151 Clarence Street – Sydney CBD

AN ENGINEERED SAFETY SYSTEM SAVED ITS OWNERS IN THE ORDER OF $1.6 MILLION

FIRE SAFE

THE NRMA'S HEAD OFFICE UNTIL 1999, 151 CLARENCE STREET, IN SYDNEY'S CBD IS A 12 LEVEL OFFICE BUILDING BUILT IN THE 1960'S AND 1970'S. WHEN THE NRMA RELOCATED, THE OWNER, AMP, UNDERTOOK A MAJOR REFURBISHMENT OF THE INTERIOR TO TAKE THE BUILDING INTO THE NEXT CENTURY.

Constructed partly in structural steel, the floor beams had been protected by an asbestos passive fire protection material to achieve the then current fire rating. The steel columns were encased in concrete to increase their load bearing capacity and provide a fire rating. The original building had no active sprinkler or smoke control system.

Refurbishment involved the removal of the asbestos, removal and replacement of all internal partitions, ceilings, and a major upgrade of the fire and smoke safety systems. AMP set a refurbished life on 151 Clarence Street of ten years, so all costs had to reap a rental return over these ten years.

Fire Safety Considerations

Resolve Engineering, as AMP's representative, determined that a full upgrade of 151 Clarence Street to meet the current BCA deemed-to-satisfy provisions would require:

- Installation of a sprinkler system
- Application of 120 minute passive fire protection to floor beams
- Installation of a zoned smoke control system
- A smoke detection system linked to above
- Upgrade of the existing Emergency Warning Information System
- Remodelling and pressurization of the fire stairs.

It was estimated that the sprinkler system alone would cost $600,000, the passive fire protection $800,000 and the smoke handling system in the order of $700,000. With a total refurbishment budget in the vicinity of $13 million, it was found that an upgrade that met all BCA deemed-to-satisfy requirements would make the refurbishment unfeasible over the proposed ten year return life.

Consultant Fire Engineers, Holmes Fire & Safety, discussed the fire safety options with OneSteel (then BHP Steel). They determined the structure would meet the performance requirements of the BCA for a design fire scenario, without re-installation of any passive fire protection to the steel floor beams, saving an estimated $800,000.

The concrete encased steel columns are effectively insulated from the effects of fire and able to resist vertical loads during a fully developed fire on a single floor. Any deformation of the unprotected steel floor beams during a fully developed fire was demonstrated to be resisted by the columns and/or the surrounding structure unaffected by the fire.

A sprinkler isolation valve was provided at each floor to temporarily isolate the system, leaving the remainder of the floors with full sprinkler protection. By analysing the egress paths and determining the escape times for the occupants in a variety of situations, it was also possible to prove that there was no requirement for a zoned smoke control system, which would of cost $700,000.

Holmes Fire & Safety also proved that, due to the influence of the sprinkler system, smoke detectors were only required in the return air ducts and outside the fire stairs, which saved around $130,000 on the total cost of the smoke detection system.

Significant Savings

Overall, the fire engineering saved in the order of $1.6 million, with the installation of a sprinkler system, no passive fire protection on the steel floor beams, no zoned smoke control system and a reduced smoke detection system. AMP and the design team agreed to adopt the engineered fire safety system described in the Fire Engineering Design Report prepared by Holmes Fire & Safety. This proposal was presented to Sydney City Council and the NSW Fire Brigade who after discussions with both Holmes Fire & Safety and OneSteel (then BHP Steel), approved the fire safety design.

OWNER/CLIENT
AMP

ARCHITECT
Cox Richardson

PROJECT MANAGER
Incoll Management

STRUCTURAL ENGINEER
Connell Wagner

FIRE ENGINEER
Holmes Fire & Safety

GROUP SERVICES ENGINEER
Grocon

This case study, although about the refurbishment of an existing building, has some important implications for the use of structural steel in new high-rise construction. With appropriate fire-engineering input, bare steel construction is likely to be able to be used for many new multi-storey buildings reducing the cost of construction and providing a more cost-effective building.