3500 MBB

WENTWORTH CASTLE, STAINBOROUGH, BARNSLEY: PROPOSED REPAIR OF STRUCTURE AND CEILING AT EAST END OF SOUTH ('PALLADIAN') WING

LISTED BUILDING STATEMENT



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1.0 Context

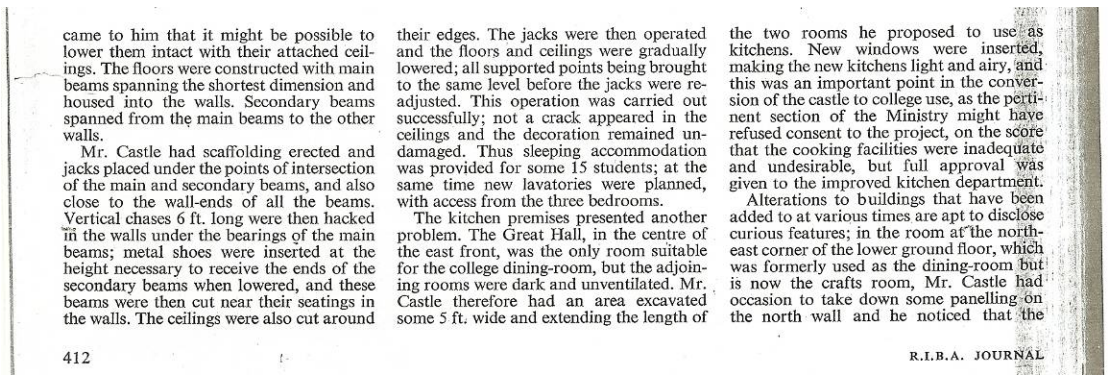
1.1 The south range of Wentworth Castle was built between 1759 – 64 to the designs of William Wentworth: second Earl Strafford with the assistance of John Platt: master mason and Charles Ross: superintendent of the works.



1 *The south façade – before restoration in 2004*

1.2 Internally the wing was organised with ground floor rooms of modest height with a piano nobile at first floor. The rooms in the centre and at the east end of this storey had lofted ceilings and the floor to ceiling height was about 5.4m. The second (attic) floor above these rooms was restricted in height and lit by windows which straddled the floor level.

1.3 In 1950 when Barnsley Corporation acquired the building it was in poor condition. The building was repaired and converted to be used as a teacher training college. The ceilings of the four first floor rooms at the east of the south range were lowered by approximately 1450mm to give better headroom at second floor level and to put the second floor windows into a better relationship with the floor.



came to him that it might be possible to lower them intact with their attached ceilings. The floors were constructed with main beams spanning the shortest dimension and housed into the walls. Secondary beams spanned from the main beams to the other walls.

Mr. Castle had scaffolding erected and jacks placed under the points of intersection of the main and secondary beams, and also close to the wall-ends of all the beams. Vertical chases 6 ft. long were then hacked in the walls under the bearings of the main beams; metal shoes were inserted at the height necessary to receive the ends of the secondary beams when lowered, and these beams were then cut near their seatings in the walls. The ceilings were also cut around their edges. The jacks were then operated and the floors and ceilings were gradually lowered; all supported points being brought to the same level before the jacks were re-adjusted. This operation was carried out successfully; not a crack appeared in the ceilings and the decoration remained undamaged. Thus sleeping accommodation was provided for some 15 students; at the same time new lavatories were planned, with access from the three bedrooms.

The kitchen premises presented another problem. The Great Hall, in the centre of the east front, was the only room suitable for the college dining-room, but the adjoining rooms were dark and unventilated. Mr. Castle therefore had an area excavated some 5 ft. wide and extending the length of the two rooms he proposed to use as kitchens. New windows were inserted, making the new kitchens light and airy, and this was an important point in the conversion of the castle to college use, as the pertinent section of the Ministry might have refused consent to the project, on the score that the cooking facilities were inadequate and undesirable, but full approval was given to the improved kitchen department.

Alterations to buildings that have been added to at various times are apt to disclose curious features; in the room at the north-east corner of the lower ground floor, which was formerly used as the dining-room but is now the crafts room, Mr. Castle had occasion to take down some panelling on the north wall and he noticed that the

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2 *Extract from RIBA Journal Sept 1950*

2.0 The Defect

2.1 In 2006 extensive restoration work was carried out with Lottery funding. At this time the roof of the south range was re-covered and infestation of the roof timbers at the east end of the range by death-watch beetle was eradicated. During the course of these works a prop was accidentally allowed to slip causing shock to the structure below.

2.2 A few months later cracks appeared in the plasterwork of the first floor ceiling of the easternmost room known as the Michael Barratt Brown Room.

2.3 At the time it was thought that load from the newly covered roof was being transferred through the modern partitions to the first floor structure causing it distress. A repair was made to the plaster and a movement joint was cut at the head of the second floor partitions. Lateral restraint members were provided at the head of the partitions. This repair appeared to have been successful.

2.4 In spring 2011 the crack re-appeared in the ceiling. This was monitored and, over the course of a couple of months it became clear that there was active movement in the second floor structure. The floor was moving at a perceptible rate particularly at the east end of the room and it was clear that this movement had caused the plaster to become detached from the structure.

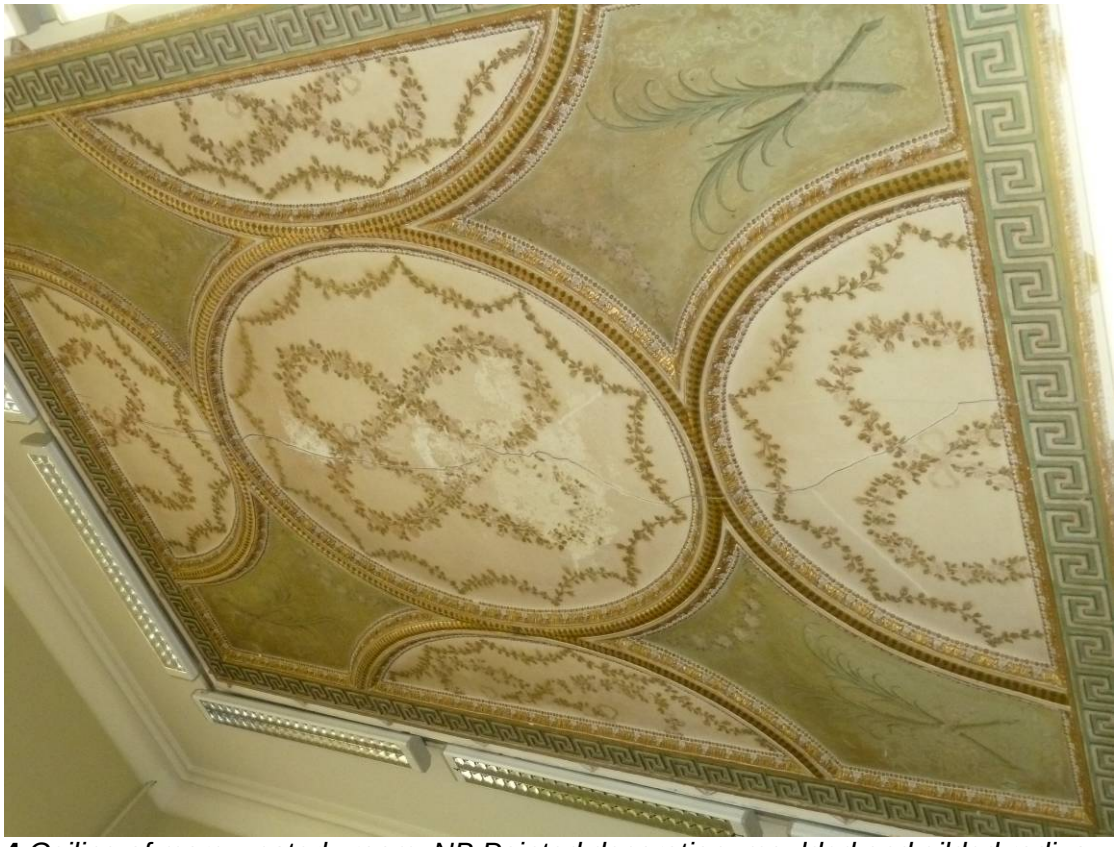


3 *Second floor structure settling below the second floor partitions pulling screw fixing of partition sole plate away June 2011*

3.0 Investigation

3.1 In July 2011, following discussion with Barnsley MBC and with English Heritage, a scaffold was erected in the Michael Barratt Brown Room to arrest the plaster should it fall and to enable a close inspection of its condition. Opening-up work was undertaken at second floor level to enable an inspection of the structural members.

3.2 It was noted that the other ceilings that were lowered in 1950 in the rooms immediately to the west of the MBB Room have decorative plaster work of a different, more elaborate style. The ceilings of these other rooms also have painted decoration.



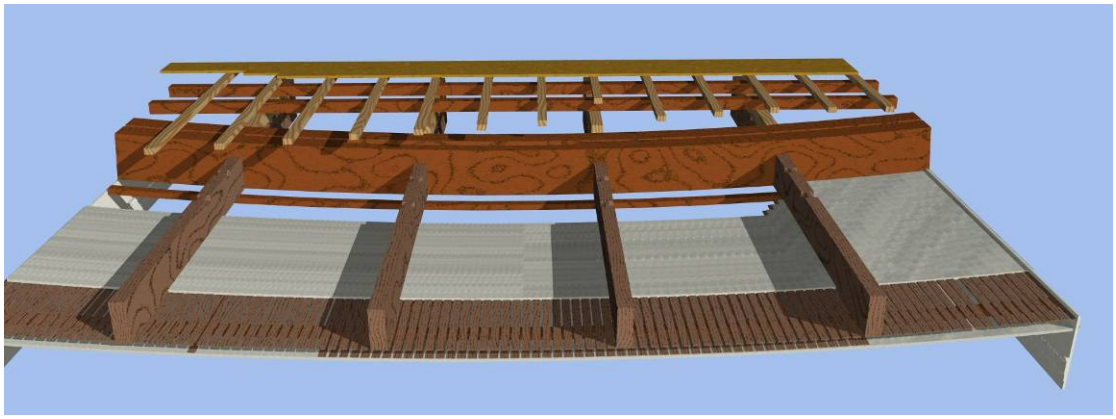
4 *Ceiling of more westerly room: NB Painted decoration, moulded and gilded radius work within decorated key pattern border. There is a cornice at the wall to ceiling junction.*

3.3 Partitions were removed at second floor level and floor boards were removed.

3.4 **Structure**

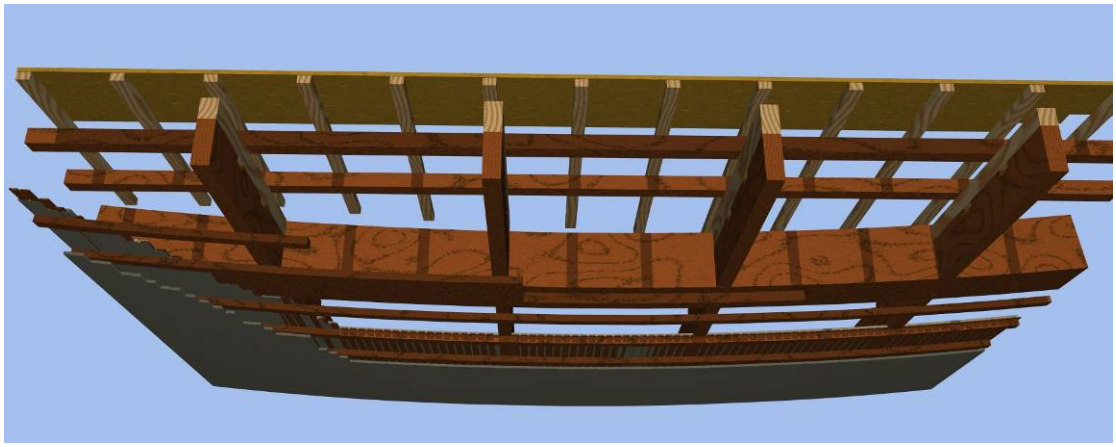
The structure of the floor is as follows and as shown on the following drawings. Two large oak principal beams span from north to south. These beams approximately 400mm square support oak secondary beams approximately 275mm x 100mm at approximately 1500mm centres. The secondary beams are morticed into the principal beams. The secondary beams support light ceiling joists approximately 100mm square at approximately 450mm centres. All these members are oak and appear to be original. The floor joists bear on the secondary beams. It is apparent that

work was done in 1950 to level the floor. This was necessary since the original structure shows considerable deflection – as much as 175mm.



5 *Model of the floor structure from above*

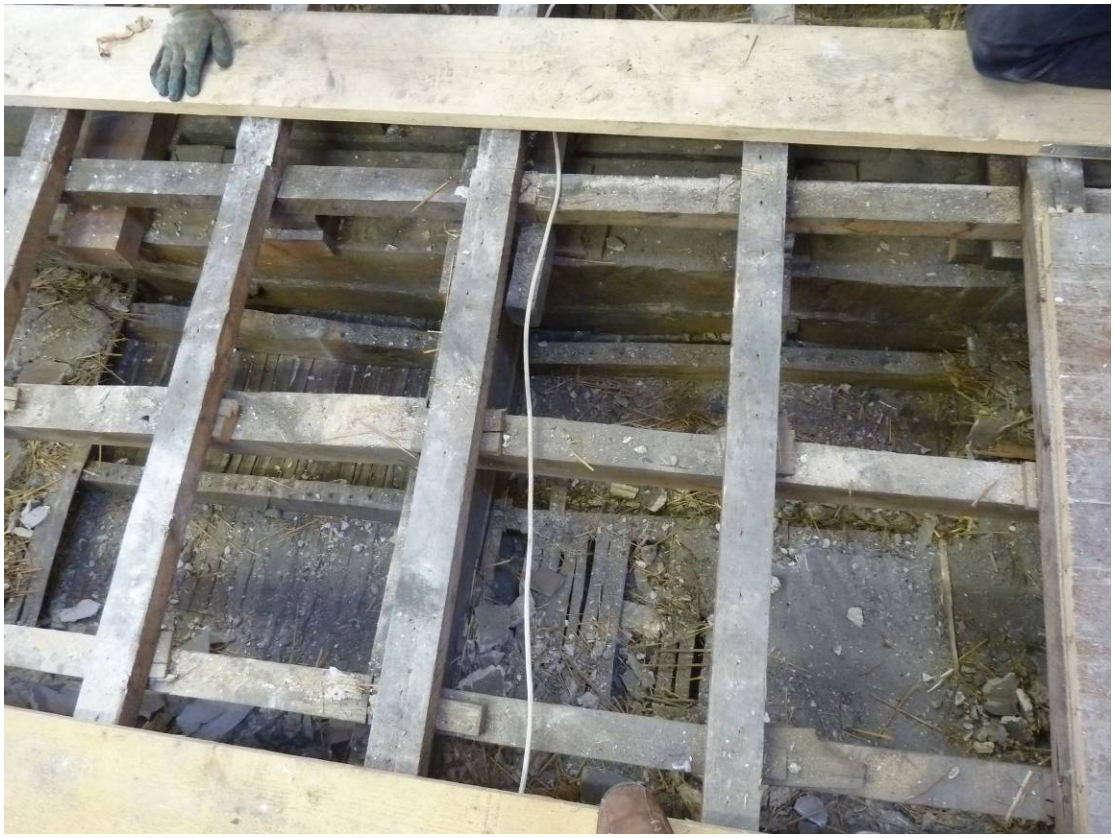
Modern softwood firring pieces have been provided on top of the secondary beams. The floor joists bear on these and have been wedged level. It would appear that some of the joists are original whilst others are modern softwood. The secondary beams are notched and it appears that these mortices originally received the ends of the floor joists. It would appear that the original floorboards finished flush with the top surface of the principal beams as would have been normal practice in the mid-eighteenth century.



6 *Model of the floor structure from below*

An additional tier of structure has been added, seemingly in the 1950 restoration. 75mm wide x 50mm deep softwood joists span east west and support a floor of narrow north American hardwood boards.

A layer of pugging is present on top of the ceiling joists. It is formed from riven oak laths covered with a layer of lime mortar reinforced with straw. The ceiling in the central portion of the room is of lime plaster on riven oak laths. The ceiling at the margins – between the key-pattern band and the walls – is of plasterboard.



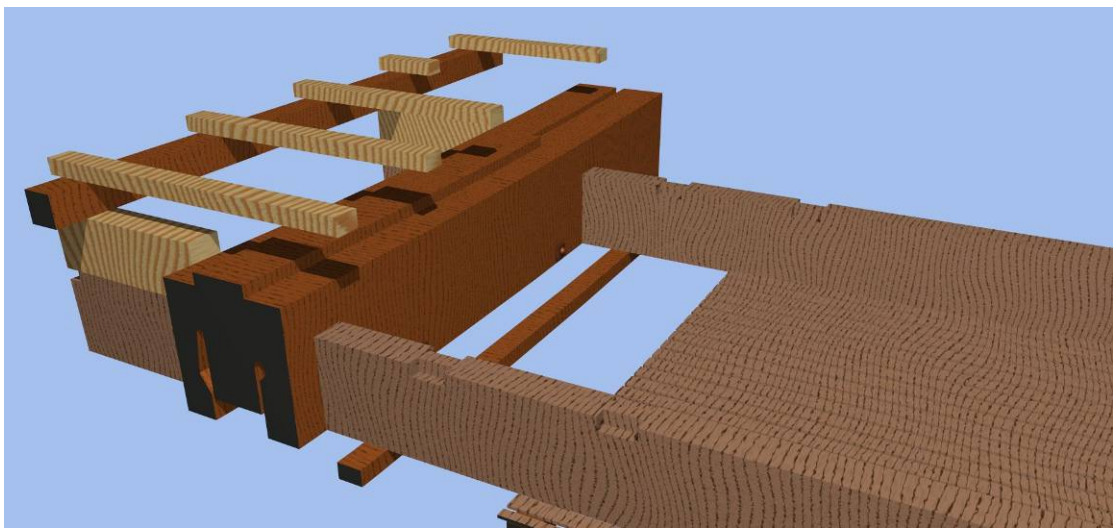
7 *Photograph of the structure from above. The lime mortar and straw pugging has been partly removed to expose the lath and plaster. The re-used riven or rough-hewn floor joists are apparent at the bottom of the photograph. The one beneath the joiner's knee is modern sawn softwood. The repair to the principal beam is apparent (see below)*



8 *Mortice in secondary beam – former housing of floor joist – and modern levelling member.*

3.5 **Historic Repair**

The eastern principal beam has been repaired in the past. The date of the repair is not known but it would seem to precede the twentieth century.



9 *Model of historic repair*

The central portion of the beam has been hollowed out over a length of about 1.5 – 2m. Presumably to remove material effected by fungal or insect attack. An oak member has been inserted into the centre of the older beam to resist compression in the top part of the beam. The central flitched portion is held in place with wedges and with bolts towards the bottom edge of the beam.

These bolts have square heads and appear to be hand-wrought, suggesting that the repair might have been made before the second half of the nineteenth century.



***10** (Failed) wedge at south end of historic repair*

3.6 **Conjectured chronology of alterations.**

It is now known from the physical evidence that the eastern principal beam was repaired probably more than 100 years ago. It would appear that the beam was hollowed out from below. This would suggest that the first floor ceiling was removed at that time and subsequently made good. This would explain the difference in quality of the plaster-work and the absence of painted decoration.

It is known from documentary evidence that the floor structure was lowered by approximately 1475mm in 1950. It is now apparent that more extensive alterations were made at that time than the article cited above would suggest. There is a border of modern plasterboard approximately 1500mm wide around the ceiling which would seem to date from the time of these alterations. There is no cornice at the wall to ceiling junction. The two adjacent rooms the ceilings of which were also lowered in 1950, have cornices. It would be impossible to lower the floor in the manner described in the RIBA Journal article without first removing any pre-existing cornices. It would appear, therefore, that the cornices in the adjacent rooms date from 1950. The decorative plasterwork frieze in the MBB Room, although clogged with paint is of a delicate rococo style and is probably original. It is thought probable that the original ceiling was as shown below.



11*Conjectured original construction.*

The central panel, enclosed by an enriched band decorated and probably painted in a similar manner to the ceiling shown on photo 4. A large radiused cove or vault extending towards the frieze. At second floor level there was probably a stud partition on the line of the principal beam – evidenced by the slot mortice that is present in the top of both beams.

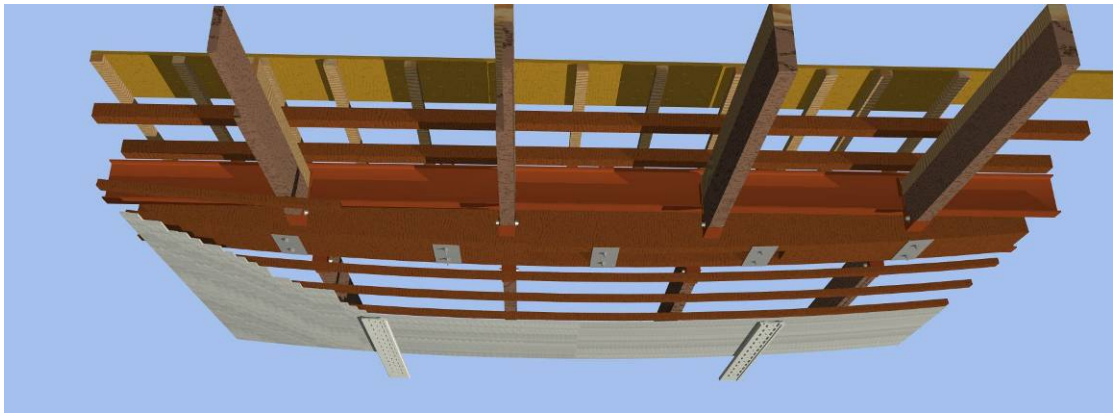
The central decorative plaster was probably lost when the beam was repaired and made good with less expensive work. The 'cornice' was probably lost in 1950 when the ceiling was lowered. The frieze remains intact.

3.7 **Present Failure**
The wedges holding the repaired member have failed (Photo 10) there is a fresh and continuous crack through the western half of the original beam approximately centrally in the repaired section and the tenon of one of the secondary beams has sheared at its junction with the main beam. It is necessary to support the beam.

4.0 Proposed repair

4.1 Pre-application consultations have taken place with the LPA and with English Heritage during the investigation stage. The principles of the proposed repair as described below have been agreed.

4.2 **Structure** The existing, defective beam will be left in-situ. It has been decided that this approach is in accordance with best conservation practice. The cost of removing the member would, in any case, have been prohibitive. A pair of parallel I section steel beams will be provided one either side of the existing beam. It will be necessary to cut back the secondary beams and remove some floor and ceiling joists to make space. Small bridging members will be provided between these beams and the defective oak beam will be hung from these. 15mm dia stainless steel rods will be inserted through holes drilled in the timber and plates provided under the beam. The existing secondary beams will be supported from the new steel beams. The connection will be formed with new steel shoes.

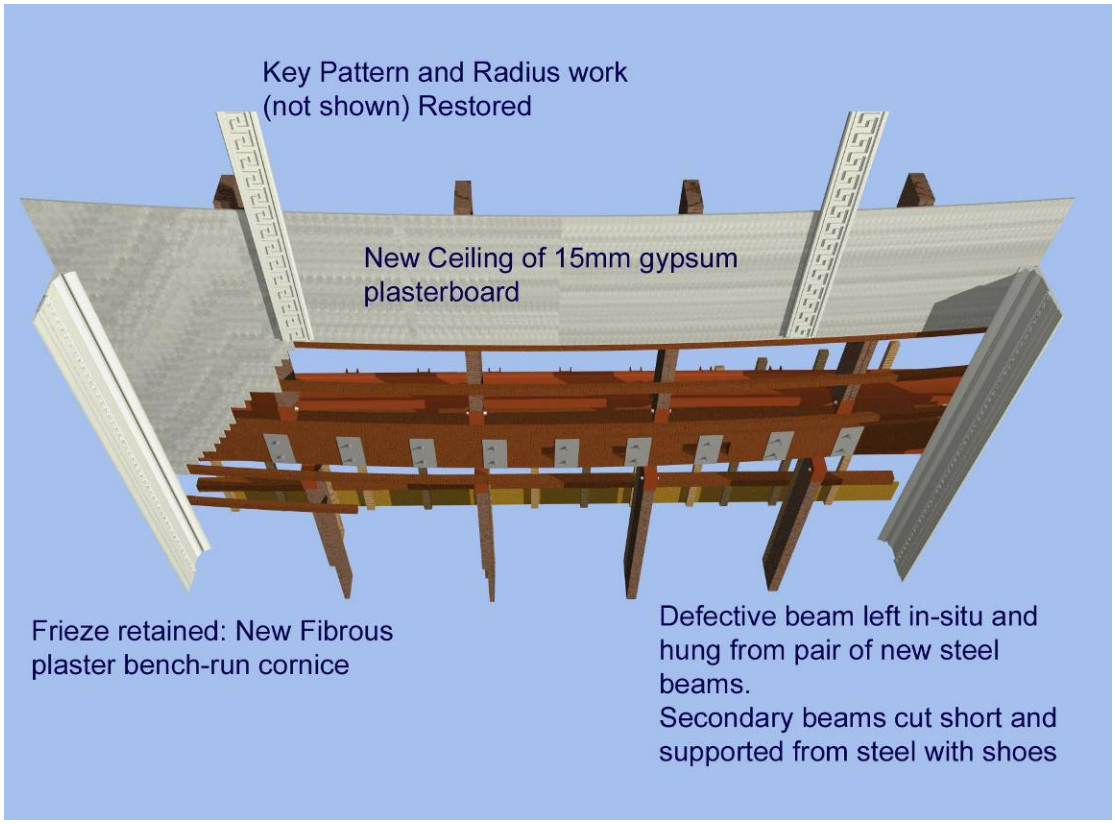


***12** Model of proposed structural repair from below*



***13** Model of proposed structural repair from above.*

4.3 **Ceiling finish** Sections of the existing decorative sections have been taken down and moulds will be taken after the paint finishes have been stripped. The existing ceiling will be removed completely. The pugging layer will be removed over most of the area to enable a thorough inspection of the remaining structural timbers. It will not be replaced. An area of pugging will be left insitu to the west of the junction between the western secondary and the western principle beams to evidence the original construction. The ceiling will be replaced with 15mm gypsum plasterboard and skim The embellishment will be replicated and adhesive fixed. The key pattern band will be bench cast to the mould in modern casting plaster. The radius work will be run on the bench in casting plaster in sections. A small new cornice of a pattern to be agreed will be provided at the wall to ceiling junction. This will be fixed as near as possible parallel to the frieze to reconcile the distorted geometry of the room caused by the structural movement.


Key Pattern and Radius work
(not shown) Restored
New Ceiling of 15mm gypsum
plasterboard
Frieze retained: New Fibrous
plaster bench-run cornice
Defective beam left in-situ and
hung from pair of new steel
beams.
Secondary beams cut short and
supported from steel with shoes