
To	Alexis Cella - JBA	Date	15 August 2017
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From	Mike King - Arup	File reference	247838-00
Subject	Over Station Development Rebuilding or Major Refurbishment Approach		

Introduction:

The Macquarie Martin Place project is generally split in function between the Metro Station (Station) and the Over Station Development (OSD) comprising two commercial office buildings above the Station. Although in terms of functionality the OSD and Station components of the project can notionally be split at Ground Level (Elizabeth St) and Lower Ground (Castlereagh St) with commercial office building above and Station below, a number of the Station services continue above the Lower Ground/Ground Levels into the OSD buildings. This is necessitated primarily by the need to intake fresh air for the station and exhaust air and smoke at height above ground. There is also a requirement due to space limitations below ground on the North Tower to support some Station Plant in a number of the above-ground levels of the North Tower building

Furthermore there a need to classify structural elements of the project as either OSD or Station due to the differing design life requirements for the structures of these two components in terms of durability, with the OSD design life 50 years and the Station, being infrastructure, having a structural design life of 100 years.

Future OSD Replacement/Major Refurbishment Strategy:

The nature of building and station designs is such that building services are integrated with the structure and the overall building form to maximise the utility and function of the buildings. In the development of the design of the MMP project a further consideration has been the future-proofing for demolition and rebuilding or major refurbishment of the OSD buildings whilst maintaining the operation of the Martin Place Sydney Metro Station. Due to the constrained nature of the site this means that the position and functionality of the Building Services components of the Station above Ground and incorporated in the OSD buildings must be maintained in-situ and in operation during and such demolition, rebuild or refurbishment of the buildings over. This is primarily because there is no feasible opportunity to divert Station Building services below ground or relocate Station building services above ground as there is no surplus space above ground in which to do so.

Overall views of the largely complete 3D computer Revit model showing combined structures and OSD + Station building services.

Memorandum

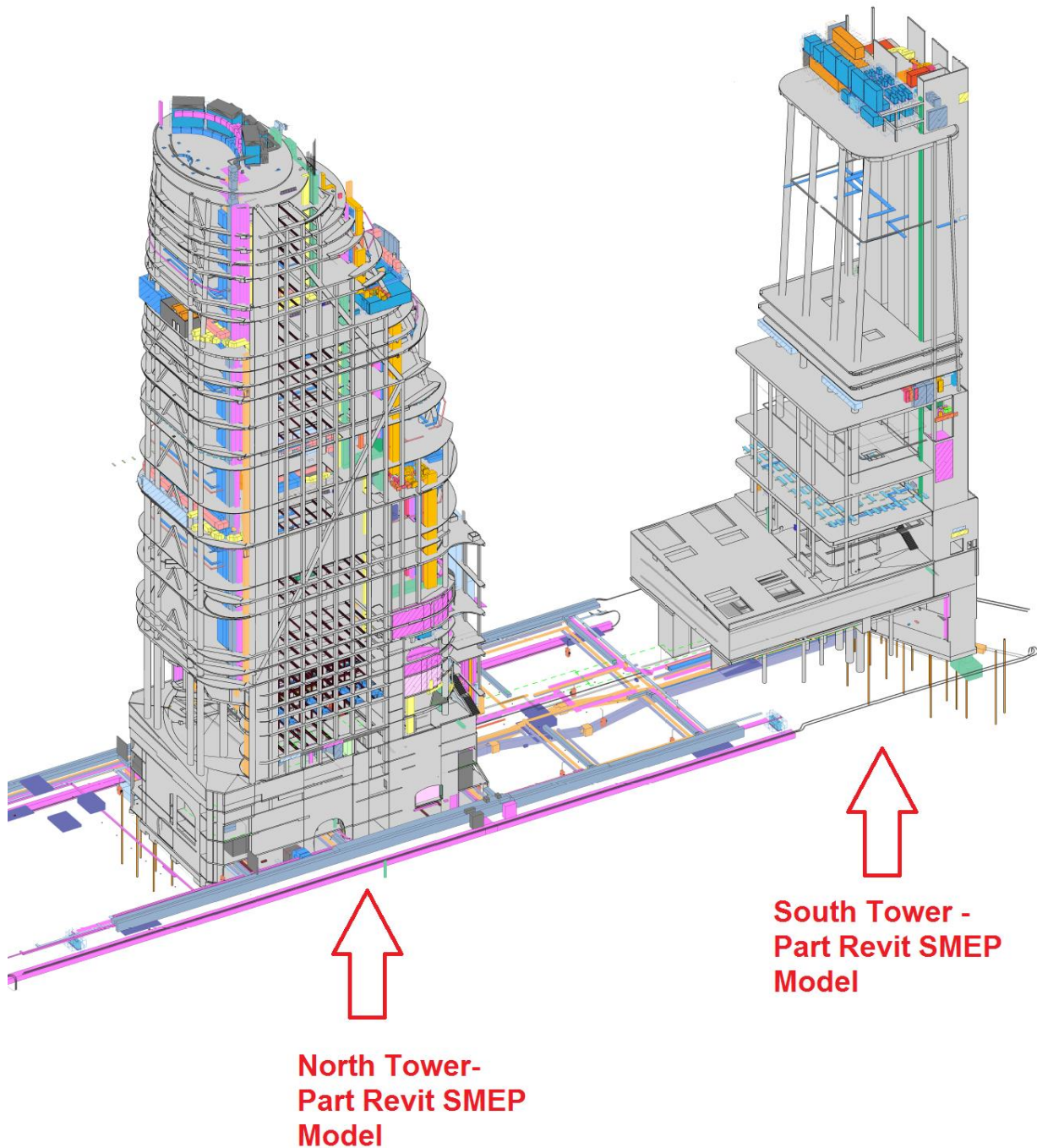


Figure 1 - Combined OSD + Station 3D Structural and Building Services Model

The strategy for ensuring the Station building services remain supported and operational during OSD demolition/reconstruction and/or refurbishment falls into two main actions;

1. Self-supporting vertical riser shafts in both North and South Towers.
2. Temporary Support of localised floor structures supporting Station plant in the North Tower.

Memorandum

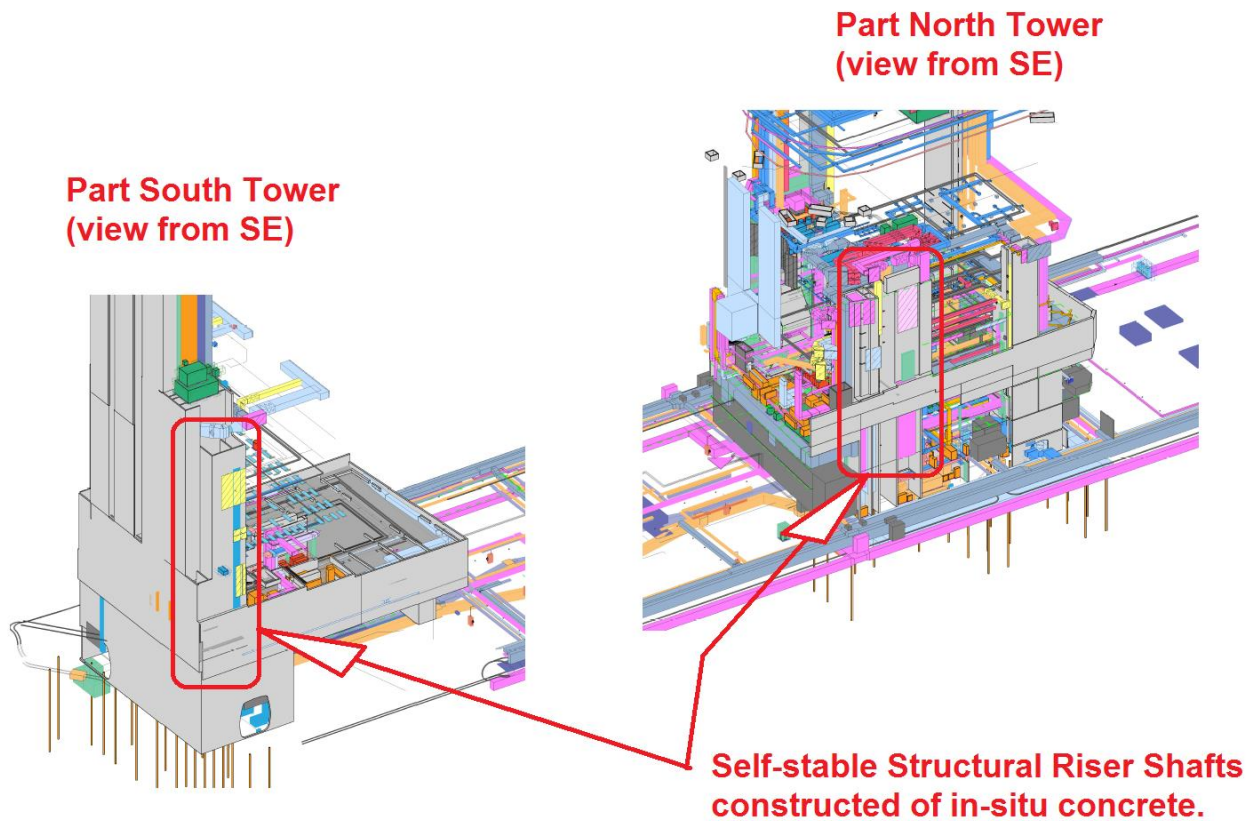


Figure 2 - Self-supporting concrete riser shafts

Self-Supporting Concrete Riser Shafts

The tunnel and station ventilation and exhaust ducts as well as vertical distribution of station building services that extend up through the lower levels of the towers are typically contained within in-situ reinforced concrete riser shafts. These riser shafts are self-supporting and laterally stable and do not rely on the adjacent tower structure for support. These concrete core elements could therefore remain to enclose and support the vertical shafts and station services vertical distribution whilst the adjacent tower structure is demolished or modified.

Temporary Floor Support Structures

Where Tower Floors support Station building services the strategy for future demolition or refurbishment of the OSD the strategy would potentially involve puncturing through the tower floors locally to insert temporary steel columns and bracing. These steel columns would support temporary steel beams positioned beneath areas of slab that directly support Station building services elements. The existing slab structure, or potentially the steel beams, would be integrated into the new or revised OSD building structure for vertical and lateral support.

Memorandum

Advice from LendLease Building with regard to Methodology for Demolition of OSD

The future demolition of the OSD buildings will be undertaken in a number of stages and in a manner not dissimilar to the current demolition of Wynyard Place, Sydney.

Further the Martin Place Metro station having 2 main above ground entry points (one at Hunter St – North South and the other at Martin Place – South Tower) allows greater flexibility with the staging of the demolition of the respective buildings.

Planning activities specific to the demolition of one of these OSD buildings would include:

- The undertaking of extensive pedestrian studies and the development of a detailed pedestrian management plan which would focus on maximising pedestrian flows through the underground links and to the ground plane accesses of the building that is not being demolished.
- Extensive services investigations & planning would be required to :
 - Identify Station services , plant & equipment
 - Prepare a detailed strategy for maintaining and protecting Station services and;
 - A strategy for the provision of alternative temporary services where the permanent services cannot be maintained
- Structural engineering of the structure being demolished as detailed in ARUP’s report
- Structural engineering of the temporary works necessary to maintain plant & equipment servicing the Metro as informed by the services strategy
- Structural engineering of temporary works such as overhead catch decks, temporary supports etc.

The first demolition activities would be the erection of class B hoardings of the perimeter of the building and then scaffold encapsulation of the façade of the building to be demolished.

The scaffold would be clad with chain wire and shade cloth to contain debris and dust.

Much of the building could be demolished prior to any impact on station services or impact to station accesses.

Normal demolition techniques would be utilised as are currently being employed during the demolition of Wynyard Place, namely the progressive demolition floor by floor using small to medium size excavators.

The key environmental factors to manage are considered to be:

- Noise & Vibration – through the selection of appropriate plant and the implementation of respite periods
- Dust Suppression – through the use of water misting fans, excavators fitted with water sprayers and attendant labour with hoses.

The debris from each floor would be pushed into the concrete lift shafts and these lift shafts would act as rubbish chutes to transport the debris to the ground floor (South Tower) or B1 basement level (North Tower).

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Once the demolition of the buildings is within two floors of station plant or within three floors of publicly accessible areas, the temporary works programme (structure and services) would be implemented.

After the erection of way-finding signage, individual ground plane accesses could be closed off on a progressive basis and internal overhead 10kPa protection structures constructed to facilitate the demolition of the lower floors of the buildings.

At this stage the demolition is undertaken part-floor by part-floor in conjunction with the staging of station access to and from the ground plane.

Memorandum

Conclusion;

In conclusion the design of the MMP project has considered a strategy for future demolition and rebuilding or significant refurbishment of the OSD building components that would allow the continued operation of the Martin Place Metro Station. It is anticipated that the strategy outlined above would be developed further in subsequent phases of the project.