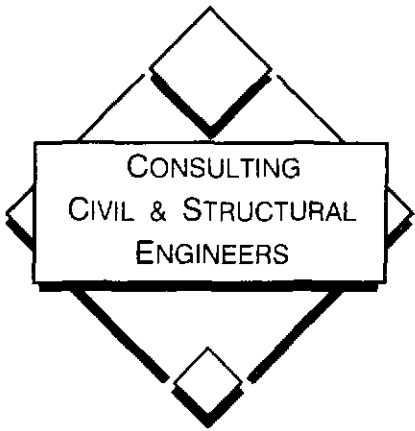

TOM HENRY & ASSOCIATES



CONSULTING
CIVIL & STRUCTURAL
ENGINEERS

all correspondence to
TOM HENRY & ASSOC
DMC, COUNTY WAY
BARNSELY S70 2JW

Tel: 01226 201951
01484 604807
01924 950021

Fax: 08712 181429

Mob: 07850 793028

email: office @ tomhenry.co.uk

Our Ref: TCH/JM/30172

9 July 2010

Paul Chapel
Dickroyd Farm
Brook Hill
Dunford Bridge
S36 4TG

Dear Mr Chapel,

Structural Inspection - Barn @ Dickroyd Farm

Acting upon your instructions, I have, on 30 June 2010, 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 aspect 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.

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 private roadway leading into the farmyard. This was consistent with the existing farmhouse being located to the right of the courtyard, the barn being to the rear.

The natural topography in the vicinity of the property was of land falling from front right to rear left.

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

The property under consideration, being the barn at Dick Royd Farm, was currently in use as an agricultural building and was constructed to two storey height in local stone masonry with this being a combination of dry laid and narrow jointed. The barn to be converted was attached to a further agricultural building to the right, which was understood to remain unconverted as part of the present proposals.

External:

The front elevation wall to the right of centre was of narrow coursed dry laid rubble stone masonry with a single structural opening through the wall with this having the benefit of a timber lintel and stone sill. Stone quoins were formed to the corners of the wall, and with those to the front left corner abutting the adjoining section of barn to the left, and at the front corner of the wall, the quoins to the front right being the division line between the element of barn to be converted and the agricultural building / garage to the right which is understood to remain in its present condition.

The main body of the walling appeared generally stable at the present time and free from major planar distortion. Some localised outwards bulging was noted above the single window opening, this was not severe and can be dealt with most probably by the localised rebuilding of a section of walling of less than 1 square metre at the time of the refurbishment works to the window, and with this then allowing inclusion of a damp membrane/cavity tray over the opening.

Linear distortion was noted to the right side of the quoins at the front right corner of the wall, with this resulting in a displacement to the right of the quoins in relation to the main rubble walling area. This was

felt to be a number of years old and although displaying no indications of significant recent progression, was felt to require restraining measures in order to ensure long term stability and with this most probably implemented using a resined Helibar insertion from the side reveal of the present opening and extending at least 400 mm into the main rubble walling area. As an alternative, strapping carried out to the inner skin could be employed and with the inner and outer skins then fully interconnected using resin steel dowelling.

A stone foundation plinth was present at the base of the wall, this projecting approximately 75 to 100 mm from the main building line. The rubble masonry walling at this position appeared generally stable, although it should be appreciated that foundation depth is unlikely to match that of modern building and hence there can be a potential for increased seasonal differential foundation activity as compared with a modern foundation. This would be unlikely to prejudice the walling in its present format, i.e., with significant flexibility related to the mode of construction of the masonry, however could cause some issues internally with more rigid modern plaster finishes to the inner skin walling.

As a consequence it may be worthwhile considering the application a separate inner skin to the walling, either some method of dry lining or alternatively, concrete blockwork. If concrete blockwork were to be used, then this would need to be built off its own foundation and with the mode of foundation determined after localised trial hole inspection within the building.

The front elevation walling to the left half of the barn was of wider but more uniformly coursed rubble stone masonry. Two structural openings were formed at first floor level and with a single door at ground floor level, the door had the benefit of stone sill, lintel and sectioned side jambs. Detailed assessment of the windows to the upper level was somewhat restricted due to the presence of secured timber shuttering, but was presumed to be of similar nature to that at the lower level of the building.

The walling appeared generally stable other than locally to the left of the door and where over a width of approximately 2 metres, pronounced lateral movement of the stone had occurred at mid height and extending through to approximately 0.75 metres below eaves level. The movement at this position had also resulted in a step fracture line extending from the top left corner of the lintel over the ground floor door, and rising upwards between the rubble masonry walling and the left side jamb to the first floor level window, and then continuing in a raking fashion through to eaves level.

The severity of the distortion was such that substantial fracture bonding was required at nominally 400 mm centres from the corner of the ground floor door lintel and extending through to eaves level with this continuing over to at least 500 mm beyond the movement line. In addition, further fracture bonding was required between the quoins at the front left corner of the wall panel and the main rubble walling panel.

The voids between the quoins and the walling would then need to be infilled using a cementitious grout and corner restraint strapping installed at 500 mm centres within the building, and this extending to at least 1 metre along both front and end walls.

As an alternative, some form of localised panel rebuilding could be implemented of an area of approximately 3 square metres, this would reduce the extent of fracture bonding required but restraining measures to the corner quoins would still be needed.

Sightings along the elevation to the right of the ground floor door opening indicated an outwards bow to the wall at mid height, this in the order of 35mm over 1 metre. The movement was considered long-standing in origin with no indications of major recent progression.

It was felt that the distortion and the current loss of integrity could be resolved by tying back the wall at mid height through to the upper level floor structure which is to be installed at mid wall height as part of the refurbishment of the building. The restraining straps should be located at approximately 1 metre centres horizontally to the length of the elevation and with fastenings continued through into the outer stone masonry.

At the step fracture to the side of the door opening, it was considered that inter skin ties over to a 500/750 mm grid pattern should be implemented over an area of approximately 2 metres x 2 metres to secure the inner and outer skin walling. This carried out using resin secured Helibar or equivalent.

The left elevation to the property formed a gable end wall was constructed integrally with part of the side wall to the rear barn, which is understood to be in part taken down in line with the current proposals.

The walling to the main section of the gable was of uniformly coursed rubble stone masonry and with the pitch-based nature of the stone becoming less apparent within the gable triangle. Two former small window openings were noted through the wall at ground floor level, these partially infilled and with the current lintel stones not fully effective, additional lintel support was required at both of these positions.

There were no indications of recent structural movement affecting the wall. However, sightings along the gable elevation indicated outwards bowing at mid height, this in the order of 25 mm over 1 metre. Based upon the current appearance of the wall it was considered that the required stability could be restored to the wall by restraining the outer skin masonry back through to the upper level floor structure which forms part of the current conversion proposals, and with further restraint mechanism installed at eaves level, i.e. at the base of the gable triangle.

The restraint as this latter position could also be enhanced to form some degree of fracture bonding to take into account localised step fracture which was noted to rise from the base of the gable triangle at mid elevation through to eaves level at the rear roof plain.

As with the front elevation sightings along the bed jointing to the wall revealed an absence of any significant differential foundation settlement.

Inspection to the rear of the building revealed the rear element of the barn, i.e. that part which is understood to be demolished be of somewhat dilapidated construction, and of poorly formed construction with extensive sections of the asbestos cement sheeted roof missing and with distortion noted to the single skin blockwork rear wall of the rear barn.

The left side wall to the rear barn, this being a continuation of the gable elevation to the main part of the building, had separated, by virtue of the planar distortion discussed earlier from the rear elevation wall to the main barn, i.e. the barn which was understood to be retained. A gap of approximately 75 mm maximum had opened up and prior to the taking down of the section of side wall to the intended demolished barn, corner restraint upgrade measures would be required to the rear left corner of the left main barn, with this implemented internally in a similar fashion to the distortion to that intended to cater for the distortion at the front left corner of the main building.

The rear wall to the barns which were to be retained was constructed in two parts, i.e. corresponding with the two elements of the walling noted to the front elevation and associated with the barn being constructed in two different stages, i.e. that to the right originally and that to the left more recently. As a consequence stone quoins were formed at the front left corner of the right half of the wall at its abutment position with the walling to the left.

The mode of the construction of the presumed older building to the right was with dry jointed masonry, laid to coursing but with variable depth of coursing within the walling, and with the walling increased in thickness locally at its base to form a foundation plinth with an overall width in the order of 900 mm. This wall being the rear wall to the right part of the barn was considered to be basically stable by virtue of its significant mass and thickness as viewed externally, despite some plainer unevenness noted to the rear building line.

Within this comment localised voids within the walling would need to be infilled.

The rear wall to the left half of the barn was of relatively poor visual appearance with partial coursing to randomised stones at first floor level, and with extensive openings formed at ground floor level with these having the benefit of timber lintels supported on somewhat slender stone piers.

Sightings along the wall indicated the wall which had a thickness in the order of 450 mm indicated it to be generally stable although displaying some localised plainer distortion. In view of the distortion it would be prudent to install restraint strapping to secure the walling at mid height back through to the intended first floor level structure.

There was extensive decay to the timber lintels over the extended openings at ground floor level, and although it may be possible to retain some sections of timber, replacement of others would be required, and this may be implemented using structural steel sections faced with older timber to maintain a sympathetic appearance.

Fracture bonding was required to the wall to the top right of the door opening leading through from the rear barn into the left barn, this can be implemented within the bed jointing using resin secured Helibar externally, and internally either in a similar fashion or alternatively with restraining straps fastened to the face of the wall and located between the wall and the anticipated inner block skin or dry lining system.

The timber lintel over the door opening had relatively poor seating lengths and displayed extensive decay and replacement should therefore be considered. Inspection within the left barn. There was doubt as to support at truss seating positions to the two queen post trusses and enhancement should be considered to both front and rear walls. In addition restraint between the walling/wallplate and the trussed ties will be required.

Some localised outwards rotation was suspected to the upper sections of the walling at wallplate level and although this was not major, localised enhancement of the wallplate restraint should be implemented, secured back to the trussed ties and to the gable walling.

Alternatively it may be depending on the positioning of the ceiling to the upper level accommodation, a mode of restraint may be possible from this source.

The trusses appear generally stable with regards to their principle members. However the queen posts and raking struts required attention particularly to the right truss.

The vertically oriented timber purlins to each roof plane were supported on the trusses by metal shoe cleats, these appeared stable, no significant deflection was identified and from the ground level assessment there was no indication of significant active decay, although within this comment it will be appreciated that a closer inspection is required at high level during the implementation works.

Two original upper level purlins had been retained, these were between the two trusses, these were of rough-hewn section timber and it was felt that these should be retained intact to provide additional stability to the roof.

The inner skin of the left gable elevation was of somewhat semi-randomised coursed rubble stone masonry. The walling appeared in the main stable, although restraint strapping was required to both front and rear corners of the wall.

Restraining measures were also felt to be required between the front/rear right corners of the barn, with the division gable walling of the adjacent presumed older building to the right. This wall should also be restrained to the front walling of the right barn throughout its full height.

Inspection within the right barn revealed planar distortion to both front and rear walls and with this combined both at mid height and also at eaves level. Some corrective measures would be required to the mode of wallplate support at both locations at the time of changing the present asbestos cement sheeted roof covering to a timbered and felted Yorkshire stone slate clad roof.

The two roof trusses which extended front to rear over the right barn displayed relatively extensive past decay, some localised loss of section had occurred.

More significantly however, the rectangular section purlings, two to each roof plane would be insufficient to carry the refurbished roof covering and with the two original rough-hewn section purlins displaying extensive splitting and again not felt to be suitable for re-use as structural use as part of the refurbishment.

The re-roofing of the building would therefore required improvement to the rubble masonry front/rear elevation walling, with removal of decayed but most probably the whole section of the existing wallplates with new wallplates inserted with walling locally rebuilt to achieve a horizontal eaves level to the elevations as a whole.

The floor level within the two elements of barn under consideration, were noted to slope and vary, the true extent of the variation was not readily apparent due to stored items within the right barn and extensive depth of hay within the left barn.

It would be appreciated that a level floor, possibly to split levels, will be required as part of the refurbishment works and at that stage assessment will need to be made as to whether any localised underpinning to the perimeter walling is required, and with this most probably incorporated at the time of installing the presumed inner skin blockwork walling to the perimeter of the building.

Localised exploratory excavation within the building to expose the level of the present foundations is required in this respect, and also prior to evaluating a viable finished floor level to the converted building. Based upon current observations however, it must be considered most likely that underpinning works will be required in the instance of the rear wall to the left barn where there was extended wide door/window openings.

The roof to the right part of the barn was clad with profiled asbestos cement sheeting and it is understood that this is to be fully removed and the roof reinstated with Yorkshire stone slates. The roof over the left section of the barn was currently clad with Yorkshire stone slate and from the ground level inspection this appeared generally uniform in plane, although it is anticipated that the roof will be taken off and refurbished in order to install sarking felt and enable enhancements and localised treatment to timber.

Renewed roof timbering will be required in places and with the extent of this dictated by a closer inspection of the present timbers and on the proposed layout of the building.

Conclusions:

The barn was considered viable for conversion without the need for extensive 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. Information of the restraint measure and fracture bonding can be more fully detailed by superimposition on the scheme layout drawings prior to construction. Foundation assessment is required to determine whether and upgrade measures (underpinning) is required to ensure long term stability.

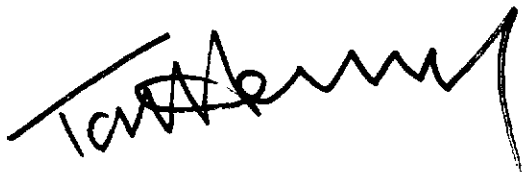
In addition, measures will be required to provide damp proof mechanism to the new ground floor and the walling. In this latter respect, the use of an inner skin blockwork walling may be beneficial and would also, with suitable foundation provision, achieve an inner lining to the building which would be less susceptible to seasonal ground changes than the present rubble masonry walling which is presumed to have relatively shallow foundations.

All existing timbers which are to be retained should be preservative treated.

The rubble masonry walling should be repointed to achieve moisture integrity to the walling. Alternatively, a full height moisture membrane should be installed 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

A handwritten signature in black ink, appearing to read 'Tom Henry', with a stylized, wavy line extending from the end.

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