 2 – Safety

Report on tunnel related collisions is well advanced. Collision data and tunnel operator surveys received from 19 countries. Aim is to have the final version of the report ready for publication in English by March 2019. Reviewers from within our Technical Committee have provided positive feedback on the quality of the draft report.

- Upgrade of DG-QRAM
The current version of DG-QRAM runs on Excel 2003 and is outdated. The upgrade project will allow DG-QRAM to run on modern platforms and its functionality will be improved. New software will also be available. Training sessions will be conducted for new users and separately for experienced users. The purchase price for the new software is 1,500 Euros.
Funding is being sought to improve the functionality of DG-QRAM.
- Significant contributions are being made to upgrade the Road Tunnels Manual.

Work Group 3 – Human Factors and ITS

- Preparation of main report on meeting the needs of people with reduced mobility when using road tunnels. Surveys were issued, and 12 countries have responded. A report on public address systems in tunnels will be included as an appendix to the main report. Final version of the report is expected to be ready for review by Committee members by March 2019.

- Preparation of a Technical Watch report on the use of ITS in tunnels is underway and will continue into November 2018.

Work Group 4 – Vehicle Emissions

- The main technical report on ventilation and emissions is complete. Report is ready to submit to PIARC's General Secretariat for publication.
- A Technical Watch report on vehicles powered by alternative fuels and impacts on tunnel safety is being prepared.

Work Group 5 – Large Underground Infrastructure

- Low participation by Work Group members is affecting progress of work. Currently reviewing case studies prepared in the previous cycle.
- Reasonable progress with a report on tunnel ventilation.
- Complex underground infrastructure is a significant emerging issue and requires committed people to develop a report on best practice underground infrastructure. This will be a priority in the next PIARC cycle.

Work Group 6 – Knowledge Management

One hundred and nine pages of the Road Tunnels Manual have been reviewed and are almost ready for upload. Twenty-three pages need to be developed. Aim is to have the updated Road Tunnels Manual in English published by the next World Road Congress in Abu Dhabi in October 2019.

2 October 2018

The Committee was updated on liaison with other organisations.

ITA

Focused on promoting use of underground space and operation of road tunnels. Aiming to increase acceptance of underground solutions. It will publish a book on contracts for underground works. This publication is expected to be available in December 2018. ITA has also developed guidelines for safe construction of tunnels. It visits schools to promote engineering and conducts training sessions in member countries.

ITA – COSUF (Committee on Operational Safety of Underground Facilities)

COSUF workshop on New Energy Carriers proposed for Feb/March 2019.

CIE (International Commission on Illumination)

It has several technical committees that are currently working on:

- Classification of tunnels according to various criteria
- Light reflected from side walls
- Dynamic control of a light system to avoid congestion in tunnels (this involves the use of lighting on the side walls to encourage acceleration or deceleration of traffic)
- Glare
- Position of first luminaires in tunnels
- A study of coloured lighting in tunnels has commenced. Results expected to be available within the next three years. Preliminary results indicate approximately 40% energy savings

NFPA (National Fire Protection Association)

NFPA 502 Committee is currently evaluating comments received on the standard. It has a number of technical committees that are currently working on: fire rating of tunnel systems; integration of SCADA in tunnel operations; confinement/critical velocity; multi incident scenarios; application of NFPA72; tunnel category re-definition; way finding and lighting; autonomous vehicles; alternative fuels and impacts on fire hazards.

AASHTO (American Association of State Highway and Transportation Officials)

Developed specifications for tunnel design and construction. It has 20 committees that meet twice a year and they have undertaken many research projects. A scan report on tunnel fixed fire- fighting systems has been prepared based on visits to Australia and New Zealand.

News from WRA General Secretariat

The General Secretariat presented their expectations for timeline of delivery of our TC reports. Our TC confirmed that reports are in line with expectations except for the WG3 report.

We received a briefing on arrangements for the World Road Congress in Abu Dhabi. Fourteen abstracts have been received in our discipline which we are to review in October 2018.

The Tunnels Technical session will be held on 9 October 2019 and the Poster session will be held on 10 October.

Terms of Reference for the next cycle, participants and technical committee chairs will be confirmed before the next World Road Congress. Candidates for technical committees are to be nominated by their country's first delegates.

Road Tunnels Program for Next Cycle

Preliminary proposals for consideration, include:

- ITS (incorporating the use of autonomous vehicles)
- New propulsion technologies (impacts on tunnel operation and safety)
- Complex underground infrastructure (continuing work)
- Road Tunnels Manual
- Risk reduction measures and analysis
- Maintenance management for heavily trafficked urban tunnels
- Quantification of collision risks; assessment of alternative fuel risks
- Zero energy tunnels (energy neutral)

Key Learnings

- Virtual reality tests in Norway have the following results:
 - Loudspeakers in combination with dynamic arrows increase way finding
 - Distance between rescue rooms should not be more than 250m
 - A handrail that is continuously lit assists way finding. A “hard” handrail should not be used as they can spear vehicles
- CETU has produced three videos, which are available on the web, on how to react in crisis situations in tunnels. Short videos with key messages.
- Use of lay-bys in Spanish tunnels

EU directive mandates the use of lay-bys for particular tunnel characteristics. Dimensions for tunnel lay-bys is not dictated. PIARC provides some guidance for lay-by dimensions. Crashes involving lay-bys are rare but serious injuries or fatalities can result. Spain has identified various treatments to reduce crash severity, such as use of LED beacons and lighting at lay-bys and use of guardrail protection. Lay-bys are mainly used in bi-directional tunnels with no shoulders or emergency breakdown lanes.

3-5 October 2018

International Conference on Road Tunnel Operations and Safety

Our TC organised this international conference which was conducted in Lyon, 3-5 October. Three hundred participants with representatives from 40 countries (including Australia and New Zealand). Some of the key learnings include:

- Japanese trials of pacemaker LED lighting on side walls result in reducing congestion by 90%.
- Japan is trialing special lighting at a tunnel entrance to discourage motorists from entering a tunnel when there is an incident. Too early to determine the effectiveness of this treatment.
- Across Europe, it is common that a control center manages many tunnels (260 tunnels in Norway).
- France currently has a 2 Billion Euro budget to increase incident monitoring, improve tunnel evacuation measures and for increased tunnel maintenance effort.
- In the Netherlands, maintenance of tunnels is becoming more challenging because of growing traffic volumes. Typically, tunnels are closed six times a year for maintenance.

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November 2018