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Ref: 21.01

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Dear Mark

Elmhirst Farm, South Lane, Cawthorne, S75 4EF

Following my visit to site on 11 January 2021 I have pleasure in presenting my report.

Background

You have asked that I make an inspection of a redundant agricultural building in order to advise on its structural integrity in connection with proposals to convert to a dwellinghouse.

The Building

The building is a detached shed or barn, of steel frame construction, possibly constructed some 40 to 50 years ago. The roof is clad in corrugated sheeting with occasional roof lights. The upper walls are generally clad in a variety of corrugated sheeting of varying age but with timber cladding on the west elevation. A single skin block wall extends up to approximately 2.4m above ground level.

Limitations of the inspection

My inspection was undertaken viewing solely from ground level and, internally in the absence of artificial lighting, in relatively poor lighting conditions.

Building description

The building is an agricultural shed or barn, approximately 16m in width and 18.5m long. It has a steel portal-framed structure extending just over half the building width, to which is attached a slightly narrower lean-to structure. Lengthways there are four bays. The inner leg of the portal frames forms the line of central columns.

Heights approximately are 5m to portal eaves, 6m to portal ridge and 3.5m to lean-to eaves.

Steelwork member sizes were measured generally to be (or present day metric equivalent) 152 x 89 UB portal rafter, 178 x 102 UB lean-to rafter and 178 x 102 UB all columns. Diagonal bracing members in the roof plane appeared to be 50mm diameter tubes. There was also a diagonal brace in the vertical plane between the central columns of the rear end bay.

Roof purlins are timber joists approximately 175 x 63 mm in size. Cladding rails are also timber,

approximately 100 x 100 mm.

It is understood that all existing cladding, sheeting, timber rails and purlins, together with the blockwork walls, are likely to be replaced and therefore no comments are deemed necessary concerning their condition.

Inspection comments

In general the structural condition of the building appears to be reasonably satisfactory, given its age and current exposure to the weather. No defects such as might have seriously weakened the structure were apparent.

Parts of the external cladding are damaged, thereby exposing the structure to the elements. In addition, although the cladding which is intact does protect the upper steelwork, the lower part of the perimeter columns are built in to the single block skin, exposing the external face of the steel. Parts of the interior of the building are open to incoming damp and driven rain because of the absence of cladding.

Consequently the steelwork throughout has extensively rusted. However, in many areas the original paintwork is visible, suggesting that the rust, although extensive, is largely superficial. It is envisaged that this can be removed by conventional means, and by applying an appropriate paint system the steelwork can be restored largely to its original strength. There may, nevertheless, be some localised areas where a measure of repair may be necessary. Such areas may include lower lengths of external columns where these are exposed to the weather, and the diagonal tubular bracings, which in view of their small size may have suffered relatively deeper corrosion.

It was noticed that, at several connection points between rafters and columns, bolts appeared to have been omitted. Although this does not appear to have adversely affected the strength it is recommended that when the connections are cleaned any missing bolts are replaced. Attention should also be paid, in any renovation work, to check that any rust has not penetrated deeper into less accessible areas such as connection plates between steel members.

The external columns appear to have been fabricated all to a common height. Where external ground levels to the south and east slope significantly downwards, the columns sit on a steel sub-column of similar size. Attention should be paid to addressing any corrosion issues at this interface.

Summary

It is proposed that the building, an agricultural barn, is suitable for change of use to a dwelling. The building is a steel framed structure with corrugated sheet or timber cladding. Sheeting and cladding along with timber purlins and sheeting rails are to be removed.

Insofar as agricultural buildings tend to be designed to slightly lower factors of safety than residential buildings, it is fully expected that the framework can be retained without the need for re-construction. Overall strength and stability will be more than adequately augmented by the introduction of the new first floor, infill panel walls and internal partitions.

The structural condition from visual inspection appears to be satisfactory such that the building can be used as a basis for supporting the proposed conversion.

Should you require any further advice I should be pleased to assist.

Yours sincerely

M J Yates
Chartered Structural Engineer