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STRUCTURAL INSPECTION

OF

BARN BUILDINGS

AT

CLIFF HOUSE FARM

FOR

MR D DAWSON

Date of Inspection **13th February 2011**

Reference No. **11/101**

1.0 INTRODUCTION

1.1 General

1.1.1 The EPOC Group was appointed by Mr D. Dawson to carry out a structural appraisal of Barn Buildings at Cliff House Farm

1.1.2 The following report shall be for the sole use of Mr D Dawson this report should not be reproduced in whole or in part or relied upon by third parties for any use without the expressed written authority of The Epoc Group. This exclusion shall not apply to any party acting for Mr D. Dawson having a strictly professional interest in the specific matters to which this report relates.

1.1.3 This report relates only to the following barn buildings
a) Laith Barn (excluding block built structure to Southern elevation)
b) Eight Cattle Barn
c) Three Cattle Barn
d) Tractor Shed

1.1.4 This report is based on an inspection of visible, exposed and accessible parts of the structural fabric of the barn buildings under consideration.

1.1.5 The objective of this report is to establish the structural condition of the barn buildings and make recommendations for remedial works to convert into dwellings.

1.1.6 Cliff House Farm is located approximately 2.0kM South of Penistone in South Yorkshire.

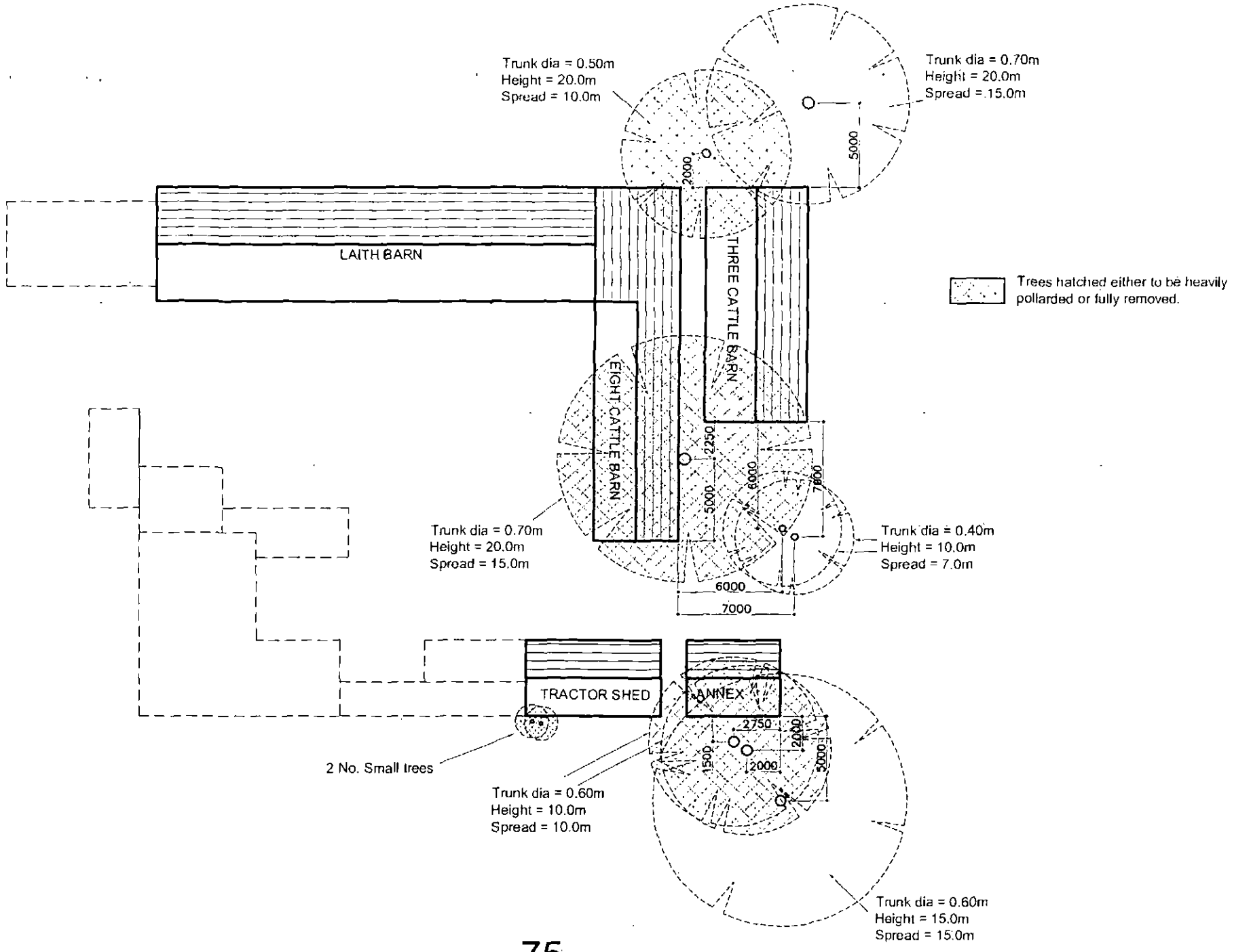
1.1.7 Access to the site is via an unmade track off Mortimer Road

1.1.8 The inspection was carried out on 22nd February 2011. At the time of the inspection the buildings were being used to house livestock and store hay.

1.1.9 The site consists of four barn buildings and a farmhouse. The farmhouse was occupied at the time of the inspection and does not form part of this structural report.

1.1.10 To the clients knowledge neither the barns nor the farmhouse are listed.

1.1.11 The Cliff House Farm dates back to pre-1850.


Trunk dia = 0.50m
Height = 20.0m
Spread = 10.0m
Trunk dia = 0.70m
Height = 20.0m
Spread = 15.0m
5000
2000
LAITH BARN
THREE CATTLE BARN
EIGHT CATTLE BARN
Trees hatched either to be heavily pollarded or fully removed.
2250
5000
6000
7000
Trunk dia = 0.70m
Height = 20.0m
Spread = 15.0m
Trunk dia = 0.40m
Height = 10.0m
Spread = 7.0m
6000
7000
TRACTOR SHED
ANNEX
2750
2000
2 No. Small trees
Trunk dia = 0.60m
Height = 10.0m
Spread = 10.0m
Trunk dia = 0.60m
Height = 15.0m
Spread = 15.0m

UNITS 1 & 2.

2.0 LAITH BARN

2.1 OBSERVATIONS

2.1.1 General Observations

2.1.1.1 The barn building comprises solid stone walls supporting a timber roof. At the time of the survey the roof was covered with slate tiles.

2.1.1.2 The barn is attached at its South end to the Eight Cattle Barn and is comprised of two and single storey sections.

2.1.1.3 The barn forms a complex of buildings on Cliff House Farm.

2.1.1.4 The ground level around the barn slopes up from North to South.

2.1.1.5 There were many large trees surrounding the barn building but all were further than 10.00m away.

2.1.2 East Elevation

2.1.2.1 This wall is approximately 500mm thick and constructed in coursed stone masonry. **(Photograph 1 & 2)**

2.1.2.2 The wall is in good condition with no signs of bulging, cracking or movement in either the vertical or horizontal planes.

2.1.2.3 This elevation has been repointed at sometime in the past using sand and cement. The pointing is general in good condition with localised spalling and mortar loss in areas.

2.1.2.4 The timber windows and doors to this elevation are in poor condition with some openings missing windows and doors altogether.

2.1.2.5 There are two archway door openings in this elevation. Both openings are in good structural condition showing no signs of settlement or failure. The smaller opening has had infill masonry each side to make a smaller door opening. **(Photograph 3)**

2.1.2.6 Lintels over doorways and windows are generally in good condition. One lintel at first floor level shows signs of outward movement. Two lintels at ground floor level have been replaced with modern concrete lintels **(Photograph 2)**

2.1.2.7 Most of the doorways and one of the windows at first floor level have vertical stone reveals which are generally in good condition with some cracks noted to two of the reveals **(Photograph 4)**

2.1.2.8 There are a set of external stone steps at the North end of this elevation. The walls to these steps are constructed in stone masonry and are in good condition. The original stone steps have had insitu concrete threads cast on top. There is a cantilever stone landing at first floor level which is in good condition. **(Photograph 5, 6 & 7)**.

2.1.2.9 The guttering to this elevation is in fair condition. There is black staining of the walls where rainwater has spilled out from damaged areas of guttering. The down pipes and also missing.

2.1.3 West Elevation

2.1.3.1 This wall is approximately 500mm thick and constructed in coursed stone masonry. **(Photograph 8)**

2.1.3.2 The wall is generally in good condition with some localised major weathering and damage to the stonework at the Northern and Southern ends caused by rainwater discharge from roof caused by missing guttering and down pipes. **(Photograph 9 & 10)**

2.1.3.3 There are several door and window openings in this elevation. The existing timber frames are in poor condition.

2.1.3.4 The wall shows no signs of major bulging, cracking or movement in both the vertical and horizontal planes. There was some minor cracking noted to the corner of one of the ground floor windows **(photograph 11)**.

2.1.3.5 At the Northern end of the elevation the Lintel above the window at first floor has moved horizontal outwards. **(Photograph 12)**

2.1.3.6 Some minor localised horizontal outward movement of the wall was also noted at eaves level.

2.1.3.7 The vertical stone reveals to the windows and doors in many of the locations have cracked or are weathered. **(Photograph 10, 11 & 13)**

2.1.3.8 The guttering and downpipes are completely missing throughout the length of this elevation.

2.1.3.9 The pointing is showing signs of weathering and erosion throughout the whole elevation.

2.1.3.10 A trial pit was dug on this elevation. The underside of the foundation was located only 500mm below ground level. The ground comprised approximately 150mm of topsoil and then and clay and gravel weather sandstone subsoil. No tree roots were observed in the trial pit. **(Photograph 14) & (Figure 1)**

2.1.3.11 At the Southern end of this elevation is located a Lean-too Building. At the junction between the Lean-too and main barn there is a vertical joint. There is a marked step in the line of the two buildings. **(Photograph 15)**

2.1.4 South Elevation

2.1.4.1 The South elevation is a gable wall approximately 500mm thick and is constructed in coursed stone masonry. **(Photograph 16)**

2.1.4.2 This elevation is partly obscured by a block built extension and only the visible parts could be inspected. Note: the block building was note part of the inspection.

2.1.4.3 The wall shows no signs of bulging, cracking or movement in both the vertical and horizontal planes.

2.1.4.4 The pointing to this elevation is in good condition with no signs of loss from any of the joints.

2.1.4.5 The verges to the gable are in good condition although the pointing is uneven.

2.1.5 North Elevation

2.1.5.1 The North elevation is a gable wall approximately 500mm thick and is constructed in coursed stone masonry. **(Photograph 17)**

2.1.5.2 This elevation was partially obscured by Lean-too Building and only the visible parts were inspected.

2.1.5.3 The wall is generally in good condition with some localised cracking and movement noted at eaves level on the Western corner. **(Photograph 17)**

2.1.5.4 There is a window opening located in this elevation with a timber window that is intact but in poor condition.

2.1.5.5 The verges are in poor condition with large area of mortar loss.

2.1.6 Roof

2.1.6.1 The roof is a duo pitch with gables on the Northern and Southern elevations. The ridge line is level with no undulations or sagging. All the ridge tiles including ventilation tiles remain intact. **(Photograph 1, 2 & 7)**

2.1.6.2 The slope faces of the roof were planar with no sagging or undulations. The slate tile roof covering was intact over a majority of the roof with only a few localised areas of missing or slipped tiles. No under felting to the tiles was present.

2.1.6.3 The roof structure comprises of king posts trusses spanning onto the East and West elevations. Purlins at third points span between the trusses and loadbearing external and internal walls. Rafters span between the external walls, purlins and ridge board. Generally the roof timbers were in good condition.

2.1.6.4 The roof timbers show signs of insect infestation and a specialist report on their condition is recommended.

2.1.7 Lean-too building

2.1.7.1 This section is located on the North elevation of the main barn and is also attached the East end of the Eight Cattle Barn.

2.1.7.2 Internal access was limited due to the barn being used to house livestock at the time of the survey.

2.1.7.3 The walls of the lean too building area constructed in random coursed dry stone masonry. The walls are in poor condition with signs of movement.

2.1.7.4 The roof is covered in stone slates. The roof slopes and ridge line exhibit large sags.

2.1.8 Internal Observations

2.1.8.1 General Observations

2.1.8.1.1 For the purpose of this survey the internal observations are split into three equal sections.

- South section
- Middle section
- North section

2.1.8.2 South Section

2.1.8.2.1 This section is located at the Southern end of the barn and is of two storey construction.

2.1.8.2.2 Where visible the inner leaves of the external walls and inner dividing walls were constructed in random coursed stone masonry that was in good structural condition.

2.1.8.2.3 The external gable wall at ground floor level has two large openings supported by steel beams to allow access into the neighbouring building.

2.1.8.2.4 The ground floor construction could not be assessed as it was covered with livestock bedding however, the client informed that the floor construction was stone flags.

2.1.8.2.5 The first floor construction comprises of timber beams at third points that spanning on to the East and West elevations. Joists span between the beams and walls and support timber floorboards. In the adjacent section the timber joists span between supporting walls. The main beams are exhibiting large deflections and are showing signs of insect infestation. A specialist report on their condition is recommended. At the time of the survey the first floor level was used to store hay and the condition of the floor could not be fully assessed. **(Photograph 18)**

2.1.8.2.6 Headroom at ground floor level was less than 2000mm

2.1.8.2.7 The roof comprises of a central king post truss spanning on to the East and West elevations. Purlins at third points span between the truss and masonry walls which support timber rafters. In the adjacent section purlins at third points span onto internal masonry walls and support timber rafters. All the timbers appear in good condition with no signs of rot or insect infestation. **(Photograph 19 & 20)**

2.1.8.3 Middle Section

2.1.8.3.1 This section of the barn is single storey with a short two storey section at the Northern end.

2.1.8.3.2 Where visible the inner leaves of the external walls and inner dividing walls were constructed in random coursed stone masonry that was in good structural condition. **(Photograph 21)**

2.1.8.3.3 The ground floor construction could not be assessed as it was covered with livestock bedding however, the client informed that the floor construction was stone flags.

2.1.8.3.4 The roof comprises of king post trusses at quarter point spanning on to the east and West elevations. Timber purlins at third points span between the trusses and internal supporting walls and support timber rafters. **(Photographs 22 & 23)**

2.1.8.3 Middle Section – continued

2.1.8.3.5 The roof timbers show signs of insect infestation and a specialist report on their condition is recommended. There are also signs of water ingress at the truss support locations. These should be investigated for signs of rot. A specialist report on the extent of insect infestation and rot is recommended. **(Photograph 24)**

2.1.8.3.6 At the North end there is a section of raised floor approximately 1800mm above the main barn ground floor level. The floor joist span North to South between a low level support wall and main internal support wall. The condition of this floor could not be assessed as at the time of the survey the floor was being used to store hay.

2.1.8.4 North Section

2.1.8.4.1 This section is located at the Northern end of the barn and is of two storey construction.

2.1.7.4.2 Access to the ground and first floor levels of this section was limited due to storage of hay and housing of livestock.

2.1.8.4.3. Where visible the inner leaves of the external walls and inner dividing walls were constructed in random coursed stone masonry that was in good structural condition. **(Photograph 25)**

2.1.8.4.4 The internal wall at ground floor level has two large openings supported by steel beams allowing access into the two storey part of the middle section.

2.1.8.4.5 The ground floor construction could not be assessed as it was covered with livestock bedding however, the client informed that the floor construction was stone flags. The level of this section is approximately 1800mm lower than the main barn.

2.1.8.4.6 The first floor construction comprises of timber beams spanning North to South supporting timber joists and floorboards. The timber beams are showing signs of excessive deflection and insect infestation. A specialist report on their condition is recommended. The floor joists appear to be in good condition. The condition of the floorboards could not be assessed as access was not available for above. **(Photograph 26)**

2.1.8.4.7 Headroom at ground floor level was less than 2000mm.

2.1.8.4.8 The roof construction comprises of a single central king post truss spanning on to the East and West elevations. Timber purlins at third points span between supporting walls and the truss and support timber rafters. The timber roof construction was in good structural order. **(Photograph 27)**

2.2 DISCUSSION

2.2.1 Overall the barn is generally in good condition.

2.2.2 The external walls on the North, South and East elevation are in very good condition with only minor stone repairs and repointing required. There was no major settlement or movement noted.

2.2.3 The West elevation due to being exposed to Westerly winds and lack of above ground rainwater drainage has suffered erosion of mortar joists, loss of stone and weathering of the stone face.

2.2.4 There was some minor cracking noted midway along the West elevation.

2.2.5 Damage to the vertical stone reveals has occurred to several of the window and door openings to the East and West Elevations

2.2.6 There has been some minor outward movement of masonry lintels and walls at eaves level to the East and West elevations.

2.2.7 The internal partition walls were in good structural condition with no major movement or settlement noted

2.2.8 Rainwater gutters and downpipes are in poor condition and completely missing on the West elevation causing rainwater to run down the walls and penetrate the barn internally.

2.2.9 The timber roof structure was generally in good condition. Insect infestation and water penetration was noted in some of the roof and floor timbers.

2.2.10 The Roof covering was intact over a majority of the roof and the tiles were in good condition. No under felting was present.

2.2.11 The first floors in the North and South Sections were in reasonable condition.

2.2.12 Some of the first floor timbers showed signs of insect infestation.

2.2.13 The main timber beams supporting the floor exhibited large permanent deflections.

2.2.14 Windows and doors were in poor condition.

2.2.15 The lean too building is general in a poor condition.

2.2.16 The trial pit that was dug on the West elevation revealed that the foundations were very shallow (only 500mm below ground level). The ground encountered was granular weathered sandstone with some clay content. There were no root present in the trial pit

2.3 CONCLUSIONS

2.3.1 Although the external walls have suffered some minor movement and weathering they are generally stable and showing no signs of distress or major movements. Where excessive erosion, movement and stones are missing this should be replaced with reclaimed stone to maintain a weather tight outer face.

2.3.2 All the external walls should be repointed in lime based mortar. This should include the East elevation which has been repointed in sand and cement mortar.

2.3.3 Carry out repairs to stone reveals around doors and windows.

2.3.4 Where outward movement at eaves has occurred this should be repaired and tied back to the roof structure.

2.3.5 The timber roof structure is in good condition. The insect infestation should be investigated together with possible wet rot where water ingress was noted. The structural adequacy of the roof timbers should be assessed for the new loading regime.

2.3.6 The slate tile roof should be removed and new under felt installed. If serviceable the existing tiles can be reinstalled.

2.3.7 The existing timber first floors in the North and South sections are in reasonable condition. However, they are exhibiting excessive permanent deflections and should be replaced. In addition the headroom is very low and may not comply with building regulations.

2.3.8 The foundations to the external walls are very shallow however, there is no sign of major cracking or movement and the ground at foundation level is of a good ground bearing capacity. Due to the granular nature of the subsoil seasonable moisture affects should be minimal.

2.3.9 The quality of the construction of the existing ground floor is unknown and should be replaced with a fully designed solution incorporating a damp proof membrane.

2.3.10 The Lean-too Building is generally in a poor state of repair. The West elevation has significantly moved away from the main barn.

It is recommended that the following work is carried out to allow the barn to be converted to a dwelling

- **Replace areas of missing and damaged stonework to all elevations to maintain a weather tight outer leaf.**
- **Repair cracks in stonework or reconstruct wall where necessary.**
- **Repair or replace damaged stone reveals to doors and windows.**
- **Carry out repairs to lintels and stonework where movement has occurred at eaves level and install ties to roof structure to prevent movement.**
- **Carry out repointing to all the elevations using a suitable lime mortar.**
- **Check loadbearing capacity of existing walls and foundations and underpin if necessary.**
- **Carry out a timber specialist investigation and necessary remedial works.**

- Install new first floor structures where required.
- Install roofing felt and either new roof covering or reinstate existing tiles. (New materials to be agreed with Planning Authority)
- Check structural capacity of existing roof to carry new loads and strengthen if necessary.
- Construct a new concrete slab incorporation a damp proof membrane.
- All new walls and floors are to be mechanically tied to existing walls to provide restraint.
- Reconstruct the West elevation of the Lean-too Building and tie back to the main barn.
- Remove existing stone slate tiles from Lean-too Building and replace roof timber.
- Either reinstate existing stone slates or replace with a lighter modern equivalent.

ANTONIO RUBINO BEng CEng MICE
CHARTERED ENGINEER

UNIT 2

3.0 EIGHT CATTLE BARN

3.1 OBSERVATIONS

3.1.1 General Observations

3.1.1.1 The barn building comprises stone masonry walls supporting a timber roof. At the time of the survey the roof was covered with stone slate tiles.

3.1.1.2 The barn is attached on its South elevation to the Laith Barn and is of single storey construction

3.1.1.3 The barn forms a complex of buildings on Cliff House Farm.

3.1.1.4 Ground is level to the South elevation. The ground on the North elevation slopes up from East to West and this wall is retaining.

3.1.1.5 There were many large trees surrounding the barn building within a 10.00m radius.

3.1.2 East Elevation

3.1.2.1 This wall is a gable wall and is constructed in random coursed stone masonry. The elevation is generally in poor condition. There is a patch of white rendering in the centre of this elevation. **(Photograph 28)**

3.1.2.2 There is a large crack at the North East corner running vertically down from eaves to approximately 1.00m above ground level. At eaves level the North elevation has moved outwards away from this elevation. There is evidence that repairs have been carried out to this crack in the form of grey sand/cement mortar. **(Photograph 29)**

3.1.2.3 Immediately to the left of the vertical crack the wall has bulged outwards approximately 75mm centrally on the wall. **(Photograph 30)**

3.1.2.4 The pointing to the elevation is in poor condition with large areas of missing and deeply eroded joints.

3.1.2.5 The verges are in poor condition with no pointing and areas of missing stone.

3.1.3 West Elevation

3.1.3.1 This wall is a gable wall and is also the East elevation of the Laith Barn & Lean-too Building. Access could not be gained to view the side within the Lean-too as it was being used to house livestock.

3.1.4 South Elevation

3.1.4.1 The South elevation constructed in coursed and dressed stone and is approximately 500mm thick. The stonework is in good condition with no weathering or erosion of the stone face. **(Photograph 31)**

3.1.4.2 To the East end of this elevation there is a panel of red brick infill with a timber framed window opening. The quality of the brickwork construction is poor with many of the vertical joints lining up.

3.1.4 South Elevation - continued

3.1.4.3 The wall shows no signs of bulging, cracking or movement in both the vertical and horizontal planes.

3.1.4.4 The pointing to this elevation is in reasonable condition with the only loss or mortar from a small central panel of masonry. **(Photograph 32)**

3.1.4.5 The doors have vertical stone reveals which are generally in good condition. To the left of the red brick infill panel there is a stone reveal that has cracked in an X pattern approximately two third up from ground level. At the location of this crack the reveal has lost much of its cross section. It was noted from the internal inspection that this reveal supported the bearing of one of the king post trusses. **(Photograph 33)**

3.1.4.6 The window and doors to this elevation are in poor condition.

3.1.4.7 The timber guttering to this elevation remains intact over 80% of the elevation with a section missing at the Eastern end. The guttering is generally in poor condition. No rainwater downpipes were noted.

3.1.5 North Elevation

3.1.5.1 The North elevation is constructed in random coursed stone masonry. The masonry is generally in reasonable condition with no bulging or cracking observed. The wall is approximately 500mm thick **(Photograph 34 & 35)**

3.1.5.2 The ground level on this elevation slopes upwards from East to West by 500mm. At the Western end the wall is retaining.

3.1.5.3 The pointing to this elevation is in poor condition. Large areas are either completely missing or heavily eroded.

3.1.5.4 The gutters and rainwater downpipes to this elevation are completely missing. **(Photograph 34 & 35)**

3.1.5.5 A trial pit was dug on this location **(Figure 2)**. The trial pit was located at the junction between the Eight Cattle Barn and the Lean-too Building. The trial pit extended 800mm below the immediate ground level which was also the underside of the wall foundation. A 300mm deep x 120mm wide extension of the wall was noted at the base of the trial pit. The ground encountered was 400mm of topsoil on 400mm of yellow gravelly weathered Sandstone with some clay content. Large amounts of tree roots were encountered some up to 50mm in diameter. **(Photograph 36)**

3.1.5.6 Three large trees were located with 5.0m of this elevation. One tree was growing up against the wall had a trunk diameter of 700mm, at height of 20.0 metres and a spread of 15.0 metres with large branches reaching over the barn. Two other trees were 5.0 metres away from this elevation and had trunk diameters of 400mm, heights of 10.0 metres and spreads of 7.0 metres **(Figure 5) (Photograph 34)**

3.1.6 Roof

3.1.6.1 The roof is a duo pitch with gables on the East and West elevations.

3.1.6.2 The roof is covered in stone slates which are in good condition and intact over it whole length. There is no under felt to the roof. **(Photograph 31 & 34)**

3.1.6 **Roof – continued**

3.1.6.3 The roof exhibits sagging and undulation throughout its length. The ridge line has undulations and some of the ridge tiles are loose and in places missing.

3.1.6.4 The roof structure comprises of king posts trusses spanning onto the North and South elevations. Purlins at third points span between the trusses and loadbearing external and internal walls. Rafters span between the external walls, purlins and ridge board. Generally the roof timbers were in good condition. **(Photograph 37 & 38)**

2.1.6.5 The roof timbers show no signs of distress and do not exhibit the same undulation observed externally.

2.1.6.6 The roof timbers show signs of insect infestation and a specialist report on their condition is recommended.

3.1.7 Internal Observations

3.1.7.1 Where visible the walls internally were constructed in random coursed stone masonry. They appear in good condition but could not be fully assessed as access was not possible.

3.1.7.2 The crack in the North East corner was also observed internally and followed the same pattern as the external crack. **(Photograph 37)**

3.1.7.3 Where visible the inner leaves of the external walls and inner dividing walls were constructed in random coursed stone masonry that was in good structural condition.

3.1.7.4 The condition of the floor could not be assessed due to livestock bedding. The Client confirmed that it was formed in stone flags.

3.1.7.5 Headroom to the underside of the trusses was approximately 2000mm.

3.2 DISCUSSION

3.2.1 Overall the barn is in reasonable condition.

3.2.2 The external walls on the North and South elevation are in good condition with some minor stone repairs and repointing required. There was no major settlement or movement noted.

3.2.3 The East elevation is in poor condition with major cracking and bulging to the North East corner.

3.2.4 Generally, the pointing was in poor condition with large areas either missing or badly eroded.

3.2.5 One of the vertical stone reveals has suffered major damage. The reveal in question supports the bearing of one of the main roof trusses

3.2.6 Rainwater gutters are in poor condition and completely missing on the North elevation. There are no rainwater downpipes to any of the elevations.

3.2.7 The timber roof structure was generally in good condition. Some insect infestation was noted in the roof timbers.

3.2.8 The stone tiles were intact over the whole roof area and were in good condition. No under felting was present.

3.2.9 Timber windows and doors were in poor condition.

3.2.10 The trial pit that was dug on the North elevation revealed that the foundations were very fairly deep (800mm below ground level). It should be noted that at the location of the trial pit the ground level on the North elevation was higher than the South elevation. Excavation of a trial pit on the South elevation could not be undertaken to investigate this due to the presence of a concrete slab to the yard area. The ground encountered was gravelly weathered Sandstone with some clay content. The trial pit contained large amounts of tree roots some up to 50mm diameter.

3.2.11 Large trees were located within 5.0 metres of the barn. One in particular was located up against the North elevation. This tree has large branches that reach over the barn and pose a safety risk if they fall.

3.2.12 No major cracking or movement was noted in the barn in the vicinity of the tree growing next to the North elevation, other than on the North east Corner. Due to the granular nature of the subsoil the barn may not suffer movement due to seasonal moisture changes caused by the trees. In addition, the building and trees may also be in equilibrium as the trees will have matured after the barn was built.

3.3 CONCLUSIONS

3.3.1 Although the external walls have suffered some movement and weathering they are generally stable and showing no signs of distress. Where there is excessive erosion or stones are missing they should be replaced with reclaimed stone to maintain a weather tight outer face.

3.3.2 Where vertical cracking has occurred at the North East corner this should be either locally taken down and rebuilt or stitched together. The bulging also noted should be repaired.

3.3.3. All the external walls should be repointed in lime based mortar.

3.3.4 Repairs to the badly damaged stone reveal supporting the truss bearing should either be repaired or replaced

3.3.5 The timber roof structure is in good condition. The insect infestation should be investigated. The Structural adequacy of the roof timbers should be assessed for the new loading regime.

3.3.6 The existing stone slate tiled roof should be removed and new under felt installed. If serviceable the existing tiles can be reinstalled. To reduce the loading on the structure the heavier stone slates could be replaced with lighter modern concrete equivalents.

3.3.7 The foundations to the external walls to the North elevation are fairly deep. However, due to the difference in ground level between the North and South elevation the founding level on the South and East elevations could be shallow. At present the structure is stable and the foundations appear to be capable of withstanding the existing loads. As the proposal is to use this barn for garages the loading will not increase and the structure should be capable of withstanding the proposed loading regime.

3.3.8 The quality of the construction of the existing floor is unknown and should be replaced with a fully designed solution incorporating a damp proof membrane.

3.3.9 The three existing trees located within 5.0 metres of the barn should be pollarded. The tree located up against the barn should be cut back such that no branches extend over the barn for safety reasons. Removal of this tree is also considered an option. Advice should be sort from an arboriculturist on how to remove the tree to prevent distress and damage to the existing structure.

It is recommended that the following work is carried out to allow the barn to be converted to a dwelling

- **Replace areas of missing and damaged stonework to all elevations to maintain a weather tight outer leaf.**
- **Repair cracks in the wall on the North East corner or reconstruct wall where necessary.**
- **Carry out repairs to the bulging section of wall on the East elevation.**
- **Repair or replace damaged stone reveal to door and reinstate the truss bearing**
- **Carry out repointing to all the elevations using a suitable lime mortar.**

- Check loadbearing capacity of existing walls and foundations and underpin if necessary
- Carry out a timber specialist investigation and necessary remedial works.
- Install roofing felt and either new roof covering or reinstate existing tiles. (New materials to be agreed with Planning Authority)
- Check structural capacity of existing roof to carry new loads and strengthen if necessary.
- Construct a new concrete slab incorporation a damp proof membrane. The slab to be able to withstand any possible seasonal moisture changes in subsoil.
- Install restraints in accordance with building regulations to existing walls and roof.
- Carry out pollarding of three large trees within 5.0 metre radius of barn.
- Tree growing against barn is to be either pollarded such that on branches extend over the barn or fully removed without causing distress or damage to the barn.
- Reduce ground level on the North elevation and relieve retaining pressures.

ANTONIO RUBINO BEng CEng MICE
CHARTERED ENGINEER

6.0 APPENDIX 1 – PHOTOGRAHS

A1.1 – Laith Barn Photographs



Photograph 1 – East Elevation



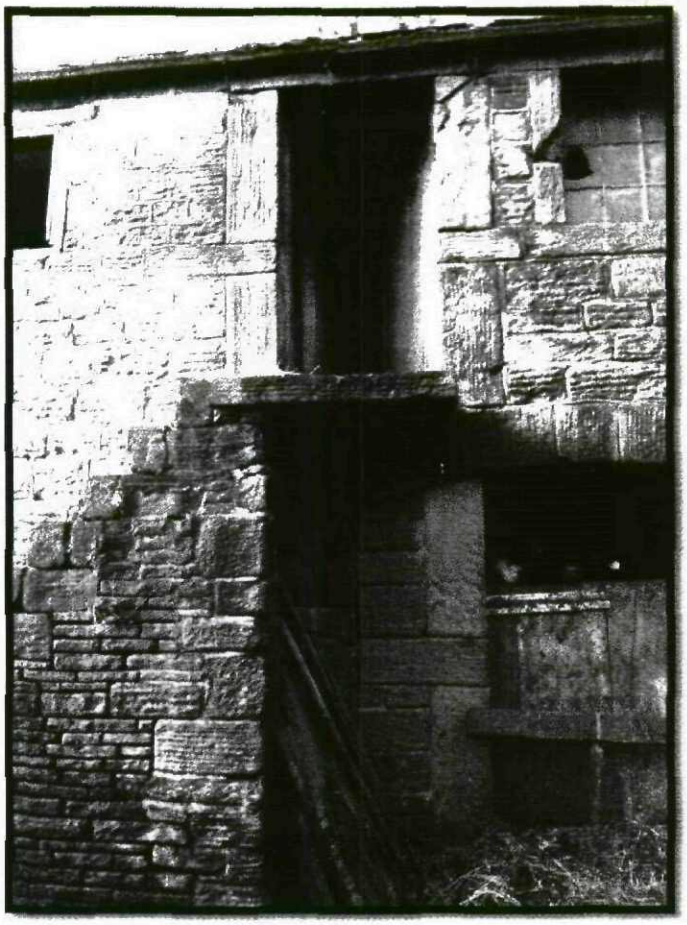
Photograph 2 – East Elevation



Photograph 5 – View of external steps



Photograph 6 – View of external steps



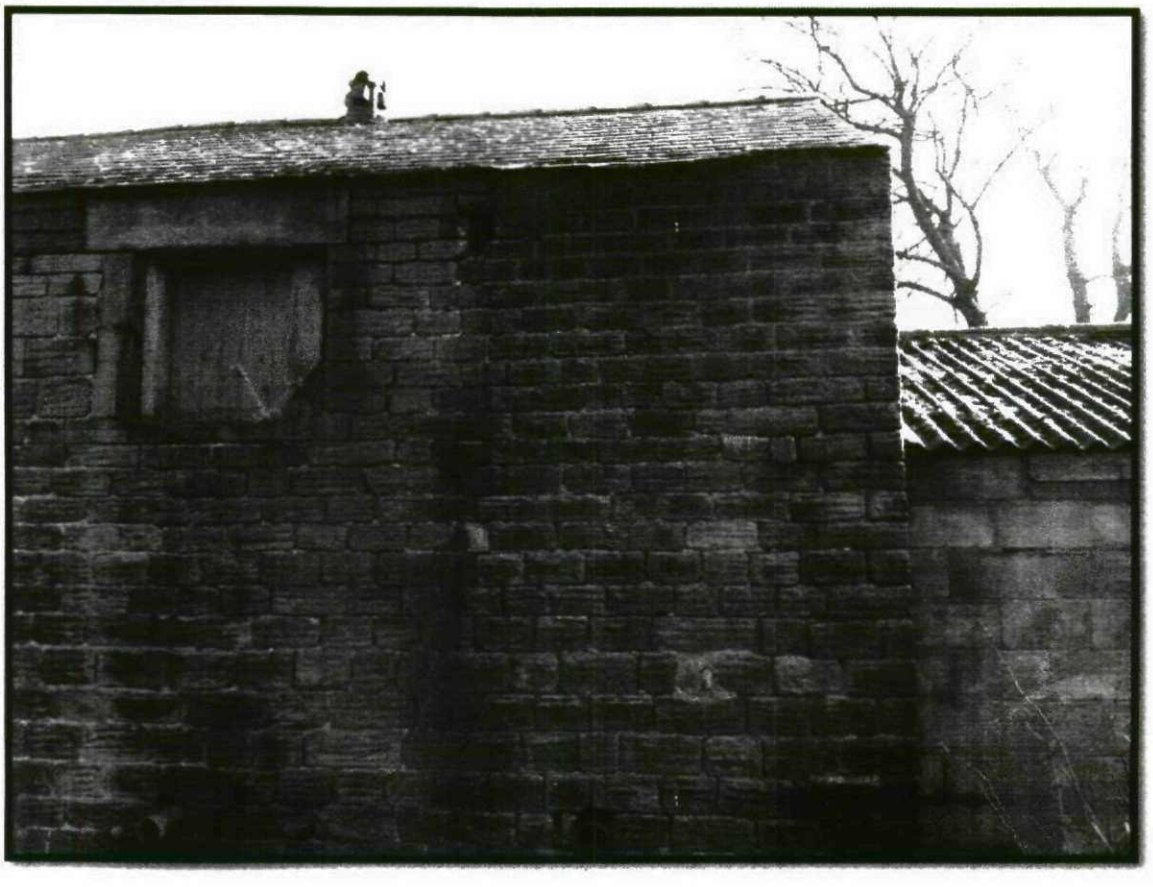
Photograph 7 – View of cantilever landing



Photograph 8 – West elevation



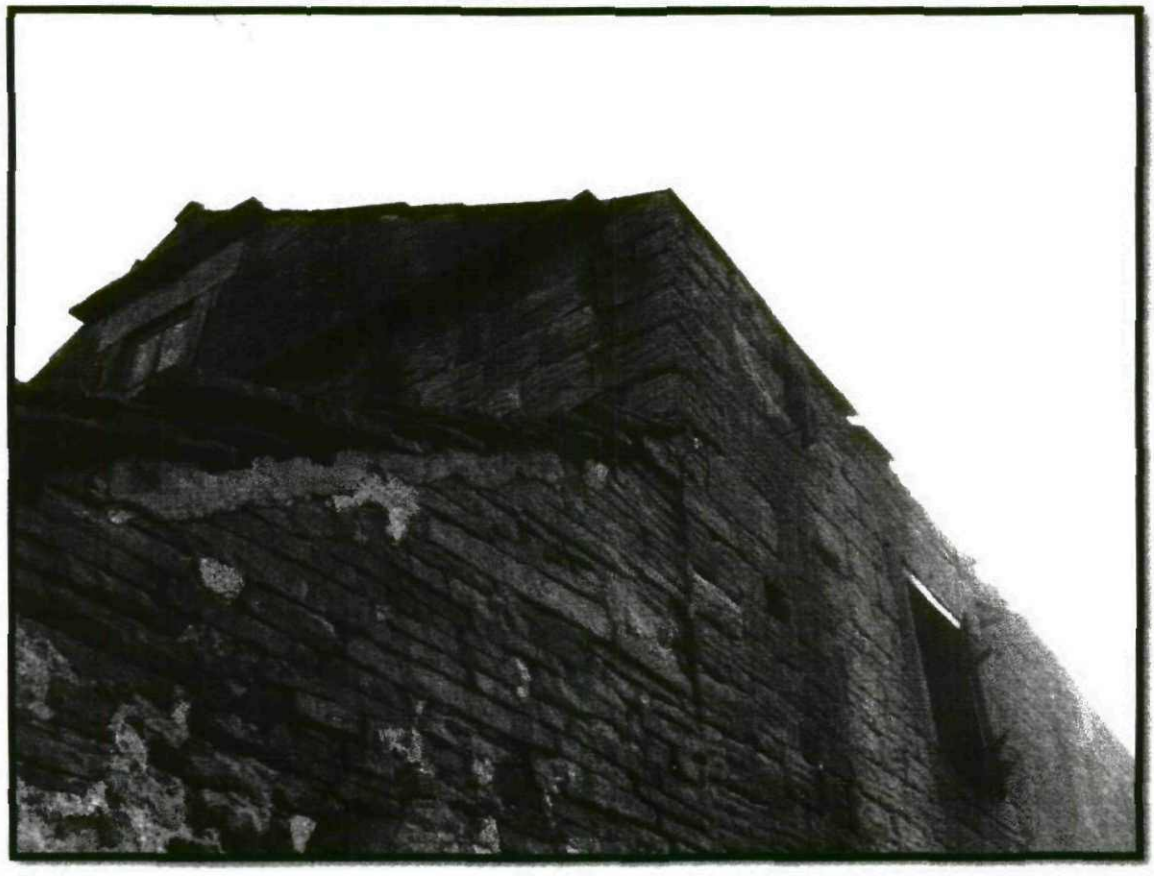
Photograph 9 – View of Northern end of West elevation



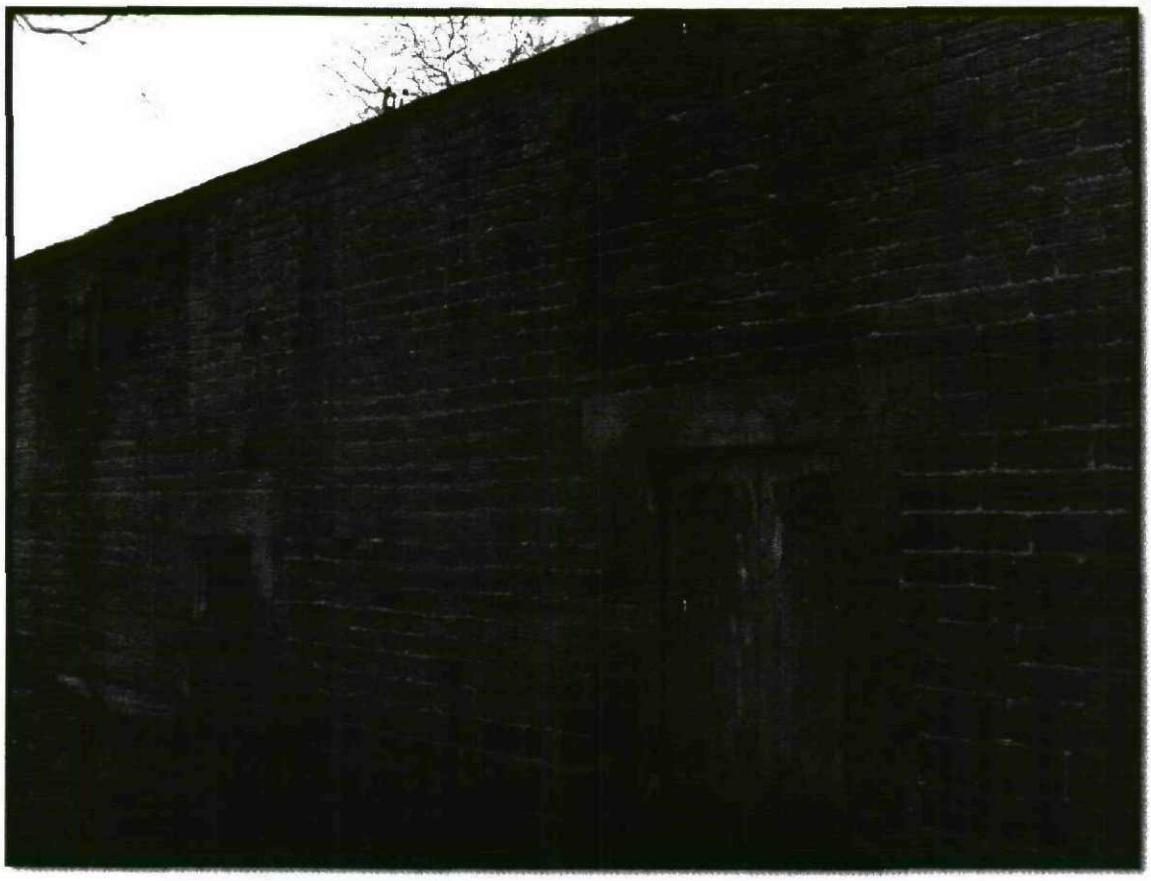
Photograph 10 – View of Southern end of West elevation



Photograph 11 – View of crack above window



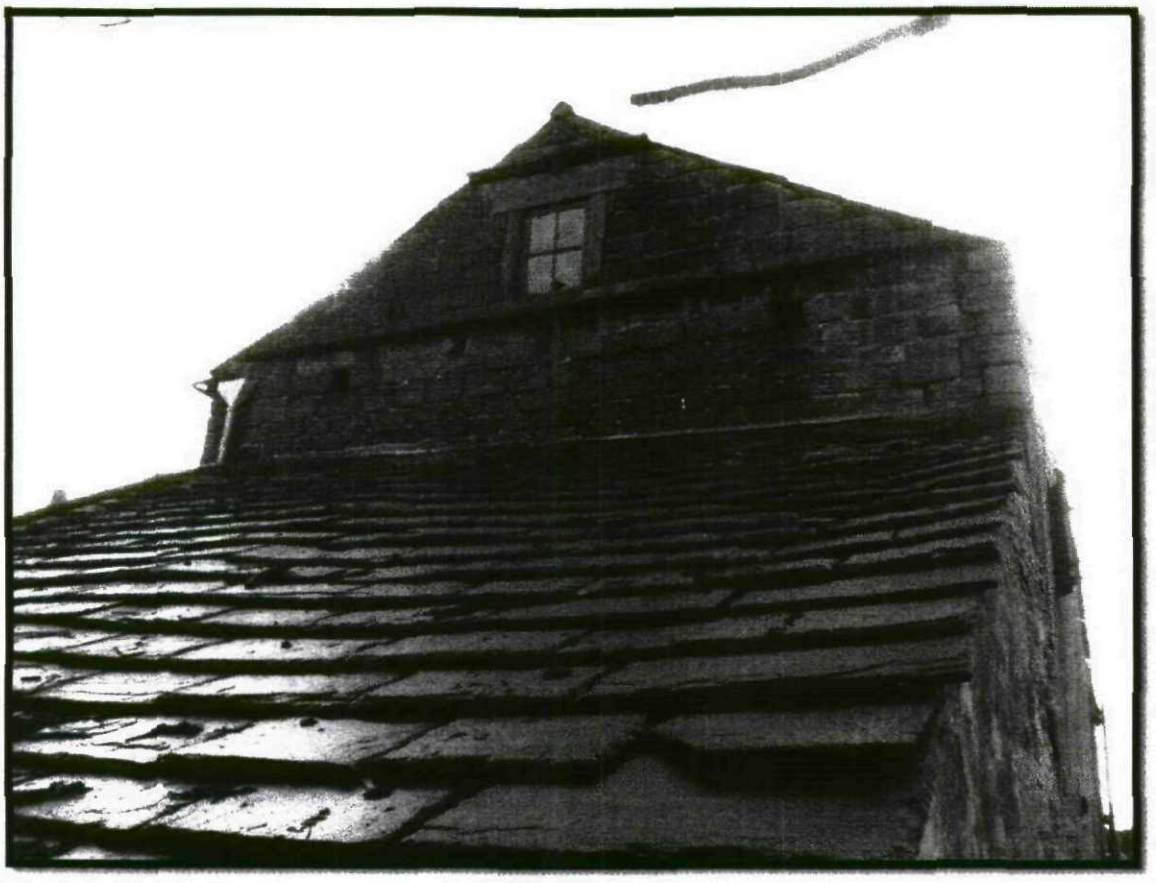
Photograph 12 – View of first floor window showing *outward horizontal movement of lintel*



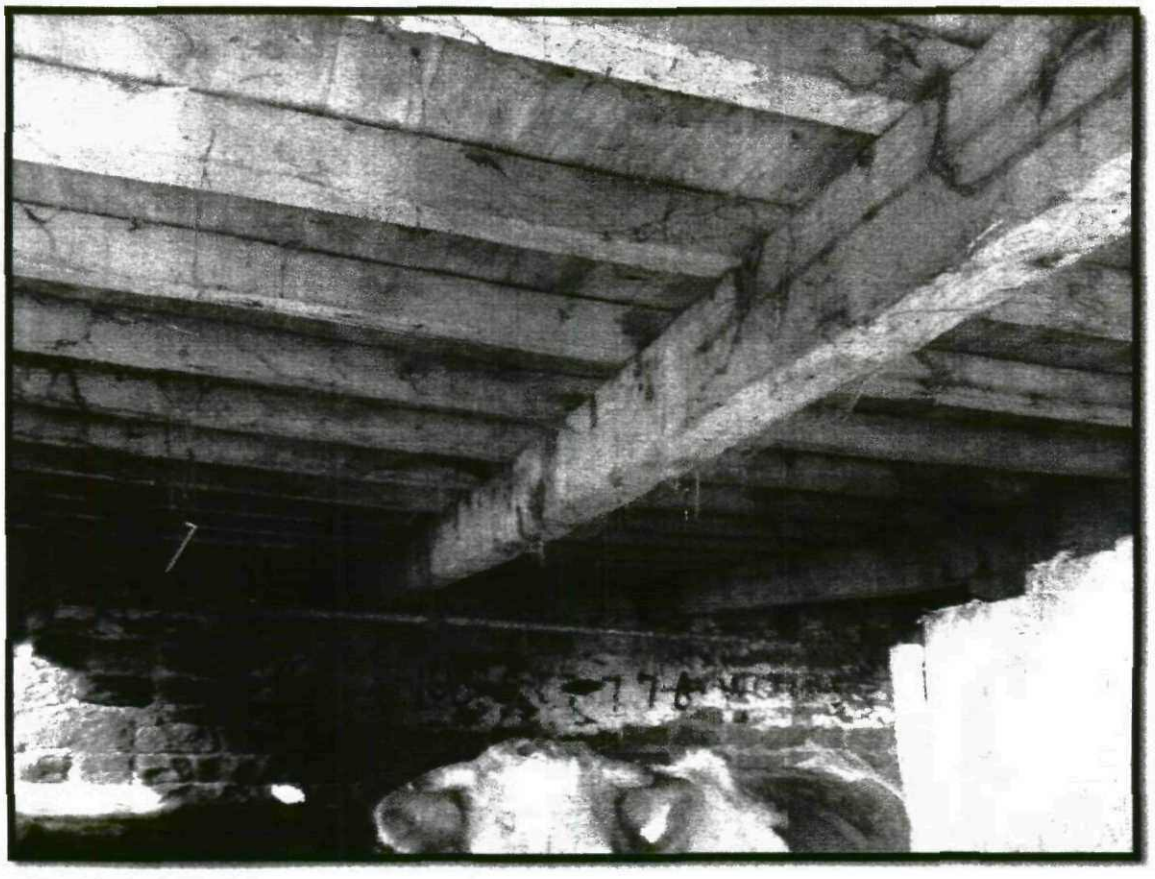
Photograph 13 – Showing damage to stone window reveal



Photograph 14 – View of trial pit dug on East Elevation



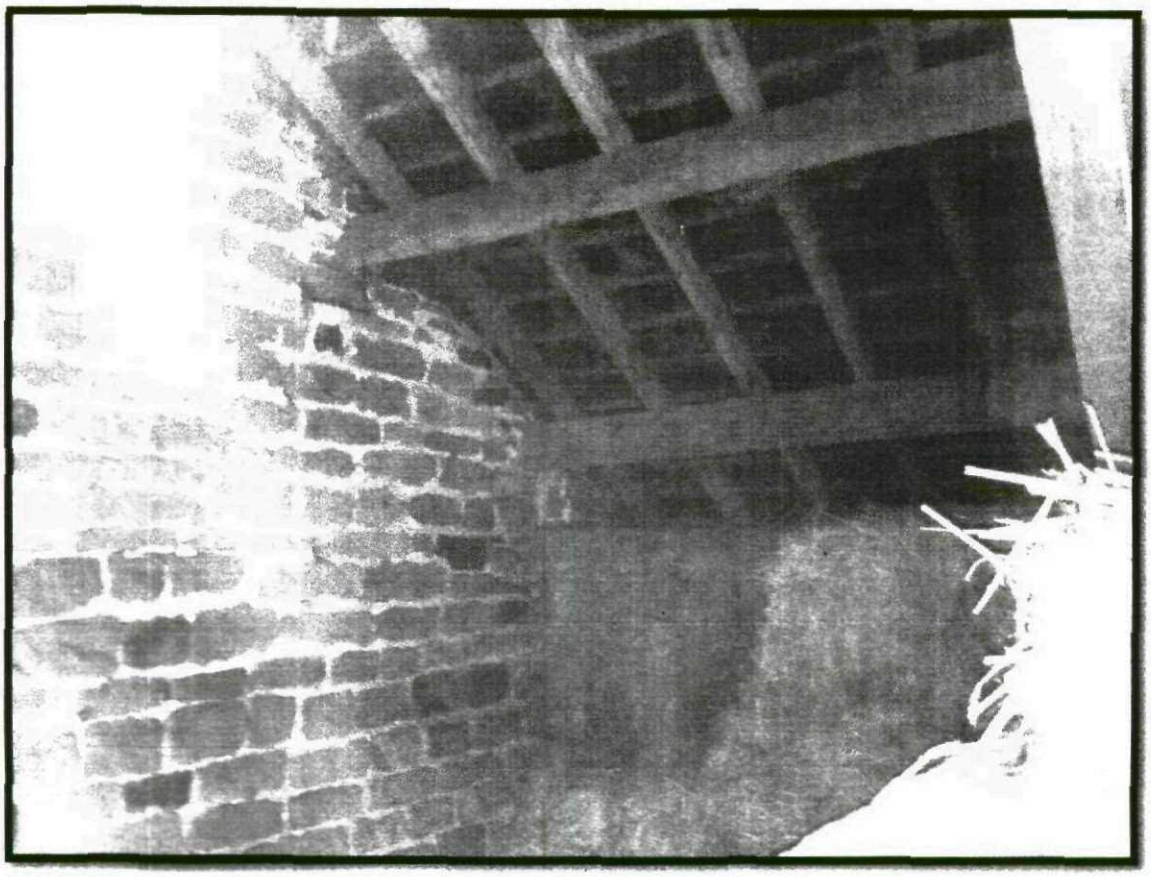
Photograph 17 – View of North Elevation



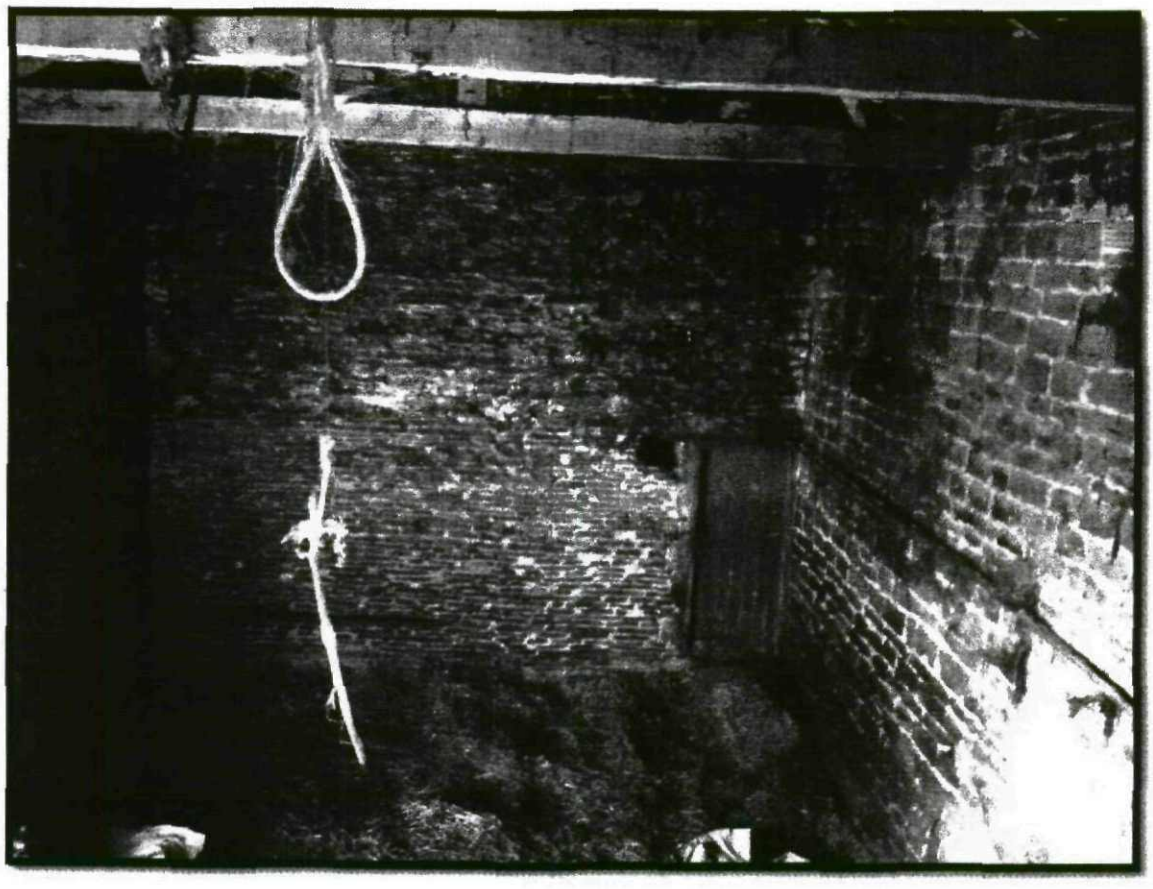
Photograph 18 – View of underside of first floor (South Section)



Photograph 19 – First floor level showing roof (South Section)



Photograph 20 – First floor level showing roof (South Section)



Photograph 21 – View of internal walls (Middle Section)



Photograph 22 – View of roof (Middle Section)



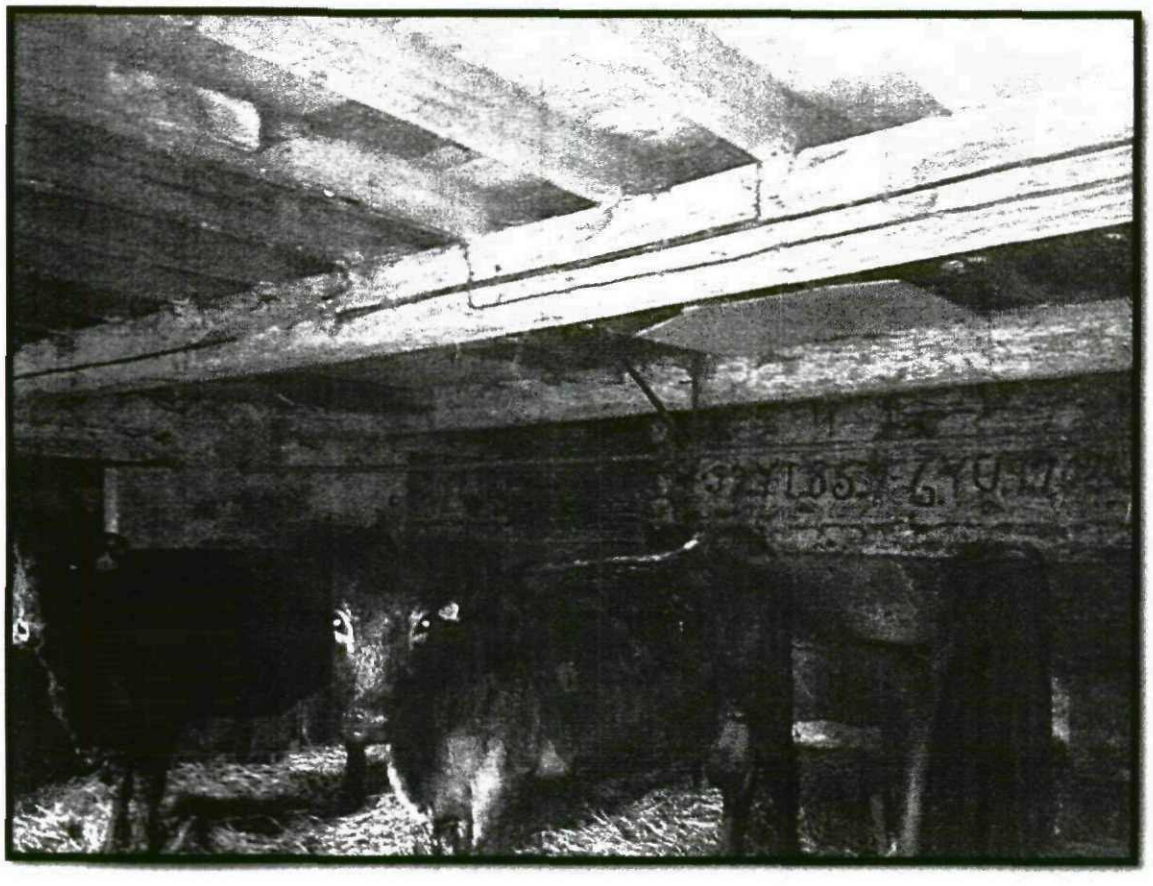
Photograph 23 – View of roof (Middle Section)



Photograph 24 – Roof timber showing insect infestation (Middle Section)



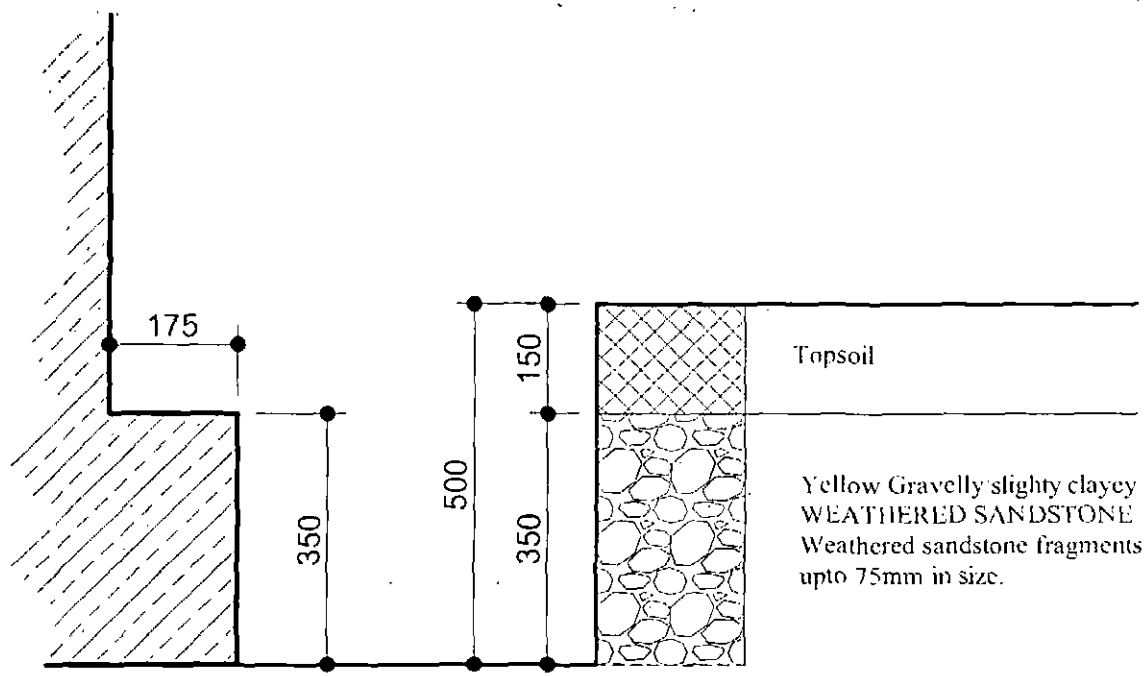
Photograph 25 – View of First floor level (North Section)



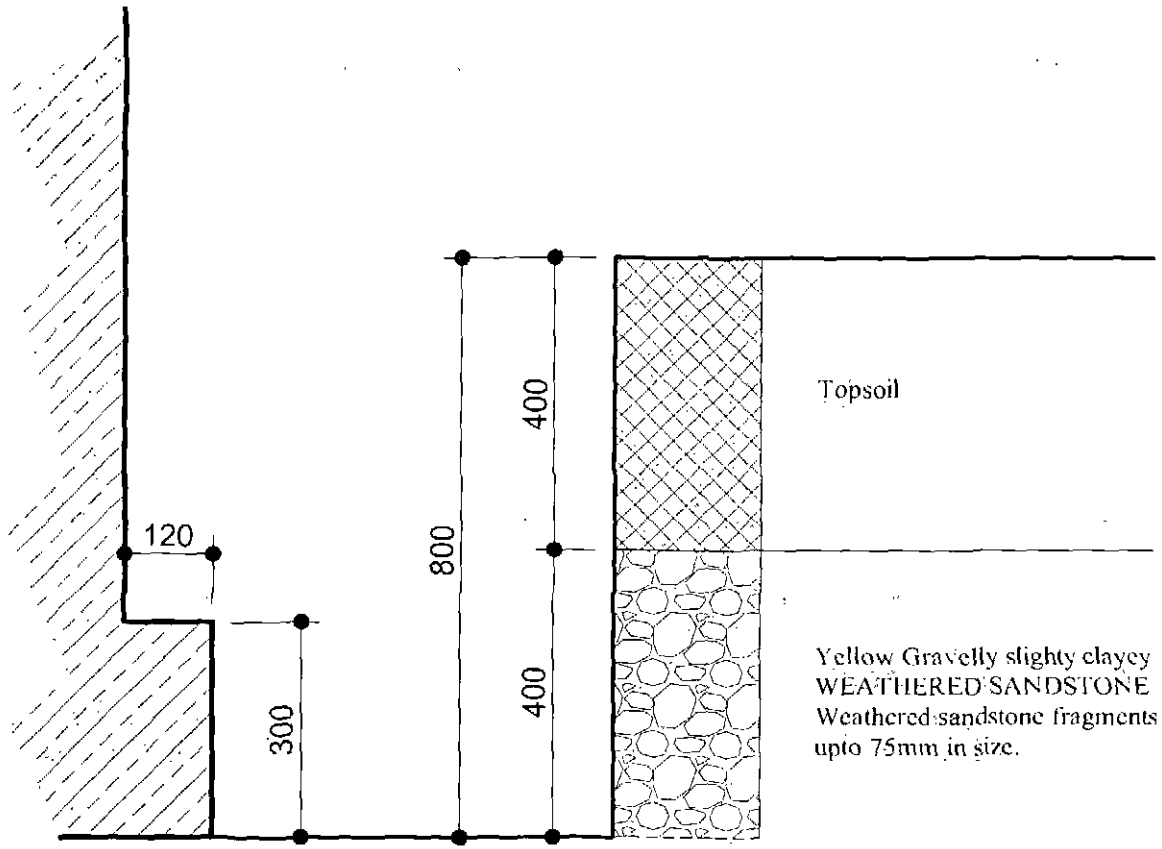
Photograph 26 – View of Ground floor level (North Section)



Photograph 27 – View of Roof and First Floor (North Section)



SECTION THROUGH TRIAL PIT
ON
WEST ELEVATION OF LAITH BARN



SECTION THROUGH TRIAL PIT
ON
WEST ELEVATION OF EIGHT CATTLE BARN

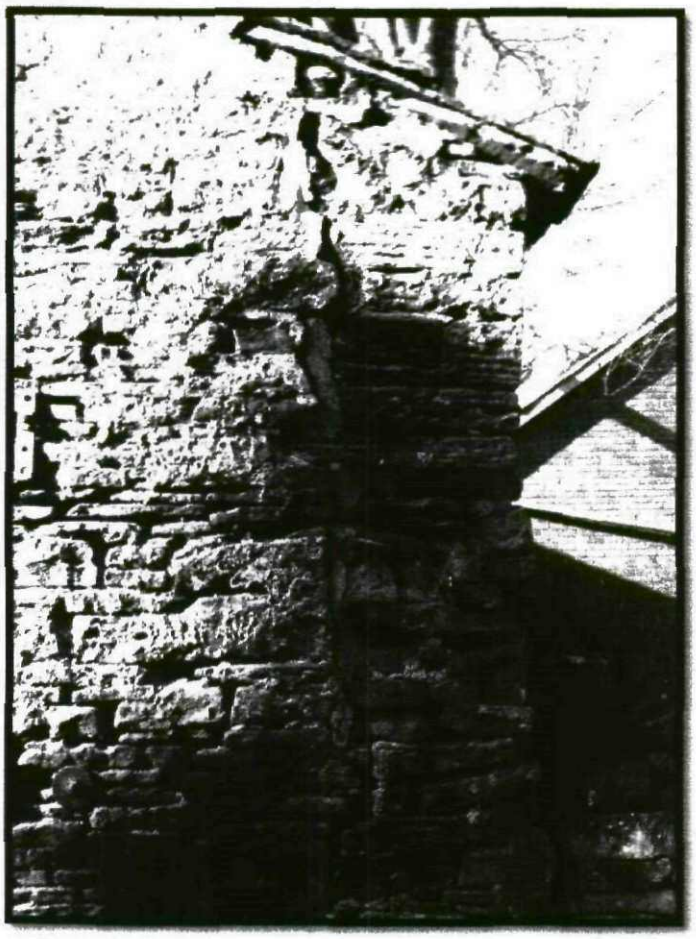
A1.2 – Eight Cattle Barn Photographs



Photograph 28 – View of East Elevation



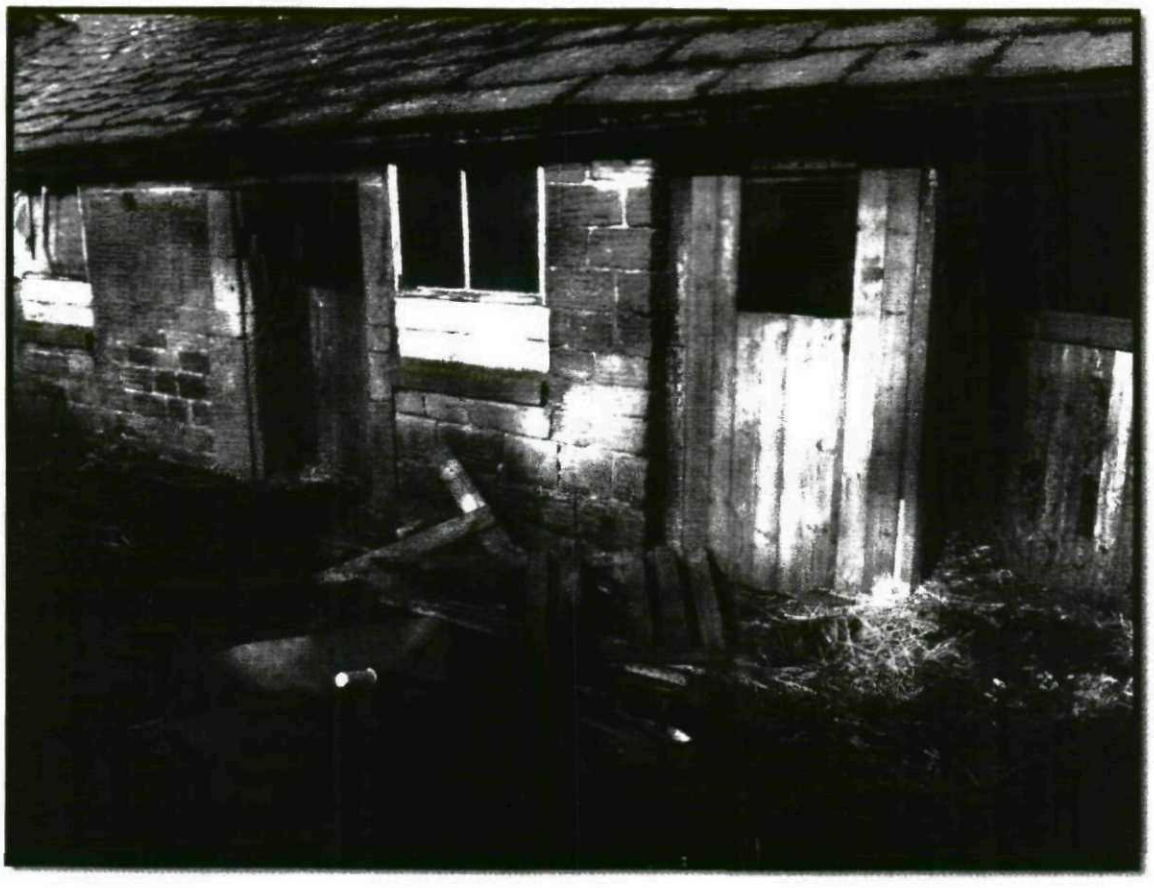
Photograph 29 – View of East Elevation showing bulging of wall#



Photograph 30 – View of East Elevation showing crack on North East Corner



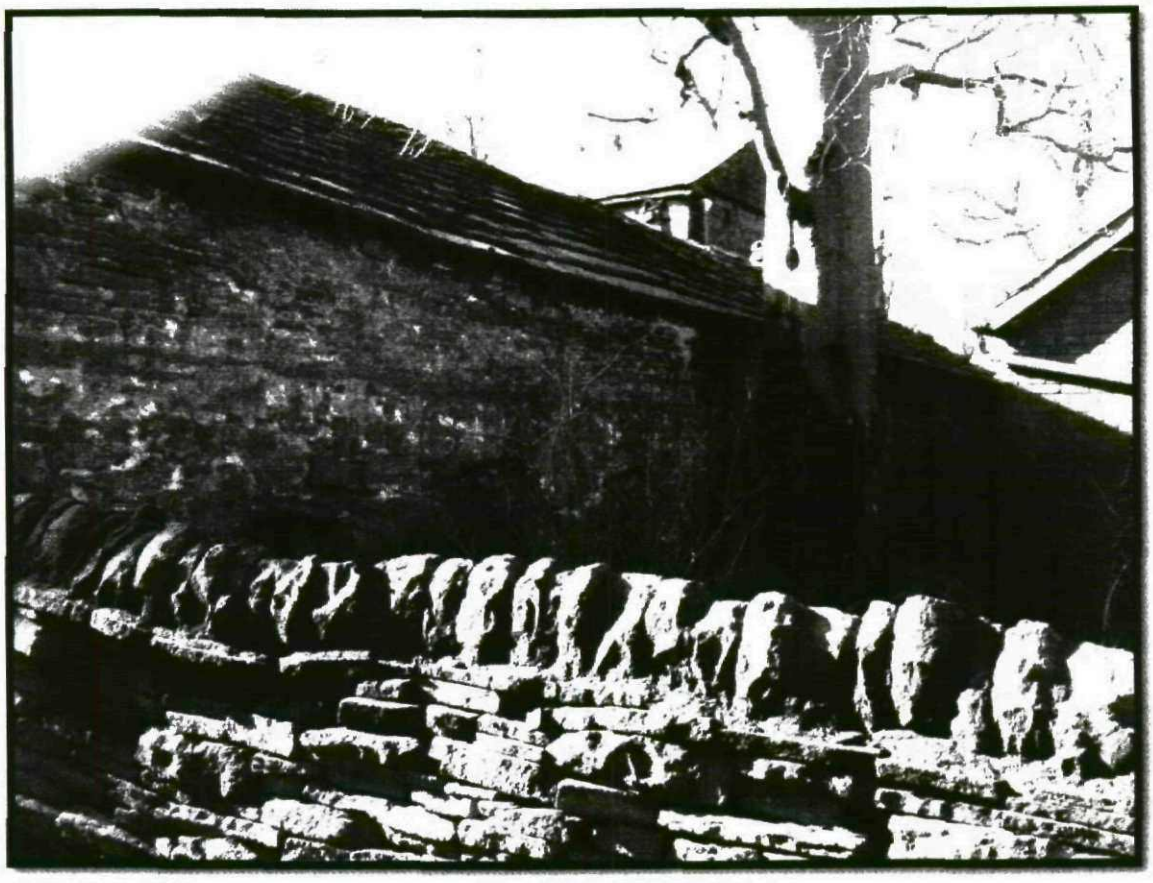
Photograph 31 – View of South Elevation



Photograph 32 – View of South Elevation showing loss of pointing from joints



Photograph 33 – South Elevation showing cracked and damaged stone column



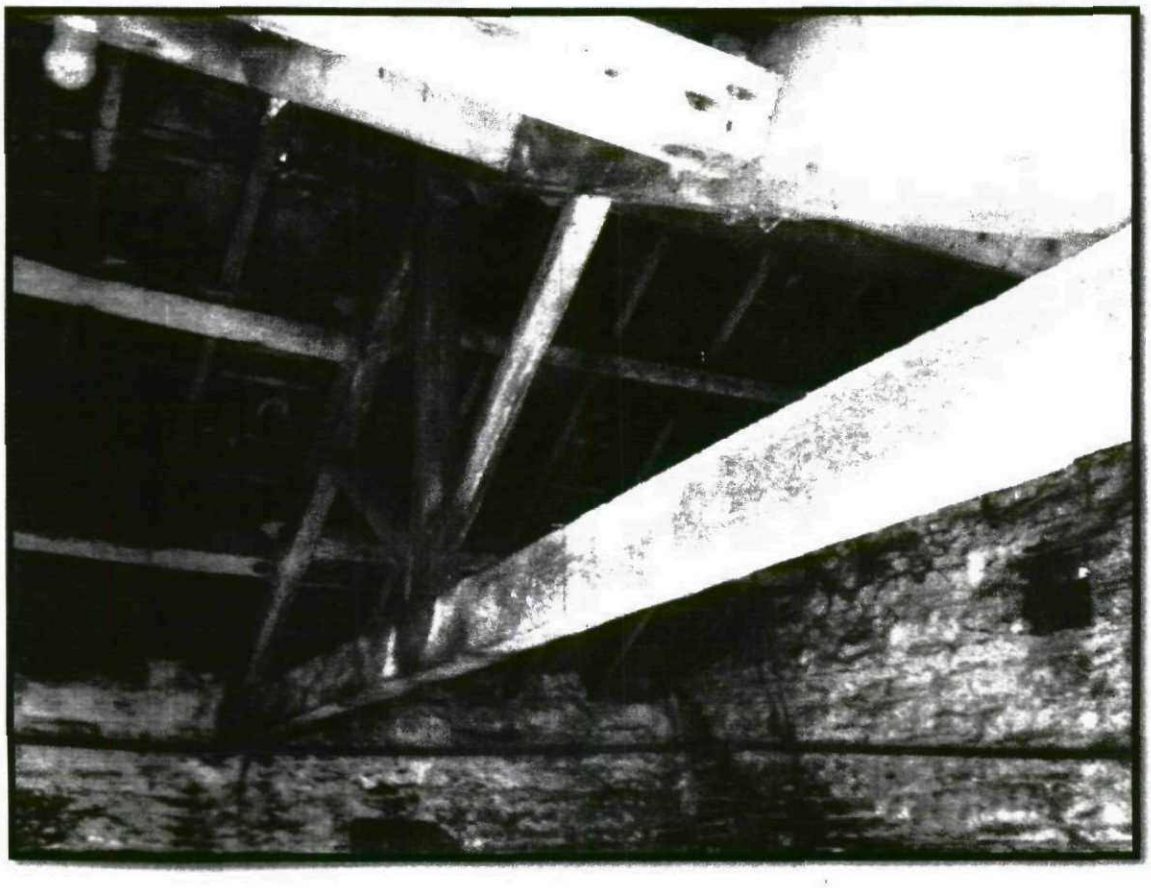
Photograph 34 – View of North Elevation



Photograph 35 – View of North Elevation



Photograph 36 – View of trial pit dug on North Elevation



Photograph 37 – View of roof structure and crack to North East corner



Photograph 38 – View of roof structure