

Structural Report Options for Remedial Works

**Brabins House
20 Talbot Street
Chipping
PR3 2QE**

The Brabin Trust

Project No.: 10139				
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1.0 INTRODUCTION

At the request of Mr Paul Smith of The Brabin Trust, Reid Jones Partnership Ltd carried out a structural inspection of a floor beam in the sitting room of Brabin's House, 20 Talbot Road, Chipping. The property is owned by The Brabin Trust and the current tenants, Nathan & Tracy Laffy, have recently occupied the property and reported concerns on the deflection of the timber beam.

Joanne Dooley BEng CEng MIStructE of Reid Jones Partnership visited the property on 1st August 2019 and prepared a letter report detailing findings and recommendations, which is appended to this report. It was found that one of the beams to the floor above the sitting room has failed and that repair or replacement is necessary.

Subsequent to that inspection, whilst in the process of re-decoration, the tenants exposed a timber beam in the dining room and requested a further structural inspection and advice.

On Wednesday 21st August 2019, Joanne Dooley met with Paul Smith and Chris Bell of JYM Partnership at the property. A further visual inspection was undertaken and options for remedial works were discussed.

On Friday 1st November 2019, a third visit was undertaken to open up areas of the floor and establish the form of construction and the materials used.

Subsequent to Reid Jones Partnership inspections, a measured survey of the property was undertaken. The findings of this survey have helped to inform the choice of remedial works.

This report summarises the observations made during the second and third inspections and evaluates the options for remedial or repair works to the failed timber beams.

This report shall be for the sole use of The Brabin Trust and their professional advisors and shall not be relied upon by any third party without the full written consent of Reid Jones Partnership Ltd.

2.0 DESCRIPTION

For orientation purposes, the right- and left-hand sides of the building are those viewed when standing at the front of the building and looking directly at the front wall. When in a room and looking at a wall, or when viewing an external wall from the outside of the building, reference to left and right relates to the wall as viewed. Floor plans are included in Appendix A.

The property comprises the shop and cafe at ground floor to the right hand side (when viewed from the front) together with the dwelling, known as John Brabin's House which is to the left hand side. It is of sandstone rubble construction with timber first floor and slated pitched roof. The building was constructed in 1668 and is currently a Grade II listed building.

3.0 OBSERVATIONS

The inspection was of a visual nature and no opening up of the fabric of the building was undertaken other than that already carried out by the tenants. The inspection was limited to the first floor structure above the sitting room and dining room and the areas in the bathroom and bedrooms above.

Refer to photos included in Appendix B.

Sitting Room

Refer to the letter report dated 4 August 2019 for details of the initial survey and findings. The letter is included in Appendix C.

Temporary props have been installed to support the beam in the sitting room.

A crack has appeared at the bearing of the beam onto the mullion between the windows on the rear elevation.

A diagonal crack and horizontal shakes were noted in the beam adjacent to the staircase in the sitting room.

A small area of plaster was removed adjacent to the propped beam, exposing the floor joists. A sketch of the floor construction is included in Appendix D. The floor joists are approximately 80mm deep.

The measured survey indicated that the maximum vertical deflection of the ceiling is 221mm.

Dining Room

Plasterboard encasement had been removed exposing a beam below ceiling level and adjacent to the wall next to the sitting room. The timber beam which was exposed supports the partition wall between the bedrooms above. The ceiling joists above the bedrooms span onto beams which are supported by the wall. It is likely that the direction of span of the floor joists is parallel with the beam.

The beam has a large crack and some timber wedge supports had been previously installed to prop the beam at mid-span. The wedge supports cantilever out of the adjacent wall and have rotated.

First Floor Bedrooms and Bathroom

The walls to the bedrooms have been re-plastered and the ceilings are relatively level. The floors in the bedroom and bathroom over the failed beam have been built up to re-level them. The wall over the beam in the dining room has been recently re-decorated by the current tenants.

Access was obtained into the roof space above the bathroom and it was confirmed that the partition wall does not extend above the ceiling. The ceiling joists span onto timber beams which are supported by the partition wall.

The floor boards in the bedroom over the failed beam were exposed and lifted to view the make up of the fabric. It was found to be shallow (80mm deep) timber joists with plasterboard to the underside. The timber floorboards had a lath and plaster finish to the underside between the joists. A sketch is included in Appendix D.

4.0 CONCLUSIONS

As concluded in the previous letter report, the deflection in the beam over the sitting room which supports the partition wall between the bathroom and bedroom is severe. The large vertical crack has developed and the beam is therefore ineffective.

The beam is overloaded with a combination of the load from the original partition and additional loads which have been subsequently added: the water tank, additional plasterboard on the wall and additional material to re-level the floor. The beam is undersized for the loading applied to it.

The movement is considered to be relatively recent, as unstained timber is visible at the internal faces of the crack in the beam. The gaps at the base of the wall in the bathroom also suggest that movement has occurred since the room was last refurbished. Although the beam has been propped since the original report, further cracking was noted at the bearing on the rear wall during subsequent visits, so the structure is not stable.

The second beam over the sitting room is of equally small cross section and is exhibiting horizontal shakes and a diagonal crack emanating from the bottom of the beam at midspan. This will likely deteriorate further if left unchecked.

Replacement or repair of the beams is necessary to ensure stability of the building.

The first floor ceilings are reasonably level, so can be left in place.

The beam in the dining room has failed and a repair has previously been attempted. The remedial cantilever props to the beam have rotated and although there are no signs of very recent movement, it is considered prudent to strengthen the beam or provide support to ensure the long term stability.

5.0 OPTIONS FOR REMEDIAL WORKS

Sitting Room

In identifying possible solutions, the following constraints have been taken into account:

- It is not possible to jack up and re-level the existing beam and floor without a great deal of disruption to the first floor arrangement. The ceilings to the first floor are reasonably level and are supported by the partition which sits on the beam.
- The beam is severely deformed, so replacing like for like or strengthening by means of an additional member adjacent to the beam is impractical. The distorted shape of the existing beams would be extremely difficult to replicate.
- The exposed section of beam is only 140mm deep and is currently undersized, so localised repair will not resolve the issue in the long term.
- The measured survey confirmed the severity of the vertical deflection of the first floor structure over the sitting room. It is not possible to insert new beams at the lower level as the headroom would be severely restricted and there is limited depth at the bearing over the window. Supporting the beam at its lowest level with a horizontal member would result in an impractically low ceiling and would necessitate alteration of the window configuration to provide support at the ends.

The following options were identified as being worthy of further consideration:

- 1) Replace the whole first floor structure above the sitting room. New beams would need to be increased in size and/or strengthened to ensure adequate stiffness and strength. The first floor ceilings could be left in place and the lower section of the wattle and daub partition would need to be removed to enable the floors to be re-levelled.
- 2) Insert additional beams either side of the partition above the first floor. The existing floor would be left in place and new steel beams (PFC sections) inserted either side of the partition. The new beams could stop short of the landing at first floor, if sufficient area is available for bearing on the internal wall adjacent to the doorway into the shop. Or alternatively, if the beams span onto the front wall, a step would be required on the landing. The existing joists and beam would be fixed to the new steel beams by hangers.
- 3) Insert posts to support the existing beam in the sitting room. The beam would be left in place and new posts inserted either side of the cracked section to provide support to the first floor structure.

Dining Room

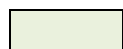
Additional support to the timber beam could be provided with minimal disruption by insertion of a new steel (or possibly timber) beam beneath the existing timber beam.

6.0 EVALUATION OF OPTIONS FOR THE SITTING ROOM

Refer to Table 6.1 which shows an assessment of the three options against various criteria.

Option \ Criteria	1. Replace Floor	2. insert New Beams	3. Insert New Post
Maintain Structural Integrity	Structurally preferred solution which also addresses issues with the second beam.	The load is transferred to the new beams and the original timber beam is structurally redundant. Issues with the second beam are not addressed.	Issues with the second beam are not addressed.
Minimise intervention	The existing floor structure is replaced. Existing floor joists could be reused where appropriate.	The existing structure is retained and strengthened. There would be some disruption to the first floor in the bedroom and bathroom and possible disturbance of the lower part of the wattle and daub partition.	Minimal intervention to the existing structure.
Minimise Disruption During the Works	Maximum disruption as the whole of the floor structure above the sitting room would be removed and replaced.	Some disturbance but the existing structure is mostly retained and new steel beams are installed.	Minimal disruption to the existing super structure. A foundation may be required depending on the floor construction.
Ease of Construction	Temporary propping of the wattle and daub partition will be required. Beams can be replaced and the floor re-levelled relatively easily.	Difficult to construct as the beams will need to be installed in short lengths with spliced connections. Support straps would need to be individually manufactured for each joist.	Easy to construct.
Relative Cost	Relatively low as using readily available materials and standard construction	Expensive as there are a number of physical constraints, working space is limited and the bespoke strapping arrangement would need to be assessed on site.	Inexpensive.
Time	Relatively quick as new beams could be installed easily.	Time consuming.	Quick to install.
Long term impact	Long term integrity is ensured with fewer maintenance issues.	The resulting headroom in the sitting room will be impractical.	The resulting arrangement will be impractical for the occupants.

Assessment of proposed option:



Good



Fair



Poor

Table 6.1 - Evaluation of Options for the Sitting Room

7.0 RECOMMENDATIONS FOR REMEDIAL WORKS

Sitting Room

Option 1 is deemed to be the most appropriate solution given the factors and constraints which have been taken into consideration. The following work is recommended:

Replace the timber beams above the sitting room, inserting new beams to replace the current timber beams. Steel beams encased in timber should be used so that the overall size of the beams is similar to the original. The first floor ceilings should be left in place and the lower section of the wattle and daub partition would need to be removed to enable the floors to be re-levelled. There is a timber rail which runs along the length of the wattle and daub wall in the bathroom at approximately 300mm above the first floor level. The wall above the rail should not be disturbed.

The existing floor joists should be assessed for reuse where possible. If they are found to be inadequate, new timber joists should be provided.

Dining Room

Additional support to the timber beam should be provided with minimal disruption by insertion of a new steel beam beneath the existing timber beam.

Refer to the proposed remedial works shown on drawing 10139-02

APPENDIX A

FLOOR PLANS

NOTES:

1. This Drawing is Design and is subject to approval by the Building Control Authority.
2. The CONTRACTOR is to ensure that all work is carried out in accordance with the Building Regulations and all relevant Building Control Authority requirements.
3. The CONTRACTOR is to ensure that all work is carried out in accordance with the Building Regulations and all relevant Building Control Authority requirements.
4. The CONTRACTOR is to ensure that all work is carried out in accordance with the Building Regulations and all relevant Building Control Authority requirements.
5. If IN COURT - ASB

Rev	Date	Revision

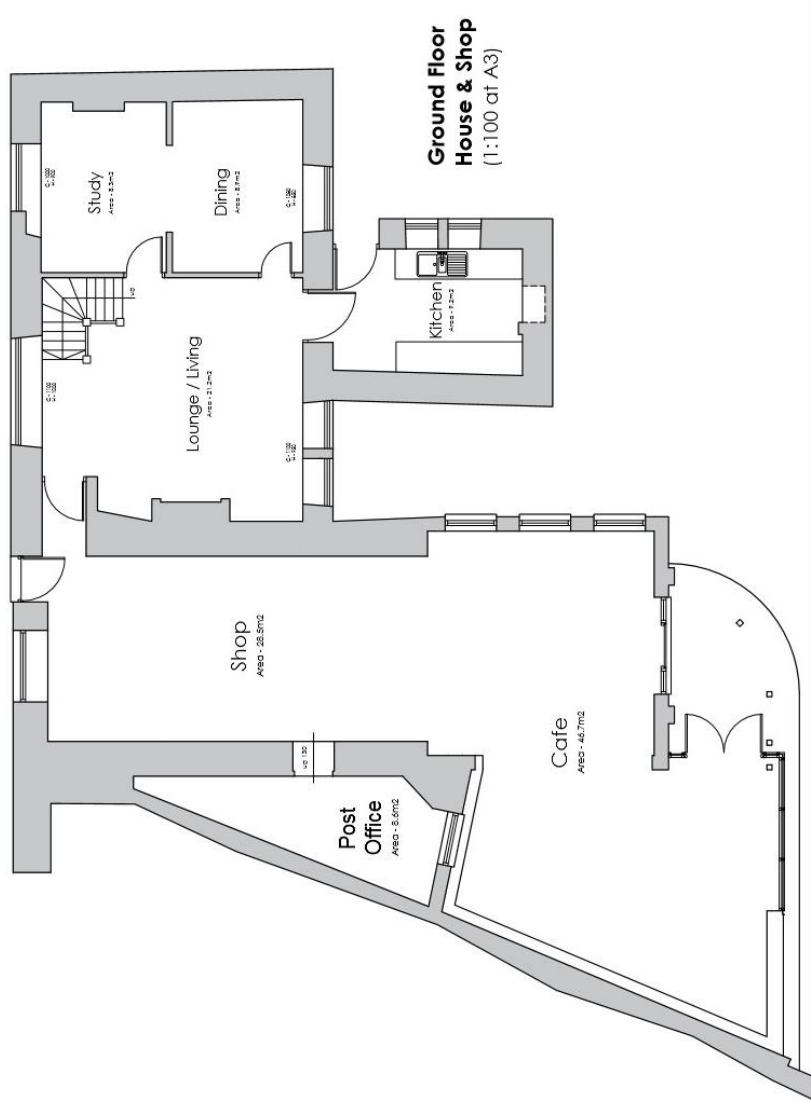
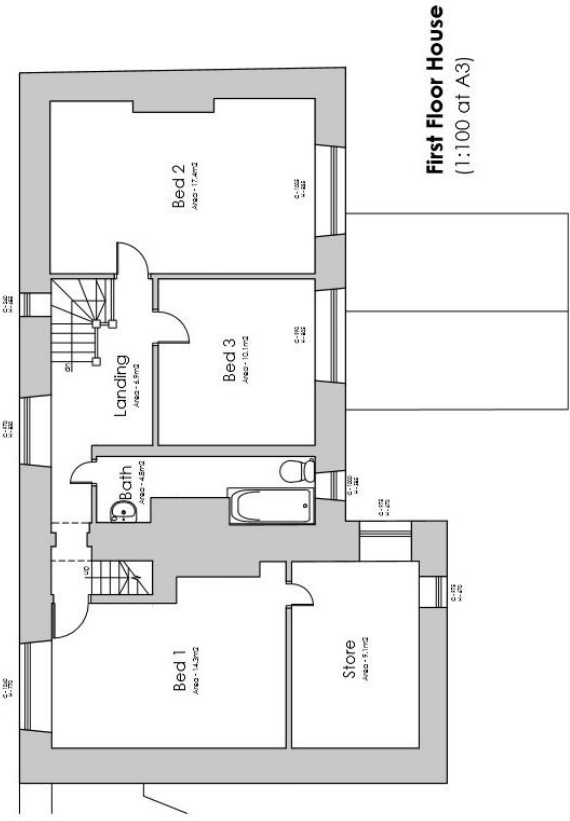
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PROJECT:
 BRAINS SHOP

CLIENT:
 BRAINS CHARITABLE TRUST

DRAWING TITLE:
 FLOOR PLAN OF BRAINS SHOP

SCALE:	1:100 at A3	DATE:	JULY 2019
DRAWN BY:	JLM	CHECKED BY:	CS
DATE:	JULY 2019	PROJECT NO.:	152
SCALE:	1:100	REV.:	01



APPENDIX B

PHOTOGRAPHS



PHOTO 1 – Temporary Propping to Sitting Room Beam



PHOTO 2- Crack at Beam Bearing



PHOTO 3 – Crack to Beam Adjacent to Staircase in Sitting Room



PHOTO 4 –Beam in Dining Room



PHOTO 5 – Wedges supporting Timber Beam in Dining Room



PHOTO 6 – Bearing onto Wall between Dining Room and Study



PHOTO 7 – Floor Boards and Joists Exposed in Bedroom 3

APPENDIX C

SURVEY REPORT

Ref. 10139/jed/01
Date. 7 August 2019

The Brabin Trust
c/o Acland Bracewell Surveyors Limited
Bradley Hall
Thornley Road
Chaigley
Clitheroe,
Lancashire
BB7 3LY

For the attention of Mr Paul Smith

Dear Mr Smith

BRABIN'S SHOP AND HOUSE, 20 TALBOT STREET, CHIPPING PR3 2QE – STRUCTURAL SURVEY

You requested that Reid Jones Partnership Ltd. carry out a structural inspection of a floor beam in the sitting room of the above property. The property is owned by The Brabin Trust and the current tenants, Nathan & Tracy Laffy, have recently occupied the property and reported concerns on the deflection of the timber beam.

The property comprises the shop and cafe at ground floor to the right hand side (when viewed from the front) together with the dwelling, known as John Brabin's House is to the left hand side. It is of sandstone rubble construction with timber first floor and slated pitched roof. The building was constructed in 1668 and is currently a Grade II listed building.

Observations

I visited the property on Thursday 1 August and can report as follows:

The inspection was of a visual nature and no opening up of the fabric of the building was undertaken. The inspection was limited to the first floor structure above the sitting room and the areas in the bathroom and bedroom above.

There are two timber beams which span approximately 4m over the sitting room supporting the first floor above. The beam to the right hand side is extremely distorted and the ceiling has a significant bow in particular towards the rear of the property. It is approximately 100mm wide x 140mm deep. There is a vertical crack in the timber beam at the point of maximum deflection. The crack is almost through the full depth of the beam. The beam has been previously stained but the internal faces of the crack are not coloured.

Directly above the beam is a partition which separates the bathroom and bedroom. The partition is of timber frame with wattle and daub construction, which is visible in feature cut-away panels in the bathroom wall. There is a gap at the base of the wall in the area of the maximum deflection of the beam.

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In the adjacent bedroom, the wall is of smooth plastered finish, which is most likely a modern addition. There is a water tank in a cupboard in the corner with the rear wall directly over the crack in the beam. Diagonal cracks were visible in the wall within the cupboard.

The first floor above the timber beam has a significant fall from the front of the property towards the rear. The fall is approximately 145mm over the length of a 1200mm spirit level. The floor in the bedroom is reasonably level, there being a deflection of approximately 25mm over the length of the spirit level. There is a similar fall evident in the bathroom floor. It is most likely that additional timber has been added to re-level the floors. It is not known when internal refurbishment was last undertaken.

Doors to the bedroom and bathroom were square and closed effectively.

Access was not gained into the roof space.

Photographs are attached for record purposes.

Conclusions and Recommendations

The deflection in the beam is severe. The large vertical crack has developed and the beam is therefore ineffective.

The beam is overloaded with a combination of the load from the original partition and additional loads which have been subsequently added: the water tank, additional plasterboard on the wall and additional material to re-level the floor.

The movement is considered to be relatively recent, as unstained timber is visible at the internal faces of the crack in the beam. The gaps at the base of the wall in the bathroom also suggest that movement has occurred since the room was last refurbished.

It is recommended that the beam is repaired or replaced. Consideration needs to be given to the extent of works undertaken so that the remediation is carried out in a sympathetic manner.

In the short term it is recommended that temporary props are installed at either side of the crack to stabilise the beam.

I trust this brief report meets your needs, but if you require any further information or advice, please do not hesitate to get in touch.

Yours sincerely,
For and on behalf of
Reid Jones Partnership Ltd



J Dooley BEng CEng MStructE
Associate Director



Photo 1 - View of Sitting Room Ceiling Towards Rear



Photo 2 - View of Deflected Beam



Photo 3 - View of Crack in Right Hand Beam



Photo 1 - View of Crack in Beam from Below



Photo 2 - Feature Panel in Bathroom Wall



Photo 3 - View of Gap at Base of Bathroom Wall



Photo 4 - View of Cracks in Partition Wall in Cupboard in Bedroom



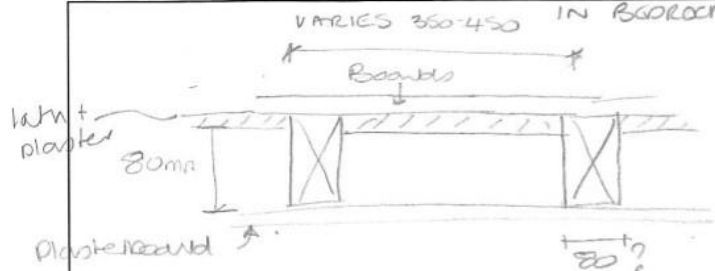
Photo 5 - Fall in First Floor at Front of Property

APPENDIX D

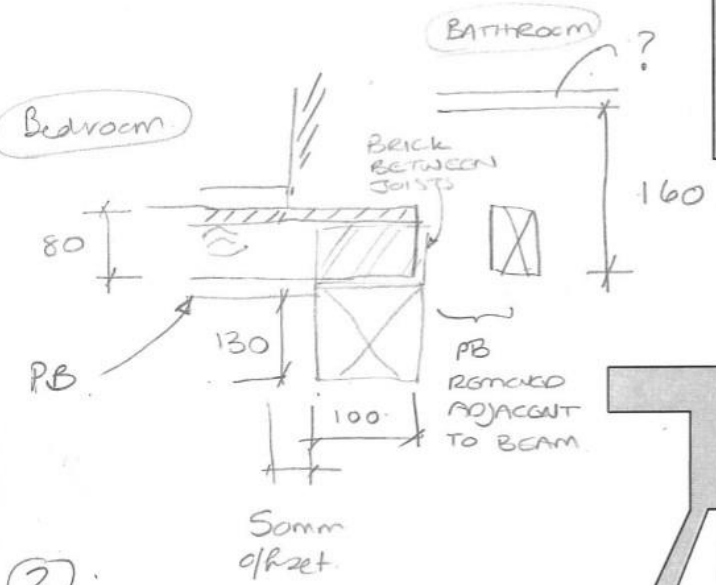
SKETCHES

ROOFED REMOVED

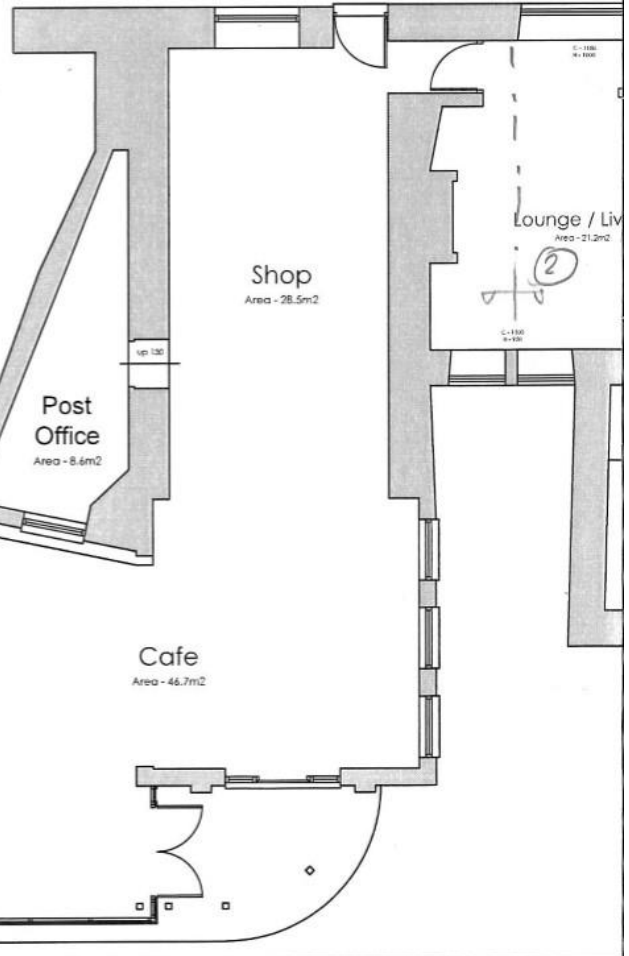
VARIES 350-450 IN BEDROOM.



① SECTION THRO' FLOOR JOISTS.



② SECTION THRO' BEAM - PART REMOVAL OF PLASTER BOARD FROM LOUNGE CEILING



10139
 RJP.
 01/11/2019.
 OPENING UP WORKS
 BRABINS HOUSE.