



# Advertiser & Sunday Mail Building Adelaide

## Welcome

Welcome to **FireSafe™** Solutions Issue 4, showcasing steel-framed retail projects that have benefited from the application of performance-based Fire Safety Engineering assessments, to provide alternative solutions using bare steel construction that can offer benefits such as:

- **INCREASED SAFETY LEVELS**
- **REDUCED BUILDING COSTS**
- **ARCHITECTURAL FLEXIBILITY**
- **FASTER CONSTRUCTION**

**THE STRUCTURAL SYSTEM INCLUDES STEEL HOLLOW SECTION COLUMNS, TYPICALLY 457 MM IN DIAMETER.**

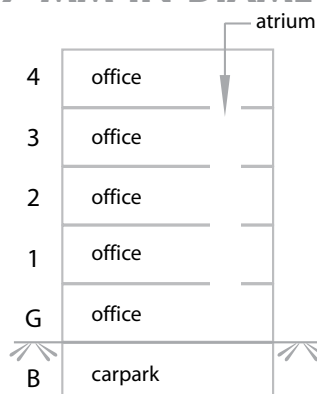


Figure 1

The Advertiser office building incorporates 5 levels of offices above a basement carpark (see Figure 1). The floor area is approximately 3200 m<sup>2</sup> per storey. It has two full-height atria connecting all office levels. Each atrium has plan dimensions of 20.2 m by 5.8 m. There are three fire-isolated stairs in addition to a non-required stair in an atrium.

The structural system includes steel hollow section columns, typically 457 mm in diameter, filled with concrete and reinforced internally. Floor slabs are composite profiled steel sheeting slabs. Steel beams include shear connectors to achieve composite action with the floor slab.

The building is sprinkler-protected throughout.

The effective height of the building is approximately 19.5 m, being less than the height of 25 m at which sprinklers are required under DTS. Sprinkler protection is required under DTS due to the presence of the atria, however. Sprinkler protection of the carpark is also required under DTS, as it contains more than 40 car spaces.

The building has been approved with structural fire protection in the office levels as follows:

- all columns are protected to achieve an FRL of 120/-/-
- the primary beams, which span across the shorter dimension of the building, are protected to achieve an FRL of 60/-/-
- all other beams are unprotected (all beams have an exposed surface area to mass ratio of less than 30 m<sup>2</sup>/t)

The sprinkler system incorporates the following features:

- separate sprinkler systems for atria and offices;
- monitored valves at each storey;
- provision for end-of-line testing; and
- fast response heads.

In addition, a sprinkler management system was specified, incorporating:

- no two zones to be isolated at any one time;
- sprinkler zones to be isolated only for single days, reinstated a night;
- fire loads to be reduced if periods of extended isolation are unavoidable; and
- end-of-line testing to be performed after any isolation.

The above fire safety solution has been justified largely on the basis that the benefits of the sprinkler system enhancements provided outweigh any additional hazard associated with the reduced FRL of the floor system.

Furthermore, it was demonstrated that even a standard sprinkler system provides about three times the benefit of fire-rated construction with respect to limiting the rate of occurrence of large fires. Since the rate of deaths and injuries from fires correlates directly with the rate of occurrence of large fires, the BCA objectives are more effectively satisfied using sprinkler protection rather than protection of structural elements.

More specifically, the impact of the proposed solution upon fire spread, detection and suppression, occupant avoidance and fire brigade intervention were considered, as follows:

- fire spread – the enhanced sprinkler system provides benefits with regard to reduced likelihood of fire spread, with sprinklers being more likely to stop spread than fire-rated floors, due to the openings and free edges which always occur. The full-scale Cardington fire tests<sup>[1]</sup> demonstrated the robustness of the structural form utilised.
- detection and suppression – the enhanced sprinkler system increases reliability.

- occupant avoidance – the egress time will be about 10 mins, whereas the real behaviour provides safety for many times that required.
- fire brigade intervention – fire brigade effectiveness is assisted by the enhancements to the sprinkler system.
- adjacent buildings – the enhancements to the sprinkler system reduce the probability of a large fire occurring, thus outweighing the impact of the reduced FRL of the floor system.

#### References

1. Kirby, B et al, "The Behaviour of Multi-Storey Steel Framed Buildings in Fire", British Steel Corporation, 1999.

#### CLIENT

Advertiser Newspapers Pty Limited

#### ARCHITECTS

E.G.O Fender Katsalidis

#### PROJECT MANAGER

E.G.O Group

#### STRUCTURAL ENGINEER

Wallbridge & Gilbert

#### BUILDING CONTRACTOR

Baulderstone Hornibrook

#### ADVERTISER BUILDING – FIRE RESISTANCE REQUIREMENTS SUMMARY

BUILDING ELEMENT	ELEMENT REQUIREMENT	
	DTS	Alternative Solution
Office – beams	120/-/-	Primary beams: 60/-/- Other beams: unprotected
Office – columns	120/-/-	120/-/-
Carpark – beams	60/-/- or 30 m <sup>2</sup> /t	30 m <sup>2</sup> /t
Carpark – columns	60/-/-	60/-/-
Sprinklers	Yes	Yes (with enhancements)

Table 1

