



Road Tunnel Operation and Safety Course: Emergency Ventilation, Control Rooms and Incident Response



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Introduction:

Road tunnel operation and safety, covering emergency ventilation, control rooms and incident response, is a 1-week course for road authority tunnel units, control room supervision teams and O&M contract managers that ends with a Tunnel Operations and Emergency Response Plan for a case tunnel operator. Tunnels in service lose lives and availability when operators hesitate over fan modes, closures are improvised and fire systems, pumps and lighting are inspected too late. Nominees already supervise urban or mountain road tunnels and learn through timed incident simulations. CoreConcept Training Center delivers this road tunnel operation and safety course.

Course Objectives:

- Assess the operational hazards and risk scenarios of an urban or mountain road tunnel using event tree analysis and equipment availability records
- Select jet fan ventilation modes for normal traffic, congestion and fire incidents and adjust them from air quality and smoke readings
- Run control room procedures for SCADA alarms, automatic incident detection, lane closures and messages to tunnel users
- Coordinate fixed fire-fighting activation, evacuation through emergency exits and handover to fire and rescue services during a tunnel fire
- Schedule periodic inspection, lighting and drainage maintenance and planned night closures while protecting tunnel availability
- Prepare a Tunnel Operations and Emergency Response Plan with ventilation mode tables, closure sequences and exercise schedules

Target Audience:

- Road authority tunnel management units accountable for safe operation and availability of tunnels in service
 - Control room supervision teams responsible for monitoring traffic, alarms and incident response around the clock
 - O&M contract management teams responsible for maintaining ventilation, fire, lighting, drainage and power systems
 - Tunnel safety units responsible for risk analysis, safety documentation and emergency exercises
 - Emergency liaison units that coordinate fire, rescue, police and recovery services at tunnel incidents
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Course Outline:

Day 1: Road Tunnel Operating Context, Hazards and Current-State Review

- PIARC Road Tunnels Manual Map of Operator Responsibilities
- Urban Versus Mountain Tunnel Operating Profile Comparison
- Tunnel Hazard Inventory for Vehicle Fires and Dangerous Goods
- Tunnel Safety Documentation Set and Operating Manual Structure
- Current-State Review of Tunnel Equipment Availability Records

Day 2: Tunnel Risk Analysis, NFPA 502 Provisions and Ventilation Operating Modes

- Event Tree Risk Analysis for Tunnel Incident Scenarios
- NFPA 502 Provisions for Emergency Ventilation and Egress
- Jet Fan Thrust Reversal and Airflow Direction Choice
- Normal, Congestion and Fire Ventilation Mode Tables
- Carbon Monoxide and Visibility Sensor Readings for Fan Control

Day 3: Tunnel Control Room Procedures, SCADA and Traffic Incident Handling

- SCADA Alarm Prioritisation and Operator Acknowledgement Routines
- Automatic Incident Detection Camera Alarm Verification Steps
- Lane Control Signals and Variable Message Sign Closure Sequences
- Stopped Vehicle, Breakdown and Collision Response Procedures
- Radio Rebroadcast, Public Address and Emergency Telephone Handling

Day 4: Fire Life Safety Systems, Lighting, Drainage and Inspection Closures

- Fixed Fire-Fighting System Deluge and Water Mist Zone Activation
- Emergency Exit Doors, Cross Passages and Evacuation Signage Checks
- Tunnel Lighting Threshold, Interior and Exit Zone Control
- Drainage Sumps, Hazardous Spill Containment and Pump Duty Rotation
- Periodic Inspection Regime and Planned Night Closure Scheduling

Day 5: Simulation Exercises and the Tunnel Operations and Emergency Response Plan

- Simulated Heavy Goods Vehicle Fire With Ventilation Mode Decisions
 - Simulated Multi-Vehicle Collision With Lane Closure and Diversion
 - Joint Exercise Debrief With Fire and Rescue Service Liaison
 - Case Operator Maintenance Closure Calendar and Availability Targets
 - Tunnel Operations and Emergency Response Plan Completion
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Skills You Will Gain:

- Tunnel Incident Risk Analysis
- Ventilation Mode Selection
- Control Room Alarm Handling
- Tunnel Closure Sequencing
- Fire Suppression Zone Activation
- Evacuation Coordination
- Tunnel Lighting Control
- Inspection Closure Scheduling

Why Attend This Course:

- Deliver a Tunnel Operations and Emergency Response Plan for a case tunnel operator to the tunnel manager and the road authority operations head
- Decide which fan mode, lane closure and suppression zone to activate within the first minutes of a tunnel incident
- Avoid smoke spreading over queued traffic, unplanned full closures and failed pumps or fans found only during an emergency
- Coach control room operators and maintenance crews on mode tables, closure sequences, alarm routines and exercise debriefs

Conclusion:

Back at work, the participant gives the tunnel manager and the road authority operations head a Tunnel Operations and Emergency Response Plan that sets ventilation mode tables, closure sequences, suppression zones, inspection closures and exercise schedules for a tunnel in service. Control room supervisors use it to brief each shift, and the O&M contractor uses it to plan night closures. After the first live exercise or real incident, the unit should compare operator response times and fan mode choices with the plan and revise the mode tables and procedures.

Frequently Asked Questions FAQ:

What should participants know before the road tunnel operation and safety course?

Participants should already supervise, operate or maintain a road tunnel or its systems and read SCADA screens and equipment schedules. Bringing an anonymised incident log, operating manual extract or maintenance closure record helps them apply the simulations and the final plan.

How does road tunnel operation and safety differ from a tunnel construction or smoke control design course?

It addresses tunnels already open to traffic: running ventilation modes, control room procedures, incident response, inspection and closures. Construction courses cover excavation methods and linings, and smoke control design courses size fans and shafts before a building or tunnel is built.

Why does road tunnel operation and safety depend on the first minutes of a fire?

Smoke from a vehicle fire spreads quickly in an enclosed bore, so the fan mode, closure signals and user messages chosen early decide whether escape routes stay clear. Pre-agreed mode tables and drilled operator routines shorten those decisions.

What do participants take back from the road tunnel operation and safety course?

Participants take back a Tunnel Operations and Emergency Response Plan for a case tunnel operator, with ventilation mode tables, lane closure sequences, alarm routines, an inspection closure calendar and an exercise debrief template adaptable to their own tunnels.