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Structural Inspection
Proposed Conversion:
Building to Rear of 69 Market Street,
Chapel-en-le-Frith, High Peak

1.0 Purpose of Report

- 1.1 Plans and Design have developed a scheme to convert the above existing building into 3No. 2-bed dwellings and are to apply for Planning Permission. We understand that a Structural Engineer's report is required for inclusion with the Planning submission.
- 1.2 This report is therefore prepared on the instruction of Emma Hall of Plans and Design, acting on behalf of Mr T Williamson, to comment on the current structural condition of the building in view of the proposals.

2.0 Site Inspection

- 2.1 The property was inspected by Mr M Davenport of this practice on Friday 17th October 2014. It is a two-storey stone-walled, gable-ended workshop building with a pitched slate roof. There is a two storey outrigger/extension to the south east of the main building. This links the main building to a domestic property to the south; off Park Road. The main building is otherwise detached. We would estimate the age of the main building to be in excess of 100 years. There are commercial properties on Market Street to the west and on Thornbrook Road to the north. There is a detached corrugated metal garage adjacent to the east-facing gable of the main building. The ground immediately adjacent to the building is generally flat.

Comments on the inspection are as follows, handing being expressed throughout this report as viewed facing the arched entrance to the main building from the courtyard to the South West:



2.2 Front Elevation (South-Facing)

Coursed natural stone. The depth of the courses generally reduces towards the top of the wall. The bottom 1.5m of the wall is rendered. Large entrance door towards the left hand side. Steel beams, bolted together side-by-side, have been introduced below the original shallow dressed stone arch to this door opening. The gap between the steel beams and underside of the arch has been infilled with dressed stone. The original stone arch has flattened towards the centre of its span and the steel beams below dip towards the centre of their span. The coursing above the arch dips down towards the centre of the arch. The top flange to the outer steel beam is significantly corroded. The coursing to the left hand side of this opening dips down towards the left hand side. The bottom 1.5m of the wall is rendered. There is a door opening to the centre of the elevation. The right half of the elevation is largely obscured by the outrigger. The surfacing adjacent to the front elevation is freshly-laid bitmac. It appears that the gutter to the front slope of the main roof overflows onto the surfacing adjacent to the front left corner. There is no gully at this position. The mortar joints are severely weathered in many areas. There are miscellaneous cracks to the top left of the arch, travelling generally upwards and towards the left from the left hand side of the arch. These cracks are up to approximately 20mm in width. Some cracking has occurred through previous repairs. Approximately 8mm to hairline crack to the bottom right of the steel beam, travelling down and to the right. The uppermost courses to the right of the wall appear to be displaced and loose. The plane of the wall is generally uneven with slight outward bulge towards first floor level. The wall is saturated at its junction with the left elevation to the outrigger, due to rainwater run-off from the front slope to the main roof and left slope to the outrigger roof.

2.3 Outrigger Left Elevation (West-Facing)

Consists of a doorway with steel cladding on a timber frame above. The timber framing is saturated at its junction with the main front elevation due to the aforementioned rainwater run-off.

2.4 Left Gable (West-Facing)

Coursed natural stone. The coursing becomes shallower towards the top of the wall. The bottom 1.5m of the wall is rendered. The mortar joints are severely weathered above first floor level. There are some missing stones. The wall leans outwards generally, particularly towards the front edge. Rearwards of the centre of the gable, and 1m to the left, there is a stone retaining wall running parallel to the gable. The ground level adjacent to the gable is 1.1m higher than the ground beyond the retaining wall.

2.5 Rear Elevation (North-Facing)

Coursed natural stone as per the front elevation and left gable. The mortar joints are severely weathered. The wall bulges outwards towards the centre at eaves level. The plane of the wall is generally uneven and also appears to lean outwards towards first floor level. Inspection of the base of the wall was restricted to the right hand side by storage. The coursing towards the right hand edge of the wall dips down towards the right. There is a rainwater downpipe close to the right hand edge. This discharges directly onto the ground and there is no gully. There is a tree in very close proximity to the wall.

2.6 Right Gable (East-Facing)

Coursed natural stone as per the other elevations of the main building. Severely weathered mortar joints. Inspection of the wall below first floor level was restricted by the corrugated metal garage, a caravan and storage. The plane of the wall appears to be slightly uneven. There is a vertical crack/open perpendicular joints approximately 0.5m forwards of the rear edge of the wall. Rearwards of this, the coursing slopes down towards the rear.

2.7 Outrigger Right Elevation (East-Facing)

Random coursed stone. The lintel over the doorway appears to be missing. The mortar joints are weathered below the gutter, which appears to be leaking.

2.8 Roof External

The covering to the main roof is slate. The roof is pitched front to rear. There is a significant dip in the ridge to the right of centre. The covering to the outrigger roof is concrete tiles. The ridge to the outrigger dips down towards its junction with the main front wall. The plane of the outrigger right slope is very uneven. The rear main roof slope was not visible due to a lack of access.

2.9 Left Ground Floor Room to Main Building

Concrete floor. Inspection partly restricted by storage. Plastered/rendered walls. The first floor joists span left to right and are supported at mid span by a steel beam spanning front to rear. There is surface corrosion to this beam. The front bearing to this beam is adjacent to the right hand edge of the door opening. The first floor joists are supported on the left gable via a timber joist spanning front to rear – due to the format of the support the first floor provides no significant lateral restraint to the gable. Hairline to 1mm cracks to the bottom left and right of the rear bearing to the steel beam.

2.10 Right Ground Floor Room to Main Building

Concrete floor. Plastered/rendered walls and boarded ceiling. Timber floor beams spanning left to right across the centre. This supports timber beams spanning front to rear close to the right elevation. Localised inward bulging and cracking to the rear right corner, adjacent to the bearing of timber beam. Steel prop to the centre of the rear wall, supporting the first floor. 2No. 3mm to hairline vertical cracks to the bottom centre of the centre window to the rear wall, travelling downwards towards floor level.

2.11 Outrigger Ground Floor

Inspection severely restricted by piles of stone. Bonded brickwork party wall to the front. This wall leans rearwards between ground and first floor level. The ground floor appears to be rough concrete.

2.12 First Floor to Outrigger

Inspection severely restricted by storage and the timber floor is considered unsafe. The outrigger roof is supported on timber purlins spanning front to rear. The rear bearing to the left hand purlin has rotted away. The end of this purlin is now supported on a blockwork pillar, in turn supported off a steel beam at first floor level, spanning front to rear adjacent to the left wall of the outrigger. The floor has collapsed towards the right hand side of the outrigger. The roof above this collapse appears to be leaking heavily and the roof timbers are in very poor condition.

2.13 First Floor Room to Main Building

Vaulted ceiling. 2No. timber kingpost trusses at third points along the length of the roof, spanning front to rear. Both trusses are severely charred. The right hand truss sags towards the centre of its span. An additional timber member has been added alongside the ceiling tie to this truss. The left hand truss also sags towards the centre of its span and is now supported by timber packing below the king post, off a substantial steel beam spanning front to rear. Some of the charred rafters remain, whereas others have been replaced. Similarly some charred purlins remain and have been supplemented by a haphazard arrangement of timbers generally spanning left to right and packed off the trusses. There are mezzanines adjacent to both gables. The floor joists to the right hand mezzanine span front to rear and are supported at mid span by a reclaimed steel beam spanning between the right hand gable and a brick pillar built off the ground floor dividing wall below. There is an office below the rear of the right hand mezzanine. This could not be accessed due to storage. The floor members to the left hand mezzanine are supported off a steel beam spanning between the front and rear walls. There is cracking to the top left and right of the steel beams above the main external doorway. The steel beams have surface corrosion. 3mm to hairline vertical crack to the top centre of the right wall, travelling downward approximately 1.5m from the high level opening. The stonework to the top of the rear wall appears to have been reduced in height slightly.

3.0 Conversion Proposals

3.1 Plans and Design drawings 69MS/PL/03 and 04 indicate the following:

1. The outrigger is to be demolished in its entirety
2. The external walls to the main building are to be retained
3. The high level windows to the rear wall are to be infilled
4. The existing door opening to the left hand side of the rear wall is to be retained and two new door openings are to be created
5. The 3No. ground floor openings to the rear wall are to be repositioned
6. The main doorway door opening to the left hand side of the front elevation is to be retained. The stone archway is to be rebuilt reusing the existing stone and the steel beams/stone infill below the arch removed
7. The left gable is to be retained in its current format
8. The right gable is to have a new window opening
9. The main roof is to be replaced in its entirety
10. The main building is to split into three by new party walls running front to rear
11. The existing first floor and mezzanines are to be removed in their entirety and new floors added to create 3No. storeys

4.0 Conclusions and Recommendations

- 4.1 The inspection highlighted a number of items of structural concern. We would discuss each of these, their respective causes and impact on the proposed conversion in more detail as follows:
- 4.2 The outrigger to the front right of the main building is in very poor condition from a structural point of view. If it was not to be demolished as part of the scheme proposals, we would have recommended that it be taken down and rebuilt in any case.
- 4.3 Similarly, the roof to the main building is in very poor condition from a structural point of view. The roof has clearly suffered extensive fire damage, although probably not in recent years. Various ad-hoc strengthening measures and repairs have been implemented in an apparent attempt to combat severe deflection of the trusses. As a consequence of the truss deflection, the ridge has dropped and in turn pushed the rear wall outwards at eaves level. It was noted that the top of the rear wall appears to have been lowered and the stonework to the right hand side of the front elevation appears loose and has been displaced outwards. We are of the opinion that this is a consequence of the roof spread and may also be attributable to partial collapse of the roof as a result of the fire.

We note that the conversion proposals call for the roof to be replaced in its entirety, and replaced in a different format. We are of the opinion that replacement of the roof is required in any case from a structural point of view.

- 4.4 There are a number of structural defects towards the left hand side of the front wall to the main building. The original shallow dressed stone arch over the main door opening has flattened, causing sagging of the coursing above and lateral thrust to the front edge of the left gable. Steel beams have been introduced below the arch and the area between the steel beams and the arch infilled with stonework. This was clearly carried out many years ago and the steel beams have since also deflected under load. In addition the steel beams have corroded, creating expansive forces that have caused cracking to radiate from the ends of the beams.

The conversion proposals call for the steel beams/infill stonework to be removed and the stone archway rebuilt reusing the existing stones. To avoid the probability of ongoing movement due to inadequate strength of the arch in its original format, we recommend that the stonework above the arch is strengthened by the specialist installation of resin-anchored stainless steel bed joint reinforcement. In addition, the displaced stonework to the top right of the wall should be reset, any residual cracks made good and the wall repointed throughout as required.

We further recommend that the new internal cross walls, floors and roof construction be tied to the front elevation in accordance with Building Regulations requirements to provide adequate lateral restraint.

- 4.5 The left gable appears to lean outwards generally, particularly towards the front edge. This movement is clearly of very long standing, however recent movement evident to the left hand side of the front elevation suggests that outward rotation of the gable may be ongoing and progressive unless remedial action is taken. We are of the opinion that the movement is attributable to a combination of lateral thrust from the deflecting arch to the left hand side of the front elevation, a lack of adequate lateral restraint to the gable by the first floor and roof construction and apparent downward movement of the foundations to the front left corner.

The issue of lateral thrust will be negated by the recommended strengthening works over the arch and subject to the incorporation of lateral restraint strapping between the gable and the proposed first and second floor and roof construction, we are satisfied that the distortions to the left gable can be considered to be within structurally acceptable limits.

We are of the opinion that the downward movement of the foundations to the front left corner can be attributed to softening or washing out of the ground beneath the foundations over the course of many years due to defective rainwater goods. The current, recently laid, surfacing is relatively impermeable and subject to future prevention of water loss into the subsoil we think it likely that the ground beneath the foundations will recover and that further significant foundation movement is unlikely.

We recommend that any missing stones to the left gable be replaced and the wall repointed throughout as necessary.

- 4.6 Evidence of downward movement of the foundations to the rear right corner was noted. A rainwater downpipe discharges directly onto the ground in this location and there was no rainwater gully. We are therefore of the opinion that the movement can be attributed to softening and/or washing out of the ground beneath the foundations over the course of many years. As with the front left corner, removing the source of the water should be sufficient to prevent further significant movement.
- 4.7 The rear wall is distorted, due to the effects of roof spread and exacerbated by a lack of adequate lateral restraint. We consider the present degree of distortion to be within structurally acceptable limits, subject to it being tied to the new internal cross walls, floors and roof construction in accordance with Building Regulations requirements, to provide adequate lateral restraint.
- We recommend that the tree adjacent to the rear elevation be removed and that the rear elevation be repointed throughout.
- 4.8 Cracking and sloping coursing was noted to the rear of the right hand gable. We would attribute this to the same cause as described in 4.6. In this case however we recommend that the vertical crack towards the rear edge of the wall be made good and strengthened by incorporating resin anchored stainless steel bed joint reinforcement across the crack. The remainder of the wall should be repointed throughout.
- 4.9 The conversion proposals include an additional floor. This could result in increased foundation loading on the gables, which may be significant towards the rear half of the left gable, where the foundations are possibly reliant to some extent upon the adjacent retaining wall. We therefore recommend that the foundations to the gable at this point be exposed and assessed by a Structural Engineer.
- 4.10 This report is confined to the matters mentioned in Section 1 and no opinion is expressed or implied on matters not specifically mentioned.
- 4.11 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 any such part of the property is free from defect.



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