

Structural Design Philosophy – Prepared by Elliott Wood Partnership

Existing Building

The existing building was substantially refurbished in the 1980's, together with the construction of a new two storey extension to the rear of the building. Record drawings of the work that was carried out at that time have been obtained from Building Control. These have been generally verified by localised opening up of the structure at strategic locations.

The original building layout has been significantly altered and new frames and beams have been used to replace original load bearing walls. The existing structure taken from Building Control records and limited opening up works together with the proposed further alterations are summarised on our preliminary scheme drawings 206386/SK1-SK7 inclusive.

The main works that were carried out during the 1980's refurbishment were as follows.

Installations of a new 5 storey steel frame to no. 52 located on the original spine wall. All of the floors between the front and rear walls were either replaced or strengthened with additional steel beams spanning between the new central frame and the front and rear walls. Diagonal bracing was introduced in to each of the floors presumably to provide stability to the flank wall.

A new lift shaft was installed adjacent to the Party Wall between nos. 52 and 53 Russell and a series of new openings were introduced in to the Party Wall at all levels. These openings are framed with individual steel box frames around each of the openings. It is considered likely that this was done to ensure that the original load paths were retained, to avoid loading the brickwork around the flues and to tie the front and rear walls to the Party Wall where the openings occur directly adjacent to these walls.

Further strengthening of the floors was carried out to no.53 Russell Square as indicated on Elliott Wood Partnership drawings.

It is considered that the refurbishment works were carried out to primarily strengthen the original floors for the increased loading from its original residential use to office use and to significantly improve the general robustness and stability of the structure. It is clear from the information obtained that the works carried out at that time would have achieved these aims.

Proposed alterations

The proposed new alterations are by comparison to the works carried out in the 1980's very minor in nature. However, the structural philosophies used in the previous refurbishment have been maintained in the new alterations to ensure that these works will not adversely affect the structural stability or robustness of the building as a whole.

Two new single door openings are proposed in the Party Walls at ground floor level. At these locations new steel box frames will be installed to carry the vertical loads over by transferring the loads from the beams above the opening through vertical columns either side of the opening down to steel spreader beams bearing on to the brickwork below. In this way the loads are transferred back in to the brickwork in a similar manner to the load distribution prior to the formation of the new opening. An assessment of the ability of the remaining masonry to sustain lateral loads applied due to wind on the front elevation will be carried out. If the remaining sections of brickwork do not have sufficient shear capacity the frames will also be designed to provide lateral stability in combination with the remaining brickwork and the previously inserted frames.

The remainder of the alterations to the existing building involves the removal of internal non load bearing partitions that were installed in the 1980's. These walls do not contribute to the vertical or horizontal stability of the building and can therefore removed without any further structural works.

Some minor alterations to the existing flat roof to no.53 Russell Square are proposed. This will involve removing the existing flat roof and lowering this to the existing ceiling level to create a lowered area for roof plant. The existing flat roof is supported on trusses spanning between the Party Walls and the stair wall. These trusses will need to be strengthened to sustain the additional loads applied from plant.

The majority of the work is focused around the link building between the original building and the extension to the rear. The link building was constructed at the same time as the rear extension.

The alterations to the link building will have a minor impact on the original building where new beams are required to support the new walls to the altered link building. The existing opening at ground floor level is to be widened slightly. Investigations in to the existing lintels over this opening will need to be carried out to establish whether the existing lintels have sufficient bearing to allow for the increase in width or whether they need to be replaced.

The new flank wall to the link block at ground floor level does not align with the basement wall and therefore a new beam will be required to support this wall. This beam will need to be supported on the rear wall of the building. Whilst the loads from this beam are insignificant for the wall as a whole, the capacity of the existing lintel over the existing opening at ground floor level will need to be checked. At this stage new beams at this location in the rear wall have been allowed for.

Investigations in to the existing foundation to the link wall that is to be extended vertically still need to be carried to establish whether the existing foundations have capacity to sustain the additional loads. It is likely that new foundations will be required at this location. A vent exists within the slab of the existing external courtyard to no. 53 Russell Square. Investigations need to be carried out to establish what this vent serves. Once this has been established decisions can be made about its possible retention or removal.

Methodology

The formation of the new openings in the Party Wall and the possible replacement of the lintels in the rear wall will require temporary works to allow the safe installation of these structures.

It is anticipated that the brickwork over the new openings will need to be needled and propped down to the basement. The new steel frames will be installed in sequence to avoid the whole wall being removed at one time. It is anticipated that the frames will be constructed from three separate frames occupying the full width of the wall. The frames will be installed one at a time. The brickwork will be cut away only for the extent of the first frame. The first frame will then be installed and dry packed to the brickwork over prior to the removal of the next section of brickwork and insertion of the next frame. In this way two thirds of the brickwork over is always supported in addition to the needles. This will mitigate the risk of movement and potential damage to the fabric of the existing building.

A similar procedure is envisaged for the replacement lintels to the rear wall if required.