STRUCTURAL INSPECTION OF

PAYNSLEY HALL FARM BARN

CRESSWELL

On Behalf Of:

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1. Introduction and Brief

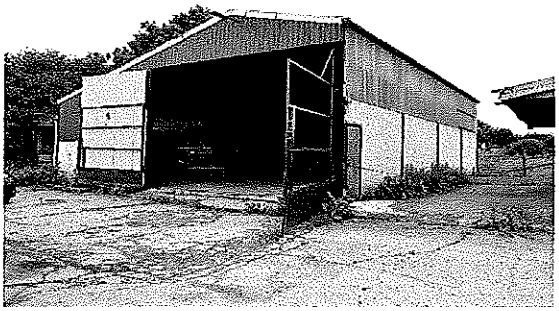
1.1. We were requested by Sammons Architectural Ltd acting as agents for the owners to undertake a structural inspection of the steel framed barn at Paynsley Hall Farm which is intended for conversion to residential use.

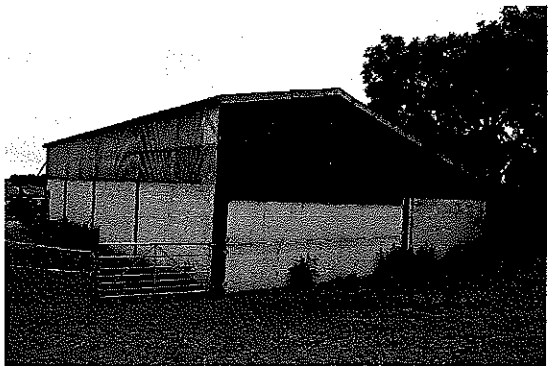
1.2. The purpose of this survey and the report is to comment upon the barns structural suitability for this conversion.

1.3. We attended site on Tuesday 30th May 2017 and the inspection was carried out in dry and bright weather conditions.

2. Existing Conditions

2.1. The existing barn consists of a steel portal frame structure, 4 bays in length, each bay being approximately 4m x 13.5m, and this frame had been extended on one side only with a further lean-to structure comprises steel sizes of identical section size to the main frame, giving us an overall floor area of 13.5m x 18m.





2.2. The portal frames consisted of 203 x 133 UB columns with 178 x 102 UB steel rafters. The left hand side eaves being approximately 2.5-3.0m lower than the right hand side eaves.

2.3. Gable posts are provided on each of the gable ends, although to accommodate the large barn entrance door on the front elevation, one of the posts has been truncated to sit on the door support beam.

2.4. Wind bracing has not been provided within the structure, although some rudimentary knee bracing is present in both directions at both the eaves and the internal column positions.

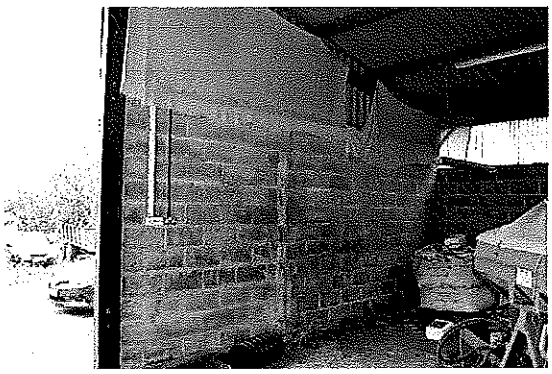




2.5. It was noted that the side walls had bene constructed in blockwork up to approximately 3m in height, above which corrugated, translucent sheeting has been utilised as a cladding to provide the maximum amount of light within the barn.

2.6. The blockwork at lower level was noted as being 140mm thick throughout, and was built into the web of the supporting steel frames in each case.

2.7. In one bay on the rear elevation, it was noted that reinforced concrete panels had been utilised in lieu of the blockwork used elsewhere. The owner informed us that this was due to vehicle damage from farm machinery, and that the panels had been inserted by himself once the damaged blockwork panel had been removed.





2.8. The internal pens within the barn that originally formed stalls (the barns initial use was as stabling) have long since been removed, but given that the external blockwork has been built into the webs of the supporting steelworks there should be adequate restraint to this blockwork without the intermediate walls being present.

2.9. The existing floor slab was concrete throughout, and anecdotal evidence would suggest that it is at least 150mm thick. It is not known at this stage whether any reinforcement was provided within the floor, but the only structural defect within it is a single movement crack at approximately half way along the buildings length and we would suggest this is entirely due to shrinkage during the curing process as movement joints have only been provided from front to back. The crack would

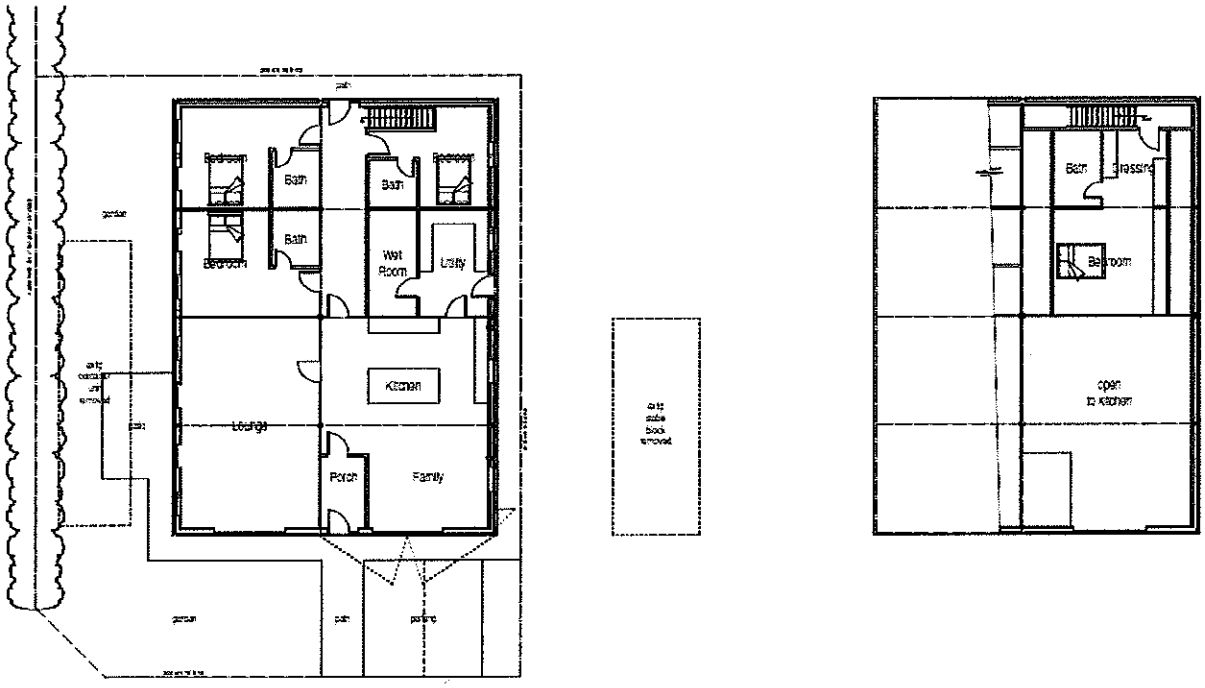
be in the position where we would normally cut a movement joint laterally, and did not appear to be opening out any more than its current 1-1.5mm width.

3. Discussions and Conclusions

3.1. We understand from discussions with the current owner that it is their intention to construct internal walls off the existing floor slab. We would need to confirm the adequacy of this slab by calculation, but at this stage we see no reason why the slab cannot be utilised in its current form as a foundation for the internal walls.

3.2. This being the case, we see no reason why new ceiling and partial first floors cannot be constructed directly off these walls, thus adding little or no further load to the existing steel structure itself. The exception to this arrangement is the ceilings above the double-height Kitchen and Family Room, where out of necessity the ceiling will need to be suspended from the existing roof structure above. The existing purlins appear sizeable enough to cater for this, although supplementary timbers could be added if required at mid-span. The steel frame should require no further strengthening to cater for this minor increase in roof loading.

3.3. We note from the architects plans that it is the intention to provide a partial first floor or mezzanine floor to the rear right hand corner which will house the master bedroom and an en-suite area, but that the remaining parts of the proposed conversion are to remain single storey.



Ground Floor Plan

First Floor Plan

3.4. It should be noted that it is the intention for the kitchen and family area to be double height, so there will be a need for some form of ceiling only in the front right hand area which will follow the profile of the existing roof structure.

3.5. We do not have any information regarding the condition of the existing approval process with the local authority, but it is likely that the existing roofing material and cladding to the side walls is to be retained for aesthetic reasons to maintain the look of an agricultural building.

3.6. If no further load is to be added to the existing structure then we would consider that it is fully suitable for conversion with the provision that diagonal wind bracing should be considered as an addition to the structure in general.

3.7. The external blockwork walls will provide some restraint between the columns at low level but no similar level of bracing is present above the head of any of the existing blockwork panels, or indeed in the roof structure at all. The knee braces to the column heads would provide a small amount of restraint but we would recommend the insertion of tubular bracing elsewhere in the structure where the proposed window and door positions allow.

3.8. Insulation should be provided at ceiling level in the form of fibreglass or mirror wool quilting to current building regulation standards.

3.9. A formal threshold will require to be provided at all new door positions, but we would suggest that this can be accommodated by providing 100mm of insulation and 70mm of floor screed onto the level of the existing floor slab.

3.10. Care will be required when cutting out the proposed windows in both gable and side elevations as the existing concrete blockwork wall will require support at proposed window/door head level.

3.11. We assume at this stage that a new internal blockwork skin is to be provided to the structure for thermal purposes and any new lintels should bridge the opening in new and existing skins.

4. Summary

4.1. To conclude we are satisfied that the existing structural frame is adequate to cater for the present and future loadings provided that the new ceilings/floors and insulations are supported independently off the existing floor slab. The exception to this arrangement is the ceilings above the double-height Kitchen and Family Room, where out of necessity the ceiling will need to be suspended from the existing roof structure above. The existing purlins appear sizeable enough to cater for this, although supplementary timbers could be added if required at mid-span. The steel frame should require no further strengthening to cater for this minor increase in roof loading.

4.2. We have not inspected the existing foundations at this stage, but given that the above scenario would generate no further loading to the existing structure we are again satisfied that the existing foundations, whatever their depth and dimensions are suitable for re-use.