

UNCONFINED COMPRESSIVE STRENGTH (UCS) WITH YOUNG'S MODULUS



Project: Ground Investigation for Northland Corridor
Location: Alternative to Brynderwyn Hills Section
Client: NZTA c/- Aurecon & WSP NZ Ltd
Contractor: N/A
Sampled by: NC_Site Team
Sampling method: Core
Sample condition: As received
Sample description: Weak UW SILTSTONE
Sample reference: BH2B_1122
Sample depth (m): 23.50-23.80
Age at test: -

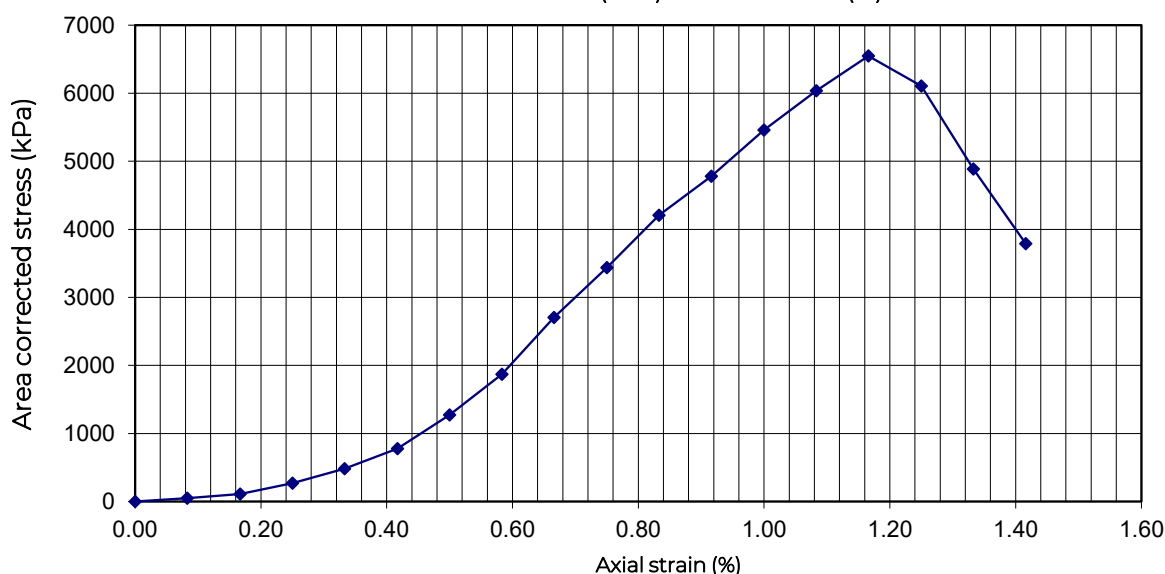
Date sampled: 23/09/25

Project number: 1-C2466.16
Lab ref number: WL4708/ 39-UCS
Client ref number: 1-C2466.16

Test results

Material size used	Whole sample	Wet mass passing size used (%)	-
Bulk density (t/m ³)	2.30	Water content as received (%)	9.8
Water content at compaction (%)	-	Initial sample diameter (mm)	60.0
Water content at testing (%)	9.8	Initial sample length (mm)	120.0
Dry density (t/m ³)	2.10	Initial sample area (mm ²)	2828.4
UCS Max stress (kPa)	6500	Initial Length:Diameter ratio	2:1
Strain at failure (%)	1.2	* Young's modulus (MPa)	770
Mode of failure:	Multiple Fracturing	for strain range	0.42 - 1.17%

Area corrected Stress (kPa) Vs Axial strain (%)



Test Methods	Notes
UCS: NZS 4402: 1986: Test 6.3.1 Water content: NZS 4402: 1986: Test 2.1 * Young's modulus is not covered by IANZ Accreditation.	-The strain rate for this test was kept constant at 0.3mm/min. -Some sample details supplied by client.

Date tested: 24/11/25 Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
Date reported: 23/12/25

Approved Signatory: *Thirushen Pillay*
Senior Civil Engineering Technician

Date: 23/12/25



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

WHG-NLC06 (10/25)

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WITH YOUNG'S MODULUS



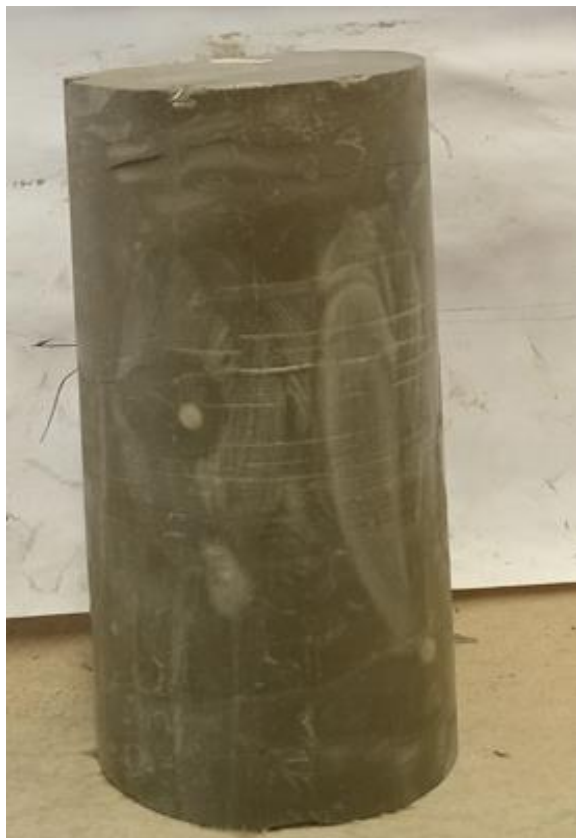
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Sample depth (m): 23.50-23.80
Age at test: -

Date sampled: 23/09/25

Project number:	1-C2466.16
Lab ref number:	WL4708/ 39-UCS
Client ref number:	1-C2466.16

Test photos

Before Test



Post Test



Date tested: 24/11/25

POINT LOAD STRENGTH OF ROCK TEST REPORT



Project : Ground Investigation for Northland Corridor
 Location : Alternative to Brynderwyn Hills Section
 Client : NZTA C/- Aurecon & WSP NZ Ltd
 Contractor : N/A
 Sampled by : NC Site Team
 Date sampled : 29/08/25
 Sampling method : Core
 Sample description : GREYWACKE SANDSTONE
 Sample condition : As Received

Project No : 1-C2466.16
 Lab Ref No : WL4708/84-PL
 Client Ref No : -

Test Results

Lab Ref No :	1	2	Water Content and Density	
Location ID No :	BH2B_1144		Water content as received(%)	0.98
Depth (m) :	26.50-31.20		Water content at testing(%)	0.98
Test Type :	-		Bulk density (t/m ³)	2.60
Width, W (mm) :	60.08		Dry density (t/m ³)	2.58
Diameter, D (mm) :	120.02			
Load, P (kN)	-			
D _e ² (mm ²)	-			
D _e (mm)	-			
I _s (MPa)	-			
Size Factor, F	-			
I _{s(50)} (MPa)	-			

Test Methods	Notes
Insitu Density: NZS 4402: 1986, Test 5.1.3 Water Content: NZS 4402: 1986, Test 2.1	

Date tested : 13/01/26
 Date reported : 14/01/26

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

Approved

Thirushen Pillay

Designation : Senior Civil Engineering Technician
 Date : 14/01/26

POINT LOAD STRENGTH OF ROCK TEST REPORT



Project : Ground Investigation for Northland Corridor
 Location : Alternative to Brynderwyn Hills Section
 Client : NZTA C/- Aurecon & WSP NZ Ltd
 Contractor : N/A
 Sampled by : NC Site Team
 Date sampled : 29/08/25
 Sampling method : Core
 Sample description : GREYWACKE SANDSTONE
 Sample condition : As Received

Project No : 1-C2466.16
 Lab Ref No : WL4708/85-PL
 Client Ref No : -

Test Results

Lab Ref No :	1	2	Water Content and Density	
Location ID No :	BH2B_1144		Water content as received(%)	1.36
Depth (m) :	41.10-46.50		Water content at testing(%)	1.36
Test Type :			Bulk density (t/m ³)	2.23
Width, W (mm) :	60.05		Dry density (t/m ³)	2.20
Diameter, D (mm) :	80.00			
Load, P (kN)	-			
D _e ² (mm ²)	-			
D _e (mm)	-			
I _s (MPa)	-			
Size Factor, F	-			
I _{s(50)} (MPa)	-			

Test Methods

Insitu Density: NZS 4402: 1986, Test 5.1.3
 Water Content: NZS 4402: 1986, Test 2.1

Notes

Date tested : 13/01/26
 Date reported : 14/01/26

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Approved

Thirushen Pillay
 Designation : Senior Civil Engineering Technician
 Date : 14/01/26

POINT LOAD STRENGTH OF ROCK TEST REPORT



Project : Ground Investigation for Northland Corridor
 Location : Alternative to Brynderwyn Hills Section
 Client : NZTA C/- Aurecon & WSP NZ Ltd
 Contractor : N/A
 Sampled by : NC Site Team
 Date sampled : 29/08/25
 Sampling method : Core
 Sample description : GREYWACKE SANDSTONE
 Sample condition : As Received

Project No : 1-C2466.16
 Lab Ref No : WL4708/86-PL
 Client Ref No : -

Test Results

Lab Ref No :	1	2	Water Content and Density	
Location ID No :	BH2B_1144		Water content as received(%)	0.86
Depth (m) :	48.20-50.55		Water content at testing(%)	0.86
Test Type :			Bulk density (t/m ³)	2.26
Width, W (mm) :	60.03		Dry density (t/m ³)	2.24
Diameter, D (mm) :	78.88			
Load, P (kN)				
D _e ² (mm ²)				
D _e (mm)				
I _s (MPa)				
Size Factor, F				
I _{s(50)} (MPa)				

Test Methods

Insitu Density: NZS 4402: 1986, Test 5.1.3
 Water Content: NZS 4402: 1986, Test 2.1

Notes

Date tested : 13/01/26
 Date reported : 14/01/26

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 All information supplied by Client

Approved

Thirushen Pillay
 Designation : Senior Civil Engineering Technician
 Date : 14/01/26

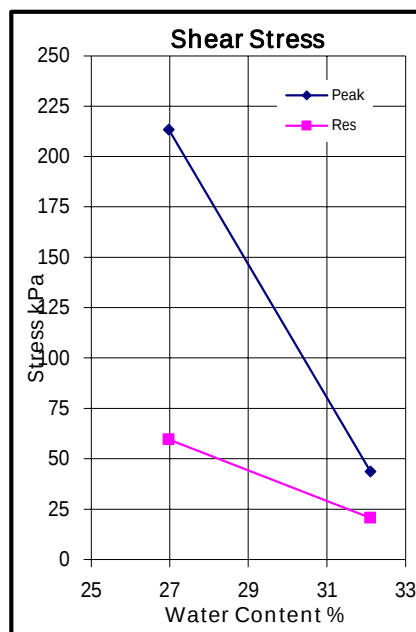
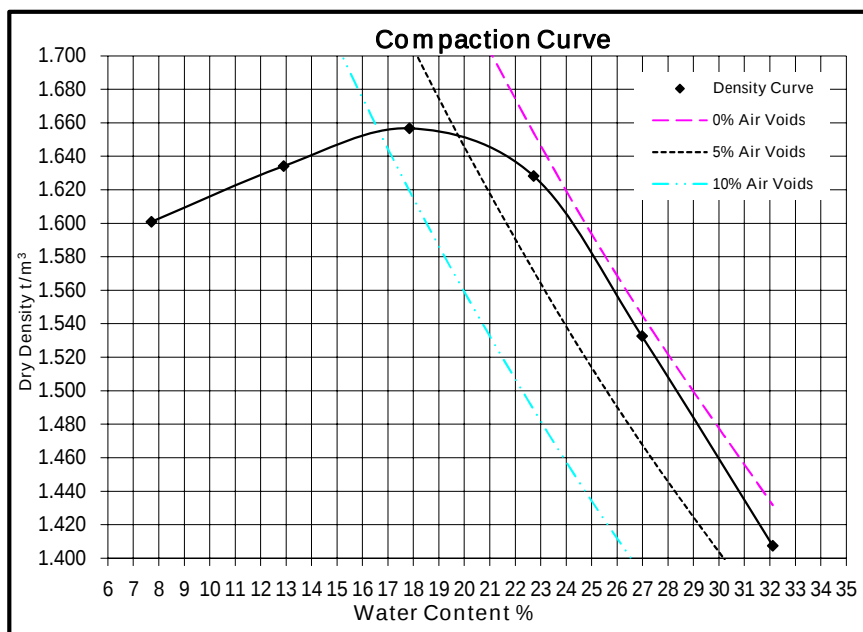
DRY DENSITY / WATER CONTENT RELATIONSHIP HEAVY COMPACTION



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.
 Contractor : N/A
 Sampled by : NC_Site team
 Date sampled : 15/09/25
 Sampling method : Not Stated
 Sample description : Light Brown with mottled orange; Silty CLAY with trace of rootlets; Moist to wet
 Sample condition : As Received
 Solid density : 2.65 t/m³ (Assumed)
 Source : TB2B_1114 (1.90m-2.60m)

Project No : 1-C21466.16
 Lab Ref No : WL47019/2
 Client Ref No : 1-C21466.16

Test Results							
Maximum dry density	1.66	t/m ³	Natural water content		27.0	%	
Optimum water content	18	%	Fraction tested		Passing 19.0 m m test sieve		
Sample ID	A	B	C	D	Nat	E	
Bulk density t/m ³	1.724	1.845	1.952	1.998	1.946	1.859	
Water content %	7.7	12.9	17.8	22.7	27.0	32.1	
Dry density t/m ³	1.601	1.634	1.657	1.628	1.533	1.408	
Sample condition	Dry	Dry	Dry	Dry-Moist	Moist Wet	Saturated	
Peak stress kPa	UTP	UTP	UTP	UTP	213	44	
Remoulded stress kPa	-	-	-	-	60	21	



Test Methods	Notes
Compaction NZS 4402 : 1986 Test 4.1.2 (Heavy)	All information supplied by Client
Shear Strength using a Hand Held Shear Vane, NZ Geotechnical Soc Inc 8/2001	

Date tested : 05/10/25
 Date reported : 07/10/25
 Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
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Approved Signatory

Richard Low

Designation : Senior Civil Engineering Technician

Date : 08/10/25



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