Toyota Showroom, Nunawading

A SAFE AND ECONOMICAL SOLUTION DRIVES BARE STEEL CONSTRUCTION WITH 300PLUS®

FIRE SAFE

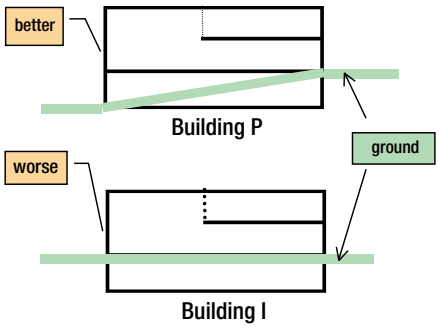
THE TOYOTA SHOWROOM IS AN ATTRACTIVE STRUCTURAL STEEL-FRAMED BUILDING THAT CONSISTS OF A LOWER GROUND, GROUND FLOOR AND A FIRST FLOOR MEZZANINE.

The building incorporates bare steel beams and columns throughout utilising OneSteel's **300PLUS®** range of structural sections.

According to the Building Code of Australia (BCA), the mezzanine must be treated as a storey due to its area. This means that the building is classified as having to be Type B construction due to its rise in storeys.

According to a strict interpretation of the Deemed-To-Satisfy (DTS) provisions of the BCA, columns and beams (since these give lateral support to the columns) would be required to have a fire-resistance level of 180 minutes. There is no requirement for the floors to have a fire-resistance level, which would have required protection of the structural steel members adding significantly to the cost of the structural steelwork.

A fire-engineering assessment was undertaken for this building to investigate whether protection of the structural steelwork was necessary. This assessment recognised first of all that evacuation would be relatively rapid from all levels (less than 5 minutes) given that direct egress is available at lower ground and ground levels. This building is relatively open so occupants would quickly become aware of a fire due to the smell and sight of smoke and this would reduce the time to evacuate the building. It was found that the building structure would not experience significant deformations until well after evacuation had taken place. Fire brigade access is good since a major fire can be fought from outside the building. It was concluded that the use of **bare steel construction** throughout was acceptable and would not have any detrimental effect on occupant safety.



The assessment also compared DTS differences for the Toyota showroom building (Building P) with an almost identical building (Building I). The difference was that in Building I the lower ground level has become a basement such that direct egress to outside is no longer possible – so that egress must be via stairs that allow evacuation at ground level. Building I can be constructed as Type C construction and beams, columns and floors have no fire-resistance requirements. Unlike Building P where the columns would require 180 minutes of passive fire protection.

In comparing these two buildings, it is concluded that with respect to evacuation of occupants on the mezzanine level or (upper) ground level and their potential exposure to a fire, the two buildings are equivalent. In the case of occupants within the lowest level, it is argued that Building P is better than Building I, since direct egress to outside is available. It follows that Building P is at least as safe as Building I and therefore it is difficult to see why the requirements applicable to Building I should not apply to this building.

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TOYOTA SHOWROOM – FIRE RESISTANCE REQUIREMENTS SUMMARY

BUILDING ELEMENT	ELEMENT REQUIREMENT	
	DTS#	Alternative Solution
columns	180/-/-	ESA/M ≤ 26m²/tonne
beams	-	ESA/M ≤ 30m²/tonne
floor slabs	-	60/60/60

Type of construction: B # Classification of building: 6