Summary Of Structural Assessment And Strengthening Works Required

The capacity of the existing structural elements have been checked against the required loadings to the Eurocodes. Below is a summary of the assessment identifying any elements which require strengthening as part of the refurbishment works:

Existing Timber Spine Beam Assessment:

The spine wall has been re-supported at 1st floor level on a 203UC steel beam, from analysis this beam is insufficient to support the full height of spine wall and floor beams above so the existing timber floor beams at each level have been assessed.

Bending Stresses @ 230% capacity => strengthening required
Deflection @ 200% limit => strengthening required

Refer to Z3-S100.1&2-Detail 1&2

Existing Timber Floor Joist Assessment:

The existing floor joists vary in both depth and width, typically they are 160x60 at 380 c/c. They have been assessed for their maximum span.

Bending Stresses @ 98% capacity
Deflection @ 160% limit => strengthening required

Refer to Z3-S100.1-Detail 1

Existing Stair Beam Assessment:

The stair wall is not supported below first floor level so the existing timber floor beams at each level have been assessed.

Bending Stresses @ 140% capacity => strengthening required
Deflection @ 200% limit => strengthening required

Refer to Z3-S100.7-Detail 9

Existing Floor Beam Assessment:

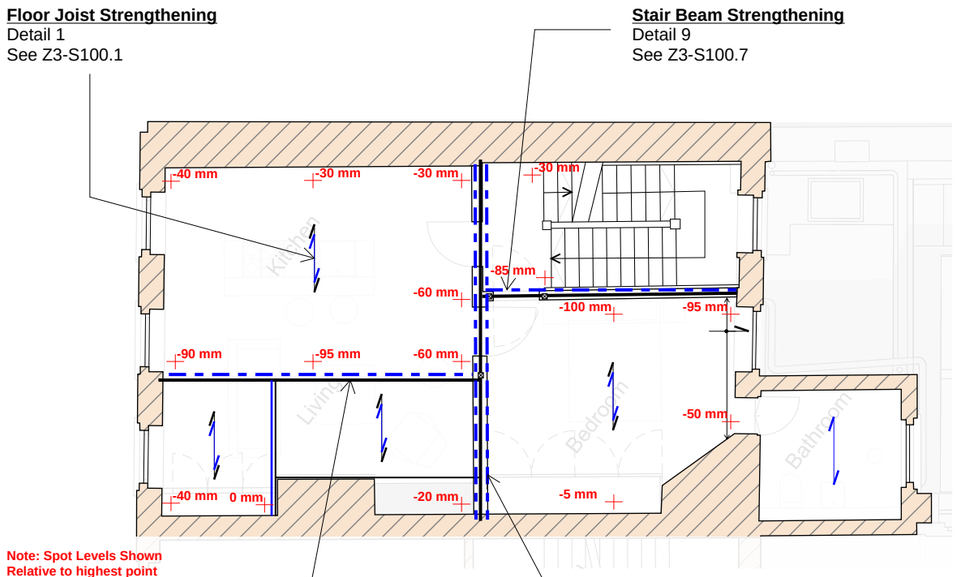
The existing timber floor beam at each level have been assessed.

Bending Stresses @ 110% capacity => strengthening required
Deflection @ 200% limit => strengthening required

Refer to Z3-S100.5-Detail 6

Existing Floor Movements:

From survey spot levels the existing floor structure has settled/deflected by up to 100mm at each floor level. Strengthening Works are required to ensure to further settlement occurs



Floor Joist Strengthening
Detail 1
See Z3-S100.1

Stair Beam Strengthening
Detail 9
See Z3-S100.7

Note: Spot Levels Shown Relative to highest point on floor (2nd Floor Shown)

Floor Beam Strengthening
Detail 6
See Z3-S100.5

Spine Beam Strengthening
Detail 1 & 2
See Z3-S100.1 & 2

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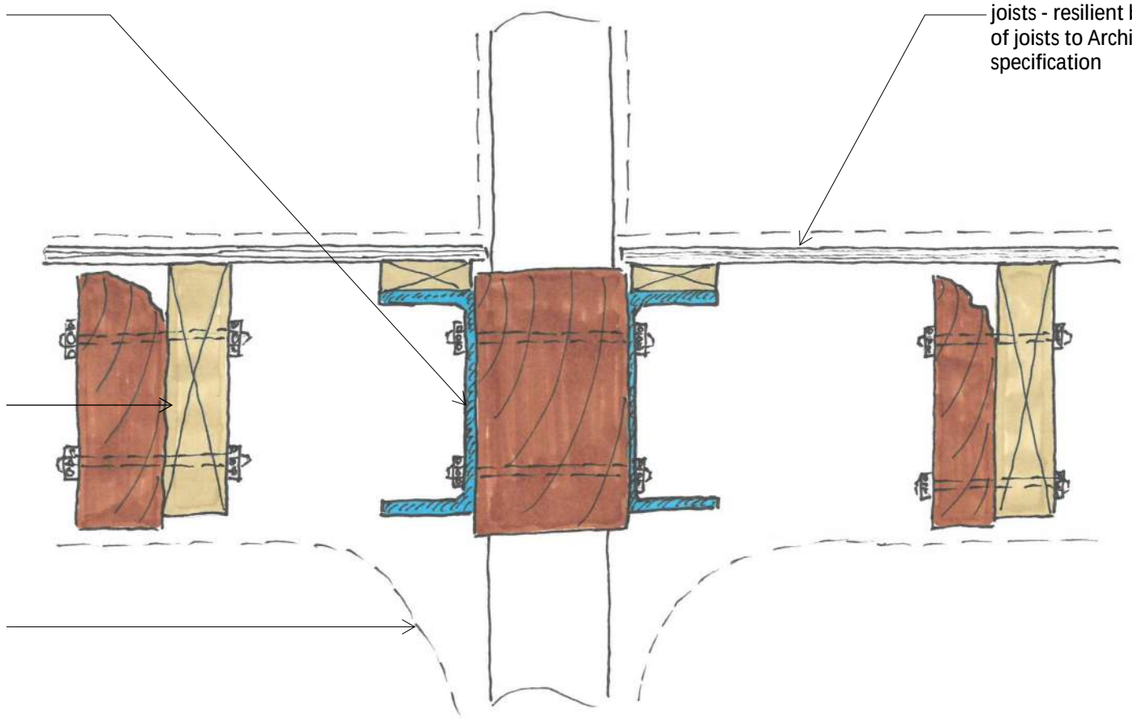
Option A:

-This option provides the required strengthening to the existing spine beam while minimising impact on the historic finishes.
-This option does require the existing floor beams to be trimmed and re-supported on the new steelwork
- Option A is considered to have the least impact on the historic building fabric while achieving the required structural strengthening

Existing timber spine wall beams to be strengthened with pairs of PFC steel beams - through bolted to spine beam with pairs of bolts at 600mm c/c

New plywood sheathing fixed down to new timer joists - resilient bars to tops of joists to Architects specification

Existing joists to be strengthened with 200x50 C24 timber joists - bolted together at 400mm staggered c/c



Proposed spine beam strengthening allows for finishes to remain largely undisturbed

Figure 1, Spine Wall Strengthening Location

Detail 1: Spine Beam & Joist Strengthening Requirements, 1:10
Option A

Structural Strengthening Requirements:

- The existing spine wall beam can not be justified to support the required residential loadings to current standards therefore strengthening is required.
- The existing floor joists require strengthening due to comply with current standards and allow for levelling of existing floors

- Generally all structural strengthening proposed will reduce deflections and movements within the building to protect the historic structure and materials form further damage

- Steel beams to bear onto padstones in masonry party walls

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Strengthening steel beams to existing timber spine wall beams allow for kitchen waste pipe to run through to riser beyond - steel beams to be strengthened locally around penetration

Existing and proposed joists to be strengthened locally with steel plates to allow for kitchen waste pipe to run within floor zone - plates to be screw fixed to joists

Service penetration to mid depth of joists

Proposed service riser location

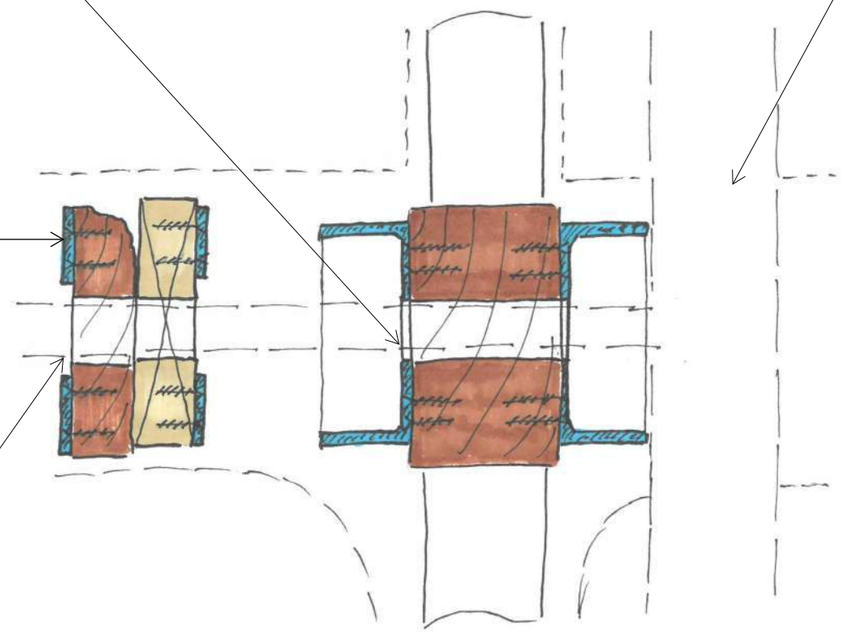

Figure 3, Spine Wall Strengthening Location

Detail 3: Spine Beam & Joist Service Penetration, 1:10

Structural Strengthening Requirements:

- The strengthening is required to allow the waste pipe from the proposed kitchen island unit to run through the floor zone. The island unit is required to avoid any damage to historic wall finishes
- The service run for the kitchen waste pipe will effect a maximum of 3 joists and the spine beam at each level

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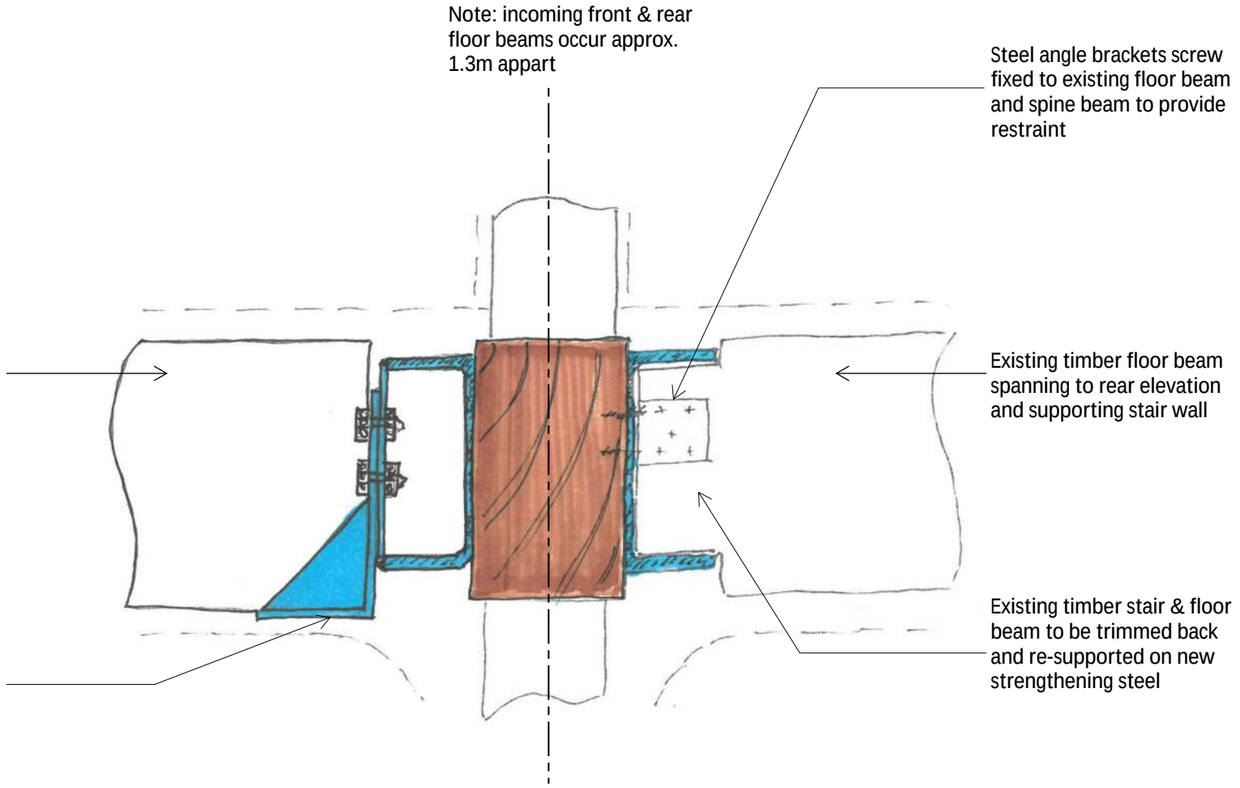

Detail 4: Floor Beam To Be Re-supported, 1:10

Structural Strengthening Requirements:

- The strengthening is required to the bearing of the floor beams to justify the connection for required residential loadings to current standards

Figure 4, Floor Beam To Be Re-supported

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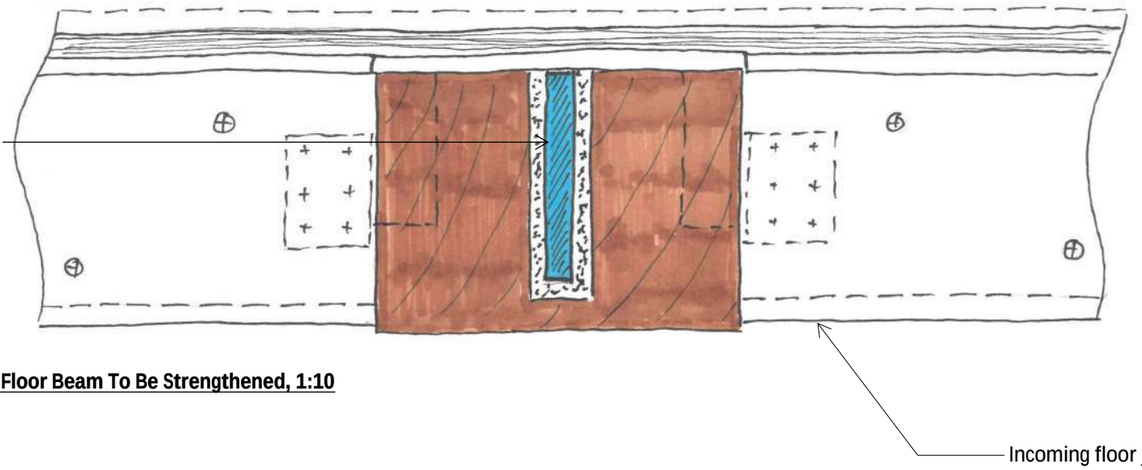
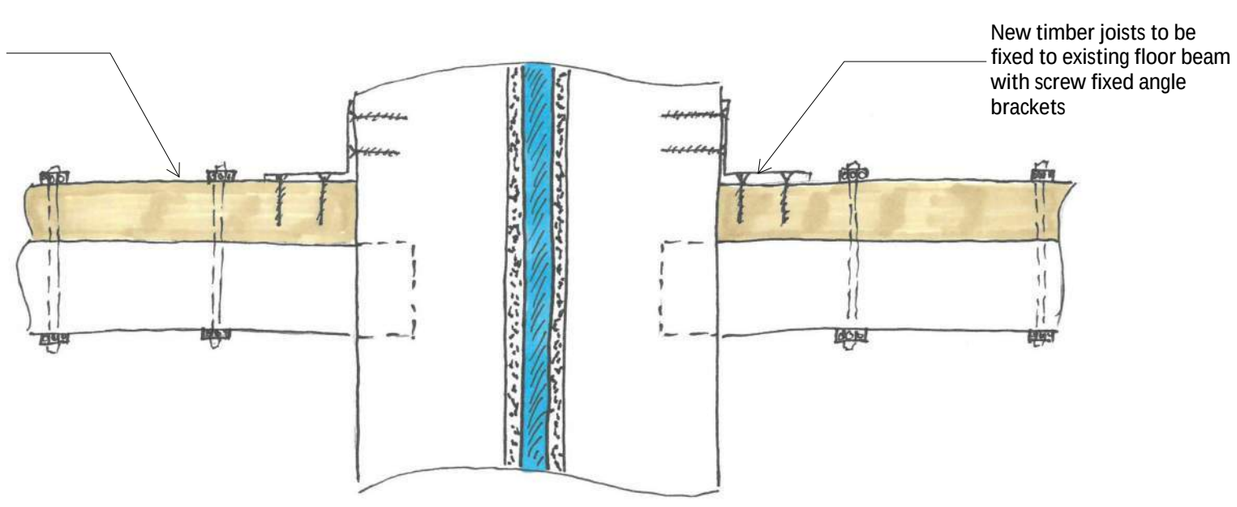


Detail 5: Section of Front Floor Beam To Be Strengthened, 1:10



Detail 6: Plan of Front Floor Beam To Be Strengthened, 1:10
Option A

Structural Strengthening Requirements:

- The existing timber floor beam can not be justified for the required residential loadings to current standards and requires strengthening
- This solution offers the least impact to the existing floor joists

Figure 5, Front Floor Beam To Be Strengthened

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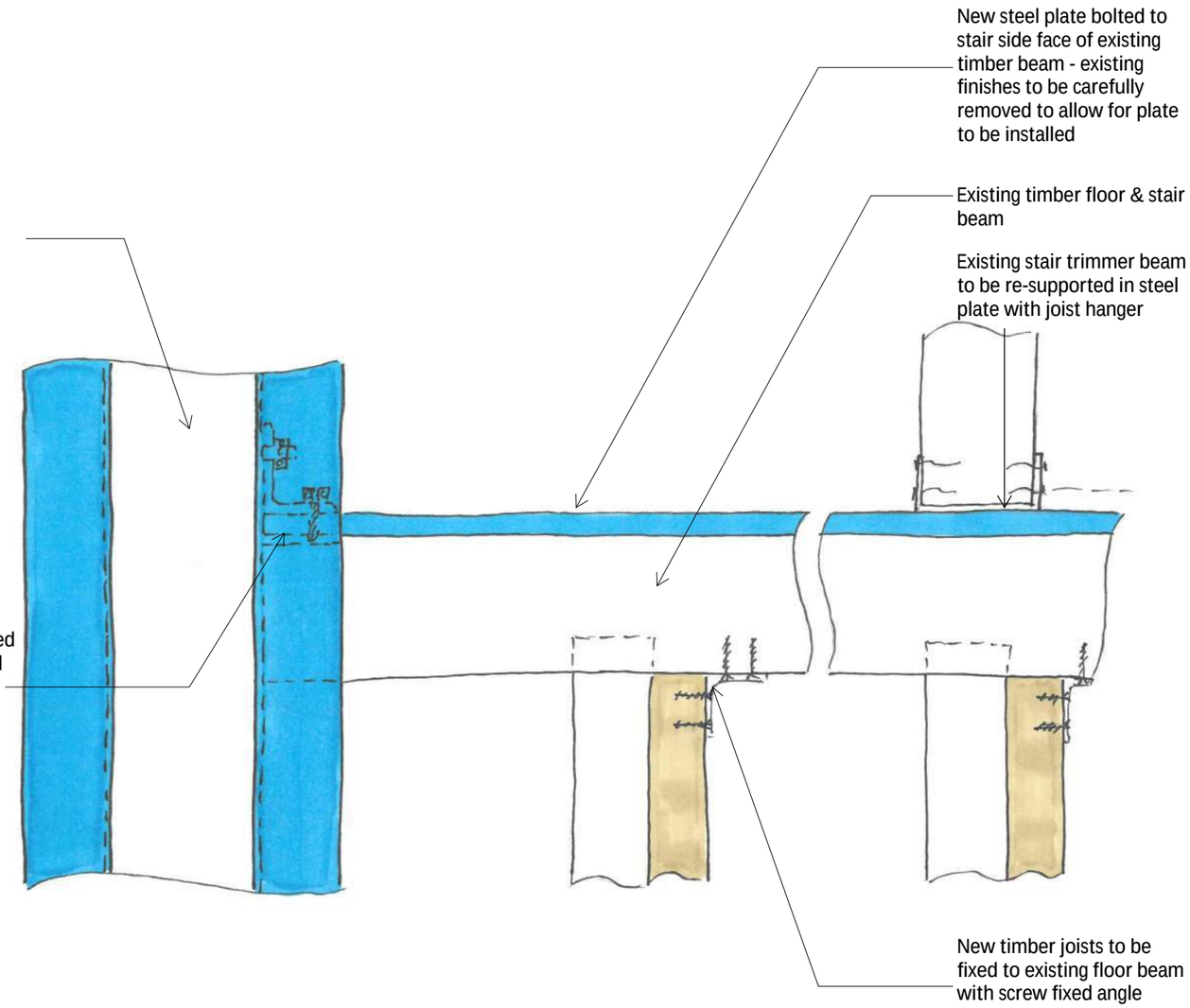

Detail 9: Plan of Rear Floor/Stair Beam To Be Strengthened, 1:10

Structural Strengthening Requirements:

- The existing timber floor beam can not be justified for the required residential loadings to current standards and requires strengthening
- The staircase shows signs of settlement due to the movement of the stair wall and the supporting beam line needs to be stabilised at each level
- The proposed solution offers the least impact to the existing floor structure as the floor joists will not require cutting back and re-supporting

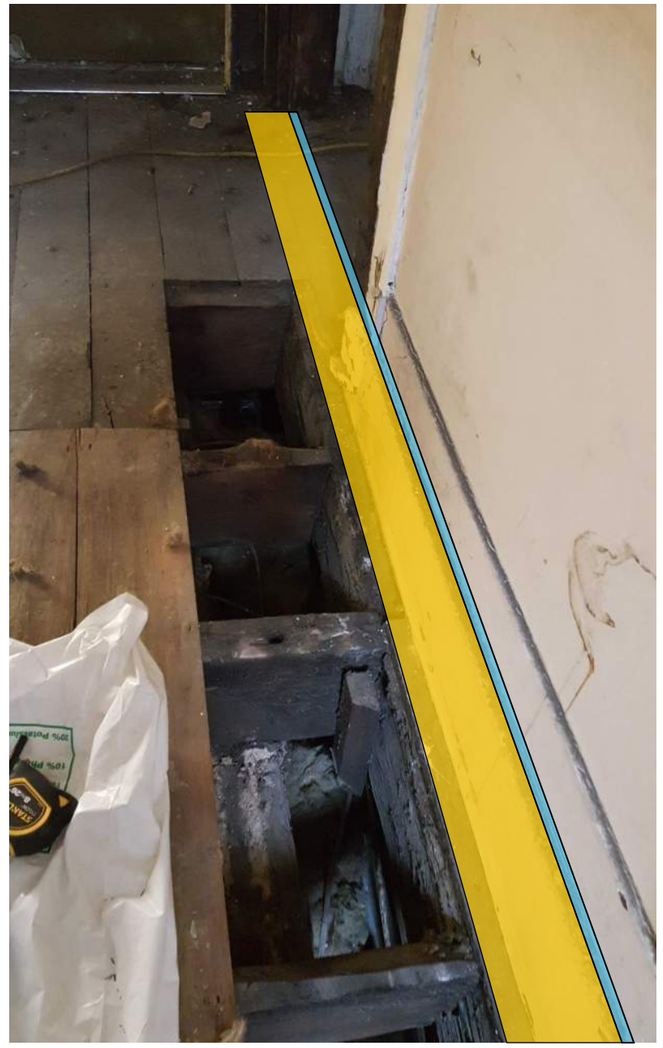

Figure 6, Rear Floor Beam To Be Strengthened
Note: Strengthening to opposite side of wall shown

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Typical Structural Repair Details

Figure 7, Typical Cracked Masonry Repair - Third Floor Party Wall Shown

Structural Repair Works:

- Cracked bricks to be replaced with bricks and mortar to match existing construction
- Helibar crack repair bars to be installed to bed joints at every 5th course to avoid future cracking
- Timber within masonry walls to be removed and bricked in to avoid future settlement or decay

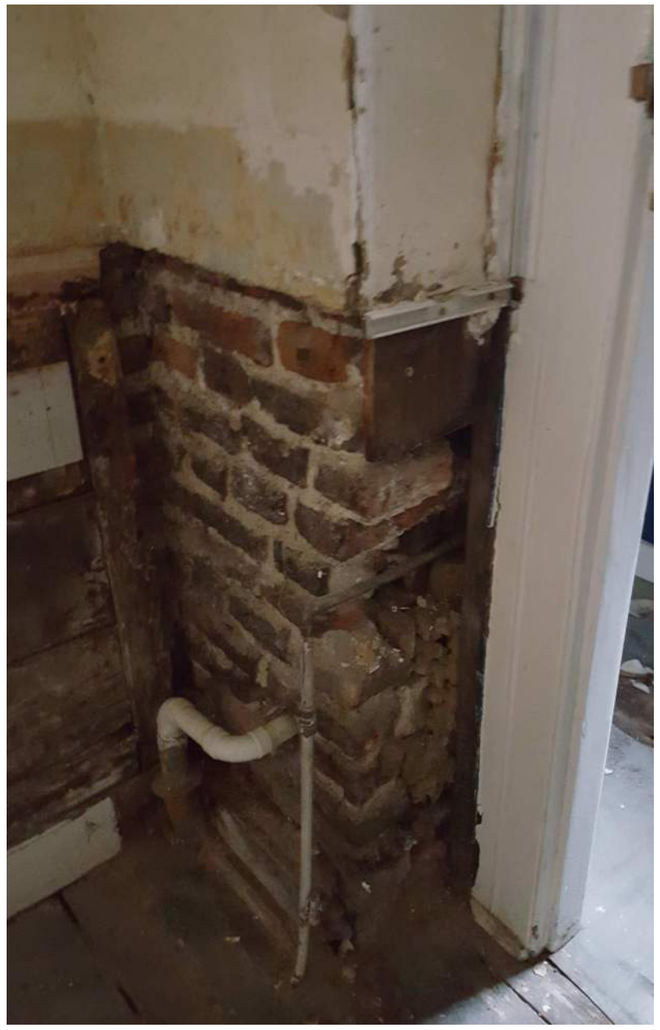

Figure 8, Typical Masonry Reveal Repair - First Floor Half Landing Shown

Structural Repair Works:

- Masonry to be made good with bricks and mortar to match existing construction

Figure 9, Typical Decayed Timber Repair - Roof Rafters & Bearing Plate Shown

Structural Repair Works:

- Decayed timber to be cut out and new timber spliced in
- Rafters to be strengthened with timbers of matching size as required

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Location of opening up required to historic finishes

Figure 10, Location Of Panelling To Be Removed - Second Floor Stair Wall

Structural Investigation Requirements:

- The existing staircase has settled significantly and we need to inspect the connection of the staircase to the stair wall and assess whether additional strengthening is required

Figure 11, Location Of Panelling To Be Removed - Second Floor Spine Wall

Structural Investigation Requirements:

- The base and head of the existing timber stud wall needs to be inspected to confirm whether any remedial works are required

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Existing Non-Structural Additions To Be Removed

Figure 12, Third Floor Non-Structural Additions

Non-Structural Items To Be Removed:

- By inspection it is apparent that almost all of the white painted timber joinery inside the plaster finish line is a decorative add-on and non-structural in nature. As such this can be removed.
- The only exception are the posts supporting each end of the roof beam high lighted above.

Figure 13, Third Floor Non-Structural Additions

Non-Structural Items To Be Removed:

- The white timber work to the ceiling has splice joints which have rotated and are not designed to be load-bearing

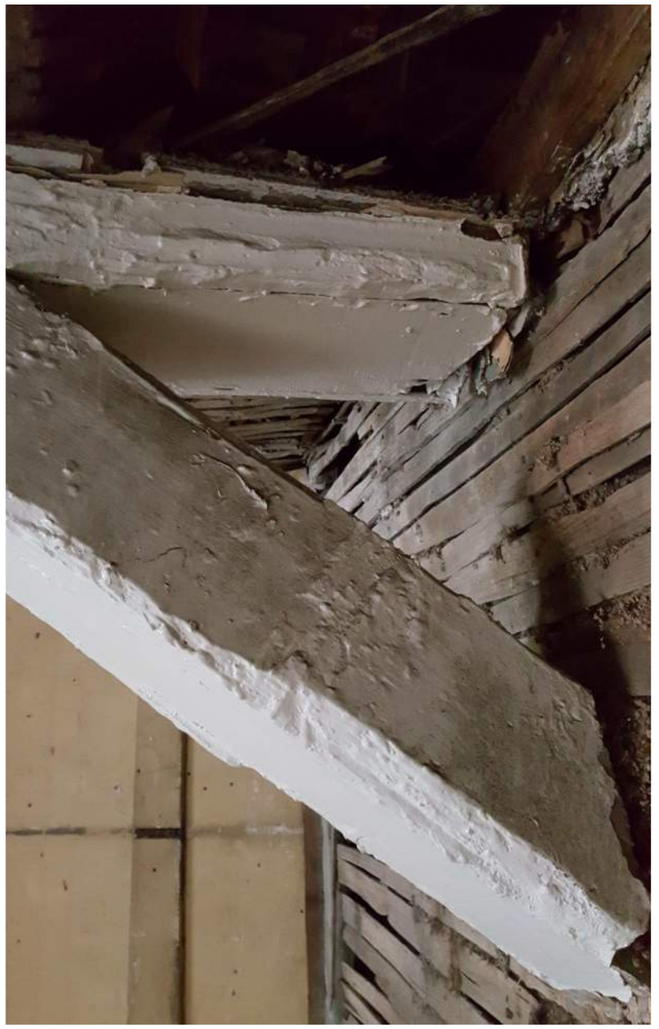

Figure 14, Third Floor Non-Structural Additions

Non-Structural Items To Be Removed:

- The apparent main white timber beam to the underside of the ceiling is formed of timber sheets and is hollow, by inspection this element is non-structural

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