

ANTHONY-JOHNSON

Consulting Engineer Ltd

Site Address:

Adjacent to Pentland House,
Chapel Drove,
Holbeach Drove,
Spalding.

Overview:

It is proposed that an existing agricultural building be converted to residential use. The purpose of this survey is to therefore review the suitability of the structure for conversion to residential use and consider the retention of structural elements contained in the current structure.

Structural Survey:



Figure 1: The internal structure of the building, showing the construction using steel frames and cladding.

The building is formed internally of steel portal frames, running front to back and set at suitable centres. S purlins, set to the head of portal frames, run side to side at suitable centres between adjacent portal frames. These provide support to corrugated steel cladding, laid to falls to the roof, running from apex to eaves level. The same cladding runs

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from eaves to ground level on side and gable elevations, with horizontal purlins providing restraint against horizontal wind loading applied to the vertical elevations.



Figure 2: The ridge haunch of a portal frame in the building.

The portal frames are formed with suitable haunches at eaves and apex, thereby providing moment resisting connections, able to resist sway induced by wind loading in the direction of the frames. It is therefore anticipated that the bases of columns have been designed as pinned connections with no moment resistance, except for that needed to prevent collapse during a fire.



Figure 3: The rear windows provide a view into the greenhouses behind the building. The cross-braces are also visible here.

Figure 4: An eaves haunch of a portal frame in the building.

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Sway introduced perpendicular to the portal frames by wind acting on each gable end is resisted by tubular cross-bracing, running from apex to eaves in adjacent portal frame bays. The sway is then transferred in purlins to side elevations back into tubular bracing, running from eaves level to ground level, in adjacent portal frame bays.

The gable end of the structure incorporates a single structural element running vertically between ground and apex. The element is designed to carry horizontal loading due to wind and provides no support to the roof structure at apex.

The floor is finished in a concrete slab that was found to extend out beyond the demise of vertical cladding to the walls. It is anticipated that steel columns are set to suitable pad foundations, particularly given the lack of movement within the concrete floor slabs which indicates suitable ground conditions, with limited volume change potential or settlement potential reflective of ground to which pad foundations, as opposed to piled foundations, may be formed.



Figure 5 and 6: The exterior of the building

The steel structural elements were all found to be in very good condition, with steel portal frames and associated bracing having been galvanised, thus providing a suitable protective finish that is anticipated to last for decades, and will thus not require remedial works prior to conversion of the structure. Purlins were similarly found to be in good condition, and suitably sized, and they will likely be sufficient to allow for the replacement of existing steel cladding with a suitably insulated steel cladding.

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Rainwater goods were found to be present throughout, allowing for the transfer and discharge of surface water run-off from the roof, without external deterioration of finishes.

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Conclusion:

Based upon the above observations, it is considered that the structure is suitable for conversion to residential use, without the replacement or removal of any internal structural elements. Steel framing and ancillary supports to cladding elements should all be retained, and subsumed into the proposed conversion.

The finished floor should similarly be retained for inclusion in the prospective conversion. The lack of damage, movement or distortion within the floor slab indicates that it is formed of a suitable concrete grade and to suitably prepared ground. Externally, exposed edges of the slab show it to be of a suitable thickness. It's prior use as a finished floor to an agricultural building infers that loads previously applied to the finished floor exceed those that will arise as a result of residential use.

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