# Restoration of the Queen Victoria Market Sheds E-F and J-M, Melbourne Australia

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## ABSTRACT

The Queen Victoria Market has continuously operated since 1878 and was the site of Melbourne's first official cemetery from 1837 to 1854. It is listed on Australia's National Heritage List.

The Queen Victoria Market Precinct Renewal program is tasked with preserving, acknowledging and celebrating the market's history. Close collaboration between the heritage consultant Lovell Chen, the client The City of Melbourne and the structural engineer Robert Bird Group provided the basis for a successful program outcome.

The sheds were analysed, and structural capacities reported as per the Building Code of Australia and AS ISO 13822-2005 (R2016) Basis for design of structures – Assessment of existing structures. Compliance with the latest Building Code of Australia was desired to provide a level of safety commensurate to the current minimum standard required for building constructions.

An archive search was conducted; however drawings were not available for most sheds. Sheds E and F date from 1878, J from 1992, K and L from 1925, and M from 1936. Site inspections, measurements and a laser scan survey were used to determine structural member sizes and geometry. A timber specialist determined species, grade, and extent of deterioration for all timber members.

Structural strengthening was minimized, and where required, followed the principals and guidelines of the Burra Charter – The Australia ICOMOS Charter for Places of Cultural Significance 2013.

The masonry wall at the back of Shed F dates to the Old Melbourne Cemetery prior to its conversion to a market. Due to foundation settlement, the wall has a 150mm lean. Rectification was required due to risk of collapse. The area around the wall is surrounded by graves, including those from a historic Aboriginal cemetery, of incredibly high cultural sensitivity. The strengthening solution for the wall is above ground to avoid disturbing graves, while respecting the sensitive heritage fabric of the wall. The strengthening is visibly an addition and a reversible modification.

The roof trusses on Sheds E, F and J had insufficient capacity under wind uplift loading, as the bottom chords were tension only members, some of which had buckled. Strengthening the existing truss members was not desired as it would have a large impact on the heritage fabric. Wind tunnel testing was used to provide accurate loading. The corrugated iron roof sheeting on the sheds had reached its end of life and required replacement. Instead of modifying trusses, built up composite sheet metal and plywood roof panels provided increased mass to prevent compression in truss bottom chords under wind uplift. Truss modification was avoided.

The lateral stability of Sheds E and F was found to be insufficient under ultimate lateral loadings for diaphragm strength. A North American design and analysis approach not used in Australia was adopted to allow for a design solution that avoided modification of the existing structures.