

Structural Assessment
Of
Proposed Alterations to Facilitate a Change of Use
At
Newbold Barn
Duntisbourne Abbots
Gloucestershire

2324/SA

LPS

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Introduction

This document outlines the structural works considered necessary to be included within the proposed alterations to Newbold Barn, Duntisbourne Abbots, to maintain the integrity and stability of the existing building elements, as part of the proposal to change to residential use.

Proposed Alterations

The structural alterations required to facilitate the proposed conversion are indicated on the Architectural drawings being submitted, as follows:

- Formation of two new ground floor openings in the existing North-West Elevation, of maximum width 1800mm.
- Formation of a new slit window at eaves level in the North-East Gable Elevation.
- Introduction of rooflight windows within the existing pitched roof.
- Construction of a single storey "Link" structure adjacent to the North-West Elevation.

The proposals do not require new floor or roof structures to be inserted within the existing structure. There does not appear to be any requirement to excavate internally within the building or disturb the main loadbearing elements, other than the limited interventions listed above.

Inspection of the Existing Structure

The building is a substantial, Cotswold Barn of traditional construction with a pitched roof supported by random rubble Cotswold stone walls, which are typically 600mm thick. The Barn has a roof structure that comprises substantial timber trusses spanning between the external walls, supporting a series of timber purlins, which in turn support the rafters. A modern sarking felt has been laid over the rafters when the roof was renewed at some time in the past. The floor appears to be a relatively modern, cast-insitu mass concrete floor.

A visual inspection confirmed the structure to be in remarkably good condition generally and clearly capable of conversion in the manner suggested within the Architectural proposals. Significant past structural movement was however on the North-East gable, with a pronounced outward lean at eaves level. This has been addressed by the addition of block masonry on the inner face of the gable and horizontal steel tie rods, taken back to the first of the roof trusses. The blockwork sits on an insitu concrete capping, cast over the original stonework.

An external inspection confirmed that a former lean-to structure, had stood against the gable but has been removed, with the remnants of the return stone wall trimmed med back against the corner of the North-West elevation. The seatings for the originally roof timbers remain in place on the external face and the masonry from eaves level to ridge appears to have been re-built.

External ground levels alongside the gable appear to have been reduced, exposing the base of the loadbearing stone wall. A second lean-to structure remains in place adjacent to the South-East corner of the main barn, with the stone in this area and on the return elevation, standing plumb and free from significant disturbance. The masonry on the North-West elevation and on the South-West gable is in a similar condition.

Assessment

The formation of the proposed openings in the North-West elevation will require the introduction of lintel sections to support the masonry retained above. With a maximum span of 1.7m, pre-cast concrete lintels of 150mm depth will be suitable, with a single piece stone lintel used on the external face. Temporary support of the masonry over the openings will need to be provided, in the form of needles and props, with the masonry then made good on completion.

Similarly, the insertion of lintels to the narrow opening to be formed in the gable would usually be a straightforward process, with temporary propping provided and a combination of concrete and stone facing lintels used. However, the past movement and pronounced outward lean of the gable, and the presence of the capping beam at eaves level requires further consideration, both in terms of the extent of disturbance required to form the opening and the potential for further instability during the work and on completion. The remedial work undertaken following the alterations to the gable, appear to have addressed the worst of the movement but the distorted shape of the masonry and the exposure of the base of the wall represent ongoing risks to its stability that should be addressed, irrespective of any proposal to alter the wall or introduce new openings.

Conversion to residential use will require improving the resistance to moisture penetration and improved thermal performance of the masonry walls, which in this case is likely to take the form of a new lining wall to be built inside the existing masonry. Adopting this approach for the gable wall will offer the opportunity to provide additional restraint and buttressing, with ground levels externally built back up to a level that allows the base of the wall to be fully restrained. The construction of the Link structure would also allow further buttressing of the corner, such that once this work is complete, cutting into the stone and block masonry and trimming the concrete capping as required to form the new slit opening would be feasible, using similar methods of temporary propping to those used on the other openings. Once complete this work would then ensure stability of the gable within the converted building.

The positioning of the rooflight windows is such that they would sit between two rows of purlins and as such the only structural impact will be the requirement to remove a number of rafters and stiffen each side of the openings with new rafters, placed alongside the existing. The purlins and trusses would not need to be disturbed to facilitate the introduction of the rooflights and there would be no impact on the loadbearing masonry.

Proposals for the formation of the openings and the insertion of the rooflights are presented in the accompanying drawing (Ref: 2324 01)

Conclusions

The structural work required to form the openings in the masonry and insert the rooflight windows is minimal and will not have any adverse effect on the stability of the structure as a whole or the integrity of the elements in question. Undertaking the proposed conversion would also offer the opportunity to address the impact of the past alterations to the gable, which have to a certain extent compromised its stability. The provisions as detailed will ensure that the integrity of the structural elements is retained and disturbance to existing/original fabric is minimised.



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