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Rose Cottage, Vale of Health, Hampstead , London.

Structural Overview

On May 8 2017 I visited this cottage and, together with the help of a builder, I was able to determine the sizes of most of the main structural elements, and see some of the defects.

Brief Description of Existing Structure

Walls. The walls are mainly brickwork, though they contain horizontal timber "bond beams" built in at 900mm vertical intervals. Some rot in these timbers is inevitable, especially since the external walls are only 112mm thick brick with render outside and plaster inside. Ideally, the rotten timber should be removed, though this would mean taking off the plaster. It seems that the party wall with the next door cottage is also only 112mm thick brick in between the chimney stacks. The outside wall of the rear extension has settled, and there are some fresh cracks suggesting that movement is ongoing.

Chimneys. There are 3 chimney stacks, all brick, and of squat proportions. 2 of these 3 chimneys are prominent, and 1 virtually invisible. The 2 chimneys in the main front part of the house are shared with the neighbouring cottage, and these project approx. 18 brick courses above the clay tiled roof. The third chimney in the rear extension sits almost behind the ridge of the double pitched roof, making it difficult to see from street level.

Roof. The main roof has adequate timber framing visible within the large loft space. Some timbers have been renewed recently. Rafters are 125 x 50 at 400mm c/s. Both purlins are 75 x 225mm, and these are propped at centre span by a truss which spans from front to central wall to back. Ceiling joists are 100 x 50 (generous for a property this age (approx. 1810)). The pantile roof is adequately supported. The lead lined timber rear gutter needs attention since it is blocked.

The rear extension is slated, and these slates seem to have been recently re-laid. There was no access into the small triangular loft above the bedroom ceiling, though boarding was visible above the ceiling joists, and perhaps this is evidence of a former flat roof.

First Floor. For the main part of the house the joists run from front to back, and must be carried by a beam in the centre, visible in the ceiling of the ground floor room. For the extension, joists (125x 50) run from party wall to the external side wall (span 2.4m). Some joists have been weakened by deep notches where pipes have been threaded, and the joist ends bearing on the thin outside wall were hardly adequate, so all these need inspection and may need repair.

Ground Floor. Some of the timber joists are rotten, because there has been a long term damp problem, partly because the external paving is too high, and partly because there is inadequate underfloor ventilation. It is hard to see how to reinstate this timber without a lot of excavation to improve air flow. A solid floor may be the answer.

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External Paving. The stone paving covers the thresholds, and without adequate measures to deal with surface water drainage, there will continue to be a damp problem, especially at door openings.

Balcony. This timber structure seems to have settled slightly, since it is pulling away from the front wall. The handrail of the balustrade is rather lower, and the open apertures do not comply with modern building regulations.

6 principal measures are suggested, and these are shown on drawings 1 and 2, and the photos of the balcony:

1. The first floor joist ends where they bear on the outside wall of the should all be inspected, and if there is rot or less than 75mm of bearing, then repair work should be done. Likewise, the buried horizontal timber bond beams within the external walls should be located, inspected and probably cut out and replaced with masonry. Since the wall is only 112mm thick, this will affect internal plaster and external render.
2. A new ground floor slab made of reinforced concrete should be introduced to form a raft foundation, with the ends tucked into the masonry walls on all 4 sides. This raft will reduce the risk of further settlement.
3. The chimney stack in the rear extension provides lateral stability, so new slender steel portal frames are needed when the masonry stack is removed. This steel frame could carry the weight of the top part of the chimney as it passes through the roof.
4. Larger deeper foundations are needed under the 2 posts which hold up the balcony. This will reduce the likelihood of further settlement.
5. Because the balcony posts are not strong enough to resist accidental outward load, the balustrade of the balcony needs to be strengthened, and a higher handrail ought to be added. The slender diagonal balusters are also too weak, and small steel flats could be added almost invisibly in order to make them stronger
6. Paving should be lowered, and falls for drainage improved.

Philip Cooper FIStructE June 13 2017

Structural Engineer. CAR Ltd

First Floor:-

① Inspect & Repair Joist Ends

New insulated lining

New storage and door within depth of chimney

New partition to create bathroom

New sanitaryware

Access hatch above

Doors replaced

Balustrade to replaced / m (TBC)

101 Bedroom

102 Hallway

103 Landing and stair

104 Bedroom

105 Bedroom

106 Bathroom

Balcony

New Fixings

③ Pair of 2 Storey Steel Portal Frames, rigid joints, made from 100x100x 6·3mm thick RHS

⑤ Balustrade Strengthening New handrail, steel flat or tube.

New build up to paved entrance

New insulated lining

New french doors to match style of existing windows

New french doors to match style of existing windows

Balustrade t replaced / m (TBC)

Paved entrance area

Front door

Main entrance

G01 WC

G02 Entrance hallway

G03 Kitchen

G05 Storage

G06 Hallway

G07 Storage

G08 Living room

B1131 Mesh primary spanning direction with 12 ϕ bars @ 100 c/s

Covered terrace

New paved incorporatir

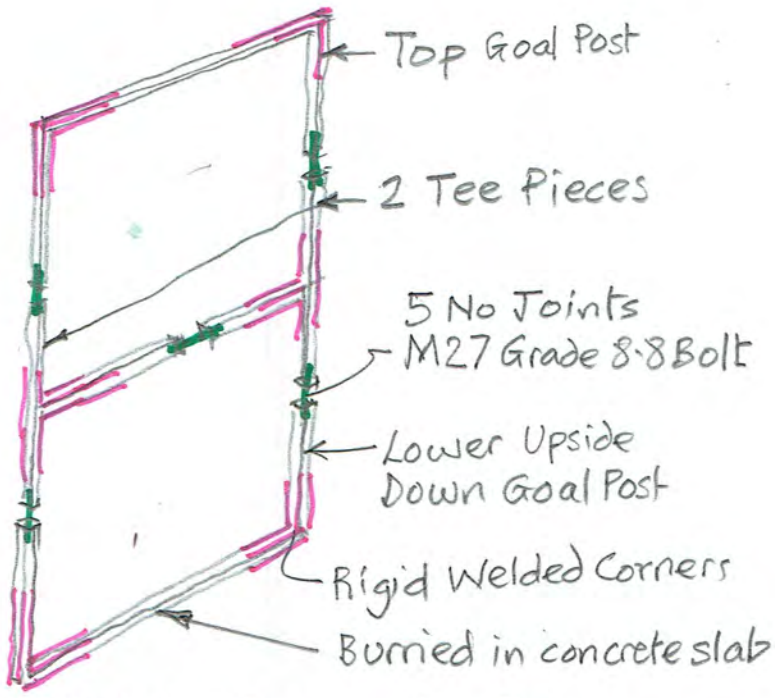
New built in joinery

New kitchen installation

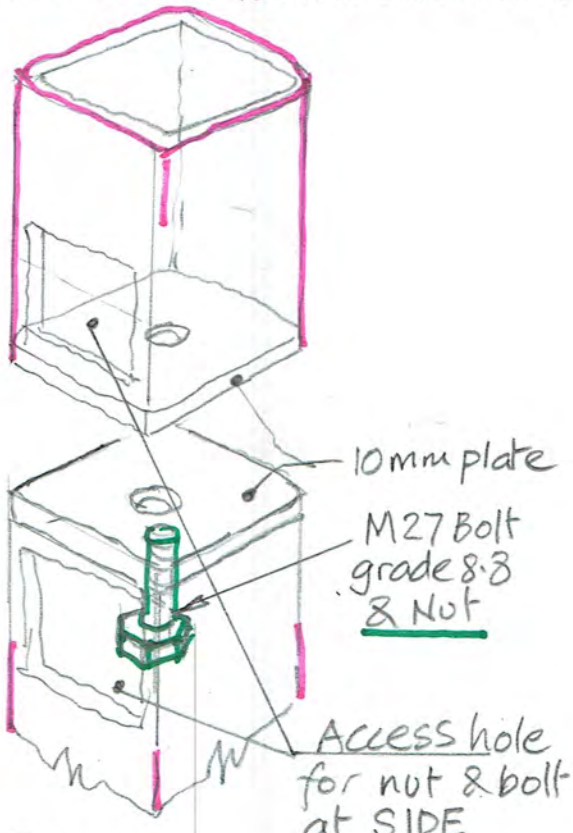
② New 150 thick RC slab 2 layers B1131 mesh reinforcement with 225x102 hit & miss reinforced tongues @ 675 c/s around perimeter

④ New 400x400 plain Concrete Bases For Balcony columns.

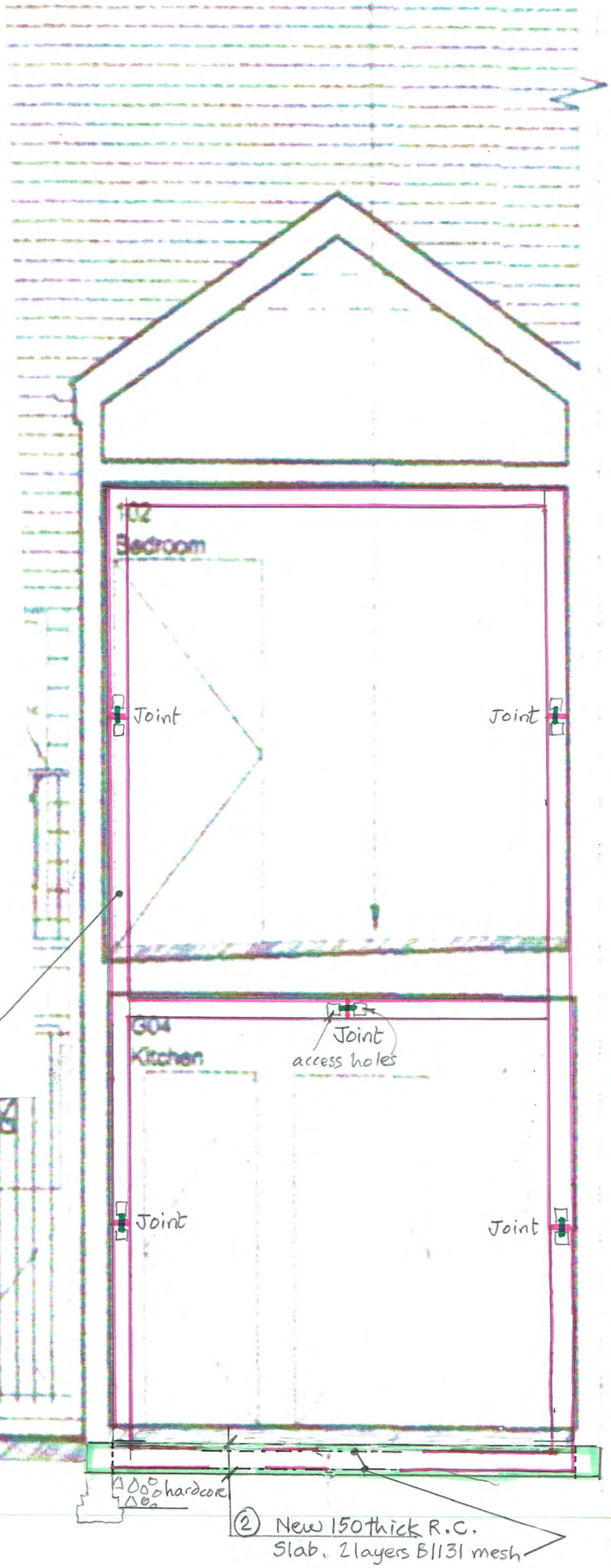
ROSE COTTAGE STRUCTURAL WORK Drawing 1
May 18 2017



2 Nº Portal Frames Like This
All members 100x100x6·3 RHS



JOINTS.



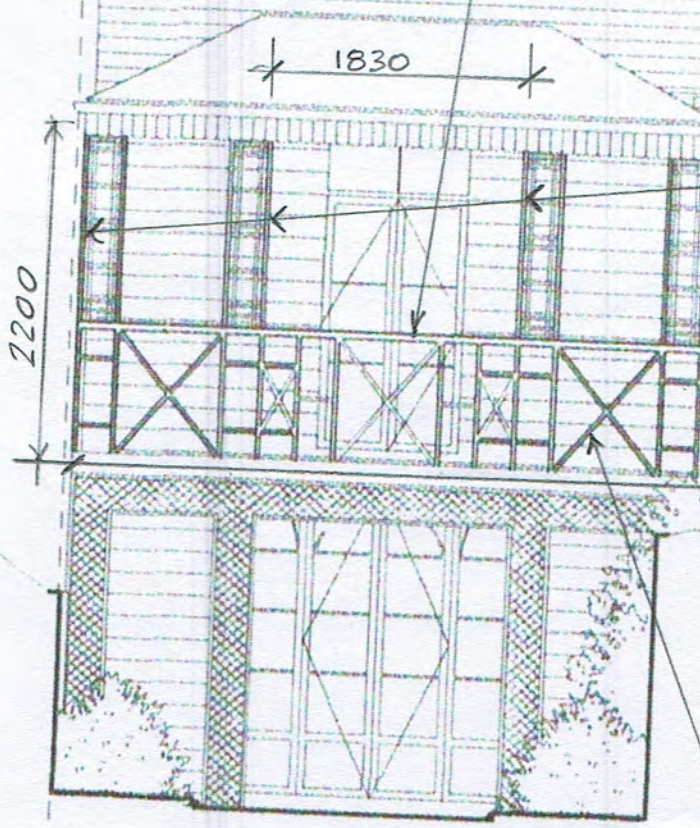
(3) Pair of steel Portals

ROSE COTTAGE STRUCTURAL WORK
Drawing 2 May 18 2017

Rose Cottage

existing handrail 60 x 45 wide deep

existing 4 posts 62 x 45 mm



Handrail span 1.83m

if 0.75 KN/m applied

$W = 0.75 \times 1.83 = 1.37$ KN

$M = 1.37 \times 1.83/8 = 0.314$ KNm

$\frac{M}{Z} = \frac{0.314 \times 10^6}{45 \times 60^2} \times 6 = 11.6$ N/mm²

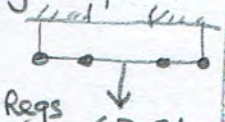
allowable short term if C24 wood,

$= 7.5 \times 1.5 = 11.25$ N/mm² just under 11.6, but probably OK since margin of safety.

Look at Joints. will handrail to post take $1.37/2 = 0.685$KN. I think it will since I gave it a sharp tug, and no sign of weakness.

So, handrail is just strong enough based on calcs but should be load tested with Horiz load to check. Put horiz load of $1.37/2 = 0.685$ KN = 68.5kg as point load centre span to verify

NB. Handrail only 900 high Not 1100 high as Building Regs

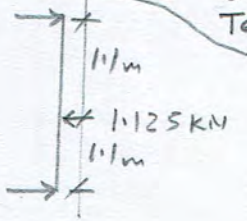


Posts height 2.2m.

if 0.75 KN/m applied to handrail, and if handrail was 1.1m high; then $W = 1.5 \times 0.75 = 1.125$ KN

$M = 1.125 \times \frac{2.2}{4} = 0.618$ KNm

$\frac{M}{Z} = \frac{0.618 \times 10^6}{45 \times 62^2} \times 6 = 21.4$ N/mm² Fails



Small Baluster 22 x 33mm (wood)

diagonal spans 1.1m what point load would overload?

if max stress = 11.25 $\sigma Z = 11.25 \times \frac{22 \times 33^2}{6} = 44921$ Nmm

$\frac{P \times 1100}{4} = 44921$ $P = 163$N = 16kg very low - Not strong enough - Balusters should be swopped for steel.

New 25x25 steel handrail, white at 1100 above deck

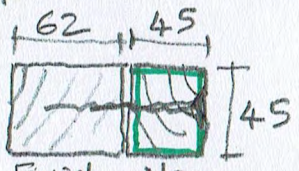
Extra 45x45 timber (taper if desired) glued & screwed to inside (back face) of 2 vertical posts at both ground to 1st and 1st to Roof.

45 x 45 or tapered wood inside

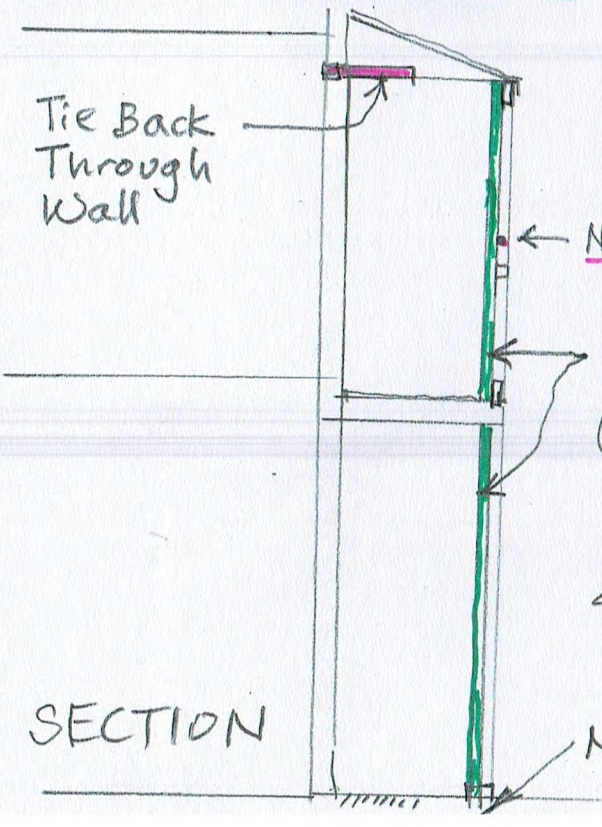
New addition 25x25 steel white

1100 mm

Add 45x45 wood, glue & screw paint wood



X SECTION THRO POSTS.



SECTION