**Clyde Sediment Results Summary**

Boskalis Westminster collected sediment samples from existing maintenance dredge areas for chemical and geotechnical analysis to inform the potential for use of this material for the Govan Basin infilling.

The Plan provided in Appendix A details licensed Clydeport Dredge Areas for 2022.

Samples were collected from the following specific dredge pockets:

- Channel 1021;
- Channel 1023;
- Channel 1026;
- Channel 1301;
- Cardross Sand Wave West;
- Cardross Sand Wave East.

Samples were issued to the project laboratories Socotec and i2 Laboratories for testing for the Marine Scotland Pre Dredge Sampling Suite and geotechnical parameters to inform the suitability of the material for reuse.

The geotechnical results are provided in Appendix B.

On the basis of the review of geotechnical results all sample sites barring Channel 1021 have been identified as potentially suitable for use. Channel 1021 will not be taken forward as an option for infill material

The geochemical results have been compiled into the Marine Scotland reporting template and are provided separately to this report.

The assessment has identified that none of the samples record contaminants in excess of the Marine Scotland Action Level 2 criteria.

Specific metals have been recorded above Action Level 1 in the majority of samples. It is considered that this will not preclude the material for use as part of the infilling exercise on the basis of appropriate mitigation measures being in place during infill to restrict the release of suspended sediments to the River Clyde (i.e. silt curtain or bubble screen).

# APPENDIX A

# Clydeport Dredge Areas 2022

PEEL PORTS GROUP

A

GOT Approaches South
-11.7m

GOT Approaches North
-11.7m

SBH Berth
-1.2m

1031 Channel
-8m

B

Cardross Sandwaves West
-8.2m

Cardross Sandwaves East
-8.2m

1026 Channel
-8.2m

C

1023 Channel
-7.8m

1021 Channel North
-7.7m

1021 Channel South
-7.7m

1020 Channel
-7.6m

A82

D

1018 Channel
-7.5m

Bowling Bend
-7.6m

Newshot Bend
-7.5m

1013 Channel
Rothesay Dock Approach Channel
-7.5m

RD Canting Basin
-6.7m

RD Approaches
and Tanker Berth
-6.7m

River Cart Entrance
-6.7m

E

1011 Channel
-7.5m

1009 North
-7.5m

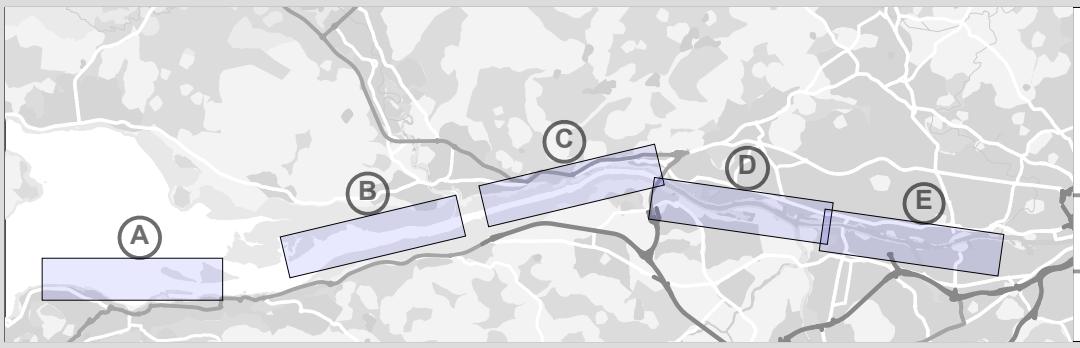
Shieldhall North 2
8.0m

Shieldhall North 1
-7.5m

Adam's Scrap Berth
-7.5m

KGV Riverside Quay
Bolls 1-23
-8.5m

KGV EMR Berth
-8.5m




Map No: CP 22/028

Production Date: 18 May 2022

Scale 1:20000 *when printed at A3*

# APPENDIX B

# TEST CERTIFICATE

**DETERMINATION OF SHEAR STRENGTH**
**BY DIRECT SHEAR**
**(SMALL SHEARBOX APPARATUS)**
Tested in Accordance with: BS 1377-7:1990: Clause 4.5.4

UKAS TESTING
4041

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Environmental Science

Client: EnviroCentre
Client Address: Craighall Business Park, Eagle Street, Glasgow, G4 9XA
Contact: Graeme Duff
Site Address: Clyde

Client Reference: 22-71245
Job Number: 22-71245
Date Sampled: Not Given
Date Received: 11/07/2022
Date Tested: 26/07/2022
Sampled By: Not Given

*Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland*

**Test Results:**

Laboratory Reference: 2349556
Hole No.: Cardross Sandwaves East
Sample Reference: Not Given
Sample Description: Brown slightly gravelly SAND with fragments of shells

Depth Top [m]: Not Given
Depth Base [m]: Not Given
Sample Type: B

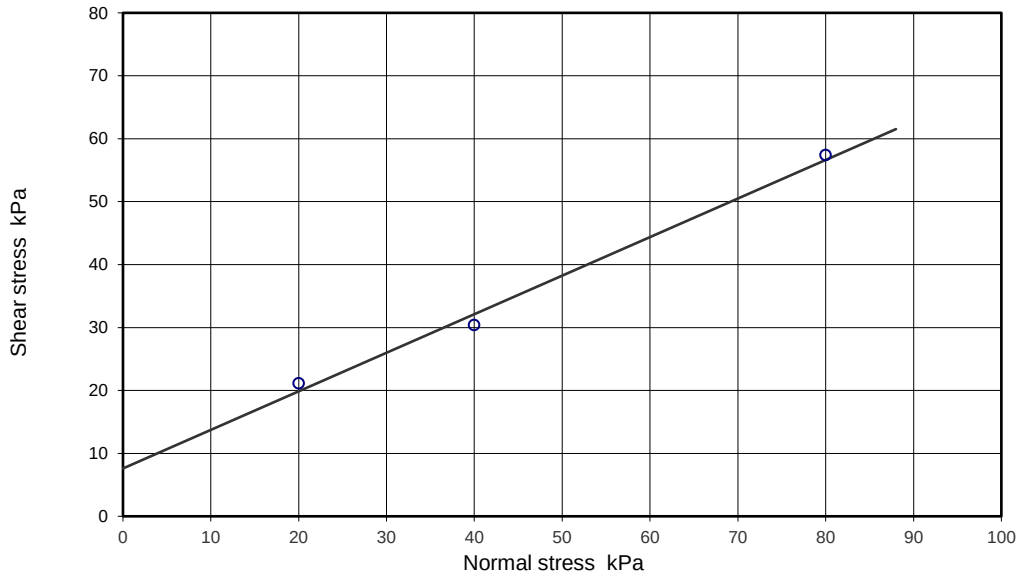
Preparation Details: Sample prepared from loose material

| **Specimen Details** | Test No. | 1 | 2 | 3 | | | | |
|---|---|---|---|---|---|---|---|---|
| Initial | Height | 20.0 | 20.0 | 20.0 | | | | mm |
| | Length | 60.1 | 60.1 | 60.1 | | | | mm |
| | Breadth | 60.1 | 60.1 | 60.1 | | | | mm |
| | Particle Density - (assumed) | 2.65 | 2.65 | 2.65 | | | | Mg/m³ |
| | Bulk Density | 1.64 | 1.64 | 1.64 | | | | Mg/m³ |
| | Moisture Content | 15.7 | 15.7 | 15.7 | | | | % |
| | Dry density | 1.42 | 1.42 | 1.42 | | | | Mg/m³ |
| | Voids ratio | 0.866 | 0.866 | 0.866 | | | | |
| | Degree of Saturation | 48 | 48 | 48 | | | | % |
| Consolidation | Consolidation / Normal Stress applied | 20 | 40 | 80 | | | | kPa |
| | Change in height during consolidation | 0.077 | 0.172 | 0.695 | | | | mm |
| | Voids ratio after consolidation | 0.859 | 0.850 | 0.801 | | | | |
| After test | Final Moisture content | 26.6 | 26.0 | 25.0 | | | | % |

**Shearing stage(s)**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Rate of displacement | Peak | 0.02983 | 0.02983 | 0.02983 | | | | mm/min |
| | Residual | | | | | | | mm/min |
| Peak values, (o) | Relative horizontal displacement | 1.44 | 2.29 | 2.17 | | | | mm |
| | Shear stress | 21.1 | 30.4 | 57.4 | | | | kPa |
| | Vertical Movement at peak shear stress | 0.02 | 0.01 | 0.14 | | | | mm |
| Residual values, (x) | No. of traverses ( including peak run ) | 1 | 1 | 1 | | | | |
| | Relative horizontal displacement | | | | | | | mm |
| | Shear stress | | | | | | | kPa |
| | Vertical movement at residual shear stress | | | | | | | mm |

**Total test time** 1 days




**Shear Strength Parameters**

| Peak strength, (o) | | Regression | Manual |
|---|---|---|---|
| c ' | kPa | 7.6 | - |
| Ø ' | degrees | 31.5 | - |

Residual strength, (x)

| | | | |
|---|---|---|---|
| c 'R | kPa | not assessed | - |
| Ø 'R | degrees | not assessed | - |

Remarks:



**Signed:** [redacted]

Katarzyna Koziel
Technical Reviewer
**for and on behalf of i2 Analytical Ltd**



**Date Reported:** 03/08/2022

**GF 174.11**

# TEST CERTIFICATE

**DETERMINATION OF SHEAR STRENGTH**
**BY DIRECT SHEAR**
**(SMALL SHEARBOX APPARATUS)**
Tested in Accordance with: BS 1377-7:1990: Clause 4.5.4

UKAS TESTING
4041

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Environmental Science

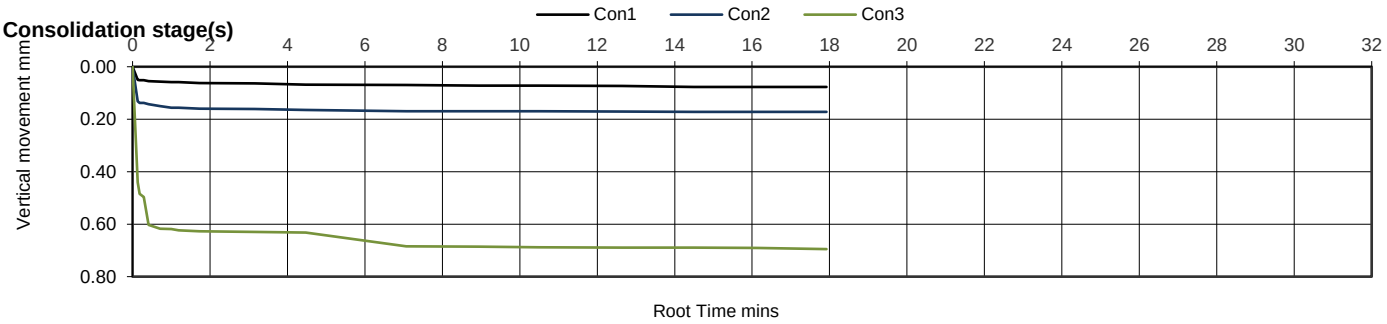
| | | | |
|---|---|---|---|
| Client: | EnviroCentre | Client Reference: | 22-71245 |
| Client Address: | Craighall Business Park, Eagle Street, Glasgow, G4 9XA | Job Number: | 22-71245 |
| | | Date Sampled: | Not Given |
| | | Date Received: | 11/07/2022 |
| Contact: | Graeme Duff | Date Tested: | 26/07/2022 |
| Site Address: | Clyde | Sampled By: | Not Given |

*Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland*

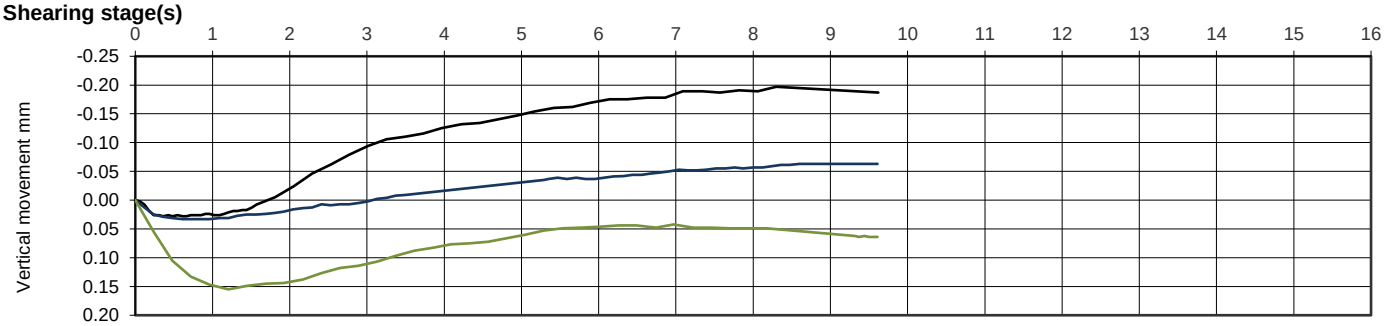
**Test Results:**

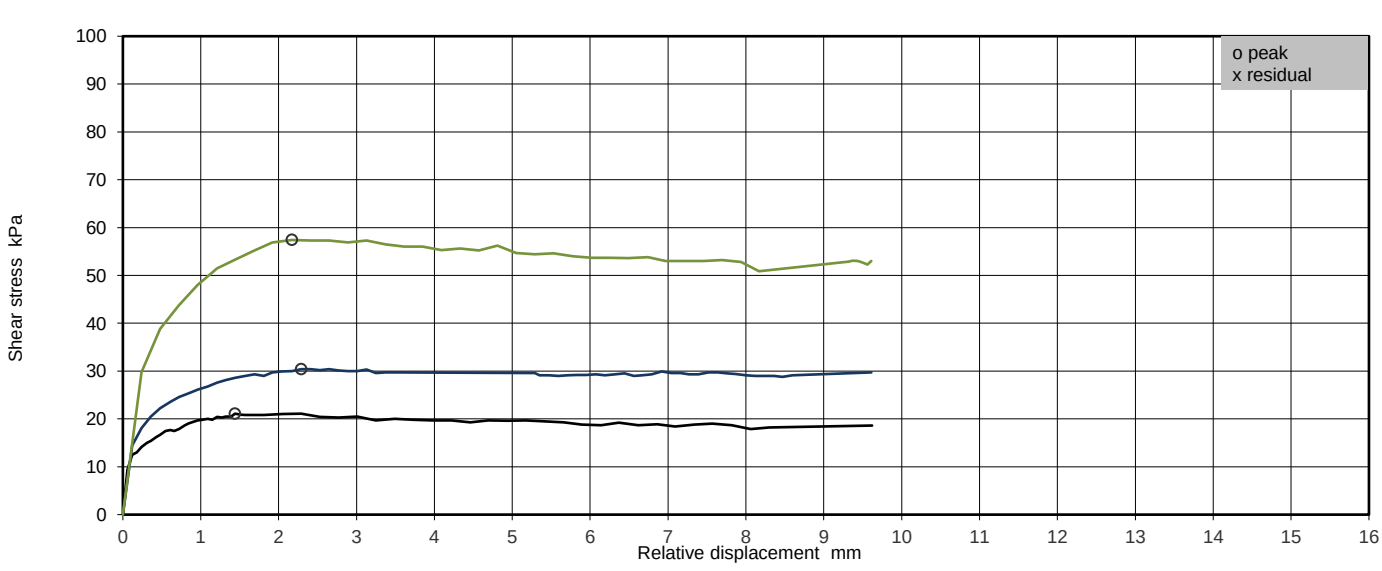
| | | | |
|---|---|---|---|
| Laboratory Reference: | 2349556 | Depth Top [m]: | Not Given |
| Hole No.: | Cardross Sandwaves East | Depth Base [m]: | Not Given |
| Sample Reference: | Not Given | Sample Type: | B |
| Sample Description: | Brown slightly gravelly SAND with fragments of shells | | |

**Consolidation stage(s)**




**Shearing stage(s)**




Remarks:

**Signed:**

Katarzyna Koziel
Technical Reviewer
**for and on behalf of i2 Analytical Ltd**





**Date Reported:** 03/08/2022

**GF 174.11**

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**BY DIRECT SHEAR**
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i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

UKAS TESTING
4041

Environmental Science

| | | | |
|---|---|---|---|
| Client: | EnviroCentre | Client Reference: | 22-71245 |
| Client Address: | Craighall Business Park, Eagle Street, Glasgow, G4 9XA | Job Number: | 22-71245 |
| | | Date Sampled: | Not Given |
| | | Date Received: | 11/07/2022 |
| Contact: | Graeme Duff | Date Tested: | 26/07/2022 |
| Site Address: | Clyde | Sampled By: | Not Given |

*Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland*

**Test Results:**

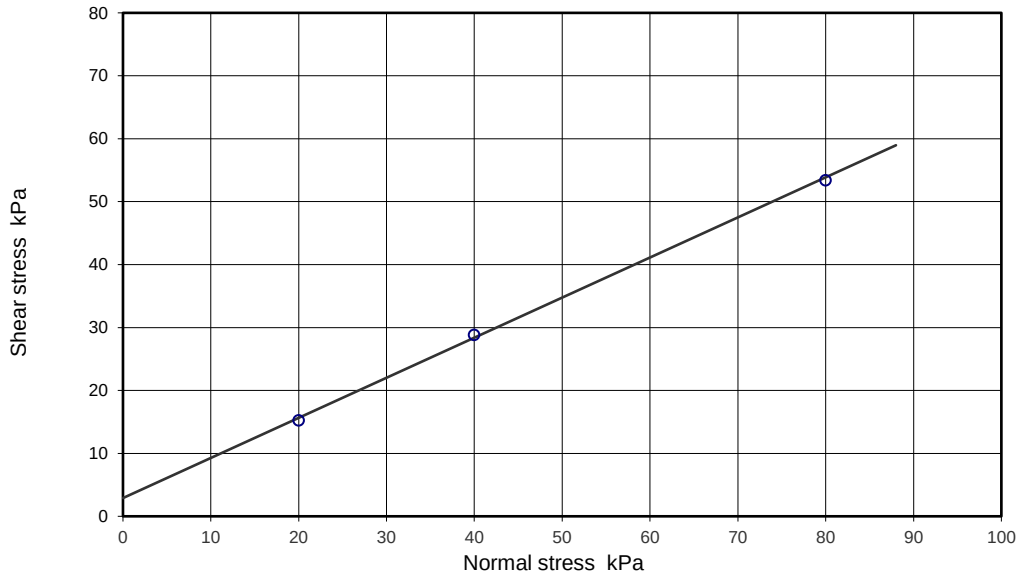
| | | | |
|---|---|---|---|
| Laboratory Reference: | 2349557 | Depth Top [m]: | Not Given |
| Hole No.: | Cardross Sandwaves West | Depth Base [m]: | Not Given |
| Sample Reference: | Not Given | Sample Type: | B |
| Sample Description: | Brown SAND with fragments of shells | | |
| Preparation Details | Sample prepared from loose material | | |

| **Specimen Details** | Test No. | 1 | 2 | 3 | | | | |
|---|---|---|---|---|---|---|---|---|
| Initial | Height | 20.0 | 20.0 | 20.0 | | | | mm |
| | Length | 60.1 | 60.1 | 60.1 | | | | mm |
| | Breadth | 60.1 | 60.1 | 60.1 | | | | mm |
| | Particle Density - (assumed) | 2.65 | 2.65 | 2.65 | | | | Mg/m³ |
| | Bulk Density | 1.62 | 1.62 | 1.62 | | | | Mg/m³ |
| | Moisture Content | 8.1 | 8.1 | 8.1 | | | | % |
| | Dry density | 1.50 | 1.50 | 1.50 | | | | Mg/m³ |
| | Voids ratio | 0.767 | 0.767 | 0.767 | | | | |
| | Degree of Saturation | 28 | 28 | 28 | | | | % |
| Consolidation | Consolidation / Normal Stress applied | 20 | 40 | 80 | | | | kPa |
| | Change in height during consolidation | 0.048 | 0.426 | 0.540 | | | | mm |
| | Voids ratio after consolidation | 0.763 | 0.729 | 0.719 | | | | |
| After test | Final Moisture content | 26.4 | 24.9 | 24.9 | | | | % |

**Shearing stage(s)**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Rate of displacement | Peak | 0.10641 | 0.10641 | 0.10641 | | | | mm/min |
| | Residual | | | | | | | mm/min |
| Peak values, (o) | Relative horizontal displacement | 1.98 | 3.13 | 8.30 | | | | mm |
| | Shear stress | 15.2 | 28.8 | 53.4 | | | | kPa |
| | Vertical Movement at peak shear stress | 0.08 | 0.03 | 0.21 | | | | mm |
| Residual values, (x) | No. of traverses ( including peak run ) | 1 | 1 | 1 | | | | |
| | Relative horizontal displacement | | | | | | | mm |
| | Shear stress | | | | | | | kPa |
| | Vertical movement at residual shear stress | | | | | | | mm |

**Total test time** 1 days




**Shear Strength Parameters**

| Peak strength, (o) | | Regression | Manual |
|---|---|---|---|
| c ' | kPa | 2.9 | - |
| Ø ' | degrees | 32.5 | - |

Residual strength, (x)

| | | | |
|---|---|---|---|
| c 'R | kPa | not assessed | - |
| Ø 'R | degrees | not assessed | - |

Remarks:

**Signed:** [redacted]

Katarzyna Koziel
Technical Reviewer
**for and on behalf of i2 Analytical Ltd**





**Date Reported:** 03/08/2022

**GF 174.11**

# TEST CERTIFICATE

**DETERMINATION OF SHEAR STRENGTH**
**BY DIRECT SHEAR**
**(SMALL SHEARBOX APPARATUS)**
Tested in Accordance with: BS 1377-7:1990: Clause 4.5.4

UKAS TESTING
4041

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Environmental Science

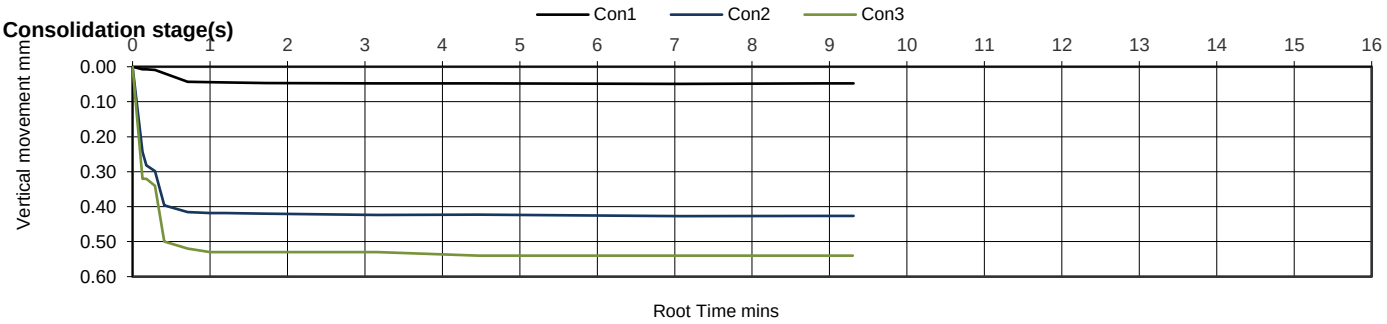
| | | | |
|---|---|---|---|
| Client: | EnviroCentre | Client Reference: | 22-71245 |
| Client Address: | Craighall Business Park, Eagle Street, Glasgow, G4 9XA | Job Number: | 22-71245 |
| | | Date Sampled: | Not Given |
| | | Date Received: | 11/07/2022 |
| Contact: | Graeme Duff | Date Tested: | 26/07/2022 |
| Site Address: | Clyde | Sampled By: | Not Given |

*Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland*

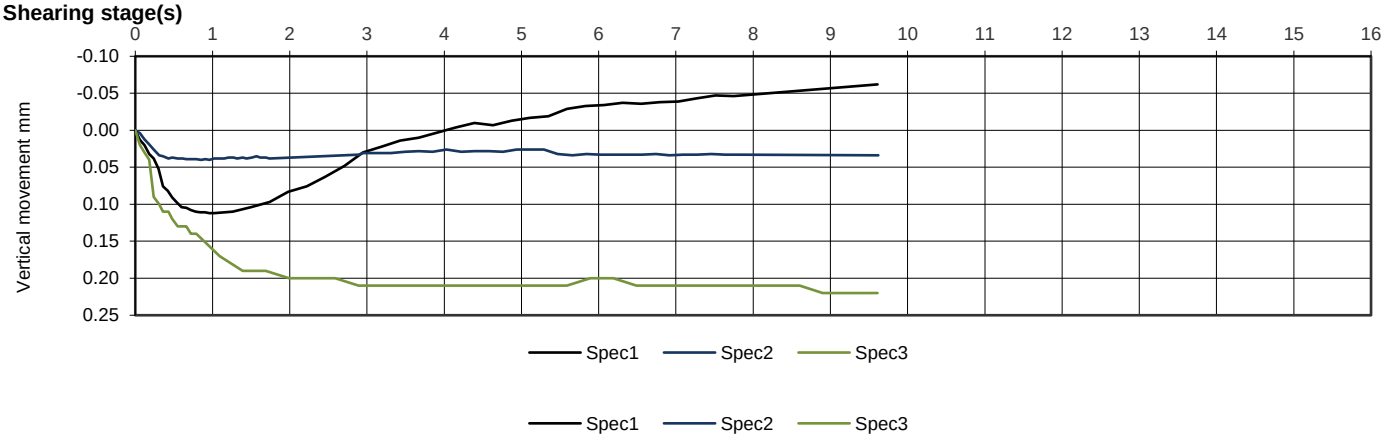
**Test Results:**

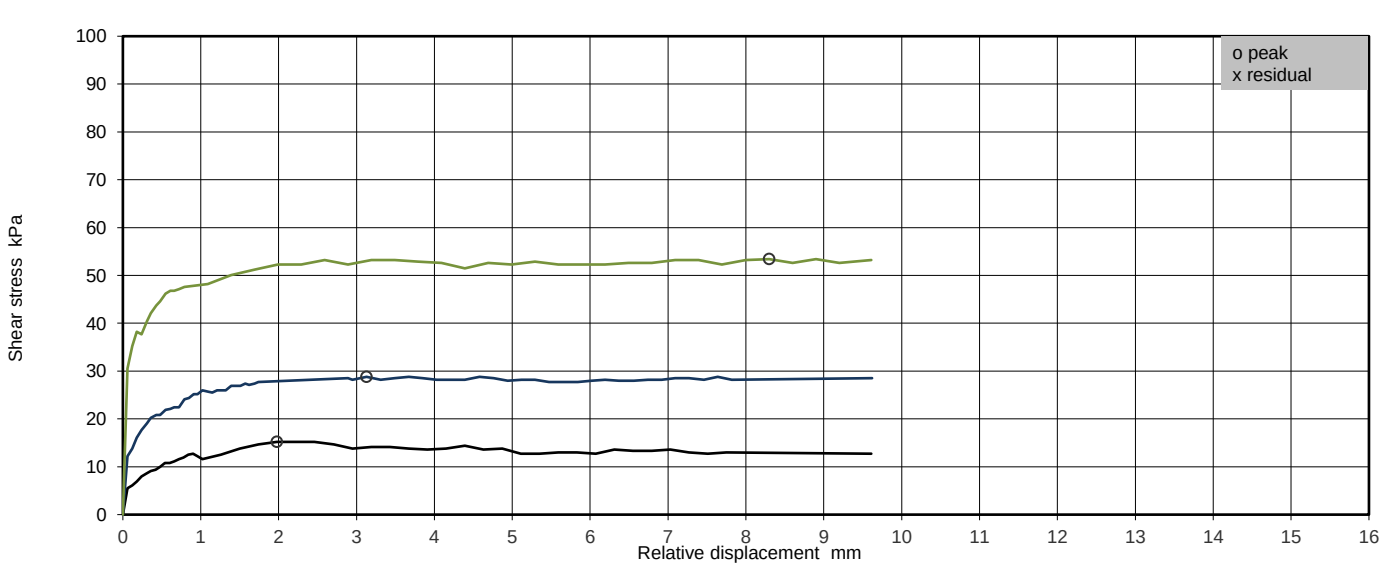
| | | | |
|---|---|---|---|
| Laboratory Reference: | 2349557 | Depth Top [m]: | Not Given |
| Hole No.: | Cardross Sandwaves West | Depth Base [m]: | Not Given |
| Sample Reference: | Not Given | Sample Type: | B |
| Sample Description: | Brown SAND with fragments of shells | | |

**Consolidation stage(s)**




**Shearing stage(s)**




Remarks:

**Signed:**

Katarzyna Koziel
Technical Reviewer
**for and on behalf of i2 Analytical Ltd**





**Date Reported:** 03/08/2022

**GF 174.11**

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**DETERMINATION OF SHEAR STRENGTH**
**BY DIRECT SHEAR**
**(SMALL SHEARBOX APPARATUS)**
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i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

UKAS TESTING
4041

Environmental Science

| | | | |
|---|---|---|---|
| Client: | EnviroCentre | Client Reference: | 22-71245 |
| Client Address: | Craighall Business Park, Eagle Street, Glasgow, G4 9XA | Job Number: | 22-71245 |
| | | Date Sampled: | Not Given |
| | | Date Received: | 11/07/2022 |
| Contact: | Graeme Duff | Date Tested: | 25/07/2022 |
| Site Address: | Clyde | Sampled By: | Not Given |

*Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland*

**Test Results:**

| | | | |
|---|---|---|---|
| Laboratory Reference: | 2349558 | Depth Top [m]: | Not Given |
| Hole No.: | 1021 Channel | Depth Base [m]: | Not Given |
| Sample Reference: | Not Given | Sample Type: | B |
| Sample Description: | Dark brown gravelly clayey SAND | | |

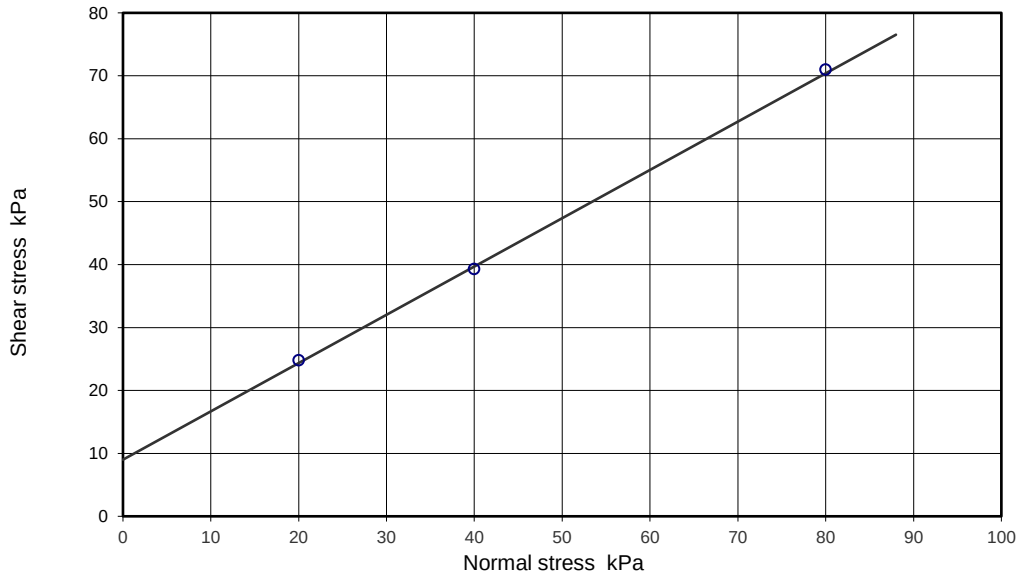
Preparation Details: Sample prepared from loose material. Sample sieve and test carried out on material passing 2mm.

| **Specimen Details** | Test No. | 1 | 2 | 3 | | | | |
|---|---|---|---|---|---|---|---|---|
| Initial | Height | 20.0 | 20.0 | 20.0 | | | | mm |
| | Length | 60.1 | 60.1 | 60.1 | | | | mm |
| | Breadth | 60.1 | 60.1 | 60.1 | | | | mm |
| | Particle Density - (assumed) | 2.65 | 2.65 | 2.65 | | | | Mg/m³ |
| | Bulk Density | 1.79 | 1.79 | 1.79 | | | | Mg/m³ |
| | Moisture Content | 27.8 | 27.8 | 27.8 | | | | % |
| | Dry density | 1.40 | 1.40 | 1.40 | | | | Mg/m³ |
| | Voids ratio | 0.893 | 0.893 | 0.893 | | | | |
| | Degree of Saturation | 82 | 82 | 82 | | | | % |
| Consolidation | Consolidation / Normal Stress applied | 20 | 40 | 80 | | | | kPa |
| | Change in height during consolidation | 0.134 | 0.301 | 0.666 | | | | mm |
| | Voids ratio after consolidation | 0.880 | 0.865 | 0.830 | | | | |
| After test | Final Moisture content | 31.2 | 31.0 | 29.6 | | | | % |

**Shearing stage(s)**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Rate of displacement | Peak | 0.05113 | 0.05113 | 0.05113 | | | | mm/min |
| | Residual | | | | | | | mm/min |
| Peak values, (o) | Relative horizontal displacement | 1.74 | 3.01 | 2.89 | | | | mm |
| | Shear stress | 24.8 | 39.3 | 71.0 | | | | kPa |
| | Vertical Movement at peak shear stress | -0.07 | 0.02 | 0.09 | | | | mm |
| Residual values, (x) | No. of traverses ( including peak run ) | 1 | 1 | 1 | | | | |
| | Relative horizontal displacement | | | | | | | mm |
| | Shear stress | | | | | | | kPa |
| | Vertical movement at residual shear stress | | | | | | | mm |

**Total test time** 1 days




**Shear Strength Parameters**

| Peak strength, (o) | | Regression | Manual |
|---|---|---|---|
| c ' | kPa | 9.0 | - |
| Ø ' | degrees | 37.5 | - |

Residual strength, (x)

| | | | |
|---|---|---|---|
| c 'R | kPa | not assessed | - |
| Ø 'R | degrees | not assessed | - |

Remarks:

**Signed:**

Katarzyna Koziel
Technical Reviewer
**for and on behalf of i2 Analytical Ltd**



 **Date Reported:** 03/08/2022 **GF 174.11**

# TEST CERTIFICATE

**DETERMINATION OF SHEAR STRENGTH**
**BY DIRECT SHEAR**
**(SMALL SHEARBOX APPARATUS)**
Tested in Accordance with: BS 1377-7:1990: Clause 4.5.4

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

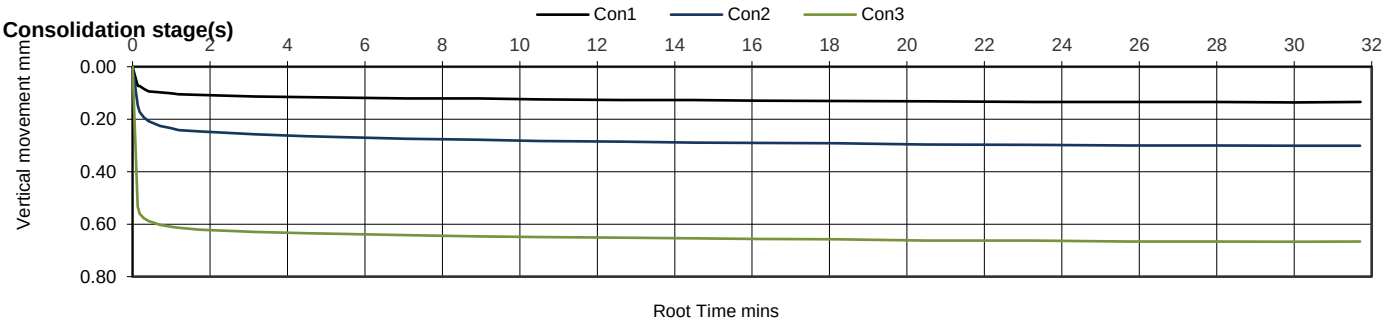
| | | | |
|---|---|---|---|
| Client: | EnviroCentre | Client Reference: | 22-71245 |
| Client Address: | Craighall Business Park, Eagle Street, Glasgow, G4 9XA | Job Number: | 22-71245 |
| | | Date Sampled: | Not Given |
| | | Date Received: | 11/07/2022 |
| Contact: | Graeme Duff | Date Tested: | 25/07/2022 |
| Site Address: | Clyde | Sampled By: | Not Given |

*Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland*

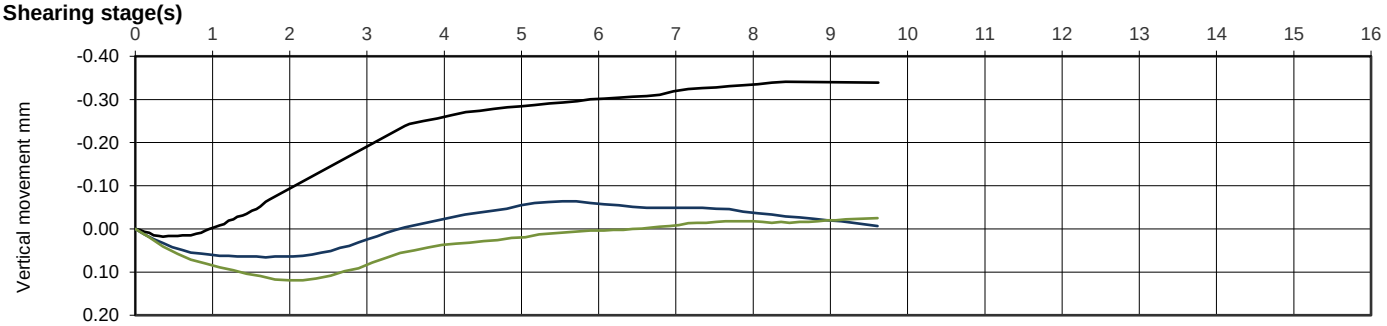
**Test Results:**

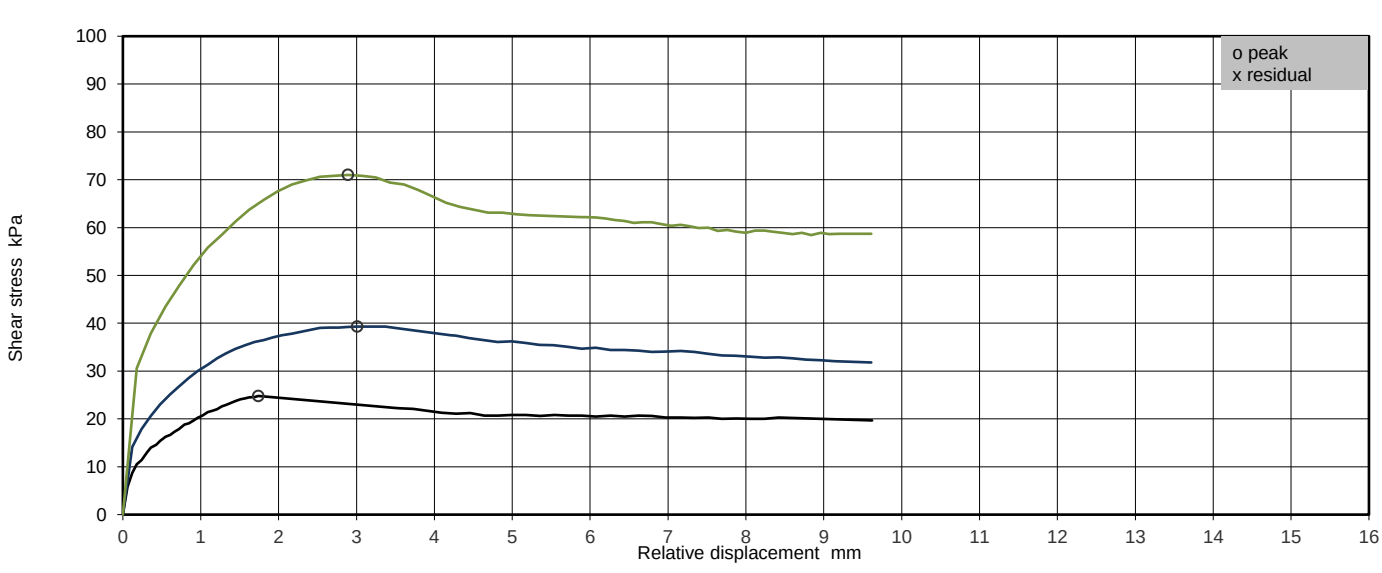
| | | | |
|---|---|---|---|
| Laboratory Reference: | 2349558 | Depth Top [m]: | Not Given |
| Hole No.: | 1021 Channel | Depth Base [m]: | Not Given |
| Sample Reference: | Not Given | Sample Type: | B |
| Sample Description: | Dark brown gravelly clayey SAND | | |

**Consolidation stage(s)**




**Shearing stage(s)**




Remarks:

**Signed:**

Katarzyna Koziel
Technical Reviewer
**for and on behalf of i2 Analytical Ltd**





**Date Reported:** 03/08/2022

**GF 174.11**

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**(SMALL SHEARBOX APPARATUS)**
Tested in Accordance with: BS 1377-7:1990: Clause 4.5.4

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

UKAS TESTING
4041

Environmental Science

| | | | |
|---|---|---|---|
| Client: | EnviroCentre | Client Reference: | 22-71245 |
| Client Address: | Craighall Business Park, Eagle Street, Glasgow, G4 9XA | Job Number: | 22-71245 |
| | | Date Sampled: | Not Given |
| | | Date Received: | 11/07/2022 |
| Contact: | Graeme Duff | Date Tested: | 26/07/2022 |
| Site Address: | Clyde | Sampled By: | Not Given |

*Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland*

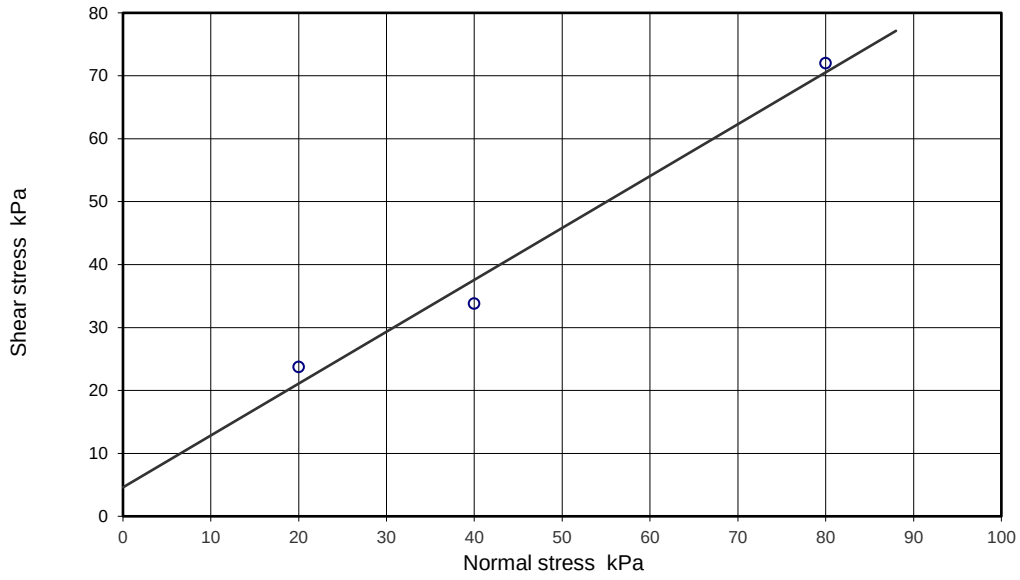
**Test Results:**

| | | | |
|---|---|---|---|
| Laboratory Reference: | 2349559 | Depth Top [m]: | Not Given |
| Hole No.: | 1023 Channel | Depth Base [m]: | Not Given |
| Sample Reference: | Not Given | Sample Type: | B |
| Sample Description: | Greyish brown gravelly slightly clayey SAND | | |
| Preparation Details | Sample prepared from loose material | | |

| **Specimen Details** | | Test No. | 1 | 2 | 3 | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Initial | Height | | 20.0 | 20.0 | 20.0 | | | | mm |
| | Length | | 60.1 | 60.1 | 60.1 | | | | mm |
| | Breadth | | 60.1 | 60.1 | 60.1 | | | | mm |
| | Particle Density - (assumed) | | 2.65 | 2.65 | 2.65 | | | | Mg/m³ |
| | Bulk Density | | 1.84 | 1.84 | 1.84 | | | | Mg/m³ |
| | Moisture Content | | 17.3 | 17.3 | 17.3 | | | | % |
| | Dry density | | 1.57 | 1.57 | 1.57 | | | | Mg/m³ |
| | Voids ratio | | 0.688 | 0.688 | 0.688 | | | | |
| | Degree of Saturation | | 67 | 67 | 67 | | | | % |
| Consolidation | Consolidation / Normal Stress applied | | 20 | 40 | 80 | | | | kPa |
| | Change in height during consolidation | | 0.165 | 0.338 | 0.790 | | | | mm |
| | Voids ratio after consolidation | | 0.674 | 0.659 | 0.621 | | | | |
| After test | Final Moisture content | | 25.2 | 24.4 | 23.8 | | | | % |

**Shearing stage(s)**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Rate of displacement | Peak | 0.02128 | 0.02128 | 0.02128 | | | | mm/min |
| | Residual | | | | | | | mm/min |
| Peak values, (o) | Relative horizontal displacement | 2.29 | 2.29 | 2.53 | | | | mm |
| | Shear stress | 23.7 | 33.8 | 72.0 | | | | kPa |
| | Vertical Movement at peak shear stress | -0.02 | -0.10 | 0.06 | | | | mm |
| Residual values, (x) | No. of traverses ( including peak run ) | 1 | 1 | 1 | | | | |
| | Relative horizontal displacement | | | | | | | mm |
| | Shear stress | | | | | | | kPa |
| | Vertical movement at residual shear stress | | | | | | | mm |




**Total test time** 1 days

**Shear Strength Parameters**

| Peak strength, (o) | | Regression | Manual |
|---|---|---|---|
| c ' | kPa | 4.6 | - |
| Ø ' | degrees | 39.5 | - |

Residual strength, (x)

| | | | |
|---|---|---|---|
| c 'R | kPa | not assessed | - |
| Ø 'R | degrees | not assessed | - |

Remarks:

**Signed:**

Katarzyna Koziel
Technical Reviewer
**for and on behalf of i2 Analytical Ltd**





**Date Reported:** 03/08/2022

**GF 174.11**

# TEST CERTIFICATE

**DETERMINATION OF SHEAR STRENGTH**
**BY DIRECT SHEAR**
**(SMALL SHEARBOX APPARATUS)**
Tested in Accordance with: BS 1377-7:1990: Clause 4.5.4

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

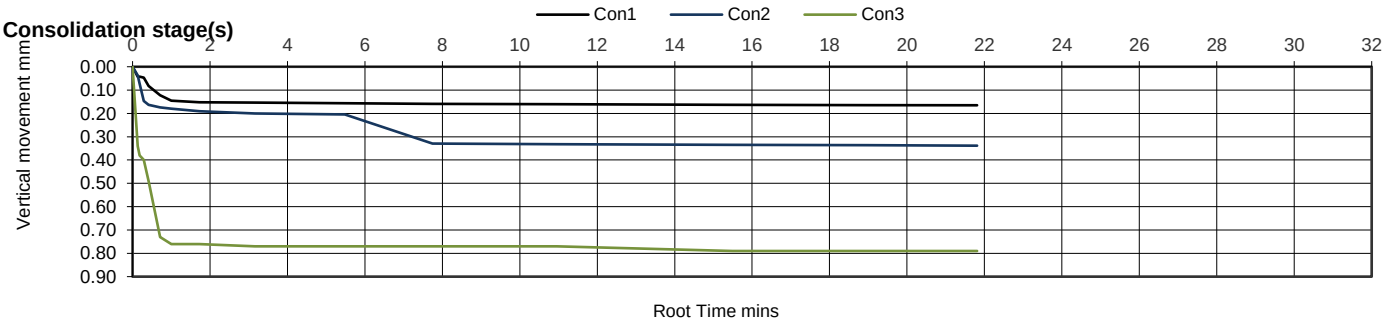
| | | | |
|---|---|---|---|
| Client: | EnviroCentre | Client Reference: | 22-71245 |
| Client Address: | Craighall Business Park, Eagle Street, Glasgow, G4 9XA | Job Number: | 22-71245 |
| | | Date Sampled: | Not Given |
| | | Date Received: | 11/07/2022 |
| Contact: | Graeme Duff | Date Tested: | 26/07/2022 |
| Site Address: | Clyde | Sampled By: | Not Given |

*Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland*

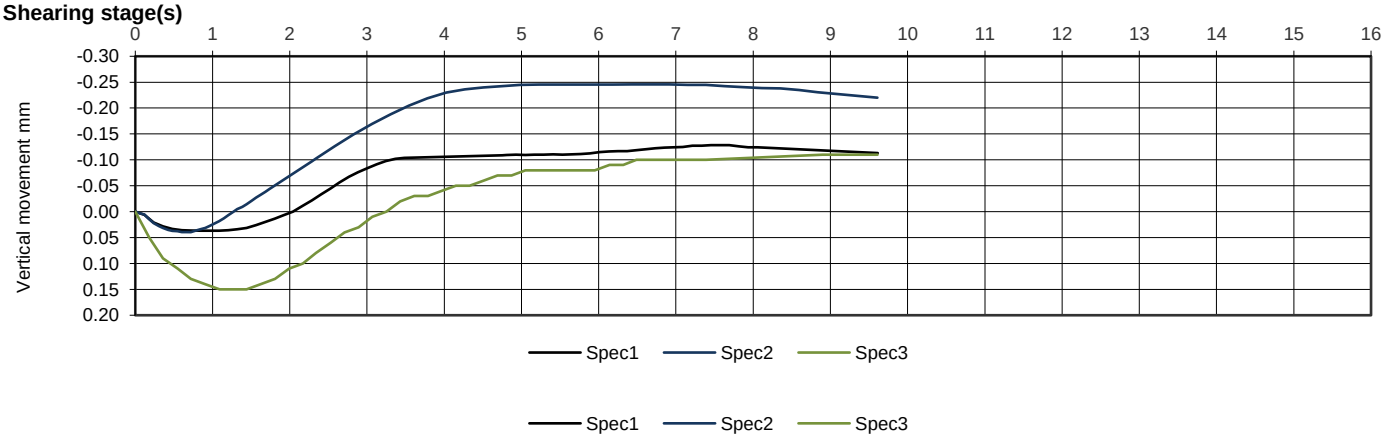
**Test Results:**

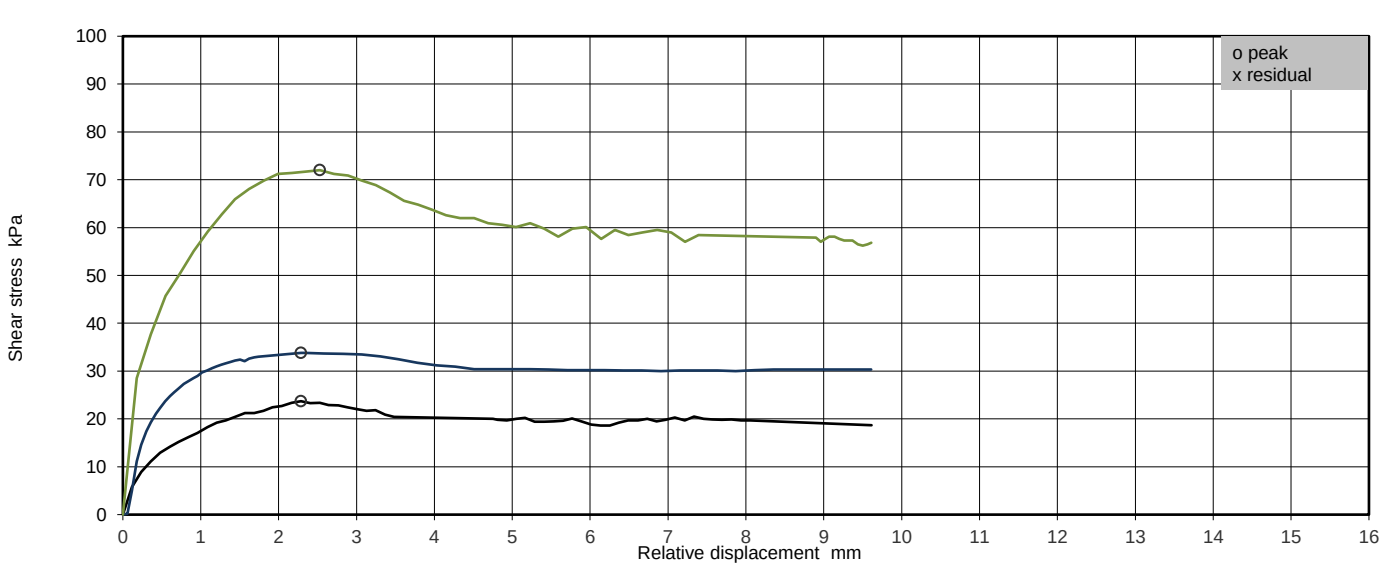
| | | | |
|---|---|---|---|
| Laboratory Reference: | 2349559 | Depth Top [m]: | Not Given |
| Hole No.: | 1023 Channel | Depth Base [m]: | Not Given |
| Sample Reference: | Not Given | Sample Type: | B |
| Sample Description: | Greyish brown gravelly slightly clayey SAND | | |

**Consolidation stage(s)**




**Shearing stage(s)**




Remarks:

**Signed:**

Katarzyna Koziel
Technical Reviewer
**for and on behalf of i2 Analytical Ltd**





**Date Reported:** 03/08/2022

**GF 174.11**

# TEST CERTIFICATE

**DETERMINATION OF SHEAR STRENGTH**
**BY DIRECT SHEAR**
**(SMALL SHEARBOX APPARATUS)**
Tested in Accordance with: BS 1377-7:1990: Clause 4.5.4

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

UKAS TESTING
4041

Environmental Science

| | | | |
|---|---|---|---|
| Client: | EnviroCentre | Client Reference: | 22-71245 |
| Client Address: | Craighall Business Park, Eagle Street, Glasgow, G4 9XA | Job Number: | 22-71245 |
| | | Date Sampled: | Not Given |
| | | Date Received: | 11/07/2022 |
| Contact: | Graeme Duff | Date Tested: | 26/07/2022 |
| Site Address: | Clyde | Sampled By: | Not Given |

*Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland*

**Test Results:**

| | | | |
|---|---|---|---|
| Laboratory Reference: | 2349560 | Depth Top [m]: | Not Given |
| Hole No.: | 1026 Channel | Depth Base [m]: | Not Given |
| Sample Reference: | Not Given | Sample Type: | B |
| Sample Description: | Brown SAND | | |

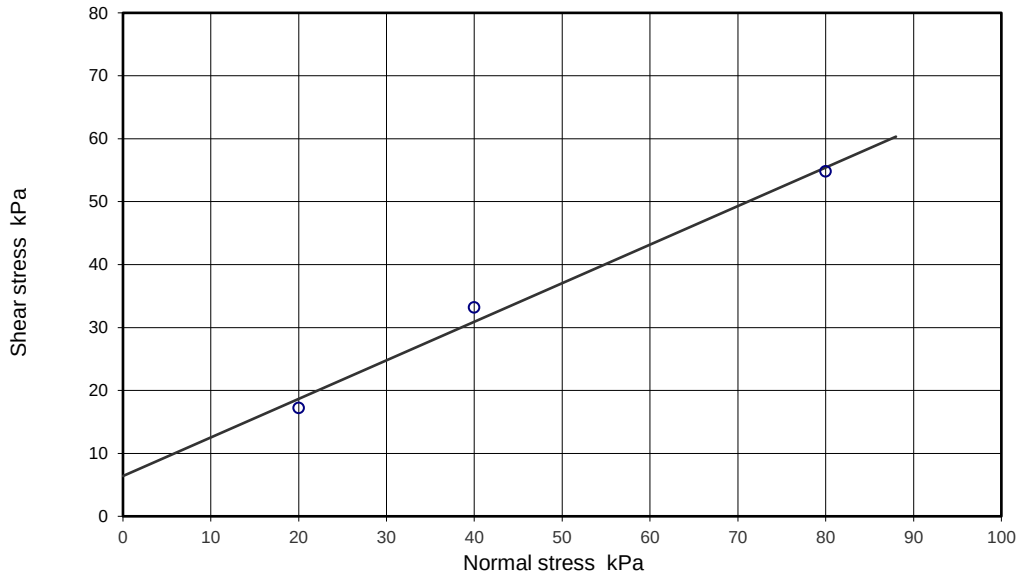
Preparation Details: Sample prepared from loose material

| **Specimen Details** | Test No. | 1 | 2 | 3 | | | | |
|---|---|---|---|---|---|---|---|---|
| Initial | Height | 20.0 | 20.0 | 20.0 | | | | mm |
| | Length | 60.1 | 60.1 | 60.1 | | | | mm |
| | Breadth | 60.1 | 60.1 | 60.1 | | | | mm |
| | Particle Density - (assumed) | 2.65 | 2.65 | 2.65 | | | | Mg/m³ |
| | Bulk Density | 1.70 | 1.70 | 1.70 | | | | Mg/m³ |
| | Moisture Content | 12.5 | 12.5 | 12.5 | | | | % |
| | Dry density | 1.51 | 1.51 | 1.51 | | | | Mg/m³ |
| | Voids ratio | 0.755 | 0.755 | 0.755 | | | | |
| | Degree of Saturation | 44 | 44 | 44 | | | | % |
| Consolidation | Consolidation / Normal Stress applied | 20 | 40 | 80 | | | | kPa |
| | Change in height during consolidation | 0.077 | 0.334 | 0.270 | | | | mm |
| | Voids ratio after consolidation | 0.748 | 0.726 | 0.731 | | | | |
| After test | Final Moisture content | 29.1 | 28.6 | 27.5 | | | | % |

**Shearing stage(s)**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Rate of displacement | Peak | 0.06673 | 0.06673 | 0.06673 | | | | mm/min |
| | Residual | | | | | | | mm/min |
| Peak values, (o) | Relative horizontal displacement | 2.35 | 2.53 | 2.17 | | | | mm |
| | Shear stress | 17.2 | 33.2 | 54.8 | | | | kPa |
| | Vertical Movement at peak shear stress | -0.02 | 0.05 | 0.13 | | | | mm |
| Residual values, (x) | No. of traverses ( including peak run ) | 1 | 1 | 1 | | | | |
| | Relative horizontal displacement | | | | | | | mm |
| | Shear stress | | | | | | | kPa |
| | Vertical movement at residual shear stress | | | | | | | mm |

**Total test time** 1 days




**Shear Strength Parameters**

| Peak strength, (o) | | Regression | Manual |
|---|---|---|---|
| c ' | kPa | 6.4 | - |
| Ø ' | degrees | 31.5 | - |

Residual strength, (x)

| | | | |
|---|---|---|---|
| c 'R | kPa | not assessed | - |
| Ø 'R | degrees | not assessed | - |

Remarks:

**Signed:**

Katarzyna Koziel
Technical Reviewer
**for and on behalf of i2 Analytical Ltd**



 **Date Reported:** 03/08/2022 **GF 174.11**

# TEST CERTIFICATE

**DETERMINATION OF SHEAR STRENGTH**
**BY DIRECT SHEAR**
**(SMALL SHEARBOX APPARATUS)**
Tested in Accordance with: BS 1377-7:1990: Clause 4.5.4

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

4041

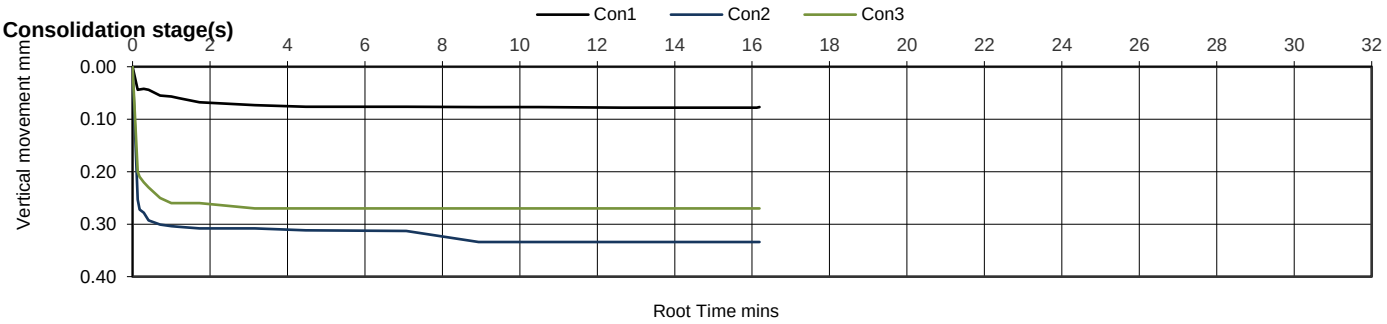
| | | | |
|---|---|---|---|
| Client: | EnviroCentre | Client Reference: | 22-71245 |
| Client Address: | Craighall Business Park, Eagle Street, Glasgow, G4 9XA | Job Number: | 22-71245 |
| | | Date Sampled: | Not Given |
| | | Date Received: | 11/07/2022 |
| Contact: | Graeme Duff | Date Tested: | 26/07/2022 |
| Site Address: | Clyde | Sampled By: | Not Given |

*Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland*

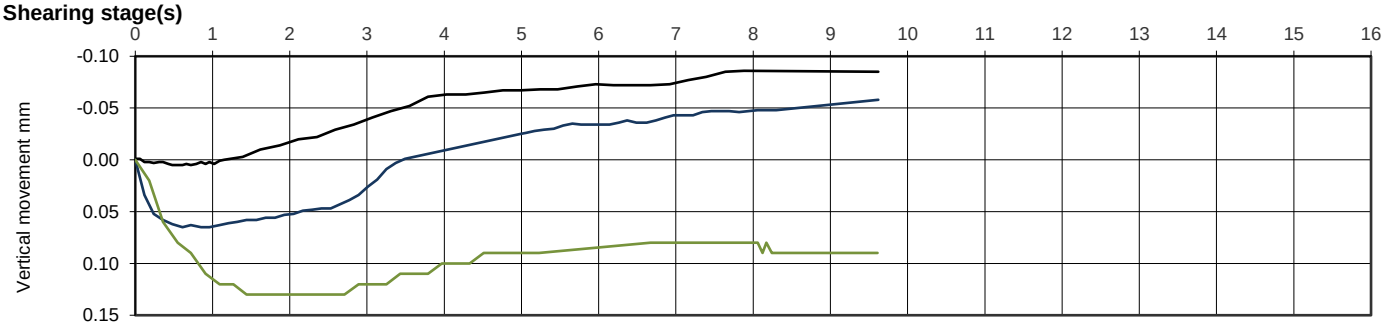
**Test Results:**

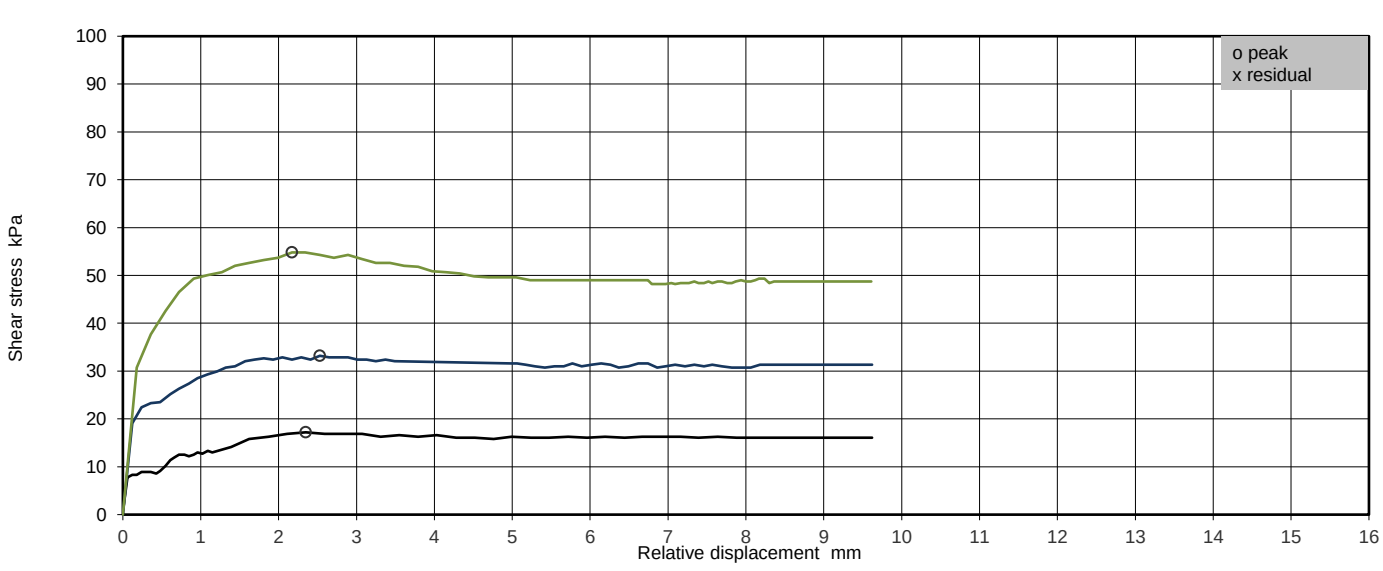
| | | | |
|---|---|---|---|
| Laboratory Reference: | 2349560 | Depth Top [m]: | Not Given |
| Hole No.: | 1026 Channel | Depth Base [m]: | Not Given |
| Sample Reference: | Not Given | Sample Type: | B |
| Sample Description: | Brown SAND | | |

**Consolidation stage(s)**




**Shearing stage(s)**




Remarks:

**Signed:**

Katarzyna Koziel
Technical Reviewer
**for and on behalf of i2 Analytical Ltd**





**Date Reported:** 03/08/2022

**GF 174.11**

# TEST CERTIFICATE

**DETERMINATION OF SHEAR STRENGTH**
**BY DIRECT SHEAR**
**(SMALL SHEARBOX APPARATUS)**
Tested in Accordance with: BS 1377-7:1990: Clause 4.5.4

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

UKAS TESTING 4041

Environmental Science

| | | | |
|---|---|---|---|
| Client: | EnviroCentre | Client Reference: | 22-71245 |
| Client Address: | Craighall Business Park, Eagle Street, Glasgow, G4 9XA | Job Number: | 22-71245 |
| | | Date Sampled: | Not Given |
| | | Date Received: | 11/07/2022 |
| Contact: | Graeme Duff | Date Tested: | 27/07/2022 |
| Site Address: | Clyde | Sampled By: | Not Given |

*Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland*

**Test Results:**

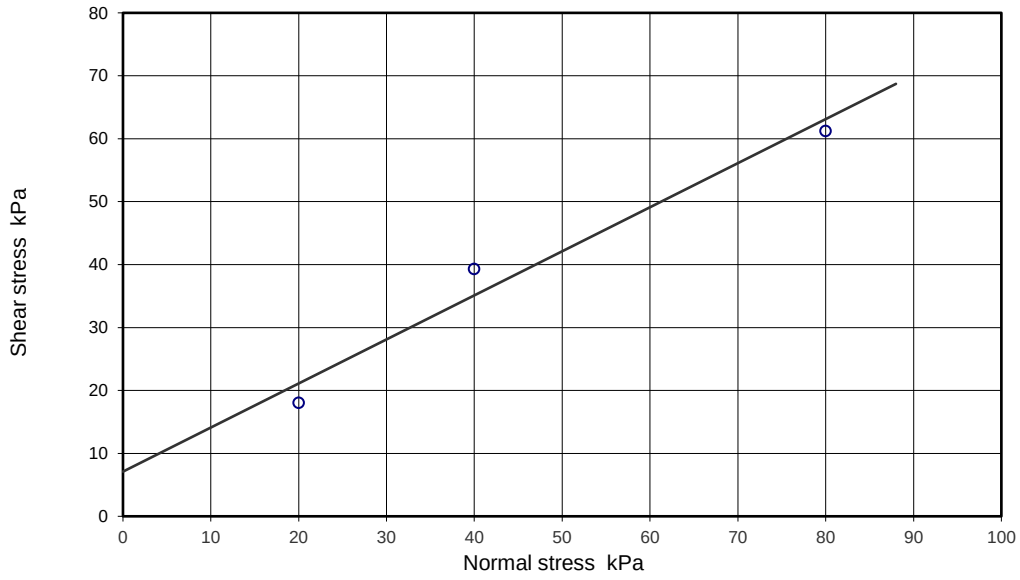
| | | | |
|---|---|---|---|
| Laboratory Reference: | 2349561 | Depth Top [m]: | Not Given |
| Hole No.: | 1031 Channel | Depth Base [m]: | Not Given |
| Sample Reference: | Not Given | Sample Type: | B |
| Sample Description: | Brown SAND with fragments of shells | | |
| Preparation Details | Sample prepared from loose material | | |

| **Specimen Details** | Test No. | 1 | 2 | 3 | | | | |
|---|---|---|---|---|---|---|---|---|
| Initial | Height | 20.0 | 20.0 | 20.0 | | | | mm |
| | Length | 60.1 | 60.1 | 60.1 | | | | mm |
| | Breadth | 60.1 | 60.1 | 60.1 | | | | mm |
| | Particle Density - (assumed) | 2.65 | 2.65 | 2.65 | | | | Mg/m³ |
| | Bulk Density | 1.60 | 1.60 | 1.60 | | | | Mg/m³ |
| | Moisture Content | 16.4 | 16.4 | 16.4 | | | | % |
| | Dry density | 1.37 | 1.37 | 1.37 | | | | Mg/m³ |
| | Voids ratio | 0.934 | 0.934 | 0.934 | | | | |
| | Degree of Saturation | 47 | 47 | 47 | | | | % |
| Consolidation | Consolidation / Normal Stress applied | 20 | 40 | 80 | | | | kPa |
| | Change in height during consolidation | 0.185 | 0.287 | 0.340 | | | | mm |
| | Voids ratio after consolidation | 0.916 | 0.906 | 0.901 | | | | |
| After test | Final Moisture content | 29.3 | 29.3 | 28.7 | | | | % |

**Shearing stage(s)**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Rate of displacement | Peak | 0.02094 | 0.02094 | 0.02094 | | | | mm/min |
| | Residual | | | | | | | mm/min |
| Peak values, (o) | Relative horizontal displacement | 6.07 | 5.77 | 4.87 | | | | mm |
| | Shear stress | 18.0 | 39.3 | 61.2 | | | | kPa |
| | Vertical Movement at peak shear stress | 0.09 | -0.01 | 0.24 | | | | mm |
| Residual values, (x) | No. of traverses ( including peak run ) | 1 | 1 | 1 | | | | |
| | Relative horizontal displacement | | | | | | | mm |
| | Shear stress | | | | | | | kPa |
| | Vertical movement at residual shear stress | | | | | | | mm |

**Total test time** 2 days




**Shear Strength Parameters**

| Peak strength, (o) | | Regression | Manual |
|---|---|---|---|
| c ' | kPa | 7.1 | - |
| Ø ' | degrees | 35.0 | - |

Residual strength, (x)

| | | | |
|---|---|---|---|
| c 'R | kPa | not assessed | - |
| Ø 'R | degrees | not assessed | - |

Remarks:

**Signed:**

Katarzyna Koziel
Technical Reviewer
**for and on behalf of i2 Analytical Ltd**



 **Date Reported:** 03/08/2022 **GF 174.11**

# TEST CERTIFICATE

**DETERMINATION OF SHEAR STRENGTH**
**BY DIRECT SHEAR**
**(SMALL SHEARBOX APPARATUS)**
Tested in Accordance with: BS 1377-7:1990: Clause 4.5.4

4041

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Environmental Science

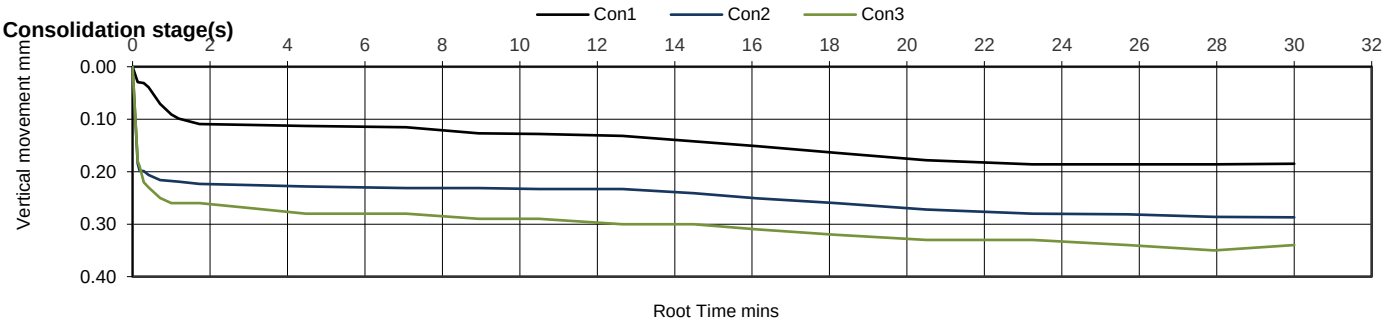
| | | | |
|---|---|---|---|
| Client: | EnviroCentre | Client Reference: | 22-71245 |
| Client Address: | Craighall Business Park, Eagle Street, Glasgow, G4 9XA | Job Number: | 22-71245 |
| | | Date Sampled: | Not Given |
| | | Date Received: | 11/07/2022 |
| Contact: | Graeme Duff | Date Tested: | 27/07/2022 |
| Site Address: | Clyde | Sampled By: | Not Given |

*Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland*

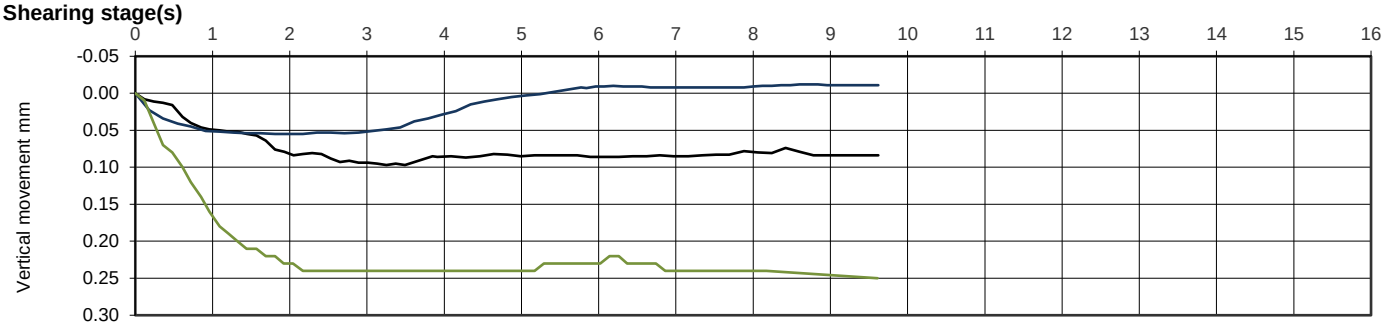
**Test Results:**

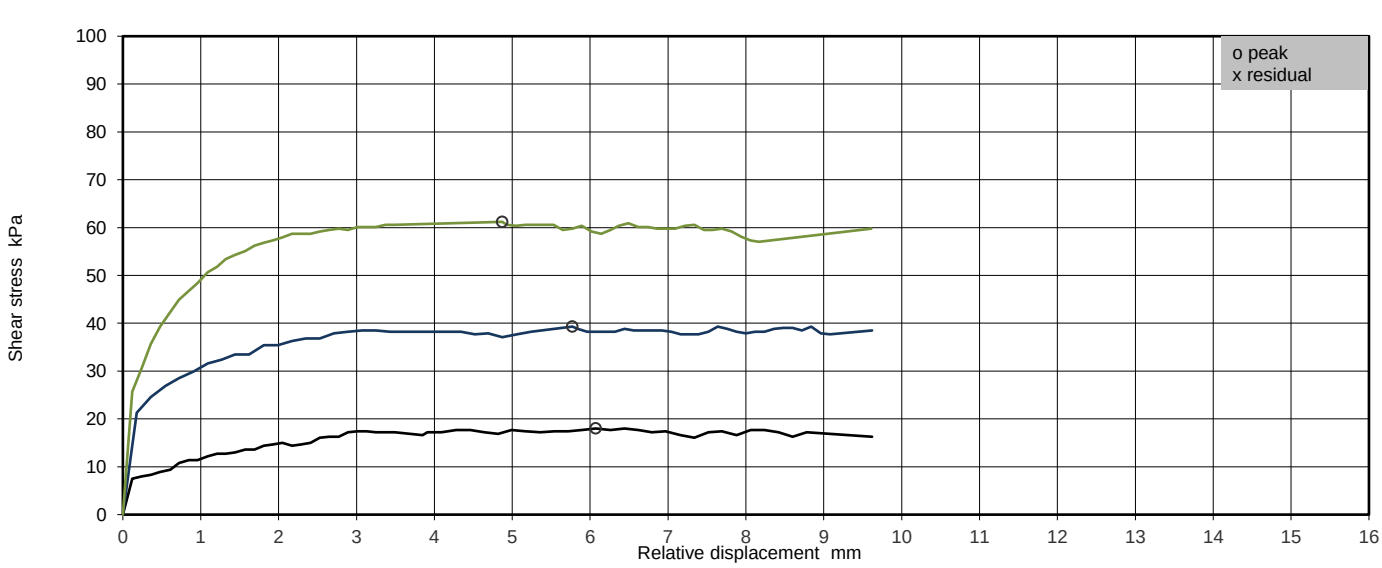
| | | | |
|---|---|---|---|
| Laboratory Reference: | 2349561 | Depth Top [m]: | Not Given |
| Hole No.: | 1031 Channel | Depth Base [m]: | Not Given |
| Sample Reference: | Not Given | Sample Type: | B |
| Sample Description: | Brown SAND with fragments of shells | | |

**Consolidation stage(s)**




**Shearing stage(s)**




Remarks:

**Signed:**

Katarzyna Koziel
Technical Reviewer
**for and on behalf of i2 Analytical Ltd**





**Date Reported:** 03/08/2022

**GF 174.11**

# TEST CERTIFICATE

**DETERMINATION OF THE ONE-DIMENSIONAL CONSOLIDATION PROPERTIES**

Tested in Accordance with: BS 1377-5:1990: Clause 3

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

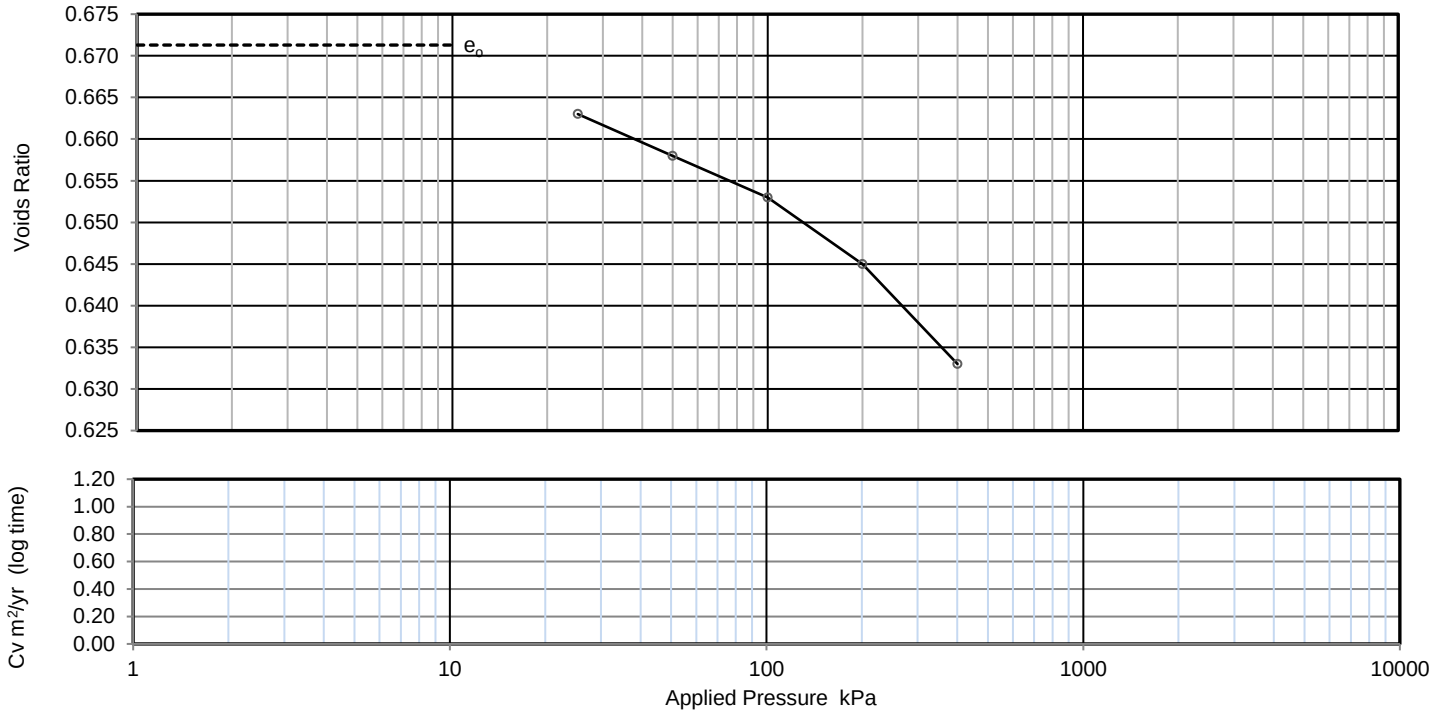
4041

| | | | |
|---|---|---|---|
| Client: | EnviroCentre | Client Reference: | 22-71245 |
| Client Address: | Craighall Business Park, Eagle Street, Glasgow, G4 9XA | Job Number: | 22-71245 |
| | | Date Sampled: | Not Given |
| | | Date Received: | 11/07/2022 |
| Contact: | Graeme Duff | Date Tested: | 26/07/2022 |
| Site Address: | Clyde | Sampled By: | Not Given |

*Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland*

**Test Results:**

| | | | |
|---|---|---|---|
| Laboratory Reference: | 2349556 | Depth Top [m]: | 0.00 |
| Hole No.: | Cardross Sandwaves East | Depth Base [m]: | Not Given |
| Sample Reference: | Not Given | Sample Type: | B |
| Sample Description: | Brown slightly gravelly SAND with fragments of shells | | |




| Applied Pressure kPa | Voids ratio | Mv m2/MN | Cv ( t50, log ) m2/yr | Cv ( t90, root m2/yr | Csec |
|---|---|---|---|---|---|
| 0 | 0.671 | - | - | - | - |
| 25 | 0.663 | 0.19 | N/A | 36 | 0.00031 |
| 50 | 0.658 | 0.12 | N/A | 57 | 0.00064 |
| 100 | 0.653 | 0.069 | N/A | 61 | 0.00029 |
| 200 | 0.645 | 0.047 | N/A | 70 | 0.00065 |
| 400 | 0.633 | 0.035 | N/A | 66 | 0.00063 |

Preparation: Sample prepared from loose material. Remoulded.

| Index tests | | | |
|---|---|---|---|
| Orientation of the sample | N/A | | |
| Particle density | assumed | 2.65 | Mg/m3 |
| Liquid limit | N/A | | % |
| Plastic limit | N/A | | % |

| Specimen details | Initial | Final | |
|---|---|---|---|
| Diameter | 50.13 | - | mm |
| Height | 19.85 | 19.40 | mm |
| Moisture Content | 7.3 | 15 | % |
| Bulk density | 1.70 | 1.87 | Mg/m3 |
| Dry density | 1.59 | 1.62 | Mg/m3 |
| Voids Ratio | 0.671 | 0.633 | |
| Saturation | 29 | 63 | % |
| Avg. temperature for test | 22.0 | | °C |
| Swelling Pressure | Not measured | | kPa |
| Settlement on saturation | | | % |
| Total test time | 5 | | days |

Note: Cv corrected to 20°C

Remarks:

**Signed:** Katarzyna Koziel
Technical Reviewer
**for and on behalf of i2 Analytical Ltd**



 **Date Reported:** 03/08/2022 **GF 172.16**

# TEST CERTIFICATE

**DETERMINATION OF THE ONE-DIMENSIONAL CONSOLIDATION PROPERTIES**

Tested in Accordance with: BS 1377-5:1990: Clause 3

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

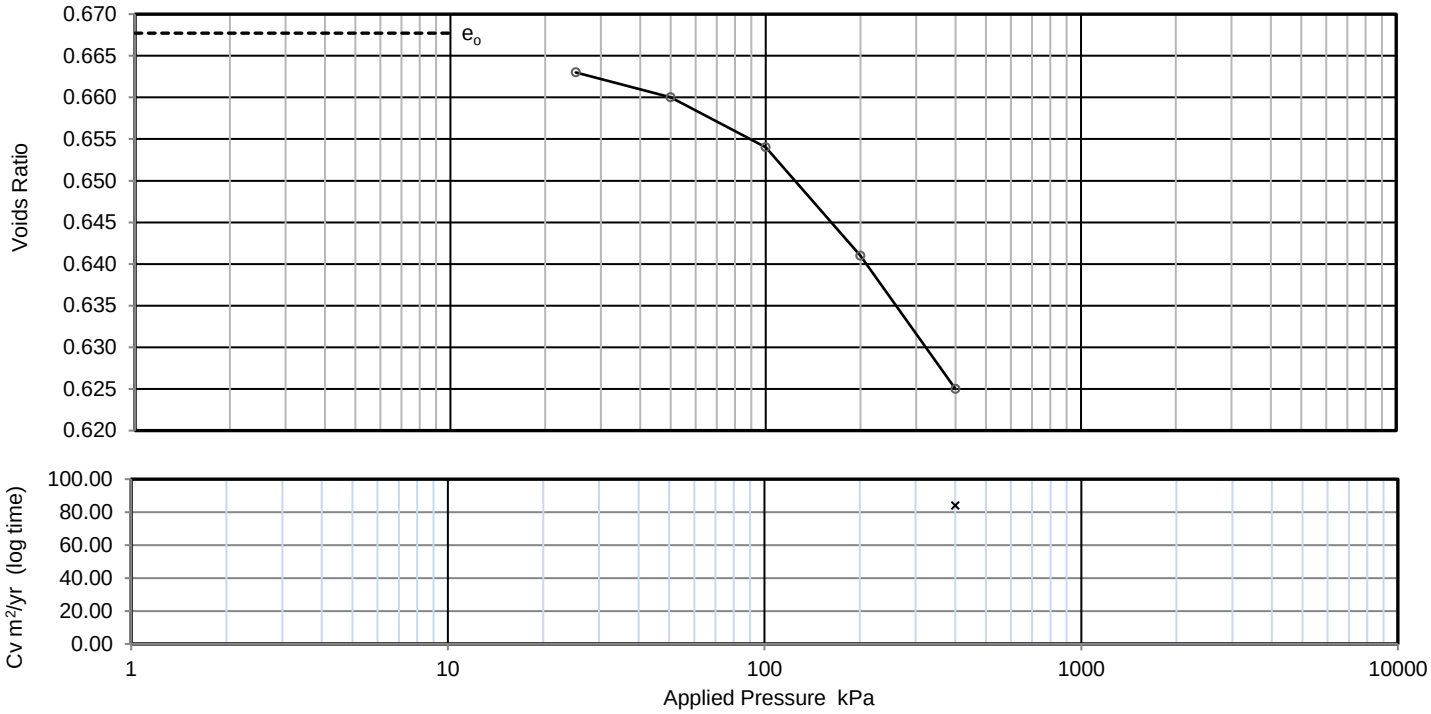
4041

| | | | |
|---|---|---|---|
| Client: | EnviroCentre | Client Reference: | 22-71245 |
| Client Address: | Craighall Business Park, Eagle Street, Glasgow, G4 9XA | Job Number: | 22-71245 |
| | | Date Sampled: | Not Given |
| | | Date Received: | 11/07/2022 |
| Contact: | Graeme Duff | Date Tested: | 26/07/2022 |
| Site Address: | Clyde | Sampled By: | Not Given |

*Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland*

**Test Results:**

| | | | |
|---|---|---|---|
| Laboratory Reference: | 2349557 | Depth Top [m]: | 0.00 |
| Hole No.: | Cardross Sandwaves West | Depth Base [m]: | Not Given |
| Sample Reference: | Not Given | Sample Type: | B |
| Sample Description: | Brown SAND with fragments of shells | | |




| Applied Pressure kPa | Voids ratio | Mv m2/MN | Cv ( t50, log ) m2/yr | Cv ( t90, root m2/yr | Csec |
|---|---|---|---|---|---|
| 0 | 0.668 | - | - | - | - |
| 25 | 0.663 | 0.1 | N/A | N/A | 0.00064 |
| 50 | 0.660 | 0.096 | N/A | N/A | 0.0019 |
| 100 | 0.654 | 0.072 | N/A | 57 | 0.00039 |
| 200 | 0.641 | 0.073 | N/A | 64 | 0.0013 |
| 400 | 0.625 | 0.05 | 84 | 60 | 0.00043 |

Preparation: Sample prepared from loose material. Remoulded.

| | | | |
|---|---|---|---|
| Index tests | | | |
| Orientation of the sample | N/A | | |
| Particle density | assumed | 2.65 | Mg/m3 |
| Liquid limit | N/A | | % |
| Plastic limit | N/A | | % |

| Specimen details | Initial | Final | |
|---|---|---|---|
| Diameter | 50.00 | - | mm |
| Height | 20.10 | 19.59 | mm |
| Moisture Content | 8.1 | 16 | % |
| Bulk density | 1.72 | 1.89 | Mg/m3 |
| Dry density | 1.59 | 1.63 | Mg/m3 |
| Voids Ratio | 0.668 | 0.625 | |
| Saturation | 32 | 68 | % |
| Avg. temperature for test | 22.0 | | °C |
| Swelling Pressure | Not measured | | kPa |
| Settlement on saturation | | | % |
| Total test time | 5 | | days |

Note: Cv corrected to 20°C

Remarks:

**Signed:** Katarzyna Koziel
Technical Reviewer
**for and on behalf of i2 Analytical Ltd**



 **Date Reported:** 03/08/2022 **GF 172.16**

# TEST CERTIFICATE

**DETERMINATION OF THE ONE-DIMENSIONAL CONSOLIDATION PROPERTIES**

Tested in Accordance with: BS 1377-5:1990: Clause 3

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

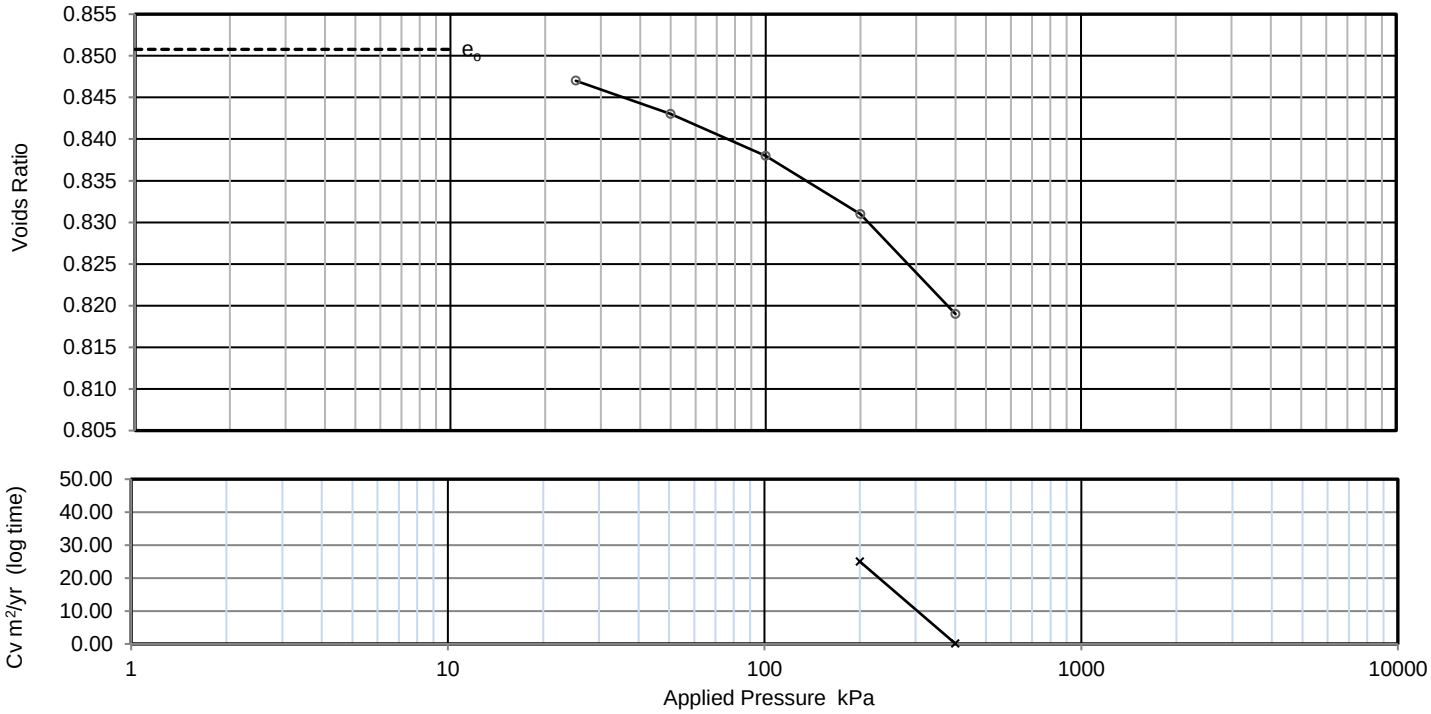
4041

| | | | |
|---|---|---|---|
| Client: | EnviroCentre | Client Reference: | 22-71245 |
| Client Address: | Craighall Business Park, Eagle Street, Glasgow, G4 9XA | Job Number: | 22-71245 |
| | | Date Sampled: | Not Given |
| | | Date Received: | 11/07/2022 |
| Contact: | Graeme Duff | Date Tested: | 26/07/2022 |
| Site Address: | Clyde | Sampled By: | Not Given |

*Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland*

**Test Results:**

| | | | |
|---|---|---|---|
| Laboratory Reference: | 2349558 | Depth Top [m]: | 0.00 |
| Hole No.: | 1021 Channel | Depth Base [m]: | Not Given |
| Sample Reference: | Not Given | Sample Type: | B |
| Sample Description: | Dark brown gravelly clayey SAND | | |




| Applied Pressure kPa | Voids ratio | Mv m2/MN | Cv ( t50, log ) m2/yr | Cv ( t90, root m2/yr | Csec |
|---|---|---|---|---|---|
| 0 | 0.851 | - | - | - | - |
| 25 | 0.847 | 0.082 | N/A | N/A | N/A |
| 50 | 0.843 | 0.082 | N/A | N/A | 0.0019 |
| 100 | 0.838 | 0.053 | N/A | 54 | 0.0013 |
| 200 | 0.831 | 0.041 | 25 | 57 | 0.00056 |
| 400 | 0.819 | 0.033 | 0.14 | 22 | 0.00064 |
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Note: Cv corrected to 20°C

Preparation

Sample prepared from loose material. Remoulded.

Index tests

| | | | |
|---|---|---|---|
| Orientation of the sample | N/A | | |
| Particle density | assumed | 2.65 | Mg/m3 |
| Liquid limit | N/A | | % |
| Plastic limit | N/A | | % |

| Specimen details | Initial | Final | |
|---|---|---|---|
| Diameter | 50.04 | - | mm |
| Height | 20.00 | 19.65 | mm |
| Moisture Content | 28 | 26 | % |
| Bulk density | 1.83 | 1.84 | Mg/m3 |
| Dry density | 1.43 | 1.46 | Mg/m3 |
| Voids Ratio | 0.851 | 0.819 | |
| Saturation | 87 | 86 | % |
| Avg. temperature for test | 22.0 | | °C |
| Swelling Pressure | Not measured | | kPa |
| Settlement on saturation | | | % |
| Total test time | 5 | | days |

Remarks:

**Signed:** Katarzyna Koziel
Technical Reviewer
**for and on behalf of i2 Analytical Ltd**





**Date Reported:** 03/08/2022

**GF 172.16**

# TEST CERTIFICATE

**DETERMINATION OF THE ONE-DIMENSIONAL CONSOLIDATION PROPERTIES**

Tested in Accordance with: BS 1377-5:1990: Clause 3

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

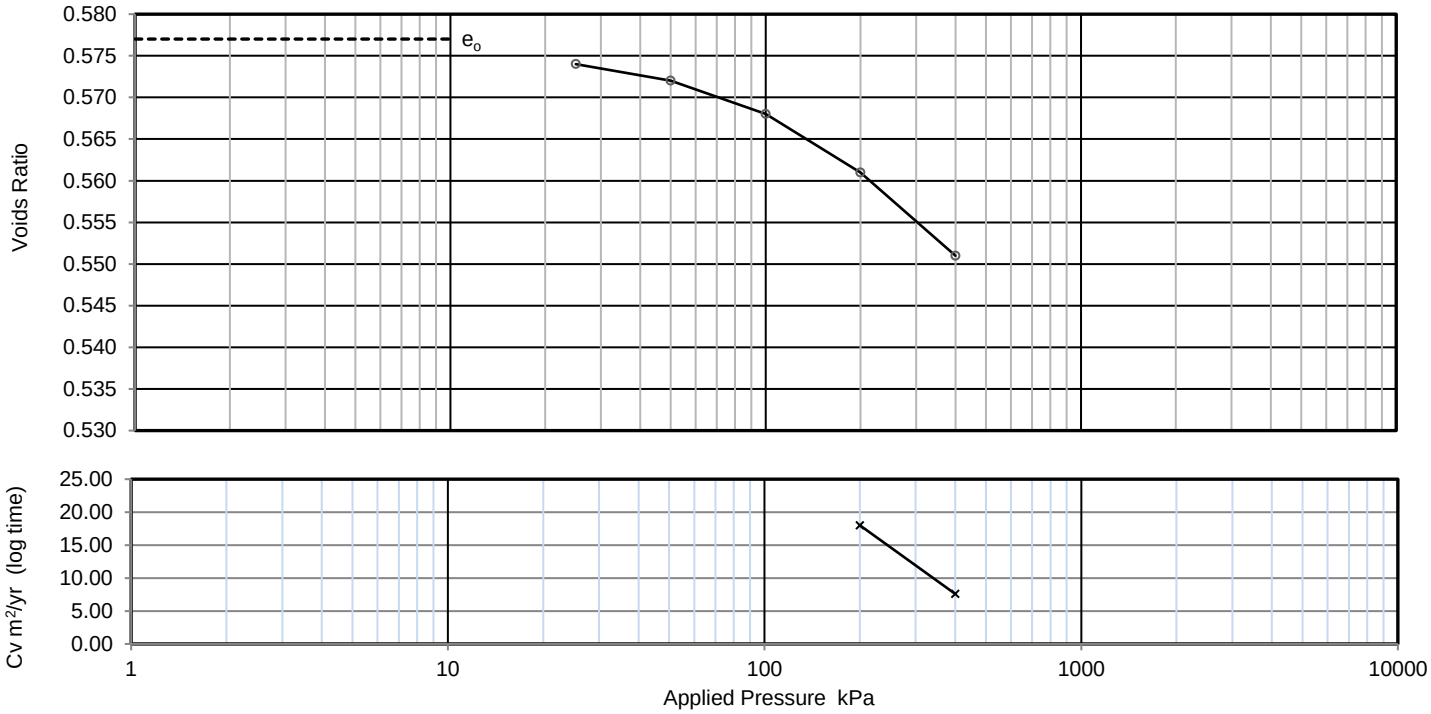
4041

| | | | |
|---|---|---|---|
| Client: | EnviroCentre | Client Reference: | 22-71245 |
| Client Address: | Craighall Business Park, Eagle Street, Glasgow, G4 9XA | Job Number: | 22-71245 |
| | | Date Sampled: | Not Given |
| | | Date Received: | 11/07/2022 |
| Contact: | Graeme Duff | Date Tested: | 26/07/2022 |
| Site Address: | Clyde | Sampled By: | Not Given |

*Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland*

**Test Results:**

| | | | |
|---|---|---|---|
| Laboratory Reference: | 2349559 | Depth Top [m]: | 0.00 |
| Hole No.: | 1023 Channel | Depth Base [m]: | Not Given |
| Sample Reference: | Not Given | Sample Type: | B |
| Sample Description: | Greyish brown gravelly slightly clayey SAND | | |




| Applied Pressure kPa | Voids ratio | Mv m2/MN | Cv ( t50, log ) m2/yr | Cv ( t90, root m2/yr | Csec |
|---|---|---|---|---|---|
| 0 | 0.577 | - | - | - | - |
| 25 | 0.574 | 0.072 | N/A | N/A | N/A |
| 50 | 0.572 | 0.068 | N/A | N/A | 0.0019 |
| 100 | 0.568 | 0.051 | N/A | N/A | 0.0013 |
| 200 | 0.561 | 0.044 | 18 | N/A | 0.00062 |
| 400 | 0.551 | 0.032 | 7.6 | 36 | 0.00035 |
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Preparation

Sample prepared from loose material. Remoulded.

Index tests

| | | | |
|---|---|---|---|
| Orientation of the sample | N/A | | |
| Particle density | assumed | 2.65 | Mg/m3 |
| Liquid limit | N/A | | % |
| Plastic limit | N/A | | % |

| Specimen details | Initial | Final | |
|---|---|---|---|
| Diameter | 50.06 | - | mm |
| Height | 20.07 | 19.74 | mm |
| Moisture Content | 17 | 22 | % |
| Bulk density | 1.97 | 2.09 | Mg/m3 |
| Dry density | 1.68 | 1.71 | Mg/m3 |
| Voids Ratio | 0.577 | 0.551 | |
| Saturation | 80 | 107 | % |
| Avg. temperature for test | 22.0 | | °C |
| Swelling Pressure | Not measured | | kPa |
| Settlement on saturation | | | % |
| Total test time | 5 | | days |

Note: Cv corrected to 20°C

Remarks:

**Signed:** Katarzyna Koziel
Technical Reviewer
**for and on behalf of i2 Analytical Ltd**





**Date Reported:** 03/08/2022

**GF 172.16**

# TEST CERTIFICATE

**DETERMINATION OF THE ONE-DIMENSIONAL CONSOLIDATION PROPERTIES**

Tested in Accordance with: BS 1377-5:1990: Clause 3

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

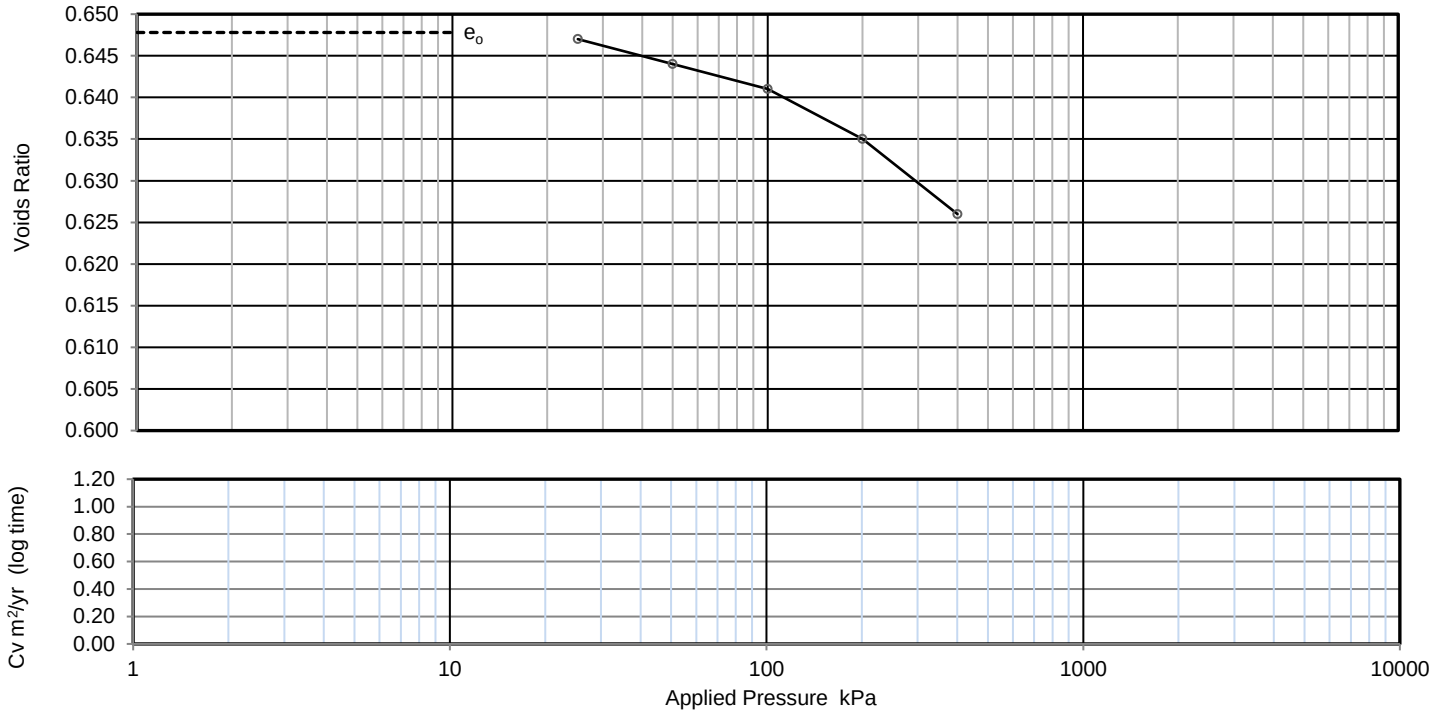
4041

| | | | |
|---|---|---|---|
| Client: | EnviroCentre | Client Reference: | 22-71245 |
| Client Address: | Craighall Business Park, Eagle Street, Glasgow, G4 9XA | Job Number: | 22-71245 |
| | | Date Sampled: | Not Given |
| | | Date Received: | 11/07/2022 |
| Contact: | Graeme Duff | Date Tested: | 26/07/2022 |
| Site Address: | Clyde | Sampled By: | Not Given |

*Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland*

**Test Results:**

| | | | |
|---|---|---|---|
| Laboratory Reference: | 2349560 | Depth Top [m]: | 0.00 |
| Hole No.: | 1026 Channel | Depth Base [m]: | Not Given |
| Sample Reference: | Not Given | Sample Type: | B |
| Sample Description: | Brown SAND | | |




| Applied Pressure kPa | Voids ratio | Mv m2/MN | Cv ( t50, log ) m2/yr | Cv ( t90, root m2/yr | Csec |
|---|---|---|---|---|---|
| 0 | 0.648 | - | - | - | - |
| 25 | 0.647 | 0.018 | N/A | N/A | 0.00043 |
| 50 | 0.644 | 0.05 | N/A | N/A | 0.00086 |
| 100 | 0.641 | 0.04 | N/A | 63 | 0.00064 |
| 200 | 0.635 | 0.039 | N/A | 64 | 0.00039 |
| 400 | 0.626 | 0.028 | N/A | 70 | 0.00051 |

Preparation

Sample prepared from loose material. Remoulded.

Index tests

| | | | |
|---|---|---|---|
| Orientation of the sample | N/A | | |
| Particle density | assumed | 2.65 | Mg/m3 |
| Liquid limit | N/A | | % |
| Plastic limit | N/A | | % |

| Specimen details | Initial | Final | |
|---|---|---|---|
| Diameter | 50.03 | - | mm |
| Height | 20.06 | 19.79 | mm |
| Moisture Content | 13 | 26 | % |
| Bulk density | 1.81 | 2.05 | Mg/m3 |
| Dry density | 1.61 | 1.63 | Mg/m3 |
| Voids Ratio | 0.648 | 0.626 | |
| Saturation | 51 | 109 | % |
| Avg. temperature for test | 22.0 | | °C |
| Swelling Pressure | Not measured | | kPa |
| Settlement on saturation | | | % |
| Total test time | 5 | | days |

Note: Cv corrected to 20°C

Remarks:

**Signed:** Katarzyna Koziel
Technical Reviewer
**for and on behalf of i2 Analytical Ltd**





**Date Reported:** 03/08/2022

**GF 172.16**

# TEST CERTIFICATE

**DETERMINATION OF THE ONE-DIMENSIONAL CONSOLIDATION PROPERTIES**

Tested in Accordance with: BS 1377-5:1990: Clause 3

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

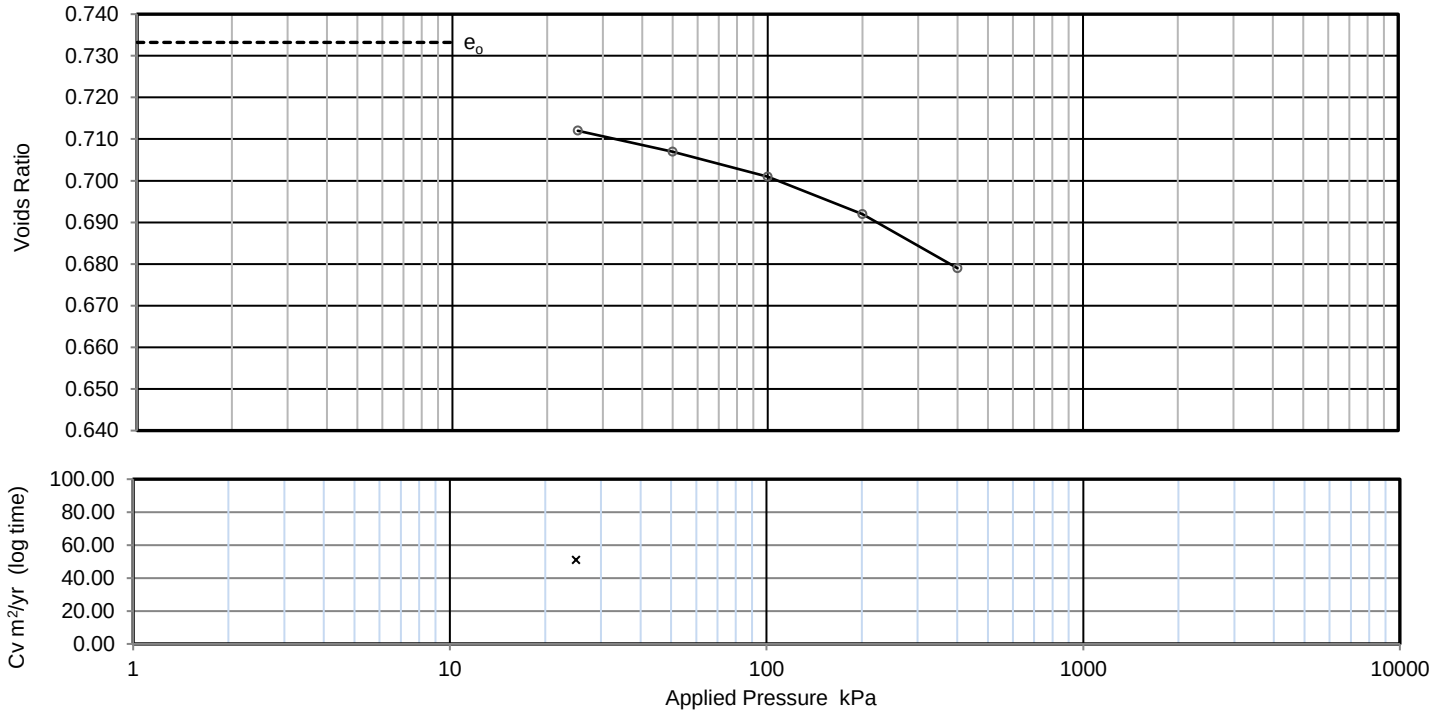
4041

| | | | |
|---|---|---|---|
| Client: | EnviroCentre | Client Reference: | 22-71245 |
| Client Address: | Craighall Business Park, Eagle Street, Glasgow, G4 9XA | Job Number: | 22-71245 |
| | | Date Sampled: | Not Given |
| | | Date Received: | 11/07/2022 |
| Contact: | Graeme Duff | Date Tested: | 26/07/2022 |
| Site Address: | Clyde | Sampled By: | Not Given |

*Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland*

**Test Results:**

| | | | |
|---|---|---|---|
| Laboratory Reference: | 2349561 | Depth Top [m]: | 0.00 |
| Hole No.: | 1031 Channel | Depth Base [m]: | Not Given |
| Sample Reference: | Not Given | Sample Type: | B |
| Sample Description: | Brown SAND with fragments of shells | | |




| Applied Pressure kPa | Voids ratio | Mv m2/MN | Cv ( t50, log ) m2/yr | Cv ( t90, root m2/yr | Csec |
|---|---|---|---|---|---|
| 0 | 0.733 | - | - | - | - |
| 25 | 0.712 | 0.48 | 51 | 32 | 0.00045 |
| 50 | 0.707 | 0.13 | N/A | 69 | 0.00061 |
| 100 | 0.701 | 0.073 | N/A | 57 | 0.00051 |
| 200 | 0.692 | 0.049 | N/A | 74 | 0.00055 |
| 400 | 0.679 | 0.04 | N/A | 76 | 0.0008 |
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Preparation

Sample prepared from loose material. Remoulded.

| | | | |
|---|---|---|---|
| Index tests | | | |
| Orientation of the sample | N/A | | |
| Particle density | assumed | 2.65 | Mg/m3 |
| Liquid limit | N/A | | % |
| Plastic limit | N/A | | % |

| Specimen details | Initial | Final | |
|---|---|---|---|
| Diameter | 50.04 | - | mm |
| Height | 19.71 | 19.09 | mm |
| Moisture Content | 16 | 26 | % |
| Bulk density | 1.77 | 2.00 | Mg/m3 |
| Dry density | 1.53 | 1.58 | Mg/m3 |
| Voids Ratio | 0.733 | 0.679 | |
| Saturation | 58 | 103 | % |
| Avg. temperature for test | 22.0 | | °C |
| Swelling Pressure | Not measured | | kPa |
| Settlement on saturation | | | % |
| Total test time | 5 | | days |

Note: Cv corrected to 20°C

Remarks:

**Signed:** Katarzyna Koziel
Technical Reviewer
**for and on behalf of i2 Analytical Ltd**





**Date Reported:** 03/08/2022

**GF 172.16**