



The tunnel portal just before completion.

Sydney Harbour Tunnel Fire System

Hazel Baker reports on a fire suppression system designed by ACADS' Hyena software for the Sydney Harbour Tunnel.

The Hyena hydraulic analysis computer program, which is licensed and maintained by the ACADS Building Services Group, ranks highly amongst building services design professionals for its comprehensiveness and ease of use. One of its largest and most unusual recent applications was in the design of the sprinkler system for the Sydney Harbour Tunnel.

The Sydney Harbour Tunnel is 2260 metres long, one of the longest in the world. Since it carries many tens of thousands of motor vehicles every day, an accident, with attendant smoke and fire and injury, is a distinct probability. Firefighting in this enclosed space represents a formidable challenge.

During the design process there was very close co-operation between all the parties to the construction, notably tunnel builder Transfield Kumagai, the NSW Roads and Traffic Authority, the NSW Fire Brigade, and Eagle Consulting Group, the company which designed the fire system.

Between them they agreed on the installation of six systems:

- under-road vehicle detectors to monitor incidents;
- closed circuit television;
- thermal fire detection systems above each carriageway;
- manually operated deluge systems, which are designed to swamp a fire, covering designated zones of each carriageway; and
- hydrants and hose reels, and a control centre with computer facilities to help select the best deluge zones for a particular fire. This was in addition to audio and visual warnings and instructions to motorists.

The brief to Eagle Consulting Group was to design a fire detection and suppression system. Both the system design and the equipment chosen had to guarantee sufficiently superior performance to meet the unique conditions of a fire occurrence in a traffic tunnel environment. As a project, the tunnel was unique because of its length, location and the projected traffic volume. According to Rick Foster, the fire consultant who did the design, the most difficult and critical aspect of designing a fire detection and suppression system was the effect of the ventilation on the fire plume and hot gases released from the fire.

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The ventilation station in the Sydney Harbour Tunnel is approximately half way along its length. As a result the ventilation effect is very complex and not uniform throughout the tunnel.

This could become even more complicated in the event of a moving fire, such as an errant truck. Road tankers and vehicles carrying hazardous materials are not allowed to travel through the tunnel but plans had to take that possibility into account.

"In developing these alternatives, one of the areas that I paid particular attention to was water supplies and the performance of the system," said Rick Foster.

"This meant we had to make the best use of the water

