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Beckenham Public Hall Refurbishment

STRUCTURAL FEASIBILITY STUDY

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APPENDICES

1. INTRODUCTION

1. Bisset Adams Architecture & Design have been invited by the London Borough of Bromley to undertake a feasibility study to refurbish the Beckenham Public Hall building and have subsequently engaged BWB Consulting to assist with this feasibility study. This section of the feasibility study addresses the structure of the existing building, its condition and its suitability to support the loadings likely to be applied as a result of the proposed uses.

2. The building is believed to be a load-bearing masonry structure with timber floors at ground and first floor level with a small area at second floor. There is a basement throughout the entire footprint.

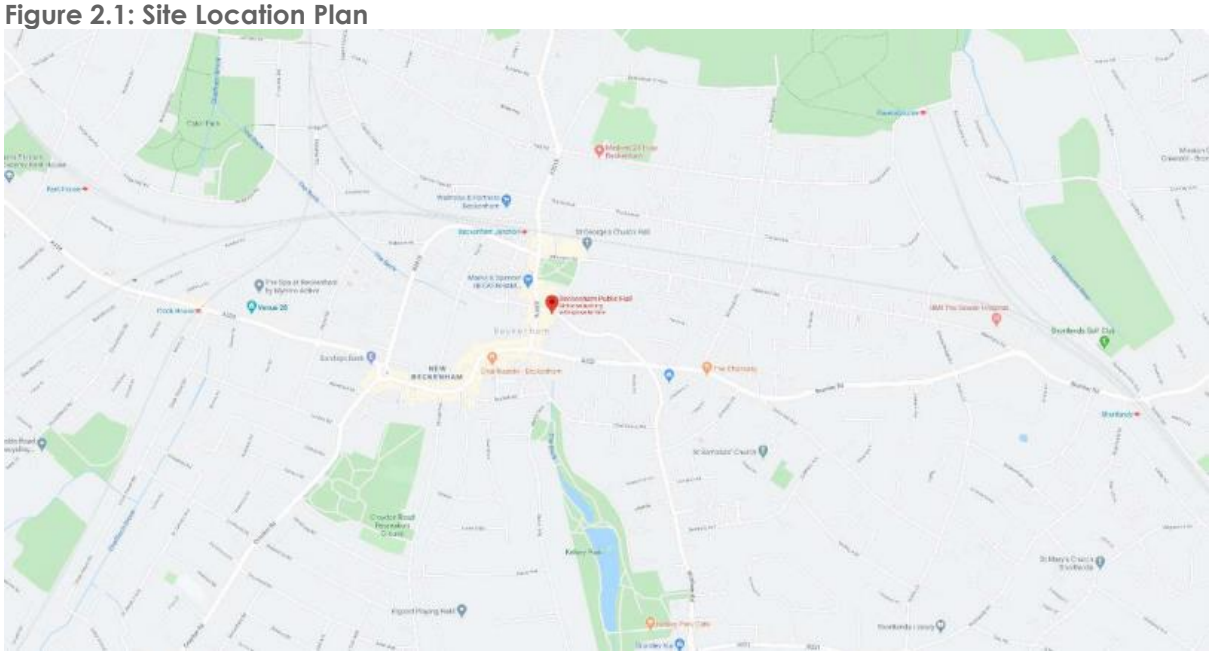
3. The building is believed to be Grade II listed and thus any intrusive surveys would be subject to approval by English Heritage, as a result non-intrusive surveys have been carried out utilising Radar and other scanning techniques to determine the make-up of any elements not open to visual inspection. This work was carried out by Bi-Tas (Birmingham Testing and Scanning)on the 21 and 22 May 2020 and the report was issued on the 27 May 2020. See APPENDIX I for the report.

2. THE SITE

Site Location

2.1 The site is located at 4 Bromley Road, Beckenham. The location of the site is shown in **Figure 2.1.** A more detailed Site/Location plan is included for reference in Appendix 1

Figure 2.1: Site Location Plan



Site Description

2.2 The mainly 2 storey building is of traditional solid brick and stone masonry construction with timber floors under a multi-pitched clay tiled roof. There are several additions to the rear and side of building of brick construction under slated roofs

2.3 There is a basement beneath the entire footprint of the building and from visual inspection the basement walls are in load-bearing masonry. From within the basement it is possible to see most of the underside of the floor.

2.4 The external faces of the building are in masonry which appears to be in good condition.

3. NON-DESTRUCTIVE SURVEY

3.1 Refer to Bi-Tas Report in **Appendix I**

3.2 GPR scans of the wall reveals no hidden steelwork and thus indicates that the structure is load-bearing masony.

3.3 The measured survey revealed that the perimeter walls are a minimum of 400mm thick with thickenings up to 650mm.

3.4 Visual inspection of the ground floor structure revealed that it is in timber with timber floor boards. The timber joists are at 360mm centres and and are 260mm deep. The timber floor boards were found by scanning to be 30mm deep.

3.5 An area of floor, beneath the existing kitchen at ground floor comprises of corrugated steel with a 150mm thick concrete creating a version of composite floor. This was often a means of creating floors to areas such as kitchens to provide a form of waterproofing.

3.6 Scans revealed that the first floor comprises of timber joists at 360mm centres together with 30mm thick timber floorboards, reflecting the make-up of the ground floor.

3.7 Where doors have been knocked through internal load bearing walls any beams or lintels installed to facilitate this could not be scanned as they were hidden within boarding and due to the air gap created between the boading and the structure it rendered impossible to use GPR.

3.8 The areas around the existing lift shaft could not be scanned due to being hidden within boarding, rendering GPR ineffective.

4. REFURBISHMENT PROPOSALS

4.1 The proposal is to refurbish the building and change to use of the building to that of a public library, retaining the club demise in some form to be agreed.

4.2 The Architects initial proposals discuss 4 options, all to include new library space, retention of the community hall space or a proportion of it.

4.3 The new use will be required to comply with current regulations and standards which are for structure:

4.4 EC1 1991-1-1 Actions on Structures

4.5 SCI P-076/AD256-Design consideration for the vibration of floors

4.6 SCI P356 Vibration in floors

4.7 The above codes and guidance documents lay down minimum requirements for imposed loadings and response factor R_f. The response factor determines the stiffness of the floor required to make vibrations imperceptible to the users. In situations where people are sitting at a desk looking at a monitor, as would be the case in a library, the R_f should be below 4. The standard imposed loadings for libraries is 4kN/m^2 which allows for book storage.

4.8 BWB have carried out initial feasibility design calculations to check the strength of the floors and their ability to support the new imposed loads. These calculations found that the capacity of the floors is below 4kN/m^2 and is only 3.6kN/m^2 thus unless the floor is strengthened it will not meet the EC1 loading requirement for libraries.

4.9 BWB have not yet carried out checks for vibration in accordance with SCI P-076/AD256, but based upon previous experience this timber floor is not likely to comply. This document is not a regulatory code and is only advisory, however it would be unwise to create a library that has issues with vibration of computer monitors etc.

4.10 Part of the proposed refurbishment is to replace the existing lift with a new larger, DDA compliant one. This will require demolition of the existing lift shaft and installing new structure to support any elements of the floor and roof that enjoy support from the existing lift shaft structure. This work will consist of a steel frame wrapping around the new lift shaft punching through the ground floor and to sit on new foundations in the basement. In order to progress this an intrusive survey will be required of the existing lift shaft to confirm structural configuration and member sizes, enabling a scheme to be produced for structural support.

5. DISCUSSION & RECOMMENDATIONS

5.1 The loading capacity of the floors is below that required in the code of practice, however not by a great deal (3.6kN/m^2 as opposed to 4kN/m^2). It is possible that minor strengthening would enable this loading capacity to be achieved. One way of doing this would be to apply a plywood covering over the floor and screw it to the timber joists. This would have the effect of creating a composite section, utilising the joist, timber flooring and plywood. More stiffness could be obtained by additionally applying plywood to the underside of the joists.

5.2 3.6kN/m^2 is greater than that specified in BCO recommendations for office loading therefore as the arrangement in the library elements of the building is more akin to office space with no levels of high bookcases it could be argued that this loading capacity is adequate, although this would mean that the building management must aware so that the floors are not overloaded in any future rearrangement of the space,

5.3 Control of vibration could potentially present a more complex issue to overcome. To advise the next stage we propose that BWB carry out calculations to confirm the natural frequency and response factor. Knowing this we can carry out a sensitivity analysis to determine how likely it is that vibrations will be perceptible. This is not an exact science as some people are more sensitive than others and so it will give the ranges for likely through to low risk, of being perceptible.

5.4 To develop a design for the lift shaft, an intrusive survey will be required to confirm structural configuration and existing member sizes, then a structural solution can be developed for providing support to the surrounding floors and roof.

5.5 These conclusions are based upon non-destructive surveying, which requires validation by breaking out and sampling materials, check measurements on unseen elements and boroscope investigations in the voids behind boarded out elements, such as the beams and lift shaft. This should be carried out in the next stage of work.

APPENDICES

APPENDIX 1: Bi-Tas Survey Report