

Report of the structural condition of the Barn at Lea Grange Farm,
Orton on the Hill, Twycross, CV9 3NP



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1. Brief

- 1.1. To Inspect the structure of the Barn and annexe forming the observations into a report regarding the suitability for conversion into a single dwelling.
- 1.2. The report is a brief report taking an overview of the construction without detailed measurements of, for example connections, but providing a considered appraisal of the feasibility of the conversion.
- 1.3. The report takes into account the general condition of structural elements and the likely loading that could be placed upon the structure due to the proposed conversion.
- 1.4. It is assumed for the purpose of appraisal that standard insulated cladding will be adopted to bring the construction into compliance with the Building Regulation requirements. This provides necessary flexibility into the structure, as agricultural buildings have lower requirements in terms of structural deflections.
- 1.5. The report does not provide detailed design calculations which would be dependent upon final design proposals, but consideration is given to the location and positioning of the structure with respect to potential loading.

2. General Observations

- 2.1. The Barn was originally constructed around 1970, as a stand-alone portal frame.
- 2.2. It was subsequently extended to form a grain store, estimated to have been constructed in the 1980's in the form of a lean-to to the portal frame.
- 2.3. The extension is bolted onto the side of the portal column and is formed from more substantial sections, with reinforced concrete pre-cast concrete retaining wall sections to form a push wall perimeter.
- 2.4. This push wall perimeter is fitted between column sections and is paced on top of a concrete floor slab which is elevated towards the north western gable.
- 2.5. The cladding is at high level to the main portal frame section and is full height to the south eastern gable of the lean-to. Steel sheet cladding extends to the top of the retaining wall sections to the south and north western elevations of the lean-to.
- 2.6. The Main portal I clad in "Big 6" fibre cement sheets which may have an asbestos content.

3. Executive Summary

- 3.1. The structural steel sections of the barn and lean-to extension are considered to be suitable for conversion to a domestic dwelling.

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- 3.2. Minor issues to be dealt with are the provision of suitable drainage connections where the existing discharge points are not aligned with the drain gullies to the south of the structure.
- 3.3. Replacement of the cladding with insulated panels to comply with current Building Regulation requirements.
- 3.4. Replacement of eroded bricks to the north western lean-to gable post to restore long term durability (Class B Engineering bricks recommended).
- 3.5. Installation of an insulated floor slab to the main portal frame section of the proposed element of the dwelling building to encase the steel columns to prevent further corrosion of the base of the columns.

4. Observations – details

- 4.1. The current cladding to the main portal frame and lean-to does not provide adequate insulation characteristics.
- 4.2. The existing “Big 6” Fibre cement sheets have a density of 0.157KN/m^2 . New Kingspan 1000 composite sheeting with a U-value of $0.15\text{W/m}^2\text{K}$ has a density of 0.134KN/m^2 , and therefore the structural frame is considered adequately strong for the new proposed cladding material.
- 4.3. Consideration has been given to the potential for additional wind loading, and due to the fixed base concrete to the columns it is considered that although the deflections may be greater than $L/360$ required for friable finishes, the use of the more flexible cladding panels which has an acceptable deflection limit suggested of $L/200$ is considered to be beneficial.
- 4.4. The Portal frame section of barn will require a new floor, which it is recommended is continued to surround the column bases of the portal to provide further resistance to corrosion which was noted to the north western gable column. The surface rust should be removed prior to the pouring of concrete.
- 4.5. The steel sections would benefit from new protective painting.
- 4.6. It is suggested that the first floor be constructed as a separate mezzanine from the main frame steelwork, but this may be feasible if calculations prove to show the sections would be adequate (not within the scope of this report).
- 4.7. It is recommended that a perimeter low-level wall or kerb be installed to the building perimeter to protect against burrowing animals and to give some measure of frost protection.
- 4.8. The rainwater downpipes should be connected to a positive drain system to ensure the ground local to the building does not become saturated.

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4.9. The existing timber purlins may require replacing with cold rolled purlin sections if found to exhibit excessive deflection.

5. Conclusions and Recommendations

5.1. The structure is in quite good condition requiring minor repairs where there has been minimal corrosion at the base of columns to the exposed northern elevation.

5.2. The steelwork generally would benefit from additional paint protection above the proposed floor levels.

5.3. The conversion to a domestic property requires consideration of flexibility of the cladding to be adopted, as agricultural buildings are designed to permit higher deflections than would be recommended for friable surfaces such as plasterwork.

5.4. The minor corrosion at the foot of columns can be simply de-scaled and protected by casting concrete around the base as this provides a highly alkaline protection.

5.5. Drainage requires a positive connection to the gullies as the rainwater goods currently discharge short of the provided gullies.

5.6. Comparison of the weights of cladding materials indicate that the adoption of composite panels provides a lighter covering than the existing Fibre cement cladding, with the added benefit of substantial insulation values required for a domestic property.

5.7. It is considered that the structure is suitable for conversion to a domestic property.

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PHOTOGRAPHS

**Report of the structural condition of the Barn at Lea Grange Farm,
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East Elevation

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North Elevation



Retaining Wall units/push wall on raised blockwork and slab

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South-west corner



South Elevation

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Interior of lean-to