

Mr J Collinson

Ancillary Barn Conversion at Hougher Hall Farm, Old Clitheroe Road, Ribchester. PR3 2YU

Structural Appraisal Report

S1440 rev0

May 2011

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Document Control Sheet

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1.0 Survey

1.0.1 The scope of this Structural Appraisal is to offer opinion as to the structural integrity of an existing agricultural building, presently derelict, prior to consideration of conversion into two individual residential dwellings. The structure in question to be surveyed is owned by Mr J Collinson.

1.0.2 This report is to be read in conjunction with PGB Architectural Services Limited's drawings referenced 2536/01-08 providing existing and proposed floor layouts, sections and elevations.

1.0.3 The structure under consideration is situated approximately 5.0km north east of the village of Longridge, and approximately 9.6km south west of Clitheroe Town Centre, within a rural environ of the County of Lancashire. The area of proposed refurbishment comprises a 'U' shaped, traditional sandstone constructed; dual pitch roofed ancillary agricultural building, presently derelict. Of three distinct areas surrounding a paved courtyard, a former animal housing/barn structure is situated to the west, with dilapidated 'store' areas bounding the courtyard to the north and east.

The surrounding landscape comprises of soft and hard landscaping associated with adjacent residential dwellings. Directly beyond the rear elevation, a more formatively constructed blockwork wall retains a 1.0m height of adjacent grassed landscape.

1.0.4 The structural inspection undertaken was limited to the area of proposed redevelopment. We would point out that during the course of our inspection, no intrusive/destructive investigation methods/procedures were utilised to ascertain the nature of construction of the property substructure and superstructure elements. Whilst comment/opinion may be made regarding perceived wall elevation/stability, such opinion is based upon visible evidence of superstructure elements, not upon visual inspection of foundation/substructure.

The structural inspection undertaken was limited to external and internal visual observations made during the course of our survey undertaken on 06 May 2011. All external observations were made from adjacent ground level. All internal observations were made from adjacent corresponding ground level.

Whilst opinion may be made regarding perceived points of a structural nature, such opinion is based solely upon visible evidence observed and experience/knowledge with

respect to such issues. Such opinions where given, should, at the earliest opportunity be confirmed or otherwise by suitable and appropriate further investigation techniques.

1.0.5 Appended to this report, photographs taken during the course of our inspection. Where reference is made thereto, the proceeding commentary should be read in conjunction to their reference, and where appropriate, annotation of the photographs has been made to highlight pertinent points.

1.0.6 The area of redevelopment is an unoccupied, in parts dilapidated, ancillary agricultural property, situated approximately 20m west of the existing 'Hougher Hall Farm' residential farmhouse. Of load bearing masonry (sandstone), presumed cavity rubble fill original construction varying between 370-600mm thickness, the roof is of traditional timber construction, holding a combination of partial slate, corrugated sheet metal and exposed timber boarding finishes supported by means of timber purlins spanning between load bearing masonry wall elevations and timber trusses.

With the exception of the 'Barn' area, all ground floor construction comprises of more formative ground bearing concrete slabs. Within the 'Barn', although severely restricted during inspection due to the presence of stored haylage, the underlying finishes comprise of original stone sets.

1.0.7 **External Elevation Survey**

Barn Rear Elevation; Plate 01 refers to the west facing rear elevation of the 'Barn' structure. The slate finishes to the rear elevation roof pitch exhibit evidence of previous historic deflection of underlying structural members, although not considered significant or detrimental based upon age and nature of construction. Significant lateral displacement (40mm) is noted approximately 2.0m from the corner junction with the rear elevation for full height (Plate 02), attributable to the 'spread' of the corresponding internal 'Cruick frame/truss'. The remaining length of elevation demonstrates 20-40mm measured over a 1.0m length of external vertical displacement from ground to eaves levels. A timber lintel, situated above a central window opening head exhibits shrinkage cracks (Plate 03), whilst vertical and diagonal mortar cracking emanating from the right hand side masonry lintel bearing is evident to the window opening adjacent to the gable corner (Plate 04), attributable to historic movement.

Barn Gable Elevation; Plate 05 provides record of the gable elevation general appearance. Apparent, the elevation 'leans' from ground to eaves level; 20mm over a 1.0m measured length. Prominent vertical cracking of mortar beds and perpends extends from eaves towards ground level, terminating approximately 1.0m above grade level adjacent to the corner junction with the Barn front elevation (Plate 06). We are of the opinion that such is a result of Thermal expansion/contraction and a lack of controlled movement joints.

Barn Front Elevation (Courtyard); The east facing front elevation of the structure is detailed within Plate 05. The slate finishes to the visible roof pitch exhibit evidence of historic underlying member deflection, not deemed excessive. The masonry facade along its length is generally plumb, with vertical displacement from ground to eaves level recorded at a maximum 10mm over a 1.0m length. An area of lateral displacement is noted to the right hand side of the main barn door opening for full elevation height, measured at 20mm from adjacent elevation lines. Cracking noted at lintel bearings of the single door opening within the front elevation (Plate 07) adjacent to the gable corner is attributable to historic differential movement of both elevations with respect to one another, together with a lack of restraint offered by both.

Store Front Elevation-South facing (Courtyard); As evident from Plate 08, the combined roof finishes of asphalt tiles, corrugated sheet metal profile and exposed timber boarding are in a severe state of dilapidation. The masonry wall elevation, comprising significant door openings is reasonably vertically and laterally plumb.

Store Front Elevation-West facing (Courtyard); Plate 09 records the condition of this annexe. As is clearly evident, the roof is in a severely dilapidated state, with areas of underlying rafters exposed. The wall elevation is reasonably plumb, however heavily weathered. The junction of the courtyard and gable elevations is not tied/bonded, with a full height vertical 'butt' joint (Plate 10) offering evidence of more formative repointing remedial works having been undertaken.

Store Gable Elevation; As evident within Plate 11, the gable elevation holds significantly weathered fascias, mortar bed and perpend joints. The elevation whilst reasonably plumb, measures 10mm vertical displacement from ground to eaves level.

Store Rear and Gable Elevation-East facing; Likewise with the front roof pitch of this annexe, the roof is in a severely dilapidated state, with areas of underlying rafters exposed (Plate 12). Beneath the window opening contained within the rear elevation, a 20mm

lateral displacement is recorded by comparison to the adjacent elevation. The elevation is generally vertically plumb for the remaining construction, however significantly weathered. The gable elevation offers 30mm lateral displacement at mid length.

Store Rear Elevation-North facing; This comprises of the store rear and barn gable elevations (Plate 13). The roof finishes and condition 'mirror' those detailed for the front roof pitch. Throughout the elevation, formative replacement of all door and window opening head, jamb and sill members had been undertaken with 'Artstone' members. The elevation generally exhibits weathered fascias, mortar bed and perpend joints, however reasonably vertically aligned. The masonry pier situated between the double door opening (adjacent to Store east facing elevation corner) and adjacent window opening 'bows' laterally, of the magnitude of 20mm within the pier width. The Barn gable elevation is reasonably plumb, more formatively subjected to remedial re-pointing works. The existing window opening situated within the gable elevation would appear to have been a previously infilled door opening (Plate 14). Adjacent to the rear elevation, a more formative blockwork retaining wall has been constructed, retaining adjacent garden areas. The wall leans 20mm from base to coping.

1.0.8 **Internal Survey**

Agricultural Barn Stalls; Within the Main Barn structure, 'stalls' have been created within and area adjacent to the south facing gable elevation (Plate 15), partitioned from the barn area by means of a single storey height, load bearing masonry partition. Additionally, a more formative timber first floor provides a 'storage platform', supported by intermediate timber beams spanning from gable to partition. All internal wall elevations hold a rendered façade. The internal aspect of the front elevation is vertically plumb, whereas the gable and rear elevations over a 1.0m length offer vertical misalignment of 10 and 30mm respectively (Plate 16). First floor 86x78 joists @ 450mm centres span from front to rear, supported intermediately by two number 230x100 timber beams spanning the width of the stall area. Visual evidence of wood boring insect infestation of the floor beam members is apparent; however excessive deflection/overstress of the structural members is not noted. The ground floor is of solid ground bearing concrete construction, visibly sloping from partition to gable elevations, however not offering any evidence of historic or recent movement.

Agricultural Barn; Plates 18 and 19 identify the original Barn structure to be that of a timber 'Cruck' frame/truss configuration. Comprising of three internal frames supporting original

timber purlin members, all original timber is of greatly reduced section, having been subject to historic damp/rot penetration and wood boring insect infestation (Plates 20 & 21). The rafter members to the roof have been more formatively replaced, and offer no evidence of similar infestation, nor rot/damp penetration when viewed from ground level. In terms of verticality, the internal gable elevation is considered plumb, with the internal elevations of the front and rear elevations 'leaning' 40 and 30mm over a one metre length from ground to eaves respectively. Several areas of the internal elevations exhibit spalled mortar beds and perpend joints (Plate 22). The existing floor incorporates a 400mm step running centrally across the area width. Although inspection was severely restricted due to the presence of stored haylage, it is presumed that the floor is of solid ground bearing construction, formed by stone sets, sloping from gable to partition elevations.

Stores (North); The northern 'Store' area comprises of four individual stores separated by means of load bearing masonry partitions. This report will detail the individual store areas identified in a west to east direction when viewed from the central courtyard area (reference Plates 8 & 13). Store 1, situated to the rear of the main barn gable holds a plastered 'bulkhead' ceiling construction, with isolated areas of spalled plaster throughout exposing underlying timber laths (Plate 23). No visual inspection of the structural roof members could be undertaken; however there was no evidence contained within the ceiling finishes suggesting any structural deformation of the overlying members. All wall elevations hold a plaster finish, exhibiting signs of obvious damp penetration, however generally plumb. A concrete, presumed ground bearing floor slab falls from rear to front, however not offering evidence of historic or recent settlement/movement.

Store 2 (Plate 24) is presently utilised for the storage of agricultural sundries. The roof holds no internal finishes, exposing damp penetration of boarding, rafter and purlin members (Plate 25). Similarly, the timber lintel member spanning the door and window opening contained within the front elevation exhibits similar rot. All internal wall elevations hold a whitewashed render application, reasonably plumb. A full height vertical joint is evident at the junction of the rear elevation and the partition to Store 3. Offering no evidence of significant movement, the joint indicates a lack of 'bond' between the two elevations (Plate 26). Again, a concrete, presumed ground bearing floor slab falls from rear to front, however not offering evidence of historic or recent settlement/movement.

Store 3 (Plates 27-29 inclusive) again holds no ceiling finishes, exposing boarding, rafter and purlin members subjected to historic damp penetration. All internal wall elevations are reasonably plumb. The partitions segregating Stores 2 and 4 are more formatively

constructed 215mm thick standard format brick elevations. The internal timber lintel member above the westerly door entrance has been the subject of historic wood boring insect and damp infestation. A concrete, presumed ground bearing floor slab falls from rear to front, however not offering evidence of historic or recent settlement/ movement.

Store 4 (Plate 30) is in a severely dilapidated condition. Obviously exposed to historic weathering, timber boarding is missing, exposing rafter and purlin members to moisture, rot and wood boring insect penetration. Similarly, the internal timber lintel member above the front elevation exhibits similar deterioration (Plate 31). All wall elevations offer obvious damp penetration, however reasonably plumb. A concrete, presumed ground bearing floor slab falls from rear to front, however not offering evidence of historic or recent settlement/movement.

Stores (West); The western 'Store' area comprises of two individual stores separated by means of a load bearing masonry partition. This report will detail the individual store areas identified in a north to south direction when viewed from the central courtyard area (reference Plate 09). Store 5 (Plate 32) is also in a severely dilapidated condition. Obviously exposed to historic weathering, timber boarding is missing, exposing rafter and purlin members to moisture, rot and wood boring insect penetration (Plate 33). With no front elevation, presumably to accommodate the movement of agricultural plant, the internal wall elevation exhibit obvious signs of mortar weathering (Plate 34). The ground floor slopes from rear to front, of solid concrete ground bearing construction.

Within Store 6, a timber coop has been constructed, severely restricting inspection of this area (Plate 35). Only partial viewing of the roof structure can be undertaken, where so again demonstrating a severe state of deterioration. The only visible wall elevation is that of the load bearing masonry partition to Store 5. Reasonably plumb, the elevation exhibits obvious damp penetration, demonstrated by the spalled whitewash application (Plate 36).

2.0 Conclusions and Recommendations

- 2.0.1 The property is generally of 'reasonable' structural condition considering its age and nature of construction. At present, the structure is stable; however, subject to historic movement and levels of deterioration, we are of the opinion that in its present condition, the medium to long term structural integrity of the property could not be categorically guaranteed. We would therefore recommend a number of remedial measures to arrest potential ongoing deterioration of structural members thus improving the long term

structural integrity of the building, particularly based upon the proposed change of use to that of residential.

- 2.0.2 It is recommended that consideration of a “specialist” timber survey is undertaken throughout the proposed redevelopment area. Such a survey should identify the nature and extent of any wood boring insect infestation, dry/wet rot and fungal attack within all pertinent structural timber members (roof and lintels) and where appropriate, recommend the extent of remedial works necessary to arrest such.

However, it is our considered opinion that the existing timber roof structure throughout the property and ‘Cruck’ frame/trusses are structurally inadequate to sustain proposed loading. Based upon our perception of the planning process, we would fully expect that the retention of the ‘Crux’ frames to be conditioned within any planning permission granted. However, we would suggest that their retention be limited to that of an aesthetic purpose, and in no way an integral element of the structural fabric of the proposed dwellings due to their dilapidated condition.

- 2.0.3 Whilst not of a structural concern, we would recommend a “damp” survey be undertaken to all masonry elevations within the proposed area of refurbishment. If as expected, the level of the moisture within the wall elevations is excessive, remedial treatment solutions should be considered if necessary, particularly as proposal necessitate the ‘physical connection/tie’ to a blockwork lining wall.

- 2.0.4 Should a timber survey determine that the existing ‘Stalls’ first floor members are free from rot, damp and wood boring insect infestation, structural assessment of their capability to sustain proposed domestic floor loading prior to redevelopment is required.

- 2.0.5 Significant, full elevation height lateral ‘bulging’ within the ‘Barn’ rear elevation is attributable to the historic ‘spread’ of the corresponding internal ‘Cruck’ frame adjacent to northern gable elevation. Based upon the extensive lateral movement, we would recommend the full height demolition of a 5.7m partial rear elevation length, extending from the corner junction of the northern gable, attributable to approximately 6% of the property’s total existing elevation area. Demolition should be taken down to existing ground level and rebuilt from existing substructure masonry, ensuring the rebuilt elevation ‘ties’ into the remaining wall elevation beyond. We would suggest that the inner and outer leaf masonry blocks are re-used, fully tied with a cavity formed and insulation requirements

to current standards. The re-built elevation should be fully bonded/'toothed' into adjoining wall elevations.

- 2.0.5 Where vertical mortar cracking is noted within the Barn rear and gable elevations, we are of the opinion that such is attributable to a potential combination of the historical 'spread' of roof members and thermal movement, particularly based upon their proximity to return openings. Proprietary mid steel straps should be secured internally with appropriate fixings, across the crack location at 300mm maximum vertical centres for the length of the crack. This remedial measure we feel is the most appropriate as it is assumed that a blockwork 'lining' wall is to be adopted.
- 2.0.6 Within the Store areas, where brickwork internal partitions have been constructed abutting front and rear elevations, proprietary mid steel straps should be secured internally with appropriate fixings across the joint location at 225mm maximum staggered vertical centres for the height of the elevation. Where a 'butt' joint is formed between Store 6 front and gable elevations, internal proprietary corner strapping is to be provided at 450mm vertical centres.
- 2.0.7 Whilst not necessarily of structural significance, we would recommend that where noted, all weathered and cracked mortar bed and perpend joints are re-pointed, particularly where vertical cracking is noted within the external elevations, previously addressed by internal strapping recommendations.
- 2.0.8 Based upon proposals, a blockwork lining skin is to be constructed internally throughout adjacent to the existing inner leaf. This leaf should be fully tied into the existing masonry using appropriate proprietary wall ties at 900mm horizontal and 450mm vertical centres; 150mm distance from and 300mm maximum vertical centres at all openings.
- 2.0.9 We would expect, particularly within the 'Barn', the provision for a replacement ground floor slab should comprise of a 150mm thick, ground bearing concrete slab, laid upon 150mm thick compacted hardcore and a single layer of 1200 gauge damp proof membrane ("Visqueen" or approved equal), formed upon approved competent sub-base strata. Nominal mesh type reinforcement (A193) to the top of the slab should be provided with 25mm cover. Adjacent to external wall elevations, the requirement of a thickening/downstand should be accommodated upon which formation of the proposed blockwork internal leaf can be made.

- 2.0.10 No lateral restraint is presently afforded to the wall elevations. Whilst evidence of lateral displacement is noted throughout, unless commented otherwise, it is of no detrimental effect to date. The provision of a proposed inner blockwork leaf tied to the existing masonry wall elevations will provide enhanced stability. However, notwithstanding this point, we would recommend as part of the refurbishment proposals, restraint strapping at eaves and apex levels are undertaken throughout.

Additionally, where partial first floor levels are proposed, again, the introduction of restraint strapping is recommended to be undertaken.

- 2.0.11 Where proposals necessitate the removal and/or demolition of existing structural elements of the property, careful consideration to the method and sequence of temporary support works should be given, not only to ensure the safety of site personnel, but so as not to compromise the structural integrity of the immediate property area.



Plate 01 – Main Barn rear elevation



Plate 02 – 'Bulge' within rear elevation adjacent to northern gable



Plate 03 – Thermal cracking to timber lintel within Barn rear elevation



Plate 04 – Vertical cracking at lintel bearing within Barn rear elevation



Plate 05 – Barn Gable and Front elevations



Plate 06 – Vertical cracking within Barn gable elevation



Plate 07 – Historic movement/visible cracking within Barn front elevation



Plate 08 – Store (northern) front elevation

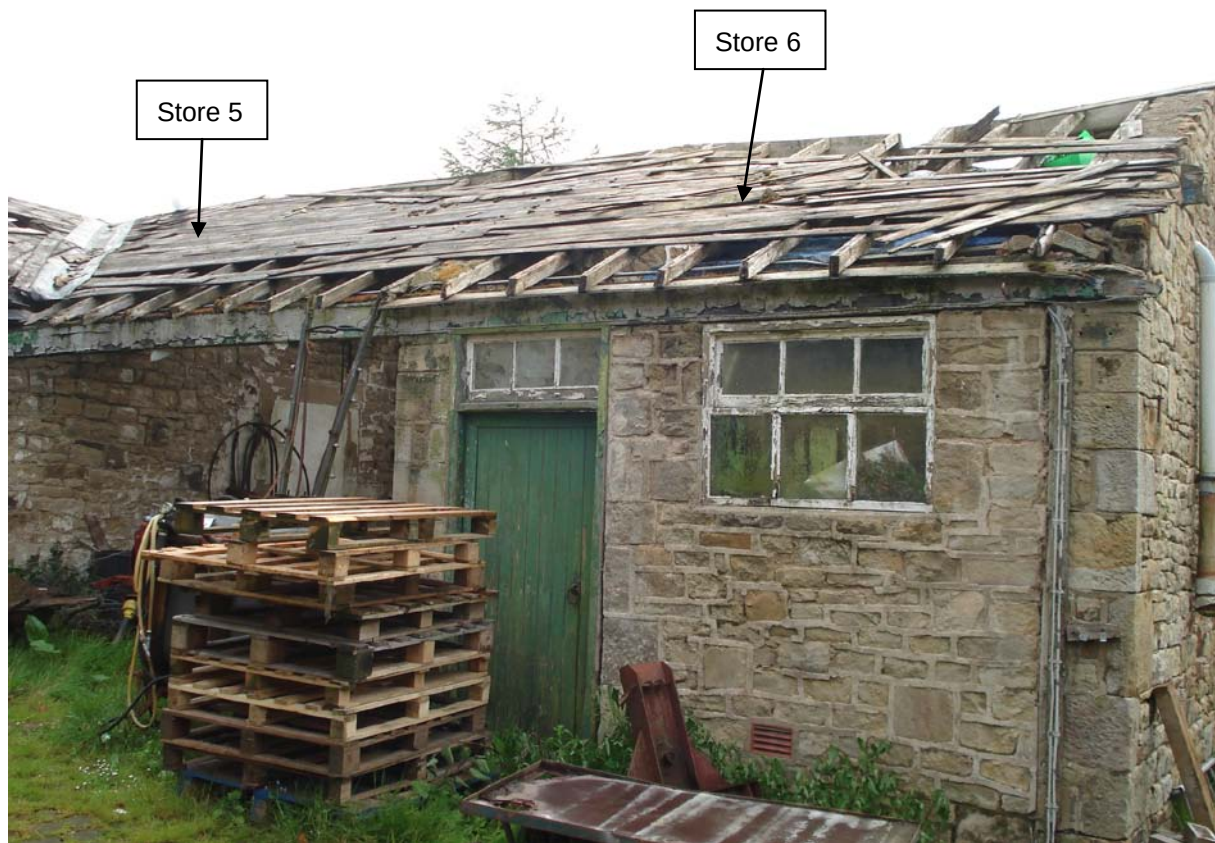


Plate 09 – Store (western) front elevation



Plate 10 – Butt joint @ Store 6 front/gable elevations



Plate 11 – Store 6 gable elevation



Plate 12 – Stores 5 & 6 rear elevation



Plate 13 – Stores (northern) rear elevation



Plate 14 – Infilled former door within Barn north gable elevation



Plate 15 – ‘Stalls’ within Main Barn structure

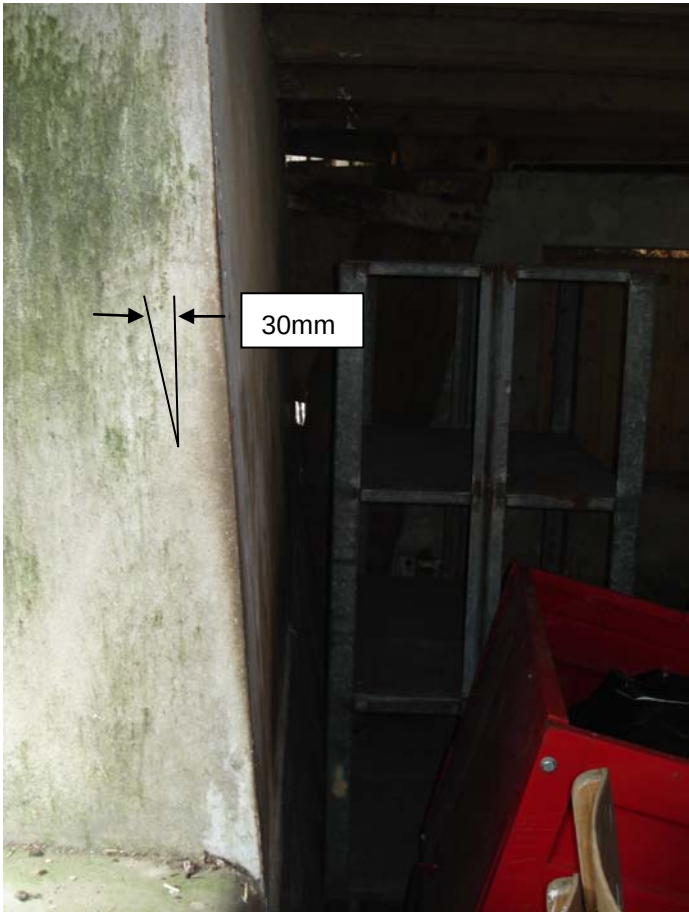


Plate 16 – Rear elevation (Stalls)



Plate 17 – Wood boring insect infestation to first floor beam (Stalls)



Plate 18 – Main Barn 'Cruck' frames (north facing)



Plate 19 – Main Barn 'Cruck' frames (south facing)



Plate 20 – 'Cruck' frame historic deterioration/section reduction



Plate 21 – 'Cruck' frame historic deterioration/section reduction



Plate 22 – Spalled mortar within internal aspect of Main Barn



Plate 23 – Spalled ceiling finishes within Store 1



Plate 24 – Store 2



Plate 25 – Store 2 internal roof finishes



Plate 26 – Store 2/3 internal partition butt joint with rear elevation



Plate 27 – Store 3 internal brickwork partition to Store 4



Plate 28 – Store 3 internal front elevation



Plate 29 – Store 3 internal roof finishes



Plate 30 – Store 4 internal gable elevation



Plate 31– Store 4 timber lintel member (front elevation)



Plate 32 – Store 5



Plate 33– Store 5 roof viewed internally



Plate 34 – Store 5 rear elevation – weathered mortar bed and perpend joints



Plate 35 – Store 6 internal partition and roof adjacent to Store 5



Plate 36 – Spalled whitewash finish to Store 5/6 partition