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SAFE PASSAGES

As more road tunnels are built in Singapore, a Wearnes company, Welmate, is right there making sure they are adequately fire-protected. "MRT tunnels do not need fire protection as the trains run on electricity, not petrol, and the concrete shell is non-combustible," says Welmate's General Manager Liew Kuan Sing.

In road tunnels, it is vital to protect the soffit (where the telephone, light and emergency signal cables are housed) so that explosive spalling of the concrete does not occur in a fire. If it does, not only will the concrete slabs fall and block escape routes, the heat will also weaken the steel reinforcements.

Welmate is working on a section of the Kallang-Paya Lebar Expressway – the part that goes under the Kallang River – where it is most vulnerable. Without protection, if the concrete suffers thermal spalling in a fire, the reinforcements will be exposed. When that gives way, the tunnel will collapse and water will rush in, flooding the tunnel. "The protection will prevent this from happening," says Liew.

To fire-protect the road tunnel, a fire-resistant material with more than twice the thickness of that used in buildings, is fixed as a soffit lining. It gives two hours of protection, enough time for people to

escape, vehicles to be removed and rescue teams to douse the fire before it damages the concrete structure. The material has been tested in an accredited laboratory in the Netherlands, the world's foremost authority on fire protection in road tunnels.

Singapore has learnt the importance of having this protection from tunnel fires which have cost lives and money, like the 1996 fire inside the Channel Tunnel and the 1999 fire in Switzerland's Mont Blanc Tunnel where 39 lives were lost.

Liew, who joined Wearnes in 1988 and has a degree in chemistry, explains that in a hydrocarbon fire (e.g. petrol fires) the temperature can reach 1,380°C. "At this temperature, concrete collapses and the steel reinforcements soften like butter. Like in the 9/11 World Trade Centre fire. A building fire would normally reach 850 to 900°C."

Welmate is also involved in fireproofing buildings, including cladding structural steel so that in a fire, its temperature does not rise above 500°C, above which steel buckles. It also clads air ducts so that the spread of fire in an outbreak can be contained inside the ducting system. Some of its jobs in Singapore were at Suntec City, Singapore Post Centre, Bank of China Building, Alexandra Technopark, SIA Air Freight Terminal V and Temasek Polytechnic.

