Appendix 4 Structural Engineer's Report.

PEP

Pearson Ellis Portsmouth
Consulting & Structural Engineers
37 Havant Road
Horndean
Hampshire PO8 0DP
Tel : 023 92 596600
Email: pepinportsmouth@aol.com

STRUCTURAL INSPECTION

OF

BARN CONVERSION AT

PARK HOUSE FARM

FOLLY LANE

CONSALL

STAFFORDSHIRE ST9 0AB

Job No M9116

Date NOV 2009

Add Ref ST9

Philip G Malin *Principal*
Structural Engineer

Consultants:
W. George Ellis
CEng MICE FIStructE

J Keith Pearson
Eur Ing CEng FICE FIStructE MConsE FFB

Incorporating
Keith Pearson Associates Est 1963
McKelvey Ellis & Partners Est 1964

An initial inspection of the barn for the proposed conversion at Park House Farm Consall Staffordshire was carried during September and October 2009.

AUTHORITY

The inspection was carried out at the request of Mr S D S Gregory acting on behalf of the owners Mr J and Mrs N Sigley the owners of the barn and farm.

The report is prepared for joint use of the owners their advisors and the Local Authority - in pursuance of a Planning Application.

This report is not to be used by a third party without first obtaining prior written approval from Pearson Ellis Portsmouth.

GENERAL CONSTRUCTION

The development is a two storey barn structure constructed of face brickwork externally to the front elevation and brick internally forming a solid wall.

The rear and gable end walls plus the quoins around some of the openings are built of local stone.

The roof is formed with a timber trusses and purlins covered with tiles.

The building is situated with the front facing West. Access to the rear East elevation is past the Northern gable wall.

The building is also situated on a slightly sloping site with the attached store on the South elevation being uppermost.

PURPOSE OF THE REPORT

The purpose of the report is to assess the structural condition of the barn building and the remedial works which may be necessary.

GROUND CONDITIONS

A check has been made on the Drift map obtained from the British Geological Survey carried out of the area. The barn is built on or close to the junction between Kimmeridge Clay and Permian & Triassic Sandstones.

Trial pits were excavated to verify the ground conditions noted above.

HISTORY

The barn was built in the early eighteen hundreds and has undergone some small amount of changes since it was first built. The large arch on the West elevation has been reduced.

A store has been built onto the South elevation.

There have been adjustment and alterations in and around the arch on the East elevation.

In the middle of the East elevation there is a brick buttress supporting the existing stone masonry.

Restraint ties / 'x' bars are visible on the upper masonry to the West elevation.

Over a period of time the ground has been raised in the area adjacent to the Southern end of the East elevation.

EXTERNAL INSPECTION

The front West elevation has one large and two smaller doors. The small door to the South enters a former potato store. Above the small door the masonry has moved out a moderate amount at from first floor level up to the eaves.

At the Southern end of the West elevation there are stone quoins from ground to roof level. The quoins allow for the adjustment in the transition between the brickwork used for this elevation and the stone of the Southern gable.

Above the level of the garage lintel / beam the stone quoins have dropped and moved outwards with the gable wall.

The garage lintel / beam was not original and has been built into the South gable wall. The lintel takes bearing underneath one of the stone quoins. The movement of the quoins is predominantly above the level of the garage lintel.

At the Northern end of the West elevation there are stone quoins for the return of the Northern gable wall. There are slight cracks radiating up through the building between the quoins and brickwork. Immediately outside these quoins is the only rainwater downpipes (rwp) and gully into which the rwp discharges. The guttering is set incorrectly against the tiles of the roof.

The remainder of the brickwork to the West elevation has areas of poor pointing and a small number of bricks which are spalling / soft surface to the brick.

To the whole of the West elevation there is a very large concrete hardstanding forming the central core of the farm yard.

The Southern gable wall has moved outwards at high level with the

smaller amount of movement being on the West side. There are some small areas where the pointing is a little loose or slightly moved outwards.

Part of the capping of the Western gable is loose or badly weathered with cracks running along the underside of the cement fillet.

The Northern gable shows very slight outward movement. There are only small areas of very slight cracking and areas of loose pointing to this elevation. The capping stones are loose on the Western side and are allowing water to penetrate into the masonry.

Alterations have been carried out to the East elevation. The alterations are the enclosing brickwork under the large arch and a brick buttress in the middle of the elevation. There are areas of extensive re-pointing.

For the East elevation starting at the Southern end there are some slight cracks in the stone masonry. The South end of the wall is satisfactory with the movement of the wall the nearer to and around the brick buttress. The wall has slightly moved outwards and bears onto the buttress. The guttering above this area has become separated and during extremes in rainfall the water cascades off the roof onto the open ground below.

A trial hole was excavated to determine ground conditions and bearing as well as foundation depths. The trial hole was located against the East elevation and very close to the Sothern wall. The depth of the foundation was 800mm and protruded from the face of the wall by 120mm. The foundations were bearing on firm moist orange CLAY.

The buttress is constructed of brick. Around the buttress the masonry has been re-pointed and a small amount of very slight cracking exists.

There is a brick arch which was originally a horse / trailer entrance. The opening arch is now in filled with brickwork from ground level to tight up

to the underside of the arch. There are no cracks within the new brickwork.

In the North East corner there is a single storey lean-to. There are some slight cracks in the return masonry to the brick arch.

There are very slight cracks in the Eastern wall with a small amount of rotation to the wall in the South East corner. Above the corner there is a small upstand which is allowing water to penetrate into the masonry. In this same corner there is a rainwater pipe which discharges onto the open ground.

INTERNAL INSPECTION

The inside of the barn is currently used as store offering full loads to various areas of the solid ground floor and the timber first floor. The roof inside of the barn has timber trusses spanning full width (East to West) of the building.

The timber trusses support timber purlins which in turn support the rafters carrying the tiles. Part of the roof has a lining and other areas have been under-clad with polythene sheeting.

The condition of the whole roof is surprisingly very good with very little evidence of decay or rot / worm. Some of the connections in the timbers are bolted or nailed and some metal fatigue is present.

There are divisional cross walls on the ground floor which provide stability to the outside walls. The cross walls abut the perimeter walls. The abutments are intact with the perimeter walls.

There is very little evidence of water penetration through the roof structure. As part to the refurbishment the roof tiles will be removed and re-laid with the appropriate felt battens etc.

There are a small number of rafters which have knots in the middle of the spans and the rafters show signs of distress.

The metal fixings show signs of metal fatigue between the connections of the rafters to purlins and wall plates.

There are trusses supporting the main structure of the roof. For the most part the timber trusses are fully intact. There are some metal fatigue to the fixings in the trusses and a small amount of woodworm.

The first floor is designed for storage loading. The condition of the first floor is in fairly good condition. At the Southern end of the building there are some substantial timber joists supporting the boarding above. Two of these large timbers have moved on the support close to the East wall. The masonry under the joists has become dislodged due to alterations and deterioration of the bed joints.

On the Eastern side the inside of the brick arch has a small number of the bricks missing. The arch is fully supported by the recent infill of masonry. There are some slight to moderate cracks in the upper part of the Eastern wall. The upper part of the Western wall has also moved outwards in a small area located towards the Southern end of the building.

The ground floor is a solid floor which will be replaced as part of the refurbishment.

We have not inspected woodwork or other parts of the structure which are covered unexposed or inaccessible and we are therefore unable to report that such parts of the property are free from defects.

CONCLUSION

The overall condition of the barn is in very good considering its age and

original usage. Additional supports have been inserted which have helped to maintain the structural stability of the building. The roof has been cared for over the years greatly helping to keep the building watertight and longevity of the internal components.

The internal floors and walls all aid to tie and hold the structure intact. There are few anomalies which are comparatively easily rectified for the future of the refurbishment.

There are two areas where a small amount of strengthening of the foundations. The Southern ends of the Eastern elevation require the foundations to be deepened to a depth of approximately 1.40 metres. As a precaution the buttress should have the foundation extended down to a similar depth.

The upper part of the Western elevation towards the southern end requires rebuilding. The new masonry should match existing and be fully toothed into the existing. The plate on top of this wall should be one continuous timber. A continuous timber can then span between and tied to the timber trusses thus strengthening the area of wall.

The roof is to be completely stripped of tiles and re-laid. The uncovering of the timbers within the roof will allow a detailed inspection by the structural engineer. Minor adjustments to the roof timbers can be made during refurbishment.

The timber trusses will require some metal bars and plates coupled with dog toothed connectors. Some new rafters should be added and reconnected to the wall plates. Strapping down of the wall plates are also a requirement for continued stability. Use 30 x 5mm thick stainless steel ties.

There are some replacement floor joists requiring replacement. The larger floor joist at the Southern end will require three joists to be

replaced. At the same time as the replacement the bearing of the timbers should also be rebuilt.

The brick arch can be strengthened to allow the inserted masonry to be removed. The mixing bricks from the arch can be replaced. Stainless steel helical bars can be drilled into the masonry adding to the cross and lateral tying of the wall and roof.

Prior to a reasonable amount of pointing to be carried out there are some additional repairs. There are some wider joints from historic and recent movement. These joints should be pressure filled with expanding / non shrinkage grout.

The front hardstanding should be disturbed as little as possible. The large slab covering the Western yard will protect foundations and maintain the consistency in moisture content of the clay subsoil. The other rainwater pipes should be re-deigned for maximum ease rainwater disposal.

The rainwater pipes / surface water drainage system should also be made to be fully operational around the property and this will therefore necessitate the introduction of new soakaways positioned away from the building.

The soakaways must be located on the downward slope and be at least 6.0 metres away from the building and must be capable of handling the volumes of water. The inside of the excavation should be filled with clean selected hardcore 75 - 100 mm in size. The hardcore should be capped off with 150 mm lean mix concrete and on top should be placed two layers of sarking felt.

The damp proof course should be a liquid injection around the perimeter of the building. The timbers should all be treated against woodworm etc. Any timbers found to contain too much damage should be replaced.

There are areas of masonry which require some re-building and re-stitching with new masonry. There are areas of brickwork which do require some re-pointing of the mortar joints.

All work specified must be carried out as follows :

a. Within four months from the date of this report.
b. Professionally Designed.
c. Professionally Supervised.

A point of note is that any trees planted alongside the property which initially are small should not be allowed to mature as these can seriously damage foundations and underground services.

If the previously mentioned works are carried out satisfactorily then although slight disturbance / cracking may occur the building will remain substantially structurally sound.



PHILIP G MALIN Structural Engineer Principal
for and on behalf of

PEARSON ELLIS PORTSMOUTH
37 HAVANT ROAD
HORNDEAN
WATERLOOVILLE
HAMPSHIRE PO8 0DP

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