Geoff Holyoake Associates Ltd.

Structural & Civil Engineering Consultants

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STRUCTURAL SURVEY

OF BARN 1,

AT 251 BROADGATE,

SUTTON ST. EDMUND.

S.742/15/GCH
AUGUST 2015

1. Client:

Old Hall Farm Co Ltd
The Oaks
251 Broadgate
Sutton St Edmund
Spalding
Lincolnshire

2. Brief.

2.1. To provide a structural survey of the existing barn to assess its suitability for domestic conversion.

2.2. All as per the client's instruction dated 13 August 2015.

2.3. In accordance with our standard practice, this report is for the sole use of the parties to whom it is addressed and no responsibility is accepted to any third party for the whole or any parts of its contents.

2.4. This report does not include any inspection of 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.

2.5. The following recommendations are based on the findings of the site investigation. We highlight that, other conditions may occur elsewhere on the site of which we have no knowledge and therefore cannot accept any responsibility.

2.6. Please note that, this site has not been tested for contamination.

3. Location & Background.

3.1. Barn 1 is situated within a farmyard complex at 251 Broadgate in the Lincolnshire village of Sutton St Edmund. This area is covered by the South Holland District Council.

3.2. The two story barn is situated centrally within the farmyard area. There are no nearby significant trees.

3.3. The barn is considered over 100 years old and it is understood from the present owner that no structural remedial works, including repointing, have been undertaken for 10 years or more.

3.4. It is apparent that, the rear single story lean-to area previously covered a larger area.

4. Trial Hole Investigation

4.1. See trial holes 01 – 03 and trial hole A, kpa readings and laboratory test results.

4.2. Trial holes 01 and 03 were excavated within the farmyard area and exposed a large depth of miscellaneous fill overlying firm mottled grey/brown silty clay overlying softer silty clays which contain a thin band of peat.

4.3. It is also highlighted that a thin lens (<75mm) of black non-fibrous material was encountered in both trial holes at approximately 1.5m below ground level.

4.4. The influential band of peat was approximately 100mm thick and commenced at approximately 2.4m below ground level.

4.5. The lower silty clays were wet and continued to deteriorate. However, trial hole 01 remained dry and no sulphate tests were undertaken.

4.6. A sample of the upper silty clay stratum from trial hole 03 was sent for analysis. The test results show that the clay has a plastic index of 23 % and therefore can be defined as a medium shrinkable soil in accordance with the guidelines of the National House Building Council Standard 4.2.

4.7. Trail hole 02 was excavated to the rear of the site and encountered firm fenland light brown sandy silt to 3m below ground level.

4.8. Fenland silt is considered a non-shrinkable soil.

4.9. Trial hole A exposed the existing barn foundation. The traditional corbelled brickwork footing extends some 800mm below ground level and was founded within the upper regions of the firm silty clay stratum.

4.10. Pilcon shear vane meter readings were taken under the existing foundations. The kpa readings of 40 - 45 represent firm silty clay with a design bearing capacity in the order of 90kn/m^2 but any design capacity is reduced by the presence of peat at lower levels.

5. Defect Survey

5.1. See photographs P1 – P14.

5.2. The slated roof profile is distorted. **See P1 & P3.**

5.3. In general, the external brickwork is weathered. **See P1, P2, P3, P4, P5 & P6.**

5.4. There is evidence of historical repointing of cracks above the large openings. It is apparent that lower horizontal lintols have been installed below the original arched brickwork detail. **See P1, P2, P3 & P6.**

5.5. The stormwater guttering to three elevations discharges into a nearby water butt. **See P1, P2, P3, P4 & P5.**

5.6. There is a distorted area to the side of a large window to one flank wall and to a lesser extent to the opposite flank wall. **See P6 & P1.**

5.7. It is understood from the owner that, these defective areas have been present for over 50 years.

5.8. There is cracking above and below the purlins to the rear lean-to roof area within the main barn wall. This cracking is reflected internally and although it is considered historic, further movement has occured since it was last repointed. **See P7, P8 & P9.**

5.9. A later lifting frame has been added internally many years ago. **See P10.**

5.10. The 'open' timber roof structure is consistent with age and construction of the building. **See P11 & P13.**

5.11. The highlighted cracking above the timber lintols to the large opening is also evident internally. **See P12 & P14.**

6. Conclusions & Recommendations

6.1. The roof structure is consistent with the age of the building but will require stiffening or replacement to satisfy modern Building Regulations requirements.

6.2. In general, the 323mm thick solid brickwork walls although weathered are satisfactory.

6.3. However, the highlighted defective areas to the side of the large openings and to the corner near to the rear lean-to will require localised repairs (incorporating 'stitching' with helibars or similar) or rebuilding.

6.4. The large span timber lintols will require replacement and, in general, all structural timbers should be checked, repaired or replaced as necessary.

6.5. Any new first floor structure will stiffen the main walls and enhance overall lateral stability.

6.6. The stormwater guttering is considered ineffective and will require replacement with all associated new underground pipework and soakaways, as necessary.

6.7. The traditional corbelled footings are founded approximately 800mm below ground level within firm silty clay and should continue to perform satisfactorily given the present status quo.

6.8. However, any significant increase in loads from the proposed conversion (eg new first floors and change in roof coverings) applied to these foundations may induce future movement within the deteriorating sub soil conditions which contain a compressible layer of peat.

6.9. Therefore, in this case the existing foundations should be underpinned by introducing a piled raft foundation internally with support 'nibs' to the extended walls.

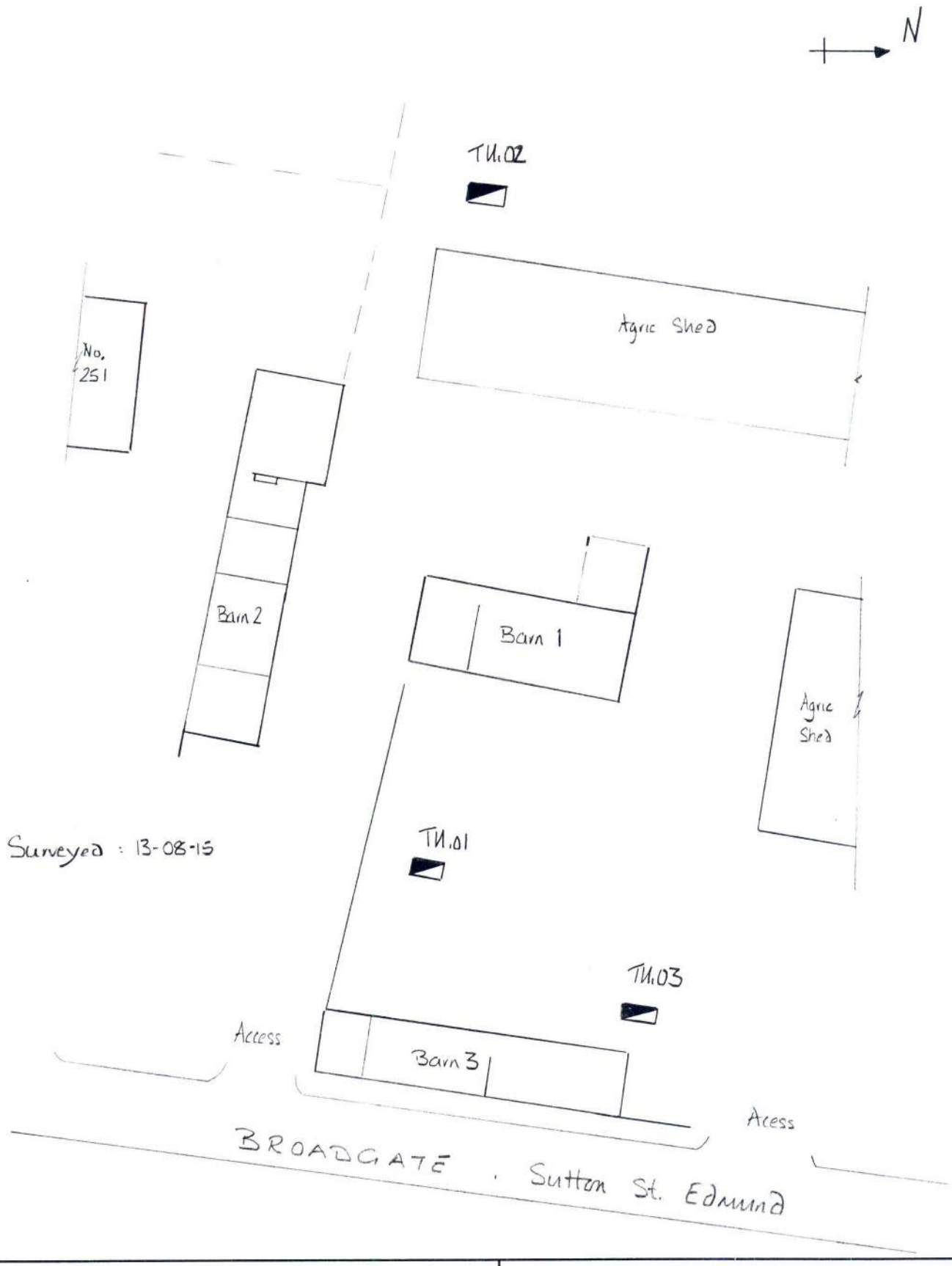
6.10. Other general recommended works include: -

- All new roofs and floors are to be strapped to the main walls using mild steel straps in accordance with the Building Regulations.
- All the walls should be checked for damp and new damproofing provided, where necessary.
- Upon completion of these works all other cracking may be repointed throughout to ensure weathertightness.

6.11. In conclusion, upon completion of the recommended remedial works the barn is considered suitable for conversion to domestic use.



Eur. Ing. G. C. Holyoake, B.Sc. C.Eng. M.I.C.E.



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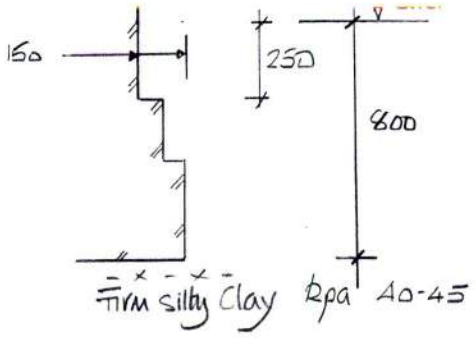
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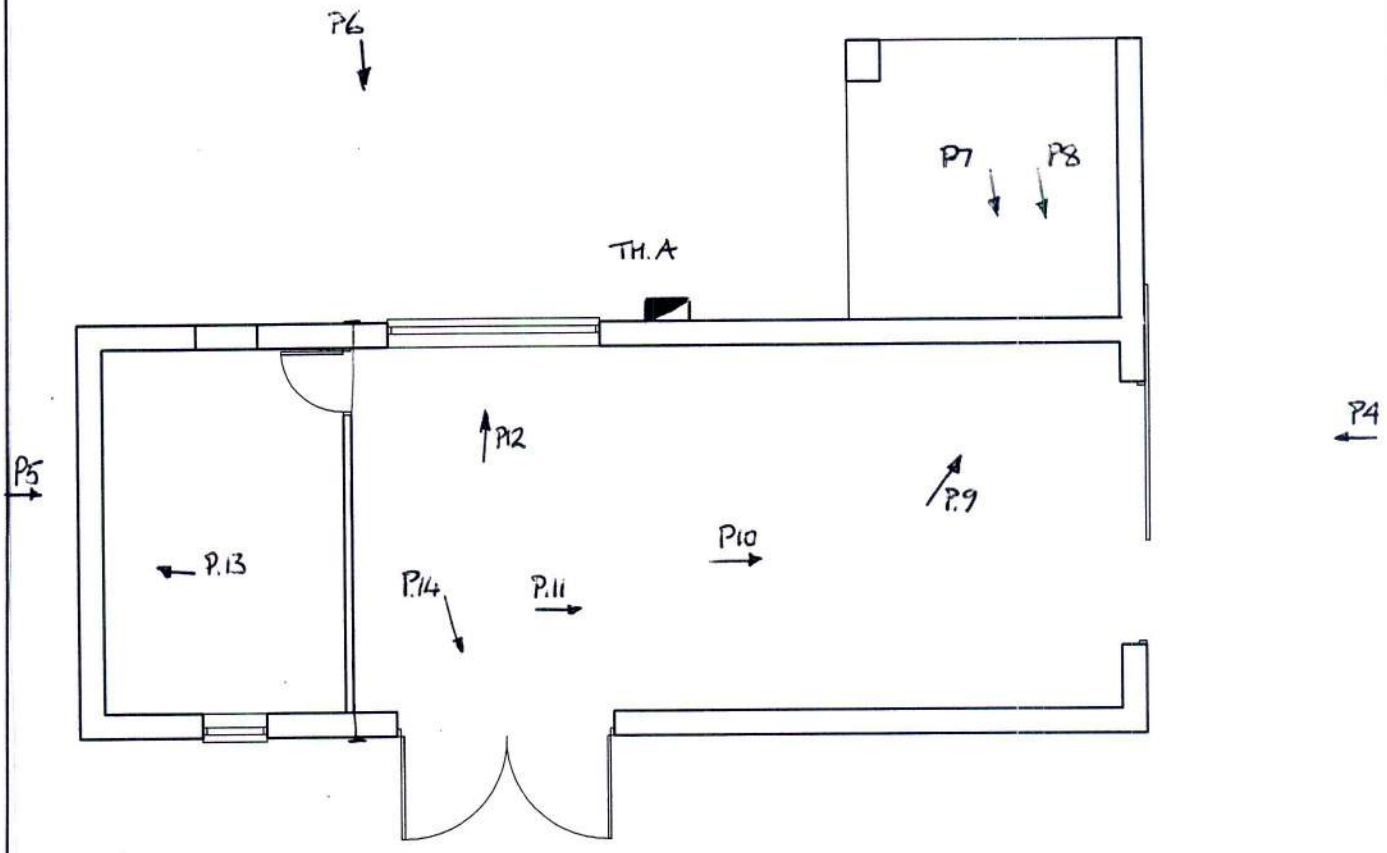
Drawing Title

LOCATION PLAN

Drawn	Date	Scale	Dwg.No
GCH	Aug'15	/	3.742 15/01

TRIAL HOLE A.





P.2.

P1 = Photograph P.1

Geoff Holyoake Associates Ltd. Structural & Civil Engineering Consultants	27 Exeter Gardens Stamford Lincolnshire PE9 2RN Tel: 01780 765971	Drawing Title: EXISTING LAYOUT	
		Drawn: GCH	Date: AUG '15
		Scale: —	Dwg.No: 3.742 15/02

Distorted roof profile

P.3



gable bwk.

distorted area See P.6

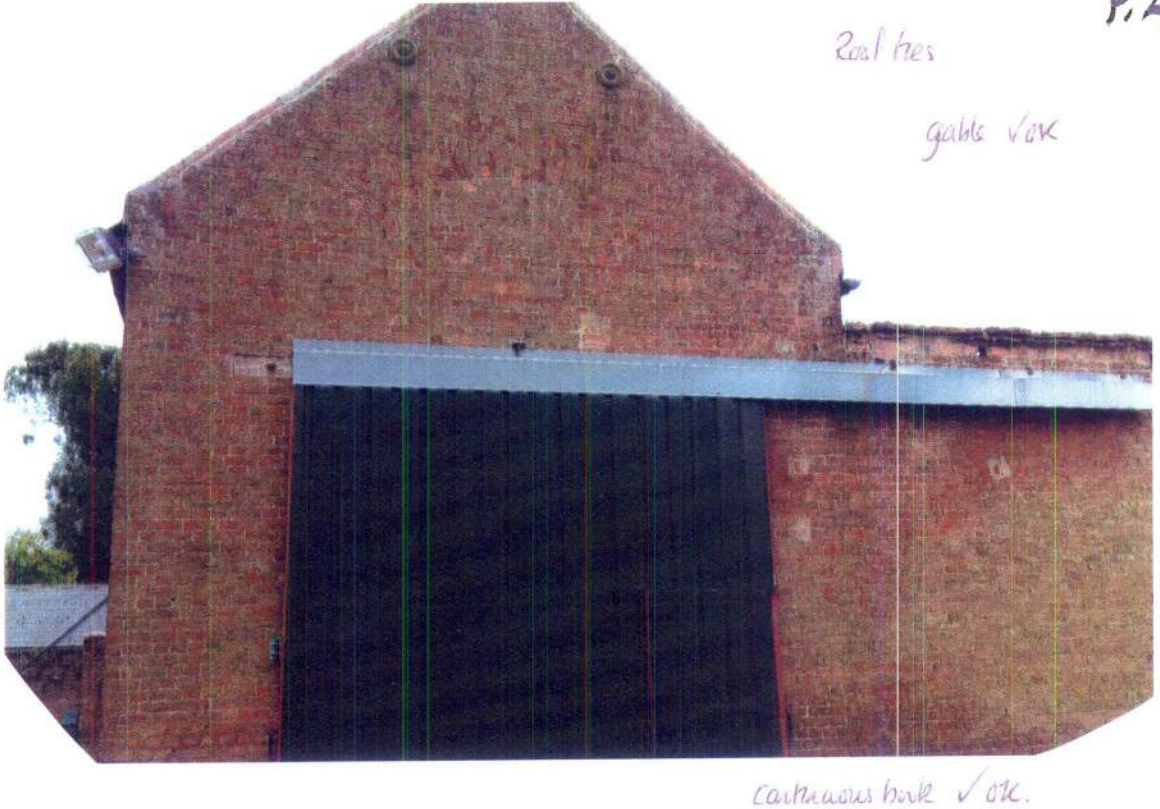
trial hole

distorted roof over "open" area

P.4

Roof ties

gable OK



continuous bwk OK.

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		Drawn: GCH	Date: AUG '16
		Scale: —	Dwg.No: S.742 15 104



P.5

Roof hes.

weathered brickwork with arches features

P.6

distortion each with previous repointing above



distortion brick with horiz. line

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Drawing Title

PHOTOGRAPHS P5 & P6

Drawn	Date	Scale	Dwg.No
GCH	AUG 15	/	8.742 15/05

P.7



diagonal cracking to corner

P.8

previously repointed



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Drawing Title: PHOTOGRAPHS P.7 & P.8

Drawn	Date	Scale	Dwg.No
GCH	AUG 15	—	S.742 15/06

P.9



diagonal cracking to corner - reflects external cracking

P.10

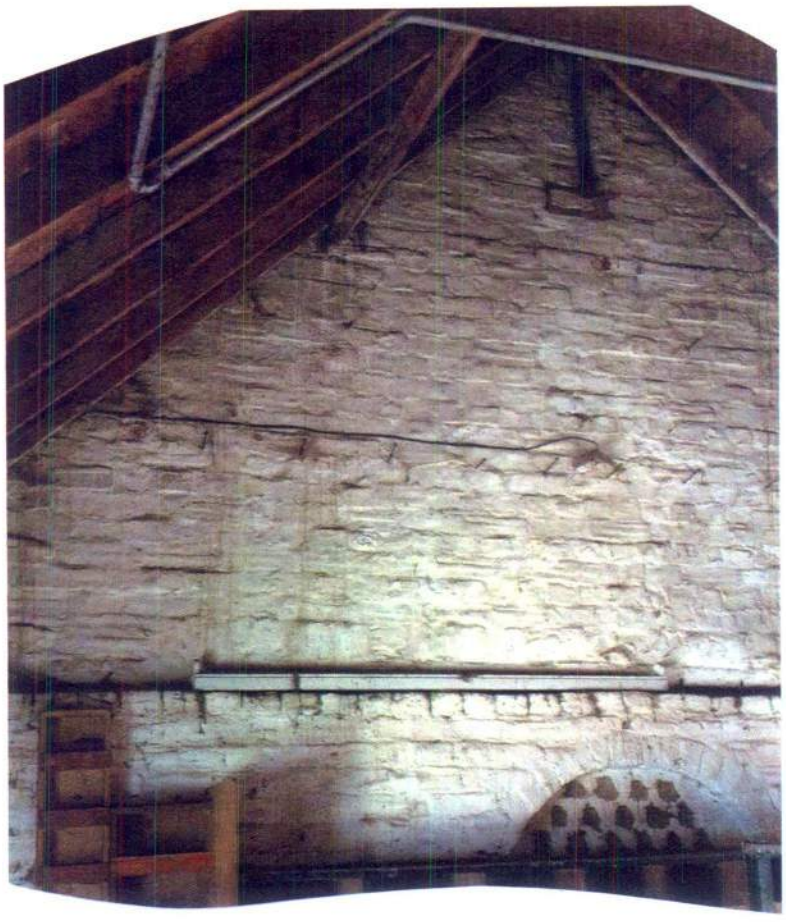


bwk ✓ ok.

later lifting frame to be removed.

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		Drawn: GCH	Date: AUG '15
		Scale: —	Dwg.No: 9.742 15/07

P.13



Gable brickwork York

Arched Feature

P.14

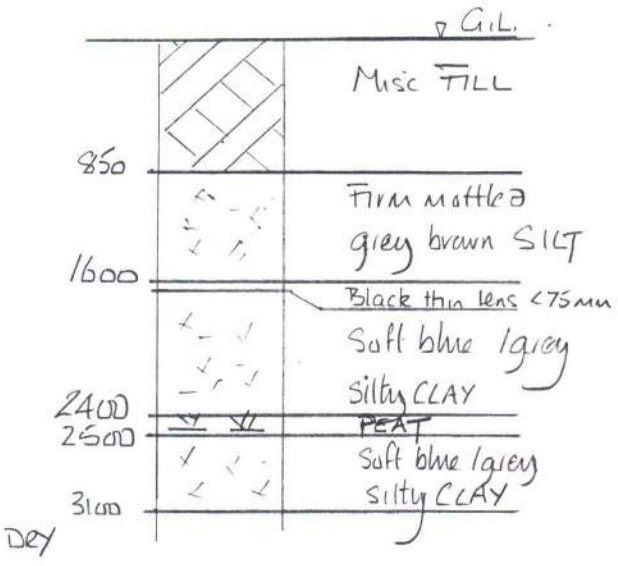


diagonal cracking above altered lintel detail.

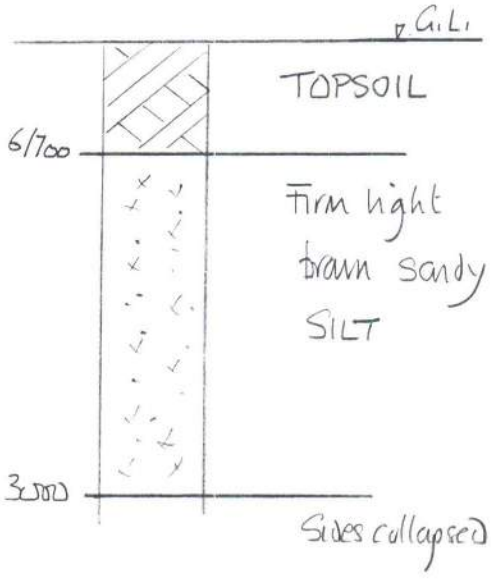
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Drawn	Date	Scale	Dwg.No
GCH	Aug 15	—	9.742 15/09

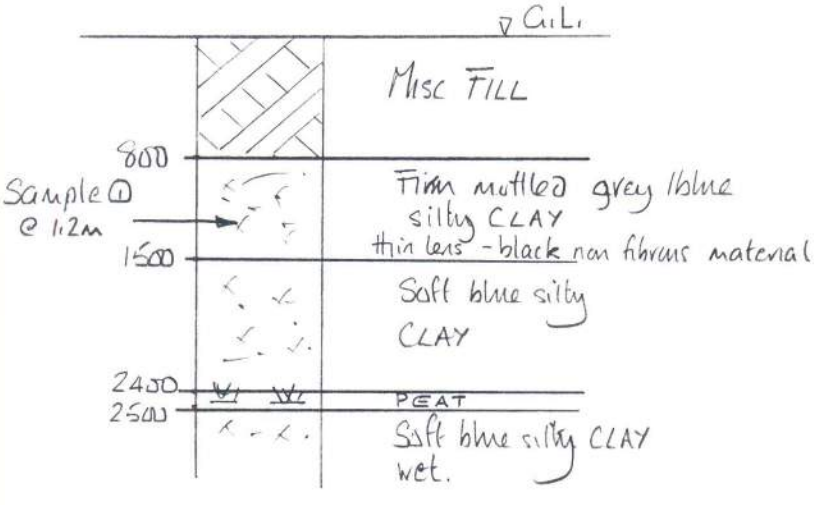
TH.01



TH.02



TH.03



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Drawing Title

TRIAL HOLE LOGS 01~03

Drawn	Date	Scale	Dwg.No
GCH	AUG '15	—	S.742 15/10

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8180

TEST CERTIFICATE

Determination of Liquid & Plastic Limits

Tested in accordance with BS 1377-2:1990: Clause 4.4 & 5: One Point Method

Client:	Geoff Holyoake Associates Ltd	Certificate Number:	PL5105-1/1/704
Client Address:	27 Exeter Gardens Stamford Lincs. PE9 2RN	Client Reference:	Not Given
		Job Number:	PL5105-1
		Date Sampled:	Unknown
Contact:	Geoff Holyoake	Date Received:	13.08.2015
		Date Tested:	25.08.2015
Site Name:	Barns at 251 Broadgate	Certificate of Sampling:	N/A
Site Address:	Sutton St Edmund	Sampling Certificate No.:	N/A
		Sampled By:	Client

Test Results:

Laboratory Reference: PL5105-1/1
Sample Reference: Sample 01

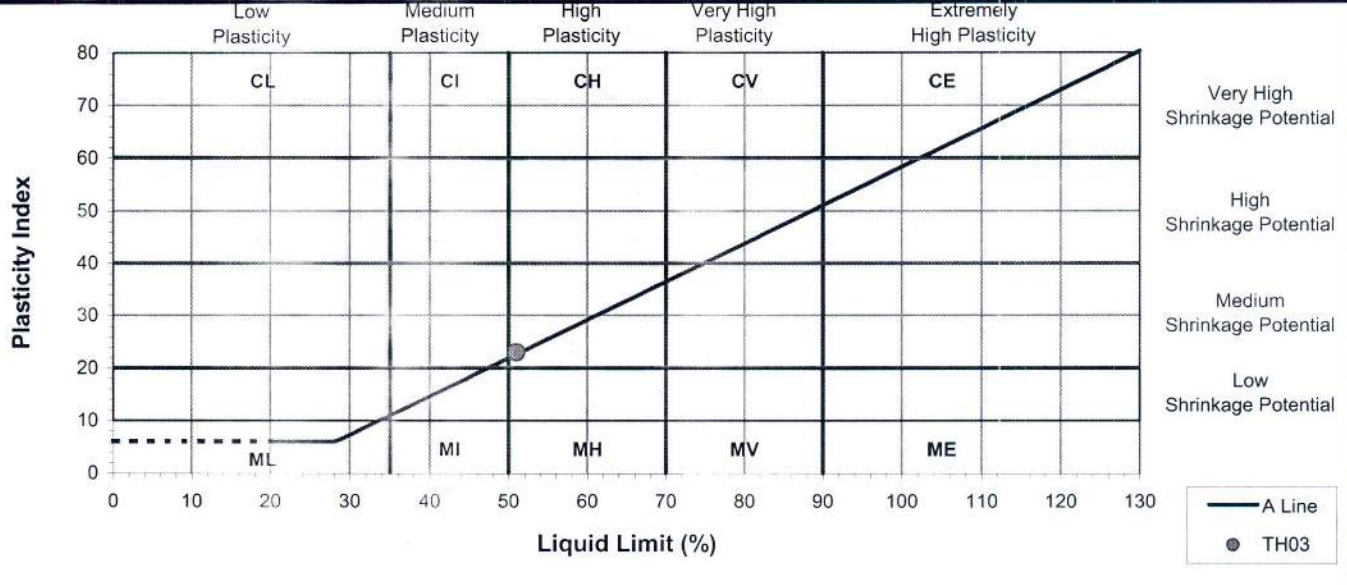
Sample Description: Firm brown dark grey silty CLAY *with slight petro-chemical odour*

Location: TH03 **Depth:** 1.20m

Sample Preparation: As Received

Estimated % Passing 425µm BS Test Sieve

Moisture Content (%)	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index	% Passing 425µm BS Test Sieve
35	51	28	23	99



Comments:

Approved Signatory: M. Hartnup - Laboratory Manager Signed:

for and on behalf of Ground Engineering Ltd

Date Reported: 26.08.2015 Page 1 of 1
Form Number: GELab/C/704 Version 40

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Newark Rd, Peterborough PE1 5UA

GROUND ENGINEERING

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TEST CERTIFICATE

Determination of Moisture Content

Tested in Accordance with BS 1377-2: 1990: Clause 3.2

Client:	Geoff Holyoake Associates Ltd	Certificate Number:	PL5105-1/1/705
Client Address:	27 Exeter Gardens Stamford Lincs. PE9 2RN	Client Reference:	Not Given
		Job Number:	PL5105-1
		Date Sampled:	Unknown
		Date Received:	13.08.2015
Contact:	Geoff Holyoake	Date Tested:	20.08.2015
		Certificate of Sampling:	N/A
Site Name:	Barns at 251 Broadgate	Sampling Certificate No.:	N/A
Site Address:	Sutton St Edmund	Sampled By:	Client

TEST RESULTS

Laboratory Reference	Sample Reference	Location	Depth Top	Depth Base	Description	Moisture Content [%]
PL5105-1/1	Sample 01	TH03	1.20m	N/A	Firm brown dark grey silty CLAY *with slight petro-chemical odour*	35

Comments:

Approved Signatory: M. Hartnup - Laboratory Manager

Signed:

for and on behalf of Ground Engineering Ltd

Date Reported: 26.08.2015

Form Number: GELab/C/705 Version 17

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distorted roof profile

P.1

original arch with later door lintol below

previous repointing and horizontal tie

P.2



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Drawing Title

PHOTOGRAPHS P1 & P2

Drawn	Date	Scale	Dwg.No
GCH	Aug 15	—	8.742 15103