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Our Ref: TCH/JM/311

6 May 2011

Mr W Mitchell
Pennine Cottage
Hazelhead, Crow Edge
South Yorkshire
S36 4HJ

Dear Mr Mitchell,

Structural Inspection - Pennine Cottage Barn, Hazlehead

Acting upon your instructions, I have, on 27th April 2011, out a Structural Inspection at the above property. The purpose of the inspection was to comment on the structural viability of the restoration, and conversion of the property to achieve habitable accommodation.

I would advise that my inspection was limited to the above aspects of the property and related structural elements. I have not examined the property as a whole in detail and I am therefore unable to comment in detail on the structural condition of the building as a whole. I must also advise that no inspection was carried out of the woodwork or other parts of the structure which were hidden, unexposed or inaccessible at the time of the Inspection, and I am, therefore, unable to report that any such part is free from defect.

The Report of the Inspection was for the use of the Client and the Client's professional advisers and the guidance of the Planning Authority and should not be reproduced in whole or in part or relied upon by any other parties for any use without the express written approval of Tom Henry and Associates.

T.C.HENRY
Chartered Engineer
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I would report as follows:

General:

For the purposes of this Report, all references to front and rear, right and left, are as viewed from the yard area adjacent to the farm house.

At the time of the inspection, the property was in use for workshop/storage purposes.

The property under consideration, Pennine Cottage Barn, Hazlehead, was a traditionally constructed agricultural building built in local rubble stone masonry beneath a twin pitched

There was no significant tree/vegetative presence in close proximity to the building at the time of the inspection.

The natural topography in the vicinity of the property was of land falling slightly from front to rear. The land sloped more noticeably to the left and with a change in level between the land in the curtilage of the subject property and that of the neighbouring Pennine Trail to the left.

The unmade access road providing access to the farmhouse and barn, ran immediately alongside the right side wall to the barn and with the consequence that the lower half of this wall served a retaining function.

External:

Inspection to the right of the building from the level of the unmade highway revealed the upper section of the side wall to the building to be constructed in coursed rubble stone masonry and with stone lintels to window openings.

The wall in the main appeared generally stable although sightings along the line of the wall indicated a pronounced inwards bow at mid elevation which although possibly associated in part with post-constructional movement was also felt to relate in the main to the actual mode of construction of the building.

There were no indications of recent pointing loss or oriented cracking to the exterior of the wall, however, in view of the distortion, localised upgrade measures, possibly using an additional inner skin to the wall, should be considered, combined with an upgrade to lateral restraint at wall-plate level.

It was considered that as part of the refurbishment of the barn the road and the ground between the building and the unmade road should be locally re-profiled (possibly incorporating a cut-off "Aco" type drain) and impermeably surfaced in order to preclude any concentration rainwater run-off from alongside the building. This would both aid foundation stability and also lessen the requirements fro a further internal tanking membrane.

The front elevation to the building forming a gable wall was of variably sized rubble stone masonry. The masonry was of relatively poor appearance with some clay brickwork inserts where the original walling had fallen away in the past. This nature of the walling as view externally was not of structural concern. However, it was considered unlikely that an acceptable visual appearance of the refurnished/converted building could be achieved without either partial rebuilding the wall or alternatively full rendering.

Inspection to the left of the building revealed the side wall of the barn to have been constructed integrally with the side wall of a former and now part-demolished building to the front. The mode of construction throughout was with uniformly coursed rubble stone masonry with stone sills and lintels to door/window openings.

The wall appeared structurally sound throughout and there were no structural concerns at the intersection between the side wall of the barn and the boundary wall attached to the front left corner of the barn. Pointing to the wall was somewhat recessed and required attention but there was no distinct oriented loss and the current condition was related to general weathering. Localised attention was required to the seals between the side reveal masonry and the central window.

The ground alongside the base of the barn wall was concealed by recently cut back self-plant vegetation and this should be maintained at no greater than its present magnitude.

The rear elevation to the property forming a gable wall was a variably sized partially coursed rubble stone masonry construction. The walling had been surface pointed and with this continuing over degraded sections of masonry as localised rendering patches

There was a stone lintel over the window at the centre of the wall. This was noted to have failed and replacement was required. Attention was required also to pointing to the left end of the wall.

Sightings along the gable indicated a pronounced tilt towards the rear and with this estimated to be in excess of 100mm over the height of the building. This tilt is consistent with the general tilt of the trusses towards the rear.

It was evident that the distortion was of longstanding origin. However, the magnitude of distortion was such that early remedial measures were required and with these taking the form of either the reconstruction of the actual gable triangle, or the formation of a structural secondary wall within the building and then the tying back of the present gable through to that wall and to the roof structure.

Internal:

Inspection within the building revealed a traditional mode of construction, with rubble masonry perimeter walls. The twin pitched roof whose ridge lines ran in a front rear direction supported within the building by means of four king post timber trusses spanning between the side walls.

The floor within the barn was stone flag paved other than for a small area adjacent to the front entrance door where the flagging had been overlaid by a thin layer of in situ concrete. There was a vehicle inspection type pit towards the rear left of the building.

The front wall to the barn as viewed internally was of rubble masonry construction with minimal coursing to the somewhat irregular stones. The wall displayed some unevenness in plane. However, this was felt to be, in the main, of longstanding incidence and no recent differential movement was identified at the corner intersections with the side walls.

There was indication of possible past differential movement causing raking becoming vertical cracking at high level to the front left corner of the wall and although this was again felt to be of longstanding origin, it was considered that corner restraint strapping combined with fracture bonding should be implemented to ensure long term stability. The bonding should extend at least 600mm beyond the fracture line with a mode of fixing of the corner restraint strapping taken through to the outer skin walling.

A substantial timber lintel over the entrance door displayed extensive decay and was at the point of collapse. Early remedial attention was required.

Two steel beam lintels had been inserted to carry the central core of the wall over the door opening. These displayed superficial corrosion and although requiring treatment, were appearing to function satisfactorily. However, their mode of seating support on the rubble masonry walling was poor and required upgrade attention. It appeared that the opening had been possibly increased in width slightly subsequent to the original construction of the building and with this resulting in a poor edge detail to the opening reveals and with associated localised instability.

The right side wall to the building as viewed internally was of rubble masonry construction but unlike the front gable the variably sized stonework had been laid to notional coursing. The wall displayed some unevenness and with this combined with an outwards lean at eaves level.

Three window openings were formed within the wall and with the soffit to these positioned approximately 0.4metres below eaves level and with the lintel support over the openings achieved by timber lintels. These lintels were considered to require replacement, particularly to the rear most window, where early attention was required. The sides over the window openings was created with the main walling stone. Sections of the sills to the openings had fallen away but this had generally not prejudiced overall integrity.

The rear wall to the building forming a gable end was of variably sized partially coursed rubble stone masonry construction. The wall appeared generally stable as viewed internally and no major differential movement was identified at purlin support positions or at the vertical intersections with the side walls. The upper section of the gable was however noted to be tilted outwards.

The left side wall to the building was of variably sized partially coursed rubble stone masonry construction. There were timber lintels over the two window openings and also the door at the centre of the elevation. As with the right side wall, lintel support to the inner skin/central core to the wall which was presently afforded by timber lintels and was considered to require upgrade/replacement attention. Skin separation had occurred between the inner and external stone work at window reveal positions and this early attention by means of resin dowelling or inter-skin ties to secure the inner and outer stonework together, or alternatively, localised rebuilding.

The twin pitched roof was by means of purlins spanning between gables and four king post timber trusses which then spanned between the side walls.

The mode of support to the main purlins into the front wall was in places poor with movement having occurred in the past and in addition moisture related decay had occurred to the seating positions of the purlins. Local probing was required to determine the decay integrity of the timber inserted in the walls and in addition to any resulting requirement for remedial attention, it was considered that restraint strapping should be installed between the principal purlins and the gable walls to improve lateral stability.

The trusses originally provided support originally to two sets of canted rectangular section timber purlins to each roof plane but with these supplemented subsequent to the original construction of the building (presumably at the time of installing the corrugated sheeting to the roof covering) by multiple lesser section purlins.

The roof structure to the property as viewed internally was felt to be, in the main, currently stable and able to support the present corrugated roof covering. However, it would not be sufficient for a renewed roof covering at the time of converting the building, unless possibly this comprised of an Eternit lightweight artificial type slate, in which instance new rafters would be required combined with remedial attention to some of the present purlins supplemented by an additional purlin to each roof plane.

The original principal purlins displayed some decay at their seating position to the front wall and replacement or splicing measures were required as part of the refurbishment of the building. In addition, the lower right purlin within the second roof bay had failed at its support position to the second truss. This required early rectification. The failing of the purlin also highlighted the generally poor mode of interconnection of the purlins with the trusses, i.e. with relatively slender tenon jointing.

In view of the actual failure of a single purlins and the minimal tenon insert depth to other purlins, and the presence of some localised decay to ends, it was considered that if the existing purlins are to be retained then metal cleating should be inserted throughout to provide the mode of support between the purlins and the king post trusses

The front king post truss appeared fully intact and was considered basically stable. The raking strut to the second truss (numbered from the front of the building) had failed and now required replacement. Both raking struts had been removed in the instance of third truss and again early reinstatement was required. The fourth truss , closest to the rear wall, appeared structurally in the main intact although tilted to the rear.

It was evident from sightings at floor level that the trusses all displayed out-of-plumb distortion, increasing in severity towards the rear of the building. It was considered that this could be rectified at the time of refurbishment/reconstruction of the roof.

Some localised active decay was noted to structural timbers within the barn and this requires preservative treatment following detailed probing of the timbering to determine the extent of the decay.

Need to talk about inner skin lining to the walling, tanking alongside the roadway wall with this integral with damp membrane beneath and a renewed floor and also integral with the mode of damp proof membrane provision elsewhere within the building.

Conclusions:

The barn was considered viable for conversion without the need for full rebuilding provided that the structural remedial/upgrade works discussed above are implemented.

The mode of implementing this will be to some extent dictated by the proposed internal layout of the converted building. However, at the present time it should be assumed that lateral restraint measures are required at nominally metre centres, at mid wall height around the perimeter of the building and with similarly spaced strapping, internally, to the corners of the building. Information of the restraint measure and fracture bonding, and the means of implementation, can be more fully detailed by superimposition on the scheme layout drawings when these are available.

Measures will be required to provide damp proof mechanism to a new ground floor and the perimeter walling, and this will need also to serve a tanking requirement at the right of the building where external ground level will remain above internal floor level.

Consequently the use of an additional inner blockwork wall should be considered as both a retention device for the tanking and also, as a means of stabilising the existing walling, especially at the rear of the building. This could also incorporate insulation upgrade measures if required.

It is assumed that the roof covering will be replaced and this will require new rafters and, if the existing trusses are to be retained, some additional purlins. The geometry of exiting roof can be improved at this stage, ie, with trusses restored to vertical. The viability roof reusing existing trusses and purlins is dependant upon the proposed layout of the building and the nature of the new roof covering. If the current principal timbers are to be retained, then a ridge purlin should be installed.

All existing timbers which are to be retained should be preservative treated. The rubble masonry walling should be repointed, where deficient, to achieve moisture integrity to the walling. Alternatively or additionally, a full height moisture membrane should be considered internally.

I trust that the above report is sufficient for your present requirements, but please do not hesitate to contact me again if I can be of any further assistance.

Yours sincerely

[redacted]

Thomas C. Henry
for and on behalf of
TOM HENRY & ASSOCIATES