A-squared Studio

Technical Note

2633-A2S-XX-XX-TN-Y-0001-00

Project	1 Museum Street and West Central Street
Project No.	2633
Subject	Addendum to Basement Impact Assessment - Demolition Works
Client	Heyne Tillett Steel Ltd

Document Reference	Status	Revision	Issued	Checked	Approved	Date
2633-A2S-XX-XX-TN-Y-0001-00	Addendum to *Basement Impact Assessment*	00	Hamed Shariff MEng(Hons), CEng MICE **Associate**	Paul Smith BEng(Hons), MSc, DIC, CEng MICE **Associate Director**	Alex Nikolic BEng(Hons), MSc, DIC, CEng MICE, MSt(Cantab) **Director**	05.10.2023

1. Introduction

A-squared Studio Engineers Ltd (A-squared) has been appointed by Heyne Tillett Steel Ltd (HTS) to provide ground engineering support for the proposed 1 Museum Street and West Central Street development in Holborn, London.

This technical note is an addendum to the *Basement Impact Assessment* prepared by A-squared, dated July 2023 (ref. 2633-A2S-XX-XX-RP-Y-0002-02), termed the 'BIA'. Please refer to the BIA report for more information regarding the scheme proposals, ground conditions and review of the impact of the works on the surrounding hydrogeological, geological and hydrological regime.

This addendum comprises a review of the updated demolition works sequence described in the construction and demolition management plans, prepared by Ove Arup and Partners Limited (Arup), in the context of the BIA prepared for the London Borough of Camden (LBC).

The following Arup reports have been reviewed:

- *Demolition Management Plan* prepared by Arup, dated June 2023.
- *Construction Management Plan* prepared by Arup, dated June 2023.
- *Site Waste Management Plan (Demolition Phase)* prepared by Arup, dated June 2023.
- *Site Waste Management Plan (Construction Phase)* prepared by Arup, dated June 2023.

2. Overview of Demolition Sequences

The demolition sequence for the 1 Museum Street scheme considers the impact of the removal of the existing tower on the underlying Post Office tunnels. Based on design checks, movement-control piles are required and have been designed to reduce ground movements around the Post Office tunnels during demolition to prevent excessive movements of the assets.

The demolition sequence presented in the BIA comprises installing the movement-control piles from within the existing basement prior to demolition works commencing =. The piles will be installed using restricted headroom piling techniques and will allow the superstructure to be removed using conventional techniques without risk of impact to the underlying tunnels. The other settlement-reducing and bearing piles can be installed after demolition works have been completed.

The demolition sequence presented in the Arup documents, mainly the *Demolition Management Plan*, aligns with an alternative sequence of works assessed by the project team for a potential contractor in 2021. The Arup documents describe a demolition sequence where the basement space is infilled with rubble from the superstructure above to minimise overburden removal above the tunnels. Once demolition works reach ground level, all movement-control and settlement-reducing piles are installed and demolition of the substructure and removal of the rubble commences. This sequence is suitable for a larger proportion of the piling supply chain (as restricted headroom techniques are not required), however more coordination of material movement and rubble backfilling is required during demolition works.

3. Review of Discrepancy

As noted in Section 2, the BIA presents a demolition sequence that follows the original construction methodology, whilst the Arup documents include a sequence aligned with the contractor alternative.

It is noted that the differences in demolition sequence do not change the findings in the BIA related to ground movement and the impact of the basement on the local hydrogeological, geological and hydrological regimes. Both sequences require local propping and reinforcement of the existing basement walls and installation of piles to limit the impact of the tower demolition on the underlying Post Office tunnels.

A detailed review of the viability of the contractor alternative sequence provided in the Arup documents was undertaken by A-squared and is included as Appendix A. The review determined that using demolition rubble to infill the basement space in stages, installing the movement-control piles from ground level and then excavating out the rubble did not result in more impact to the underlying Post Office tunnels than the original methodology presented in the BIA.

The ground movement assessments undertaken for the other assets surrounding the site (including the Elizabeth Line, Thames Water utilities and surrounding listed buildings) have been based on idealised construction stages. One of the stages models ground movements at the end of the demolition and excavation works period, which is the same for both sequences (removal of superstructure, substructure and any backfill).

It is noted that the final demolition sequence shall be coordinated with the contractor undertaking the works and ground movement assessments for the various assets below and surrounding the site. The construction and demolition management plans, BIA and other relevant documents will be updated to reflect the detailed contractor method statement in due course as part of detailed design.

Appendix A: Contractor Alternative Post Office Tunnel Impact Review

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1 Museum Street and West Central Street

JRL Alternative Demolition Sequence Feasibility Review

1084-A2S-XX-XX-RP-Y-0009-00

14/04/2021

Document Information

Document Reference	Status	Revision	Issued by	Date
1084-A2S-XX-XX-RP-Y-0009-00	First Issue - Interim	00	HS	15.04.2021

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Introduction

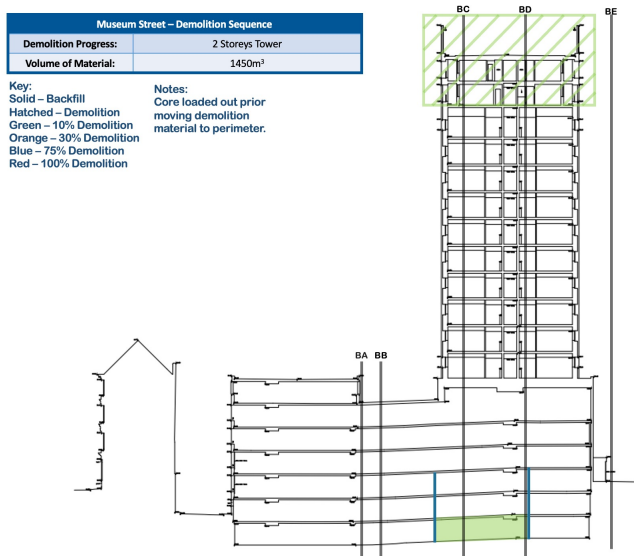
A-squared Studio Engineers Ltd (A-squared) has been appointed by Meinhardt (UK) Ltd (Meinhardt) to review the feasibility of an alternative demolition sequence proposed by JRL.

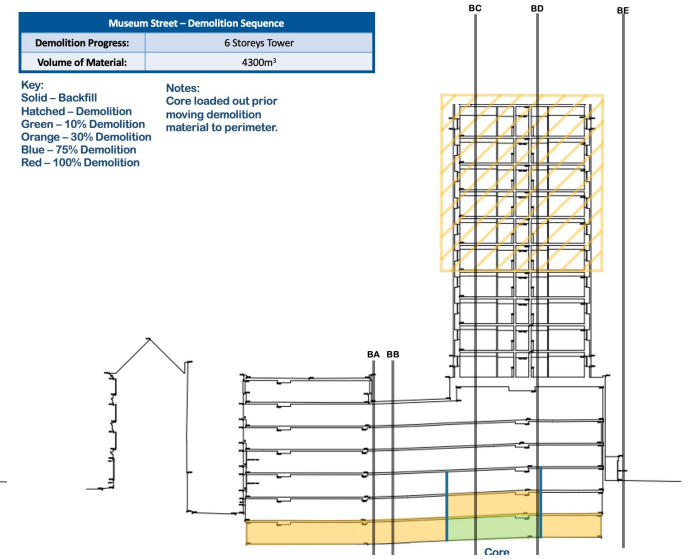
The alternative sequence involves backfilling the existing Selkirk House basement with demolition rubble from the superstructure above to minimise the deformations of the underlying Post Office tunnels.

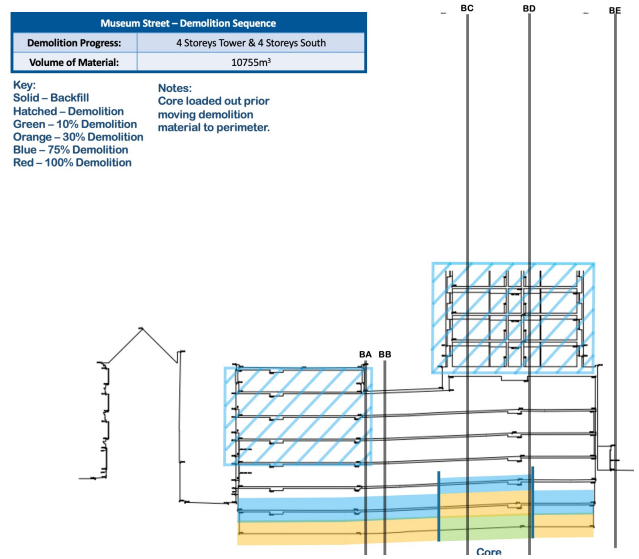
This report summarises how the JRL sequence has been idealised and discretised into the analytical Plaxis 3D finite element models used for the feasibility review and the impact on the Post Office tunnels.

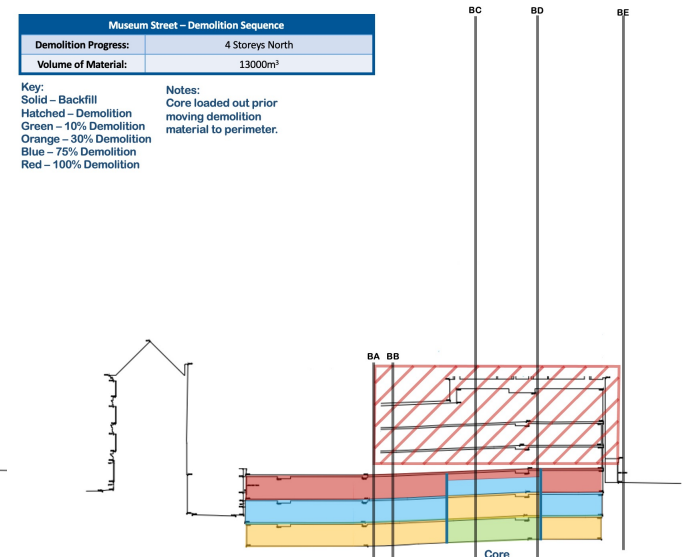
JRL Alternative Sequence

- Four stages of backfilling, as the superstructure is demolished.
- Targeted filling over the tunnel prior to spreading over other areas of the basement.
- Piling from ground level once backfilling is complete.
- Excavation of demolition rubble with all piles acting as movement-control piles.



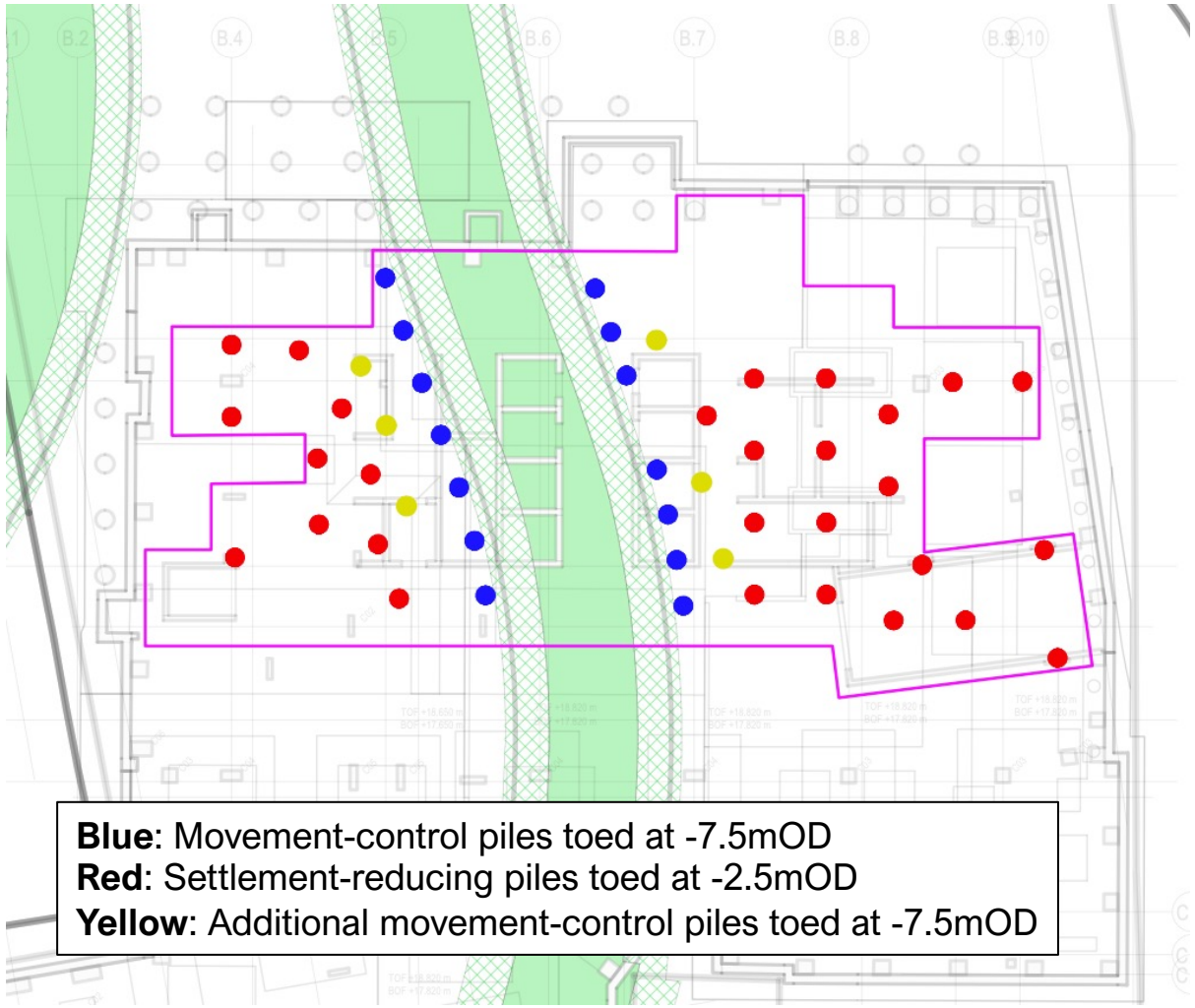






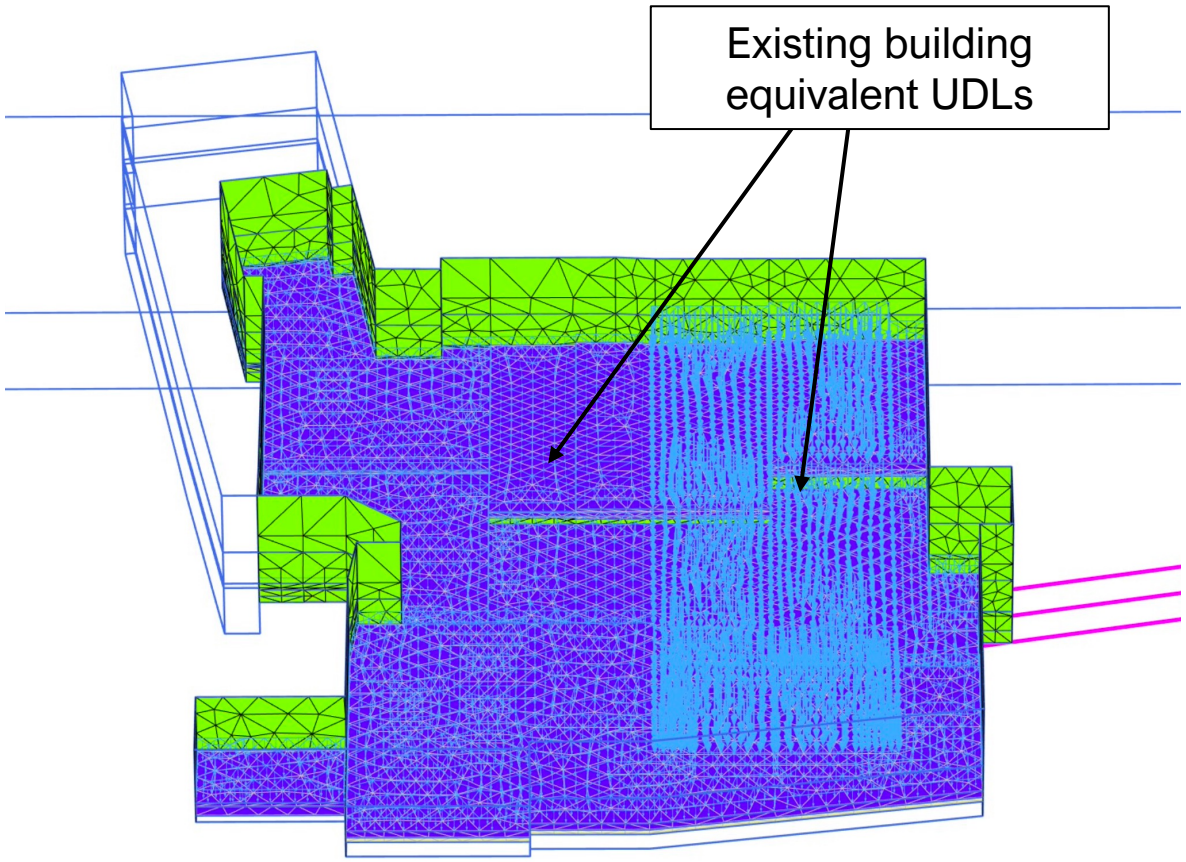
Key Changes from Previous Sequence

- 6no. additional movement-control piles toed at -7.5mOD (32.5m bore length from ground level) positioned as shown in the adjacent figure. JRL has confirmed that these can be installed using their proposed piling technique and logistics.
- All piles installed from ground level prior to excavation – all piles act to restrain the tunnel and mitigate upwards movement.



Modelling Assumptions

- Existing Selkirk House equivalent uniformly distributed loading (UDL) increased/reduced according to anticipated demolition and rubble in various basement areas.
- 2m of additional fill maintained in lowest basement areas directly above the Post Office tunnel alignment.
- Demolition rubble volumes provided by JRL adopted in this assessment.



Modelled Demolition Stages

Stage 1

Demolition Progress

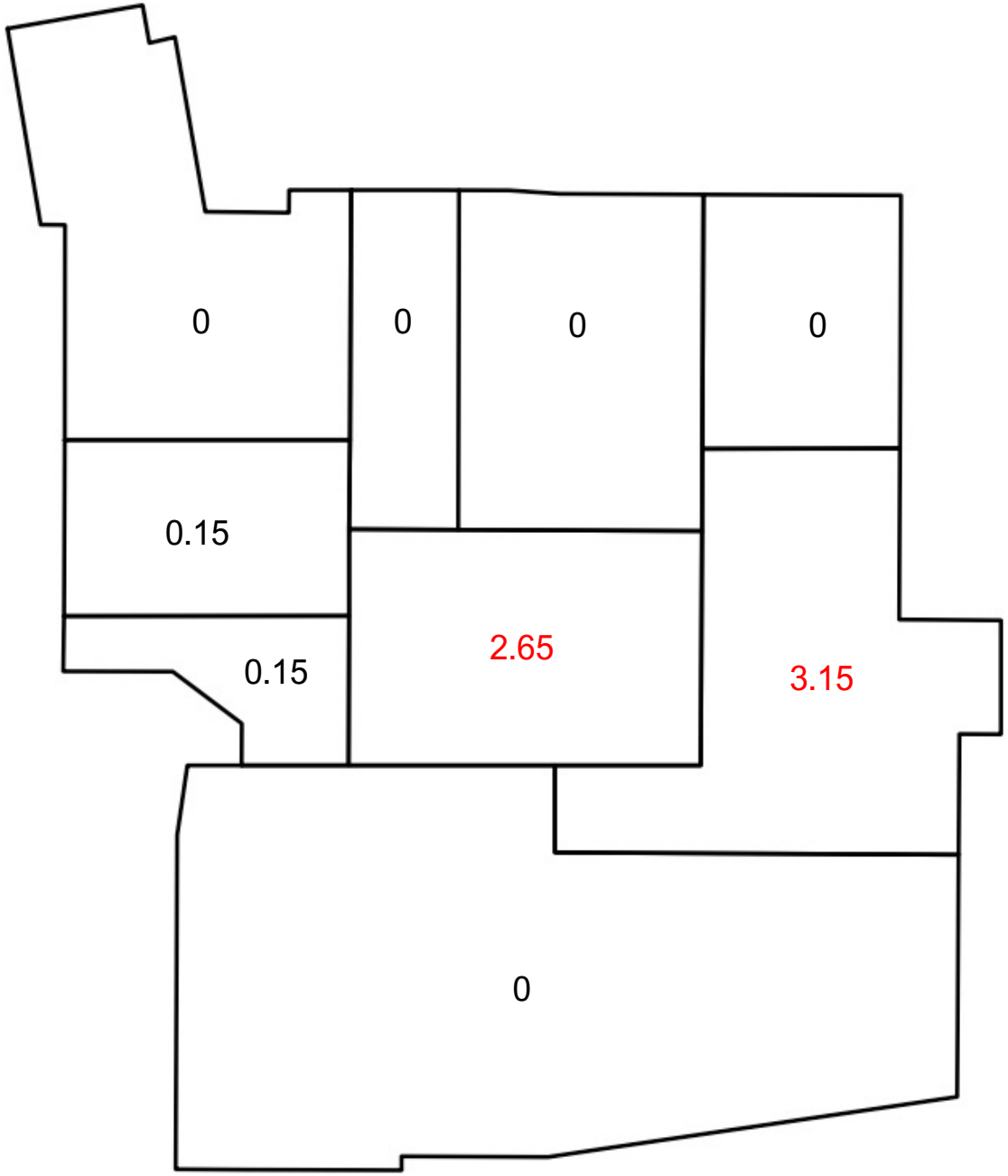
Total: 10%

- Tower: 17%
- Carpark/Podium: 0%

Cumulative Demolition Rubble Volume

1,450m^3

Demolition rubble fill depths (m) across the basement footprint shown in the adjacent figure.



Modelled Demolition Stages

Stage 2

Demolition Progress

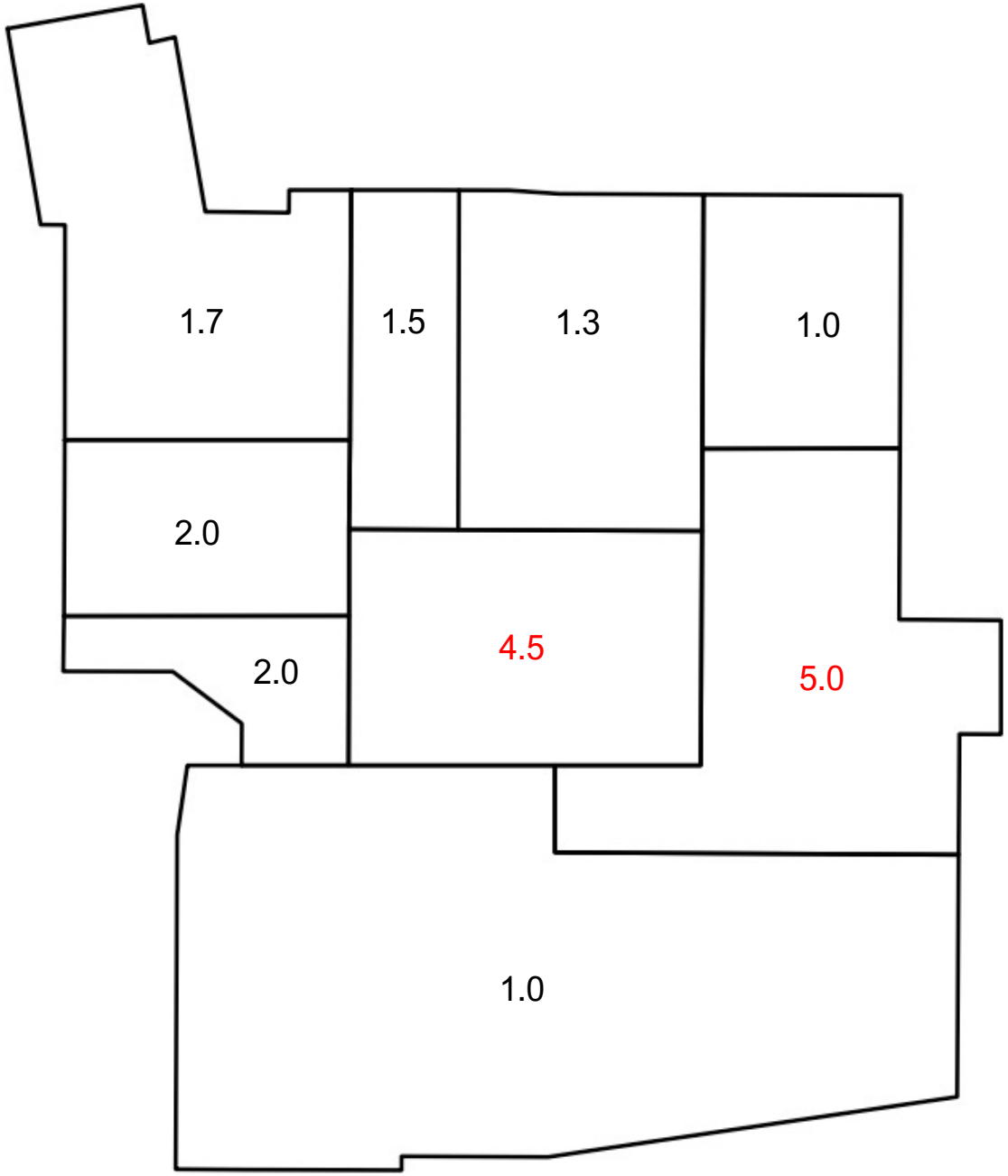
Total: 30%

- Tower: 52%
- Carpark/Podium: 0%

Cumulative Demolition Rubble Volume

4,300m^3

Demolition rubble fill depths (m) across the basement footprint shown in the adjacent figure.



Modelled Demolition Stages

Stage 3

Demolition Progress

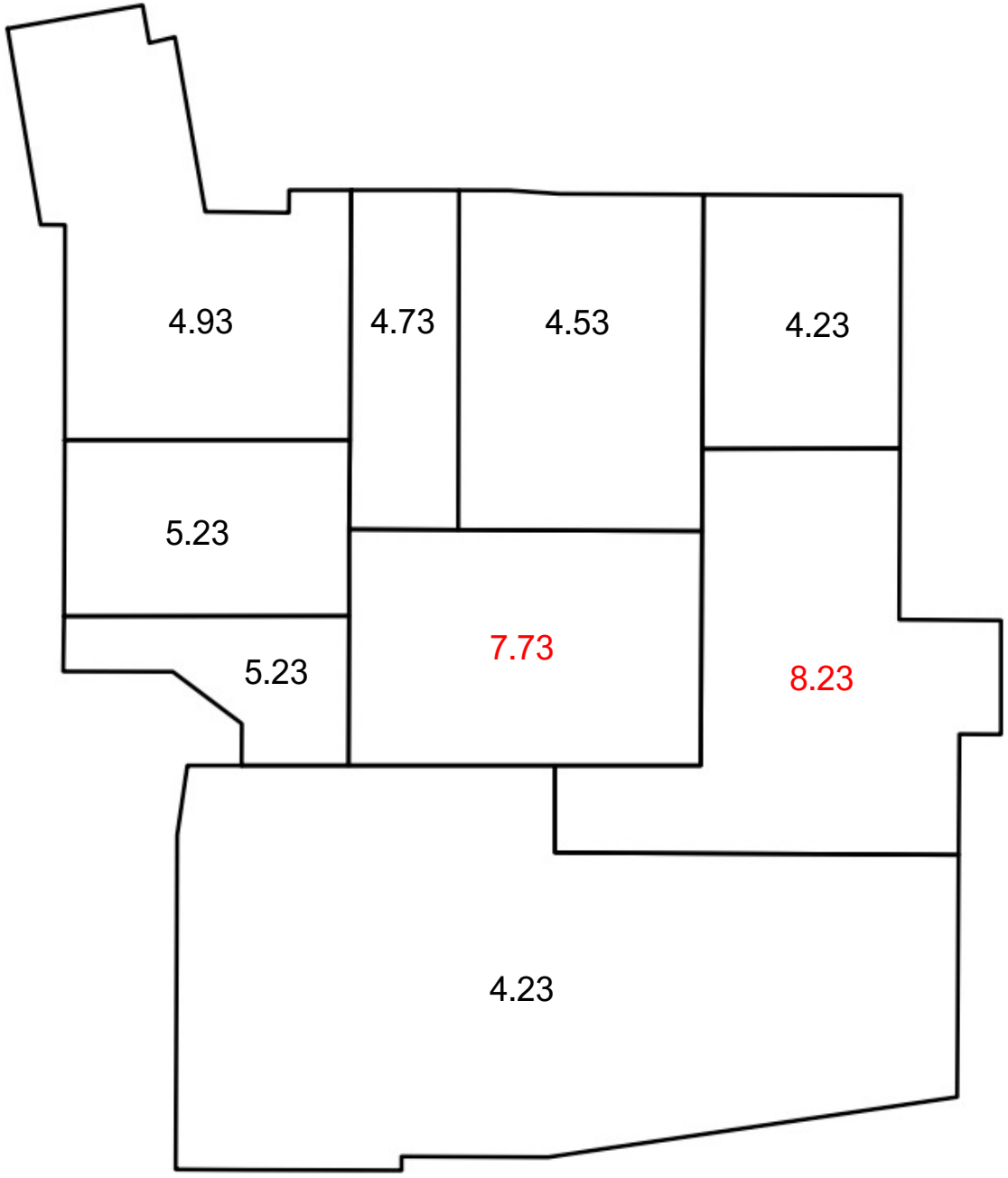
Total: 75%

- Tower: 76%
- Carpark/Podium: 74%

Cumulative Demolition Rubble Volume

10,755m^3

Demolition rubble fill depths (m) across the basement footprint shown in the adjacent figure.



Modelled Demolition Stages

Stage 4

Demolition Progress

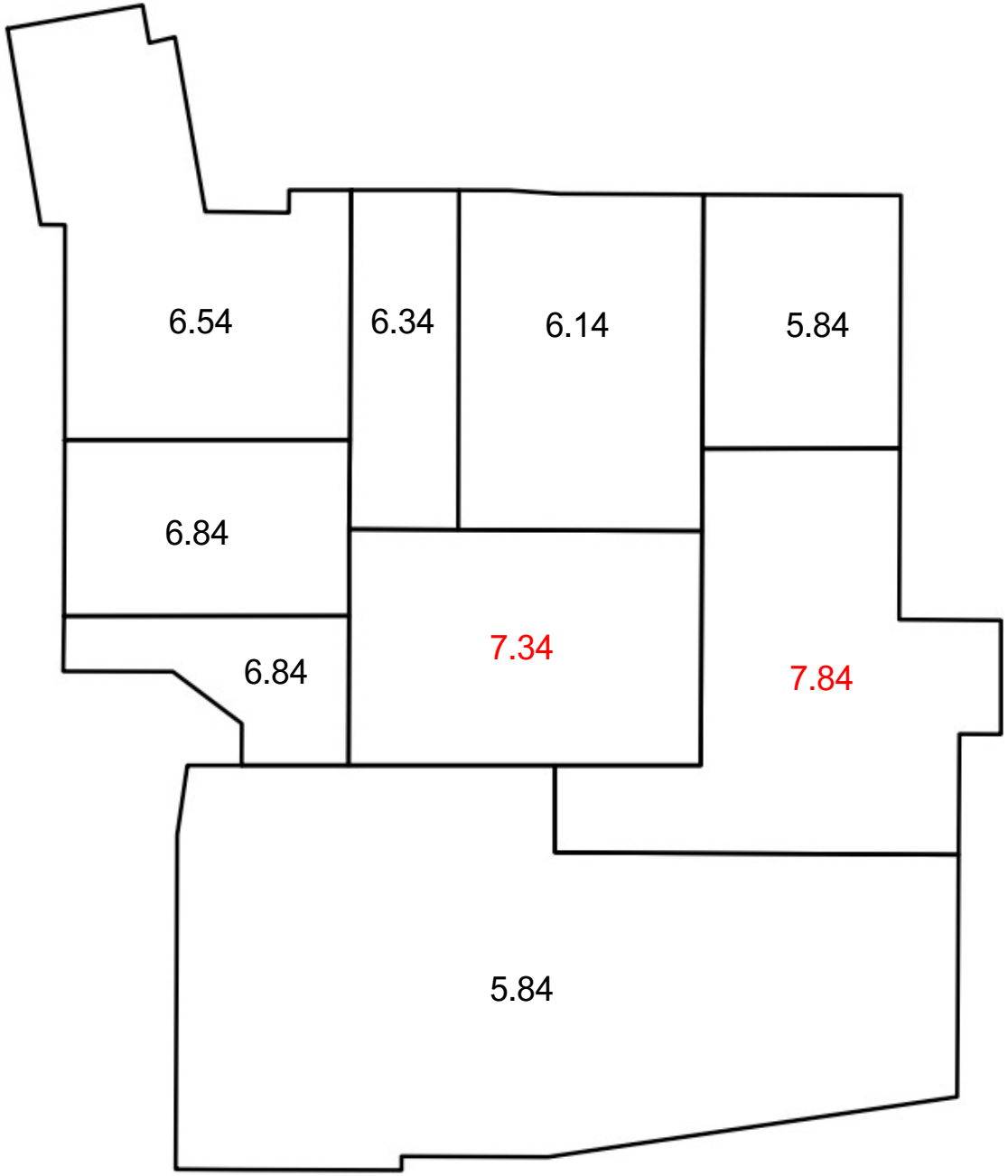
Total: 100%

- Tower: 100%
- Carpark/Podium: 100%

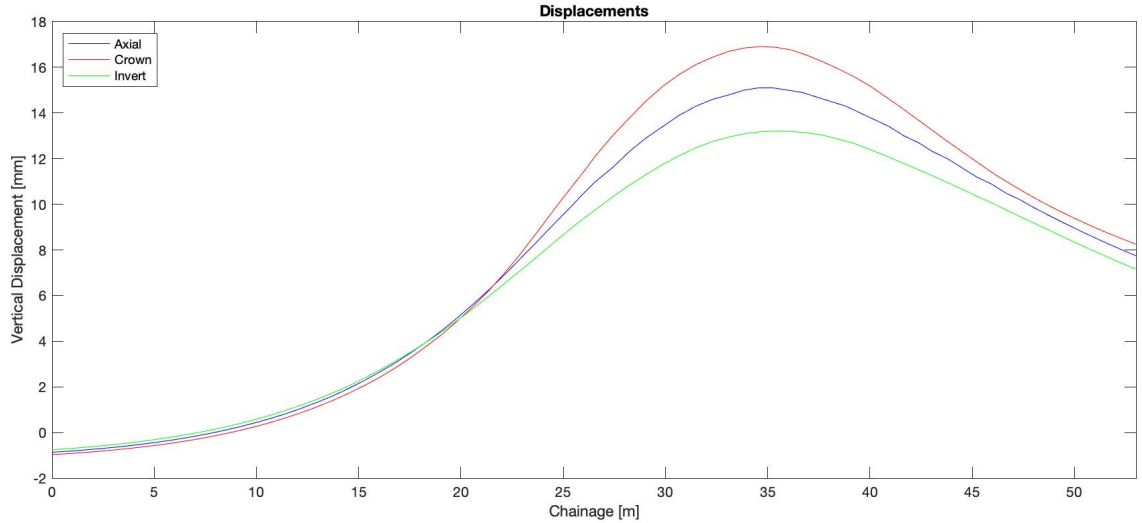
Cumulative Demolition Rubble Volume

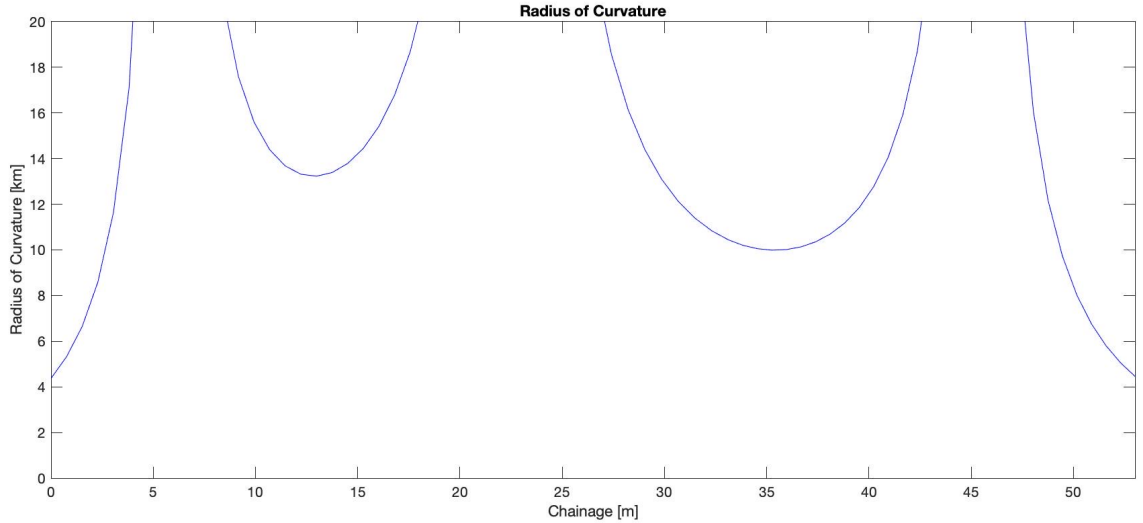
13,000m^3

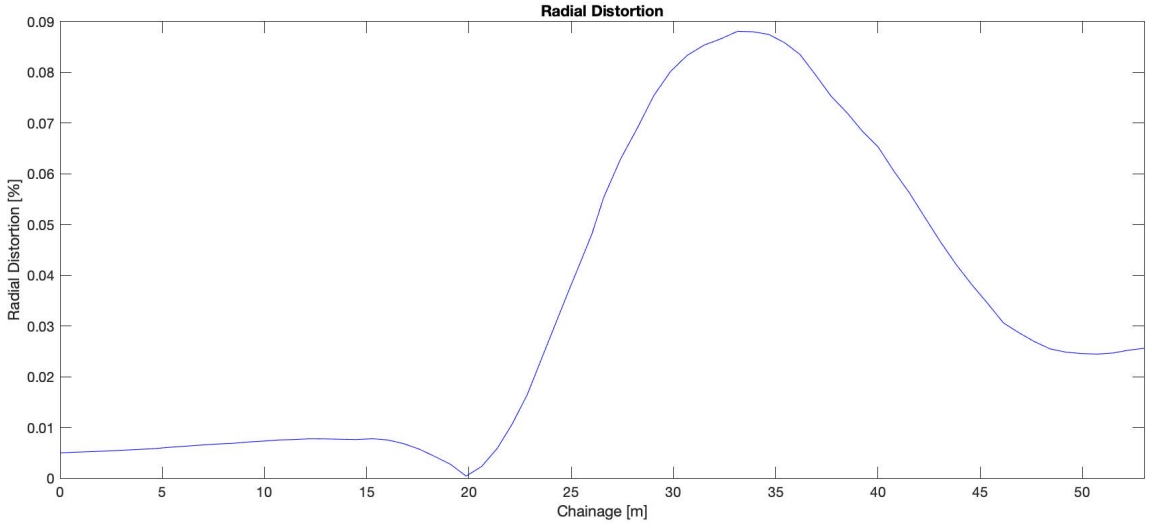
Demolition rubble fill depths (m) across the basement footprint shown in the adjacent figure.



Post Office Tunnels Impact







Maximum Displacements

- Crown: 17mm
- Axial: 15mm
- Invert: 13mm

Minimum Radius of Curvature: 10km

Maximum Radial Distortion: 0.09%

Summary

- The JRL alternative sequence is feasible and does not induce excessive deformations of the underlying Post Office tunnels.

- The sequence presented herein has been assumed based on information received from JRL. This will require revision and refinement as the design of the sequence develops.

- The Post Office Tunnels Ground Movement Assessment Report prepared by A-squared for the Stage 3 construction sequence will require revision and resubmission to Jacobs following incorporation of detailed sequencing information from JRL.

- It is anticipated that letters/notes describing the change in demolition sequence will be sufficient for all other third-party asset protection teams.

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