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February 2008

Structural Inspection Report for Mr & Mrs Hendy

Barn Building
Tysdale House
Tydd St Mary
Lincolnshire

constructionline
U.K. REGISTER OF PRE-QUALIFIED CONSTRUCTION SERVICES

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1.0 Introduction

1.01 Further to instructions received from Robert Doughty Consultancy, agents for Mr & Mrs B Hendy, the author undertook a visual structural inspection of the existing barns to the rear of Tysdale House on 18 February 2008.

1.02 The purpose of this inspection and report is to establish whether or not the barns are structurally adequate for a change of use to commercial or residential occupancy in the future. This form of report is not a detailed condition survey or repair schedule.

2.0 Property Description

2.01 The barns are located to the rear of Tysdale House and are attached to the existing garages that are adjacent to the main house which we understand to be a Listed Building.

2.02 The barns appear to have been constructed in three portions in the order of 150 years ago. The first 2 No portions are two storey and the last is a long single storey portion.

2.03 The barns are of traditional construction with solid brick walls, timber upper floors, timber truss and purlin roofs which are covered with slate on the two storey portions and fibre cement sheeting has been used to re-roof the single storey area.

2.04 The two storey portion has had approximately two thirds of the first floor removed historically. Ground floor slabs are typically formed in concrete.

2.05 The site topography is flat.

2.06 There are no trees within the vicinity of the property that could be of detrimental influence.

2.07 The appended photographs assist to describe the property and our observations.

3.0 Ground Conditions

3.01 The British geological survey 10-mile map of the area indicates that alluvial silty clays prevail in the area.

3.01 Whilst published geological information and local knowledge are useful in assessing any site, the precise geotechnical/geological conditions cannot be determined without undertaking such laboratory testing, trial holes and boreholes are as necessary.

4.0 Observations

4.01 The immediate observation on the front and rear elevation is the presence of vertical steel channels that have been bolted to the external walls and tied together with steel rods across the building in the area of the two storey barn which has had the floors removed. The walls do exercise some degree of distortion in these areas but are within acceptable limits.

4.02 There is minor cracking above virtually all openings which have a timber lintel over.

4.03 There is a series of cracks to the rear elevation in the area nearest to the garages where the only rainwater downpipe is located that serves the roof to the two storey portion. Cracks widths of upto 10mm were observed and the bias of the movement is indicative of building settlement in the vicinity of the downpipe.

It is apparent that this drain is leaking into the ground in the vicinity of the movement area and softening the soil upon which the property is formed, thereby causing it to settle.

It is also worth pointing out that this single downpipe serves the whole of the two storey barn which is insufficient for a building of this size and it is likely that the gutters overspill during severe rainfall events which would compound the problem of soil softening / erosion. Indeed, looking at the extent of masonry frost damage / mortar bed erosion at low level throughout the whole property, it appears that roof water had also historically been allowed to run-off freely onto the walls below. The current fibre cement gutters are obviously a later addition that was an attempt to rectify the problem.

4.04 The gutters to the single storey portion are almost entirely absent on the front elevation and large areas are missing or have dislodged along the rear elevation. The gutters that do prevail here are set too low to function satisfactory.

4.05 The poor rainwater collection has caused settlement to both long flank walls to the single storey portion causing the walls to crack above many of the openings; crack in walls nearest to the ends of the gutters where water will concentrate onto the ground; gable walls to crack because they are tied to the flank walls; and both main walls now lean toward the rear.

4.06 The walls to the single storey section are fairly damp because the floor is lower than the ground level outside.

4.07 The roof exhibits a small degree of spread at eaves but that is not unusual for this form of construction and is within acceptable limits.

5.0 Conclusions & Recommendations

5.01 The property has been subject to structural damage that is classified as Minor and Moderate in accordance with BRE Digest 251. The majority of this movement has been caused by ineffective rainwater collection from the roofs influencing the soil upon which the foundations are formed. The cracks can be readily repaired using a "Heli-fix" or similar approved system, see appendices.

5.02 It is recommended that the whole property is provided with adequate guttering and downpipes. These should be collected to a new underground drainage system and soakaways, if employed, should be located at least 5 metres away from any structure.

5.03 In considering a change of use or refurbishment it would be of major structural benefit to re-instate the missing first floor construction as part of the proposed layout.

5.04 With due note of the limited extent and magnitude of structural damage to this property and its relative ease of repair, we conclude that the barns are structurally suitable for a change of use to a commercial or residential use.

5.05 If the roof coverings are to be replaced as part of any conversion proposal, then we recommend that any new cross walls are constructed in blockwork and tied properly to the flank walls and that a tied and braced scaffolding be through fixed to the walls of the building prior to taking off the roof.

Signed: P. Waldeck

Paul Waldeck B.Eng.(Hons.) C.Eng., M.I.C.E., M.I.Struct.E.

Date: 25 February 2008

































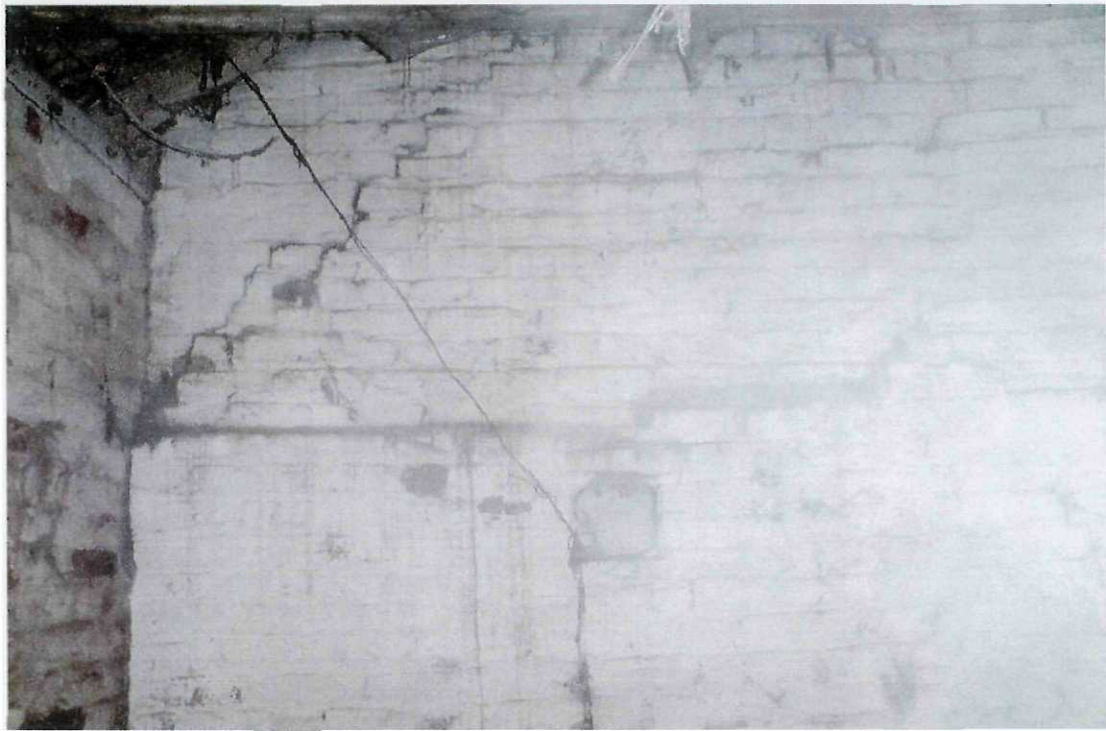










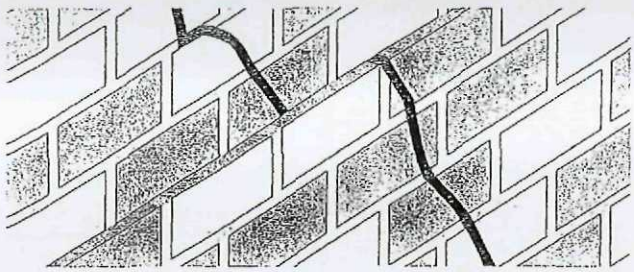




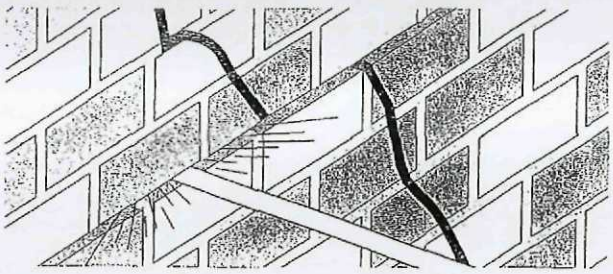




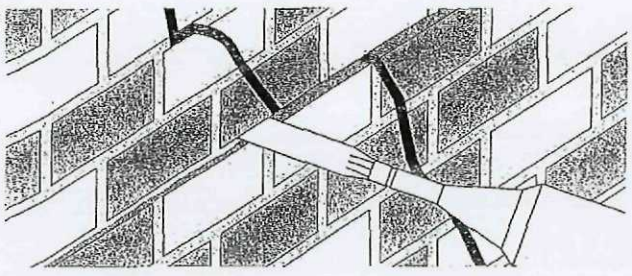
Installation Procedures



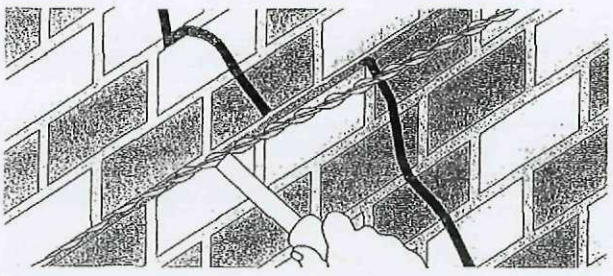
1. Rake out or cut slots into the horizontal mortar beds, a minimum of 500mm either side of the crack, to the specified depth.



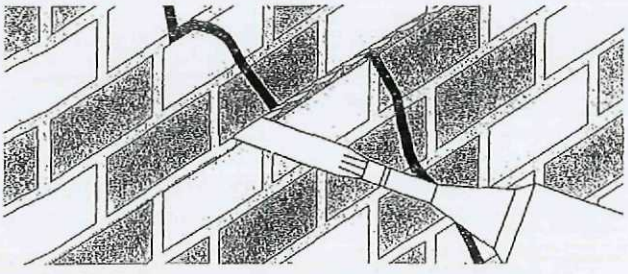
2. Clean out slots with blow pump and apply HeliBond Primer or flush with water.



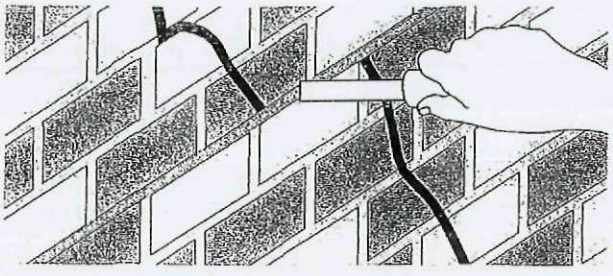
3. Using the CS Pointing Gun Kit, inject a bead of HeliBond to the back of the slot.



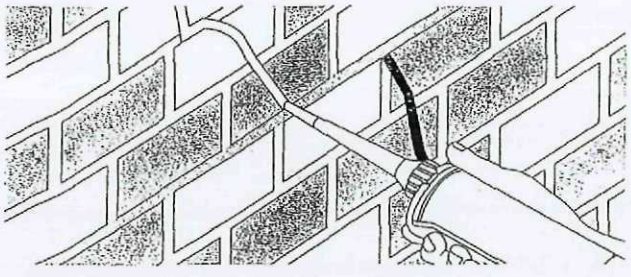
4. Using a finger trowel, or similar, push the HeliBar into the grout to obtain good coverage.



5. Insert a further bead of HeliBond over the exposed HeliBar, finishing 10-15mm from the face, and 'iron' into the slot using a finger trowel.



6. Repoint the mortar bed and make good.



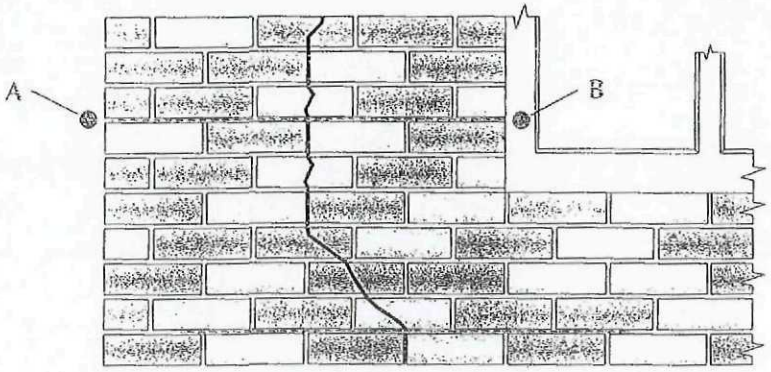
7. Make good the vertical crack with a weatherproof filler. e.g. CrackBond TE.

	Single skin/ Cavity wall	Solid wall
Vertical Spacing	Every 4-6 brick courses (300-450mm)	
Depth of slot	25-35mm	35-40mm

REFERENCE HeliBar – Page 33, HeliBond Grout – Page 25, CrackBond TE – Page 24

Crack Stitching

Cracked masonry is best stabilised by bonding HeliBar stainless steel rods into appropriate bed joints or cut slots. Tensile loads are redistributed along the masonry to minimise further developments of the crack which may occur with simple injection methods.



REPAIRING CRACKS NEAR CORNERS AND OPENINGS

Where cracks are less than 500mm from an external corner (A) or an opening (B) at least 100mm should be bent round the corner and bonded into the return wall or bent and fixed into the reveal, avoiding any DPC membrane.

Benefits

- Quick, simple, effective and permanent
- HeliBar and HeliBond grout combine to produce an excellent bond within the substrate
- Masonry remains flexible enough to accommodate natural building movement
- Non-disruptive structural stabilisation with no additional stresses

Technical Specifications

Available diameters: ..... 4.5, 6 and 8mm

Available lengths ..... cuts lengths up to 1.5m

Material: ..... Austenitic stainless steel, grade 304 or 316

POINTS TO NOTE

A *Where two or more cracks are close together these may be stitched using one continuous length of HeliBar which must be long enough to extend 500mm beyond the outer cracks. e.g. if there are three cracks, each 250mm apart, then the overall length of HeliBar required would be 1.5m.*

B *The horizontal slot, normally the mortar bed, can be cut using a twin diamond blade chaser with vacuum attachment, an angle grinder or a mortar chisel.*

C *All mortar must be removed, together with any loose debris, to ensure a sound bond.*

D *Prepare the slot with HeliBond Primer or thoroughly wet the slot with clean water.*

E *As standard, slots should be 10mm wide to accommodate the 6mm diameter HeliBar. For thin joints use 4.5mm HeliBar*

F *HeliBond grout is the recommended bonding agent. PolyPlus resin is used for smaller jobs and where loads are to be rapidly applied.*

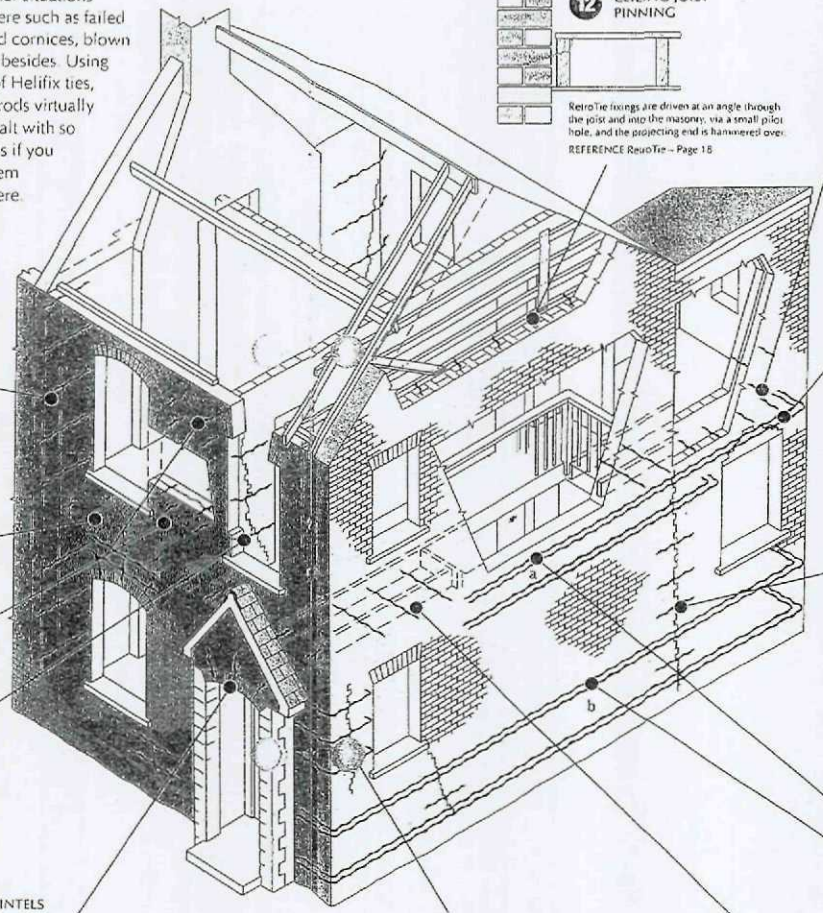
REFERENCE HeliBond Grout – Page 25, PolyPlus Resin – Page 26

Helibeam System

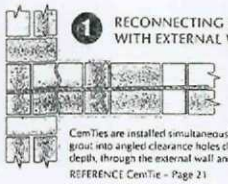
Masonry may deteriorate, crack, delaminate and fail for a variety of reasons. All of these problems can be overcome by using various combinations of Helifix remedial ties and masonry reinforcement products and techniques.

The illustration shows a typical two storey Victorian property of solid wall construction with a later cavity wall extension. However, masonry repair strategies using Helifix products have proven to be fully effective in virtually every type of masonry structure from medieval churches to modern tower blocks, from bridges and tunnels to all forms of housing. They will provide secure, lasting, stress-free connections in all forms of brick, blocks, concrete, stone and timber as well as traditional local building materials such as Devon Cob, Wytchert and Norfolk Clay Lump. Highlighted are some of the most commonly occurring structural faults that affect every type of commercial and residential property of all ages and construction. In conjunction with the Helibeam System other products are able to remedy specific problems. These are installed externally in the vast majority of situations leaving buildings visibly unimpaired and causing negligible disruption to their occupants.

Clearly there are other situations which are not shown here such as failed parapet walls, separated cornices, blown render and many more besides. Using various combinations of Helifix ties, fixings and reinforcing rods virtually any situation can be dealt with so do not hesitate to call us if you have a particular problem which is not covered here.



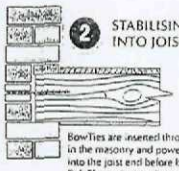
1 RECONNECTING PARTY WALLS WITH EXTERNAL WALLS



CemTies are installed simultaneously with HeliBond NM2 grout into angled clearance holes drilled, to the required depth, through the external wall and into the party wall.

REFERENCE CemTie – Page 21

2 STABILISING BOWED WALLS INTO JOIST ENDS



BowTies are inserted through a clearance hole in the masonry and power driven directly into the joist end before bonding with PolyPlus resin into the masonry.

REFERENCE BowTie – Page 22

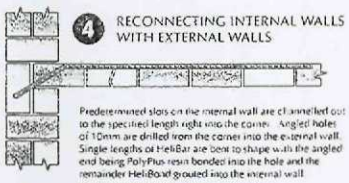
3 REPAIRING SEPARATED MASONRY



CemTies and HeliBond grout are installed into clearance holes drilled through the near leaf and at least 75mm into the far leaf. The density of the ties will depend upon the degree of separation, the material, the cause and the condition of the masonry overall.

REFERENCE
CemTie – Page 21, DryFix – Page 16-17

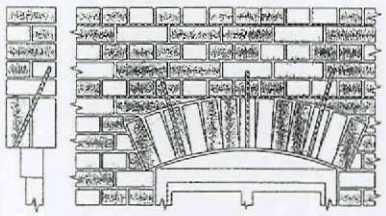
4 RECONNECTING INTERNAL WALLS WITH EXTERNAL WALLS



Predetermined slots on the internal wall are channelled out to the specified length right into the corner. Angled holes of 10mm are drilled from the corner into the external wall. Single lengths of HeliBar are bent to shape with the angled end being PolyPlus resin bonded into the hole and the remainder HeliBond grouted into the external wall.

REFERENCE: Helibeam System – Pages 6-7, PolyPlus Resin Page 26, HeliBond Grout – Page 25

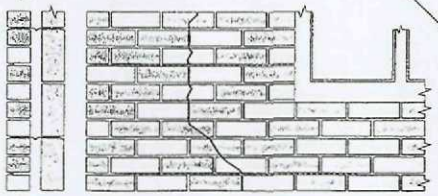
5 REPAIRING BRICK ARCH LINTELS



Parallel lengths of HeliBar rod are bonded into the specified cut slots directly above the existing lintel. Angled CemTies or DryFix ties are installed through the lintel and into the masonry above the lower HeliBars.

REFERENCE: Helibeam System – Pages 6-7, CemTie – Page 21, DryFix – Pages 16-17

6 REPAIRING CRACKS NEAR CORNERS AND OPENINGS



Where cracks are less than 500mm from an external corner or an opening, at least 100mm should be bent round the corner and bonded into the return wall or bent and fixed into the reveal, avoiding any DPC membrane.

REFERENCE: Crack Stitching – Pages 12-13

12 CEILING JOIST PINNING

RetroTie fixings are driven at an angle through the joist and into the masonry, via a small pilot hole, and the projecting end is hammered over.

REFERENCE ReuoTie – Page 18

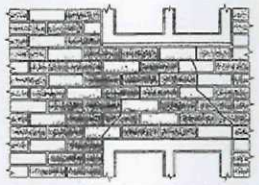
11 REPLACING CAVITY WALL TIES



DryFix wall ties are power driven directly into both leaves, via a small pilot hole around 6mm diameter. RetroTies are driven into a 4-5mm pilot hole in the far leaf, via a clearance hole in the near leaf into which they are bonded with PolyPlus. ResiTies are resin bonded into a 10mm hole in both leaves.

REFERENCE DryFix – Pages 16-17, RetroTie – Page 18, ResiTie – Page 19, Technical Data – Pages 14-15

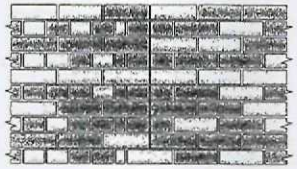
10 REPAIRING OR CREATING FLAT ARCH LINTELS



Parallel lengths of HeliBar rod, are bonded into the specified cut slots above the existing lintel.

REFERENCE Helibeam System – Pages 6-7

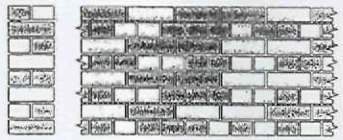
9 CRACK STITCHING



Lengths of HeliBar rod extending 500mm either side of the crack are bonded into cut slots, normally the mortar beds, with HeliBond or PolyPlus resin.

REFERENCE Crack Stitching – Pages 12-13

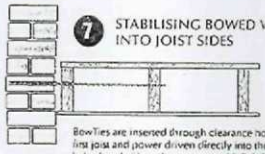
8 CREATING MASONRY BEARS



The Helibeam System uses parallel lengths of HeliBar reinforcing rod bonded into predetermined cut slots (normally the mortar beds) with HeliBond grout to form deep masonry beams which distribute the building loads.
a shows a beam resisting the horizontal displacement of a bowing wall. Due to the internal stairwell BowTies cannot be used as there are no joists at this point.
b shows a beam resisting vertical loads to prevent building subsidence.

REFERENCE Helibeam System – Pages 6-7, HeliBond Grout – Page 25

7 STABILISING BOWED WALLS INTO JOIST SIDES



BowTies are inserted through clearance holes in the masonry and first joist and power driven directly into the second joist before being bonded into the masonry with PolyPlus resin.

REFERENCE BowTie – Page 22

LIMITATIONS AND QUALIFICATIONS

Structural Inspection, Appraisals and Investigation Reports are subject to the following limitations and qualifications:

Structural Inspection

This report has been prepared in the context of a Structural Inspection which is defined as "an assessment of the behavior of the primary load bearing elements of the building". Examples of items not covered are electrical and mechanical installation, decorative condition, damp proofing, ground bearing floors, non-structural timber fixtures, fittings, mouldings and coverings which are usually the subject of advise given by other specialists in their reports. Any comments, advice or recommendations given in the report are based upon information made available and circumstances prevailing at the time of the inspection.

Non-Related Areas of the Structure

This report is limited to the specific areas of structural damage and to those elements of the structure directly relating thereto, except where the necessary inspection area is inaccessible. The specific areas defining the scope of the report are defined at the start of the report or by our brief. We cannot comment upon concealed or covered-up areas of works or structure unless there is a specific requirement to "open-up", as sanctioned by the Employer.

Roof Structures

Inspection within the roof void is not made where no means of access is provided or where entry cannot reasonably be achieved. Liability cannot be extended to any comments offered regarding the roof structure or elements relating thereto, when such access restrictions prevail.

Wood Infestation

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 fee from defect. All matters under this heading are subject to advise by other specialists and is beyond the scope of this report.

Finishes

Where cracking is noted in the report, this is based upon those noted on the finished surface and these are not necessarily representative of the crack width or extend of damage to the structure beyond such a finish. Finishes may include such items as paint, paper, plaster and rendering but this list is not exhaustive.

Foundations

Inspection of foundations by trial hole excavation is not carried out as part of an Inspection unless agreed otherwise.

Where trial holes are excavated as part of a Structural Investigation, the condition of the footing and the founding soil relates only to the point of excavation and does not guarantee a continuation of the same throughout non inspected areas of the structure.

Mining and Mineral searches are beyond the scope of this report.

Investigation of Methane, Carbon Dioxide, Radon and other such gases or contaminants hazardous to health are not undertaken as part of the investigation unless specifically requested by the client and then only at discretion of a Director of the Company.

Foul and Surface Water Drains

When it is requested as part of the investigation, drains are inspected as inspection chambers only, where there is reasonable suspicion of defect. Drains are not water tested or subject to television inspection unless specifically essential to complete our brief.

Listed Buildings/Structures

Where remedial works are required to Listed Buildings or structures it would be prudent of the addressee to contact the Local Authority Planning Description Department to determine whether Planning Approval and/or Listed Building Consent are required.

Costings

Any costings for remedial or new build works given with this report are indicative and subject to detailed design and specification and are only to be taken for comparative purposes in assessing the commercial superiority of a given solution option over another.

Monitoring

Stability of a structure, confirmed as a result of a series of monitoring readings during a given period, does not guarantee the future stability of a structure beyond the monitoring period.

Investigations/Testing

Where uncovering, excavation, exploration, testing has been undertaken insitu or in the laboratory to assist in the preparation of a report. The findings of the report and any recommendations offered are based on the specific results of those inspection, tests, explorations at given locations. Whilst it may be reasonable to use such results for general purposes, there may be considerations prevailing beyond those sampled points, that differ and would otherwise give rise to different report conclusions.

Disclosure to a Third Party

A third party may NOT rely upon this report for any purpose, without the written consent of a Director of the Company.

This report has been prepared and issued specifically for the benefit of the addressee and no responsibility will be extended to any third party of the whole or any parts of its contents.