HOW DOES THE MOBILITY REVOLUTION IMPACT HOW WE DESIGN TUNNELS?

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How are we adapting to changes in tunnel-based transportation, from tunnel design to tunnel safety implementations?

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With the increasing need for additional infrastructure capable of keeping up with growing population, the need for more tunnel-based transportation technology could be a part of our future. From hyperloop technologies to autonomous fleets of vehicle "hives" constantly traveling closely together without ever needing to park, concepts like these point to more underground transportation infrastructure in densely populated areas.

Exposure to smoke during a fire, heat, and other airborne chemical hazards in confined space pose significant risks to tunnel users. A serious incident involving the transport of dangerous goods in tunnel can be costly in terms of loss of lives, tunnel damage and economic losses.

The United Nations Economic Commission for Europe (UNECE) recommends improving motorist behaviors, their vehicles, tunnel operator efficiency and the infrastructure as ways to decrease the number of tunnel incidents—but tunnel ventilation and fire protection systems will also need to account for modern alternative-fueled vehicles and associated materials. There are now hydrogen-based buses traveling in many major cities and battery storage technologies are being implemented in vehicles which have the capacity to hold a large quantity of energy which may be released during a crash or fire. The materials used in automotive manufacturing have also evolved. Today's generation of vehicles have a much higher potential heat release rate and fire load than metal-based vehicles of days past. For instance, 1,400 vehicles were destroyed in a multi-story parking garage fire in Liverpool in early 2018.

Some of the latest technological advances to these issues will likely involve video surveillance incorporating the latest "intelligent video" software solutions. This artificial intelligence processing technology is able to distinguish certain types of crowding behaviors and even acts of aggression in order to trigger automatic functions or alert first responders. For the right fire protection systems to be employed in a complex scenario or faster response time, these intelligent systems will have to adapt and respond to the hazard type and traffic scenario.

Other solutions will require adherence to the standards and recommended practices of today. Many jurisdictions do not comply with the latest editions of NFPA 502 *Standard for Road Tunnels, Bridges and Other Limited Access Highways* and NFPA 130 *Standard for Fixed Guideway Transit and Passenger Rail Systems.* Although these are often not adopted as law, they are best practices guides that should be adhered to for all tunnel systems. Our staff serve on the technical committee of NFPA 130 and have vast experience working on tunnel related compliance testing meeting the NFPA 502 criteria. See how we can help you navigate the approval process for your tunnel fire and life safety systems.