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Dear Michael

Transport House - Structural Assessment for Seismic Strengthening at Stage 1 DA

This letter provides a summary of the conclusions from the structural assessment of Transport House and is supporting document for the Stage 1 DA application.

Arup have conducted a detailed review and analysis of the existing Transport House structure to determine the feasibility of the proposed additional ballroom and roof above Level 8 (roof). This review demonstrated that the ballroom is a feasible modification to the existing structure. Major strengthening to the columns and footings for the additional vertical load will likely not be required. However, the review also determined that strengthening would be required to the lateral stability system. The ballroom and roof fundamentally change the seismic behaviour of the building and consequently must be upgraded to satisfy current earthquake design standards (AS1170.4).

These conclusions are discussed in detail in the Arup document *Memo_1_Existing Building Assessement_Rev 3_180209*.

A number of options for seismic strengthening were reviewed and it was concluded that full-height bracing to the building provides the most efficient structural solution minimising risk, the extent of investigation and testing, and the costs associated with the proposed modifications. However, in some locations, the braced option interrupts the current usage of the building either by passing in front of windows or by crossing internal, open spaces.

Consequently, a number of other options were reviewed to consider alternatives that have less impact on internal spaces. In contrast to the braced option, these alternatives are more disruptive to the usage of the building, present buildability challenges, and involve a relatively large amount of investigation and testing into the existing structure to confirm if they can be integrated with the existing structure. The final design response may require a combination of these options that balance cost with the amenity of the building. These alternative options are summarised below.

Portal frames at windows and open internal spaces
Portal frames could be substituted for cross-bracing to avoid diagonal, braced structure. These frames would be relatively large members and require more intensive construction works to integrate them into the existing structure. New footings would be required in the basement and sub-basement.

New shear walls
New shear walls and footings could be constructed within the building to provide the required additional strength. These walls could either be new elements inserted into the existing structure or the reconstruction of existing walls at stairs and lift cores. This option has wider reaching impact on the usage of the building during construction as it requires demolition and invasive construction works.

Strengthen existing frames and walls
The option to utilise the existing structure to limit the extent of supplementary strengthening would seek to strengthen the steel frame and/or core walls. Given that the documented information for the steel frame structure is limited in detail, a much wider regime of investigation and testing would be required to gain certainty in the in-situ condition of the steelwork and connections.

Support Transport House against the Intercontinental Hotel
The possibility of supporting Transport House against the Intercontinental Hotel in the seismic condition will be considered in the next stage. This option has the potential to reduce the extent of seismic strengthening required, however it has a significant number of technical and legal title complexities associated with it.

Testing of materials and an investigation into the column-beam joint connections is currently proceeding to establish a basis for the Stage 2 DA assessment. The outcome of this initial investigation may demonstrate that this option is feasible.

For the Stage 2 DA application these options will be reviewed in further detail informed by the investigation and testing of the existing structure. This next stage will consider these structural systems with regard their effectiveness to resist seismic loading; impact on the heritage fabric of the building; and buildability/intrusiveness of the construction to determine the option (or combinations of options) that provides the most appropriate solution from both a structural and heritage perspective.

We trust this letter provides sufficient information to inform the Stage 1 DA application. Please don’t hesitate to contact us if you require any clarification on the above.

Yours sincerely

Peter Jameson
Senior Structural Engineer