BEAVER BRIDGES

Bridge Design Specification

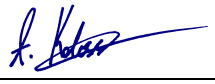
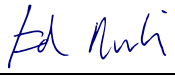
Bridge No. BB1543

Date: January 2023

Project Name: Cross Keys Bridge

Document Title: Bridge Design Specification

Document No: BB1543–SP-001

Version	Issue	Prepared by: AK Date: 05/06/23	Checked by: ED Date: 05/06/23
C01	First Issue		

1. Introduction

This document is a performance specification for the proposed Cross Keys Footbridge to cross the River Rawthey in the Yorkshire Dales. The bridge will be a 35m span half-through pratt truss bridge and will replace an existing timber footbridge.

2. General

2.1 Site Details

Dimensions of the bridge is shown on drawing. BB1543-GA-001 Rev A. Grid reference for the bridge is SD 6982 9696 (54.3671476 -2.4644174) and the elevation of the bridge deck is approximately 199m AOD.

2.2 Geometry

The bridge is to have the following critical dimensions:

2.2.1	Overall Length	35.750m
2.2.2	Span between bearings	35.000m
2.2.3	Clear Width Between Parapets	2.500m
2.2.4	Parapet Height Above Deck	1.800m
2.2.5	Overall Width	2.950m
2.2.6	Construction Depth	300mm

2.3 Design Life

Design working lives for bridge components will be as follows as per CD 350:

Superstructure: Steel bridge will have a design life of 120 years (Category 5)
Bearings: Elastomeric bearings will have a design life of 15 years (Category 2)
Parapets: Softwood timber will have a design life of 15 years (Category 2)
Decking: FRP panels will have a design life of 50 years (Category 3)

2.4 Classes and Levels

Consequence class to be CC2 in accordance with BS EN 1990:2002+A1:2005.
Reliability class to be RC2 in accordance with BS EN 1990:2002+A1:2005.
Inspection level to be IL2 in accordance with BS EN 1990:2002+A1:2005.

2.5 Materials

Superstructure Steelwork:

All steelwork will be minimum steel grade S355 to BS EN 10025 or an equivalent higher grade. All steelwork greater than 4mm

thick will have a minimum sub-grade of J0.

Corrosion Protection:

All steelwork to be applied with a Highways Agency Type II Paint System in accordance with The Specification for Highway Works Series 1900 or a fluoropolymer (FEVE) system such as Vitreflon 195. Top coat colour RAL 7022 Umba Grey.

FRP:

The FRP deck panels are durable and maintenance free with anti-skid surfacing with a slip resistance in accordance with CD 353 clause 9.5. All FRP pultruded products to be minimum E23 grade.

Concrete:

Element	Strength Class in accordance with BS8500-1	Design Chemical Class	Exposure Class
Abutments	C28/35	DC1	XD3

Concrete finishes:

Element	Finish
Buried unformed surfaces	U1
Buried/hidden formed surfaces	F1
Exposed formed surfaces	F3
Exposed unformed surfaces	U3

Structural backfill:

Class 6N/6P to abutments.

2.6 Articulation

All bearings will be Type C elastomeric deforming bearings C200200(10.0)23C5 supplied by SKE Bearings. The bearings are designed to permit longitudinal movement and deformations only whereby transverse movement and deformations will be resisted by vertical guided plates .

2.7 Road and Pedestrian Restraint Requirements

The pedestrian restraint system is 1.8m high, formed from horizontal timber rails spanning between the vertical and diagonal brace members of the truss. The top of truss top chord will act as top rail at 1.8m from deck level.

The rails will provide a 600mm infill panel at 25mm above deck level in line with the requirements for equestrian use according to BS 7818, CD353 and CD377. Guidance from Path Bridges (Forestry Commission) recommends the horizontal rails to be designed for a minimum load of 1.3kN/m and 0.74kN/m for equestrian use and pedestrian normal loading, respectively. This also corresponds to BS 7817 which recommends Class 2 loading (0.7kN/m) for normal duty guard rails.

2.8 Foundations

The foundations to both embankments will be designed as shallow bearing reinforced concrete abutments.

The supports for the bridge will be designed and constructed to a tolerance of + or – 20mm in line in any direction and + or – 10mm in level. The bridge shall be designed and fabricated such that it can still function and be installed even if the supports are constructed up to these tolerances away from their intended location.

Differential settlement between any 2 foundations could be up to 20mm. The bridges should still be able to function with this level of differential settlement between supports.

3. Design Criteria

3.1 Permanent Actions

3.1.1 Self-weight of used materials (CS454 Table 4.1.1a)

Steel	7850 kg/m^3
Concrete	2400 kg/m^3

3.2 Variable Actions

3.2.1 Wind actions on bridge

Defined according to BS EN 1991-1-4 and applied in accordance with Section 8. Basic hourly wind speed from NA to BS EN 1991-1-4 Figure NA.1 = 23.5 m/s.

3.2.2 Snow Actions

Snow actions will not be considered as per NA to BS EN 1990 NA.2.3.4.2 A2.2.3(3).

3.2.3 Temperature Actions

Defined according to BS EN 1991-1-5 and applied in accordance with Section 6.
Minimum shade air temperature (Figure NA.1) = -17°C
Maximum shade air temperature (Figure NA.2) = +31°C

3.2.4 Seismic Actions

The effects of seismicity have not been considered due to the low consequence of the structure.

3.2.5 Hydrodynamic Actions

Due to the soffit level of the bridge, there is no requirement for hydrodynamic actions to be considered.

3.2.6 Accidental Actions

Not applicable.

3.2.7 Construction Actions

The bridge will be designed for actions during its construction (i.e. lifting in).

3.2.8 Carriageway Actions

3.2.8.1 Uniformly Distributed Loads

Pedestrian loading on the structure will be considered by applying uniformly distributed load in accordance with NA.2.36 of NA to BS EN 1991-2.

3.2.8.2 Vehicle Traffic Load

Not applicable.

3.2.9 Dynamic Loads

3.2.9.1 Pedestrian Comfort Criteria

Detailed dynamic analysis will be performed for fundamental frequencies below values specified BSEN1990 Annex 2 A.2.4.3.2 ii): 5 Hz for vertical direction and 2.5 Hz for horizontal direction.

3.2.9.2 Crowd Density

For bridge class for design crowd density determination, Class A will be assumed as per NA to BS EN 1991-2, Table NA.7.

3.2.9.3 Limits for Dynamic Response

Value for dynamic response limit of 1.23 m/s² will be used (based on NA.2.44.6 and Figure NA.10 of NA to BS EN 1991-2). This factor has been developed assuming:
k1 = 1.6 (Rural)

k2 = 0.7 (Primary Route. No other routes are available)
k3 = 1.1 (Height above flood channel is less than 4m)
k4 = 1.0 (Recommended value)

Appendix A – Geotechnical Investigations

GEO Environmental Engineering

GEO2020-4541: Ground Investigation Report (Factual)

Footbridge, Cross Keys, Sedbergh

Introduction:

The site comprises a footbridge at Cross Keys, Sedbergh.

- Cross Keys Footbridge, A683, Sedbergh, Cumbria
  The Cross Keys Temperance Inn, A683, Sedbergh, South Lakeland, Cumbria, LA10 5NE
  NGR: 369820, 496960 (SD6982 9696)

The proposal is to replace the footbridge. GEO was requested to undertake the investigation by RG Parkins Consulting Engineers on behalf of Yorkshire Dales National Park Authority.

Previous Investigation Works:

GEO is not aware of any previous investigation works.

Fieldworks:

GEO were requested to undertake two rotary cored boreholes to determine ground and groundwater conditions to aid the design of the replacement bridge by the Structural Engineer. Any items not specifically mentioned cannot be assumed to be covered.

The site had restricted access, with the northern bank accessible by foot only. RBH01 was completed by a rotary coring rig, with the borehole positioned within the farmyard adjacent to the river and bridge. RBH02 was completed using hand-held coring equipment, with the borehole positioned on the north side of the river adjacent to the bridge.

Fieldworks Findings (GEO):

RBH01 noted made ground of topsoil with anthropogenic debris to c.0.30m bgl overlying dense, very gravelly sand to c.1.20m bgl. Dense becoming very dense very sandy, slightly clayey gravel with cobbles was noted to a depth of c.2.80m bgl. Dark grey SILTSTONE initially weathered and recovered as gravel was noted to c.4.30m bgl. Strong appearing dark grey SILTSTONE was encountered from c.4.30m to the base of the borehole at c.7.50m which was noted as more competent with depth. Core was recovered (100%) from c.4.50m to c.7.50m depth.

RBH02 noted rough grass over topsoil to c.0.35m depth. Siltstone gravel and cobbles was then present to c.0.65m bgl. Dark grey SILTSTONE, initially weathered and recovered as gravel was noted to c.1.20m bgl. From c.1.20m to the base of the borehole at c.1.50m dark grey SILTSTONE was noted. 1.50m bgl which was the operational limit of the handheld coring equipment.

In-situ Geotechnical Testing:

In-situ Standard Penetration tests were completed within RBH01, generally at c.1.00m spacings. The test values recorded on the borehole logs. Due to the handheld drilling techniques employed on the northern bank, in-situ testing was not possible.

In-situ Sampling:

Samples were recovered from the borehole and details are presented on the exploratory hole log. This included samples of the drift deposits, weathered rock and cores of the intact rock.

Laboratory Testing:

Geotechnical Testing:

The following laboratory based geotechnical testing was undertaken by Pro Soils Laboratory Ltd of Doncaster:

- Determination of Unconfined Compressive Strength (4 no. samples)
- Determination of Point Load Tests (Axial and Diametral – 3 no. samples)

The results of the testing are summarised below and presented in the Laboratory test reports within the appendices.

DETERMINATION OF UNCONFINED COMPRESSIVE STRENGTH

ISRM Suggested Methods, pp 111 –116, 1981.

Hole Number	Sample Number	Sample Type	Top Depth (m)	Base Depth (m)	Sample Diameter (mm)	Sample Length (mm)	Height Ratio	Initial Mass (g)	Bulk Density (Mg/m)	Moisture Content (%)	Dry Density (Mg/m)	Load Failure (kN)	UCS (MPa)	Failure Mode	Date Tested	Remarks
RBH01		C	4.60	4.75	47	93	2.0	439	2.72	1.4	2.68	21.0	12.1	Brittle	12/04/21	
RBH01		C	5.80	6.07	48	94	2.0	442	2.60	0.7	2.58	58.2	32.2	Brittle	12/04/21	
RBH01		C	6.50	7.10	48	97	2.0	461	2.63	1.0	2.60	50.1	27.7	Brittle	12/04/21	
RBH01		C	7.10	7.35	47	95	2.0	453	2.75	0.8	2.73	58.3	33.6	Brittle	12/04/21	

PSL Professional Soils Laboratory

Cross Keys Footbridge, Sedbergh

Contract No:
PSL21/2196
Client Ref:
2020-4541

SUMMARY OF POINT LOAD TEST RESULTS

ISRM Suggested Methods : 2007

Borehole Number	Depth (m)	Sample Ref	Test Type	Orientation	Dimensions (mm)		Area	D_e^2	D_e	Failure Load (P)		I_s	Corr Fac	I_{s50}	Failure Type	Remarks
				Par / Perp	W	D	(mm2)		(mm)	(Mpa)	(kN)	(MPa)	F	(MPa)		
RBH01	5.00		I	Par	38	38	1444	1838.56	42.88	-	6.52	3.55	0.933	3.31	Valid	
RBH01	6.30		A	Perp	47	32	1504	1914.95	43.76	-	8.69	4.54	0.942	4.27	Valid	

Note All testing carried out on samples at as received water content Par = parallel, Perp = perpendicular, U = Random A = Axial, D = Diametral, I = Irregular

UKAS TESTING 4043

PSL Professional Soils Laboratory

Cross Keys Footbridge, Sedbergh

Contract No:
PSL21/2196
Client Ref:
2020-4541

SUMMARY OF POINT LOAD TEST RESULTS

ISRM Suggested Methods : 2007

Borehole Number	Depth (m)	Sample Ref	Test Type	Orientation	Dimensions (mm)		D_e^2	D_e	Failure Load		I_s	Corr Fac	I_{s50}	Failure Type	Remarks
				Par / Perp	L	D		(mm)	(Mpa)	(kN)	(MPa)	F	(MPa)		
RBH01	6.30		D	Par	-	47	2209	47.00	-	9.76	4.418	0.973	4.30	Valid	

Note All testing carried out on samples at as received water content Par = parallel, Perp = perpendicular, U = Random

UKAS TESTING 4043

PSL Professional Soils Laboratory

Cross Keys Footbridge, Sedbergh

Contract No:
PSL21/2196
Client Ref:
2020-4541

Geochemical and Contamination Testing:

The following laboratory based geochemical and contamination testing was undertaken by Chemtech Environmental Limited of Stanley:

- Determination of Generic metalloid and inorganic contaminants (1 no. sample)
- Determination of pH and Water Soluble Sulphate (3 no. samples)

The results of the testing are summarised below and presented in the Laboratory test reports within the appendices.

Chemtech Environmental Limited

SOILS

Lab number			94487-1	94487-2	94487-3
Sample id			RBH01	RBH01	RBH01
Depth (m)			0.00-0.30	0.50-1.00	1.50-1.90
Date sampled			09/03/2021	09/03/2021	09/03/2021
Test	**Method**	**Units**			
Arsenic (total)	CE127 M	mg/kg As	20	-	-
Cadmium (total)	CE127 M	mg/kg Cd	0.3	-	-
Chromium (total)	CE127 M	mg/kg Cr	72	-	-
Chromium (III)	CE208	mg/kg CrIII	72	-	-
Chromium (VI)	CE146	mg/kg CrVI	<1	-	-
Copper (total)	CE127 M	mg/kg Cu	23	-	-
Lead (total)	CE127 M	mg/kg Pb	116	-	-
Mercury (total)	CE127 M	mg/kg Hg	<0.5	-	-
Nickel (total)	CE127 M	mg/kg Ni	24	-	-
Selenium (total)	CE127 M	mg/kg Se	1.5	-	-
Zinc (total)	CE127 M	mg/kg Zn	128	-	-
pH	CE004 M	units	7.9	8.0	8.2
Sulphate (2:1 water soluble)	CE061	mg/l SO_4	19	15	<10
Cyanide (total)	CE077	mg/kg CN	<1	-	-
Total Organic Carbon (TOC)	CE197	% w/w C	3.5	-	-

Lab number			94487-4
Sample id			RBH01
Date sampled			09/03/2021
Test	**Method**	**Units**	
pH	CE160	units	8.4
Sulphate (2:1 water soluble)	CE061	mg/l SO_4	53

General Comments and Limitations:

Consideration must be made for variations to occur in the ground conditions between the exploratory hole locations for which GEO holds no responsibility. It is therefore recommended that a “watching brief” and “observational technique” be applied to this site to ensure that if ground conditions appear to vary from those identified within this investigation report then advice should be sought from a suitably qualified and experienced Engineering Geologist, Geotechnical or Geo-Environmental Engineer.

The recommendations and opinions expressed in this report are based on the strata observed within the exploratory holes in addition to the results of the site and laboratory tests commissioned by GEO. Consequently, GEO takes no responsibility for conditions that have not been revealed or which occur between them. GEO takes no responsibility for the accuracy of third-party information provided by sub-contract drillers.

The conclusions and recommendations presented within this report are considered reasonable based on the available information. However, these cannot be guaranteed to gain regulatory approval. Therefore, the report should be passed to the appropriate regulatory authorities and/or other key stakeholders in order to seek their approval of the findings prior to undertaking any works on site.

Factual Report Completed By:

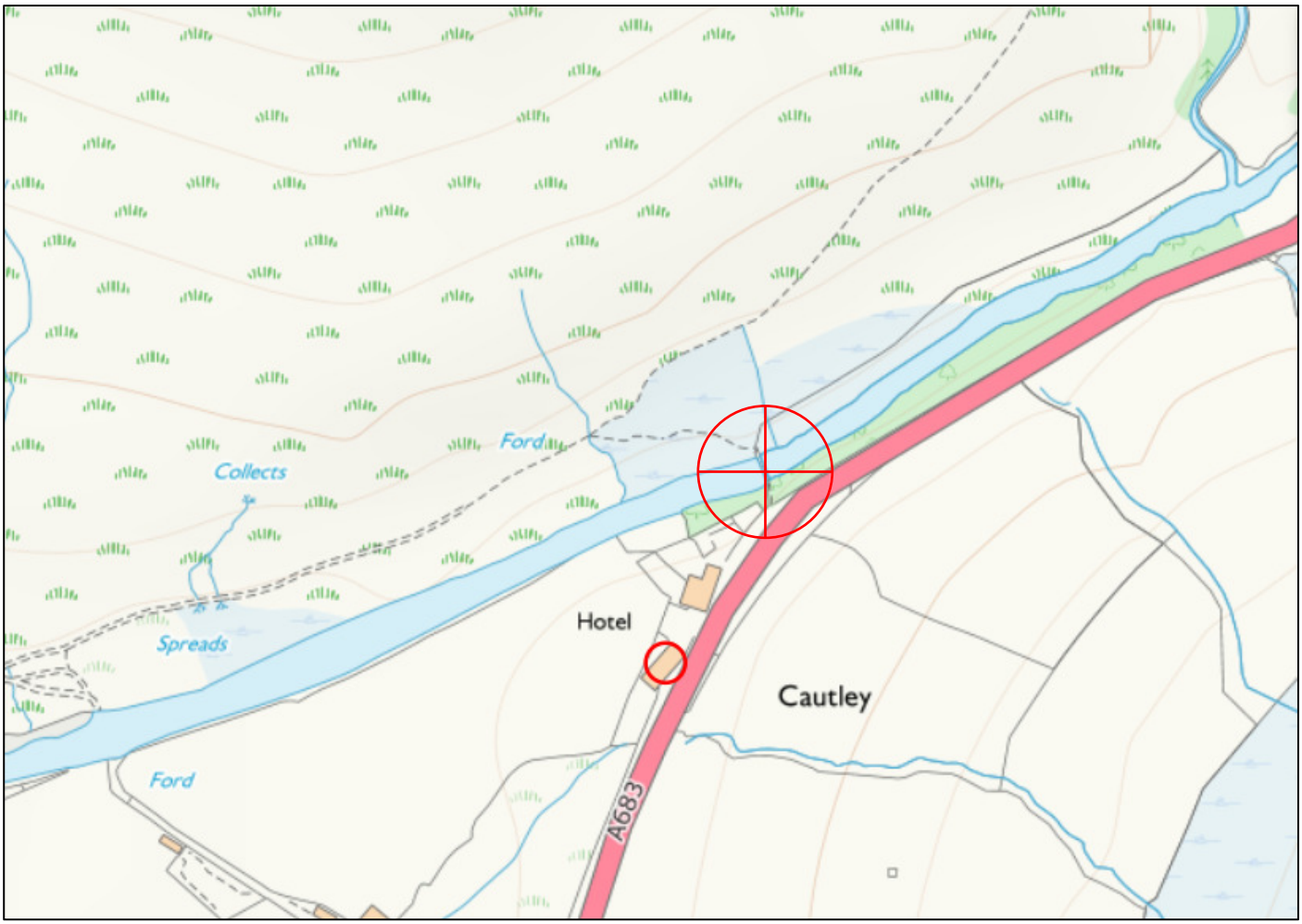
……

Curtis R. Evans *B.Sc (Hons) FGS*
Director
For and On Behalf Of Geo Environmental Engineering Ltd
Visit our Website: www.geoenvironmentalengineering.com Email: info@geoenvironmentalengineering.com

GEO Environmental Engineering

GEO2020-4541: Footbridge, Cross Keys, Sedbergh.

Site Location Plan (Not to Scale)

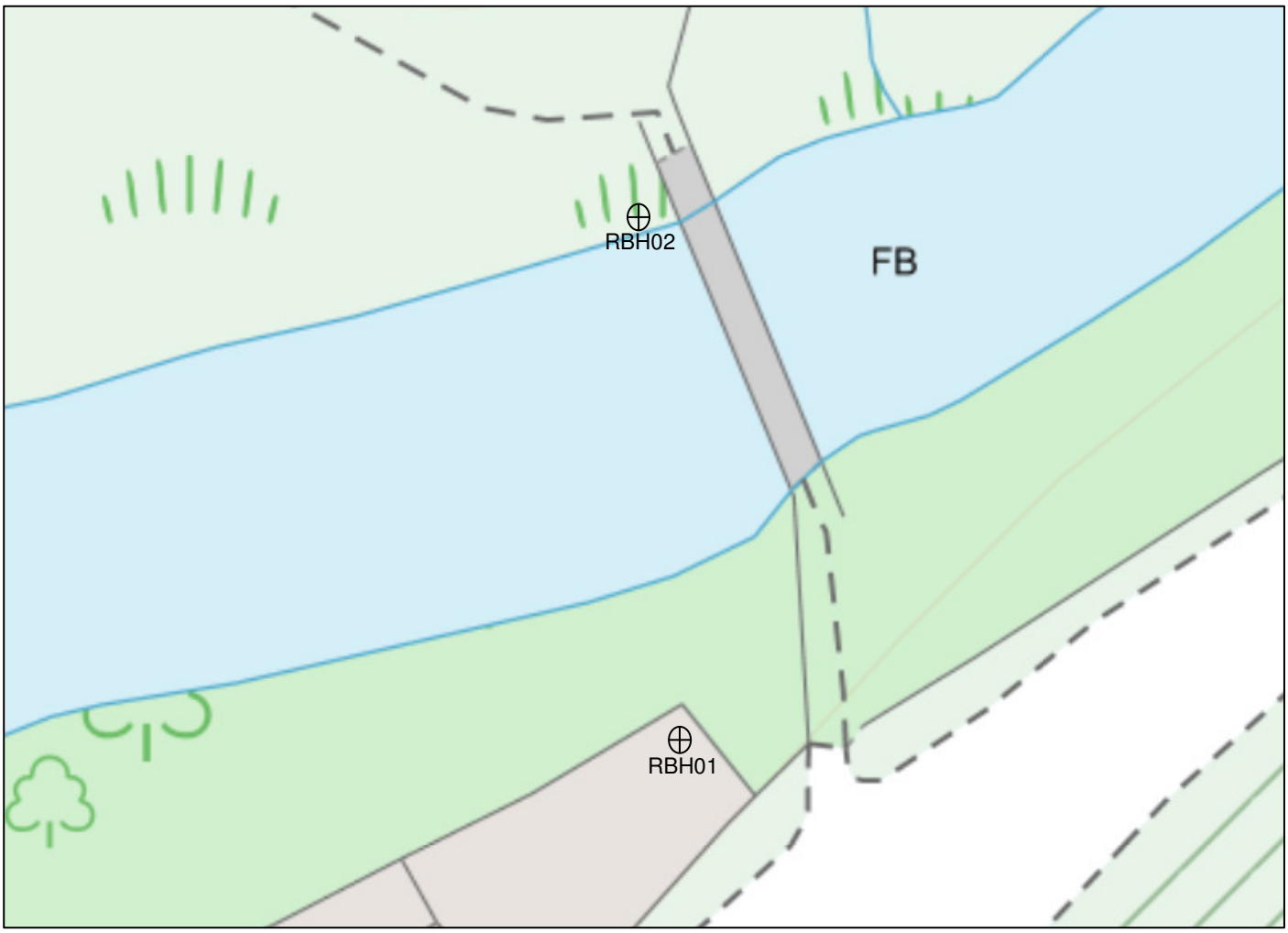


Website: www.geoenvironmentalengineering.com
Email: info@geoenvironmentalengineering.com
Telephone: 08456 768 895 / 07883 440 186

GEO Environmental Engineering

GEO2020-4541: Footbridge, Cross Keys, Sedbergh.

Exploratory Hole Location Plan (Approximate Locations – Not to Scale – Borehole Locations Positioned Where Safe Access Allowed)



Website: www.geoenvironmentalengineering.com
Email: info@geoenvironmentalengineering.com
Telephone: 08456 768 895 / 07883 440 186

GEO Environmental Engineering

GEO2020-4541: Footbridge, Cross Keys, Sedbergh. RBH01

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.30	MADE GROUND: Dark brown very sandy TOPSOIL with much fine to coarse gravel including brick and many roots.		0-0.30 TJ
0.30	1.20	Dense dark brown very gravelly fine to coarse SAND. Gravel is fine to coarse and angular of sandstone, limestone with siltstone and occasional cobbles.		0.50-1.00 B 0.63 SPT: N37
1.20	2.80	Dense becoming very dense grey brown, initially slightly clayey, very sandy fine to coarse GRAVEL of angular to sub-angular limestone, sandstone, siltstone and slate with limestone cobbles.		1.20 SPT: N31 1.50-1.90 B 1.90 SPT: N50/145mm
2.80	4.30	Dark grey SILTSTONE. Weathered. Recovered as coarse sub-angular and tabular gravel.		3.00-4.00 B
4.30	7.50	Strong appearing dark grey SILTSTONE. Occasional thin (<6mm) quartz veining. Occasionally fractured at 60-65 degrees. Becoming more competent with depth.		4.50-5.50: 100% Recovery C 5.50-6.50: 100% Recovery C 6.50-7.50: 100% Recovery C

Log Notes:
End of borehole
Borehole remained open and dry on completion
Full flush throughout borehole

Hand dug before drilling
Cased to 4.50m.

Site: Footbridge, Cross Keys, Sedbergh
Client: RG Parkins
Engineer: GE/CRE
Site Works Date: Feb 21
Plant: Premier 200 multi purpose rig with water flush

Log Key:
SPT = Standard Penetration Test (result as N value)
HSV = Hand Shear Vane (result in kN/m^2)
CBR = California Bearing Ratio by Mexe Cone Penetrometer (result as percentage)
LP = Limited Penetration (HSV/CBR)
NP = No penetration (HSV/CBR)
B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub
C = Core Run including %age recovery

GEO Environmental Engineering

GEO2020-4541: Footbridge, Cross Keys, Sedbergh. RBH02

Depth From (m)	Depth To (m)	Strata Description	Legend	Testing / Samples
0.00	0.35	Rough grass over dark brown sandy, gravelly TOPSOIL.		
0.35	0.65	Grey and brown sandy siltstone GRAVEL with many cobbles and occasional boulders.		
0.65	1.20	Dark grey SILTSTONE. Weathered. Recovered as coarse sub-angular and tabular gravel.		
1.20	1.50	Hard dark grey SILTSTONE.		

Log Notes:
End of borehole
Borehole remained open and dry on completion
Full flush throughout borehole

Hand dug before core drilling to c.0.65m

Site: Footbridge, Cross Keys, Sedbergh
Client: RG Parkins
Engineer: GE/CRE
Site Works Date:
Plant: Hycon coring rig with water flush

Log Key:
SPT = Standard Penetration Test (result as N value)
HSV = Hand Shear Vane (result in kN/m^2)
CBR = California Bearing Ratio by Mexe Cone Penetrometer (result as percentage)
LP = Limited Penetration (HSV/CBR)
NP = No penetration (HSV/CBR)
B = Bulk Bag, J = Amber Glass Jar, T = Plastic Tub
C = Core Run including %age recovery

GEO Environmental Engineering

GEO2020-4541: Footbridge, Cross Keys, Sedbergh.

Core Sample Photographs

Website: www.geoenvironmentalengineering.com
Email: info@geoenvironmentalengineering.com
Telephone: 08456 768 895 / 07883 440 186

GEO Environmental Engineering

GEO2020-4541: Footbridge, Cross Keys, Sedbergh.

Core Sample Photographs

Website: www.geoenvironmentalengineering.com
Email: info@geoenvironmentalengineering.com
Telephone: 08456 768 895 / 07883 440 186

GEO Environmental Engineering

GEO2020-4541: Footbridge, Cross Keys, Sedbergh.

Site Works Photographs

RBH01

RBH01 Borehole

Website: www.geoenvironmentalengineering.com
Email: info@geoenvironmentalengineering.com
Telephone: 08456 768 895 / 07883 440 186

GEO Environmental Engineering

GEO2020-4541: Footbridge, Cross Keys, Sedbergh.

Site Works Photographs

Hand Coring at RBH02

Website: www.geoenvironmentalengineering.com
Email: info@geoenvironmentalengineering.com
Telephone: 08456 768 895 / 07883 440 186

LABORATORY REPORT

4043

Contract Number: PSL21/2196

Report Date: 13 April 2021

Client's Reference: 2020-4541

Client Name: GEO Environmental Engineering
4 Culgarth Avenue
Cockermouth
Cumbria
CA13 9PL

For the attention of: Curtis Evans

Contract Title: Cross Keys Footbridge, Sedbergh

Date Received: 15/3/2021
Date Commenced: 15/3/2021
Date Completed: 13/4/2021

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

A Watkins (Director)	R Berriman (Quality Manager)	S Royle (Laboratory Manager)
L Knight (Senior Technician)	S Eyre (Senior Technician)	H Daniels (Senior Technician)

5 – 7 Hexthorpe Road, Hexthorpe,
Doncaster DN4 0AR
tel: +44 (0)844 815 6641
fax: +44 (0)844 815 6642
e-mail: rberriman@prosoils.co.uk
awatkins@prosoils.co.uk

DETERMINATION OF UNCONFINED COMPRESSIVE STRENGTH

ISRM Suggested Methods, pp 111 –116, 1981.

Hole Number	Sample Number	Sample Type	Top Depth (m)	Base Depth (m)	Sample Diameter (mm)	Sample Length (mm)	Height Ratio	Initial Mass (g)	Bulk Density (Mg/m)	Moisture Content (%)	Dry Density (Mg/m)	Load Failure (kN)	UCS (MPa)	Failure Mode	Date Tested	Remarks
RBH01		C	4.60	4.75	47	93	2.0	439	2.72	1.4	2.68	21.0	12.1	Brittle	12/04/21	
RBH01		C	5.80	6.07	48	94	2.0	442	2.60	0.7	2.58	58.2	32.2	Brittle	12/04/21	
RBH01		C	6.50	7.10	48	97	2.0	461	2.63	1.0	2.60	50.1	27.7	Brittle	12/04/21	
RBH01		C	7.10	7.35	47	95	2.0	453	2.75	0.8	2.73	58.3	33.6	Brittle	12/04/21	

Professional Soils Laboratory

Cross Keys Footbridge, Sedbergh

Contract No:
PSL21/2196
Client Ref:
2020-4541

SUMMARY OF POINT LOAD TEST RESULTS

ISRM Suggested Methods : 2007

Borehole Number	Depth (m)	Sample Ref	Test Type	Orientation	Dimensions (mm)		Area	D_e^2	D_e	Failure Load (P)		I_s	Corr Fac	I_{s50}	Failure Type	Remarks
				Par / Perp	W	D	(mm2)		(mm)	(Mpa)	(kN)	(MPa)	F	(MPa)		
RBH01	5.00		I	Par	38	38	1444	1838.56	42.88	-	6.52	3.55	0.933	3.31	Valid	
RBH01	6.30		A	Perp	47	32	1504	1914.95	43.76	-	8.69	4.54	0.942	4.27	Valid	

Note All testing carried out on samples at as received water content

Par = parallel, Perp = perpendicular, U = Random

A = Axial, D = Diametral, I = Irregular

UKAS TESTING 4043

PSL Professional Soils Laboratory

Cross Keys Footbridge, Sedbergh

Contract No:

PSL21/2196

Client Ref:

2020-4541

SUMMARY OF POINT LOAD TEST RESULTS

ISRM Suggested Methods : 2007

Borehole Number	Depth (m)	Sample Ref	Test Type	Orientation	Dimensions (mm)		D_e^2	D_e	Failure Load		I_s	Corr Fac	I_{s50}	Failure Type	Remarks
				Par / Perp	L	D		(mm)	(Mpa)	(kN)	(MPa)	F	(MPa)		
RBH01	6.30		D	Par	-	47	2209	47.00	-	9.76	4.418	0.973	4.30	Valid	

Note All testing carried out on samples at as received water content

Par = parallel, Perp = perpendicular, U = Random

UKAS TESTING 4043

PSL Professional Soils Laboratory

Cross Keys Footbridge, Sedbergh

Contract No:

PSL21/2196

Client Ref:

2020-4541

ANALYTICAL TEST REPORT

Contract no: 94487

Contract name: Cross Keys Footbridge, Sedbergh

Client reference: GEO2020-4541

Clients name: Geo Environmental Engineering

Clients address: 4 Culgarth Avenue
Cockermouth
Cumbria
CA13 9PL

Samples received: 18 March 2021

Analysis started: 18 March 2021

Analysis completed: 25 March 2021

Report issued: 25 March 2021

Notes:
Opinions and interpretations expressed herein are outside the UKAS accreditation scope.
Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.
All testing carried out at Unit 6 Parkhead, Stanley, DH9 7YB, except for subcontracted testing.
Methods, procedures and performance data are available on request.
Results reported herein relate only to the material supplied to the laboratory.
This report shall not be reproduced except in full, without prior written approval.
Samples will be disposed of 6 weeks from initial receipt unless otherwise instructed.

Key:
U UKAS accredited test
M MCERTS & UKAS accredited test
$ Test carried out by an approved subcontractor
I/S Insufficient sample to carry out test
N/S Sample not suitable for testing

Approved by:

Rachael Burton
Customer Support Squad Leader

Chemtech Environmental Limited

SAMPLE INFORMATION

MCERTS (Soils):

Soil descriptions are only intended to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions. MCERTS accreditation applies for sand, clay and loam/topsoil, or combinations of these whether these are derived from naturally occurring soils or from made ground, as long as these materials constitute the major part of the sample. Other materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

All results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.
Analytical results are inclusive of stones.

Lab ref	Sample id	Depth (m)	Sample description	Material removed	% Removed	% Moisture
94487-1	RBH01	0.00-0.30	Loamy Clay with Gravel & Roots	-	-	25.3
94487-2	RBH01	0.50-1.00	Loamy Clay with Gravel & Roots	-	-	13.3
94487-3	RBH01	1.50-1.90	Loamy Clay with Gravel & Roots	-	-	7.2

Chemtech Environmental Limited

SOILS

Lab number			94487-1	94487-2	94487-3
Sample id			RBH01	RBH01	RBH01
Depth (m)			0.00-0.30	0.50-1.00	1.50-1.90
Date sampled			09/03/2021	09/03/2021	09/03/2021
Test	**Method**	**Units**			
Arsenic (total)	CE127 [M]	mg/kg As	20	-	-
Cadmium (total)	CE127 [M]	mg/kg Cd	0.3	-	-
Chromium (total)	CE127 [M]	mg/kg Cr	72	-	-
Chromium (III)	CE208	mg/kg CrIII	72	-	-
Chromium (VI)	CE146	mg/kg CrVI	<1	-	-
Copper (total)	CE127 [M]	mg/kg Cu	23	-	-
Lead (total)	CE127 [M]	mg/kg Pb	116	-	-
Mercury (total)	CE127 [M]	mg/kg Hg	<0.5	-	-
Nickel (total)	CE127 [M]	mg/kg Ni	24	-	-
Selenium (total)	CE127 [M]	mg/kg Se	1.5	-	-
Zinc (total)	CE127 [M]	mg/kg Zn	128	-	-
pH	CE004 [M]	units	7.9	8.0	8.2
Sulphate (2:1 water soluble)	CE061	mg/l SO_4	19	15	<10
Cyanide (total)	CE077	mg/kg CN	<1	-	-
Total Organic Carbon (TOC)	CE197	% w/w C	3.5	-	-

Chemtech Environmental Limited

SOLIDS

Lab number			94487-4
Sample id			RBH01
Date sampled			09/03/2021
Test	**Method**	**Units**	
pH	CE160	units	8.4
Sulphate (2:1 water soluble)	CE061	mg/l SO_4	53

Chemtech Environmental Limited

METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE127	Arsenic (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg As
CE127	Cadmium (total)	Aqua regia digest, ICP-MS	Dry	M	0.2	mg/kg Cd
CE127	Chromium (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cr
CE208	Chromium (III)	Calculation: Cr (total) - Cr (VI)	Dry		1	mg/kg CrIII
CE146	Chromium (VI)	Acid extraction, Colorimetry	Dry		1	mg/kg CrVI
CE127	Copper (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cu
CE127	Lead (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Pb
CE127	Mercury (total)	Aqua regia digest, ICP-MS	Dry	M	0.5	mg/kg Hg
CE127	Nickel (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Ni
CE127	Selenium (total)	Aqua regia digest, ICP-MS	Dry	M	0.3	mg/kg Se
CE127	Zinc (total)	Aqua regia digest, ICP-MS	Dry	M	5	mg/kg Zn
CE004	pH	Based on BS 1377, pH Meter	As received	M	-	units
CE061	Sulphate (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry		10	mg/l SO_4
CE077	Cyanide (total)	Extraction, Continuous Flow Colorimetry	As received		1	mg/kg CN
CE197	Total Organic Carbon (TOC)	Carbon Analyser	Dry		0.1	% w/w C

Chemtech Environmental Limited

METHOD DETAILS

METHOD	SOLIDS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE004	pH	Based on BS 1377, pH Meter	As received		-	units
CE061	Sulphate (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry		10	mg/l SO_4

Chemtech Environmental Limited

DEVIATING SAMPLE INFORMATION

Comments
Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.
For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.
Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

N	No (not deviating sample)
Y	Yes (deviating sample)
NSD	Sampling date not provided
NST	Sampling time not provided (waters only)
EHT	Sample exceeded holding time(s)
IC	Sample not received in appropriate containers
HP	Headspace present in sample container
NCF	Sample not chemically fixed (where appropriate)
OR	Other (specify)

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
94487-1	RBH01	0.00-0.30	N	
94487-2	RBH01	0.50-1.00	N	
94487-3	RBH01	1.50-1.90	N	

End of Report

Website: www.geoenvironmentalengineering.com
Email: info@geoenvironmentalengineering.com
Telephone: 08456 768 895 / 07883 440 186

Photo 1

Current route of bridleway 568100.

1
0002

To bridleway 568099 and "A Penine Journey" long distance footpath.

Approach of path side drain

DR02

WS03

North Bank

4000

Existing bridleway to be reconstructed to tie in with new crossing.

Cross drain in existing path

WS02

DR03

Proposed crossing.

Existing three span bridge to be removed

RBH02

Existing pier to be demolished below bed level

River Rawthey
Flow direction

Existing concrete abutment to be retained

South Bank

Land boundary

Existing access steps to be removed

1500

Retaining wall demolished locally at bridge and reinstated against new bankseat

RBH01

Fence removed and realigned.

Edge of carriageway.

A683

To Kirby Stephen

4000

GDR01

WS01

Indicative landing

Existing stone retaining wall typically 500mm high from roadside

Land Title: CU245122
Proprietor: National Trust

Grass verge.

Gravel verge.

Cross Keys Temperance Inn

To Sedbergh

Photo 2

Proposed Site Plan

1 : 100

Photo 1 - View Of Existing Bridge From North Bank

LOCATION INFORMATION:
Grid Reference: SD 698 969
Approximate Postcode: LA10 5NE

GROUND INVESTIGATION SPECIFICATION
1. Sampling to be carried out to BS 5930:2015. To be carried out to 6mbgl or refusal. SPT values to be obtained and as near to surface level as practical following hand dig.
2. Water levels to be suitably logged at encountered levels as applicable.

Key

Window sample (3No)

Photo 2 - View Of South Approach to Bridge

Rev	Description	Chkd	By	Date
P01	Approval	AK	ARH	31.01.23

Beaver Bridges Ltd
The Warehouse,
Cartmel Drive,
Harlescott,
Shrewsbury SY1 3TB
Tel: 01743 811 811

Client
Yorkshire Dales NPA

Project Name
Cross Keys Footbridge

Drawing Title
GI Spec

Start Date	Drawn	Designed	Checked	Scale
	ARH	AK	ED	1:100

Drawing Status: INFORMATION
Page Size: A1
Drawing No: BB1543-01-XX-SK-0001
Rev: P01

MURRAY RIX

CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client Beaver Bridges Ltd

Address The Warehouse
Cartmel Drive
Harlescott
Shrewsbury
SY1 3TB

Contract Cross Keys Footbridge, Cumbria LA10 5NE

Job Number MRN 4733
Date of Issue 06 April 2023
Pages 1 of 5

Approved Signatories

S J Hutchings, O P Davies

Notes

1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.

2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.

3 Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.

4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted.

5 The results included within the report are representative of the samples submitted for analysis.

6 This certificate should not be reproduced, except in full, without the express permission of the laboratory.

BOREHOLE LOG - MURRAY RIX GEOTECHNICAL

HOLE NO. 1
Sheet 1 of 1

CLIENT	SITE
Beaver Bridges Ltd	Cross Keys Footbridge, Cumbria LA10 5NE

DATE OF FIELDWORK	SCALE	LEVEL/POSITION	OPERATOR	LOGGED BY	JOB NO.
06/04/23 - 06/04/23	1:50	WS01	PA/TW	PA	MRN 4733

SAMPLE DEPTH	RECORD TYPE	SPT N (Cu-kN/m^2)	Standp/ Piezo	DESCRIPTION OF STRATUM (thickness)	DEPTH	LEGEND
				Grass over TOPSOIL (0.08)	0.08	
0.50	D	16		Firm to stiff dark brown silty slightly gravelly CLAY. Gravel was sub-angular fine (0.73)		
1.00	D	13		Firm orange brown silty sandy slightly gravelly CLAY. Gravel was sub-angular fine to medium (0.90)	0.80	
1.50	D	14				
2.00	D	14		Firm moist orange brown silty sandy slightly gravelly CLAY. Gravel was rounded fine (1.10)	1.70	
2.50	D	15				
2.80	D	REFUSAL		Borehole terminated due to obstruction. Lead driller believes this to be the interface of the underlying Coniston Group (Sandstone) Bedrock.	2.80	

GROUNDWATER AND CASING INFORMATION

DEPTH STRUCK	DEPTH CASED	ELAPSED TIME	WATER LEVEL	DEPTH SEALED	REMARKS ON GROUNDWATER AND CASING
N/A	N/A	N/A	N/A	N/A	No Groundwater encountered.

BORING METHOD AND REMARKS

Limited access continuous flight auger rig. Drillers log.

All dimensions are in metres unless otherwise stated

BOREHOLE LOG - MURRAY RIX GEOTECHNICAL

HOLE NO. 2
Sheet 1 of 1

CLIENT	SITE
Beaver Bridges Ltd	Cross Keys Footbridge, Cumbria LA10 5NE

DATE OF FIELDWORK	SCALE	LEVEL/POSITION	OPERATOR	LOGGED BY	JOB NO.
06/04/23 - 06/04/23	1:50	WS02	PA/TW	PA	MRN 4733

SAMPLE DEPTH	RECORD TYPE	SPT N (Cu-kN/m^2)	Standp/ Piezo	DESCRIPTION OF STRATUM (thickness)	DEPTH	LEGEND
				Grass over Topsoil (0.07)	0.07	
0.50	D	9		Firm orange brown silty sandy slightly gravelly CLAY. Gravel was sub-angular fine (1.13)		
1.00	D	12				
1.20	D	REFUSAL		Borehole terminated due to obstruction. Lead driller believes this to be the interface of the underlying Coniston Group (Sandstone) Bedrock.	1.20	

GROUNDWATER AND CASING INFORMATION

DEPTH STRUCK	DEPTH CASED	ELAPSED TIME	WATER LEVEL	DEPTH SEALED	REMARKS ON GROUNDWATER AND CASING
N/A	N/A	N/A	N/A	N/A	No Groundwater encountered.

BORING METHOD AND REMARKS

Hand augered borehole.
Drillers log.
SPT values shown in this log are equlivalent SPT values calculated from Mackintosh Probe Test.

All dimensions are in metres unless otherwise stated

BOREHOLE LOG - MURRAY RIX GEOTECHNICAL

HOLE NO. 3
Sheet 1 of 1

CLIENT	SITE
Beaver Bridges Ltd	Cross Keys Footbridge, Cumbria LA10 5NE

DATE OF FIELDWORK	SCALE	LEVEL/POSITION	OPERATOR	LOGGED BY	JOB NO.
06/04/23 - 06/04/23	1:50	WS03	PA/TW	PA	MRN 4733

SAMPLE DEPTH	RECORD TYPE	SPT N (Cu-kN/m^2)	Standp/ Piezo	DESCRIPTION OF STRATUM (thickness)	DEPTH	LEGEND
				Grass over Topsoil (0.07)	0.07	
0.50	D	10		Firm orange brown silty sandy slightly gravelly CLAY. Gravel was sub-angular fine to medium (1.34)		
1.00	D	12				
1.40	D	REFUSAL		Borehole terminated due to obstruction. Lead driller believes this to be the interface of the underlying Coniston Group (Sandstone) Bedrock.	1.40	

GROUNDWATER AND CASING INFORMATION

DEPTH STRUCK	DEPTH CASED	ELAPSED TIME	WATER LEVEL	DEPTH SEALED	REMARKS ON GROUNDWATER AND CASING
N/A	N/A	N/A	N/A	N/A	No Groundwater encountered.

BORING METHOD AND REMARKS

Hand augered borehole.
Drillers log.
SPT results shown in this log are equlivalent SPT values calculated from Mackintosh Probe Test.

All dimensions are in metres unless otherwise stated

MURRAY RIX

CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client Beaver Bridges Ltd

Address The Warehouse
Cartmel Drive
Harlescott
Shrewsbury
SY1 3TB

Contract Cross Keys Footbridge, Cumbria LA10 5NE

Job Number MRN 4733/1
Date of Issue 22 May 2023
Pages 1 of 11

Approved Signatories

S J Hutchings, O P Davies

Notes

1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.

2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.

3 Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.

4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted.

5 The results included within the report are representative of the samples submitted for analysis.

6 This certificate should not be reproduced, except in full, without the express permission of the laboratory.

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

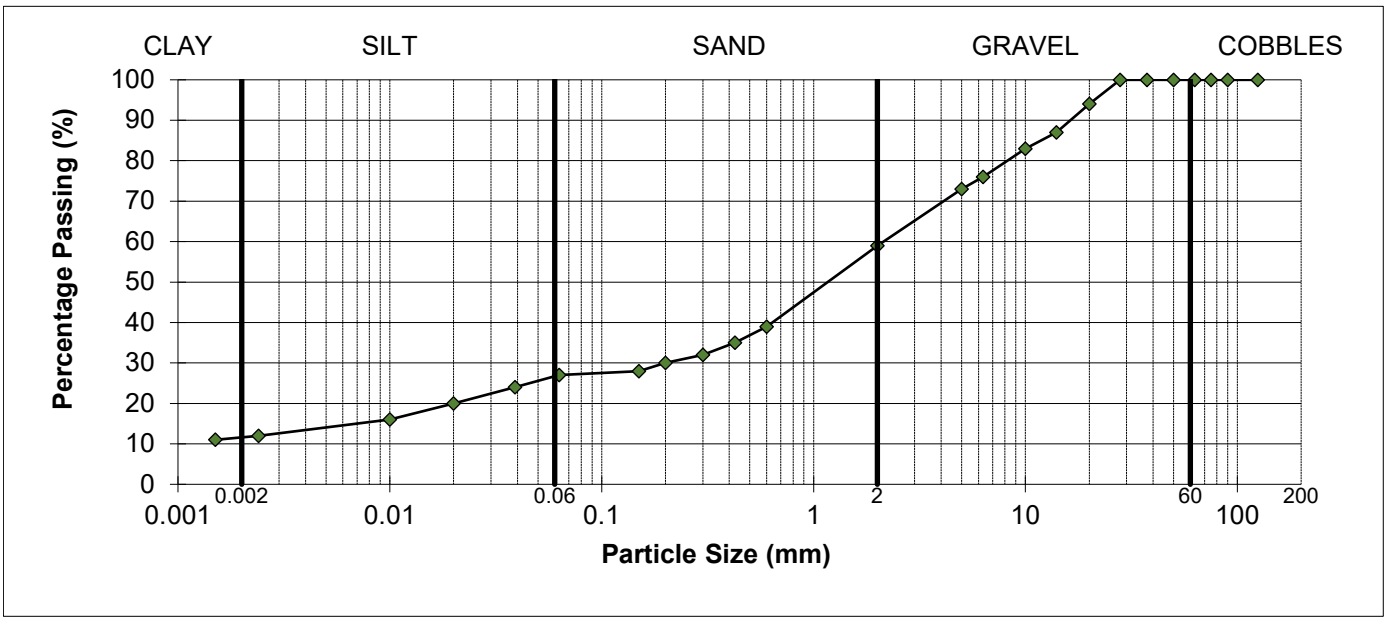
Determination of Water Content in accordance with BS EN ISO 17892-1:2014 (Oven Dry)

CLIENT	Beaver Bridges Ltd
SITE	Cross Keys Footbridge, Cumbria LA10 5NE
JOB NUMBER	MRN 4733/1

SAMPLE LABEL	BH 1 0.5, 1.0 & 1.5m	DATE SAMPLED	06-Apr-23
LAB SAMPLE No	123240, 123241, 123242	DATE RECEIVED	11-Apr-23
DATE TESTED	15-May-23	SAMPLED BY	Murray Rix

MATERIAL	See Remarks
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2	59	
90	100		0.6	39	
75	100		0.425	35	
63	100		0.3	32	
50	100		0.2	30	
37.5	100		0.15	28	
28	100		0.063	27	
20	94		0.039	24	
14	87		0.02	20	
10	83		0.01	16	
6.3	76		0.0024	12	
5	73		0.0015	11	



REMARKS

Combined sample - BH 1 0.5, 1.0 and 1.5m

Sample at 0.5m was Firm to stiff dark brown silty sandy gravelly Clay. Gravel was sub-angular fine to medium

Sample at 1.0 and 1.5m was Firm orange brown silty sandy gravelly Clay. Gravel was sub-angular fine to medium

SIGNED

NAME S.J. Hutchings (Director) DATE 22-May-23

M U R R A Y R I X

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

TEST CERTIFICATE

PARTICLE SIZE DISTRIBUTION

BS EN ISO 17892-4:2016

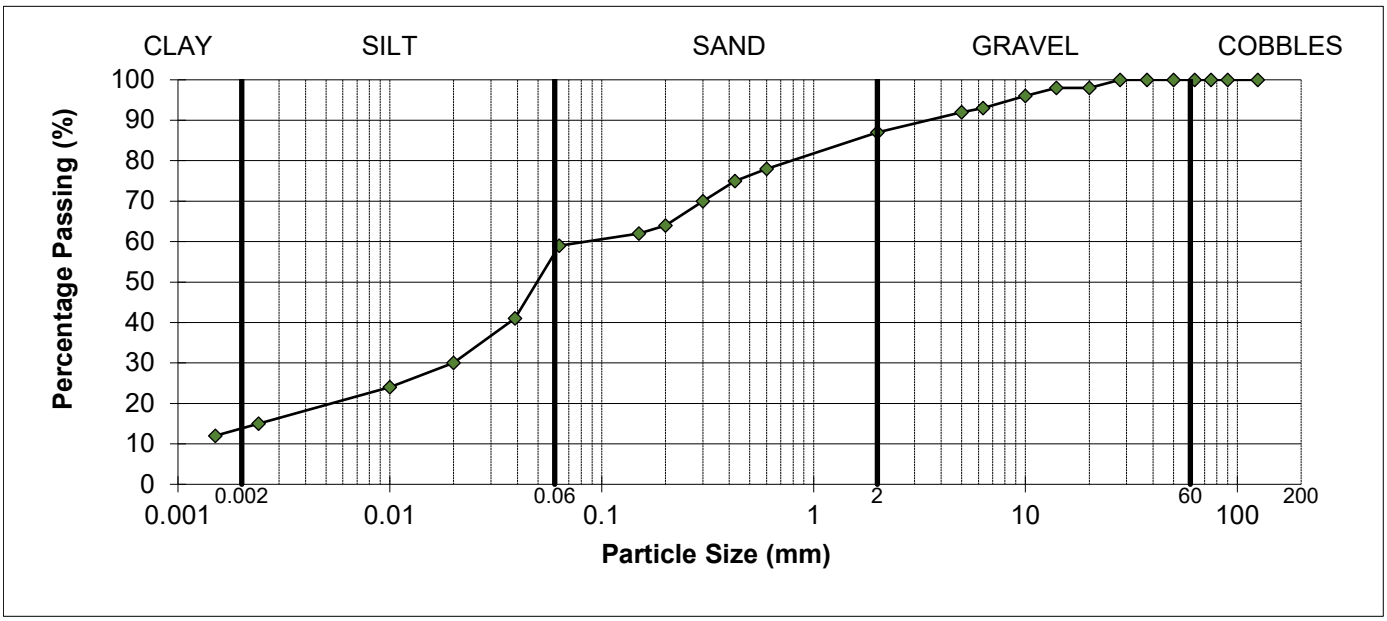
Determination of Water Content in accordance with BS EN ISO 17892-1:2014 (Oven Dry)

CLIENT	Beaver Bridges Ltd
SITE	Cross Keys Footbridge, Cumbria LA10 5NE
JOB NUMBER	MRN 4733/1

SAMPLE LABEL	BH 1 2.0 & 2.5m	DATE SAMPLED	06-Apr-23
LAB SAMPLE No	123243 & 123244	DATE RECEIVED	11-Apr-23
DATE TESTED	15-May-23	SAMPLED BY	Murray Rix

MATERIAL	See Remarks
ADVISED SOURCE	Site Investigation Sample

Sieve Size (mm)	% Passing (%)	Specification (%)	Sieve Size (mm)	% Passing (%)	Specification (%)
125	100		2	87	
90	100		0.6	78	
75	100		0.425	75	
63	100		0.3	70	
50	100		0.2	64	
37.5	100		0.15	62	
28	100		0.063	59	
20	98		0.039	41	
14	98		0.02	30	
10	96		0.01	24	
6.3	93		0.0024	15	
5	92		0.0015	12	



REMARKS

Combined sample - BH 1 2.0 and 2.5m

Firm moist orange brown silty slightly sandy slightly gravelly CLAY. Gravel was rounded fine to medium

SIGNED

NAME S.J. Hutchings (Director) DATE 22-May-23

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A1:2021 Clause 5.3 (30° FALL CONE) 1 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A1:2021 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014

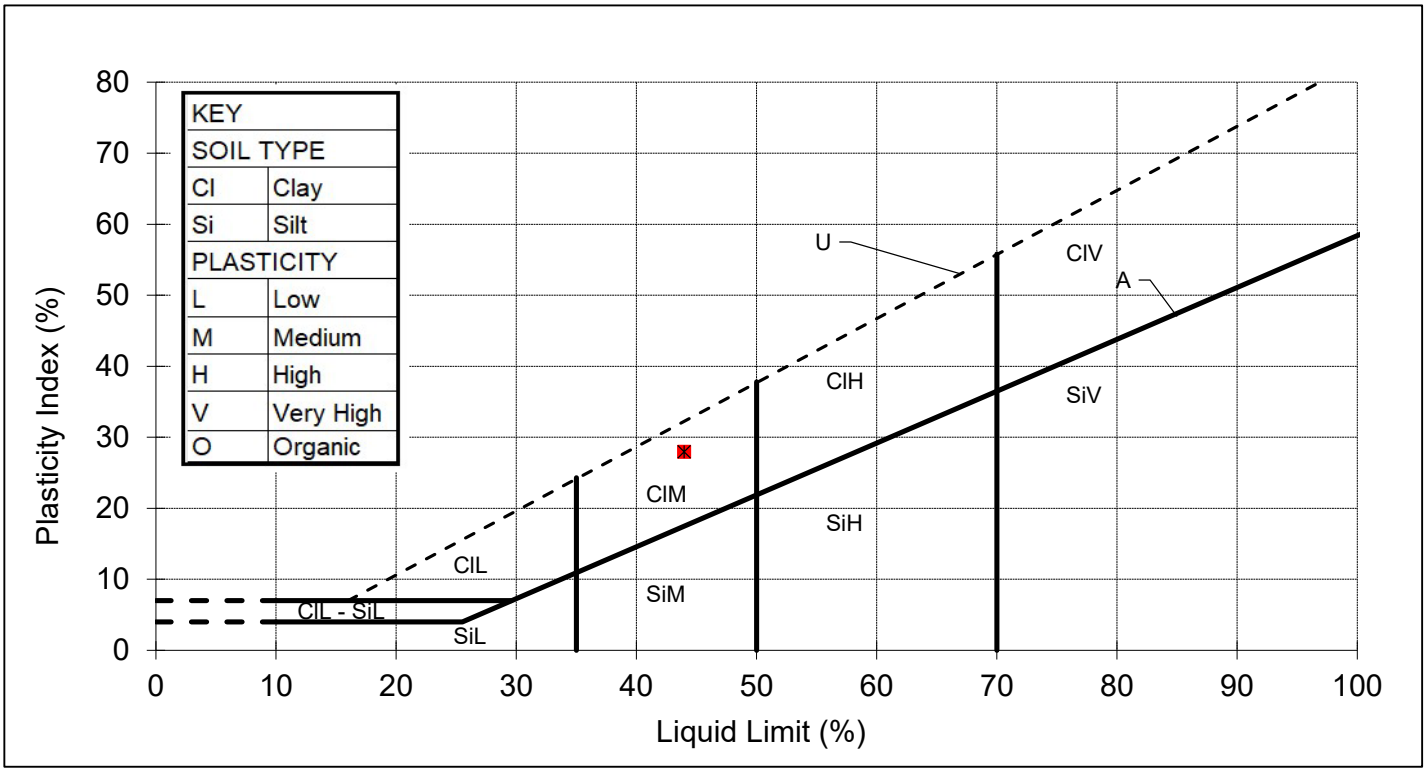
CLIENT	Beaver Bridges Ltd
SITE	Cross Keys Footbridge, Cumbria LA10 5NE
JOB NUMBER	MRN 4733/1

SAMPLE LABEL	BH 1 0.5m	DATE SAMPLED	06-Apr-23
SAMPLE No.	123240	DATE RECEIVED	11-Apr-23
DATE TESTED	12-Apr-23	SAMPLED BY	Murray Rix

MATERIAL	Firm to stiff dark brown silty sandy gravelly CLAY. Gravel was sub-angular fine to medium		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Test Readings mm (average)		Moisture Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	21.7	45.1	0.978	
Determination 2 (avg)	21.2	44.8		

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
9.1	44	16	28	38



REMARKS

SIGNED

NAME S.J. Hutchings (Director) DATE 22-May-23

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A1:2021 Clause 5.3 (30° FALL CONE) 1 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A1:2021 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014

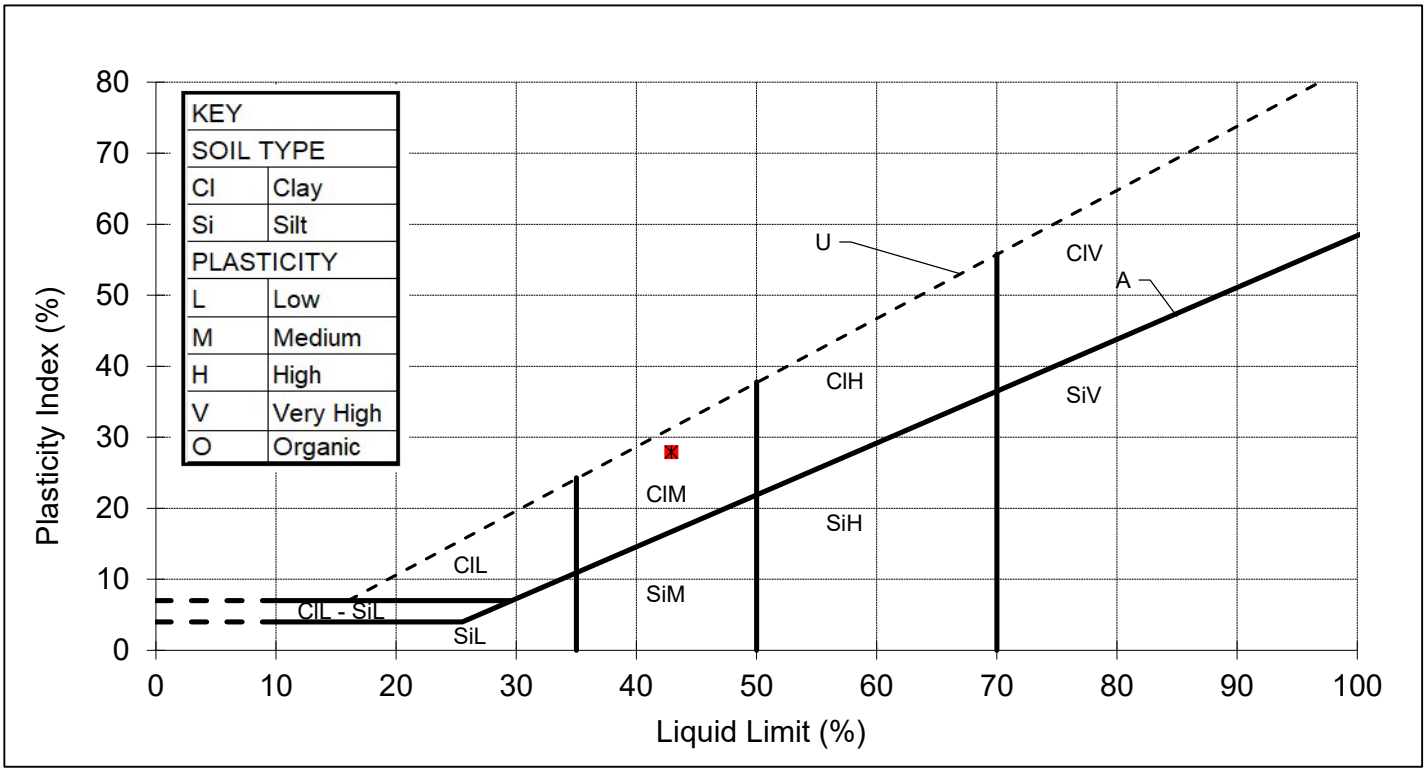
CLIENT	Beaver Bridges Ltd
SITE	Cross Keys Footbridge, Cumbria LA10 5NE
JOB NUMBER	MRN 4733/1

SAMPLE LABEL	BH 1 1.0m	DATE SAMPLED	06-Apr-23
SAMPLE No.	123241	DATE RECEIVED	11-Apr-23
DATE TESTED	12-Apr-23	SAMPLED BY	Murray Rix

MATERIAL	Firm orange brown silty sandy gravelly CLAY. Gravel was sub-angular fine to medium		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Test Readings mm (average)		Moisture Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	19.5	42.6	1.012	
Determination 2 (avg)	19.3	42.2		

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
9.9	43	15	28	35



REMARKS

SIGNED

NAME S.J. Hutchings (Director) DATE 22-May-23

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A1:2021 Clause 5.3 (30° FALL CONE) 1 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A1:2021 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014

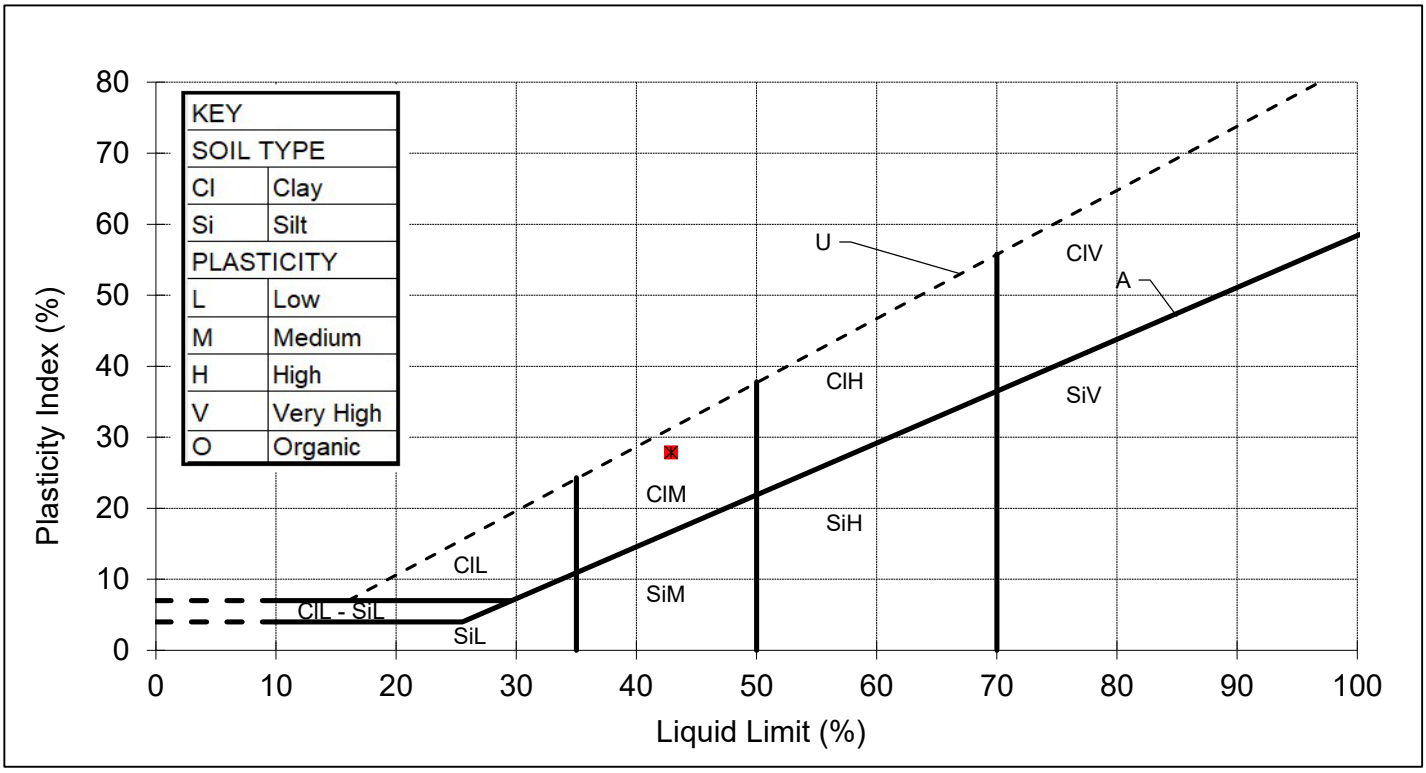
CLIENT	Beaver Bridges Ltd
SITE	Cross Keys Footbridge, Cumbria LA10 5NE
JOB NUMBER	MRN 4733/1

SAMPLE LABEL	BH 1 1.5m	DATE SAMPLED	06-Apr-23
SAMPLE No.	123242	DATE RECEIVED	11-Apr-23
DATE TESTED	12-Apr-23	SAMPLED BY	Murray Rix

MATERIAL	Firm orange brown silty sandy gravelly CLAY. Gravel was sub-angular fine to medium		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Test Readings mm (average)		Moisture Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	19.0	42.1	1.020	
Determination 2 (avg)	19.0	42.0		

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
9.1	43	15	28	35



REMARKS

SIGNED

NAME S.J. Hutchings (Director) DATE 22-May-23

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A1:2021 Clause 5.3 (30° FALL CONE) 1 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A1:2021 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014

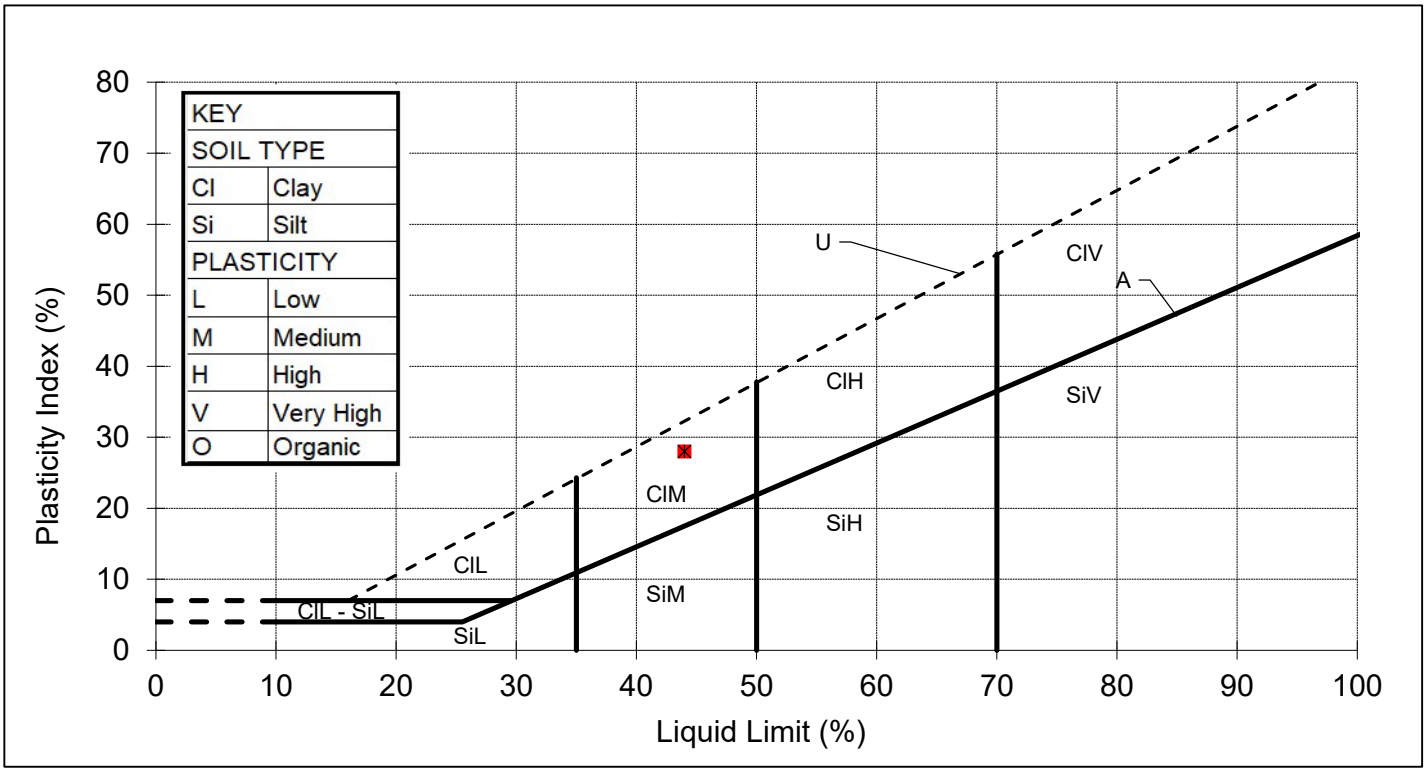
CLIENT	Beaver Bridges Ltd
SITE	Cross Keys Footbridge, Cumbria LA10 5NE
JOB NUMBER	MRN 4733/1

SAMPLE LABEL	BH 1 2.0m	DATE SAMPLED	06-Apr-23
SAMPLE No.	123243	DATE RECEIVED	11-Apr-23
DATE TESTED	12-Apr-23	SAMPLED BY	Murray Rix

MATERIAL	Firm moist orange brown silty slightly sandy slightly gravelly CLAY. Gravel was rounded fine to medium.		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Test Readings mm (average)		Moisture Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	19.6	43.7	1.008	
Determination 2 (avg)	19.6	43.6		

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
18.7	44	16	28	73



REMARKS

SIGNED

NAME S.J. Hutchings (Director) DATE 22-May-23

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A1:2021 Clause 5.3 (30° FALL CONE) 1 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A1:2021 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014

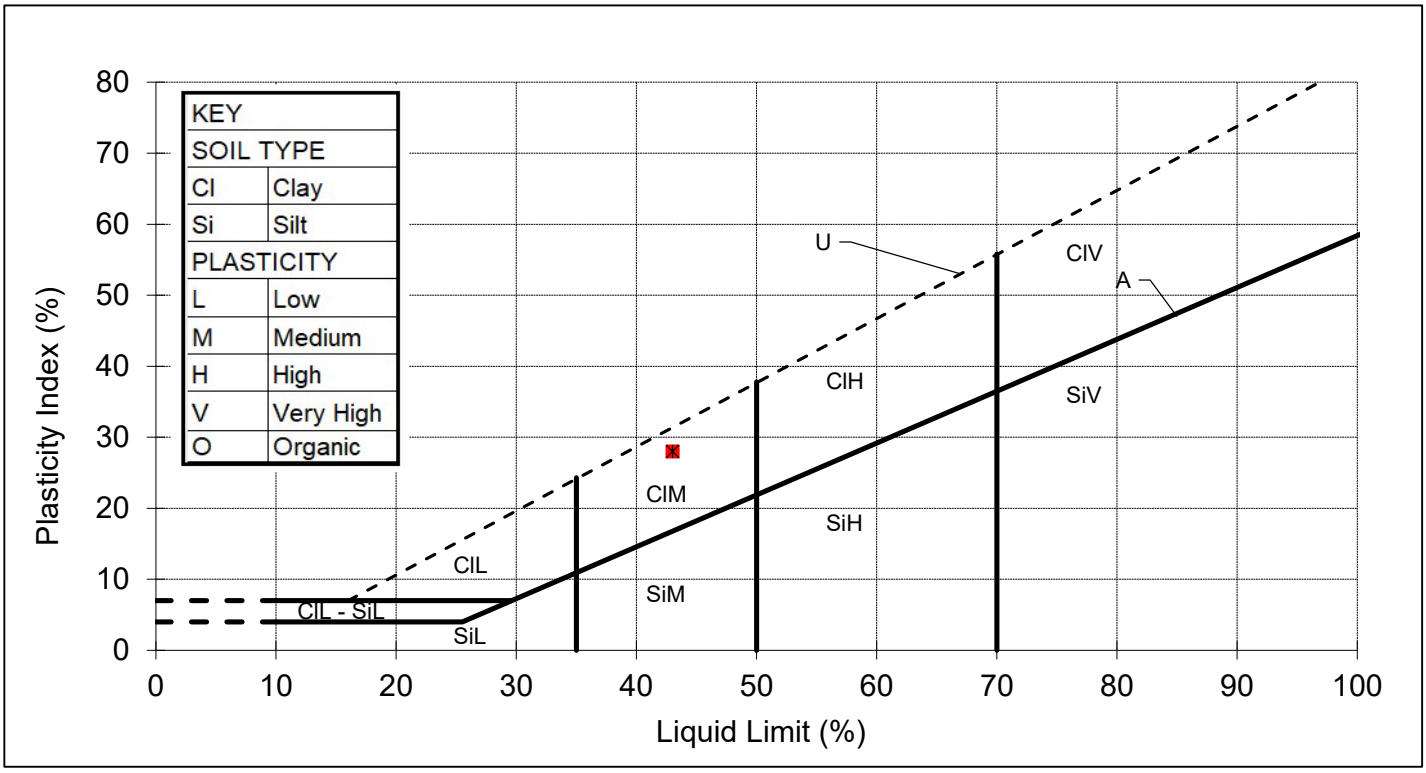
CLIENT	Beaver Bridges Ltd
SITE	Cross Keys Footbridge, Cumbria LA10 5NE
JOB NUMBER	MRN 4733/1

SAMPLE LABEL	BH 1 2.5m	DATE SAMPLED	06-Apr-23
SAMPLE No.	123244	DATE RECEIVED	11-Apr-23
DATE TESTED	12-Apr-23	SAMPLED BY	Murray Rix

MATERIAL	Firm moist orange brown silty slightly sandy slightly gravelly CLAY. Gravel was rounded fine to medium.		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Test Readings mm (average)		Moisture Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	20.4	43.2	0.994	
Determination 2 (avg)	20.4	43.3		

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
19.0	43	15	28	76



REMARKS

SIGNED

NAME S.J. Hutchings (Director) DATE 22-May-23

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A1:2021 Clause 5.3 (30° FALL CONE) 1 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A1:2021 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014

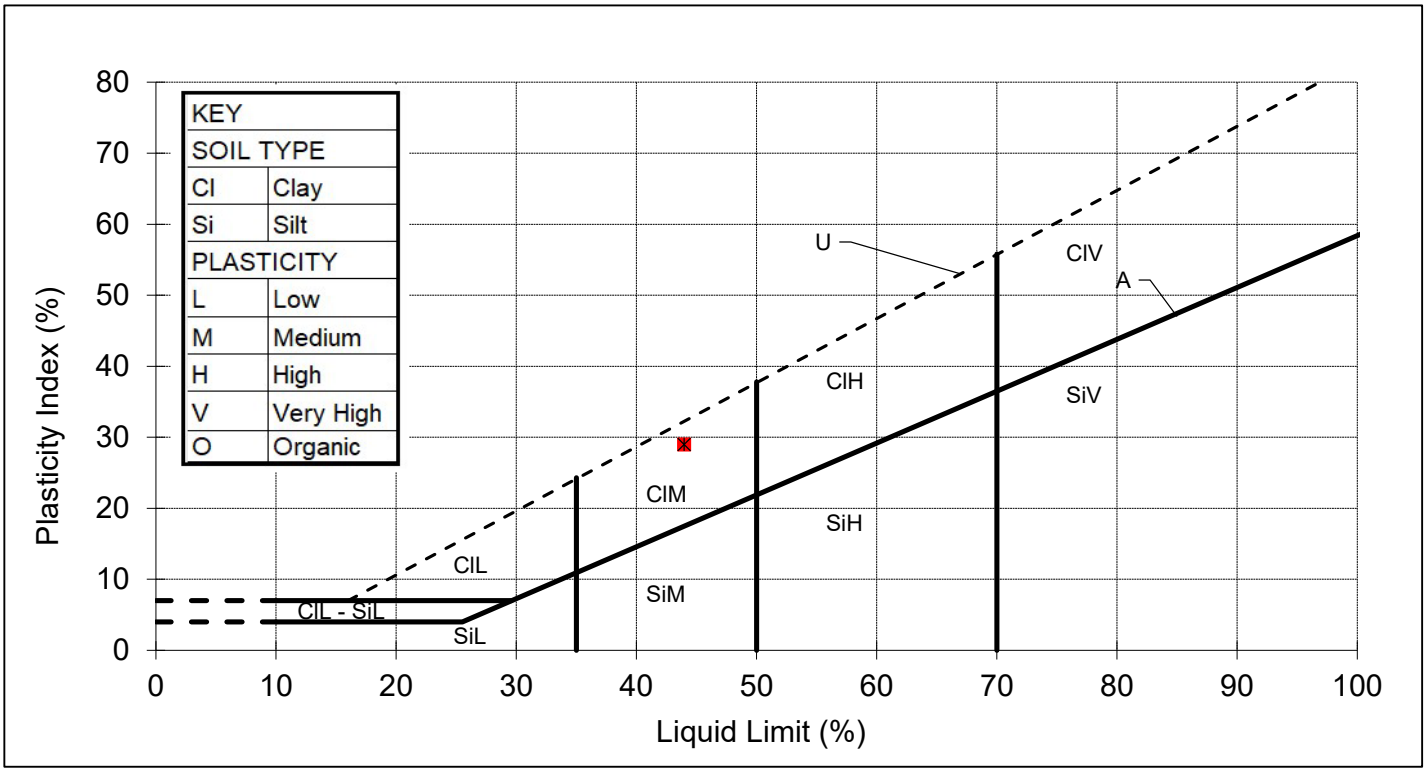
CLIENT	Beaver Bridges Ltd
SITE	Cross Keys Footbridge, Cumbria LA10 5NE
JOB NUMBER	MRN 4733/1

SAMPLE LABEL	BH 2 0.5m	DATE SAMPLED	06-Apr-23
SAMPLE No.	123245	DATE RECEIVED	11-Apr-23
DATE TESTED	12-Apr-23	SAMPLED BY	Murray Rix

MATERIAL	Firm orange brown silty sandy gravelly CLAY. Gravel was sub-angular fine to medium		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Test Readings mm (average)		Moisture Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	19.8	43.8	1.004	
Determination 2 (avg)	19.8	43.8		

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
11.9	44	15	29	38



REMARKS

SIGNED

NAME S.J. Hutchings (Director) DATE 22-May-23

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A1:2021 Clause 5.3 (30° FALL CONE) 1 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A1:2021 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014

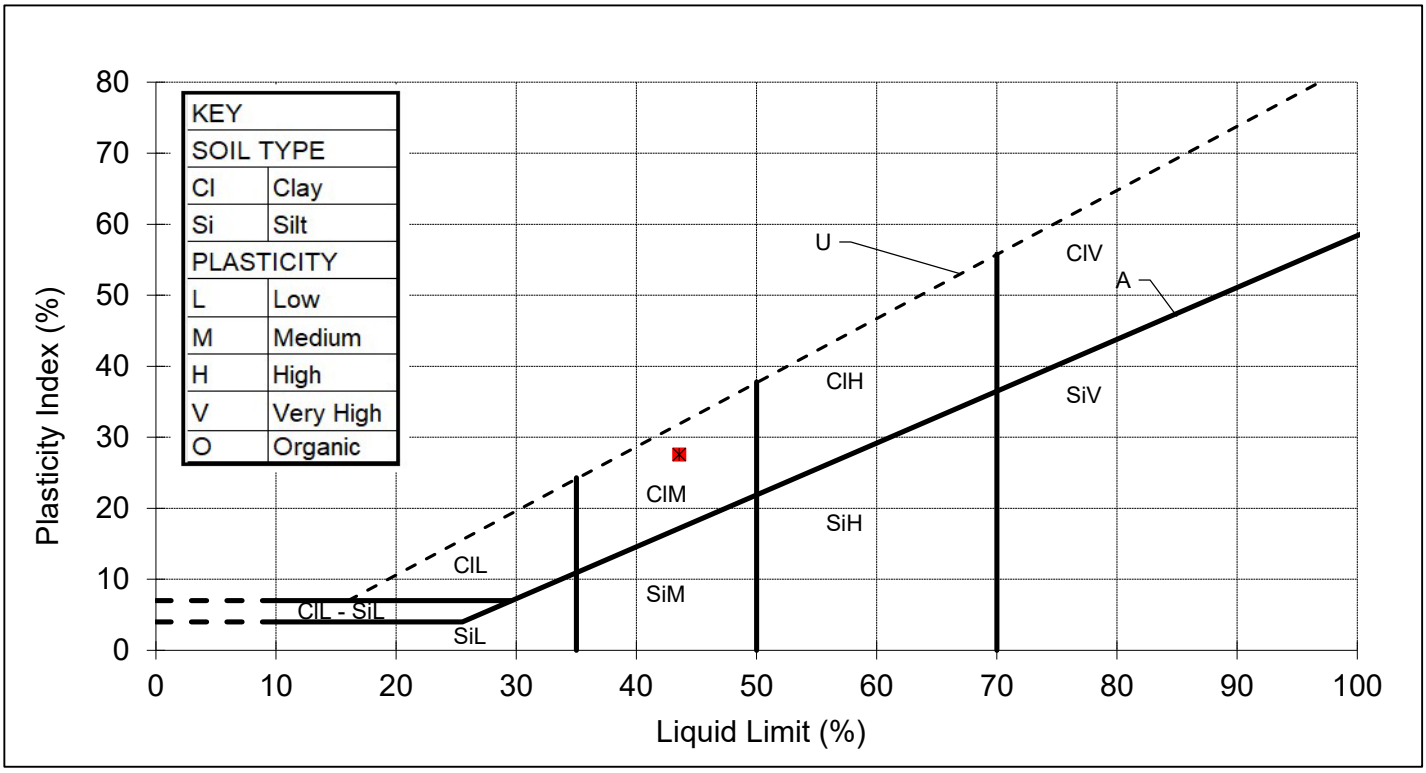
CLIENT	Beaver Bridges Ltd
SITE	Cross Keys Footbridge, Cumbria LA10 5NE
JOB NUMBER	MRN 4733/1

SAMPLE LABEL	BH 3 0.5m	DATE SAMPLED	06-Apr-23
SAMPLE No.	123246	DATE RECEIVED	11-Apr-23
DATE TESTED	12-Apr-23	SAMPLED BY	Murray Rix

MATERIAL	Firm orange brown silty sandy gravelly CLAY. Gravel was sub-angular fine to medium		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Test Readings mm (average)		Moisture Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	20.2	43.6	0.997	
Determination 2 (avg)	20.3	43.8		

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
10.8	44	16	28	36



REMARKS

SIGNED

NAME S.J. Hutchings (Director) DATE 22-May-23

MURRAY RIX

ANDREW HOUSE, HADFIELD STREET,
DUKINFIELD, CHESHIRE SK16 4QX
TEL 0161 475 0870

UKAS TESTING 1580

TEST CERTIFICATE

LIQUID LIMIT BS EN ISO 17892-12:2018+A1:2021 Clause 5.3 (30° FALL CONE) 1 POINT METHOD
PLASTIC LIMIT BS EN ISO 17892-12:2018+A1:2021 Clause 5.5
WATER CONTENT METHOD BS EN ISO 17892-1:2014

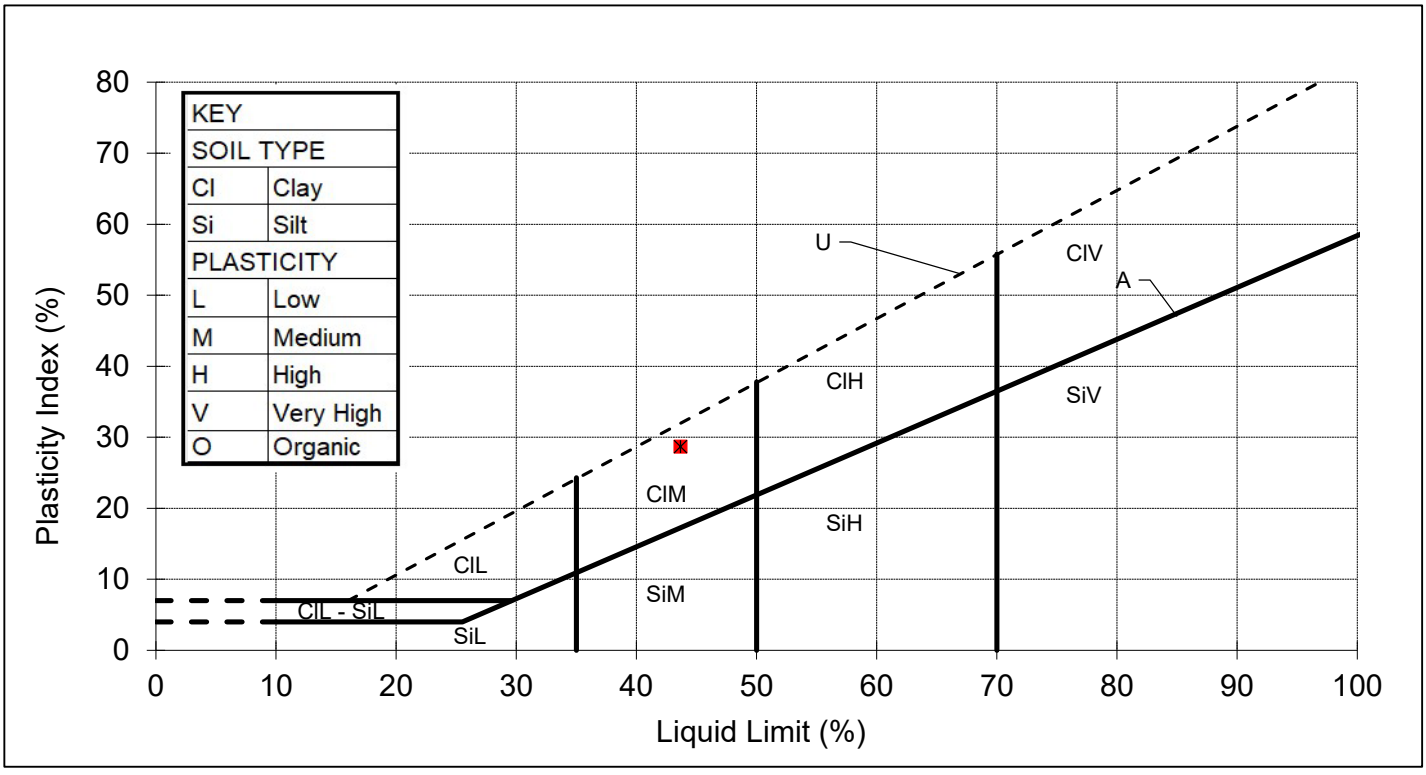
CLIENT	Beaver Bridges Ltd
SITE	Cross Keys Footbridge, Cumbria LA10 5NE
JOB NUMBER	MRN 4733/1

SAMPLE LABEL	BH 3 1.0m	DATE SAMPLED	06-Apr-23
SAMPLE No.	123247	DATE RECEIVED	11-Apr-23
DATE TESTED	12-Apr-23	SAMPLED BY	Murray Rix

MATERIAL	Firm orange brown silty sandy gravelly CLAY. Gravel was sub-angular fine to medium		
ADVISED SOURCE	Site Investigation Sample	WATER CONTENT	Increasing
SAMPLE HISTORY	Natural State	% RET. 425um BY	Wet Sieved

Test Readings mm (average)		Moisture Content %	Correction Factor	Correction factor from Clayton and Jukes 1978
Determination 1 (avg)	20.9	44.2	0.986	
Determination 2 (avg)	20.9	44.4		

Natural Moisture Content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 micron (%)
11.5	44	15	29	40



REMARKS

SIGNED

NAME S.J. Hutchings (Director) DATE 22-May-23

MURRAY RIX

CONSULTANCY, SITE INVESTIGATION
CONSTRUCTION MATERIALS TESTING

TEST REPORT

Client Beaver Bridges Ltd

Address The Warehouse
Cartmel Drive
Harlescott
Shrewsbury
SY1 3TB

Contract Cross Keys Footbridge, Cumbria LA10 5NE

Job Number MRN 4733
Date of Issue 22 May 2023
Pages 1 of 5

Approved Signatories

S J Hutchings, O P Davies

Notes

1 All remaining samples and remnants from this contract will be disposed 28 days from the date of this report unless you notify us to the contrary.

2 Result certificates, in this report, not bearing a UKAS mark, are not included in our UKAS accreditation schedule.

3 Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation.

4 Certified that the samples have been examined and tested in accordance with the terms of the contract/order and unless otherwise stated conform to the standards/specifications quoted.

5 The results included within the report are representative of the samples submitted for analysis.

6 This certificate should not be reproduced, except in full, without the express permission of the laboratory.

BOREHOLE LOG - MURRAY RIX GEOTECHNICAL

HOLE NO. 1
Sheet 1 of 1

CLIENT	SITE
Beaver Bridges Ltd	Cross Keys Footbridge, Cumbria LA10 5NE

DATE OF FIELDWORK	SCALE	LEVEL/POSITION	OPERATOR	LOGGED BY	JOB NO.
06/04/23 - 06/04/23	1:50	WS01	PA/TW	PA	MRN 4733

SAMPLE DEPTH	RECORD TYPE	SPT N (Cu-kN/m^2)	Standp/ Piezo	DESCRIPTION OF STRATUM (thickness)	DEPTH	LEGEND
				Grass over TOPSOIL (0.08)	0.08	
0.50	D	16		Firm to stiff dark brown silty sandy gravelly CLAY. Gravel was sub-angular fine to medium (0.73)		
1.00	D	13		Firm orange brown silty sandy gravelly CLAY. Gravel was sub-angular fine to medium (0.90)	0.80	
1.50	D	14				
2.00	D	14		Firm moist orange brown silty slightly sandy slightly gravelly CLAY. Gravel was rounded fine to medium (1.10)	1.70	
2.50	D	15				
2.80	D	REFUSAL		Borehole terminated due to obstruction. Lead driller believes this to be the interface of the underlying Coniston Group (Sandstone) Bedrock.	2.80	

GROUNDWATER AND CASING INFORMATION

DEPTH STRUCK	DEPTH CASED	ELAPSED TIME	WATER LEVEL	DEPTH SEALED	REMARKS ON GROUNDWATER AND CASING
N/A	N/A	N/A	N/A	N/A	No Groundwater encountered.

BORING METHOD AND REMARKS

Limited access continuous flight auger rig. Drillers log.

All dimensions are in metres unless otherwise stated

BOREHOLE LOG - MURRAY RIX GEOTECHNICAL

HOLE NO. 2
Sheet 1 of 1

CLIENT	SITE
Beaver Bridges Ltd	Cross Keys Footbridge, Cumbria LA10 5NE

DATE OF FIELDWORK	SCALE	LEVEL/POSITION	OPERATOR	LOGGED BY	JOB NO.
06/04/23 - 06/04/23	1:50	WS02	PA/TW	PA	MRN 4733

SAMPLE DEPTH	RECORD TYPE	SPT N (Cu-kN/m^2)	Standp/ Piezo	DESCRIPTION OF STRATUM (thickness)	DEPTH	LEGEND
				Grass over Topsoil (0.07)	0.07	
0.50	D	9		Firm orange brown silty sandy gravelly CLAY. Gravel was sub-angular fine to medium (1.13)		
1.00	D	12				
1.20	D	REFUSAL		Borehole terminated due to obstruction. Lead driller believes this to be the interface of the underlying Coniston Group (Sandstone) Bedrock.	1.20	

GROUNDWATER AND CASING INFORMATION

DEPTH STRUCK	DEPTH CASED	ELAPSED TIME	WATER LEVEL	DEPTH SEALED	REMARKS ON GROUNDWATER AND CASING
N/A	N/A	N/A	N/A	N/A	No Groundwater encountered.

BORING METHOD AND REMARKS

Hand augered borehole.
Drillers log.
SPT values shown in this log are equlivalent SPT values calculated from Mackintosh Probe Test.

All dimensions are in metres unless otherwise stated

BOREHOLE LOG - MURRAY RIX GEOTECHNICAL

HOLE NO. 3
Sheet 1 of 1

CLIENT	SITE
Beaver Bridges Ltd	Cross Keys Footbridge, Cumbria LA10 5NE

DATE OF FIELDWORK	SCALE	LEVEL/POSITION	OPERATOR	LOGGED BY	JOB NO.
06/04/23 - 06/04/23	1:50	WS03	PA/TW	PA	MRN 4733

SAMPLE DEPTH	RECORD TYPE	SPT N (Cu-kN/m^2)	Standp/ Piezo	DESCRIPTION OF STRATUM (thickness)	DEPTH	LEGEND
				Grass over Topsoil (0.07)	0.07	
0.50	D	10		Firm orange brown silty sandy gravelly CLAY. Gravel was sub-angular fine to medium (1.34)		
1.00	D	12				
1.40	D	REFUSAL		Borehole terminated due to obstruction. Lead driller believes this to be the interface of the underlying Coniston Group (Sandstone) Bedrock.	1.40	

GROUNDWATER AND CASING INFORMATION

DEPTH STRUCK	DEPTH CASED	ELAPSED TIME	WATER LEVEL	DEPTH SEALED	REMARKS ON GROUNDWATER AND CASING
N/A	N/A	N/A	N/A	N/A	No Groundwater encountered.

BORING METHOD AND REMARKS

Hand augered borehole.
Drillers log.
SPT results shown in this log are equlivalent SPT values calculated from Mackintosh Probe Test.

All dimensions are in metres unless otherwise stated