

Grosvenor Gardens House: 150 years in the making



Figure 1: Looking north to Grosvenor Gardens House, 2021

Background

Grosvenor Gardens House is one of countless historic gems scattered across London. Set behind Buckingham Palace, it was London's first serviced apartments in 1868, with a glorious red-brick façade overlooking Grosvenor Gardens. The Queen Mother was born here and the American Expeditionary Force used the building in World War One, before conversion into a hotel, then offices. Its original Grade II-listed splendour has faded in recent years as it has fallen empty and into disrepair. With planning permission obtained for redevelopment, but a court case threatening the building's existence, a new owner intervened in 2021. This kickstarted its resurrection and my own involvement leading the Structural Engineering design.

As with any existing building, various alterations have occurred over decades. We often see ourselves as the key figures in a site's history. When developing such an old and already adapted structure, you quickly realise you are just one small player in its lifetime, just as the present is but one snapshot in the whole continuum of time.

Proposal

The original building has seven storeys of load-bearing and stabilising masonry walls, clinker floors and a single-storey basement. Foundations are mass concrete strips. The main building is an elongated C-shape on plan, with outbuildings behind the central wing that create dark, narrow courtyards. To make redevelopment commercially viable, the outbuildings were replaced with a single RC frame to make a rectangle on plan. The original proposal was façade retention only. This increased the programme and embodied carbon but somehow feels like cheating the original building and its colourful history, so we successfully persuaded the Client to keep the whole building bar outbuildings. The new frame matches the existing height, with a two-storey basement for car stacker and plant.

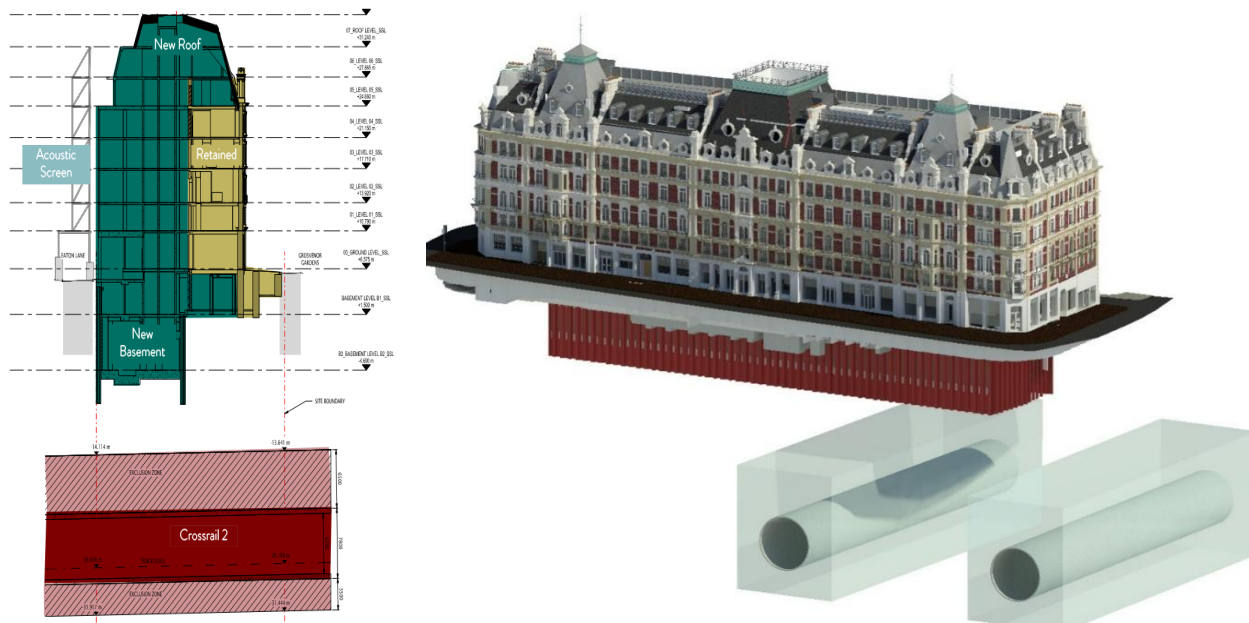


Figure 2: New and retained structure with Crossrail 2 tunnels underneath

New Structure

The new structure narrows from 14 m in the east to only 7 m in the west, so basement space is at a premium. The new foundation is a raft slab with sheet pile walls, as the Crossrail exclusion zone precluded piled foundations. To maximise basement area, sheet piles were located as close to existing structure as possible, necessitating careful coordination. Pressing rather than driving piles prevented excessive vibrations. Welding pile clutches for waterproofing avoided liner walls. This reduced space and material usage but had programme implications. Piles twisted upon hitting gravel, further increasing site welding as filler plates had to be fabricated and welded to adjacent sheet piles. Because space was so valuable and the basement narrow, I believe the right solution was chosen here, but all consequences of removing liner walls must be considered at concept stage.

To further increase basement area, new RC cores and many columns were transferred at B1, as parking access to B2 is by robotic car stacker. The lateral load was taken through the B1 slab to ground, and vertical push-pull taken to the B2 raft through blade columns. This complicated the design and increased embodied carbon but achieved a key client objective. This ethical quandary is increasingly common in construction.

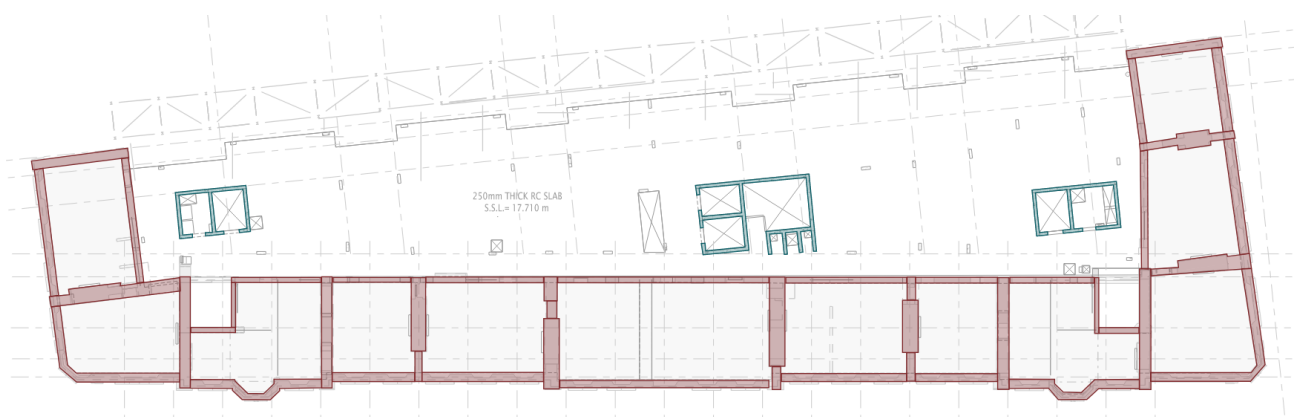


Figure 3: Stage 4 stability system, masonry walls in red, new RC in-situ walls in green

With the Contractor appointed, their key driver was programme. We assessed the viability of changing columns and core walls to precast columns for erection speed. The governing factor was the dowelled connection capacity for moments and robustness, so some lower in-situ walls were retained. There were several drawbacks to changing to precast after detailed design. Some in-situ columns that were rotated or moved slightly on plan to optimise architectural layouts now have complicated end connections. The precast columns were made with a higher concrete grade than designed to accelerate curing and delivery. Without time for reinforcement redesign, this increased embodied carbon. Embodied carbon measurement during design is improving, but with Contractors driven by programme, design figures can mask reality.



Figure 4: Core construction in progress on site, precast columns with dowel holes in top, in-situ wall with exposed reinforcement to right

Alterations to Existing Structure

Several existing walls were removed to accommodate a pool in the retained basement. Steel box frames transfer load and lower the slab by 3 m. To avoid damaging the existing building, the construction sequence was critical. A close working relationship with the Subcontractor facilitated this. We removed the bottom steel beams from the concrete capping beam to simplify installation and developed a jacking option for if cumulative deflections were excessive. Following lower-than-expected ground capacity tests and a sequence change, we redesigned the pool foundations from ground-bearing to loading the temporary piles. This required localised increased reinforcement but otherwise did not increase material volumes as the piles were designed to take the building weight. Collaboration and clear definition of load paths enabled us to overcome this unexpected unknown.

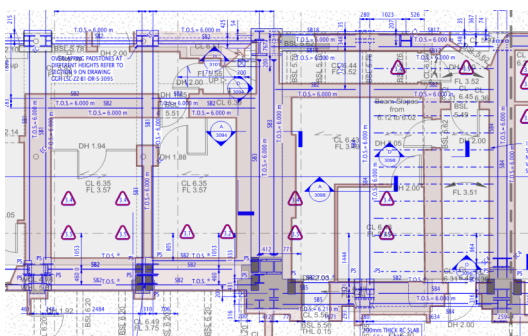


Figure 5: Pool area showing basement walls removed in red, retained in grey and new steel in blue, left photo before construction, right photo August 2025

Movement Joint

By retaining the existing C-shaped building with a new RC frame infill, we have two adjacent structures of different materials, ages and importantly stiffnesses. Therefore, the planning scheme had a movement joint between new and retained structures. This would require complicated architectural detailing and inefficient separate stability systems.

Therefore, we worked with A Squared geotechnical engineers to consider if/when we could lock the two structures together. We assessed relative deflections and locked-in forces across the movement joint if it were closed at different construction phases. Locking the joint before the new basement excavation would put huge forces into the joint due to soil unloading. Once the basement box is formed, the forces between the new and retained structures drop, which enables transfer into existing masonry walls at each floor, so this connection timing was chosen.

The B1 connection between underpinned existing footings and new capping beam needed to allow for movement during basement formation but none thereafter, so we designed a dowel that was resin anchored into the underpinning and sleeved through the capping beam. The sleeve was fully grouted up after basement completion. This was effective but some grout tube protection was damaged, risking debris compromising the grout. This was spotted on site and rectified, showing the importance of regular site visits.

At upper levels, steel angles were resin anchored to existing walls with regularly spaced shear studs for lateral load connection. To avoid concrete shrinkage of new slabs pulling on masonry walls, we specified a pour joint around the angle. To speed up construction, the Contractor proposed replacing the pour joint with waxed cardboard cones round shear studs, to be grouted up later. We reviewed concrete shrinkage under the proposed pour sequence and determined the cones could accommodate it.

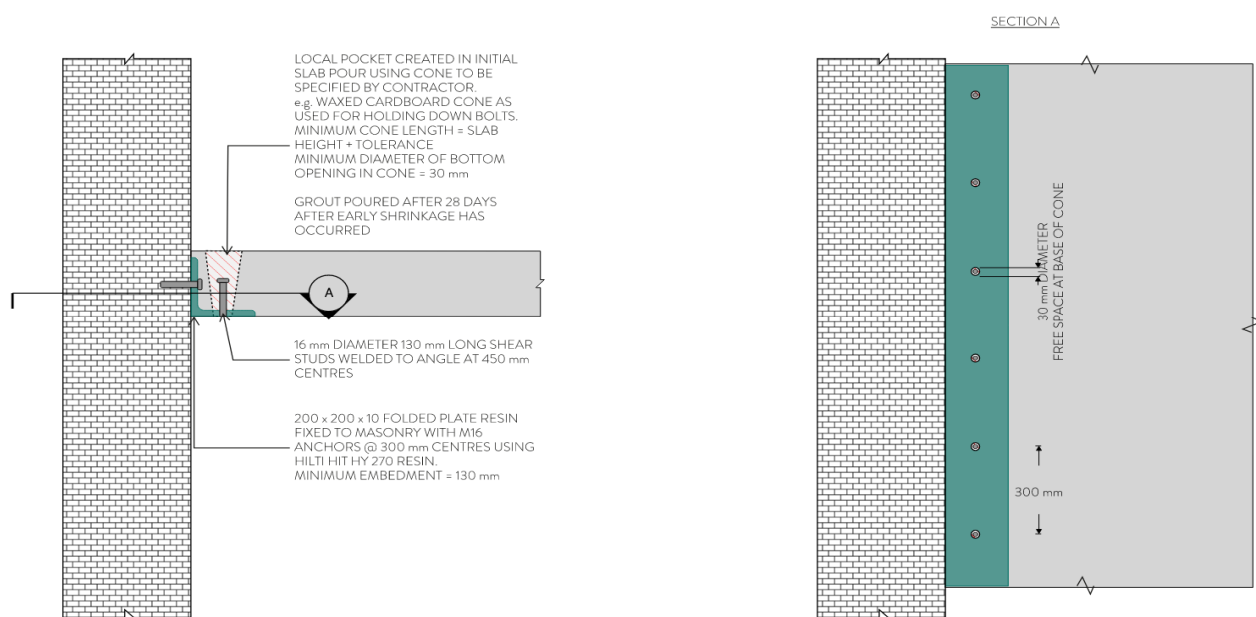


Figure 6: Alternative movement joint detail using waxed cardboard cone

To avoid locking the movement joint too early, communication of sequencing with the Contractor and Subcontractors and regular site visits were critical. This became complicated when eastern slab pours advanced ahead of west. The superstructure joints designed for lateral movement under concrete shrinkage now had to facilitate vertical differential movement until the basement was complete. This was enabled by leaving a pour strip along the interface which had a programme impact, as slab edges had to be propped until the strip was infilled. This could have been managed better by earlier communication of programme changes.

Closing Remarks

The above is a snapshot of technical and construction challenges faced during the redevelopment of Grosvenor Gardens House. Four years after site possession, structural works are incomplete, demonstrating the scale of the endeavour.

This project has been a coming-of-age for me as a Structural Engineer. Walking the tightrope between office design and on-site reality, three Architects, a Main Contractor, and Client has required engineering judgement, clear communication, and a level head. Navigating these challenges to save our heritage buildings whilst meeting modern standards is easier said than done. It has required a design and construction team of hundreds of individuals, each with their own valuable contribution, not least the skilled craftsmen restoring the façade and rebuilding the roof. As we near the end and the scaffold starts to descend, I can definitely say that for me, the hard work has been worth it.



Figure 7: Completed render, PDP Architects