

Structural Engineering Advice

Address: 221-291 Crown Street, 216-238 Keira Street and 86-90 Burelli Street, Wollongong NSW 2500

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1. Introduction and Purpose of Advise

Mance Arraj Engineers have been engaged as the Principal Structural Consultant for the project at 221-291 Crown Street, 216-238 Keira Street and 86-90 Burelli Street, Wollongong, also known as Crown Square.

The primary purpose of this engineering advice is to provide a high-level review and structural endorsement regarding the feasibility and intent of the heritage facade retention scheme originally proposed and designed by Enstruct (refer job no 5959). As the lead structural consultant responsible for the bulk of the subsequent temporary excavation works and permanent building works, Mance Arraj is of the opinion that the conceptual intentions of the proposed retention scheme are structurally reasonable and compatible with the future permanent building framework.

This advice is based on a high-level structural review of preliminary concept designs prepared by others. It represents an assessment of engineering intent only, and must not be interpreted as a final certified construction-issued design or a transfer of structural liability

2. Reviewed Documentation

To form the basis of this structural advice, Mance Arraj has reviewed the following third-party documentation:

CSW-ST-SK-011-01 TO 03	Heritage Façade Retention Sequence
CSW-ST-SK-013-01 TO 05	Column Foundation and Site Retention
CSW-ST-SK-015-01 TO 03	External Hoarding Options

3. Structural Methodology and Sequencing

To protect the structural integrity of the heritage asset, the construction sequencing must strictly isolate construction loads from the masonry elements as well as sufficiently stabilise the asset until required permanent structure has been instated. The engineering intent is divided into two distinct structural phases:

Phase 1: Temporary Case (Excavation & Substructure Works)

Load Path Transfer: Before any bulk excavation or ground works commence on-site within the zone of influence of the heritage asset, the asset first must be temporary supported by structural steelwork. The steelwork will consist of its own footing system that will have sufficient capacity to brace the heritage asset until the permanent structure has been built.

Early substructure works: Careful decommissioning of the existing structure whilst simultaneously installing the temporary structure must be carried out before substantive demolishing of the overall existing structure.

Excavation Safeguards: Where the excavation zone falls within the zone of influence of the heritage foundations, local underpinning or structural shoring to be executed sequentially as detailed by the retention designer.

Vibration Control: Rigorous vibration limits must be enforced during piling and excavation. A project Geotechnical specialist will be engaged to assess limits on Peak Particle Velocity (PPV) near the heritage masonry interfaces. High-impact rock-breaking is prohibited within the vicinity of the asset.

Surcharge Loading: No construction traffic, heavy machinery, or materials stockpiles are permitted within the zone of influence of the temporary facade framing or adjacent embankments.

Phase 2: Permanent Integration (Construction of Main Structure)

Structural Tie-In Sequence: Once required permanent structure has been constructed, the heritage asset will be permanently tied into the newly established concrete structure. This will be achieved using high-strength chemical anchors, structural dowels with allowance for required movement, and any other means of remediation designed to provide long-term robustness to the heritage asset.

Permanent Lateral Stability: Once integrated, the new multi-storey building structure will assume the role of the permanent lateral support system for the heritage façade.

De-propping Protocol: The temporary retention steel structure must remain fully active and engaged until the new main structure has been constructed to a level that provides full structural stability of the asset. No temporary supporting elements shall be unbolted or removed until the new permanent concrete structures have reached their full characteristic 28-day compressive strength (f_c) and the connections are certified by the site engineer.

4. Risk Mitigation and Safety Measures

Given the nature of risk of conducting structural works adjacent to historical elements, a strict risk management framework must be implemented by the head contractor.

Structural Monitoring Program: A comprehensive, real-time structural monitoring program to be operational prior to the commencement of Phase 1 and maintained throughout construction.

Suggested Instrumentation and Risk Matrix:

Automated Total Stations (Prism Monitoring): Affixed to the external face of the heritage masonry to track 3D spatial displacements.

High-Precision Tiltmeters: Positioned at critical heights along the facade to monitor real-time rotation.

Crack Width Monitoring: Installed across known pre-existing defects to monitor crack propagation. **Trigger Level System (Traffic Light Control):**

GREEN (Normal): Movement within expected elastic boundaries. Works proceed as planned under standard observation.

AMBER (Review): Exceeds normal variance. Construction methods must be immediately reviewed, excavation pace slowed, and monitoring frequency increased.

RED (Halt): Allowable safety threshold breached. All construction and site activities must cease immediately. The affected zone must be stabilized/backfilled, and the structural engineer notified to assess structural safety before works resume.

Contingency & Emergency Measures:

On-Site Kit: The contractor must maintain an emergency propping kit (including heavy-duty Acrow props, structural timber, and ties) on-site at all times during the substructure works.

Dilapidation Records: Comprehensive, high-resolution photographic and video dilapidation records must be compiled for the entire heritage structure prior to site establishment to form a baseline asset condition assessment.

5. Summary of Engineering Intent

In summary, Mance Arraj Engineering endorses the structural logic and feasibility of the proposed heritage facade retention scheme. The design intent appears robust and compatible with the future engineering requirements of the permanent main structure. To advance this scheme from concept to construction execution, approval of intent to the proposed retention scheme to be obtained as well as further design development to be made to coincide with the proposed facade retention scheme.