

Our ref: SJA\BBR\22757~Interim Structural Statement

13 February 2025

Interim Structural Statement

Ground Investigation 02/12/2024

Under my supervision 6 boreholes (window samples) were sunk at positions in the yard to the northeast corner of the site and then to the south of G10 (the Great Room) and G6 (the Drawing Room). This gave a basic representation of the ground make up around the most heavily subsided part of the building. A trial hole was also dug below the easternmost window to the south wall of G10.

The boreholes typically showed made ground over clay and a narrow band of peat over sand/gravel. The depth of the made ground was at the shallowest, 0.8m below the surface and at the deepest, was to 2.1m. Notably, the deepest make up was on the southeast corner of G10 where the subsidence has been greatest and where the footing depth was approximately 1.2m; this indicating that this corner has likely been built onto the fill. Peat and clay layers were similar throughout, but the one closest to the southeast corner was slightly wetter than the others. The sand and gravels reached about 2.6m in depth.

Overall, a combination of placed fill, soft clay and peat indicate poor ground make up (as anticipated) with firm sand below the depth reachable by conventional strip footings, or indeed the footings of the building as it stands. Exceptional susceptibility of the rear corner to movement could relate to the increased moisture content (possibly influenced by defective downpipe), and the increased depth of fill. The prevailing characteristics is otherwise similar for all the boreholes.

Investigation of Structure 28/01/2025

G10 and Rooms Above

Purpose was to understand the building condition better and identify relationship between above ground structure and subsidence.

Investigation of south wall of G10 found that significant first floor load and south wall load is supported on a relatively small plan areas of masonry forming the two piers between southern windows. This takes account of findings that under the window there is very thin brickwork and adjacent to the door, there are timber support posts rather than masonry piers. The loading arrangement has concentrated significant proportion of the building weight on relatively small area of footing top.

Further investigation of this south wall identified that there is a built in and decayed timber running above the windows for the full length of the wall and this has contributed to the hinging/bowing effect. To make matters worse, the post either side of the door has likely suffered decay to the bottom end due to moisture, and therefore the weight of the arch and the centre floor beam above to a degree must be carried on the ends of the defective timber plate above the post. In this area, the crushing of the wall has resulted in the ashlar stones bowing and separating from the wall core either side of the doorway.

Further up the building, there is less notable sign of recent movement since repointing/repairs have been put in place. The east wall has coped remarkably well with the substantial settlement of the southeast corner, with only cracks against the stairwell, but otherwise with the wall moving largely as one. Inside there are piecemeal ties but of poor quality, as well as an angle section in the southeast corner that ties the quoins back to the internal tie straps. The floor was investigated and a large steel

repair was found on the easternmost of three floor beams, and some decay to the top of the centre one. The west one was sound.

My overall view of the investigations so far into the ground condition and inspection of the building in this area indicates to me that the settlement has been driven by ground condition, possibly made worse by defective underground drainage. The building has generally moved as one, and there is not significant sign of new movement based on integrity of passed repairs. Internal strapping is generally of poor quality. The other contributory factor is the poor arrangement of the south wall due to the decayed embedded timber and overloaded masonry piers and lack of lateral continuity due to the high door arch. Inevitably, a wall of poor arrangement will be more susceptible to damage under settlement of ground materials.

My current (but not final) expectation is that we will not underpin the walls to this room, but it will be necessary to remove the panelling to that we can remove the embedded timber plate and fill this void, improve the support around the doorway, rebuild the stone facing around the doorway and adjacent windows and look at better ways of spreading the weight along the foundation.

Some form of hidden steel frame may be required locally around the doorway. In conjunction with realigning the stonework and improving the support around the doorway, it will be necessary to provide a timber structural lining to the inside face of the bowed wall to stiffen it. This may require the lining to be rebuilt slightly further into the room to provide a zone for the structural improvements, and better alignment to allow the refitting of the windows and shutters. This lining could include concealed better propping vertically under the first floor outer beam ends and better support to the central one, although this is difficult because it is over the door.

To the east wall and west wall, ties will need to be introduced at a number of levels running back to front and generally to be hidden in linings, except possibly through the stairwell where they may have to be independently boxed around. The south wall can also be tied in better to the first floor structure.

Better spreading of the load on the south footing may involve thicker brickwork under the windows and some strengthening over the top of the foundation, with a possible beam (limecrete or reinforced brickwork) to be considered further.

As an early activity, drains will need to be relayed and we recommend some soakaway tests to ensure that we can identify the best area of the garden to dispose effectively of rainwater. The sooner this process starts, the better, because the initial drying of the soil could cause some further movement.

I would not recommend that roof works commence over this range until we have finalised the strategy and repaired the rear wall and in doing so there would need to be temporary support at the door arch level.

We have requested additional survey cross sections and long section survey so we can look at the potential tie positions at all levels. We also at one stage talked about possible buttressing to the rear wall, but I currently do not think that we will need this if we can provide adequate ties. The floor above is accessible for inspection as most of the boards are loose. Tying across the stairway in particular is difficult, but I think possible to at least two levels.

The ground floor structure is rotten and will need to be relayed. This was investigated with a trial hole and the bearing timbers were found to be substantially decayed and surrounded in damp soil.

G6 and Rooms Above

We looked at the wall make up in the Drawing Room and found substantially decayed lintels to the south wall, little tying in to the first floor and one of the structural piers between the windows perished, cracked and blown, and the other one was better but having been subject to low level damp. There has been some separation of brickwork, but principally the whole wall has moved out as one and I am proposing that this needs to be tied back into the first floor as well a rebuilding locally to the most defective brickwork around the windows.

Note that some of the mortar found was extremely lean and to the core of the wall resembled an earth mortar.

Again, we have requested additional long sections and cross sections of survey to mark up potential tie positions, as well as some opening up of the ground and first floor. The ground floor structure is similarly rotten and will need to be replaced. There will need to be temporary support installed under the first floor and also during the works, lateral bracing of the rear wall and needling through window heads. Presently, first floor joists may only sit on timber wall linings on the south wall.

There will need to rebuilding of the brickwork piers and possible improvement of the top of the footing (similar to that for G10) and investigation of the depth of the footing by trial hole. At high level, the coping and gable edge will need to be rebuilt, as this has been poorly repaired with a margin of water damaged brickwork retained below the newer work.

G10 and G6 and Wider Site

The above items are significant areas of work, to which the details will now need to be developed further, as well as the additional ground percolation tests. On the same occasion, an extra window sample is needed near the kitchen southwest corner to understand why this has sunk so badly as a localised area. It may also relate to the close by drainpipe.

The above is provided as an interim structural statement and whilst the conclusion is away from any underpinning, consideration is still being given to the final proposal.

Work to Roofs

We carried out a high level walkaround to view the roofs and the chimneys, and my view is that Phase 1 works should be the retiling of the roofs above the original house block above attic S1, S2, S3, S4 and S6, which excludes the timber frame link (S5) and the eastern flank S7, back to the hip with S4.

The southwest chimney which has been rebuilt appears sound, but the centre chimney needs to be rebuilt above roof level. Removal of internal damaged plaster in these attics will allow inspection and modest timber frame repairs, although generally the roof structures appear reasonable in these areas. My view would be that wide lead margins are created against the link roof, so that the tiling could stop short and the link could be dealt with separately later.

As I do not anticipate significant timber repairs being needed to these roofs, it may become practical to carry them out from scaffolding to eaves level and not have a temporary roof, but rather manage sheeting. The roof flank S7 needs investigation and more substantial repair, so is excluded from the Phase 1. A decision on the roof lights replacement type would be required. These works would be coordinated with the facades (stone and window repairs) to the west and north and the further investigations needed in G10 and G6 (removal of panelling and ground floor).

Flue surveys are advisable.