

ANTHONY-JOHNSON

Consulting Engineer Ltd

Site Address:

Mintlyn farm,
Queen Elizabeth Way,
Bawsey,
King's Lynn

Overview:

It is proposed that an existing barn be converted into a residential unit and the purpose of the survey is to review structural elements so as to discern whether the existing structure is suitable for such a purpose.

The existing building is noted as being formed of a concrete frame, likely in Atcost barn, with infill block work panels set between concrete columns.



Image 1.0: View of Barn structure

External Review:

In reviewing the side gable end, facing the existing farmhouse, it is noted that the block infill panel spans between adjacent columns on the portal frame. Block work is cut so as to rise with the concrete haunch at either end. The block work panel stops at lintel height with a steel member running horizontal to the head of the block work, allowing for fixing back of a corrugated cement sheet.



Image 2.0: Gable end to structure.

The Base of the block work wall is set abutting an external concrete slab, allowing for vehicle access and ground level is noted as a sloping with a pitch of 200 mm front to back, indicating that block work extends down below ground level.



Image 3.0: Blockwork with concrete laid to falls to gable

A uPVC double glazed window has been inset into an opening in the block work with lintel set to the head of the window.

The side elevation of the building, with open bays allowing for vehicle parking and trailer parking, is noted as being formed with bays set between concrete portal frames.

Block work infill panels are noted as being formed either end of the barn between adjacent portal frames. To one end of the structure the resultant enclosure forms an office space/ workshop and to the other end of the building, blockwork forms a partially enclosed storage area.

The enclosed office or workshop space is noted as being formed with three additional UPVC windows all set in a block work skin forms from 100 mm wide blocks.



Image 4.0: Office/ workshop block, formed to one end of the Atcost barn

Block work is noted as being in good condition with limited deterioration to bed joints and perpend.

Concrete beams run along eaves level between adjacent portals and beams were noted as being in good condition with no visible damage or surface defects to the concrete.

Concrete columns to the portal frames are noted as lacking any significant staining to the surface indicating that reinforcement remains suitably covered with limited risk of corrosion. Spalling and cracking to the concrete was similarly not noted and to this end it is considered that the stanchions continue to function as intended.

Lichen, identified through grey discolouration of the concrete, is reflective of a long standing structure, with long term exposure to a humid environment. This should be considered as a reflection of the robust design employed in the formation of the concrete elements.



Image 5.0; View of concrete columns/ stanchions with haunches.

The external ground level falls away sharply at one end of the building, with access ramp dropping down to a lower level serving adjacent barns. This exposes the base of the block work wall, which is noted as being formed to the head of a mass concrete pour with surface marks indicative of shuttering.



Image 6.0: Access ramp, local to opposite gable end with lower mass concrete set to underside of blockwork.

The gable end facing towards the barn complex is noted as being formed again from a concrete block infill panel, set between adjacent columns to the portal frame. Unlike the opposite end of the structure, the block wall to this end rises from the base of a concrete slab which has likely been cast in-situ and given markings to the side elevation, laid to falls.

Formed from dense concrete blocks, the gable elevation rises to haunch level before giving way to vertically hung corrugated cement sheeting. Sheeting is dressed to the eaves line with lap over cement sheeting, running to the head of the gable up to apex.



Image 7.0: Opposite gable end to structure.

A series of storage bays have been formed to the side of the structure, abutting the gable end and these have again been constructed from solid concrete blocks. The width of blocks is noted as being 200 mm to these bins. The mono pitch structure set between gable to the barn and storage bays is however noted as being formed from 100 mm wide blocks.



Image 8.0: Monopitch storage shed and storage bays, set to gable end of barn.

The elevation facing the access track is similarly in very good condition, with limited movement evident where block infill panels abut the existing portal frame stanchions. This is likely the result of sway in the concrete portals and thermal movement within the concrete block infill panels. Movement between both elements is however very limited, at less than 3mm and is not commensurate with any form of structural deterioration. It may be ascribed to there being a lack of physical connectivity between both structural elements, with both being suitably free to move relative to each other.



Image 9.0: Vertical cracks at juncture of wall panel abutting end portal frame.

The base along this elevation is noted as having an excessive amount of moss, indicative of a high moisture content within the slab, likely as a result of silt building up on the head of the concrete slab local to this building elevation.



Image 10.0: Excessive SILT to head of concrete slab and moss growing in this medium.

The base of the elevation follows a variable ground level with the wall panels stepping as each bay with a continual change in external ground level



Image 11.0: Side elevation of barn facing access track.

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It is noted to the new UPVC gutter with downpipe and fascia board have been fitted along the entire elevation. The gutter is formed of a deep gully, 150 mm in width, suitable for significant rain water run-off. Downpipes set either end of the structure allow for capture and discharge of the rainwater to ground only.



Image 12.0: Deep gutter, discharging into 75mm diameter downpipe

The roof to the structure is noted as being finished in a corrugated cement sheeting with ventilation set to ridge line and a stack/ vent pipe clearly installed at one end rising up through the roof and terminating short.



Image 13.0: Stack/ Flue rising through head of roof structure. Note gradual 200mm fall, side to side of the structure.

Internal Review:

Internally, the structure has been subdivided into a small workspace with electric supply to one end and external storage areas set to bays between portal frames to the other end. Parking/ plant storage is made available to remaining bays, set between adjacent portal frames.

The work space comprises a concrete floor and partitions clad in plasterboard, rising floor to ceiling with further plasterboard sheeting set to the ceiling line. Nail lines are indicative of timber elements spanning side to side between adjacent walls allowing for the suspension of the ceiling.



Image 14.0: Internal view of workshop/ office area.

The floor is noted as having been cast in situ with trowelling indicative of a roughcast finish. Expansion joints are set running longitudinally down the building at roughly 3 m centres.

In reviewing the internal framing of the superstructure, the Atcost barn is noted as being formed of concrete beams, rising haunch to apex, supporting concrete purlins set at roughly 1100 mm centres to the head of the beams, with cement sheeting laid to falls over providing a watertight finish.

The floor to the remaining barn is noted as being formed of roughcast concrete, suitably tamped and with expansion joints set to sub-divide the slab between each portal frame bay.

Livestock bays are noted as being formed to the opposite gable end of the structure, set to the head of the concrete slab, with block infill panels dividing the depth of the structure into three individual bays.



Image 15.0: First of three livestock bays, with sub-dividing wall evident

Block work is noted as rising 7 1/2 courses above finished floor level, providing some limited buttressing to the gable end.

Limited stepped cracking is noted as having arisen in the block work to the gable end. Inspection of the blockwork panel to this elevation and to the gable elevation abutting the livestock pens indicates some limited stepped cracking, arising as a result of thermal movement. Inspection of blockwork local to external ground level failed to reveal further cracking or movement, indicating a lack of movement within the underlying foundation.

Extensive hardstanding to the demise of the entire site prevented any examination of the underlying foundations.

Conclusion & Recommendations:

The above survey revealed the structure to be suitably robust, free from structural defects. Structural elements were found to be in good condition and continue to function as originally intended.

In reviewing the proposed alterations, it is considered that the structure proffers a suitable shell in which to develop a residential unit. The proposed design recognizes and aims to work in sympathy with the existing concrete portal frames, allowing internal partitions to fall on gridlines matching existing columns. Large openings are confined to masonry panels set between adjacent columns, ensuring the primary super structure remains intact, functioning as originally intended.

Internal partitions may be further incorporated into the design as a means to buttress the structure, reducing sway within the concrete portal frames, and allowing for the formation of a lightweight false ceiling, where required.

Existing blockwork infill panels are considered suitable for incorporation into the proposed alterations. Such panels may form the external weathertight skin of external walls, allowing for the formation of a dry lining, with insulation and plasterboard finishes, all set to studwork panels, formed to the head of the existing concrete floor.

The existing corrugated cement roofing sheets yield a mass commensurate with that of modern composite insulated roofing systems, allowing for an exchange, with no significant change in applied loads.

On the basis of the above and of the proposed layout, it is considered that limited non-structural alterations would be required so as to allow for the formation of the proposed residential unit.