



28 January 2026

Our Ref: 1102090.0000.0.0/Rep1

Customer Ref: Ground Investigation for Northland Corridor

WSP NEW ZEALAND LIMITED
PO BOX 33 1527
TAKAPUNA
NORTH SHORE CITY 0740
Auckland 0740

Attention: Sekope Wakefield Koroi

Dear Sekope

Northland Corridor Laboratory Test Report

Customer's Instructions

Detailed testing instructions were provided by the customer via email dated 13 January 2026.

Sampling Procedure

Samples have been tested as received.

Sample Location Plan

Not applicable.

Samples

We received a small bag sample of extruded material from a push tube, labelled with the location ID and sample depth.

Date(s) of Sample Receipt

12 January 2026

Test Method(s)

ISO 17892:2018 Part 10 - Direct shear tests (Ring Shear)

NZS 4402: 1986 Test 2.1 - Water Content

Material Description

Descriptions are provided in the attached presentation pages.

Test Results

Test results are attached.

Test Remarks

Test remarks are detailed on the presentation page.

General Remarks

Samples not destroyed during testing, will be retained for one month from the date of this report before being discarded.

Descriptions are enclosed for your information but are not covered under the IANZ endorsement of this report.

This report has been prepared for the benefit of WSP NEW ZEALAND LIMITED, with respect to the particular brief given to us and it cannot be relied upon in other contexts or for any other purpose without our prior review and agreement.

Please reproduce this report in full when transmitting to others or including in internal reports.

If we can be of any further assistance, feel free to get in touch. Contact details are provided at the bottom of the letterhead page.

GEOTECHNICS LTD

Report approved by:



.....
Helen Wang
Triaxial Laboratory Manager
Key Technical Person

Authorised for Geotechnics by:



.....
Steven Anderson
Project Director



All tests reported herein
have been performed in
accordance with the
laboratory's scope of
accreditation

28-Jan-26

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1 Hill Street

Onehunga

Auckland

New Zealand

p. +64 9 356 3510

Geotechnics Project ID:

1102090.0000.0.0

Customer Project ID:

Ground Investigation for Northland Corridor

Testing Schedule Reference:

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Site/Location:

Northland Corridor

Location ID:

BH2B_1151

Sample Ref.:

WL4708/93-RS

Geotechnics ID:

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Depth:

3.0 -3.5

(m)

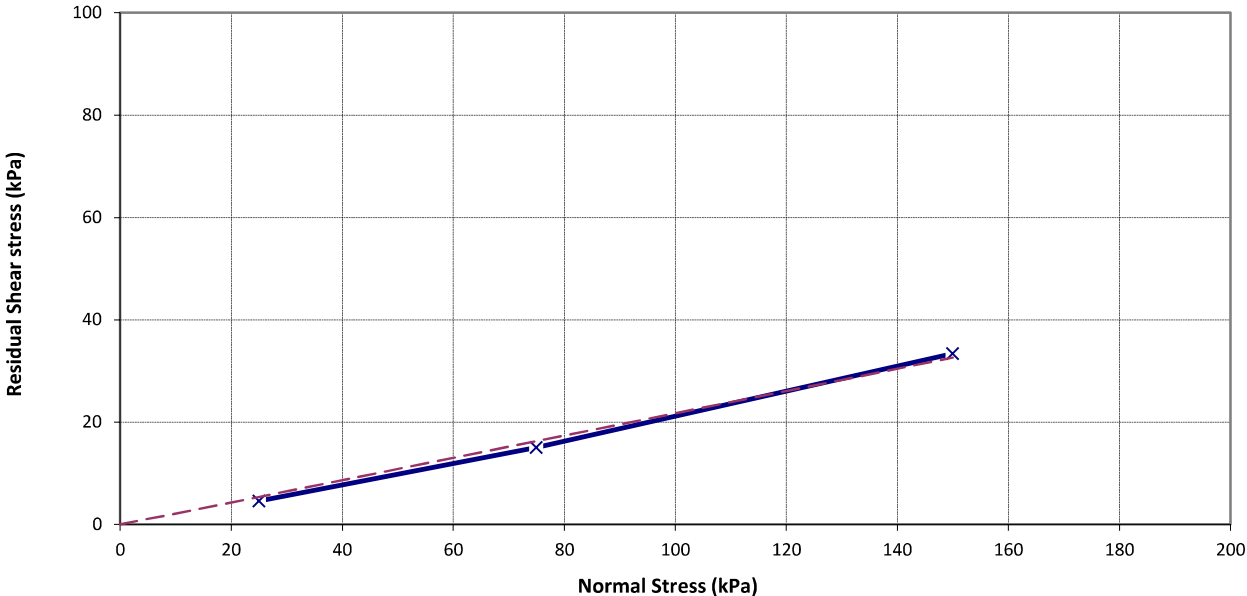
Test method used:

ISO 17892-10:2018 Part 10 Direct shear tests

NZS 4402:1986 Test 2.1 Determination of Water Content

RING SHEAR TEST

SHEAR STRESS VS NORMAL STRESS



General Sample Parameters							
	Specimen 1		Specimen 2		Specimen 3		
Initial Sample Height:	5.5	mm	5.5	mm	5.5	mm	
Inner Diameter:	69.8	mm	69.8	mm	69.8	mm	
Outer Diameter:	100.1	mm	100.1	mm	100.1	mm	
Initial Water Content:	31.9	%	31.9	%	31.9	%	
Initial Bulk Density:	1.79	t/m ³	1.80	t/m ³	1.81	t/m ³	
Initial Dry Density:	1.36	t/m ³	1.37	t/m ³	1.37	t/m ³	
Final Water Content:	34.4	%	33.0	%	32.1	%	

Test Results						
	Consolidation Stage		Residual Strength			
	Normal Stress (kPa)	Sample Height after Consolidation (mm)	Residual Shear Stress (kPa)	Cumulative Angular Displacement (°)	Average Linear Displacement (mm)	Test Speed (°/min)
Specimen 1	25.0	5.46	4.63	41.0	30.37	0.024
Specimen 2	75.0	5.37	15.06	42.4	31.37	0.024
Specimen 3	150.0	5.27	33.38	41.0	30.25	0.024

Residual Strength

Angle of Frictional Resistance:

$\phi'_R = 12.5^\circ$

Linear Regression Coefficient:

$r = 0.998$

Sample History:

Test was performed on whole soil. The sample was kneaded evenly and remoulded into the annular cavity with finger force.

Sample description:

SILT, with some clay and a trace of sand; light greyish brown, mottled orange brown and grey, moist.

Test Remarks:

The test was performed in a type B ring shear apparatus, and tested submerged.
Residual strength parameters have been derived by using a linear regression fitting method.
The angle of friction resistance was derived on the assumption that Cohesion C'_R is zero.
The sample swelled in the first consolidation stage under the normal stress 25 kPa. As a result, we terminated consolidation and started shearing.

Tested by:

PIHE

Date:

22/01/2026

Approved by KTP:



Date:

28/01/2026

Geotechnics Ltd

ISO 17892-10:2018 Part 10 Direct shear tests

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Version 2.0 - 5 September 2025



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Customer Project ID: Ground Investigation for Northland
Testing Schedule Reference: --

Site/Location: Northland Corridor

Location ID: BH2B_1151

Sample No.: WL4708/93-RS

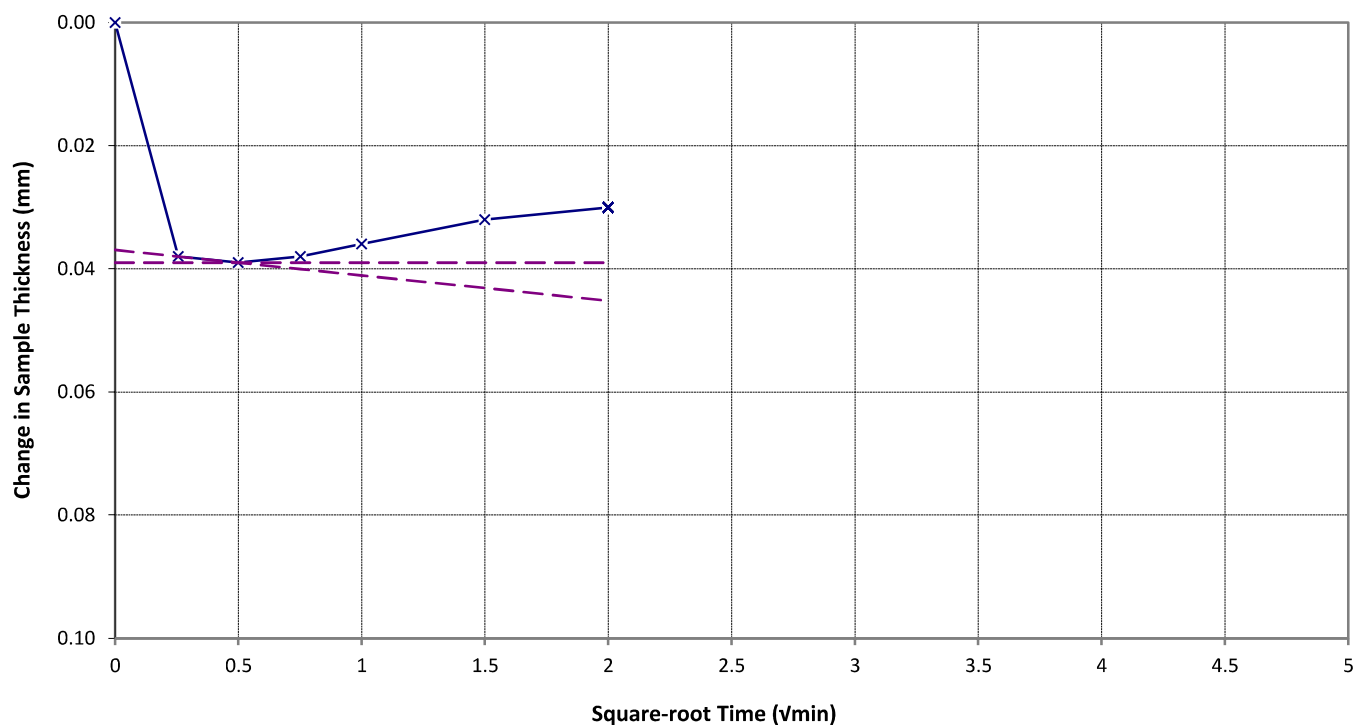
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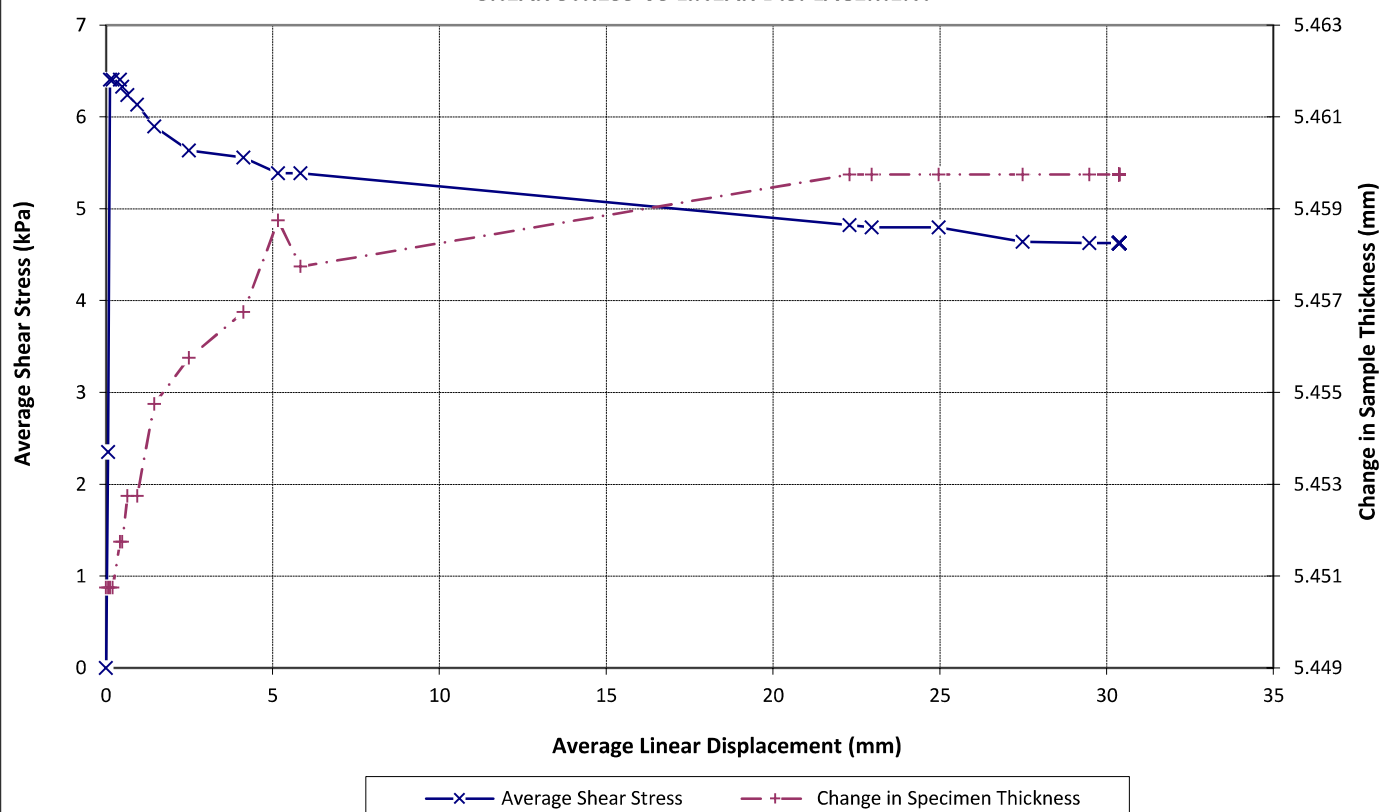
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NZS 4402:1986 Test 2.1 Determination of Water Content

SPECIMEN 1 GRAPHS

CONSOLIDATION



SHEAR STRESS VS LINEAR DISPLACEMENT



Tested by: PIHE

Date: 22/01/2026

Approved by KTP:

Date: 28/01/2026



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Sample No.: WL4708/93-RS

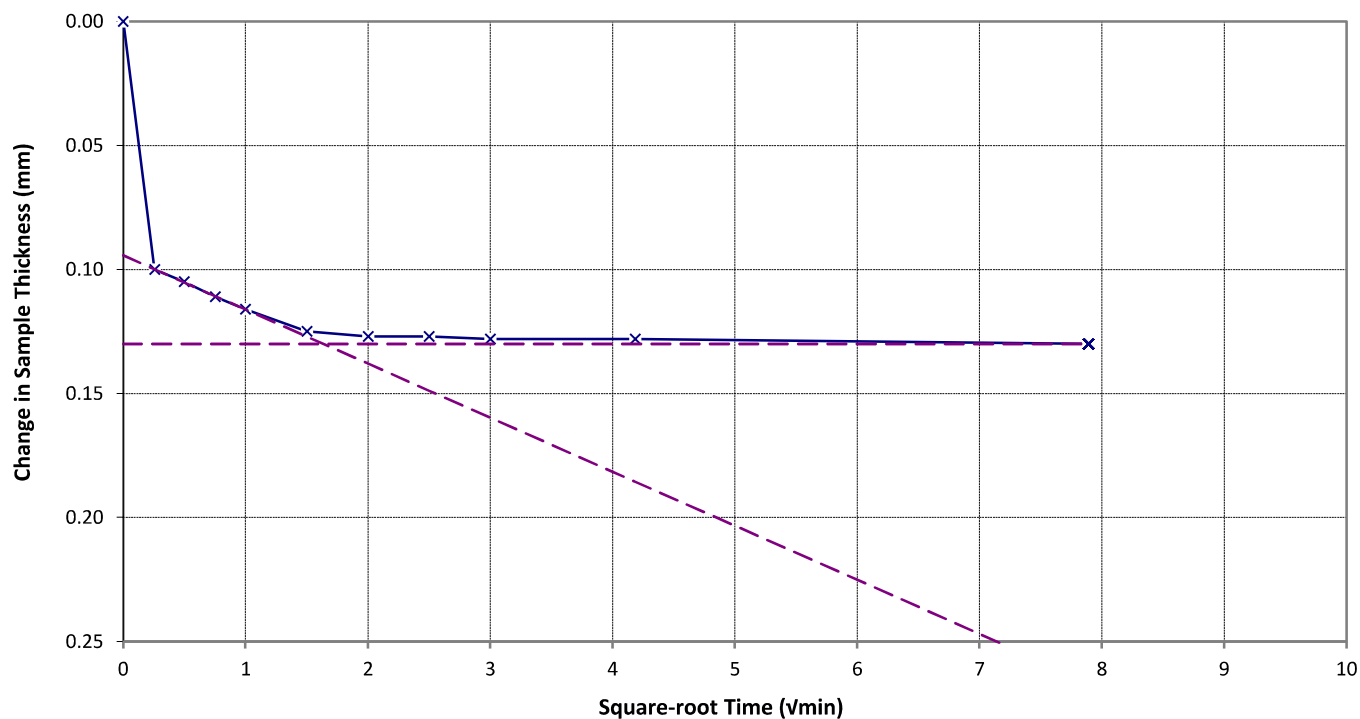
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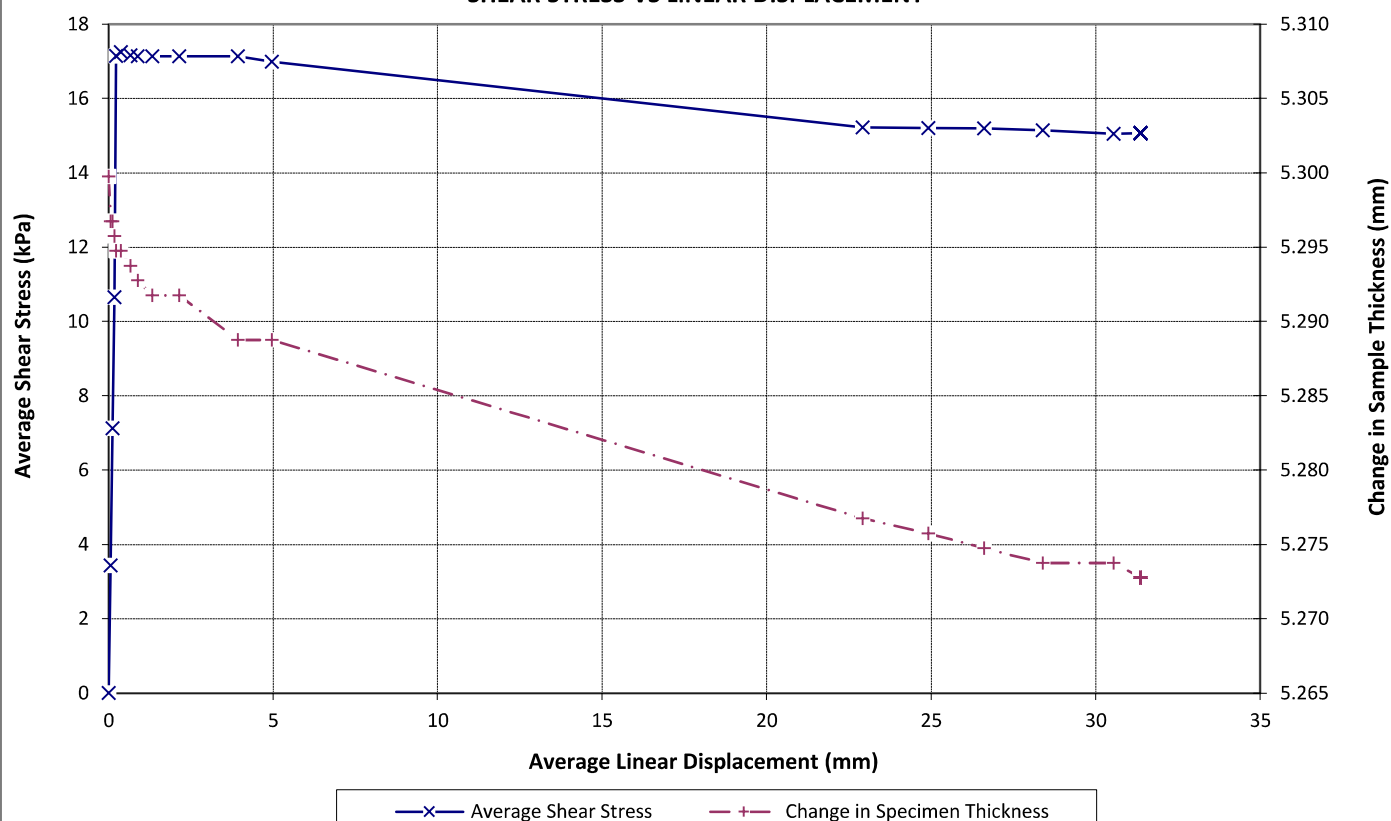
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SPECIMEN 2 GRAPHS

CONSOLIDATION



SHEAR STRESS VS LINEAR DISPLACEMENT



Tested by:

PIHE

Date: 22/01/2026

Approved by KTP:

Date:

28/01/2026



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Testing Schedule Reference: --

Site/Location: Northland Corridor

Location ID: BH2B_1151

Sample No.: WL4708/93-RS

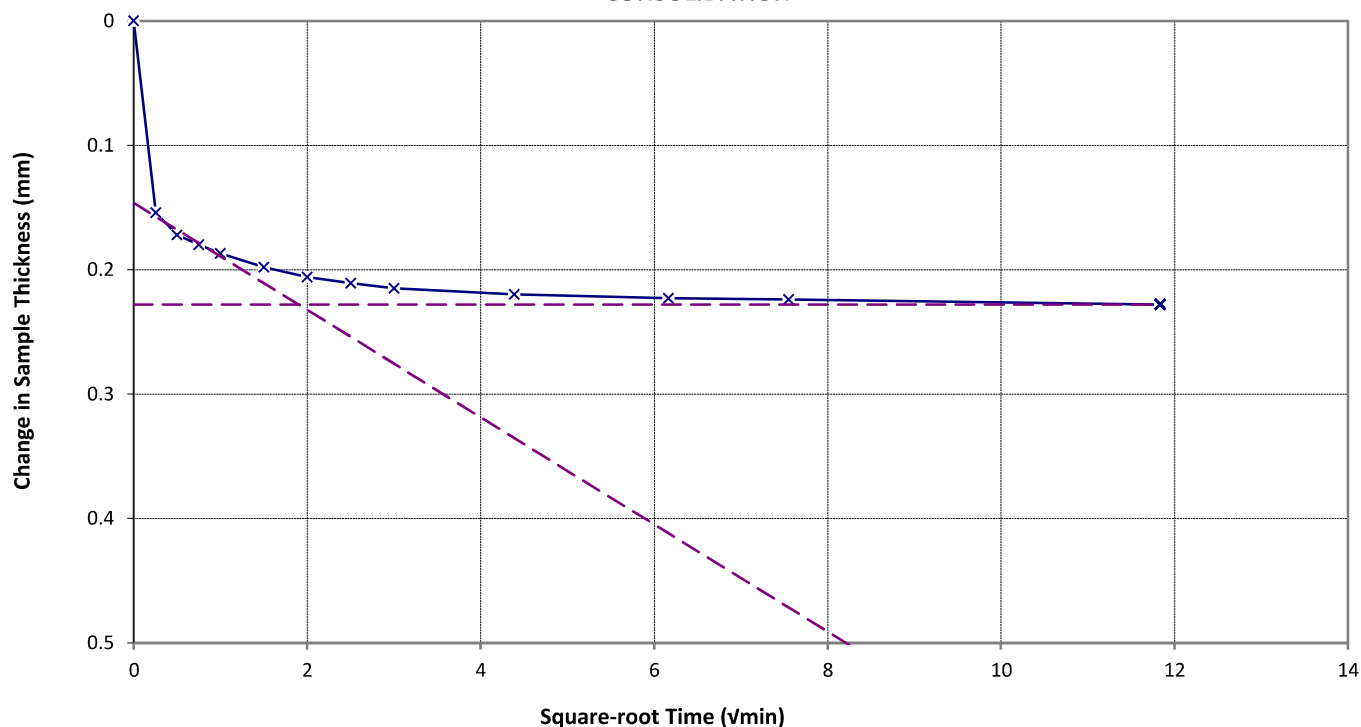
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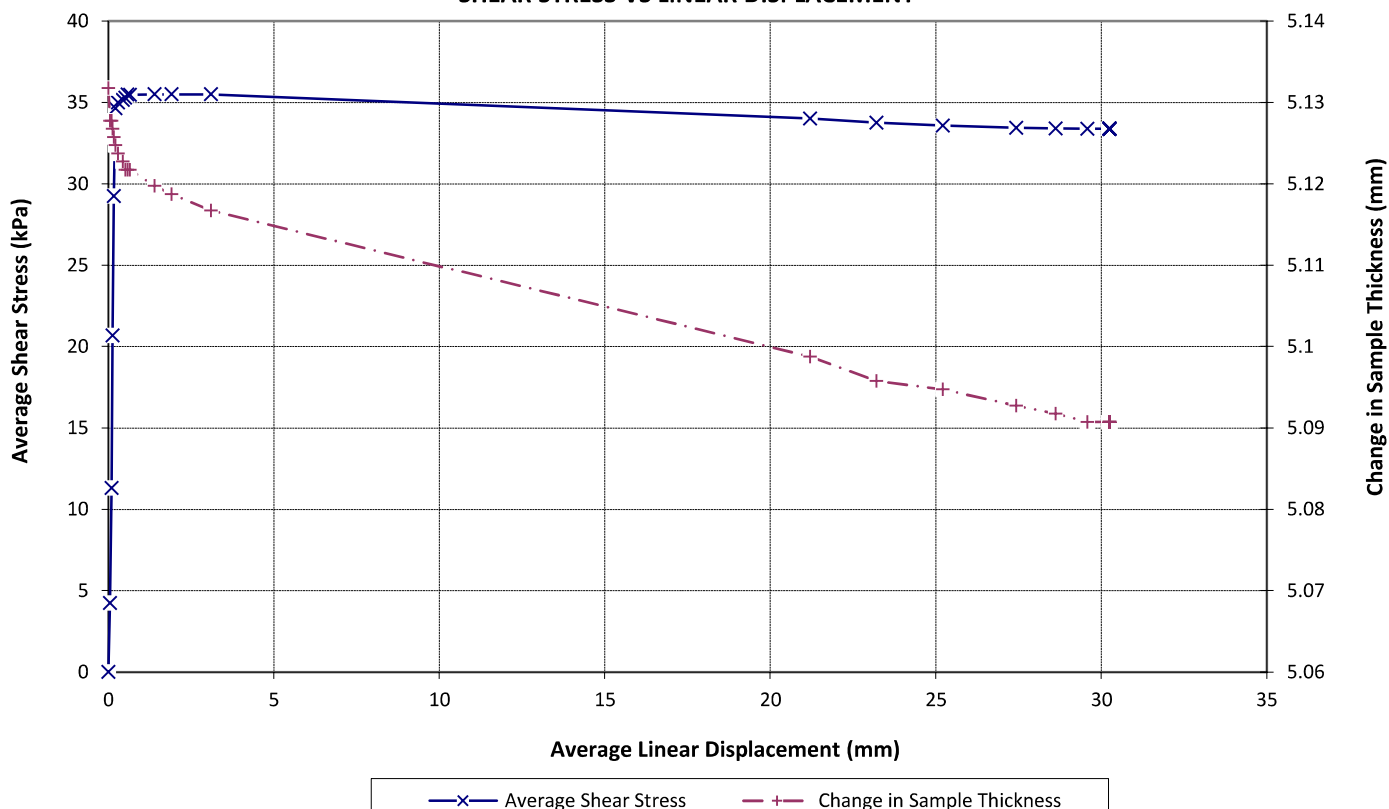
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SPECIMEN 3 GRAPHS

CONSOLIDATION



SHEAR STRESS VS LINEAR DISPLACEMENT



Tested by:

PIHE

Date: 22/01/2026

Approved by KTP:

Date:

28/01/2026