

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - Result Summary



Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1101
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Clayey SILT; grey
 Depth (m): 6.00-6.50
 Date sampled: 14/10/25

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/151-TXL-CUM
 Client Ref: -

Initial Sample properties		Rate of strain (mm/min)	
Length (mm)	= 109.88	Stage 1	0.011
Diameter (mm)	= 54.05	Stage 2	0.011
Membrane Correction (kPa)=		Stage 3	0.011

Saturation achieved using a minimum Back Pressure of 500 kPa

Specimen Stage No	Effective Confining Pressure (kPa)	INITIAL PROPERTIES			Solid Particle Density (Mg/m³)	FINAL PROPERTIES		
		Densities (Mg/m³)		Water Content (%)		Densities (Mg/m³)		Water Content (%)
		Bulk (Mg/m³)	Dry (Mg/m³)			Bulk (Mg/m³)	Dry (Mg/m³)	
1	50	1.62	1.00	62.5				
2	100				2.72			
3	200				(assumed)	1.68	1.05	60.2

Specimen Stage No	Effective Confining Pressure (kPa)	Void Ratio (e)	Deg of Saturation (Sr)		Deviator Stress $\sigma_1 - \sigma_3$ (kPa)	Pore Pressure μ (kPa)	Cumulative Strain (%)	Failure Criteria at Maximum Values
			Sr before Consolid.	Sr after Consolid.				
1	50	1.72	99	100	89.5	38	0.83	Stress Ratio
2	100				107.5	71	1.50	Stress Ratio
3	200				124.6	138	2.60	Stress Ratio

Specimen Stage No	Effective Confining Pressure (kPa)	Coefficient of Consolidation Cv (m ² /year)	Volume Compressibility Mv (m ² /MN)	Coefficient of Permeability k (m/s)	Final B Value	Due to the use of side filter drains, IANZ endorsement does not include the Cv, Mv and k values reported herein. Mv, Cv & k calculated for the following conditions:- L/D=2, RADIAL+TOP+BOTTOM Drainage Side Filter Drains Used (L/D= Sample Length/Diameter.)
1	50	6.7	0.25	5.3 x 10 ⁻¹⁰	1.00	
2	100	2.4	0.23	1.7 x 10 ⁻¹⁰		
3	200	0.47	0.22	3.2 x 10 ⁻¹¹		

TOTAL STRESS RESULT		
Intercept d	36.34	(kPa)
Beta β	5.79	(deg)
Cohesion c	37	(kPa)
Phi ϕ	6	(deg)
Correl coeff.	0.9667	(r ²)

EFFECTIVE STRESS RESULT		
Intercept d'	31.22	(kPa)
Beta β'	14.28	(deg)
Cohesion c'	32	(kPa)
Phi ϕ'	15	(deg)
Correl coeff.	0.9787	(r ²)

Test Method	Notes
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	Cv and Mv have been rounded to 2 significant figures. Mg/m ³ is equivalent to t/m ³ Deviation from standard, rate of vertical strain for shear stage reported in mm/min vs. %/hr

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Date tested: 10-18/11/25
 Date reported: 27/11/25

Approved Signatory: 
 Designation: Thirushen Pillay
 Senior Civil Engineering Technician

Date: 27/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Volume change vs $\sqrt{t}$ Plot (Consolidation stage)



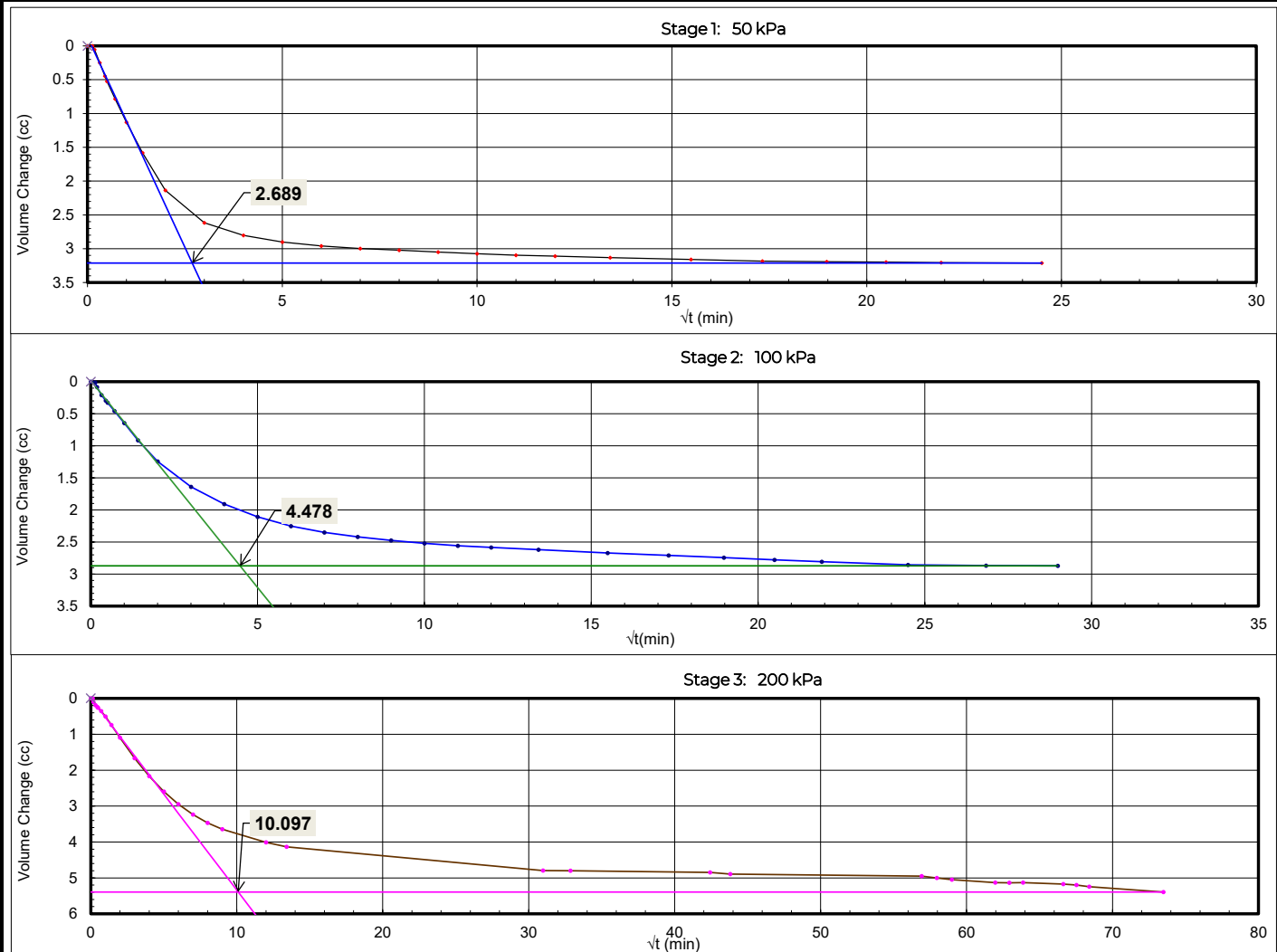
Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1101
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Clayey SILT; grey

Depth (m): 6.00-6.50
 Date sampled: 14/10/25

Sample Type: Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/151-TXL-CUM
 Client Ref: -

Final Back Pressure (kPa) : 500 kPa



Test Method	Test Results at end of consolidation			
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018	Effective Stress (kPa)=	50 kPa	100 kPa	200 kPa
Water Content : NZS4402 : 1986 Test 2.1	t_{100} (min) =	7.231	20.052	101.949
	Volumetric Strain (%)=	1.274	1.139	2.140
	Vertical Strain (%)=	0.425	0.380	0.713
	PWP Dissipation (U)=	1.000	1.000	1.000
	Estimated Strain to failure(%)=	5	5	5

Date tested : 27/11/25
 Date reported : 10-18/11/25

Approved Signatory: Thirushen Pillay
 Designation: Senior Civil Engineering Technician

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Date: 27/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

LHF 2418 (08/25)

Page 2 of 9

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - Mohr Coulomb Envelope Plot



Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1101
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Clayey SILT; grey

Depth (m): 6.00-6.50
 Date sampled: 14/10/25

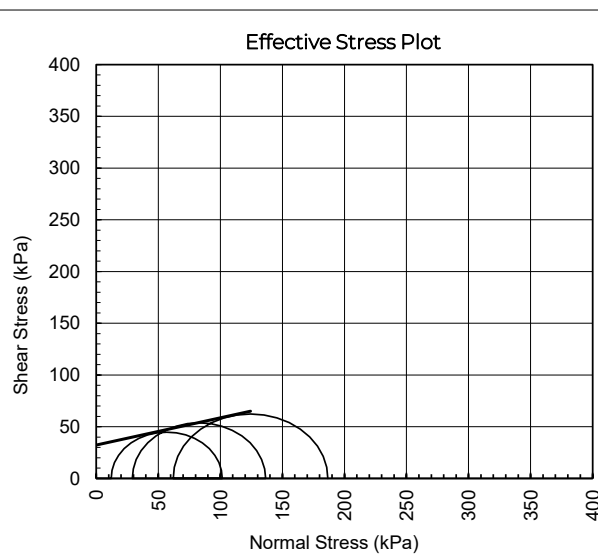
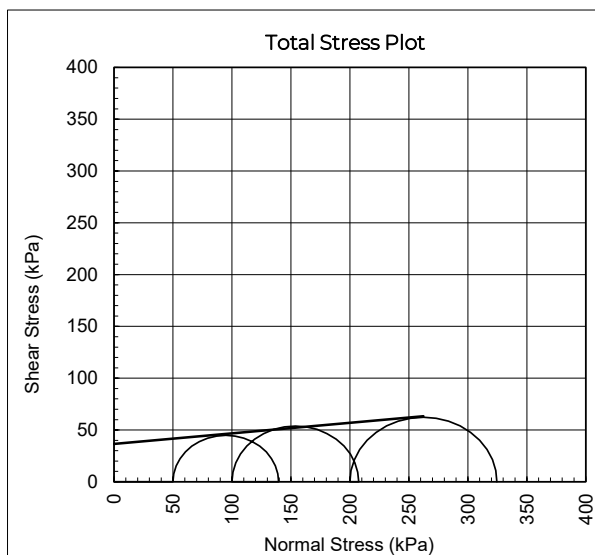
Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/151-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Mohr-Coulomb envelope plots - Result at Maximum Stress

Back Pressure Saturated at 500 kPa



TOTAL STRESS RESULT			
Intercept d	36.34	(kPa)	
Beta β	5.79	(deg)	
Cohesion c	37	(kPa)	
Phi ϕ	6	(deg)	
Correl coeff.	0.9667	(r ²)	

EFFECTIVE STRESS RESULT			
Intercept d'	31.22	(kPa)	
Beta β'	14.28	(deg)	
Cohesion c'	32	(kPa)	
Phi ϕ'	15	(deg)	
Correl coeff.	0.9787	(r ²)	

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Drainage Conditions during Shear :
 Stage 2 : Stress Ratio
 Stage 3 : Stress Ratio

Date tested: 10-18/11/25
 Date reported: 27/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory:

Thirushen Pillay

Date: 27/11/25

Designation:

Senior Civil Engineering Technician



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - P vs Q Total Stress Plot



Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1101
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Clayey SILT; grey

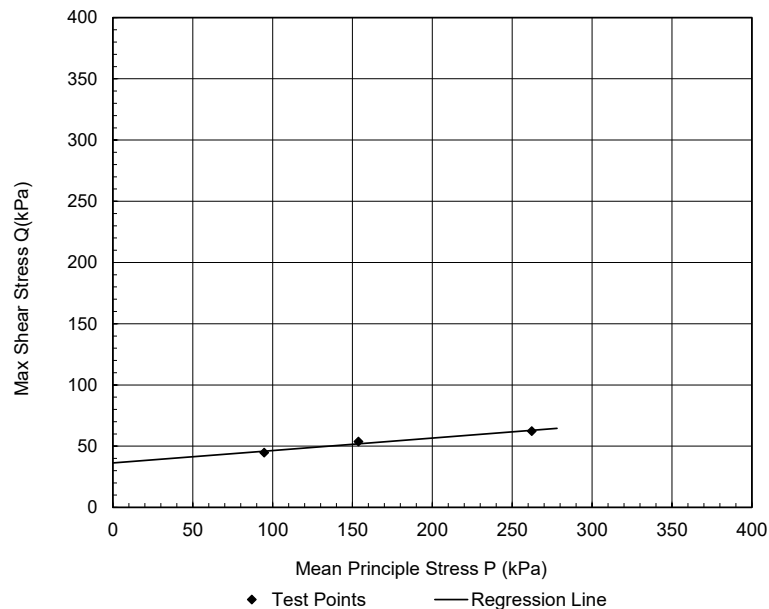
Depth (m): 6.00-6.50
 Date sampled: 14/10/25

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/151-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P vs Q Total Stress Plot - Back Pressure saturated at 500 kPa



TOTAL STRESS RESULT			Correl coeff	0.9667	(r^2)
Intercept d	36.34	(kPa)	Cohesion c	37	(kPa)
Beta β	5.79	(deg)	Phi ϕ	6	(deg)

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
 Failure Criteria: Stage 2 : Stress Ratio
 (at Max. Values) Stage 3 : Stress Ratio

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

Date tested: 10-18/11/25
 Date reported: 27/11/25

This report may only be reproduced in full
 All information supplied by Client

Approved Signatory:

Thirushen Pillay
 Senior Civil Engineering Technician

Date: 27/11/25

Designation:

LHF 2418 (08/25)



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - P' vs Q' Effective Stress Plot



Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1101
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Clayey SILT; grey

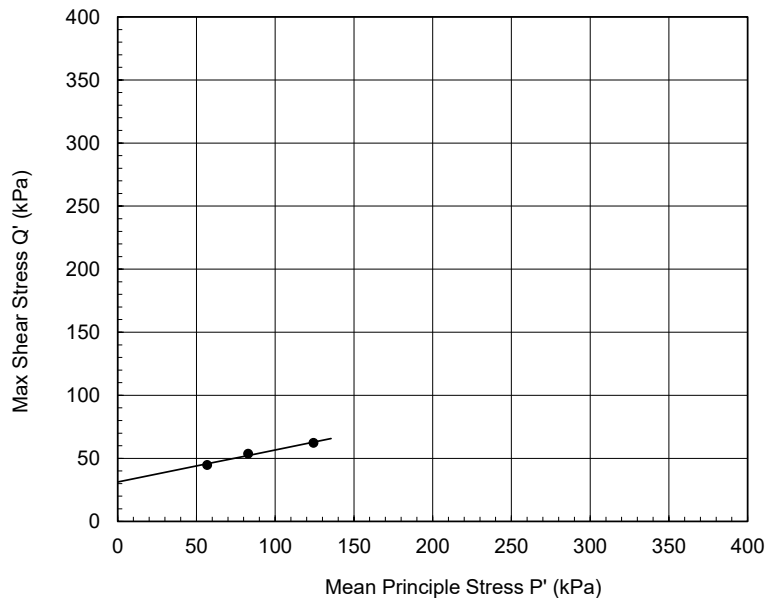
Depth (m): 6.00-6.50
 Date sampled: 14/10/25

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/151-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P' vs Q' Effective Stress Plot - Back Pressure saturated at 500 kPa



● Test Points — Regression Line

EFFECTIVE STRESS RESULT			Correl coeff	0.9787	(r ²)
Intercept d'	31.22	(kPa)	Cohesion c'	32	(kPa)
Beta β'	14.28	(deg)	Phi Ø'	15	(deg)

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
 Failure Criteria: Stage 2 : Stress Ratio
 (at Max. Values) Stage 3 : Stress Ratio

Date tested: 10-18/11/25
 Date reported: 27/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory:

Thirushen Pillay
 Senior Civil Engineering Technician

Date: 27/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

Designation:
 LHF 2418 (08/25)

Page 5 of 9

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - PvsQ Stress Path Plot



Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1101
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Clayey SILT; grey

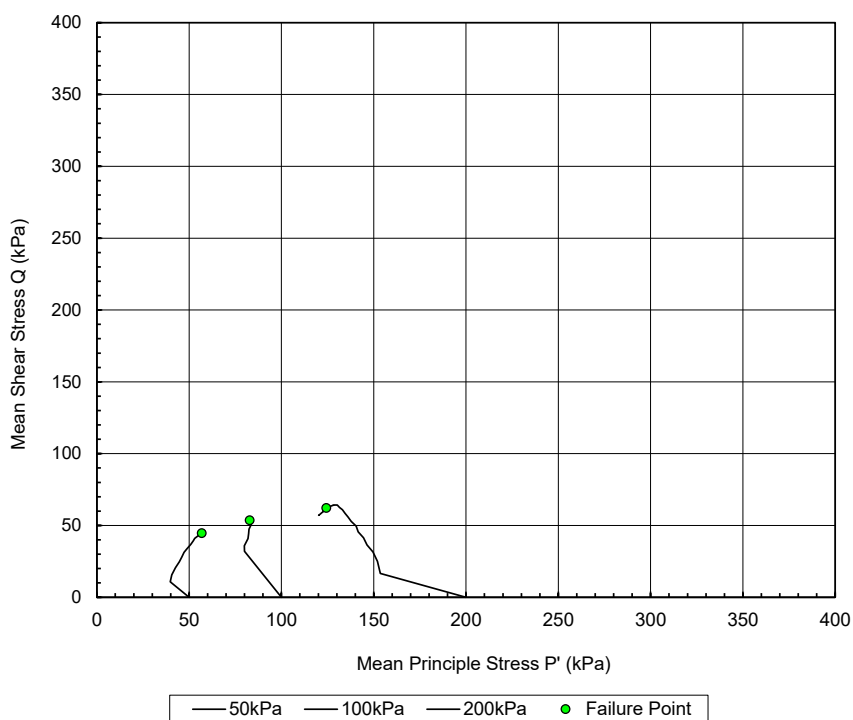
Depth (m): 6.00-6.50
 Date sampled: 14/10/25

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/151-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P' vs Q Stress Path (Effective Stress Plot) - Back Pressure saturated at 500 kPa



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
 Failure Criteria: Stage 2 : Stress Ratio
 (at Max. Values) Stage 3 : Stress Ratio

Date tested: 10-18/11/25
 Date reported: 27/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory:

Designation: Thirushen Pillay
 Senior Civil Engineering Technician

Date: 27/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - Strain vs Deviator Stress Plot



Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1101
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Clayey SILT; grey

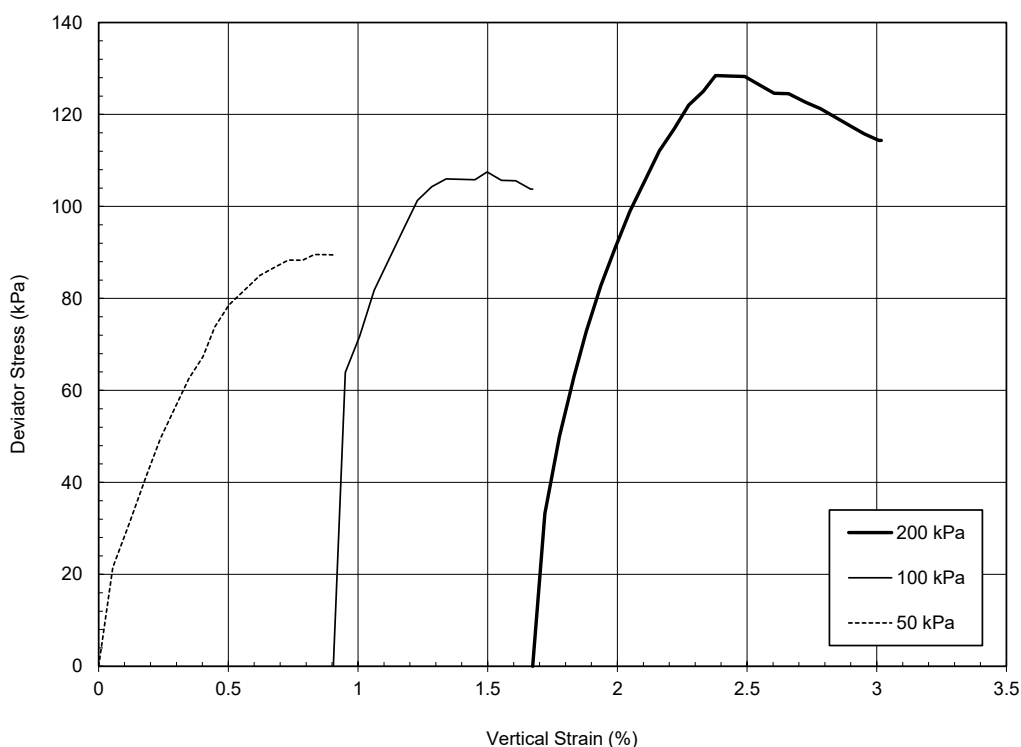
Depth (m): 6.00-6.50
 Date sampled: 14/10/25

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/151-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Vertical Strain vs Deviator Stress Plot - Back Pressure saturated at 500 kPa



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Date tested: 10-18/11/25
 Date reported: 27/11/25

Approved Signatory: 
 Designation: Thirushen Pillay
 Senior Civil Engineering Technician

Date: 27/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

LHF 2418 (08/25)

Page 7 of 9

WSP
 Auckland Laboratory
 Quality Management Systems Certified to ISO 9001

7a Ride Way, Albany
 Private Bag 101982, NS Mail Centre, North
 Shore City 0745, New Zealand

Telephone +64 9 4154660
 Website www.wsp.com/nz

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Strain vs Pore Pressure Plot



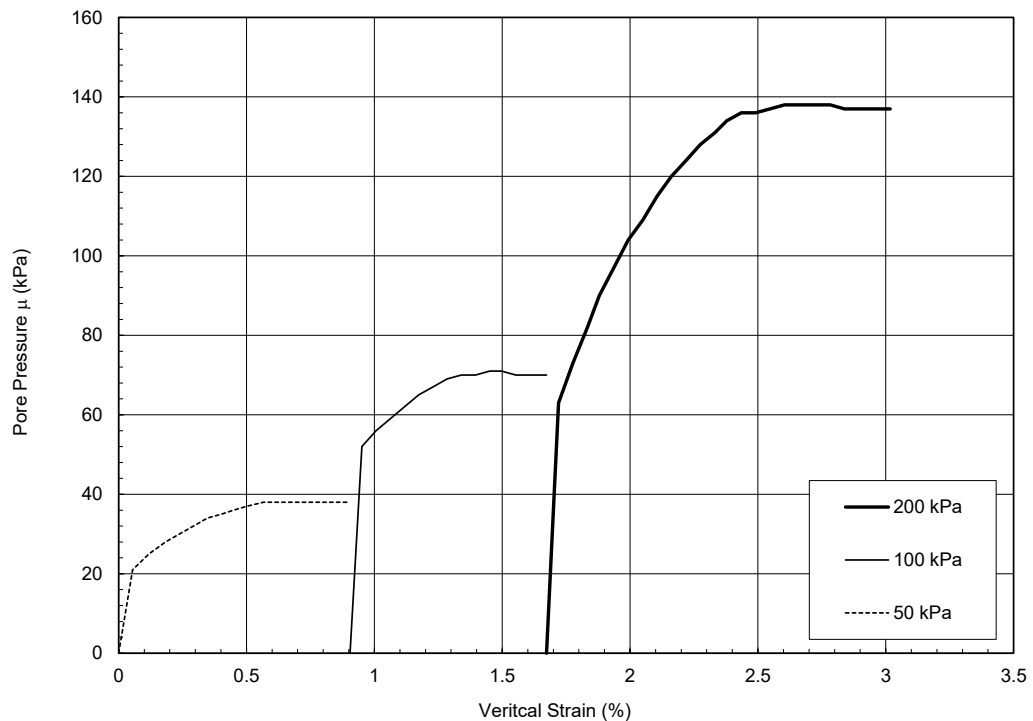
Project: Ground Investigation for Northland Corridor
Location: Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1101
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Clayey SILT; grey
Depth (m): 6.00-6.50
Date sampled: 14/10/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/151-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Vertical Strain vs Pore Pressure Plot - Back Pressure saturated at 500 kPa



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Date tested: 10-18/11/25
Date reported: 27/11/25

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 27/11/25

Designation:



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test report - Photograph of Failure Type



Project: Ground Investigation for Northland Corridor
Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1101
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Clayey SILT; grey

Depth (m): 6.00-6.50
Date sampled: 14/10/25

Sample Type : Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/151-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Photo of failure type



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Date tested: 10-18/11/25
Date reported: 27/11/25

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 27/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

LHF 2418 (08/25)

Page 9 of 9

WSP
Auckland Laboratory
Quality Management Systems Certified to ISO 9001

7a Ride Way, Albany
Private Bag 101982, NS Mail Centre, North
Shore City 0745, New Zealand

Telephone +64 9 4154660
Website www.wsp.com/nz

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION

Test Report - Result Summary



Project: Ground Investigation for Northland Corridor
 Location : Section 2B Warkworth to Te Hana to Port Marsden Highway Section 2B GI
 Client : NZTA C/- Aurecon & WSP NZ Ltd.
 Sample Reference BH2B_T104 Sample Depth (m): 9.00-9.50
 Sampled by: NC_Site Team Date sampled: 20/08/25
 Sampling Method: Pushtube
 Sample Description: Silty CLAY with traces of sand & roots; grey; moist; plastic
 Specific Depth : 9.30-9.45m
 Order Number : -

Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/3_TXL_CUM
 Client Ref No: 1-C2466.16

Initial Sample properties

Length (mm) = 109.65
 Diameter (mm) = 54.05

Membrane Correction has been applied

Saturation achieved using a minimum Back Pressure of 450 kPa

Specimen Stage No	Effective Confining Pressure (kPa)	INITIAL PROPERTIES			Solid Particle Density (t/m³)	FINAL PROPERTIES		
		Densities (t/m³)		Water Content (%)		Densities (t/m³)		Water Content (%)
		Wet (t/m³)	Dry (t/m³)			Wet (t/m³)	Dry (t/m³)	
1	50	2.02	1.58	27.8				
2	100				2.72			
3	300				(assumed)	2.11	1.69	24.6

Specimen Stage No	Effective Confining Pressure (kPa)	Void Ratio (e)	Deg of Saturation (Sr)		Deviator Stress $\sigma_1 - \sigma_3$ (kPa)	Pore Pressure μ (kPa)	Strain (%)	Failure Criteria at Maximum Values
			Sr before Consolid. (%)	Sr after Consolid. (%)				
1	50	0.72	100	100	75.7	32	2.50	Deviator Stress
2	100				117.3	57	2.80	Deviator Stress
3	300				277.9	190	4.47	Deviator Stress

Specimen Stage No	Effective Confining Pressure (kPa)	Coefficient of Consolidation Cv (m ² /year)	Volume Compressibility Mv (m ² /MN)	Coefficient of Permeability k (m/s)	B at the start of test	Due to the use of side filter drains, IANZ endorsement does not include the Cv, Mv and k values reported herein. Mv, Cv & k calculated for the following conditions:- L/D=2, RADIAL+TOP+BOTTOM Drainage Side Filter Drains Used (L/D= Sample Length/Diameter.)
1	50	2.4	0.32	2.4 x 10 ⁻¹⁰	1.04	
2	100	0.34	0.34	3.5 x 10 ⁻¹¹		
3	300	0.31	0.16	1.6 x 10 ⁻¹¹		

TOTAL STRESS RESULT		
Intercept d	12.78	(kPa)
Beta β	16.04	(deg)
Cohesion c	13	(kPa)
Phi ϕ	17	(deg)
Correl coeff.	1.0000	(r ²)

EFFECTIVE STRESS RESULT		
Intercept d'	6.83	(kPa)
Beta β'	27.87	(deg)
Cohesion c'	8	(kPa)
Phi ϕ'	32	(deg)
Correl coeff.	0.9989	(r ²)

Test Method	Notes
Triaxial Test : Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	Cv and Mv have been rounded to 2 significant figures. L/D= Sample Length/Diameter.

Date tested: 02-16/10/25
 Date reported: 20/10/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory: 
 Designation: Senior Civil Engineering Technician

Date: 20/10/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION
Test Report - Mohr Coulomb Envelope Plot



Project: Ground Investigation for Northland Corridor
 Location : Section 2B Warkworth to Te Hana to Port Marsden Highway Section 2B GI
 Client : NZTA C/- Aurecon & WSP NZ Ltd.
 Sample Reference: BH2B.1104 Sample Depth (m): 9.00-9.50
 Sampled by: NC_Site Team Date sampled: 20/08/25
 Sampling Method: Pushtube
 Sample Description: Silty CLAY with traces of sand & roots; grey; moist; plastic
 Specific Depth : 9.30-9.45m
 Order Number : -

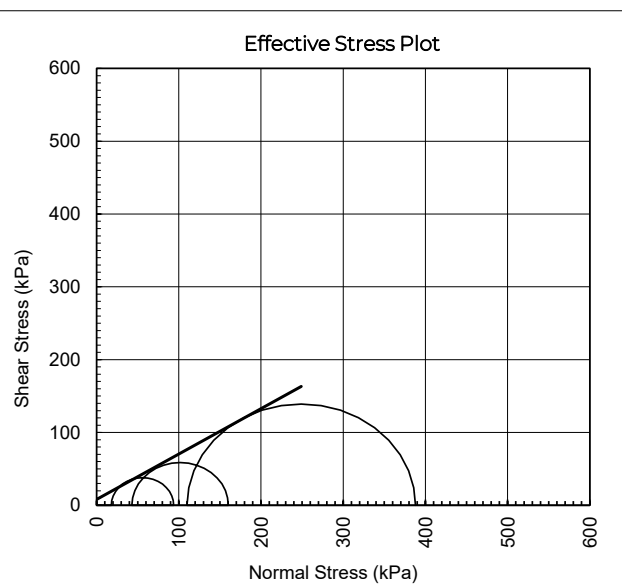
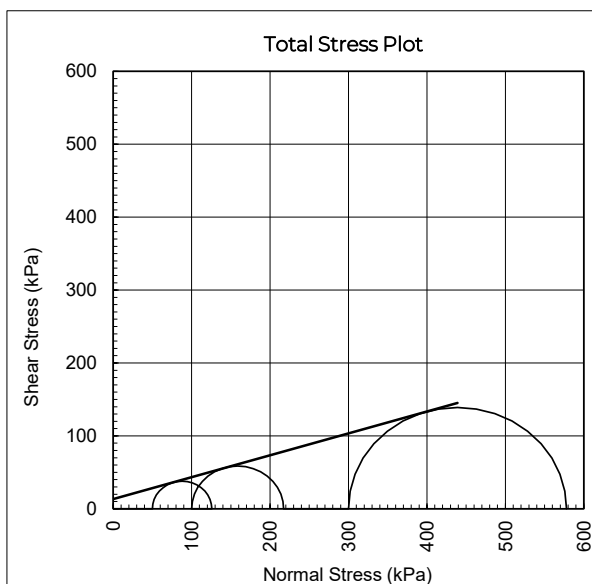
Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/3_TXL_CUM
 Client Ref No: 1-C2466.16

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Mohr-Coulomb envelope plots - Result at Maximum Stress

Back Pressure Saturated at 450 kPa



TOTAL STRESS RESULT		
Intercept d	12.78	(kPa)
Beta β	16.04	(deg)
Cohesion c	13	(kPa)
Phi ϕ	17	(deg)
Correl coeff.	1.0000	(r ²)

EFFECTIVE STRESS RESULT		
Intercept d'	6.83	(kPa)
Beta β'	27.87	(deg)
Cohesion c'	8	(kPa)
Phi ϕ'	32	(deg)
Correl coeff.	0.9989	(r ²)

Test Method

Triaxial Test : Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Deviator Stress
 Failure Criteria: Stage 2 : Deviator Stress
 (at Max. Values) Stage 3 : Deviator Stress

Date tested: 02-16/10/25
 Date reported: 20/10/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Approved Signatory:

Thirushen Pillay

Date: 20/10/25

Designation:

Senior Civil Engineering Technician



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION
Test Report - P vs Q Total Stress Plot



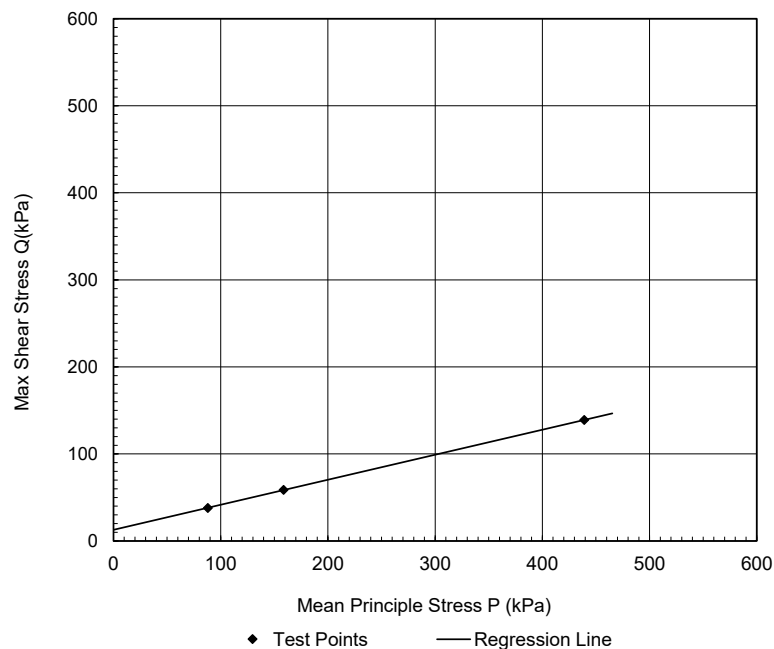
Project: Ground Investigation for Northland Corridor
 Location : Section 2B Warkworth to Te Hana to Port Marsden Highway Section 2B GI
 Client : NZTA C/- Aurecon & WSP NZ Ltd.
 Sample Reference: BH2B_1104 Sample Depth (m): 9.00-9.50
 Sampled by: NC_Site Team Date sampled: 20/08/25
 Sampling Method: Pushtube
 Sample Description: Silty CLAY with traces of sand & roots; grey; moist; plastic
 Specific Depth : 9.30-9.45m
 Order Number : -

Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/3_TXL_CUM
 Client Ref No: 1-C2466.16

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P vs Q Total Stress Plot - Back Pressure saturated at 450 kPa



TOTAL STRESS RESULT			Correl coeff	1.0000	(r ²)
Intercept d	12.78	(kPa)	Cohesion c	13	(kPa)
Beta β	16.04	(deg)	Phi Ø	17	(deg)

Test Method	Notes
Triaxial Test : Consolidated undrained triaxial test : BS EN ISO 17892-9:2018	Stage 1 : Deviator Stress
Water Content : NZS4402 : 1986 Test 2.1	Failure Criteria: Stage 2 : Deviator Stress
	(at Max. Values) Stage 3 : Deviator Stress

Date tested: 02-16/10/25
 Date reported: 20/10/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Approved Signatory:


 Thirushen Pillay

Date: 20/10/25

Designation:

Senior Civil Engineering Technician

LHF 2517 (09/20)



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION
Test Report - P' vs Q' Effective Stress Plot



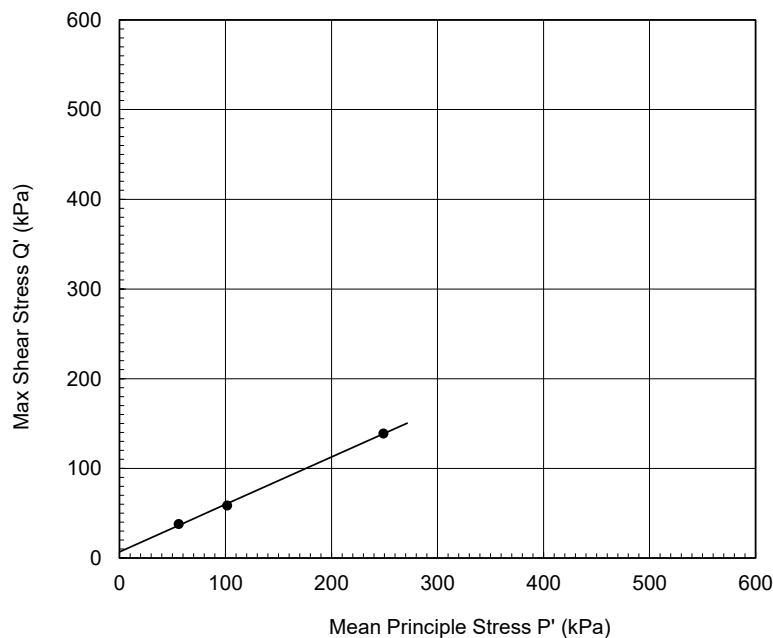
Project: Ground Investigation for Northland Corridor
Location: Section 2B Warkworth to Te Hana to Port Marsden Highway Section 2B GI
Client: NZTA C/- Aurecon & WSP NZ Ltd.
Sample Reference: BH2B_1104 Depth (m): 9.00-9.50
Sampled by: NC_Site Team Date sampled: 20/08/25
Sampling Method: Pushtube
Sample Description: Silty CLAY with traces of sand & roots; grey; moist; plastic
Specific Depth: 9.30-9.45m
Order Number: -

Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/3_TXL_CUM
Client Ref No: 1-C2466.16

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P' vs Q' Effective Stress Plot - Back Pressure saturated at 450 kPa



● Test Points — Regression Line

EFFECTIVE STRESS RESULT			Correl coeff	0.9989	(r ²)
Intercept d'	6.83	(kPa)	Cohesion c'	8	(kPa)
Beta β'	27.87	(deg)	Phi Ø'	32	(deg)

Test Method

Triaxial Test : Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Deviator Stress
Failure Criteria: Stage 2 : Deviator Stress
(at Max. Values) Stage 3 : Deviator Stress

Date tested: 02-16/10/25
Date reported: 20/10/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 20/10/25

Designation:

LHF 2517 (09/20)



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION

Test Report - PvsQ Stress Path Plot



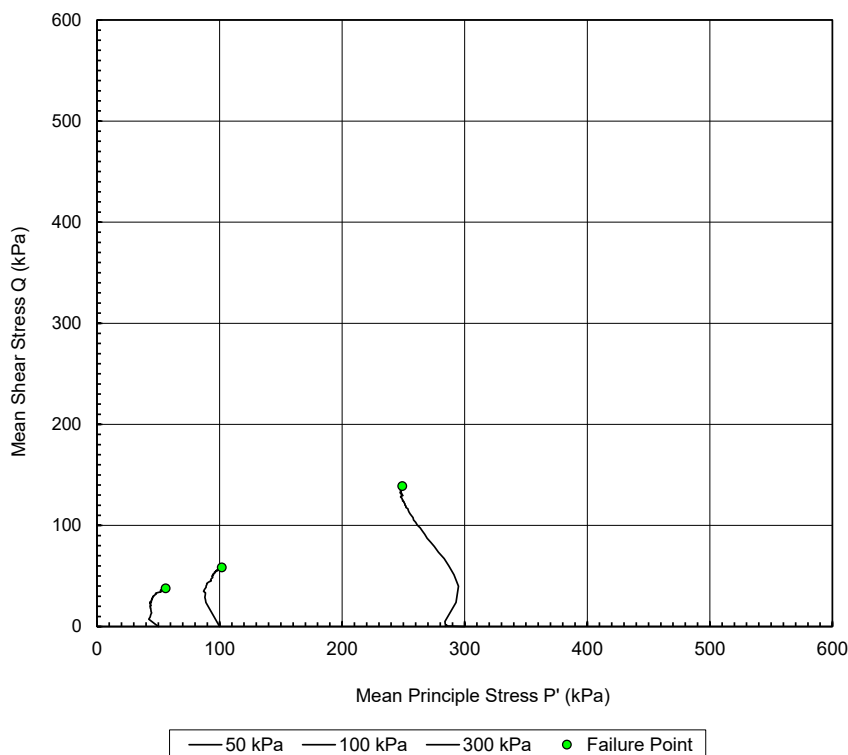
Project: Ground Investigation for Northland Corridor
 Location : Section 2B Warkworth to Te Hana to Port Marsden Highway Section 2B GI
 Client : NZTA C/- Aurecon & WSP NZ Ltd.
 Sample Reference: BH2B_T104 Sample Depth (m): 9.00-9.50
 Sampled by: NC_Site Team Date sampled: 20/08/25
 Sampling Method: Pushtube
 Sample Description: Silty CLAY with traces of sand & roots; grey; moist; plastic
 Specific Depth : 9.30-9.45m
 Order Number : -

Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/3_TXL_CUM
 Client Ref No: 1-C2466.16

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P' vs Q Stress Path (Effective Stress Plot) - Back Pressure saturated at 450 kPa



Test Method

Triaxial Test : Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Deviator Stress
 Failure Criteria: Stage 2 : Deviator Stress
 (at Max. Values) Stage 3 : Deviator Stress

Date tested: 02-16/10/25
 Date reported: 20/10/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Approved Signatory:

Thirushen Pillay
 Senior Civil Engineering Technician

Date: 20/10/25



Test results indicated as not
 accredited are outside the
 scope of the laboratory's
 accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION
Test Report - Strain vs Deviator Stress Plot



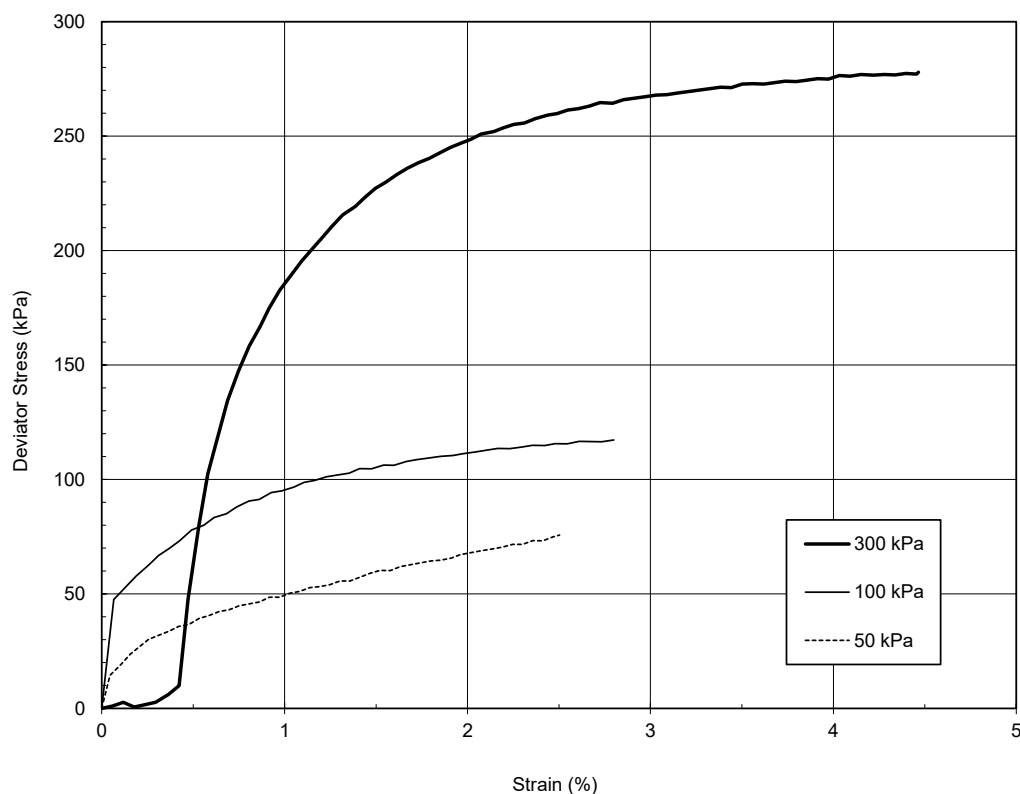
Project: Ground Investigation for Northland Corridor
 Location : Section 2B Warkworth to Te Hana to Port Marsden Highway Section 2B GI
 Client : NZTA C/- Aurecon & WSP NZ Ltd.
 Sample Reference BH2B_1104 Sample Depth (m): 9.00-9.50
 Sampled by: NC_Site Team Date sampled: 20/08/25
 Sampling Method: Pushtube
 Sample Description: Silty CLAY with traces of sand & roots; grey; moist; plastic
 Specific Depth : 9.30-9.45m
 Order Number : -

Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/3_TXL_CUM
 Client Ref No: 1-C2466.16

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Strain vs Deviator Stress Plot - Back Pressure saturated at 450 kPa



Test Method	Notes
Triaxial Test : Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	

Date tested: 02-16/10/25
 Date reported: 20/10/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory: 
 Designation: Thirushen Pillay
 Senior Civil Engineering Technician

Date: 20/10/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION
Test Report - Strain vs Pore Pressure Plot

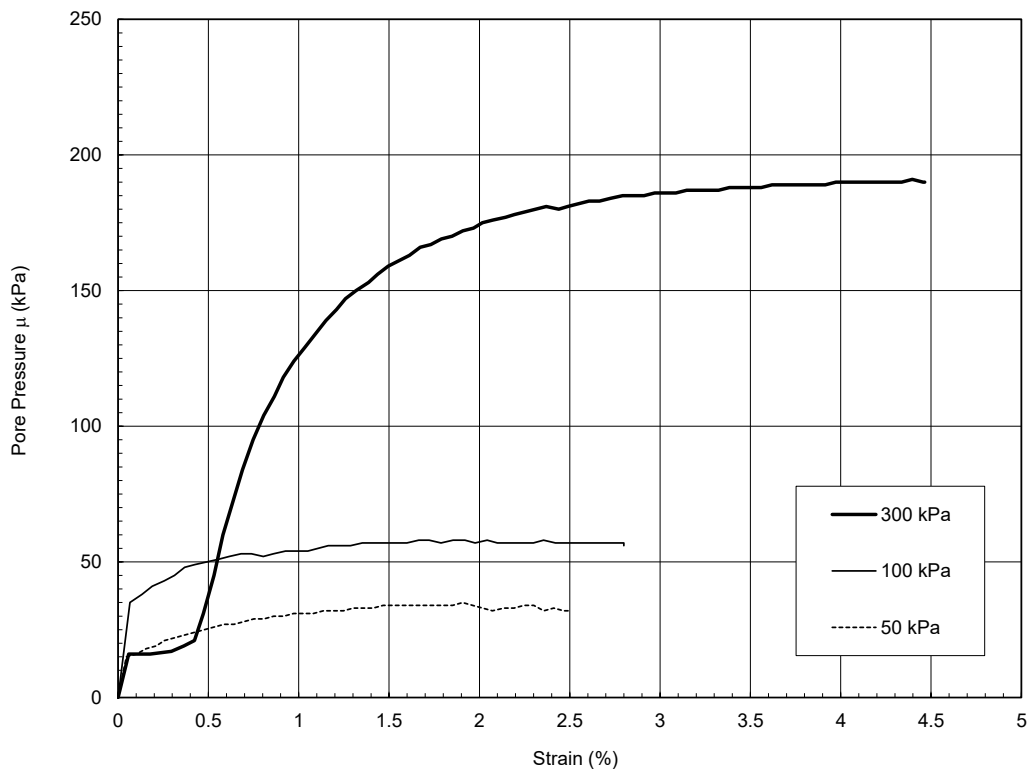


Project: Ground Investigation for Northland Corridor
 Location : Section 2B Warkworth to Te Hana to Port Marsden Highway Section 2B GI
 Client : NZTA C/- Aurecon & WSP NZ Ltd.
 Sample Reference: BH2B_1104 Sample Depth (m): 9.00-9.50
 Sampled by: NC_Site Team Date sampled: 20/08/25
 Sampling Method: Pushtube
 Sample Description: Silty CLAY with traces of sand & roots; grey; moist; plastic
 Specific Depth : 9.30-9.45m
 Order Number : -

Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/3_TXL_CUM
 Client Ref No: 1-C2466.16

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT
 Strain vs Pore Pressure Plot - Back Pressure saturated at 450 kPa



Test Method	Notes
Triaxial Test : Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	

Date tested: 02-16/10/25
 Date reported: 20/10/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Approved Signatory: 
 Designation: Thirushen Pillay
 Senior Civil Engineering Technician

Date: 20/10/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

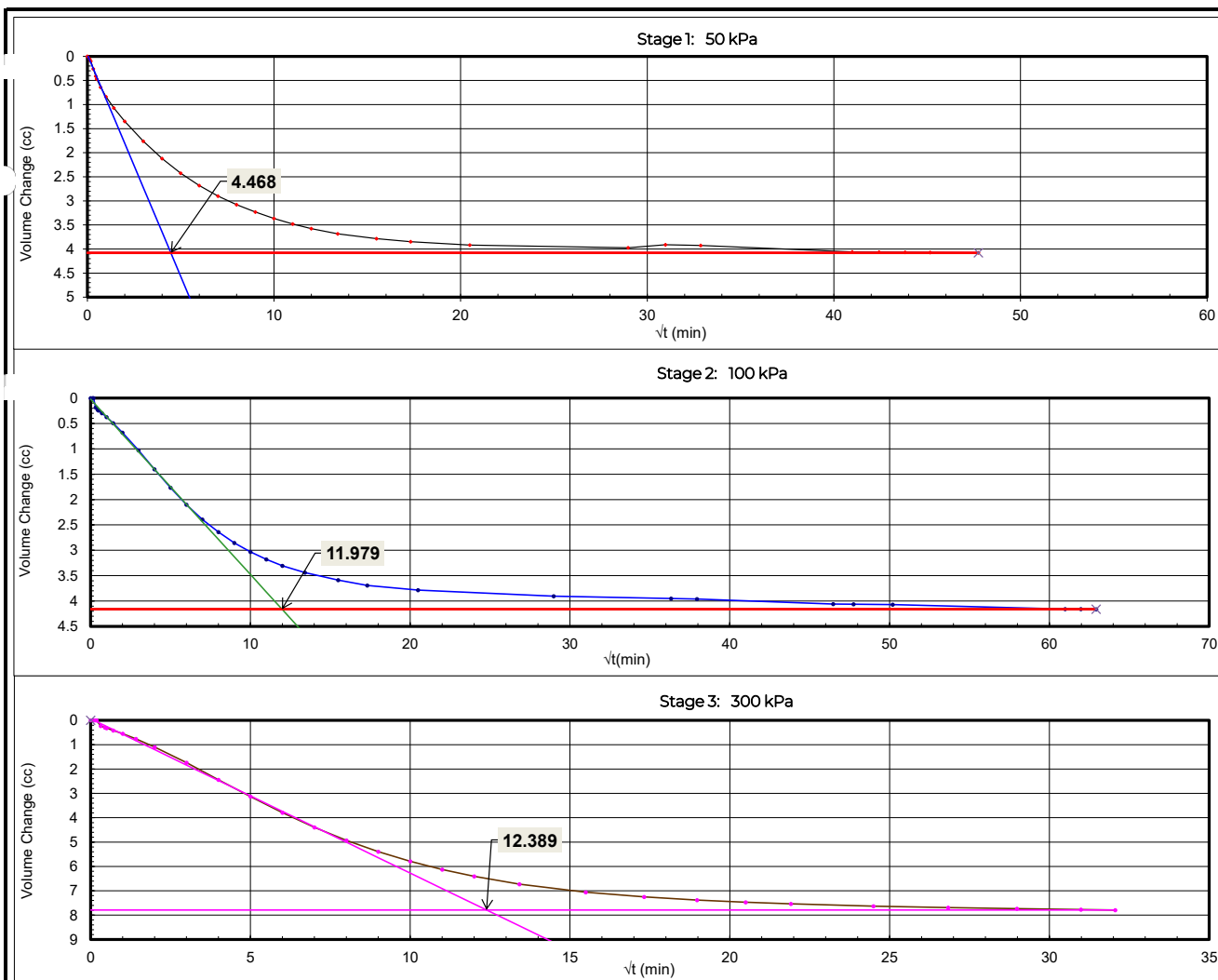
CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION
Displacement vs $\sqrt{t}$ Plot (Consolidation stage)



Project: Ground Investigation for Northland Corridor
 Location : Section 2B Warkworth to Te Hana to Port Marsden Highway Section 2B GI
 Client : NZTA C/- Aurecon & WSP NZ Ltd.
 Sample Reference: BH2B_T104 Sample Depth (m): 9.00-9.50
 Sampled by: NC_Site Team Date sampled: 20/08/25
 Sampling Method: Pushtube
 Sample Description: Silty CLAY with traces of sand & roots; grey; moist; plastic
 Specific Depth : 9.30-9.45m
 Order Number : -

Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/3_TXL_CUM
 Client Ref No: 1-C2466.16



Test Method	Test Results			
Triaxial Test : Consolidated undrained triaxial test : BS EN ISO 17892-9:2018	Confining Pressure (kPa)=	50 kPa	100 kPa	300 kPa
Water Content : NZS4402 : 1986 Test 2.1	C_v (m^2/yr)=	2.42	0.34	0.31
	M_v (m^2/MN)=	0.32	0.34	0.16
	k (m/s)=	2.43E-10	3.50E-11	1.56E-11
	$\sqrt{t}$ =	4.468	11.979	12.389
	t_{100} =	19.963	143.496	153.487

Date tested : 02-16/10/25

Date reported : 20/10/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Date: 20/10/25

Approved Signatory

Thirushen Pillay
 Senior Civil Engineering Technician

Designation:

LHF 2517 (09/20)



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

Page 8 of 8

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION

Test Report - Result Summary



Project: Ground Investigation for Northland Corridor
 Location : Section 2 Warkworth to Te Hana to Port Marsden Highway, Sector
 Client : NZTA C/- Aurecon & WSP NZ Ltd.
 Sample Reference BH2B_T104A Sample Depth (m): 3.10-3.60
 Sampled by: NC_Site Team Date sampled: 02/09/25
 Sampling Method: Pushtube
 Sample Description: Clayey SILT with traces of sand; Brown mottled orange; moist; plastic
 Specific Depth : 3.45-3.60m
 Order Number : -

Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/66_TXL_CUM
 Client Ref No: 1-C2466.16

Initial Sample properties

Length (mm) = 109.28
 Diameter (mm) = 54.18

Membrane Correction has been applied

Saturation achieved using a minimum Back Pressure of 400 kPa

Specimen Stage No	Effective Confining Pressure (kPa)	INITIAL PROPERTIES			Solid Particle Density (t/m³)	FINAL PROPERTIES		
		Densities (t/m³)		Water Content (%)		Densities (t/m³)		Water Content (%)
		Wet (t/m³)	Dry (t/m³)			Wet (t/m³)	Dry (t/m³)	
1	50	1.89	1.43	32.2				
2	100				2.70			
3	200				(assumed)	1.96	1.51	29.7

Specimen Stage No	Effective Confining Pressure (kPa)	Void Ratio (e)	Deg of Saturation (Sr)		Deviator Stress $\sigma_1 - \sigma_3$ (kPa)	Pore Pressure μ (kPa)	Strain (%)	Failure Criteria at Maximum Values
			Sr before Consolid. (%)	Sr after Consolid. (%)				
1	50	0.89	98	100	71.8	24	1.74	Deviator Stress
2	100				136.1	48	1.96	Deviator Stress
3	200				218.5	109	4.81	Deviator Stress

Specimen Stage No	Effective Confining Pressure (kPa)	Coefficient of Consolidation C_v (m ² /year)	Volume Compressibility M_v (m ² /MN)	Coefficient of Permeability k (m/s)	B at the start of test	Due to the use of side filter drains, IANZ endorsement does not include the C_v , M_v and k values reported herein. Mv, Cv & k calculated for the following conditions:- L/D=2, RADIAL+TOP+BOTTOM Drainage Side Filter Drains Used (L/D= Sample Length/Diameter.)
1	50	3.3	0.27	2.8×10^{-10}	0.96	
2	100	0.78	0.33	8.0×10^{-11}		
3	200	0.31	0.23	2.2×10^{-11}		

TOTAL STRESS RESULT		
Intercept d	10.15	(kPa)
Beta β	17.98	(deg)
Cohesion c	11	(kPa)
Phi ϕ	19	(deg)
Correl coeff.	0.9935	(r ²)

EFFECTIVE STRESS RESULT		
Intercept d'	3.64	(kPa)
Beta β'	27.89	(deg)
Cohesion c'	4	(kPa)
Phi ϕ'	32	(deg)
Correl coeff.	0.9996	(r ²)

Test Method	Notes
Triaxial Test : Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	Cv and Mv have been rounded to 2 significant figures. L/D= Sample Length/Diameter.

Date tested: 03-14/10/25

Date reported: 28/10/25

[Signature]

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Approved Signatory:

Date: 28/10/25

Designation:

Thirushen Pillay
 Senior Civil Engineering Technician



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION
Test Report - Mohr Coulomb Envelope Plot



Project: Ground Investigation for Northland Corridor
 Location : Section 2 Warkworth to Te Hana to Port Marsden Highway, Section
 Client : NZTA C/- Aurecon & WSP NZ Ltd.
 Sample Reference BH2B_1104A Sample Depth (m): 3.10-3.60
 Sampled by: NC_Site Team Date sampled: 02/09/25
 Sampling Method: Pushtube
 Sample Description: Clayey SILT with traces of sand; Brown mottled orange; moist; plastic
 Specific Depth : 3.45-3.60m
 Order Number : -

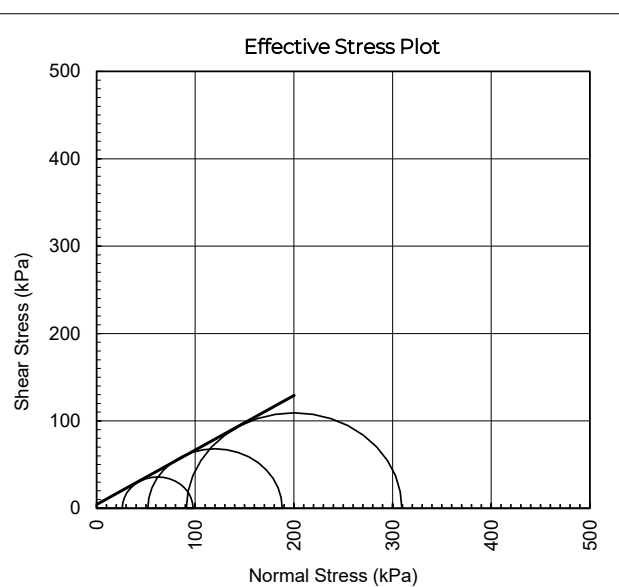
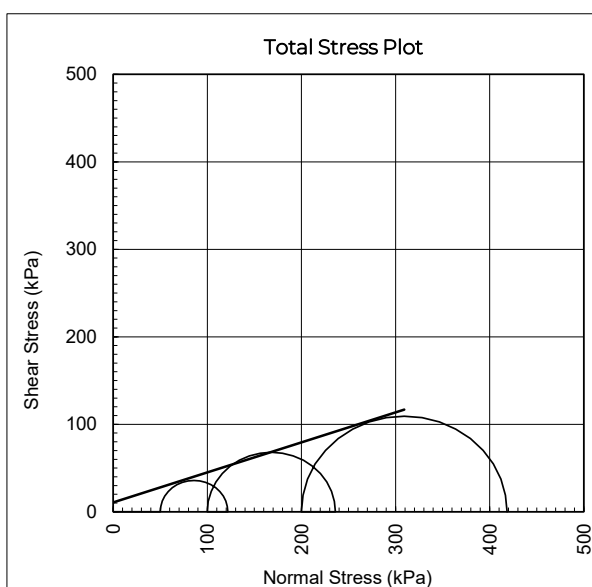
Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/66_TXL_CUM
 Client Ref No: 1-C2466.16

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Mohr-Coulomb envelope plots - Result at Maximum Stress

Back Pressure Saturated at 400 kPa



TOTAL STRESS RESULT			
Intercept d	10.15	(kPa)	
Beta β	17.98	(deg)	
Cohesion c	11	(kPa)	
Phi ϕ	19	(deg)	
Correl coeff.	0.9935	(r ²)	

EFFECTIVE STRESS RESULT			
Intercept d'	3.64	(kPa)	
Beta β'	27.89	(deg)	
Cohesion c'	4	(kPa)	
Phi ϕ'	32	(deg)	
Correl coeff.	0.9996	(r ²)	

Test Method

Triaxial Test : Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Deviator Stress
 Failure Criteria: Stage 2 : Deviator Stress
 (at Max. Values) Stage 3 : Deviator Stress

Date tested: 03-14/10/25
 Date reported: 28/10/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory:

Thirushen Pillay

Date: 28/10/25

Designation:

Senior Civil Engineering Technician



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION
Test Report - P vs Q Total Stress Plot



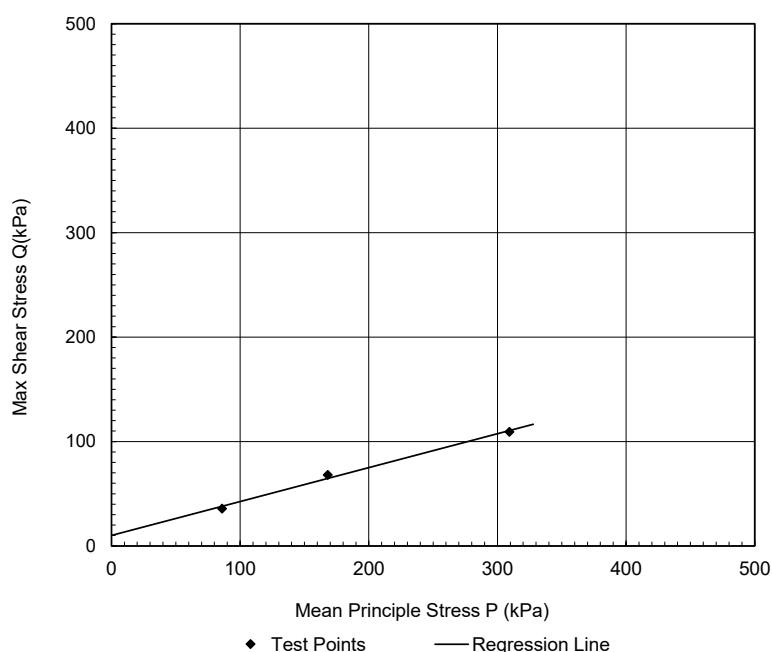
Project: Ground Investigation for Northland Corridor
 Location : Section 2 Warkworth to Te Hana to Port Marsden Highway, Section
 Client : NZTA C/- Aurecon & WSP NZ Ltd.
 Sample Reference: BH2B_1104A Sample Depth (m): 3.10-3.60
 Sampled by: NC_Site Team Date sampled: 02/09/25
 Sampling Method: Pushtube
 Sample Description: Clayey SILT with traces of sand; Brown mottled orange; moist; plastic
 Specific Depth : 3.45-3.60m
 Order Number : -

Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/66_TXL_CUM
 Client Ref No: 1-C2466.16

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P vs Q Total Stress Plot - Back Pressure saturated at 400 kPa



TOTAL STRESS RESULT			Correl coeff	0.9935	(r^2)
Intercept d	10.15	(kPa)	Cohesion c	11	(kPa)
Beta β	17.98	(deg)	Phi ϕ	19	(deg)

Test Method

Triaxial Test : Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Deviator Stress
 Failure Criteria: Stage 2 : Deviator Stress
 (at Max. Values) Stage 3 : Deviator Stress

Date tested: 03-14/10/25
 Date reported: 28/10/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory:

Thirushen Pillay
 Senior Civil Engineering Technician

Date: 28/10/25

Designation:

LHF 2517 (09/20)



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION
Test Report - P' vs Q' Effective Stress Plot



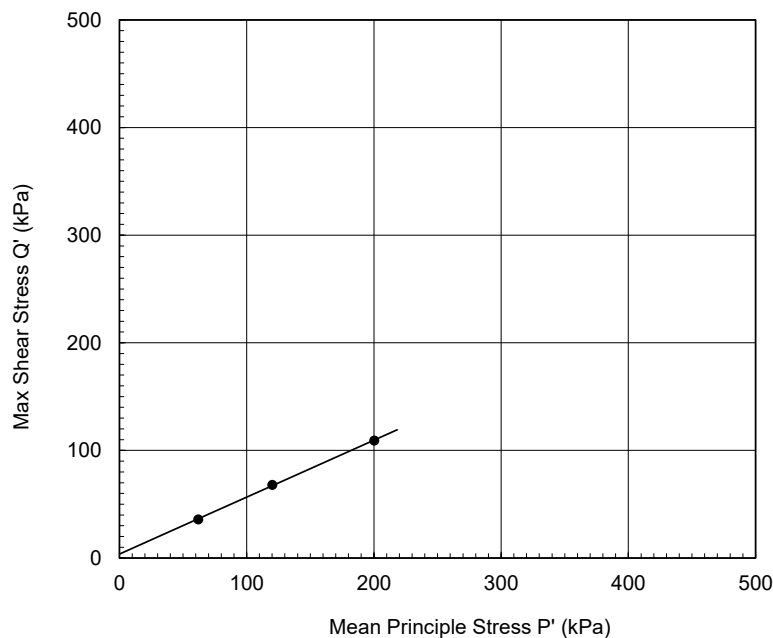
Project: Ground Investigation for Northland Corridor
Location: Section 2 Warkworth to Te Hana to Port Marsden Highway, Section
Client: NZTA C/- Aurecon & WSP NZ Ltd.
Sample Reference: BH2B_1104A Depth (m): 3.10-3.60
Sampled by: NC_Site Team Date sampled: 02/09/25
Sampling Method: Pushtube
Sample Description: Clayey SILT with traces of sand; Brown mottled orange; moist; plastic
Specific Depth: 3.45-3.60m
Order Number: -

Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/66_TXL_CUM
Client Ref No: 1-C2466.16

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P' vs Q' Effective Stress Plot - Back Pressure saturated at 400 kPa



● Test Points — Regression Line

EFFECTIVE STRESS RESULT			Correl coeff	0.9996	(r ²)
Intercept d'	3.64	(kPa)	Cohesion c'	4	(kPa)
Beta β'	27.89	(deg)	Phi Ø'	32	(deg)

Test Method

Triaxial Test : Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Deviator Stress
Failure Criteria: Stage 2 : Deviator Stress
(at Max. Values) Stage 3 : Deviator Stress

Date tested: 03-14/10/25
Date reported: 28/10/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 28/10/25

Designation:

LHF 2517 (09/20)



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION

Test Report - PvsQ Stress Path Plot



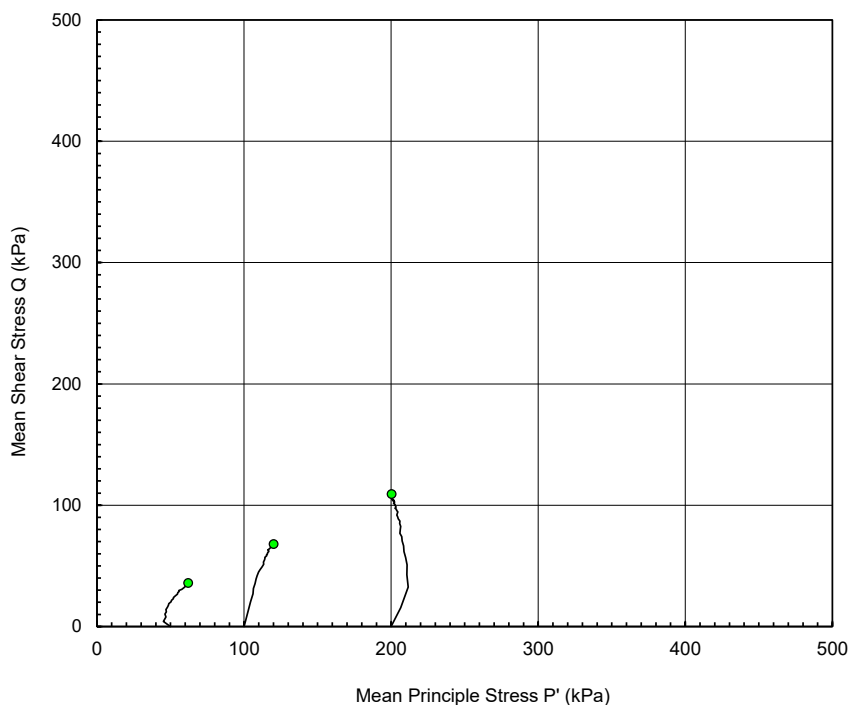
Project: Ground Investigation for Northland Corridor
 Location : Section 2 Warkworth to Te Hana to Port Marsden Highway, Section
 Client : NZTA C/- Aurecon & WSP NZ Ltd.
 Sample Reference BH2B_T104A Sample Depth (m): 3.10-3.60
 Sampled by: NC_Site Team Date sampled: 02/09/25
 Sampling Method: Pushtube
 Sample Description: Clayey SILT with traces of sand; Brown mottled orange; moist; plastic
 Specific Depth : 3.45-3.60m
 Order Number : -

Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/66_TXL_CUM
 Client Ref No: 1-C2466.16

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P' vs Q Stress Path (Effective Stress Plot) - Back Pressure saturated at 400 kPa



Test Method

Triaxial Test : Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Deviator Stress
 Failure Criteria: Stage 2 : Deviator Stress
 (at Max. Values) Stage 3 : Deviator Stress

Date tested: 03-14/10/25
 Date reported: 28/10/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Approved Signatory:

Thirushen Pillay
 Senior Civil Engineering Technician

Date: 28/10/25



Test results indicated as not
 accredited are outside the
 scope of the laboratory's
 accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION
Test Report - Strain vs Deviator Stress Plot



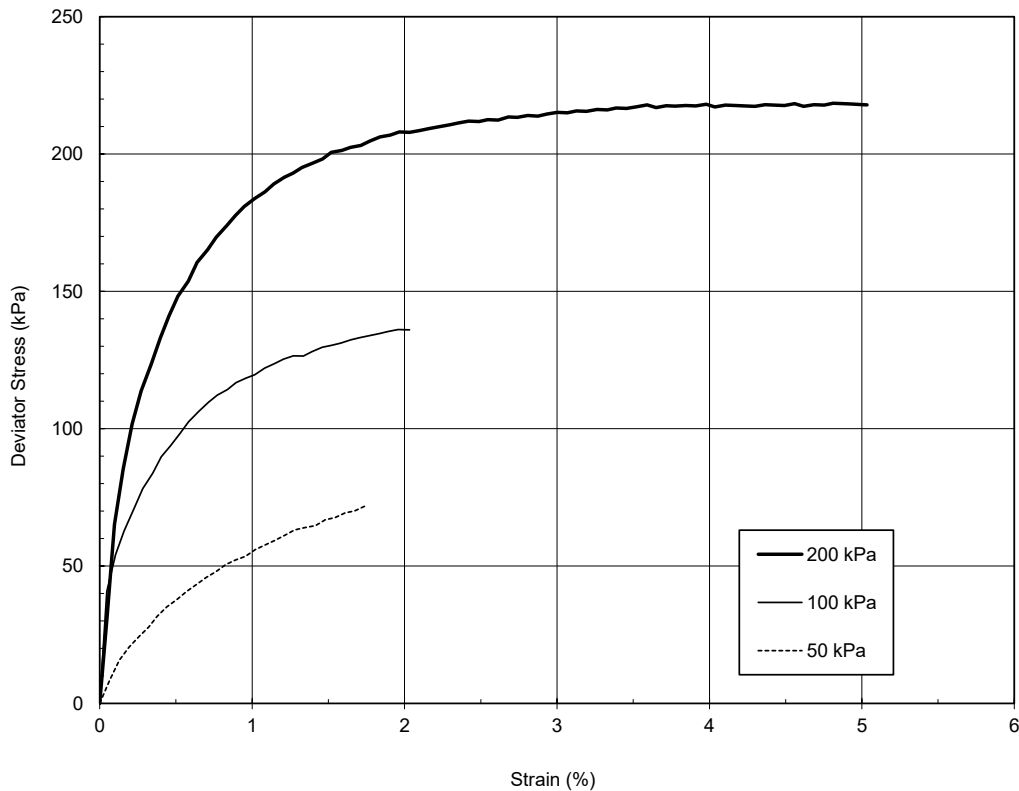
Project: Ground Investigation for Northland Corridor
 Location: Section 2 Warkworth to Te Hana to Port Marsden Highway, Section
 Client: NZTA C/- Aurecon & WSP NZ Ltd.
 Sample Reference: BH2B_1104A Sample Depth (m): 3.10-3.60
 Sampled by: NC_Site Team Date sampled: 02/09/25
 Sampling Method: Pushtube
 Sample Description: Clayey SILT with traces of sand; Brown mottled orange; moist; plastic
 Specific Depth: 3.45-3.60m
 Order Number: -

Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/66_TXL_CUM
 Client Ref No: 1-C2466.16

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Strain vs Deviator Stress Plot - Back Pressure saturated at 400 kPa



Test Method	Notes
Triaxial Test : Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	

Date tested: 03-14/10/25
 Date reported: 28/10/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Approved Signatory: 
 Designation: Senior Civil Engineering Technician

Date: 28/10/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION

Test Report - Strain vs Pore Pressure Plot



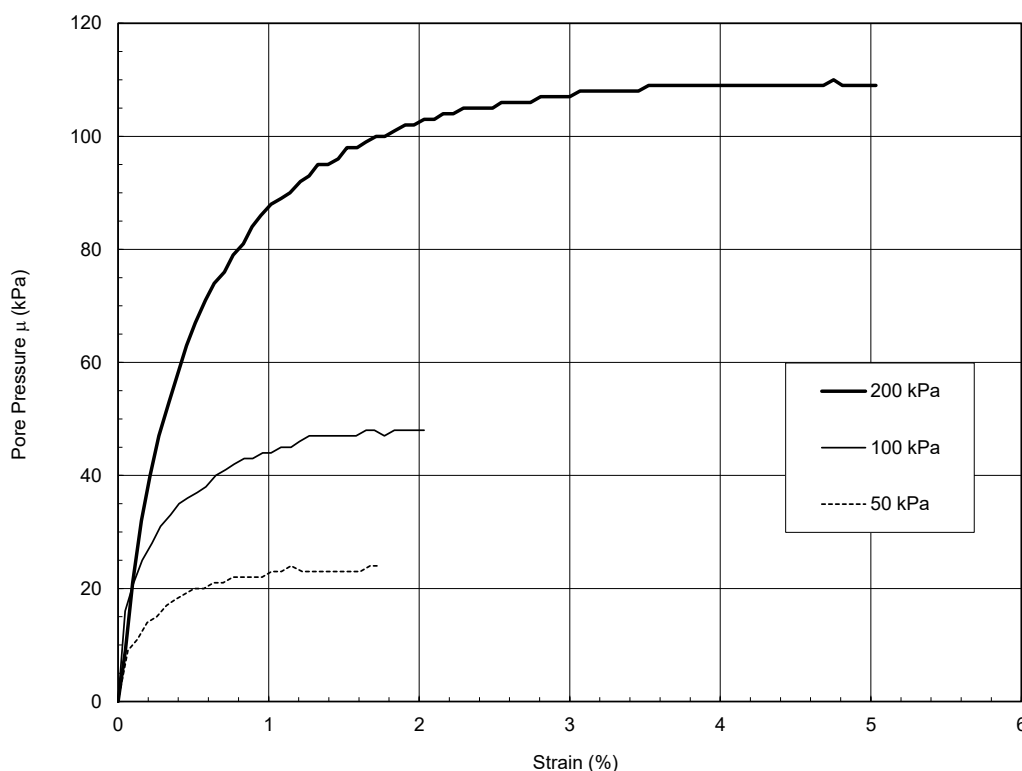
Project: Ground Investigation for Northland Corridor
 Location : Section 2 Warkworth to Te Hana to Port Marsden Highway, Section
 Client : NZTA C/- Aurecon & WSP NZ Ltd.
 Sample Reference: BH2B_1104A Sample Depth (m): 3.10-3.60
 Sampled by: NC_Site Team Date sampled: 02/09/25
 Sampling Method: Pushtube
 Sample Description: Clayey SILT with traces of sand; Brown mottled orange; moist; plastic
 Specific Depth : 3.45-3.60m
 Order Number : -

Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/66_TXL_CUM
 Client Ref No: 1-C2466.16

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Strain vs Pore Pressure Plot - Back Pressure saturated at 400 kPa



Test Method

Triaxial Test : Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Date tested: 03-14/10/25

Date reported: 28/10/25

Approved Signatory:

Thirushen Pillay

Date: 28/10/25

Designation:

Senior Civil Engineering Technician



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

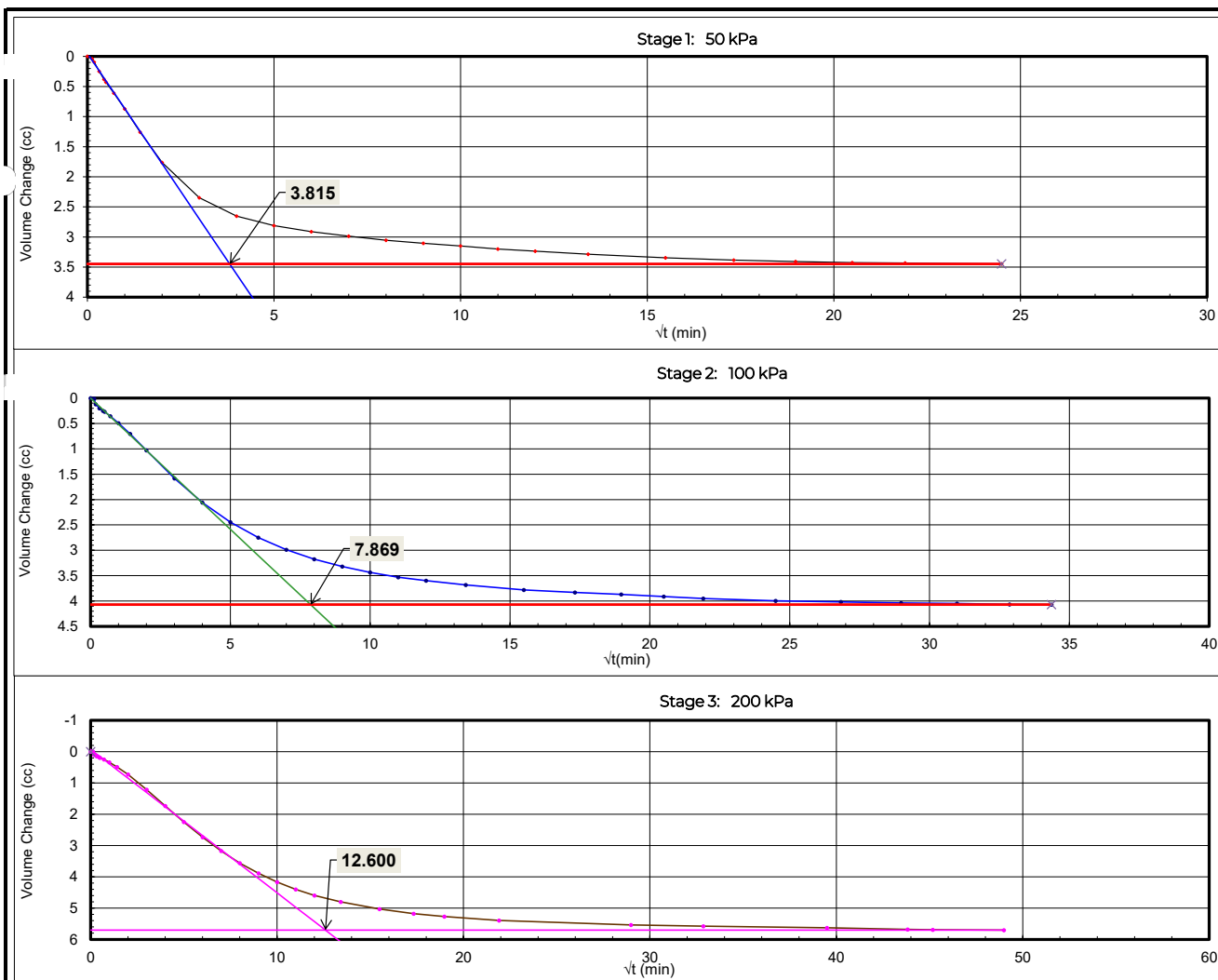
CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION
Displacement vs $\sqrt{t}$ Plot (Consolidation stage)



Project: Ground Investigation for Northland Corridor
 Location : Section 2 Warkworth to Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA C/- Aurecon & WSP NZ Ltd.
 Sample Reference: BH2B_T104A Sample Depth (m): 3.10-3.60
 Sampled by: NC_Site Team Date sampled: 02/09/25
 Sampling Method: Pushtube
 Sample Description: Clayey SILT with traces of sand; Brown mottled orange; moist; plastic
 Specific Depth : 3.45-3.60m
 Order Number : -

Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/66_TXL_CUM
 Client Ref No: 1-C2466.16



Test Method	Test Results			
Triaxial Test : Consolidated undrained triaxial test : BS EN ISO 17892-9:2018	Confining Pressure (kPa)=	50 kPa	100 kPa	200 kPa
Water Content : NZS4402 : 1986 Test 2.1	C_v (m^2/yr)=	3.33	0.78	0.31
	M_v (m^2/MN)=	0.27	0.33	0.23
	k (m/s)=	2.83E-10	7.95E-11	2.21E-11
	$\sqrt{t}$ =	3.815	7.869	12.600
	t_{100} =	14.554	61.921	158.760

Date tested : 03-14/10/25

Date reported : 28/10/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Date: 28/10/25

Approved Signatory

Thirushen Pillay
 Senior Civil Engineering Technician

Designation:

LHF 2517 (09/20)



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

Page 8 of 8

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION

Test Report - Result Summary



Project: Ground Investigation for Northland Corridor
 Location : Section 2 Warkworth to Te Hana to Port Marsden Highway, Sector
 Client : NZTA C/- Aurecon & WSP NZ Ltd.
 Sample Reference BH2B_T104A Sample Depth (m): 12.10-12.60
 Sampled by: NC_Site Team Date sampled: 02/09/25
 Sampling Method: Pushtube
 Sample Description: Clayey Sandy SILT;grey;moist;plastic
 Specific Depth : 12.30-12.46m
 Order Number : -

Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/68_TXL_CUM
 Client Ref No: 1-C2466.16

Initial Sample properties		
Length (mm)	=	108.28
Diameter (mm)	=	53.88
Membrane Correction has been applied		

Saturation achieved using a minimum Back Pressure of 500 kPa

Specimen Stage No	Effective Confining Pressure (kPa)	INITIAL PROPERTIES			Solid Particle Density (t/m³)	FINAL PROPERTIES		
		Densities (t/m³)		Water Content (%)		Densities (t/m³)		Water Content (%)
		Wet (t/m³)	Dry (t/m³)			Wet (t/m³)	Dry (t/m³)	
1	50	2.05	1.62	26.8				
2	100				2.70			
3	200				(assumed)	2.11	1.73	22.0

Specimen Stage No	Effective Confining Pressure (kPa)	Void Ratio (e)	Deg of Saturation (Sr)		Deviator Stress $\sigma_1 - \sigma_3$ (kPa)	Pore Pressure μ (kPa)	Strain (%)	Failure Criteria at Maximum Values
			Sr before Consolid. (%)	Sr after Consolid. (%)				
1	50	0.67	100	100	82.2	26	2.91	Deviator Stress
2	100				178.7	49	2.90	Deviator Stress
3	200				277.3	99	6.20	Deviator Stress

Specimen Stage No	Effective Confining Pressure (kPa)	Coefficient of Consolidation Cv (m ² /year)	Volume Compressibility Mv (m ² /MN)	Coefficient of Permeability k (m/s)	B at the start of test	Due to the use of side filter drains, IANZ endorsement does not include the Cv, Mv and k values reported herein. Mv, Cv & k calculated for the following conditions:- L/D=2, RADIAL+TOP+BOTTOM Drainage Side Filter Drains Used (L/D= Sample Length/Diameter.)
1	50	0.43	0.46	6.2 x 10 ⁻¹¹	1.00	
2	100	0.39	0.41	5.0 x 10 ⁻¹¹		
3	200	0.35	0.22	2.4 x 10 ⁻¹¹		

TOTAL STRESS RESULT		
Intercept d	9.46	(kPa)
Beta β	21.25	(deg)
Cohesion c	10	(kPa)
Phi ϕ	23	(deg)
Correl coeff.	0.9874	(r ²)

EFFECTIVE STRESS RESULT		
Intercept d'	7.26	(kPa)
Beta β'	29.06	(deg)
Cohesion c'	9	(kPa)
Phi ϕ'	34	(deg)
Correl coeff.	0.9946	(r ²)

Test Method	Notes
Triaxial Test : Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	Cv and Mv have been rounded to 2 significant figures. L/D= Sample Length/Diameter.

Date tested: 02-12/10/25
 Date reported: 28/10/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory: 
 Designation: Senior Civil Engineering Technician

Date: 28/10/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION
Test Report - Mohr Coulomb Envelope Plot



Project: Ground Investigation for Northland Corridor
 Location : Section 2 Warkworth to Te Hana to Port Marsden Highway, Section
 Client : NZTA C/- Aurecon & WSP NZ Ltd.
 Sample Reference: BH2B_1104A Sample Depth (m): 12.10-12.60
 Sampled by: NC_Site Team Date sampled: 02/09/25
 Sampling Method: Pushtube
 Sample Description: Clayey Sandy SILT;grey;moist;plastic
 Specific Depth : 12.30-12.46m
 Order Number : -

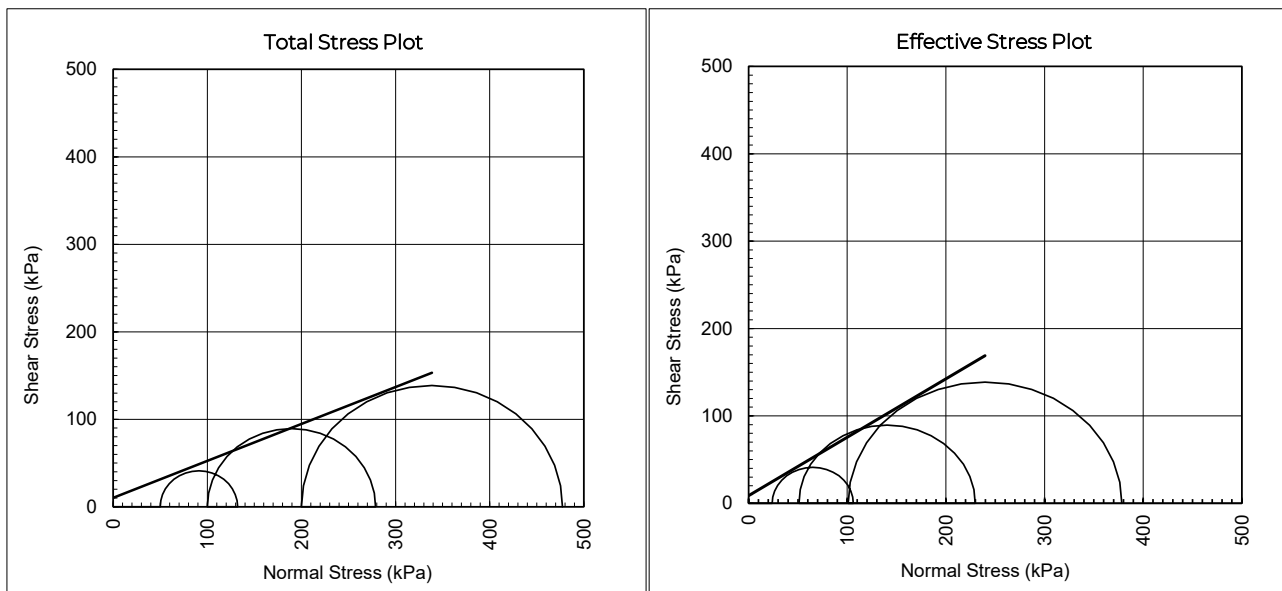
Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/68_TXL_CUM
 Client Ref No: 1-C2466.16

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Mohr-Coulomb envelope plots - Result at Maximum Stress

Back Pressure Saturated at 500 kPa



TOTAL STRESS RESULT			
Intercept d	9.46	(kPa)	
Beta β	21.25	(deg)	
Cohesion c	10	(kPa)	
Phi ϕ	23	(deg)	
Correl coeff.	0.9874	(r ²)	

EFFECTIVE STRESS RESULT			
Intercept d'	7.26	(kPa)	
Beta β'	29.06	(deg)	
Cohesion c'	9	(kPa)	
Phi ϕ'	34	(deg)	
Correl coeff.	0.9946	(r ²)	

Test Method

Triaxial Test : Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Deviator Stress
 Failure Criteria: Stage 2 : Deviator Stress
 (at Max. Values) Stage 3 : Deviator Stress

Date tested: 02-12/10/25
 Date reported: 28/10/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory:

Thirushen Pillay

Date: 28/10/25

Designation:

Senior Civil Engineering Technician



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION
Test Report - P vs Q Total Stress Plot



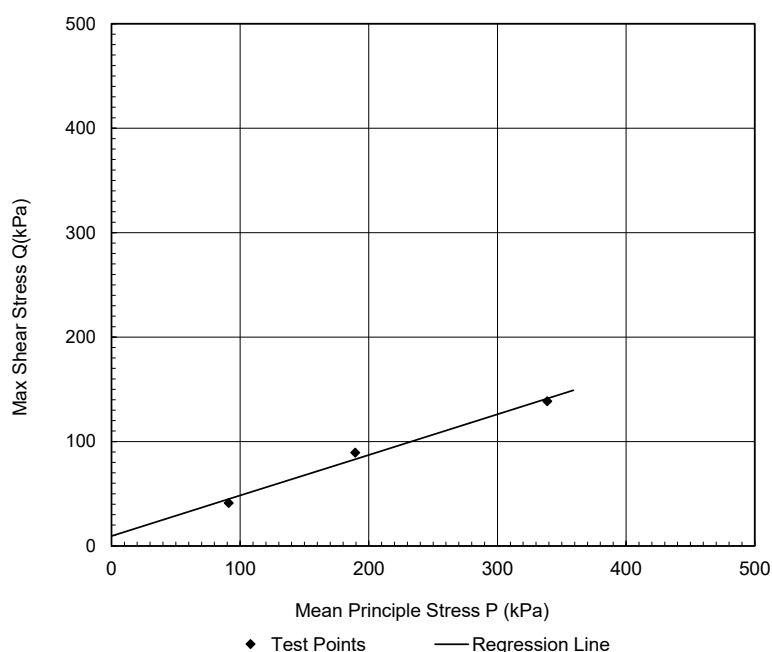
Project: Ground Investigation for Northland Corridor
 Location: Section 2 Warkworth to Te Hana to Port Marsden Highway, Section
 Client: NZTA C/- Aurecon & WSP NZ Ltd.
 Sample Reference: BH2B_1104A Sample Depth (m): 12.10-12.60
 Sampled by: NC_Site Team Date sampled: 02/09/25
 Sampling Method: Pushtube
 Sample Description: Clayey Sandy SILT;grey;moist;plastic
 Specific Depth: 12.30-12.46m
 Order Number: -

Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/68_TXL_CUM
 Client Ref No: 1-C2466.16

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P vs Q Total Stress Plot - Back Pressure saturated at 500 kPa



TOTAL STRESS RESULT			Correl coeff	0.9874	(r^2)
Intercept d	9.46	(kPa)	Cohesion c	10	(kPa)
Beta β	21.25	(deg)	Phi ϕ	23	(deg)

Test Method

Triaxial Test : Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1: Deviator Stress
 Failure Criteria: Stage 2: Deviator Stress
 (at Max. Values) Stage 3: Deviator Stress

Date tested: 02-12/10/25
 Date reported: 28/10/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Approved Signatory:

Thirushen Pillay
 Senior Civil Engineering Technician

Date: 28/10/25

Designation:

LHF 2517 (09/20)



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION
Test Report - P' vs Q' Effective Stress Plot

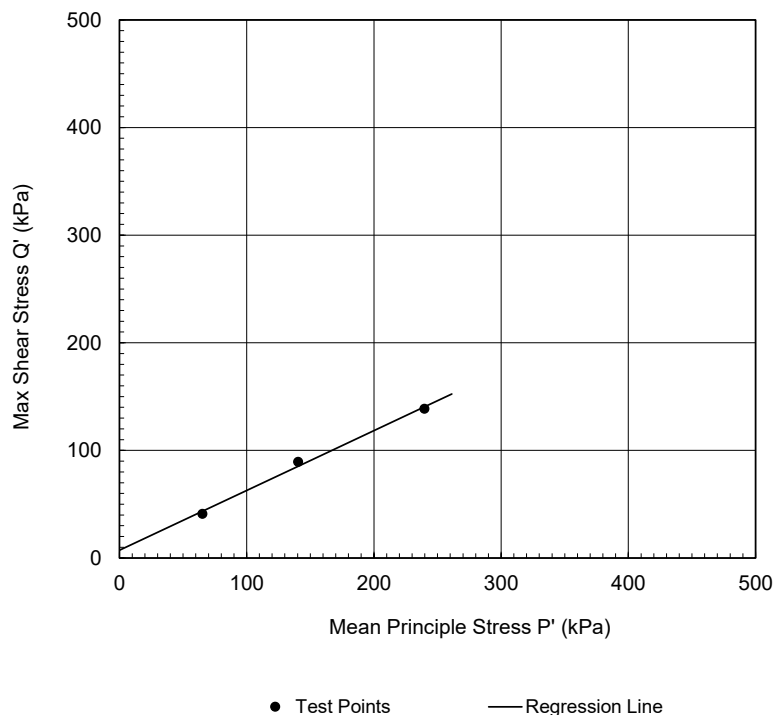


Project: Ground Investigation for Northland Corridor
 Location : Section 2 Warkworth to Te Hana to Port Marsden Highway, Section
 Client : NZTA C/- Aurecon & WSP NZ Ltd.
 Sample Reference BH2B_1104A Depth (m): 12.10-12.60
 Sampled by: NC_Site Team Date sampled: 02/09/25
 Sampling Method: Pushtube
 Sample Description: Clayey Sandy SILT;grey;moist;plastic
 Specific Depth : 12.30-12.46m
 Order Number : -

Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/68_TXL_CUM
 Client Ref No: 1-C2466.16

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT
 P' vs Q' Effective Stress Plot - Back Pressure saturated at 500 kPa



EFFECTIVE STRESS RESULT			Correl coeff	0.9946	(r^2)
Intercept d'	7.26	(kPa)	Cohesion c'	9	(kPa)
Beta β'	29.06	(deg)	Phi ϕ'	34	(deg)

Test Method

Triaxial Test : Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Deviator Stress
 Failure Criteria: Stage 2 : Deviator Stress
 (at Max. Values) Stage 3 : Deviator Stress

Date tested: 02-12/10/25
 Date reported: 28/10/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory:

Thirushen Pillay
 Senior Civil Engineering Technician

Date: 28/10/25

Designation:

LHF 2517 (09/20)



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION

Test Report - PvsQ Stress Path Plot



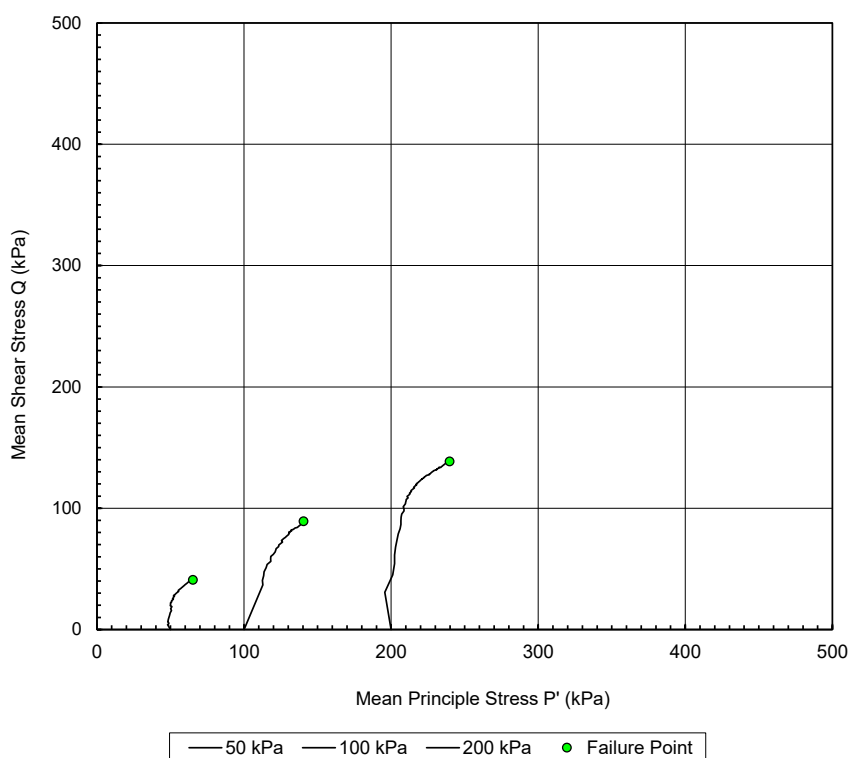
Project: Ground Investigation for Northland Corridor
 Location : Section 2 Warkworth to Te Hana to Port Marsden Highway, Section
 Client : NZTA C/- Aurecon & WSP NZ Ltd.
 Sample Reference: BH2B_T104A Sample Depth (m): 12.10-12.60
 Sampled by: NC_Site Team Date sampled: 02/09/25
 Sampling Method: Pushtube
 Sample Description: Clayey Sandy SILT;grey;moist;plastic
 Specific Depth : 12.30-12.46m
 Order Number : -

Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/68_TXL_CUM
 Client Ref No: 1-C2466.16

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P' vs Q Stress Path (Effective Stress Plot) - Back Pressure saturated at 500 kPa



Test Method

Triaxial Test : Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Deviator Stress
 Failure Criteria: Stage 2 : Deviator Stress
 (at Max. Values) Stage 3 : Deviator Stress

Date tested: 02-12/10/25
 Date reported: 28/10/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Approved Signatory:

Thirushen Pillay
 Senior Civil Engineering Technician

Date: 28/10/25



Test results indicated as not
 accredited are outside the
 scope of the laboratory's
 accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION
Test Report - Strain vs Deviator Stress Plot



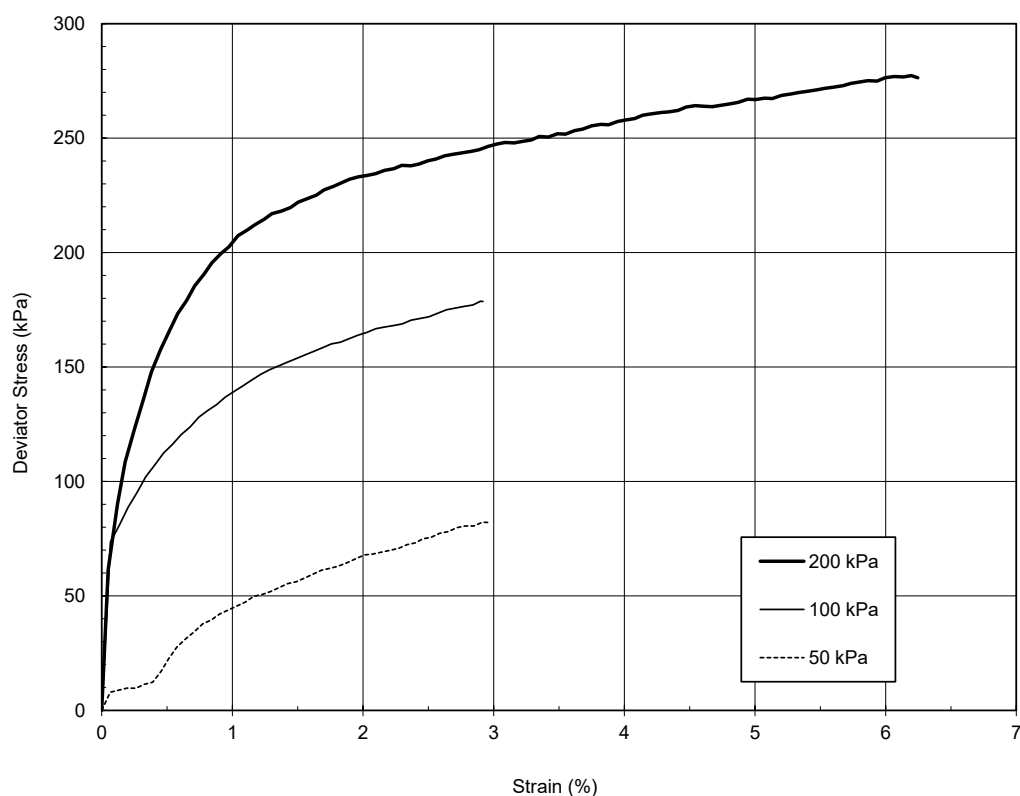
Project: Ground Investigation for Northland Corridor
 Location : Section 2 Warkworth to Te Hana to Port Marsden Highway, Section
 Client : NZTA C/- Aurecon & WSP NZ Ltd.
 Sample Reference BH2B_1104A Sample Depth (m): 12.10-12.60
 Sampled by: NC_Site Team Date sampled: 02/09/25
 Sampling Method: Pushtube
 Sample Description: Clayey Sandy SILT; grey; moist; plastic
 Specific Depth : 12.30-12.46m
 Order Number : -

Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/68_TXL_CUM
 Client Ref No: 1-C2466.16

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Strain vs Deviator Stress Plot - Back Pressure saturated at 500 kPa



Test Method	Notes
Triaxial Test : Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	

Date tested: 02-12/10/25
 Date reported: 28/10/25

Approved Signatory: Thirushen Pillay
 Designation: Senior Civil Engineering Technician

Date: 28/10/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION

Test Report - Strain vs Pore Pressure Plot



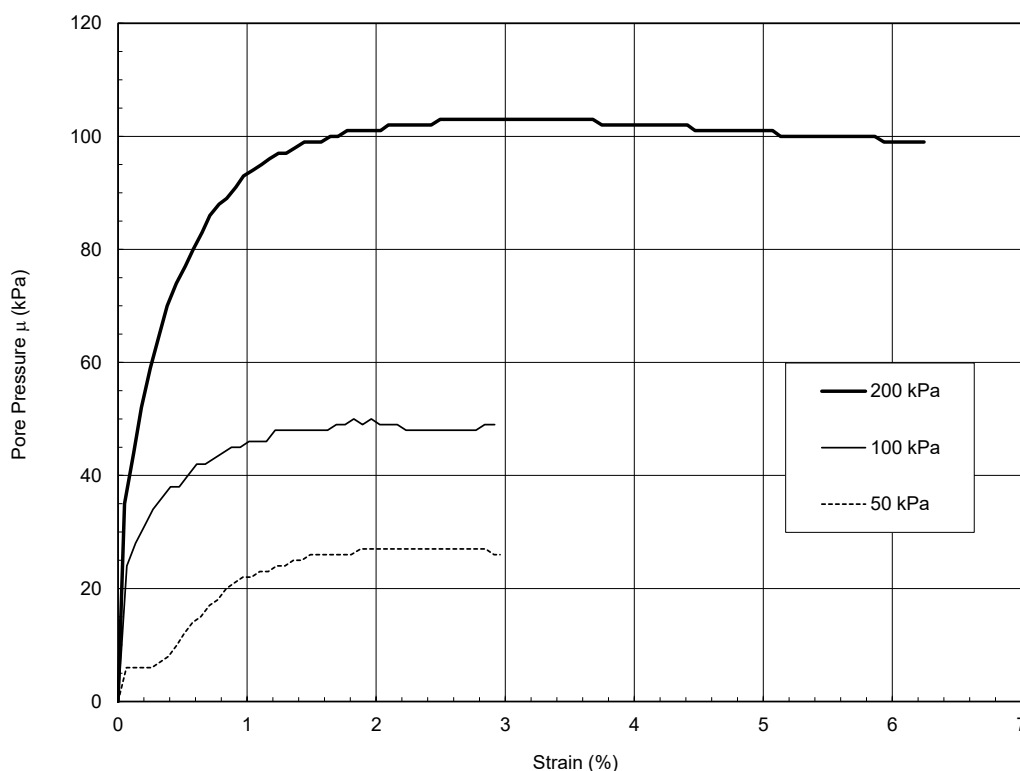
Project: Ground Investigation for Northland Corridor
 Location : Section 2 Warkworth to Te Hana to Port Marsden Highway, Section
 Client : NZTA C/- Aurecon & WSP NZ Ltd.
 Sample Reference: BH2B_1104A Sample Depth (m): 12.10-12.60
 Sampled by: NC_Site Team Date sampled: 02/09/25
 Sampling Method: Pushtube
 Sample Description: Clayey Sandy SILT;grey;moist;plastic
 Specific Depth : 12.30-12.46m
 Order Number : -

Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/68_TXL_CUM
 Client Ref No: 1-C2466.16

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Strain vs Pore Pressure Plot - Back Pressure saturated at 500 kPa



Test Method

Triaxial Test : Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Date tested: 02-12/10/25

Date reported: 28/10/25

Approved Signatory:

Thirushen Pillay

Date: 28/10/25

Designation:

Senior Civil Engineering Technician



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

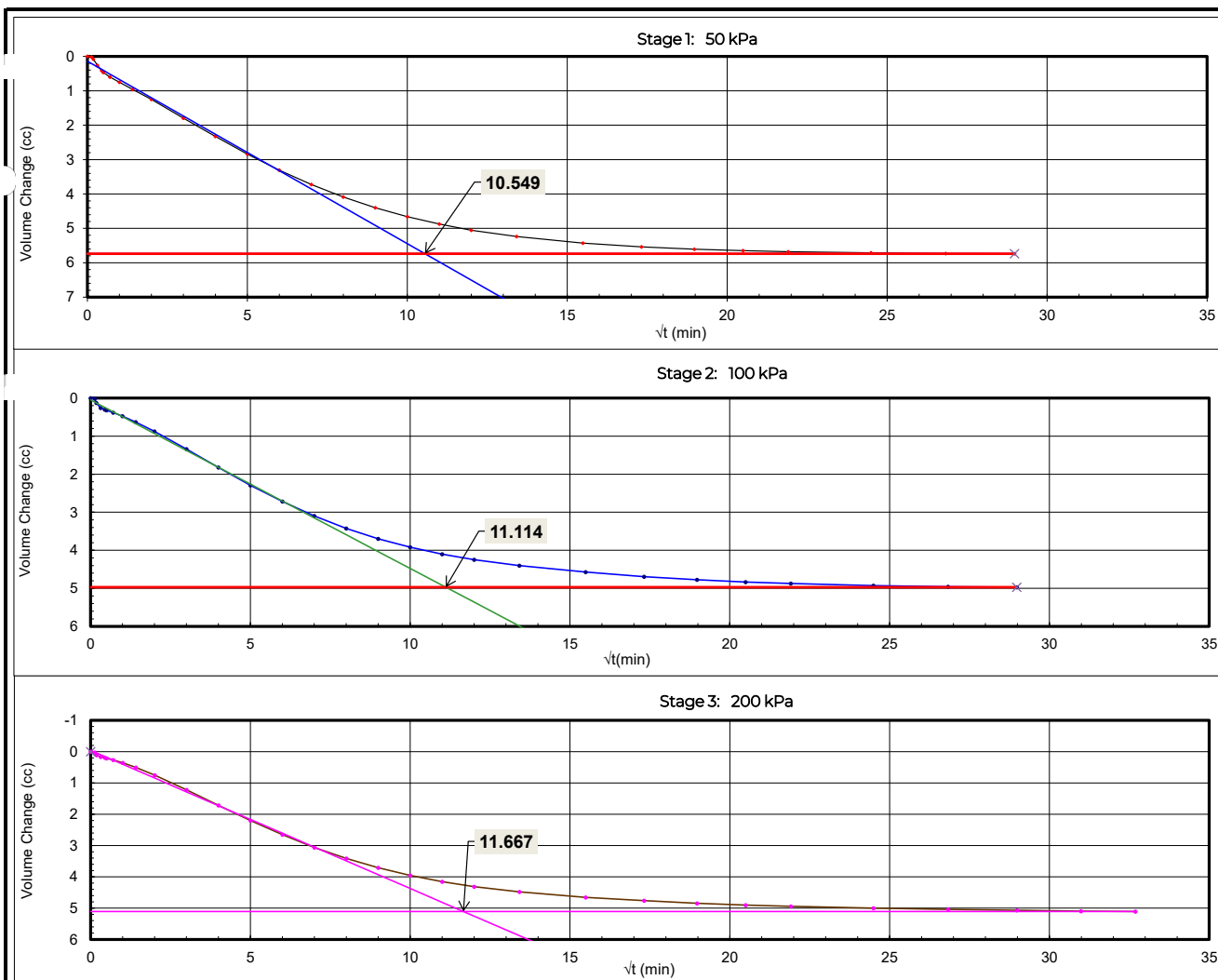
CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION
Displacement vs $\sqrt{t}$ Plot (Consolidation stage)



Project: Ground Investigation for Northland Corridor
Location: Section 2 Warkworth to Te Hana to Port Marsden Highway, Section 2B GI
Client: NZTA C/- Aurecon & WSP NZ Ltd.
Sample Reference: BH2B_T104A Sample Depth (m): 12.10-12.60
Sampled by: NC_Site Team Date sampled: 02/09/25
Sampling Method: Pushtube
Sample Description: Clayey Sandy SILT; grey; moist; plastic
Specific Depth: 12.30-12.46m
Order Number: -

Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/68_TXL_CUM
Client Ref No: 1-C2466.16



Test Method	Test Results			
Triaxial Test : Consolidated undrained triaxial test : BS EN ISO 17892-9:2018	Confining Pressure (kPa)=	50 kPa	100 kPa	200 kPa
Water Content : NZS4402 : 1986 Test 2.1	C_v (m^2/yr)=	0.43	0.39	0.35
	M_v (m^2/MN)=	0.46	0.41	0.22
	k (m/s)=	6.21E-11	4.96E-11	2.36E-11
	$\sqrt{t}$ =	10.549	11.114	11.667
	t_{100} =	111.281	123.521	136.119

Date tested : 02-12/10/25

Date reported : 28/10/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Date: 28/10/25

Approved Signatory

Thirushen Pillay
Senior Civil Engineering Technician

Designation:

LHF 2517 (09/20)



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

Page 8 of 8

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION

Test Report - Result Summary



Project: Ground Investigation for Northland Corridor
 Location : Section 2B Warkworth to Te Hana to Port Marsden Highway Sectic
 Client : NZTA C/- Aurecon & WSP NZ Ltd.
 Sample Reference BH2B_T105 Sample Depth (m): 6.00-6.50
 Sampled by: NC_Site Team Date sampled: 03/09/25
 Sampling Method: Pushtube
 Sample Description: Silty CLAY; grey; moist; plastic
 Specific Depth : 6.35-6.50m
 Order Number : -

Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/28_TXL_CUM
 Client Ref No: 1-C2466.16

Initial Sample properties		
Length (mm)	=	108.30
Diameter (mm)	=	53.38
Membrane Correction has been applied		

Saturation achieved using a minimum Back Pressure of 450 kPa

Specimen Stage No	Effective Confining Pressure (kPa)	INITIAL PROPERTIES			Solid Particle Density (t/m³)	FINAL PROPERTIES		
		Densities (t/m³)		Water Content (%)		Densities (t/m³)		Water Content (%)
		Wet (t/m³)	Dry (t/m³)			Wet (t/m³)	Dry (t/m³)	
1	50	1.93	1.44	33.7				
2	100				2.69			
3	200				(tested)	2.00	1.56	28.1

Specimen Stage No	Effective Confining Pressure (kPa)	Void Ratio (e)	Deg of Saturation (Sr)		Deviator Stress $\sigma_1 - \sigma_3$ (kPa)	Pore Pressure μ (kPa)	Strain (%)	Failure Criteria at Maximum Values
			Sr before Consolid. (%)	Sr after Consolid. (%)				
1	50	0.86	100	100	43.8	25	0.98	Deviator Stress
2	100				79.0	58	2.03	Deviator Stress
3	200				153.5	123	5.17	Deviator Stress

Specimen Stage No	Effective Confining Pressure (kPa)	Coefficient of Consolidation C_v (m ² /year)	Volume Compressibility M_v (m ² /MN)	Coefficient of Permeability k (m/s)	B at the start of test	Due to the use of side filter drains, IANZ endorsement does not include the C_v , M_v and k values reported herein. Mv, Cv & k calculated for the following conditions:- L/D=2, RADIAL+TOP+BOTTOM Drainage Side Filter Drains Used (L/D= Sample Length/Diameter.)
1	50	0.58	0.49	8.7×10^{-11}	1.00	
2	100	0.092	0.43	1.2×10^{-11}		
3	200	0.067	0.32	6.6×10^{-12}		

TOTAL STRESS RESULT		
Intercept d	0.00	(kPa)
Beta β	15.63	(deg)
Cohesion c	0	(kPa)
Phi ϕ	16	(deg)
Correl coeff.	0.9995	(r ²)

EFFECTIVE STRESS RESULT		
Intercept d'	0.00	(kPa)
Beta β'	26.29	(deg)
Cohesion c'	0	(kPa)
Phi ϕ'	30	(deg)
Correl coeff.	0.9996	(r ²)

Value (Total Stress) has been adjusted to zero

NB: The Cohesion Value (Eff. Stress) has been adjusted to zero

Test Method	Notes
Triaxial Test : Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	Cv and Mv have been rounded to 2 significant figures. L/D= Sample Length/Diameter.

Date tested: 06-14/10/25
 Date reported: 28/10/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory: 
 Designation: Senior Civil Engineering Technician

Date: 28/10/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION
Test Report - Mohr Coulomb Envelope Plot



Project: Ground Investigation for Northland Corridor
 Location : Section 2B Warkworth to Te Hana to Port Marsden Highway Section
 Client : NZTA C/- Aurecon & WSP NZ Ltd.
 Sample Reference: BH2B.1105 Sample Depth (m): 6.00-6.50
 Sampled by: NC_Site Team Date sampled: 03/09/25
 Sampling Method: Pushtube
 Sample Description: Silty CLAY; grey; moist; plastic
 Specific Depth : 6.35-6.50m
 Order Number : -

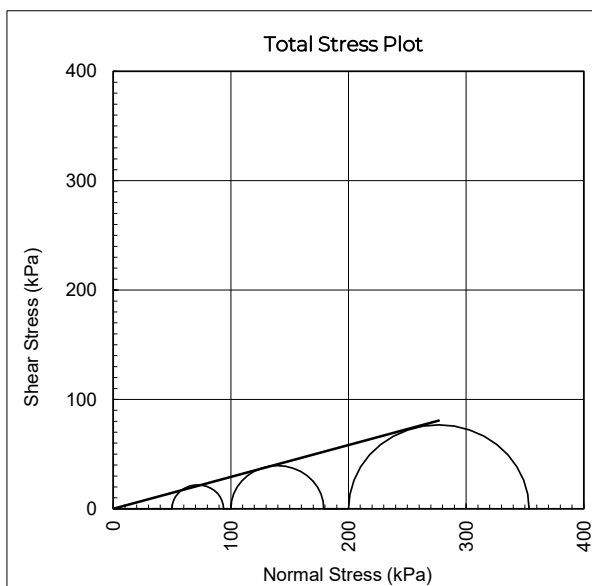
Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/28_TXL_CUM
 Client Ref No: 1-C2466.16

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

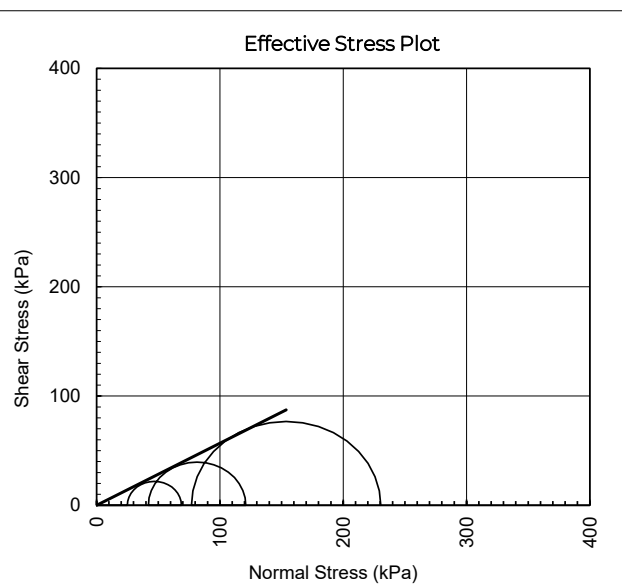
Mohr-Coulomb envelope plots - Result at Maximum Stress

Back Pressure Saturated at 450 kPa



NB: The Cohesion Value (Total Stress) has been adjusted to zero

TOTAL STRESS RESULT			
Intercept d	0.00	(kPa)	
Beta β	15.63	(deg)	
Cohesion c	0	(kPa)	
Phi ϕ	16	(deg)	
Correl coeff.	0.9995	(r ²)	



NB: The Cohesion Value (Effective Stress) has been adjusted to zero

EFFECTIVE STRESS RESULT			
Intercept d'	0.00	(kPa)	
Beta β'	26.29	(deg)	
Cohesion c'	0	(kPa)	
Phi ϕ'	30	(deg)	
Correl coeff.	0.9996	(r ²)	

Test Method

Triaxial Test : Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Deviator Stress
 Failure Criteria: Stage 2 : Deviator Stress
 (at Max. Values) Stage 3 : Deviator Stress

Date tested: 06-14/10/25
 Date reported: 28/10/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Approved Signatory:

Thirushen Pillay

Date: 28/10/25

Designation:

Senior Civil Engineering Technician



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION
Test Report - P vs Q Total Stress Plot



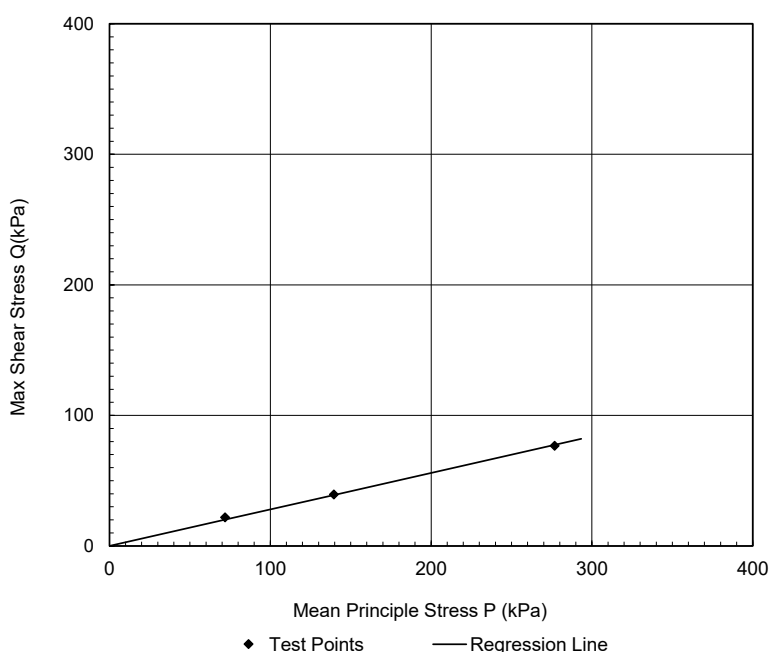
Project: Ground Investigation for Northland Corridor
 Location : Section 2B Warkworth to Te Hana to Port Marsden Highway Section
 Client : NZTA C/- Aurecon & WSP NZ Ltd.
 Sample Reference: BH2B_1105 Sample Depth (m): 6.00-6.50
 Sampled by: NC_Site Team Date sampled: 03/09/25
 Sampling Method: Pushtube
 Sample Description: Silty CLAY; grey; moist; plastic
 Specific Depth : 6.35-6.50m
 Order Number : -

Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/28_TXL_CUM
 Client Ref No: 1-C2466.16

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P vs Q Total Stress Plot - Back Pressure saturated at 450 kPa



NB: The Cohesion Value (Total Stress) has been adjusted to zero

TOTAL STRESS RESULT			Correl coeff	0.9995	(r^2)
Intercept d	0.00	(kPa)	Cohesion c	0	(kPa)
Beta β	15.63	(deg)	Phi ϕ	16	(deg)

Test Method

Triaxial Test : Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Deviator Stress
 Failure Criteria: Stage 2 : Deviator Stress
 (at Max. Values) Stage 3 : Deviator Stress

Date tested: 06-14/10/25
 Date reported: 28/10/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Approved Signatory:

Thirushen Pillay
 Senior Civil Engineering Technician

Date: 28/10/25

Designation:

LHF 2517 (09/20)



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION
Test Report - P' vs Q' Effective Stress Plot



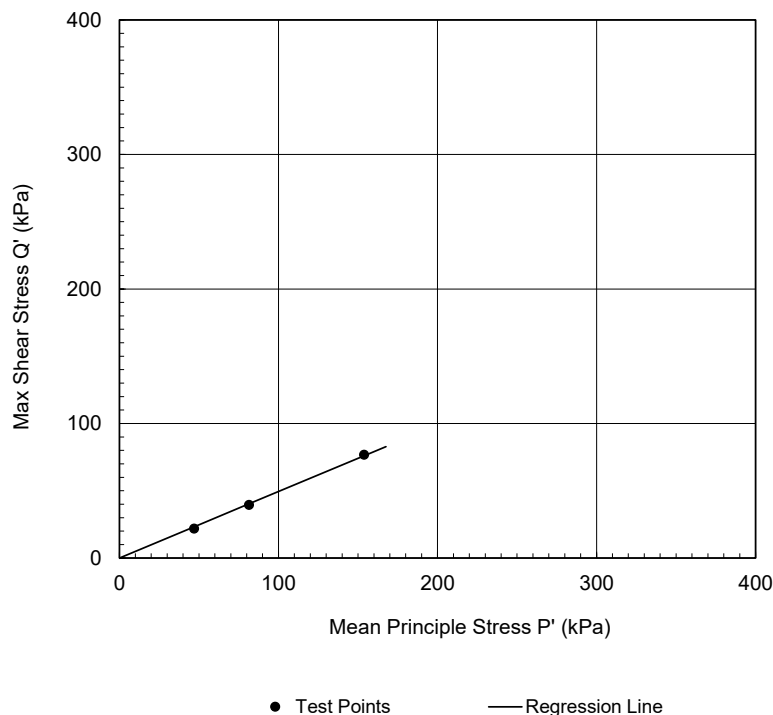
Project: Ground Investigation for Northland Corridor
Location: Section 2B Warkworth to Te Hana to Port Marsden Highway Section
Client: NZTA C/- Aurecon & WSP NZ Ltd.
Sample Reference: BH2B_1105 Depth (m): 6.00-6.50
Sampled by: NC_Site Team Date sampled: 03/09/25
Sampling Method: Pushtube
Sample Description: Silty CLAY; grey; moist; plastic
Specific Depth: 6.35-6.50m
Order Number: -

Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/28_TXL_CUM
Client Ref No: 1-C2466.16

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P' vs Q' Effective Stress Plot - Back Pressure saturated at 450 kPa



EFFECTIVE STRESS RESULT			Correl coeff	0.9996	(r ²)
Intercept d'	0.00	(kPa)	Cohesion c'	0	(kPa)
Beta β'	26.29	(deg)	Phi Ø'	30	(deg)

Test Method

Triaxial Test : Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Deviator Stress
Failure Criteria: Stage 2 : Deviator Stress
(at Max. Values) Stage 3 : Deviator Stress

Date tested: 06-14/10/25
Date reported: 28/10/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 28/10/25

Designation:

LHF 2517 (09/20)



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION
Test Report - PvsQ Stress Path Plot



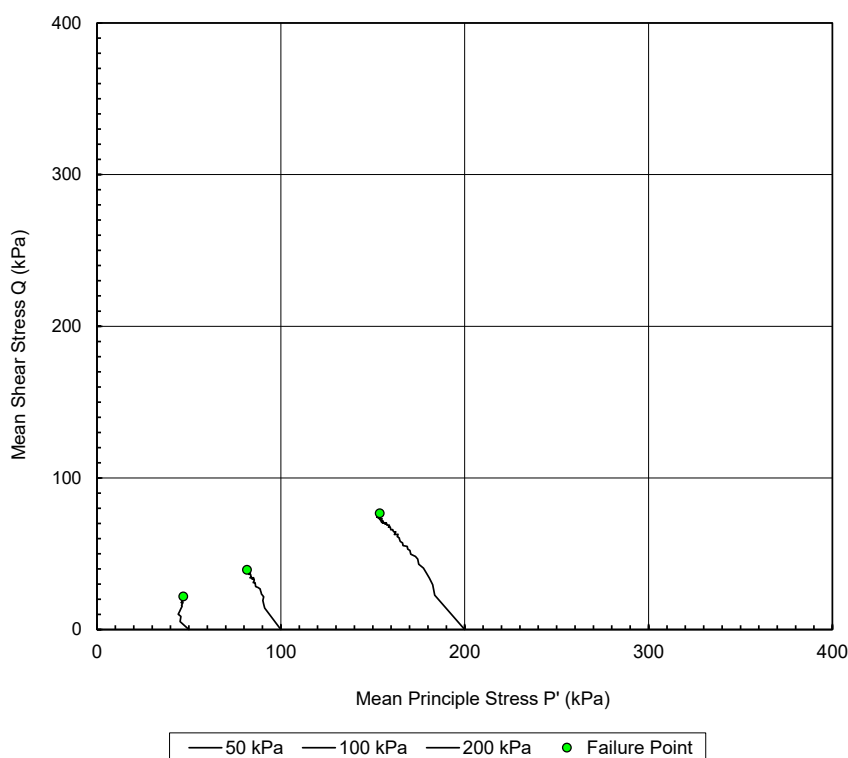
Project: Ground Investigation for Northland Corridor
 Location : Section 2B Warkworth to Te Hana to Port Marsden Highway Section
 Client : NZTA C/- Aurecon & WSP NZ Ltd.
 Sample Reference: BH2B_T105 Sample Depth (m): 6.00-6.50
 Sampled by: NC_Site Team Date sampled: 03/09/25
 Sampling Method: Pushtube
 Sample Description: Silty CLAY; grey; moist; plastic
 Specific Depth : 6.35-6.50m
 Order Number : -

Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/28_TXL_CUM
 Client Ref No: 1-C2466.16

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P' vs Q Stress Path (Effective Stress Plot) - Back Pressure saturated at 450 kPa



Test Method

Triaxial Test : Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Deviator Stress
 Failure Criteria: Stage 2 : Deviator Stress
 (at Max. Values) Stage 3 : Deviator Stress

Date tested: 06-14/10/25
 Date reported: 28/10/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Approved Signatory:

Thirushen Pillay
 Senior Civil Engineering Technician

Date: 28/10/25

Designation:



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION
Test Report - Strain vs Deviator Stress Plot



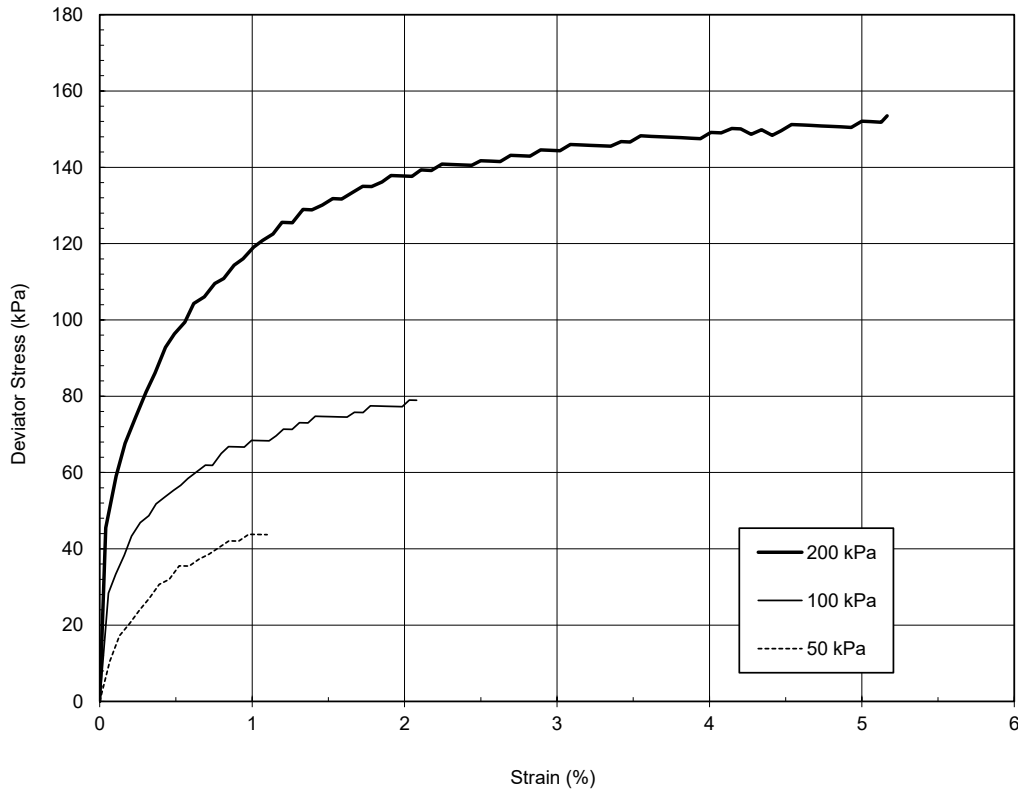
Project: Ground Investigation for Northland Corridor
Location: Section 2B Warkworth to Te Hana to Port Marsden Highway Section
Client: NZTA C/- Aurecon & WSP NZ Ltd.
Sample Reference: BH2B_1105 Sample Depth (m): 6.00-6.50
Sampled by: NC_Site Team Date sampled: 03/09/25
Sampling Method: Pushtube
Sample Description: Silty CLAY; grey; moist; plastic
Specific Depth: 6.35-6.50m
Order Number: -

Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/28_TXL_CUM
Client Ref No: 1-C2466.16

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Strain vs Deviator Stress Plot - Back Pressure saturated at 450 kPa



Test Method

Triaxial Test : Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Date tested: 06-14/10/25
Date reported: 28/10/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Approved Signatory:

Thirushen Pillay

Date: 28/10/25

Designation:

Senior Civil Engineering Technician



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION

Test Report - Strain vs Pore Pressure Plot



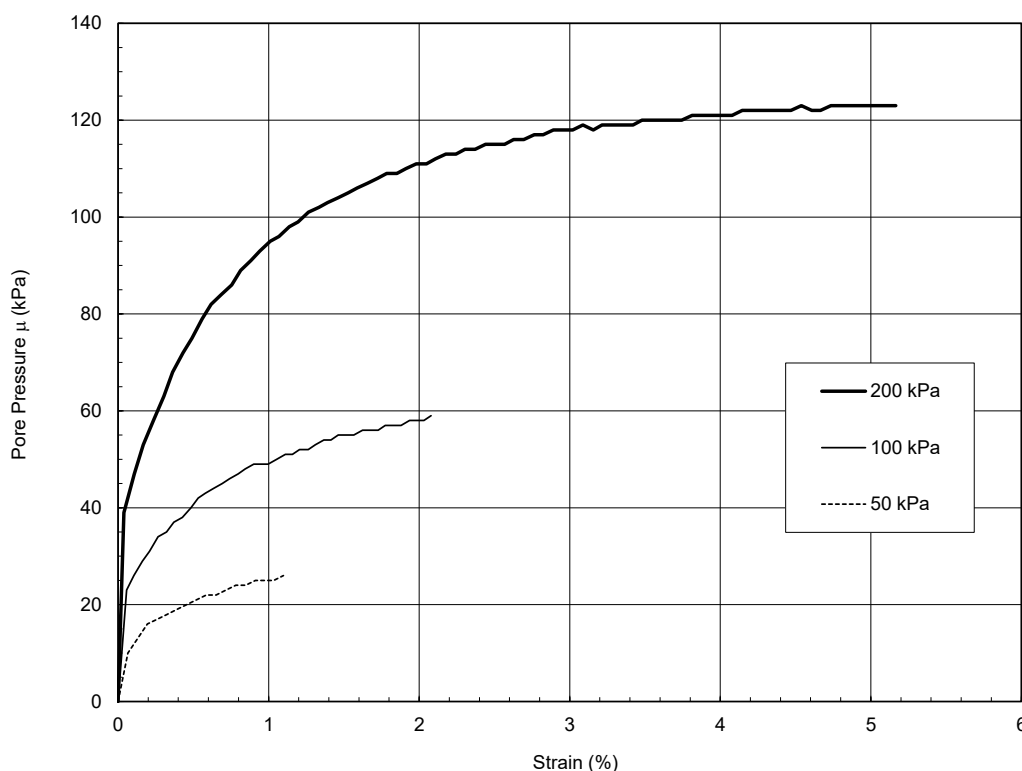
Project: Ground Investigation for Northland Corridor
 Location : Section 2B Warkworth to Te Hana to Port Marsden Highway Section
 Client : NZTA C/- Aurecon & WSP NZ Ltd.
 Sample Reference: BH2B_1105 Sample Depth (m): 6.00-6.50
 Sampled by: NC_Site Team Date sampled: 03/09/25
 Sampling Method: Pushtube
 Sample Description: Silty CLAY; grey; moist; plastic
 Specific Depth : 6.35-6.50m
 Order Number : -

Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/28_TXL_CUM
 Client Ref No: 1-C2466.16

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Strain vs Pore Pressure Plot - Back Pressure saturated at 450 kPa



Test Method

Triaxial Test : Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Date tested: 06-14/10/25

Date reported: 28/10/25

Approved Signatory:

Thirushen Pillay

Date: 28/10/25

Designation:

Senior Civil Engineering Technician



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

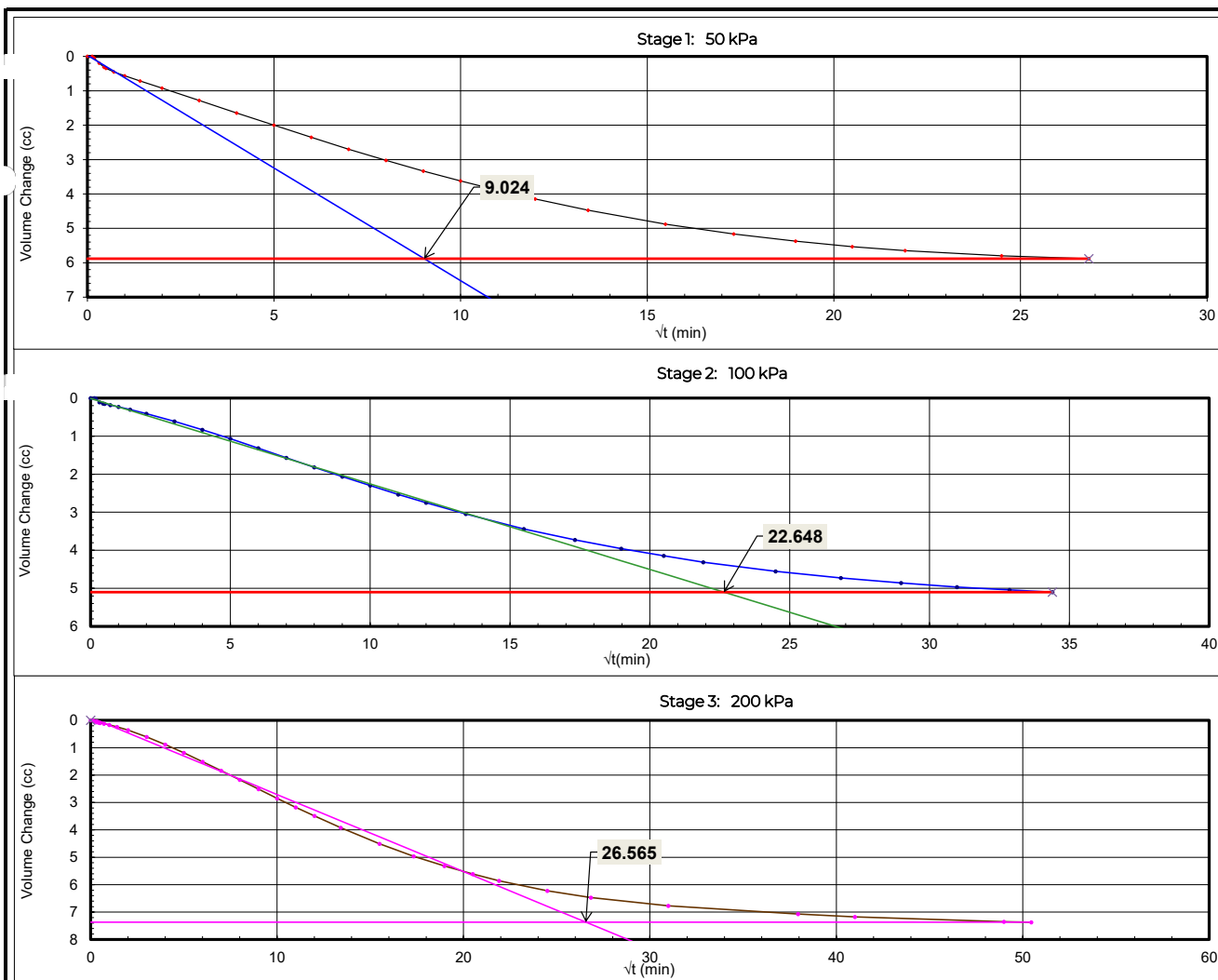
CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION
Displacement vs $\sqrt{t}$ Plot (Consolidation stage)



Project: Ground Investigation for Northland Corridor
Location: Section 2B Warkworth to Te Hana to Port Marsden Highway Section 2B GI
Client: NZTA C/- Aurecon & WSP NZ Ltd.
Sample Reference: BH2B_T105 Sample Depth (m): 6.00-6.50
Sampled by: NC_Site Team Date sampled: 03/09/25
Sampling Method: Pushtube
Sample Description: Silty CLAY; grey; moist; plastic
Specific Depth: 6.35-6.50m
Order Number: -

Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/28_TXL_CUM
Client Ref No: 1-C2466.16



Test Method	Test Results			
Triaxial Test : Consolidated undrained triaxial test : BS EN ISO 17892-9:2018	Confining Pressure (kPa)=	50 kPa	100 kPa	200 kPa
Water Content : NZS4402 : 1986 Test 2.1	C_v (m^2/yr)=	0.58	0.09	0.07
	M_v (m^2/MN)=	0.49	0.43	0.32
	k (m/s)=	8.70E-11	1.23E-11	6.59E-12
	$\sqrt{t}$ =	9.024	22.648	26.565
	t_{100} =	81.433	512.932	705.699

Date tested: 06-14/10/25
Date reported: 28/10/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Date: 28/10/25

Approved Signatory

Thirushen Pillay
Senior Civil Engineering Technician

Designation:

LHF 2517 (09/20)



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION

Test Report - Result Summary



Project: Ground Investigation for Northland Corridor
 Location : Section 2B Warkworth to Te Hana to Port Marsden Highway Section 2B GI
 Client : NZTA C/- Aurecon & WSP NZ Ltd.
 Sample Reference BH2B_T106 Sample Depth (m): 4.50-5.00
 Sampled by: NC_Site Team Date sampled: 19/08/25
 Sampling Method: Pushtube
 Sample Description: Clayey SILT; grey mottled brown; moist; plastic
 Specific Depth : 4.65-5.00m
 Order Number : -

Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/6_TXL_CUM
 Client Ref No: 1-C2466.16

Initial Sample properties

Length (mm) = 109.93
 Diameter (mm) = 53.55

Membrane Correction has been applied

Saturation achieved using a minimum Back Pressure of 400 kPa

Specimen Stage No	Effective Confining Pressure (kPa)	INITIAL PROPERTIES			Solid Particle Density (t/m³)	FINAL PROPERTIES		
		Densities (t/m³)		Water Content (%)		Densities (t/m³)		Water Content (%)
		Wet (t/m³)	Dry (t/m³)			Wet (t/m³)	Dry (t/m³)	
1	50	1.69	1.07	57.8				
2	100				2.72			
3	300				(assumed)	1.80	1.18	52.5

Specimen Stage No	Effective Confining Pressure (kPa)	Void Ratio (e)	Deg of Saturation (Sr)		Deviator Stress $\sigma_1 - \sigma_3$ (kPa)	Pore Pressure μ (kPa)	Strain (%)	Failure Criteria at Maximum Values
			Sr before Consolid. (%)	Sr after Consolid. (%)				
1	50	1.54	100	100	45.4	24	1.15	Deviator Stress
2	100				100.6	52	1.10	Deviator Stress
3	300				138.4	154	2.28	Deviator Stress

Specimen Stage No	Effective Confining Pressure (kPa)	Coefficient of Consolidation Cv (m ² /year)	Volume Compressibility Mv (m ² /MN)	Coefficient of Permeability k (m/s)	B at the start of test	Due to the use of side filter drains, IANZ endorsement does not include the Cv, Mv and k values reported herein. Mv, Cv & k calculated for the following conditions:- L/D=2, RADIAL+TOP+BOTTOM Drainage Side Filter Drains Used (L/D= Sample Length/Diameter.)
1	50	4.8	0.36	5.4 x 10 ⁻¹⁰	0.98	
2	100	1.2	0.3	1.1 x 10 ⁻¹⁰		
3	300	0.3	0.32	3.0 x 10 ⁻¹¹		

TOTAL STRESS RESULT		
Intercept d	19.48	(kPa)
Beta β	8.05	(deg)
Cohesion c	20	(kPa)
Phi ϕ	8	(deg)
Correl coeff.	0.8652	(r ²)

EFFECTIVE STRESS RESULT		
Intercept d'	16.23	(kPa)
Beta β'	14.48	(deg)
Cohesion c'	17	(kPa)
Phi ϕ'	15	(deg)
Correl coeff.	0.8908	(r ²)

Test Method	Notes
Triaxial Test : Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	Cv and Mv have been rounded to 2 significant figures. L/D= Sample Length/Diameter.

Date tested: 25/09/25-02/10/25
 Date reported: 16/10/25

Approved Signatory: Thrushen Pillay
 Designation: Senior Civil Engineering Technician

Date: 16/10/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION
Test Report - Mohr Coulomb Envelope Plot



Project: Ground Investigation for Northland Corridor
 Location : Section 2B Warkworth to Te Hana to Port Marsden Highway Section 2B GI
 Client : NZTA C/- Aurecon & WSP NZ Ltd.
 Sample Reference: BH2B.1106 Sample Depth (m): 4.50-5.00
 Sampled by: NC_Site Team Date sampled: 19/08/25
 Sampling Method: Pushtube
 Sample Description: Clayey SILT; grey mottled brown; moist; plastic
 Specific Depth : 4.65-5.00m
 Order Number : -

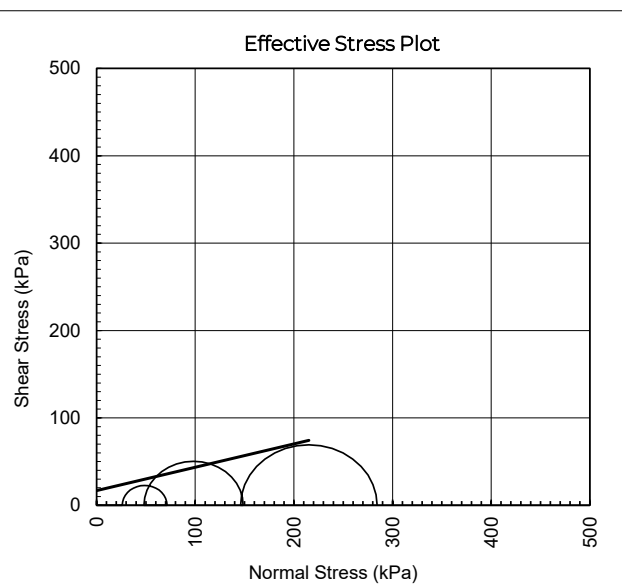
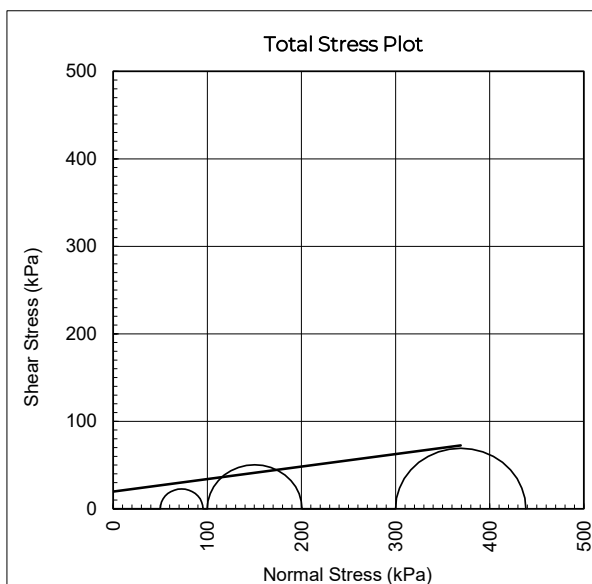
Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/6_TXL_CUM
 Client Ref No: 1-C2466.16

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Mohr-Coulomb envelope plots - Result at Maximum Stress

Back Pressure Saturated at 400 kPa



TOTAL STRESS RESULT			
Intercept d	19.48	(kPa)	
Beta β	8.05	(deg)	
Cohesion c	20	(kPa)	
Phi ϕ	8	(deg)	
Correl coeff.	0.8652	(r^2)	

EFFECTIVE STRESS RESULT			
Intercept d'	16.23	(kPa)	
Beta β'	14.48	(deg)	
Cohesion c'	17	(kPa)	
Phi ϕ'	15	(deg)	
Correl coeff.	0.8908	(r^2)	

Test Method

Triaxial Test : Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Deviator Stress
 Failure Criteria: Stage 2 : Deviator Stress
 (at Max. Values) Stage 3 : Deviator Stress

Date tested: 25/09/25-02/10/25
 Date reported: 16/10/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Approved Signatory:

Thirushen Pillay

Date: 16/10/25

Designation:

Senior Civil Engineering Technician



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION
Test Report - P vs Q Total Stress Plot



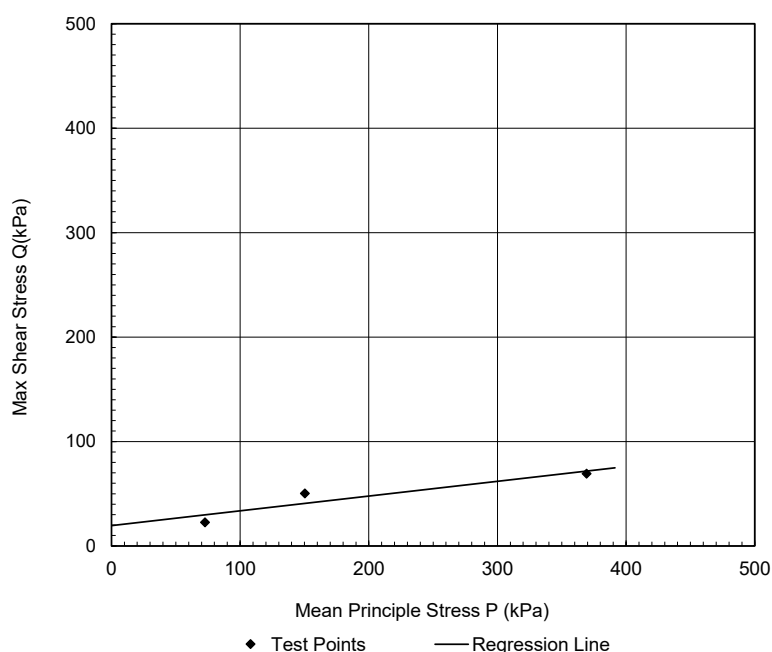
Project: Ground Investigation for Northland Corridor
 Location : Section 2B Warkworth to Te Hana to Port Marsden Highway Section 2B GI
 Client : NZTA C/- Aurecon & WSP NZ Ltd.
 Sample Reference BH2B_1106 Sample Depth (m): 4.50-5.00
 Sampled by: NC_Site Team Date sampled: 19/08/25
 Sampling Method: Pushtube
 Sample Description: Clayey SILT; grey mottled brown; moist; plastic
 Specific Depth : 4.65-5.00m
 Order Number : -

Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/6_TXL_CUM
 Client Ref No: 1-C2466.16

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P vs Q Total Stress Plot - Back Pressure saturated at 400 kPa



TOTAL STRESS RESULT			Correl coeff	0.8652	(r ²)
Intercept d	19.48	(kPa)	Cohesion c	20	(kPa)
Beta β	8.05	(deg)	Phi Ø	8	(deg)

Test Method

Triaxial Test : Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Deviator Stress
 Failure Criteria: Stage 2 : Deviator Stress
 (at Max. Values) Stage 3 : Deviator Stress

Date tested: 25/09/25-02/10/25
 Date reported: 16/10/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Approved Signatory:

Thirushen Pillay
 Senior Civil Engineering Technician

Date: 16/10/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

Designation:

LHF 2517 (09/20)

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION
Test Report - P' vs Q' Effective Stress Plot



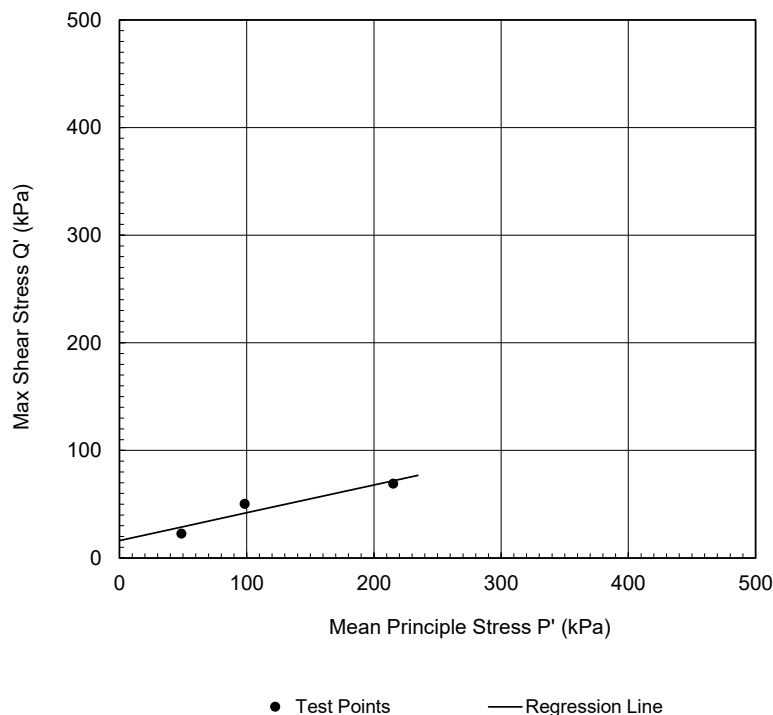
Project: Ground Investigation for Northland Corridor
Location: Section 2B Warkworth to Te Hana to Port Marsden Highway Section 2B GI
Client: NZTA C/- Aurecon & WSP NZ Ltd.
Sample Reference: BH2B_1106 Depth (m): 4.50-5.00
Sampled by: NC_Site Team Date sampled: 19/08/25
Sampling Method: Pushtube
Sample Description: Clayey SILT; grey mottled brown; moist; plastic
Specific Depth: 4.65-5.00m
Order Number: -

Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/6_TXL_CUM
Client Ref No: 1-C2466.16

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P' vs Q' Effective Stress Plot - Back Pressure saturated at 400 kPa



EFFECTIVE STRESS RESULT			Correl coeff	0.8908	(r ²)
Intercept d'	16.23	(kPa)	Cohesion c'	17	(kPa)
Beta β'	14.48	(deg)	Phi Ø'	15	(deg)

Test Method

Triaxial Test : Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Deviator Stress
Failure Criteria: Stage 2 : Deviator Stress
(at Max. Values) Stage 3 : Deviator Stress

Date tested: 25/09/25-02/10/25
Date reported: 16/10/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 16/10/25

Designation:

LHF 2517 (09/20)



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION
Test Report - PvsQ Stress Path Plot



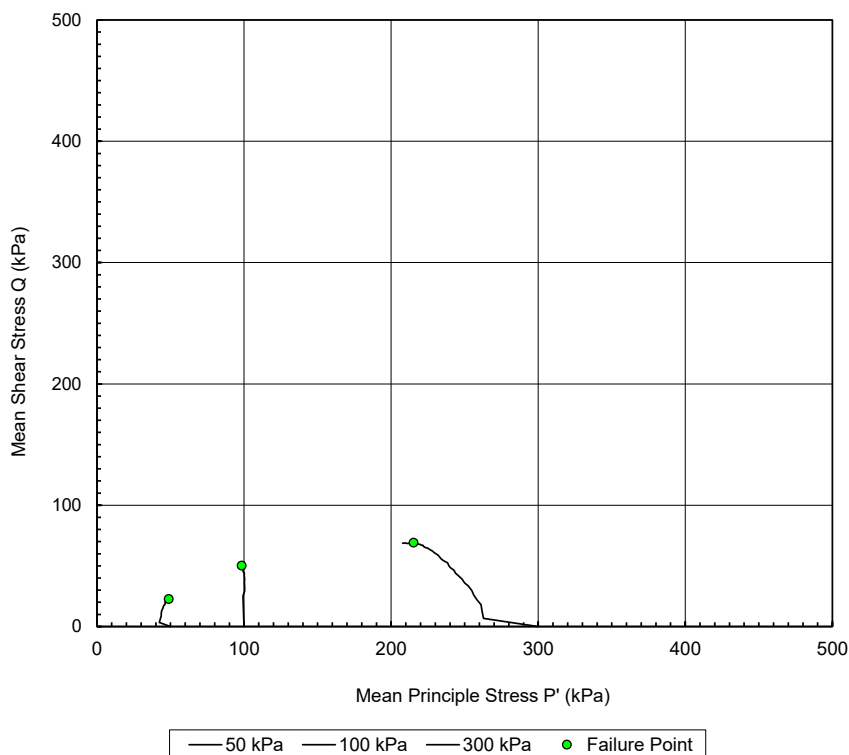
Project: Ground Investigation for Northland Corridor
Location : Section 2B Warkworth to Te Hana to Port Marsden Highway Section 2B GI
Client : NZTA C/- Aurecon & WSP NZ Ltd.
Sample Reference: BH2B_T106 Sample Depth (m): 4.50-5.00
Sampled by: NC_Site Team Date sampled: 19/08/25
Sampling Method: Pushtube
Sample Description: Clayey SILT; grey mottled brown; moist; plastic
Specific Depth : 4.65-5.00m
Order Number : -

Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/6_TXL_CUM
Client Ref No: 1-C2466.16

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P' vs Q Stress Path (Effective Stress Plot) - Back Pressure saturated at 400 kPa



Test Method

Triaxial Test : Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Deviator Stress
Failure Criteria: Stage 2 : Deviator Stress
(at Max. Values) Stage 3 : Deviator Stress

Date tested: 25/09/25-02/10/25
Date reported: 16/10/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 16/10/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION
Test Report - Strain vs Deviator Stress Plot



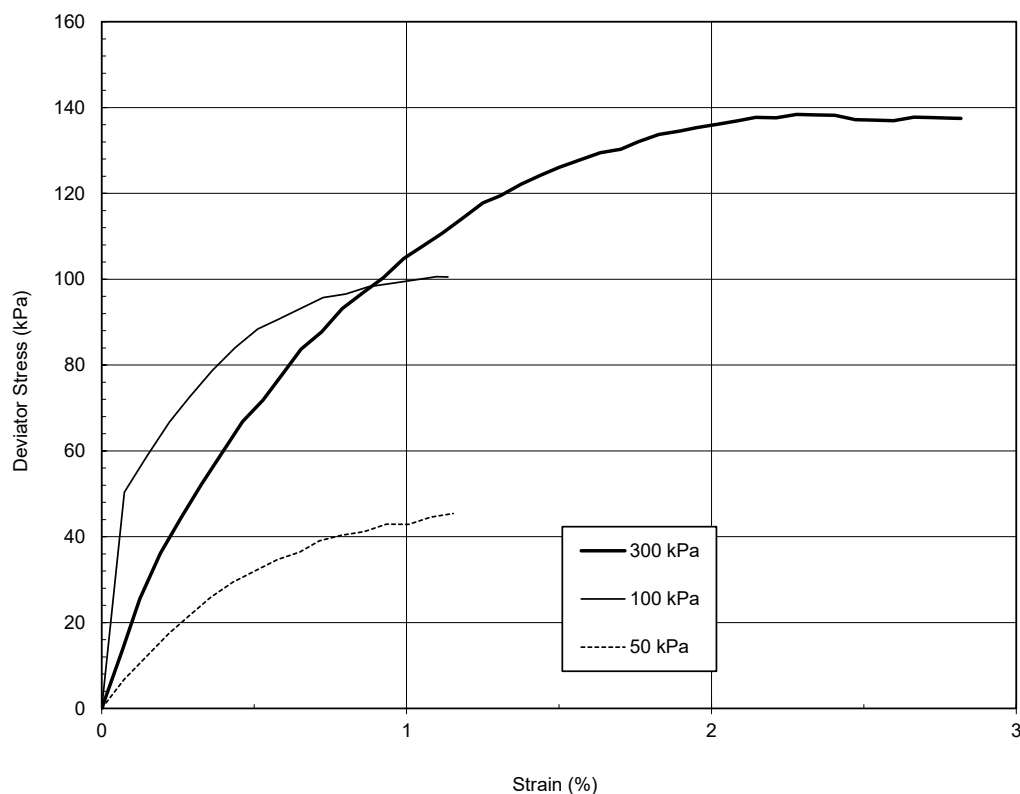
Project: Ground Investigation for Northland Corridor
 Location : Section 2B Warkworth to Te Hana to Port Marsden Highway Section 2B GI
 Client : NZTA C/- Aurecon & WSP NZ Ltd.
 Sample Reference BH2B_1106 Sample Depth (m): 4.50-5.00
 Sampled by: NC_Site Team Date sampled: 19/08/25
 Sampling Method: Pushtube
 Sample Description: Clayey SILT; grey mottled brown; moist; plastic
 Specific Depth : 4.65-5.00m
 Order Number : -

Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/6_TXL_CUM
 Client Ref No: 1-C2466.16

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Strain vs Deviator Stress Plot - Back Pressure saturated at 400 kPa



Test Method	Notes
Triaxial Test : Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	

Date tested: 25/09/25-02/10/25
 Date reported: 16/10/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory: 
 Designation: Thirushen Pillay
 Senior Civil Engineering Technician

Date: 16/10/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION
Test Report - Strain vs Pore Pressure Plot

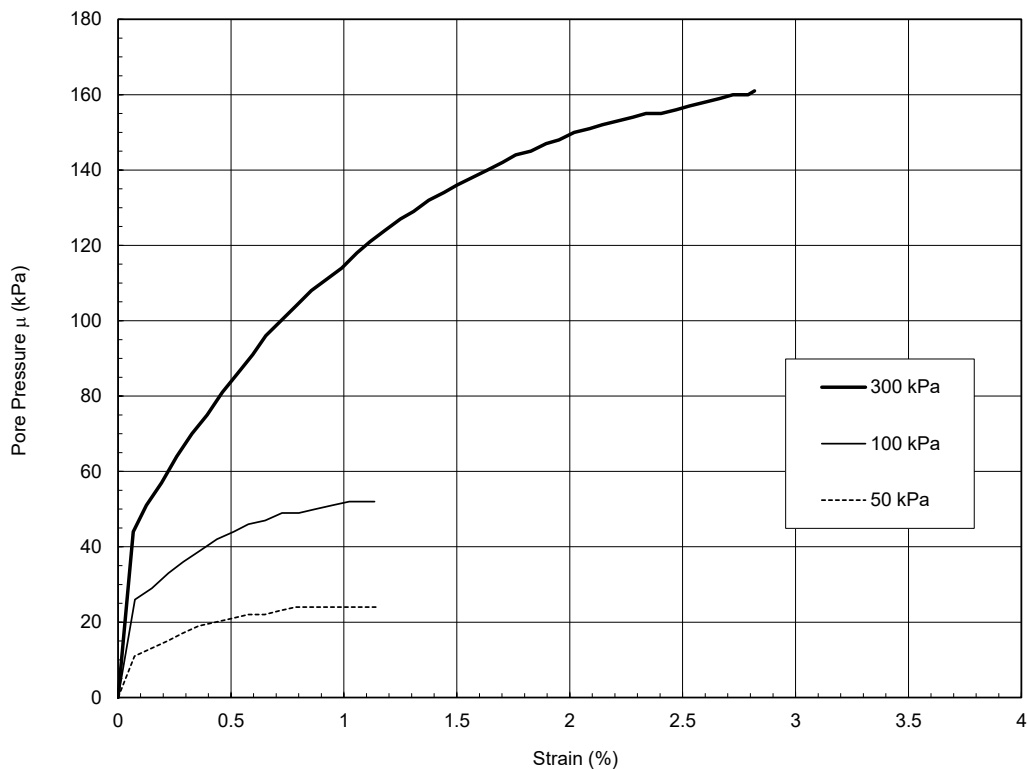


Project: Ground Investigation for Northland Corridor
 Location : Section 2B Warkworth to Te Hana to Port Marsden Highway Section 2B GI
 Client : NZTA C/- Aurecon & WSP NZ Ltd.
 Sample Reference: BH2B_1106 Sample Depth (m): 4.50-5.00
 Sampled by: NC_Site Team Date sampled: 19/08/25
 Sampling Method: Pushtube
 Sample Description: Clayey SILT; grey mottled brown; moist; plastic
 Specific Depth : 4.65-5.00m
 Order Number : -

Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/6_TXL_CUM
 Client Ref No: 1-C2466.16

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT
 Strain vs Pore Pressure Plot - Back Pressure saturated at 400 kPa



Test Method	Notes
Triaxial Test : Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	

Date tested: 25/09/25-02/10/25
 Date reported: 16/10/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Approved Signatory: 
 Designation: Thirushen Pillay
 Senior Civil Engineering Technician

Date: 16/10/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

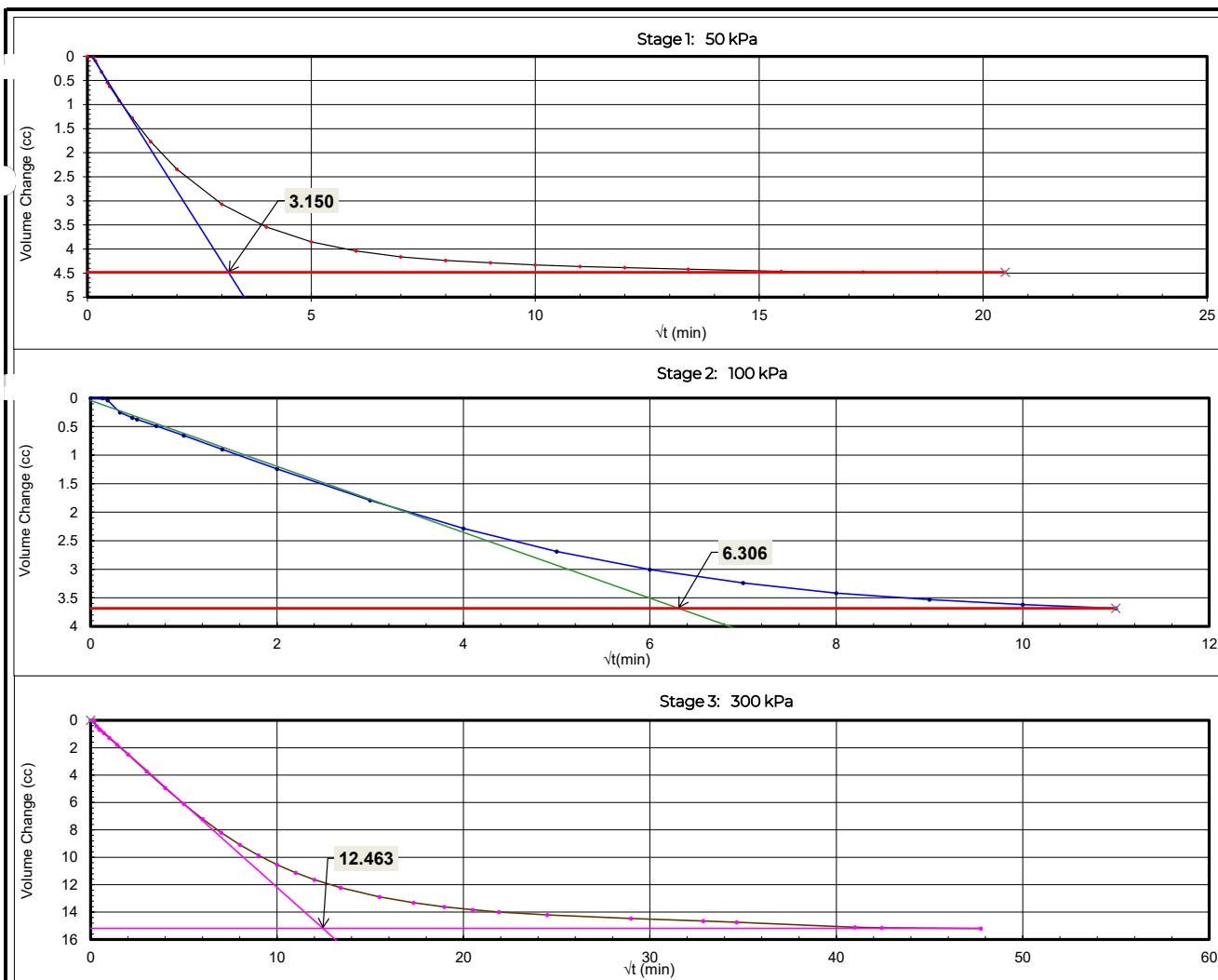
CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION
Displacement vs $\sqrt{t}$ Plot (Consolidation stage)



Project: Ground Investigation for Northland Corridor
Location: Section 2B Warkworth to Te Hana to Port Marsden Highway Section 2B GI
Client: NZTA C/- Aurecon & WSP NZ Ltd.
Sample Reference: BH2B_T106 Sample Depth (m): 4.50-5.00
Sampled by: NC_Site Team Date sampled: 19/08/25
Sampling Method: Pushtube
Sample Description: Clayey SILT; grey mottled brown; moist; plastic
Specific Depth: 4.65-5.00m
Order Number: -

Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/6_TXL_CUM
Client Ref No: 1-C2466.16



Test Method	Test Results			
Triaxial Test : Consolidated undrained triaxial test : BS EN ISO 17892-9:2018	Confining Pressure (kPa)=	50 kPa	100 kPa	300 kPa
Water Content : NZS4402 : 1986 Test 2.1	C_v (m^2/yr)=	4.77	1.19	0.30
	M_v (m^2/MN)=	0.36	0.30	0.32
	k (m/s)=	5.36E-10	1.12E-10	3.00E-11
	$\sqrt{t}$ =	3.150	6.306	12.463
	t_{100} =	9.923	39.766	155.326

Date tested: 25/09/25-02/10/25
Date reported: 16/10/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Date: 16/10/25

Approved Signatory

Thirushen Pillay
Senior Civil Engineering Technician

Designation:

LHF 2517 (09/20)



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

Page 8 of 8

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - Result Summary



Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1107
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Clayey SILT; brown mottled orange; moist; plastic
 Depth (m): 6.00-6.50
 Date sampled: 8/10/25

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/155-TXL-CUM
 Client Ref: -

Initial Sample properties		Rate of strain (mm/min)	
Length (mm)	= 108.09	Stage 1	0.011
Diameter (mm)	= 53.50	Stage 2	0.011
Membrane Correction (kPa)=		Stage 3	0.011

Saturation achieved using a minimum Back Pressure of 450 kPa

Specimen Stage No	Effective Confining Pressure (kPa)	INITIAL PROPERTIES			Solid Particle Density (Mg/m³)	FINAL PROPERTIES		
		Densities (Mg/m³)		Water Content (%)		Densities (Mg/m³)		Water Content (%)
		Bulk (Mg/m³)	Dry (Mg/m³)			Bulk (Mg/m³)	Dry (Mg/m³)	
1	50	1.85	1.33	39.3				
2	100				2.72			
3	200				(assumed)	1.94	1.40	38.8

Specimen Stage No	Effective Confining Pressure (kPa)	Void Ratio (e)	Deg of Saturation (Sr)		Deviator Stress $\sigma_1 - \sigma_3$ (kPa)	Pore Pressure μ (kPa)	Cumulative Strain (%)	Failure Criteria at Maximum Values
			Sr before Consolid.	Sr after Consolid.				
1	50	1.05	100	100	64.9	26	1.40	Stress Ratio
2	100				63.6	43	2.76	Stress Ratio
3	200				207.9	93	5.08	Stress Ratio

Specimen Stage No	Effective Confining Pressure (kPa)	Coefficient of Consolidation Cv (m ² /year)	Volume Compressibility Mv (m ² /MN)	Coefficient of Permeability k (m/s)	Final B Value	Due to the use of side filter drains, IANZ endorsement does not include the Cv, Mv and k values reported herein. Mv, Cv & k calculated for the following conditions:- L/D=2, RADIAL+TOP+BOTTOM Drainage Side Filter Drains Used (L/D= Sample Length/Diameter.)
1	50	5.2	0.39	6.2 x 10 ⁻¹⁰	1.00	
2	100	3.6	0.26	2.9 x 10 ⁻¹⁰		
3	200	3.2	0.16	1.6 x 10 ⁻¹⁰		

TOTAL STRESS RESULT		
Intercept d	0.00	(kPa)
Beta β	18.26	(deg)
Cohesion c	0	(kPa)
Phi ϕ	19	(deg)
Correl coeff.	0.9862	(r ²)

EFFECTIVE STRESS RESULT		
Intercept d'	0.00	(kPa)
Beta β'	25.57	(deg)
Cohesion c'	0	(kPa)
Phi ϕ'	29	(deg)
Correl coeff.	0.9881	(r ²)

Value (Total Stress) has been adjusted to zero

NB: The Cohesion Value (Eff. Stress) has been adjusted to zero

Test Method	Notes
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	Cv and Mv have been rounded to 2 significant figures. Mg/m ³ is equivalent to t/m ³ Deviation from standard, rate of vertical strain for shear stage reported in mm/min vs. %/hr

Date tested: 30/10/25-11/11/25
 Date reported: 28/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory: 
 Designation: Thirushen Pillay
 Senior Civil Engineering Technician

Date: 28/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Volume change vs $\sqrt{t}$ Plot (Consolidation stage)



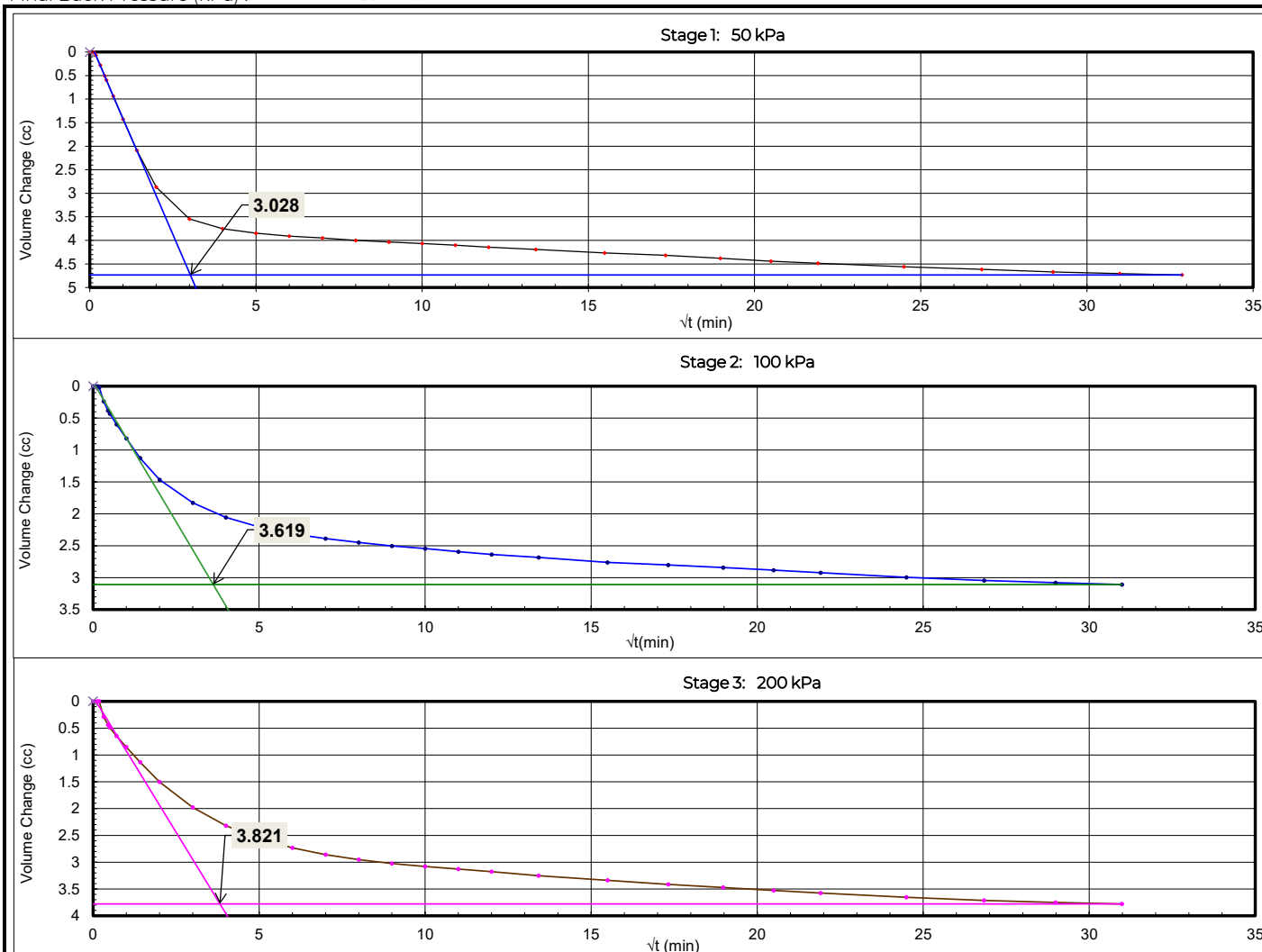
Project: Ground Investigation for Northland Corridor
Location: Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1107
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Clayey SILT; brown mottled orange; moist; plastic

Depth (m): 6.00-6.50
Date sampled: 8/10/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/155-TXL-CUM
Client Ref: -

Final Back Pressure (kPa): 450 kPa



Test Method	Test Results at end of consolidation			
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018	Effective Stress (kPa)=	50 kPa	100 kPa	200 kPa
Water Content : NZS4402 : 1986 Test 2.1	t_{100} (min) =	9.169	13.097	14.600
	Volumetric Strain (%)=	1.948	1.279	1.555
	Vertical Strain (%)=	0.649	0.423	0.514
	PWP Dissipation (U)=	1.000	1.000	1.000
	Estimated Strain to failure(%)=	5	5	5

Date tested : 28/11/25
Date reported : 30/10/25-11/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Date: 28/11/25

Approved Signatory: Thirushen Pillay
Designation: Senior Civil Engineering Technician

LHF 2418 (08/25)

WSP
Auckland Laboratory
Quality Management Systems Certified to ISO 9001

7a Ride Way, Albany
Private Bag 101982, NS Mail Centre, North
Shore City 0745, New Zealand



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

Telephone +64 9 4154660
Website www.wsp.com/nz

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - Mohr Coulomb Envelope Plot



Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1107
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Clayey SILT; brown mottled orange; moist; plastic

Depth (m): 6.00-6.50
 Date sampled: 8/10/25

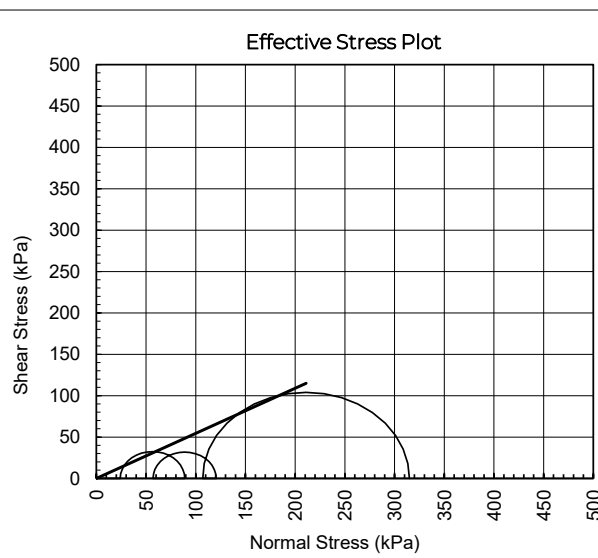
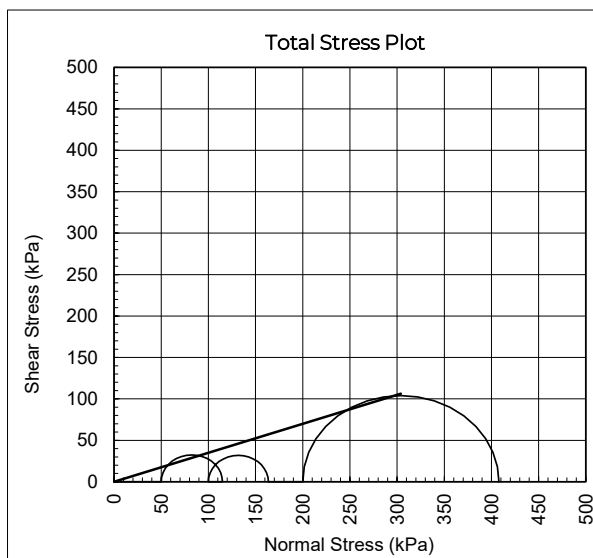
Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/155-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Mohr-Coulomb envelope plots - Result at Maximum Stress

Back Pressure Saturated at 450 kPa



NB: The Cohesion Value (Total Stress) has been adjusted to zero

NB: The Cohesion Value (Effective Stress) has been adjusted to zero

TOTAL STRESS RESULT			
Intercept d	0.00	(kPa)	
Beta β	18.26	(deg)	
Cohesion c	0	(kPa)	
Phi ϕ	19	(deg)	
Correl coeff.	0.9862	(r ²)	

EFFECTIVE STRESS RESULT			
Intercept d'	0.00	(kPa)	
Beta β'	25.57	(deg)	
Cohesion c'	0	(kPa)	
Phi ϕ'	29	(deg)	
Correl coeff.	0.9881	(r ²)	

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Drainage Conditions during Shear :
 Stage 2 : Stress Ratio
 Stage 3 : Stress Ratio

Date tested: 30/10/25-11/11/25
 Date reported: 28/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Approved Signatory:

Thirushen Pillay

Date: 28/11/25

Designation:

Senior Civil Engineering Technician



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - P vs Q Total Stress Plot



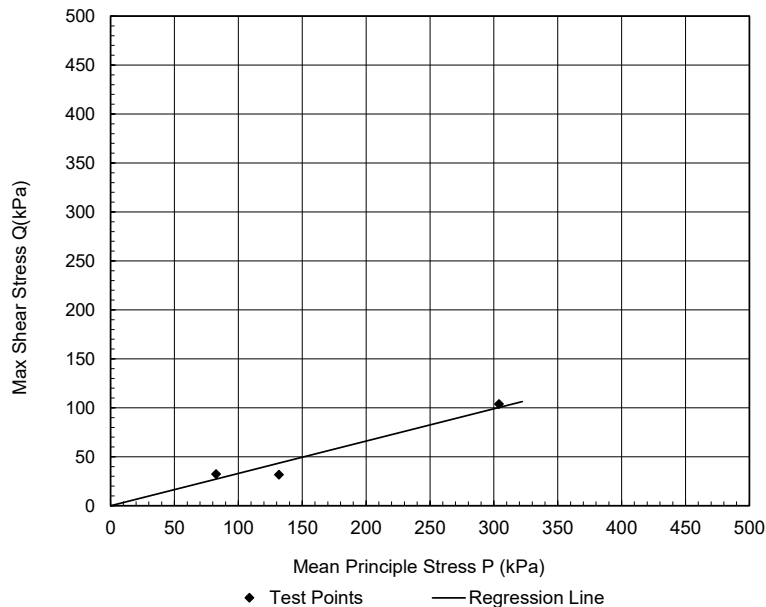
Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1107 Depth (m): 6.00-6.50
 Sampled by: NC Site Team Date sampled: 8/10/25
 Sampling Method: Pushtube
 Sample Description: Clayey SILT; brown mottled orange; moist; plastic

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/155-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P vs Q Total Stress Plot - Back Pressure saturated at 450 kPa



NB: The Cohesion Value (Total Stress) has been adjusted to zero

TOTAL STRESS RESULT			Correl coeff	0.9862	(r^2)
Intercept d	0.00	(kPa)	Cohesion c	0	(kPa)
Beta β	18.26	(deg)	Phi ϕ	19	(deg)

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
 Failure Criteria: Stage 2 : Stress Ratio
 (at Max. Values) Stage 3 : Stress Ratio

Date tested: 30/10/25-11/11/25
 Date reported: 28/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory: 
 Designation: Thirushen Pillay
 Senior Civil Engineering Technician

Date: 28/11/25



Test results indicated as not
 accredited are outside the
 scope of the laboratory's
 accreditation

LHF 2418 (08/25)

Page 4 of 9

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - P' vs Q' Effective Stress Plot

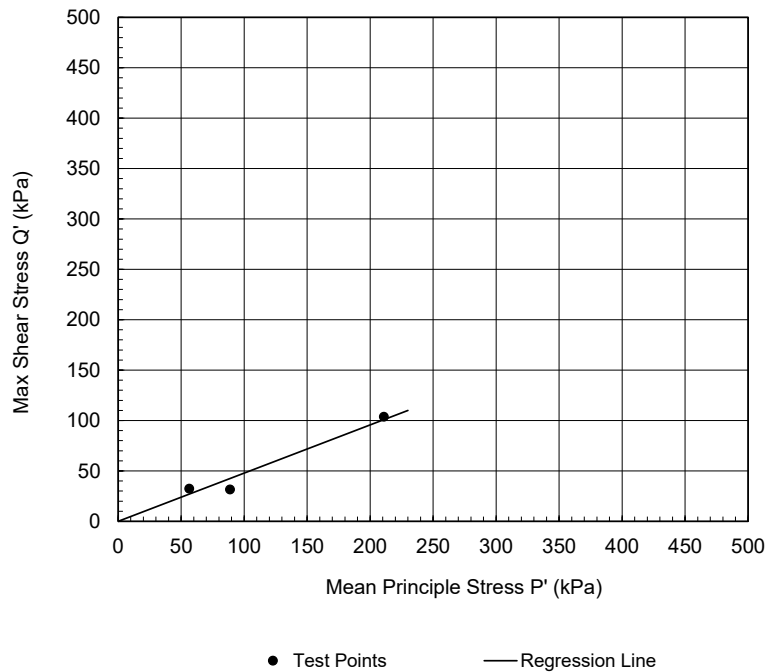


Project: Ground Investigation for Northland Corridor
Location: Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1107 Depth (m): 6.00-6.50
Sampled by: NC Site Team Date sampled: 8/10/25
Sampling Method: Pushtube
Sample Description: Clayey SILT; brown mottled orange; moist; plastic

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/155-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT
P' vs Q' Effective Stress Plot - Back Pressure saturated at 450 kPa



EFFECTIVE STRESS RESULT			Correl coeff	0.9881	(r ²)
Intercept d'	0.00	(kPa)	Cohesion c'	0	(kPa)
Beta β'	25.57	(deg)	Phi Ø'	29	(deg)

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
Failure Criteria: Stage 2 : Stress Ratio
(at Max. Values) Stage 3 : Stress Ratio

Date tested: 30/10/25-11/11/25
Date reported: 28/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 28/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

Designation:
LHF 2418 (08/25)

Page 5 of 9

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - PvsQ Stress Path Plot



Project: Ground Investigation for Northland Corridor
Location: Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1107
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Clayey SILT; brown mottled orange; moist; plastic

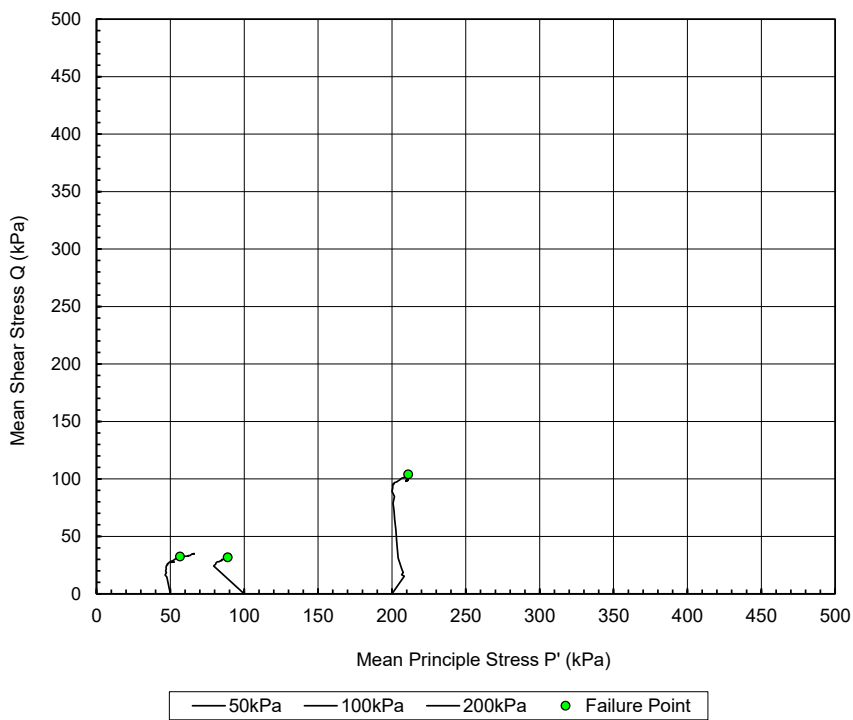
Depth (m): 6.00-6.50
Date sampled: 8/10/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/155-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P' vs Q Stress Path (Effective Stress Plot) - Back Pressure saturated at 450 kPa



Test Method

Consolidated undrained triaxial test: BS EN ISO 17892-9:2018
Water Content: NZS4402:1986 Test 2.1

Notes

Stage 1: Stress Ratio
Failure Criteria: Stage 2: Stress Ratio
(at Max. Values) Stage 3: Stress Ratio

Date tested: 30/10/25-11/11/25
Date reported: 28/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory: Thirushen Pillay
Designation: Senior Civil Engineering Technician

Date: 28/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Strain vs Deviator Stress Plot

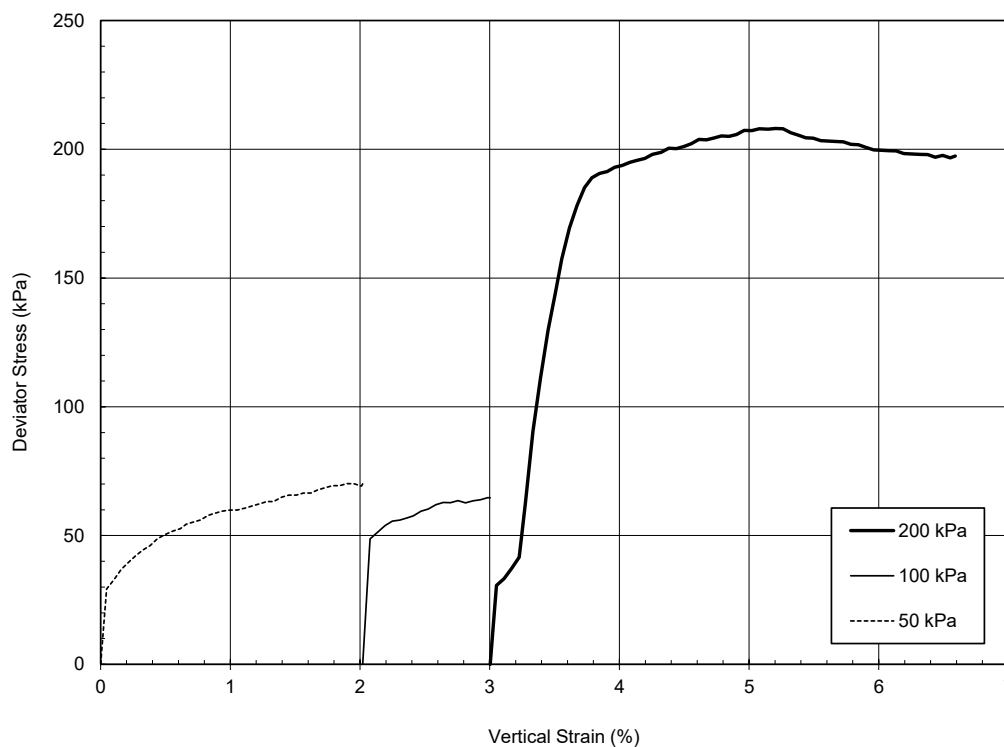


Project: Ground Investigation for Northland Corridor
Location: Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1107
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Clayey SILT; brown mottled orange; moist; plastic
Depth (m): 6.00-6.50
Date sampled: 8/10/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/155-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT
Vertical Strain vs Deviator Stress Plot - Back Pressure saturated at 450 kPa



Test Method	Notes
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	

Date tested: 30/10/25-11/11/25
Date reported: 28/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory: 
Designation: Thirushen Pillay
Senior Civil Engineering Technician

Date: 28/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Strain vs Pore Pressure Plot



Project: Ground Investigation for Northland Corridor
Location: Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1107
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Clayey SILT; brown mottled orange; moist; plastic

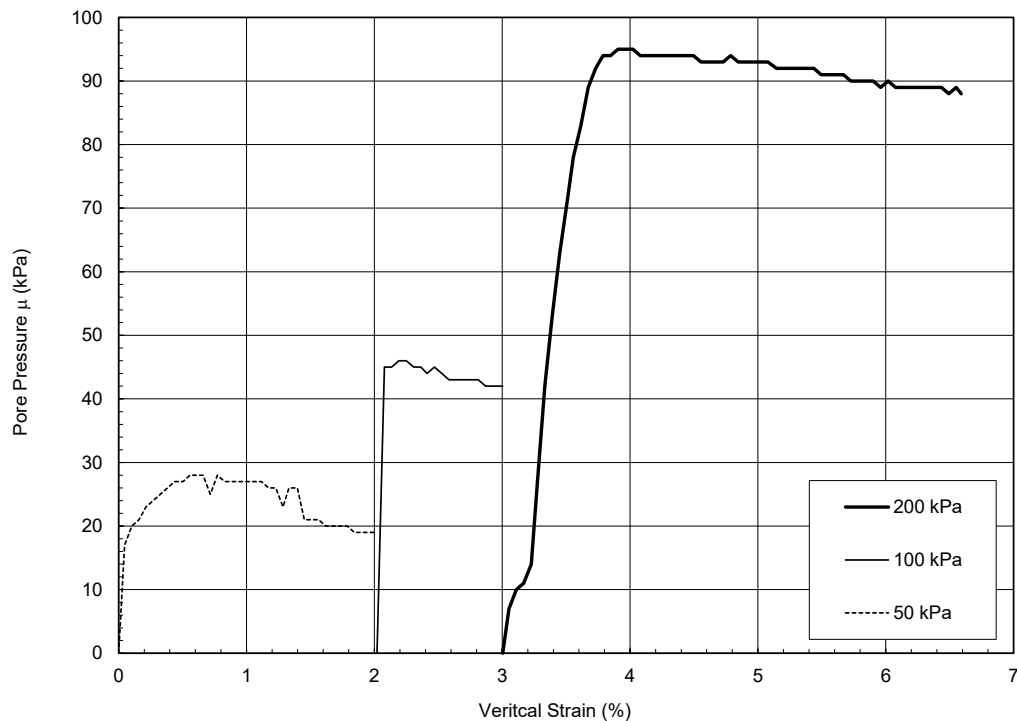
Depth (m): 6.00-6.50
Date sampled: 8/10/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/155-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Vertical Strain vs Pore Pressure Plot - Back Pressure saturated at 450 kPa



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Date tested: 30/10/25-11/11/25
Date reported: 28/11/25

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 28/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

LHF 2418 (08/25)

Page 8 of 9

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test report - Photograph of Failure Type



Project: Ground Investigation for Northland Corridor
Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1107
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Clayey SILT; brown mottled orange; moist; plastic

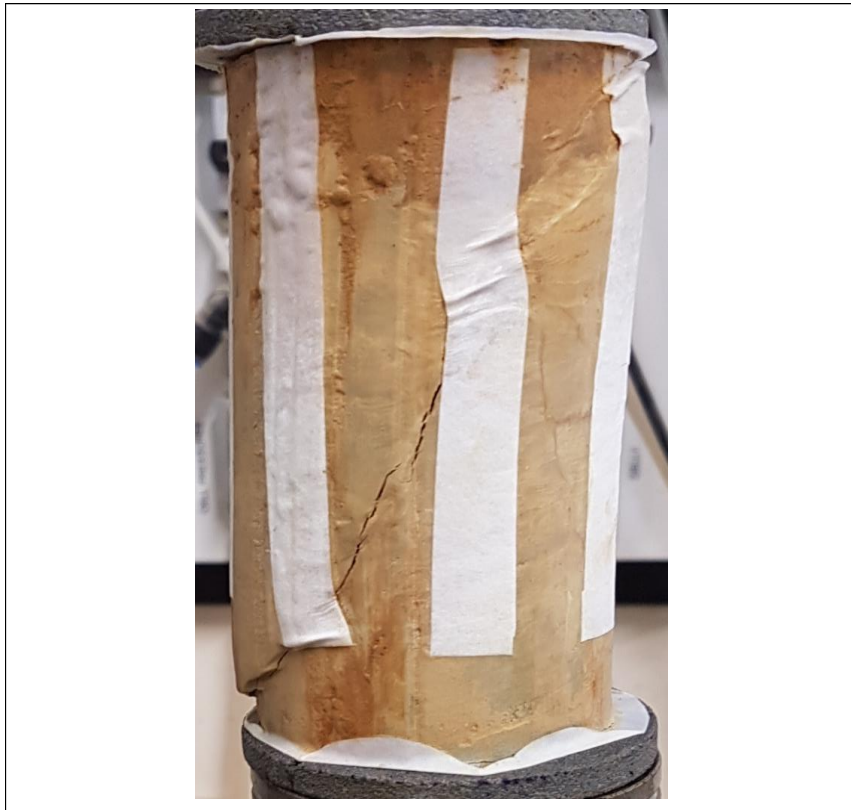
Depth (m): 6.00-6.50
Date sampled: 8/10/25

Sample Type : Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/155-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Photo of failure type



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Date tested: 30/10/25-11/11/25
Date reported: 28/11/25

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 28/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

LHF 2418 (08/25)

Page 9 of 9

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - Result Summary



Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1108
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Silty CLAY; brown mottled orange; moist; plastic

Depth (m): 3.00-3.50
 Date sampled: 17/10/25

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/160-TXL-CUM
 Client Ref: -

Initial Sample properties		Rate of strain (mm/min)	
Length (mm)	= 107.95	Stage 1	0.011
Diameter (mm)	= 53.75	Stage 2	0.011
Membrane Correction (kPa)=		Stage 3	0.011

Saturation achieved using a minimum Back Pressure of 600 kPa

Specimen Stage No	Effective Confining Pressure (kPa)	INITIAL PROPERTIES			Solid Particle Density (Mg/m ³)	FINAL PROPERTIES		
		Densities (Mg/m ³)		Water Content (%)		Densities (Mg/m ³)		Water Content (%)
		Bulk (Mg/m ³)	Dry (Mg/m ³)			Bulk (Mg/m ³)	Dry (Mg/m ³)	
1	50	1.77	1.21	45.5				
2	100				2.73			
3	200				(assumed)	1.89	1.31	44.2

Specimen Stage No	Effective Confining Pressure (kPa)	Void Ratio (e)	Deg of Saturation (Sr)		Deviator Stress $\sigma_1 - \sigma_3$ (kPa)	Pore Pressure μ (kPa)	Cumulative Strain (%)	Failure Criteria at Maximum Values
			Sr before Consolid.	Sr after Consolid.				
1	50	1.25	99	100	74.2	27	1.89	Stress Ratio
2	100				155.1	47	3.92	Stress Ratio
3	200				190.6	96	7.26	Stress Ratio

Specimen Stage No	Effective Confining Pressure (kPa)	Coefficient of Consolidation Cv (m ² /year)	Volume Compressibility Mv (m ² /MN)	Coefficient of Permeability k (m/s)	Final B Value	Due to the use of side filter drains, IANZ endorsement does not include the Cv, Mv and k values reported herein. Mv, Cv & k calculated for the following conditions:- L/D=2, RADIAL+TOP+BOTTOM Drainage Side Filter Drains Used (L/D= Sample Length/Diameter.)
1	50	0.47	0.49	7.1 x 10 ⁻¹¹	0.96	
2	100	0.22	0.43	2.9 x 10 ⁻¹¹		
3	200	0.14	0.30	1.3 x 10 ⁻¹¹		

TOTAL STRESS RESULT		
Intercept d	18.97	(kPa)
Beta β	15.29	(deg)
Cohesion c	20	(kPa)
Phi ϕ	16	(deg)
Correl coeff.	0.9143	(r ²)

EFFECTIVE STRESS RESULT		
Intercept d'	15.54	(kPa)
Beta β'	22.73	(deg)
Cohesion c'	17	(kPa)
Phi ϕ'	25	(deg)
Correl coeff.	0.9547	(r ²)

Test Method	Notes
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	Cv and Mv have been rounded to 2 significant figures. Mg/m ³ is equivalent to t/m ³ Deviation from standard, rate of vertical strain for shear stage reported in mm/min vs. %/hr

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Date tested: 05-18/11/25
 Date reported: 28/11/25

Approved Signatory: Thirushen Pillay
 Designation: Senior Civil Engineering Technician

Date: 28/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Volume change vs $\sqrt{t}$ Plot (Consolidation stage)



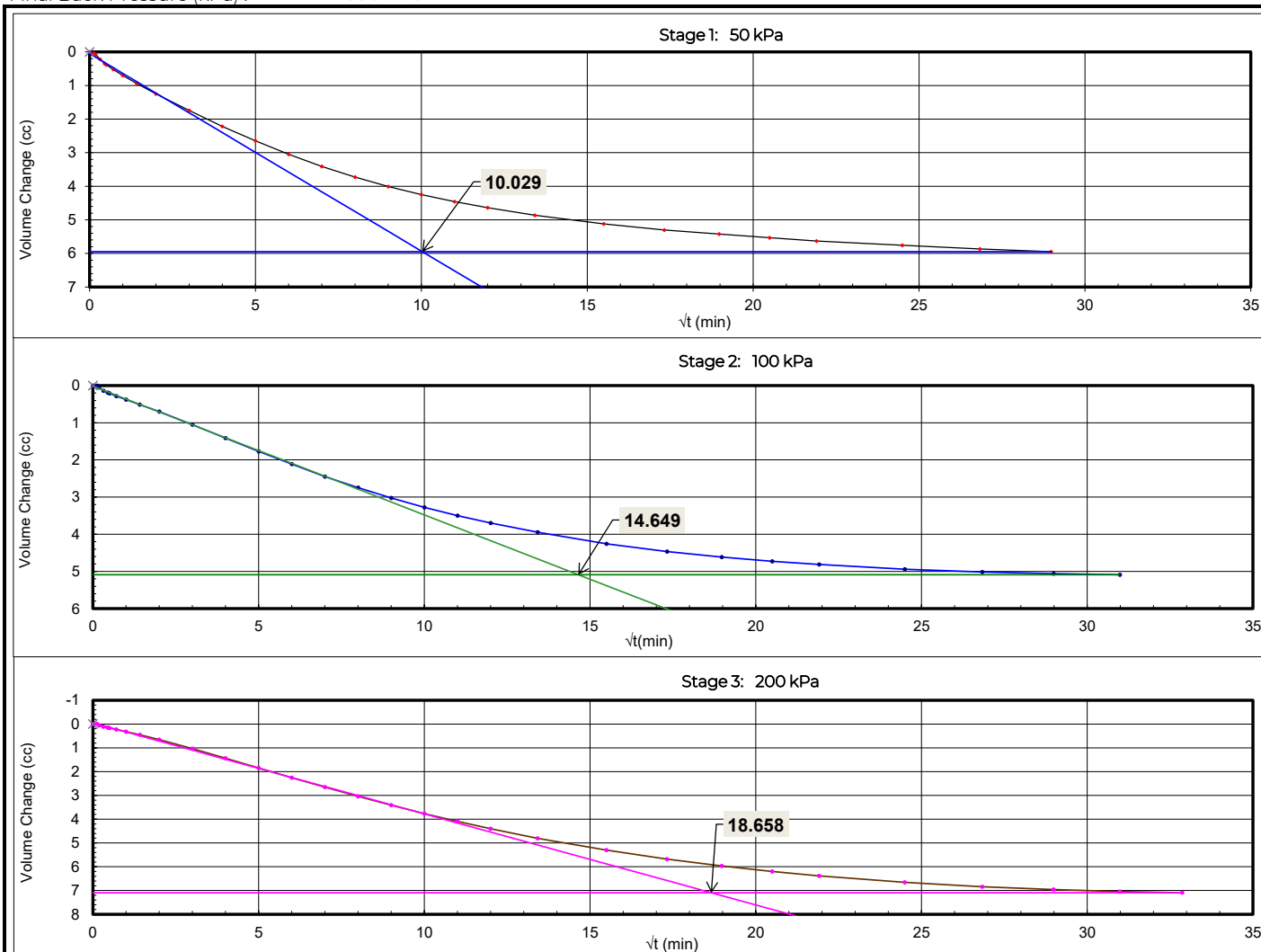
Project: Ground Investigation for Northland Corridor
Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1108
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Silty CLAY; brown mottled orange; moist; plastic

Depth (m): 3.00-3.50
Date sampled: 17/10/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/160-TXL-CUM
Client Ref: -

Final Back Pressure (kPa) : 600 kPa



Test Method	Test Results at end of consolidation			
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018	Effective Stress (kPa)=	50 kPa	100 kPa	200 kPa
Water Content : NZS4402 : 1986 Test 2.1	t_{100} (min) =	100.581	214.593	348.121
	Volumetric Strain (%)=	2.428	2.078	2.895
	Vertical Strain (%)=	0.809	0.691	0.957
	PWP Dissipation (U)=	1.000	1.000	1.000
	Estimated Strain to failure(%)=	5	5	5

Date tested : 28/11/25
Date reported : 05-18/11/25

Approved Signatory: Thirushen Pillay
Designation: Senior Civil Engineering Technician

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Date: 28/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

LHF 2418 (08/25)

WSP
Auckland Laboratory
Quality Management Systems Certified to ISO 9001

7a Ride Way, Albany
Private Bag 101982, NS Mail Centre, North
Shore City 0745, New Zealand

Telephone +64 9 4154660
Website www.wsp.com/nz

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Mohr Coulomb Envelope Plot



Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1108
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Silty CLAY; brown mottled orange; moist; plastic

Depth (m): 3.00-3.50
 Date sampled: 17/10/25

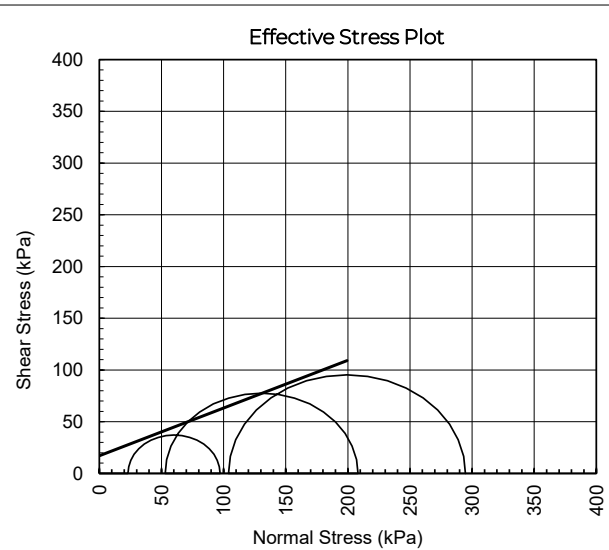
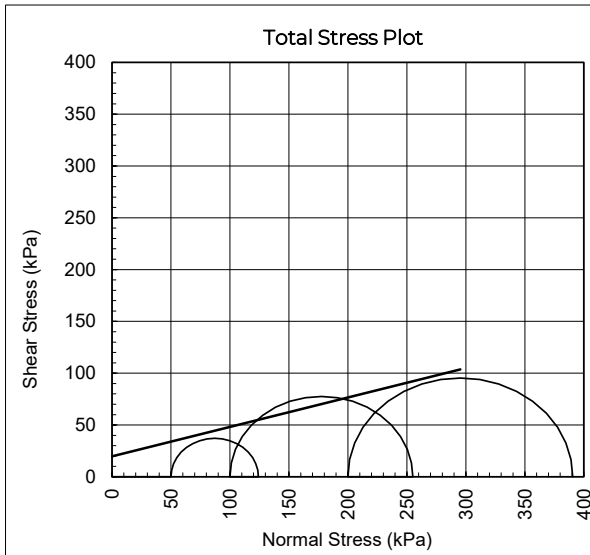
Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/160-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Mohr-Coulomb envelope plots - Result at Maximum Stress

Back Pressure Saturated at 600 kPa



TOTAL STRESS RESULT			
Intercept d	18.97	(kPa)	
Beta β	15.29	(deg)	
Cohesion c	20	(kPa)	
Phi ϕ	16	(deg)	
Correl coeff.	0.9143	(r ²)	

EFFECTIVE STRESS RESULT			
Intercept d'	15.54	(kPa)	
Beta β'	22.73	(deg)	
Cohesion c'	17	(kPa)	
Phi ϕ'	25	(deg)	
Correl coeff.	0.9547	(r ²)	

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Drainage Conditions during Shear :
 Stage 2 : Stress Ratio
 Stage 3 : Stress Ratio

Date tested: 05-18/11/25
 Date reported: 28/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory: Thirushen Pillay
 Designation: Senior Civil Engineering Technician

Date: 28/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - P vs Q Total Stress Plot



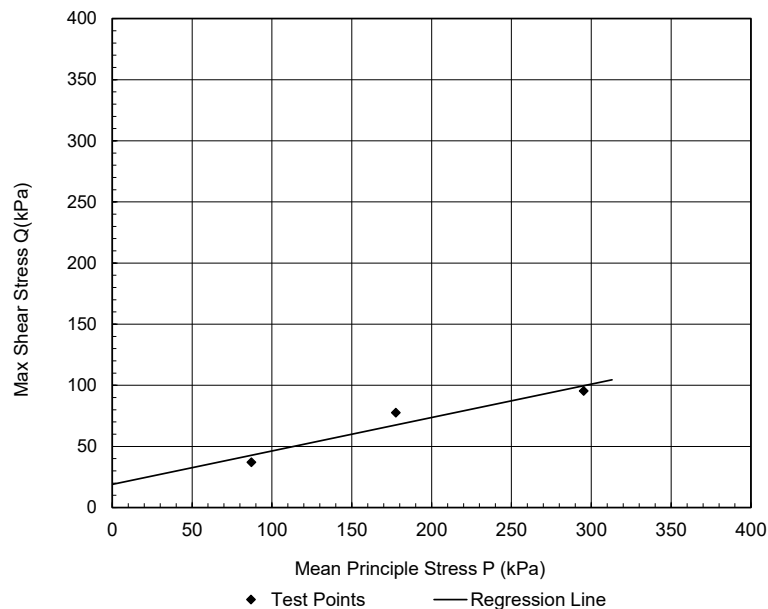
Project: Ground Investigation for Northland Corridor
Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1108 Depth (m): 3.00-3.50
Sampled by: NC Site Team Date sampled: 17/10/25
Sampling Method: Pushtube
Sample Description: Silty CLAY; brown mottled orange; moist; plastic

Sample Type : Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/160-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P vs Q Total Stress Plot - Back Pressure saturated at 600 kPa



TOTAL STRESS RESULT			Correl coeff	0.9143	(r^2)
Intercept d	18.97	(kPa)	Cohesion c	20	(kPa)
Beta β	15.29	(deg)	Phi ϕ	16	(deg)

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
Failure Criteria: Stage 2 : Stress Ratio
(at Max. Values) Stage 3 : Stress Ratio

Date tested: 05-18/11/25
Date reported: 28/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 28/11/25

Designation:

LHF 2418 (08/25)



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - P' vs Q' Effective Stress Plot

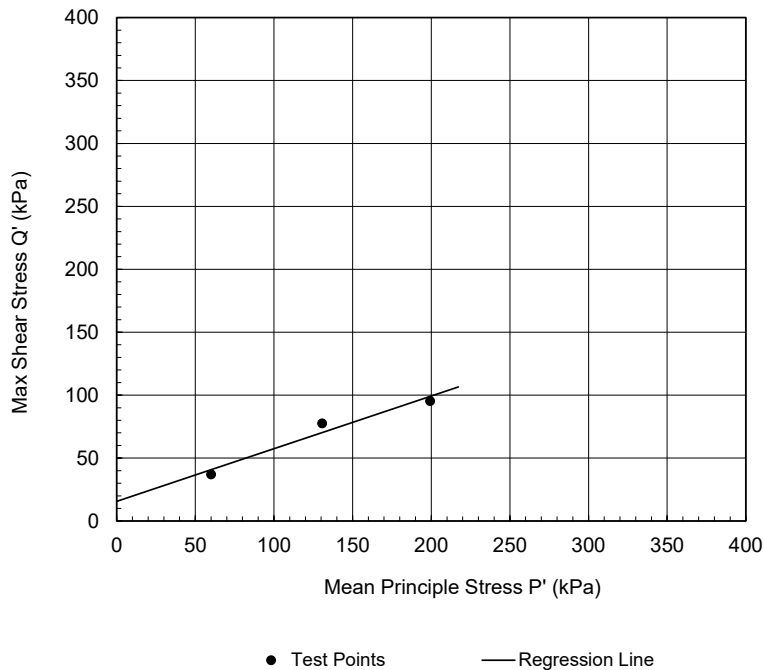


Project: Ground Investigation for Northland Corridor
Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1108 Depth (m): 3.00-3.50
Sampled by: NC Site Team Date sampled: 17/10/25
Sampling Method: Pushtube
Sample Description: Silty CLAY; brown mottled orange; moist; plastic

Sample Type : Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/160-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT
P' vs Q' Effective Stress Plot - Back Pressure saturated at 600 kPa



EFFECTIVE STRESS RESULT			Correl coeff	0.9547	(r ²)
Intercept d'	15.54	(kPa)	Cohesion c'	17	(kPa)
Beta β'	22.73	(deg)	Phi Ø'	25	(deg)

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
Failure Criteria: Stage 2 : Stress Ratio
(at Max. Values) Stage 3 : Stress Ratio

Date tested: 05-18/11/25
Date reported: 28/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 28/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

Designation:
LHF 2418 (08/25)

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - PvsQ Stress Path Plot



Project: Ground Investigation for Northland Corridor
Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1108
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Silty CLAY; brown mottled orange; moist; plastic

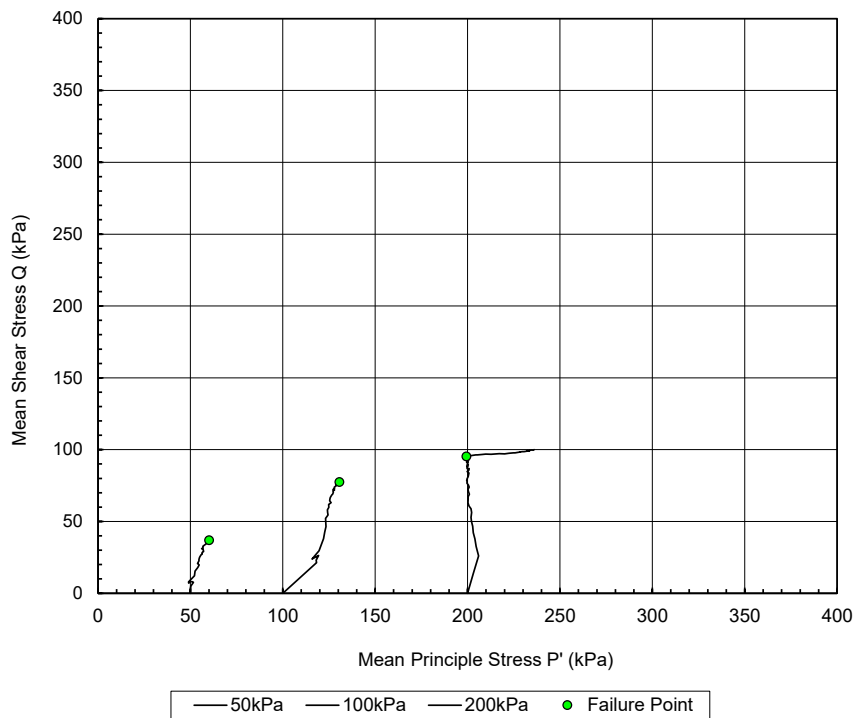
Depth (m): 3.00-3.50
Date sampled: 17/10/25

Sample Type : Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/160-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P' vs Q Stress Path (Effective Stress Plot) - Back Pressure saturated at 600 kPa



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
Failure Criteria: Stage 2 : Stress Ratio
(at Max. Values) Stage 3 : Stress Ratio

Date tested: 05-18/11/25
Date reported: 28/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 28/11/25

Designation:



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Strain vs Deviator Stress Plot



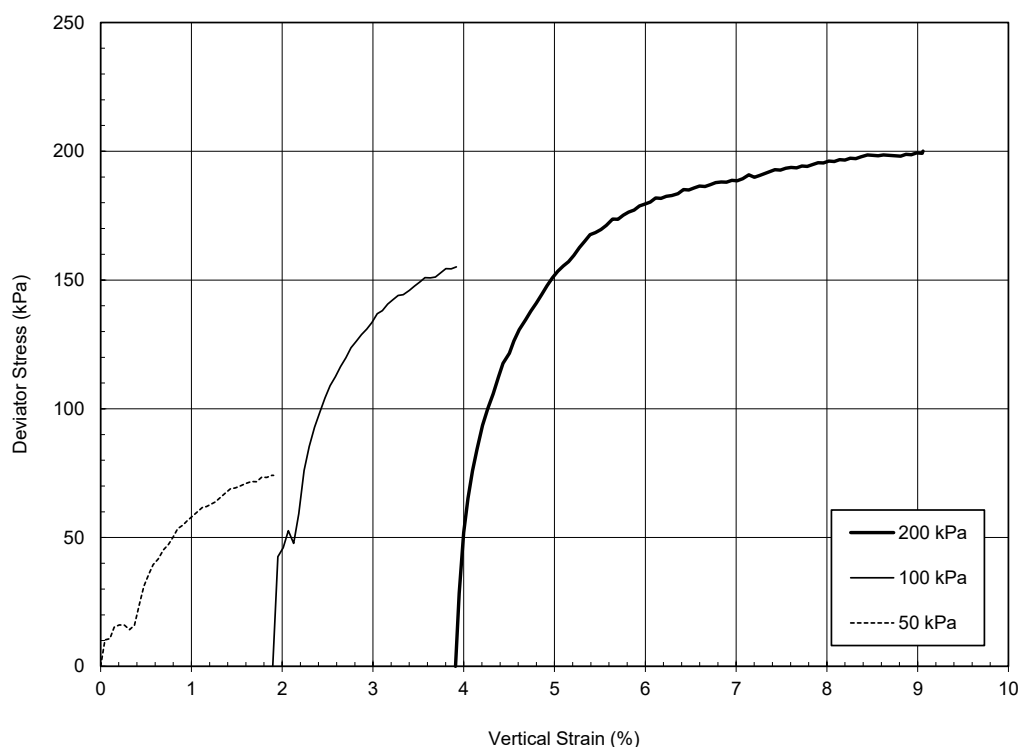
Project: Ground Investigation for Northland Corridor
Location: Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1108
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Silty CLAY; brown mottled orange; moist; plastic

Depth (m): 3.00-3.50
Date sampled: 17/10/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/160-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT
Vertical Strain vs Deviator Stress Plot - Back Pressure saturated at 600 kPa



Test Method	Notes
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	

Date tested: 05-18/11/25
Date reported: 28/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory: Thirushen Pillay
Designation: Senior Civil Engineering Technician

Date: 28/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Strain vs Pore Pressure Plot



Project: Ground Investigation for Northland Corridor
Location: Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1108
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Silty CLAY; brown mottled orange; moist; plastic

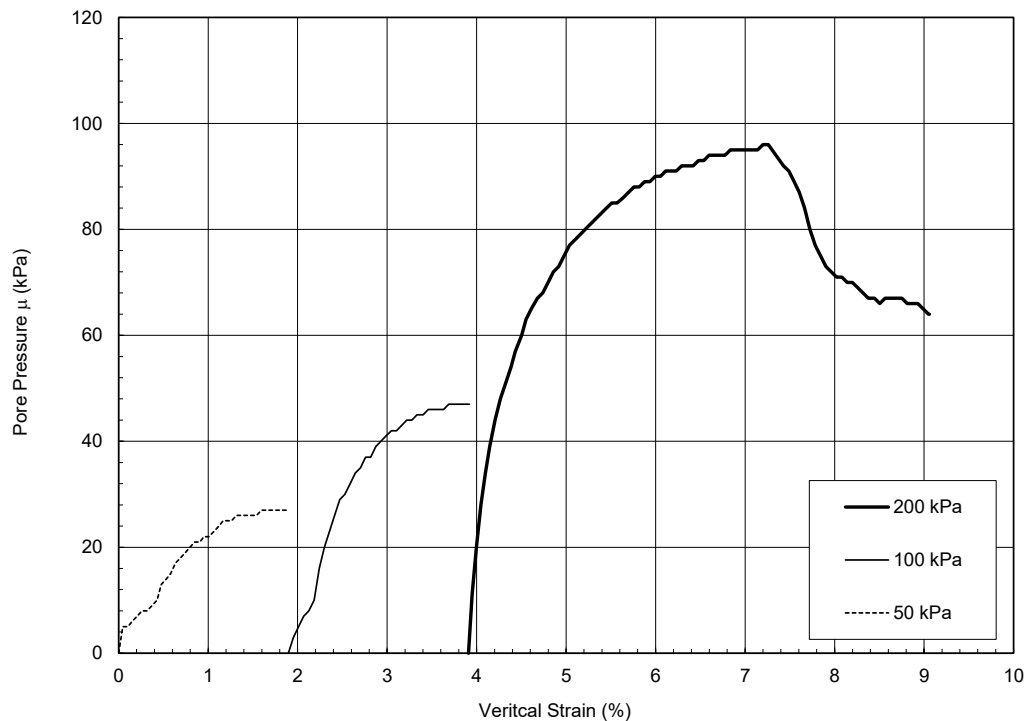
Depth (m): 3.00-3.50
Date sampled: 17/10/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/160-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Vertical Strain vs Pore Pressure Plot - Back Pressure saturated at 600 kPa



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Date tested: 05-18/11/25
Date reported: 28/11/25

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 28/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

LHF 2418 (08/25)

Page 8 of 9

WSP
Auckland Laboratory
Quality Management Systems Certified to ISO 9001

7a Ride Way, Albany
Private Bag 101982, NS Mail Centre, North
Shore City 0745, New Zealand

Telephone +64 9 4154660
Website www.wsp.com/nz

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test report - Photograph of Failure Type



Project: Ground Investigation for Northland Corridor
Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1108
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Silty CLAY; brown mottled orange; moist; plastic

Depth (m): 3.00-3.50
Date sampled: 17/10/25

Sample Type : Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/160-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Photo of failure type



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Date tested: 05-18/11/25

Date reported: 28/11/25

Approved Signatory:

Date: 28/11/25

Designation:

Thirushen Pillay
Senior Civil Engineering Technician



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

LHF 2418 (08/25)

Page 9 of 9

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - Result Summary



Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1113 Depth (m): 3.00-3.50
 Sampled by: NC Site Team Date sampled: 30/10/25
 Sampling Method: Pushtube
 Sample Description: CW-HW SILTSTONE

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/167-TXL-CUM
 Client Ref: -

Initial Sample properties		Rate of strain (mm/min)	
Length (mm)	= 109.88	Stage 1	0.01
Diameter (mm)	= 54.13	Stage 2	0.01
Membrane Correction (kPa)=		Stage 3	0.01

Saturation achieved using a minimum Back Pressure of 450 kPa

Specimen Stage No	Effective Confining Pressure (kPa)	INITIAL PROPERTIES			Solid Particle Density (Mg/m³)	FINAL PROPERTIES		
		Densities (Mg/m³)		Water Content (%)		Densities (Mg/m³)		Water Content (%)
		Bulk (Mg/m³)	Dry (Mg/m³)			Bulk (Mg/m³)	Dry (Mg/m³)	
1	50	1.91	1.49	27.9				
2	100				2.70			
3	200				(assumed)	2.01	1.59	26.4

Specimen Stage No	Effective Confining Pressure (kPa)	Void Ratio (e)	Deg of Saturation (Sr)		Deviator Stress $\sigma_1 - \sigma_3$ (kPa)	Pore Pressure μ (kPa)	Cumulative Strain (%)	Failure Criteria at Maximum Values
			Sr before Consolid.	Sr after Consolid.				
1	50	0.81	93	100	77.7	34	1.67	Stress Ratio
2	100				107.4	60	3.79	Stress Ratio
3	200				187.9	120	6.01	Stress Ratio

Specimen Stage No	Effective Confining Pressure (kPa)	Coefficient of Consolidation C_v (m ² /year)	Volume Compressibility M_v (m ² /MN)	Coefficient of Permeability k (m/s)	Final B Value	Due to the use of side filter drains, IANZ endorsement does not include the C_v , M_v and k values reported herein. <u>M_v, C_v & k calculated for the following conditions:-</u> L/D=2, RADIAL+TOP+BOTTOM Drainage Side Filter Drains Used (L/D= Sample Length/Diameter.)
1	50	3	0.49	4.6×10^{-10}	0.98	
2	100	0.9	0.37	1.0×10^{-10}		
3	200	1	0.20	6.2×10^{-11}		

TOTAL STRESS RESULT		
Intercept d	13.60	(kPa)
Beta β	15.19	(deg)
Cohesion c	14	(kPa)
Phi ϕ	16	(deg)
Correl coeff.	0.9974	(r ²)

EFFECTIVE STRESS RESULT		
Intercept d'	11.81	(kPa)
Beta β'	25.10	(deg)
Cohesion c'	13	(kPa)
Phi ϕ'	28	(deg)
Correl coeff.	0.9961	(r ²)

Test Method	Notes
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	Cv and Mv have been rounded to 2 significant figures. Mg/m ³ is equivalent to t/m ³ Deviation from standard, rate of vertical strain for shear stage reported in mm/min vs. %/hr

Date tested: 24/11/25-01/12/25
 Date reported: 19/12/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory: Thirushen Pillay
 Designation: Senior Civil Engineering Technician

Date: 19/12/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Volume change vs $\sqrt{t}$ Plot (Consolidation stage)



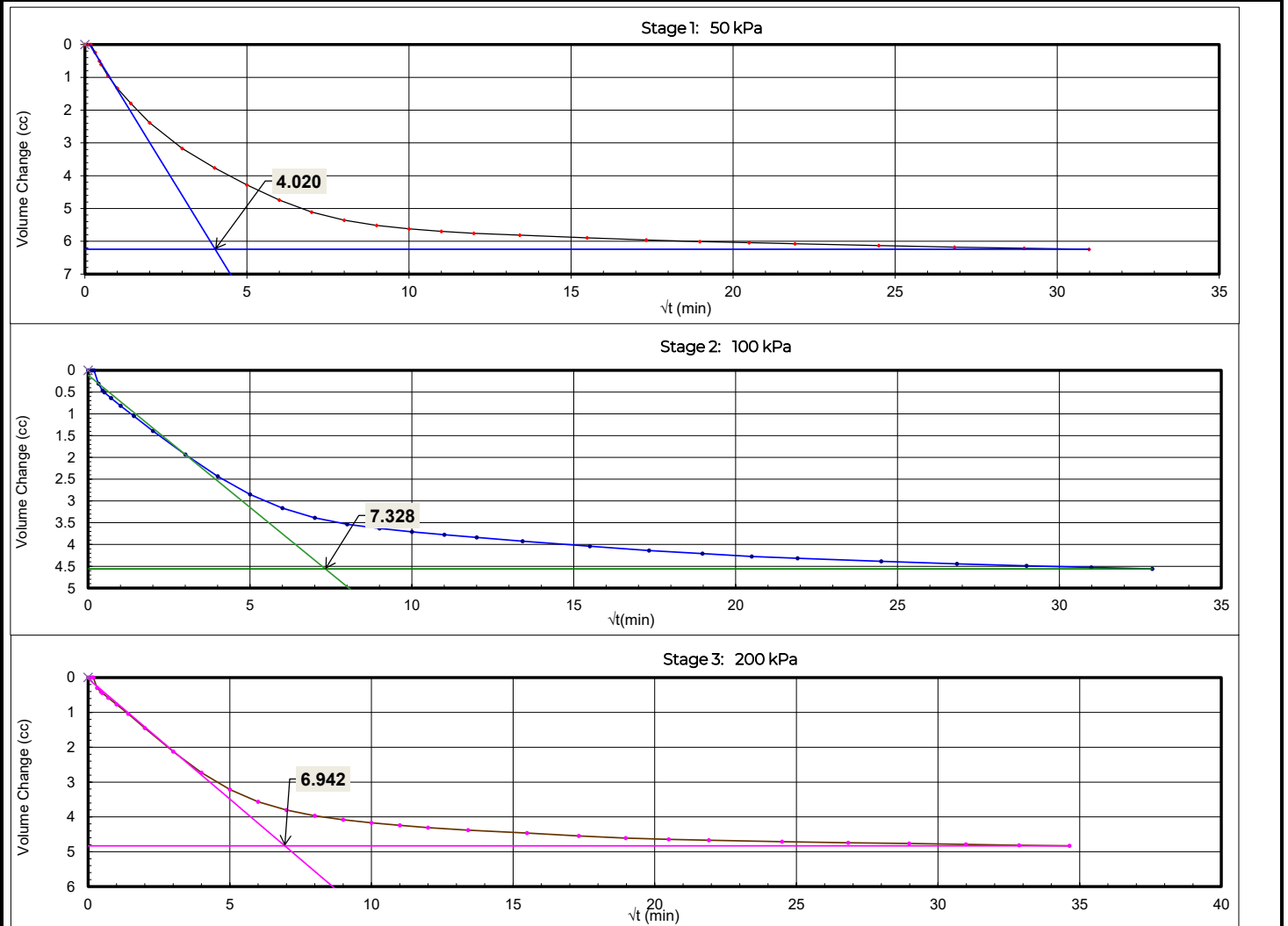
Project: Ground Investigation for Northland Corridor
Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1113
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: CW-HW SILTSTONE

Depth (m): 3.00-3.50
Date sampled: 30/10/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/167-TXL-CUM
Client Ref: -

Final Back Pressure (kPa) : 450 kPa



Test Method	Test Results at end of consolidation		
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018	Effective Stress (kPa)=	50 kPa	100 kPa
Water Content : NZS4402 : 1986 Test 2.1	t_{100} (min) =	16.160	53.700
	Volumetric Strain (%)=	2.469	1.804
	Vertical Strain (%)=	0.823	0.601
	PWP Dissipation (U%)=	100.00	100.00
	Estimated Strain to failure(%)=	5	5

Date tested : 19/12/25
Date reported : 24/11/25-01/12/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Date: 19/12/25

Approved Signatory: Thirushen Pillay
Designation: Senior Civil Engineering Technician

LHF 2418 (08/25)



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

WSP
Auckland Laboratory
Quality Management Systems Certified to ISO 9001

7a Ride Way, Albany
Private Bag 101982, NS Mail Centre, North
Shore City 0745, New Zealand

Telephone +64 9 4154660
Website www.wsp.com/nz

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - Mohr Coulomb Envelope Plot



Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1113
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: CW-HW SILTSTONE

Depth (m): 3.00-3.50
 Date sampled: 30/10/25

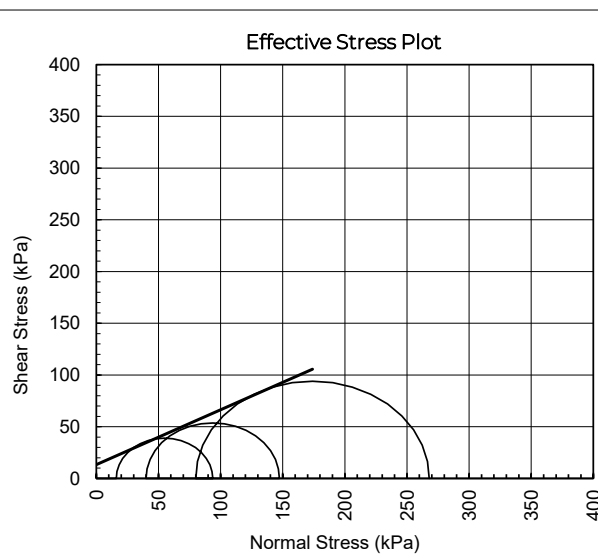
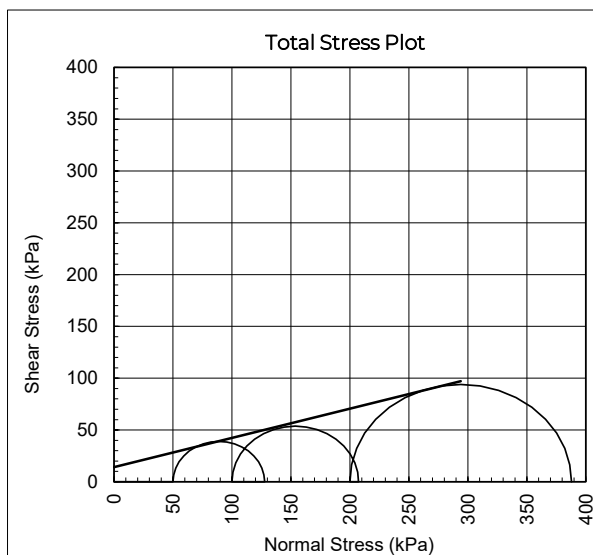
Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/167-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Mohr-Coulomb envelope plots - Result at Maximum Stress

Back Pressure Saturated at 450 kPa



TOTAL STRESS RESULT			
Intercept d	13.60	(kPa)	
Beta β	15.19	(deg)	
Cohesion c	14	(kPa)	
Phi ϕ	16	(deg)	
Correl coeff.	0.9974	(r ²)	

EFFECTIVE STRESS RESULT			
Intercept d'	11.81	(kPa)	
Beta β'	25.10	(deg)	
Cohesion c'	13	(kPa)	
Phi ϕ'	28	(deg)	
Correl coeff.	0.9961	(r ²)	

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Drainage Conditions during Shear :
 Stage 2 : Stress Ratio
 Stage 3 : Stress Ratio

Date tested: 24/11/25-01/12/25
 Date reported: 19/12/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Approved Signatory:

Thirushen Pillay

Date: 19/12/25

Designation:

Senior Civil Engineering Technician



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - P vs Q Total Stress Plot



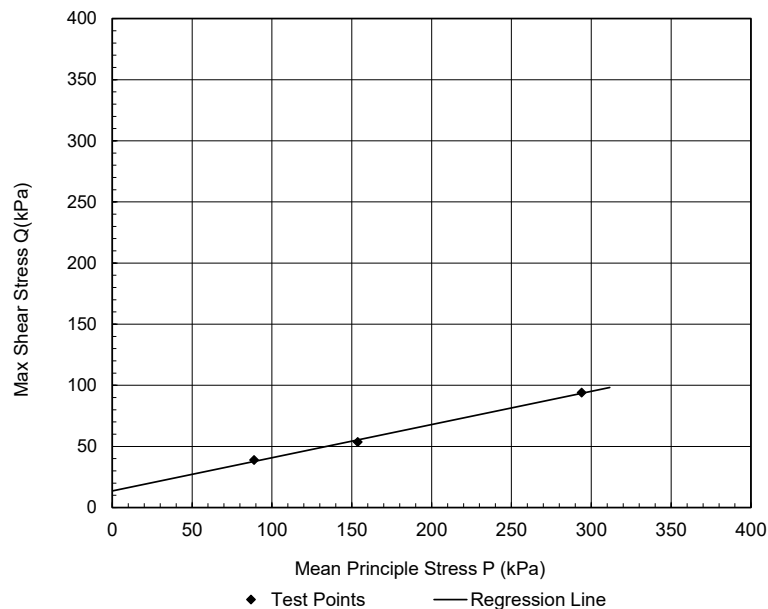
Project: Ground Investigation for Northland Corridor
Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1113 Depth (m): 3.00-3.50
Sampled by: NC Site Team Date sampled: 30/10/25
Sampling Method: Pushtube
Sample Description: CW-HW SILTSTONE

Sample Type : Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/167-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P vs Q Total Stress Plot - Back Pressure saturated at 450 kPa



TOTAL STRESS RESULT			Correl coeff	0.9974	(r ²)
Intercept d	13.60	(kPa)	Cohesion c	14	(kPa)
Beta β	15.19	(deg)	Phi Ø	16	(deg)

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
Failure Criteria: Stage 2 : Stress Ratio
(at Max. Values) Stage 3 : Stress Ratio

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Date tested: 24/11/25-01/12/25
Date reported: 19/12/25

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 19/12/25

Designation:

LHF 2418 (08/25)



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

Page 4 of 9

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - P' vs Q' Effective Stress Plot



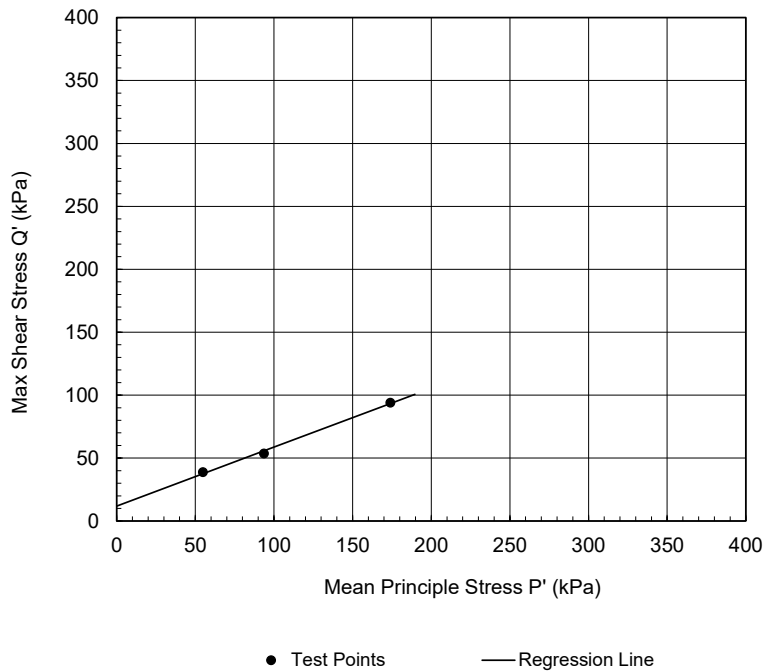
Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1113
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: CW-HW SILTSTONE
 Depth (m): 3.00-3.50
 Date sampled: 30/10/25

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/167-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P' vs Q' Effective Stress Plot - Back Pressure saturated at 450 kPa



EFFECTIVE STRESS RESULT			Correl coeff	0.9961	(r ²)
Intercept d'	11.81	(kPa)	Cohesion c'	13	(kPa)
Beta β'	25.10	(deg)	Phi Ø'	28	(deg)

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
 Failure Criteria:
 (at Max. Values) Stage 2 : Stress Ratio
 Stage 3 : Stress Ratio

Date tested: 24/11/25-01/12/25
 Date reported: 19/12/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory:

Thirushen Pillay
 Senior Civil Engineering Technician

Date: 19/12/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

Designation:
 LHF 2418 (08/25)

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - PvsQ Stress Path Plot



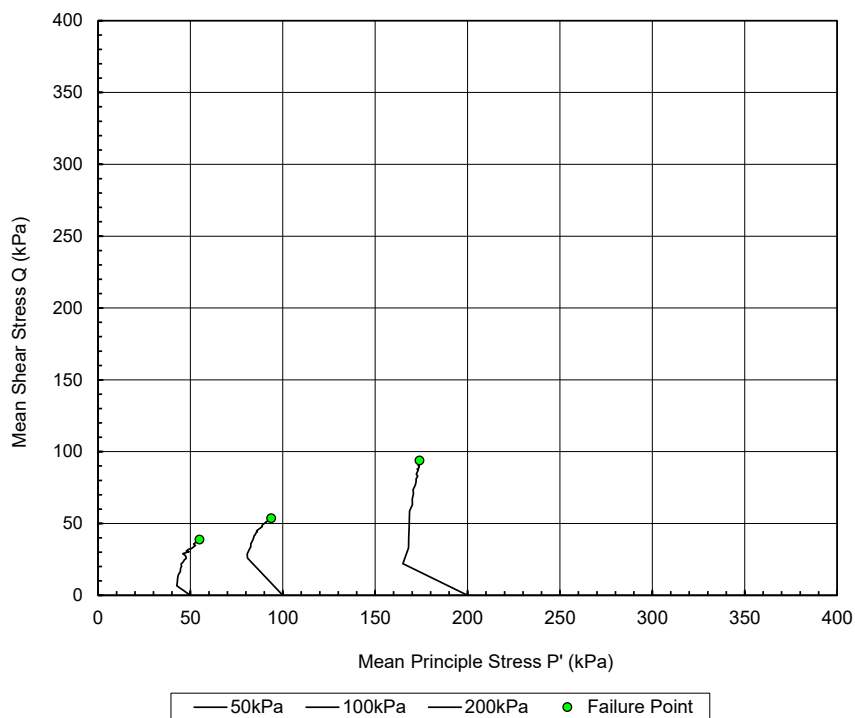
Project: Ground Investigation for Northland Corridor
Location: Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1113
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: CW-HW SILTSTONE
Depth (m): 3.00-3.50
Date sampled: 30/10/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/167-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P' vs Q Stress Path (Effective Stress Plot) - Back Pressure saturated at 450 kPa



Test Method

Consolidated undrained triaxial test: BS EN ISO 17892-9:2018
Water Content: NZS4402:1986 Test 2.1

Notes

Stage 1: Stress Ratio
Failure Criteria: Stage 2: Stress Ratio
(at Max. Values) Stage 3: Stress Ratio

Date tested: 24/11/25-01/12/25
Date reported: 19/12/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 19/12/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Strain vs Deviator Stress Plot

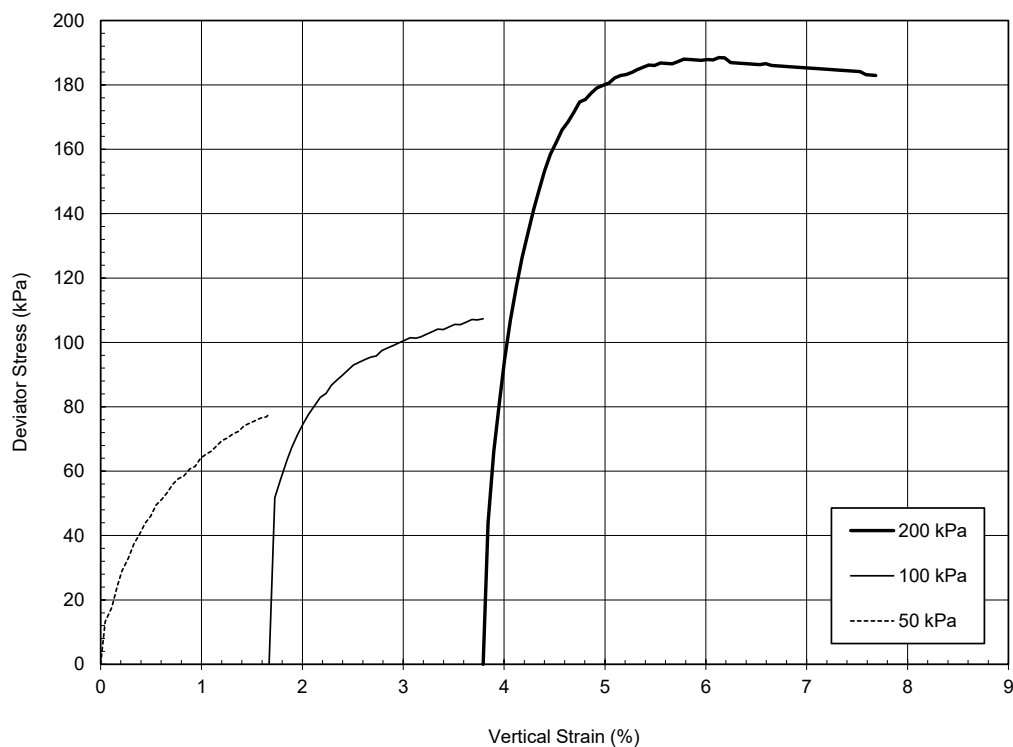


Project: Ground Investigation for Northland Corridor
Location: Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1113
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: CW-HW SILTSTONE
Depth (m): 3.00-3.50
Date sampled: 30/10/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/167-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT
Vertical Strain vs Deviator Stress Plot - Back Pressure saturated at 450 kPa



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Date tested: 24/11/25-01/12/25
Date reported: 19/12/25

Approved Signatory: Thirushen Pillay
Designation: Senior Civil Engineering Technician

Date: 19/12/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Strain vs Pore Pressure Plot



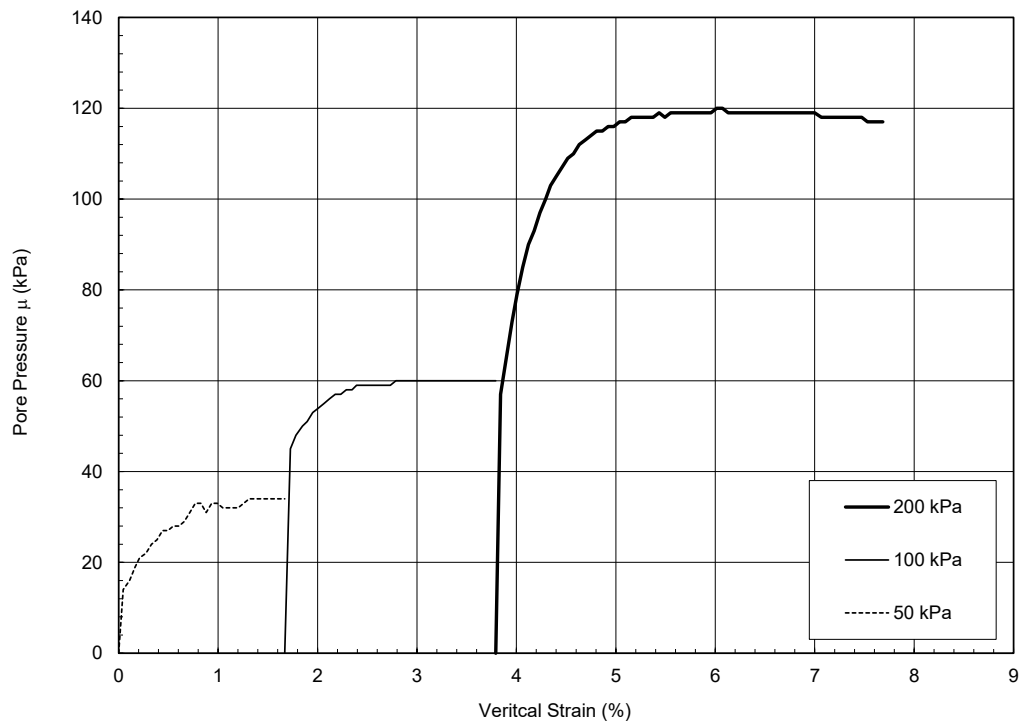
Project: Ground Investigation for Northland Corridor
Location: Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1113
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: CW-HW SILTSTONE
Depth (m): 3.00-3.50
Date sampled: 30/10/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/167-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Vertical Strain vs Pore Pressure Plot - Back Pressure saturated at 450 kPa



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Date tested: 24/11/25-01/12/25
Date reported: 19/12/25

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 19/12/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

LHF 2418 (08/25)

Page 8 of 9

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test report - Photograph of Failure Type



Project: Ground Investigation for Northland Corridor
Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1113
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: CW-HW SILTSTONE
Depth (m): 3.00-3.50
Date sampled: 30/10/25

Sample Type : Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/167-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Photo of failure type

Photo not taken

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Date tested: 24/11/25-01/12/25
Date reported: 19/12/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 19/12/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

LHF 2418 (08/25)

Page 9 of 9

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - Result Summary



Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1122
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Silty SAND with traces of clay; grey; moist
 Depth (m): 6.00-6.50
 Date sampled: 22/09/25

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/121-TXL-CUM
 Client Ref: -

Initial Sample properties		Rate of strain (mm/min)	
Length (mm)	= 106.93	Stage 1	0.011
Diameter (mm)	= 53.30	Stage 2	0.011
Membrane Correction (kPa)=		Stage 3	0.011

Saturation achieved using a minimum Back Pressure of 500 kPa

Specimen Stage No	Effective Confining Pressure (kPa)	INITIAL PROPERTIES			Solid Particle Density (Mg/m³)	FINAL PROPERTIES		
		Densities (Mg/m³)		Water Content (%)		Densities (Mg/m³)		Water Content (%)
		Bulk (Mg/m³)	Dry (Mg/m³)			Bulk (Mg/m³)	Dry (Mg/m³)	
1	50	2.08	1.67	24.2				
2	100				2.70			
3	200				(assumed)	2.14	1.77	21.1

Specimen Stage No	Effective Confining Pressure (kPa)	Void Ratio (e)	Deg of Saturation (Sr)		Deviator Stress $\sigma_1 - \sigma_3$ (kPa)	Pore Pressure μ (kPa)	Cumulative Strain (%)	Failure Criteria at Maximum Values
			Sr before Consolid.	Sr after Consolid.				
1	50	0.62	100	100	83.9	23	1.98	Stress Ratio
2	100				160.1	47	4.46	Dev Stress
3	200				244.4	103	9.84	Stress Ratio

Specimen Stage No	Effective Confining Pressure (kPa)	Coefficient of Consolidation C_v (m ² /year)	Volume Compressibility M_v (m ² /MN)	Coefficient of Permeability k (m/s)	Final B Value	Due to the use of side filter drains, IANZ endorsement does not include the C_v , M_v and k values reported herein. <u>M_v, C_v & k calculated for the following conditions:-</u> L/D=2, RADIAL+TOP+BOTTOM Drainage Side Filter Drains Used (L/D= Sample Length/Diameter.)
1	50	1.1	0.37	1.3×10^{-10}	0.96	
2	100	0.5	0.36	5.7×10^{-11}		
3	200	0.5	0.20	3.2×10^{-11}		

TOTAL STRESS RESULT		
Intercept d	13.37	(kPa)
Beta β	18.96	(deg)
Cohesion c	14	(kPa)
Phi ϕ	20	(deg)
Correl coeff.	0.9889	(r ²)

EFFECTIVE STRESS RESULT		
Intercept d'	6.78	(kPa)
Beta β'	27.99	(deg)
Cohesion c'	8	(kPa)
Phi ϕ'	32	(deg)
Correl coeff.	0.9969	(r ²)

Test Method	Notes
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	Cv and Mv have been rounded to 2 significant figures. Mg/m ³ is equivalent to t/m ³ Deviation from standard, rate of vertical strain for shear stage reported in mm/min vs. %/hr

Date tested: 30/10/25-11/11/25
 Date reported: 19/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory: 
 Designation: Thirushen Pillay
 Senior Civil Engineering Technician

Date: 19/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Volume change vs $\sqrt{t}$ Plot (Consolidation stage)



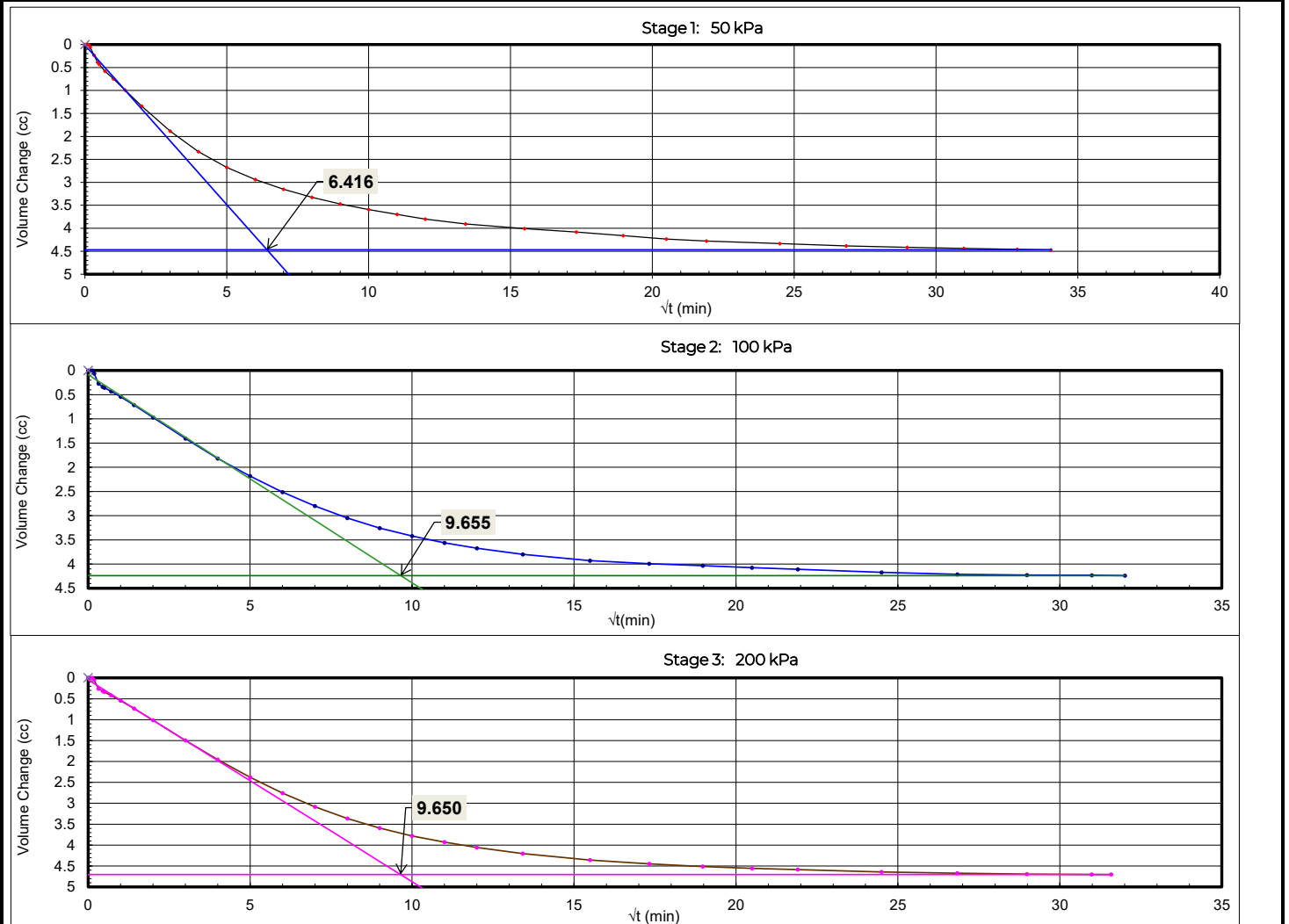
Project: Ground Investigation for Northland Corridor
Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1122
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Silty SAND with traces of clay; grey; moist

Depth (m): 6.00-6.50
Date sampled: 22/09/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/121-TXL-CUM
Client Ref: -

Final Back Pressure (kPa) : 500 kPa



Test Method	Test Results at end of consolidation			
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018	Effective Stress (kPa)=	50 kPa	100 kPa	200 kPa
Water Content : NZS4402 : 1986 Test 2.1	t_{100} (min) =	41.165	93.219	93.123
	Volumetric Strain (%)=	1.873	1.777	1.972
	Vertical Strain (%)=	0.624	0.587	0.644
	PWP Dissipation (U)=	100.0	100.0	100.0
	Estimated Strain to failure(%)=	5	5	5

Date tested : 19/11/25
Date reported : 30/10/25-11/11/25

Approved Signatory: Thirushen Pillay
Designation: Senior Civil Engineering Technician

LHF 2418 (08/25)

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Date: 19/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

**CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Mohr Coulomb Envelope Plot**



Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1122
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Silty SAND with traces of clay, grey, moist

Depth (m): 6.00-6.50
 Date sampled: 22/09/25

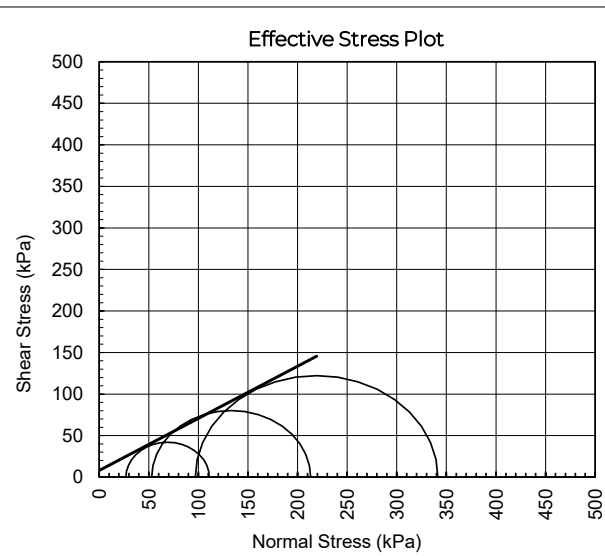
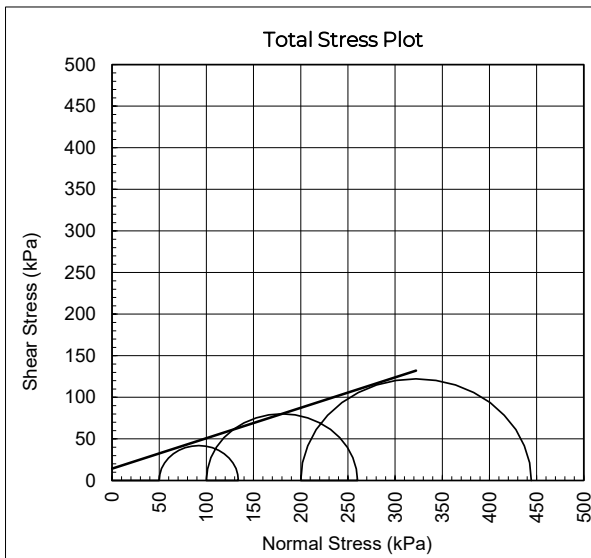
Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/121-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Mohr-Coulomb envelope plots - Result at Maximum Stress

Back Pressure Saturated at 500 kPa



TOTAL STRESS RESULT			
Intercept d	13.37	(kPa)	
Beta β	18.96	(deg)	
Cohesion c	14	(kPa)	
Phi ϕ	20	(deg)	
Correl coeff.	0.9889	(r ²)	

EFFECTIVE STRESS RESULT			
Intercept d'	6.78	(kPa)	
Beta β'	27.99	(deg)	
Cohesion c'	8	(kPa)	
Phi ϕ'	32	(deg)	
Correl coeff.	0.9969	(r ²)	

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Drainage Conditions during Shear :
 Stage 2 : Dev Stress
 Stage 3 : Stress Ratio

Date tested: 30/10/25-11/11/25
 Date reported: 19/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Approved Signatory:

Thirushen Pillay

Date: 19/11/25

Designation:

Senior Civil Engineering Technician



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - P vs Q Total Stress Plot



Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1122
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Silty SAND with traces of clay, grey, moist

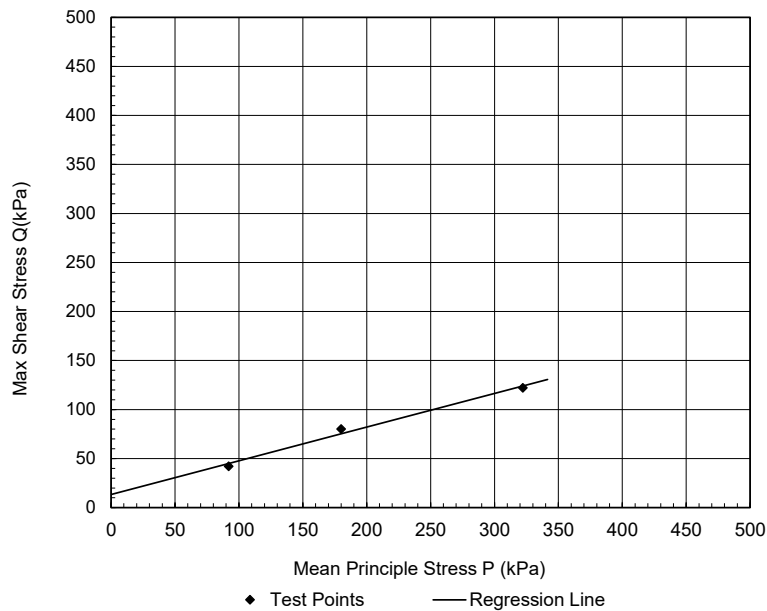
Depth (m): 6.00-6.50
 Date sampled: 22/09/25

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/121-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P vs Q Total Stress Plot - Back Pressure saturated at 500 kPa



TOTAL STRESS RESULT			Correl coeff	0.9889	(r^2)
Intercept d	13.37	(kPa)	Cohesion c	14	(kPa)
Beta β	18.96	(deg)	Phi ϕ	20	(deg)

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
 Failure Criteria: Stage 2 : Dev Stress
 (at Max. Values) Stage 3 : Stress Ratio

Date tested: 30/10/25-11/11/25
 Date reported: 19/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory: 
 Designation: Thirushen Pillay
 Senior Civil Engineering Technician

Date: 19/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

LHF 2418 (08/25)

Page 4 of 9

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - P' vs Q' Effective Stress Plot



Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1122
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Silty SAND with traces of clay; grey; moist

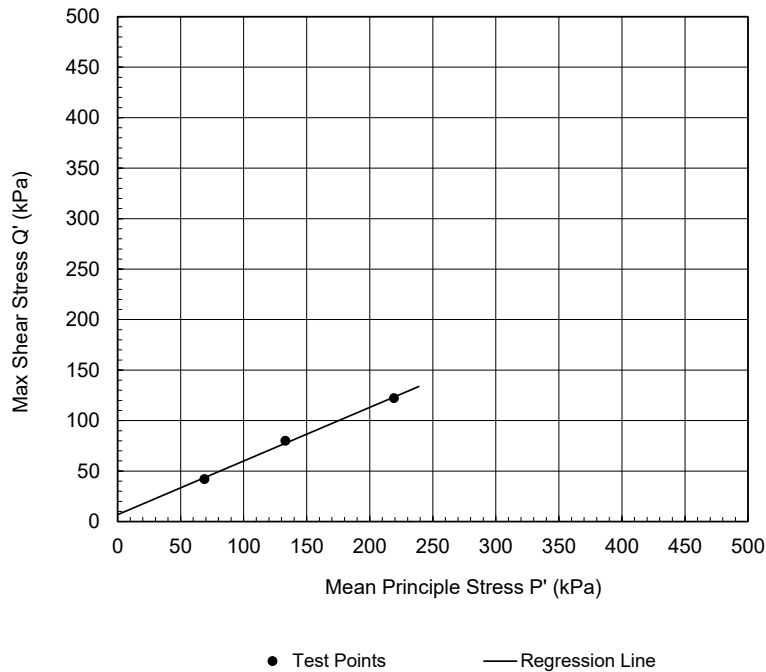
Depth (m): 6.00-6.50
 Date sampled: 22/09/25

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/121-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P' vs Q' Effective Stress Plot - Back Pressure saturated at 500 kPa



EFFECTIVE STRESS RESULT			Correl coeff	0.9969	(r ²)
Intercept d'	6.78	(kPa)	Cohesion c'	8	(kPa)
Beta β'	27.99	(deg)	Phi Ø'	32	(deg)

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
 Failure Criteria: Stage 2 : Dev Stress
 (at Max. Values) Stage 3 : Stress Ratio

Date tested: 30/10/25-11/11/25
 Date reported: 19/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory:

Thirushen Pillay
 Senior Civil Engineering Technician

Date: 19/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

Designation:
 LHF 2418 (08/25)

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - PvsQ Stress Path Plot



Project: Ground Investigation for Northland Corridor
Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1122
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Silty SAND with traces of clay, grey, moist

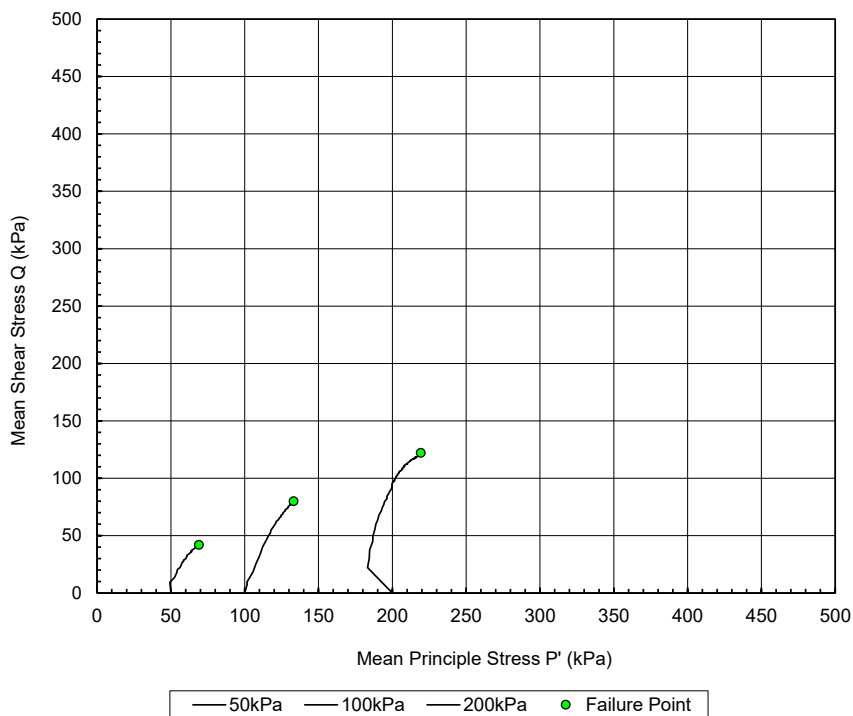
Depth (m): 6.00-6.50
Date sampled: 22/09/25

Sample Type : Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/121-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P' vs Q Stress Path (Effective Stress Plot) - Back Pressure saturated at 500 kPa



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
Failure Criteria: Stage 2 : Dev Stress
(at Max. Values) Stage 3 : Stress Ratio

Date tested: 30/10/25-11/11/25
Date reported: 19/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 19/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - Strain vs Deviator Stress Plot



Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1122
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Silty SAND with traces of clay; grey; moist

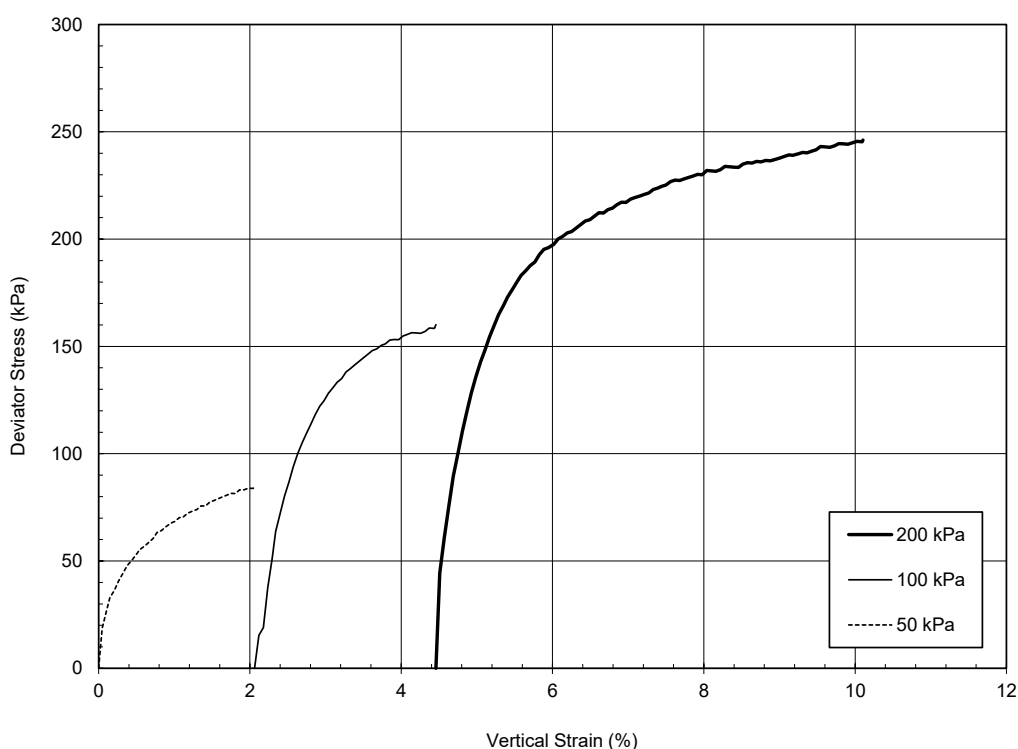
Depth (m): 6.00-6.50
 Date sampled: 22/09/25

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/121-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Vertical Strain vs Deviator Stress Plot - Back Pressure saturated at 500 kPa



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Date tested: 30/10/25-11/11/25
 Date reported: 19/11/25

Approved Signatory: 
 Designation: Thirushen Pillay
 Senior Civil Engineering Technician

Date: 19/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

LHF 2418 (08/25)

Page 7 of 9

WSP
 Auckland Laboratory
 Quality Management Systems Certified to ISO 9001

7a Ride Way, Albany
 Private Bag 101982, NS Mail Centre, North
 Shore City 0745, New Zealand

Telephone +64 9 4154660
 Website www.wsp.com/nz

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Strain vs Pore Pressure Plot



Project: Ground Investigation for Northland Corridor
Location: Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1122
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Silty SAND with traces of clay; grey; moist

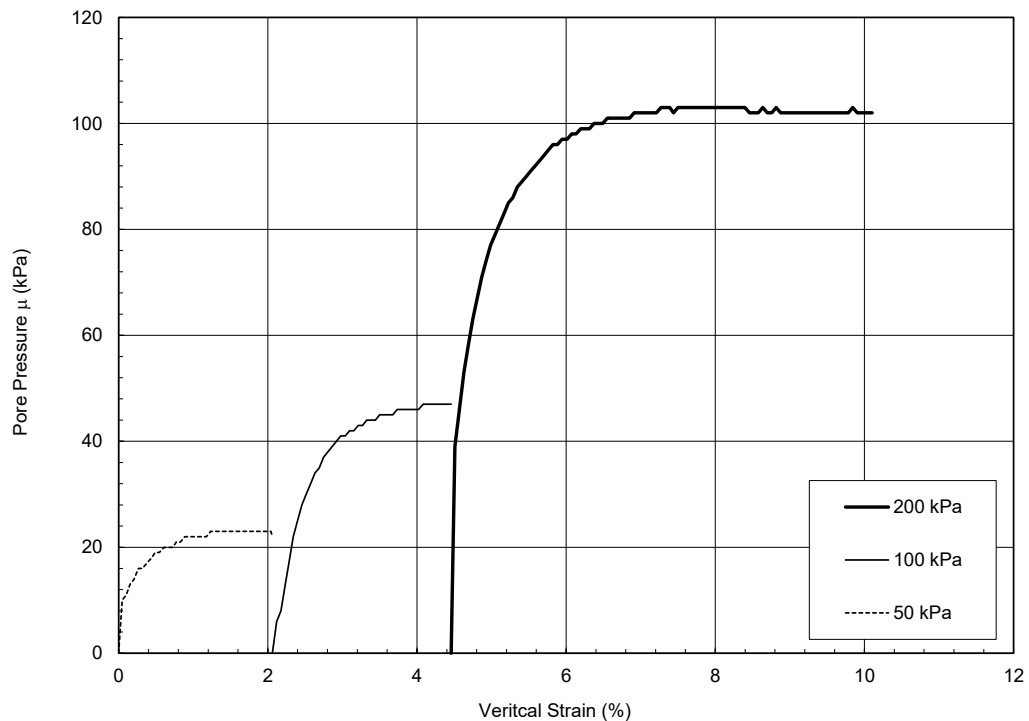
Depth (m): 6.00-6.50
Date sampled: 22/09/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/121-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Vertical Strain vs Pore Pressure Plot - Back Pressure saturated at 500 kPa



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Date tested: 30/10/25-11/11/25
Date reported: 19/11/25

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 19/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

LHF 2418 (08/25)

Page 8 of 9

WSP
Auckland Laboratory
Quality Management Systems Certified to ISO 9001

7a Ride Way, Albany
Private Bag 101982, NS Mail Centre, North
Shore City 0745, New Zealand

Telephone +64 9 4154660
Website www.wsp.com/nz

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test report - Photograph of Failure Type



Project: Ground Investigation for Northland Corridor
Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1122
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Silty SAND with traces of clay; grey; moist

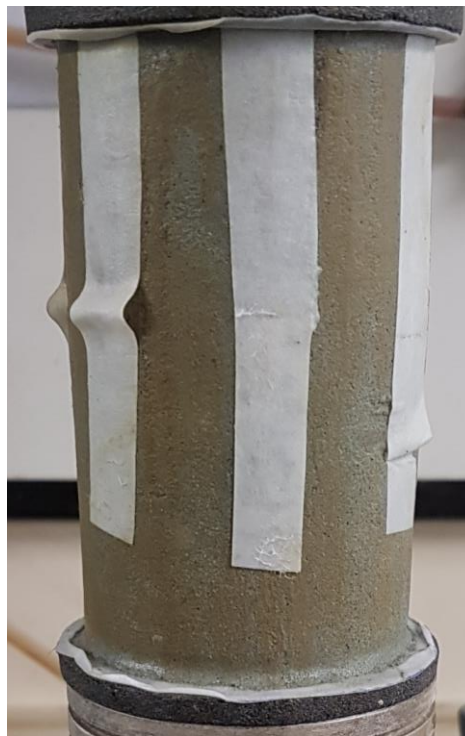
Depth (m): 6.00-6.50
Date sampled: 22/09/25

Sample Type : Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/121-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Photo of failure type



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Date tested: 30/10/25-11/11/25
Date reported: 19/11/25

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 19/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

LHF 2418 (08/25)

Page 9 of 9

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - Result Summary



Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1126
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Siltstone
 Depth (m): 2.50-2.80
 Date sampled: 2/10/25

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/130-TXL-CUM
 Client Ref: -

Initial Sample properties		Rate of strain (mm/min)	
Length (mm)	= 108.63	Stage 1	0.011
Diameter (mm)	= 51.18	Stage 2	0.011
Membrane Correction (kPa)=		Stage 3	0.011

Saturation achieved using a minimum Back Pressure of 500 kPa

Specimen Stage No	Effective Confining Pressure (kPa)	INITIAL PROPERTIES			Solid Particle Density (Mg/m³)	FINAL PROPERTIES		
		Densities (Mg/m³)		Water Content (%)		Densities (Mg/m³)		Water Content (%)
		Bulk (Mg/m³)	Dry (Mg/m³)			Bulk (Mg/m³)	Dry (Mg/m³)	
1	50	2.04	1.67	22.2				
2	100				2.70			
3	200				(assumed)	2.13	1.73	23.4

Specimen Stage No	Effective Confining Pressure (kPa)	Void Ratio (e)	Deg of Saturation (Sr)		Deviator Stress $\sigma_1 - \sigma_3$ (kPa)	Pore Pressure μ (kPa)	Cumulative Strain (%)	Failure Criteria at Maximum Values
			Sr before Consolid.	Sr after Consolid.				
1	50	0.62	97	100	84.0	29	2.03	Dev Stress
2	100				120.6	51	3.05	Dev Stress
3	200				215.2	97	4.89	Dev Stress

Specimen Stage No	Effective Confining Pressure (kPa)	Coefficient of Consolidation C_v (m ² /year)	Volume Compressibility M_v (m ² /MN)	Coefficient of Permeability k (m/s)	Final B Value	Due to the use of side filter drains, IANZ endorsement does not include the C_v , M_v and k values reported herein. <u>M_v, C_v & k calculated for the following conditions:-</u> L/D=2, RADIAL+TOP+BOTTOM Drainage Side Filter Drains Used (L/D= Sample Length/Diameter.)
1	50	3.4	0.28	2.9×10^{-10}	1.04	
2	100	0.68	0.21	4.4×10^{-11}		
3	200	0.24	0.13	9.8×10^{-12}		

TOTAL STRESS RESULT			
Intercept d	12.67	(kPa)	
Beta β	17.07	(deg)	
Cohesion c	13	(kPa)	
Phi ϕ	18	(deg)	
Correl coeff.	0.9983	(r ²)	

EFFECTIVE STRESS RESULT			
Intercept d'	12.77	(kPa)	
Beta β'	24.14	(deg)	
Cohesion c'	14	(kPa)	
Phi ϕ'	27	(deg)	
Correl coeff.	0.9986	(r ²)	

Test Method	Notes
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	Cv and Mv have been rounded to 2 significant figures. Mg/m ³ is equivalent to t/m ³ Deviation from standard, rate of vertical strain for shear stage reported in mm/min vs. %/hr

Date tested: 28/10/25-07/11/25
 Date reported: 19/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory: 
 Designation: Thirushen Pillay
 Senior Civil Engineering Technician

Date: 19/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Volume change vs $\sqrt{t}$ Plot (Consolidation stage)



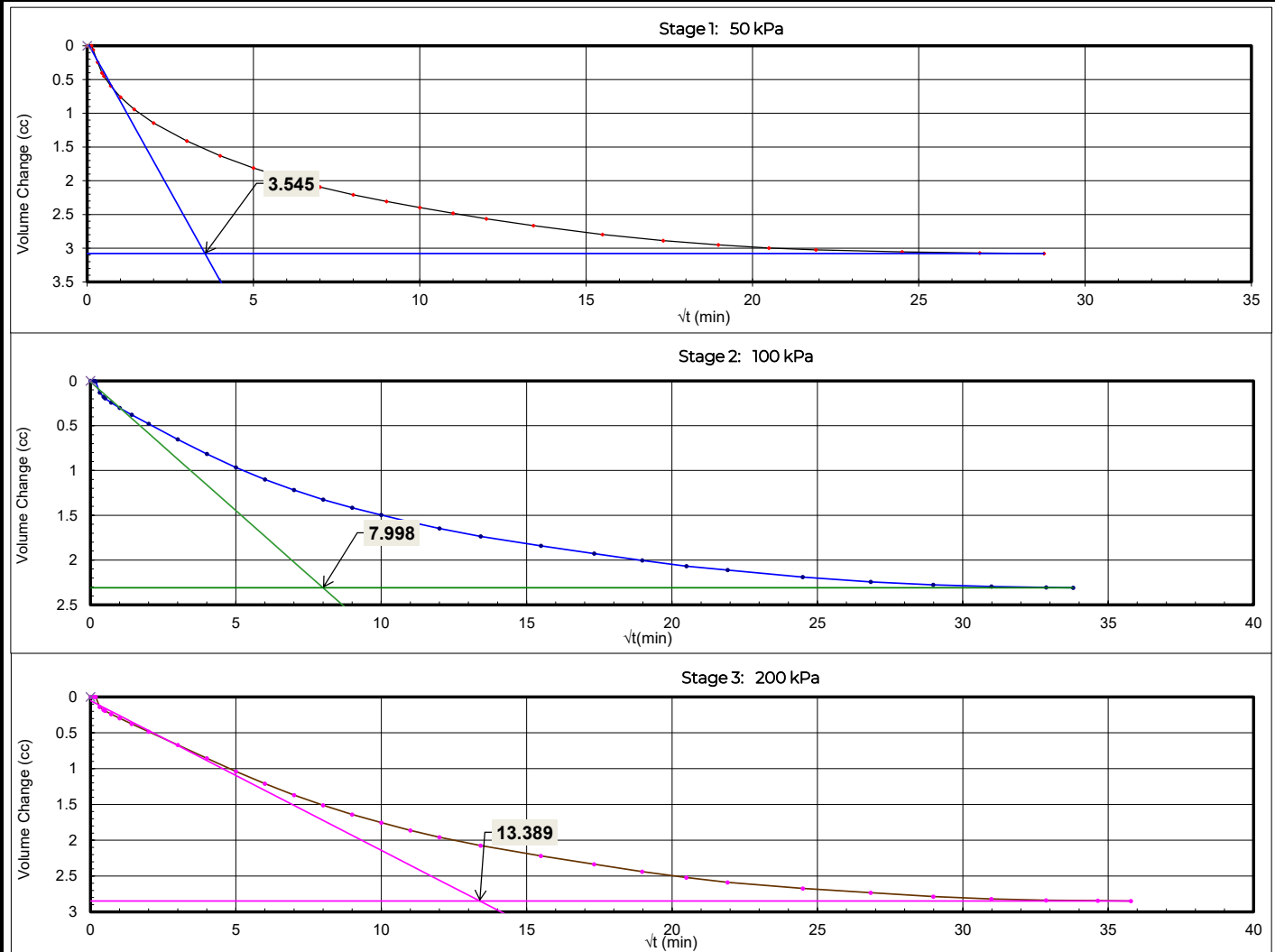
Project: Ground Investigation for Northland Corridor
Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1126
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Siltstone

Depth (m): 2.50-2.80
Date sampled: 2/10/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/130-TXL-CUM
Client Ref: -

Final Back Pressure (kPa) : 500 kPa



Test Method	Test Results at end of consolidation			
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018	Effective Stress (kPa)=	50 kPa	100 kPa	200 kPa
Water Content : NZS4402 : 1986 Test 2.1	t_{100} (min) =	12.567	63.968	179.265
	Volumetric Strain (%)=	1.378	1.033	1.275
	Vertical Strain (%)=	0.459	0.340	0.419
	PWP Dissipation (U)=	100.0	100.0	100.0
	Estimated Strain to failure(%)=	5	5	5

Date tested : 19/11/25
Date reported : 28/10/25-07/11/25

Approved Signatory: Thirushen Pillay
Designation: Senior Civil Engineering Technician

LHF 2418 (08/25)

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Date: 19/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

WSP
Auckland Laboratory
Quality Management Systems Certified to ISO 9001

7a Ride Way, Albany
Private Bag 101982, NS Mail Centre, North
Shore City 0745, New Zealand

Telephone +64 9 4154660
Website www.wsp.com/nz

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Mohr Coulomb Envelope Plot



Project: Ground Investigation for Northland Corridor
Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1126
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Siltstone
Depth (m): 2.50-2.80
Date sampled: 2/10/25

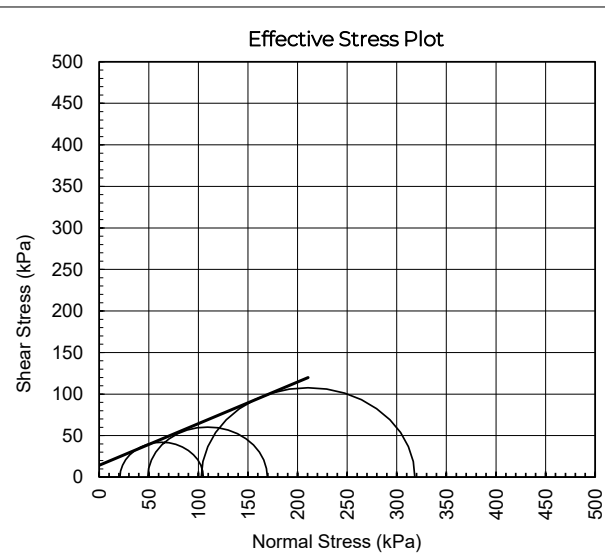
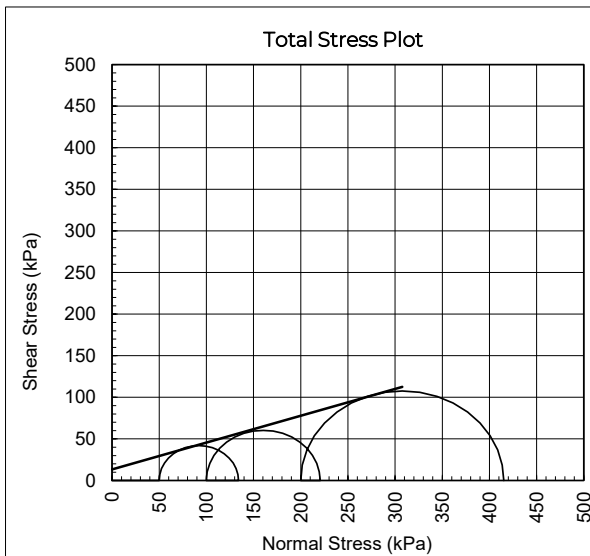
Sample Type : Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/130-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Mohr-Coulomb envelope plots - Result at Maximum Stress

Back Pressure Saturated at 500 kPa



TOTAL STRESS RESULT			
Intercept d	12.67	(kPa)	
Beta β	17.07	(deg)	
Cohesion c	13	(kPa)	
Phi ϕ	18	(deg)	
Correl coeff.	0.9983	(r ²)	

EFFECTIVE STRESS RESULT			
Intercept d'	12.77	(kPa)	
Beta β'	24.14	(deg)	
Cohesion c'	14	(kPa)	
Phi ϕ'	27	(deg)	
Correl coeff.	0.9986	(r ²)	

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Drainage Conditions during Shear :
Stage 2 : Dev Stress
Stage 3 : Dev Stress

Date tested: 28/10/25-07/11/25
Date reported: 19/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory:

Thirushen Pillay

Date: 19/11/25

Designation:

Senior Civil Engineering Technician



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - P vs Q Total Stress Plot



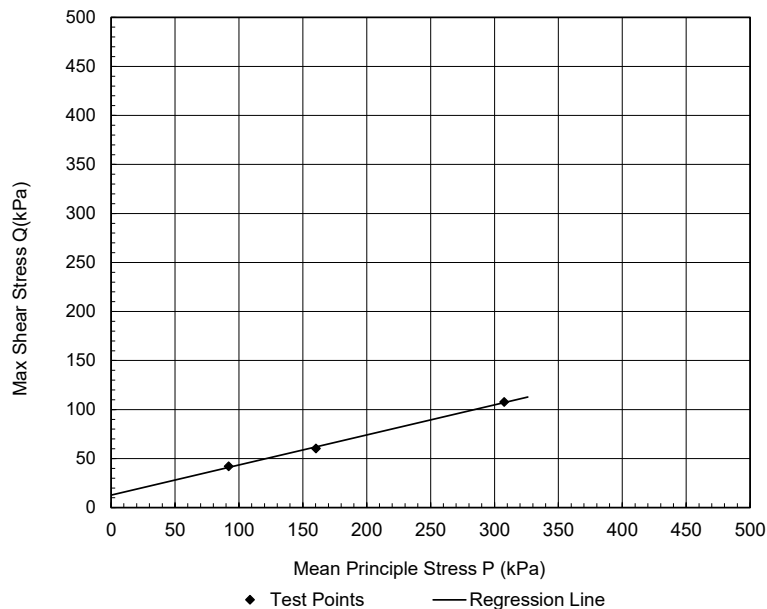
Project: Ground Investigation for Northland Corridor
Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1126 Depth (m): 2.50-2.80
Sampled by: NC Site Team Date sampled: 2/10/25
Sampling Method: Pushtube
Sample Description: Siltstone

Sample Type : Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/130-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P vs Q Total Stress Plot - Back Pressure saturated at 500 kPa



TOTAL STRESS RESULT			Correl coeff	0.9983	(r ²)
Intercept d	12.67	(kPa)	Cohesion c	13	(kPa)
Beta β	17.07	(deg)	Phi Ø	18	(deg)

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Dev Stress
Failure Criteria: Stage 2 : Dev Stress
(at Max. Values) Stage 3 : Dev Stress

Date tested: 28/10/25-07/11/25
Date reported: 19/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory: 
Thirushen Pillay
Senior Civil Engineering Technician

Date: 19/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

LHF 2418 (08/25)

Page 4 of 9

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - P' vs Q' Effective Stress Plot



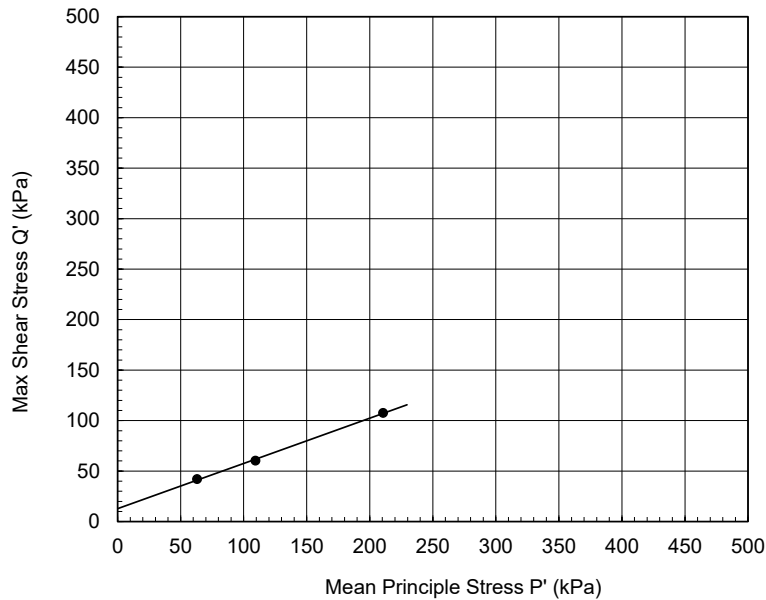
Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1126
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Siltstone
 Depth (m): 2.50-2.80
 Date sampled: 2/10/25

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/130-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P' vs Q' Effective Stress Plot - Back Pressure saturated at 500 kPa



● Test Points — Regression Line

EFFECTIVE STRESS RESULT			Correl coeff	0.9986	(r ²)
Intercept d'	12.77	(kPa)	Cohesion c'	14	(kPa)
Beta β'	24.14	(deg)	Phi Ø'	27	(deg)

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Dev Stress
 Failure Criteria: Stage 2 : Dev Stress
 (at Max. Values) Stage 3 : Dev Stress

Date tested: 28/10/25-07/11/25
 Date reported: 19/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory:

Thirushen Pillay
 Senior Civil Engineering Technician

Date: 19/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

Designation:
 LHF 2418 (08/25)

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - PvsQ Stress Path Plot



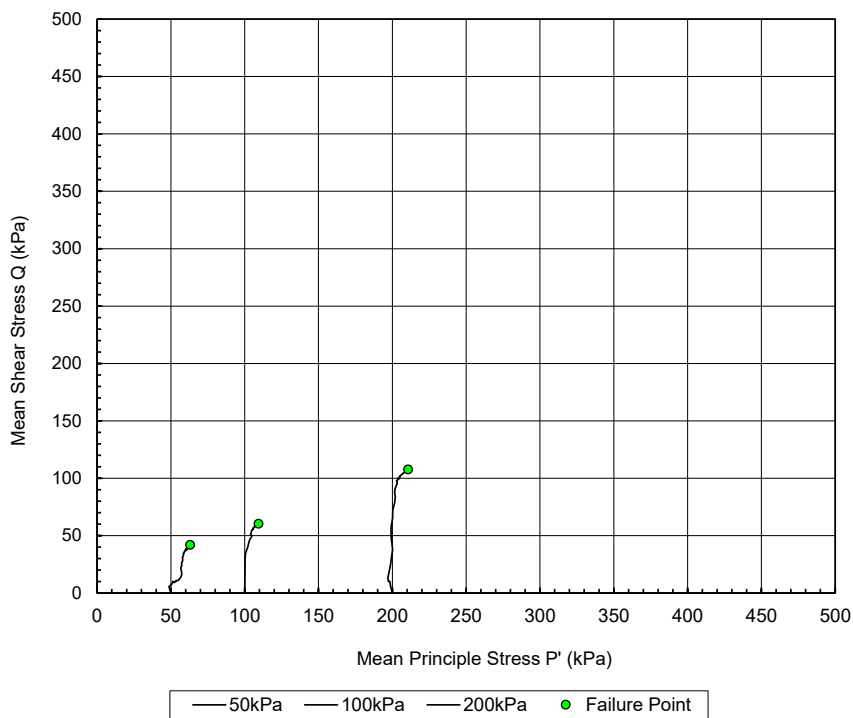
Project: Ground Investigation for Northland Corridor
Location: Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1126
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Siltstone
Depth (m): 2.50-2.80
Date sampled: 2/10/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/130-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P' vs Q Stress Path (Effective Stress Plot) - Back Pressure saturated at 500 kPa



Test Method

Consolidated undrained triaxial test: BS EN ISO 17892-9:2018
Water Content: NZS4402:1986 Test 2.1

Notes

Stage 1: Dev Stress
Failure Criteria: Stage 2: Dev Stress
(at Max. Values) Stage 3: Dev Stress

Date tested: 28/10/25-07/11/25
Date reported: 19/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory: 
Designation: Thirushen Pillay
Senior Civil Engineering Technician

Date: 19/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Strain vs Deviator Stress Plot

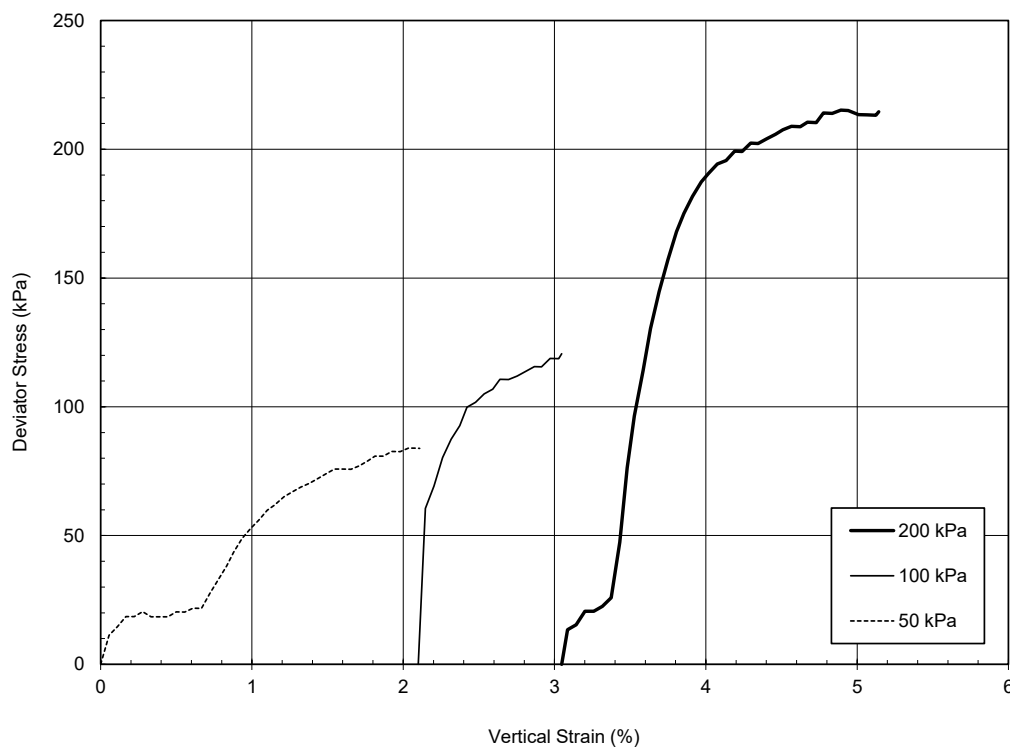


Project: Ground Investigation for Northland Corridor
Location: Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1126
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Siltstone
Depth (m): 2.50-2.80
Date sampled: 2/10/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/130-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT
Vertical Strain vs Deviator Stress Plot - Back Pressure saturated at 500 kPa



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Date tested: 28/10/25-07/11/25
Date reported: 19/11/25

Approved Signatory: 
Designation: Thirushen Pillay
Senior Civil Engineering Technician

Date: 19/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Strain vs Pore Pressure Plot



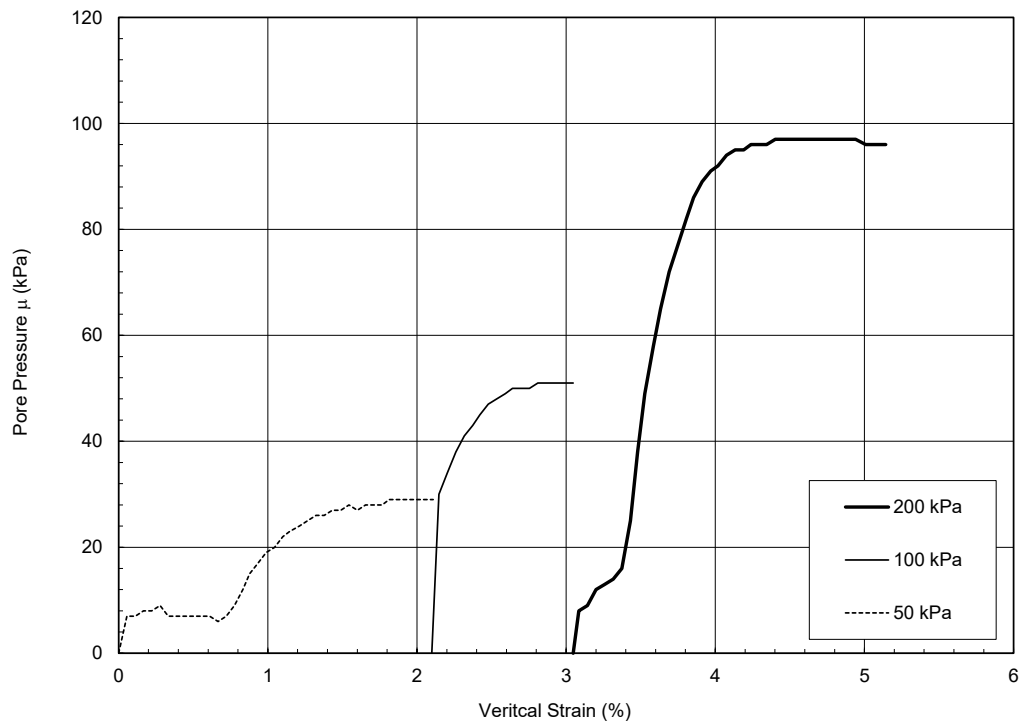
Project: Ground Investigation for Northland Corridor
Location: Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1126
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Siltstone
Depth (m): 2.50-2.80
Date sampled: 2/10/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/130-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Vertical Strain vs Pore Pressure Plot - Back Pressure saturated at 500 kPa



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Date tested: 28/10/25-07/11/25
Date reported: 19/11/25

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 19/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test report - Photograph of Failure Type



Project: Ground Investigation for Northland Corridor
Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1126
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Siltstone

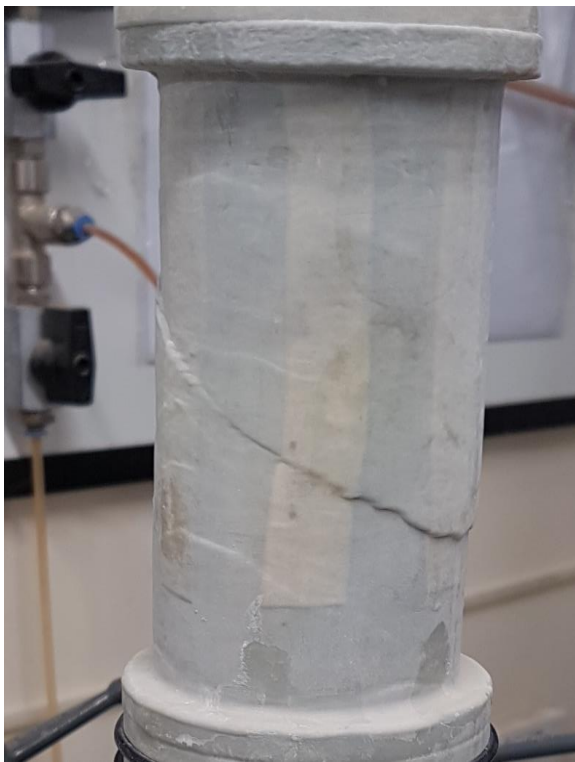
Depth (m): 2.50-2.80
Date sampled: 2/10/25

Sample Type : Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/130-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Photo of failure type



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Date tested: 28/10/25-07/11/25
Date reported: 19/11/25

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 19/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

LHF 2418 (08/25)

Page 9 of 9

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - Result Summary



Project: Ground Investigation for Northland Corridor
 Location : Alternative to Brynderwyn Hills Section
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1128
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: CW-HW SILTSTONE

Depth (m): 6.00-6.50
 Date sampled: 30/10/25

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/193-TXL-CUM
 Client Ref: -

Initial Sample properties		Rate of strain (mm/min)	
Length (mm)	= 107.93	Stage 1	0.012
Diameter (mm)	= 53.75	Stage 2	0.01
Membrane Correction (kPa)=		Stage 3	0.012

Saturation achieved using a minimum Back Pressure of 400 kPa

Specimen Stage No	Effective Confining Pressure (kPa)	INITIAL PROPERTIES			Solid Particle Density (Mg/m³)	FINAL PROPERTIES		
		Densities (Mg/m³)		Water Content (%)		Densities (Mg/m³)		Water Content (%)
		Bulk (Mg/m³)	Dry (Mg/m³)			Bulk (Mg/m³)	Dry (Mg/m³)	
1	50	1.86	1.38	34.9				
2	100				2.72			
3	200				(assumed)	1.96	1.46	34.6

Specimen Stage No	Effective Confining Pressure (kPa)	Void Ratio (e)	Deg of Saturation (Sr)		Deviator Stress $\sigma_1 - \sigma_3$ (kPa)	Pore Pressure μ (kPa)	Cumulative Strain (%)	Failure Criteria at Maximum Values
			Sr before Consolid.	Sr after Consolid.				
1	50	0.98	97	100	132.8	17	1.92	Stress Ratio
2	100				192.2	26	4.01	Stress Ratio
3	200				290.1	76	6.41	Stress Ratio

Specimen Stage No	Effective Confining Pressure (kPa)	Coefficient of Consolidation C_v (m ² /year)	Volume Compressibility M_v (m ² /MN)	Coefficient of Permeability k (m/s)	Final B Value	Due to the use of side filter drains, IANZ endorsement does not include the C_v , M_v and k values reported herein. <u>M_v, C_v & k calculated for the following conditions:-</u> L/D=2, RADIAL+TOP+BOTTOM Drainage Side Filter Drains Used (L/D= Sample Length/Diameter.)
1	50	7.3	0.54	1.2×10^{-9}	1.00	
2	100	9.8	0.28	8.5×10^{-10}		
3	200	12	0.15	5.4×10^{-10}		

TOTAL STRESS RESULT		
Intercept d	27.55	(kPa)
Beta β	18.88	(deg)
Cohesion c	29	(kPa)
Phi ϕ	20	(deg)
Correl coeff.	0.9989	(r ²)

EFFECTIVE STRESS RESULT		
Intercept d'	18.93	(kPa)
Beta β'	24.97	(deg)
Cohesion c'	21	(kPa)
Phi ϕ'	28	(deg)
Correl coeff.	0.9980	(r ²)

Test Method	Notes
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	Cv and Mv have been rounded to 2 significant figures. Mg/m ³ is equivalent to t/m ³ Deviation from standard, rate of vertical strain for shear stage reported in mm/min vs. %/hr

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Date tested: 04-15/12/25
 Date reported: 8/01/26

Approved Signatory: Thirushen Pillay
 Designation: Senior Civil Engineering Technician

Date: 8/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Volume change vs $\sqrt{t}$ Plot (Consolidation stage)



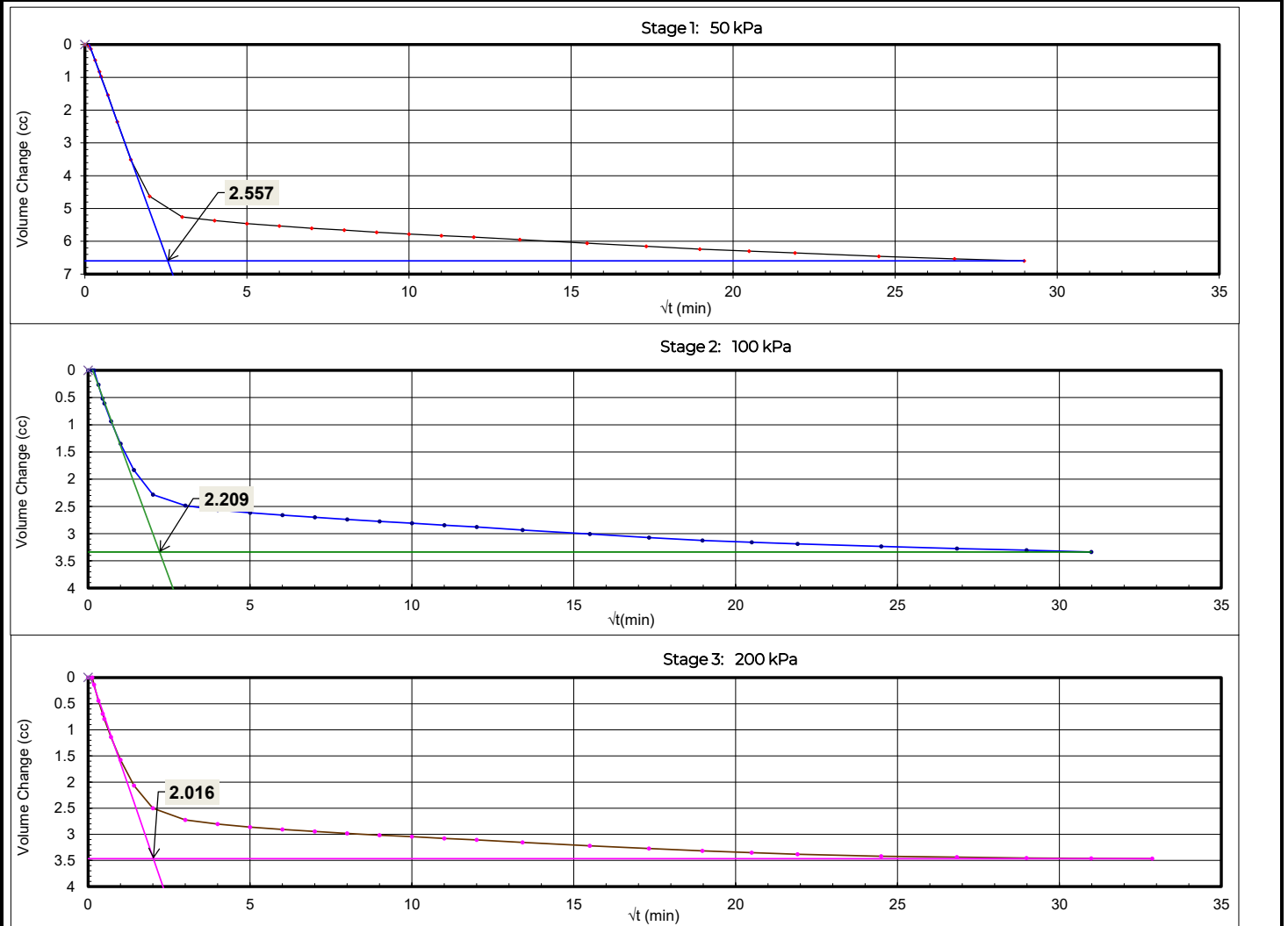
Project: Ground Investigation for Northland Corridor
Location: Alternative to Brynderwyn Hills Section
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1128
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: CW-HW SILTSTONE

Depth (m): 6.00-6.50
Date sampled: 30/10/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/193-TXL-CUM
Client Ref: -

Final Back Pressure (kPa): 400 kPa



Test Method	Test Results at end of consolidation			
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018	Effective Stress (kPa)=	50 kPa	100 kPa	200 kPa
Water Content : NZS4402 : 1986 Test 2.1	t_{100} (min) =	6.538	4.880	4.064
	Volumetric Strain (%)=	2.693	1.363	1.415
	Vertical Strain (%)=	0.898	0.453	0.466
	PWP Dissipation (U)=	100.00	100.00	100.00
	Estimated Strain to failure(%)=	5	5	5

Date tested : 8/01/26
Date reported : 04-15/12/25

Approved Signatory: Thirushen Pillay
Designation: Senior Civil Engineering Technician

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Date: 8/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

LHF 2418 (08/25)

Page 2 of 9

WSP
Auckland Laboratory
Quality Management Systems Certified to ISO 9001

7a Ride Way, Albany
Private Bag 101982, NS Mail Centre, North
Shore City 0745, New Zealand

Telephone +64 9 4154660
Website www.wsp.com/nz

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - Mohr Coulomb Envelope Plot



Project: Ground Investigation for Northland Corridor
 Location : Alternative to Brynderwyn Hills Section
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1128
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: CW-HW SILTSTONE

Depth (m): 6.00-6.50
 Date sampled: 30/10/25

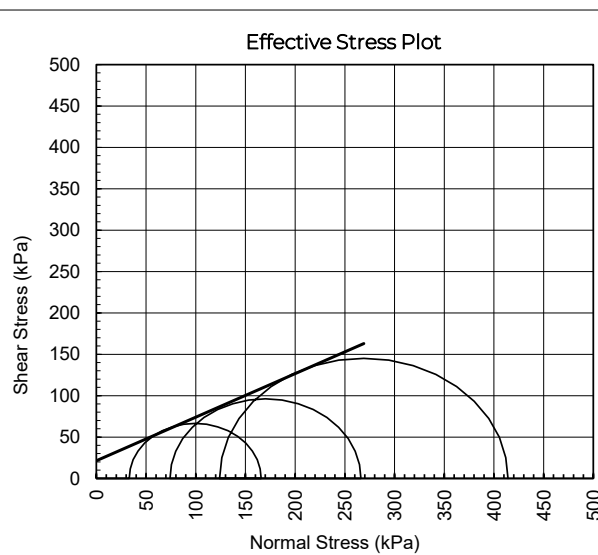
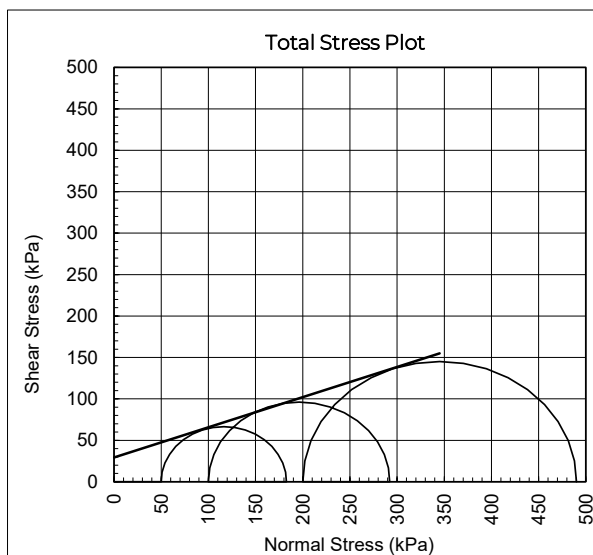
Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/193-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Mohr-Coulomb envelope plots - Result at Maximum Stress

Back Pressure Saturated at 400 kPa



TOTAL STRESS RESULT			
Intercept d	27.55	(kPa)	
Beta β	18.88	(deg)	
Cohesion c	29	(kPa)	
Phi ϕ	20	(deg)	
Correl coeff.	0.9989	(r ²)	

EFFECTIVE STRESS RESULT			
Intercept d'	18.93	(kPa)	
Beta β'	24.97	(deg)	
Cohesion c'	21	(kPa)	
Phi ϕ'	28	(deg)	
Correl coeff.	0.9980	(r ²)	

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Drainage Conditions during Shear :
 Stage 2 : Stress Ratio
 Stage 3 : Stress Ratio

Date tested: 04-15/12/25
 Date reported: 8/01/26

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory:

Thirushen Pillay

Date: 8/01/26

Designation:

Senior Civil Engineering Technician



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - P vs Q Total Stress Plot



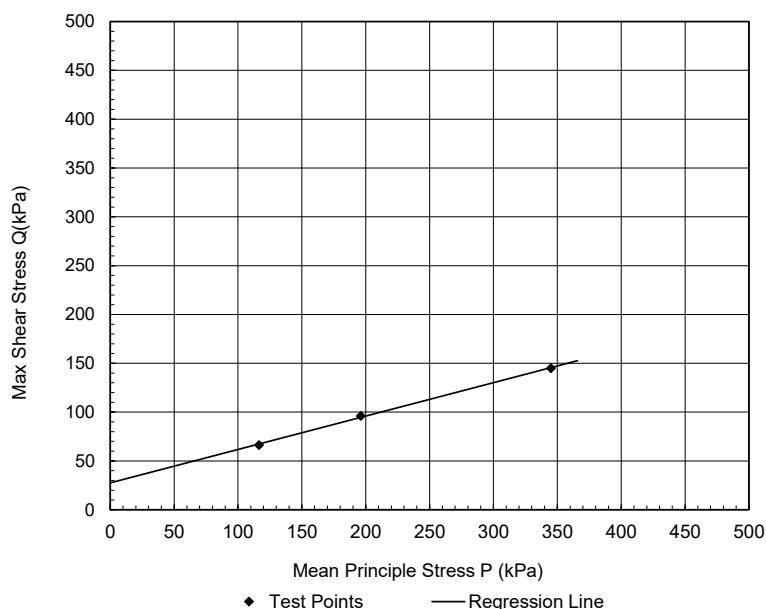
Project: Ground Investigation for Northland Corridor
 Location : Alternative to Brynderwyn Hills Section
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1128
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: CW-HW SILTSTONE
 Depth (m): 6.00-6.50
 Date sampled: 30/10/25

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/193-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P vs Q Total Stress Plot - Back Pressure saturated at 400 kPa



TOTAL STRESS RESULT			Correl coeff	0.9989	(r ²)
Intercept d	27.55	(kPa)	Cohesion c	29	(kPa)
Beta β	18.88	(deg)	Phi Ø	20	(deg)

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
 Failure Criteria: Stage 2 : Stress Ratio
 (at Max. Values) Stage 3 : Stress Ratio

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Date tested: 04-15/12/25

Date reported: 8/01/26

Approved Signatory:

Date: 8/01/26

Designation:

Thirushen Pillay
 Senior Civil Engineering Technician

LHF 2418 (08/25)



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

Page 4 of 9

WSP
 Auckland Laboratory
 Quality Management Systems Certified to ISO 9001

7a Ride Way, Albany
 Private Bag 101982, NS Mail Centre, North
 Shore City 0745, New Zealand

Telephone +64 9 4154660
 Website www.wsp.com/nz

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - P' vs Q' Effective Stress Plot

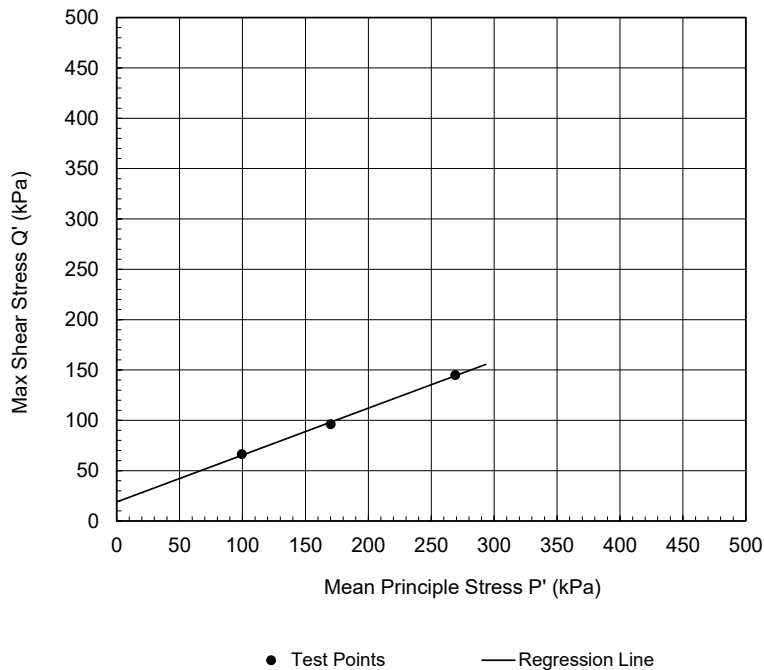


Project: Ground Investigation for Northland Corridor
Location: Alternative to Brynderwyn Hills Section
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1128
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: CW-HW SILTSTONE
Depth (m): 6.00-6.50
Date sampled: 30/10/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/193-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT
P' vs Q' Effective Stress Plot - Back Pressure saturated at 400 kPa



EFFECTIVE STRESS RESULT			Correl coeff	0.9980	(r ²)
Intercept d'	18.93	(kPa)	Cohesion c'	21	(kPa)
Beta β'	24.97	(deg)	Phi Ø'	28	(deg)

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
Failure Criteria:
Stage 2 : Stress Ratio
(at Max. Values) Stage 3 : Stress Ratio

Date tested: 04-15/12/25
Date reported: 8/01/26

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 8/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

Designation:
LHF 2418 (08/25)

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - PvsQ Stress Path Plot



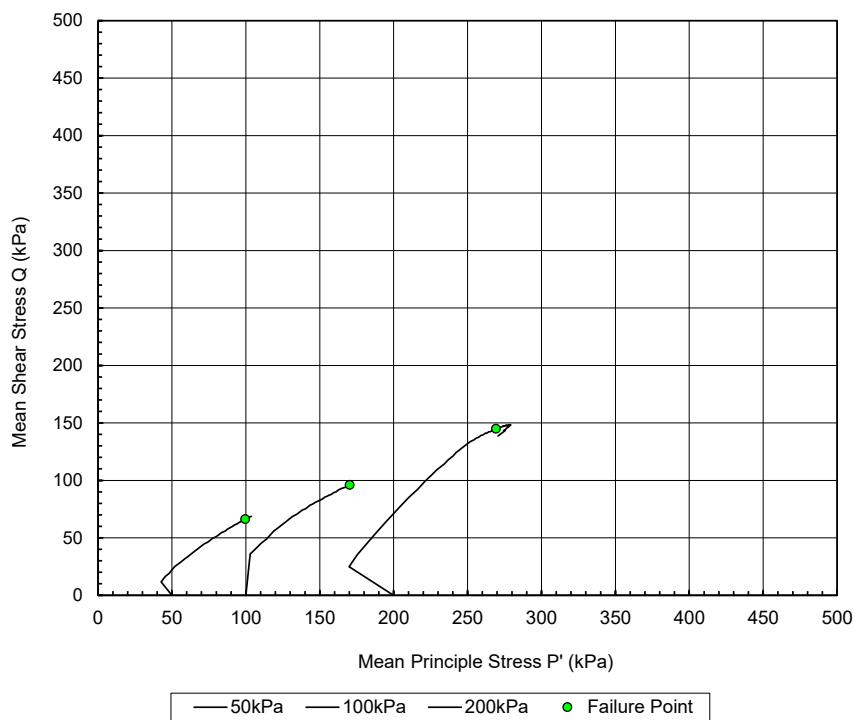
Project: Ground Investigation for Northland Corridor
Location: Alternative to Brynderwyn Hills Section
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1128
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: CW-HW SILTSTONE
Depth (m): 6.00-6.50
Date sampled: 30/10/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/193-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P' vs Q Stress Path (Effective Stress Plot) - Back Pressure saturated at 400 kPa



Test Method

Consolidated undrained triaxial test: BS EN ISO 17892-9:2018
Water Content: NZS4402:1986 Test 2.1

Notes

Stage 1: Stress Ratio
Failure Criteria: Stage 2: Stress Ratio
(at Max. Values) Stage 3: Stress Ratio

Date tested: 04-15/12/25
Date reported: 8/01/26

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 8/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Strain vs Deviator Stress Plot

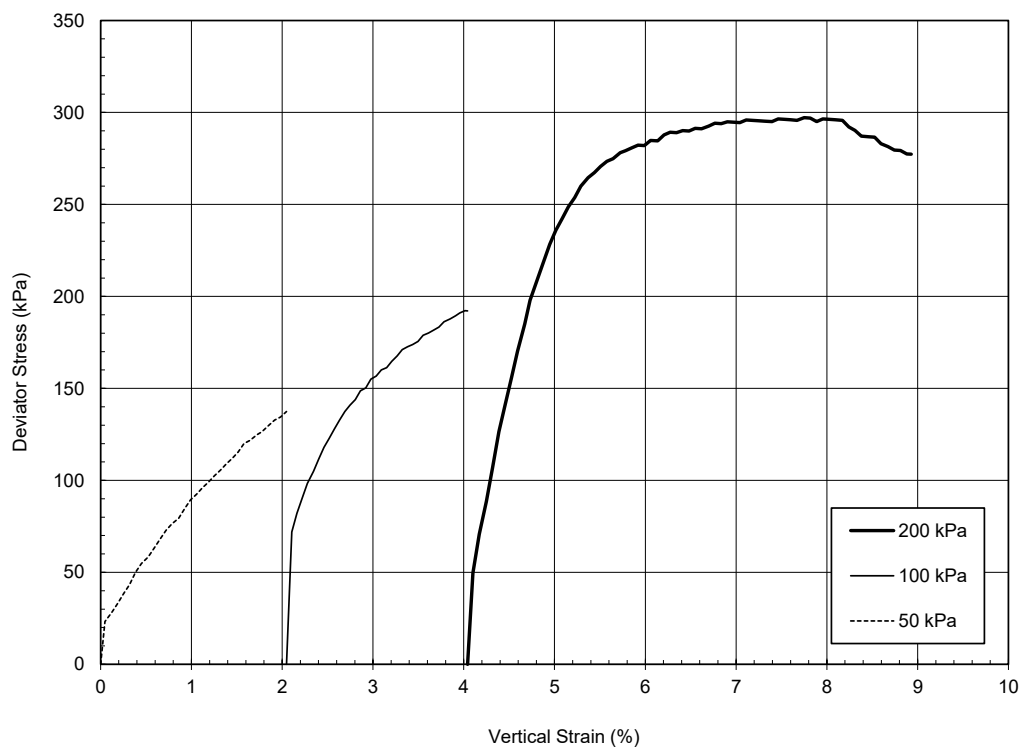


Project: Ground Investigation for Northland Corridor
Location: Alternative to Brynderwyn Hills Section
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1128
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: CW-HW SILTSTONE
Depth (m): 6.00-6.50
Date sampled: 30/10/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/193-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT
Vertical Strain vs Deviator Stress Plot - Back Pressure saturated at 400 kPa



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Date tested: 04-15/12/25
Date reported: 8/01/26

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 8/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Strain vs Pore Pressure Plot



Project: Ground Investigation for Northland Corridor
Location: Alternative to Brynderwyn Hills Section
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1128
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: CW-HW SILTSTONE

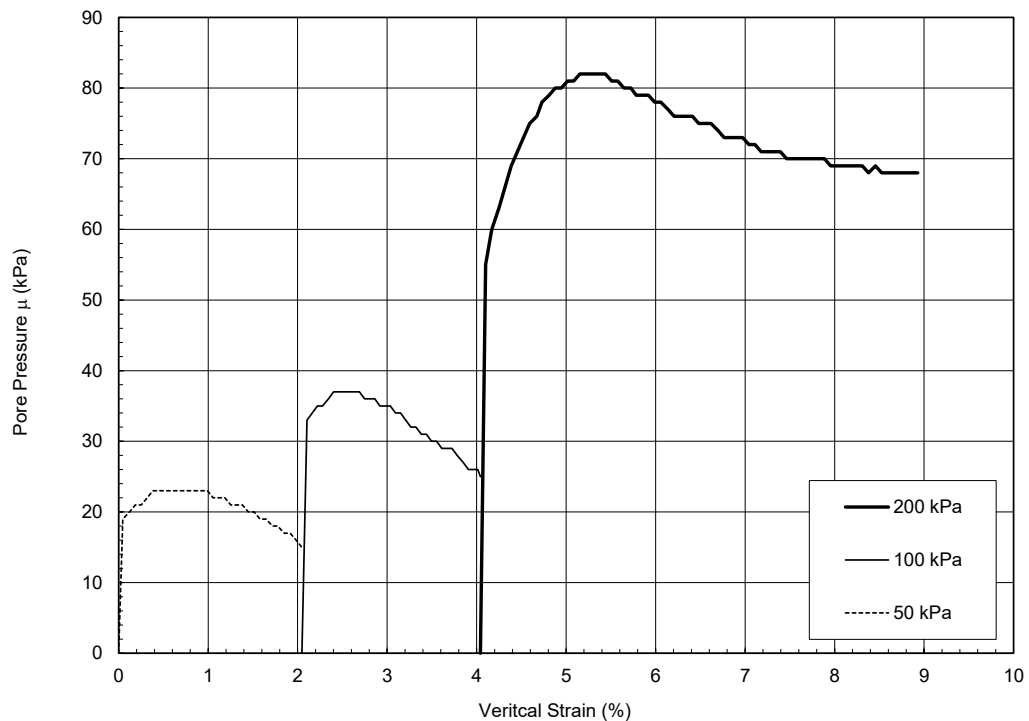
Depth (m): 6.00-6.50
Date sampled: 30/10/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/193-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Vertical Strain vs Pore Pressure Plot - Back Pressure saturated at 400 kPa



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Date tested: 04-15/12/25
Date reported: 8/01/26

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 8/01/26

Designation:



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

LHF 2418 (08/25)

Page 8 of 9

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test report - Photograph of Failure Type



Project: Ground Investigation for Northland Corridor
Location : Alternative to Brynderwyn Hills Section
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1128
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: CW-HW SILTSTONE

Depth (m): 6.00-6.50
Date sampled: 30/10/25

Sample Type : Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/193-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Photo of failure type



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Date tested: 04-15/12/25

Date reported: 8/01/26

Approved Signatory:

Date: 8/01/26

Designation:

Thirushen Pillay
Senior Civil Engineering Technician



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

LHF 2418 (08/25)

Page 9 of 9

WSP
Auckland Laboratory
Quality Management Systems Certified to ISO 9001

7a Ride Way, Albany
Private Bag 101982, NS Mail Centre, North
Shore City 0745, New Zealand

Telephone +64 9 4154660
Website www.wsp.com/nz

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - Result Summary



Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1130 Depth (m): 4.00-4.50
 Sampled by: NC Site Team Date sampled: 16/09/25
 Sampling Method: Pushtube
 Sample Description: Clayey SILT; Brown mottled grey; moist; plastic

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/107-TXL-CUM
 Client Ref: -

Initial Sample properties		Rate of strain (mm/min)	
Length (mm)	= 109.58	Stage 1	0.011
Diameter (mm)	= 50.68	Stage 2	0.011
Membrane Correction (kPa)=		Stage 3	0.011

Saturation achieved using a minimum Back Pressure of 400 kPa

Specimen Stage No	Effective Confining Pressure (kPa)	INITIAL PROPERTIES			Solid Particle Density (Mg/m ³)	FINAL PROPERTIES		
		Densities (Mg/m ³)		Water Content (%)		Densities (Mg/m ³)		Water Content (%)
		Bulk (Mg/m ³)	Dry (Mg/m ³)			Bulk (Mg/m ³)	Dry (Mg/m ³)	
1	50	1.76	1.22	43.4				
2	100				2.70			
3	200				(assumed)	1.86	1.34	38.3

Specimen Stage No	Effective Confining Pressure (kPa)	Void Ratio (e)	Deg of Saturation (Sr)		Deviator Stress $\sigma_1 - \sigma_3$ (kPa)	Pore Pressure μ (kPa)	Cumulative Strain (%)	Failure Criteria at Maximum Values
			Sr before Consolid.	Sr after Consolid.				
1	50	1.21	97	100	73.5	27	2.04	Stress Ratio
2	100				89.6	56	6.23	Deviator Stress
3	200				217.8	112	11.47	Deviator Stress

Specimen Stage No	Effective Confining Pressure (kPa)	Coefficient of Consolidation Cv (m ² /year)	Volume Compressibility Mv (m ² /MN)	Coefficient of Permeability k (m/s)	Final B Value	Due to the use of side filter drains, IANZ endorsement does not include the Cv, Mv and k values reported herein. Mv, Cv & k calculated for the following conditions:- L/D=2, RADIAL+TOP+BOTTOM Drainage Side Filter Drains Used (L/D= Sample Length/Diameter.)
1	50	4.4	0.5	6.9 x 10 ⁻¹⁰	1.02	
2	100	5.3	0.47	7.7 x 10 ⁻¹⁰		
3	200	4	0.43	5.4 x 10 ⁻¹⁰		

TOTAL STRESS RESULT		
Intercept d	2.37	(kPa)
Beta β	18.74	(deg)
Cohesion c	3	(kPa)
Phi ϕ	20	(deg)
Correl coeff.	0.9769	(r ²)

EFFECTIVE STRESS RESULT		
Intercept d'	0.80	(kPa)
Beta β'	28.56	(deg)
Cohesion c'	1	(kPa)
Phi ϕ'	33	(deg)
Correl coeff.	0.9900	(r ²)

Test Method	Notes
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	Cv and Mv have been rounded to 2 significant figures. Mg/m ³ is equivalent to t/m ³ Deviation from standard, rate of vertical strain for shear stage reported in mm/min vs. %/hr

Date tested: 17-29/10/25
 Date reported: 18/11/25

[Signature]

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory: Thirushen Pillay
 Designation: Senior Civil Engineering Technician

Date: 18/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Volume change vs $\sqrt{t}$ Plot (Consolidation stage)



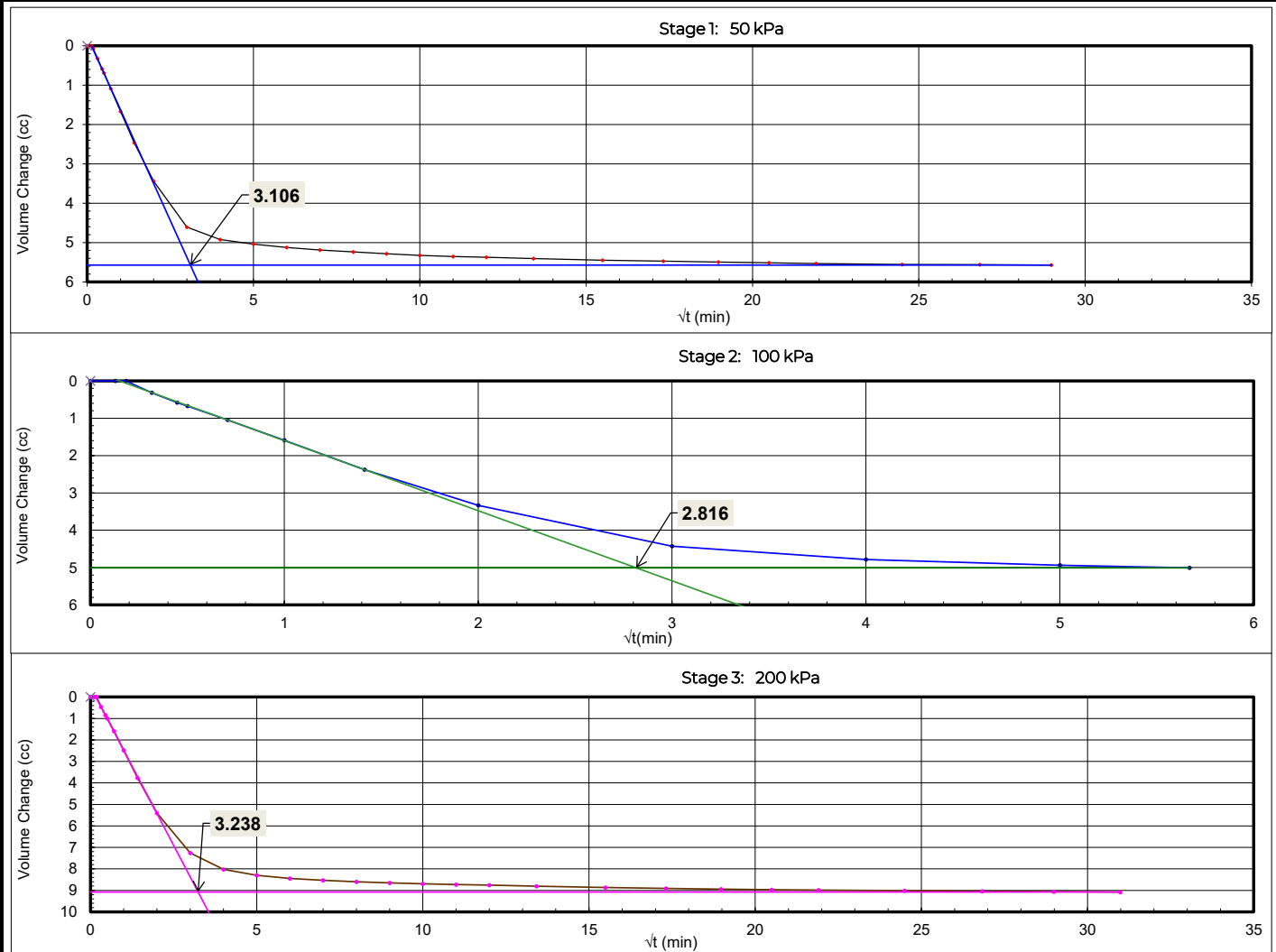
Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1130
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Clayey SILT; Brown mottled grey; moist; plastic

Depth (m): 4.00-4.50
 Date sampled: 16/09/25

Sample Type: Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/107-TXL-CUM
 Client Ref: -

Final Back Pressure (kPa) : 400 kPa



Test Method	Test Results at end of consolidation			
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018	Effective Stress (kPa)=	50 kPa	100 kPa	200 kPa
Water Content : NZS4402 : 1986 Test 2.1	t_{100} (min) =	9.647	7.930	10.485
	Volumetric Strain (%)=	2.521	2.267	4.107
	Vertical Strain (%)=	0.840	0.748	1.325
	PWP Dissipation (U)=	100.0	100.0	100.0
	Estimated Strain to failure(%)=	5	5	5

Date tested : 18/11/25
 Date reported : 17-29/10/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Date: 18/11/25

Approved Signatory: Thirushen Pillay
 Designation: Senior Civil Engineering Technician

LHF 2418 (08/25)



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - Mohr Coulomb Envelope Plot



Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1130
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Clayey SILT; Brown mottled grey; moist; plastic

Depth (m): 4.00-4.50
 Date sampled: 16/09/25

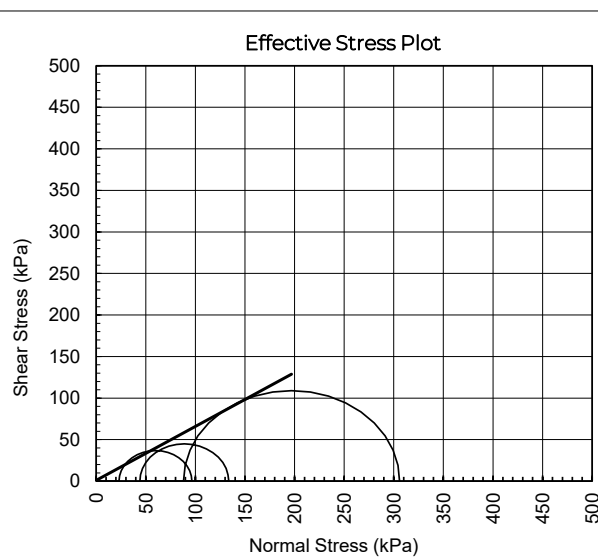
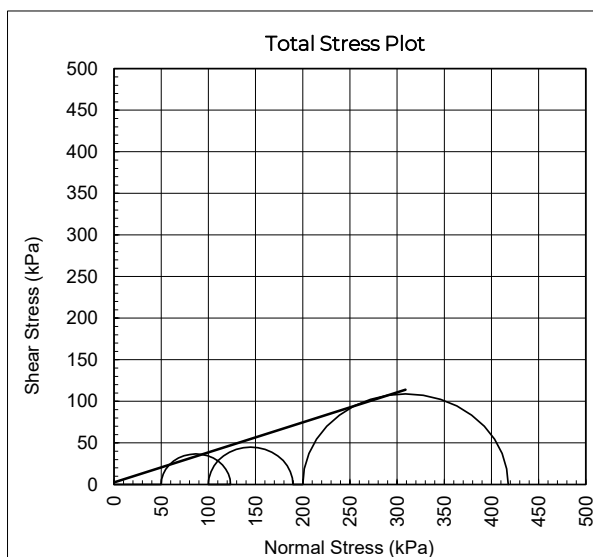
Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/107-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Mohr-Coulomb envelope plots - Result at Maximum Stress

Back Pressure Saturated at 400 kPa



TOTAL STRESS RESULT			
Intercept d	2.37	(kPa)	
Beta β	18.74	(deg)	
Cohesion c	3	(kPa)	
Phi ϕ	20	(deg)	
Correl coeff.	0.9769	(r ²)	

EFFECTIVE STRESS RESULT			
Intercept d'	0.80	(kPa)	
Beta β'	28.56	(deg)	
Cohesion c'	1	(kPa)	
Phi ϕ'	33	(deg)	
Correl coeff.	0.9900	(r ²)	

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Drainage Conditions during Shear :
 Stage 2 : Deviator Stress
 Stage 3 : Deviator Stress

Date tested: 17-29/10/25
 Date reported: 18/11/25

Approved Signatory:

Thirushen Pillay

Designation:

Senior Civil Engineering Technician

Date: 18/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - P vs Q Total Stress Plot



Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1130
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Clayey SILT; Brown mottled grey; moist; plastic

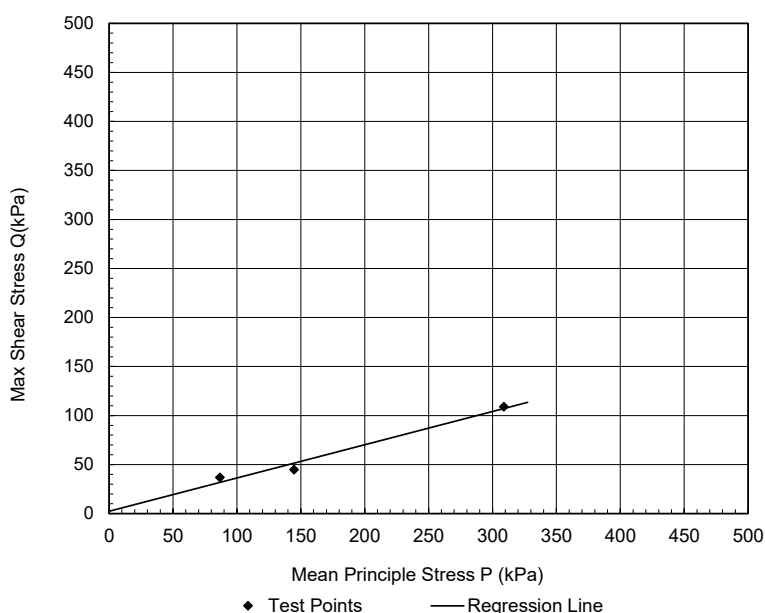
Depth (m): 4.00-4.50
 Date sampled: 16/09/25

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/107-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P vs Q Total Stress Plot - Back Pressure saturated at 400 kPa



TOTAL STRESS RESULT			Correl coeff	0.9769	(r ²)
Intercept d	2.37	(kPa)	Cohesion c	3	(kPa)
Beta β	18.74	(deg)	Phi Ø	20	(deg)

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
 Failure Criteria: Stage 2 : Deviator Stress
 (at Max. Values) Stage 3 : Deviator Stress

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Date tested: 17-29/10/25

Date reported: 18/11/25

Approved Signatory:

Thirushen Pillay
 Senior Civil Engineering Technician

Date: 18/11/25

Designation:

LHF 2418 (08/25)



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

Page 4 of 9

WSP
 Auckland Laboratory
 Quality Management Systems Certified to ISO 9001

7a Ride Way, Albany
 Private Bag 101982, NS Mail Centre, North
 Shore City 0745, New Zealand

Telephone +64 9 4154660
 Website www.wsp.com/nz

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - P' vs Q' Effective Stress Plot

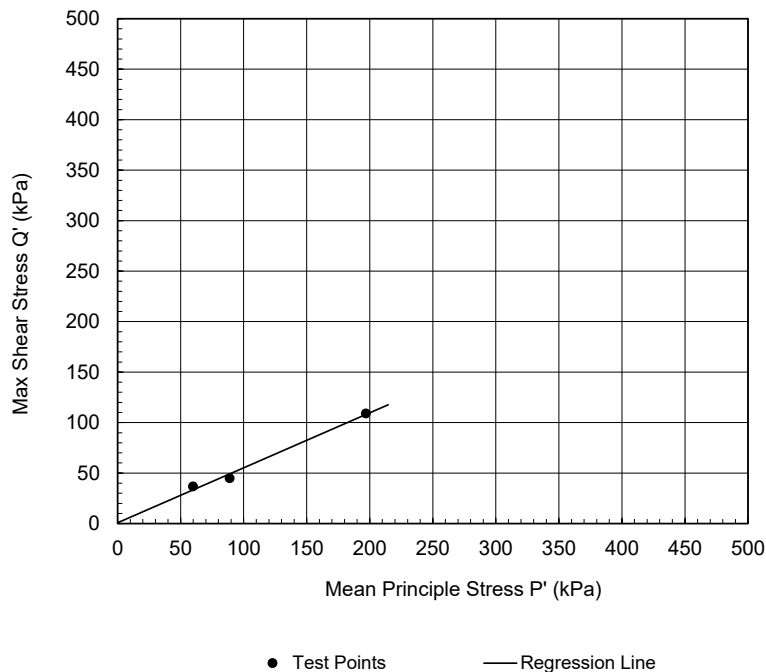


Project: Ground Investigation for Northland Corridor
Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1130 Depth (m): 4.00-4.50
Sampled by: NC Site Team Date sampled: 16/09/25
Sampling Method: Pushtube
Sample Description: Clayey SILT; Brown mottled grey; moist; plastic

Sample Type : Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/107-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT
P' vs Q' Effective Stress Plot - Back Pressure saturated at 400 kPa



EFFECTIVE STRESS RESULT			Correl coeff	0.9900	(r ²)
Intercept d'	0.80	(kPa)	Cohesion c'	1	(kPa)
Beta β'	28.56	(deg)	Phi Ø'	33	(deg)

Test Method	Notes
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018	Stage 1 : Stress Ratio
Water Content : NZS4402 : 1986 Test 2.1	Failure Criteria: Stage 2 : Deviator Stress
	(at Max. Values) Stage 3 : Deviator Stress

Date tested: 17-29/10/25
Date reported: 18/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory: Thirushen Pillay
Senior Civil Engineering Technician

Date: 18/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

LHF 2418 (08/25)

Page 5 of 9

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - PvsQ Stress Path Plot



Project: Ground Investigation for Northland Corridor
Location: Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1130
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Clayey SILT; Brown mottled grey; moist; plastic

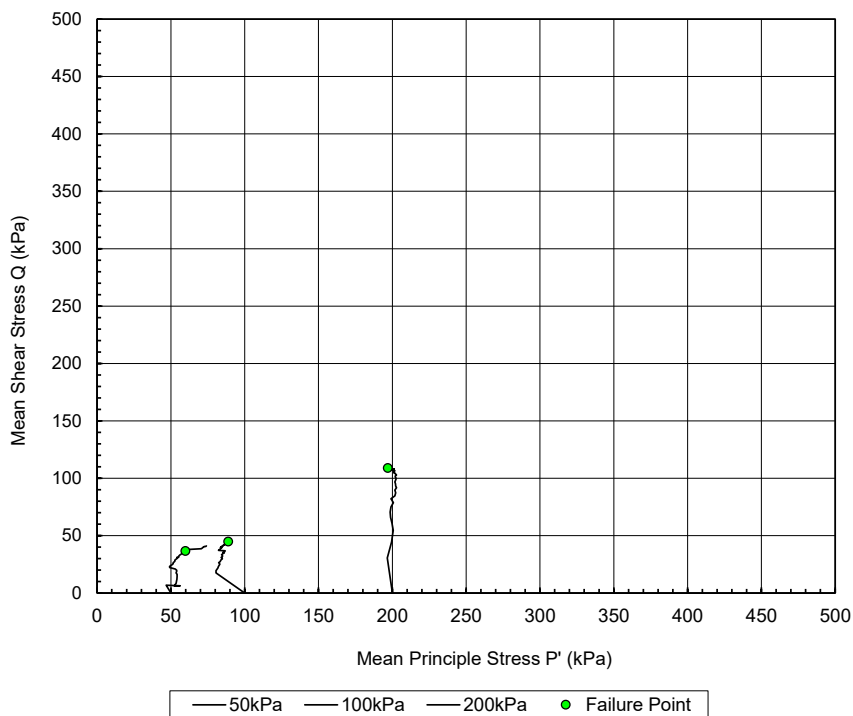
Depth (m): 4.00-4.50
Date sampled: 16/09/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/107-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P' vs Q Stress Path (Effective Stress Plot) - Back Pressure saturated at 400 kPa



Test Method

Consolidated undrained triaxial test: BS EN ISO 17892-9:2018
Water Content: NZS4402:1986 Test 2.1

Notes

Stage 1: Stress Ratio
Failure Criteria: Stage 2: Deviator Stress
(at Max. Values) Stage 3: Deviator Stress

Date tested: 17-29/10/25
Date reported: 18/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory: Thirushen Pillay
Designation: Senior Civil Engineering Technician

Date: 18/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Strain vs Deviator Stress Plot



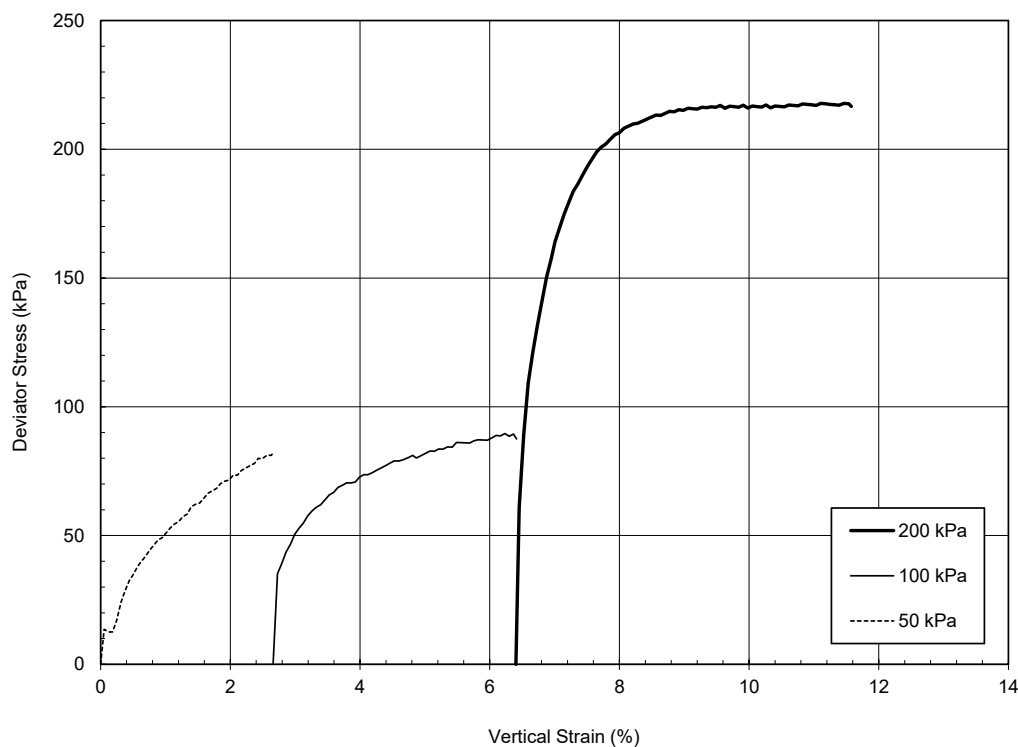
Project: Ground Investigation for Northland Corridor
Location: Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1130
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Clayey SILT; Brown mottled grey; moist; plastic

Depth (m): 4.00-4.50
Date sampled: 16/09/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/107-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT
Vertical Strain vs Deviator Stress Plot - Back Pressure saturated at 400 kPa



Test Method	Notes
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	

Date tested: 17-29/10/25
Date reported: 18/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory: 
Designation: Thirushen Pillay
Senior Civil Engineering Technician

Date: 18/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Strain vs Pore Pressure Plot



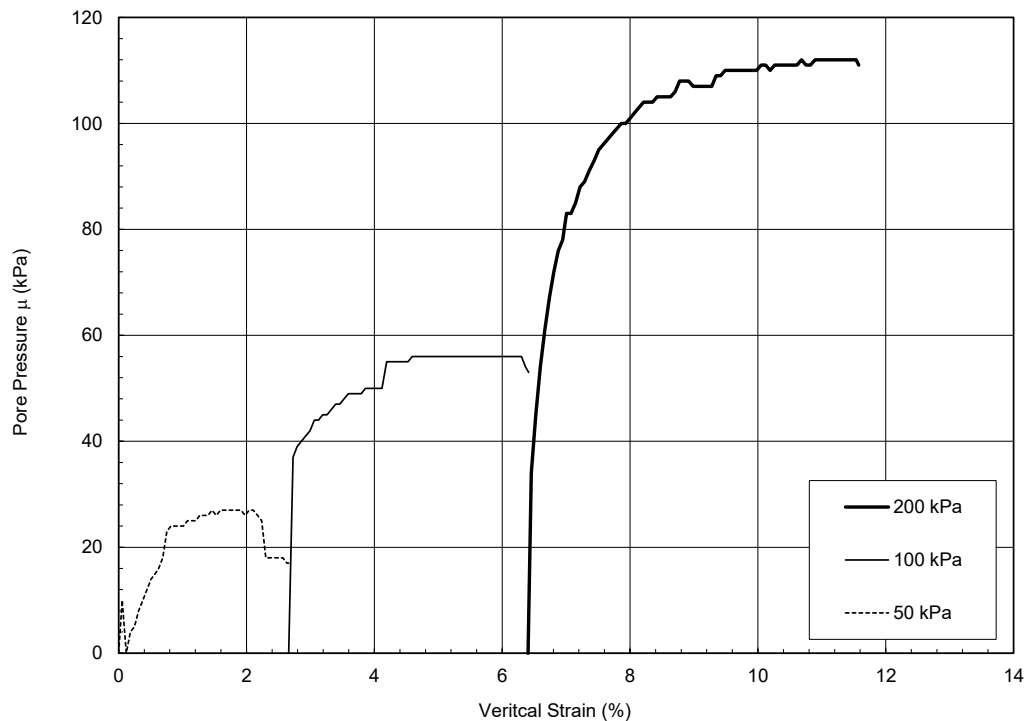
Project: Ground Investigation for Northland Corridor
Location: Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1130
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Clayey SILT; Brown mottled grey; moist; plastic
Depth (m): 4.00-4.50
Date sampled: 16/09/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/107-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Vertical Strain vs Pore Pressure Plot - Back Pressure saturated at 400 kPa



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Date tested: 17-29/10/25
Date reported: 18/11/25

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 18/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

LHF 2418 (08/25)

Page 8 of 9

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test report - Photograph of Failure Type



Project: Ground Investigation for Northland Corridor
Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1130 Depth (m): 4.00-4.50
Sampled by: NC Site Team Date sampled: 16/09/25
Sampling Method: Pushtube
Sample Description: Clayey SILT; Brown mottled grey; moist; plastic

Sample Type : Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/107-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Photo of failure type

Not taken

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

Date tested: 17-29/10/25

Date reported: 18/11/25

This report may only be reproduced in full

All information supplied by Client

Approved Signatory:

Thirushen Pillay

Date: 18/11/25

Designation:

Senior Civil Engineering Technician



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

LHF 2418 (08/25)

Page 9 of 9

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - Result Summary



Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1137
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Clayey SILT; grey mottled orange; moist; plastic

Depth (m): 4.50-5.00
 Date sampled: 2/10/25

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/132-TXL-CUM
 Client Ref: -

Initial Sample properties		Rate of strain (mm/min)	
Length (mm)	= 109.88	Stage 1	0.011
Diameter (mm)	= 54.05	Stage 2	0.011
Membrane Correction (kPa)=		Stage 3	0.011

Saturation achieved using a minimum Back Pressure of 500 kPa

Specimen Stage No	Effective Confining Pressure (kPa)	INITIAL PROPERTIES			Solid Particle Density (Mg/m³)	FINAL PROPERTIES		
		Densities (Mg/m³)		Water Content (%)		Densities (Mg/m³)		Water Content (%)
		Bulk (Mg/m³)	Dry (Mg/m³)			Bulk (Mg/m³)	Dry (Mg/m³)	
1	50	1.78	1.24	43.1				
2	100				2.73			
3	200				(assumed)	1.86	1.32	41.2

Specimen Stage No	Effective Confining Pressure (kPa)	Void Ratio (e)	Deg of Saturation (Sr)		Deviator Stress $\sigma_1 - \sigma_3$ (kPa)	Pore Pressure μ (kPa)	Cumulative Strain (%)	Failure Criteria at Maximum Values
			Sr before Consolid.	Sr after Consolid.				
1	50	1.20	98	100	99.4	23	2.19	Stress Ratio
2	100				169.8	53	4.29	Dev Stress
3	200				219.8	108	8.39	Stress Ratio

Specimen Stage No	Effective Confining Pressure (kPa)	Coefficient of Consolidation C_v (m ² /year)	Volume Compressibility M_v (m ² /MN)	Coefficient of Permeability k (m/s)	Final B Value	Due to the use of side filter drains, IANZ endorsement does not include the C_v , M_v and k values reported herein. <u>M_v, C_v & k calculated for the following conditions:-</u> L/D=2, RADIAL+TOP+BOTTOM Drainage Side Filter Drains Used (L/D= Sample Length/Diameter.)
1	50	4.1	0.33	4.2×10^{-10}	1.02	
2	100	2.8	0.3	2.6×10^{-10}		
3	200	1.3	0.28	1.1×10^{-10}		

TOTAL STRESS RESULT		
Intercept d	26.00	(kPa)
Beta β	15.64	(deg)
Cohesion c	27	(kPa)
Phi ϕ	16	(deg)
Correl coeff.	0.9579	(r ²)

EFFECTIVE STRESS RESULT		
Intercept d'	16.44	(kPa)
Beta β'	25.43	(deg)
Cohesion c'	19	(kPa)
Phi ϕ'	28	(deg)
Correl coeff.	0.9728	(r ²)

Test Method	Notes
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	Cv and Mv have been rounded to 2 significant figures. Mg/m ³ is equivalent to t/m ³ Deviation from standard, rate of vertical strain for shear stage reported in mm/min vs. %/hr

Date tested: 16-29/10/25
 Date reported: 19/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory: Thirusen Pillay
 Designation: Senior Civil Engineering Technician

Date: 19/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Volume change vs $\sqrt{t}$ Plot (Consolidation stage)



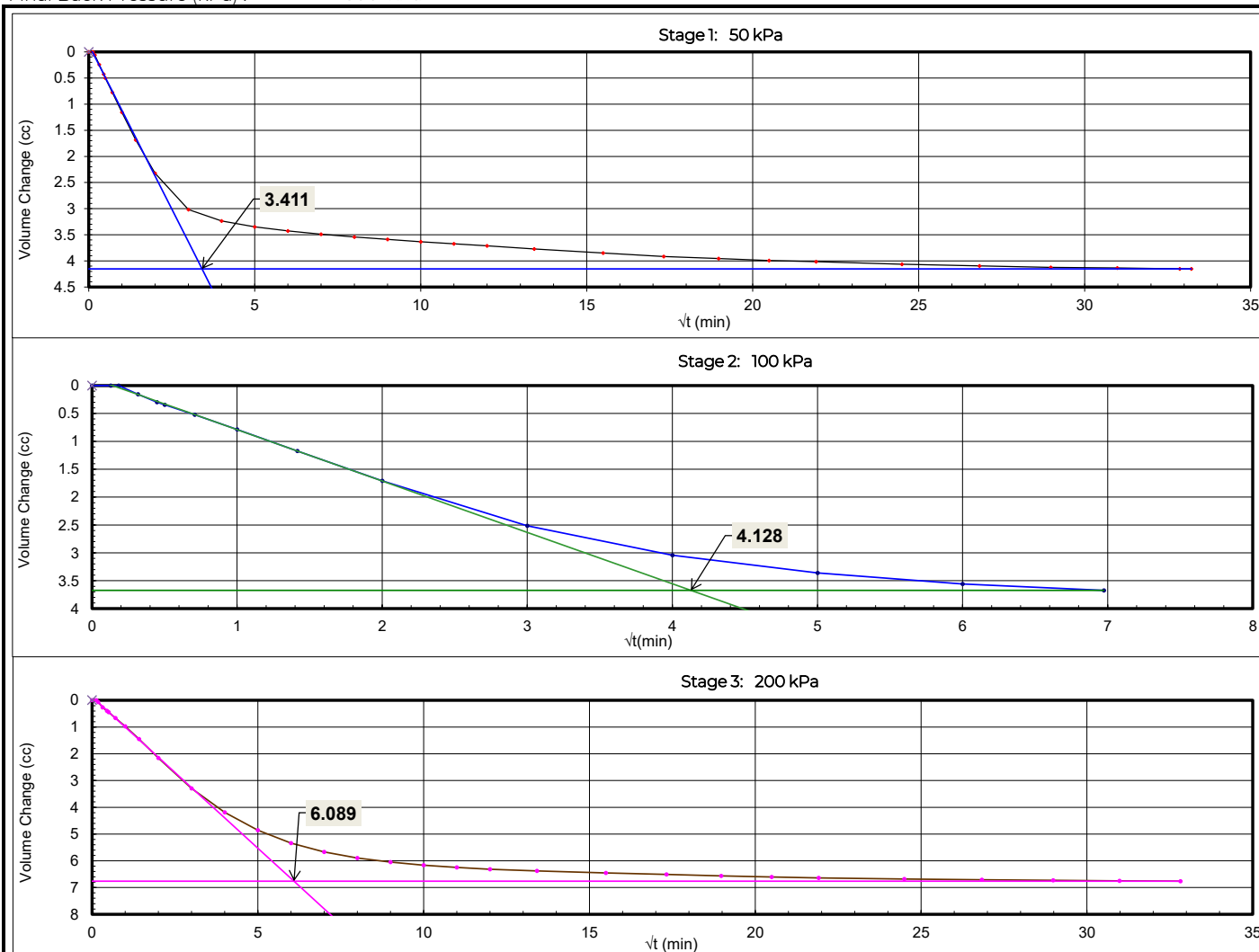
Project: Ground Investigation for Northland Corridor
Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1137
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Clayey SILT; grey mottled orange; moist; plastic

Depth (m): 4.50-5.00
Date sampled: 2/10/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/132-TXL-CUM
Client Ref: -

Final Back Pressure (kPa) : 500 kPa



Test Method	Test Results at end of consolidation		
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018	Effective Stress (kPa)=	50 kPa	100 kPa
Water Content : NZS4402 : 1986 Test 2.1	t_{100} (min) =	11.635	17.040
	Volumetric Strain (%)=	1.647	1.457
	Vertical Strain (%)=	0.549	0.479
	PWP Dissipation (U)=	100.0	100.0
	Estimated Strain to failure(%)=	5	5

Date tested : 19/11/25
Date reported : 16-29/10/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Date: 19/11/25

Approved Signatory
Designation:
LHF 2418 (08/25)

Thirushen Pillay
Senior Civil Engineering Technician



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Mohr Coulomb Envelope Plot



Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1137
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Clayey SILT; grey mottled orange; moist; plastic

Depth (m): 4.50-5.00
 Date sampled: 2/10/25

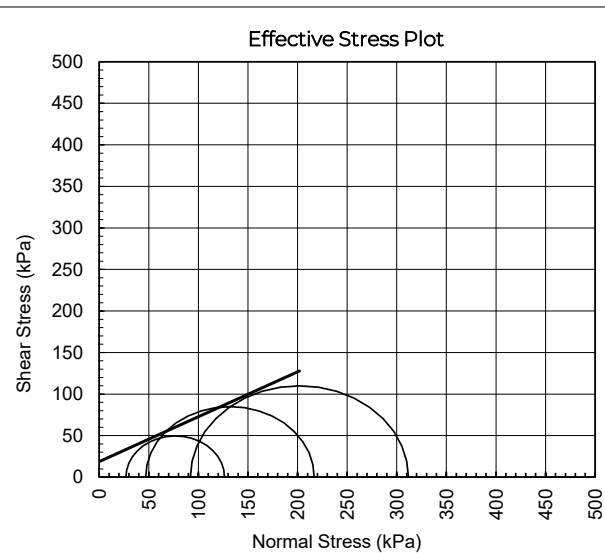
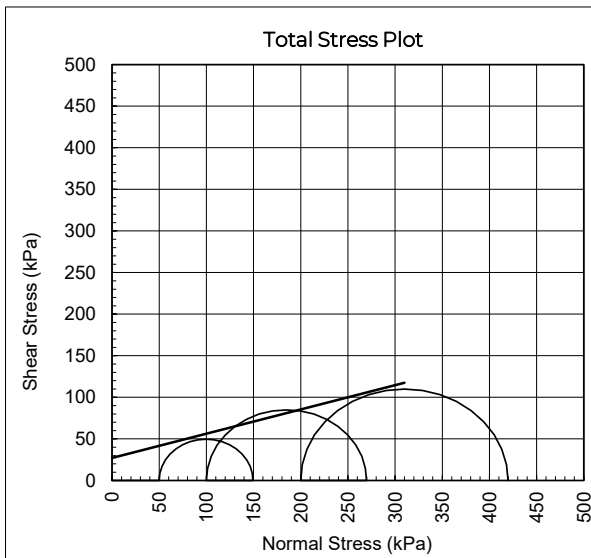
Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/132-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Mohr-Coulomb envelope plots - Result at Maximum Stress

Back Pressure Saturated at 500 kPa



TOTAL STRESS RESULT			
Intercept d	26.00	(kPa)	
Beta β	15.64	(deg)	
Cohesion c	27	(kPa)	
Phi ϕ	16	(deg)	
Correl coeff.	0.9579	(r ²)	

EFFECTIVE STRESS RESULT			
Intercept d'	16.44	(kPa)	
Beta β'	25.43	(deg)	
Cohesion c'	19	(kPa)	
Phi ϕ'	28	(deg)	
Correl coeff.	0.9728	(r ²)	

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Drainage Conditions during Shear :
 Stage 2 : Dev Stress
 Stage 3 : Stress Ratio

Date tested: 16-29/10/25
 Date reported: 19/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory:

Thirushen Pillay

Date: 19/11/25

Designation:

Senior Civil Engineering Technician



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - P vs Q Total Stress Plot



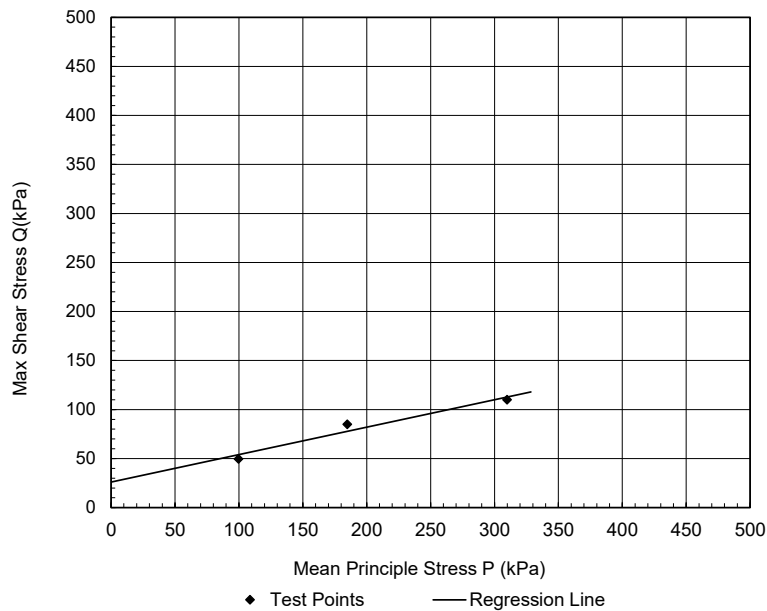
Project: Ground Investigation for Northland Corridor
Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1137 Depth (m): 4.50-5.00
Sampled by: NC Site Team Date sampled: 2/10/25
Sampling Method: Pushtube
Sample Description: Clayey SILT; grey mottled orange; moist; plastic

Sample Type : Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/132-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P vs Q Total Stress Plot - Back Pressure saturated at 500 kPa



TOTAL STRESS RESULT			Correl coeff	0.9579	(r ²)
Intercept d	26.00	(kPa)	Cohesion c	27	(kPa)
Beta β	15.64	(deg)	Phi Ø	16	(deg)

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
Failure Criteria: Stage 2 : Dev Stress
(at Max. Values) Stage 3 : Stress Ratio

Date tested: 16-29/10/25
Date reported: 19/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 19/11/25

Designation:

LHF 2418 (08/25)



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - P' vs Q' Effective Stress Plot

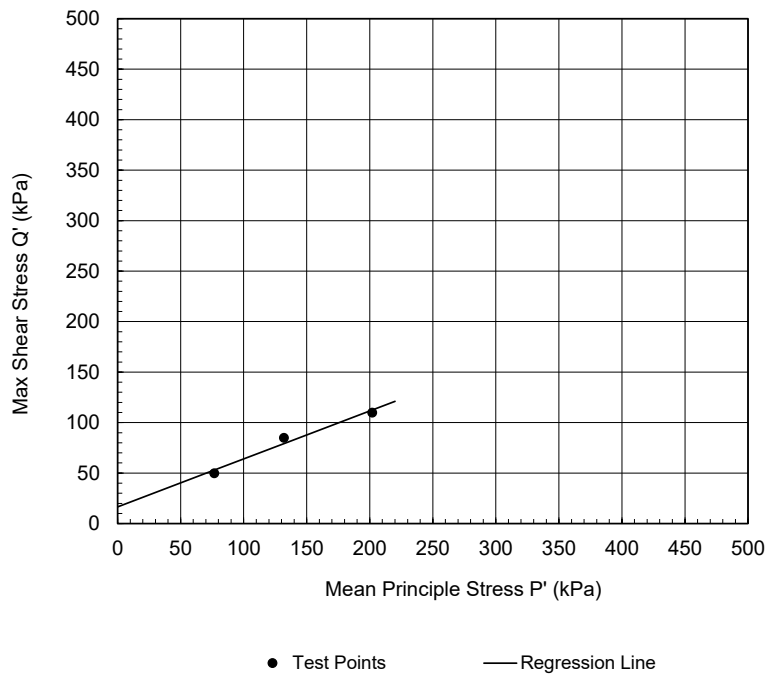


Project: Ground Investigation for Northland Corridor
Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1137 Depth (m): 4.50-5.00
Sampled by: NC Site Team Date sampled: 2/10/25
Sampling Method: Pushtube
Sample Description: Clayey SILT; grey mottled orange; moist; plastic

Sample Type : Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/132-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT
P' vs Q' Effective Stress Plot - Back Pressure saturated at 500 kPa



EFFECTIVE STRESS RESULT			Correl coeff	0.9728	(r ²)
Intercept d'	16.44	(kPa)	Cohesion c'	19	(kPa)
Beta β'	25.43	(deg)	Phi Ø'	28	(deg)

Test Method	Notes
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018	Stage 1 : Stress Ratio
Water Content : NZS4402 : 1986 Test 2.1	Failure Criteria: Stage 2 : Dev Stress
	(at Max. Values) Stage 3 : Stress Ratio

Date tested: 16-29/10/25
Date reported: 19/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory: Thirusen Pillay
Senior Civil Engineering Technician

Date: 19/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

LHF 2418 (08/25)

Page 5 of 9

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - PvsQ Stress Path Plot



Project: Ground Investigation for Northland Corridor
Location: Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1137
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Clayey SILT; grey mottled orange; moist; plastic

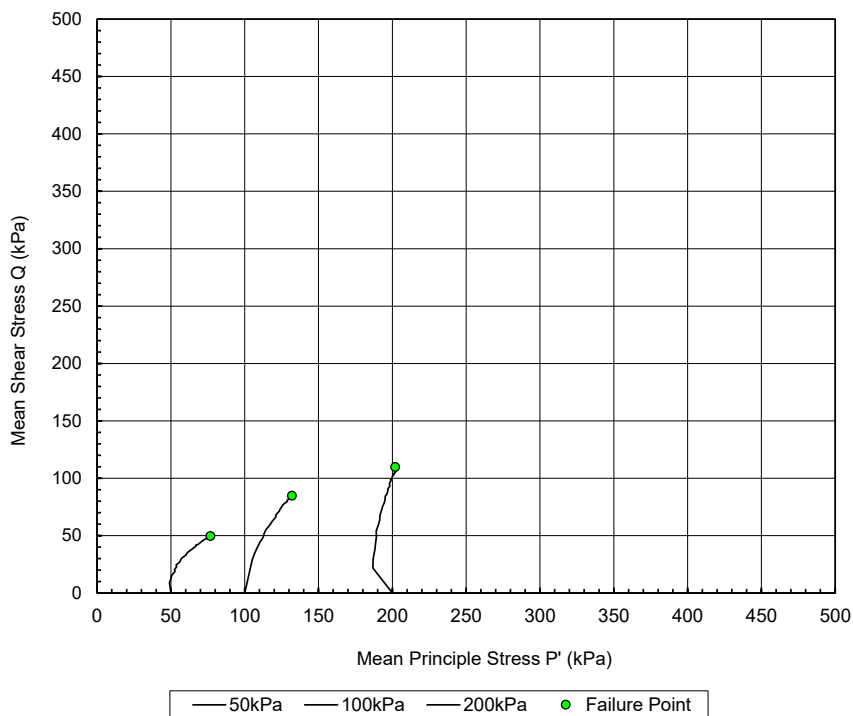
Depth (m): 4.50-5.00
Date sampled: 2/10/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/132-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P' vs Q Stress Path (Effective Stress Plot) - Back Pressure saturated at 500 kPa



Test Method

Consolidated undrained triaxial test: BS EN ISO 17892-9:2018
Water Content: NZS4402:1986 Test 2.1

Notes

Stage 1: Stress Ratio
Failure Criteria: Stage 2: Dev Stress
(at Max. Values) Stage 3: Stress Ratio

Date tested: 16-29/10/25
Date reported: 19/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 19/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Strain vs Deviator Stress Plot



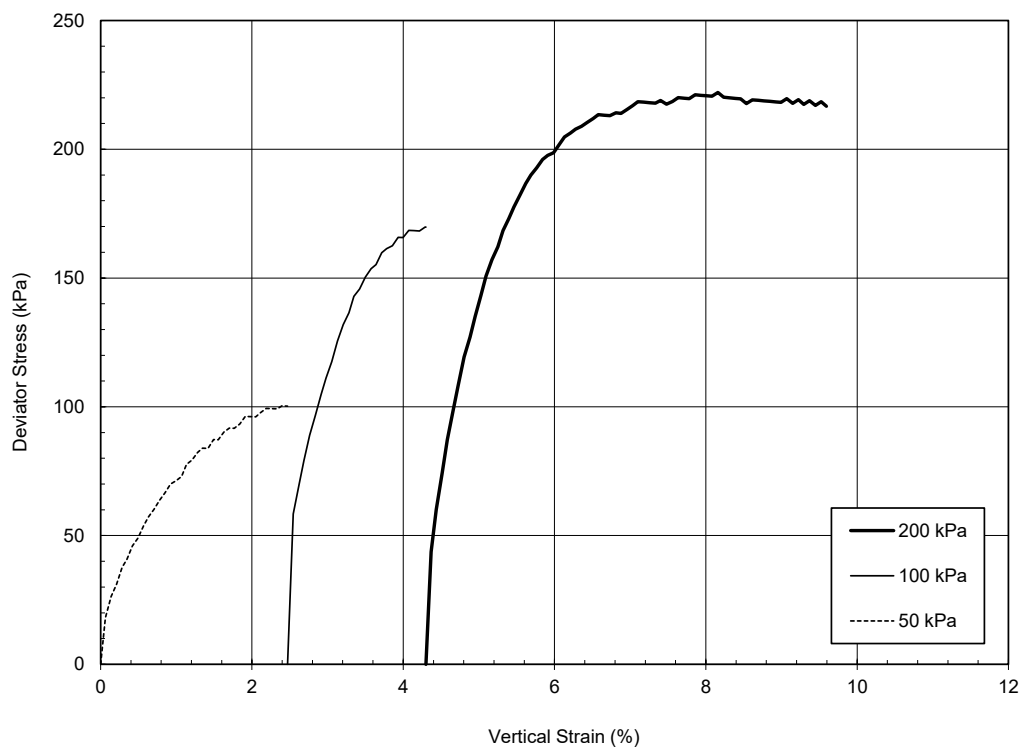
Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1137
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Clayey SILT; grey mottled orange; moist; plastic

Depth (m): 4.50-5.00
 Date sampled: 2/10/25

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/132-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT
 Vertical Strain vs Deviator Stress Plot - Back Pressure saturated at 500 kPa



Test Method	Notes
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	

Date tested: 16-29/10/25
 Date reported: 19/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory: 
 Designation: Thirushen Pillay
 Senior Civil Engineering Technician

Date: 19/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Strain vs Pore Pressure Plot



Project: Ground Investigation for Northland Corridor
Location: Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1137
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Clayey SILT; grey mottled orange; moist; plastic

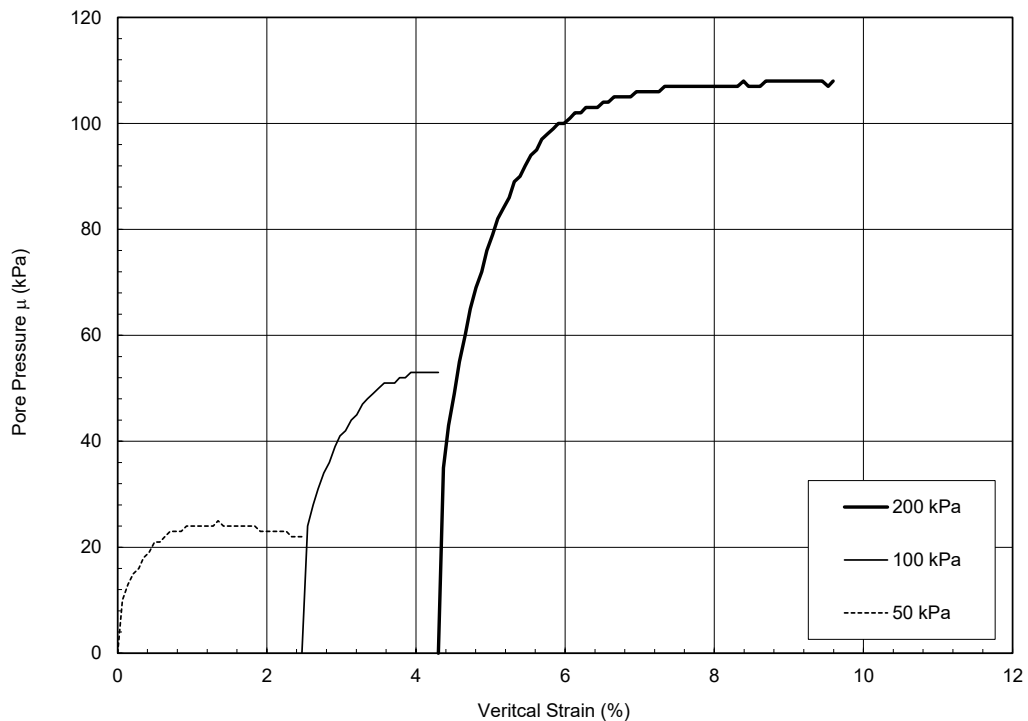
Depth (m): 4.50-5.00
Date sampled: 2/10/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/132-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Vertical Strain vs Pore Pressure Plot - Back Pressure saturated at 500 kPa



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Date tested: 16-29/10/25
Date reported: 19/11/25

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 19/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

LHF 2418 (08/25)

Page 8 of 9

WSP
Auckland Laboratory
Quality Management Systems Certified to ISO 9001

7a Ride Way, Albany
Private Bag 101982, NS Mail Centre, North
Shore City 0745, New Zealand

Telephone +64 9 4154660
Website www.wsp.com/nz

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test report - Photograph of Failure Type



Project: Ground Investigation for Northland Corridor
Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1137 Depth (m): 4.50-5.00
Sampled by: NC Site Team Date sampled: 2/10/25
Sampling Method: Pushtube
Sample Description: Clayey SILT; grey mottled orange; moist; plastic

Sample Type : Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/132-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Photo of failure type

Not taken

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Date tested: 16-29/10/25

Date reported: 19/11/25

Approved Signatory:

Thirushen Pillay

Date: 19/11/25

Designation:

Senior Civil Engineering Technician



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - Result Summary



Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1140 Depth (m): 3.00-3.50
 Sampled by: NC Site Team Date sampled: 10/09/25
 Sampling Method: Pushtube
 Sample Description: Clayey SILT; grey mottled brown; moist; plastic

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/75-TXL-CUM
 Client Ref: -

Initial Sample properties		Rate of strain (mm/min)	
Length (mm)	= 109.73	Stage 1	0.011
Diameter (mm)	= 53.78	Stage 2	0.011
Membrane Correction (kPa)=		Stage 3	0.011

Saturation achieved using a minimum Back Pressure of 500 kPa

Specimen Stage No	Effective Confining Pressure (kPa)	INITIAL PROPERTIES			Solid Particle Density (Mg/m³)	FINAL PROPERTIES		
		Densities (Mg/m³)		Water Content (%)		Densities (Mg/m³)		Water Content (%)
		Bulk (Mg/m³)	Dry (Mg/m³)			Bulk (Mg/m³)	Dry (Mg/m³)	
1	50	1.90	1.42	33.2				
2	100				2.73			
3	200				(tested)	1.96	1.49	31.6

Specimen Stage No	Effective Confining Pressure (kPa)	Void Ratio (e)	Deg of Saturation (Sr)		Deviator Stress $\sigma_1 - \sigma_3$ (kPa)	Pore Pressure μ (kPa)	Cumulative Strain (%)	Failure Criteria at Maximum Values
			Sr before Consolid.	Sr after Consolid.				
1	50	0.92	99	100	98.5	25	1.71	Stress Ratio
2	100				181.5	40	4.68	Stress Ratio
3	200				299.8	83	10.09	Stress Ratio

Specimen Stage No	Effective Confining Pressure (kPa)	Coefficient of Consolidation C_v (m ² /year)	Volume Compressibility M_v (m ² /MN)	Coefficient of Permeability k (m/s)	Final B Value	Due to the use of side filter drains, IANZ endorsement does not include the C_v , M_v and k values reported herein. <u>M_v, C_v & k calculated for the following conditions:-</u> L/D=2, RADIAL+TOP+BOTTOM Drainage Side Filter Drains Used (L/D= Sample Length/Diameter.)
1	50	5.6	0.23	4.0×10^{-10}	0.98	
2	100	0.078	0.26	6.2×10^{-12}		
3	200	0.045	0.21	2.9×10^{-12}		

TOTAL STRESS RESULT		
Intercept d	11.68	(kPa)
Beta β	21.72	(deg)
Cohesion c	13	(kPa)
Phi ϕ	23	(deg)
Correl coeff.	0.9971	(r ²)

EFFECTIVE STRESS RESULT		
Intercept d'	11.13	(kPa)
Beta β'	27.54	(deg)
Cohesion c'	13	(kPa)
Phi ϕ'	31	(deg)
Correl coeff.	0.9997	(r ²)

Test Method	Notes
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	Cv and Mv have been rounded to 2 significant figures. Mg/m ³ is equivalent to t/m ³ Deviation from standard, rate of vertical strain for shear stage reported in mm/min vs. %/hr

Date tested: 15/10/25-04/11/25
 Date reported: 18/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory: 
 Designation: Thirushen Pillay
 Senior Civil Engineering Technician

Date: 18/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Volume change vs $\sqrt{t}$ Plot (Consolidation stage)



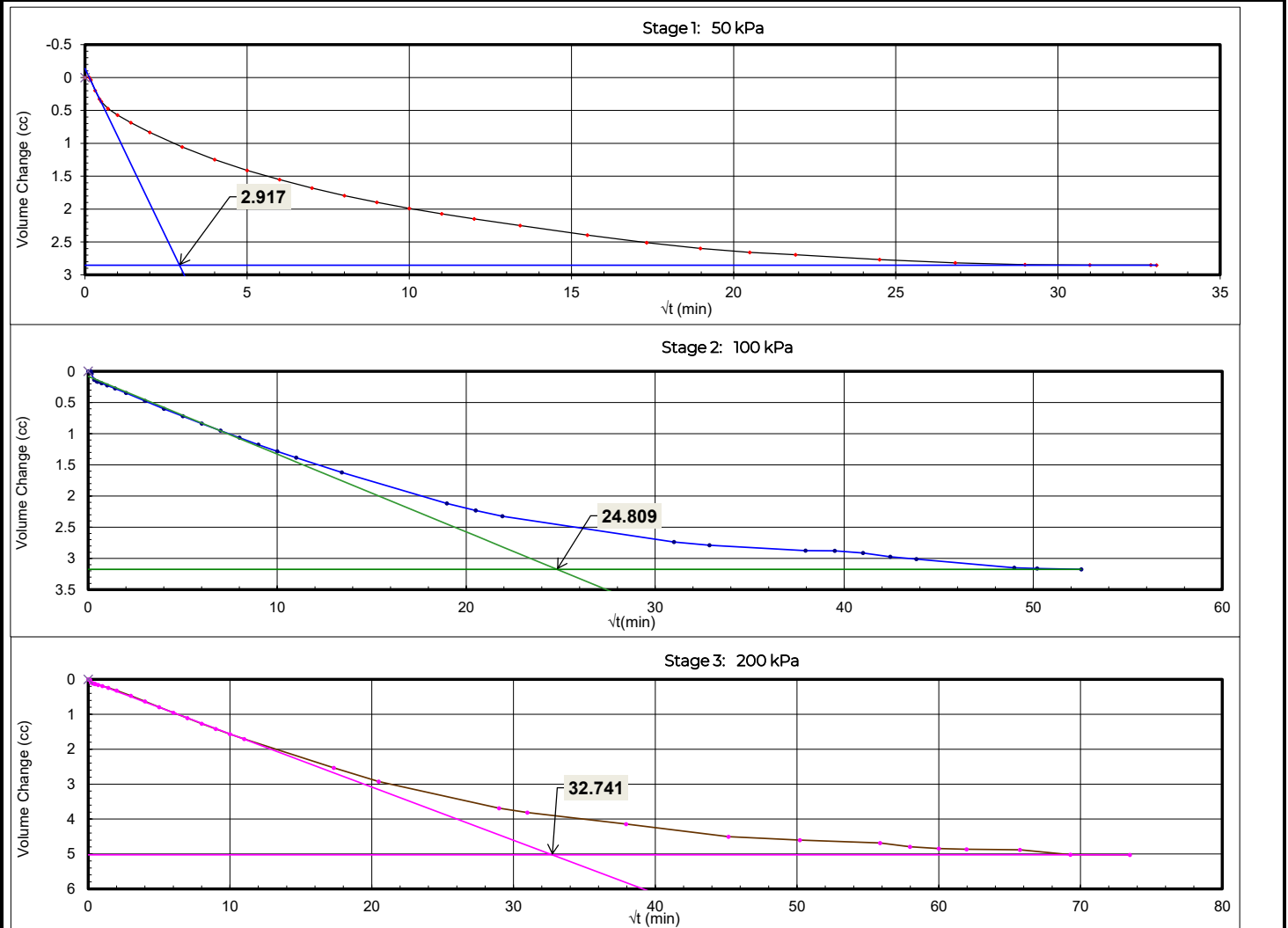
Project: Ground Investigation for Northland Corridor
Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1140
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Clayey SILT; grey mottled brown; moist; plastic

Depth (m): 3.00-3.50
Date sampled: 10/09/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/75-TXL-CUM
Client Ref: -

Final Back Pressure (kPa) : 500 kPa



Test Method	Test Results at end of consolidation			
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018	Effective Stress (kPa)=	50 kPa	100 kPa	200 kPa
Water Content : NZS4402 : 1986 Test 2.1	t_{100} (min) =	8.509	615.486	1071.973
	Volumetric Strain (%)=	1.145	1.274	2.016
	Vertical Strain (%)=	0.382	0.418	0.651
	PWP Dissipation (U)=	100.0	100.0	100.0
	Estimated Strain to failure(%)=	5	5	5

Date tested : 18/11/25
Date reported : 15/10/25-04/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Date: 18/11/25

Approved Signatory

Thirushen Pillay

Designation:

Senior Civil Engineering Technician

LHF 2418 (08/25)

WSP
Auckland Laboratory
Quality Management Systems Certified to ISO 9001

7a Ride Way, Albany
Private Bag 101982, NS Mail Centre, North
Shore City 0745, New Zealand



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

Telephone +64 9 4154660
Website www.wsp.com/nz

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Mohr Coulomb Envelope Plot



Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1140
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Clayey SILT; grey mottled brown; moist; plastic

Depth (m): 3.00-3.50
 Date sampled: 10/09/25

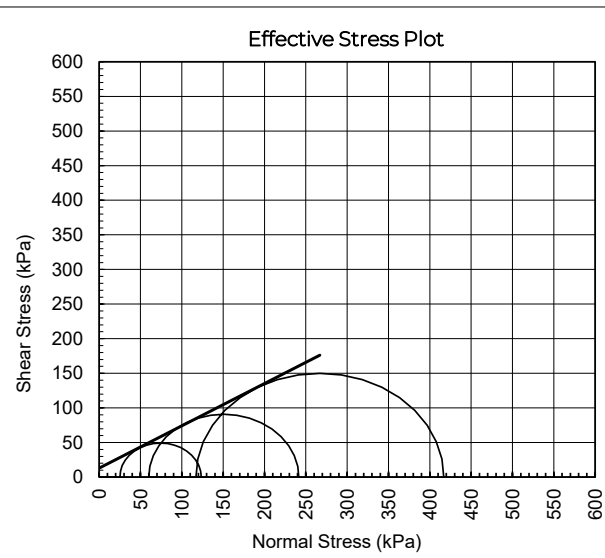
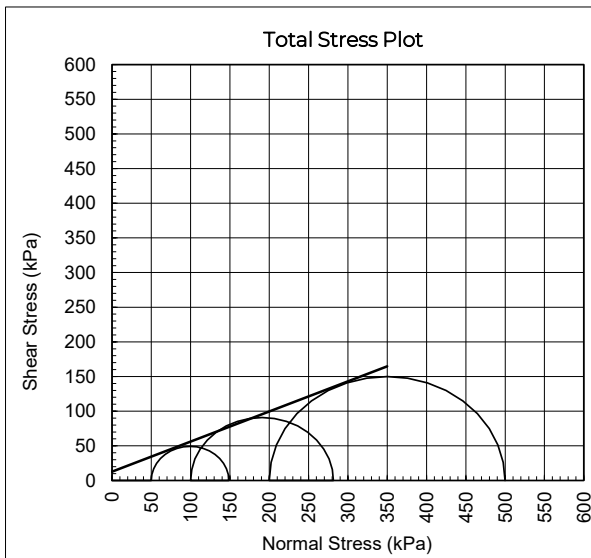
Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/75-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Mohr-Coulomb envelope plots - Result at Maximum Stress

Back Pressure Saturated at 500 kPa



TOTAL STRESS RESULT			
Intercept d	11.68	(kPa)	
Beta β	21.72	(deg)	
Cohesion c	13	(kPa)	
Phi ϕ	23	(deg)	
Correl coeff.	0.9971	(r ²)	

EFFECTIVE STRESS RESULT			
Intercept d'	11.13	(kPa)	
Beta β'	27.54	(deg)	
Cohesion c'	13	(kPa)	
Phi ϕ'	31	(deg)	
Correl coeff.	0.9997	(r ²)	

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Drainage Conditions during Shear :
 Stage 2 : Stress Ratio
 Stage 3 : Stress Ratio

Date tested: 15/10/25-04/11/25
 Date reported: 18/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory:

Thirushen Pillay

Date: 18/11/25

Designation:

Senior Civil Engineering Technician



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - P vs Q Total Stress Plot



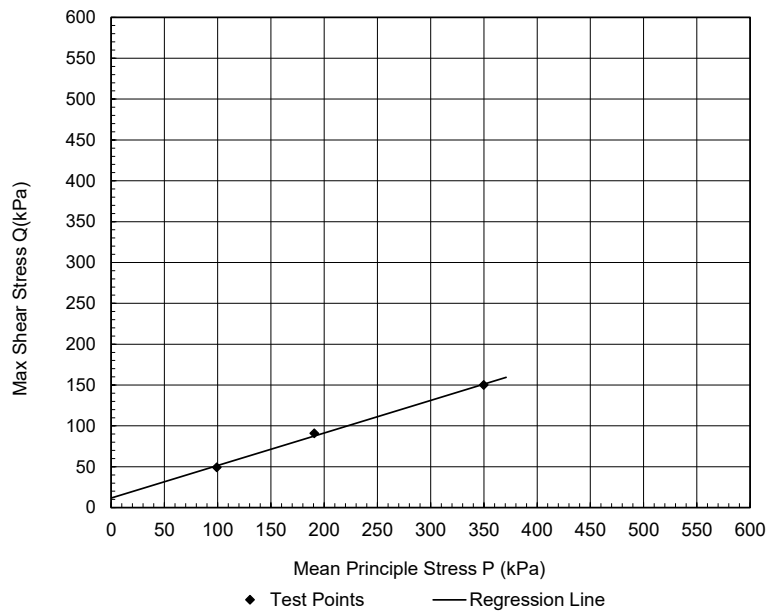
Project: Ground Investigation for Northland Corridor
Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1140 Depth (m): 3.00-3.50
Sampled by: NC Site Team Date sampled: 10/09/25
Sampling Method: Pushtube
Sample Description: Clayey SILT; grey mottled brown; moist; plastic

Sample Type : Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/75-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P vs Q Total Stress Plot - Back Pressure saturated at 500 kPa



TOTAL STRESS RESULT			Correl coeff	0.9971	(r^2)
Intercept d	11.68	(kPa)	Cohesion c	13	(kPa)
Beta β	21.72	(deg)	Phi ϕ	23	(deg)

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
Failure Criteria: Stage 2 : Stress Ratio
(at Max. Values) Stage 3 : Stress Ratio

Date tested: 15/10/25-04/11/25
Date reported: 18/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 18/11/25

Designation:

LHF 2418 (08/25)



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - P' vs Q' Effective Stress Plot

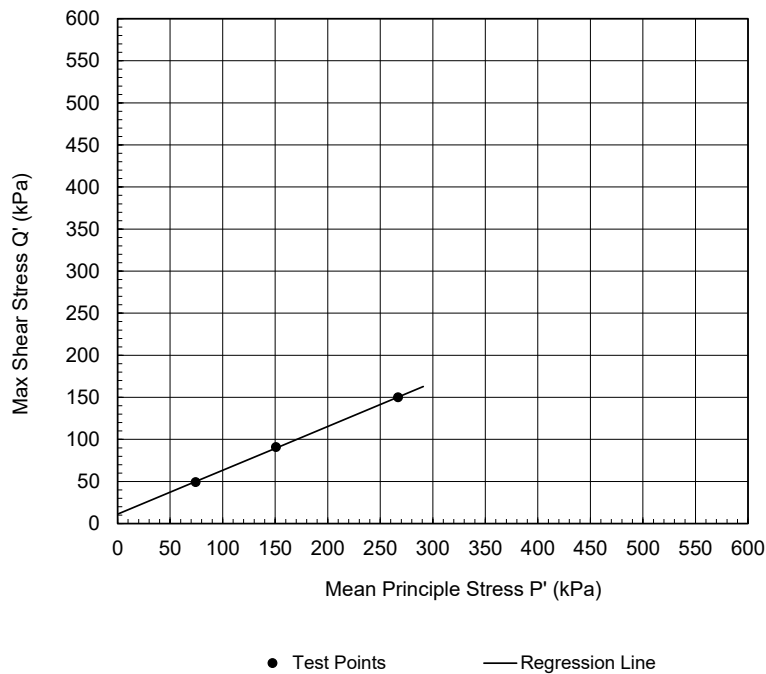


Project: Ground Investigation for Northland Corridor
Location: Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1140 Depth (m): 3.00-3.50
Sampled by: NC Site Team Date sampled: 10/09/25
Sampling Method: Pushtube
Sample Description: Clayey SILT; grey mottled brown; moist; plastic

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/75-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT
P' vs Q' Effective Stress Plot - Back Pressure saturated at 500 kPa



EFFECTIVE STRESS RESULT			Correl coeff	0.9997	(r ²)
Intercept d'	11.13	(kPa)	Cohesion c'	13	(kPa)
Beta β'	27.54	(deg)	Phi Ø'	31	(deg)

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
Failure Criteria: Stage 2 : Stress Ratio
(at Max. Values) Stage 3 : Stress Ratio

Date tested: 15/10/25-04/11/25
Date reported: 18/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 18/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

Designation:
LHF 2418 (08/25)

Page 5 of 9

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - PvsQ Stress Path Plot



Project: Ground Investigation for Northland Corridor
Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1140
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Clayey SILT; grey mottled brown; moist; plastic

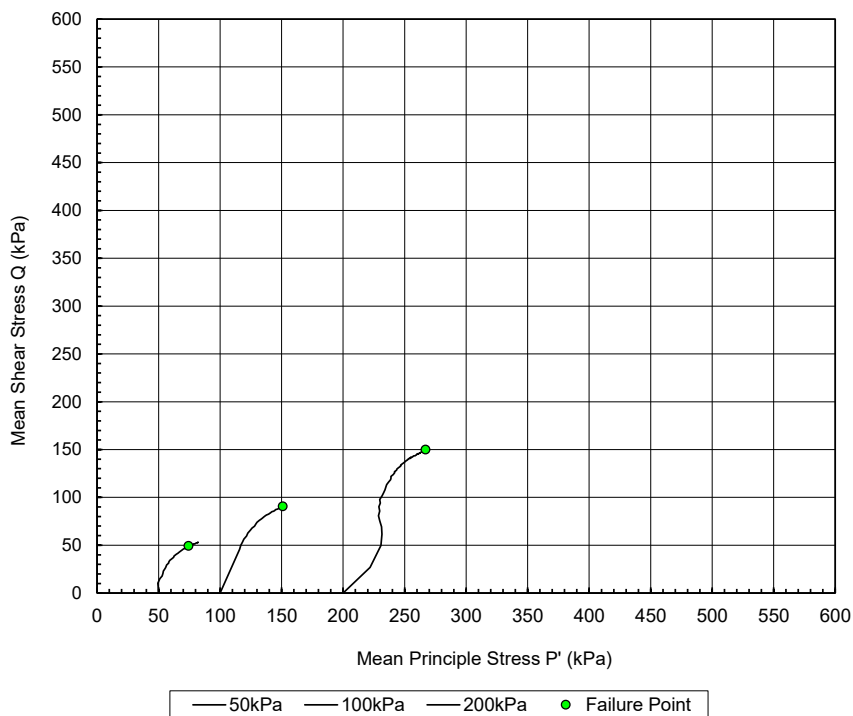
Depth (m): 3.00-3.50
Date sampled: 10/09/25

Sample Type : Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/75-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P' vs Q Stress Path (Effective Stress Plot) - Back Pressure saturated at 500 kPa



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
Failure Criteria: Stage 2 : Stress Ratio
(at Max. Values) Stage 3 : Stress Ratio

Date tested: 15/10/25-04/11/25
Date reported: 18/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 18/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Strain vs Deviator Stress Plot

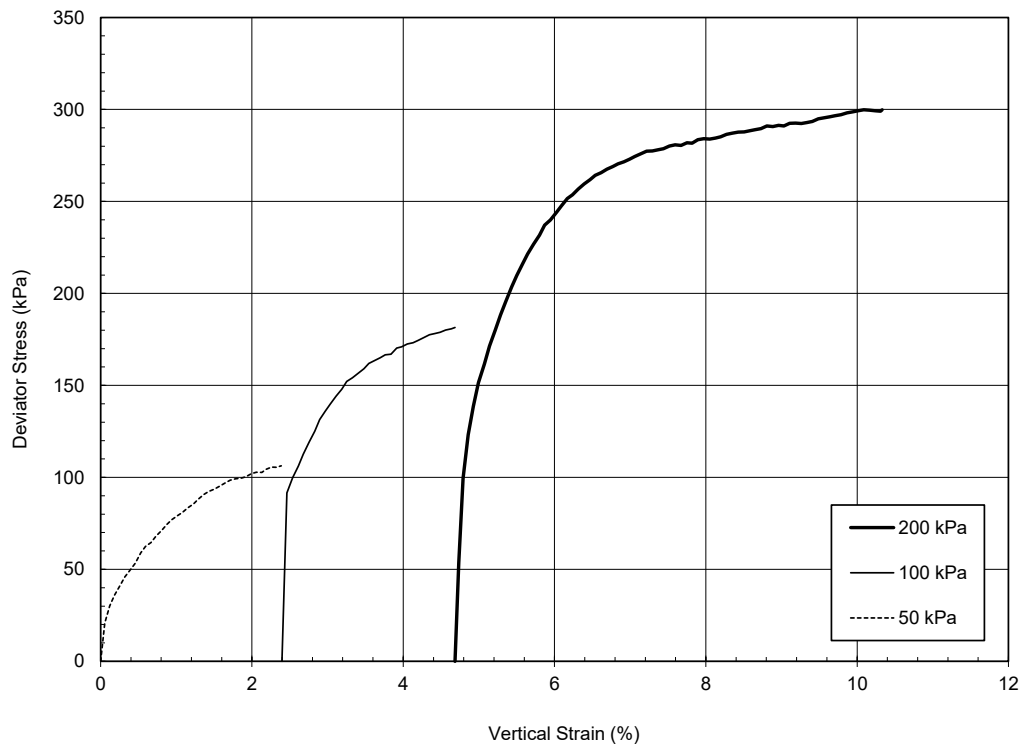


Project: Ground Investigation for Northland Corridor
Location: Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1140 Depth (m): 3.00-3.50
Sampled by: NC Site Team Date sampled: 10/09/25
Sampling Method: Pushtube
Sample Description: Clayey SILT; grey mottled brown; moist; plastic

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/75-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT
Vertical Strain vs Deviator Stress Plot - Back Pressure saturated at 500 kPa



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Date tested: 15/10/25-04/11/25
Date reported: 18/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory: 
Designation: Thirushen Pillay
Senior Civil Engineering Technician

Date: 18/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Strain vs Pore Pressure Plot



Project: Ground Investigation for Northland Corridor
Location: Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1140
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Clayey SILT; grey mottled brown; moist; plastic

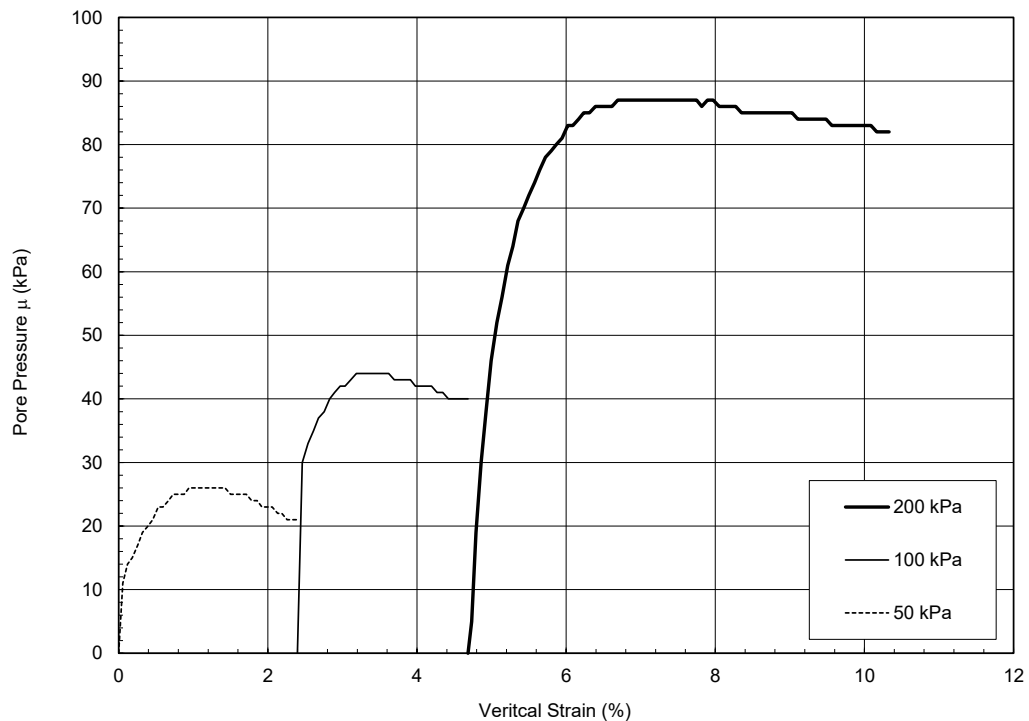
Depth (m): 3.00-3.50
Date sampled: 10/09/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/75-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Vertical Strain vs Pore Pressure Plot - Back Pressure saturated at 500 kPa



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Date tested: 15/10/25-04/11/25
Date reported: 18/11/25

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 18/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

LHF 2418 (08/25)

Page 8 of 9

WSP
Auckland Laboratory
Quality Management Systems Certified to ISO 9001

7a Ride Way, Albany
Private Bag 101982, NS Mail Centre, North
Shore City 0745, New Zealand

Telephone +64 9 4154660
Website www.wsp.com/nz

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test report - Photograph of Failure Type



Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1140
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Clayey SILT; grey mottled brown; moist; plastic

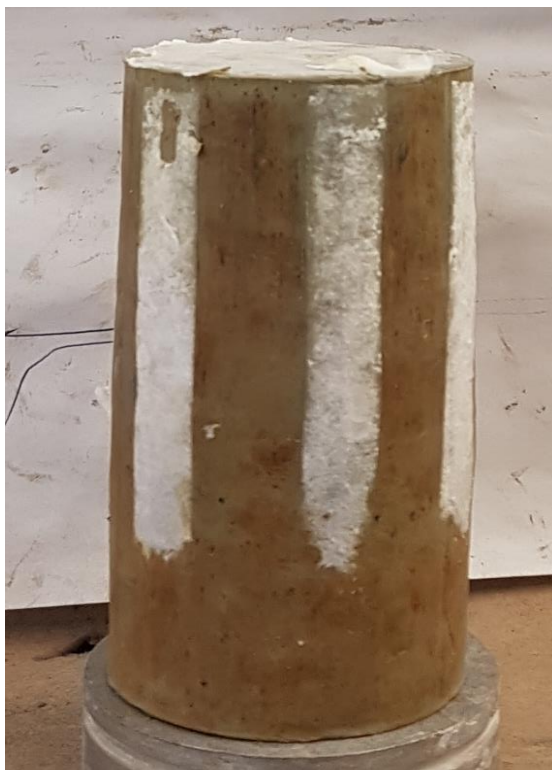
Depth (m): 3.00-3.50
 Date sampled: 10/09/25

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/75-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Photo of failure type



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Date tested: 15/10/25-04/11/25
 Date reported: 18/11/25

Approved Signatory:

Thirushen Pillay
 Senior Civil Engineering Technician

Date: 18/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

LHF 2418 (08/25)

Page 9 of 9

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - Result Summary



Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1140
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Silty CLAY; greenish grey; moist; plastic

Depth (m): 12.00-12.50
 Date sampled: 10/09/25

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/79-TXL-CUM
 Client Ref: -

Initial Sample properties		Rate of strain (mm/min)	
Length (mm)	= 109.25	Stage 1	0.011
Diameter (mm)	= 53.58	Stage 2	0.011
Membrane Correction (kPa)=		Stage 3	0.011

Saturation achieved using a minimum Back Pressure of 400 kPa

Specimen Stage No	Effective Confining Pressure (kPa)	INITIAL PROPERTIES			Solid Particle Density (Mg/m³)	FINAL PROPERTIES		
		Densities (Mg/m³)		Water Content (%)		Densities (Mg/m³)		Water Content (%)
		Bulk (Mg/m³)	Dry (Mg/m³)			Bulk (Mg/m³)	Dry (Mg/m³)	
1	50	1.98	1.52	30.6				
2	100				2.70			
3	300				(assumed)	2.10	1.67	26.0

Specimen Stage No	Effective Confining Pressure (kPa)	Void Ratio (e)	Deg of Saturation (Sr)		Deviator Stress $\sigma_1 - \sigma_3$ (kPa)	Pore Pressure μ (kPa)	Cumulative Strain (%)	Failure Criteria at Maximum Values
			Sr before Consolid.	Sr after Consolid.				
1	50	0.78	100	100	35.2	18	2.29	Stress Ratio
2	100				74.3	39	5.19	Deviator Stress
3	300				239.2	162	9.58	Deviator Stress

Specimen Stage No	Effective Confining Pressure (kPa)	Coefficient of Consolidation Cv (m ² /year)	Volume Compressibility Mv (m ² /MN)	Coefficient of Permeability k (m/s)	Final B Value	Due to the use of side filter drains, IANZ endorsement does not include the Cv, Mv and k values reported herein. Mv, Cv & k calculated for the following conditions:- L/D=2, RADIAL+TOP+BOTTOM Drainage Side Filter Drains Used (L/D= Sample Length/Diameter.)
1	50	0.41	0.61	7.8 x 10 ⁻¹¹	1.02	
2	100	0.13	0.5	2.0 x 10 ⁻¹¹		
3	300	0.12	0.19	7.2 x 10 ⁻¹²		

TOTAL STRESS RESULT		
Intercept d	0.00	(kPa)
Beta β	15.81	(deg)
Cohesion c	0	(kPa)
Phi ϕ	16	(deg)
Correl coeff.	0.9996	(r ²)

EFFECTIVE STRESS RESULT		
Intercept d'	0.00	(kPa)
Beta β'	24.24	(deg)
Cohesion c'	0	(kPa)
Phi ϕ'	27	(deg)
Correl coeff.	0.9947	(r ²)

Value (Total Stress) has been adjusted to zero

NB: The Cohesion Value (Eff. Stress) has been adjusted to zero

Test Method	Notes
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	Cv and Mv have been rounded to 2 significant figures. Mg/m ³ is equivalent to t/m ³ Deviation from standard, rate of vertical strain for shear stage reported in mm/min vs. %/hr

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Date tested: 06-16/10/25
 Date reported: 18/11/25

[Signature]

Approved Signatory: Thirushen Pillay
 Designation: Senior Civil Engineering Technician

Date: 18/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Volume change vs $\sqrt{t}$ Plot (Consolidation stage)



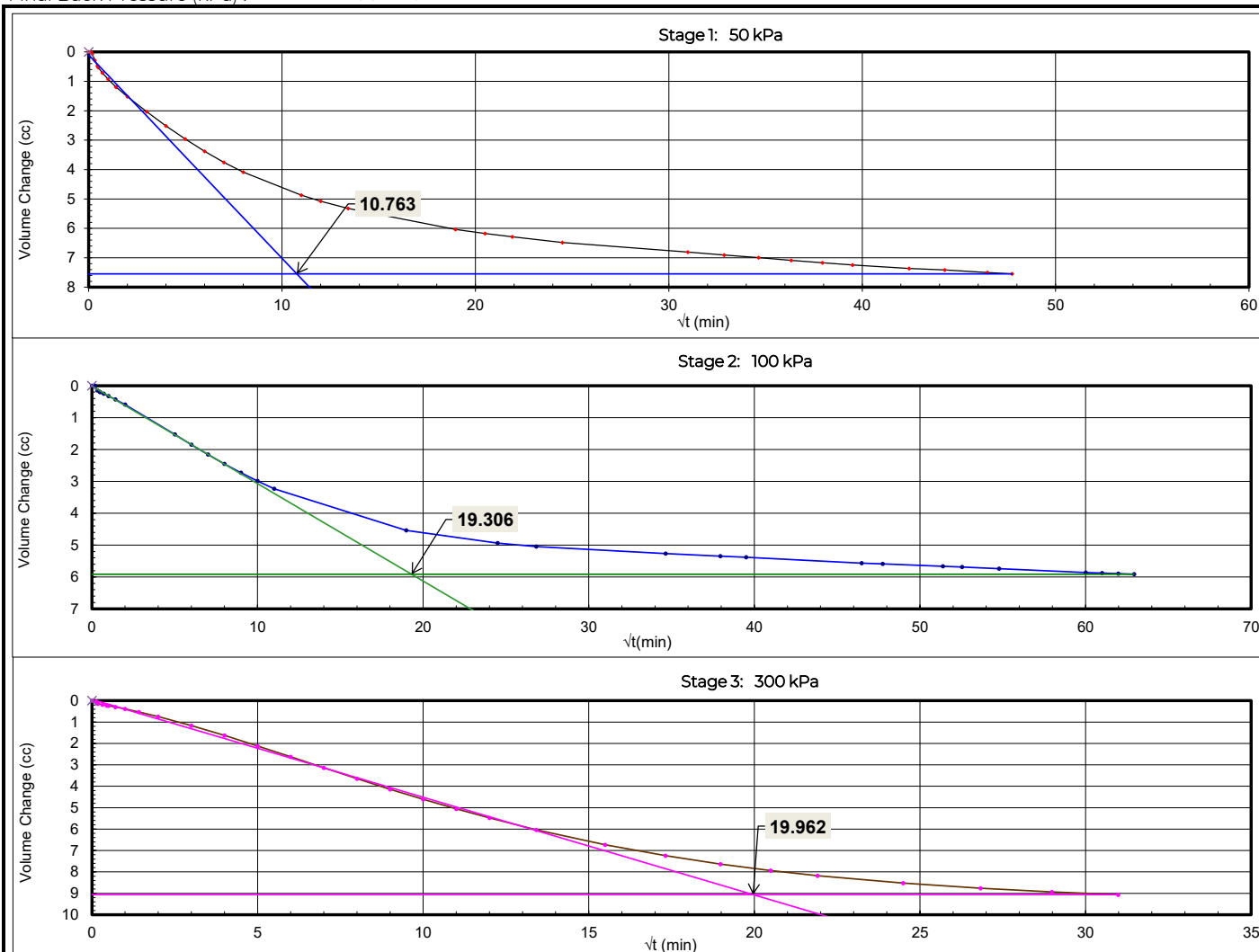
Project: Ground Investigation for Northland Corridor
Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1140
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Silty CLAY; greenish grey; moist; plastic

Depth (m): 12.00-12.50
Date sampled: 10/09/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/79-TXL-CUM
Client Ref: -

Final Back Pressure (kPa) : 400 kPa



Test Method	Test Results at end of consolidation		
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018	Effective Stress (kPa)=	50 kPa	100 kPa
Water Content : NZS4402 : 1986 Test 2.1	t_{100} (min) =	115.842	372.722
	Volumetric Strain (%)=	3.065	2.401
	Vertical Strain (%)=	1.022	0.798
	PWP Dissipation (U)=	100.0	100.0
	Estimated Strain to failure(%)=	5	5

Date tested : 18/11/25
Date reported : 06-16/10/25

Approved Signatory: Thirushen Pillay
Designation: Senior Civil Engineering Technician

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Date: 18/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

LHF 2418 (08/25)

Page 2 of 9

WSP
Auckland Laboratory
Quality Management Systems Certified to ISO 9001

7a Ride Way, Albany
Private Bag 101982, NS Mail Centre, North
Shore City 0745, New Zealand

Telephone +64 9 4154660
Website www.wsp.com/nz

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - Mohr Coulomb Envelope Plot



Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1140
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Silty CLAY; greenish grey; moist; plastic

Depth (m): 12.00-12.50
 Date sampled: 10/09/25

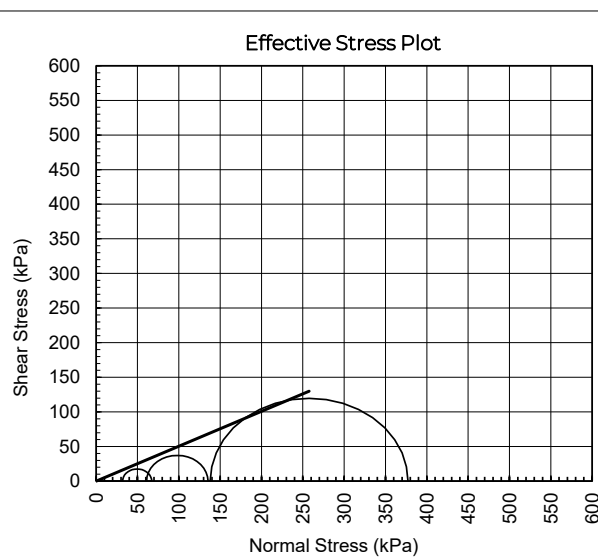
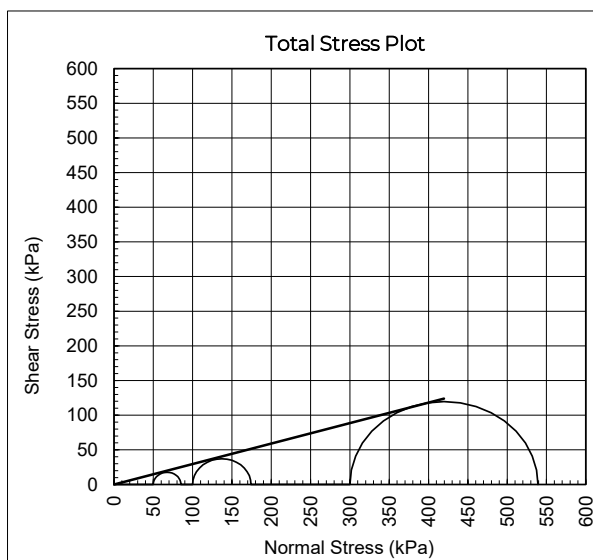
Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/79-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Mohr-Coulomb envelope plots - Result at Maximum Stress

Back Pressure Saturated at 400 kPa



NB: The Cohesion Value (Total Stress) has been adjusted to zero

NB: The Cohesion Value (Effective Stress) has been adjusted to zero

TOTAL STRESS RESULT			
Intercept d	0.00	(kPa)	
Beta β	15.81	(deg)	
Cohesion c	0	(kPa)	
Phi ϕ	16	(deg)	
Correl coeff.	0.9996	(r ²)	

EFFECTIVE STRESS RESULT			
Intercept d'	0.00	(kPa)	
Beta β'	24.24	(deg)	
Cohesion c'	0	(kPa)	
Phi ϕ'	27	(deg)	
Correl coeff.	0.9947	(r ²)	

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Drainage Conditions during Shear :
 Stage 2 : Deviator Stress
 Stage 3 : Deviator Stress

Date tested: 06-16/10/25
 Date reported: 18/11/25

Approved Signatory: 
 Designation: Senior Civil Engineering Technician

Date: 18/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - P vs Q Total Stress Plot



Project: Ground Investigation for Northland Corridor
Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1140
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Silty CLAY; greenish grey; moist; plastic

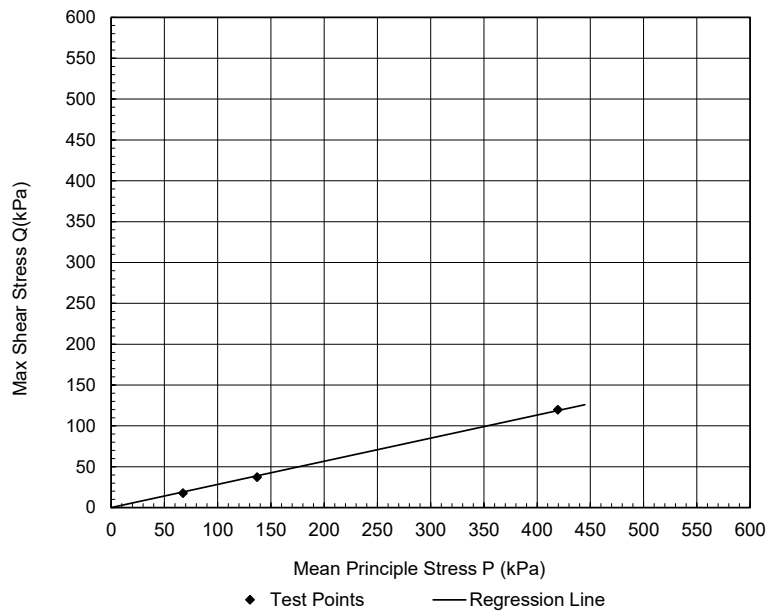
Depth (m): 12.00-12.50
Date sampled: 10/09/25

Sample Type : Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/79-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P vs Q Total Stress Plot - Back Pressure saturated at 400 kPa



NB: The Cohesion Value (Total Stress) has been adjusted to zero

TOTAL STRESS RESULT			Correl coeff	0.9996	(r^2)
Intercept d	0.00	(kPa)	Cohesion c	0	(kPa)
Beta β	15.81	(deg)	Phi ϕ	16	(deg)

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
Failure Criteria: Stage 2 : Deviator Stress
(at Max. Values) Stage 3 : Deviator Stress

Date tested: 06-16/10/25
Date reported: 18/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 18/11/25

Designation:

LHF 2418 (08/25)



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - P' vs Q' Effective Stress Plot



Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1140
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Silty CLAY; greenish grey; moist; plastic

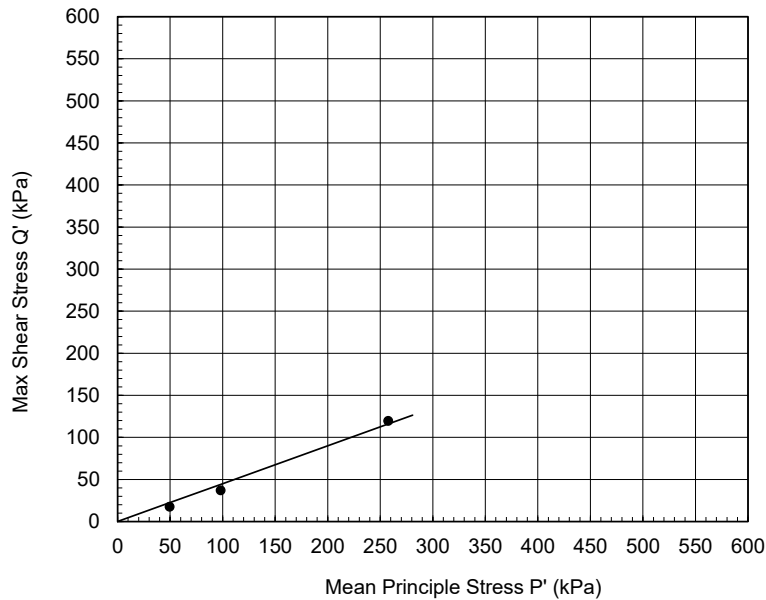
Depth (m): 12.00-12.50
 Date sampled: 10/09/25

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/79-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P' vs Q' Effective Stress Plot - Back Pressure saturated at 400 kPa



● Test Points — Regression Line

EFFECTIVE STRESS RESULT			Correl coeff	0.9947	(r ²)
Intercept d'	0.00	(kPa)	Cohesion c'	0	(kPa)
Beta β'	24.24	(deg)	Phi Ø'	27	(deg)

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
 Failure Criteria: Stage 2 : Deviator Stress
 (at Max. Values) Stage 3 : Deviator Stress

Date tested: 06-16/10/25
 Date reported: 18/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory:

Thirushen Pillay
 Senior Civil Engineering Technician

Date: 18/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

Designation:
 LHF 2418 (08/25)

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - PvsQ Stress Path Plot



Project: Ground Investigation for Northland Corridor
Location: Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1140
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Silty CLAY; greenish grey; moist; plastic

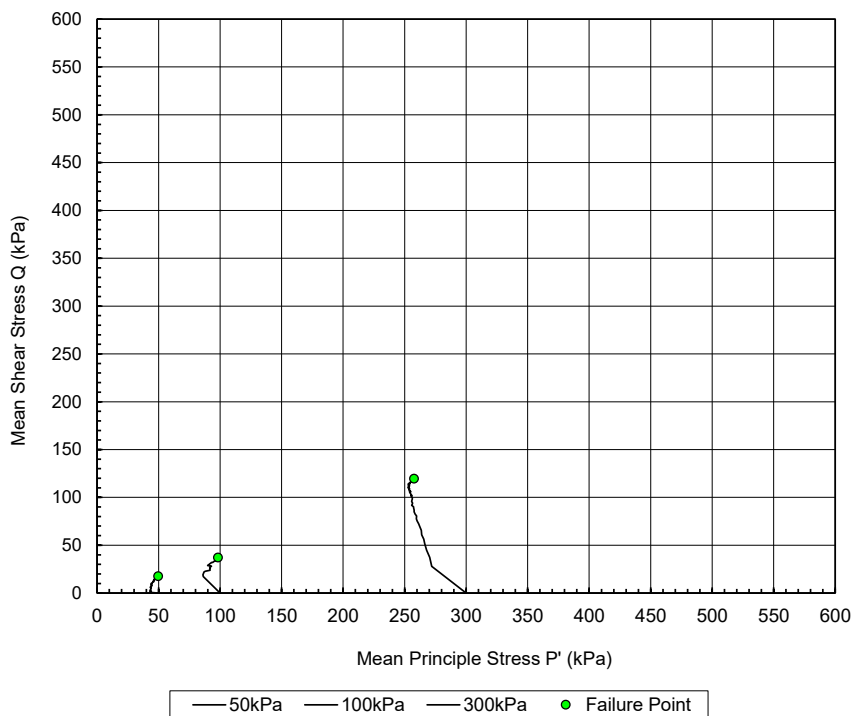
Depth (m): 12.00-12.50
Date sampled: 10/09/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/79-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P' vs Q Stress Path (Effective Stress Plot) - Back Pressure saturated at 400 kPa



Test Method

Consolidated undrained triaxial test: BS EN ISO 17892-9:2018
Water Content: NZS4402:1986 Test 2.1

Notes

Stage 1: Stress Ratio
Failure Criteria: Stage 2: Deviator Stress
(at Max. Values) Stage 3: Deviator Stress

Date tested: 06-16/10/25
Date reported: 18/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 18/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Strain vs Deviator Stress Plot



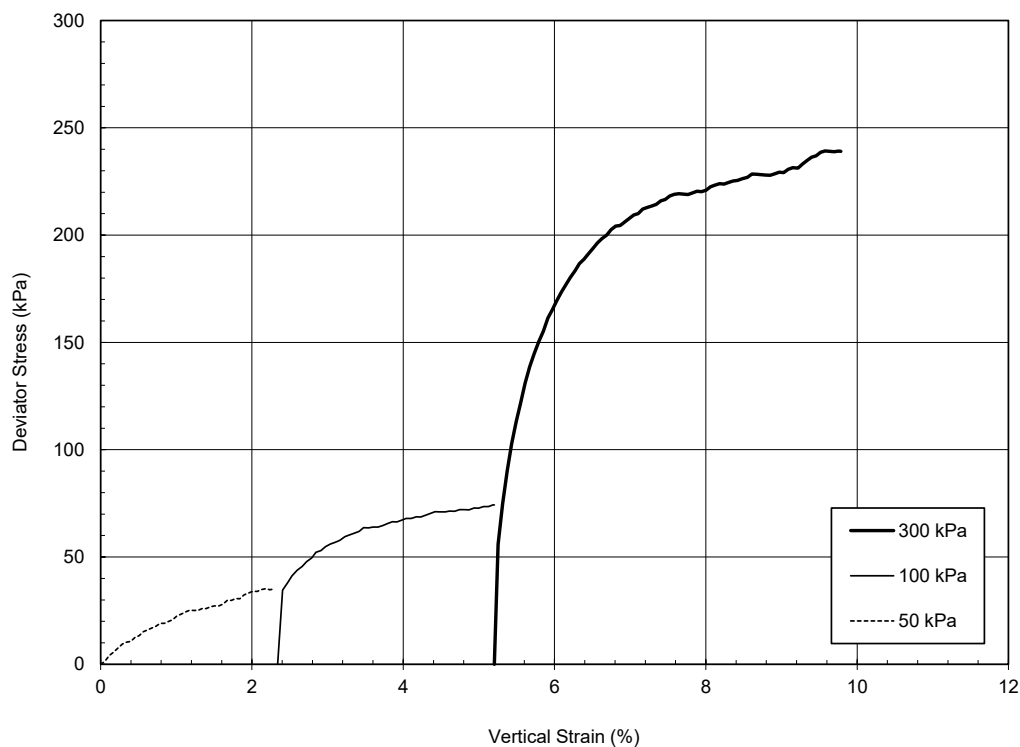
Project: Ground Investigation for Northland Corridor
Location: Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1140
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Silty CLAY; greenish grey; moist; plastic

Depth (m): 12.00-12.50
Date sampled: 10/09/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/79-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT
Vertical Strain vs Deviator Stress Plot - Back Pressure saturated at 400 kPa



Test Method	Notes
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	

Date tested: 06-16/10/25
Date reported: 18/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory: 
Designation: Thirushen Pillay
Senior Civil Engineering Technician

Date: 18/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Strain vs Pore Pressure Plot



Project: Ground Investigation for Northland Corridor
Location: Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1140
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Silty CLAY; greenish grey; moist; plastic

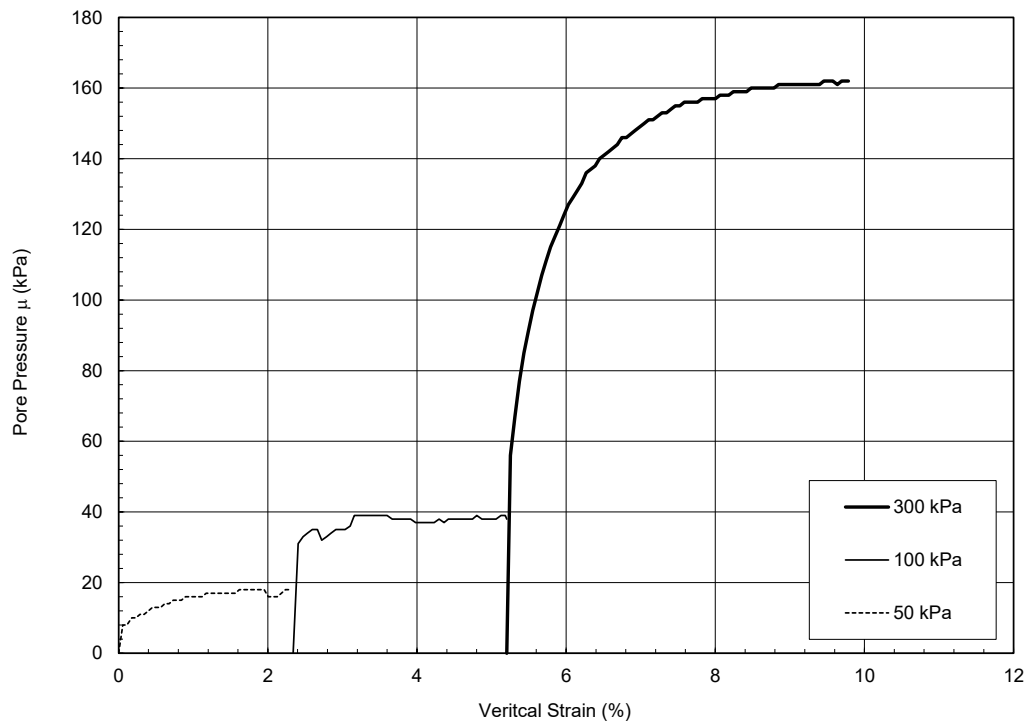
Depth (m): 12.00-12.50
Date sampled: 10/09/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/79-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Vertical Strain vs Pore Pressure Plot - Back Pressure saturated at 400 kPa



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Date tested: 06-16/10/25
Date reported: 18/11/25

Approved Signatory:

Date: 18/11/25

Designation:

Thirushen Pillay
Senior Civil Engineering Technician



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

LHF 2418 (08/25)

Page 8 of 9

WSP
Auckland Laboratory
Quality Management Systems Certified to ISO 9001

7a Ride Way, Albany
Private Bag 101982, NS Mail Centre, North
Shore City 0745, New Zealand

Telephone +64 9 4154660
Website www.wsp.com/nz

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test report - Photograph of Failure Type



Project: Ground Investigation for Northland Corridor
Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1140
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Silty CLAY; greenish grey; moist; plastic

Depth (m): 12.00-12.50
Date sampled: 10/09/25

Sample Type : Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/79-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Photo of failure type

Not taken

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Date tested: 06-16/10/25
Date reported: 18/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 18/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - Result Summary



Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1142
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Silty CLAY; grey; moist
 Depth (m): 6.00-6.50
 Date sampled: 3/10/25

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/149-TXL-CUM
 Client Ref: -

Initial Sample properties		Rate of strain (mm/min)	
Length (mm)	= 107.53	Stage 1	0.011
Diameter (mm)	= 53.03	Stage 2	0.011
Membrane Correction (kPa)=		Stage 3	0.011

Saturation achieved using a minimum Back Pressure of 400 kPa

Specimen Stage No	Effective Confining Pressure (kPa)	INITIAL PROPERTIES			Solid Particle Density (Mg/m³)	FINAL PROPERTIES		
		Densities (Mg/m³)		Water Content (%)		Densities (Mg/m³)		Water Content (%)
		Bulk (Mg/m³)	Dry (Mg/m³)			Bulk (Mg/m³)	Dry (Mg/m³)	
1	50	1.84	1.31	40.5				
2	100				2.73			
3	200				(assumed)	2.00	1.49	34.1

Specimen Stage No	Effective Confining Pressure (kPa)	Void Ratio (e)	Deg of Saturation (Sr)		Deviator Stress $\sigma_1 - \sigma_3$ (kPa)	Pore Pressure μ (kPa)	Cumulative Strain (%)	Failure Criteria at Maximum Values
			Sr before Consolid.	Sr after Consolid.				
1	50	1.08	100	100	29.9	29	1.95	Stress Ratio
2	100				79.9	49	3.98	Stress Ratio
3	200				167.6	111	9.60	Stress Ratio

Specimen Stage No	Effective Confining Pressure (kPa)	Coefficient of Consolidation C_v (m ² /year)	Volume Compressibility M_v (m ² /MN)	Coefficient of Permeability k (m/s)	Final B Value	Due to the use of side filter drains, IANZ endorsement does not include the C_v , M_v and k values reported herein. <u>M_v, C_v & k calculated for the following conditions:-</u> L/D=2, RADIAL+TOP+BOTTOM Drainage Side Filter Drains Used (L/D= Sample Length/Diameter.)
1	50	2	0.73	4.5×10^{-10}	1.00	
2	100	0.033	0.55	5.7×10^{-12}		
3	200	0.094	0.62	1.8×10^{-11}		

TOTAL STRESS RESULT		
Intercept d	0.00	(kPa)
Beta β	16.22	(deg)
Cohesion c	0	(kPa)
Phi ϕ	17	(deg)
Correl coeff.	0.9980	(r ²)

EFFECTIVE STRESS RESULT		
Intercept d'	0.00	(kPa)
Beta β'	25.32	(deg)
Cohesion c'	0	(kPa)
Phi ϕ'	28	(deg)
Correl coeff.	0.9980	(r ²)

Value (Total Stress) has been adjusted to zero

NB: The Cohesion Value (Eff. Stress) has been adjusted to zero

Test Method	Notes
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	Cv and Mv have been rounded to 2 significant figures. Mg/m ³ is equivalent to t/m ³ Deviation from standard, rate of vertical strain for shear stage reported in mm/min vs. %/hr

Date tested: 07-24/11/25
 Date reported: 27/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory: Thirushen Pillay
 Designation: Senior Civil Engineering Technician

Date: 27/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Volume change vs $\sqrt{t}$ Plot (Consolidation stage)



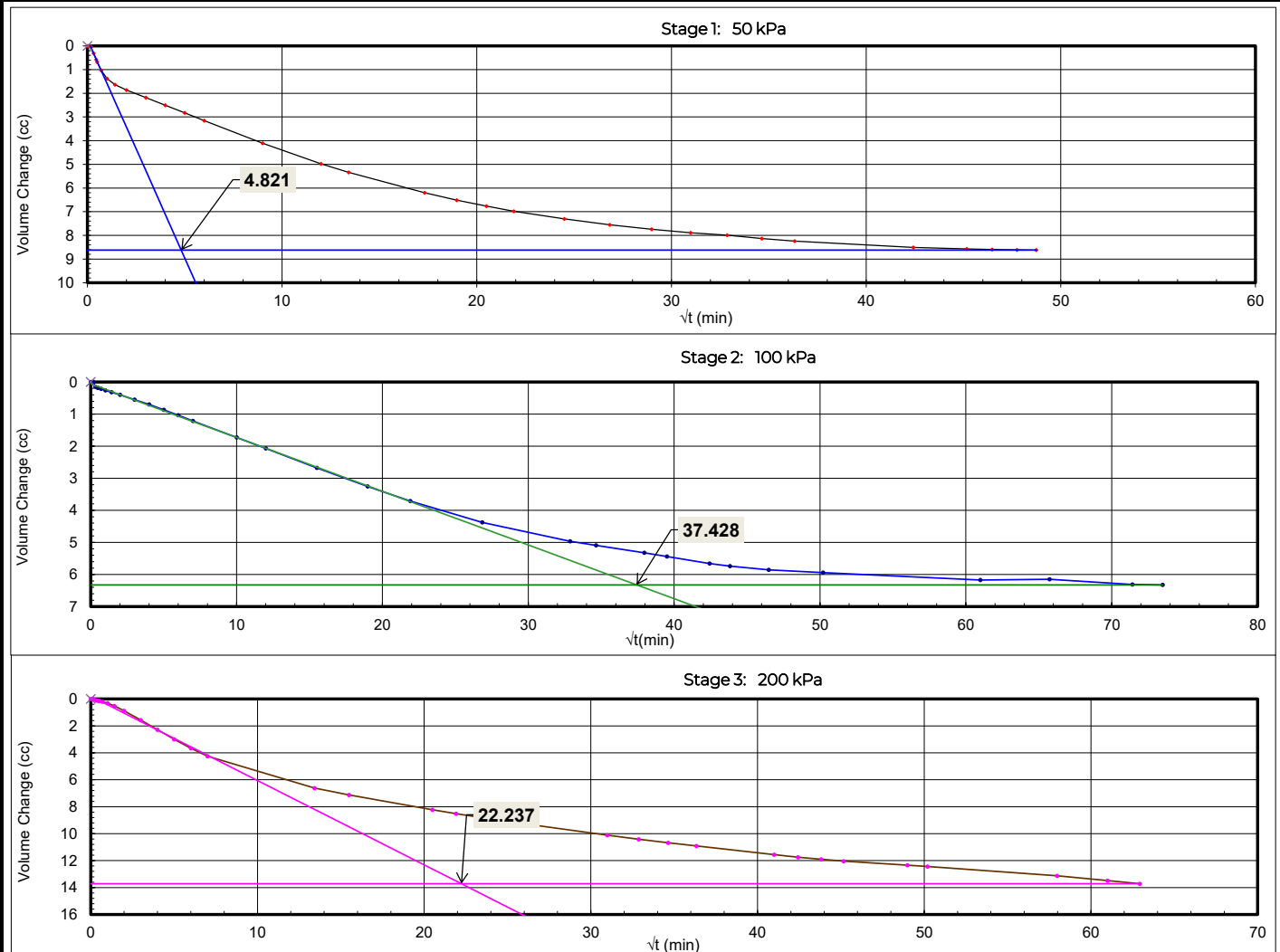
Project: Ground Investigation for Northland Corridor
Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1142
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Silty CLAY; grey; moist

Depth (m): 6.00-6.50
Date sampled: 3/10/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/149-TXL-CUM
Client Ref: -

Final Back Pressure (kPa) : 400 kPa



Test Method	Test Results at end of consolidation			
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018	Effective Stress (kPa)=	50 kPa	100 kPa	200 kPa
Water Content : NZS4402 : 1986 Test 2.1	t_{100} (min) =	23.242	1400.855	494.484
	Volumetric Strain (%)=	3.631	2.664	5.776
	Vertical Strain (%)=	1.210	0.890	1.929
	PWP Dissipation (U)=	100.0	100.0	100.0
	Estimated Strain to failure(%)=	5	5	5

Date tested : 27/11/25
Date reported : 07-24/11/25

Approved Signatory: Thirushen Pillay
Designation: Senior Civil Engineering Technician

LHF 2418 (08/25)

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Date: 27/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - Mohr Coulomb Envelope Plot



Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1142
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Silty CLAY; grey; moist

Depth (m): 6.00-6.50
 Date sampled: 3/10/25

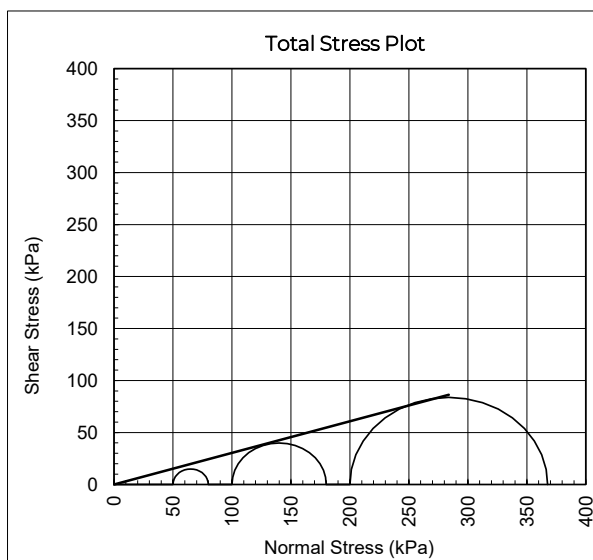
Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/149-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

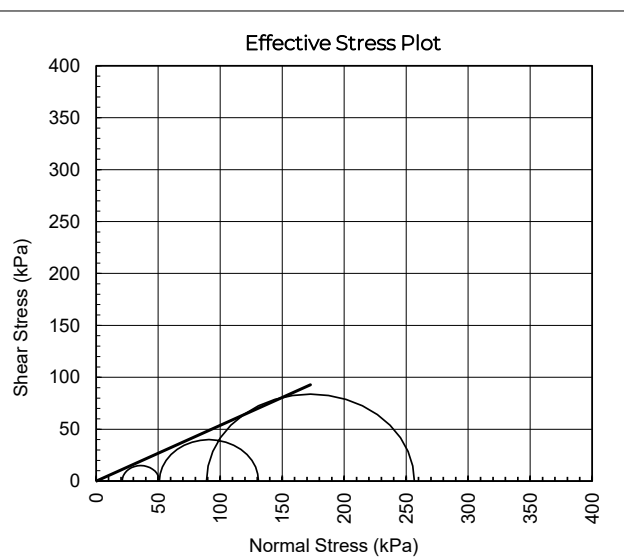
Mohr-Coulomb envelope plots - Result at Maximum Stress

Back Pressure Saturated at 400 kPa



NB: The Cohesion Value (Total Stress) has been adjusted to zero

TOTAL STRESS RESULT			
Intercept d	0.00	(kPa)	
Beta β	16.22	(deg)	
Cohesion c	0	(kPa)	
Phi ϕ	17	(deg)	
Correl coeff.	0.9980	(r ²)	



NB: The Cohesion Value (Effective Stress) has been adjusted to zero

EFFECTIVE STRESS RESULT			
Intercept d'	0.00	(kPa)	
Beta β'	25.32	(deg)	
Cohesion c'	0	(kPa)	
Phi ϕ'	28	(deg)	
Correl coeff.	0.9980	(r ²)	

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Drainage Conditions during Shear :
 Stage 2 : Stress Ratio
 Stage 3 : Stress Ratio

Date tested: 07-24/11/25
 Date reported: 27/11/25

Approved Signatory: Thirushen Pillay
 Designation: Senior Civil Engineering Technician

Date: 27/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - P vs Q Total Stress Plot



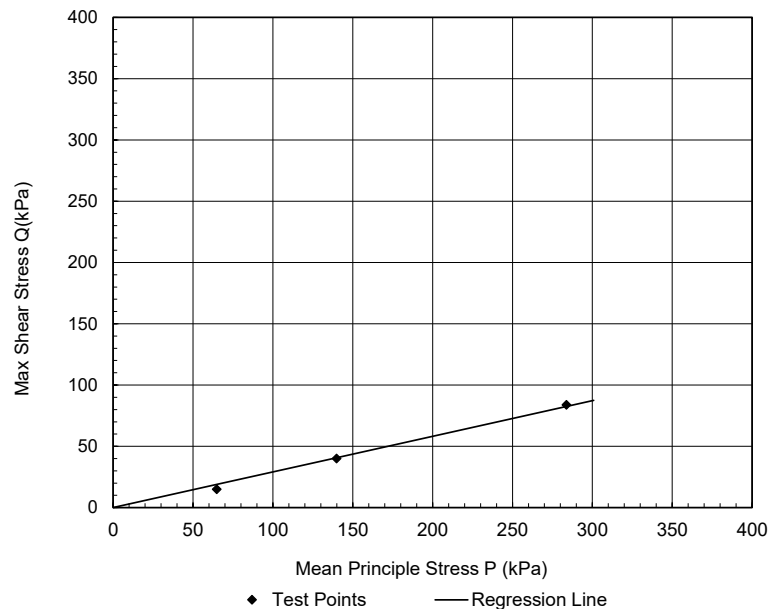
Project: Ground Investigation for Northland Corridor
Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1142 Depth (m): 6.00-6.50
Sampled by: NC Site Team Date sampled: 3/10/25
Sampling Method: Pushtube
Sample Description: Silty CLAY; grey, moist

Sample Type : Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/149-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P vs Q Total Stress Plot - Back Pressure saturated at 400 kPa



NB: The Cohesion Value (Total Stress) has been adjusted to zero

TOTAL STRESS RESULT			Correl coeff	0.9980	(r^2)
Intercept d	0.00	(kPa)	Cohesion c	0	(kPa)
Beta β	16.22	(deg)	Phi ϕ	17	(deg)

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
Failure Criteria: Stage 2 : Stress Ratio
(at Max. Values) Stage 3 : Stress Ratio

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Date tested: 07-24/11/25
Date reported: 27/11/25

Approved Signatory:

Date: 27/11/25

Designation: Thirushen Pillay
Senior Civil Engineering Technician

LHF 2418 (08/25)



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

Page 4 of 9

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - P' vs Q' Effective Stress Plot



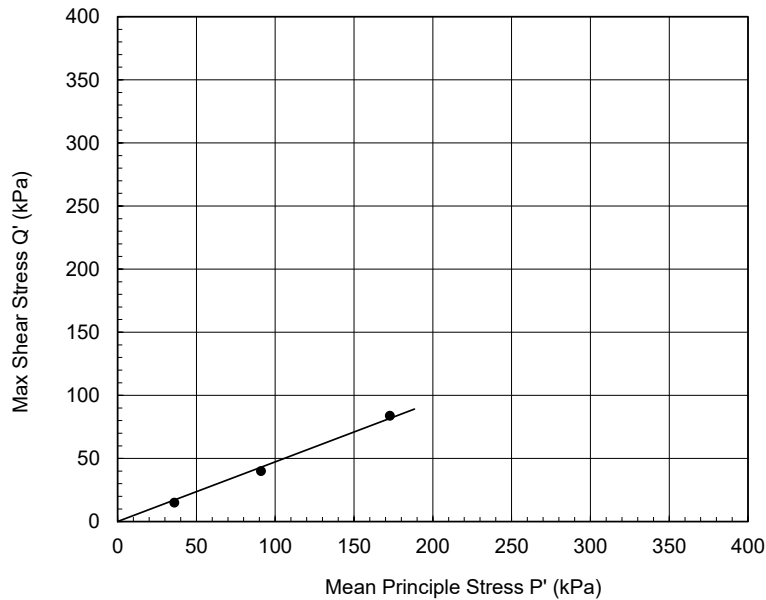
Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1142
 Depth (m): 6.00-6.50
 Sampled by: NC Site Team
 Date sampled: 3/10/25
 Sampling Method: Pushtube
 Sample Description: Silty CLAY; grey; moist

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/149-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P' vs Q' Effective Stress Plot - Back Pressure saturated at 400 kPa



• Test Points — Regression Line

EFFECTIVE STRESS RESULT			Correl coeff	0.9980	(r ²)
Intercept d'	0.00	(kPa)	Cohesion c'	0	(kPa)
Beta β'	25.32	(deg)	Phi Ø'	28	(deg)

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
 Failure Criteria: Stage 2 : Stress Ratio
 (at Max. Values) Stage 3 : Stress Ratio

Date tested: 07-24/11/25
 Date reported: 27/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory:

Thirushen Pillay
 Senior Civil Engineering Technician

Date: 27/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

Designation:
 LHF 2418 (08/25)

Page 5 of 9

WSP
 Auckland Laboratory
 Quality Management Systems Certified to ISO 9001

7a Ride Way, Albany
 Private Bag 101982, NS Mail Centre, North
 Shore City 0745, New Zealand

Telephone +64 9 4154660
 Website www.wsp.com/nz

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - PvsQ Stress Path Plot



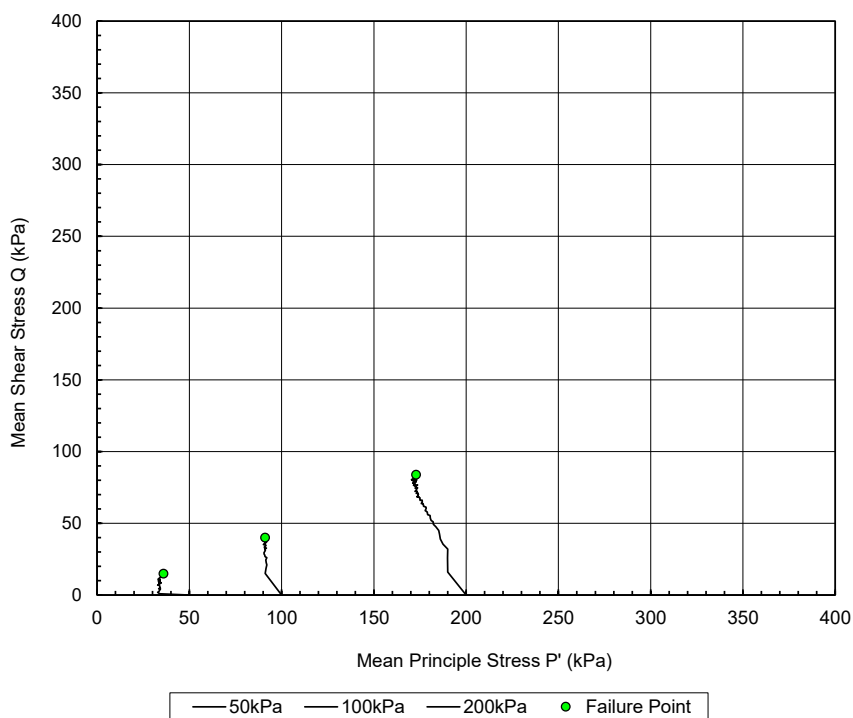
Project: Ground Investigation for Northland Corridor
Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1142
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Silty CLAY; grey; moist
Depth (m): 6.00-6.50
Date sampled: 3/10/25

Sample Type : Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/149-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P' vs Q Stress Path (Effective Stress Plot) - Back Pressure saturated at 400 kPa



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
Failure Criteria: Stage 2 : Stress Ratio
(at Max. Values) Stage 3 : Stress Ratio

Date tested: 07-24/11/25
Date reported: 27/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 27/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Strain vs Deviator Stress Plot

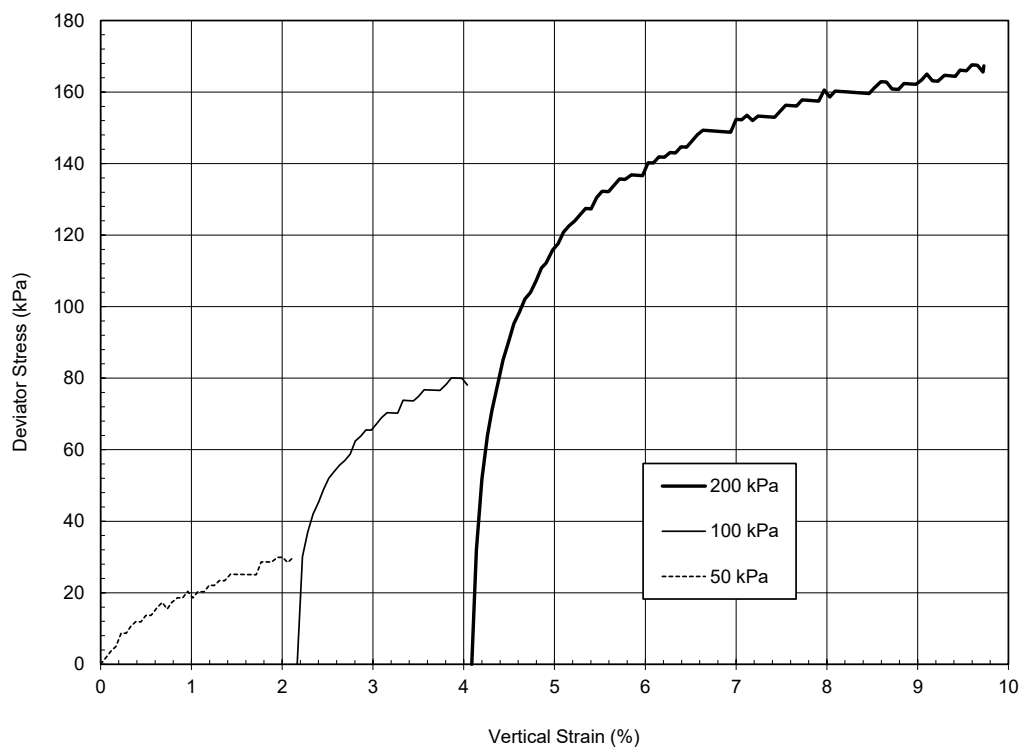


Project: Ground Investigation for Northland Corridor
Location: Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1142
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Silty CLAY; grey, moist
Depth (m): 6.00-6.50
Date sampled: 3/10/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/149-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT
Vertical Strain vs Deviator Stress Plot - Back Pressure saturated at 400 kPa



Test Method	Notes
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	

Date tested: 07-24/11/25
Date reported: 27/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory: 
Designation: Thirushen Pillay
Senior Civil Engineering Technician

Date: 27/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Strain vs Pore Pressure Plot



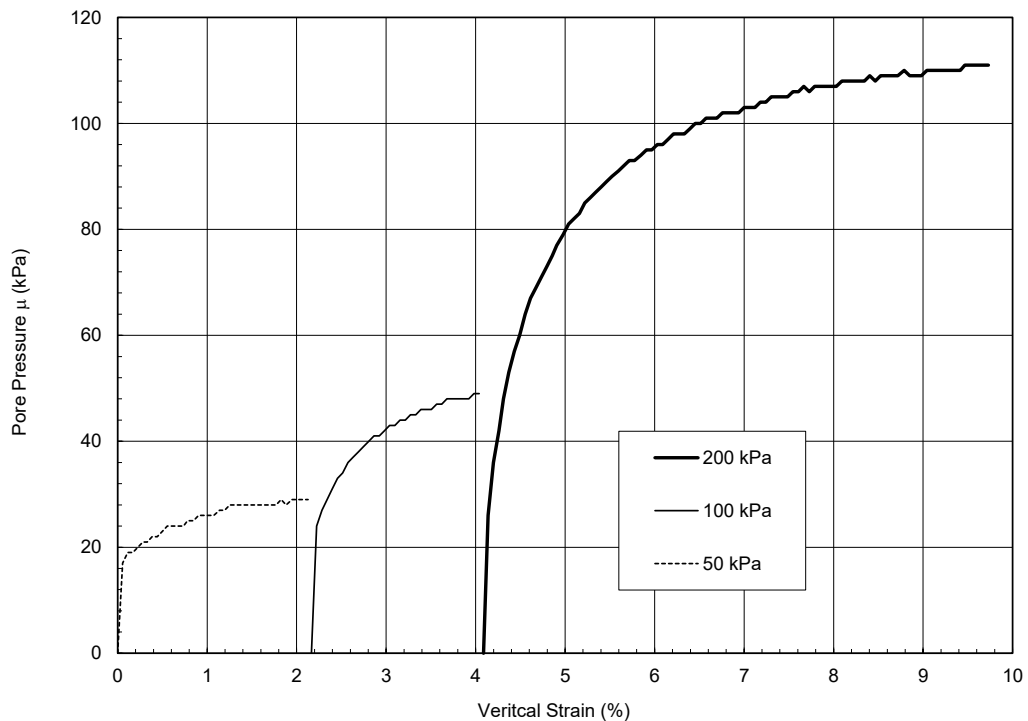
Project: Ground Investigation for Northland Corridor
Location: Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1142
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Silty CLAY; grey; moist
Depth (m): 6.00-6.50
Date sampled: 3/10/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/149-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Vertical Strain vs Pore Pressure Plot - Back Pressure saturated at 400 kPa



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Date tested: 07-24/11/25
Date reported: 27/11/25

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 27/11/25

Designation:



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test report - Photograph of Failure Type



Project: Ground Investigation for Northland Corridor
Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1142
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Silty CLAY; grey; moist

Depth (m): 6.00-6.50
Date sampled: 3/10/25

Sample Type : Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/149-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Photo of failure type



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

Date tested: 07-24/11/25

Date reported: 27/11/25

This report may only be reproduced in full

All information supplied by Client

Approved Signatory:

Thirushen Pillay

Date: 27/11/25

Designation:

Senior Civil Engineering Technician



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

LHF 2418 (08/25)

Page 9 of 9

WSP
Auckland Laboratory
Quality Management Systems Certified to ISO 9001

7a Ride Way, Albany
Private Bag 101982, NS Mail Centre, North
Shore City 0745, New Zealand

Telephone +64 9 4154660
Website www.wsp.com/nz

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - Result Summary



Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1142
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Silty CLAY; grey; moist;plastic
 Depth (m): 12.00-12.50
 Date sampled: 3/10/25

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/146-TXL-CUM
 Client Ref: -

Initial Sample properties		Rate of strain (mm/min)	
Length (mm)	= 107.98	Stage 1	0.012
Diameter (mm)	= 53.85	Stage 2	0.01
Membrane Correction (kPa)=		Stage 3	0.012

Saturation achieved using a minimum Back Pressure of 500 kPa

Specimen Stage No	Effective Confining Pressure (kPa)	INITIAL PROPERTIES			Solid Particle Density (Mg/m³)	FINAL PROPERTIES		
		Densities (Mg/m³)		Water Content (%)		Densities (Mg/m³)		Water Content (%)
		Bulk (Mg/m³)	Dry (Mg/m³)			Bulk (Mg/m³)	Dry (Mg/m³)	
1	50	1.58	0.92	70.9				
2	100				2.72			
3	300				(assumed)	1.91	1.17	62.9

Specimen Stage No	Effective Confining Pressure (kPa)	Void Ratio (e)	Deg of Saturation (Sr)		Deviator Stress $\sigma_1 - \sigma_3$ (kPa)	Pore Pressure μ (kPa)	Cumulative Strain (%)	Failure Criteria at Maximum Values
			Sr before Consolid.	Sr after Consolid.				
1	50	1.95	99	100	99.5	40	1.88	Stress Ratio
2	100				143.7	76	2.77	Stress Ratio
3	300				249.6	219	8.78	Stress Ratio

Specimen Stage No	Effective Confining Pressure (kPa)	Coefficient of Consolidation C_v (m ² /year)	Volume Compressibility M_v (m ² /MN)	Coefficient of Permeability k (m/s)	Final B Value	Due to the use of side filter drains, IANZ endorsement does not include the C_v , M_v and k values reported herein. <u>M_v, C_v & k calculated for the following conditions:-</u> L/D=2, RADIAL+TOP+BOTTOM Drainage Side Filter Drains Used (L/D= Sample Length/Diameter.)
1	50	0.59	1.3	2.4×10^{-10}	1.07	
2	100	0.19	0.98	5.7×10^{-11}		
3	300	0.034	0.56	6.0×10^{-12}		

TOTAL STRESS RESULT		
Intercept d	29.85	(kPa)
Beta β	12.69	(deg)
Cohesion c	31	(kPa)
Phi ϕ	13	(deg)
Correl coeff.	0.9940	(r ²)

EFFECTIVE STRESS RESULT		
Intercept d'	21.14	(kPa)
Beta β'	26.85	(deg)
Cohesion c'	25	(kPa)
Phi ϕ'	30	(deg)
Correl coeff.	0.9974	(r ²)

Test Method	Notes
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	Cv and Mv have been rounded to 2 significant figures. Mg/m ³ is equivalent to t/m ³ Deviation from standard, rate of vertical strain for shear stage reported in mm/min vs. %/hr

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Date tested: 01-19/12/25
 Date reported: 7/01/26

[Signature]

Approved Signatory: Thirushen Pillay
 Designation: Senior Civil Engineering Technician

Date: 7/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Volume change vs $\sqrt{t}$ Plot (Consolidation stage)



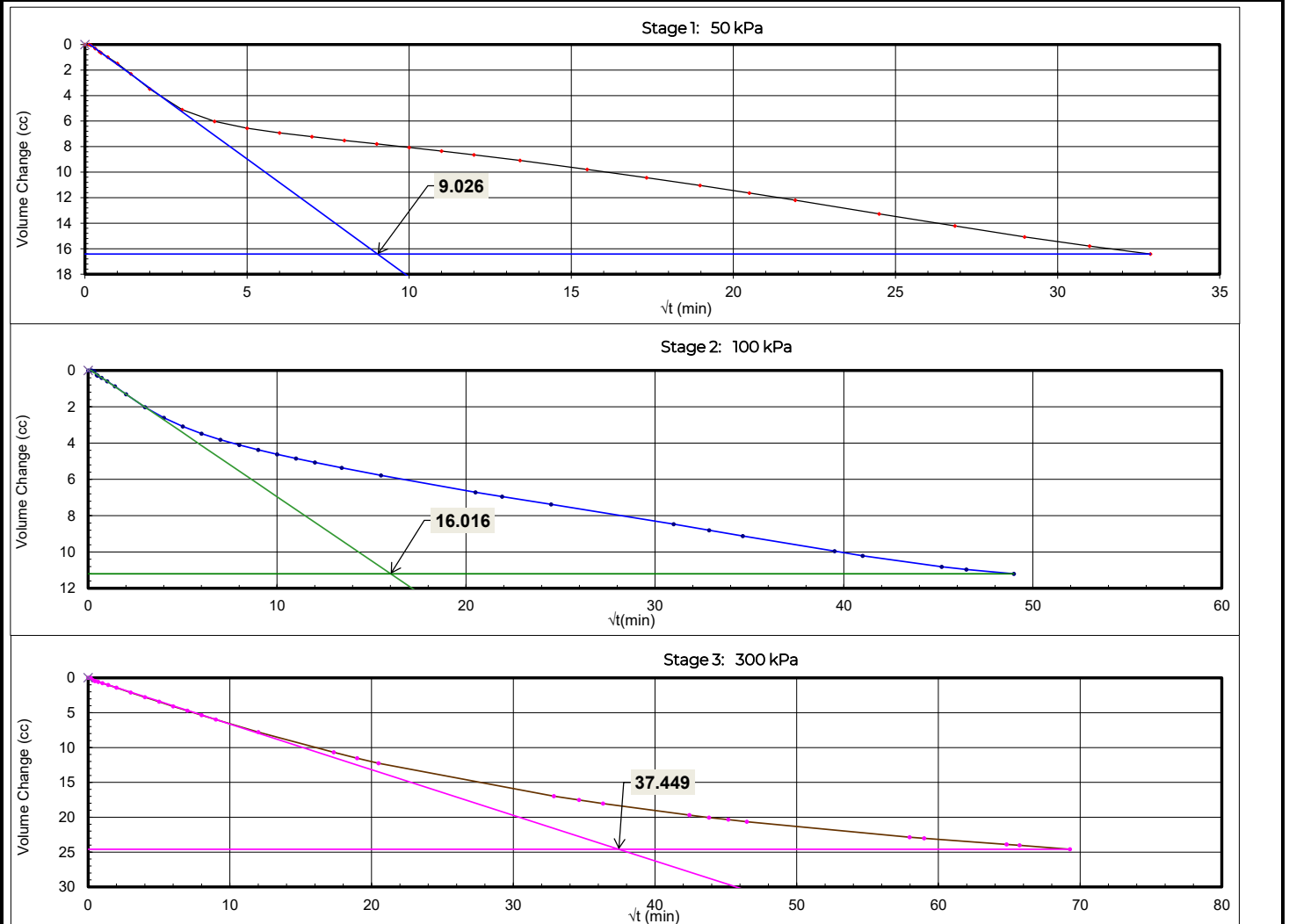
Project: Ground Investigation for Northland Corridor
Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1142
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Silty CLAY; grey; moist; plastic

Depth (m): 12.00-12.50
Date sampled: 3/10/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/146-TXL-CUM
Client Ref: -

Final Back Pressure (kPa) : 500 kPa



Test Method	Test Results at end of consolidation			
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018	Effective Stress (kPa)=	50 kPa	100 kPa	300 kPa
Water Content : NZS4402 : 1986 Test 2.1	t_{100} (min) =	81.469	256.512	1402.428
	Volumetric Strain (%)=	6.677	4.555	10.001
	Vertical Strain (%)=	2.226	1.559	3.505
	PWP Dissipation (U)=	100.0	100.0	100.0
	Estimated Strain to failure(%)=	5	5	5

Date tested : 7/01/26
Date reported : 01-19/12/25

Approved Signatory: Thirushen Pillay
Designation: Senior Civil Engineering Technician

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Date: 7/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

LHF 2418 (08/25)

Page 2 of 9

WSP
Auckland Laboratory
Quality Management Systems Certified to ISO 9001

7a Ride Way, Albany
Private Bag 101982, NS Mail Centre, North
Shore City 0745, New Zealand

Telephone +64 9 4154660
Website www.wsp.com/nz

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Mohr Coulomb Envelope Plot



Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1142
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Silty CLAY; grey; moist; plastic

Depth (m): 12.00-12.50
 Date sampled: 3/10/25

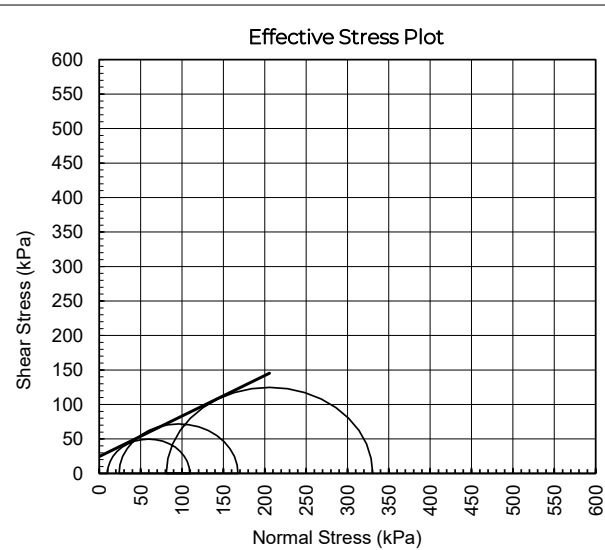
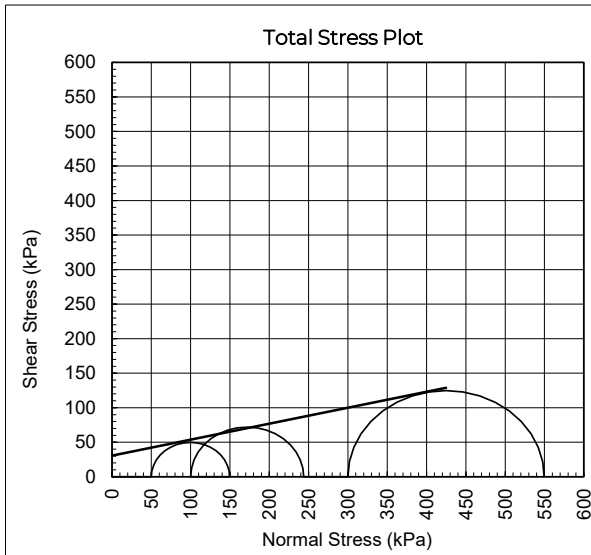
Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/146-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Mohr-Coulomb envelope plots - Result at Maximum Stress

Back Pressure Saturated at 500 kPa



TOTAL STRESS RESULT			
Intercept d	29.85	(kPa)	
Beta β	12.69	(deg)	
Cohesion c	31	(kPa)	
Phi ϕ	13	(deg)	
Correl coeff.	0.9940	(r ²)	

EFFECTIVE STRESS RESULT			
Intercept d'	21.14	(kPa)	
Beta β'	26.85	(deg)	
Cohesion c'	25	(kPa)	
Phi ϕ'	30	(deg)	
Correl coeff.	0.9974	(r ²)	

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Drainage Conditions during Shear :
 Stage 2 : Stress Ratio
 Stage 3 : Stress Ratio

Date tested: 01-19/12/25
 Date reported: 7/01/26

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory: 
 Designation: Senior Civil Engineering Technician

Date: 7/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - P vs Q Total Stress Plot



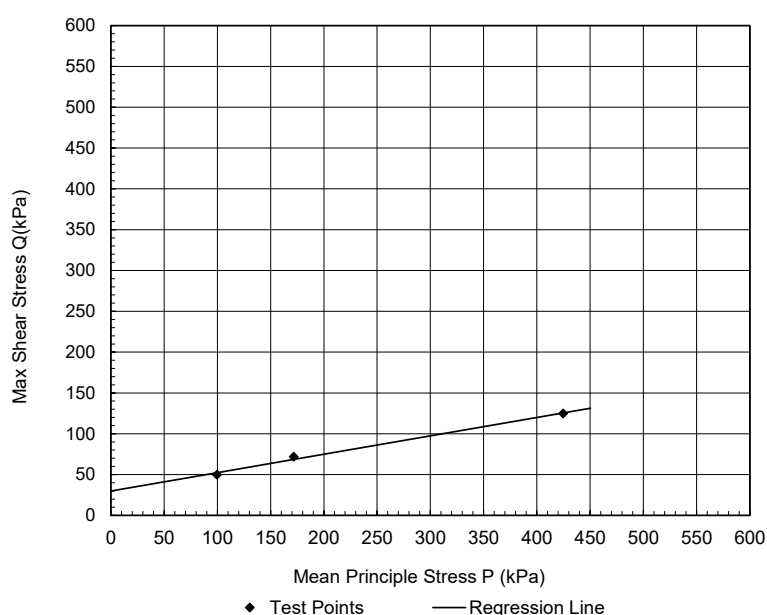
Project: Ground Investigation for Northland Corridor
Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1142
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Silty CLAY; grey, moist; plastic
Depth (m): 12.00-12.50
Date sampled: 3/10/25

Sample Type : Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/146-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P vs Q Total Stress Plot - Back Pressure saturated at 500 kPa



TOTAL STRESS RESULT			Correl coeff	0.9940	(r^2)
Intercept d	29.85	(kPa)	Cohesion c	31	(kPa)
Beta β	12.69	(deg)	Phi ϕ	13	(deg)

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
Failure Criteria: Stage 2 : Stress Ratio
(at Max. Values) Stage 3 : Stress Ratio

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

Date tested: 01-19/12/25
Date reported: 7/01/26

This report may only be reproduced in full
All information supplied by Client

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 7/01/26

Designation:

LHF 2418 (08/25)



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - P' vs Q' Effective Stress Plot



Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1142
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Silty CLAY; grey; moist;plastic

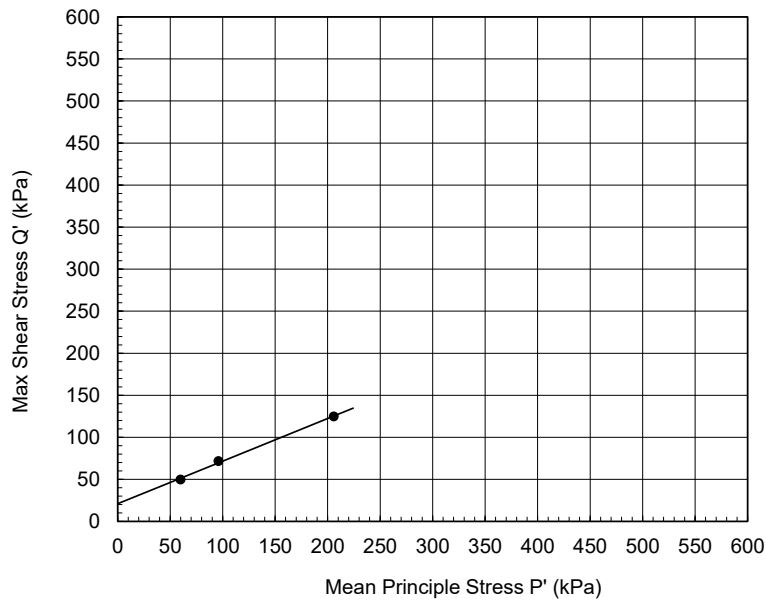
Depth (m): 12.00-12.50
 Date sampled: 3/10/25

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/146-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P' vs Q' Effective Stress Plot - Back Pressure saturated at 500 kPa



● Test Points — Regression Line

EFFECTIVE STRESS RESULT			Correl coeff	0.9974	(r ²)
Intercept d'	21.14	(kPa)	Cohesion c'	25	(kPa)
Beta β'	26.85	(deg)	Phi Ø'	30	(deg)

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
 Failure Criteria:
 (at Max. Values) Stage 2 : Stress Ratio
 Stage 3 : Stress Ratio

Date tested: 01-19/12/25
 Date reported: 7/01/26

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory:

Thirushen Pillay
 Senior Civil Engineering Technician

Date: 7/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

Designation:
 LHF 2418 (08/25)

Page 5 of 9

WSP
 Auckland Laboratory
 Quality Management Systems Certified to ISO 9001

7a Ride Way, Albany
 Private Bag 101982, NS Mail Centre, North
 Shore City 0745, New Zealand

Telephone +64 9 4154660
 Website www.wsp.com/nz

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - PvsQ Stress Path Plot



Project: Ground Investigation for Northland Corridor
Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1142
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Silty CLAY; grey; moist; plastic

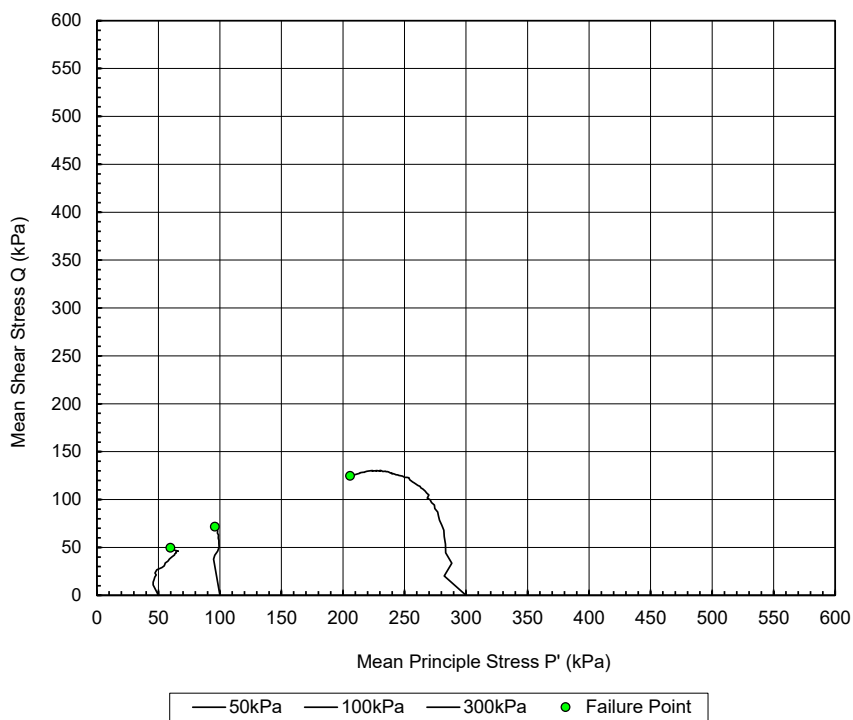
Depth (m): 12.00-12.50
Date sampled: 3/10/25

Sample Type : Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/146-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P' vs Q Stress Path (Effective Stress Plot) - Back Pressure saturated at 500 kPa



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
Failure Criteria: Stage 2 : Stress Ratio
(at Max. Values) Stage 3 : Stress Ratio

Date tested: 01-19/12/25
Date reported: 7/01/26

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 7/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Strain vs Deviator Stress Plot

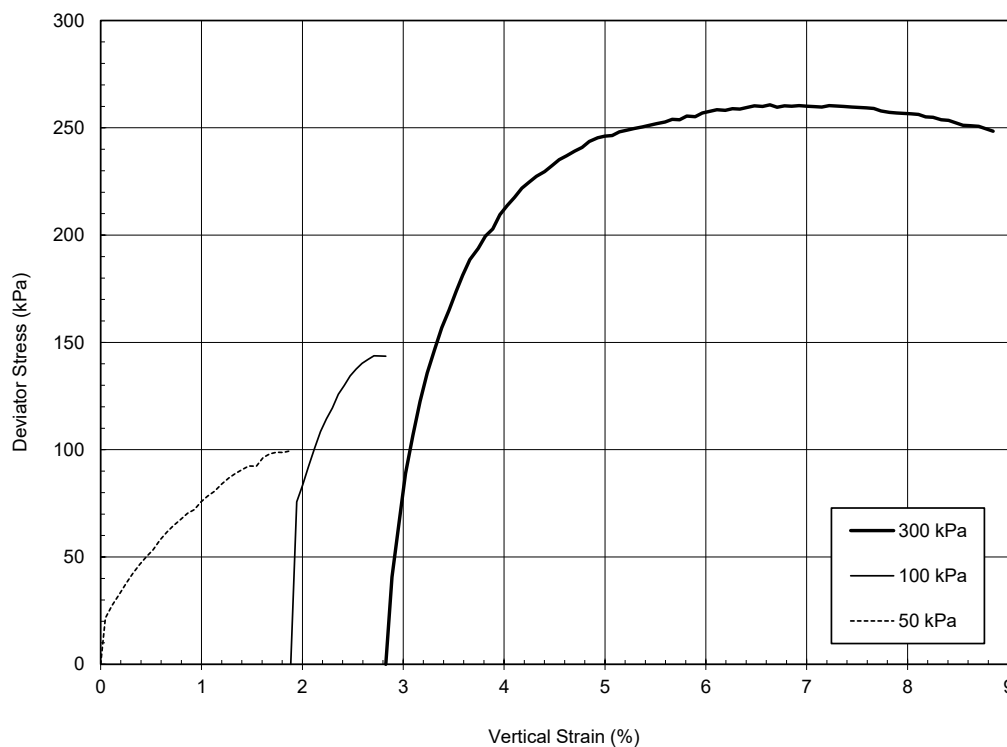


Project: Ground Investigation for Northland Corridor
Location: Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1142
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Silty CLAY; grey; moist; plastic
Depth (m): 12.00-12.50
Date sampled: 3/10/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/146-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT
Vertical Strain vs Deviator Stress Plot - Back Pressure saturated at 500 kPa



Test Method	Notes
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	

Date tested: 01-19/12/25
Date reported: 7/01/26

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory: 
Designation: Thirushen Pillay
Senior Civil Engineering Technician

Date: 7/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Strain vs Pore Pressure Plot



Project: Ground Investigation for Northland Corridor
Location: Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1142
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Silty CLAY; grey; moist; plastic

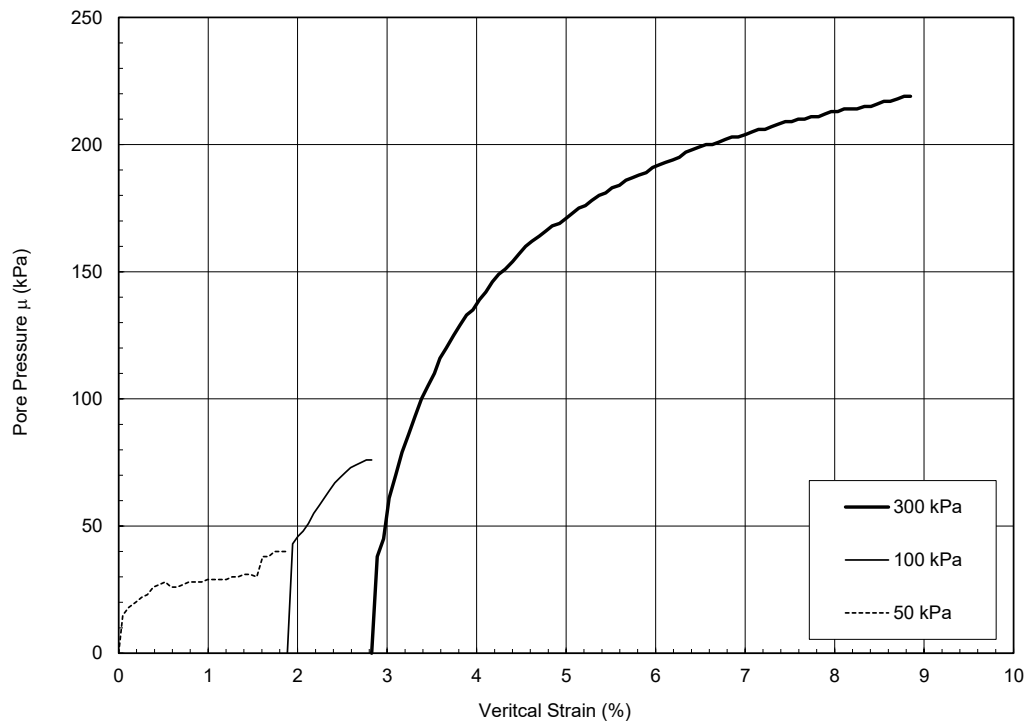
Depth (m): 12.00-12.50
Date sampled: 3/10/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/146-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Vertical Strain vs Pore Pressure Plot - Back Pressure saturated at 500 kPa



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Date tested: 01-19/12/25
Date reported: 7/01/26

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 7/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test report - Photograph of Failure Type



Project: Ground Investigation for Northland Corridor
Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1142
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Silty CLAY; grey; moist; plastic

Depth (m): 12.00-12.50
Date sampled: 3/10/25

Sample Type : Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/146-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Photo of failure type

Not taken

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Date tested: 01-19/12/25
Date reported: 7/01/26

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 7/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - Result Summary



Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1143
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Silty CLAY with traces of organics
 Depth (m): 6.00-6.50
 Date sampled: 23/10/25

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/172-TXL-CUM
 Client Ref: -

Initial Sample properties		Rate of strain (mm/min)	
Length (mm)	= 109.75	Stage 1	0.01
Diameter (mm)	= 53.63	Stage 2	0.01
Membrane Correction (kPa)=		Stage 3	0.01

Saturation achieved using a minimum Back Pressure of 400 kPa

Specimen Stage No	Effective Confining Pressure (kPa)	INITIAL PROPERTIES			Solid Particle Density (Mg/m³)	FINAL PROPERTIES		
		Densities (Mg/m³)		Water Content (%)		Densities (Mg/m³)		Water Content (%)
		Bulk (Mg/m³)	Dry (Mg/m³)			Bulk (Mg/m³)	Dry (Mg/m³)	
1	50	1.82	1.29	40.2				
2	100				2.72			
3	200				(assumed)	1.93	1.41	36.6

Specimen Stage No	Effective Confining Pressure (kPa)	Void Ratio (e)	Deg of Saturation (Sr)		Deviator Stress $\sigma_1 - \sigma_3$ (kPa)	Pore Pressure μ (kPa)	Cumulative Strain (%)	Failure Criteria at Maximum Values
			Sr before Consolid.	Sr after Consolid.				
1	50	1.10	99	100	54.3	10	1.36	Stress Ratio
2	100				77.3	47	3.48	Stress Ratio
3	200				161.8	102	7.33	Stress Ratio

Specimen Stage No	Effective Confining Pressure (kPa)	Coefficient of Consolidation C_v (m ² /year)	Volume Compressibility M_v (m ² /MN)	Coefficient of Permeability k (m/s)	Final B Value	Due to the use of side filter drains, IANZ endorsement does not include the C_v , M_v and k values reported herein. <u>M_v, C_v & k calculated for the following conditions:-</u> L/D=2, RADIAL+TOP+BOTTOM Drainage Side Filter Drains Used (L/D= Sample Length/Diameter.)
1	50	2	0.57	3.4×10^{-10}	1.00	
2	100	0.12	0.43	1.7×10^{-11}		
3	200	0.035	0.35	3.8×10^{-12}		

TOTAL STRESS RESULT		
Intercept d	0.00	(kPa)
Beta β	16.17	(deg)
Cohesion c	0	(kPa)
Phi ϕ	17	(deg)
Correl coeff.	0.9971	(r ²)

EFFECTIVE STRESS RESULT		
Intercept d'	0.00	(kPa)
Beta β'	23.83	(deg)
Cohesion c'	0	(kPa)
Phi ϕ'	26	(deg)
Correl coeff.	0.9985	(r ²)

Value (Total Stress) has been adjusted to zero

NB: The Cohesion Value (Eff. Stress) has been adjusted to zero

Test Method	Notes
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	Cv and Mv have been rounded to 2 significant figures. Mg/m ³ is equivalent to t/m ³ Deviation from standard, rate of vertical strain for shear stage reported in mm/min vs. %/hr

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Date tested: 11-21/11/25
 Date reported: 28/11/25

[Signature]

Approved Signatory: Thirushen Pillay
 Designation: Senior Civil Engineering Technician

Date: 28/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Volume change vs $\sqrt{t}$ Plot (Consolidation stage)



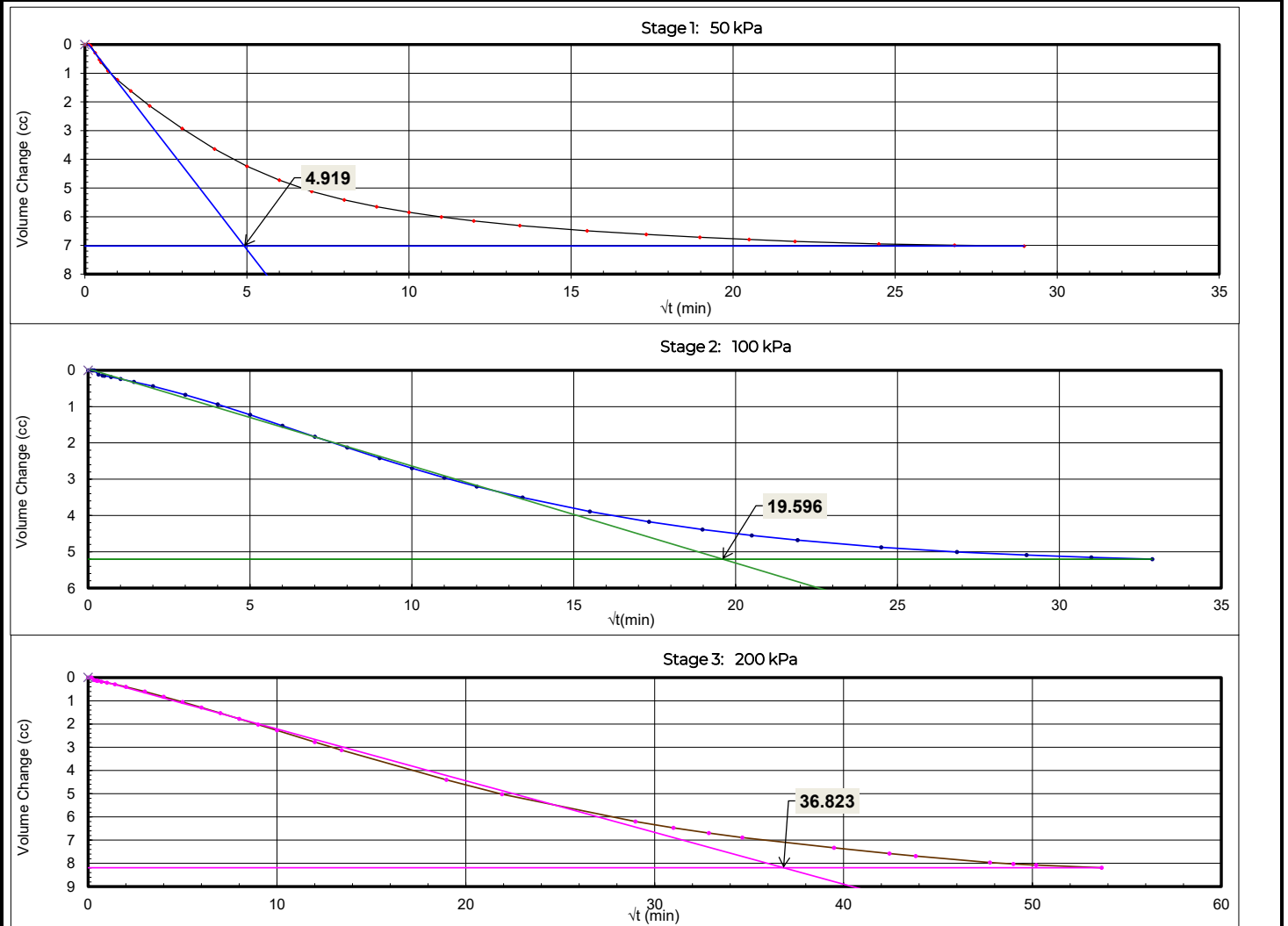
Project: Ground Investigation for Northland Corridor
Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1143
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Silty CLAY with traces of organics

Depth (m): 6.00-6.50
Date sampled: 23/10/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/172-TXL-CUM
Client Ref: -

Final Back Pressure (kPa) : 400 kPa



Test Method	Test Results at end of consolidation			
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018	Effective Stress (kPa)=	50 kPa	100 kPa	200 kPa
Water Content : NZS4402 : 1986 Test 2.1	t_{100} (min) =	24.197	384.003	1355.933
	Volumetric Strain (%)=	2.833	2.099	3.304
	Vertical Strain (%)=	0.944	0.703	1.098
	PWP Dissipation (U)=	100.00	100.00	100.00
	Estimated Strain to failure(%)=	5	5	5

Date tested : 28/11/25
Date reported : 11-21/11/25

Approved Signatory: Thirushen Pillay
Designation: Senior Civil Engineering Technician

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Date: 28/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

LHF 2418 (08/25)

Page 2 of 9

WSP
Auckland Laboratory
Quality Management Systems Certified to ISO 9001

7a Ride Way, Albany
Private Bag 101982, NS Mail Centre, North
Shore City 0745, New Zealand

Telephone +64 9 4154660
Website www.wsp.com/nz

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Mohr Coulomb Envelope Plot



Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1143
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Silty CLAY with traces of organics

Depth (m): 6.00-6.50
 Date sampled: 23/10/25

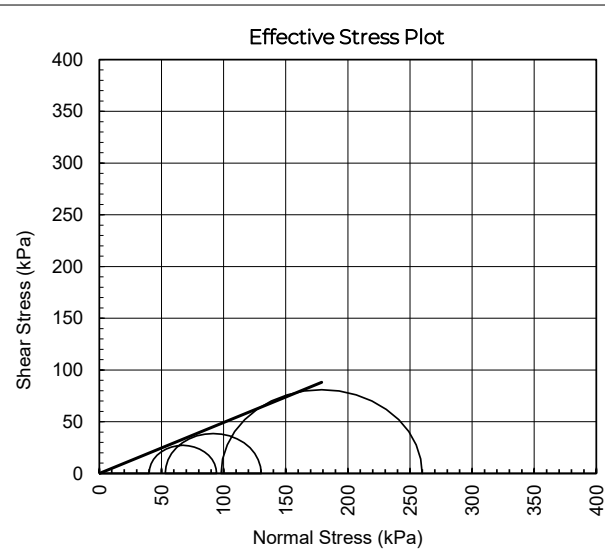
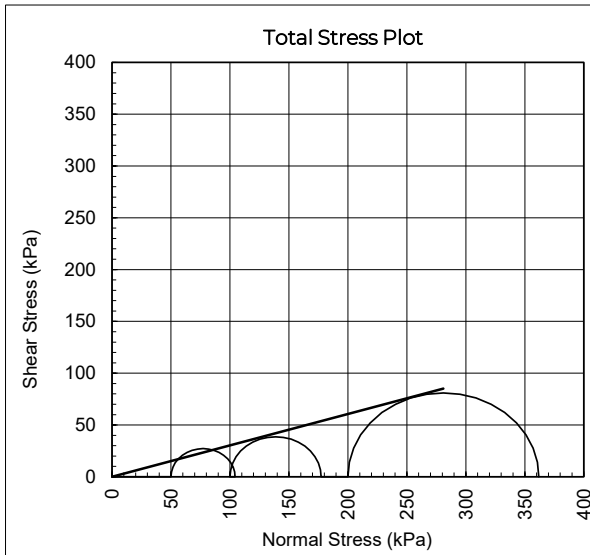
Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/172-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Mohr-Coulomb envelope plots - Result at Maximum Stress

Back Pressure Saturated at 400 kPa



NB: The Cohesion Value (Total Stress) has been adjusted to zero

NB: The Cohesion Value (Effective Stress) has been adjusted to zero

TOTAL STRESS RESULT			
Intercept d	0.00	(kPa)	
Beta β	16.17	(deg)	
Cohesion c	0	(kPa)	
Phi ϕ	17	(deg)	
Correl coeff.	0.9971	(r ²)	

EFFECTIVE STRESS RESULT			
Intercept d'	0.00	(kPa)	
Beta β'	23.83	(deg)	
Cohesion c'	0	(kPa)	
Phi ϕ'	26	(deg)	
Correl coeff.	0.9985	(r ²)	

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Drainage Conditions during Shear :
 Stage 2 : Stress Ratio
 Stage 3 : Stress Ratio

Date tested: 11-21/11/25
 Date reported: 28/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory: 
 Designation: Senior Civil Engineering Technician

Date: 28/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - P vs Q Total Stress Plot



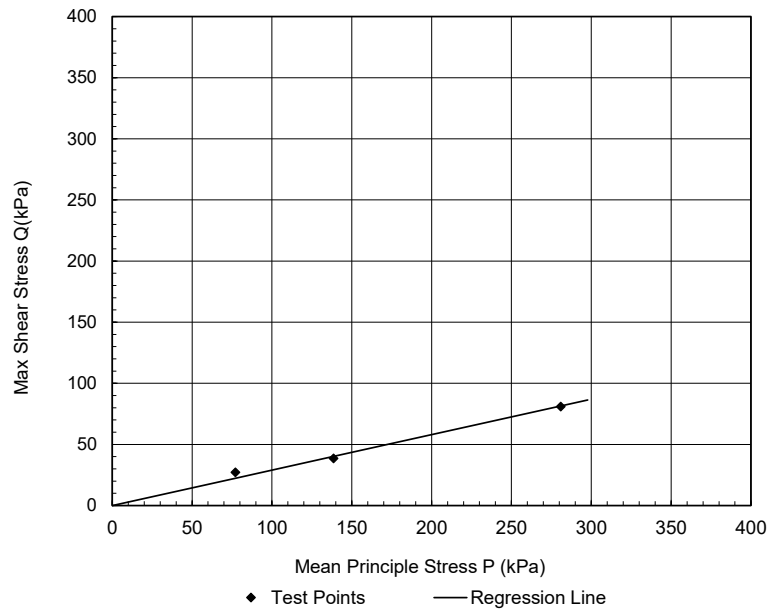
Project: Ground Investigation for Northland Corridor
Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1143 Depth (m): 6.00-6.50
Sampled by: NC Site Team Date sampled: 23/10/25
Sampling Method: Pushtube
Sample Description: Silty CLAY with traces of organics

Sample Type : Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/172-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P vs Q Total Stress Plot - Back Pressure saturated at 400 kPa



NB: The Cohesion Value (Total Stress) has been adjusted to zero

TOTAL STRESS RESULT			Correl coeff	0.9971	(r^2)
Intercept d	0.00	(kPa)	Cohesion c	0	(kPa)
Beta β	16.17	(deg)	Phi ϕ	17	(deg)

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
Failure Criteria: Stage 2 : Stress Ratio
(at Max. Values) Stage 3 : Stress Ratio

Date tested: 11-21/11/25
Date reported: 28/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 28/11/25

Designation:

LHF 2418 (08/25)



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - P' vs Q' Effective Stress Plot

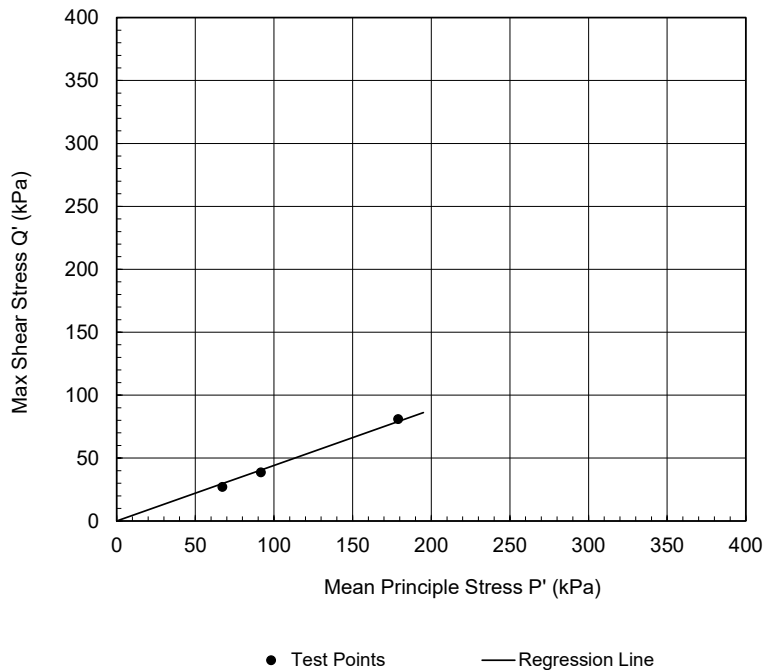


Project: Ground Investigation for Northland Corridor
Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1143 Depth (m): 6.00-6.50
Sampled by: NC Site Team Date sampled: 23/10/25
Sampling Method: Pushtube
Sample Description: Silty CLAY with traces of organics

Sample Type : Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/172-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT
P' vs Q' Effective Stress Plot - Back Pressure saturated at 400 kPa



EFFECTIVE STRESS RESULT			Correl coeff	0.9985	(r ²)
Intercept d'	0.00	(kPa)	Cohesion c'	0	(kPa)
Beta β'	23.83	(deg)	Phi Ø'	26	(deg)

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
Failure Criteria: Stage 2 : Stress Ratio
(at Max. Values) Stage 3 : Stress Ratio

Date tested: 11-21/11/25
Date reported: 28/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 28/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

Designation:
LHF 2418 (08/25)

Page 5 of 9

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - PvsQ Stress Path Plot



Project: Ground Investigation for Northland Corridor
Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1143
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Silty CLAY with traces of organics

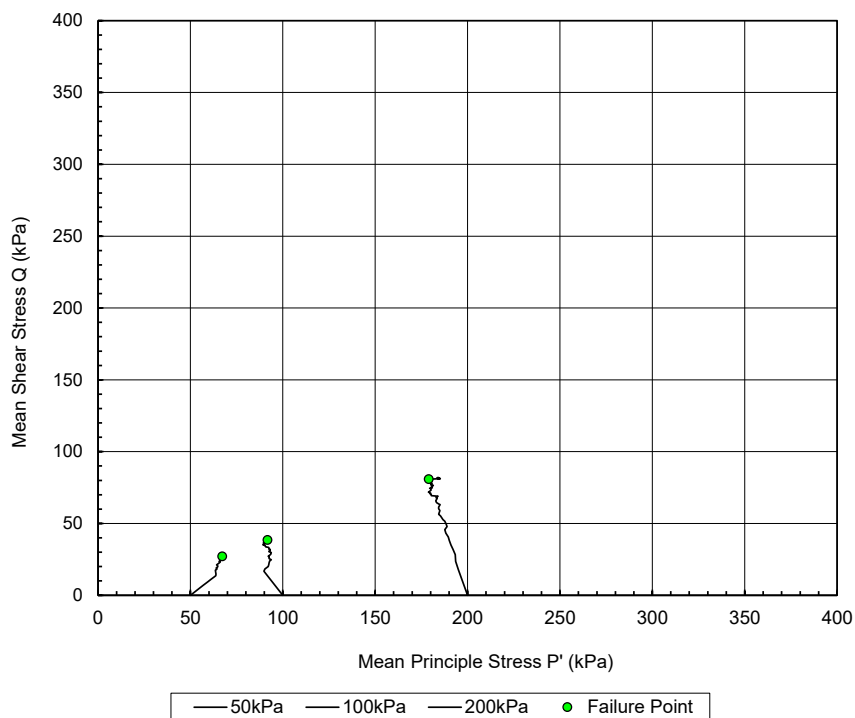
Depth (m): 6.00-6.50
Date sampled: 23/10/25

Sample Type : Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/172-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P' vs Q Stress Path (Effective Stress Plot) - Back Pressure saturated at 400 kPa



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
Failure Criteria: Stage 2 : Stress Ratio
(at Max. Values) Stage 3 : Stress Ratio

Date tested: 11-21/11/25
Date reported: 28/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory: Thirushen Pillay
Designation: Senior Civil Engineering Technician

Date: 28/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Strain vs Deviator Stress Plot

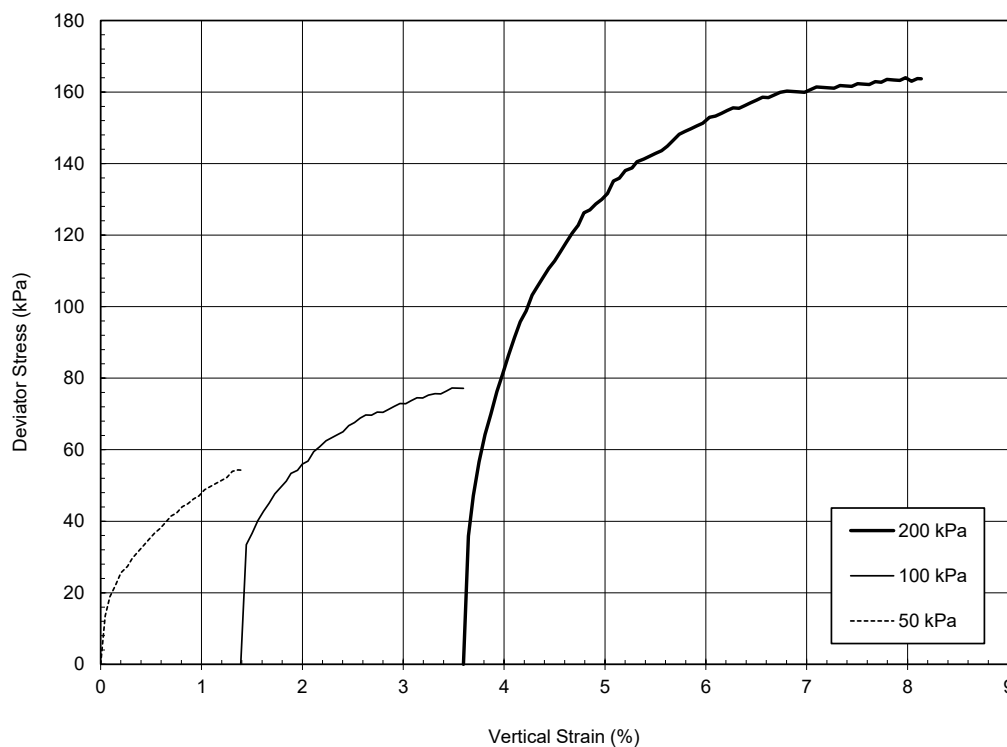


Project: Ground Investigation for Northland Corridor
Location: Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1143
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Silty CLAY with traces of organics
Depth (m): 6.00-6.50
Date sampled: 23/10/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/172-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT
Vertical Strain vs Deviator Stress Plot - Back Pressure saturated at 400 kPa



Test Method	Notes
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	

Date tested: 11-21/11/25
Date reported: 28/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory: Thirushen Pillay
Designation: Senior Civil Engineering Technician

Date: 28/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Strain vs Pore Pressure Plot



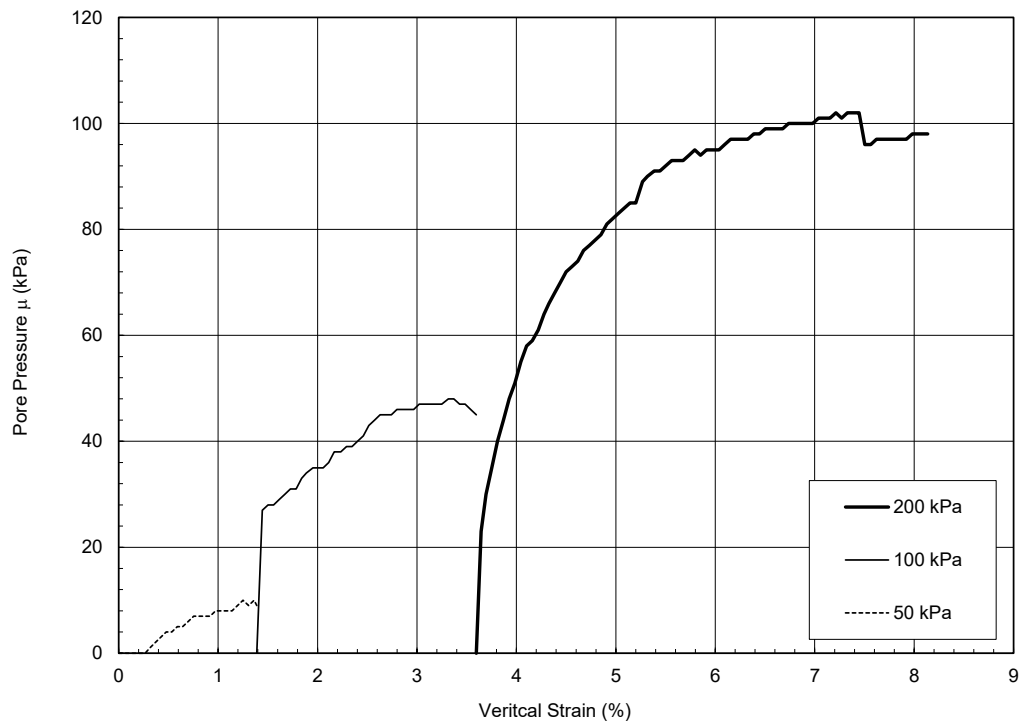
Project: Ground Investigation for Northland Corridor
Location: Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1143
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Silty CLAY with traces of organics
Depth (m): 6.00-6.50
Date sampled: 23/10/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/172-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Vertical Strain vs Pore Pressure Plot - Back Pressure saturated at 400 kPa



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Date tested: 11-21/11/25
Date reported: 28/11/25

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 28/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

LHF 2418 (08/25)

Page 8 of 9

WSP
Auckland Laboratory
Quality Management Systems Certified to ISO 9001

7a Ride Way, Albany
Private Bag 101982, NS Mail Centre, North
Shore City 0745, New Zealand

Telephone +64 9 4154660
Website www.wsp.com/nz

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test report - Photograph of Failure Type



Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1143
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Silty CLAY with traces of organics

Depth (m): 6.00-6.50
 Date sampled: 23/10/25

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/172-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Photo of failure type



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Date tested: 11-21/11/25
 Date reported: 28/11/25

Approved Signatory:
 Designation: Thirushen Pillay
 Senior Civil Engineering Technician

Date: 28/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

LHF 2418 (08/25)

Page 9 of 9

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - Result Summary



Project: Ground Investigation for Northland Corridor
 Location : Alternative to Brynderwyn Hills Section
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1143
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Silty SAND with some clay

Depth (m): 10.50-11.00
 Date sampled: 23/10/25

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/174-TXL-CUM
 Client Ref: -

Initial Sample properties		Rate of strain (mm/min)	
Length (mm)	= 109.80	Stage 1	0.012
Diameter (mm)	= 53.75	Stage 2	0.01
Membrane Correction (kPa)=		Stage 3	0.012

Saturation achieved using a minimum Back Pressure of 600 kPa

Specimen Stage No	Effective Confining Pressure (kPa)	INITIAL PROPERTIES			Solid Particle Density (Mg/m³)	FINAL PROPERTIES		
		Densities (Mg/m³)		Water Content (%)		Densities (Mg/m³)		Water Content (%)
		Bulk (Mg/m³)	Dry (Mg/m³)			Bulk (Mg/m³)	Dry (Mg/m³)	
1	50	1.61	0.98	64.1				
2	100				2.72			
3	200				(assumed)	1.67	1.06	57.5

Specimen Stage No	Effective Confining Pressure (kPa)	Void Ratio (e)	Deg of Saturation (Sr)		Deviator Stress $\sigma_1 - \sigma_3$ (kPa)	Pore Pressure μ (kPa)	Cumulative Strain (%)	Failure Criteria at Maximum Values
			Sr before Consolid.	Sr after Consolid.				
1	50	1.77	98	100	105.8	32	1.69	Stress Ratio
2	100				130.7	67	3.88	Stress Ratio
3	200				181.7	148	8.79	Stress Ratio

Specimen Stage No	Effective Confining Pressure (kPa)	Coefficient of Consolidation C_v (m ² /year)	Volume Compressibility M_v (m ² /MN)	Coefficient of Permeability k (m/s)	Final B Value	Due to the use of side filter drains, IANZ endorsement does not include the C_v , M_v and k values reported herein. <u>M_v, C_v & k calculated for the following conditions:-</u> L/D=2, RADIAL+TOP+BOTTOM Drainage Side Filter Drains Used (L/D= Sample Length/Diameter.)
1	50	4.1	0.28	3.5×10^{-10}	1.00	
2	100	1.1	0.34	1.2×10^{-10}		
3	200	0.22	0.48	3.2×10^{-11}		

TOTAL STRESS RESULT			
Intercept d	32.03	(kPa)	
Beta β	11.43	(deg)	
Cohesion c	33	(kPa)	
Phi ϕ	12	(deg)	
Correl coeff.	1.0000	(r ²)	

EFFECTIVE STRESS RESULT			
Intercept d'	14.37	(kPa)	
Beta β'	28.01	(deg)	
Cohesion c'	17	(kPa)	
Phi ϕ'	32	(deg)	
Correl coeff.	0.9964	(r ²)	

Test Method	Notes
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	Cv and Mv have been rounded to 2 significant figures. Mg/m ³ is equivalent to t/m ³ Deviation from standard, rate of vertical strain for shear stage reported in mm/min vs. %/hr

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Date tested: 24/11/25-15/12/25
 Date reported: 8/01/26

Approved Signatory: 
 Designation: Thirushen Pillay
 Senior Civil Engineering Technician

Date: 8/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Volume change vs $\sqrt{t}$ Plot (Consolidation stage)



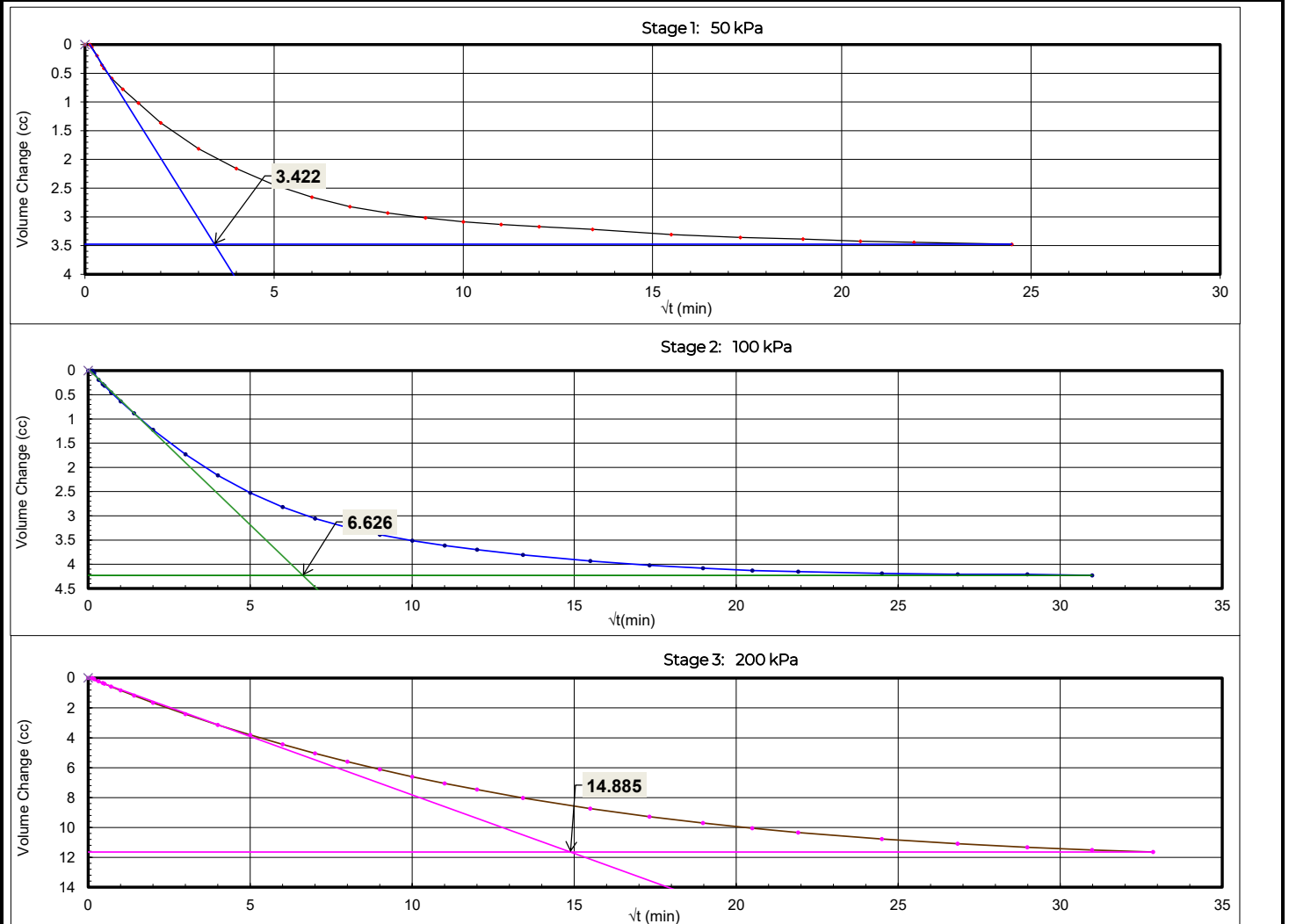
Project: Ground Investigation for Northland Corridor
Location : Alternative to Brynderwyn Hills Section
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1143
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Silty SAND with some clay

Depth (m): 10.50-11.00
Date sampled: 23/10/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/174-TXL-CUM
Client Ref: -

Final Back Pressure (kPa) : 600 kPa



Test Method	Test Results at end of consolidation			
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018	Effective Stress (kPa)=	50 kPa	100 kPa	200 kPa
Water Content : NZS4402 : 1986 Test 2.1	t_{100} (min) =	11.710	43.904	221.563
	Volumetric Strain (%)=	1.395	1.698	4.675
	Vertical Strain (%)=	0.465	0.561	1.530
	PWP Dissipation (U%)=	100.00	100.00	100.00
	Estimated Strain to failure(%)=	5	5	5

Date tested : 8/01/26
Date reported : 24/11/25-15/12/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Date: 8/01/26

Approved Signatory: Thirushen Pillay
Designation: Senior Civil Engineering Technician

LHF 2418 (08/25)



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

WSP
Auckland Laboratory
Quality Management Systems Certified to ISO 9001

7a Ride Way, Albany
Private Bag 101982, NS Mail Centre, North
Shore City 0745, New Zealand

Telephone +64 9 4154660
Website www.wsp.com/nz

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Mohr Coulomb Envelope Plot



Project: Ground Investigation for Northland Corridor
 Location : Alternative to Brynderwyn Hills Section
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1143
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Silty SAND with some clay

Depth (m): 10.50-11.00
 Date sampled: 23/10/25

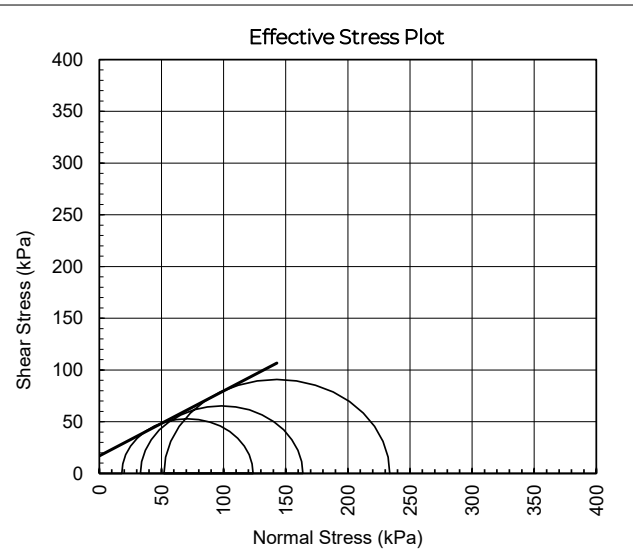
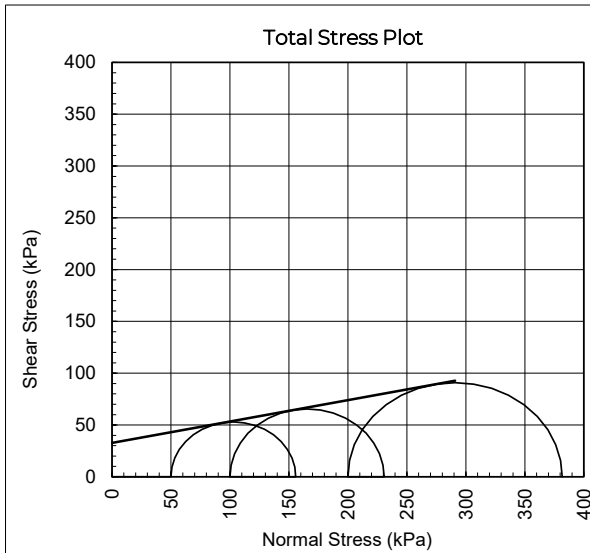
Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/174-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Mohr-Coulomb envelope plots - Result at Maximum Stress

Back Pressure Saturated at 600 kPa



TOTAL STRESS RESULT			
Intercept d	32.03	(kPa)	
Beta β	11.43	(deg)	
Cohesion c	33	(kPa)	
Phi ϕ	12	(deg)	
Correl coeff.	1.0000	(r ²)	

EFFECTIVE STRESS RESULT			
Intercept d'	14.37	(kPa)	
Beta β'	28.01	(deg)	
Cohesion c'	17	(kPa)	
Phi ϕ'	32	(deg)	
Correl coeff.	0.9964	(r ²)	

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Drainage Conditions during Shear :
 Stage 2 : Stress Ratio
 Stage 3 : Stress Ratio

Date tested: 24/11/25-15/12/25
 Date reported: 8/01/26

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Approved Signatory:

Thirushen Pillay

Date: 8/01/26

Designation:

Senior Civil Engineering Technician



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - P vs Q Total Stress Plot



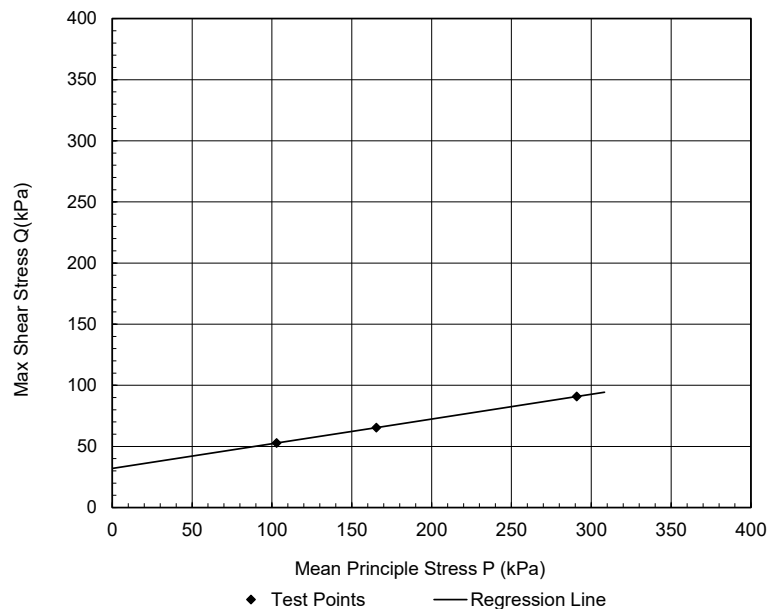
Project: Ground Investigation for Northland Corridor
Location : Alternative to Brynderwyn Hills Section
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1143
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Silty SAND with some clay
Depth (m): 10.50-11.00
Date sampled: 23/10/25

Sample Type : Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/174-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P vs Q Total Stress Plot - Back Pressure saturated at 600 kPa



TOTAL STRESS RESULT			Correl coeff	1.0000	(r ²)
Intercept d	32.03	(kPa)	Cohesion c	33	(kPa)
Beta β	11.43	(deg)	Phi Ø	12	(deg)

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
Failure Criteria: Stage 2 : Stress Ratio
(at Max. Values) Stage 3 : Stress Ratio

Date tested: 24/11/25-15/12/25
Date reported: 8/01/26

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 8/01/26

Designation:

LHF 2418 (08/25)



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

Page 4 of 9

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - P' vs Q' Effective Stress Plot

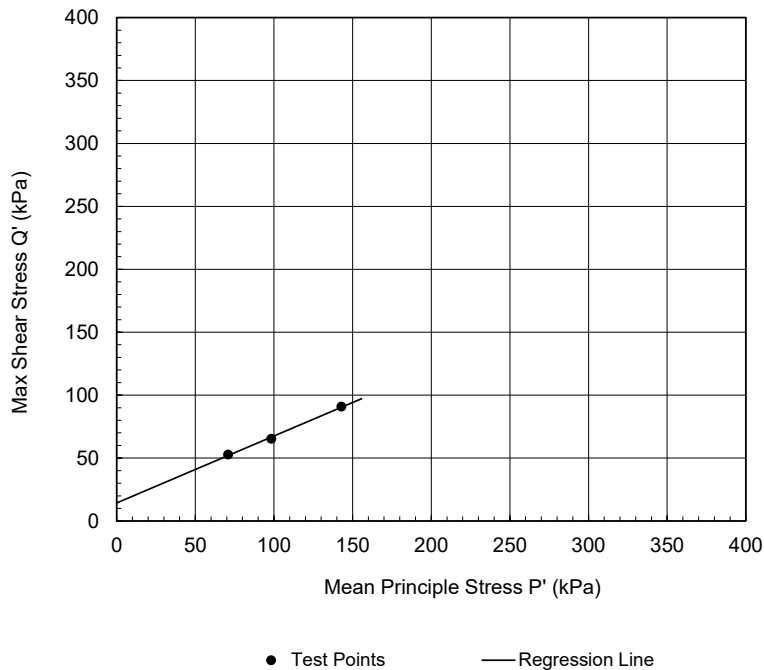


Project: Ground Investigation for Northland Corridor
Location: Alternative to Brynderwyn Hills Section
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1143
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Silty SAND with some clay
Depth (m): 10.50-11.00
Date sampled: 23/10/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/174-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT
P' vs Q' Effective Stress Plot - Back Pressure saturated at 600 kPa



EFFECTIVE STRESS RESULT			Correl coeff	0.9964	(r ²)
Intercept d'	14.37	(kPa)	Cohesion c'	17	(kPa)
Beta β'	28.01	(deg)	Phi Ø'	32	(deg)

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
Failure Criteria: Stage 2 : Stress Ratio
(at Max. Values) Stage 3 : Stress Ratio

Date tested: 24/11/25-15/12/25
Date reported: 8/01/26

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 8/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

Designation:
LHF 2418 (08/25)

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - PvsQ Stress Path Plot



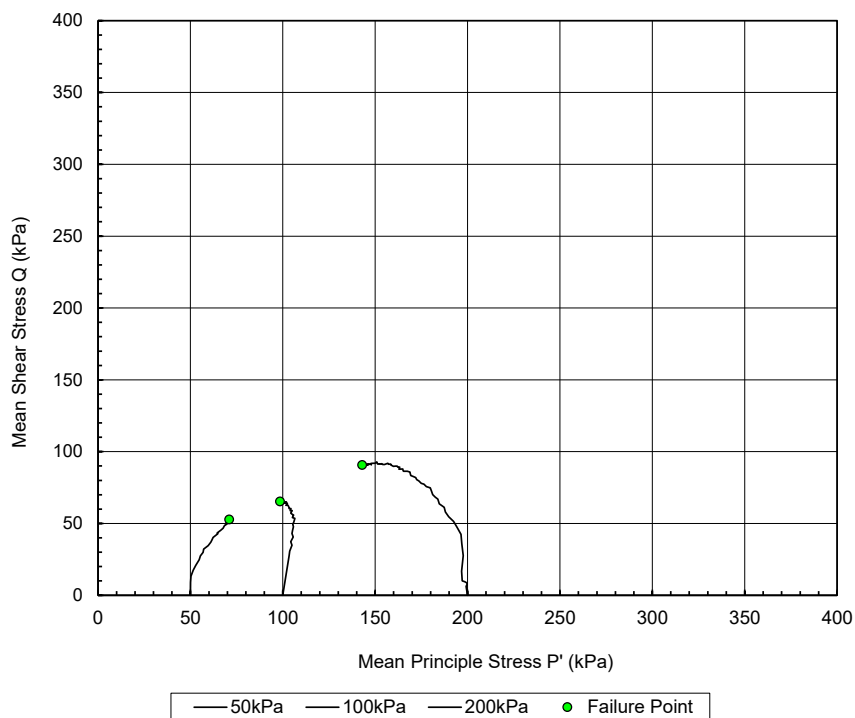
Project: Ground Investigation for Northland Corridor
Location: Alternative to Brynderwyn Hills Section
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1143
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Silty SAND with some clay
Depth (m): 10.50-11.00
Date sampled: 23/10/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/174-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P' vs Q Stress Path (Effective Stress Plot) - Back Pressure saturated at 600 kPa



Test Method

Consolidated undrained triaxial test: BS EN ISO 17892-9:2018
Water Content: NZS4402:1986 Test 2.1

Notes

Stage 1: Stress Ratio
Failure Criteria: Stage 2: Stress Ratio
(at Max. Values) Stage 3: Stress Ratio

Date tested: 24/11/25-15/12/25
Date reported: 8/01/26

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory: Thirushen Pillay
Designation: Senior Civil Engineering Technician

Date: 8/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Strain vs Deviator Stress Plot

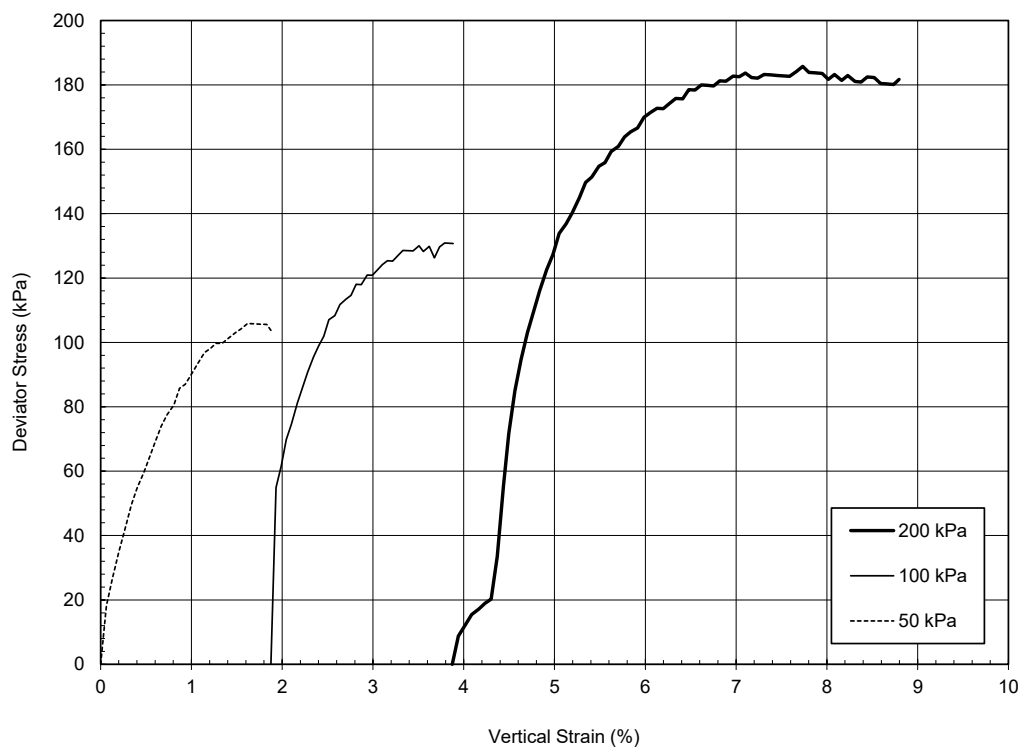


Project: Ground Investigation for Northland Corridor
Location: Alternative to Brynderwyn Hills Section
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1143
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Silty SAND with some clay
Depth (m): 10.50-11.00
Date sampled: 23/10/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/174-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT
Vertical Strain vs Deviator Stress Plot - Back Pressure saturated at 600 kPa



Test Method	Notes
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	

Date tested: 24/11/25-15/12/25
Date reported: 8/01/26

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory: 
Designation: Thirushen Pillay
Senior Civil Engineering Technician

Date: 8/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Strain vs Pore Pressure Plot



Project: Ground Investigation for Northland Corridor
Location: Alternative to Brynderwyn Hills Section
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1143
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Silty SAND with some clay

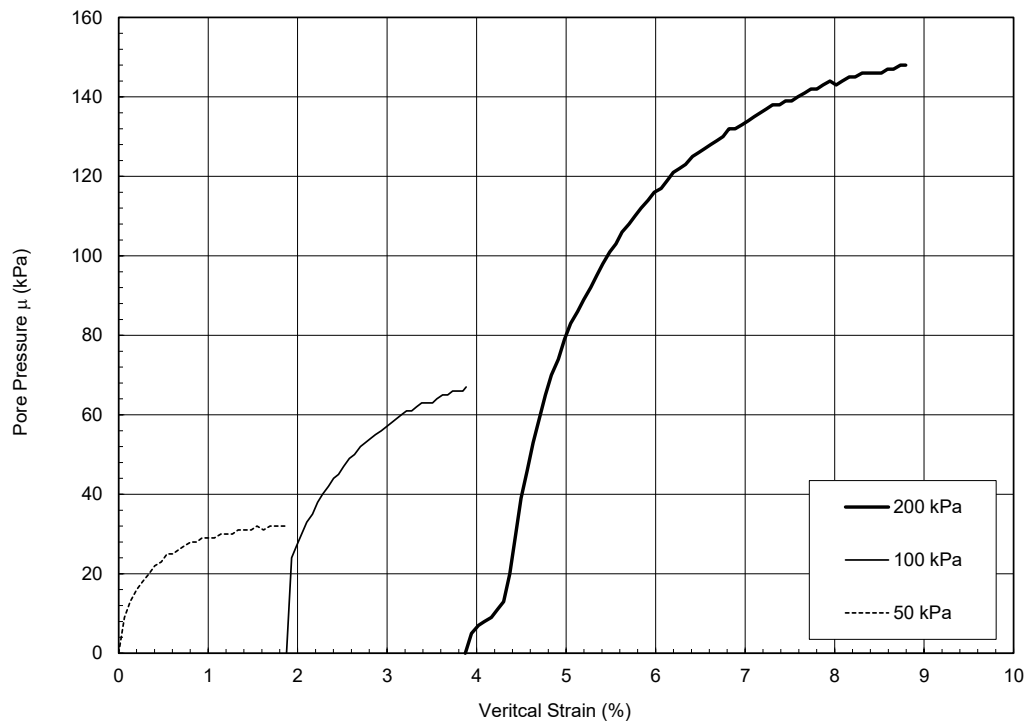
Depth (m): 10.50-11.00
Date sampled: 23/10/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/174-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Vertical Strain vs Pore Pressure Plot - Back Pressure saturated at 600 kPa



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Date tested: 24/11/25-15/12/25
Date reported: 8/01/26

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 8/01/26

Designation:



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

LHF 2418 (08/25)

Page 8 of 9

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test report - Photograph of Failure Type



Project: Ground Investigation for Northland Corridor
Location : Alternative to Brynderwyn Hills Section
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1143
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Silty SAND with some clay

Depth (m): 10.50-11.00
Date sampled: 23/10/25

Sample Type : Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/174-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Photo of failure type



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Date tested: 24/11/25-15/12/25
Date reported: 8/01/26

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 8/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

LHF 2418 (08/25)

Page 9 of 9

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - Result Summary



Project: Ground Investigation for Northland Corridor
 Location : Alternative to Brynderwyn Hills Section
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1146
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Organic CLAY; brown mottled black; moist; plastic

Depth (m): 6.00-6.50
 Date sampled: 24/11/25

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/208-TXL-CUM
 Client Ref: -

Initial Sample properties		Rate of strain (mm/min)	
Length (mm)	= 107.70	Stage 1	0.01
Diameter (mm)	= 53.45	Stage 2	0.01
Membrane Correction (kPa)=		Stage 3	0.01

Saturation achieved using a minimum Back Pressure of 400 kPa

Specimen Stage No	Effective Confining Pressure (kPa)	INITIAL PROPERTIES			Solid Particle Density (Mg/m ³)	FINAL PROPERTIES		
		Densities (Mg/m ³)		Water Content (%)		Densities (Mg/m ³)		Water Content (%)
		Bulk (Mg/m ³)	Dry (Mg/m ³)			Bulk (Mg/m ³)	Dry (Mg/m ³)	
1	50	1.28	0.50	154.4				
2	100				2.68			
3	200				(assumed)	1.80	0.87	107.8

Specimen Stage No	Effective Confining Pressure (kPa)	Void Ratio (e)	Deg of Saturation (Sr)		Deviator Stress $\sigma_1 - \sigma_3$ (kPa)	Pore Pressure μ (kPa)	Cumulative Strain (%)	Failure Criteria at Maximum Values
			Sr before Consolid.	Sr after Consolid.				
1	50	4.35	95	100	37.5	46	3.07	Stress Ratio
2	100				75.4	66	4.69	Stress Ratio
3	200				160.1	152	9.73	Stress Ratio

Specimen Stage No	Effective Confining Pressure (kPa)	Coefficient of Consolidation Cv (m ² /year)	Volume Compressibility Mv (m ² /MN)	Coefficient of Permeability k (m/s)	Final B Value	Due to the use of side filter drains, IANZ endorsement does not include the Cv, Mv and k values reported herein. Mv, Cv & k calculated for the following conditions:- L/D=2, RADIAL+TOP+BOTTOM Drainage Side Filter Drains Used (L/D= Sample Length/Diameter.)
1	50	0.14	4	1.8 x 10 ⁻¹⁰	0.98	
2	100	0.019	3.5	2.1 x 10 ⁻¹¹		
3	200	0.016	1.20	6.1 x 10 ⁻¹²		

TOTAL STRESS RESULT		
Intercept d	0.00	(kPa)
Beta β	15.80	(deg)
Cohesion c	0	(kPa)
Phi ϕ	16	(deg)
Correl coeff.	0.9997	(r ²)

EFFECTIVE STRESS RESULT		
Intercept d'	2.02	(kPa)
Beta β'	30.38	(deg)
Cohesion c'	2	(kPa)
Phi ϕ'	36	(deg)
Correl coeff.	0.9692	(r ²)

Value (Total Stress) has been adjusted to zero

Test Method	Notes
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	Cv and Mv have been rounded to 2 significant figures. Mg/m ³ is equivalent to t/m ³ Deviation from standard, rate of vertical strain for shear stage reported in mm/min vs. %/hr

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Date tested: 15/12/25-13/01/26
 Date reported: 16/01/26

Approved Signatory: Thirushen Pillay
 Designation: Senior Civil Engineering Technician

Date: 16/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Volume change vs $\sqrt{t}$ Plot (Consolidation stage)



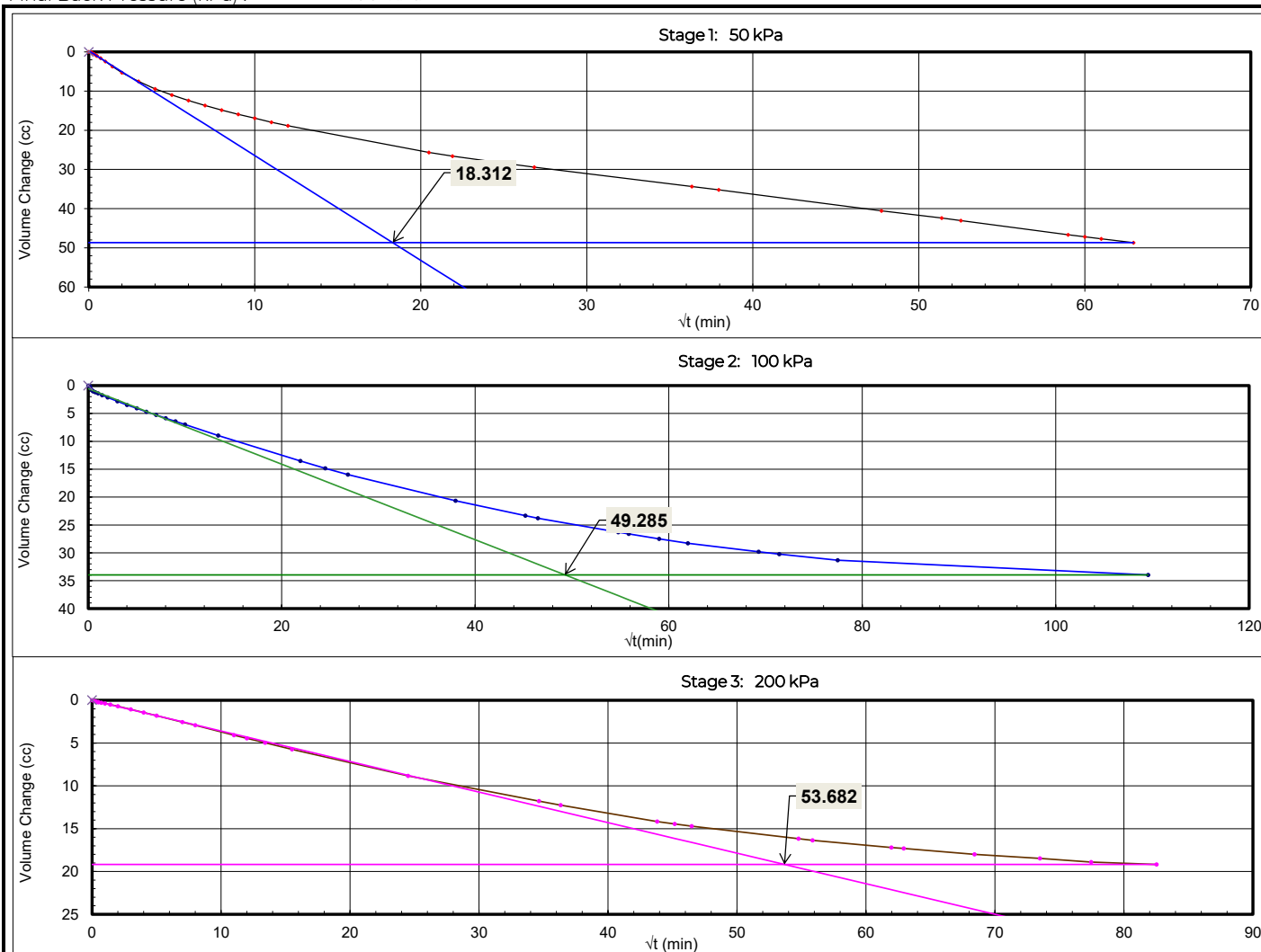
Project: Ground Investigation for Northland Corridor
Location: Alternative to Brynderwyn Hills Section
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1146
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Organic CLAY; brown mottled black; moist; plastic

Depth (m): 6.00-6.50
Date sampled: 24/11/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/208-TXL-CUM
Client Ref: -

Final Back Pressure (kPa): 400 kPa



Test Method	Test Results at end of consolidation		
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018	Effective Stress (kPa)=	50 kPa	100 kPa
Water Content : NZS4402 : 1986 Test 2.1	t_{100} (min) =	335.329	2429.011
	Volumetric Strain (%)=	20.138	14.053
	Vertical Strain (%)=	6.713	5.244
	PWP Dissipation (U)=	100.00	100.00
	Estimated Strain to failure(%)=	5	5

Date tested : 16/01/26
Date reported : 15/12/25-13/01/26

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Date: 16/01/26

Approved Signatory

Thirushen Pillay

Designation:

Senior Civil Engineering Technician

LHF 2418 (08/25)



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

WSP
Auckland Laboratory
Quality Management Systems Certified to ISO 9001

7a Ride Way, Albany
Private Bag 101982, NS Mail Centre, North
Shore City 0745, New Zealand

Telephone +64 9 4154660
Website www.wsp.com/nz

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Mohr Coulomb Envelope Plot



Project: Ground Investigation for Northland Corridor
 Location : Alternative to Brynderwyn Hills Section
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1146
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Organic CLAY; brown mottled black; moist; plastic

Depth (m): 6.00-6.50
 Date sampled: 24/11/25

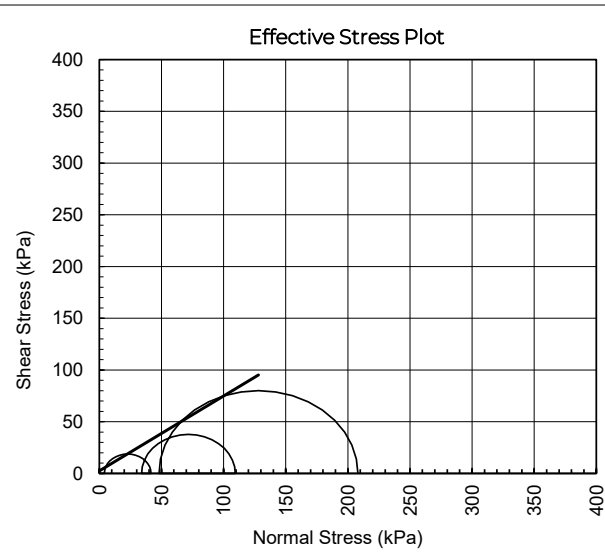
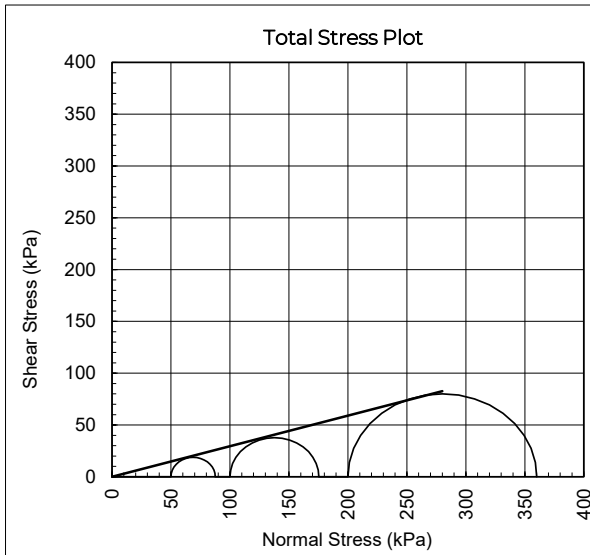
Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/208-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Mohr-Coulomb envelope plots - Result at Maximum Stress

Back Pressure Saturated at 400 kPa



NB: The Cohesion Value (Total Stress) has been adjusted to zero

TOTAL STRESS RESULT			
Intercept d	0.00	(kPa)	
Beta β	15.80	(deg)	
Cohesion c	0	(kPa)	
Phi ϕ	16	(deg)	
Correl coeff.	0.9997	(r ²)	

EFFECTIVE STRESS RESULT			
Intercept d'	2.02	(kPa)	
Beta β'	30.38	(deg)	
Cohesion c'	2	(kPa)	
Phi ϕ'	36	(deg)	
Correl coeff.	0.9692	(r ²)	

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Drainage Conditions during Shear :
 Stage 2 : Stress Ratio
 Stage 3 : Stress Ratio

Date tested: 15/12/25-13/01/26
 Date reported: 16/01/26

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Approved Signatory:

Thirushen Pillay

Date: 16/01/26

Designation:

Senior Civil Engineering Technician



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - P vs Q Total Stress Plot



Project: Ground Investigation for Northland Corridor
Location : Alternative to Brynderwyn Hills Section
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1146
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Organic CLAY; brown mottled black; moist; plastic

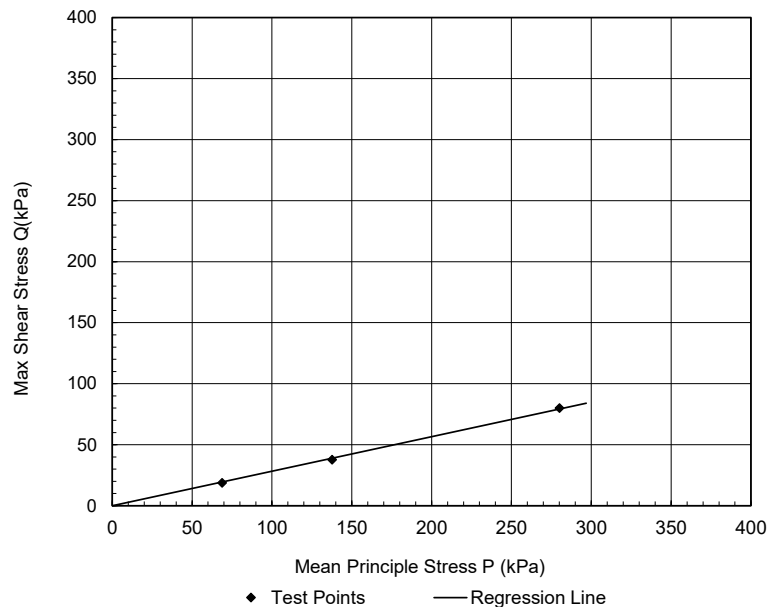
Depth (m): 6.00-6.50
Date sampled: 24/11/25

Sample Type : Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/208-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P vs Q Total Stress Plot - Back Pressure saturated at 400 kPa



NB: The Cohesion Value (Total Stress) has been adjusted to zero

TOTAL STRESS RESULT			Correl coeff	0.9997	(r ²)
Intercept d	0.00	(kPa)	Cohesion c	0	(kPa)
Beta β	15.80	(deg)	Phi Ø	16	(deg)

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
Failure Criteria: Stage 2 : Stress Ratio
(at Max. Values) Stage 3 : Stress Ratio

Date tested: 15/12/25-13/01/26
Date reported: 16/01/26

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 16/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

Designation:
LHF 2418 (08/25)

Page 4 of 9

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - P' vs Q' Effective Stress Plot



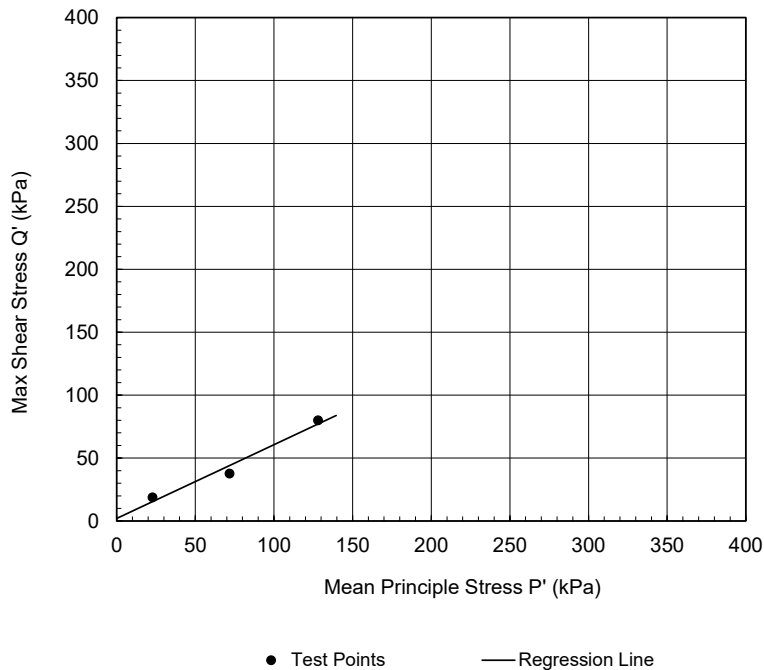
Project: Ground Investigation for Northland Corridor
Location : Alternative to Brynderwyn Hills Section
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1146
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Organic CLAY; brown mottled black; moist; plastic

Depth (m): 6.00-6.50
Date sampled: 24/11/25

Sample Type : Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/208-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT
P' vs Q' Effective Stress Plot - Back Pressure saturated at 400 kPa



EFFECTIVE STRESS RESULT			Correl coeff	0.9692	(r ²)
Intercept d'	2.02	(kPa)	Cohesion c'	2	(kPa)
Beta β'	30.38	(deg)	Phi Ø'	36	(deg)

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
Failure Criteria:
Stage 2 : Stress Ratio
(at Max. Values) Stage 3 : Stress Ratio

Date tested: 15/12/25-13/01/26
Date reported: 16/01/26

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 16/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

Designation:
LHF 2418 (08/25)

Page 5 of 9

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - PvsQ Stress Path Plot



Project: Ground Investigation for Northland Corridor
Location: Alternative to Brynderwyn Hills Section
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1146
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Organic CLAY; brown mottled black; moist; plastic

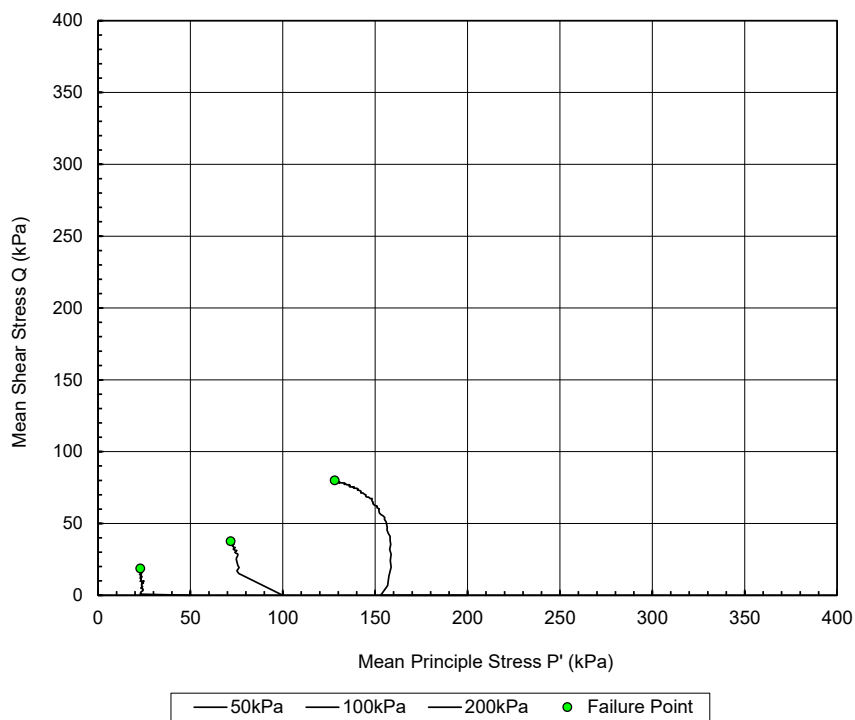
Depth (m): 6.00-6.50
Date sampled: 24/11/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/208-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P' vs Q Stress Path (Effective Stress Plot) - Back Pressure saturated at 400 kPa



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1: Stress Ratio
Failure Criteria: Stage 2: Stress Ratio
(at Max. Values) Stage 3: Stress Ratio

Date tested: 15/12/25-13/01/26
Date reported: 16/01/26

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory: Thirushen Pillay
Designation: Senior Civil Engineering Technician

Date: 16/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - Strain vs Deviator Stress Plot



Project: Ground Investigation for Northland Corridor
 Location : Alternative to Brynderwyn Hills Section
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1146
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Organic CLAY; brown mottled black; moist; plastic

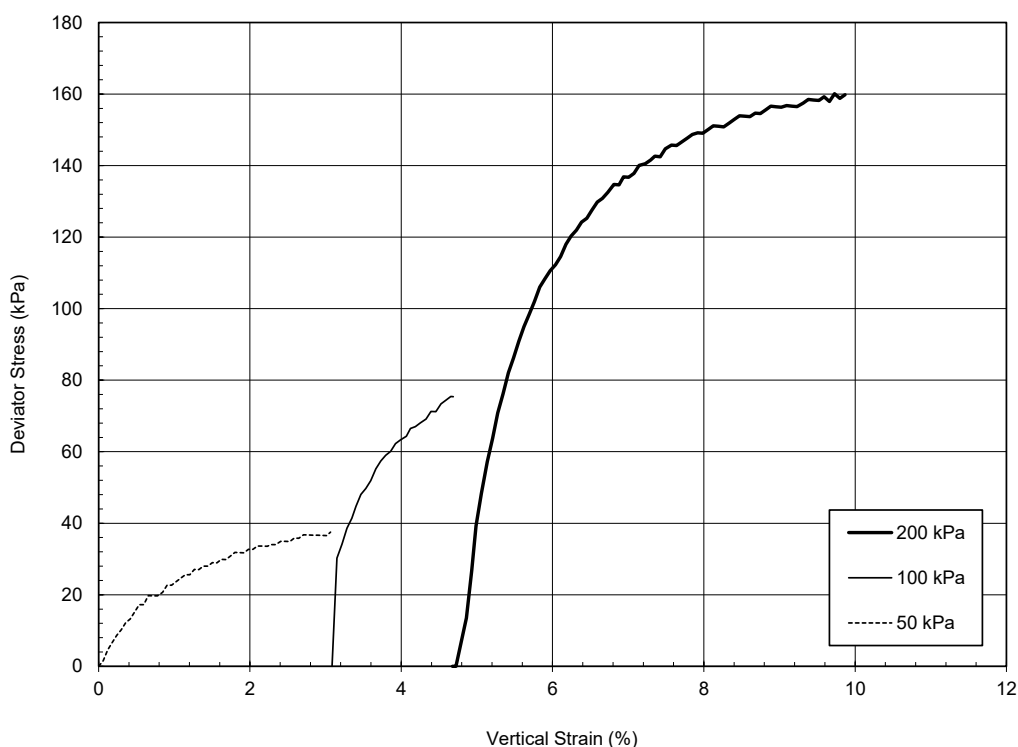
Depth (m): 6.00-6.50
 Date sampled: 24/11/25

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/208-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Vertical Strain vs Deviator Stress Plot - Back Pressure saturated at 400 kPa



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Date tested: 15/12/25-13/01/26
 Date reported: 16/01/26

Approved Signatory:

Thirushen Pillay
 Senior Civil Engineering Technician

Date: 16/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

LHF 2418 (08/25)

Page 7 of 9

WSP
 Auckland Laboratory
 Quality Management Systems Certified to ISO 9001

7a Ride Way, Albany
 Private Bag 101982, NS Mail Centre, North
 Shore City 0745, New Zealand

Telephone +64 9 4154660
 Website www.wsp.com/nz

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Strain vs Pore Pressure Plot



Project: Ground Investigation for Northland Corridor
Location: Alternative to Brynderwyn Hills Section
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1146
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Organic CLAY; brown mottled black; moist; plastic

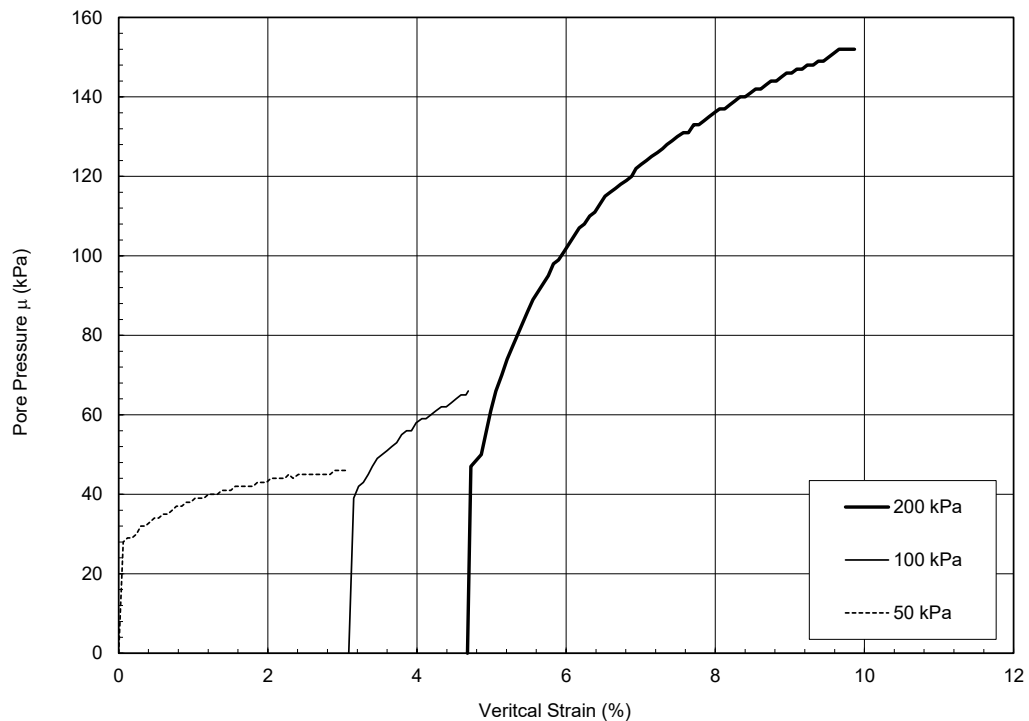
Depth (m): 6.00-6.50
Date sampled: 24/11/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/208-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Vertical Strain vs Pore Pressure Plot - Back Pressure saturated at 400 kPa



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Date tested: 15/12/25-13/01/26
Date reported: 16/01/26

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 16/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test report - Photograph of Failure Type



Project: Ground Investigation for Northland Corridor
 Location : Alternative to Brynderwyn Hills Section
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1146
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Organic CLAY; brown mottled black; moist; plastic

Depth (m): 6.00-6.50
 Date sampled: 24/11/25

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/208-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Photo of failure type



Test Method	Notes
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	

Date tested: 15/12/25-13/01/26
 Date reported: 16/01/26

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory: 
 Designation: Thirushen Pillay
 Senior Civil Engineering Technician

Date: 16/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

LHF 2418 (08/25)

Page 9 of 9

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - Result Summary



Project: Ground Investigation for Northland Corridor
 Location : Alternative to Brynderwyn Hills Section
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1146
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Clayey SILT with minor sand

Depth (m): 16.50-17.00
 Date sampled: 25/11/25

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/210-TXL-CUM
 Client Ref: -

Initial Sample properties		Rate of strain (mm/min)	
Length (mm)	= 108.15	Stage 1	0.01
Diameter (mm)	= 53.98	Stage 2	0.01
Membrane Correction (kPa)=		Stage 3	0.01

Saturation achieved using a minimum Back Pressure of 500 kPa

Specimen Stage No	Effective Confining Pressure (kPa)	INITIAL PROPERTIES			Solid Particle Density (Mg/m³)	FINAL PROPERTIES		
		Densities (Mg/m³)		Water Content (%)		Densities (Mg/m³)		Water Content (%)
		Bulk (Mg/m³)	Dry (Mg/m³)			Bulk (Mg/m³)	Dry (Mg/m³)	
1	50	1.63	1.04	57.7				
2	100				2.72			
3	200				(assumed)	1.69	1.09	55.5

Specimen Stage No	Effective Confining Pressure (kPa)	Void Ratio (e)	Deg of Saturation (Sr)		Deviator Stress $\sigma_1 - \sigma_3$ (kPa)	Pore Pressure μ (kPa)	Cumulative Strain (%)	Failure Criteria at Maximum Values
			Sr before Consolid.	Sr after Consolid.				
1	50	1.63	96	100	116.6	31	1.78	Stress Ratio
2	100				176.3	61	3.62	Stress Ratio
3	200				250.5	132	8.18	Stress Ratio

Specimen Stage No	Effective Confining Pressure (kPa)	Coefficient of Consolidation C_v (m ² /year)	Volume Compressibility M_v (m ² /MN)	Coefficient of Permeability k (m/s)	Final B Value	Due to the use of side filter drains, IANZ endorsement does not include the C_v , M_v and k values reported herein. <u>M_v, C_v & k calculated for the following conditions:-</u> L/D=2, RADIAL+TOP+BOTTOM Drainage Side Filter Drains Used (L/D= Sample Length/Diameter.)
1	50	5.6	0.32	5.6×10^{-10}	1.02	
2	100	0.65	0.27	5.4×10^{-11}		
3	200	0.28	0.20	1.7×10^{-11}		

TOTAL STRESS RESULT		
Intercept d	27.49	(kPa)
Beta β	16.93	(deg)
Cohesion c	29	(kPa)
Phi ϕ	18	(deg)
Correl coeff.	0.9922	(r ²)

EFFECTIVE STRESS RESULT		
Intercept d'	14.15	(kPa)
Beta β'	29.96	(deg)
Cohesion c'	17	(kPa)
Phi ϕ'	35	(deg)
Correl coeff.	0.9997	(r ²)

Test Method	Notes
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	Cv and Mv have been rounded to 2 significant figures. Mg/m ³ is equivalent to t/m ³ Deviation from standard, rate of vertical strain for shear stage reported in mm/min vs. %/hr

Date tested: 09-19/12/25
 Date reported: 8/01/26

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory: Thirushen Pillay
 Designation: Senior Civil Engineering Technician

Date: 8/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Volume change vs $\sqrt{t}$ Plot (Consolidation stage)



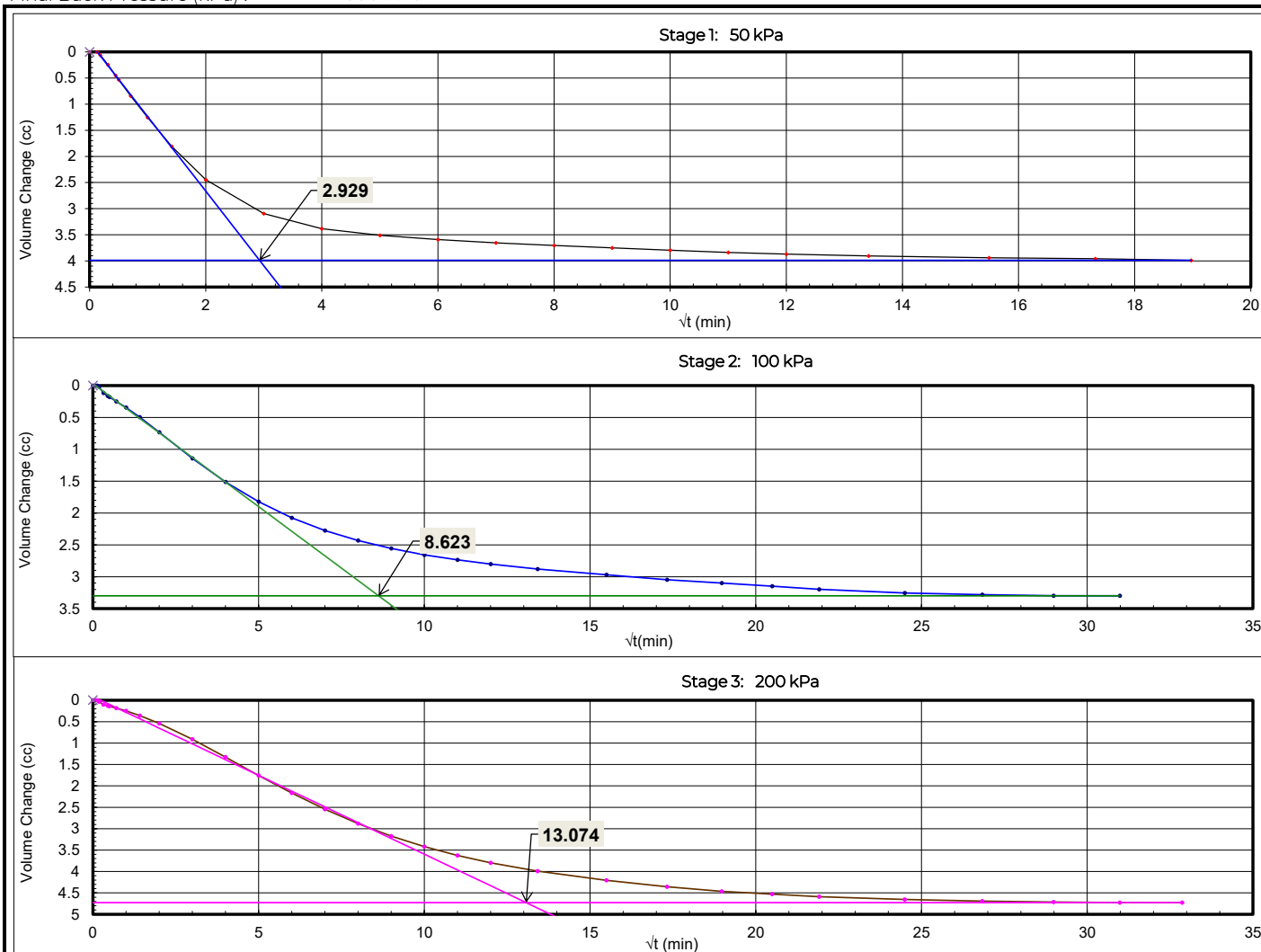
Project: Ground Investigation for Northland Corridor
Location: Alternative to Brynderwyn Hills Section
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1146
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Clayey SILT with minor sand

Depth (m): 16.50-17.00
Date sampled: 25/11/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/210-TXL-CUM
Client Ref: -

Final Back Pressure (kPa): 500 kPa



Test Method	Test Results at end of consolidation			
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018	Effective Stress (kPa)=	50 kPa	100 kPa	200 kPa
Water Content : NZS4402 : 1986 Test 2.1	t_{100} (min) =	8.579	74.356	170.929
	Volumetric Strain (%)=	1.612	1.334	1.910
	Vertical Strain (%)=	0.537	0.440	0.626
	PWP Dissipation (U)=	100.00	100.00	100.00
	Estimated Strain to failure(%)=	5	5	5

Date tested : 8/01/26
Date reported : 09-19/12/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Date: 8/01/26

Approved Signatory

Thirushen Pillay

Designation:

Senior Civil Engineering Technician

LHF 2418 (08/25)



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

WSP
Auckland Laboratory
Quality Management Systems Certified to ISO 9001

7a Ride Way, Albany
Private Bag 101982, NS Mail Centre, North
Shore City 0745, New Zealand

Telephone +64 9 4154660
Website www.wsp.com/nz

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Mohr Coulomb Envelope Plot



Project: Ground Investigation for Northland Corridor
 Location : Alternative to Brynderwyn Hills Section
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1146
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Clayey SILT with minor sand

Depth (m): 16.50-17.00
 Date sampled: 25/11/25

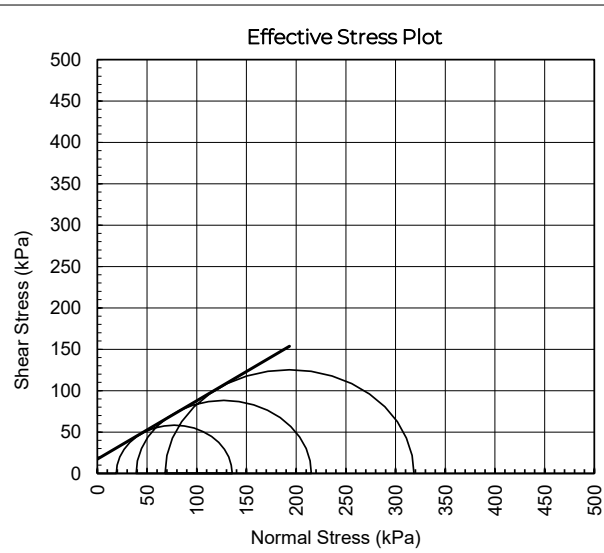
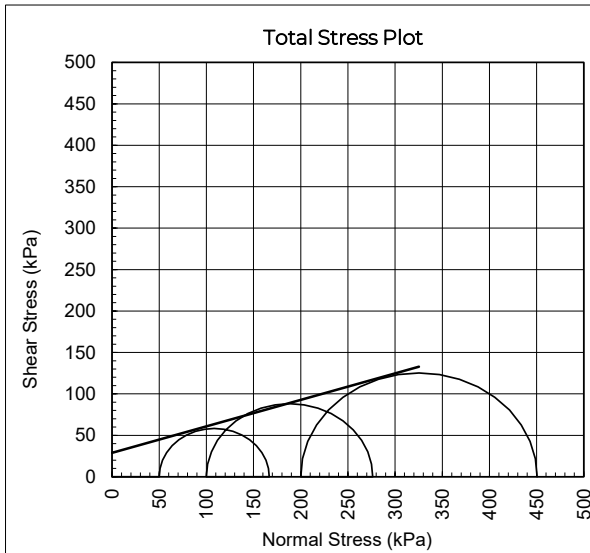
Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/210-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Mohr-Coulomb envelope plots - Result at Maximum Stress

Back Pressure Saturated at 500 kPa



TOTAL STRESS RESULT			
Intercept d	27.49	(kPa)	
Beta β	16.93	(deg)	
Cohesion c	29	(kPa)	
Phi ϕ	18	(deg)	
Correl coeff.	0.9922	(r ²)	

EFFECTIVE STRESS RESULT			
Intercept d'	14.15	(kPa)	
Beta β'	29.96	(deg)	
Cohesion c'	17	(kPa)	
Phi ϕ'	35	(deg)	
Correl coeff.	0.9997	(r ²)	

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Drainage Conditions during Shear :
 Stage 2 : Stress Ratio
 Stage 3 : Stress Ratio

Date tested: 09-19/12/25
 Date reported: 8/01/26

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory: 
 Designation: Senior Civil Engineering Technician

Date: 8/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - P vs Q Total Stress Plot



Project: Ground Investigation for Northland Corridor
Location : Alternative to Brynderwyn Hills Section
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1146
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Clayey SILT with minor sand

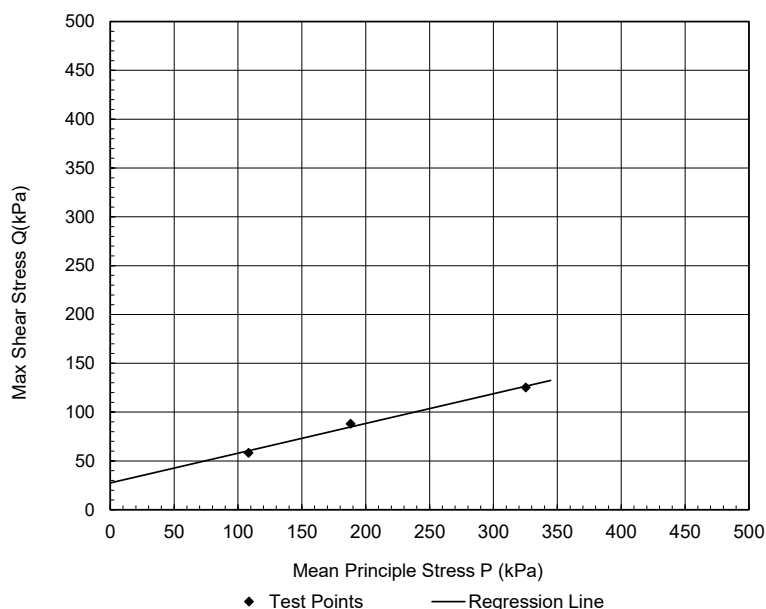
Depth (m): 16.50-17.00
Date sampled: 25/11/25

Sample Type : Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/210-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P vs Q Total Stress Plot - Back Pressure saturated at 500 kPa



TOTAL STRESS RESULT			Correl coeff	0.9922	(r ²)
Intercept d	27.49	(kPa)	Cohesion c	29	(kPa)
Beta β	16.93	(deg)	Phi Ø	18	(deg)

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
Failure Criteria: Stage 2 : Stress Ratio
(at Max. Values) Stage 3 : Stress Ratio

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Date tested: 09-19/12/25
Date reported: 8/01/26

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 8/01/26

Designation:

LHF 2418 (08/25)



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

Page 4 of 9

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - P' vs Q' Effective Stress Plot

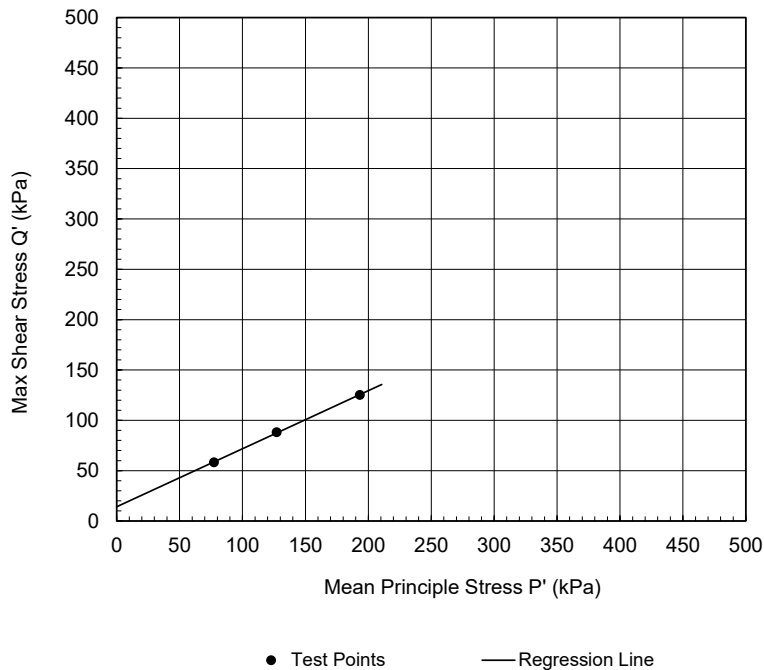


Project: Ground Investigation for Northland Corridor
Location: Alternative to Brynderwyn Hills Section
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1146
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Clayey SILT with minor sand
Depth (m): 16.50-17.00
Date sampled: 25/11/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/210-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT
P' vs Q' Effective Stress Plot - Back Pressure saturated at 500 kPa



EFFECTIVE STRESS RESULT			Correl coeff	0.9997	(r ²)
Intercept d'	14.15	(kPa)	Cohesion c'	17	(kPa)
Beta β'	29.96	(deg)	Phi Ø'	35	(deg)

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
Failure Criteria:
(at Max. Values) Stage 2 : Stress Ratio
Stage 3 : Stress Ratio

Date tested: 09-19/12/25
Date reported: 8/01/26

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 8/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

Designation:
LHF 2418 (08/25)

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - PvsQ Stress Path Plot



Project: Ground Investigation for Northland Corridor
Location : Alternative to Brynderwyn Hills Section
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1146
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Clayey SILT with minor sand

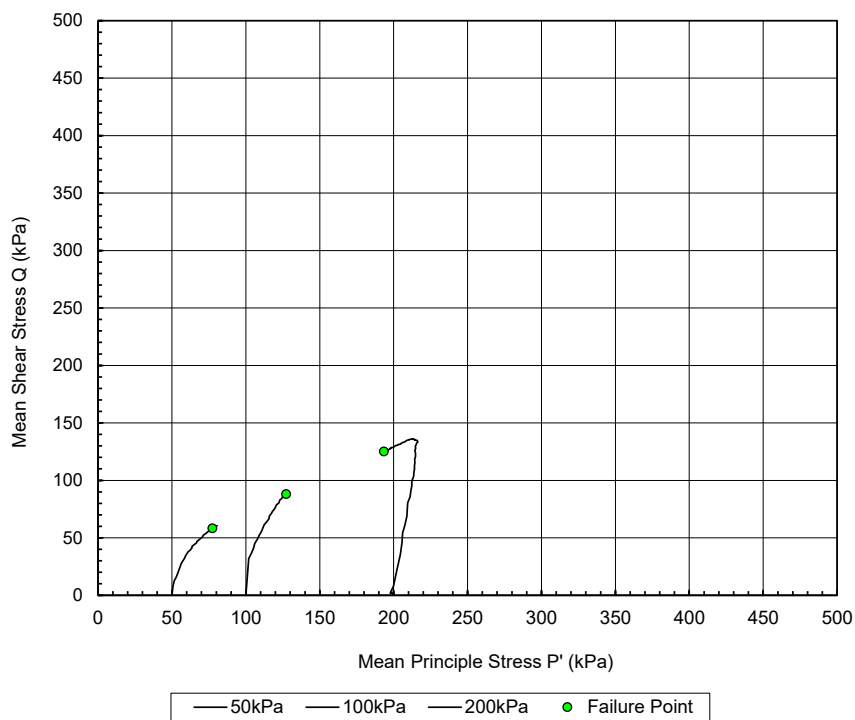
Depth (m): 16.50-17.00
Date sampled: 25/11/25

Sample Type : Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/210-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P' vs Q Stress Path (Effective Stress Plot) - Back Pressure saturated at 500 kPa



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
Failure Criteria: Stage 2 : Stress Ratio
(at Max. Values) Stage 3 : Stress Ratio

Date tested: 09-19/12/25
Date reported: 8/01/26

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 8/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Strain vs Deviator Stress Plot

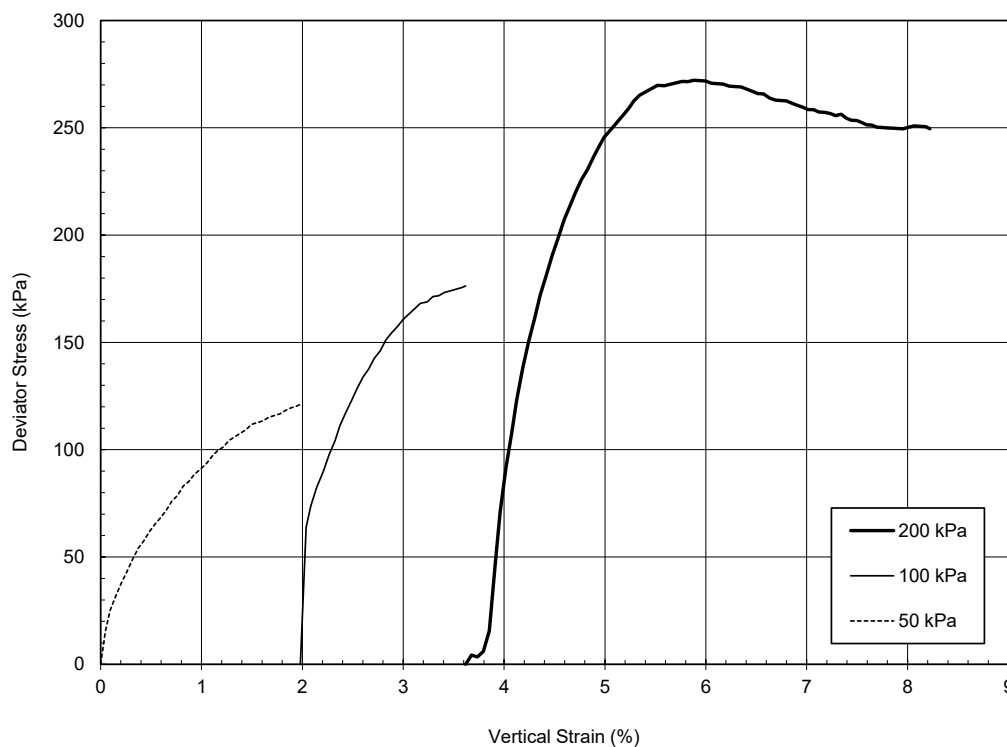


Project: Ground Investigation for Northland Corridor
Location: Alternative to Brynderwyn Hills Section
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1146
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Clayey SILT with minor sand
Depth (m): 16.50-17.00
Date sampled: 25/11/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/210-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT
Vertical Strain vs Deviator Stress Plot - Back Pressure saturated at 500 kPa



Test Method	Notes
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	

Date tested: 09-19/12/25
Date reported: 8/01/26

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory: 
Designation: Thirushen Pillay
Senior Civil Engineering Technician

Date: 8/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Strain vs Pore Pressure Plot



Project: Ground Investigation for Northland Corridor
Location: Alternative to Brynderwyn Hills Section
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1146
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Clayey SILT with minor sand

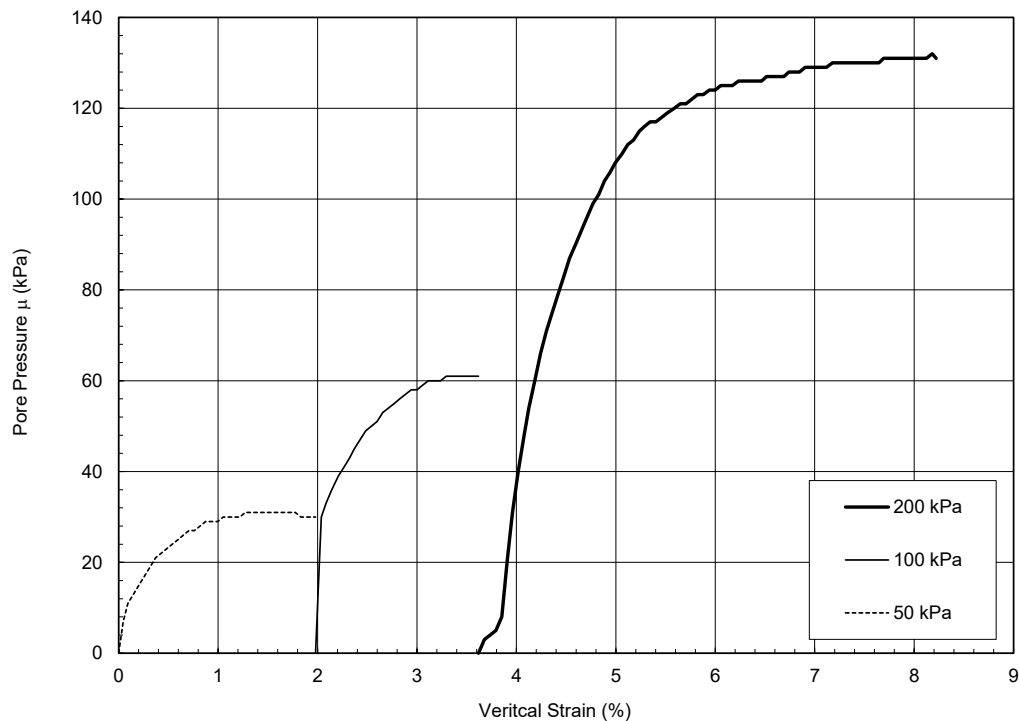
Depth (m): 16.50-17.00
Date sampled: 25/11/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/210-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Vertical Strain vs Pore Pressure Plot - Back Pressure saturated at 500 kPa



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Date tested: 09-19/12/25
Date reported: 8/01/26

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 8/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test report - Photograph of Failure Type



Project: Ground Investigation for Northland Corridor
 Location : Alternative to Brynderwyn Hills Section
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1146
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Clayey SILT with minor sand

Depth (m): 16.50-17.00
 Date sampled: 25/11/25

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/210-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Photo of failure type



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Date tested: 09-19/12/25
 Date reported: 8/01/26

Approved Signatory:

Thirushen Pillay
 Senior Civil Engineering Technician

Date: 8/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

LHF 2418 (08/25)

Page 9 of 9

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION

Test Report - Result Summary



Project: Ground Investigation for Northland Corridor
 Location : Section 2 Warkworth to Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA C/- Aurecon & WSP NZ Ltd.
 Sample Reference BH2B_T150 Sample Depth (m): 3.00-3.50
 Sampled by: NC_Site Team Date sampled: 18/08/25
 Sampling Method: Pushtube
 Sample Description: Clayey sandy SILT; Grey;moist;plastic
 Specific Depth : 3.35-3.50m
 Order Number : -

Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/19_TXL_CUM
 Client Ref No: 1-C2466.16

Initial Sample properties

Length (mm) = 109.30
 Diameter (mm) = 50.38

Membrane Correction has been applied

Saturation achieved using a minimum Back Pressure of 400 kPa

Specimen Stage No	Effective Confining Pressure (kPa)	INITIAL PROPERTIES			Solid Particle Density (t/m³)	FINAL PROPERTIES		
		Densities (t/m³)		Water Content (%)		Densities (t/m³)		Water Content (%)
		Wet (t/m³)	Dry (t/m³)			Wet (t/m³)	Dry (t/m³)	
1	50	1.77	1.19	48.9				
2	100				2.70			
3	300				(assumed)	2.01	1.49	34.7

Specimen Stage No	Effective Confining Pressure (kPa)	Void Ratio (e)	Deg of Saturation (Sr)		Deviator Stress $\sigma_1 - \sigma_3$ (kPa)	Pore Pressure μ (kPa)	Strain (%)	Failure Criteria at Maximum Values
			Sr before Consolid. (%)	Sr after Consolid. (%)				
1	50	1.27	100	100	46.8	30	1.77	Deviator Stress
2	100				97.1	62	2.53	Deviator Stress
3	300				234.6	210	4.36	Deviator Stress

Specimen Stage No	Effective Confining Pressure (kPa)	Coefficient of Consolidation C_v (m ² /year)	Volume Compressibility M_v (m ² /MN)	Coefficient of Permeability k (m/s)	B at the start of test	Due to the use of side filter drains, IANZ endorsement does not include the C_v , M_v and k values reported herein. Mv,Cv & k calculated for the following conditions:- L/D=2, RADIAL+TOP+BOTTOM Drainage Side Filter Drains Used (L/D= Sample Length/Diameter.)
1	50	0.91	1.9	5.4×10^{-10}	1.00	
2	100	0.16	1.1	5.4×10^{-11}		
3	300	0.12	0.35	1.3×10^{-11}		

TOTAL STRESS RESULT		
Intercept d	0.00	(kPa)
Beta β	16.02	(deg)
Cohesion c	0	(kPa)
Phi ϕ	17	(deg)
Correl coeff.	0.9972	(r ²)

EFFECTIVE STRESS RESULT		
Intercept d'	0.00	(kPa)
Beta β'	29.43	(deg)
Cohesion c'	0	(kPa)
Phi ϕ'	34	(deg)
Correl coeff.	0.9999	(r ²)

Value (Total Stress) has been adjusted to zero

NB:The Cohesion Value (Eff. Stress) has been adjusted to zero

Test Method	Notes
Triaxial Test : Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	Cv and Mv have been rounded to 2 significant figures. L/D= Sample Length/Diameter.

Date tested: 07-16/10/25
 Date reported: 28/10/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory: 
 Designation: Senior Civil Engineering Technician

Date: 28/10/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION
Test Report - Mohr Coulomb Envelope Plot



Project: Ground Investigation for Northland Corridor
 Location : Section 2 Warkworth to Te Hana to Port Marsden Highway, Section 2B G1
 Client : NZTA C/- Aurecon & WSP NZ Ltd.
 Sample Reference: BH2B.1150 Sample Depth (m): 3.00-3.50
 Sampled by: NC_Site Team Date sampled: 18/08/25
 Sampling Method: Pushtube
 Sample Description: Clayey sandy SILT; Grey;moist;plastic
 Specific Depth : 3.35-3.50m
 Order Number : -

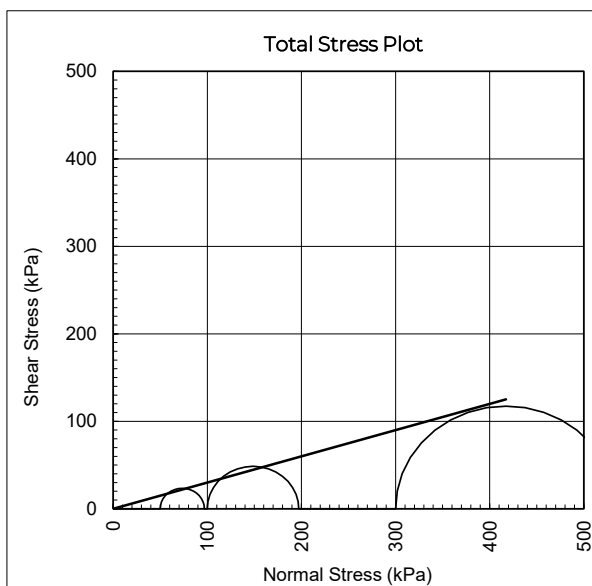
Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/19_TXL_CUM
 Client Ref No: 1-C2466.16

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

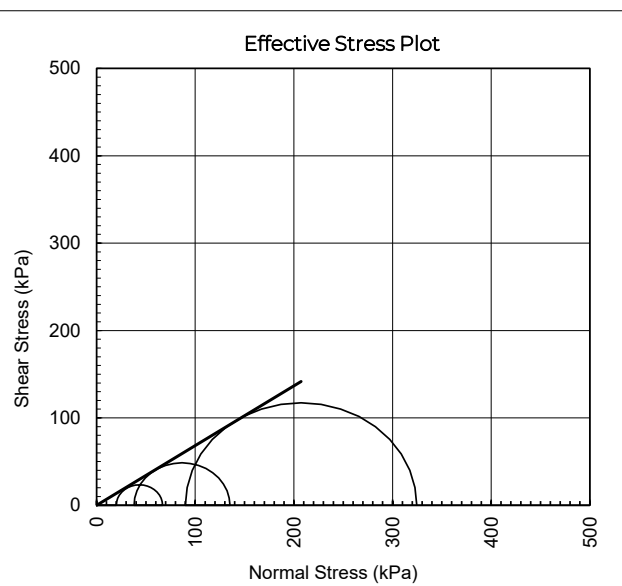
Mohr-Coulomb envelope plots - Result at Maximum Stress

Back Pressure Saturated at 400 kPa



NB: The Cohesion Value (Total Stress) has been adjusted to zero

TOTAL STRESS RESULT			
Intercept d	0.00	(kPa)	
Beta β	16.02	(deg)	
Cohesion c	0	(kPa)	
Phi ϕ	17	(deg)	
Correl coeff.	0.9972	(r ²)	



NB: The Cohesion Value (Effective Stress) has been adjusted to zero

EFFECTIVE STRESS RESULT			
Intercept d'	0.00	(kPa)	
Beta β'	29.43	(deg)	
Cohesion c'	0	(kPa)	
Phi ϕ'	34	(deg)	
Correl coeff.	0.9999	(r ²)	

Test Method

Triaxial Test : Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Deviator Stress
 Failure Criteria: Stage 2 : Deviator Stress
 (at Max. Values) Stage 3 : Deviator Stress

Date tested: 07-16/10/25
 Date reported: 28/10/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory:

Thirushen Pillay

Date: 28/10/25

Designation:

Senior Civil Engineering Technician



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION
Test Report - P vs Q Total Stress Plot



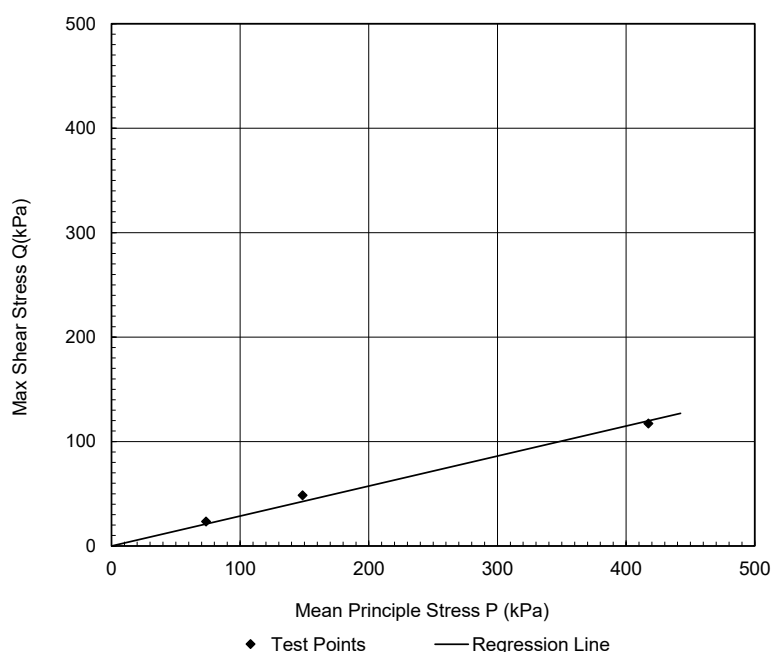
Project: Ground Investigation for Northland Corridor
 Location : Section 2 Warkworth to Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA C/- Aurecon & WSP NZ Ltd.
 Sample Reference: BH2B_1150 Sample Depth (m): 3.00-3.50
 Sampled by: NC_Site Team Date sampled: 18/08/25
 Sampling Method: Pushtube
 Sample Description: Clayey sandy SILT; Grey;moist;plastic
 Specific Depth : 3.35-3.50m
 Order Number : -

Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/19_TXL_CUM
 Client Ref No: 1-C2466.16

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P vs Q Total Stress Plot - Back Pressure saturated at 400 kPa



NB: The Cohesion Value (Total Stress) has been adjusted to zero

TOTAL STRESS RESULT			Correl coeff	0.9972	(r^2)
Intercept d	0.00	(kPa)	Cohesion c	0	(kPa)
Beta β	16.02	(deg)	Phi ϕ	17	(deg)

Test Method

Triaxial Test : Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Deviator Stress
 Failure Criteria: Stage 2 : Deviator Stress
 (at Max. Values) Stage 3 : Deviator Stress

Date tested: 07-16/10/25
 Date reported: 28/10/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Approved Signatory:


 Thirushen Pillay
 Senior Civil Engineering Technician

Date: 28/10/25

Designation:

LHF 2517 (09/20)



Test results indicated as not
 accredited are outside the
 scope of the laboratory's
 accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION
Test Report - P' vs Q' Effective Stress Plot

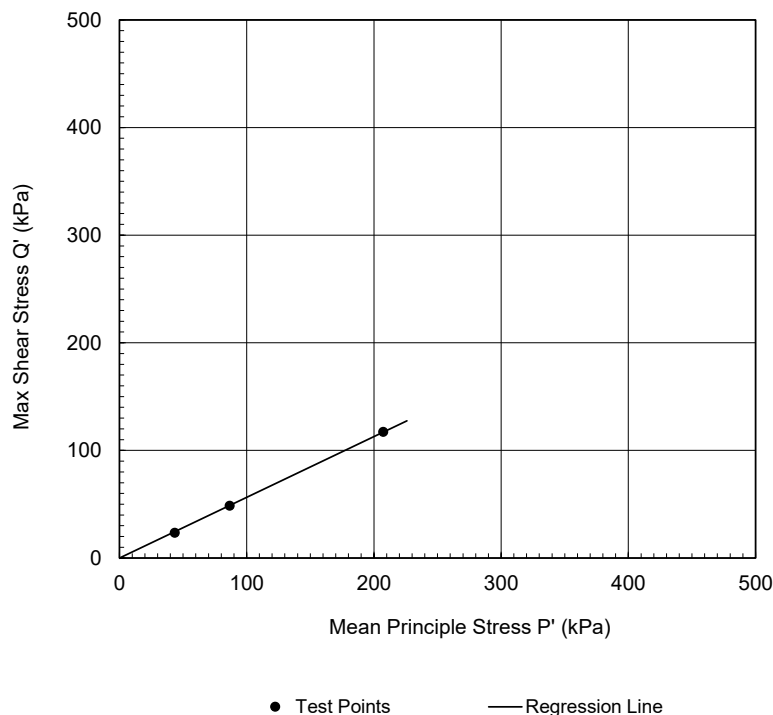


Project: Ground Investigation for Northland Corridor
 Location : Section 2 Warkworth to Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA C/- Aurecon & WSP NZ Ltd.
 Sample Reference BH2B_1150 Depth (m): 3.00-3.50
 Sampled by: NC_Site Team Date sampled: 18/08/25
 Sampling Method: Pushtube
 Sample Description: Clayey sandy SILT; Grey;moist;plastic
 Specific Depth : 3.35-3.50m
 Order Number : -

Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/19_TXL_CUM
 Client Ref No: 1-C2466.16

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT
 P' vs Q' Effective Stress Plot - Back Pressure saturated at 400 kPa



EFFECTIVE STRESS RESULT			Correl coeff	0.9999	(r^2)
Intercept d'	0.00	(kPa)	Cohesion c'	0	(kPa)
Beta β'	29.43	(deg)	Phi ϕ'	34	(deg)

Test Method

Triaxial Test : Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Deviator Stress
 Failure Criteria: Stage 2 : Deviator Stress
 (at Max. Values) Stage 3 : Deviator Stress

Date tested: 07-16/10/25
 Date reported: 28/10/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory:

Thirushen Pillay
 Senior Civil Engineering Technician

Date: 28/10/25

Designation:

LHF 2517 (09/20)



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION
Test Report - PvsQ Stress Path Plot



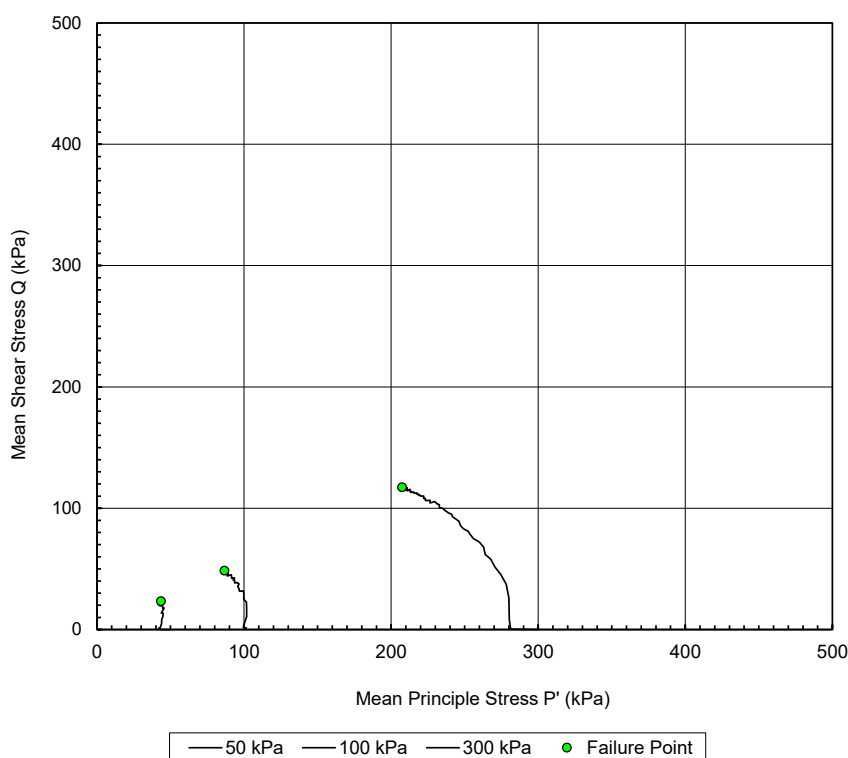
Project: Ground Investigation for Northland Corridor
Location : Section 2 Warkworth to Te Hana to Port Marsden Highway, Section 2B GI
Client : NZTA C/- Aurecon & WSP NZ Ltd.
Sample Reference: BH2B_T150 Sample Depth (m): 3.00-3.50
Sampled by: NC_Site Team Date sampled: 18/08/25
Sampling Method: Pushtube
Sample Description: Clayey sandy SILT; Grey;moist;plastic
Specific Depth : 3.35-3.50m
Order Number : -

Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/19_TXL_CUM
Client Ref No: 1-C2466.16

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P' vs Q Stress Path (Effective Stress Plot) - Back Pressure saturated at 400 kPa



Test Method

Triaxial Test : Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Deviator Stress
Failure Criteria: Stage 2 : Deviator Stress
(at Max. Values) Stage 3 : Deviator Stress

Date tested: 07-16/10/25
Date reported: 28/10/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 28/10/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION
Test Report - Strain vs Deviator Stress Plot



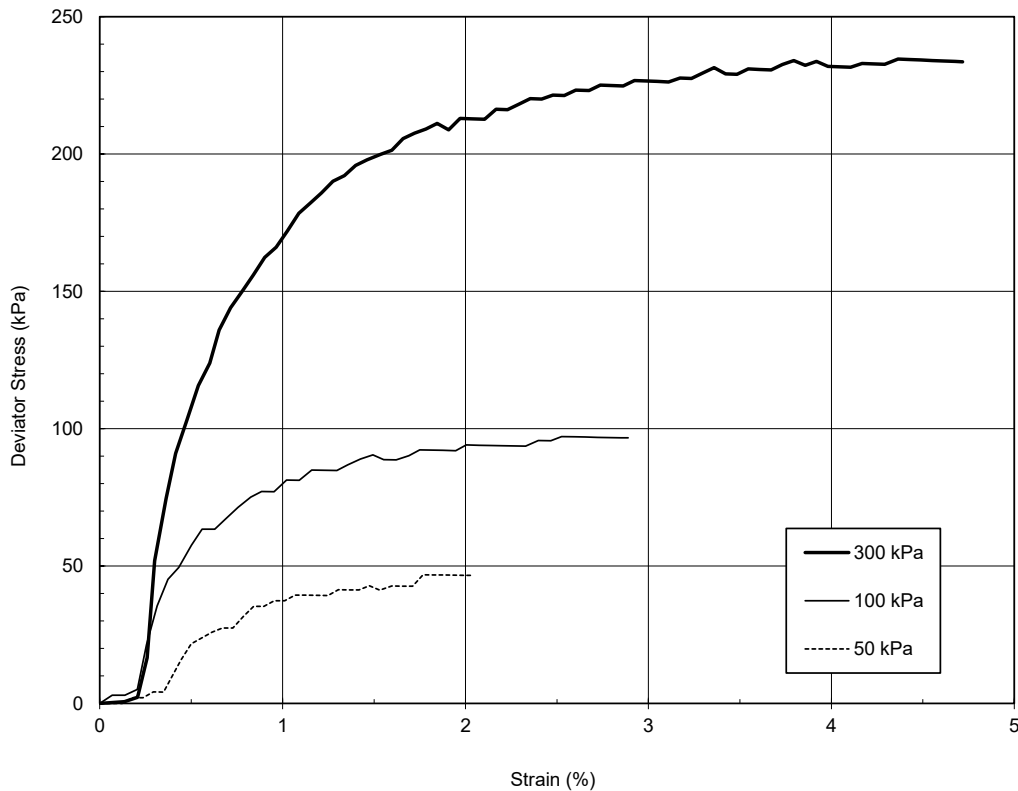
Project: Ground Investigation for Northland Corridor
 Location : Section 2 Warkworth to Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA C/- Aurecon & WSP NZ Ltd.
 Sample Reference BH2B_1150 Sample Depth (m): 3.00-3.50
 Sampled by: NC_Site Team Date sampled: 18/08/25
 Sampling Method: Pushtube
 Sample Description: Clayey sandy SILT; Grey;moist;plastic
 Specific Depth : 3.35-3.50m
 Order Number : -

Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/19_TXL_CUM
 Client Ref No: 1-C2466.16

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Strain vs Deviator Stress Plot - Back Pressure saturated at 400 kPa



Test Method	Notes
Triaxial Test : Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	

Date tested: 07-16/10/25
 Date reported: 28/10/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Approved Signatory: 
 Designation: Thirushen Pillay
 Senior Civil Engineering Technician

Date: 28/10/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION

Test Report - Strain vs Pore Pressure Plot



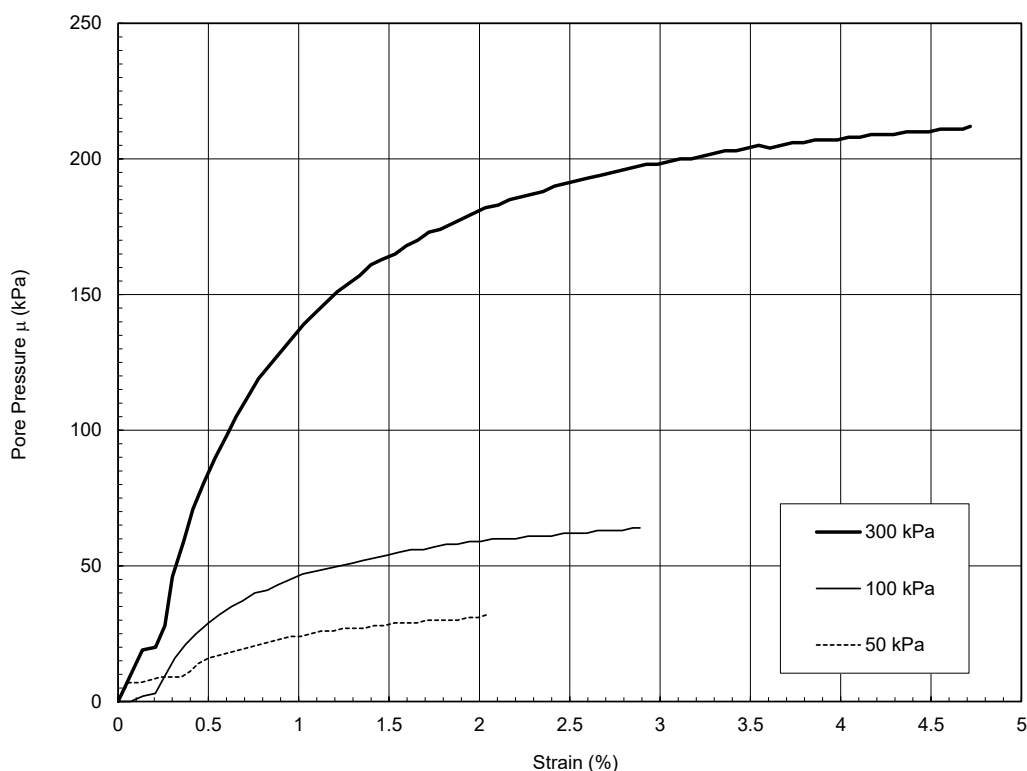
Project: Ground Investigation for Northland Corridor
 Location : Section 2 Warkworth to Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA C/- Aurecon & WSP NZ Ltd.
 Sample Reference: BH2B_1150 Sample Depth (m): 3.00-3.50
 Sampled by: NC_Site Team Date sampled: 18/08/25
 Sampling Method: Pushtube
 Sample Description: Clayey sandy SILT; Grey;moist;plastic
 Specific Depth : 3.35-3.50m
 Order Number : -

Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/19_TXL_CUM
 Client Ref No: 1-C2466.16

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Strain vs Pore Pressure Plot - Back Pressure saturated at 400 kPa



Test Method

Triaxial Test : Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Date tested: 07-16/10/25

Date reported: 28/10/25

Approved Signatory:

Thirushen Pillay

Date: 28/10/25

Designation:

Senior Civil Engineering Technician



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

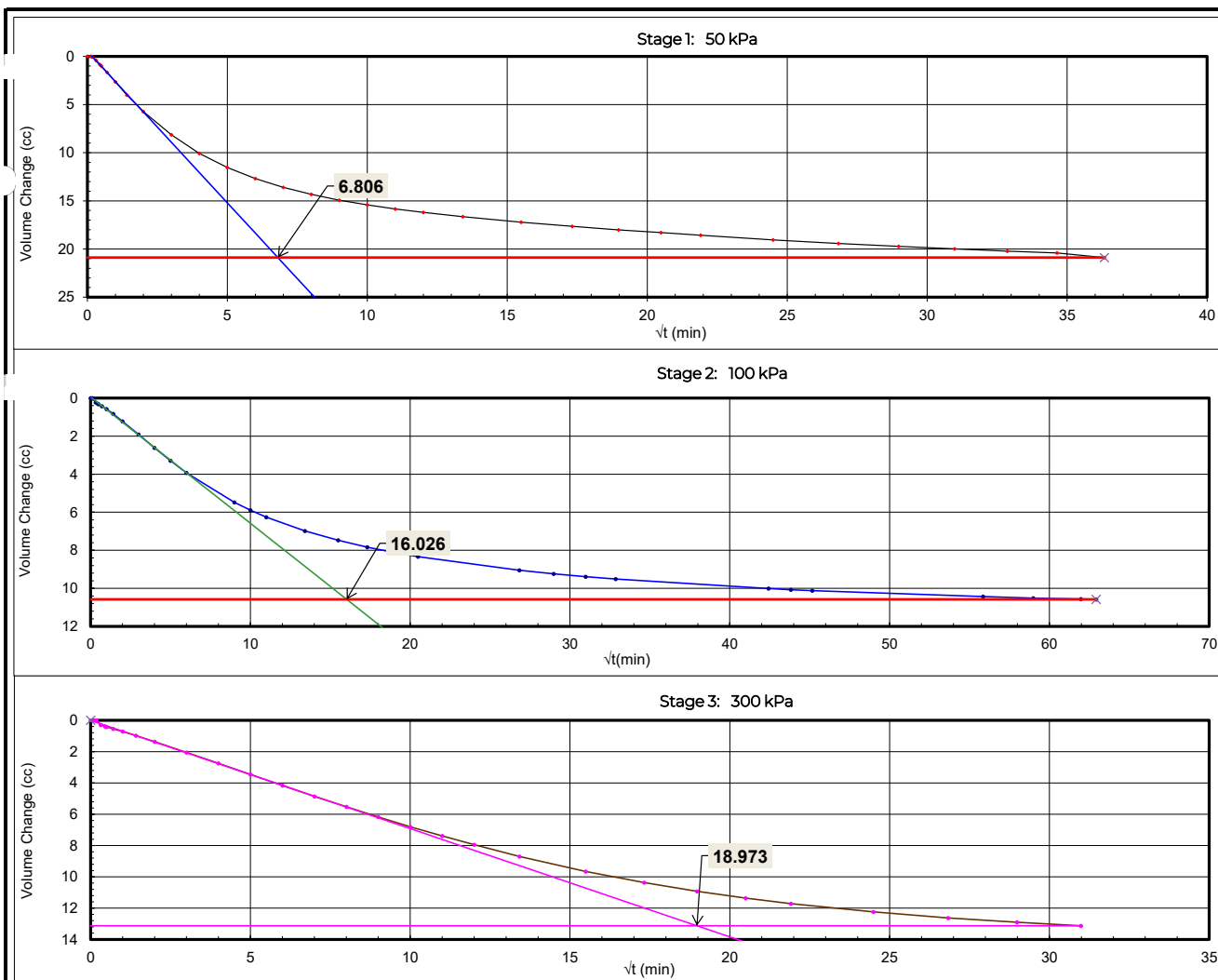
CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION
Displacement vs $\sqrt{t}$ Plot (Consolidation stage)



Project: Ground Investigation for Northland Corridor
 Location : Section 2 Warkworth to Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA C/- Aurecon & WSP NZ Ltd.
 Sample Reference: BH2B_T150 Sample Depth (m): 3.00-3.50
 Sampled by: NC_Site Team Date sampled: 18/08/25
 Sampling Method: Pushtube
 Sample Description: Clayey sandy SILT; Grey;moist;plastic
 Specific Depth : 3.35-3.50m
 Order Number : -

Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/19_TXL_CUM
 Client Ref No: 1-C2466.16



Test Method	Test Results			
Triaxial Test : Consolidated undrained triaxial test : BS EN ISO 17892-9:2018	Confining Pressure (kPa)=	50 kPa	100 kPa	300 kPa
Water Content : NZS4402 : 1986 Test 2.1	C_v (m^2/yr)=	0.91	0.16	0.12
	M_v (m^2/MN)=	1.92	1.07	0.35
	k (m/s)=	5.38E-10	5.43E-11	1.27E-11
	$\sqrt{t}$ =	6.806	16.026	18.973
	t_{100} =	46.322	256.833	359.975

Date tested : 07-16/10/25

Date reported : 28/10/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Date: 28/10/25

Approved Signatory

Thirushen Pillay
 Senior Civil Engineering Technician

Designation:

LHF 2517 (09/20)



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

Page 8 of 8

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - Result Summary



Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1151 Depth (m): 3.00-3.50
 Sampled by: NC Site Team Date sampled: 10/09/25
 Sampling Method: Pushtube
 Sample Description: Silty CLAY; grey mottled brown & orange; moist; plastic

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/93-TXL-CUM
 Client Ref: -

Initial Sample properties		Rate of strain (mm/min)	
Length (mm)	= 107.93	Stage 1	0.012
Diameter (mm)	= 51.10	Stage 2	0.01
Membrane Correction (kPa)=		Stage 3	0.012

Saturation achieved using a minimum Back Pressure of 450 kPa

Specimen Stage No	Effective Confining Pressure (kPa)	INITIAL PROPERTIES			Solid Particle Density (Mg/m³)	FINAL PROPERTIES		
		Densities (Mg/m³)		Water Content (%)		Densities (Mg/m³)		Water Content (%)
		Bulk (Mg/m³)	Dry (Mg/m³)			Bulk (Mg/m³)	Dry (Mg/m³)	
1	50	1.82	1.31	39.2				
2	100				2.71			
3	200				(assumed)	1.95	1.40	39.3

Specimen Stage No	Effective Confining Pressure (kPa)	Void Ratio (e)	Deg of Saturation (Sr)		Deviator Stress $\sigma_1 - \sigma_3$ (kPa)	Pore Pressure μ (kPa)	Cumulative Strain (%)	Failure Criteria at Maximum Values
			Sr before Consolid.	Sr after Consolid.				
1	50	1.07	99	100	43.6	30	1.40	Stress Ratio
2	100				92.4	34	3.17	Stress Ratio
3	200				158.6	93	5.78	Stress Ratio

Specimen Stage No	Effective Confining Pressure (kPa)	Coefficient of Consolidation C_v (m ² /year)	Volume Compressibility M_v (m ² /MN)	Coefficient of Permeability k (m/s)	Final B Value	Due to the use of side filter drains, IANZ endorsement does not include the C_v , M_v and k values reported herein. <u>M_v, C_v & k calculated for the following conditions:-</u> L/D=2, RADIAL+TOP+BOTTOM Drainage Side Filter Drains Used (L/D= Sample Length/Diameter.)
1	50	2.8	0.53	4.7×10^{-10}	0.98	
2	100	1.1	0.35	1.2×10^{-10}		
3	200	0.38	0.24	2.9×10^{-11}		

TOTAL STRESS RESULT		
Intercept d	3.73	(kPa)
Beta β	15.31	(deg)
Cohesion c	4	(kPa)
Phi ϕ	16	(deg)
Correl coeff.	0.9944	(r ²)

EFFECTIVE STRESS RESULT		
Intercept d'	3.93	(kPa)
Beta β'	21.72	(deg)
Cohesion c'	4	(kPa)
Phi ϕ'	23	(deg)
Correl coeff.	0.9948	(r ²)

Test Method	Notes
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	Cv and Mv have been rounded to 2 significant figures. Mg/m ³ is equivalent to t/m ³ Deviation from standard, rate of vertical strain for shear stage reported in mm/min vs. %/hr

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Date tested: 02-15/12/25
 Date reported: 19/12/25

[Signature]

Approved Signatory: Thirushen Pillay
 Designation: Senior Civil Engineering Technician

Date: 19/12/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Volume change vs $\sqrt{t}$ Plot (Consolidation stage)



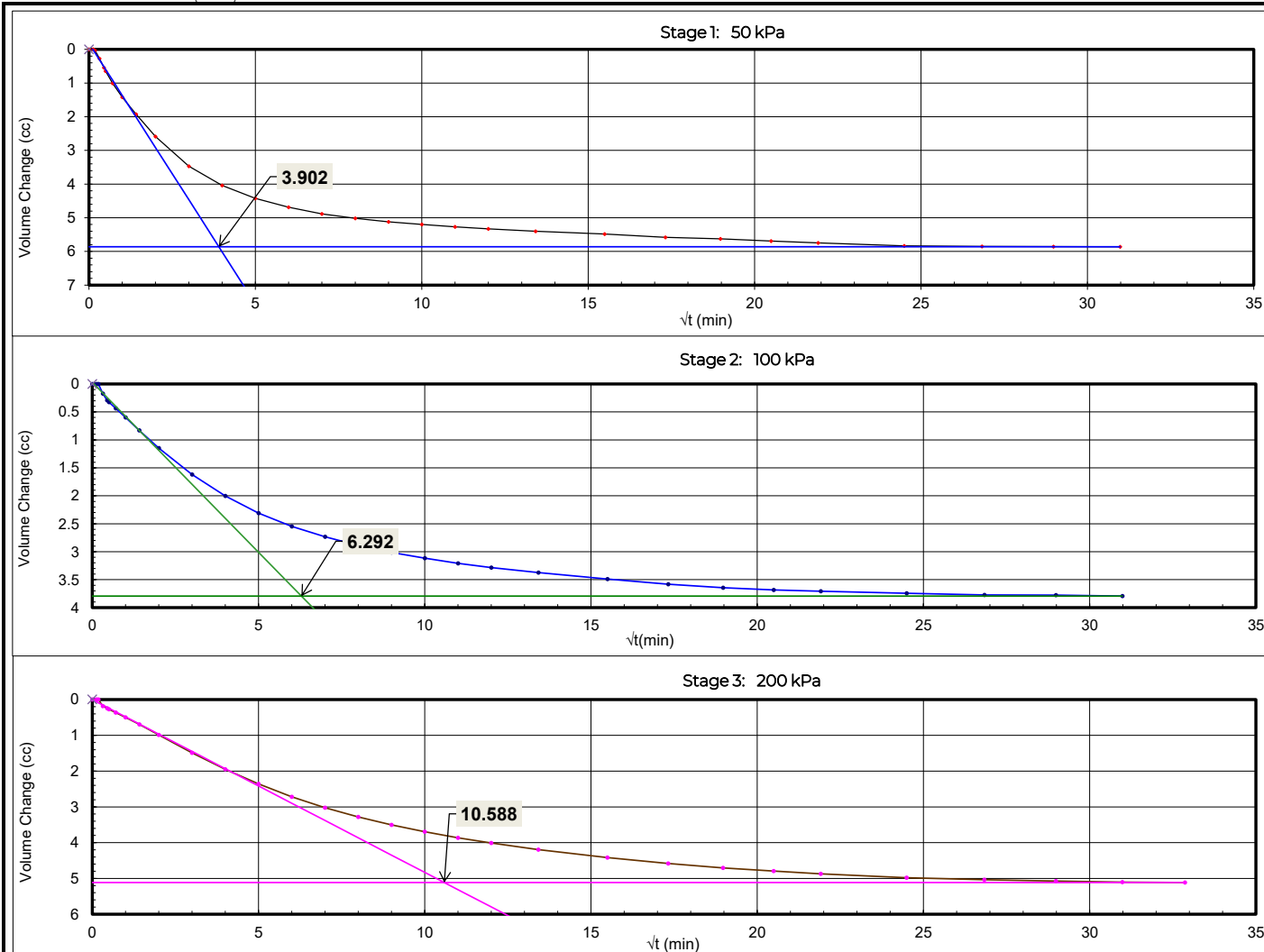
Project: Ground Investigation for Northland Corridor
Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1151
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Silty CLAY; grey mottled brown & orange; moist; plastic

Depth (m): 3.00-3.50
Date sampled: 10/09/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/93-TXL-CUM
Client Ref: -

Final Back Pressure (kPa) : 450 kPa



Test Method	Test Results at end of consolidation			
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018	Effective Stress (kPa)=	50 kPa	100 kPa	200 kPa
Water Content : NZS4402 : 1986 Test 2.1	t_{100} (min) =	15.226	39.589	112.106
	Volumetric Strain (%)=	2.648	1.714	2.311
	Vertical Strain (%)=	0.883	0.573	0.766
	PWP Dissipation (U)=	1.000	1.000	1.000
	Estimated Strain to failure(%)=	5	5	5

Date tested : 19/12/25
Date reported : 02-15/12/25

Approved Signatory
Designation:
LHF 2418 (08/25)

Thirushen Pillay
Senior Civil Engineering Technician

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Date: 19/12/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - Mohr Coulomb Envelope Plot



Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1151
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Silty CLAY; grey mottled brown & orange; moist; plastic

Depth (m): 3.00-3.50
 Date sampled: 10/09/25

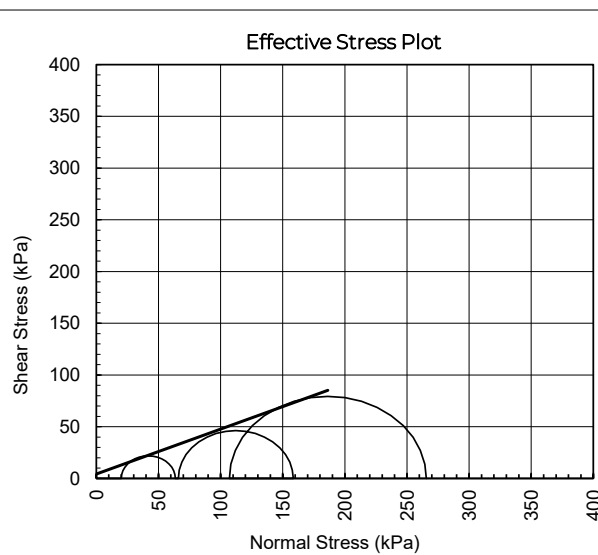
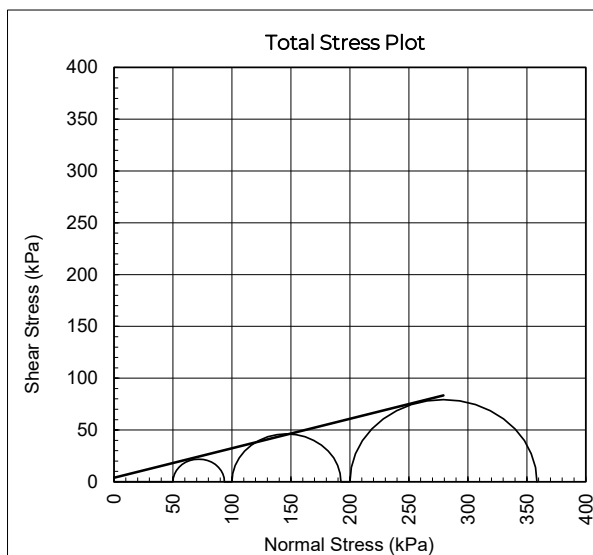
Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/93-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Mohr-Coulomb envelope plots - Result at Maximum Stress

Back Pressure Saturated at 450 kPa



TOTAL STRESS RESULT			
Intercept d	3.73	(kPa)	
Beta β	15.31	(deg)	
Cohesion c	4	(kPa)	
Phi ϕ	16	(deg)	
Correl coeff.	0.9944	(r ²)	

EFFECTIVE STRESS RESULT			
Intercept d'	3.93	(kPa)	
Beta β'	21.72	(deg)	
Cohesion c'	4	(kPa)	
Phi ϕ'	23	(deg)	
Correl coeff.	0.9948	(r ²)	

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Drainage Conditions during Shear :
 Stage 2 : Stress Ratio
 Stage 3 : Stress Ratio

Date tested: 02-15/12/25
 Date reported: 19/12/25

Approved Signatory:

Thirushen Pillay

Designation:

Senior Civil Engineering Technician

Date: 19/12/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - P vs Q Total Stress Plot



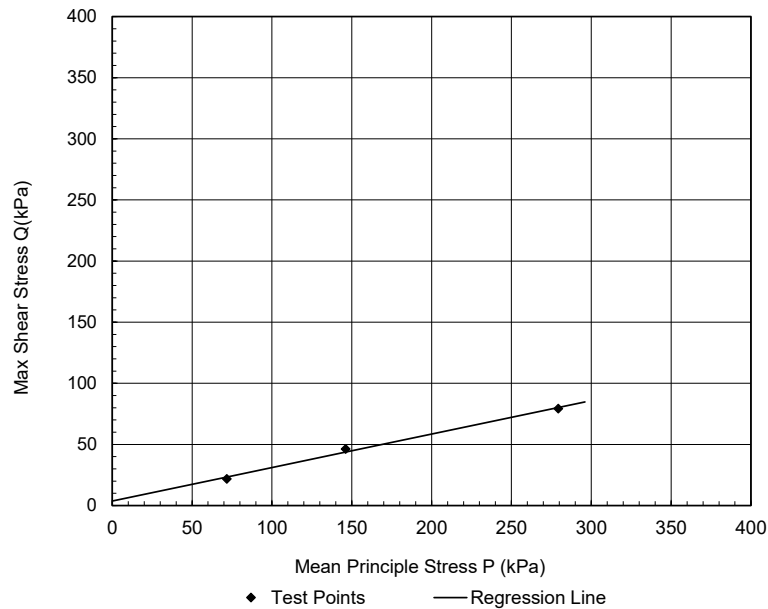
Project: Ground Investigation for Northland Corridor
Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1151 Depth (m): 3.00-3.50
Sampled by: NC Site Team Date sampled: 10/09/25
Sampling Method: Pushtube
Sample Description: Silty CLAY; grey mottled brown & orange; moist; plastic

Sample Type : Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/93-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P vs Q Total Stress Plot - Back Pressure saturated at 450 kPa



TOTAL STRESS RESULT			Correl coeff	0.9944	(r^2)
Intercept d	3.73	(kPa)	Cohesion c	4	(kPa)
Beta β	15.31	(deg)	Phi ϕ	16	(deg)

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
Failure Criteria: Stage 2 : Stress Ratio
(at Max. Values) Stage 3 : Stress Ratio

Date tested: 02-15/12/25
Date reported: 19/12/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory:

Date: 19/12/25

Designation: Thirushen Pillay
Senior Civil Engineering Technician

LHF 2418 (08/25)



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

Page 4 of 9

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - P' vs Q' Effective Stress Plot



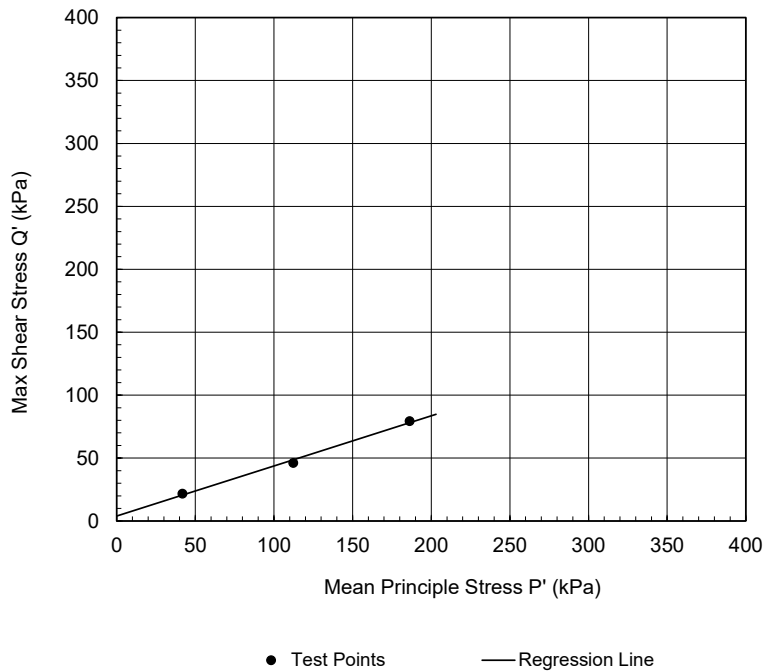
Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1151 Depth (m): 3.00-3.50
 Sampled by: NC Site Team Date sampled: 10/09/25
 Sampling Method: Pushtube
 Sample Description: Silty CLAY; grey mottled brown & orange; moist; plastic

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/93-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P' vs Q' Effective Stress Plot - Back Pressure saturated at 450 kPa



EFFECTIVE STRESS RESULT			Correl coeff	0.9948	(r ²)
Intercept d'	3.93	(kPa)	Cohesion c'	4	(kPa)
Beta β'	21.72	(deg)	Phi Ø'	23	(deg)

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
 Failure Criteria: Stage 2 : Stress Ratio
 (at Max. Values) Stage 3 : Stress Ratio

Date tested: 02-15/12/25
 Date reported: 19/12/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory:

Thirushen Pillay
 Senior Civil Engineering Technician

Date: 19/12/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

Designation:
 LHF 2418 (08/25)

Page 5 of 9

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - PvsQ Stress Path Plot



Project: Ground Investigation for Northland Corridor
Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1151
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Silty CLAY; grey mottled brown & orange; moist; plastic

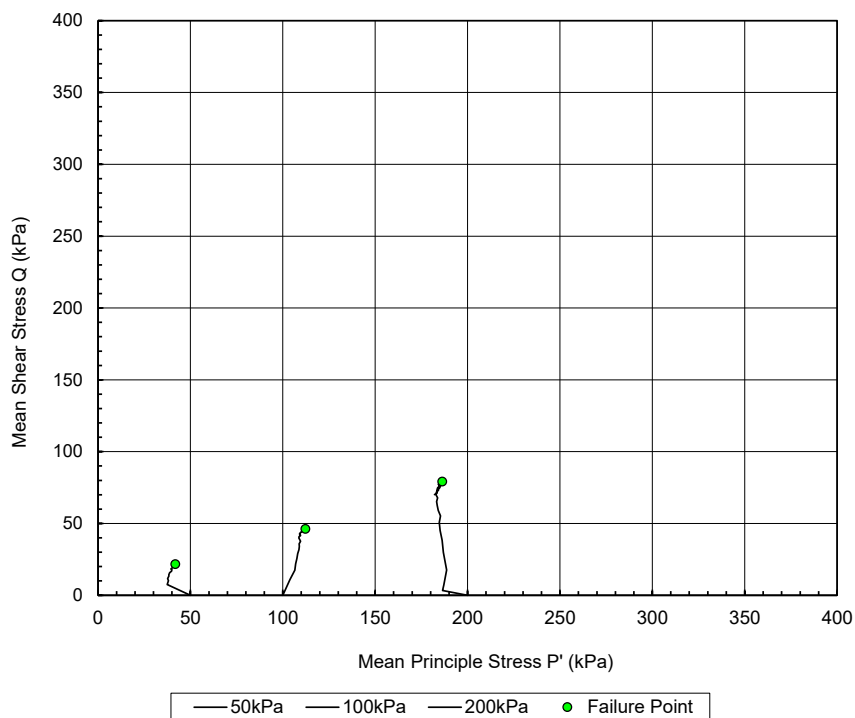
Depth (m): 3.00-3.50
Date sampled: 10/09/25

Sample Type : Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/93-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P' vs Q Stress Path (Effective Stress Plot) - Back Pressure saturated at 450 kPa



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
Failure Criteria: Stage 2 : Stress Ratio
(at Max. Values) Stage 3 : Stress Ratio

Date tested: 02-15/12/25
Date reported: 19/12/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 19/12/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - Strain vs Deviator Stress Plot



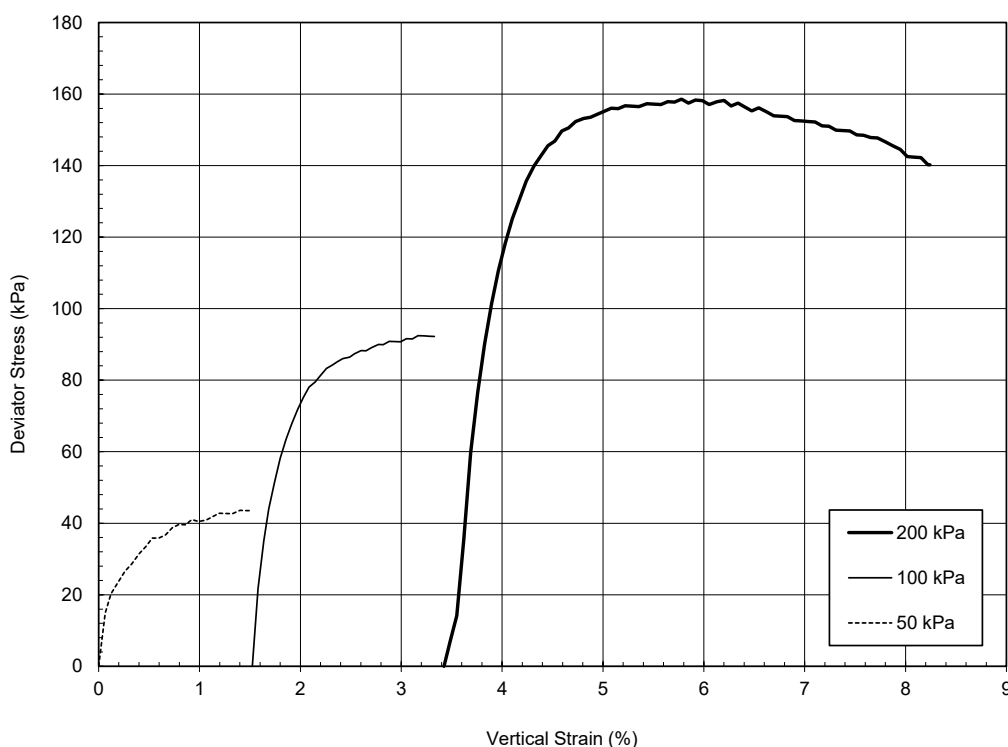
Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1151
 Depth (m): 3.00-3.50
 Sampled by: NC Site Team
 Date sampled: 10/09/25
 Sampling Method: Pushtube
 Sample Description: Silty CLAY; grey mottled brown & orange; moist; plastic

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/93-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Vertical Strain vs Deviator Stress Plot - Back Pressure saturated at 450 kPa



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Date tested: 02-15/12/25
 Date reported: 19/12/25

Approved Signatory: Thirushen Pillay
 Designation: Senior Civil Engineering Technician

Date: 19/12/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Strain vs Pore Pressure Plot



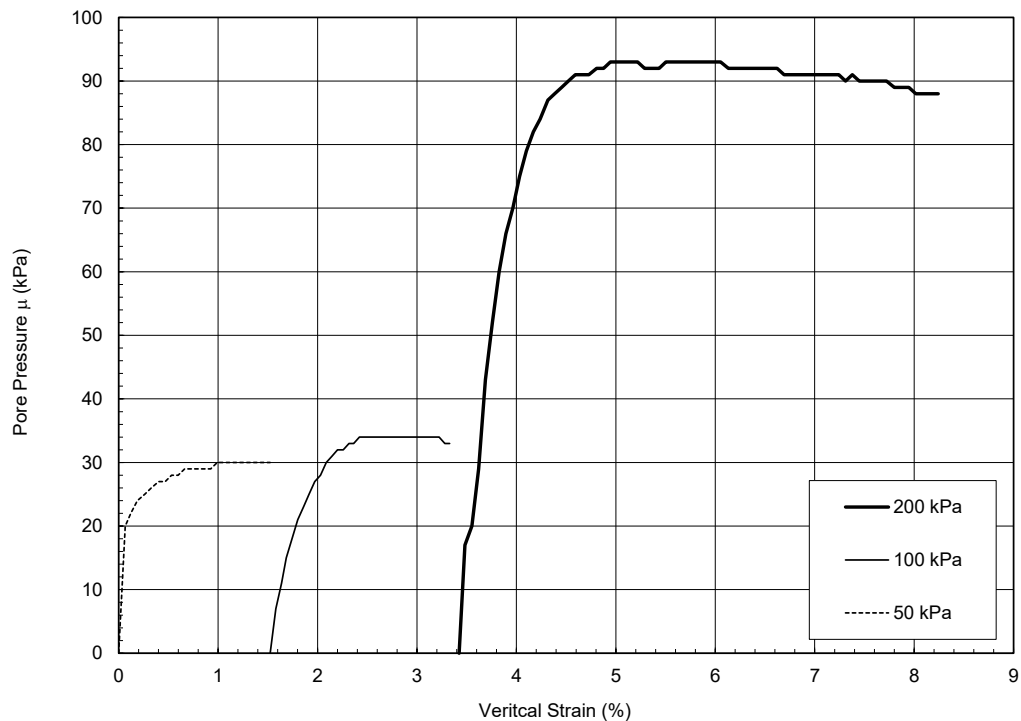
Project: Ground Investigation for Northland Corridor
Location: Section 2 Te Hana to Port Marsden Highway, Section 2B GI
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1151 Depth (m): 3.00-3.50
Sampled by: NC Site Team Date sampled: 10/09/25
Sampling Method: Pushtube
Sample Description: Silty CLAY; grey mottled brown & orange; moist; plastic

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/93-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Vertical Strain vs Pore Pressure Plot - Back Pressure saturated at 450 kPa



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Date tested: 02-15/12/25
Date reported: 19/12/25

Approved Signatory: Thirushen Pillay
Designation: Senior Civil Engineering Technician

Date: 19/12/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test report - Photograph of Failure Type



Project: Ground Investigation for Northland Corridor
 Location : Section 2 Te Hana to Port Marsden Highway, Section 2B GI
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1151
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Silty CLAY; grey mottled brown & orange; moist; plastic

Depth (m): 3.00-3.50
 Date sampled: 10/09/25

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/93-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Photo of failure type



Test Method	Notes
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	

Date tested: 02-15/12/25
 Date reported: 19/12/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory: 
 Designation: Thirushen Pillay
 Senior Civil Engineering Technician

Date: 19/12/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

LHF 2418 (08/25)

Page 9 of 9

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - Result Summary



Project: Ground Investigation for Northland Corridor
 Location : Alternative to Brynderwyn Hills Section
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1157
 Sampled by: NC Site Team
 Sampling Method: Core
 Sample Description: Refer to Log

Depth (m): 28.20-28.40
 Date sampled: 29/10/25

Sample Type : Disturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/250-TXL-CUM
 Client Ref: -

Initial Sample properties		Rate of strain (mm/min)	
Length (mm)	= 119.91	Stage 1	0.012
Diameter (mm)	= 59.10	Stage 2	0.01
Membrane Correction (kPa)=		Stage 3	0.012

Saturation achieved using a minimum Back Pressure of 500 kPa

Specimen Stage No	Effective Confining Pressure (kPa)	INITIAL PROPERTIES			Solid Particle Density (Mg/m³)	FINAL PROPERTIES		
		Densities (Mg/m³)		Water Content (%)		Densities (Mg/m³)		Water Content (%)
		Bulk (Mg/m³)	Dry (Mg/m³)			Bulk (Mg/m³)	Dry (Mg/m³)	
1	50	2.11	1.77	19.0				
2	100				2.70			
3	200				(assumed)	2.16	1.81	19.4

Specimen Stage No	Effective Confining Pressure (kPa)	Void Ratio (e)	Deg of Saturation (Sr)		Deviator Stress $\sigma_1 - \sigma_3$ (kPa)	Pore Pressure μ (kPa)	Cumulative Strain (%)	Failure Criteria at Maximum Values
			Sr before Consolid.	Sr after Consolid.				
1	50	0.52	98	100	446.8	19	1.97	Stress Ratio
2	100				714.3	29	3.34	Stress Ratio
3	200				1154.8	31	5.28	Stress Ratio

Specimen Stage No	Effective Confining Pressure (kPa)	Coefficient of Consolidation C_v (m ² /year)	Volume Compressibility M_v (m ² /MN)	Coefficient of Permeability k (m/s)	Final B Value	Due to the use of side filter drains, IANZ endorsement does not include the C_v , M_v and k values reported herein. <i>M_v, C_v & k calculated for the following conditions:-</i> L/D=2, RADIAL+TOP+BOTTOM Drainage Side Filter Drains Used (L/D= Sample Length/Diameter.)
1	50	7	0.16	3.5×10^{-10}	0.98	
2	100	5.8	0.13	2.4×10^{-10}		
3	200	4.9	0.08	1.2×10^{-10}		

TOTAL STRESS RESULT		
Intercept d	33.74	(kPa)
Beta β	35.02	(deg)
Cohesion c	47	(kPa)
Phi ϕ	44	(deg)
Correl coeff.	0.9998	(r ²)

EFFECTIVE STRESS RESULT		
Intercept d'	44.87	(kPa)
Beta β'	35.61	(deg)
Cohesion c'	64	(kPa)
Phi ϕ'	46	(deg)
Correl coeff.	0.9992	(r ²)

Test Method	Notes
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	Cv and Mv have been rounded to 2 significant figures. Mg/m ³ is equivalent to t/m ³ Deviation from standard, rate of vertical strain for shear stage reported in mm/min vs. %/hr

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Date tested: 02-15/12/25
 Date reported: 13/01/26

[Signature]

Approved Signatory: Thirushen Pillay
 Designation: Senior Civil Engineering Technician

Date: 13/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Volume change vs $\sqrt{t}$ Plot (Consolidation stage)



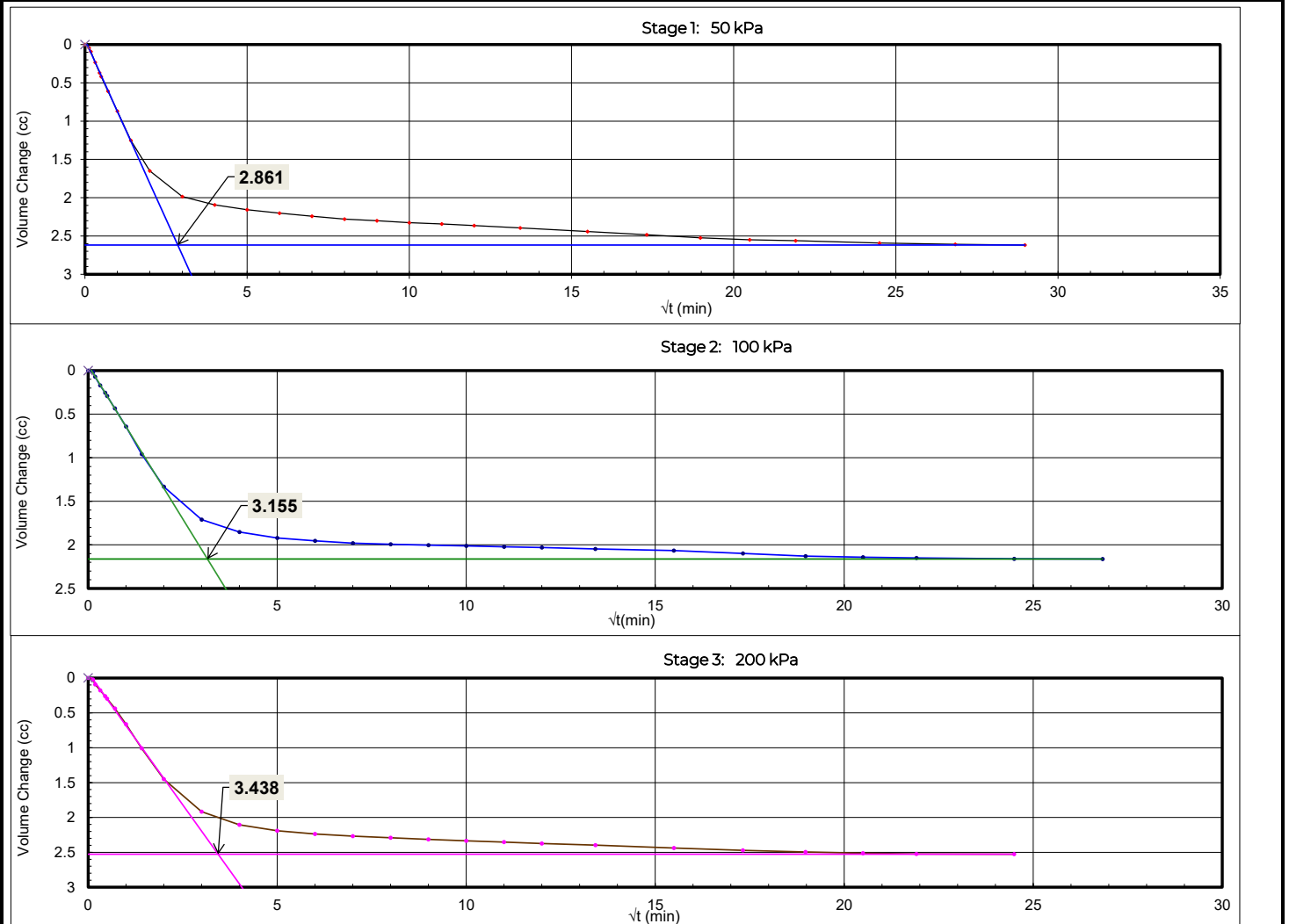
Project: Ground Investigation for Northland Corridor
Location: Alternative to Brynderwyn Hills Section
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1157
Sampled by: NC Site Team
Sampling Method: Core
Sample Description: Refer to Log

Depth (m): 28.20-28.40
Date sampled: 29/10/25

Sample Type: Disturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/250-TXL-CUM
Client Ref: -

Final Back Pressure (kPa): 500 kPa



Test Method	Test Results at end of consolidation			
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018	Effective Stress (kPa)=	50 kPa	100 kPa	200 kPa
Water Content : NZS4402 : 1986 Test 2.1	t_{100} (min) =	8.185	9.954	11.820
	Volumetric Strain (%)=	0.796	0.657	0.768
	Vertical Strain (%)=	0.265	0.216	0.249
	PWP Dissipation (U)=	100.00	100.00	100.00
	Estimated Strain to failure(%)=	5	5	5

Date tested : 13/01/26
Date reported : 02-15/12/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Date: 13/01/26

Approved Signatory: Thirushen Pillay
Designation: Senior Civil Engineering Technician

LHF 2418 (08/25)



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Mohr Coulomb Envelope Plot



Project: Ground Investigation for Northland Corridor
Location : Alternative to Brynderwyn Hills Section
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1157
Sampled by: NC Site Team
Sampling Method: Core
Sample Description: Refer to Log

Depth (m): 28.20-28.40
Date sampled: 29/10/25

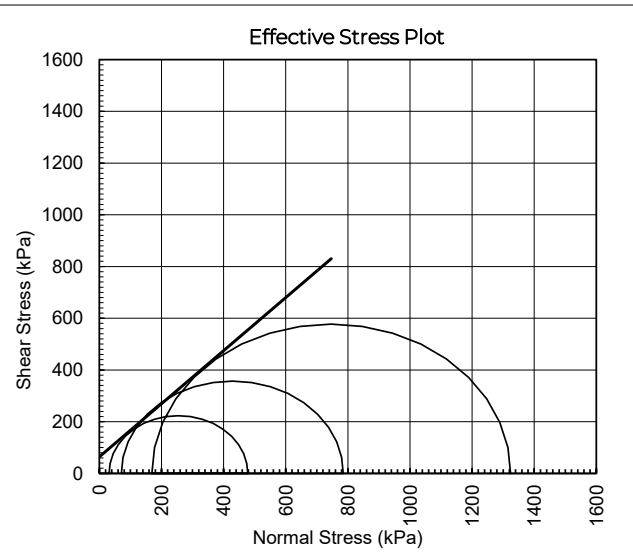
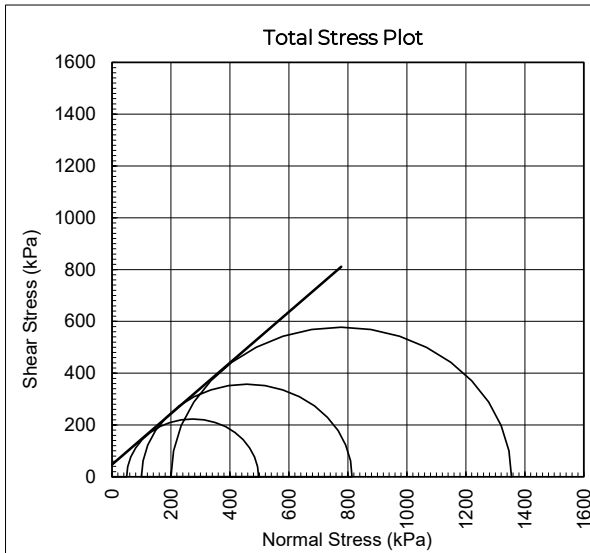
Sample Type : Disturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/250-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Mohr-Coulomb envelope plots - Result at Maximum Stress

Back Pressure Saturated at 500 kPa



TOTAL STRESS RESULT			
Intercept d	33.74	(kPa)	
Beta β	35.02	(deg)	
Cohesion c	47	(kPa)	
Phi ϕ	44	(deg)	
Correl coeff.	0.9998	(r ²)	

EFFECTIVE STRESS RESULT			
Intercept d'	44.87	(kPa)	
Beta β'	35.61	(deg)	
Cohesion c'	64	(kPa)	
Phi ϕ'	46	(deg)	
Correl coeff.	0.9992	(r ²)	

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Drainage Conditions during Shear :
Stage 2 : Stress Ratio
Stage 3 : Stress Ratio

Date tested: 02-15/12/25
Date reported: 13/01/26

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory: Thirushen Pillay
Designation: Senior Civil Engineering Technician

Date: 13/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - P vs Q Total Stress Plot



Project: Ground Investigation for Northland Corridor
 Location : Alternative to Brynderwyn Hills Section
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1157
 Sampled by: NC Site Team
 Sampling Method: Core
 Sample Description: Refer to Log

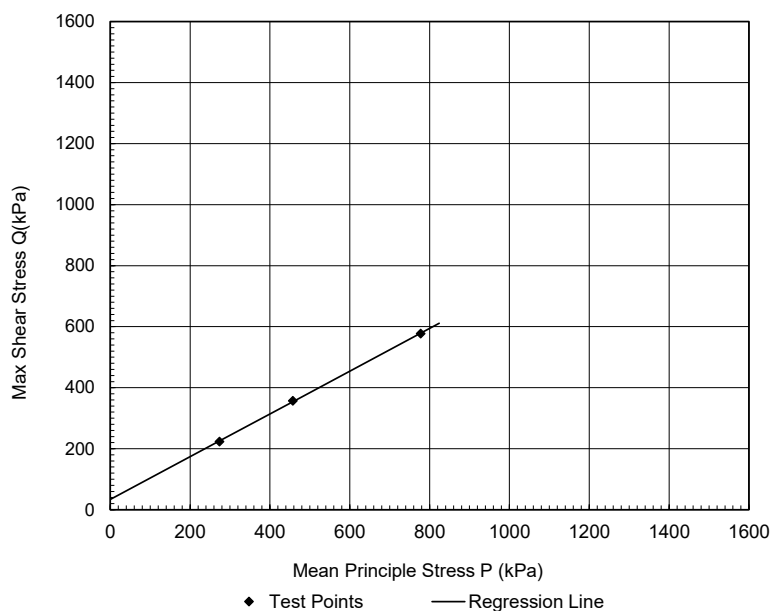
Depth (m): 28.20-28.40
 Date sampled: 29/10/25

Sample Type : Disturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/250-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P vs Q Total Stress Plot - Back Pressure saturated at 500 kPa



TOTAL STRESS RESULT			Correl coeff	0.9998	(r ²)
Intercept d	33.74	(kPa)	Cohesion c	47	(kPa)
Beta β	35.02	(deg)	Phi Ø	44	(deg)

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
 Failure Criteria: Stage 2 : Stress Ratio
 (at Max. Values) Stage 3 : Stress Ratio

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

Date tested: 02-15/12/25
 Date reported: 13/01/26

This report may only be reproduced in full
 All information supplied by Client

Approved Signatory:

Thirushen Pillay
 Senior Civil Engineering Technician

Date: 13/01/26

Designation:

LHF 2418 (08/25)



Test results indicated as not
 accredited are outside the
 scope of the laboratory's
 accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - P' vs Q' Effective Stress Plot



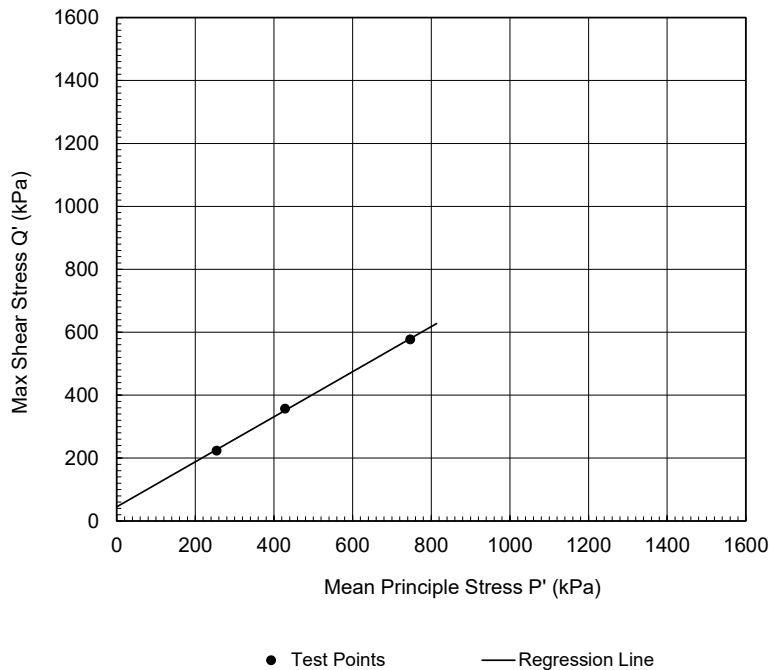
Project: Ground Investigation for Northland Corridor
Location: Alternative to Brynderwyn Hills Section
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1157
Sampled by: NC Site Team
Sampling Method: Core
Sample Description: Refer to Log

Depth (m): 28.20-28.40
Date sampled: 29/10/25

Sample Type: Disturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/250-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT
P' vs Q' Effective Stress Plot - Back Pressure saturated at 500 kPa



EFFECTIVE STRESS RESULT			Correl coeff	0.9992	(r ²)
Intercept d'	44.87	(kPa)	Cohesion c'	64	(kPa)
Beta β'	35.61	(deg)	Phi Ø'	46	(deg)

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
Failure Criteria: Stage 2 : Stress Ratio
(at Max. Values) Stage 3 : Stress Ratio

Date tested: 02-15/12/25
Date reported: 13/01/26

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 13/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

Designation:
LHF 2418 (08/25)

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - PvsQ Stress Path Plot



Project: Ground Investigation for Northland Corridor
Location : Alternative to Brynderwyn Hills Section
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1157
Sampled by: NC Site Team
Sampling Method: Core
Sample Description: Refer to Log

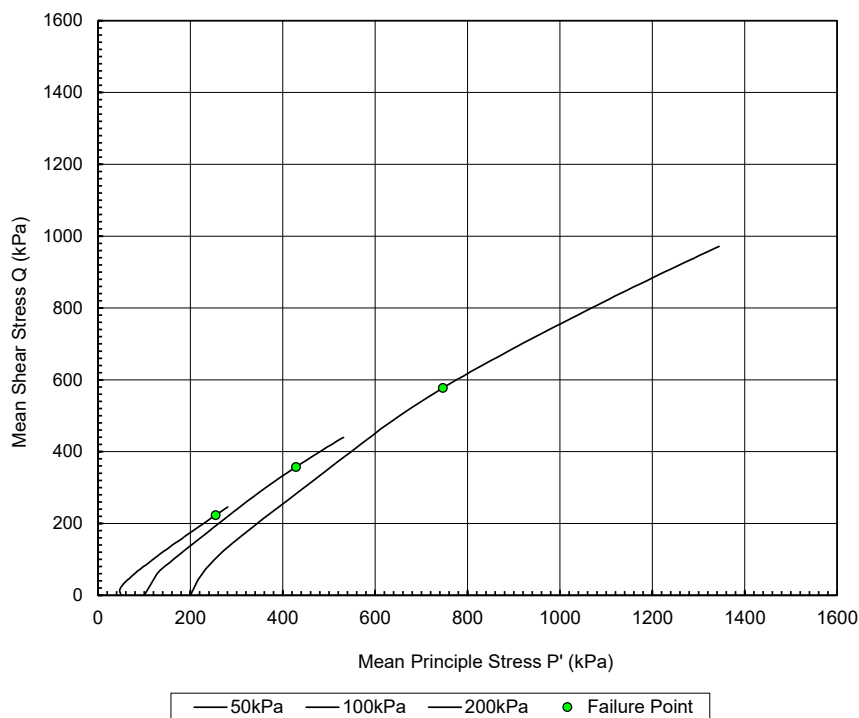
Depth (m): 28.20-28.40
Date sampled: 29/10/25

Sample Type : Disturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/250-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P' vs Q Stress Path (Effective Stress Plot) - Back Pressure saturated at 500 kPa



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
Failure Criteria: Stage 2 : Stress Ratio
(at Max. Values) Stage 3 : Stress Ratio

Date tested: 02-15/12/25
Date reported: 13/01/26

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 13/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Strain vs Deviator Stress Plot

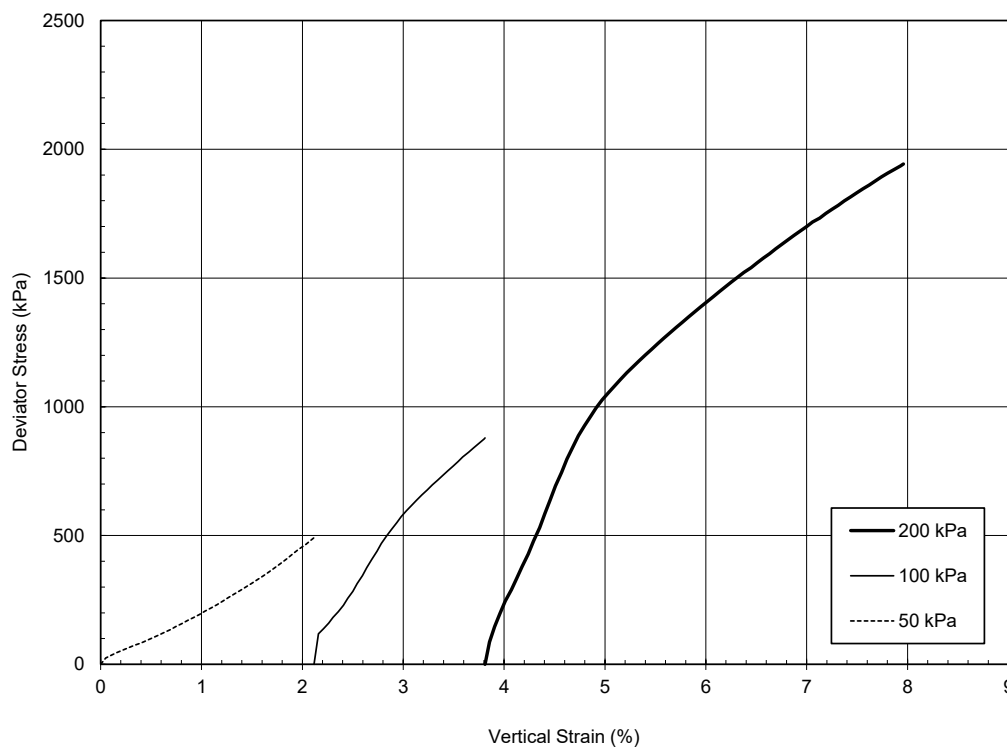


Project: Ground Investigation for Northland Corridor
Location: Alternative to Brynderwyn Hills Section
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1157
Sampled by: NC Site Team
Sampling Method: Core
Sample Description: Refer to Log
Depth (m): 28.20-28.40
Date sampled: 29/10/25

Sample Type: Disturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/250-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT
Vertical Strain vs Deviator Stress Plot - Back Pressure saturated at 500 kPa



Test Method	Notes
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	

Date tested: 02-15/12/25
Date reported: 13/01/26

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory: Thirushen Pillay
Designation: Senior Civil Engineering Technician

Date: 13/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Strain vs Pore Pressure Plot



Project: Ground Investigation for Northland Corridor
Location: Alternative to Brynderwyn Hills Section
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1157
Sampled by: NC Site Team
Sampling Method: Core
Sample Description: Refer to Log

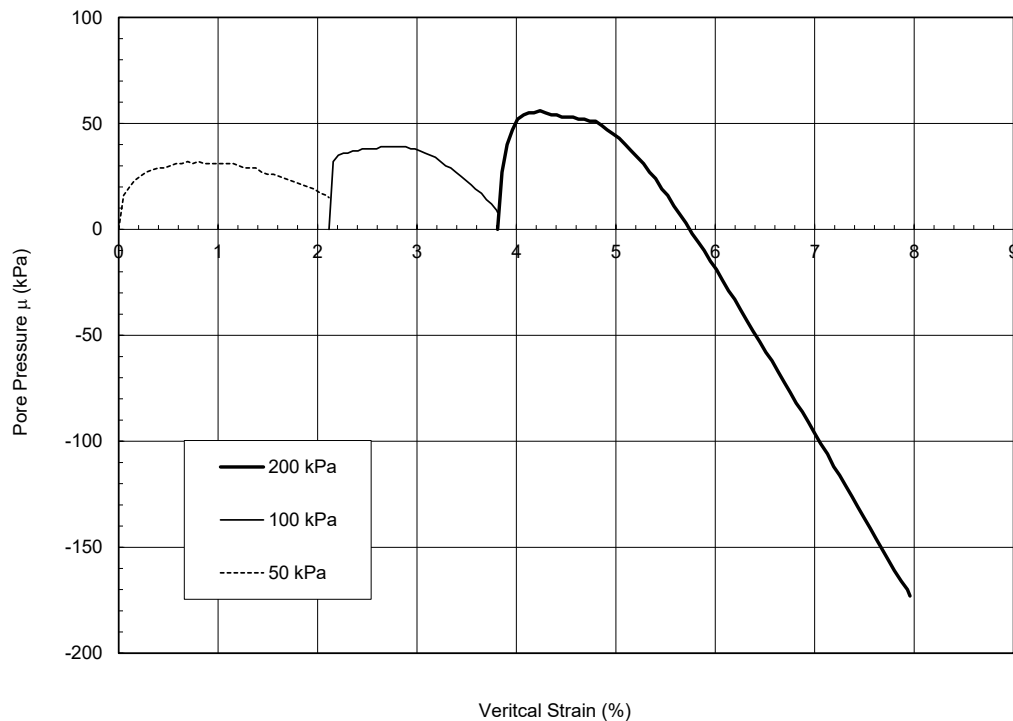
Depth (m): 28.20-28.40
Date sampled: 29/10/25

Sample Type: Disturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/250-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Vertical Strain vs Pore Pressure Plot - Back Pressure saturated at 500 kPa



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Date tested: 02-15/12/25
Date reported: 13/01/26

Approved Signatory: Thirushen Pillay
Designation: Senior Civil Engineering Technician

Date: 13/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test report - Photograph of Failure Type



Project: Ground Investigation for Northland Corridor
 Location : Alternative to Brynderwyn Hills Section
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1157
 Sampled by: NC Site Team
 Sampling Method: Core
 Sample Description: Refer to Log

Depth (m): 28.20-28.40
 Date sampled: 29/10/25

Sample Type : Disturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/250-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Photo of failure type



Test Method	Notes
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	

Date tested: 02-15/12/25
 Date reported: 13/01/26

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory: 
 Designation: Thirushen Pillay
 Senior Civil Engineering Technician

Date: 13/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - Result Summary



Project: Ground Investigation for Northland Corridor
 Location : Alternative to Brynderwyn Hills Section
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1162
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Clayey sandy SILT; Grey mottled brown; moist; plastic

Depth (m): 3.00-3.50
 Date sampled: 29/10/25

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/187-TXL-CUM
 Client Ref: -

Initial Sample properties		Rate of strain (mm/min)	
Length (mm)	= 108.40	Stage 1	0.01
Diameter (mm)	= 50.05	Stage 2	0.01
Membrane Correction (kPa)=		Stage 3	0.01

Saturation achieved using a minimum Back Pressure of 400 kPa

Specimen Stage No	Effective Confining Pressure (kPa)	INITIAL PROPERTIES			Solid Particle Density (Mg/m ³)	FINAL PROPERTIES		
		Densities (Mg/m ³)		Water Content (%)		Densities (Mg/m ³)		Water Content (%)
		Bulk (Mg/m ³)	Dry (Mg/m ³)			Bulk (Mg/m ³)	Dry (Mg/m ³)	
1	50	1.83	1.30	41.0				
2	100				2.70			
3	200				(assumed)	2.78	2.01	38.5

Specimen Stage No	Effective Confining Pressure (kPa)	Void Ratio (e)	Deg of Saturation (Sr)		Deviator Stress $\sigma_1 - \sigma_3$ (kPa)	Pore Pressure μ (kPa)	Cumulative Strain (%)	Failure Criteria at Maximum Values
			Sr before Consolid.	Sr after Consolid.				
1	50	1.08	100	100	95.1	29	2.53	Stress Ratio
2	100				194.3	53	4.94	Stress Ratio
3	200				269.1	117	9.99	Stress Ratio

Specimen Stage No	Effective Confining Pressure (kPa)	Coefficient of Consolidation C_v (m ² /year)	Volume Compressibility M_v (m ² /MN)	Coefficient of Permeability k (m/s)	Final B Value	Due to the use of side filter drains, IANZ endorsement does not include the C_v , M_v and k values reported herein. <u>M_v, C_v & k calculated for the following conditions:-</u> L/D=2, RADIAL+TOP+BOTTOM Drainage Side Filter Drains Used (L/D= Sample Length/Diameter.)
1	50	0.21	4.3	2.7×10^{-10}	1.02	
2	100	0.88	1.6	4.3×10^{-10}		
3	200	1.4	1.10	4.6×10^{-10}		

TOTAL STRESS RESULT		
Intercept d	17.32	(kPa)
Beta β	19.86	(deg)
Cohesion c	19	(kPa)
Phi ϕ	21	(deg)
Correl coeff.	0.9705	(r ²)

EFFECTIVE STRESS RESULT		
Intercept d'	9.30	(kPa)
Beta β'	30.29	(deg)
Cohesion c'	11	(kPa)
Phi ϕ'	36	(deg)
Correl coeff.	0.9948	(r ²)

Test Method	Notes
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	Cv and Mv have been rounded to 2 significant figures. Mg/m ³ is equivalent to t/m ³ Deviation from standard, rate of vertical strain for shear stage reported in mm/min vs. %/hr

Date tested: 15/12/25-13/01/26
 Date reported: 14/01/26

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory: 
 Designation: Thirushen Pillay
 Senior Civil Engineering Technician

Date: 14/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Volume change vs $\sqrt{t}$ Plot (Consolidation stage)



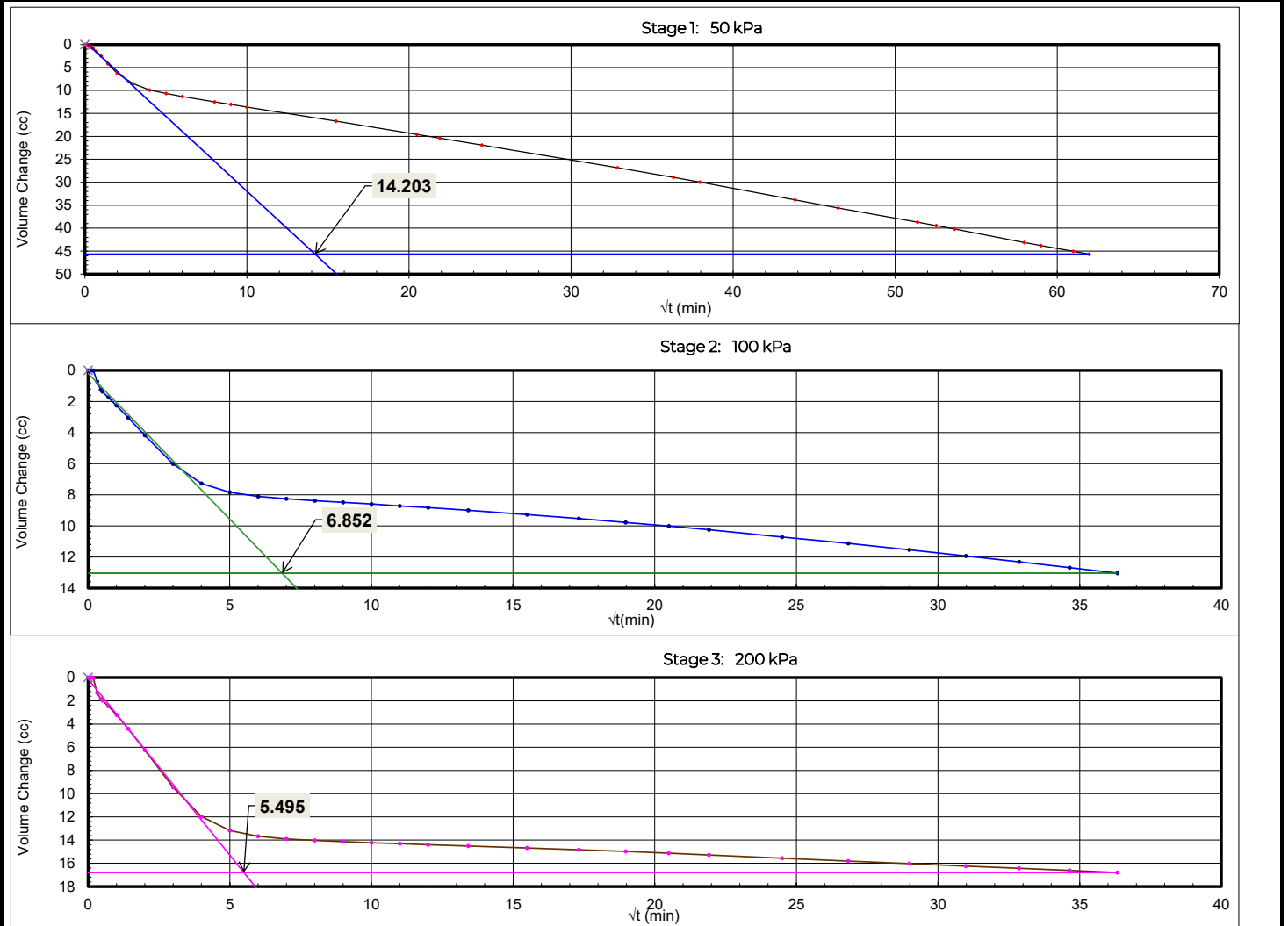
Project: Ground Investigation for Northland Corridor
Location: Alternative to Brynderwyn Hills Section
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1162
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Clayey sandy SILT; Grey mottled brown; moist; plastic

Depth (m): 3.00-3.50
Date sampled: 29/10/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/187-TXL-CUM
Client Ref: -

Final Back Pressure (kPa): 400 kPa



Test Method	Test Results at end of consolidation		
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018	Effective Stress (kPa)=	50 kPa	100 kPa
Water Content : NZS4402 : 1986 Test 2.1	t_{100} (min) =	201.725	46.950
	Volumetric Strain (%)=	21.406	6.115
	Vertical Strain (%)=	7.135	2.314
	PWP Dissipation (U)=	100.00	100.00
	Estimated Strain to failure(%)=	5	5

Date tested : 14/01/26
Date reported : 15/12/25-13/01/26

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Date: 14/01/26

Approved Signatory

Thirushen Pillay

Designation:

Senior Civil Engineering Technician

LHF 2418 (08/25)



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

WSP
Auckland Laboratory
Quality Management Systems Certified to ISO 9001

7a Ride Way, Albany
Private Bag 101982, NS Mail Centre, North
Shore City 0745, New Zealand

Telephone +64 9 4154660
Website www.wsp.com/nz

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Mohr Coulomb Envelope Plot



Project: Ground Investigation for Northland Corridor
Location : Alternative to Brynderwyn Hills Section
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1162
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Clayey sandy SILT; Grey mottled brown; moist; plastic

Depth (m): 3.00-3.50
Date sampled: 29/10/25

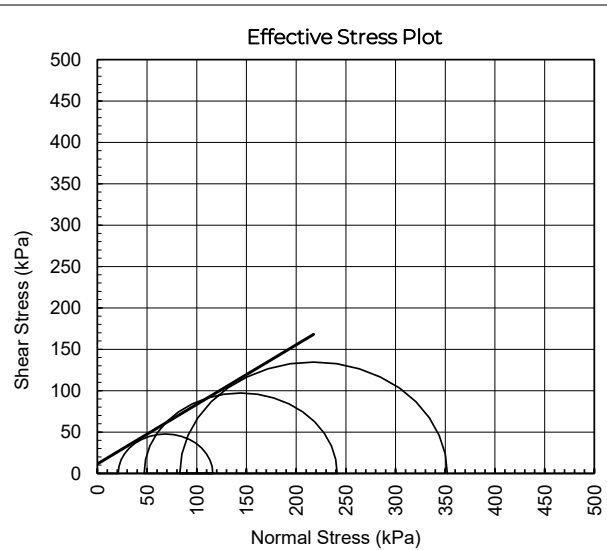
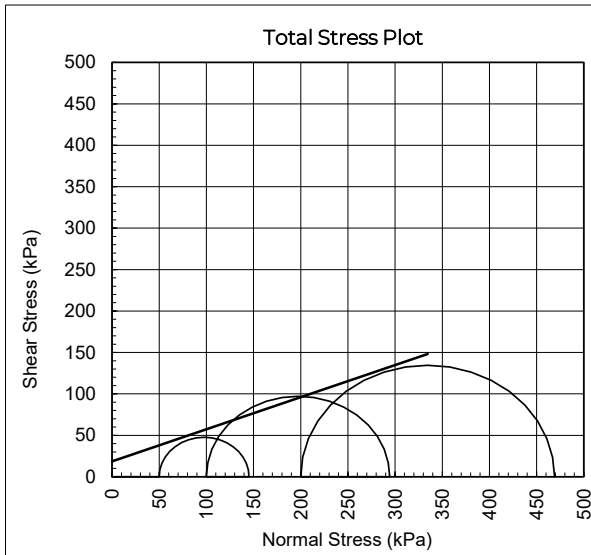
Sample Type : Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/187-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Mohr-Coulomb envelope plots - Result at Maximum Stress

Back Pressure Saturated at 400 kPa



TOTAL STRESS RESULT			
Intercept d	17.32	(kPa)	
Beta β	19.86	(deg)	
Cohesion c	19	(kPa)	
Phi ϕ	21	(deg)	
Correl coeff.	0.9705	(r ²)	

EFFECTIVE STRESS RESULT			
Intercept d'	9.30	(kPa)	
Beta β'	30.29	(deg)	
Cohesion c'	11	(kPa)	
Phi ϕ'	36	(deg)	
Correl coeff.	0.9948	(r ²)	

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Drainage Conditions during Shear :
Stage 2 : Stress Ratio
Stage 3 : Stress Ratio

Date tested: 15/12/25-13/01/26
Date reported: 14/01/26

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory:

Thirushen Pillay

Date: 14/01/26

Designation:

Senior Civil Engineering Technician



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - P vs Q Total Stress Plot



Project: Ground Investigation for Northland Corridor
 Location : Alternative to Brynderwyn Hills Section
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1162
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Clayey sandy SILT; Grey mottled brown; moist; plastic

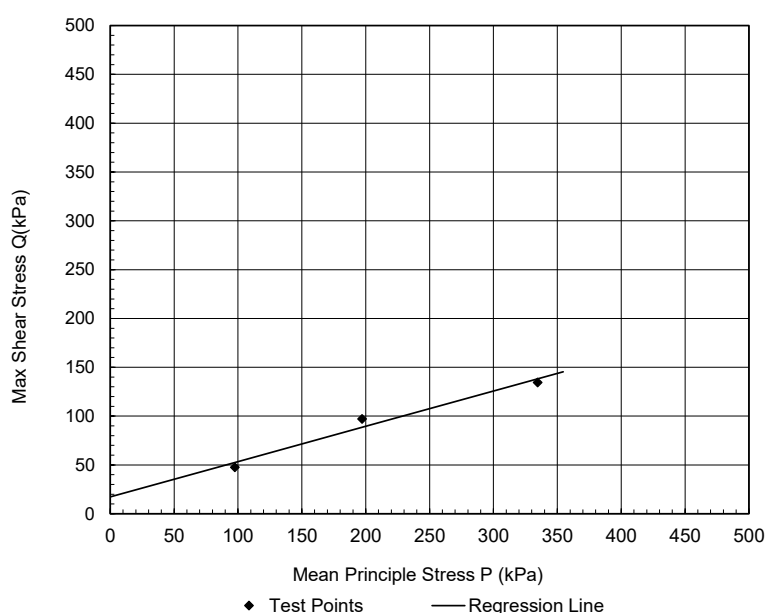
Depth (m): 3.00-3.50
 Date sampled: 29/10/25

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/187-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P vs Q Total Stress Plot - Back Pressure saturated at 400 kPa



TOTAL STRESS RESULT			Correl coeff	0.9705	(r ²)
Intercept d	17.32	(kPa)	Cohesion c	19	(kPa)
Beta β	19.86	(deg)	Phi Ø	21	(deg)

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
 Failure Criteria: Stage 2 : Stress Ratio
 (at Max. Values) Stage 3 : Stress Ratio

Date tested: 15/12/25-13/01/26
 Date reported: 14/01/26

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory:

Thirushen Pillay
 Senior Civil Engineering Technician

Date: 14/01/26

Designation:

LHF 2418 (08/25)



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - P' vs Q' Effective Stress Plot

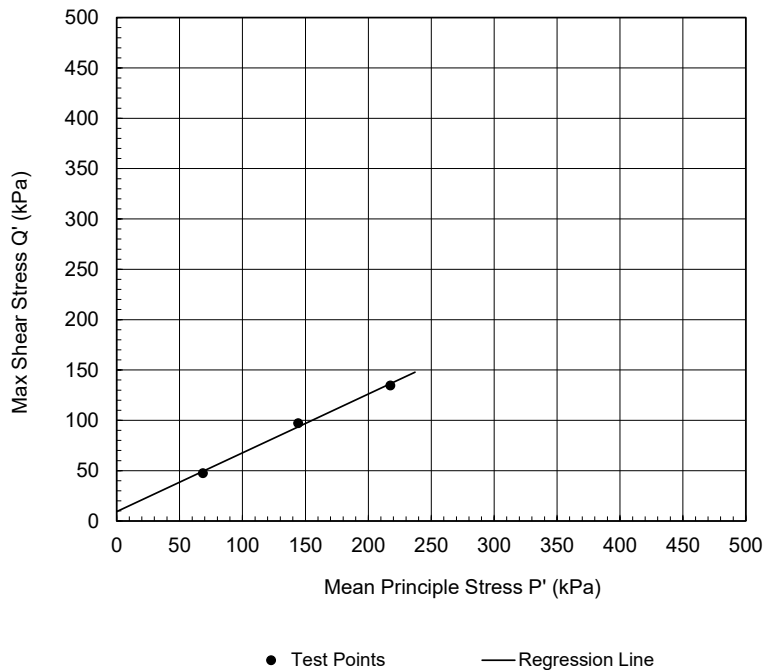


Project: Ground Investigation for Northland Corridor
Location: Alternative to Brynderwyn Hills Section
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1162
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Clayey sandy SILT; Grey mottled brown; moist; plastic
Depth (m): 3.00-3.50
Date sampled: 29/10/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/187-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT
P' vs Q' Effective Stress Plot - Back Pressure saturated at 400 kPa



EFFECTIVE STRESS RESULT			Correl coeff	0.9948	(r ²)
Intercept d'	9.30	(kPa)	Cohesion c'	11	(kPa)
Beta β'	30.29	(deg)	Phi Ø'	36	(deg)

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
Failure Criteria:
(at Max. Values) Stage 2 : Stress Ratio
Stage 3 : Stress Ratio

Date tested: 15/12/25-13/01/26
Date reported: 14/01/26

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 14/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

Designation:
LHF 2418 (08/25)

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - PvsQ Stress Path Plot



Project: Ground Investigation for Northland Corridor
 Location : Alternative to Brynderwyn Hills Section
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1162
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Clayey sandy SILT; Grey mottled brown; moist; plastic

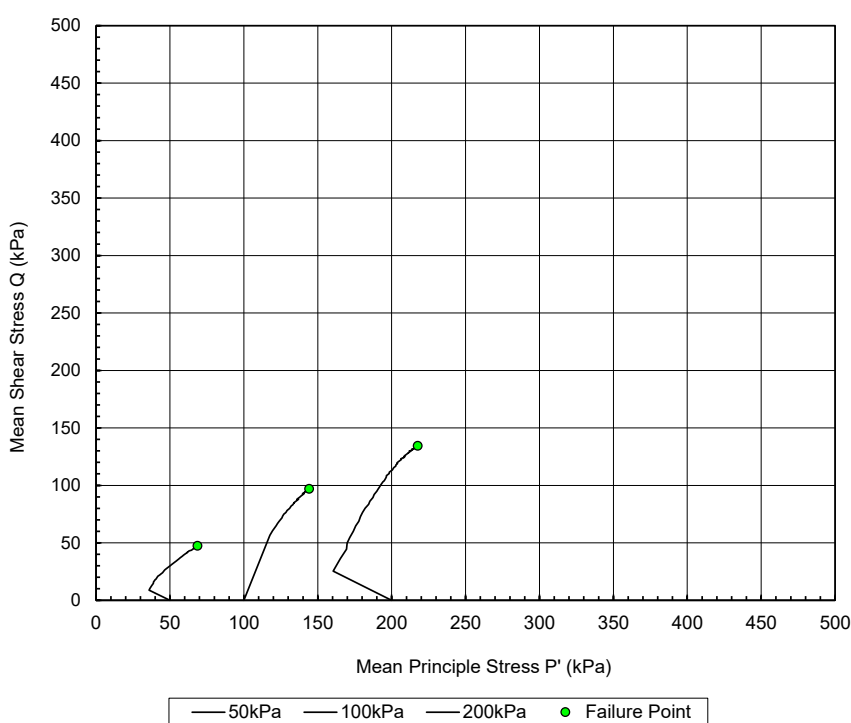
Depth (m): 3.00-3.50
 Date sampled: 29/10/25

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/187-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P' vs Q Stress Path (Effective Stress Plot) - Back Pressure saturated at 400 kPa



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
 Failure Criteria: Stage 2 : Stress Ratio
 (at Max. Values) Stage 3 : Stress Ratio

Date tested: 15/12/25-13/01/26
 Date reported: 14/01/26

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory:

Thirushen Pillay
 Senior Civil Engineering Technician

Date: 14/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Strain vs Deviator Stress Plot

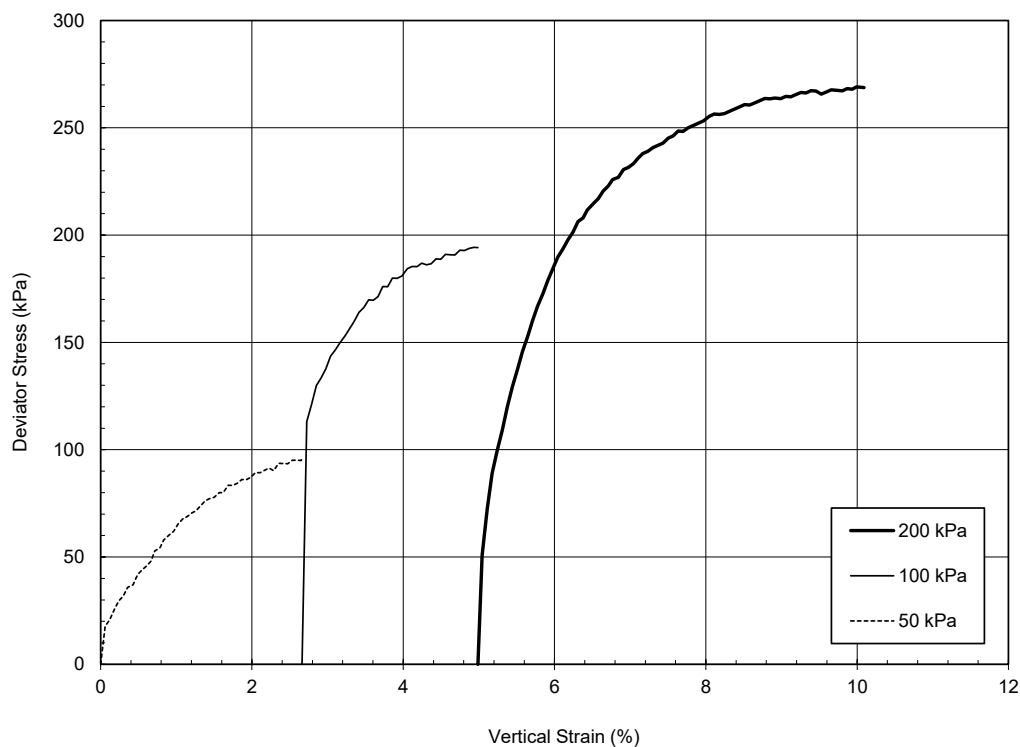


Project: Ground Investigation for Northland Corridor
Location: Alternative to Brynderwyn Hills Section
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1162
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Clayey sandy SILT; Grey mottled brown; moist; plastic
Depth (m): 3.00-3.50
Date sampled: 29/10/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/187-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT
Vertical Strain vs Deviator Stress Plot - Back Pressure saturated at 400 kPa



Test Method	Notes
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	

Date tested: 15/12/25-13/01/26
Date reported: 14/01/26

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory: Thirushen Pillay
Designation: Senior Civil Engineering Technician

Date: 14/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Strain vs Pore Pressure Plot



Project: Ground Investigation for Northland Corridor
Location: Alternative to Brynderwyn Hills Section
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1162
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Clayey sandy SILT; Grey mottled brown; moist; plastic

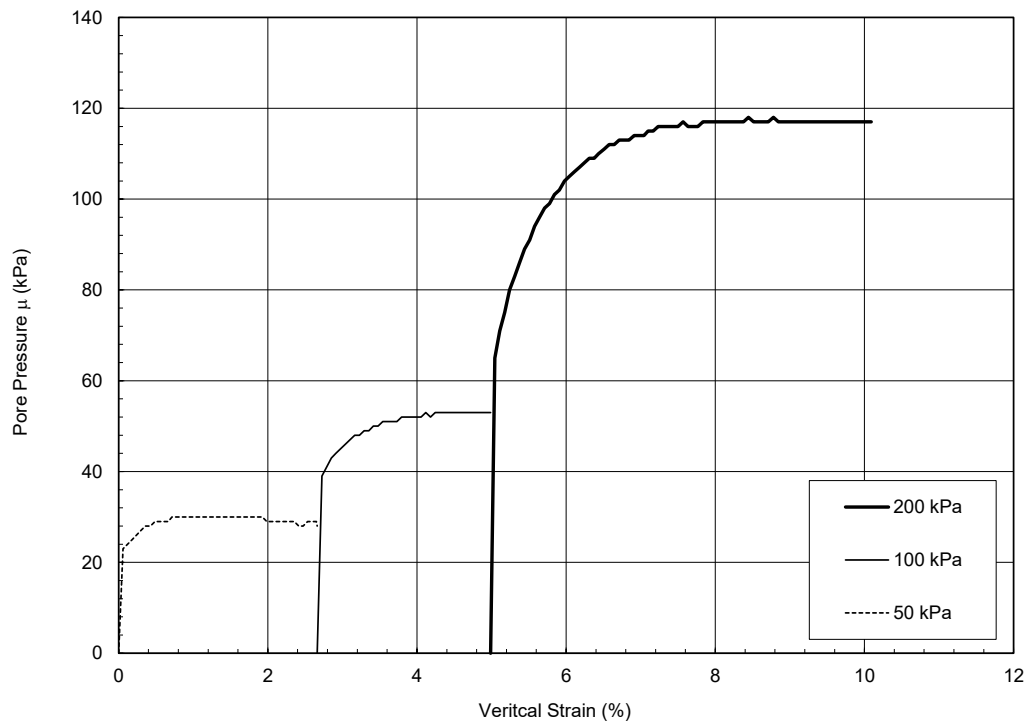
Depth (m): 3.00-3.50
Date sampled: 29/10/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/187-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Vertical Strain vs Pore Pressure Plot - Back Pressure saturated at 400 kPa



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Date tested: 15/12/25-13/01/26
Date reported: 14/01/26

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 14/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test report - Photograph of Failure Type



Project: Ground Investigation for Northland Corridor
 Location : Alternative to Brynderwyn Hills Section
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1162
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Clayey sandy SILT; Grey mottled brown; moist; plastic

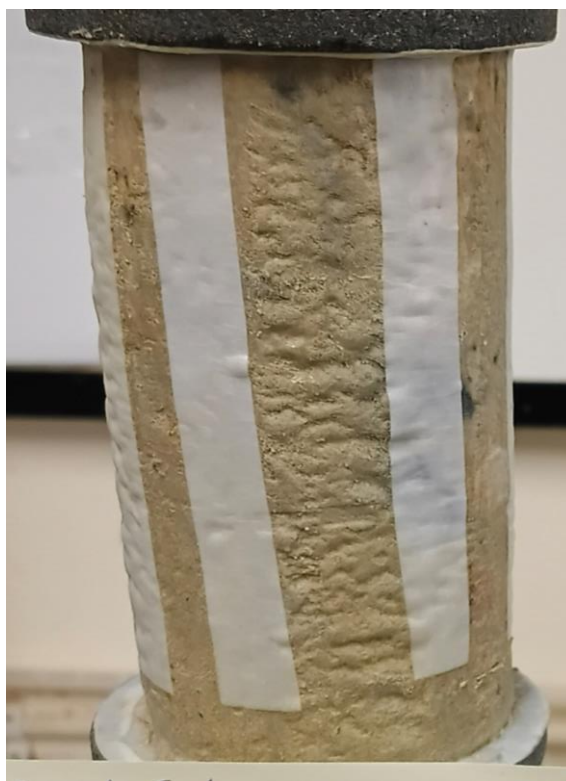
Depth (m): 3.00-3.50
 Date sampled: 29/10/25

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/187-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Photo of failure type



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Date tested: 15/12/25-13/01/26
 Date reported: 14/01/26

Approved Signatory:
 Designation: Thirushen Pillay
 Senior Civil Engineering Technician

Date: 14/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

LHF 2418 (08/25)

Page 9 of 9

WSP
 Auckland Laboratory
 Quality Management Systems Certified to ISO 9001

7a Ride Way, Albany
 Private Bag 101982, NS Mail Centre, North
 Shore City 0745, New Zealand

Telephone +64 9 4154660
 Website www.wsp.com/nz

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - Result Summary



Project: Ground Investigation for Northland Corridor
 Location : Alternative to Brynderwyn Hills Section
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1162
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Clayey SILT; grey mottled brown

Depth (m): 4.50-5.00
 Date sampled: 29/10/25

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/189-TXL-CUM
 Client Ref: -

Initial Sample properties		Rate of strain (mm/min)	
Length (mm)	= 118.35	Stage 1	0.01
Diameter (mm)	= 59.33	Stage 2	0.01
Membrane Correction (kPa)=		Stage 3	0.01

Saturation achieved using a minimum Back Pressure of 400 kPa

Specimen Stage No	Effective Confining Pressure (kPa)	INITIAL PROPERTIES			Solid Particle Density (Mg/m³)	FINAL PROPERTIES		
		Densities (Mg/m³)		Water Content (%)		Densities (Mg/m³)		Water Content (%)
		Bulk (Mg/m³)	Dry (Mg/m³)			Bulk (Mg/m³)	Dry (Mg/m³)	
1	50	1.94	1.44	34.4				
2	100				2.70			
3	200				(assumed)	1.97	1.53	29.0

Specimen Stage No	Effective Confining Pressure (kPa)	Void Ratio (e)	Deg of Saturation (Sr)		Deviator Stress $\sigma_1 - \sigma_3$ (kPa)	Pore Pressure μ (kPa)	Cumulative Strain (%)	Failure Criteria at Maximum Values
			Sr before Consolid.	Sr after Consolid.				
1	50	0.87	100	100	76.2	31	3.36	Stress Ratio
2	100				237.4	39	7.12	Stress Ratio
3	200				448.3	53	13.01	Stress Ratio

Specimen Stage No	Effective Confining Pressure (kPa)	Coefficient of Consolidation Cv (m ² /year)	Volume Compressibility Mv (m ² /MN)	Coefficient of Permeability k (m/s)	Final B Value	Due to the use of side filter drains, IANZ endorsement does not include the Cv, Mv and k values reported herein. Mv, Cv & k calculated for the following conditions:- L/D=2, RADIAL+TOP+BOTTOM Drainage Side Filter Drains Used (L/D= Sample Length/Diameter.)
1	50	0.89	0.49	1.3 x 10 ⁻¹⁰	1.02	
2	100	1	0.29	9.4 x 10 ⁻¹¹		
3	200	1.2	0.19	7.1 x 10 ⁻¹¹		

TOTAL STRESS RESULT		
Intercept d	0.00	(kPa)
Beta β	27.84	(deg)
Cohesion c	0	(kPa)
Phi ϕ	32	(deg)
Correl coeff.	0.9988	(r ²)

EFFECTIVE STRESS RESULT		
Intercept d'	7.68	(kPa)
Beta β'	30.49	(deg)
Cohesion c'	9	(kPa)
Phi ϕ'	36	(deg)
Correl coeff.	0.9976	(r ²)

Value (Total Stress) has been adjusted to zero

Test Method	Notes
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	Cv and Mv have been rounded to 2 significant figures. Mg/m ³ is equivalent to t/m ³ Deviation from standard, rate of vertical strain for shear stage reported in mm/min vs. %/hr

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

Date tested: 25/11/25-09/12/25
 Date reported: 8/01/26

This report may only be reproduced in full
 All information supplied by Client

Approved Signatory: 
 Designation: Thirushen Pillay
 Senior Civil Engineering Technician

Date: 8/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Volume change vs $\sqrt{t}$ Plot (Consolidation stage)



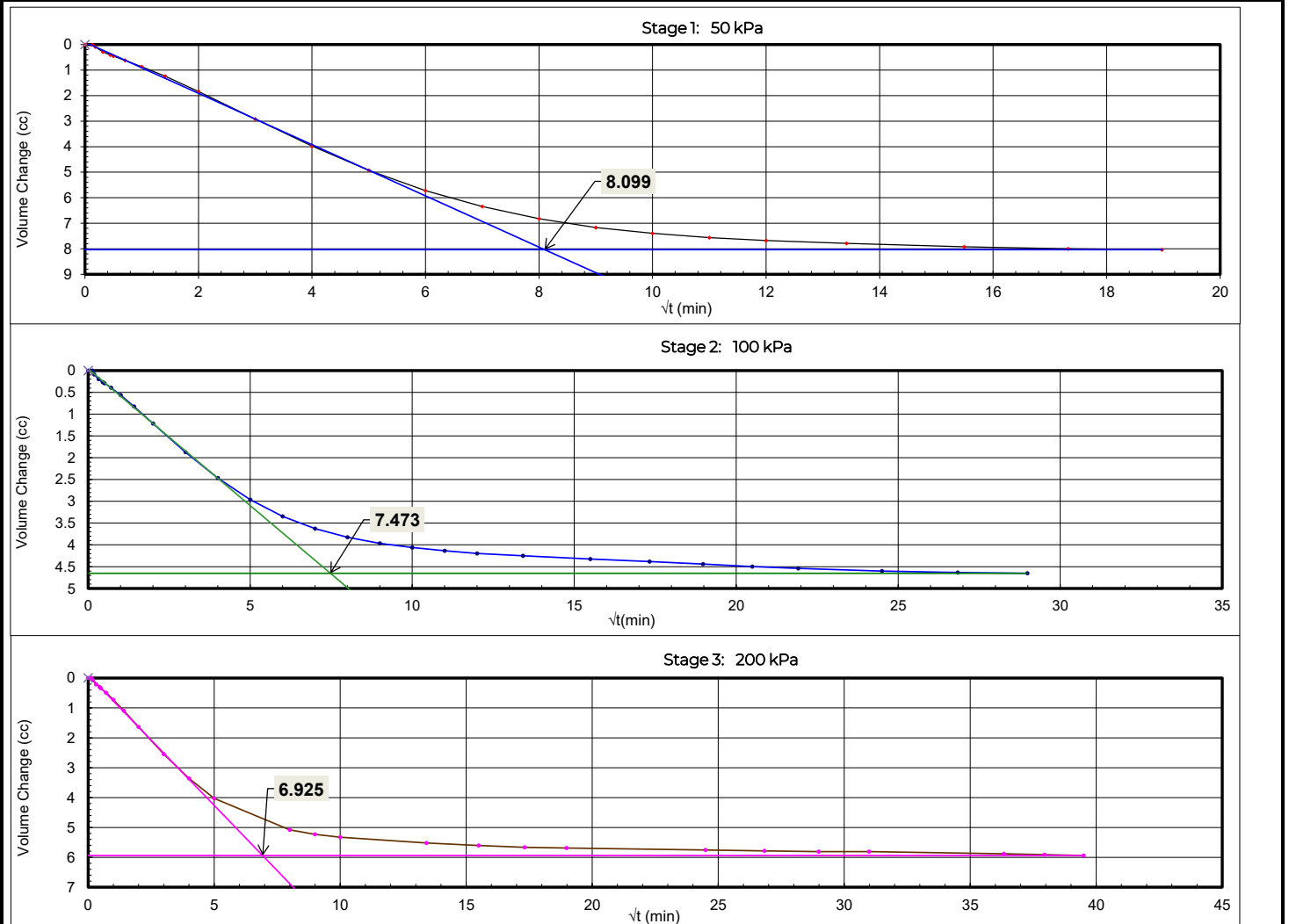
Project: Ground Investigation for Northland Corridor
Location : Alternative to Brynderwyn Hills Section
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1162
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Clayey SILT; grey mottled brown

Depth (m): 4.50-5.00
Date sampled: 29/10/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/189-TXL-CUM
Client Ref: -

Final Back Pressure (kPa) : 400 kPa



Test Method	Test Results at end of consolidation			
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018	Effective Stress (kPa)=	50 kPa	100 kPa	200 kPa
Water Content : NZS4402 : 1986 Test 2.1	t_{100} (min) =	65.594	55.846	47.956
	Volumetric Strain (%)=	2.456	1.422	1.816
	Vertical Strain (%)=	0.819	0.465	0.577
	PWP Dissipation (U)=	100.00	100.00	100.00
	Estimated Strain to failure(%)=	5	5	5

Date tested : 8/01/26
Date reported : 25/11/25-09/12/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

This report may only be reproduced in full

All information supplied by Client

Date: 8/01/26

Approved Signatory: Thirushen Pillay
Designation: Senior Civil Engineering Technician

LHF 2418 (08/25)



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Mohr Coulomb Envelope Plot



Project: Ground Investigation for Northland Corridor
 Location : Alternative to Brynderwyn Hills Section
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1162
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Clayey SILT; grey mottled brown

Depth (m): 4.50-5.00
 Date sampled: 29/10/25

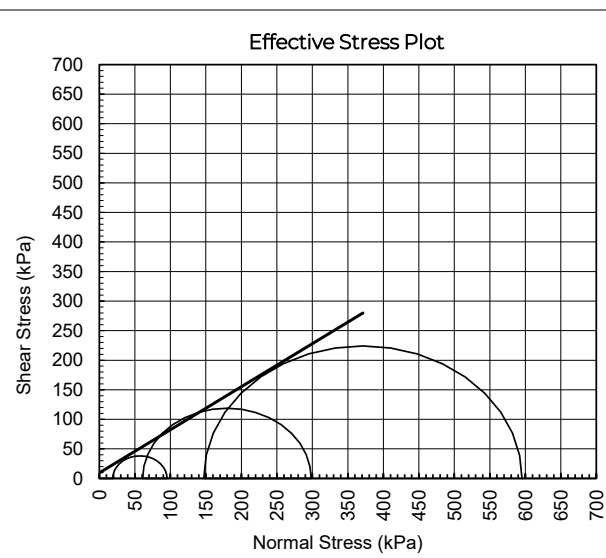
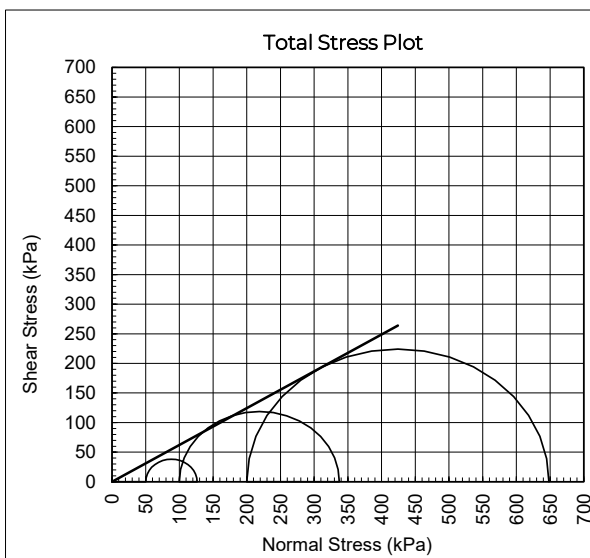
Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/189-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Mohr-Coulomb envelope plots - Result at Maximum Stress

Back Pressure Saturated at 400 kPa



NB: The Cohesion Value (Total Stress) has been adjusted to zero

TOTAL STRESS RESULT			
Intercept d	0.00	(kPa)	
Beta β	27.84	(deg)	
Cohesion c	0	(kPa)	
Phi ϕ	32	(deg)	
Correl coeff.	0.9988	(r ²)	

EFFECTIVE STRESS RESULT			
Intercept d'	7.68	(kPa)	
Beta β'	30.49	(deg)	
Cohesion c'	9	(kPa)	
Phi ϕ'	36	(deg)	
Correl coeff.	0.9976	(r ²)	

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Drainage Conditions during Shear :
 Stage 2 : Stress Ratio
 Stage 3 : Stress Ratio

Date tested: 25/11/25-09/12/25
 Date reported: 8/01/26

Approved Signatory: 
 Designation: Senior Civil Engineering Technician

Date: 8/01/26

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - P vs Q Total Stress Plot



Project: Ground Investigation for Northland Corridor
 Location : Alternative to Brynderwyn Hills Section
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1162
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Clayey SILT; grey mottled brown

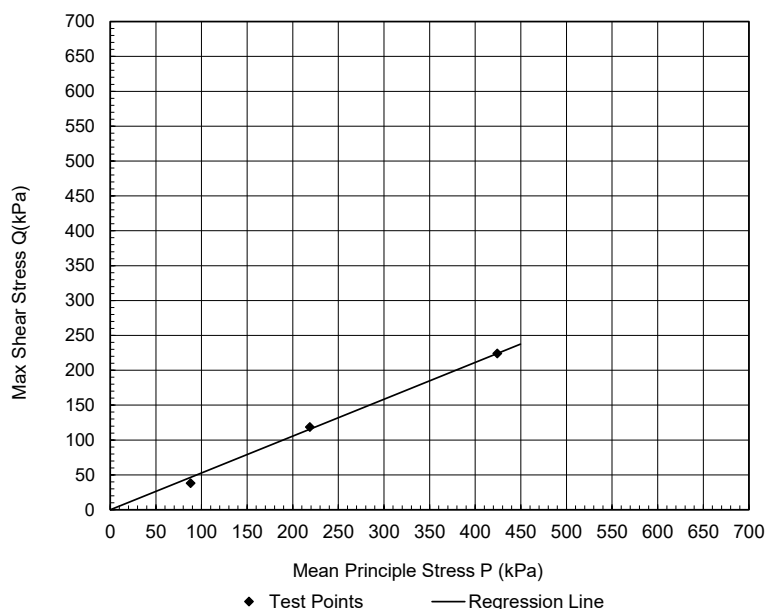
Depth (m): 4.50-5.00
 Date sampled: 29/10/25

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/189-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P vs Q Total Stress Plot - Back Pressure saturated at 400 kPa



NB: The Cohesion Value (Total Stress) has been adjusted to zero

TOTAL STRESS RESULT			Correl coeff	0.9988	(r ²)
Intercept d	0.00	(kPa)	Cohesion c	0	(kPa)
Beta β	27.84	(deg)	Phi Ø	32	(deg)

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
 Failure Criteria: Stage 2 : Stress Ratio
 (at Max. Values) Stage 3 : Stress Ratio

Date tested: 25/11/25-09/12/25
 Date reported: 8/01/26

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory:

Thirushen Pillay
 Senior Civil Engineering Technician

Date: 8/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

Designation:

LHF 2418 (08/25)

Page 4 of 9

WSP
 Auckland Laboratory
 Quality Management Systems Certified to ISO 9001

7a Ride Way, Albany
 Private Bag 101982, NS Mail Centre, North
 Shore City 0745, New Zealand

Telephone +64 9 4154660
 Website www.wsp.com/nz

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - P' vs Q' Effective Stress Plot



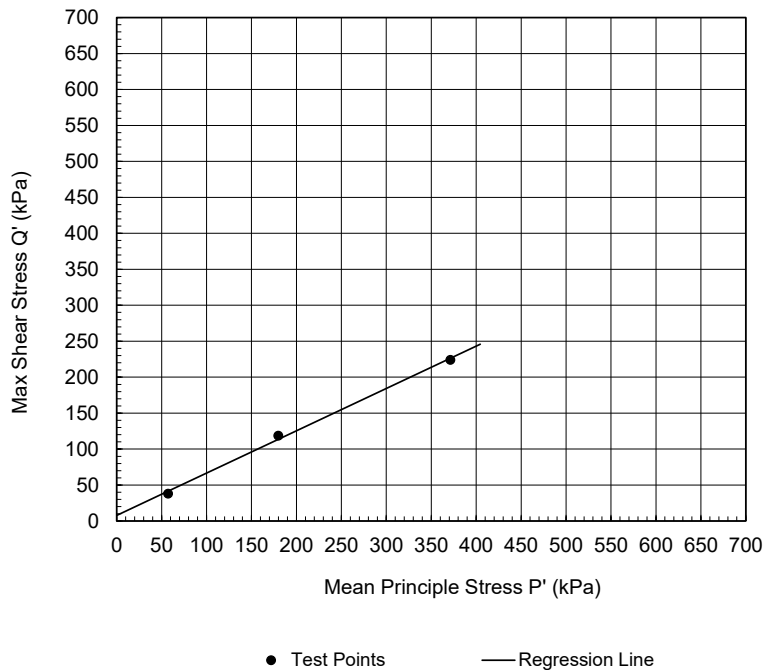
Project: Ground Investigation for Northland Corridor
Location : Alternative to Brynderwyn Hills Section
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1162
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Clayey SILT; grey mottled brown

Depth (m): 4.50-5.00
Date sampled: 29/10/25

Sample Type : Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/189-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT
P' vs Q' Effective Stress Plot - Back Pressure saturated at 400 kPa



EFFECTIVE STRESS RESULT			Correl coeff	0.9976	(r ²)
Intercept d'	7.68	(kPa)	Cohesion c'	9	(kPa)
Beta β'	30.49	(deg)	Phi Ø'	36	(deg)

Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
Failure Criteria:
Stage 2 : Stress Ratio
(at Max. Values) Stage 3 : Stress Ratio

Date tested: 25/11/25-09/12/25
Date reported: 8/01/26

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 8/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

Designation:
LHF 2418 (08/25)

Page 5 of 9

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)

Test Report - PvsQ Stress Path Plot



Project: Ground Investigation for Northland Corridor
 Location : Alternative to Brynderwyn Hills Section
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1162
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Clayey SILT; grey mottled brown

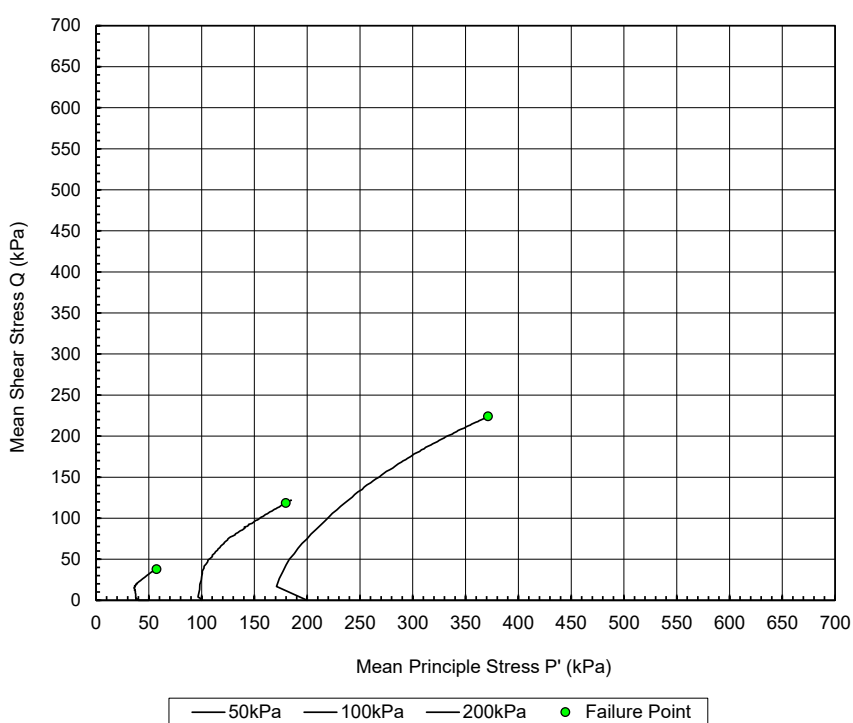
Depth (m): 4.50-5.00
 Date sampled: 29/10/25

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/189-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

P' vs Q Stress Path (Effective Stress Plot) - Back Pressure saturated at 400 kPa



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
 Water Content : NZS4402 : 1986 Test 2.1

Notes

Stage 1 : Stress Ratio
 Failure Criteria: Stage 2 : Stress Ratio
 (at Max. Values) Stage 3 : Stress Ratio

Date tested: 25/11/25-09/12/25
 Date reported: 8/01/26

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory:

Thirushen Pillay
 Senior Civil Engineering Technician

Date: 8/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Strain vs Deviator Stress Plot



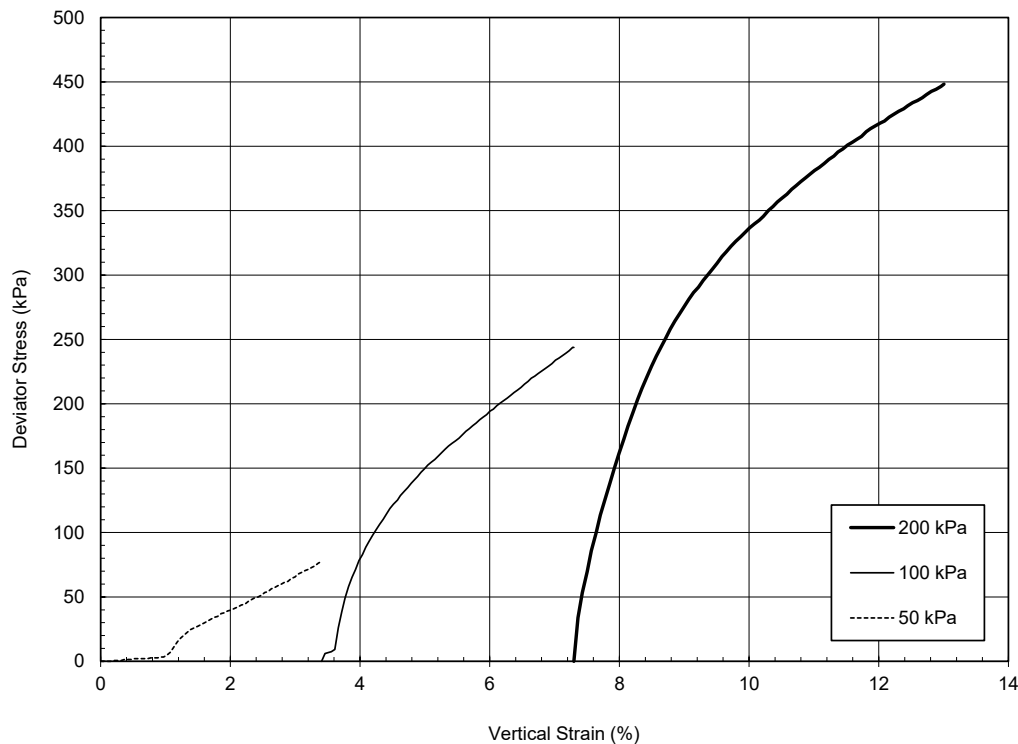
Project: Ground Investigation for Northland Corridor
 Location : Alternative to Brynderwyn Hills Section
 Client : NZTA c/- Aurecon & WSP NZ Ltd
 Borehole No: BH2B-1162
 Sampled by: NC Site Team
 Sampling Method: Pushtube
 Sample Description: Clayey SILT; grey mottled brown

Depth (m): 4.50-5.00
 Date sampled: 29/10/25

Sample Type : Undisturbed
 Comments: Multistage Test.

Project No: 1-C2466.16
 Lab Ref No: WL4708/189-TXL-CUM
 Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT
 Vertical Strain vs Deviator Stress Plot - Back Pressure saturated at 400 kPa



Test Method	Notes
Consolidated undrained triaxial test : BS EN ISO 17892-9:2018 Water Content : NZS4402 : 1986 Test 2.1	

Date tested: 25/11/25-09/12/25
 Date reported: 8/01/26

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory: 
 Designation: Thirushen Pillay
 Senior Civil Engineering Technician

Date: 8/01/26



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test Report - Strain vs Pore Pressure Plot



Project: Ground Investigation for Northland Corridor
Location: Alternative to Brynderwyn Hills Section
Client: NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1162
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Clayey SILT; grey mottled brown

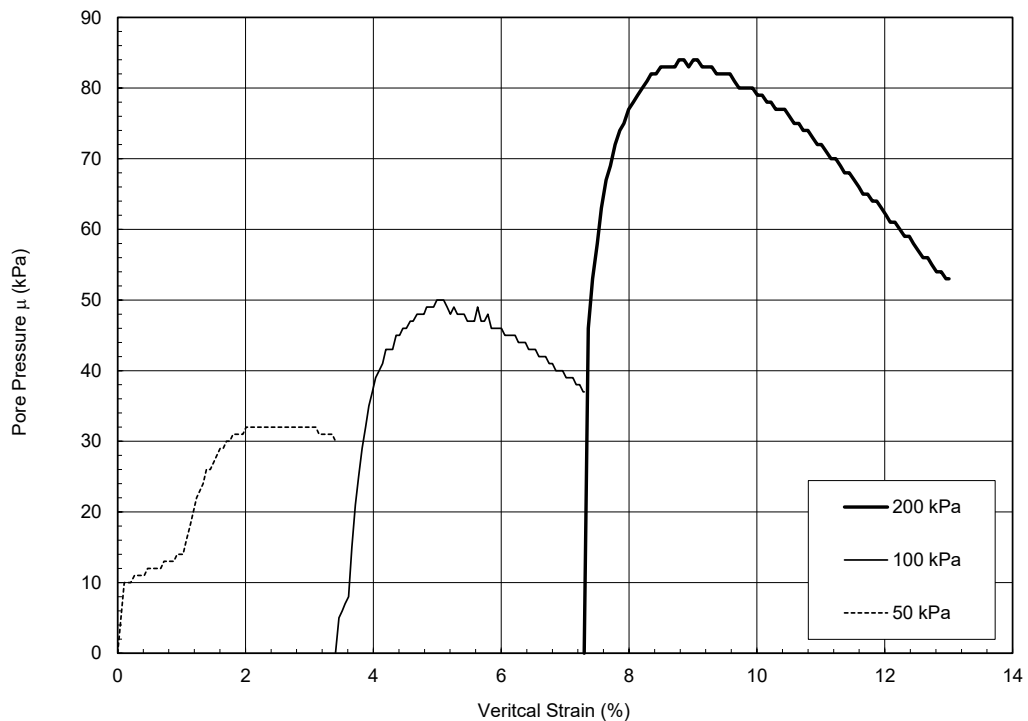
Depth (m): 4.50-5.00
Date sampled: 29/10/25

Sample Type: Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/189-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Vertical Strain vs Pore Pressure Plot - Back Pressure saturated at 400 kPa



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Date tested: 25/11/25-09/12/25
Date reported: 8/01/26

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 8/01/26

Designation:



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (CIU)
Test report - Photograph of Failure Type



Project: Ground Investigation for Northland Corridor
Location : Alternative to Brynderwyn Hills Section
Client : NZTA c/- Aurecon & WSP NZ Ltd
Borehole No: BH2B-1162
Sampled by: NC Site Team
Sampling Method: Pushtube
Sample Description: Clayey SILT; grey mottled brown

Depth (m): 4.50-5.00
Date sampled: 29/10/25

Sample Type : Undisturbed
Comments: Multistage Test.

Project No: 1-C2466.16
Lab Ref No: WL4708/189-TXL-CUM
Client Ref: -

Consolidated Undrained TRIAXIAL COMPRESSION TEST RESULT

Photo of failure type



Test Method

Consolidated undrained triaxial test : BS EN ISO 17892-9:2018
Water Content : NZS4402 : 1986 Test 2.1

Notes

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Date tested: 25/11/25-09/12/25
Date reported: 8/01/26

Approved Signatory:

Thirushen Pillay
Senior Civil Engineering Technician

Date: 8/01/26



Test results indicated as not
accredited are outside the
scope of the laboratory's
accreditation

LHF 2418 (08/25)

Page 9 of 9