SH8 Beaumont Bridge Realignment

Geotechnical Factual Report

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Contents

Appendices

1 Introduction

WSP Opus has been commissioned by the New Zealand Transport Agency (the Agency) to provide engineering services for the design and construction of a new multi-span bridge to replace the existing Beaumont Bridge in Beaumont, Otago.

As part as this commission, WSP Opus has undertaken site-specific ground investigations near the proposed bridge site to inform the design. This report presents a summary of the factual results from the investigations.

2 Site Description

The existing Beaumont Bridge (the 'Bridge') is a single lane bridge, situated on State Highway 8 (SH8) between RP 401/6.23 and 401/6.35. The Bridge is located in Beaumont, approximately 110km west of Dunedin and 7km south east of Raes Junction. The Bridge forms part of an arterial route between Central Otago and Coastal Otago.

The Bridge has traffic lights installed on either side to control the release of traffic at any given time. The posted speed limit of SH8 through Beaumont is 100km/h.

The existing bridge is founded on mass concrete piers formed directly onto exposed rock outcrops typically consisting of schist.

As part of the Detailed Business Case, potential alignments for the proposed bridge were assessed and Option A (preferred) was adopted as the most suitable. The existing and proposed bridge alignments are presented on Figure 1.

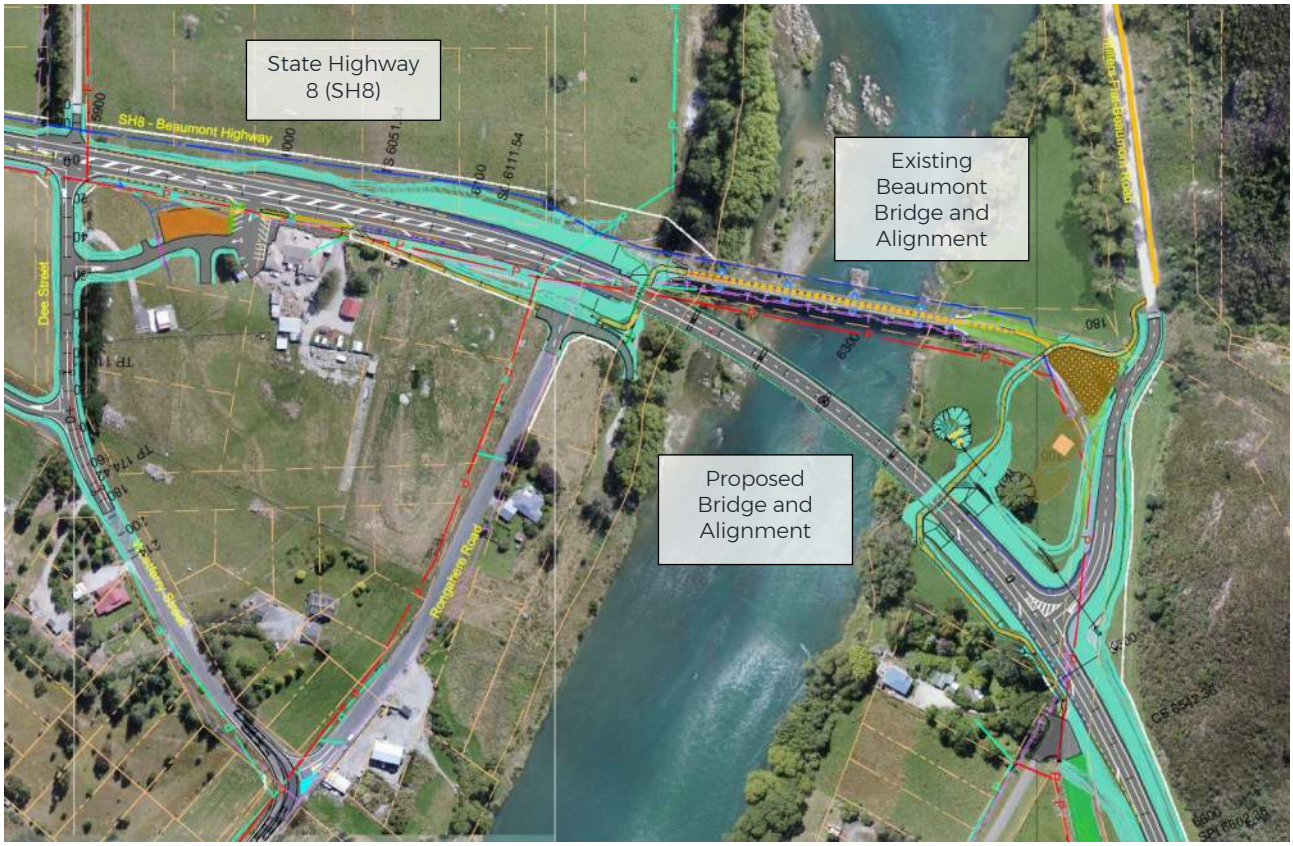

Figure 1: Existing and Proposed Alignments of the Beaumont Bridge

3 Geological Setting

The geological map of the local area (NZ 1: 250,000 scale Geological Map) indicates that the site is located within a valley plain identified as having been deposited in the late quaternary. These deposits typically consist of unconsolidated to poorly consolidated mud, sand, gravel and peat of alluvial and colluvial origin.

The wider area, including the adjacent hills comprise Caples Group Grade TZIII schist rock. The schist rock is identified to be heavily foliated. Geological records indicate that the schist typically has a strong foliation dip towards the south and east at about 30 to 40 degrees.

An extract from the geological map is presented on Figure 2.

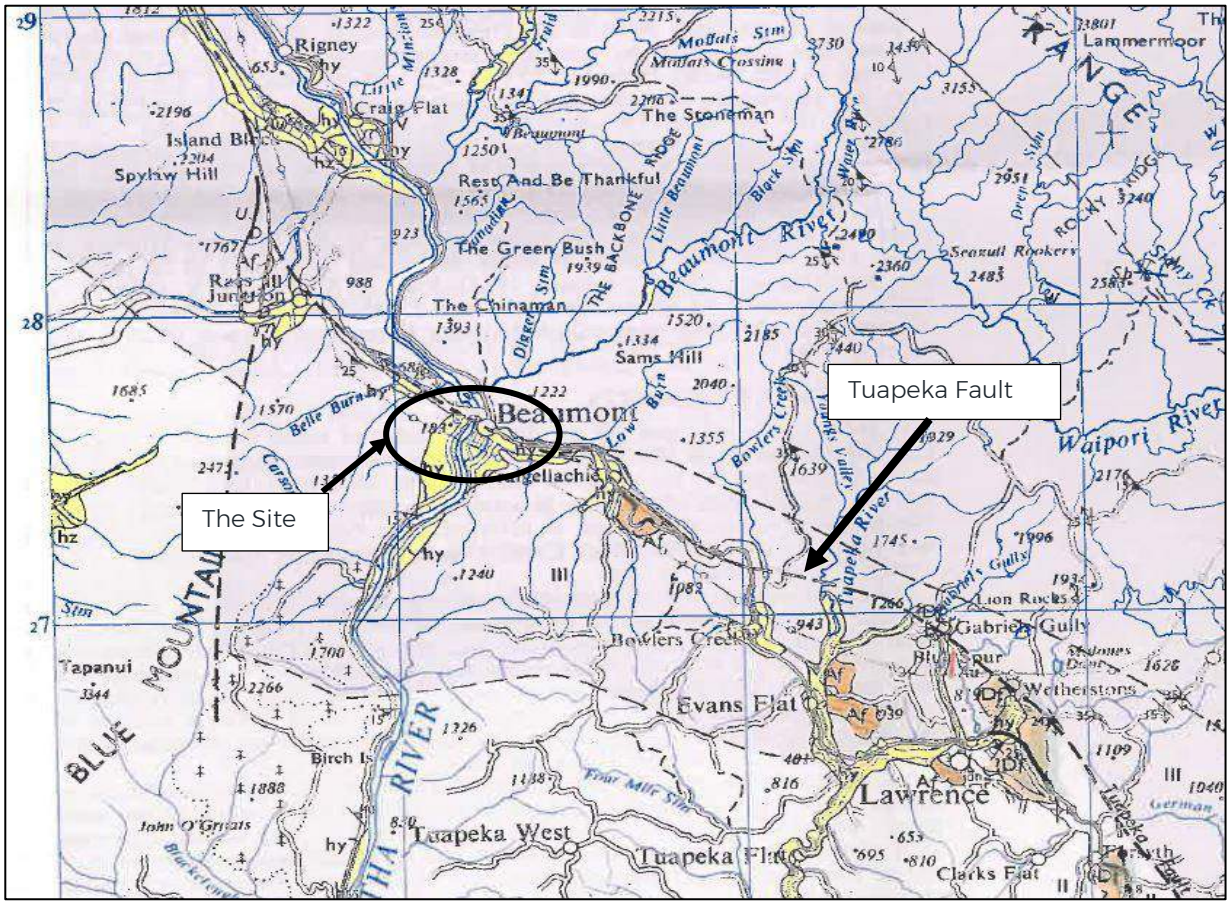

Figure 2: Extract of Geological Sheet 25, Dunedin, 1: 250,000 Scale

The New Zealand Geology Web Map by GNS Science indicated the bridge site is underlain by late Pleistocene River Deposits (Unit Q). This unit generally comprises middle Pleistocene (units Q4 – Q12) and late Pleistocene (units Q2 – Q3) deposits, consisting of sand, clay, silt and gravel.

The rock underlying the site is Undifferentiated Caples terrane TZ Grade III Schist (Unit Y TR), comprising well foliated psammitic and pelitic schist with incipient segregation, minor greenschist and metachert with common quartz veining. An extract from the Web Map is presented on Figure 3 below.

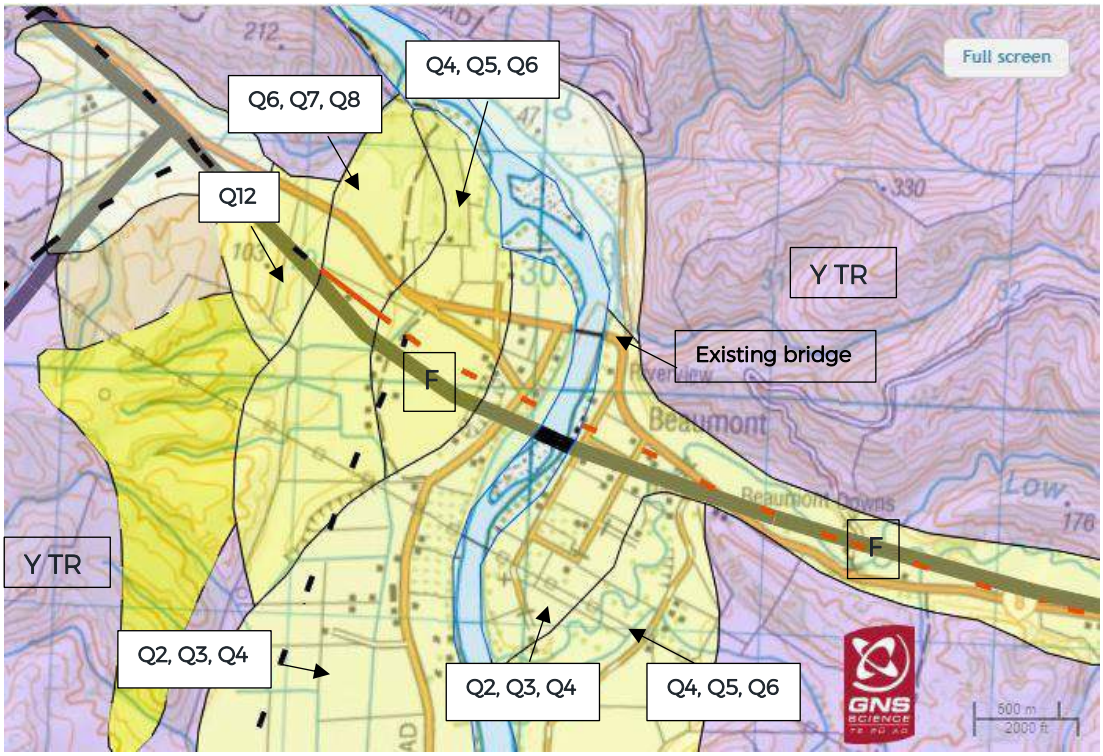

Figure 3: Extract of Geological Web Map (image courtesy of GNS Web Map)

Key

F = Tuapeka Fault line (two traces).
Y TR = Undifferentiated Caples terrane TZ Grade III Schist
Q = Pleistocene River Deposits (Q2-Q3 = late Pleistocene, Q4 – Q12 middle Pleistocene).

Groundwater monitoring records are not available within the local area. However, vegetation observed during the site walkover indicates that shallow groundwater conditions (poor draining soils) overlying the bedrock should be anticipated on both the east and west banks of the Clutha River. It is considered likely that a deeper groundwater table exists that may be in continuity with the river levels.

Seasonal groundwater fluctuations can be expected to be in the order of 1m to 2m and may be influenced strongly by the Clutha River flows.

The geological plan indicates the active Tuapeka Fault to be present approximately 100m south of the existing bridge alignment. The Fault is recorded as a normal fault and generally trends in the south-east / north-west direction. The recurrence interval and the estimate magnitude of displacements of this fault are currently unknown.

4 Geotechnical Investigations

Site-specific ground investigations were undertaken between 13 August 2018 and 1 February 2019. The purpose of the investigations was to assess the nature and variability of the ground and groundwater profiles across the site to inform the detailed design of the proposed bridge. The investigations comprised the following:

- 8 machine boreholes undertaken to depths ranging between 11m to 20m below ground level (bgl).
- 9 Cone Penetration Tests (CPTs) undertaken to refusal depth.
- 18 machine-excavated test pits undertaken to the target depth of 3m bgl (or shallower refusal).
- 13 shallow pavement pits to approximately 0.4m to 0.6m below pavement surface to within sub grade.

The approximate locations of the investigation points are presented on the Geotechnical Investigation Location Plan – Appendix A.

4.1 Machine Boreholes

A total of 8 machine boreholes (BH1 to BH8) were undertaken by McNeill Drilling Ltd using a wheel mounted rig. Drilling was undertaken using the diamond rotary coring method. The boreholes were drilled to depths ranging between 11.0m and 20.0m bgl between 21 August 2018 and 1 February 2019.

Details of the machine boreholes are presented in Table 1. The approximate locations of the machine boreholes are presented on the Geotechnical Investigation Location Plan, refer to Appendix A.

Table 1: Details of the machine boreholes

BH ID	Approximate Location	Northing[1] (m)	Easting[1] (m)	Total Depth (m bgl)
BH1	SH8, between Dee Street and Rongahere Rd (North east of the Beaumont Hotel)	804543.4	341098.9	11.0
BH2	Proposed west bridge abutment	804484.5	341206.2	12.3
BH3	Proposed west bridge abutment	804456.9	341267.5	20.0
BH4	Proposed east bridge abutment	804413.3	341347.3	20.0
BH5	Proposed east bridge abutment	804401.0	341366.5	19.6
BH6	Proposed east bridge approach	804346.3	341388.1	16.5
BH7	Proposed east bridge approach	804251.2	341454.3	15.1
BH8	Proposed east bridge approach	804108.9	341513.5	13.3

[1] Coordinates are in NZTM Datum (projected to North Taieri 2000 Circuit) and estimated based on the survey data.

The investigations were supervised by a WSP Opus Geotechnical engineer on a full time basis. The materials recovered from the boreholes were logged in accordance with the New Zealand Geotechnical Society Guidelines (NZGS, 2005).

Upon completion, a standpipe piezometer was installed within boreholes BH6. The remaining boreholes were backfilled with drill spoil and bentonite clay.

The machine borehole logs and photographs are presented in Appendix B.

4.2 Cone Penetration Tests

A total of 9 CPTs (CPT1 to CPT9) were undertaken by McNeill Drilling on 20 August 2018. The purpose of the CPTs was to inform the nature of soils overlying the bedrock at the bridge abutments. The CPTs refused at depths between 1.1m and 5.4m bgl upon encountering bedrock.

Testing was carried out using a track mounted rig fitted with a 15cm^2 cone to measure cone resistance, sleeve friction and pore pressures. Testing was undertaken in accordance with ASTM D5778-12.

Details of the CPTs are presented in Table 2. The CPT results are presented in Appendix C.

Table 2: Details of the CPTs

CPT ID	Approximate Location	Northing[1] (m)	Easting[1] (m)	Approximate Depth (m bgl)
CPT 1	Proposed east bridge abutment	804488.9	341186.0	1.1
CPT 2	Proposed east bridge abutment	804487.6	341202.0	2.6
CPT 3	Proposed east bridge abutment	804378.6	341354.8	2.0
CPT 4	Proposed east bridge abutment	804372.2	341366.4	5.0
CPT 5	Proposed east bridge approach	804355.4	341377.2	3.5
CPT 6	Proposed east bridge approach	804325.9	341404.5	3.4
CPT 7	Proposed east bridge approach	804277.7	341448.5	5.4
CPT 8	Proposed east bridge approach	804184.1	341477.5	4.3
CPT 9	Proposed east bridge approach	804069.1	341552.3	2.9

[1] Coordinates are in NZTM Datum (projected to North Taieri 2000 Circuit) and estimated based on the survey data.

4.3 Test Pits

15 machine-excavated test pits (TP1 to TP22 excluding TP11-13 and TP15-18) were undertaken by Central Testing Services between 13 and 17 August 2018. The Test pits were excavated by Downers using an 8 Tonne excavator. The purpose of test pits was to assess the nature and density of near surface soils.

Test pits TP11-13 were excavated by Downers on 25 October 2018 using a 20 Tonne excavator. The test pits depths ranged between 0.2m and 3.6m bgl.

The materials excavated within TP11, TP12 and TP13 were logged and photographed by a WSP Opus Geotechnical Engineer. The materials excavated within all remaining test pits were logged and photographed by a Civil Engineering Technician from Central Testing Services Ltd. Soil logging was undertaken in general accordance with NZGS (2005).

TP15 to TP18 were not undertaken due to constraints with access to a private property at the proposed east bridge abutment.

Details of the test pits are presented in Table 3. Test pit logs and photographs are presented in Appendix D.

Table 3: Details of the Test Pits

Test Pit ID	Approximate Location	Northing[1] (m)	Easting[1] (m)	Approximate Depth (m bgl)
TP1	Intersection of SH8 and Dee Street	804572.4	340873.6	3.0
TP2	Intersection of SH8 and Dee Street	804530.9	340907.7	0.8
TP3	Dee Street	804466.5	340907.1	3.0
TP4	SH8, between Dee Street and Rongahere Rd	804543.9	341034.0	2.0
TP5	SH8, between Dee Street and Rongahere Rd	804531.9	341096.9	1.3
TP6	SH8, between Dee Street and Rongahere Rd	804524.5	341143.0	1.5
TP7	Rongahere Rd	804486.1	341128.9	2.3
TP8	Rongahere Rd	804470.4	341146.6	0.2
TP9	SH8, between Dee Street and Rongahere Rd	804511.1	341123.3	1.4
TP10	SH8, between Dee Street and Rongahere Rd	804517.4	341207.4	2.2
TP11	SH8, proposed west abutment	804505.5	341242.6	2.6
TP12	SH8, proposed west abutment	804489.2	341236.0	2.8
TP13	SH8, proposed west abutment	804473.3	341227.3	3.6
TP14	SH8, proposed west abutment	804475.6	341186.5	0.9
TP19	SH8, east approach	804214.0	341461.4	3.2
TP20	SH8, east approach	804155.1	341511.1	3.0
TP21	SH8, east approach	804073.7	341548.1	0.5
TP22	SH8, east approach	804043.2	341579.6	1.3

[1] Coordinates are in NZTM Datum (projected to North Taieri 2000 Circuit) and estimated based on the survey data.

Scala penetrometer testing was undertaken within the test pits to assess the relative density of the soils. Testing was undertaken in general accordance with NZS 4402: 1988, Test 6.5.2. Testing results are presented on the logs in Appendix D.

4.4 Pavement Pits

A total of 13 pavement pits (PP1-PP13) were undertaken by Central Testing Services between 13 and 17 August 2018 to inform the subgrade properties for pavement design. The pavement pits were excavated by Downers using an 8 Tonne excavator. Details of the pavement pits are presented in Table 4 below.

Table 4: Details of the Pavement Pits

Test Pit ID	Approximate Location	Northing[1] (m)	Easting[1] (m)	Approximate Depth (m bgl)
PP1	SH8	804590.5	340711.9	0.5
PP2	SH8	804584.5	340782	0.4
PP3	Intersection of SH8 and Dee Street	804559.2	340888	0.4
PP4	Intersection of SH8 and Dee Street	804543.8	340912.2	0.6
PP5	Dee Street	804489.6	340915.4	0.6
PP6	Intersection Dee Street and Westferry Street	804433.7	340909	0.6
PP7	Westferry Street	804456.6	340841.8	0.5
PP8	Westferry Street	804392.6	340925.2	0.5
PP9	SH8, between Dee Street and Rongahere Rd	804550.7	340967.8	0.5
PP10	SH8, between Dee Street and Rongahere Rd	804524.9	341072.6	0.5
PP11	Intersection of SH8 and Craig Flat Road	804433.6	341462.2	0.6
PP12	SH8, east approach	804002.5	341609.8	0.5
PP13	SH8, east approach	803970.8	341652.3	0.4

[1] Coordinates are in NZTM Datum (projected to North Taieri 2000 Circuit) and estimated based on the survey data.

Scala penetrometer testing was undertaken within the test pits to assess the relative density of the soils. Testing results are presented on the test pit logs in Appendix D.

4.5 Laboratory Testing

4.5.1 Rock Samples

Laboratory testing was undertaken by the WSP Opus Laboratory (based in Christchurch) on selected rock samples recovered from the machine boreholes. Testing was undertaken to confirm the rock strength and properties to inform the design of bridge foundations. Testing included the following:

- Unconfined Compressive Strength (UCS) Testing, in accordance with NZS 4402: 1986, Test 6.3.1.
- Point Load Testing on residual UCS samples as well as discrete samples at various depths, in accordance with ASTM D5731.

Details of the laboratory testing are presented in Table 5. Testing results are presented in Appendix F.

Table 5: Summary of Laboratory Testing on Rock Samples

Borehole ID	Sample Depth (m bgl)	Rock Description	Test
BH2	7.70	Metasandstone	UCS
BH3	1.90	Metasandstone	Point Load
	5.85	Metasandstone	Point Load
	11.10	Metasandstone	UCS
	16.88	Metasandstone/Phyllite	UCS
BH4	2.70	Metasandstone	Point Load
	6.45	Metasandstone	UCS
	7.00	Metasandstone	Point Load
	9.55	Metasandstone	UCS
	10.00	Metasandstone	Point Load
	14.75	Metasandstone	UCS
	17.80	Metasandstone	UCS
BH5	7.00	Metasandstone	Point Load
	7.75	Metasandstone	Point Load
	10.15	Metasandstone	UCS
	14.50	Phyllite	Point Load
BH6	8.20	Metasandstone	UCS

4.5.2 Aggregate Samples

Laboratory testing was undertaken by Central Testing Services on selected aggregate samples from the pavement pits. Testing included the following:

- Particle Size Distribution Testing (in accordance with NZS 4407: 2015, Test 3.8.1)
- Laboratory CBR Testing (in accordance with NZS 4407: 2015, Test 3.15).

Test sample details are presented in Table 6. Testing results are presented in Appendix F.

Table 6: Summary of Laboratory Testing on Pavement Pit Samples

Pavement Pit ID	Sample Depth (m bgl)
PP1	0.14 – 0.26
PP2	0.08 – 0.15
PP3	0.26 – 0.39
	0.08 – 0.13
	0.13 – 0.24
	0.24 – 0.32
	0.32 – 0.41
PP4	0.0 – 0.12
	0.12 – 0.33
PP5	0.0 – 0.10
	0.10 – 0.25
PP6	0.0 – 0.18
PP7	0.05 – 0.22
PP8	0.05 – 0.20
	0.20 – 0.30
PP9	0.07 – 0.30
	0.30 – 0.44
PP10	0.13 – 0.19
PP11	0.0 – 0.20
	0.20 – 0.27
PP12	0.07 – 0.22
	0.34 – 0.50
PP13	0.18 – 0.27

4.6 Groundwater Monitoring

A standpipe piezometer was installed within BH6 to monitor groundwater levels at the east abutment. The piezometer details and groundwater readings to date are presented in Table 6. The as-built records of the piezometers are included on the machine borehole logs – refer Appendix B.

Table 7: Summary piezometer reading results (as of April 2019)

Borehole ID	Reduced Level (RL)	Response Zone (m bgl)	Groundwater Level (m bgl)	Groundwater Level (m RL)	Measurement Date
BH6	47.2	3.5 - 6.5	5.74	41.49	15/01/2019
			5.80	41.43	29/01/2019
			5.80	41.43	01/02/2019

5 Limitations

The interpretation of ground conditions presented in this report is based on the tests undertaken at discrete locations at this site. Ground conditions may change suddenly over short distances resulting in variations between test positions across the site.

This report has been prepared for the benefit of the NZ Transport Agency (The 'Agency) for the purpose of providing sub-surface ground conditions for the proposed replacement of Beaumont Bridge. It is not to be relied upon or used out of context by any other person without further reference to WSP Opus.

6 References

ASTM, 2012. ASTM D5778-12, Standard Test Method for Electronic Friction Cone and Piezocone Penetration Testing of Soils, ASTM International, West Conshohocken, PA.

GNS Science, New Zealand Geology Web Map, accessed 22/08/2018. http://data.gns.cri.nz/geology/

NZGS, 2005. Field Description of Soil and Rock. Guideline for the Field Classification and Description of Soil and Rock for Engineering Purposes. New Zealand Geotechnical Society.

NZS 4402, 1986, Test 6.3.1. Determination of Compressive Strength of Cohesive Soils.

NZS 4402, 1988, Test 6.5.2. Determination of Penetration Resistance of the Soils.

NZS 4407, 2015. Methods of Sampling and Testing Road Aggregates.

Appendix A
Geotechnical Investigation Location Plan

SH8 Beaumont Bridge Realignment
Geotechnical Factual Report

KEY

- (BH) Boreholes
- (TP) Trial Pit / Scala
- (PP) Pavement Pit / Scala
- (CPT) Cone Penetration Test

STAGE 1: Investigation Boreholes Only
STAGE 2: Trial Pits/Scala and Pavement Pits
STAGE 3: Cone Penetration Test (If Required)

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CAUTION: FIBRE OPTIC CABLE RELOCATION REQUIRED

Chorus fibre optic or high capacity cables have been identified as being present at this intersection location. Contractor must contact Chorus onsite cable locate and/or stand over if you are working within one metre of these cables. Please contact beforeUdig 0800 248 344 with a minimum 48 hours notice to arrange these above services prior to any excavation taking place.

SERVICE NOTES;

1. HV & LV POWER CABLES
   are in the vicinity of works, The contractor must provide a Safety plan for working near power cables, this plan must be submitted and sign off by NZTA before any works can begin.
2. All permits and approvals are to be approved before any work can commence
3. Chorus Cables shown are approximate location only, Contractor must not start any works until they have confirmed the location of Chorus/Power on site prior to commencement of excavation.

EXISTING SERIVCES LEGEND

- T — CHORUS (Indicative Only)
- P — POWER - LOW VOLTAGE
- P — POWER - HIGH VOLTAGE

Revision	Amendment	Approved	Revision Date
A	Preliminary Issue	RB	
B	Updated BH , CPT, TP and PP locations	RB	

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Designed	Approved	Approved Date
R Bond	R Bond	18.04.2019
Drawn	Scales	
B Mulholland	1:3000 (A3)	

Project
NEW ZEALAND TRANSPORT AGENCY
BEAUMONT, OTAGO
SH8 BEAUMONT BRIDGE REPLACEMENT

Sheet
GEOTECHNICAL TESTING LOCATIONS
OVERALL LAYOUT PLAN

Project No.	Sheet. No.	Revision
6-CT012.00	C201	B

PRELIMINARY

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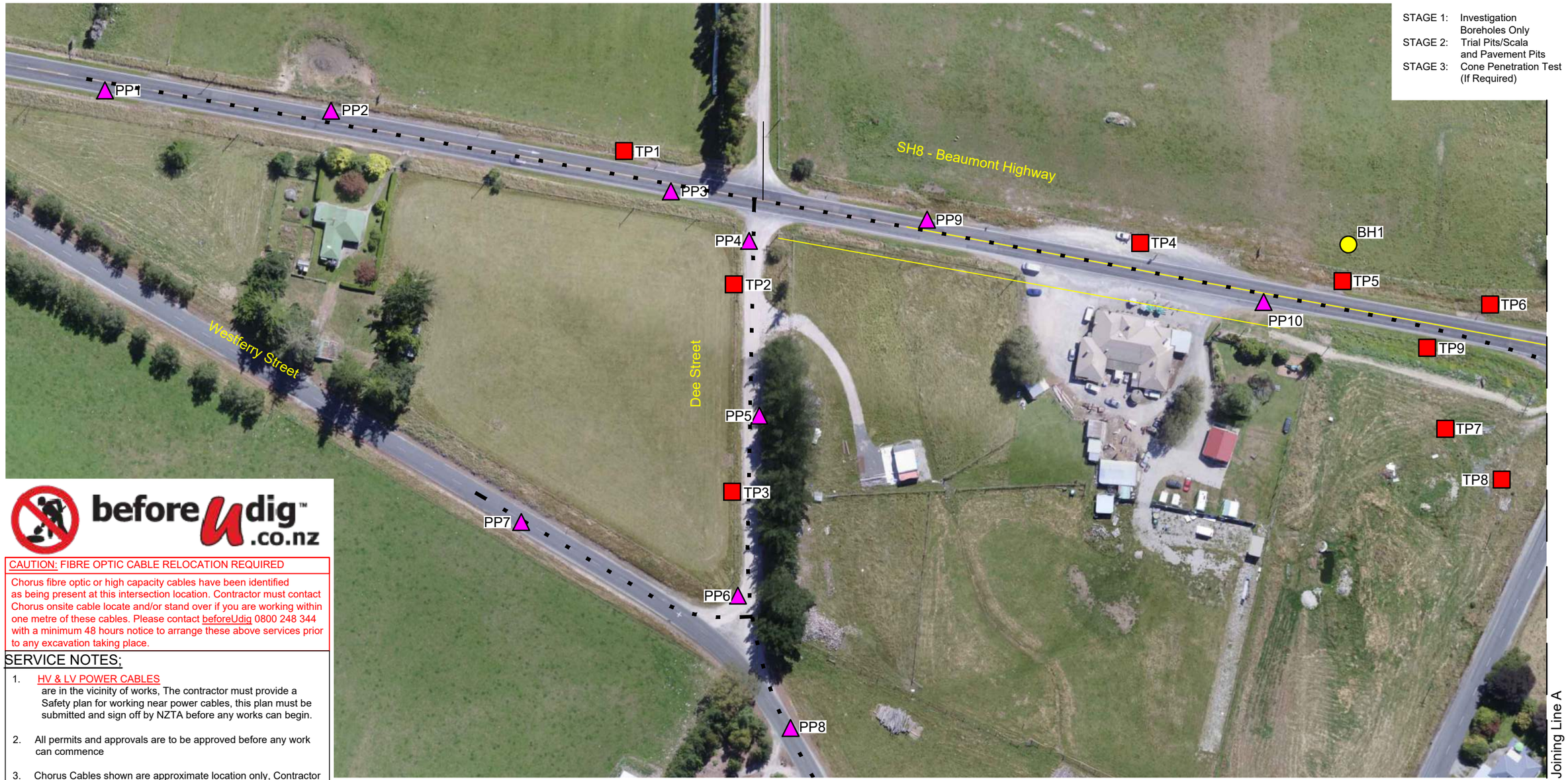

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Designed	Approved	Approved Date
R Bond	R Bond	18.04.2019
Drawn	Scales	
B Mulholland	1:1250 (A3)	

Project
NEW ZEALAND TRANSPORT AGENCY
BEAUMONT, OTAGO
SH8 BEAUMONT BRIDGE REPLACEMENT

Sheet
GEOTECHNICAL TESTING LOCATIONS
LAYOUT PLAN - WEST BEAUMONT

Project No.	Sheet No.	Revision
6-CT012.00	C202	B

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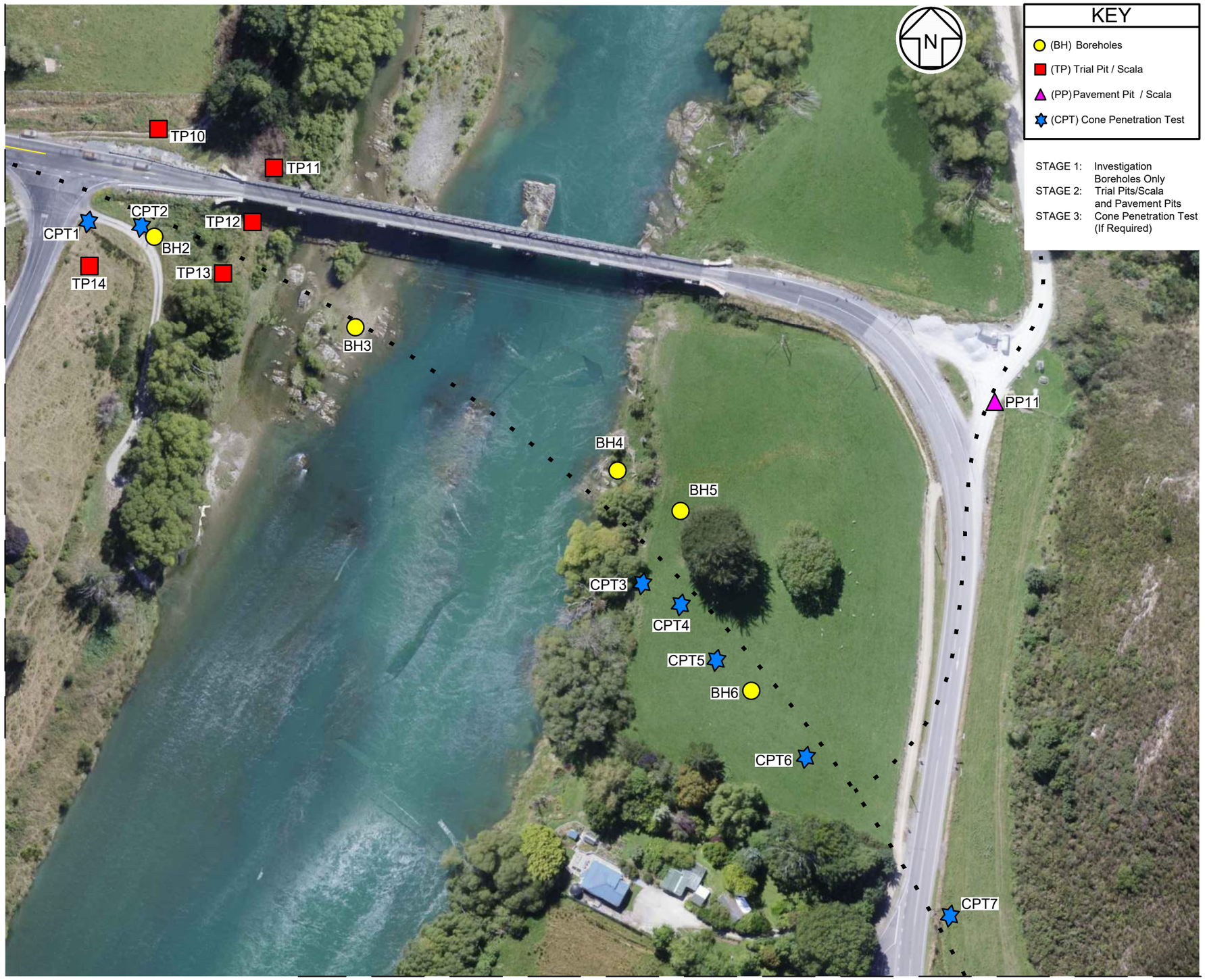

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Drawn	Scales	
B Mulholland	1:1250 (A3)	

Project: NEW ZEALAND TRANSPORT AGENCY
BEAUMONT, OTAGO
SH8 BEAUMONT BRIDGE REPLACEMENT

Sheet: GEOTECHNICAL TESTING LOCATIONS
LAYOUT PLAN - BEAUMONT BRIDGE AREA

Project No.	Sheet. No.	Revision
6-CT012.00	C203	B

1:1250 @ A3

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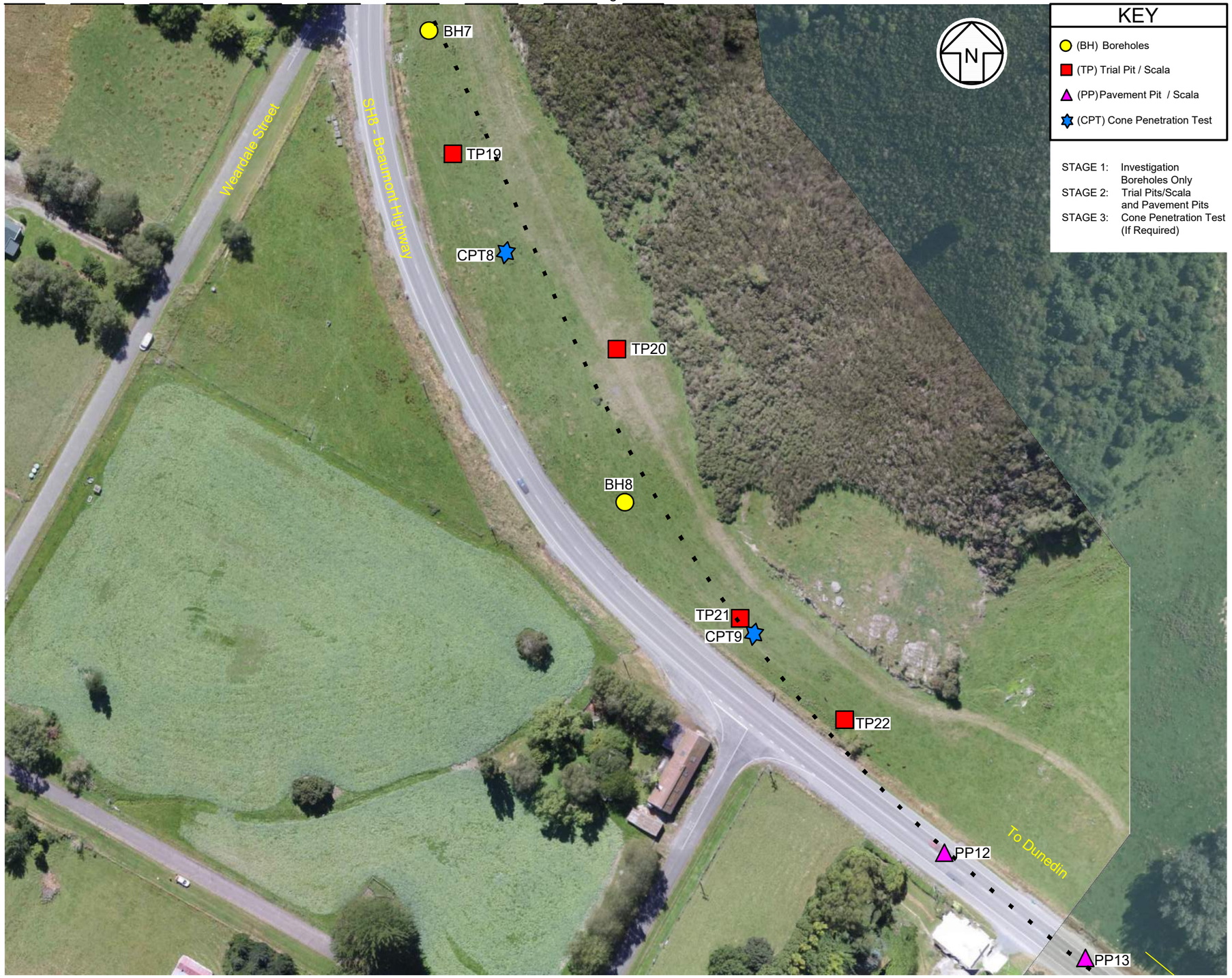

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EXISTING SERIVCES LEGEND

- T — CHORUS (Indicative Only)
- P — POWER - LOW VOLTAGE
- P — POWER - HIGH VOLTAGE

PRELIMINARY

Revision	Amendment	Approved	Revision Date
A	Preliminary Issue	RB	
B	Updated BH , CPT, TP and PP locations	RB	

NZ TRANSPORT AGENCY WAKA KOTAHI

WSP OPUS
Alexandra Office
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PO Box 273
Alexandra 9340
New Zealand

Designed	Approved	Approved Date
R Bond	R Bond	18.04.2019
Drawn	Scales	
B Mulholland	1:1250 (A3)	

Project: NEW ZEALAND TRANSPORT AGENCY
BEAUMONT, OTAGO
SH8 BEAUMONT BRIDGE REPLACEMENT

Sheet: GEOTECHNICAL TESTING LOCATIONS
LAYOUT PLAN - EAST BEAUMONT

Project No.	Sheet. No.	Revision
6-CT012.00	C204	B

Original Sheet Size A3 [420x297] Plot Date 2019-03-29 at 10:02:39 AM Path S:\Proj\NZ\6C\6-CT012.00 Beaumont Bridge Replacement\Home\500 Technical\520 Geotech\05110 - Geotech Testing Mgnt\4. Drawings\6-CT012.00_C201-C204(A) -GEOTECH TESTING LAYOUT PLANS(B).dwg C204(B)

1:1250 @ A3

0 10 20 30 40 50

Appendix B
Machine Borehole Logs and Photographs

SH8 Beaumont Bridge Realignment
Geotechnical Factual Report

Borehole No. BH01

Project:	Beaumont Bridge Replacement	*Coordinates:*	341099 E 804543 N		
Client:	NZTA	*Ref. Grid:*	n/a	*Depth:*	11 m
Project No.:	6-CT012.00	*R.L.:*	Not established	*Inclination:*	Vertical
Location:	SH1 - Beaumont	*Datum:*			

GEOLOGY	MAIN DESCRIPTION / DETAIL DESCRIPTION	R.L. (m)	DEPTH (m)	GRAPHIC LOG	TESTS: SPT 'N' VALUE	TESTS: SPT BLOW COUNTS OR SHEAR VALUE	ROCK STRENGTH	ROCK WEATHERING	ROCK DEFECT SPACING	DEFECT DIP (degrees 0–90)	DEFECTS / NOTES / OTHER TESTS	CORE: SAMPLE TYPE	CORE: TCR (%)	CORE: RQD (%)	DRILLING: DRILLING METHOD	DRILLING: CASING	DRILLING: BASE OF HOLE & WATER LEVEL	INSTALLATION DETAILS
	Clayey SILT with some sand and gravel; dark brown. Firm; moist; non plastic; sand, fine; gravel, fine, angular.											PQ	86	0	PQ Size, Triple Tube, Wireline Rotary Coring			
	Clayey SILT with sand; brownish orange. Moist; non plastic; sand fine.																	
	Fine to coarse GRAVEL rare boulders; grey/white/light orange. Sub rounded to rounded (washed via drilling)																	
	Metasandstone Highly weathered, orangish brown, foliated. Very weak, fine fabric. Foliation - steeply inclined, closely spaced, undulating rough, moderately narrow, infilled with completely weathered schist (silt/quartz gravel) greasy J1- very steeply inclined, closely spaced undulating rough, moderately narrow, infilled with completely weathered schist (silt/quartz gravel) greasy.		1				VW	HW				PQ	80	0				
	Metasandstone Moderately weathered, light grey. Very weak to weak, foliation steeply inclined laminated. Foliation - steeply inclined, moderately widely to very closely spaced, undulating smooth, narrow. J3 - steeply inclined, moderately widely spaced, slight infill with weathered schist.		2				W	MW				PQ	98	15				
			3									PQ	98	52				
			4									PQ	100	18				
	Machine fractured to gravel, majority quartz remaining.		5								4.60-5.00m - Highly weathered crush zone							
	Metasandstone Moderately weathered, light grey. Very weak to weak, foliation steeply inclined laminated. Foliation - steeply inclined, moderately widely to very closely spaced, undulating smooth, narrow. J3 - steeply inclined, moderately widely spaced, slight infill with weathered schist.		6				W	MW				PQ	95	0				
	Metasandstone/Phyllite Moderately weathered, orangish grey. Very weak to weak, foliation moderately to steeply inclined thinly laminated. Foliation - Moderately to steeply inclined, very closely spaced, planar smooth, narrow, greasy. J1 - Very steeply inclined, moderately widely spaced, undulating rough, iron oxide stained with minor infill J3 - Very steeply inclined, moderately widely spaced, narrow, iron oxide stained, weak.		7				W	MW				PQ	80	0				
												PQ	100	60				
												PQ	92	38				
	Silt infill possible cavity/vug																	
	Metasandstone/Phyllite Moderately weathered, orangish grey. Very weak to weak, foliation moderately to steeply inclined thinly laminated. Foliation - Moderately to steeply inclined, very closely spaced, planar smooth, narrow, greasy. J1 - Very steeply inclined, moderately widely spaced, undulating rough, iron oxide stained with minor infill J3 - Very steeply inclined, moderately widely spaced, narrow, iron oxide stained, weak.		8				W	MW				PQ	80	0				
												PQ	90	0				
	Metasandstone/Phyllite Moderately to slightly weathered, grey. Weak to moderately strong, foliation, thinly laminated, steeply inclined. Foliation - steeply inclined, closely spaced, stepped smooth, narrow, silt infill moderately		9				MS	MW			9.10-10.00m - Possible crush/ shear zone	PQ	94	0				

Notes:

Started:	24/08/2018	*Finished:*	28/08/2018
Drilling Co.:	McNeill	*Drilling Rig:*	UDR600
Logged by:	Liam Abbot	*Checked by:*	

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

Borehole No. BH01

Project:	Beaumont Bridge Replacement	*Coordinates:*	341099 E 804543 N		
Client:	NZTA	*Ref. Grid:*	n/a	*Depth:*	11 m
Project No.:	6-CT012.00	*R.L.:*	Not established	*Inclination:*	Vertical
Location:	SH1 - Beaumont	*Datum:*			

GEOLOGY	MAIN DESCRIPTION / DETAIL DESCRIPTION	R.L. (m) / DEPTH (m)	GRAPHIC LOG	TESTS: SPT 'N' VALUE	TESTS: SPT BLOW COUNTS OR SHEAR VALUE	ROCK STRENGTH	ROCK WEATHERING	ROCK DEFECT SPACING	DEFECT DIP (degrees 0–90)	DEFECTS / NOTES / OTHER TESTS	CORE: SAMPLE TYPE	CORE: TCR (%)	CORE: RQD (%)	DRILLING: DRILLING METHOD	DRILLING: CASING	DRILLING: BASE OF HOLE & WATER LEVEL	INSTALLATION DETAILS
	inclined. J3 - very steeply inclined widely spaced, stepped smooth, on quartz band. 6.55-11.00m - Water level										PQ	94	0				
	Metasandstone Moderately weathered, grey. Weak to moderately strong, foliation, thinly laminated, moderately inclined. Quartzofeldspathic bands, folded, 150mm thick, very 300mm Foliation - moderately inclined, moderately widely spaced, planar rough, very narrow, weak surface. J1 - sub vertical, moderately widely spaced, stepped rough, narrow J3 - very steeply inclined, moderately widely spaced, stepped rough, very narrow, weak.	11				MS	MW				PQ	87	13				
	Metasandstone Moderately weathered, grey. Weak to moderately strong, foliation, thinly laminated, moderately inclined. Quartzofeldspathic banding widely spaced with foliation and on J3. Foliation - moderately inclined, very closely spaced, planar rough, very narrow, weak surface. J1 - sub vertical, widely spaced, stepped rough, moderately narrow*(continued)*	12 13 14 15 16 17 18 19															
	END OF BOREHOLE AT 11m - Target Depth Reached																

BOREHOLE SOIL/ROCK LOG A4 BEAUMONT BRIDGE - SITE INVESTGATION INFORMATION.GPJ OPUS2016_TEM.GDT 12/4/19

Notes:

Started:	24/08/2018	*Finished:*	28/08/2018
Drilling Co.:	McNeill	*Drilling Rig:*	UDR600
Logged by:	Liam Abbot	*Checked by:*	

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

Borehole No. BH01

Project:	Beaumont Bridge Replacement	*Coordinates:*	341099 E 804543 N		
Client:	NZTA	*Ref. Grid:*	n/a	*Depth:*	11 m
Project No.:	6-CT012.00	*R.L.:*	Not established	*Inclination:*	Vertical
Location:	SH1 - Beaumont	*Datum:*			

PHOTOGRAPHS

Photo BH01.1
0.0-2.5m

Photo BH01.2
2.5-4.6m

BOREHOLE SOIL/ROCK LOG A4 BEAUMONT BRIDGE - SITE INVESTGATION INFORMATION.GPJ OPUS2016_TEM.GDT 12/4/19

Notes:

Started:	24/08/2018	*Finished:*	28/08/2018
Drilling Co.:	McNeill	*Drilling Rig:*	UDR600
Logged by:	Liam Abbot	*Checked by:*	

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

Borehole No. BH01

Project:	Beaumont Bridge Replacement	*Coordinates:*	341099 E 804543 N		
Client:	NZTA	*Ref. Grid:*	n/a	*Depth:*	11 m
Project No.:	6-CT012.00	*R.L.:*	Not established	*Inclination:*	Vertical
Location:	SH1 - Beaumont	*Datum:*			

PHOTOGRAPHS

Photo BH01.3
4.6-6.7m

Photo BH01.4
6.7-8.8m

Notes:

Started:	24/08/2018	*Finished:*	28/08/2018
Drilling Co.:	McNeill	*Drilling Rig:*	UDR600
Logged by:	Liam Abbot	*Checked by:*	

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

Borehole No. BH01

Project:	Beaumont Bridge Replacement	*Coordinates:*	341099 E 804543 N		
Client:	NZTA	*Ref. Grid:*	n/a	*Depth:*	11 m
Project No.:	6-CT012.00	*R.L.:*	Not established	*Inclination:*	Vertical
Location:	SH1 - Beaumont	*Datum:*			

PHOTOGRAPHS

Photo BH01.5
8.8-10.8m

Photo BH01.6
10.8-11.0m

Notes:

Started:	24/08/2018	*Finished:*	28/08/2018
Drilling Co.:	McNeill	*Drilling Rig:*	UDR600
Logged by:	Liam Abbot	*Checked by:*	

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

Borehole No. BH02

Project:	Beaumont Bridge Replacement	*Coordinates:*	341207 E 804482 N
Client:	NZTA	*Ref. Grid:*	n/a
Project No.:	6-CT012.00	*R.L.:*	46.68 m
Location:	SH1 - Beaumont	*Datum:*	

Depth: 12.3 m
Inclination: Vertical

GEOLOGY	MAIN DESCRIPTION / DETAIL DESCRIPTION	R.L. (m)	DEPTH (m)	GRAPHIC LOG	TESTS: SPT 'N' VALUE	TESTS: SPT BLOW COUNTS OR SHEAR VALUE	ROCK STRENGTH	ROCK WEATHERING	ROCK DEFECT SPACING	DEFECT DIP (degrees 0–90)	DEFECTS / NOTES / OTHER TESTS	CORE: SAMPLE TYPE	CORE: TCR (%)	CORE: RQD (%)	DRILLING: DRILLING METHOD	DRILLING: CASING	DRILLING: BASE OF HOLE & WATER LEVEL	INSTALLATION DETAILS
	Sandy fine to coarse GRAVEL with some silt; greyish brown. Moist, sub rounded.	46	1									PQ	10	0	PQ Size, Triple Tube, Wireline Rotary Coring			
			2									PQ	20	0				
	Metasandstone Moderately weathered, orangish grey. Weak, foliated, steeply inclined laminated. Quartzofeldspathic folded banding, 100mm widely space. Foliation - steeply inclined, closely spaced, planar rough, moderate narrow. J1 - sub vertical, moderately widely spaced, undulating smooth, very narrow, highly weathered at surface.	44	3				W	MW				PQ	86	14				
												PQ	96	88				
	Metasandstone Slightly weathered, grey. Moderately strong, foliated, moderately inclined, thinly laminated. Quartzofeldspathic folded zoned 4.05-4.15m 4.3-4.6m Foliation - moderately inclined, closely spaced (becoming very closely at 5.7m), planar rough, very narrow, moderately weathered, iron pyrite, greasy. J1 - sub vertical, widely spaced, planar rough, tight, slight weathering. J3 - moderately inclined, widely spaced, very narrow, silt infill, iron pyrite	42	4				MS	SW				PQ	100	38				
			5									PQ	89	79				
												PQ	75	14				
	Metasandstone Slightly weathered, grey. Moderately strong to strong, foliated, moderately inclined, laminated. Quartzofeldspathic banding with foliation, very thin closely spaced. Foliation - moderately inclined, closely spaced, planar rough, very narrow, weathered mica, iron pyrite, greasy. J1 - Very steeply inclined to sub vertical, moderately widely spaced, planar rough, tight, weathered surfaces, greasy. J3 - steeply inclined, widely spaced, stepped rough, narrow, weathered mica Below 9.5m defects dominated by fractures on quartz banding on J3 stepped rough, very narrow, weathered feldspar.	40	6				S	SW			7.70-11.00m - Poor circulation during drilling Lab: PLT 187.2 MPa Axial Estimated Compressive strength Lab: UCS 75.7 MPa Lab: PLT 187.2 MPa Axial Estimated Compressive strength Lab: UCS 75.7 MPa 8.40-8.90m - Crush zone on J1 slightly weathered	PQ	80	39				
			7															
			8									PQ	100	44				
		38	9				S	MW				PQ	100	37				

BOREHOLE SOIL/ROCK LOG A4 BEAUMONT BRIDGE - SITE INVESTGATION INFORMATION.GPJ OPUS2016_TEM.GDT 12/4/19

Notes:

Started:	29/08/2018	*Finished:*	30/08/2018
Drilling Co.:	McNeill	*Drilling Rig:*	UDR600
Logged by:	Liam Abbot	*Checked by:*	

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

Borehole No. BH02

Project:	Beaumont Bridge Replacement	*Coordinates:*	341207 E 804482 N		
Client:	NZTA	*Ref. Grid:*	n/a	*Depth:*	12.3 m
Project No.:	6-CT012.00	*R.L.:*	46.68 m	*Inclination:*	Vertical
Location:	SH1 - Beaumont	*Datum:*			

GEOLOGY	MAIN DESCRIPTION / DETAIL DESCRIPTION	R.L. (m)	DEPTH (m)	GRAPHIC LOG	TESTS: SPT 'N' VALUE	TESTS: SPT BLOW COUNTS OR SHEAR VALUE	ROCK STRENGTH	ROCK WEATHERING	ROCK DEFECT SPACING	DEFECT DIP (degrees 0–90)	DEFECTS / NOTES / OTHER TESTS	CORE: SAMPLE TYPE	CORE: TCR (%)	CORE: RQD (%)	DRILLING: DRILLING METHOD	DRILLING: CASING	DRILLING: BASE OF HOLE & WATER LEVEL	INSTALLATION DETAILS
	Metasandstone Moderately weathered, grey. Weak to moderately strong, foliation, thinly laminated, moderately inclined. Quartzofeldspathic banding widely spaced with foliation and on J3. Foliation - moderately inclined, very closely spaced, planar rough, very narrow, weak surface. J1 - sub vertical, widely spaced, stepped rough, moderately narrow	36	11				S	MW				PQ	100	37	PQ Size, Triple Tube, Wireline Rotary Coring			
												PQ	100	0				
												PQ	95	7				
			12															
	END OF BOREHOLE AT 12.3m - Target Depth Reached	34	13															
			14															
		32	15															
			16															
		30	17															
			18															
		28	19															

BOREHOLE SOIL/ROCK LOG A4 BEAUMONT BRIDGE - SITE INVESTGATION INFORMATION.GPJ OPUS2016_TEM.GDT 12/4/19

Notes:

Started:	29/08/2018	*Finished:*	30/08/2018
Drilling Co.:	McNeill	*Drilling Rig:*	UDR600
Logged by:	Liam Abbot	*Checked by:*	

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

Borehole No. BH02

Project:	Beaumont Bridge Replacement	*Coordinates:*	341207 E 804482 N		
Client:	NZTA	*Ref. Grid:*	n/a	*Depth:*	12.3 m
Project No.:	6-CT012.00	*R.L.:*	46.68 m	*Inclination:*	Vertical
Location:	SH1 - Beaumont	*Datum:*			

PHOTOGRAPHS

Photo BH02.1
0.0-4.0m

Photo BH02.2
4.0-6.0m

BOREHOLE SOIL/ROCK LOG A4 BEAUMONT BRIDGE - SITE INVESTGATION INFORMATION.GPJ OPUS2016_TEM.GDT 12/4/19

Notes:

Started:	29/08/2018	*Finished:*	30/08/2018
Drilling Co.:	McNeill	*Drilling Rig:*	UDR600
Logged by:	Liam Abbot	*Checked by:*	

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

Borehole No. BH02

Project:	Beaumont Bridge Replacement	*Coordinates:*	341207 E 804482 N		
Client:	NZTA	*Ref. Grid:*	n/a	*Depth:*	12.3 m
Project No.:	6-CT012.00	*R.L.:*	46.68 m	*Inclination:*	Vertical
Location:	SH1 - Beaumont	*Datum:*			

PHOTOGRAPHS

Photo BH02.3
6.0-8.1m

Photo BH02.4
8.1-10.25m

Notes:

Started:	29/08/2018	*Finished:*	30/08/2018
Drilling Co.:	McNeill	*Drilling Rig:*	UDR600
Logged by:	Liam Abbot	*Checked by:*	

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

Borehole No. BH02

Project:	Beaumont Bridge Replacement	*Coordinates:*	341207 E 804482 N		
Client:	NZTA	*Ref. Grid:*	n/a	*Depth:*	12.3 m
Project No.:	6-CT012.00	*R.L.:*	46.68 m	*Inclination:*	Vertical
Location:	SH1 - Beaumont	*Datum:*			

PHOTOGRAPHS

Photo BH02.5
10.25-12.3m

Notes:

Started:	29/08/2018	*Finished:*	30/08/2018
Drilling Co.:	McNeill	*Drilling Rig:*	UDR600
Logged by:	Liam Abbot	*Checked by:*	

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

Borehole No. BH03

Project:	Beaumont Bridge Replacement	*Coordinates:*	341273 E 804460 N		
Client:	NZTA	*Ref. Grid:*	n/a	*Depth:*	20 m
Project No.:	6-CT012.00	*R.L.:*	39.76 m	*Inclination:*	Vertical
Location:	SH1 - Beaumont	*Datum:*			

GEOLOGY	MAIN DESCRIPTION / DETAIL DESCRIPTION	R.L. (m)	DEPTH (m)	GRAPHIC LOG	TESTS: SPT 'N' VALUE	TESTS: SPT BLOW COUNTS OR SHEAR VALUE	ROCK STRENGTH	ROCK WEATHERING	ROCK DEFECT SPACING	DEFECT DIP (degrees 0–90)	DEFECTS / NOTES / OTHER TESTS	CORE: SAMPLE TYPE	CORE: TCR (%)	CORE: RQD (%)	DRILLING: DRILLING METHOD	DRILLING: CASING	DRILLING: BASE OF HOLE & WATER LEVEL	INSTALLATION DETAILS
	Cobbles and silt		1									PQ	36		PQ Size, Triple Tube, Wireline Rotary Coring			
												PQ	65					
	Metasandstone Slightly weathered to unweathered, light greg, foliated. Moderately strong, foliation steeply inclined, undulating smooth.	38					MS	SW										
	Quartzofeldspathic banding, thin to very thin, moderately to steep ly inclined, occurs both parallel to and crosscutting foliation.		2								Lab: PLT 38.6 MPa Diametral Estimated Compressive strength	PQ	73	45				
	J1 - (1.42m) Very steeply inclined, moderately narrow, undulating rough, infilled with quartz. No other information availible due to drilling damage.											PQ	68					
												PQ	100	0				
												PQ	100	70				
	Metasandstone Slightly to unweathered, greenish grey, foliation with segregation bands. Moderately stong to strong, foliation steeply inclined, very thin segregations of epidote rich and quartzofeldspathic material. closely to very closely spaced.		3									PQ	82	44				
	Foliation separations - steeply inclined, closely spaced, moderately narrow, stepped smooth to rough, healed in placed.	36										PQ	65					
												PQ	56					
	J1 - Very steeply inclined, moderately widely spaced, narrow, undulating smooth to stepped rough.		4				S	UW										
	J2 (cross cutting foliation) - moderately inclined, widely spaced, narrow, undulating smooth.											PQ	22					
	Metasandstone - quartz rich Slightly to unweathered, light grey, foliated. Moderately strong. Quartz banding very thin, closely to very closely spaced. Significant drilling breakage on quartz banding, no other defect information available.		5															
		34										PQ	36					
			6								Lab: PLT 29.1 MPa Axial Estimated Compressive Strength	PQ	73					
	Metasandstone Slightly weathered, light grey, foliated. Moderately strong. quartzofeldspathic banding very thin, closely to very closely spaced, mainly cross cutting foliation.											PQ	46					
	J1 - sub vertical to very steeply inclined, widely spaced, narrow, undulating steeped to rough, clear surfaces with no infill but slight weathered on surface.		7									PQ	98	75				
	foliation separations - steeply inclined, closely spaced, narrow, undulating rough, unweathered surfaces but slightly greasy where not healed.	32										PQ	59	26				
			8				MS	SW										
												PQ	100	250				
												PQ	25	250				
			9									PQ	29					
		30										PQ	100	100				
												PQ	96	43				

Notes:

Started:	29/01/2019	*Finished:*	1/02/2019
Drilling Co.:	McNeill	*Drilling Rig:*	UDR600
Logged by:	J Grindley / L Abbot	*Checked by:*	

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

Borehole No. BH03

Project:	Beaumont Bridge Replacement	*Coordinates:*	341273 E 804460 N		
Client:	NZTA	*Ref. Grid:*	n/a	*Depth:*	20 m
Project No.:	6-CT012.00	*R.L.:*	39.76 m	*Inclination:*	Vertical
Location:	SH1 - Beaumont	*Datum:*			

GEOLOGY	MAIN DESCRIPTION / DETAIL DESCRIPTION	R.L. (m)	DEPTH (m)	GRAPHIC LOG	TESTS: SPT 'N' VALUE	TESTS: SPT BLOW COUNTS OR SHEAR VALUE	ROCK STRENGTH	ROCK WEATHERING	ROCK DEFECT SPACING	DEFECT DIP (degrees 0–90)	DEFECTS / NOTES / OTHER TESTS	CORE: SAMPLE TYPE	CORE: TCR (%)	CORE: RQD (%)	DRILLING: DRILLING METHOD	DRILLING: CASING	DRILLING: BASE OF HOLE & WATER LEVEL	INSTALLATION DETAILS
	@10.62 Foliation separation - moderately narrow, infilled with silt and some clay, greasy.						MS	SW				PQ	96	43	PQ Size, Triple Tube, Wireline Rotary Coring			
	Foliation shear - steeply inclined, moderately wide, undulating rough, infilled with non plastic silt with fine laminated fabric, surfaces are weak with platy alteration.		11															
	Metasandstone, Unweathered, light grey, foliated. Moderately strong to strong, foliation steeply inclined undulating smooth, segregation becomes laminated, quartz veining becomes rarer and some pyrite is present. Quartzofeldspathic banding, steeply inclined, closely to moderately widely spaced. It only cuts foliation in rare cases		28								Lab: PLT 40.9 MPa Diametral Estimated Compressive strength Lab: UCS 27.0 MPa							
	J1 - sub vertical, widely spaced, very narrow, undulating smooth to roughy.		12									PQ	97	67				
	J2 - moderately inclined, widely spaced, narrow, undulating rough, clean surfaces with no infill.																	
	Foliation separations - widely spaced, closely to moderately spaced, moderately narrow, undulating smooth to planar, healed in placed with otherwise minor weathering of feldspar on clean surfaces.		13				MS	UW				PQ	100	100				
	Metasandstone Unweathered, light grey, Moderately strong, foliation, laminated, steeply inclined.		26									PQ	100	84				
	Quartzofeldspathic banding with foliation and perpendicular to foliation, thin, very closely spaced.		14									PQ	80	20				
	Foliation separation - steeply inclined, closely spaced, undulating smooth, very narrow, slight weathering on surface.											PQ	88	20				
	J1 - very steeply inclined to sub vertical, moderately widely spaced, steeped smooth, very narrow.		15									PQ	98	20				
	J3 - steeply inclined planar rough, narrow.																	
	Metasandstone/Phyllite Slightly weathered, grey, Weak to Moderately strong, foliation, thinly laminated, steeply inclined.		24									PQ	63	0				
	Quartzofeldspathic banding perpendicular to foliation, thin, closely spaced.		16				W	SW				PQ	60	0				
	Foliation separation - steeply inclined, very closely spaced, undulating smooth, very narrow, slight weathering on surface, weak.											PQ	400	0				
	J1 - very steeply inclined to sub vertical, widely spaced, steeped smooth, tight.											PQ	100	0				
	Metasandstone/Phyllite Unweathered, light grey, foliated. Moderately strong, foliation, laminated, steeply inclined. Chlorite banding at 17.3m Foliation - Steeply inclined, closely spaced, undulating smooth very narrow,		17								Lab: PLT 117 MPa Axial Estimated Compressive Strength Lab: PLT 132 MPa Diametral Estimated Compressive Strength Lab: UCS 42.5 MPa	PQ	100	90				
	J3 - very steeply inclined, moderately weathered, weak, weathered feldspar, slight discolouration.		22															
	Metasandstone, dominated by Quartzofeldspathic banding Grey/white/green grey, unweathered, foliated. Moderately strong.		18				S	UW				PQ	100	36				
	Foliation - steeply inclined, closely spaced, very narrow, weathered mica.											PQ	100	53				
	J1 - very steeply inclined, widely spaced, stepped rough, very narrow, minor weathering of quartz.		19															
	Metasandstone Unweathered, light grey, foliated. Moderately strong, foliation, laminated, steeply inclined. Chlorite banding. Foliation - Steeply inclined, moderately widely spaced, undulating smooth very narrow,											PQ	100	79				
	J3 - very steeply inclined, moderately weathered, weak, weathered feldspar, slight		20															

BOREHOLE SOIL/ROCK LOG A4 BEAUMONT BRIDGE - SITE INVESTGATION INFORMATION.GPJ OPUS2016_TEM.GDT 12/4/19

Notes:

Started:	29/01/2019	*Finished:*	1/02/2019
Drilling Co.:	McNeill	*Drilling Rig:*	UDR600
Logged by:	J Grindley / L Abbot	*Checked by:*	

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

Borehole No. BH03

Project:	Beaumont Bridge Replacement	*Coordinates:*	341273 E 804460 N		
Client:	NZTA	*Ref. Grid:*	n/a	*Depth:*	20 m
Project No.:	6-CT012.00	*R.L.:*	39.76 m	*Inclination:*	Vertical
Location:	SH1 - Beaumont	*Datum:*			

GEOLOGY	MAIN DESCRIPTION / DETAIL DESCRIPTION	R.L. (m)	DEPTH (m)	GRAPHIC LOG	TESTS: SPT 'N' VALUE	TESTS: SPT BLOW COUNTS OR SHEAR VALUE	ROCK STRENGTH	ROCK WEATHERING	ROCK DEFECT SPACING	DEFECT DIP (degrees 0–90)	DEFECTS / NOTES / OTHER TESTS	CORE: SAMPLE TYPE	CORE: TCR (%)	CORE: RQD (%)	DRILLING: DRILLING METHOD	DRILLING: CASING	DRILLING: BASE OF HOLE & WATER LEVEL	INSTALLATION DETAILS
	discolouration.																	
	Metasandstone, dominated by Quartzofeldspathic banding Grey/white/green grey, unweathered, foliated. Moderately strong. Foliation - steeply inclined, closely spaced, undulating smooth, narrow, weathered mica and feldspar.																	
	END OF BOREHOLE AT 20m - Target Depth Reached	21																
		18																
		22																
		23																
		16																
		24																
		25																
		14																
		26																
		27																
		12																
		28																
		29																
		10																

BOREHOLE SOIL/ROCK LOG A4 BEAUMONT BRIDGE - SITE INVESTGATION INFORMATION.GPJ OPUS2016_TEM.GDT 12/4/19

Notes:

Started:	29/01/2019	*Finished:*	1/02/2019
Drilling Co.:	McNeill	*Drilling Rig:*	UDR600
Logged by:	J Grindley / L Abbot	*Checked by:*	

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

Borehole No. BH03

Project:	Beaumont Bridge Replacement	*Coordinates:*	341273 E 804460 N		
Client:	NZTA	*Ref. Grid:*	n/a	*Depth:*	20 m
Project No.:	6-CT012.00	*R.L.:*	39.76 m	*Inclination:*	Vertical
Location:	SH1 - Beaumont	*Datum:*			

PHOTOGRAPHS

Photo BH03.1
Box 1 - 0.0m to 2.7m

Photo BH03.2
Box 2 - 2.7m to 6.2m

Notes:

Started:	29/01/2019	*Finished:*	1/02/2019
Drilling Co.:	McNeill	*Drilling Rig:*	UDR600
Logged by:	J Grindley / L Abbot	*Checked by:*	

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

Borehole No. BH03

Project:	Beaumont Bridge Replacement	*Coordinates:*	341273 E 804460 N		
Client:	NZTA	*Ref. Grid:*	n/a	*Depth:*	20 m
Project No.:	6-CT012.00	*R.L.:*	39.76 m	*Inclination:*	Vertical
Location:	SH1 - Beaumont	*Datum:*			

PHOTOGRAPHS

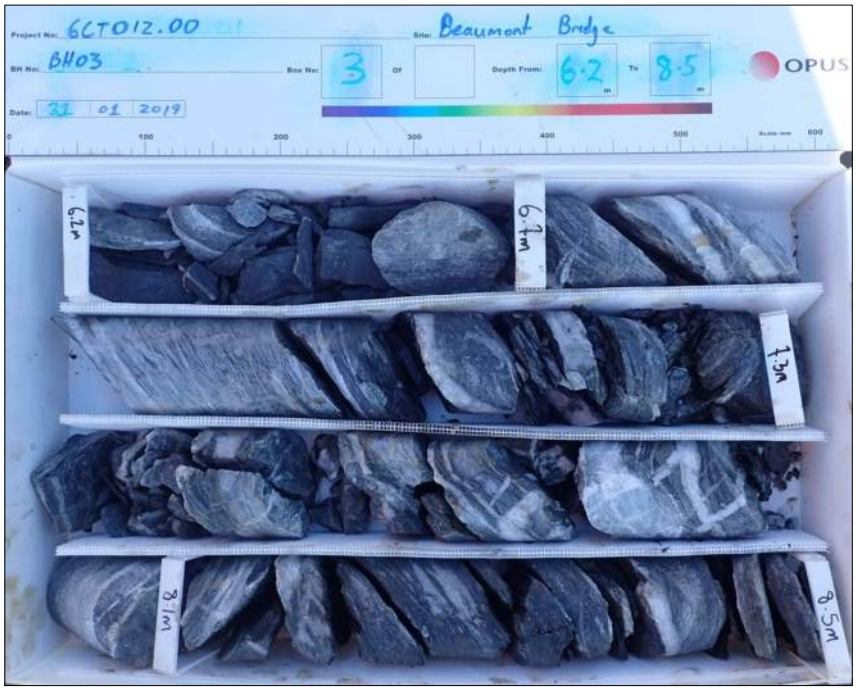


Photo BH03.3
Box 3 - 6.2m to 8.5m

Photo BH03.4
Box 4 - 8.5m to 11.1m

BOREHOLE SOIL/ROCK LOG A4 BEAUMONT BRIDGE - SITE INVESTGATION INFORMATION.GPJ OPUS2016_TEM.GDT 12/4/19

Notes:

Started:	29/01/2019	*Finished:*	1/02/2019
Drilling Co.:	McNeill	*Drilling Rig:*	UDR600
Logged by:	J Grindley / L Abbot	*Checked by:*	

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

Borehole No. BH03

Project:	Beaumont Bridge Replacement	*Coordinates:*	341273 E 804460 N		
Client:	NZTA	*Ref. Grid:*	n/a	*Depth:*	20 m
Project No.:	6-CT012.00	*R.L.:*	39.76 m	*Inclination:*	Vertical
Location:	SH1 - Beaumont	*Datum:*			

PHOTOGRAPHS

Photo BH03.5
Box 5 - 11.1m to 13.1m

Photo BH03.6
Box 6 13.1m to 15.3m

BOREHOLE SOIL/ROCK LOG A4 BEAUMONT BRIDGE - SITE INVESTGATION INFORMATION.GPJ OPUS2016_TEM.GDT 12/4/19

Notes:

Started:	29/01/2019	*Finished:*	1/02/2019
Drilling Co.:	McNeill	*Drilling Rig:*	UDR600
Logged by:	J Grindley / L Abbot	*Checked by:*	

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

Borehole No. BH03

Project:	Beaumont Bridge Replacement	*Coordinates:*	341273 E 804460 N		
Client:	NZTA	*Ref. Grid:*	n/a	*Depth:*	20 m
Project No.:	6-CT012.00	*R.L.:*	39.76 m	*Inclination:*	Vertical
Location:	SH1 - Beaumont	*Datum:*			

PHOTOGRAPHS

Photo BH03.7
Box 7 - 15.3m to 17.3m

Photo BH03.8
Box 8 - 17.3m to 19.2m

Notes:

Started:	29/01/2019	*Finished:*	1/02/2019
Drilling Co.:	McNeill	*Drilling Rig:*	UDR600
Logged by:	J Grindley / L Abbot	*Checked by:*	

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

Borehole No. BH03

Project:	Beaumont Bridge Replacement	*Coordinates:*	341273 E 804460 N		
Client:	NZTA	*Ref. Grid:*	n/a	*Depth:*	20 m
Project No.:	6-CT012.00	*R.L.:*	39.76 m	*Inclination:*	Vertical
Location:	SH1 - Beaumont	*Datum:*			

PHOTOGRAPHS

Photo BH03.9
Box 9 - 19.2m to 20.0m

Notes:

Started:	29/01/2019	*Finished:*	1/02/2019
Drilling Co.:	McNeill	*Drilling Rig:*	UDR600
Logged by:	J Grindley / L Abbot	*Checked by:*	

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

Borehole No. BH04

Project:	Beaumont Bridge Replacement	*Coordinates:*	341350 E 804416 N		
Client:	NZTA	*Ref. Grid:*	n/a	*Depth:*	20 m
Project No.:	6-CT012.00	*R.L.:*	40.84 m	*Inclination:*	90°
Location:	SH1 - Beaumont	*Datum:*		*Azimuth:*	0°

GEOLOGY	MAIN DESCRIPTION / DETAIL DESCRIPTION	R.L. (m)	DEPTH (m)	GRAPHIC LOG	TESTS: SPT 'N' VALUE	TESTS: SPT BLOW COUNTS OR SHEAR VALUE	ROCK STRENGTH	ROCK WEATHERING	ROCK DEFECT SPACING	DEFECT DIP (degrees 0–90)	DEFECTS / NOTES / OTHER TESTS	CORE: SAMPLE TYPE	CORE: TCR (%)	CORE: RQD (%)	DRILLING: DRILLING METHOD	DRILLING: CASING	DRILLING: BASE OF HOLE & WATER LEVEL	INSTALLATION DETAILS
	Cobbles, silt, and fill	40	1									PQ	14	0	PQ Size, Triple Tube, Wireline Rotary Coring			Backfilled with Arisings
	Lost Core - Barrel closed off with cobble		2									PQ	0	0				
	Metasandstone Slightly weathered, light grey, foliated. Moderately strong, recovered as gravel / broken chips. Becomes Intact, quartzofeldspathic banding up to 30mm thick. Foliation - moderately inclined, undulating smooth to planar rough, narrow. J1 - Very steeply inclined	38	3				S	SW			Lab: PLT 105.7 MPa Axial Estimated Compressive Strength	PQ	85	0				
												PQ	100	39				
	Phyllite, Unweathered to slightly weathered, blueish grey, foliated. Weak to moderately strong, foliation mm scale, recovered as chips breaking along foliation. Quartzofeldspathic banding, closely spaced, thin.		4				W	SW				PQ	45	0				
	Metasandstone Slightly weathered, greenish grey, foliated. Weak to moderately strong, foliation mm scale.	36	5				MS	SW			4.80m - Runs shortened due to recovery	PQ	91	41				
												PQ	70	70				
	Metasandstone As above but segregated into quart and epidote rich bands. Recovery is more intact due to restarting drilling. Quartzofeldspathic banding, moderately to steeply inclined, closely spaced, 15mm thick, orientated parallel and perpendicular to foliaiton. Foliation separations, steeply inclined, closely spaced, moderately narrow, undulating, smooth to rough.	34	6								5.70m - Pulled and re-ran rods	PQ	93	93				
	J1 - Sub vertical, moderately widely spaced, narrow, undulating rough to stepped smooth, healed in places 6.55m - Foliation separations as above but have healed		7								Lab: UCS 17.5 MPa Lab: PLT 38.6 MPa Diametral Estimated Compressive Strength Lab: PLT 36.7 MPa Axial Estimated Compressive Strength Lab: PLT 65.6 MPa Axial Estimated Compressive Strength	PQ	68	13				
	Phyllite As above, foliation smooth to rough. Quartzofeldspathic banding inclined with foliation, closely spaced, narrow. Fracturing, sub vertical to steeply inclined, very closely spaced, very narrow, undulating rough, healed.		8									PQ	92	15				
	Metasandstone Slightly weathered to unweathered, bluish grey, foliated. Moderately strong, foliation mm scale undulating smooth. Quartz banding with foliation at 10mm scale. J1 - Very steeply inclined, moderately widely spaced, moderately narrow, steeped smooth with iron hydroxyl staining on surfaces. Fracturing around joint occurred as drilling damage. Conjugate set to J1, as J1 but closed.	32	9				S	SW				PQ	94	0				
											Lab: PLT 71.9 MPa Axial Estimated Compressive Strength	PQ	95	16				

Notes:

Started:	6/11/2018	*Finished:*	8/11/2018
Drilling Co.:	McNeill	*Drilling Rig:*	UDR600
Logged by:	J Grindley / L Abbot	*Checked by:*	

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

Borehole No. BH04

Project:	Beaumont Bridge Replacement	*Coordinates:*	341350 E 804416 N		
Client:	NZTA	*Ref. Grid:*	n/a	*Depth:*	20 m
Project No.:	6-CT012.00	*R.L.:*	40.84 m	*Inclination:*	90°
Location:	SH1 - Beaumont	*Datum:*		*Azimuth:*	0°

GEOLOGY	MAIN DESCRIPTION / DETAIL DESCRIPTION	R.L. (m)	DEPTH (m)	GRAPHIC LOG	TESTS: SPT 'N' VALUE	TESTS: SPT BLOW COUNTS OR SHEAR VALUE	ROCK STRENGTH	ROCK WEATHERING	ROCK DEFECT SPACING	DEFECT DIP (degrees 0–90)	DEFECTS / NOTES / OTHER TESTS	CORE: SAMPLE TYPE	CORE: TCR (%)	CORE: RQD (%)	DRILLING: DRILLING METHOD	DRILLING: CASING	DRILLING: BASE OF HOLE & WATER LEVEL	INSTALLATION DETAILS
	As above but veining closely spaced, moderately narrow, both parallel and perpendicular to foliation. Foliation, moderately to steeply inclined, closely spaced, narrow to moderately narrow, undulating rough to stepped smooth. At 9.55 becomes very closely spaced. At 10.8 goes back to closely spaced. J1 - sub vertical, very widely spaced, narrow, stepped rough, slight weathering of surface feldspars. J2 - very steeply inclined, closely spaced, narrow to moderately narrow, undulating rough to stepped rough, infilled with quartz in places.*(continued)*		30								Lab: UCS 58.5 MPa Lab: PLT 18.2 MPa Axial Estimated Compressive Strength	PQ	95	16				
		11					S	SW			10.90m - Bit changed due to prevous poor run	PQ	88	8				
	As above Veining moderately to very steeply inclined, closely to very closely spaced, moderately narrow to moderately wide											PQ	36	0				
		12																
	Metasandstone Slightly weathered, dark grey, foliated. Moderately strong, foliation, moderately inclined, mm scale. Alternating bands of chlorites and quartz rich bands, very closely spaced, very thin, planar smooth. Foliation separations, steeply inclined, moderately widely spaced, very narrow to narrow, planar rough to undulating smooth, wall surfaces weak, with some weathering and pyrites present on surface.	28										PQ	92	30				
		13										PQ	100	50				
	Joints - inclined, widely spaced, moderately narrow, undulating smooth, surfaces slightly greasy with weathering rind on feldspars up to 2mm J1 fracture, sub vertical, very narrow, stepped rough.		14								13.60m - Bit change, not advancing	PQ	91	13				
	Wide quartz band oriented with foliation Chlorite bands become closely spaced.	26																
	J2 joint infilled with calcite, very steeply inclined, narrow, stepped smooth, no alteration of rock surface		15								Lab: UCS 58.5 MPa Lab: PLT 52.4 MPa Diametral Estimated Compressive Strength	PQ	100	81				
	Metasandstone Slightly weathered, light grey, foliated. Moderately strong, foliation steeply inclined, undulating smooth to planner. Quartzofeldspathic banding close to very closely spaced, moderately wide. Rare crosscutting narrow veins are also present.																	
			16								15.90m - Lost core - fell out of barrel	PQ	65	28				
	narrow bands of chlorite rich materteral., very closely spaced, very thin. Foliation separations - steeply inclined, widely spaced, very narrow, undulating, smooth, quartz infill that heals surface.						S	SW				PQ	92	72				
		24																
			17									PQ	100	58				
	J1 - sub vertical, moderate widely spaced, very narrow, undulating rough to smooth, some quartz infill J2 - gently inclined, moderately wildly spaced to closely spaced, very narrow, undulating smooth, slightly weathered surface with pyrite present.											PQ	100	0				
	Metasandstone Slightly weathered, greenish grey, foliated. Moderately strong. Interbedded with thin beds of phyllite, moderately widely spaced. Foliation, steeply inclined, undulating slickensided to undulating rough. Segregation bands of epidote rich material, very thin. Quartzofeldspathic banding along foliation, close to very closely spaced, thin,		18								17.80m - New bit, advacning speed increased Lab: PLT 57.6 MPa Axial Estimated Compressive Strength	PQ	100	63				
	Foliation separations, steeply inclined, moderately widely spaced, very narrow, undulating smooth with slight weathering on surfaces.	22																
			19									PQ	100	32				
	J1 - very steeply inclined, moderately widely spaced, stepped smooth, with clean unweathered surfaces, healed in places with Quartzofeldspathics. Quartzofeldspathic banding becomes more prevalent Foliation separations become closely spaced Metasandstone														PQ Size, Triple Tube, Wireline Rotary Coring			Backfilled with Arisings

Notes:

Started:	6/11/2018	*Finished:*	8/11/2018
Drilling Co.:	McNeill	*Drilling Rig:*	UDR600
Logged by:	J Grindley / L Abbot	*Checked by:*	

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

Borehole No. BH04

Project:	Beaumont Bridge Replacement	*Coordinates:*	341350 E 804416 N		
Client:	NZTA	*Ref. Grid:*	n/a	*Depth:*	20 m
Project No.:	6-CT012.00	*R.L.:*	40.84 m	*Inclination:*	90°
Location:	SH1 - Beaumont	*Datum:*		*Azimuth:*	0°

GEOLOGY	MAIN DESCRIPTION / DETAIL DESCRIPTION	R.L. (m) / DEPTH (m)	GRAPHIC LOG	TESTS: SPT 'N' VALUE	TESTS: SPT BLOW COUNTS OR SHEAR VALUE	ROCK STRENGTH	ROCK WEATHERING	ROCK DEFECT SPACING	DEFECT DIP (degrees 0–90)	DEFECTS / NOTES / OTHER TESTS	CORE: SAMPLE TYPE	CORE: TCR (%)	CORE: RQD (%)	DRILLING: DRILLING METHOD	DRILLING: CASING	DRILLING: BASE OF HOLE & WATER LEVEL	INSTALLATION DETAILS
	Slightly weathered, light greenish grey, foliated. Weak to moderately strong. Segregation banding of epidote and chlorite rich material. Bands, moderately thick to very thin, chlorite bands moderately widely spaced. Quartzofeldspathic banding along foliation, close to very closely spaced, thin, Foliation separations - Steeply inclined, moderately widely spaced, narrow to very narrow, planar smooth to stepped and smooth with weak surfaces up to 5mm thick. J1 - Very steeply inclined to sub vertical, moderately widely spaced, narrow to moderately narrow, undulating rough, heled in places, but otherwise coated in greasy, weathered feldspar couple of mm thick. END OF BOREHOLE AT 20m - Target Depth Reached	20 21 22 18 23 24 16 25 26 14 27 28 12 29															

Notes:

Started:	6/11/2018	*Finished:*	8/11/2018
Drilling Co.:	McNeill	*Drilling Rig:*	UDR600
Logged by:	J Grindley / L Abbot	*Checked by:*	

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

Borehole No. BH04

Project:	Beaumont Bridge Replacement	*Coordinates:*	341350 E 804416 N		
Client:	NZTA	*Ref. Grid:*	n/a	*Depth:*	20 m
Project No.:	6-CT012.00	*R.L.:*	40.84 m	*Inclination:*	90°
Location:	SH1 - Beaumont	*Datum:*		*Azimuth:*	0°

PHOTOGRAPHS

Photo BH04.1
Box 1 - 0.0m to 3.6m

Photo BH04.2
Box 2 - 3.6m to 6.9m

BOREHOLE SOIL/ROCK LOG A4 BEAUMONT BRIDGE - SITE INVESTGATION INFORMATION.GPJ OPUS2016_TEM.GDT 12/4/19

Notes:

Started:	6/11/2018	*Finished:*	8/11/2018
Drilling Co.:	McNeill	*Drilling Rig:*	UDR600
Logged by:	J Grindley / L Abbot	*Checked by:*	

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

Borehole No. BH04

Project:	Beaumont Bridge Replacement	*Coordinates:*	341350 E 804416 N		
Client:	NZTA	*Ref. Grid:*	n/a	*Depth:*	20 m
Project No.:	6-CT012.00	*R.L.:*	40.84 m	*Inclination:*	90°
Location:	SH1 - Beaumont	*Datum:*		*Azimuth:*	0°

PHOTOGRAPHS

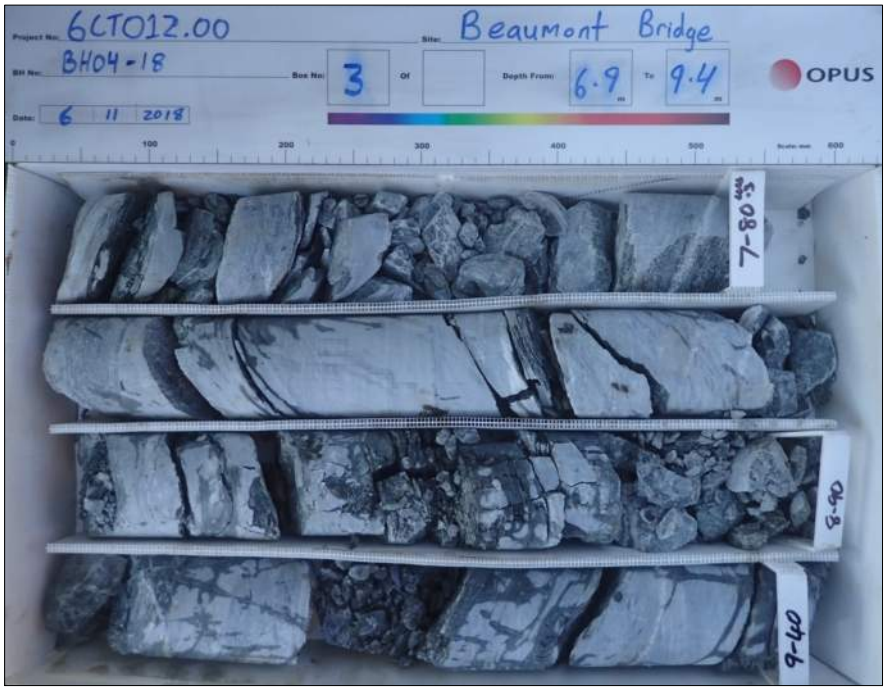


Photo BH04.3
Box 3 - 6.9m to 9.4m

Photo BH04.4
Box 4 - 9.4m to 11.7m

Notes:

Started:	6/11/2018	*Finished:*	8/11/2018
Drilling Co.:	McNeill	*Drilling Rig:*	UDR600
Logged by:	J Grindley / L Abbot	*Checked by:*	

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

Borehole No. BH04

Project:	Beaumont Bridge Replacement	*Coordinates:*	341350 E 804416 N		
Client:	NZTA	*Ref. Grid:*	n/a	*Depth:*	20 m
Project No.:	6-CT012.00	*R.L.:*	40.84 m	*Inclination:*	90°
Location:	SH1 - Beaumont	*Datum:*		*Azimuth:*	0°

PHOTOGRAPHS

Photo BH04.5
Box 5 - 11.7m to 14.2m

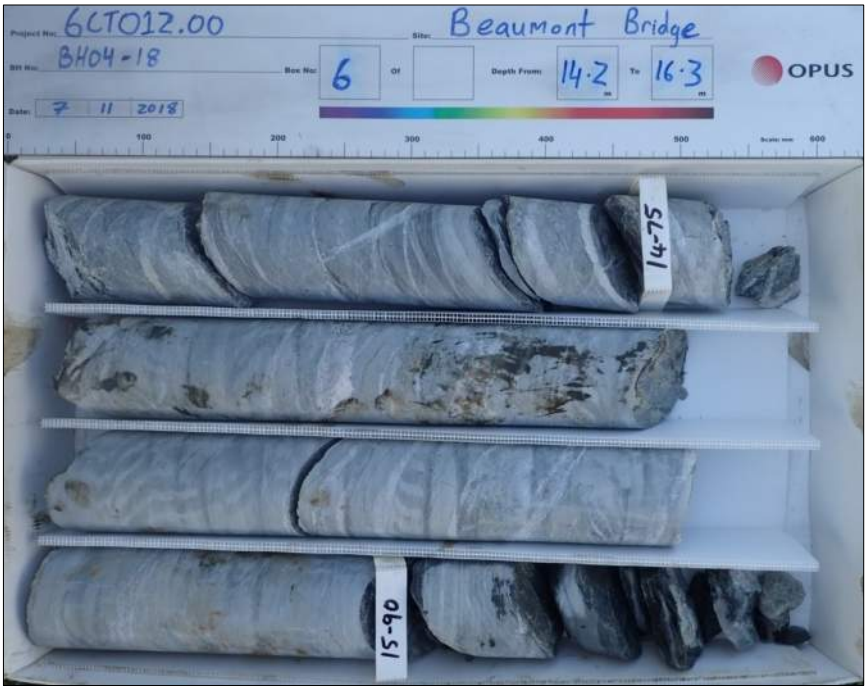


Photo BH04.6
Box 6 - 14.2m to 16.3m

BOREHOLE SOIL/ROCK LOG A4 BEAUMONT BRIDGE - SITE INVESTIGATION INFORMATION.GPJ OPUS2016_TEM.GDT 12/4/19

Notes:

Started:	6/11/2018	*Finished:*	8/11/2018
Drilling Co.:	McNeill	*Drilling Rig:*	UDR600
Logged by:	J Grindley / L Abbot	*Checked by:*	

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

Borehole No. BH04

Project:	Beaumont Bridge Replacement	*Coordinates:*	341350 E 804416 N		
Client:	NZTA	*Ref. Grid:*	n/a	*Depth:*	20 m
Project No.:	6-CT012.00	*R.L.:*	40.84 m	*Inclination:*	90°
Location:	SH1 - Beaumont	*Datum:*		*Azimuth:*	0°

PHOTOGRAPHS

Photo BH04.7
Box 7 - 16.3m to 18.3m

Photo BH04.8
Box 8 - 18.3m to 20.0m

Notes:

Started:	6/11/2018	*Finished:*	8/11/2018
Drilling Co.:	McNeill	*Drilling Rig:*	UDR600
Logged by:	J Grindley / L Abbot	*Checked by:*	

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

Borehole No. BH05

Project:	Beaumont Bridge Replacement	*Coordinates:*	341370 E 804405 N		
Client:	NZTA	*Ref. Grid:*	n/a	*Depth:*	19.6 m
Project No.:	6-CT012.00	*R.L.:*	43.19 m	*Inclination:*	Vertical
Location:	SH1 - Beaumont	*Datum:*			

GEOLOGY	MAIN DESCRIPTION / DETAIL DESCRIPTION	R.L. (m)	DEPTH (m)	GRAPHIC LOG	TESTS: SPT 'N' VALUE	TESTS: SPT BLOW COUNTS OR SHEAR VALUE	ROCK STRENGTH	ROCK WEATHERING	ROCK DEFECT SPACING	DEFECT DIP (degrees 0–90)	DEFECTS / NOTES / OTHER TESTS	CORE: SAMPLE TYPE	CORE: TCR (%)	CORE: RQD (%)	DRILLING: DRILLING METHOD	DRILLING: CASING	DRILLING: BASE OF HOLE & WATER LEVEL	INSTALLATION DETAILS
	SILT with some clay and sand; dark greyish brown. Soft; wet; slightly plastic; sand, fine. (Contains roots and rootlets)																	
	Silty fine SAND; dark brownish grey. Very soft; wet.	42	1									PQ	38	0				
	Clayey SILT with some sand; dark greyish brown. Soft; wet; moderately plastic; sand, fine. (Contains large roots and rootlets)																	
	Medium to coarse GRAVEL and COBBLES; grey/white/orangish white. Sub angular to rounded. (any finer soils likely washed away during drilling)		2									PQ	56	0				
												PQ	0	0				
	Metasandstone Moderately weathered, bluish orangish grey. Weak, foliation, thinly laminated steeply inclined. Quartzofeldspathic banding moderately inclined, very thin, very closely spaced. Foliation - steeply inclined, closely spaced, stepped smooth, narrow, weathered surfaces, iron oxide stained. J1 - sub vertical, widely spaced, undulating rough, narrow, weathered surface.	40	3				W	MW			3.00-4.60m - Machine fractured to gravel	PQ	25	7				
			4															
	Phyllite Slightly weathered, dark bluish grey. Weak to moderately strong, foliation, thinly laminated, steeply inclined. Quartzofeldspathic banding moderately inclined with J3, very thin, moderately widely spaced. Foliation - steeply inclined, closely spaced, planar smooth, narrow, greasy. J1 - very steeply inclined, moderately inclined, undulating smooth, narrow J3 - very steeply inclined, moderately widely spaced, undulating rough, narrow, weathered surface.	38	5				MS	SW				PQ	64	13				
							MS	SW										
			6									PQ	40	0				
	Metasandstone Slightly weathered, dark bluish grey. Weak to moderately strong, foliation, thinly laminated, steeply inclined. Quartzofeldspathic banding moderately inclined with J3, very thin, moderately widely spaced. Foliation - steeply inclined, closely spaced, planar smooth, narrow, iron oxide staining. J1 - very steeply inclined, moderately inclined, undulating smooth, narrow J3 - very steeply inclined, moderately widely spaced, undulating rough, narrow, weathered surface.	36	7				W	MW										
	Metasandstone Moderately weathered, Orangish light grey/greyish orange. Weak, foliation, thinly laminated. Highly machine fractured		8				MS	SW			8.10-8.45m - Machine fractured to gravel	PQ	64	0				
	Metasandstone Moderately weathered, bluish grey with dark grey bands. Moderately strong, foliation, moderately inclined, laminated. High quartzofeldpathic content. Foliation - moderately inclined, very closely spaced, planar smooth, narrow iron oxide staining, weak at surface. J1 - sub vertical, occurs once, undulating smooth, narrow, weak on surface, weathered feldspar, iron oxide staining.	34	9				S	SW			8.90-9.10m - Crush zone on J1 very steeply inclined, infilled with silts sands, gravels, very weak. Yellow colouring present with sulphur odour.	PQ	68	0				
												PQ	73	62				

PQ Size, Triple Tube, Wireline Rotary Coring

BOREHOLE SOIL/ROCK LOG A4 BEAUMONT BRIDGE - SITE INVESTGATION INFORMATION.GPJ OPUS2016_TEM.GDT 12/4/19

Notes:

Started:	8/11/2018	*Finished:*	9/11/2018
Drilling Co.:	McNeill	*Drilling Rig:*	UDR600
Logged by:	Liam Abbot	*Checked by:*	

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

Borehole No. BH05

Project:	Beaumont Bridge Replacement	*Coordinates:*	341370 E 804405 N		
Client:	NZTA	*Ref. Grid:*	n/a	*Depth:*	19.6 m
Project No.:	6-CT012.00	*R.L.:*	43.19 m	*Inclination:*	Vertical
Location:	SH1 - Beaumont	*Datum:*			

GEOLOGY	MAIN DESCRIPTION / DETAIL DESCRIPTION	R.L. (m) / DEPTH (m)	GRAPHIC LOG	TESTS: SPT 'N' VALUE	TESTS: SPT BLOW COUNTS OR SHEAR VALUE	ROCK STRENGTH	ROCK WEATHERING	ROCK DEFECT SPACING	DEFECT DIP (degrees 0–90)	DEFECTS / NOTES / OTHER TESTS	CORE: SAMPLE TYPE	CORE: TCR (%)	CORE: RQD (%)	DRILLING: DRILLING METHOD	DRILLING: CASING	DRILLING: BASE OF HOLE & WATER LEVEL	INSTALLATION DETAILS
	Phyllite Moderately weathered, grey. Weak, foliation, steeply inclined, laminated. Foliation - steeply inclined, closely spaced, undulating smooth, narrow, silt infill. J1 - Sub vertical, planar smooth, narrow.									9.10-9.80m - Machine fractured, closely spaced foliation separation, J1 also present Lab: PLT 29.4 MPa Diametral Estimated Compressive Strength Lab: UCS 59.5 MPa	PQ	73	62	PQ Size, Triple Tube, Wireline Rotary Coring			
	Metasandstone Slightly weathered, light grey. Strong, foliation, moderately inclined, laminated, Foliation - moderately inclined, moderately widely spaced, planar smooth, narrow. J3 - Steeply inclined, moderately widely spaced, undulating rough, very narrow, iron pyrite on surface. below 11.2m high machine fracture *(continued)*	11 32 12 13 30									PQ	77	9				
											PQ	92	0				
										12.50-13.80m - Large quartzofeldspathic layer, some weathered fractures with weathered feldspar	PQ	28	0				
	Phyllite Slightly weathered, light grey, foliated. Strong, foliation, moderately inclined, thinly laminated. Foliation - moderately inclined, very closely spaced, undulating smooth, narrow, silt infill. J1 - Sub vertical, very closely spaced, planar rough, very narrow, calcite fill	14				S	SW				PQ	93	0				
		15 28								Lab: PLT 82.2 MPa Diametral Estimated Compressive Strength	PQ	25	0				
	LOST CORE										PQ	0	0				
	Metasandstone Slightly to moderately weathered, dark grey. Moderately strong, foliation, laminated, steeply inclined. Quartzofeldspathic banding steeply inclined, thin, very closely spaced. Foliation - steeply inclined, very closely to closely spaced, undulating slickensided, narrow, weak, greasy, silt infill weathered feldspar on banding. J3 - very steeply inclined to sub vertical, closely spaced, stepped rough, moderately narrow, very weak surface, highly weathered surface infilled with silt and gravel.	16									PQ	90	0				
		17 26				MS	SW				PQ	39	9				
		18									PQ	87	0				
		19 24									PQ	60	0				
	END OF BOREHOLE AT 19.6m - Target Depth Reached																

Notes:

Started:	8/11/2018	*Finished:*	9/11/2018
Drilling Co.:	McNeill	*Drilling Rig:*	UDR600
Logged by:	Liam Abbot	*Checked by:*	

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

Borehole No. BH05

Project:	Beaumont Bridge Replacement	*Coordinates:*	341370 E 804405 N		
Client:	NZTA	*Ref. Grid:*	n/a	*Depth:*	19.6 m
Project No.:	6-CT012.00	*R.L.:*	43.19 m	*Inclination:*	Vertical
Location:	SH1 - Beaumont	*Datum:*			

PHOTOGRAPHS

Photo BH05.1
0.0-4.6m

Photo BH05.2
4.6-8.1m

Notes:

Started:	8/11/2018	*Finished:*	9/11/2018
Drilling Co.:	McNeill	*Drilling Rig:*	UDR600
Logged by:	Liam Abbot	*Checked by:*	

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

Borehole No. BH05

Project:	Beaumont Bridge Replacement	*Coordinates:*	341370 E 804405 N		
Client:	NZTA	*Ref. Grid:*	n/a	*Depth:*	19.6 m
Project No.:	6-CT012.00	*R.L.:*	43.19 m	*Inclination:*	Vertical
Location:	SH1 - Beaumont	*Datum:*			

PHOTOGRAPHS

Photo BH05.3
8.1-11.2m

Photo BH05.4
11.2-14.2m

Notes:

Started:	8/11/2018	*Finished:*	9/11/2018
Drilling Co.:	McNeill	*Drilling Rig:*	UDR600
Logged by:	Liam Abbot	*Checked by:*	

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

Borehole No. BH05

Project:	Beaumont Bridge Replacement	*Coordinates:*	341370 E 804405 N		
Client:	NZTA	*Ref. Grid:*	n/a	*Depth:*	19.6 m
Project No.:	6-CT012.00	*R.L.:*	43.19 m	*Inclination:*	Vertical
Location:	SH1 - Beaumont	*Datum:*			

PHOTOGRAPHS

Photo BH05.5
14.2-18.4m

Photo BH05.6
18.4-19.6m

Notes:

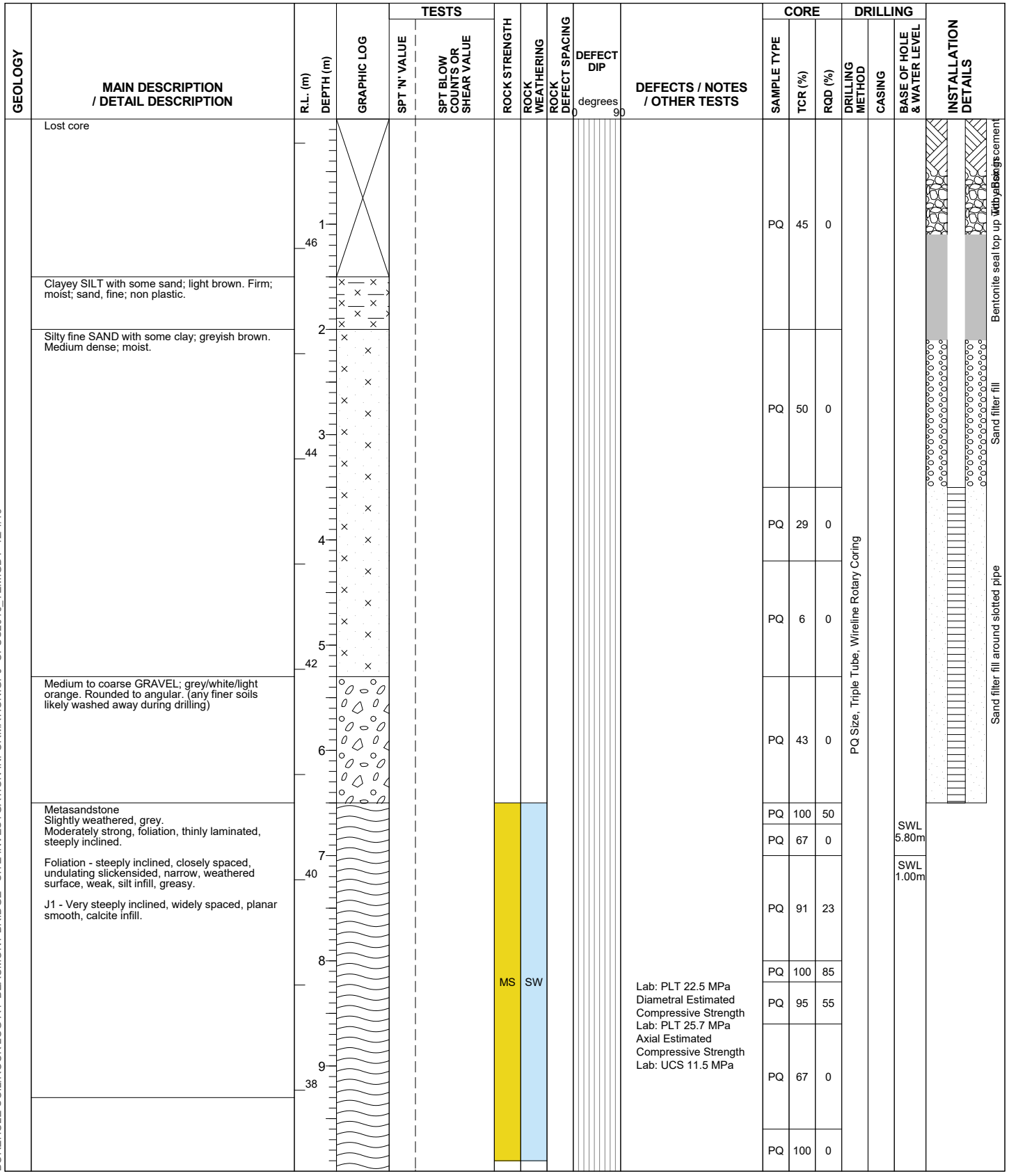
Started:	8/11/2018	*Finished:*	9/11/2018
Drilling Co.:	McNeill	*Drilling Rig:*	UDR600
Logged by:	Liam Abbot	*Checked by:*	

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

Borehole No. BH06

Project:	Beaumont Bridge Replacement	*Coordinates:*	341390 E 804348 N		
Client:	NZTA	*Ref. Grid:*	n/a	*Depth:*	16.5 m
Project No.:	6-CT012.00	*R.L.:*	47.23 m	*Inclination:*	Vertical
Location:	SH1 - Beaumont	*Datum:*			



BOREHOLE SOIL/ROCK LOG A4 BEAUMONT BRIDGE - SITE INVESTGATION INFORMATION.GPJ OPUS2016_TEM.GDT 12/4/19

Notes:

Started:	12/11/2018	*Finished:*	12/11/2018
Drilling Co.:	McNeill	*Drilling Rig:*	UDR600
Logged by:	Liam Abbot	*Checked by:*	

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

Borehole No. BH06

Project:	Beaumont Bridge Replacement	*Coordinates:*	341390 E 804348 N		
Client:	NZTA	*Ref. Grid:*	n/a	*Depth:*	16.5 m
Project No.:	6-CT012.00	*R.L.:*	47.23 m	*Inclination:*	Vertical
Location:	SH1 - Beaumont	*Datum:*			

GEOLOGY	MAIN DESCRIPTION / DETAIL DESCRIPTION	R.L. (m) / DEPTH (m)	GRAPHIC LOG	TESTS: SPT 'N' VALUE	TESTS: SPT BLOW COUNTS OR SHEAR VALUE	ROCK STRENGTH	ROCK WEATHERING	ROCK DEFECT SPACING	DEFECT DIP (degrees 0–90)	DEFECTS / NOTES / OTHER TESTS	CORE: SAMPLE TYPE	CORE: TCR (%)	CORE: RQD (%)	DRILLING: DRILLING METHOD	DRILLING: CASING	DRILLING: BASE OF HOLE & WATER LEVEL	INSTALLATION DETAILS
	Metasandstone Moderately weathered, dark grey. Weak, foliation, thinly laminated, steeply inclined. High chlorite content. Foliation - steeply inclined, very closely spaced, planar smooth, narrow, silt infill, greasy.*(continued)*	11 36 12				W	MW			9.90-10.20m - CRUSH ZONE J1/J2 steeped rough, moderately narrow, infilled with sand and fine gravel. Weak moderately weathered	PQ PQ	100 17	0 0	PQ Size, Triple Tube, Wireline Rotary Coring			
	Phyllite Slightly weathered, grey with white banding. Moderately strong, foliation, steeply inclined, laminated. Quartzofeldspathic banding, very thin, very closely spaced. Foliation - steeply inclined, closely spaced, undulating slickensided/ undulating rough, very narrow, weathered mica/silt infill greasy. J1 - Sub vertical, widely spaced, planar rough, tight, slightly weathered. Intermittent Metasandstone below 14.9m	13 34 14 15 32 16				MS	SW				PQ PQ PQ PQ	100 53 96 38	17 0 72 11				
	END OF BOREHOLE AT 16.5m - Target Depth Reached	17 30 18 19 28									PQ	83	0				

BOREHOLE SOIL/ROCK LOG A4 BEAUMONT BRIDGE - SITE INVESTGATION INFORMATION.GPJ OPUS2016_TEM.GDT 12/4/19

Notes:

Started:	12/11/2018	*Finished:*	12/11/2018
Drilling Co.:	McNeill	*Drilling Rig:*	UDR600
Logged by:	Liam Abbot	*Checked by:*	

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

Borehole No. BH06

Project:	Beaumont Bridge Replacement	*Coordinates:*	341390 E 804348 N		
Client:	NZTA	*Ref. Grid:*	n/a	*Depth:*	16.5 m
Project No.:	6-CT012.00	*R.L.:*	47.23 m	*Inclination:*	Vertical
Location:	SH1 - Beaumont	*Datum:*			

PHOTOGRAPHS

Photo BH06.1
0.0-5.5m

Photo BH06.2
5.5-8.5m

Notes:

Started:	12/11/2018	*Finished:*	12/11/2018
Drilling Co.:	McNeill	*Drilling Rig:*	UDR600
Logged by:	Liam Abbot	*Checked by:*	

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

Borehole No. BH06

Project:	Beaumont Bridge Replacement	*Coordinates:*	341390 E 804348 N		
Client:	NZTA	*Ref. Grid:*	n/a	*Depth:*	16.5 m
Project No.:	6-CT012.00	*R.L.:*	47.23 m	*Inclination:*	Vertical
Location:	SH1 - Beaumont	*Datum:*			

PHOTOGRAPHS

Photo BH06.3
8.5-10.6m

Photo BH06.4
10.6-13.9m

Notes:

Started:	12/11/2018	*Finished:*	12/11/2018
Drilling Co.:	McNeill	*Drilling Rig:*	UDR600
Logged by:	Liam Abbot	*Checked by:*	

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

Borehole No. BH06

Project:	Beaumont Bridge Replacement	*Coordinates:*	341390 E 804348 N		
Client:	NZTA	*Ref. Grid:*	n/a	*Depth:*	16.5 m
Project No.:	6-CT012.00	*R.L.:*	47.23 m	*Inclination:*	Vertical
Location:	SH1 - Beaumont	*Datum:*			

PHOTOGRAPHS

Photo BH06.5
13.9-16.5m

BOREHOLE SOIL/ROCK LOG A4 BEAUMONT BRIDGE - SITE INVESTGATION INFORMATION.GPJ OPUS2016_TEM.GDT 12/4/19

Notes:

Started:	12/11/2018	*Finished:*	12/11/2018
Drilling Co.:	McNeill	*Drilling Rig:*	UDR600
Logged by:	Liam Abbot	*Checked by:*	

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

Borehole No. BH07

Project:	Beaumont Bridge Replacement	*Coordinates:*	341454 E 804251 N
Client:	NZTA	*Ref. Grid:*	n/a
Project No.:	6-CT012.00	*R.L.:*	Not established
Location:	SH1 - Beaumont	*Datum:*	

Depth: 15.1 m
Inclination: Vertical

GEOLOGY	MAIN DESCRIPTION / DETAIL DESCRIPTION	R.L. (m) / DEPTH (m)	GRAPHIC LOG	TESTS: SPT 'N' VALUE	TESTS: SPT BLOW COUNTS OR SHEAR VALUE	ROCK STRENGTH	ROCK WEATHERING	ROCK DEFECT SPACING	DEFECT DIP (degrees 0–90)	DEFECTS / NOTES / OTHER TESTS	CORE: SAMPLE TYPE	CORE: TCR (%)	CORE: RQD (%)	DRILLING: DRILLING METHOD	DRILLING: CASING	DRILLING: BASE OF HOLE & WATER LEVEL	INSTALLATION DETAILS
	SILT with some gravel and minor sand; dark brown. Soft; saturated; slightly plastic; gravel; angular to sub angular, fine to medium; sand, fine to coarse.																
	Fine to coarse GRAVEL with minor silt and sand; orange/white. Saturated; angular to sub angular; sand, fine to coarse. (soil most likely washed during drilling also increasing water present)	1									PQ	40	0				
	SILT with some clay; grey. Stiff; wet; moderately plastic.	2									PQ	23	0				
	Silty fine SAND; greyish orange. Dense; saturated; high cohesion/adhesion.	3									PQ	57	0				
	Cobblely fine to coarse GRAVEL with minor silt and sand; grey/white/orange. Saturated; angular to sub rounded. (soil most likely washed during drilling also increasing water present)	4									PQ	83	0	PQ Size, Triple Tube, Wireline Rotary Coring			
	Metasandstone Moderately weathered, brownish grey. Weak, foliation, thinly laminated, moderately inclined. Foliation - moderately inclined, closely spaced, planar rough, narrow, iron oxide stained. J1 - sub vertical, moderately widely spaced, planar rough, narrow, weathered surface with silt infill. J3 - very steeply inclined, widely spaced, stepped rough, narrow, weathered with silt infill. Turing grey, and foliation becoming thinly laminated and steeply inclined at 6.6m	5 6 7 8				W EW W	MW CW MW			5.40-5.50m - Highly weathered J3 joint	PQ PQ PQ	100 98	7 0				
	Metasandstone Slightly weathered, grey. Moderately strong, foliation, laminated, steeply inclined. Foliation - moderately inclined, closely spaced, planar rough, very narrow, Moderately weathered. J1 - sub vertical, moderately widely spaced, planar rough, narrow, weathered mica infill.	9				MS	SW				PQ PQ	90 100	29 8				

Notes:

Started:	22/08/2018	*Finished:*	23/08/2018
Drilling Co.:	McNeill	*Drilling Rig:*	UDR600
Logged by:	Liam Abbot	*Checked by:*	

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

Borehole No. BH07

Project:	Beaumont Bridge Replacement	*Coordinates:*	341454 E 804251 N
Client:	NZTA	*Ref. Grid:*	n/a
Project No.:	6-CT012.00	*R.L.:*	Not established
Location:	SH1 - Beaumont	*Datum:*	

Depth: 15.1 m
Inclination: Vertical

GEOLOGY	MAIN DESCRIPTION / DETAIL DESCRIPTION	R.L. (m) / DEPTH (m)	GRAPHIC LOG	TESTS: SPT 'N' VALUE	TESTS: SPT BLOW COUNTS OR SHEAR VALUE	ROCK STRENGTH	ROCK WEATHERING	ROCK DEFECT SPACING	DEFECT DIP (degrees 0–90)	DEFECTS / NOTES / OTHER TESTS	CORE: SAMPLE TYPE	CORE: TCR (%)	CORE: RQD (%)	DRILLING: DRILLING METHOD	DRILLING: CASING	DRILLING: BASE OF HOLE & WATER LEVEL	INSTALLATION DETAILS
	Metasandstone Slightly weathered, grey. Moderately strong, foliation, laminated, steeply inclined. Foliation - moderately inclined, closely spaced, planar rough, very narrow, Moderately weathered. J1 - sub vertical, moderately widely spaced, planar rough, narrow, weathered mica infill.*(continued)*	11				MS	SW			10.40-11.40m - highly jointed and machine fractured, igh quartzofeldspathic content	PQ	100	8	PQ Size, Triple Tube, Wireline Rotary Coring			
											PQ	60	20				
											PQ	90	0				
	Phyllite Slightly weathered, dark grey with white banding. Moderately strong, foliation, steeply inclined, thinly laminated. Foliation - steeply inclined, very closely spaced to closely, undulating smooth, very narrow, weak at surface, moderately weathered, greasy. J1 - steeply inclined, moderately widely spaced, stepped smooth, very narrow, weak at surface, moderately weathered, greasy.	12									PQ	100	44				
											PQ	100	0				
		13									PQ	100	0				
											PQ	93	0				
											PQ	67	0				
		14									PQ	100	30				
		15									PQ	80	0				
	END OF BOREHOLE AT 15.1m - Target Depth Reached	16															
		17															
		18															
		19															

Notes:

Started: 22/08/2018 *Finished:* 23/08/2018
Drilling Co.: McNeill *Drilling Rig:* UDR600
Logged by: Liam Abbot *Checked by:*

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

Borehole No. BH07

Project:	Beaumont Bridge Replacement	*Coordinates:*	341454 E 804251 N		
Client:	NZTA	*Ref. Grid:*	n/a	*Depth:*	15.1 m
Project No.:	6-CT012.00	*R.L.:*	Not established	*Inclination:*	Vertical
Location:	SH1 - Beaumont	*Datum:*			

PHOTOGRAPHS

Photo BH07.1
0.0-4.95m

Photo BH07.2
4.95-7.4m

Notes:

Started:	22/08/2018	*Finished:*	23/08/2018
Drilling Co.:	McNeill	*Drilling Rig:*	UDR600
Logged by:	Liam Abbot	*Checked by:*	

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

Borehole No. BH07

Project:	Beaumont Bridge Replacement	*Coordinates:*	341454 E 804251 N		
Client:	NZTA	*Ref. Grid:*	n/a	*Depth:*	15.1 m
Project No.:	6-CT012.00	*R.L.:*	Not established	*Inclination:*	Vertical
Location:	SH1 - Beaumont	*Datum:*			

PHOTOGRAPHS

Photo BH07.3
7.4-9.35m

Photo BH07.4
9.35-11.3m

Notes:

Started:	22/08/2018	*Finished:*	23/08/2018
Drilling Co.:	McNeill	*Drilling Rig:*	UDR600
Logged by:	Liam Abbot	*Checked by:*	

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

Borehole No. BH07

Project:	Beaumont Bridge Replacement	*Coordinates:*	341454 E 804251 N		
Client:	NZTA	*Ref. Grid:*	n/a	*Depth:*	15.1 m
Project No.:	6-CT012.00	*R.L.:*	Not established	*Inclination:*	Vertical
Location:	SH1 - Beaumont	*Datum:*			

PHOTOGRAPHS

Photo BH07.5
11.3-13.25m

Photo BH07.6
13.25-15.1m

Notes:

Started:	22/08/2018	*Finished:*	23/08/2018
Drilling Co.:	McNeill	*Drilling Rig:*	UDR600
Logged by:	Liam Abbot	*Checked by:*	

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

Borehole No. BH08

Project:	Beaumont Bridge Replacement	*Coordinates:*	341514 E 804109 N		
Client:	NZTA	*Ref. Grid:*	n/a	*Depth:*	14.8 m
Project No.:	6-CT012.00	*R.L.:*	Not established	*Inclination:*	Vertical
Location:	SH1 - Beaumont	*Datum:*			

GEOLOGY	MAIN DESCRIPTION / DETAIL DESCRIPTION	R.L. (m)	DEPTH (m)	GRAPHIC LOG	TESTS: SPT 'N' VALUE	TESTS: SPT BLOW COUNTS OR SHEAR VALUE	ROCK STRENGTH	ROCK WEATHERING	ROCK DEFECT SPACING	DEFECT DIP (degrees 0–90)	DEFECTS / NOTES / OTHER TESTS	CORE: SAMPLE TYPE	CORE: TCR (%)	CORE: RQD (%)	DRILLING: DRILLING METHOD	DRILLING: CASING	DRILLING: BASE OF HOLE & WATER LEVEL	INSTALLATION DETAILS
	SILT with minor sand; dark brown. Soft; wet; slightly plastic; sand, fine. (contains roots and rootlets)																	
	Fine to coarse GRAVEL with minor silt and sand; orangish grey. Saturated; angular to sub angular; sand, fine to coarse. (soil most likely washed during drilling also increasing water present)											PQ	40	0				
	Clayey SILT; light grey mottled orange. Stiff; moist; moderately plastic.		1															
			2									PQ	67	0				
	Silty fine SAND; light brown. Medium dense/firm; saturated.		3															
	Lost core											PQ	27	13				
			4														SWL 3.40m	
	Fine to coarse GRAVEL; grey/orange/white. Saturated; sub angular to rounded, schist/quartzite. (soil most likely washed during drilling also increasing water present)																	
	Metasandstone Moderately weathered, bluish orangish grey. Weak, foliation, laminated, steeply inclined. Quartzofeldspathic banding moderately inclined, very thin, closely spaced. Foliation - steeply inclined, closely spaced, stepped smooth, narrow, weathered surfaces, iron oxide stained. J3 - very steeply inclined, closely spaced, undulating rough, narrow, weathered surface, silt and gravel infill.		5									PQ	97	0				
			6				W	MW										
			7									PQ	97	0				
	Phyllite Moderately weathered, light grey. Very weak to weak, foliation, laminated, steeply inclined. Quartzofeldspathic banding very thin, moderately widely spaced. Foliation - moderately inclined, closely spaced, planar rough, very narrow, moderately weathered. Probable J1/J3 jointing						VW	MW			7.40-8.00m - machine fractured turned to fine gravel 8.20-9.00m - Potential crush/shear zone, highly weathered and machine fractured							
			8									PQ	73	0				
			9															
	Metasandstone Moderately weathered, grey, foliated. Weak to moderately strong, foliation, laminated, moderately inclined. Quartzofeldspathic banding moderately inclined, very thin, moderately widely spaced. Foliation - moderately inclined, very closely spaced, planar rough, very narrow, moderately						W	MW				PQ	70	7				

PQ Size, Triple Tube, Wireline Rotary Coring

Notes:

Started:	21/08/2018	*Finished:*	22/08/2018
Drilling Co.:	McNeill	*Drilling Rig:*	UDR600
Logged by:	Liam Abbot	*Checked by:*	

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

Borehole No. BH08

Project:	Beaumont Bridge Replacement	*Coordinates:*	341514 E 804109 N		
Client:	NZTA	*Ref. Grid:*	n/a	*Depth:*	14.8 m
Project No.:	6-CT012.00	*R.L.:*	Not established	*Inclination:*	Vertical
Location:	SH1 - Beaumont	*Datum:*			

GEOLOGY	MAIN DESCRIPTION / DETAIL DESCRIPTION	R.L. (m) / DEPTH (m)	GRAPHIC LOG	TESTS: SPT 'N' VALUE	TESTS: SPT BLOW COUNTS OR SHEAR VALUE	ROCK STRENGTH	ROCK WEATHERING	ROCK DEFECT SPACING	DEFECT DIP (degrees 0–90)	DEFECTS / NOTES / OTHER TESTS	CORE: SAMPLE TYPE	CORE: TCR (%)	CORE: RQD (%)	DRILLING: DRILLING METHOD	DRILLING: CASING	DRILLING: BASE OF HOLE & WATER LEVEL	INSTALLATION DETAILS
	weathered. J - very steeply inclined, moderately widely spaced, undulating smooth, narrow, calcite infill.	11				MS	SW				PQ	70	7	PQ Size, Triple Tube, Wireline Rotary Coring			
	Phyllite Moderately weathered, dark grey. Weak to moderately strong, foliation, laminated, moderately inclined. Foliation - moderately inclined, very closely spaced, planar rough, very narrow, moderately weathered. J3 - very steeply inclined, closely spaced, planar rough, narrow, weathered surface, silt infill.										PQ	100	32				
	Metasandstone Slightly weathered, light grey. Moderately strong, foliation, laminated, steeply inclined. Quartzofeldspathic banding steeply inclined, moderately widely spaced moderately thin to very thin. Foliation - steeply inclined, closely spaced, planar smooth, very narrow slight silt infill.*(continued)*	12				MS	SW				PQ	95	15				
	Phyllite Slightly weathered, grey. Moderately strong, foliation, laminated, moderately inclined. Quartzofeldspathic banding very thin, moderately widely spaced. Foliation - moderately inclined, closely spaced, planar smooth, very narrow, weathered surface. J1 - Sub horizontal, widely spaced, undulating rough, weathered weak surface. J3 - Sub horizontal, widely spaced, undulating rough, weathered weak surface.	13									PQ	59	0				
	Metasandstone Slightly weathered, light grey. Moderately strong, foliation, laminated, moderately inclined. Quartzofeldspathic banding moderately thin, moderately widely spaced. Foliation - moderately inclined, closely spaced, planar rough, very narrow, weathered surface. J1 - Sub horizontal, widely spaced, undulating rough, weathered weak surface. J3 - Sub horizontal, widely spaced, undulating rough, weathered weak surface.	14									PQ	82	0				
	END OF BOREHOLE AT 14.8m - Target Depth Reached	15 16 17 18 19															

Notes:

Started:	21/08/2018	*Finished:*	22/08/2018
Drilling Co.:	McNeill	*Drilling Rig:*	UDR600
Logged by:	Liam Abbot	*Checked by:*	

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

Borehole No. BH08

Project:	Beaumont Bridge Replacement	*Coordinates:*	341514 E 804109 N		
Client:	NZTA	*Ref. Grid:*	n/a	*Depth:*	14.8 m
Project No.:	6-CT012.00	*R.L.:*	Not established	*Inclination:*	Vertical
Location:	SH1 - Beaumont	*Datum:*			

PHOTOGRAPHS

Photo BH08.1
0.0-4.7m

Photo BH08.2
4.7-7.0m

Notes:		*Started:*	21/08/2018	*Finished:*	22/08/2018
		Drilling Co.:	McNeill	*Drilling Rig:*	UDR600
		Logged by:	Liam Abbot	*Checked by:*	

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

Borehole No. BH08

Project:	Beaumont Bridge Replacement	*Coordinates:*	341514 E 804109 N		
Client:	NZTA	*Ref. Grid:*	n/a	*Depth:*	14.8 m
Project No.:	6-CT012.00	*R.L.:*	Not established	*Inclination:*	Vertical
Location:	SH1 - Beaumont	*Datum:*			

PHOTOGRAPHS

Photo BH08.3
7.0-9.5

Photo BH08.4
9.5-11.8m

Notes:

Started:	21/08/2018	*Finished:*	22/08/2018
Drilling Co.:	McNeill	*Drilling Rig:*	UDR600
Logged by:	Liam Abbot	*Checked by:*	

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

Borehole No. BH08

Project:	Beaumont Bridge Replacement	*Coordinates:*	341514 E 804109 N		
Client:	NZTA	*Ref. Grid:*	n/a	*Depth:*	14.8 m
Project No.:	6-CT012.00	*R.L.:*	Not established	*Inclination:*	Vertical
Location:	SH1 - Beaumont	*Datum:*			

PHOTOGRAPHS

Photo BH08.5
11.8-14.5m

Photo BH08.6
Box 6 14.5-14.8m

Notes:

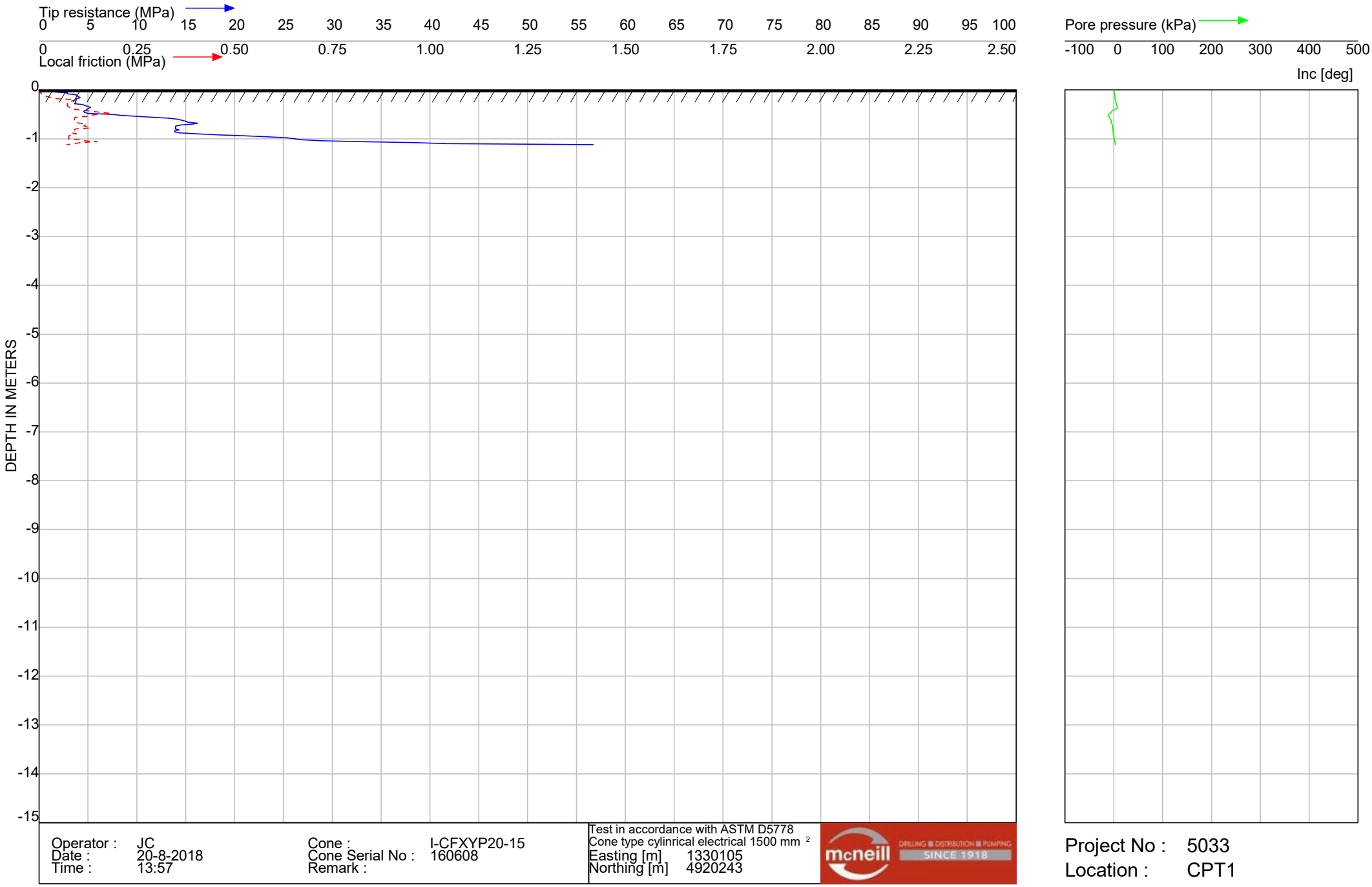
Started:	21/08/2018	*Finished:*	22/08/2018
Drilling Co.:	McNeill	*Drilling Rig:*	UDR600
Logged by:	Liam Abbot	*Checked by:*	

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:50 @ A4

Appendix C
Cone Penetration Test Results

SH8 Beaumont Bridge Realignment
Geotechnical Factual Report

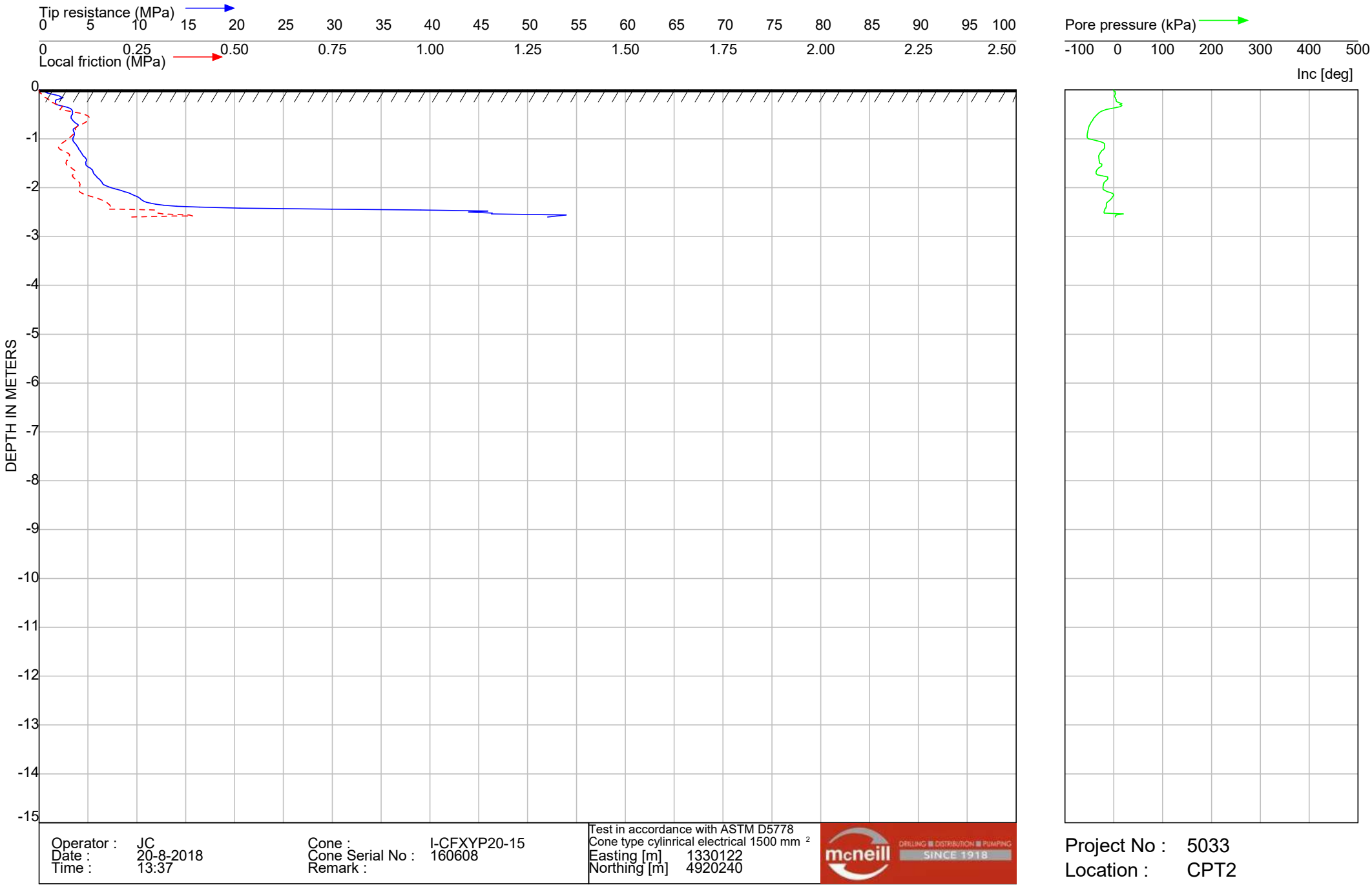


Operator :	JC	Cone :	I-CFXYP20-15	Test in accordance with ASTM D5778	
Date :	20-8-2018	Cone Serial No :	160608	Cone type cylinrical electrical 1500 mm ²	
Time :	13:57	Remark :		Easting [m]	1330105
				Northing [m]	4920243

Project No : 5033
Location : CPT1

PIEZO CONE PENETRATION TEST

Client : Opus
Project : Beaumont Bridge



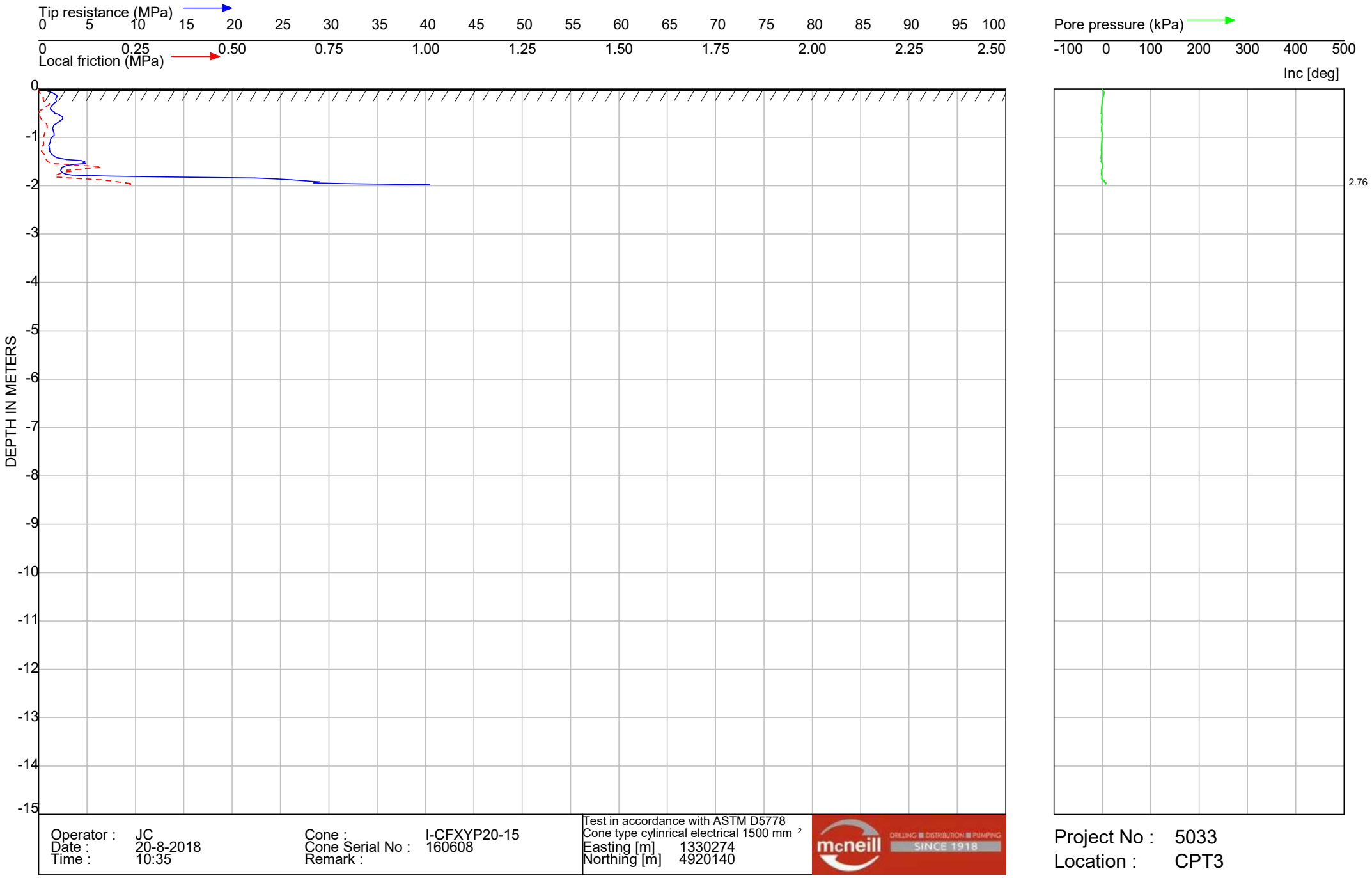
Operator :	JC	Cone :	I-CFXYP20-15
Date :	20-8-2018	Cone Serial No :	160608
Time :	13:37	Remark :	

Test in accordance with ASTM D5778
Cone type cylinrical electrical 1500 mm ²
Easting [m] 1330122
Northing [m] 4920240

Project No : 5033
Location : CPT2

PIEZO CONE PENETRATION TEST

Client : Opus
Project : Beaumont Bridge



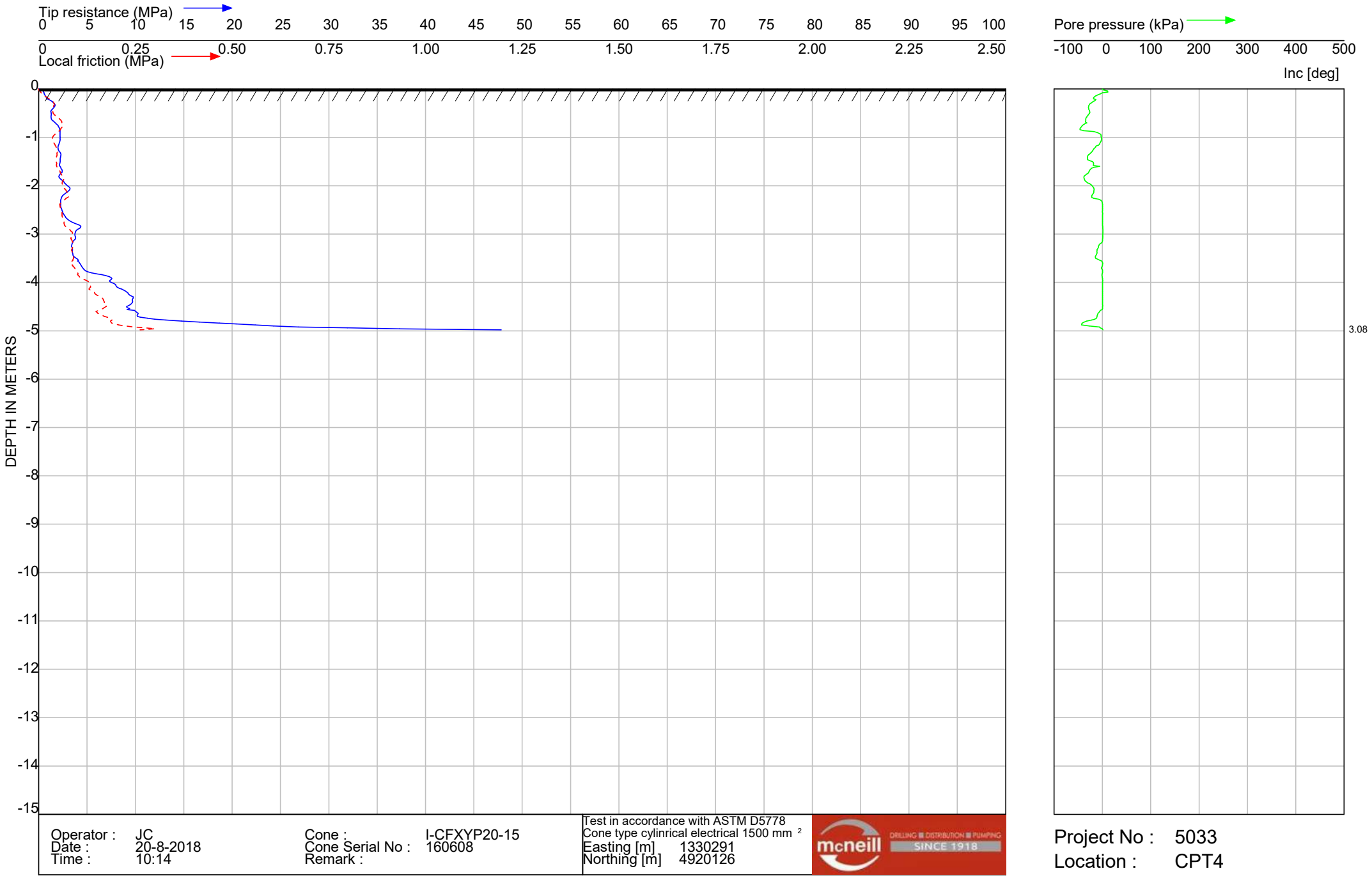
Operator :	JC	Cone :	I-CFXYP20-15
Date :	20-8-2018	Cone Serial No :	160608
Time :	10:35	Remark :	

Test in accordance with ASTM D5778
Cone type cylinrical electrical 1500 mm ²
Easting [m] 1330274
Northing [m] 4920140

Project No : 5033
Location : CPT3

PIEZO CONE PENETRATION TEST

Client : Opus
Project : Beaumont Bridge



Operator : JC
Date : 20-8-2018
Time : 10:14

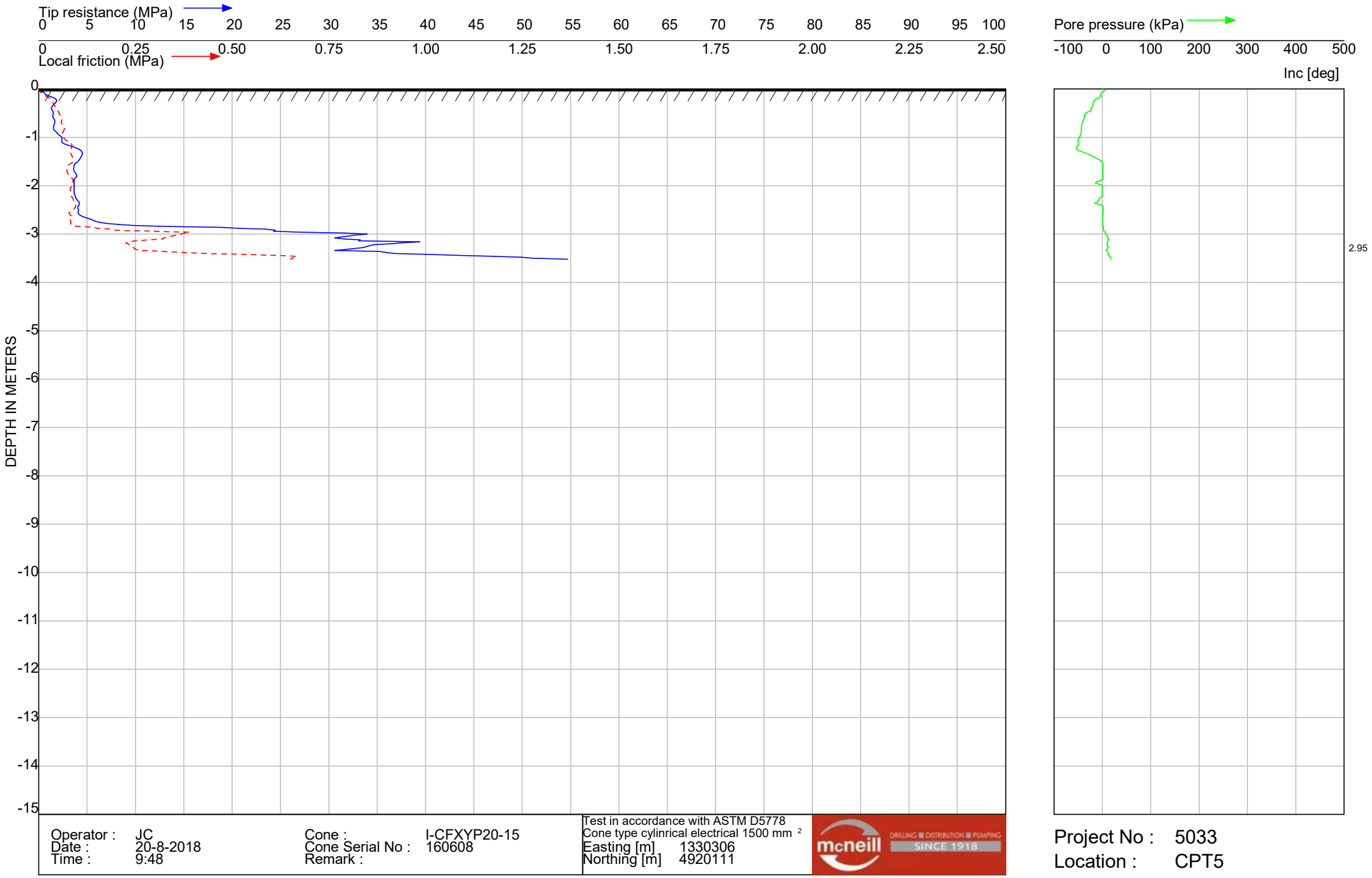
Cone : I-CFXYP20-15
Cone Serial No : 160608
Remark :

Test in accordance with ASTM D5778
Cone type cylinrical electrical 1500 mm ²
Easting [m] 1330291
Northing [m] 4920126

Project No : 5033
Location : CPT4

PIEZO CONE PENETRATION TEST

Client : Opus
Project : Beaumont Bridge



Operator : JC
Date : 20-8-2018
Time : 9:48

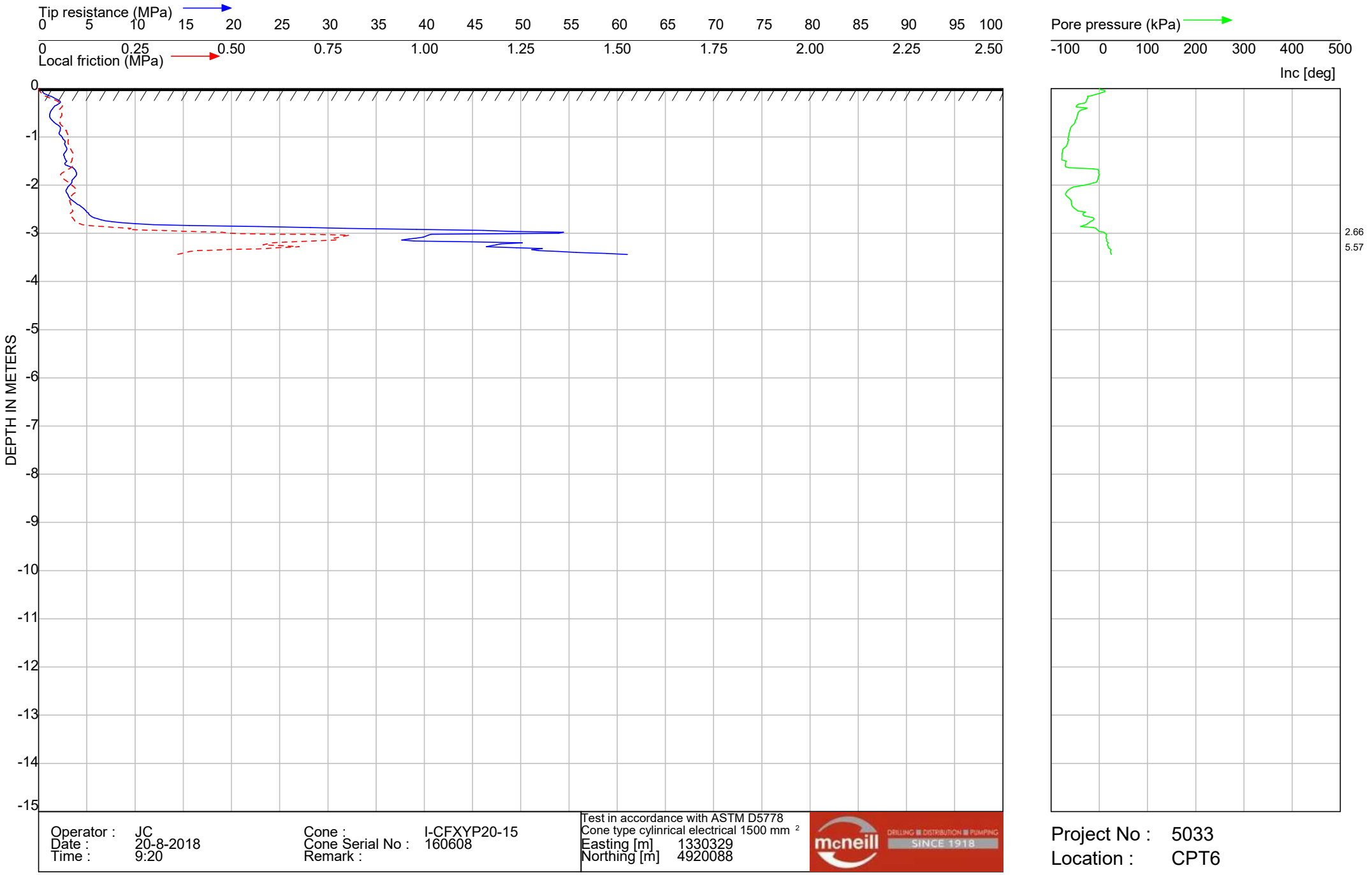
Cone : I-CFXYP20-15
Cone Serial No : 160608
Remark :

Test in accordance with ASTM D5778
Cone type cylinrical electrical 1500 mm ²
Easting [m] 1330306
Northing [m] 4920111

Project No : 5033
Location : CPT5

PIEZO CONE PENETRATION TEST

Client : Opus
Project : Beaumont Bridge

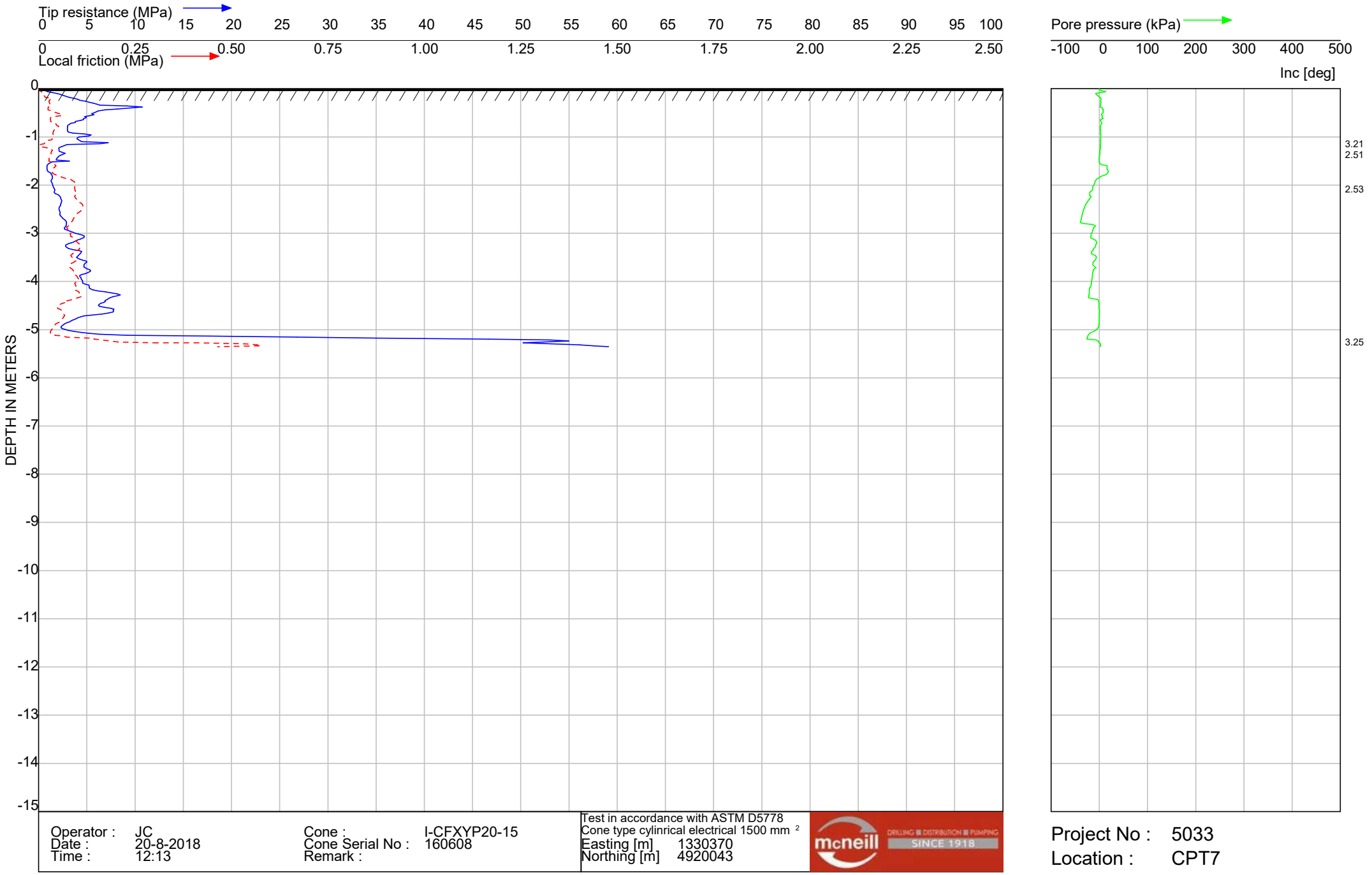


Operator :	JC	Cone :	I-CFXYP20-15	Test in accordance with ASTM D5778	
Date :	20-8-2018	Cone Serial No :	160608	Cone type cylinrical electrical 1500 mm ²	
Time :	9:20	Remark :		Easting [m]	1330329
				Northing [m]	4920088

Project No : 5033
Location : CPT6

PIEZO CONE PENETRATION TEST

Client : Opus
Project : Beaumont Bridge



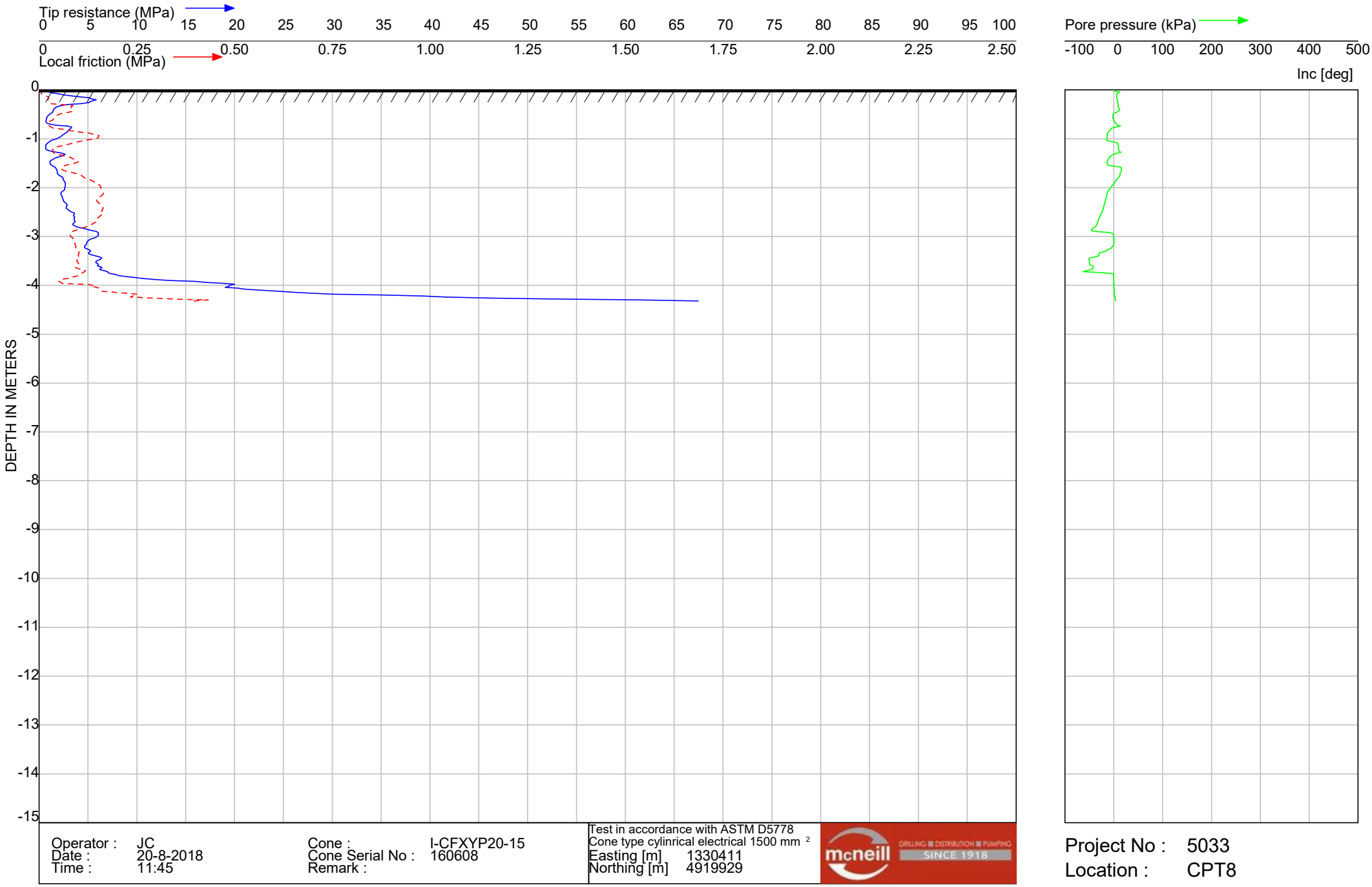
Operator :	JC	Cone :	I-CFXYP20-15
Date :	20-8-2018	Cone Serial No :	160608
Time :	12:13	Remark :	

Test in accordance with ASTM D5778
Cone type cylinrical electrical 1500 mm ²
Easting [m] 1330370
Northing [m] 4920043

Project No : 5033
Location : CPT7

PIEZO CONE PENETRATION TEST

Client : Opus
Project : Beaumont Bridge

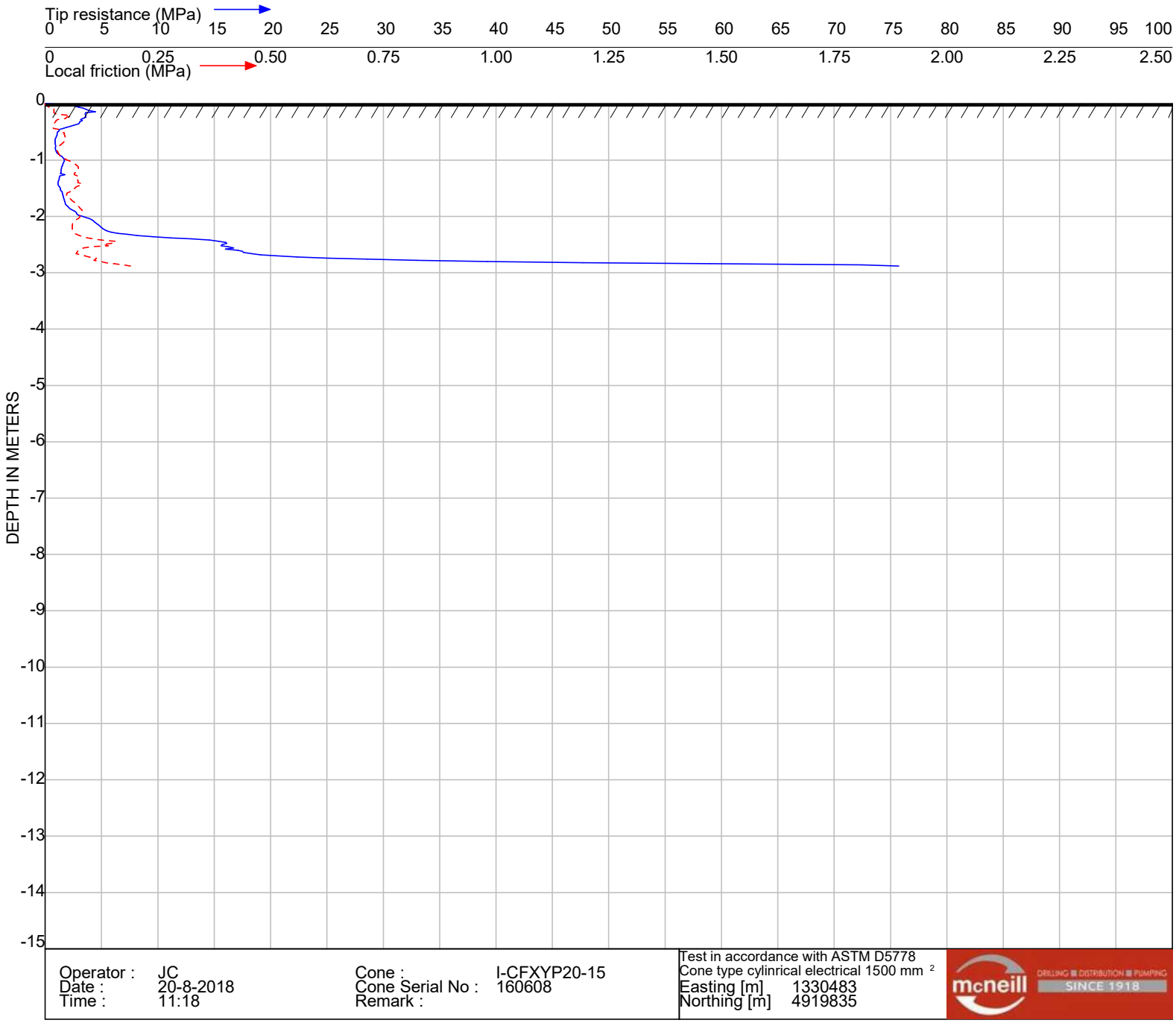


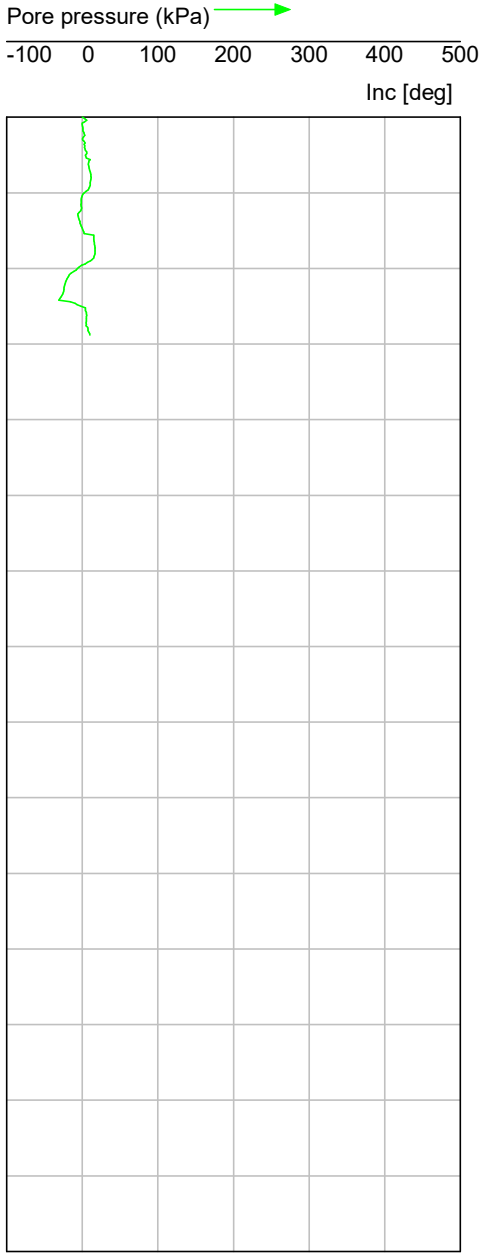
Operator :	JC	Cone :	I-CFXYP20-15	Test in accordance with ASTM D5778	
Date :	20-8-2018	Cone Serial No :	160608	Cone type cylinrical electrical 1500 mm ²	
Time :	11:45	Remark :		Easting [m]	1330411
				Northing [m]	4919929

Project No : 5033
Location : CPT8

PIEZO CONE PENETRATION TEST

Client : Opus
Project : Beaumont Bridge





Operator : JC
Date : 20-8-2018
Time : 11:18

Cone : I-CFXYP20-15
Cone Serial No : 160608
Remark :

Test in accordance with ASTM D5778
Cone type cylinrical electrical 1500 mm ²
Easting [m] 1330483
Northing [m] 4919835

Project No : 5033
Location : CPT9

PIEZO CONE PENETRATION TEST

Client : Opus
Project : Beaumont Bridge

TEST CERTIFICATE
Icone (all versions)

Supplier:	A.P. v.d. Berg Machinefabriek, Heerenveen The Netherlands
Production-order:	78287
Client:	McNeills Drilling Co Ltd
Cone-type:	ELCI-CFXYP20-15
Cone-number:	160608

To test / To check item	Required value	Checked value
Check Quad-ring groove behind friction sleeve with check ring; **Sample testing: 1 of every 5 Icones is tested.**	Sleeve fixed	/
Isolation-resistance.	>0.5 GΩ	1 GΩ
Straightness: Icone 5, 10 and 15 cm^2 S < 2.2. mm. At Icone base: S < 0,2 mm	S<= 2,2 mm	0,3 mm
"Classic calibration" NOT present! Check of calibration-file: "Classic calibration" removed.	O.K.	✓
Check alarm-settings Icone. Alarm values are set. (Kill Shutdown).	O.K.	✓
Software version - check at opening screen. (from 18 Jan 2018 v. 2.3)	version: 2.3	2.3
Calibration date of Icone; check cone data [F1]..[F1].	Yes	✓
Initial zero-Value Tip after calibration – within 1.0 % of nominal load.	O.K.	✓
Initial zero-Value Local Friction after calibration – within 1.0% of nominal load.	O.K.	✓
Initial zero-Value Pore Pressure after calibration – within 1.0% of nominal load.	O.K.	✓
Initial zero-Value Inclination X. Initial zero-Value Inclination Y.	-1°< X <+1° -1° < Y <+1°	-0.4 ° 0.8 °
Measurements Tip resistance OK?	Tested range:	0-75 MPa
Influence Tip load on **Local Friction and Pore Pressure:** Max. tip load: 5 cm^2: 100 MPa; 10 cm^2: 100 MPa; 15 cm^2: 75 MPa.	LF < 10 kPa PP <½% nom	1 kPa 1 kPa
Measurements local friction OK?	Tested range:	0-1 MPa
Local friction at max. load.	Tested value:	1,5 MPa
Measurements Pore Pressure OK?	Tested range:	0-2000 kPa
Measure Pore Pressure to 150%.	Tested value:	3000 kPa
Measurements Inclination OK?	Tested range:	±20°
Cone recognition on disconnecting and connecting Icone again?	Yes	✓

Remarks:

Calibrated by: C.J. Ouwejan	Date: 01-02-2018	Sign.:
Final check: C.J. Ouwejan	Date: 01-02-2018	Sign.:

a.p. van den berg

Zero Value Cone 0,011 [MPa] **Max. Deviation from Zero Value** Cone 3.75 [MPa]
Sleeve 0.001 [MPa] Sleeve 0.05 [MPa]
Pore(u2) 5,1 [kPa] Pore(u2) 100.0 [kPa]

Ref [MPa]	Cone [MPa]	Cone-Ref [kPa]
0.006	0.008	2
0.837	0.848	11
1.559	1.578	19
2.569	2.591	22
5.443	5.471	28
8.383	8.436	53
13.760	13.829	69
16.735	16.824	89
28.115	28.199	84
42.388	42.462	74
54.335	54.383	48
74.308	74.310	2

Ref [MPa]	Sleeve [MPa]	Sleeve-Ref [kPa]
0.000	0.001	1
0.021	0.022	1
0.043	0.044	1
0.062	0.063	1
0.121	0.123	2
0.180	0.182	2
0.266	0.269	3
0.363	0.366	3
0.474	0.477	3
0.650	0.653	3
0.831	0.834	3
0.988	0.988	0

Ref [MPa]	Pore(u2) [MPa]	Pore(u2)-Ref [kPa]
0.001	0.003	2
0.107	0.109	2
0.208	0.211	3
0.305	0.309	4
0.418	0.422	4
0.665	0.669	4
0.777	0.783	6
1.037	1.042	5
1.226	1.230	4
1.452	1.457	5
1.597	1.601	4
2.057	2.058	1

A:	**Cone Resistance**	
	Accuracy	100.0 kPa or 5.0%
	Nom.Cone Resistance	75 MPa
	Max.Cone Resistance	150 MPa
	Effective Area	15 cm²
B:	**Local Friction**	
	Accuracy	15.0 kPa or 15.0%
	Nom.Local Friction	1.00 MPa
	Max.Local Friction	1.5 MPa
	Effective Area	225 cm²
C:	**Pore Water Pressure**	
	Accuracy	25.0 kPa or 3.0%
	Nom.Pore Water Pressure	2 MPa
	Max.Pore Water Pressure	3 MPa
D:	**Inclination X**	
	Accuracy	1.0°
	Nom.Inclination X	20°
	Max.Inclination X	25°
E:	**Inclination Y**	
	Accuracy	1.0°
	Nom.Inclination Y	20°
	Max.Inclination Y	25°

Date : 01 February 2018
Ordernr : 78287
Regel/Pos. : 20

a.p. van den berg

ELECTRICAL CONE MAINTENANCE REPORT

Client : McNeills Drilling Co Ltd
Cone : 160608
Cone type : ELCI-CFXYP20-15

Maintenance description

* Check
* Repair
* Calibration
  Modify

Used materials

* Cone tip
* Sleeve
* Set of seals
* Quad rings
* Adapter
* Centering ring
* Wave ring
* Prepressure ring
  Connector 4 pins
  Load-cell with strain gauges
* Icone Multiplexer
* Stud
  Connection piece between cable and Icone
  Assembly Incl. + PP20 bar

Notes:

Checked and cleaned the cone. Replaced adapter and missing parts, the screw thread of the stud is damaged: replaced the stud. Calibrated the cone. Added a new datasheet.

Ready for shipment : 01 February 2018

Technician : C.J. Ouwejan

Calibration Certificate

a.p. van den berg

1.1 General

Cone number:	160608
Cone type:	I-CFXYP20-15
Description:	Tip 75 MPa Sleeve 1.00 MPa Inclinometer 20° Pore 2MPa
Part number:	0100297A
Certificate number:	160608-2
Client:	McNeills Drilling Co Ltd

1.2 Calibration equipment

	calibrated
Autolog 3000	
SN2090011	August 2016 (Peekel: EA 44251)
SN2090011	August 2016 (Peekel: EA 44251)
SN2090011	August 2016 (Peekel: EA 44251)
Reference Loadcell 100kN H54435	August 2016 (HBM: 56471 2016-08)
Reference Loadcell 20kN D16200	August 2016 (HBM: 56490 2016-08)
Reference Sensor 40 Bar 4318470	August 2015 (Trescal: 1607-12075)
Reference ACS-080-2-SC00-HE 08/11 470480	February 2015 (Trescal: 1502-10558)
Reference ACS-080-2-SC00-HE 08/11 470480	February 2015 (Trescal: 1502-10558)

1.3 Standard

EN ISO 22476-1 2012 Class 2

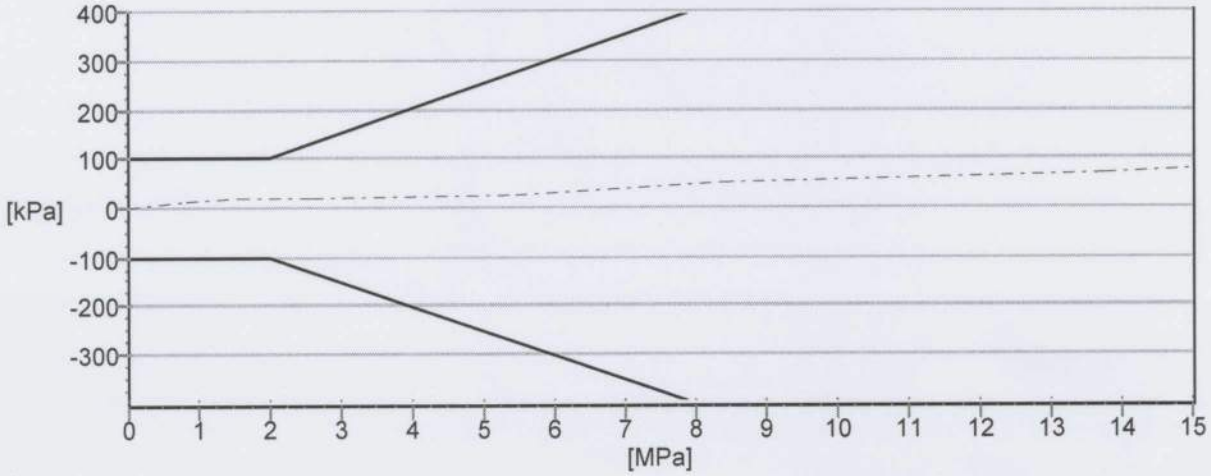
1.4 Result

The sensor complies to the above standard

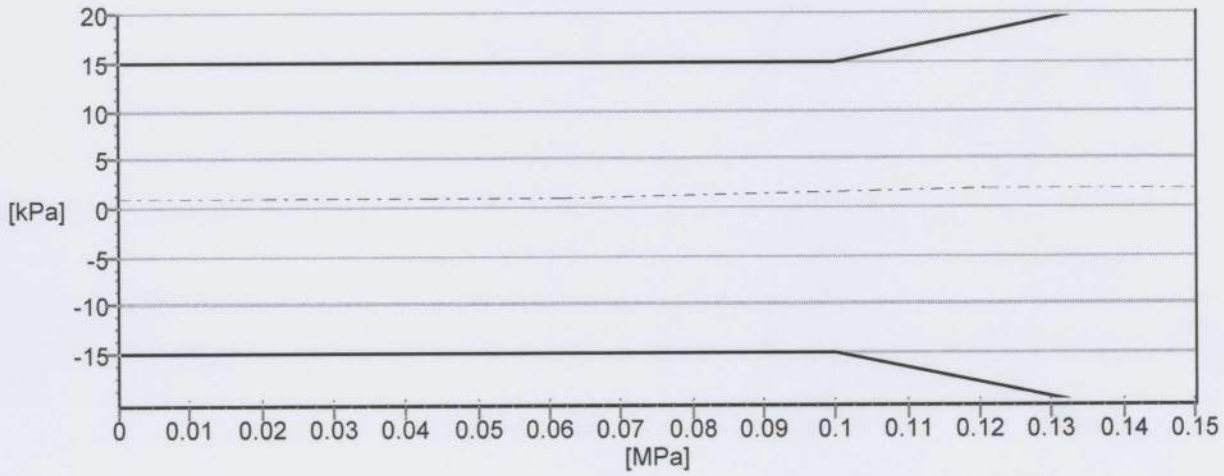
Calibrated by:	C.J. Ouwejan
Date:	01/02/2018
Signature:	

QA Manager:	N.R.E. de Jong
Date:	01/02/2018
Signature:	

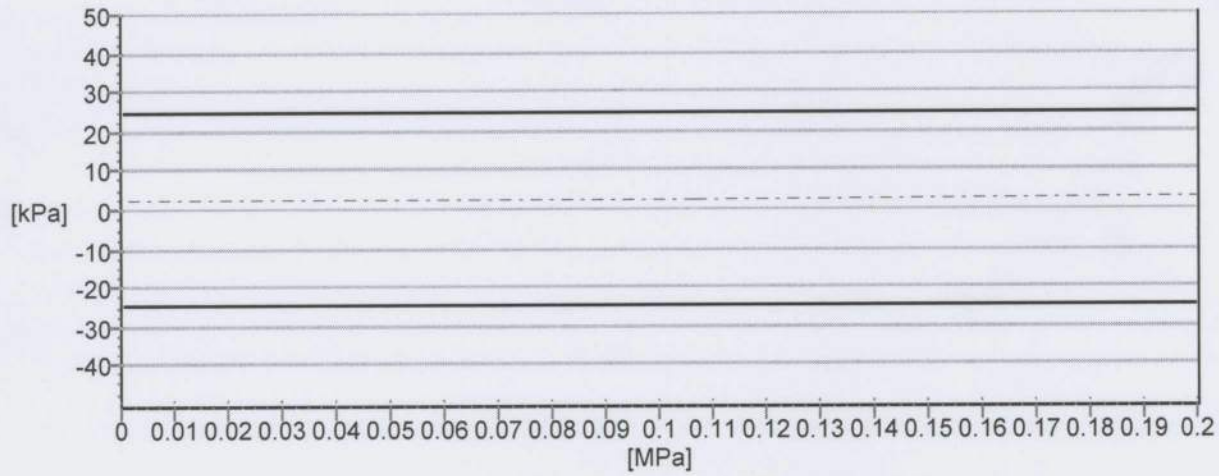
Cone Resistance (qc)



Local Friction (fs)



Pore Water Pressure (u2)



- - - - - - Deviation ——— EN ISO 22476-1 2012 Class 2

Appendix D
Test Pit Logs and Photographs

SH8 Beaumont Bridge Realignment
Geotechnical Factual Report

Central Testing Services
18 Ngapara St, P.O. Box 397, Alexandra 9340, Central Otago, New Zealand
P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: 18/2116-1

Date: 14 September 2018

TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Test Pit 1; Adjacent SH8 - Increasing Side (see below)

FIELD LOG DESCRIPTIONS – Not IANZ Accredited (NZ Geotechnical Society Guidelines 2005)

Depth (mm)	Description
0 - 150	Topsoil & vegetation.
150 - 420	Dark orangish brown Sandy GRAVEL with minor silt. Moist. Compact / Loose. Gravel, subrounded to rounded, maximum particle size 13.2mm; Sand, fine to coarse; Silt, plastic.
420 - 590	Grey SILT with trace of / minor sand. Moist. Soft / Firm. Sand, fine; Silt, plastic.
590 - 880	Mottled grey / yellowish / light brown SILT with minor clay and minor gravel. Moist. Soft / Firm. Gravel, subrounded to rounded, maximum particle size 13.2mm; Sand, fine to coarse; Silt, plastic.
880 - 1300	Light brown / yellow Sandy GRAVEL with minor / some silt and trace of clay. Moist. Compact / Loose. Gravel, subrounded to rounded, maximum particle size 37.5mm; Sand, fine to coarse; Silt, slight plasticity.
1300 - 3000	Greenish grey / brown Sandy GRAVEL with minor silt. Moist. Compact. Gravel, subrounded to rounded, maximum particle size 106.0mm; Sand, fine to coarse; Silt, non-plastic.

Note: This report may not be reproduced except in full.

Tested By: N.P. Danischewski **Date: 15 & 16-Aug-18**

Checked By:

Tests indicated as Not Accredited are outside the scope of the laboratory's accreditation

IANZ ACCREDITED LABORATORY Accreditation No: 434

Central Testing Services
18 Ngapara St, P.O. Box 397, Alexandra 9340, Central Otago, New Zealand
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Reference No: 18/2116-1

Date: 14 September 2018

TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

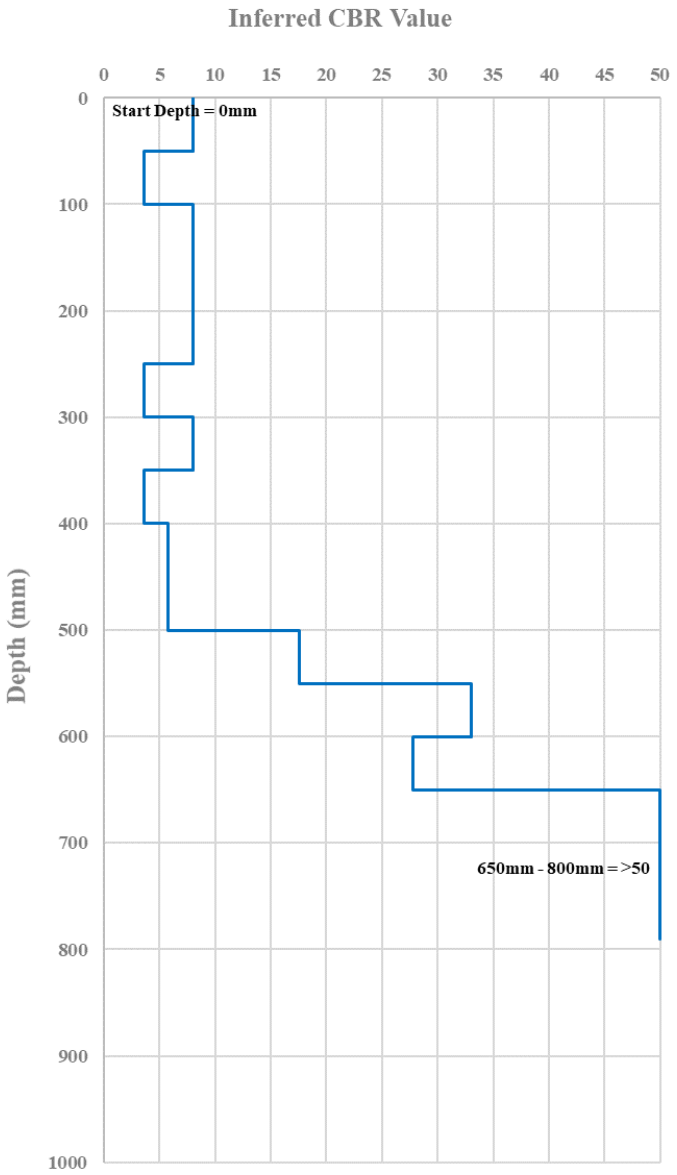
Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Test Pit 1; Adjacent SH8 - Increasing Side

SCALA PENETROMETER RESULTS (NZS 4402:1988, Test 6.5.2)

Depth (mm)	Penetration (mm/blow)	Inferred CBR [1]
0 - 50	25.0	8
50 - 100	50.0	3.5
100 - 150	25.0	8
150 - 200	25.0	8
200 - 250	25.0	8
250 - 300	50.0	3.5
300 - 350	25.0	8
350 - 400	50.0	3.5
400 - 450	33.3	6
450 - 500	33.3	6
500 - 550	12.5	18
550 - 600	7.1	33
600 - 650	8.3	28
650 - 700	3.6	>50
700 - 750	1.9	>50
750 - 800	1.1	>50
Refusal		

Note: [1] CBR values have been inferred from AustRoads Pavement Design Manual (2012) – Fig 5.3 (Not IANZ Accredited).



Tested By: N.P. Danischewski **Date: 15 & 16-Aug-18**

Checked By:

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Reference No: 18/2116-1

Date: 14 September 2018

TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Test Pit 2; Dee Street - SH8 End (see below)

FIELD LOG DESCRIPTIONS – Not IANZ Accredited (NZ Geotechnical Society Guidelines 2005)

Depth (mm)	Description
0 - 200	Topsoil & vegetation (organic matter).
200 - 600	Dark orangish brown Sandy GRAVEL with some silt and trace of clay. Moist. Compact / Loose. Gravel, rounded, maximum particle size 37.5mm; Sand, fine to coarse, Silt, slight plasticity.
600 - 800	Bedrock – Schist.

Tested By: N.P. Danischewski **Date: 15 & 16-Aug-18**

Checked By:

Tests indicated as Not Accredited are outside the scope of the laboratory's accreditation

IANZ ACCREDITED LABORATORY
Accreditation No: 434

Central Testing Services
18 Ngapara St, P.O. Box 397, Alexandra 9340, Central Otago, New Zealand
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Reference No: 18/2116-1

Date: 14 September 2018

TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

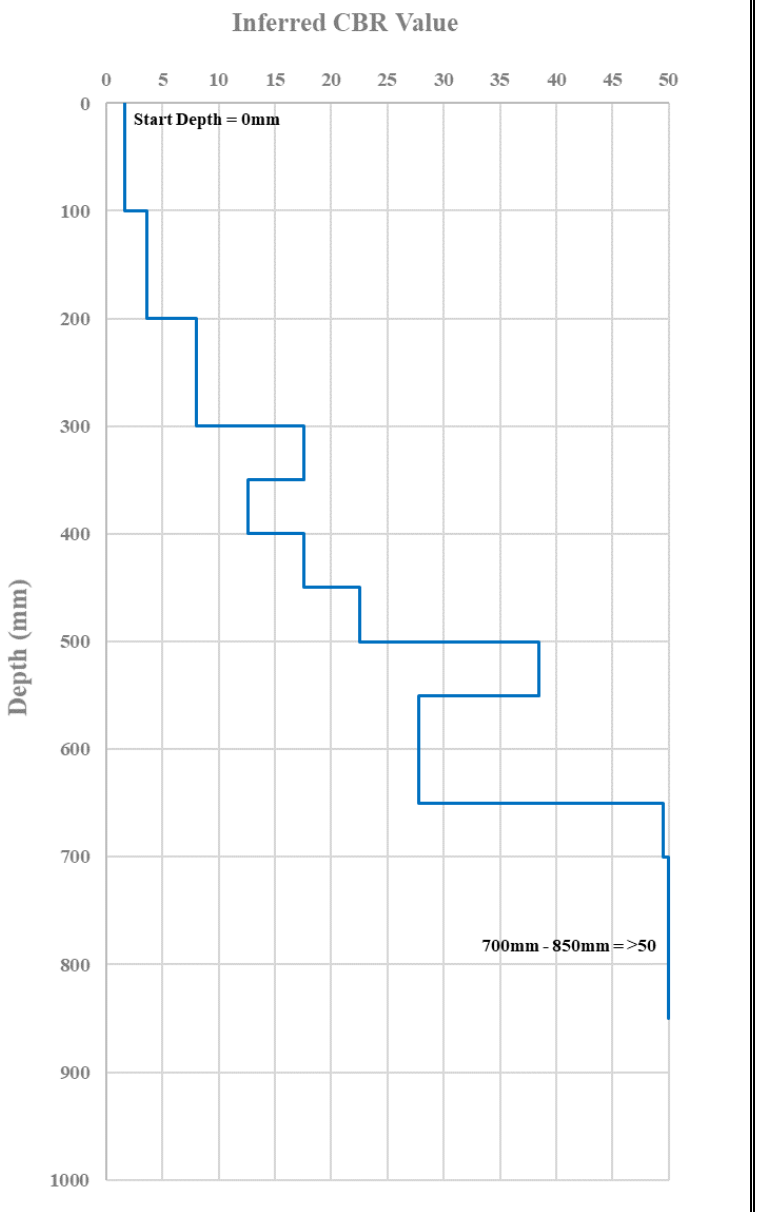
Test Pit 2; Dee Street - SH8 End (see below)

SCALA PENETROMETER RESULTS (NZS 4402:1988, Test 6.5.2)

Depth (mm)	Penetration (mm/blow)	Inferred CBR [1]
0 - 50	100.0	1.5
50 - 100	100.0	1.5
100 - 150	50.0	3.5
150 - 200	50.0	3.5
200 - 250	25.0	8
250 - 300	25.0	8
300 - 350	12.5	18
350 - 400	16.7	13
400 - 450	12.5	18
450 - 500	10.0	23
500 - 550	6.3	38
550 - 600	8.3	28
600 - 650	8.3	28
650 - 700	5.0	50
700 - 750	2.4	>50
750 - 800	2.5	>50
800 - 850	2.5	>50

Refusal

Note: [1] CBR values have been inferred from AustRoads Pavement Design Manual (2012) – Fig 5.3 (Not IANZ Accredited).



Tested By: N.P. Danischewski **Date: 15 & 16-Aug-18**

Checked By:

Tests indicated as Not Accredited are outside the scope of the laboratory's accreditation

IANZ ACCREDITED LABORATORY Accreditation No: 434

Central Testing Services
18 Ngapara St, P.O. Box 397, Alexandra 9340, Central Otago, New Zealand
P: 03 4487644, W: www.centraltesting.co.nz, E: info@centraltesting.co.nz

Reference No: 18/2116-1

Date: 14 September 2018

TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Test Pit 3; Dee Street – Westferry Street End (see below)

FIELD LOG DESCRIPTIONS – Not IANZ Accredited (NZ Geotechnical Society Guidelines 2005)

Depth (mm)	Description
0 - 230	Topsoil & vegetation (organic matter).
230 - 560	Dark orangish brown Sandy GRAVEL with some silt and trace of cobbles. Moist. Compact / Loose. Gravel, subrounded to rounded, maximum particle size 75.0mm; Sand, fine to coarse; Silt, slight plasticity.
560 - 1500	Light greyish brown Sandy GRAVEL with minor silt. Moist / Compact. Gravel / cobbles, subrounded to rounded, maximum particle size 63.0mm; Sand, fine to coarse; Silt, non-plastic.
1500 - 2050	Light greyish brown Sandy GRAVEL with minor silt and minor cobbles / boulders. Wet. Compact. Gravel / cobbles / boulders, angular to subangular, maximum particle size 400.0mm; Sand, fine to coarse; Silt, non-plastic. Free water @ 1850mm to 2050mm perched on underlying clayey silt.
2050 - 3000	Light greenish / yellowish grey Clayey SILT. Moist. Soft / Firm. Bedded. Silt / Clay, plastic.

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Reference No: 18/2116-1

Date: 14 September 2018

TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

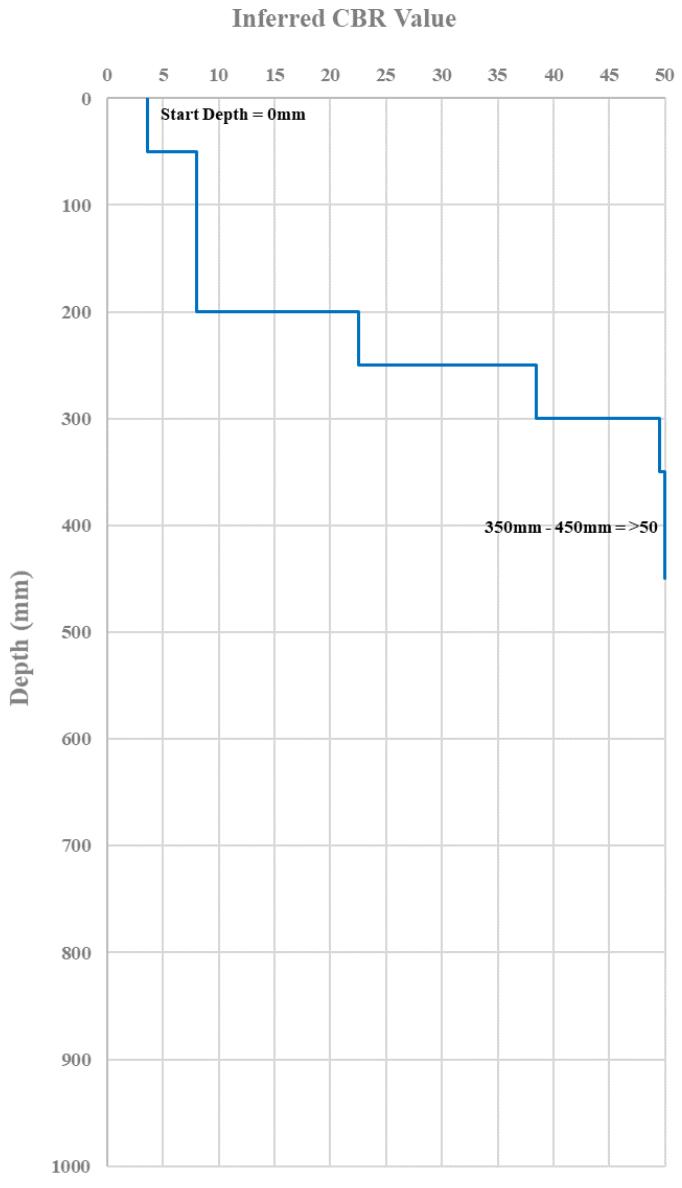
Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Test Pit 3; Dee Street – Westferry Street End

SCALA PENETROMETER RESULTS (NZS 4402:1988, Test 6.5.2)

Depth (mm)	Penetration (mm/blow)	Inferred CBR [1]
0 - 50	50.0	3.5
50 - 100	25.0	8
100 - 150	25.0	8
150 - 200	25.0	8
200 - 250	10.0	23
250 - 300	6.3	38
300 - 350	5.0	50
350 - 400	2.3	>50
400 - 450	1.3	>50
Refusal		

Note: [1] CBR values have been inferred from AustRoads Pavement Design Manual (2012) – Fig 5.3 (Not IANZ Accredited).



Tested By: N.P. Danischewski **Date: 15 & 16-Aug-18**

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Date: 14 September 2018

TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Test Pit 4; Adjacent SH8 - Increasing Side (Opposite Beaumont Hotel)

FIELD LOG DESCRIPTIONS – Not IANZ Accredited (NZ Geotechnical Society Guidelines 2005)

Depth (mm)	Description
0 - 250	Grey Sandy GRAVEL with some silt and trace of cobbles. Moist. Compact. Gravel / cobbles, subrounded to rounded, maximum particle size 75.0mm; Sand, fine to coarse; Silt, non-plastic.
250 - 460	Dark orangish brown Sandy GRAVEL with minor silt. Moist. Loose. Gravel, subrounded to rounded, maximum particle size 19.0mm; Sand, fine to coarse; Silt, non-plastic. Tree stump, roots and organic matter present.
460 - 1850	Orangish brown Sandy GRAVEL with minor silt and trace of cobbles. Dry / Moist. Compact / Loose. Gravel / cobbles, subrounded to rounded, maximum particle size 106.0mm; Sand, fine to coarse; Silt, non-plastic. Free water /water table @ approximately 1550mm.
1850 - 2000	Bedrock – Schist.

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Reference No: 18/2116-1

Date: 14 September 2018

TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

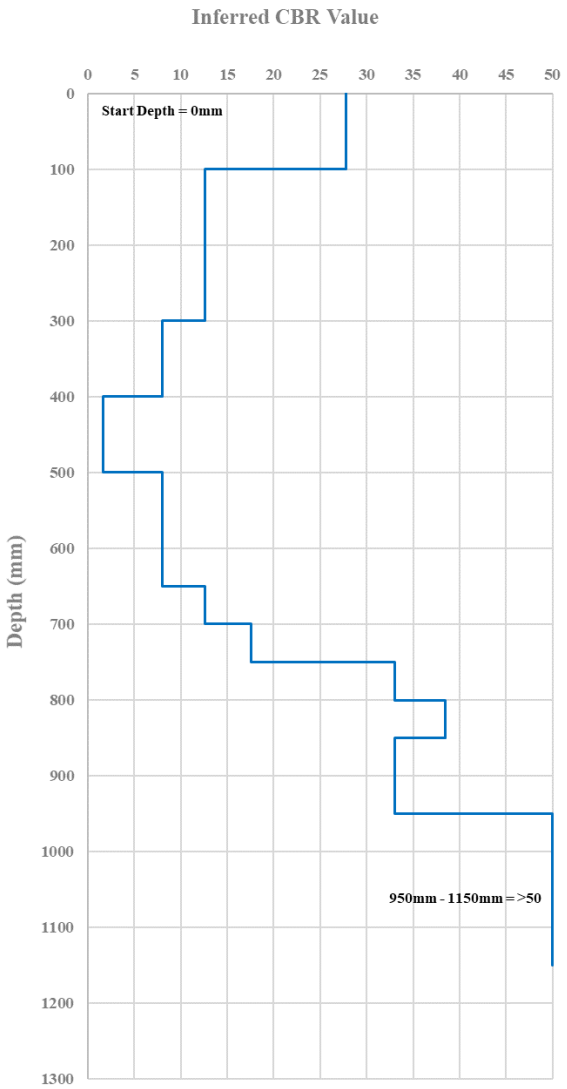
Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Test Pit 4; Adjacent SH8 - Increasing Side (Opposite Beaumont Hotel)

SCALA PENETROMETER RESULTS (NZS 4402:1988, Test 6.5.2)

Depth (mm)	Penetration (mm/blow)	Inferred CBR [1]
0 - 50	8.3	28
50 - 100	8.3	28
100 - 150	16.7	13
150 - 200	16.7	13
200 - 250	16.7	13
250 - 300	16.7	13
300 - 350	25.0	8
350 - 400	25.0	8
400 - 450	100.0	1.5
450 - 500	100.0	1.5
500 - 550	25.0	8
550 - 600	25.0	8
600 - 650	25.0	8
650 - 700	16.7	13
700 - 750	12.5	18
750 - 800	7.1	33
800 - 850	6.3	38
850 - 900	7.1	33
900 - 950	7.1	33
950 - 1000	3.3	>50
1000 - 1050	2.1	>50
1050 - 1100	1.7	>50
1100 - 1150	2.1	>50
Refusal		

Note: [1] CBR values have been inferred from AustRoads Pavement Design Manual (2012) – Fig 5.3 (Not IANZ Accredited).



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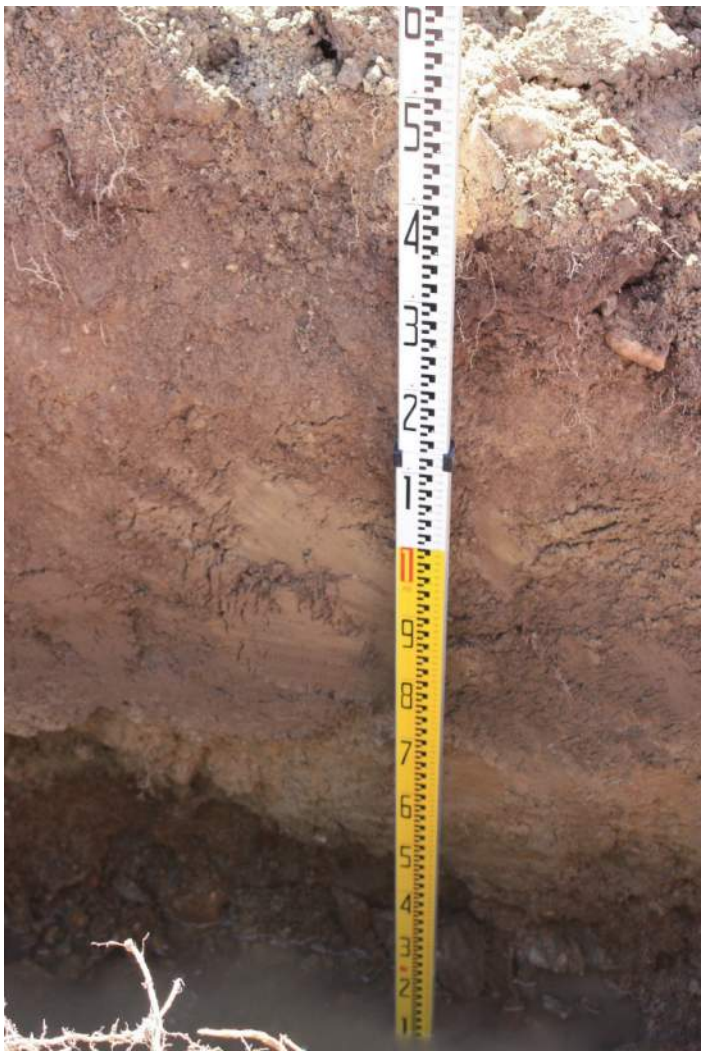
TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Test Pit 5; Adjacent SH8 - Increasing Side (see below)

FIELD LOG DESCRIPTIONS – Not IANZ Accredited (NZ Geotechnical Society Guidelines 2005)

Depth (mm)	Description
0 - 100	Topsoil & vegetation (organic matter).
100 - 220	Greyish brown Silty SAND with minor gravel. Moist. Soft. Gravel, subrounded to rounded, maximum particle size 19.0mm; Sand, fine to medium; Silt, slight plasticity.
220 - 640	Grey SILT with trace of gravel and trace of / minor clay. Moist / Wet. Soft. Gravel, rounded, maximum particle size 6.70mm; Sand, fine; Silt, plastic.
640 - 1000	Greenish grey / mottled orange SILT with minor / some clay. Moist. Soft. Silt, plastic.
1000 - 1200	Dark orangish brown Sandy GRAVEL with trace of silt and trace of cobbles. Moist. Compact. Gravel / cobbles, maximum particle size 63.0mm; Sand, fine to coarse; Silt, non-plastic. Occasional weathered schist boulder to 300mm at top of layer. Water table.
1200 - 1300	Bedrock – schist.



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TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

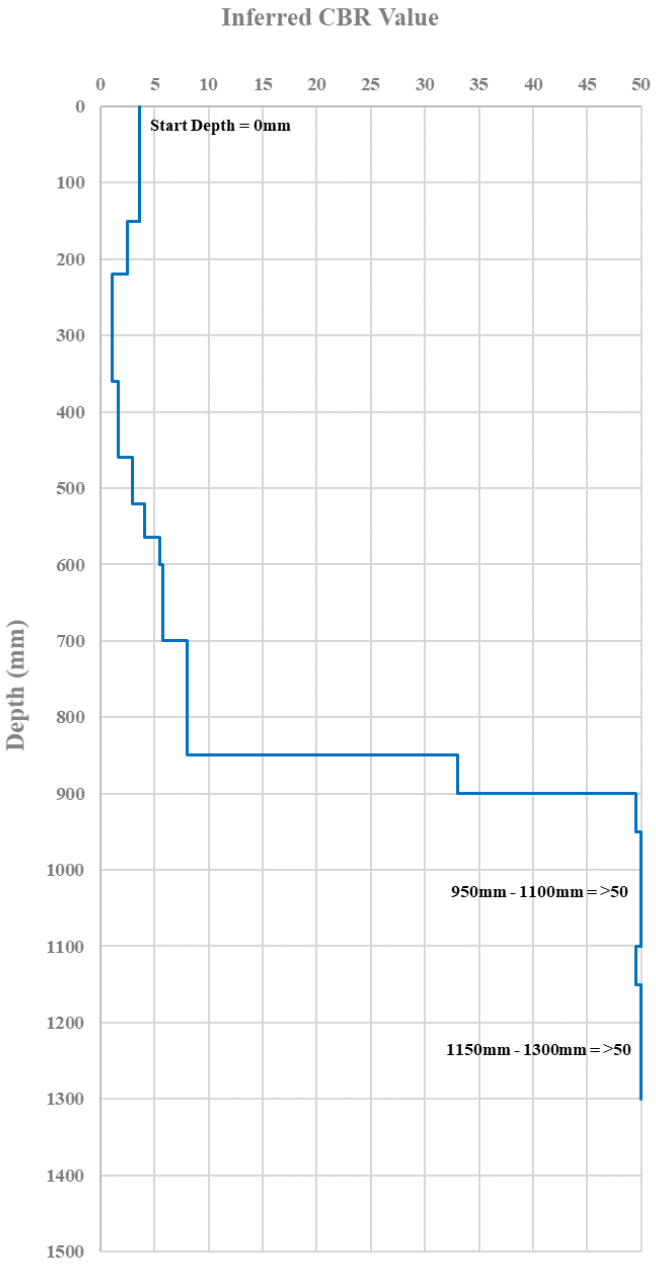
Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Test Pit 5; Adjacent SH8 - Increasing Side

SCALA PENETROMETER RESULTS (NZS 4402:1988, Test 6.5.2)

Depth (mm)	Penetration (mm/blow)	Inferred CBR [1]
0 - 50	50.0	3.5
50 - 100	50.0	3.5
100 - 150	50.0	3.5
150 - 220	70.0	2.5
220 - 360	140.0	1.0
360 - 460	100.0	1.5
460 - 520	60.0	3.0
520 - 565	45.0	4.0
565 - 600	35.0	5
600 - 650	33.3	6
650 - 700	33.3	6
700 - 750	25.0	8
750 - 800	25.0	8
800 - 850	25.0	8
850 - 900	7.1	33
900 - 950	5.0	50
950 - 1000	3.3	>50
1000 - 1050	3.1	>50
1050 - 1100	3.8	>50
1100 - 1150	5.0	50
1150 - 1200	4.5	>50
1200 - 1250	3.8	>50
1250 - 1300	1.3	>50
Refusal		

Note: [1] CBR values have been inferred from AustRoads Pavement Design Manual (2012) – Fig 5.3 (Not IANZ Accredited).



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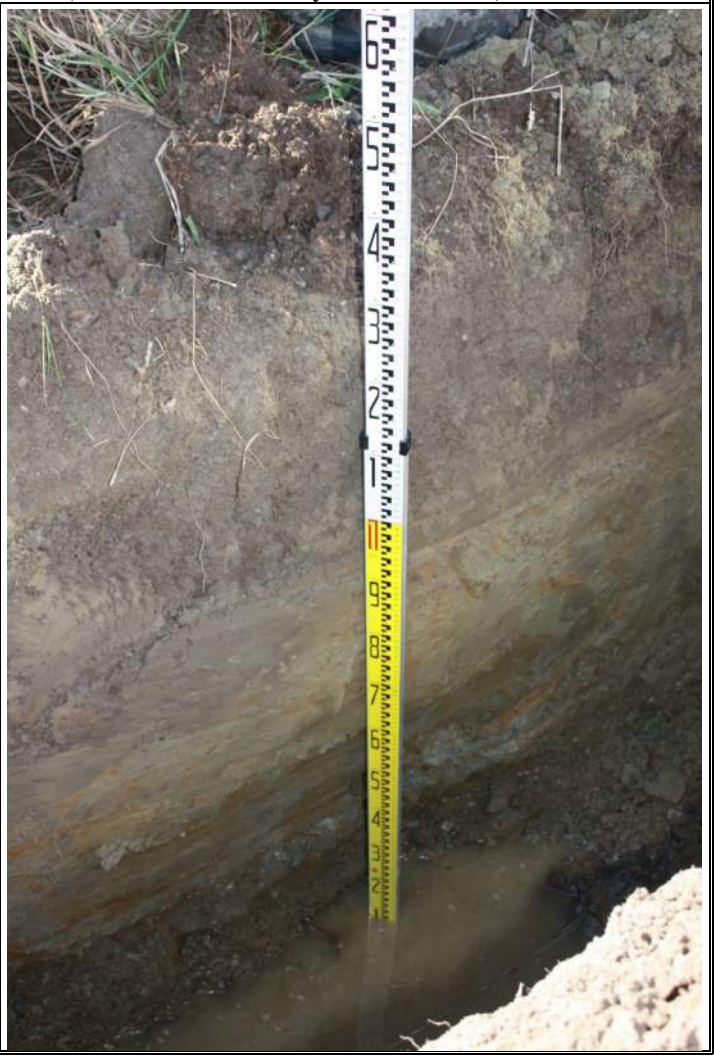
TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Test Pit 6; Adjacent SH8 - Increasing Side (see below)

FIELD LOG DESCRIPTIONS – Not IANZ Accredited (NZ Geotechnical Society Guidelines 2005)

Depth (mm)	Description
0 - 200	Topsoil & vegetation (organic matter).
200 - 600	Brownish grey SILT with trace of clay. Moist / Wet. Soft. Silt, plastic.
600 - 830	Light brown SILT with trace of / minor clay and trace of gravel. Moist / Wet. Firm. Gravel, maximum particle size 6.70mm; Silt, plastic.
830 - 1050	Mottled yellowish grey / orange Silty SAND. Moist. Soft / Firm. Sand, fine; Silt, slight plasticity.
1050 - 1500	Greyish brown Sandy GRAVEL with minor silt and trace of cobbles. Moist / Wet. Loose. Gravel / cobbles, subrounded to rounded, maximum particle size 150.0mm; Sand, fine to coarse; Silt, plastic. Water table @ 1100mm.
1500 +	Bedrock.



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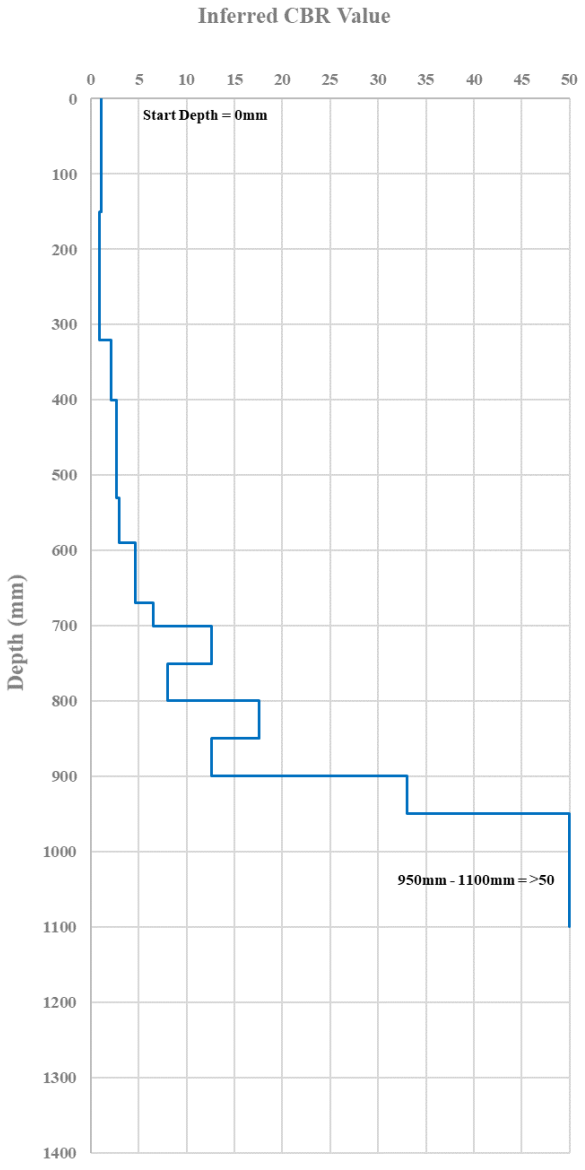
TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Test Pit 6; Adjacent SH8 - Increasing Side (see below)

SCALA PENETROMETER RESULTS (NZS 4402:1988, Test 6.5.2)

Depth (mm)	Penetration (mm/blow)	Inferred CBR [1]
0 - 150	150.0	1.0
150 - 320	170.0	1.0
320 - 400	80.0	2.0
400 - 465	65.0	2.5
465 - 530	65.0	2.5
530 - 590	60.0	3.0
590 - 630	40.0	5
630 - 670	40.0	5
670 - 700	30.0	7
700 - 750	16.7	13
750 - 800	25.0	8
800 - 850	12.5	18
850 - 900	16.7	13
900 - 950	7.1	33
950 - 1000	1.9	>50
1000 - 1050	1.9	>50
1050 - 1100	1.6	>50
Refusal		



Note: [1] CBR values have been inferred from AustRoads Pavement Design Manual (2012) – Fig 5.3 (Not IANZ Accredited).

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TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Test Pit 7; Adjacent SH8 – Decreasing Side in Paddock; Corner Section SH8 and Rongahere Road (see below)

FIELD LOG DESCRIPTIONS - Not IANZ Accredited (NZ Geotechnical Society Guidelines 2005)

Depth (mm)	Description
0 - 130	Topsoil & vegetation (organic matter).
130 - 400	Brownish grey Gravelly SILT with minor / some sand and trace of cobbles / boulders. Moist. Firm. Gravel / cobbles, angular to rounded, maximum particle size 500mm; Sand, fine to coarse; Silt, plastic.
400 - 1000	Green / Greenish grey / orange mottled SILT with trace of / minor clay and trace of sand. Moist. Firm / Stiff. Sand, fine. Silt / clay, plastic.
1000 - 2300	Blueish grey SILT with minor clay. Plastic. Pockets of organic material present, possible old fill area. Water present.
2300 +	Bedrock.

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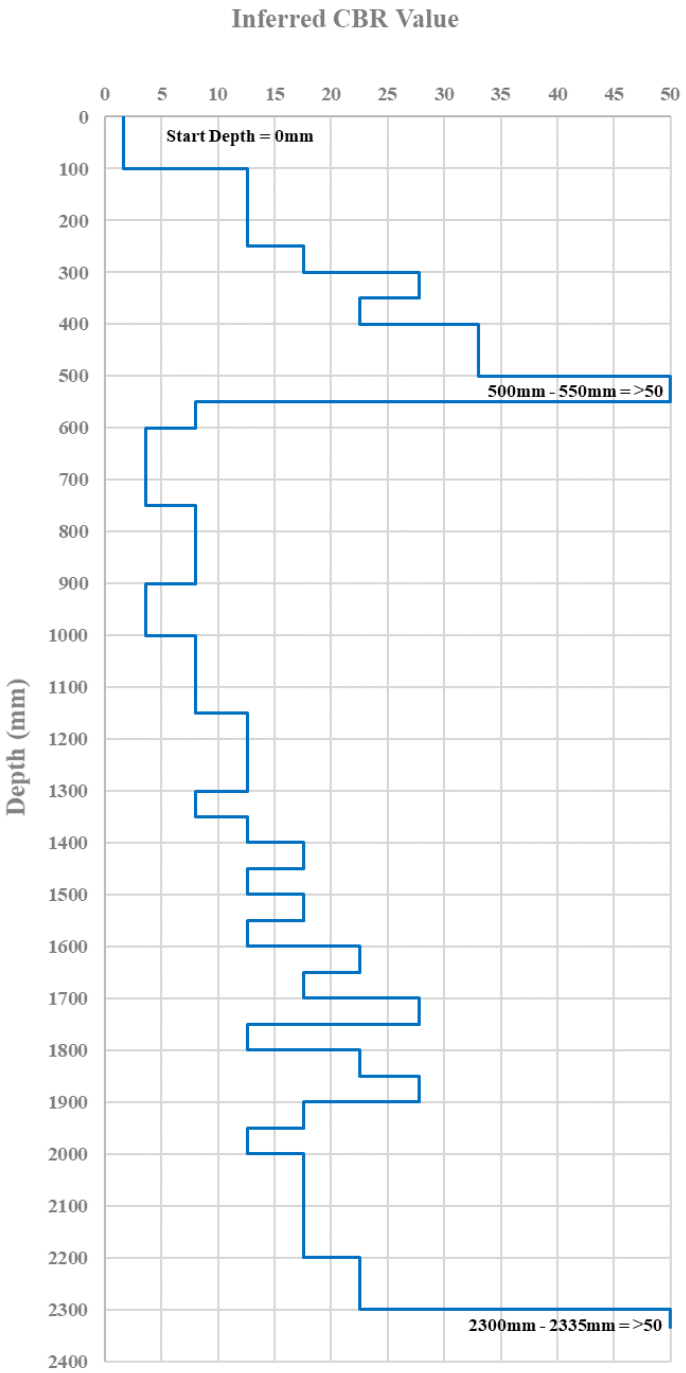
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Test Pit 7; Adjacent SH8 - Decreasing Side in Paddock; Corner Section SH8 and Rongahere Road

SCALA PENETROMETER RESULTS (NZS 4402:1988, Test 6.5.2)

Depth (mm)	Penetration (mm/blow)	Inferred CBR [1]
0 - 50	100.0	1.5
50 - 100	100.0	1.5
100 - 150	16.7	13
150 - 200	16.7	13
200 - 250	16.7	13
250 - 300	12.5	18
300 - 350	8.3	28
350 - 400	10.0	23
400 - 450	7.1	33
450 - 500	7.1	33
500 - 550	4.2	>50
550 - 600	25.0	8
600 - 650	50.0	3.5
650 - 700	50.0	3.5
700 - 750	50.0	3.5
750 - 800	25.0	8
800 - 850	25.0	8
850 - 900	25.0	8
900 - 950	50.0	3.5
950 - 1000	50.0	3.5
1000 - 1050	25.0	8
1050 - 1100	25.0	8
1100 - 1150	25.0	8
1150 - 1200	16.7	13
1200 - 1250	16.7	13
1250 - 1300	16.7	13
1300 - 1350	25.0	8
1350 - 1400	16.7	13
1400 - 1450	12.5	18
1450 - 1500	16.7	13
1500 - 1550	12.5	18
1550 - 1600	16.7	13
1600 - 1650	10.0	23
1650 - 1700	12.5	18
1700 - 1750	8.3	28
1750 - 1800	16.7	13
1800 - 1850	10.0	23
1850 - 1900	8.3	28
1900 - 1950	12.5	18
1950 - 2000	16.7	13
2000 - 2050	12.5	18
2050 - 2100	12.5	18
2100 - 2150	12.5	18
2150 - 2200	12.5	18
2200 - 2250	10.0	23
2250 - 2300	10.0	23
2300 - 2335	1.8	>50

Note: [1] CBR values have been inferred from AustRoads Pavement Design Manual (2012) – Fig 5.3 (Not IANZ Accredited).



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TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Test Pit 8; Adjacent SH8 – Decreasing Side in Paddock; Corner Section SH8 and Rongahere Road (see below)

FIELD LOG DESCRIPTIONS - Not IANZ Accredited (NZ Geotechnical Society Guidelines 2005)

Depth (mm)	Description
0 - 150	Topsoil & vegetation (organic matter).
150 +	Bedrock – Schist.

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Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Test Pit 8; Adjacent SH8 - Decreasing Side in Paddock; Corner Section SH8 and Rongahere Road

SCALA PENETROMETER RESULTS (NZS 4402:1988, Test 6.5.2)

Depth (mm)	Penetration (mm/blow)	Inferred CBR [1]

Note: [1] CBR values have been inferred from AustRoads Pavement Design Manual (2012) – Fig 5.3 (Not IANZ Accredited).

Bedrock - No scala penetrometer test !

Tested By: N.P. Danischewski **Date: 15 & 16-Aug-18**

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Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Test Pit 9; Adjacent SH8 – Decreasing Side in Paddock; Corner Section SH8 and Rongahere Road (see below)

FIELD LOG DESCRIPTIONS - Not IANZ Accredited (NZ Geotechnical Society Guidelines 2005)

Depth (mm)	Description
0 - 200	Topsoil & vegetation (organic matter).
200 - 410	Grey Sandy GRAVEL with minor silt / clay. Wet. Compact / Loose. Gravel, subrounded to rounded, maximum particle size 19.0mm; Sand, fine to coarse; Silt, slight plasticity.
410 - 700	Grey SILT with minor sand, minor clay and trace of gravel. Gravel, subrounded to rounded, maximum particle size 13.2mm; Sand, fine to coarse; Silt, plastic.
700 - 900	Mottled orange / light greyish brown SILT with trace of sand and trace of / minor clay. Moist / Wet. Soft. Sand, fine to coarse; Silt, plastic.
900 - 1150	Greenish / brownish grey SILT with minor clay, minor sand, trace of / minor gravel. Gravel, subrounded to rounded, maximum particle size 63.0mm; Sand, fine to coarse; Silt, plastic.
1150 - 1400	Bedrock.

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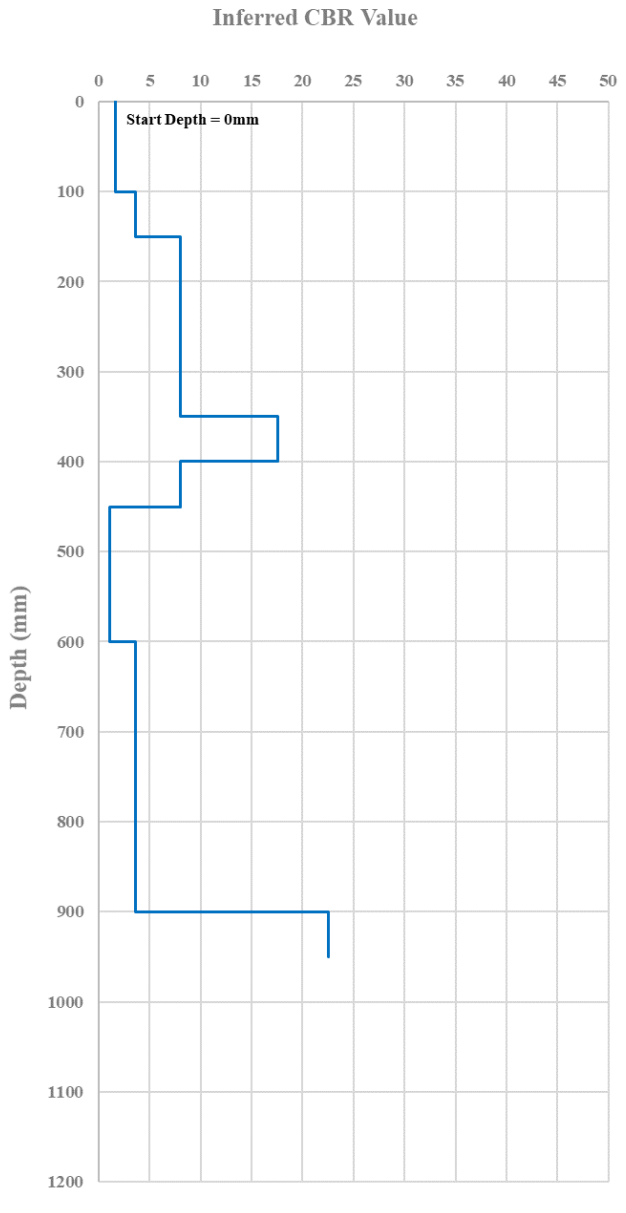
TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Test Pit 9; Adjacent SH8 – Decreasing Side in Paddock; Corner Section SH8 and Rongahere Road

SCALA PENETROMETER RESULTS (NZS 4402:1988, Test 6.5.2)

Depth (mm)	Penetration (mm/blow)	Inferred CBR [1]
0 - 100	100.0	1.5
100 - 150	50.0	3.5
150 - 200	25.0	8
200 - 250	25.0	8
250 - 300	25.0	8
300 - 350	25.0	8
350 - 400	12.5	18
400 - 450	25.0	8
450 - 600	150.0	1.0
600 - 650	50.0	3.5
650 - 700	50.0	3.5
700 - 750	50.0	3.5
750 - 800	50.0	3.5
800 - 850	50.0	3.5
850 - 900	50.0	3.5
900 - 950	10.0	23
Refusal		



Note: [1] CBR values have been inferred from AustRoads Pavement Design Manual (2012) – Fig 5.3 (Not IANZ Accredited).

Tested By: N.P. Danischewski **Date: 15 & 16-Aug-18**

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Reference No: 18/2116-1

Date: 14 September 2018

TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Test Pit 10; Adjacent SH8 – Increasing Side, Western Side of Existing Bridge (see below)

FIELD LOG DESCRIPTIONS - Not IANZ Accredited (NZ Geotechnical Society Guidelines 2005)

Depth (mm)	Description (as per photograph – Clutha river side)
0 - 400	Greenish grey Sandy GRAVEL with some silt and trace of cobbles. Moist. Compact. Gravel / cobbles, subrounded to rounded, maximum particle size 75.0mm; Sand, fine to coarse; Silt, slight plasticity.
400 - 600	Dark greyish brown SILT with minor sand. Moist. Firm. Sand, fine; Silt, slight plasticity.
600 - 2200	Light orangish / yellowish brown SILT with trace of sand and trace of clay. Moist. Firm. Sand, fine; Silt, plastic.
Depth (mm)	**Description (Hotel side of test pit – not visible)**
0 - 2200	Schist bedrock

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Date: 14 September 2018

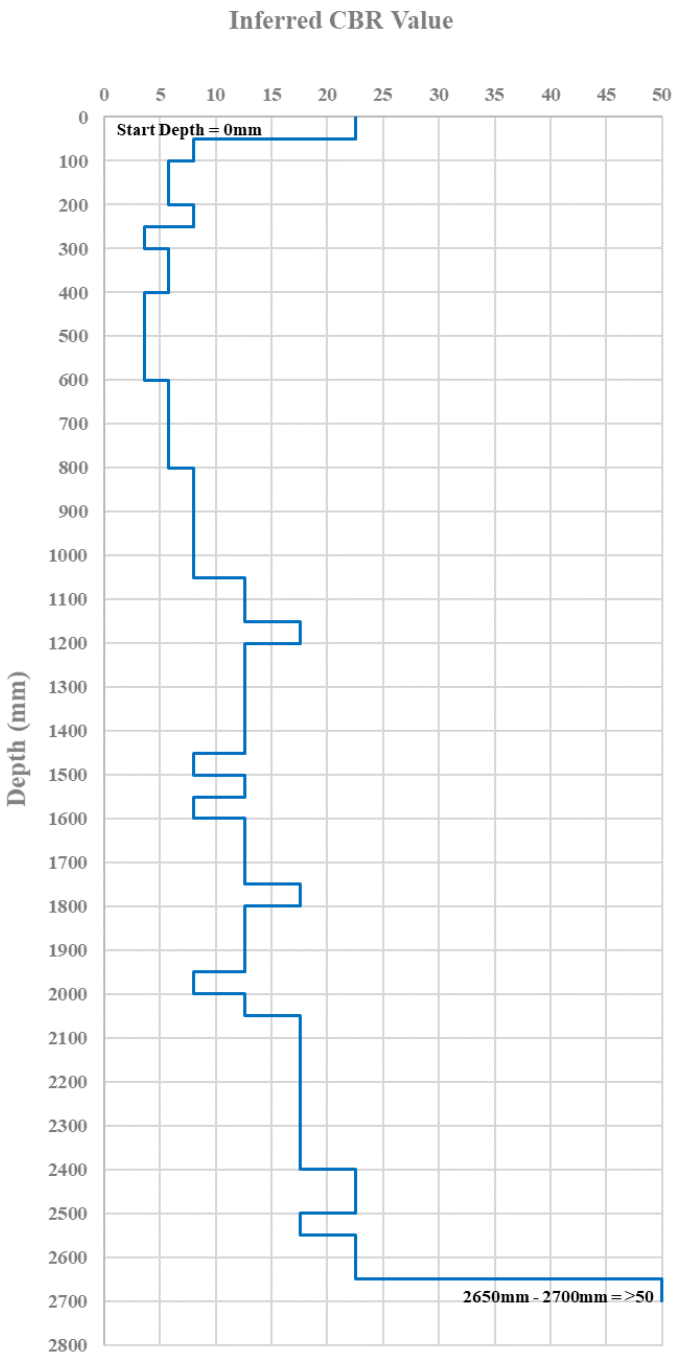
TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

SCALA PENETROMETER RESULTS (NZS 4402:1988, Test 6.5.2)
Test Pit 10; Adjacent SH8 – Increasing Side, Western Side of Existing Bridge

Depth (mm)	Penetration (mm/blow)	Inferred CBR [1]
0 - 50	10.0	23
50 - 100	25.0	8
100 - 150	33.3	6
150 - 200	33.3	6
200 - 250	25.0	8
250 - 300	50.0	3.5
300 - 350	33.3	6
350 - 400	33.3	6
400 - 450	50.0	3.5
450 - 500	50.0	3.5
500 - 550	50.0	3.5
550 - 600	50.0	3.5
600 - 650	33.3	6
650 - 700	33.3	6
700 - 750	33.3	6
750 - 800	33.3	6
800 - 850	25.0	8
850 - 900	25.0	8
900 - 950	25.0	8
950 - 1000	25.0	8
1000 - 1050	25.0	8
1050 - 1100	16.7	13
1100 - 1150	16.7	13
1150 - 1200	12.5	18
1200 - 1250	16.7	13
1250 - 1300	16.7	13
1300 - 1350	16.7	13
1350 - 1400	16.7	13
1400 - 1450	16.7	13
1450 - 1500	25.0	8
1500 - 1550	16.7	13
1550 - 1600	25.0	8
1600 - 1650	16.7	13
1650 - 1700	16.7	13
1700 - 1750	16.7	13
1750 - 1800	12.5	18
1800 - 1850	16.7	13
1850 - 1900	16.7	13
1900 - 1950	16.7	13
1950 - 2000	25.0	8
2000 - 2050	16.7	13
2050 - 2100	12.5	18
2100 - 2150	12.5	18
2150 - 2200	12.5	18
2200 - 2250	12.5	18
2250 - 2300	12.5	18
2300 - 2350	12.5	18
2350 - 2400	12.5	18
2400 - 2450	10.0	23
2450 - 2500	10.0	23
2500 - 2550	12.5	18
2550 - 2600	10.0	23
2600 - 2650	10.0	23
2650 - 2700	2.6	>50

Note: [1] CBR values have been inferred from AustRoads Pavement Design Manual (2012) – Fig 5.3 (Not IANZ Accredited).



Tested By: N.P. Danischewski **Date: 15 & 16-Aug-18**

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IANZ ACCREDITED LABORATORY
Accreditation No: 434

Test Pit No. TP 11

Project:	SH 8 Beaumont Bridge Replacement	*Coordinates:*	341243 E 804505 N
Client:	NZTA	*Ref. Grid:*	North Taieri 2000
Project No.:	6-CT012.01	*R.L.:*	Not established
Location:	Beaumont		

GEOLOGY	DEPTH (m)	DESCRIPTION	GRAPHIC LOG	WATER LEVEL	R.L. (m)	DEPTH (m)	SOIL TESTS: SCALA PENETROMETER (Blows per mm) 0 2 4 6 8 10 12 14 16 18 20	SHEAR STRENGTH (kPa)	OTHER TESTS	SAMPLES
	0	TOPSOIL; Sandy SILT with rootes and rootlets; dark brown. Soft; moist; sand, fine to medium.				0				
		Silty fine SAND; light brownish grey. Loose; moist.								
	1	Silty fine to coase GRAVEL; light brown. Loose moist; rounded to sub rounded.				1				
		Gravel decreasing								
		Silty fine SAND; light brownish grey. Loose; moist.								
				1.8m 25/10						
	2	Fine to coarse GRAVEL with some sand and cobbles; orangish brown. Loose; saturated; rounded to sub rounded.				2				
		Cobbles increasing								
		SCHIST								
		END OF PIT AT 2.61m - Target Criteria Achieved								
	3					3				
	4					4				

Notes:

Date Tested: 25/10/2018
Excavator:
Tested by: LA
Checked by: NT

Test Methods:
Determination of the Penetration Resistance of a Soil, NZS 4402 Test 6.5.2:1988
Guideline for Hand Held Shear Vane Test, NZ Geotechnical Soc., 2001

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:25 @ A4

Test Pit No. TP 11

Project:	SH 8 Beaumont Bridge Replacement	*Coordinates:*	341243 E 804505 N
Client:	NZTA	*Ref. Grid:*	North Taieri 2000
Project No.:	6-CT012.01	*R.L.:*	Not established
Location:	Beaumont		

PIT PHOTOGRAPH

TP 11

Notes:

Date Tested:	25/10/2018
Excavator:	
Tested by:	LA
Checked by:	NT

Test Methods:
Determination of the Penetration Resistance of a Soil, NZS 4402 Test 6.5.2:1988
Guideline for Hand Held Shear Vane Test, NZ Geotechnical Soc., 2001

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:25 @ A4

Test Pit No. TP 12

Project:	SH 8 Beaumont Bridge Replacement	*Coordinates:*	341236 E 804489 N
Client:	NZTA	*Ref. Grid:*	North Taieri 2000
Project No.:	6-CT012.01	*R.L.:*	Not established
Location:	Beaumont		

GEOLOGY	DEPTH (m)	DESCRIPTION	GRAPHIC LOG	WATER LEVEL	R.L. (m)	DEPTH (m)	SOIL TESTS: SCALA PENETROMETER (Blows per mm) 0 2 4 6 8 10 12 14 16 18 20	SHEAR STRENGTH (kPa)	OTHER TESTS	SAMPLES
		TOPSOIL; SILT with roots and rootlets; dark brown. Soft to firm; moist.								
		Silty fine SAND with roots and rootlets; light brownish grey. Loose; moist.								
	1	Fine SAND with some silt; light brownish grey. Loose; moist. Ocassional course sand lenses.				1				
		Silty sandy fine to coase GRAVEL with some cobbles; light brown. Loose; moist; rounded to sub rounded.		1.5m 25/10						
	2					2				
		END OF PIT AT 2.8m - Collapse								
	3					3				
	4					4				

Notes:

Date Tested: 25/10/2018
Excavator:
Tested by: LA
Checked by: NT

Test Methods:
Determination of the Penetration Resistance of a Soil, NZS 4402 Test 6.5.2:1988
Guideline for Hand Held Shear Vane Test, NZ Geotechnical Soc., 2001

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:25 @ A4

Test Pit No. TP 12

Project:	SH 8 Beaumont Bridge Replacement	*Coordinates:*	341236 E 804489 N
Client:	NZTA	*Ref. Grid:*	North Taieri 2000
Project No.:	6-CT012.01	*R.L.:*	Not established
Location:	Beaumont		

PIT PHOTOGRAPH

TP 12

Notes:

Date Tested:	25/10/2018
Excavator:	
Tested by:	LA
Checked by:	NT

Test Methods:
Determination of the Penetration Resistance of a Soil, NZS 4402 Test 6.5.2:1988
Guideline for Hand Held Shear Vane Test, NZ Geotechnical Soc., 2001

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:25 @ A4

Test Pit No. TP 13

Project:	SH 8 Beaumont Bridge Replacement	*Coordinates:*	341227 E 804473 N
Client:	NZTA	*Ref. Grid:*	North Taieri 2000
Project No.:	6-CT012.01	*R.L.:*	Not established
Location:	Beaumont		

GEOLOGY	DEPTH (m)	DESCRIPTION	GRAPHIC LOG	WATER LEVEL	R.L. (m)	DEPTH (m)	SOIL TESTS: SCALA PENETROMETER (Blows per mm) 0 2 4 6 8 10 12 14 16 18 20	SOIL TESTS: SHEAR STRENGTH (kPa)	SOIL TESTS: OTHER TESTS	SOIL TESTS: SAMPLES
	1	Fine SAND with some silt and roots and rootlets; grey. Loose/soft; moist.				1				
		Silty GRAVEL and BOULDERS with roots and rootlets; orangish grey. Medium dense; moist; rounded to sub rounded.								
	2	SCHIST END OF PIT AT 1.41m - Target Criteria Achieved				2				
	3					3				
	4					4				

Notes:
No ground water encountered

Test Methods:
Determination of the Penetration Resistance of a Soil, NZS 4402 Test 6.5.2:1988
Guideline for Hand Held Shear Vane Test, NZ Geotechnical Soc., 2001

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:25 @ A4

Date Tested:	25/10/2018
Excavator:	
Tested by:	LA
Checked by:	NT

Test Pit No. TP 13

Project:	SH 8 Beaumont Bridge Replacement	*Coordinates:*	341227 E 804473 N
Client:	NZTA	*Ref. Grid:*	North Taieri 2000
Project No.:	6-CT012.01	*R.L.:*	Not established
Location:	Beaumont		

PIT PHOTOGRAPH

TP 13

Notes:
No ground water encountered

Test Methods:
Determination of the Penetration Resistance of a Soil, NZS 4402 Test 6.5.2:1988
Guideline for Hand Held Shear Vane Test, NZ Geotechnical Soc., 2001

Date Tested:	25/10/2018
Excavator:	
Tested by:	LA
Checked by:	NT

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols.

Scale 1:25 @ A4

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Reference No: 18/2116-1

Date: 14 September 2018

TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Test Pit 14; Adjacent SH8 – Decreasing Side in Paddock; Corner Section SH8 and Rongahere Road (see below)

FIELD LOG DESCRIPTIONS - Not IANZ Accredited (NZ Geotechnical Society Guidelines 2005)

Depth (mm)	Description
0 - 230	Topsoil & vegetation (organic matter).
230 - 520	Light orangish brown SILT with trace of sand and trace of clay. Moist. Firm. Sand, fine; Silt, plastic.
520 - 860	Dark orangish brown Sandy GRAVEL with trace of / some silt and trace of cobbles. Moist. Compact. Gravel / cobbles, subrounded to rounded, maximum particle size 75.0mm; Sand, fine to coarse; Silt, slight plasticity.
860 +	Bedrock. Water at base.

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Tested By: N.P. Danischewski **Date: 15 & 16-Aug-18**

Checked By:

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Date: 14 September 2018

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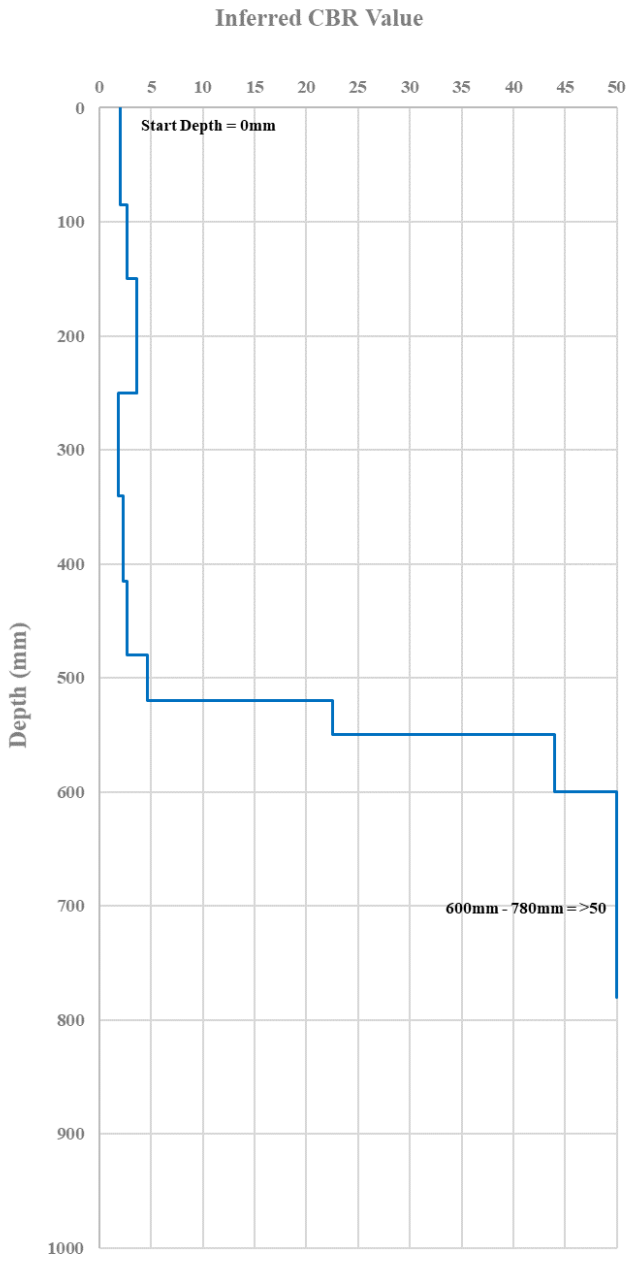
Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Test Pit 14; Adjacent SH8 – Decreasing Side in Paddock; Corner Section SH8 and Rongahere Road

SCALA PENETROMETER RESULTS (NZS 4402:1988, Test 6.5.2)

Depth (mm)	Penetration (mm/blow)	Inferred CBR [1]
0 - 85	85.0	2.0
85 - 150	65.0	2.5
150 - 200	50.0	3.5
200 - 250	50.0	3.5
250 - 340	90.0	2.0
340 - 415	75.0	2.5
415 - 480	65.0	2.5
480 - 520	40.0	5
520 - 550	10.0	23
550 - 600	5.6	44
600 - 650	3.1	>50
650 - 700	3.6	>50
700 - 750	2.2	>50
750 - 780	0.9	>50
Refusal		

Note: [1] CBR values have been inferred from AustRoads Pavement Design Manual (2012) – Fig 5.3 (Not IANZ Accredited).



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Reference No: 18/2116-1

Date: 14 September 2018

TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Test Pit 19; Adjacent SH8 – Increasing Side in Paddock (see below)

FIELD LOG DESCRIPTIONS - Not IANZ Accredited (NZ Geotechnical Society Guidelines 2005)

Depth (mm)	Description
0 - 100	Topsoil & vegetation (organic matter).
100 - 370	Light brown Sandy GRAVEL with minor silt. Moist. Compact. Gravel / cobbles, angular to subangular, maximum particle size 63.0mm; Sand, fine to coarse; Silt, non-plastic.
370 - 950	Mottled orange / grey /yellowish brown SILT with trace of / minor clay and trace of gravel. Moist. Stiff. Gravel, angular to subangular, maximum particle size 19.0mm; Silt, plastic.
950 - 1080	Light brownish grey Gravelly SAND with trace of silt. Moist. Compact. Gravel, subrounded to rounded, maximum particle size 6.70mm; Sand, fine to coarse; Silt, non-plastic.
1080 - 1150	Orangish brown Sandy GRAVEL with trace of silt and trace of cobbles. Moist. Compact. Gravel / cobbles, rounded, maximum particle size 106.0mm; Sand, fine to coarse; Silt, non-plastic. Water @ 1.13m.
1150 - 1370	Light grey Silty SAND / SAND with some silt and minor / some gravel. Moist. Compact. Gravel, subrounded to rounded, maximum particle size 19.0mm; Sand, fine to medium; Silt, non-plastic.
1370 - 3200	Grey SILT with minor clay. Wet. Soft / Firm. Plastic.

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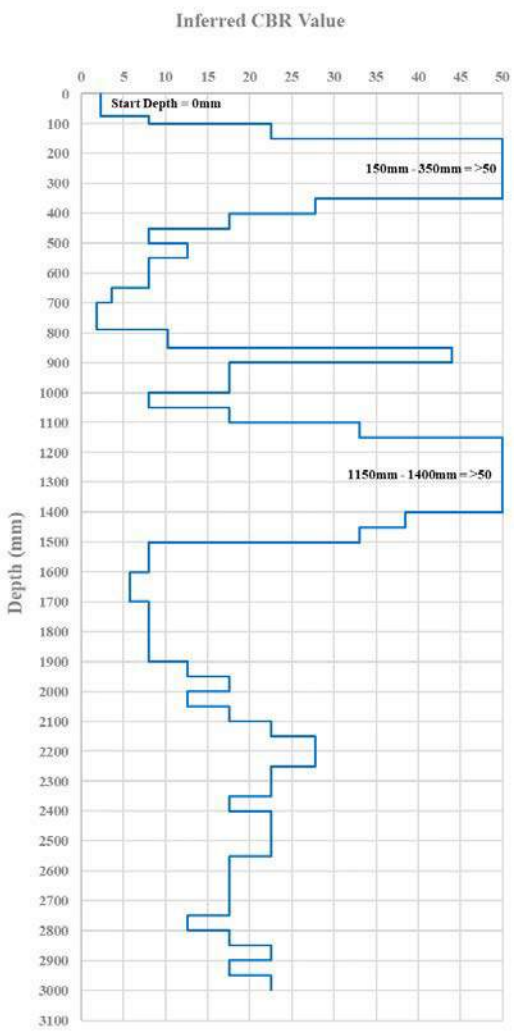
TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Test Pit 19; Adjacent SH8 – Increasing Side in Paddock - SCALA PENETROMETER RESULTS (NZS 4402:1988, Test 6.5.2)

Depth (mm)	Penetration (mm/blow)	Inferred CBR [1]
0 - 75	75.0	2.5
75 - 100	25.0	8
100 - 150	10.0	23
150 - 200	4.2	>50
200 - 250	3.1	>50
250 - 300	3.3	>50
300 - 350	4.2	>50
350 - 400	8.3	28
400 - 450	12.5	18
450 - 500	25.0	8
500 - 550	16.7	13
550 - 600	25.0	8
600 - 650	25.0	8
650 - 700	50.0	3.5
700 - 790	90.0	2.0
790 - 850	20.0	10
850 - 900	5.6	44
900 - 950	12.5	18
950 - 1000	12.5	18
1000 - 1050	25.0	8
1050 - 1100	12.5	18
1100 - 1150	7.1	33
1150 - 1200	3.8	>50
1200 - 1250	3.8	>50
1250 - 1300	3.3	>50
1300 - 1350	2.9	>50
1350 - 1400	3.8	>50
1400 - 1450	6.3	38
1450 - 1500	7.1	33
1500 - 1550	25.0	8
1550 - 1600	25.0	8
1600 - 1650	33.3	6
1650 - 1700	33.3	6
1700 - 1750	25.0	8
1750 - 1800	25.0	8
1800 - 1850	25.0	8
1850 - 1900	25.0	8
1900 - 1950	16.7	13
1950 - 2000	12.5	18
2000 - 2050	16.7	13
2050 - 2100	12.5	18
2100 - 2150	10.0	23
2150 - 2200	8.3	28
2200 - 2250	8.3	28
2250 - 2300	10.0	23
2300 - 2350	10.0	23
2350 - 2400	12.5	18
2400 - 2450	10.0	23
2450 - 2500	10.0	23
2500 - 2550	10.0	23



Depth (mm)	Penetration (mm/blow)	Inferred CBR [1]
2550 - 2600	12.5	18
2600 - 2650	12.5	18
2650 - 2700	12.5	18
2700 - 2750	12.5	18
2750 - 2800	16.7	13
2800 - 2850	12.5	18
2850 - 2900	10.0	23
2900 - 2950	12.5	18
2950 - 3000	10.0	23

Note: [1] CBR values have been inferred from AustRoads Pavement Design Manual (2012) – Fig 5.3 (Not IANZ Accredited).

Tested By: N.P. Danischewski **Date: 15 & 16-Aug-18**

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Date: 14 September 2018

TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Test Pit 20; Adjacent SH8 – Increasing Side in Paddock (see below)

FIELD LOG DESCRIPTIONS - Not IANZ Accredited (NZ Geotechnical Society Guidelines 2005)

Depth (mm)	Description
0 - 100	Topsoil & vegetation (organic matter).
100 - 600	Grey Sandy Cobbly GRAVEL with trace of / minor silt. Moist. Compact. Gravel / cobbles, angular, maximum particle size 175.0mm; Sand, fine to coarse; Silt, slight plasticity.
600 - 700	Light orangish / yellowish brown Sandy SILT. Moist. Soft / Firm. Sand, fine; Silt, slight plasticity. Water @ 600 to 700mm.
700 - 1700	Grey SILT with trace of clay. Moist. Soft / Firm. Plastic.
1700 - 3000	Light orangish / yellowish grey SILT. Moist. Firm. Slight plasticity.

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Tested By: N.P. Danischewski **Date: 15 & 16-Aug-18**

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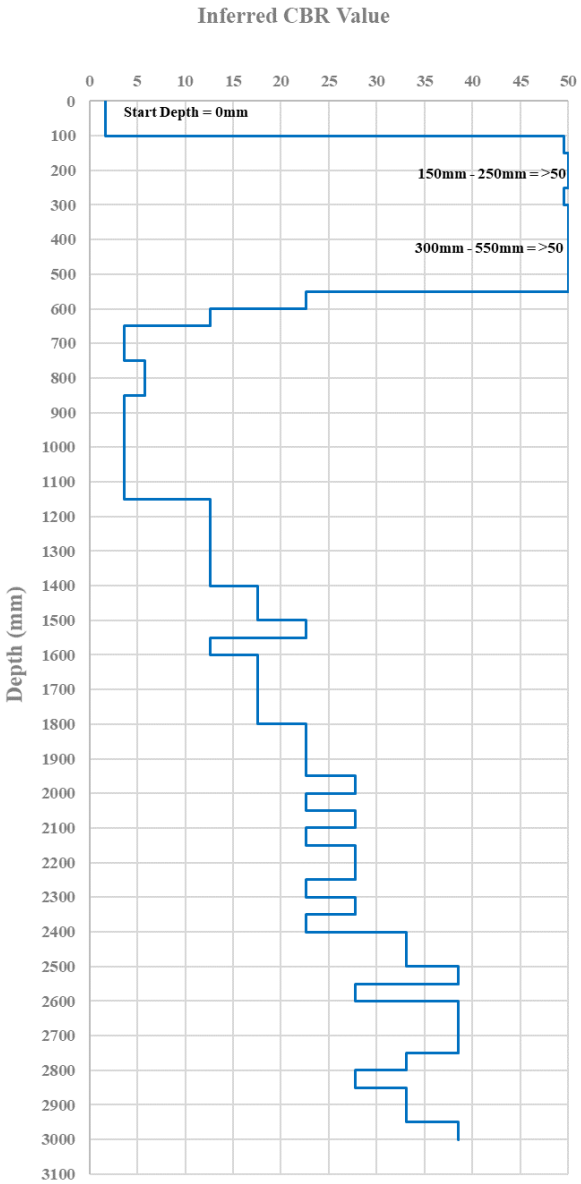
TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Test Pit 20; Adjacent SH8 – Increasing Side in Paddock - SCALA PENETROMETER RESULTS (NZS 4402:1988, Test 6.5.2)

Depth (mm)	Penetration (mm/blow)	Inferred CBR [1]
0 - 100	100.0	1.5
100 - 150	5.0	50
150 - 200	2.1	>50
200 - 250	2.3	>50
250 - 300	5.0	50
300 - 350	2.3	>50
350 - 400	2.5	>50
400 - 450	1.9	>50
450 - 500	1.2	>50
500 - 550	4.2	>50
550 - 600	10.0	23
600 - 650	16.7	13
650 - 700	50.0	3.5
700 - 750	50.0	3.5
750 - 800	33.3	6
800 - 850	33.3	6
850 - 900	50.0	3.5
900 - 950	50.0	3.5
950 - 1000	50.0	3.5
1000 - 1050	50.0	3.5
1050 - 1100	50.0	3.5
1100 - 1150	50.0	3.5
1150 - 1200	16.7	13
1200 - 1250	16.7	13
1250 - 1300	16.7	13
1300 - 1350	16.7	13
1350 - 1400	16.7	13
1400 - 1450	12.5	18
1450 - 1500	12.5	18
1500 - 1550	10.0	23
1550 - 1600	16.7	13
1600 - 1650	12.5	18
1650 - 1700	12.5	18
1700 - 1750	12.5	18
1750 - 1800	12.5	18
1800 - 1850	10.0	23
1850 - 1900	10.0	23
1900 - 1950	10.0	23
1950 - 2000	8.3	28
2000 - 2050	10.0	23
2050 - 2100	8.3	28
2100 - 2150	10.0	23
2150 - 2200	8.3	28
2200 - 2250	8.3	28
2250 - 2300	10.0	23
2300 - 2350	8.3	28
2350 - 2400	10.0	23
2400 - 2450	7.1	33
2450 - 2500	7.1	33
2500 - 2550	6.3	38
2550 - 2600	8.3	28
2600 - 2650	6.3	38
2650 - 2700	6.3	38
2700 - 2750	6.3	38
2750 - 2800	7.1	33



Depth (mm)	Penetration (mm/blow)	Inferred CBR [1]
2800 - 2850	8.3	28
2850 - 2900	7.1	33
2900 - 2950	7.1	33
2950 - 3000	6.3	38

Note: [1] CBR values have been inferred from AustRoads Pavement Design Manual (2012) – Fig 5.3 (Not IANZ Accredited).

Tested By: N.P. Danischewski **Date: 15 & 16-Aug-18**

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Reference No: 18/2116-1

Date: 14 September 2018

TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Test Pit 21; Adjacent SH8 – Increasing Side in Paddock (see below)

FIELD LOG DESCRIPTIONS - Not IANZ Accredited (NZ Geotechnical Society Guidelines 2005)

Depth (mm)	Description
0 - 70	Topsoil & vegetation (organic matter).
70 - 450	Grey Sandy Cobbly GRAVEL. Saturated. Loose. Gravel / cobbles, angular, maximum particle size 150.0mm; Sand, fine to coarse; Silt, plastic.

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Tested By: N.P. Danischewski **Date: 15 & 16-Aug-18**

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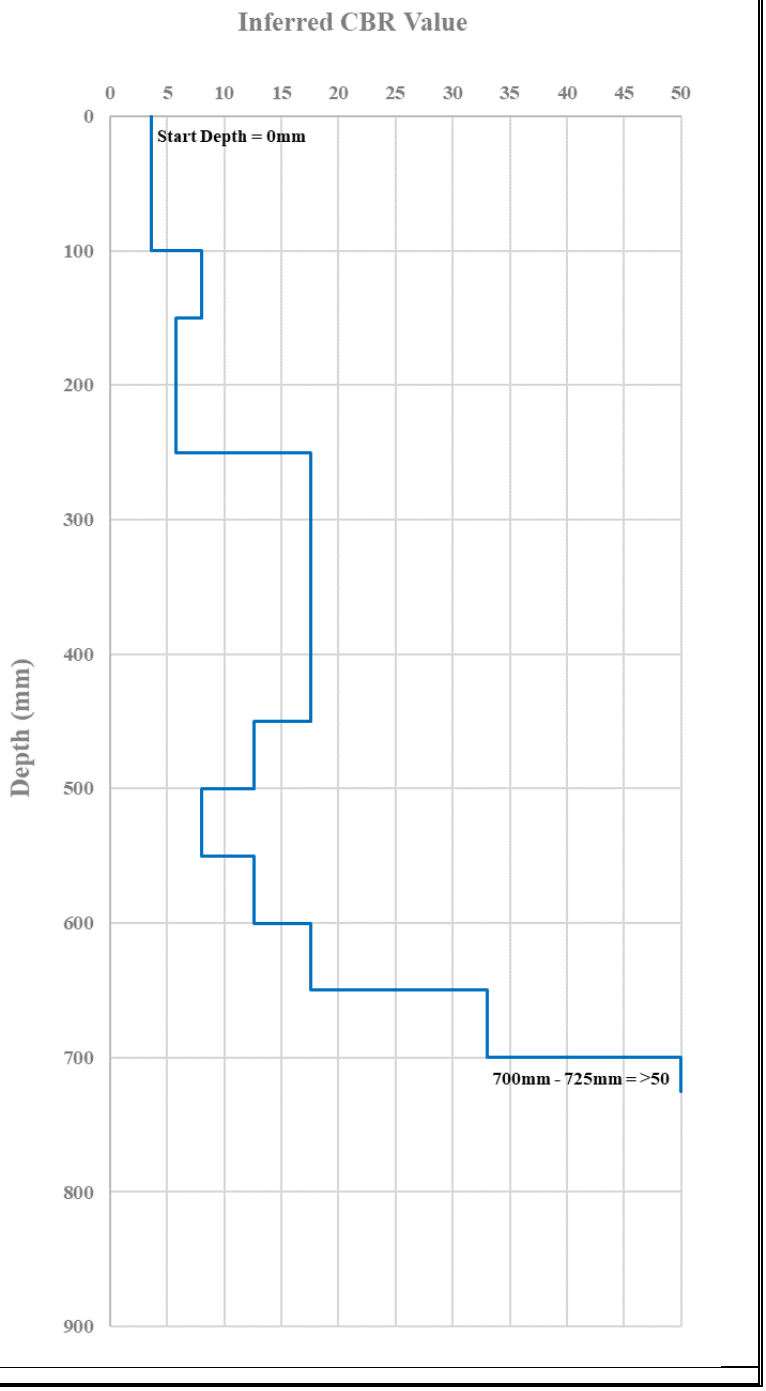
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Test Pit 21; Adjacent SH8 – Increasing Side in Paddock

SCALA PENETROMETER RESULTS (NZS 4402:1988, Test 6.5.2)

Depth (mm)	Penetration (mm/blow)	Inferred CBR [1]
0 - 50	50.0	3.5
50 - 100	50.0	3.5
100 - 150	25.0	8
150 - 200	33.3	6
200 - 250	33.3	6
250 - 300	12.5	18
300 - 350	12.5	18
350 - 400	12.5	18
400 - 450	12.5	18
450 - 500	16.7	13
500 - 550	25.0	8
550 - 600	16.7	13
600 - 650	12.5	18
650 - 700	7.1	33
700 - 725	1.1	>50
Refusal		

Note: [1] CBR values have been inferred from AustRoads Pavement Design Manual (2012) – Fig 5.3 (Not IANZ Accredited).



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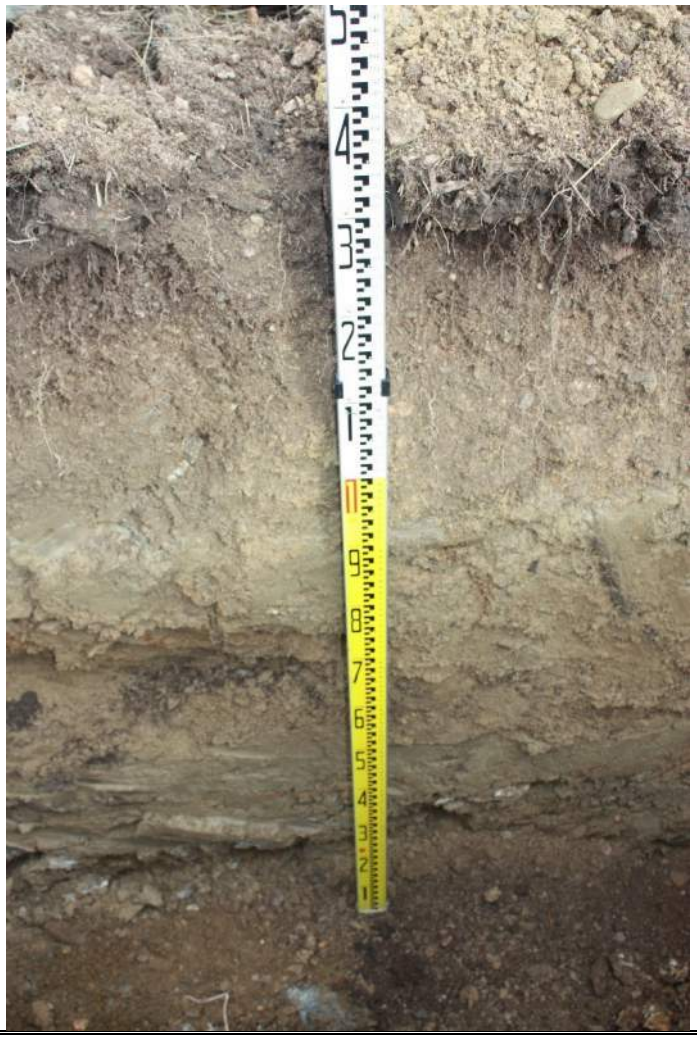
TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Test Pit 22; Adjacent SH8 – Increasing Side in Paddock (see below)

FIELD LOG DESCRIPTIONS - Not IANZ Accredited (NZ Geotechnical Society Guidelines 2005)

Depth (mm)	Description
0 - 100	Topsoil & vegetation (organic matter).
100 - 340	Brown Schist Sandy GRAVEL with minor silt. Moist. Compact. Gravel / cobbles, angular to rounded, maximum particle size 63.0mm; Sand, fine to coarse. Silt, slight plasticity.
340 - 1300	Light orangish / yellowish brown SILT with trace of clay. Moist. Soft / Firm. Silt, plastic.



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Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

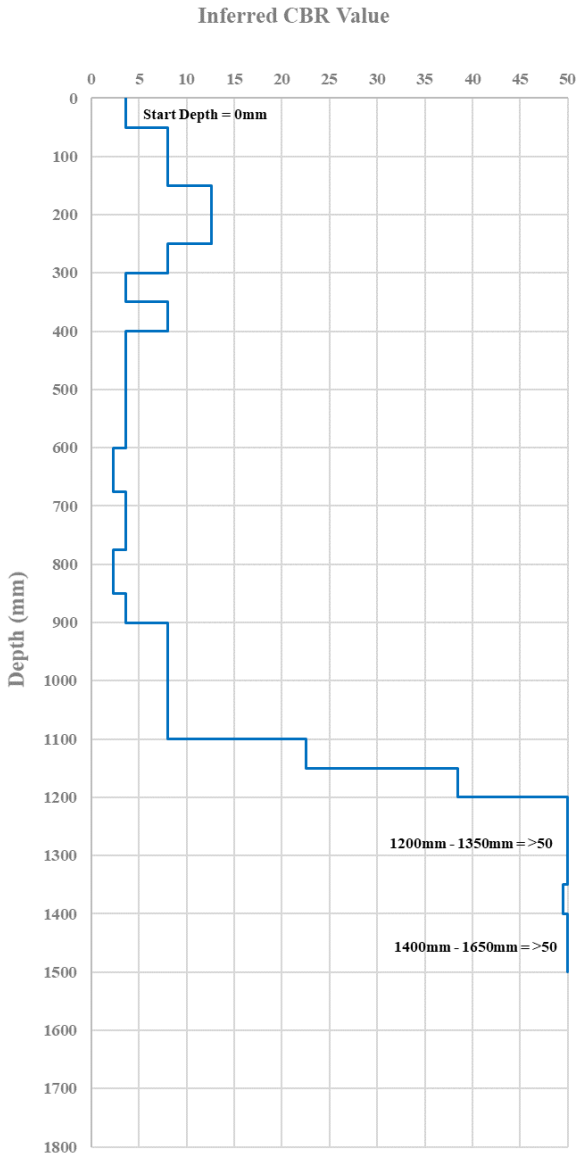
Test Pit 22; Adjacent SH8 – Increasing Side in Paddock

SCALA PENETROMETER RESULTS (NZS 4402:1988, Test 6.5.2)

Depth (mm)	Penetration (mm/blow)	Inferred CBR [1]
0 - 50	50.0	3.5
50 - 100	25.0	8
100 - 150	25.0	8
150 - 200	16.7	13
200 - 250	16.7	13
250 - 300	25.0	8
300 - 350	50.0	3.5
350 - 400	25.0	8
400 - 450	50.0	3.5
450 - 500	50.0	3.5
500 - 550	50.0	3.5
550 - 600	50.0	3.5
600 - 675	75.0	2.5
675 - 725	50.0	3.5
725 - 775	50.0	3.5
775 - 850	75.0	2.5
850 - 900	50.0	3.5
900 - 950	25.0	8
950 - 1000	25.0	8
1000 - 1050	25.0	8
1050 - 1100	25.0	8
1100 - 1150	10.0	23
1150 - 1200	6.3	38
1200 - 1250	2.8	>50
1250 - 1300	2.4	>50
1300 - 1350	3.1	>50
1350 - 1400	5.0	50
1400 - 1450	3.8	>50
1450 - 1500	2.9	>50
1500 - 1550	3.8	>50
1550 - 1600	4.5	>50
1600 - 1650	3.8	>50

Refusal

Note: [1] CBR values have been inferred from AustRoads Pavement Design Manual (2012) – Fig 5.3 (Not IANZ Accredited).



Tested By: N.P. Danischewski **Date: 15 & 16-Aug-18**

Checked By:

Approved Signatory

A.P. Julius
Laboratory Manager

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Appendix E
Pavement Pit Logs and Photographs

SH8 Beaumont Bridge Realignment
Geotechnical Factual Report

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Reference No: 18/2116-2

Date: 17 September 2018

TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Pavement Pit 1; SH8, Decreasing Lane, O/S 2.25m to 3.40m (See below)

FIELD LOG DESCRIPTIONS – Not IANZ Accredited (NZ Geotechnical Society Guidelines 2005)

Depth (mm)	Description	Depth (mm)	Description
0 – 60	Chip Seal. Nearby scabbing.	260 - 390 (sampled)	Subgrade – Light orangish brown Sandy GRAVEL with trace of / minor silt. Moist. Compact. Gravel, subrounded to rounded, maximum particle size 75.0mm; Sand, fine to coarse; Silt, non-plastic.
60 - 140 (sampled)	Basecourse – Sandy GRAVEL with minor silt. Moist. Compact. Gravel, subrounded to rounded, maximum particle size 37.5mm; Sand, fine to coarse; Silt, non-plastic.	390 - 510	Subgrade – Light grey Sandy GRAVEL / Gravelly SAND with trace of / minor silt. Dry / Moist. Very Compact. Gravel, angular to subangular, maximum particle size 37.5mm; Sand, fine to medium / coarse; Silt, non-plastic.
140 - 260 (sampled)	Subbase – Brown Sandy GRAVEL with minor / some silt. Moist. Compact. Gravel, subrounded to rounded, maximum particle size 53.0mm; Sand, fine to coarse; Silt, non-plastic.		

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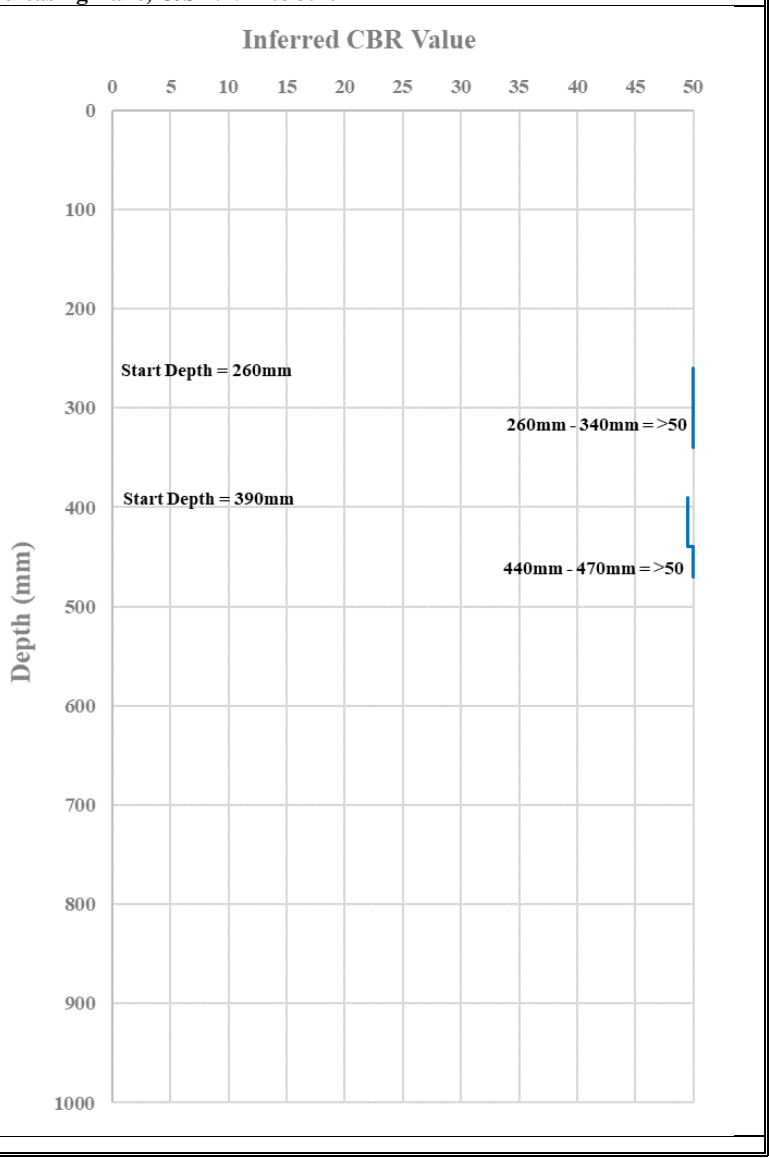
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Pavement Pit 1; SH8, Decreasing Lane, O/S 2.25m to 3.40m

SCALA PENETROMETER RESULTS (NZS 4402:1988, Test 6.5.2)

Depth (mm)	Penetration (mm/blow)	Inferred CBR [1]
260 - 310	3.1	>50
310 - 340	1.0	>50
Refusal		
390 - 440	5.0	50
440 - 470	1.0	>50
Refusal		

Note: [1] CBR values have been inferred from AustRoads Pavement Design Manual (2012) – Fig 5.3 (Not IANZ Accredited).



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Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Pavement Pit 2; SH8, Increasing Lane, O/S 2.65m to 3.60m @ 80mm - 150mm (see below)

FIELD LOG DESCRIPTIONS – Not IANZ Accredited (NZ Geotechnical Society Guidelines 2005)

Depth (mm)	Description	Depth (mm)	Description
0 - 80	Chip Seal	150 - 260	Subbase – Brown Sandy GRAVEL with minor silt. Moist. Compact. Gravel, subrounded to rounded, maximum particle size 37.5mm. Sand, fine to coarse; Silt, non-plastic.
80 - 150 (sampled)	Basecourse – Light brown Sandy GRAVEL with minor silt. Moist. Compact. Gravel, subangular to rounded, maximum particle size 37.5mm; Sand, fine to coarse; Silt, non-plastic.	260 - 390 (sampled)	Subgrade – Brown Silty Sandy GRAVEL with minor clay. Moist / wet. Compact. Gravel, subrounded to rounded, maximum particle size 63.0mm; Sand, fine to coarse; Silt, Slight plasticity.

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Tested By: N.P. Danischewski **Date: 13 to 17-Aug-18**

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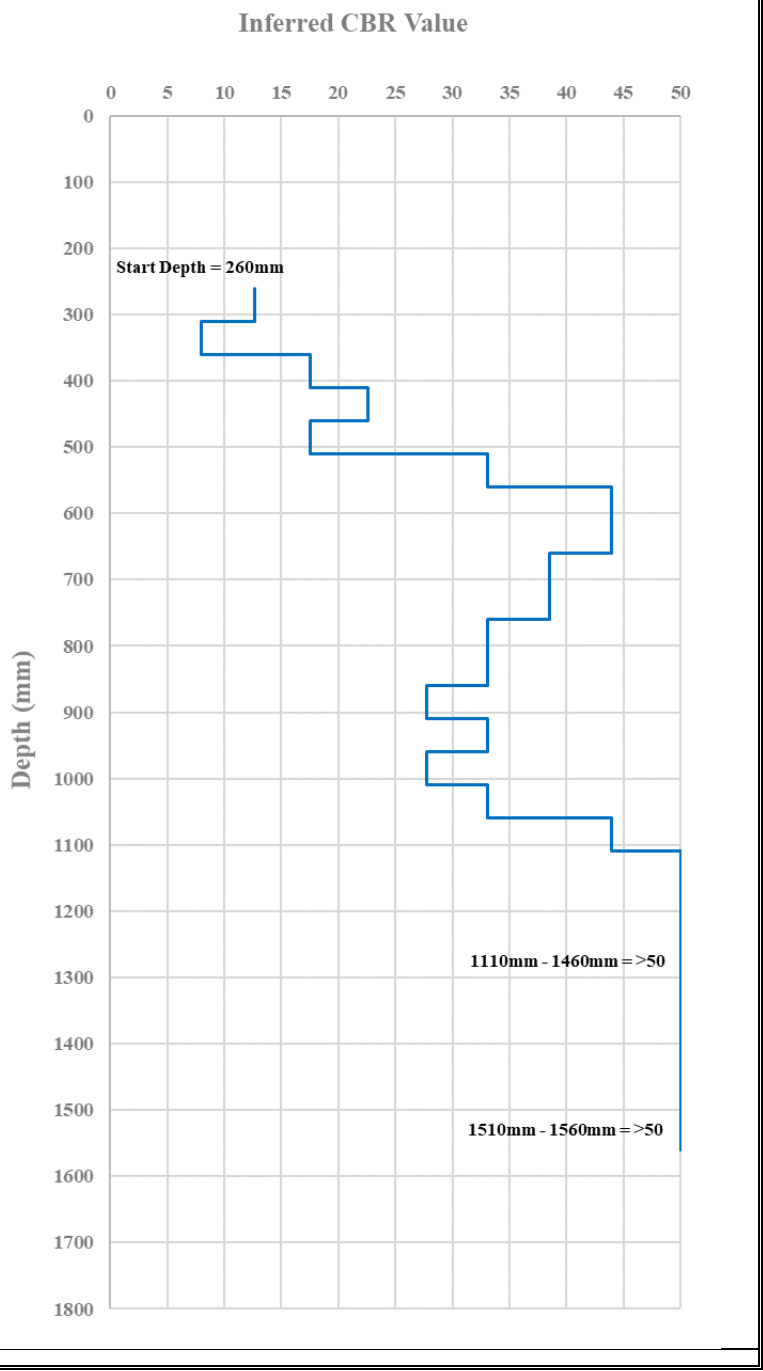
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Pavement Pit 2; SH8, Increasing Lane, O/S 2.65m to 3.60m

SCALA PENETROMETER RESULTS (NZS 4402:1988, Test 6.5.2)

Depth (mm)	Penetration (mm/blow)	Inferred CBR [1]
260 - 310	16.7	13
310 - 360	25.0	8
360 - 410	12.5	18
410 - 460	10.0	23
460 - 510	12.5	18
510 - 560	7.1	33
560 - 610	5.6	44
610 - 660	5.6	44
660 - 710	6.3	38
710 - 760	6.3	38
760 - 810	7.1	33
810 - 860	7.1	33
860 - 910	8.3	28
910 - 960	7.1	33
960 - 1010	8.3	28
1010 - 1060	7.1	33
1060 - 1110	5.6	44
1110 - 1160	3.8	>50
1160 - 1210	3.3	>50
1210 - 1260	3.6	>50
1260 - 1310	2.9	>50
1310 - 1360	3.8	>50
1360 - 1410	4.2	>50
1410 - 1460	4.2	>50
1460 - 1510	3.8	50
1510 - 1560	4.2	>50

Note: [1] CBR values have been inferred from AustRoads Pavement Design Manual (2012) – Fig 5.3 (Not IANZ Accredited).



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Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Pavement Pit 3; SH8, Decreasing Lane, O/S 2.25m to 3.40m (see below)

FIELD LOG DESCRIPTIONS – Not IANZ Accredited (NZ Geotechnical Society Guidelines 2005)

Depth (mm)	Description	Depth (mm)	Description
0 - 80	**Chip Seal.**	**240 - 320 (sampled)**	**Subbase – Light greyish brown Silty Sandy GRAVEL. Moist. Compact. Gravel, subangular to rounded, maximum particle size 53.0mm; Sand, fine to coarse; Silt, non-plastic.**
80 - 125 (sampled)	**Cement Stabilised Basecourse – Light brown Sandy GRAVEL with minor silt. Moist. Compact. Gravel, subrounded to rounded, maximum particle size 37.5mm; Sand, fine to coarse; Silt, non-plastic.**	**320 - 410 (sampled)**	**Subgrade – Light orangish / greyish brown Sandy GRAVEL with trace of / minor silt. Moist. Very compact. Gravel, angular to rounded, maximum particle size 75.0mm; Sand, fine to coarse; Silt, non-plastic.**
125 - 240 (sampled)	**Basecourse – Light greyish brown Sandy GRAVEL with some silt. Moist. Compact. Gravel, subrounded to rounded, maximum particle size 37.5mm; Sand, fine to coarse; Silt, non-plastic.**		

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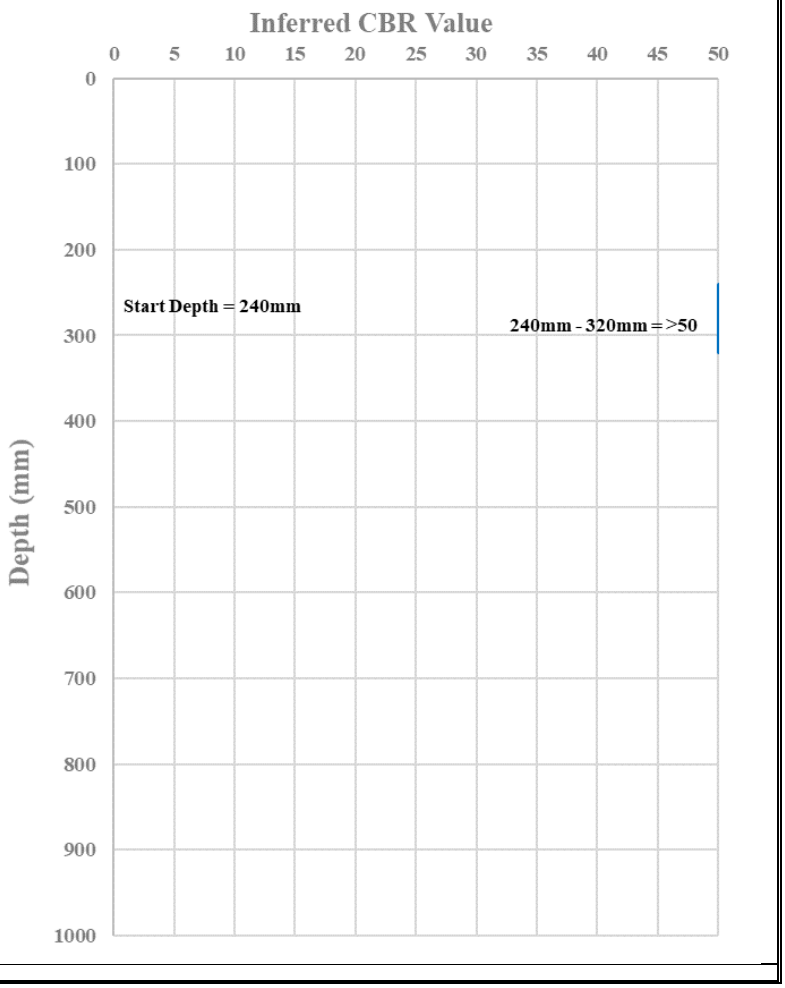
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Pavement Pit 3; SH8, Decreasing Lane, O/S 2.25m to 3.40m

SCALA PENETROMETER RESULTS (NZS 4402:1988, Test 6.5.2)

Depth (mm)	Penetration (mm/blow)	Inferred CBR [1]
240 - 290	2.0	>50
290 - 320	1.0	>50
Refusal		

Note: [1] CBR values have been inferred from AustRoads Pavement Design Manual (2012) – Fig 5.3 (Not IANZ Accredited).



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Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Pavement Pit 4; Dee Street - SH8 End (see below)

FIELD LOG DESCRIPTIONS – Not IANZ Accredited (NZ Geotechnical Society Guidelines 2005)

Depth (mm)	Description	Depth (mm)	Description
0 - 120 (sampled)	Maintenance Metal – Light brown Sandy GRAVEL with some silt. Moist. Compact. Gravel, subrounded to rounded, maximum particle size 37.5mm; Sand, fine to coarse; Silt, non-plastic.	330 - 500 (sampled)	Dark brown Silty Sandy GRAVEL with some clay. Moist. Compact. Gravel, subrounded to rounded, maximum particle size 63.0mm; Sand, fine to coarse; Silt, plastic.
120 - 330 (sampled)	Light brown Sandy GRAVEL with trace of / minor silt and trace of cobbles. Moist; Compact. Gravel, subrounded to rounded, maximum particle size 106.0mm; Sand, fine to coarse; Silt, non-plastic.	500 - 600	Dark orangish brown Sandy GRAVEL with trace of silt. Moist. Compact. Gravel, subrounded to rounded, maximum particle size 63mm; Sand, fine to coarse; Silt, non-plastic.

Tested By: N.P. Danischewski **Date: 13 to 17-Aug-18**

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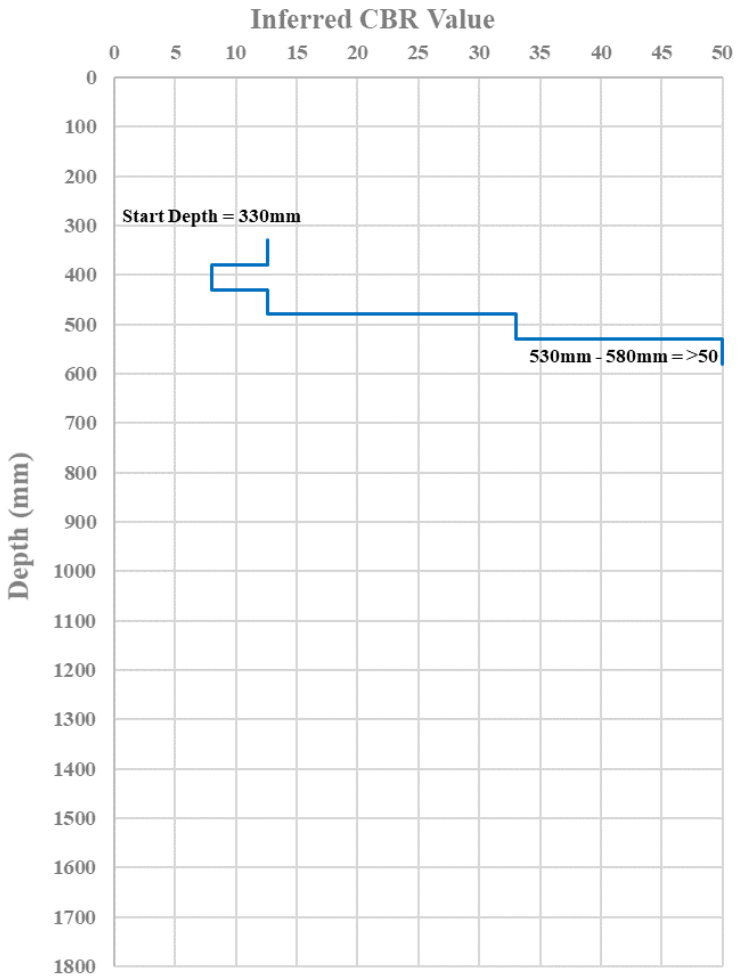
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Pavement Pit 4; Dee Street - SH8 End

SCALA PENETROMETER RESULTS (NZS 4402:1988, Test 6.5.2)

Depth (mm)	Penetration (mm/blow)	Inferred CBR [1]
330 - 380	16.7	13
380 - 430	25.0	8
430 - 480	16.7	13
480 - 530	7.1	33
530 - 580	1.7	>50
Refusal		

Note: [1] CBR values have been inferred from AustRoads Pavement Design Manual (2012) – Fig 5.3 (Not IANZ Accredited).



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Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Pavement Pit 5; Dee Street, Middle (see below)

FIELD LOG DESCRIPTIONS – Not IANZ Accredited (NZ Geotechnical Society Guidelines 2005)

Depth (mm)	Description	Depth (mm)	Description
0 - 100 (sampled)	Maintenance Metal – Light brown Sandy GRAVEL with some silt. Moist. Compact. Gravel, subangular to rounded, maximum particle size 53.0mm; Sand, fine to coarse; Silt, non-plastic.	250 - 570	Dark orangish brown Sandy GRAVEL with some silt / clay. Moist. Compact. Gravel, subrounded to rounded, maximum particle size 63.0mm; Sand, fine to coarse; Silt, plastic.
100 - 250 (sampled)	Dark brown Sandy GRAVEL with some silt. Moist. Compact. Gravel, subrounded to rounded, maximum particle size 37.5mm; Sand, fine to coarse; Silt, slight plasticity.		

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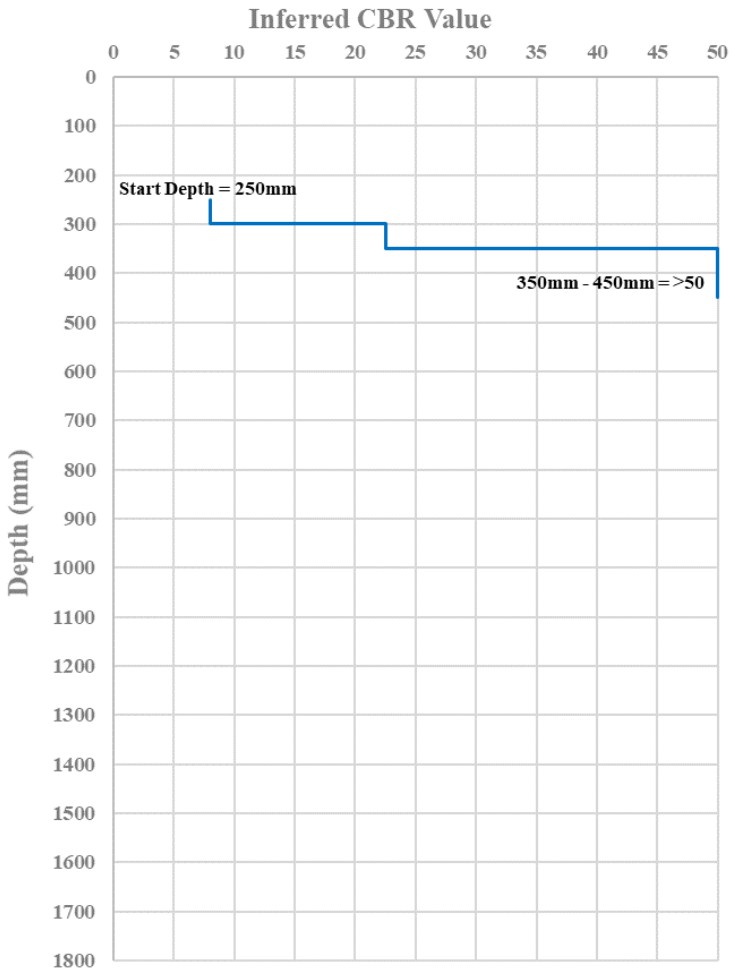
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Pavement Pit 5; Dee Street, Middle

SCALA PENETROMETER RESULTS (NZS 4402:1988, Test 6.5.2)

Depth (mm)	Penetration (mm/blow)	Inferred CBR [1]
250 - 300	25.0	8
300 - 350	10.0	23
350 - 400	4.2	>50
400 - 450	2.8	>50
Refusal		

Note: [1] CBR values have been inferred from AustRoads Pavement Design Manual (2012) – Fig 5.3 (Not IANZ Accredited).



Tested By: N.P. Danischewski **Date: 13 to 17-Aug-18**

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Reference No: 18/2116-2

Date: 17 September 2018

TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Pavement Pit 6; Dee Street, Westferry Street End (see below)

FIELD LOG DESCRIPTIONS – Not IANZ Accredited (NZ Geotechnical Society Guidelines 2005)

Depth (mm)	Description	Depth (mm)	Description
0 - 180 (sampled)	Maintenance Metal – Light / dark brown Sandy GRAVEL with some silt. Moist. Compact. Gravel, subrounded to rounded, maximum particle size 53.0mm; Sand, fine to coarse; Silt, slight plasticity.	400 - 560	Dark orangish brown Sandy GRAVEL with some silt. Moist. Compact. Gravel, subrounded to rounded, maximum particle size 19.0mm; Sand, fine to coarse; Silt, slight plasticity.
180 - 400 (sampled)	Dark brown Sandy GRAVEL with some silt. Moist. Compact. Gravel, subrounded to rounded, maximum particle size 26.5mm; Sand, fine to coarse; Silt, plastic.		

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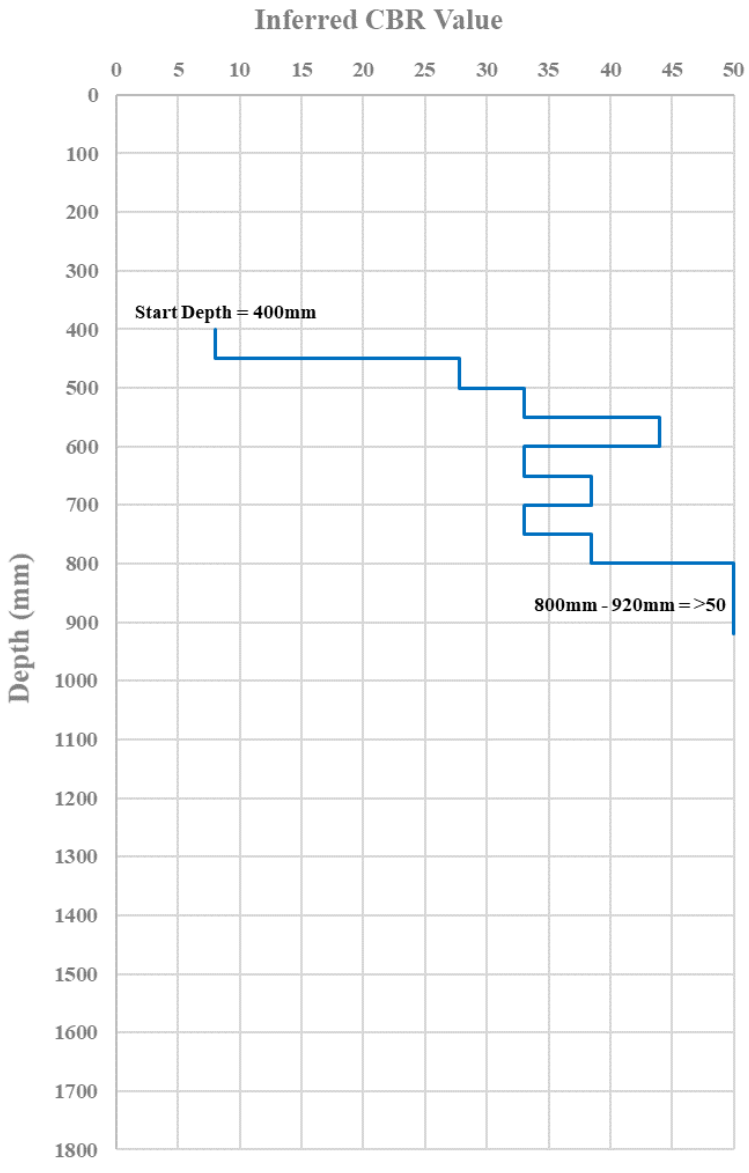
Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Pavement Pit 6; Dee Street, Westferry Street End

SCALA PENETROMETER RESULTS (NZS 4402:1988, Test 6.5.2)

Depth (mm)	Penetration (mm/blow)	Inferred CBR [1]
400 - 450	25.0	8
450 - 500	8.3	28
500 - 550	7.1	33
550 - 600	5.6	44
600 - 650	7.1	33
650 - 700	6.3	38
700 - 750	7.1	33
750 - 800	6.3	38
800 - 850	3.8	>50
850 - 900	2.0	>50
900 - 920	0.7	>50
Refusal		

Note: [1] CBR values have been inferred from AustRoads Pavement Design Manual (2012) – Fig 5.3 (Not IANZ Accredited).



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Reference No: 18/2116-2

Date: 17 September 2018

TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Pavement Pit 7; Westferry Street, O/S 1.50m to 2.70m (see below)

FIELD LOG DESCRIPTIONS – Not IANZ Accredited (NZ Geotechnical Society Guidelines 2005)

Depth (mm)	Description	Depth (mm)	Description
0 - 50	Chip Seal.	220 - 520 (sampled)	Subbase / Subgrade – Dark brown Sandy GRAVEL with minor silt. Moist. Compact. Gravel, subrounded to rounded, maximum particle size 26.5mm; Sand, fine to coarse; Silt, non-plastic.
50 - 220 (sampled)	Basecourse – Light brown Sandy GRAVEL with minor silt and trace of cobbles. Moist. Compact. Gravel / cobbles, subangular to rounded, maximum particle size 53.0mm; Sand, fine to coarse; Silt, non-plastic.		

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TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

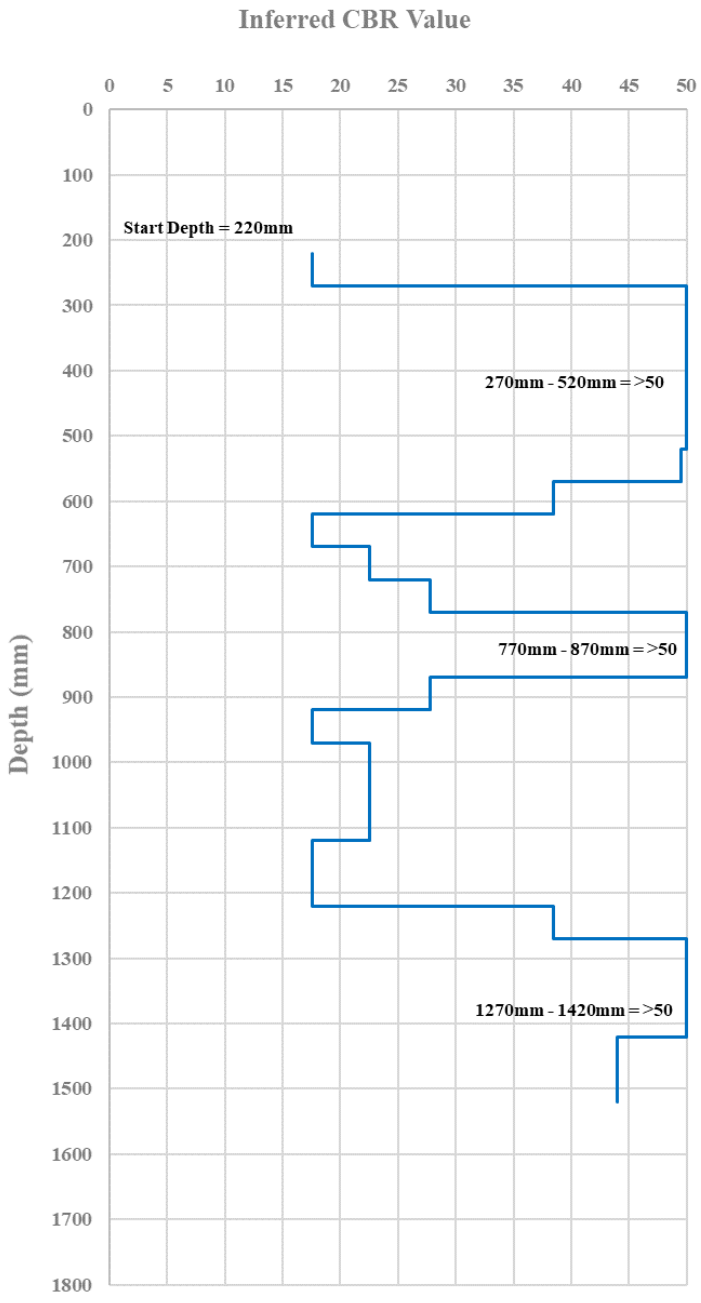
Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Pavement Pit 7; Westferry Street

SCALA PENETROMETER RESULTS (NZS 4402:1988, Test 6.5.2)

Depth (mm)	Penetration (mm/blow)	Inferred CBR [1]
220 - 270	12.5	18
270 - 320	4.2	>50
320 - 370	4.5	>50
370 - 420	3.8	>50
420 - 470	4.2	>50
470 - 520	3.8	>50
520 - 570	5.0	50
570 - 620	6.3	38
620 - 670	12.5	18
670 - 720	10.0	23
720 - 770	8.3	28
770 - 820	4.5	>50
820 - 870	4.5	>50
870 - 920	8.3	28
920 - 970	12.5	18
970 - 1020	10.0	23
1020 - 1070	10.0	23
1070 - 1120	10.0	23
1120 - 1170	12.5	18
1170 - 1220	12.5	18
1220 - 1270	6.3	38
1270 - 1320	3.8	>50
1320 - 1370	3.8	>50
1370 - 1420	4.2	>50
1420 - 1470	5.6	44
1470 - 1520	5.6	44

Note: [1] CBR values have been inferred from AustRoads Pavement Design Manual (2012) – Fig 5.3 (Not IANZ Accredited).



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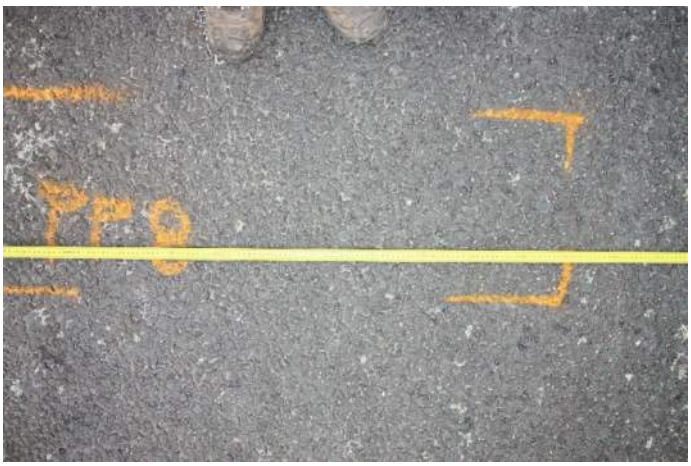
TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Pavement Pit 8, Westferry Street, O/S 1.50m to 2.70m (see below)

FIELD LOG DESCRIPTIONS – Not IANZ Accredited (NZ Geotechnical Society Guidelines 2005)

Depth (mm)	Description	Depth (mm)	Description
0 - 50	Chip Seal.	200 - 300 (sampled)	Subbase – Brown Sandy GRAVEL with minor silt and trace of cobbles. Moist. Compact. Gravel / cobbles, subrounded to rounded, maximum particle size 106.0mm; Sand, fine to coarse; Silt, slight plasticity.
50 - 200 (sampled)	Basecourse – Light brown Sandy GRAVEL with minor silt. Moist. Compact. Gravel, subrounded to rounded, maximum particle size 37.5mm; Sand, fine to coarse; Silt, non-plastic.	300 - 460 (sampled)	Dark brown Silty Sandy GRAVEL. Moist. Compact. Gravel, subrounded to rounded, maximum particle size 37.5mm; Sand, fine to coarse; Silt, plastic.



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TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

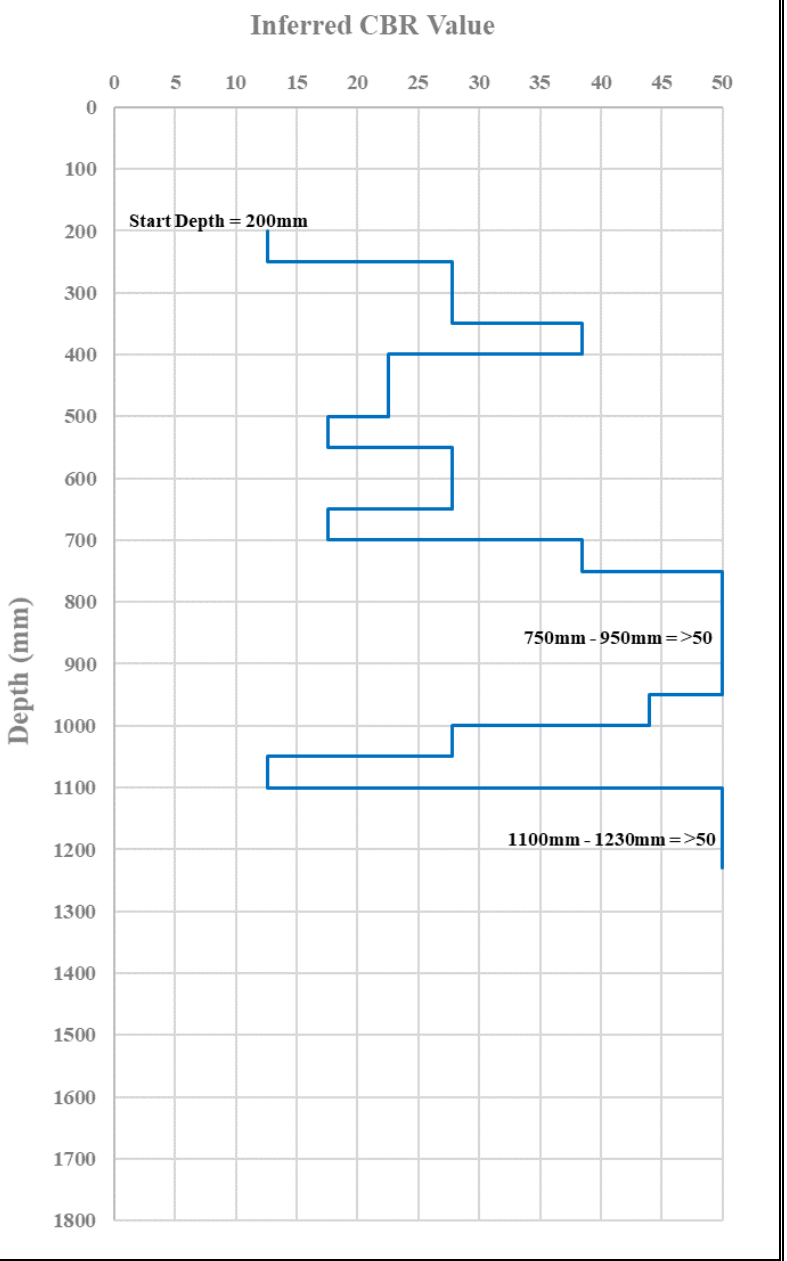
Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Pavement Pit 8, Westferry Street, O/S 1.50m to 2.70m

SCALA PENETROMETER RESULTS (NZS 4402:1988, Test 6.5.2)

Depth (mm)	Penetration (mm/blow)	Inferred CBR [1]
200 - 250	16.7	13
250 - 300	8.3	28
300 - 350	8.3	28
350 - 400	6.3	38
400 - 450	10.0	23
450 - 500	10.0	23
500 - 550	12.5	18
550 - 600	8.3	28
600 - 650	8.3	28
650 - 700	12.5	18
700 - 750	6.3	38
750 - 800	3.8	>50
800 - 850	3.8	>50
850 - 900	2.8	>50
900 - 950	3.6	>50
950 - 1000	5.6	44
1000 - 1050	8.3	28
1050 - 1100	16.7	13
1100 - 1150	3.1	>50
1150 - 1200	1.9	>50
1200 - 1230	1.4	>50

Note: [1] CBR values have been inferred from AustRoads Pavement Design Manual (2012) – Fig 5.3 (Not IANZ Accredited).



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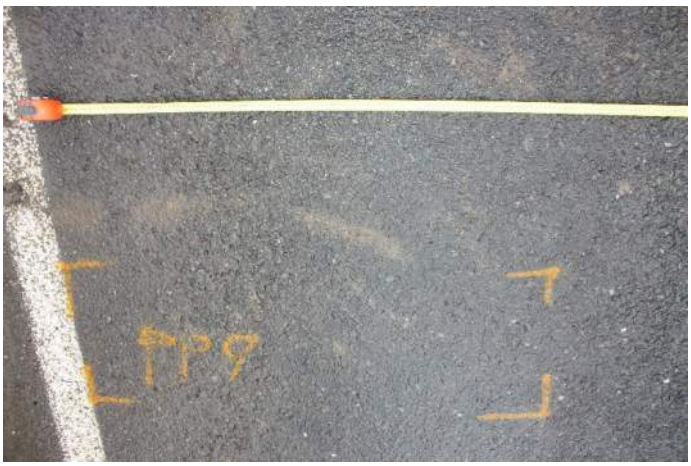
TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Pavement Pit 9; SH8, Increasing Lane, O/S 2.05m to 2.90m (see below)

FIELD LOG DESCRIPTIONS – Not IANZ Accredited (NZ Geotechnical Society Guidelines 2005)

Depth (mm)	Description	Depth (mm)	Description
0 - 70	Chip Seal.	300 - 440 (sampled)	Subgrade - Dark grey SILT with minor clay, trace of gravel and trace of sand. Moist / wet. Firm. Gravel; maximum particle size 4.75mm; Sand, fine; Silt, plastic.
70 - 300 (sampled)	Cement Stabilised Basecourse – Light grey Sandy GRAVEL with some silt. Moist. Compact. Gravel, subangular to rounded, maximum particle size 19.0mm; Sand, fine to coarse; Silt, non to slight plasticity.	440 - 500	Subgrade – Light orangish / yellowish brown Gravelly SILT with trace of sand and trace of / minor clay. Moist. Firm. Gravel, subrounded to rounded, maximum particle size 19.0mm; Sand, fine to coarse; Silt, plastic.



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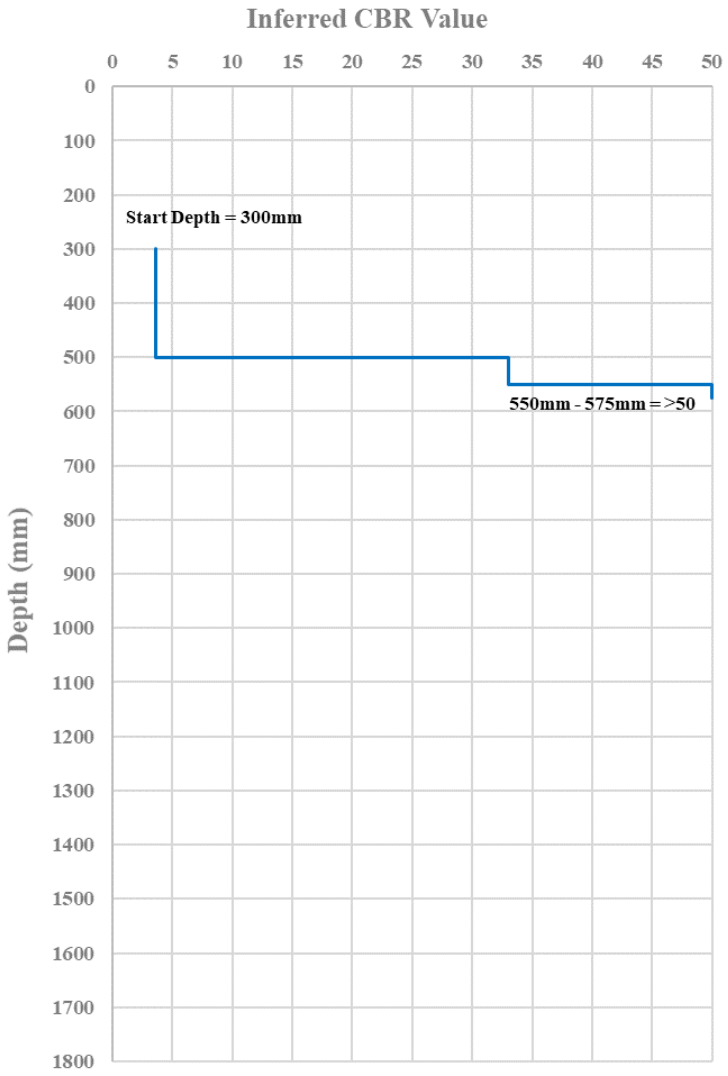
Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Pavement Pit 9; SH8, Increasing Lane, O/S 2.05m to 2.90m

SCALA PENETROMETER RESULTS (NZS 4402:1988, Test 6.5.2)

Depth (mm)	Penetration (mm/blow)	Inferred CBR [1]
300 - 350	50.0	3.5
350 - 400	50.0	3.5
400 - 450	50.0	3.5
450 - 500	50.0	3.5
500 - 550	7.1	33
550 - 575	1.0	>50
Refusal		

Note: [1] CBR values have been inferred from AustRoads Pavement Design Manual (2012) – Fig 5.3 (Not IANZ Accredited).



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Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Pavement Pit 10, SH8, Increasing Lane, O/S 1.95m to 3.15m (see below)

FIELD LOG DESCRIPTIONS – Not IANZ Accredited (NZ Geotechnical Society Guidelines 2005)

Depth (mm)	Description	Depth (mm)	Description
0 - 50	Chip Seal.	190 - 320 (sampled)	Subgrade – Light greyish brown Sandy GRAVEL with minor silt. Moist. Compact. Gravel, subrounded to rounded, maximum particle size 63.0mm; Sand, fine to coarse; Silt, non-plastic.
50 - 130 (sampled)	Cement stabilised Basecourse - Light grey Sandy GRAVEL with some silt. Moist. Compact. Gravel, subrounded to rounded, maximum particle size 26.5mm; Sand, fine to coarse; Silt, non-plastic.	320 - 540	Subgrade – Brown Sandy GRAVEL with minor silt. Moist. Compact / Loose. Gravel, subrounded to rounded, maximum particle size 75.0mm; Sand, fine to coarse; Silt, non-plastic.
130 - 190 (sampled)	Subbase – Light brown Sandy GRAVEL with some silt. Moist. Compact. Gravel, subrounded to rounded, maximum particle size 37.5mm; Sand, fine to coarse; Silt, non-plastic.		

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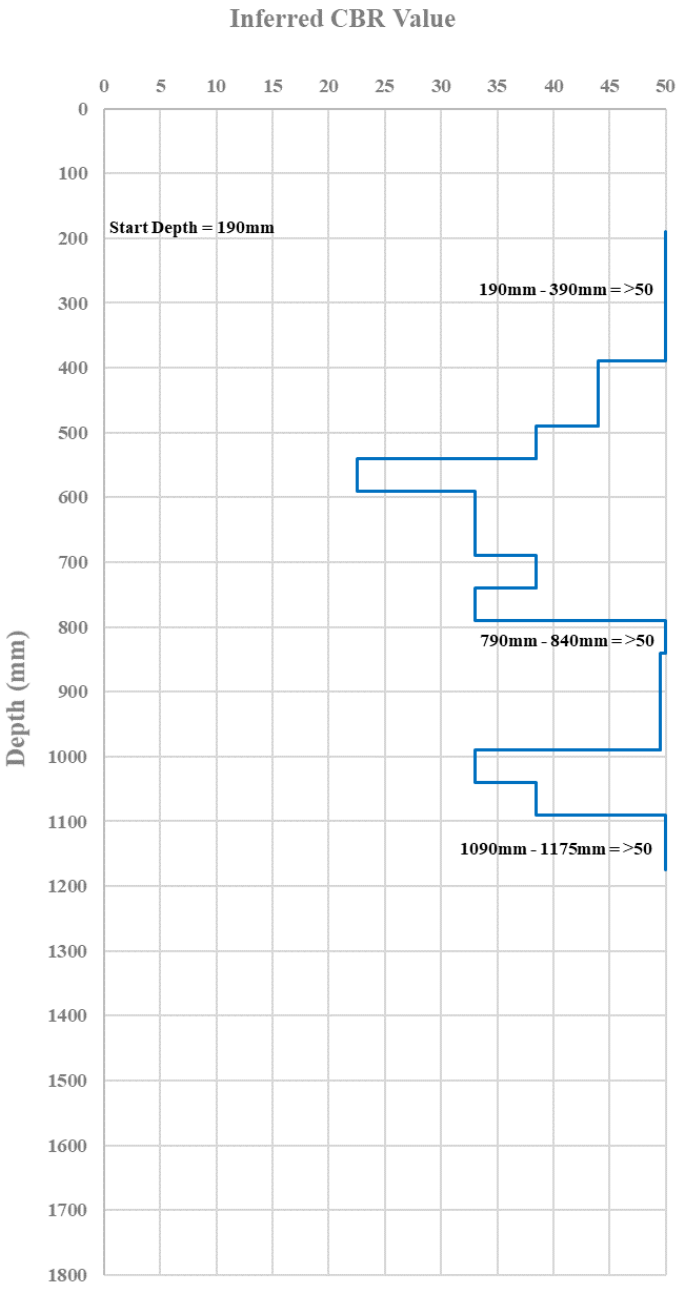
Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Pavement Pit 10, SH8, Increasing Lane, O/S 1.95m to 3.15m

SCALA PENETROMETER RESULTS (NZS 4402:1988, Test 6.5.2)

Depth (mm)	Penetration (mm/blow)	Inferred CBR [1]
190 - 240	1.9	>50
240 - 290	3.8	>50
290 - 340	3.8	>50
340 - 390	3.8	>50
390 - 440	5.6	44
440 - 490	5.6	44
490 - 540	6.3	38
540 - 590	10.0	23
590 - 640	7.1	33
640 - 690	7.1	33
690 - 740	6.3	38
740 - 790	7.1	33
790 - 840	4.5	>50
840 - 890	5.0	50
890 - 940	5.0	50
940 - 990	5.0	50
990 - 1040	7.1	33
1040 - 1090	6.3	38
1090 - 1140	3.3	>50
1140 - 1175	1.4	>50

Note: [1] CBR values have been inferred from AustRoads Pavement Design Manual (2012) – Fig 5.3 (Not IANZ Accredited).



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Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Pavement Pit 11, Millennium Track (see below)

FIELD LOG DESCRIPTIONS – Not IANZ Accredited (NZ Geotechnical Society Guidelines 2005)

Depth (mm)	Description	Depth (mm)	Description
0 - 200 (sampled)	Maintenance Metal - Light greyish brown Sandy GRAVEL with minor cobbles and minor silt. Moist. Compact. Gravel / cobbles, subrounded to rounded, maximum particle size 106.0mm; Sand, fine to coarse; Silt, non-plastic.	270 - 560 (sampled)	Light brown Sandy GRAVEL with trace of cobbles and trace of silt. Moist. Compact. Gravel / cobbles, subrounded to rounded, maximum particle size 150.0mm; Sand, fine to coarse; Silt, non-plastic.
200 - 270 (sampled)	Black Sandy GRAVEL with some silt. Moist. Compact. Gravel, subrounded to rounded, maximum particle size 53.0mm; Sand, fine to coarse; Silt, non-plastic.		

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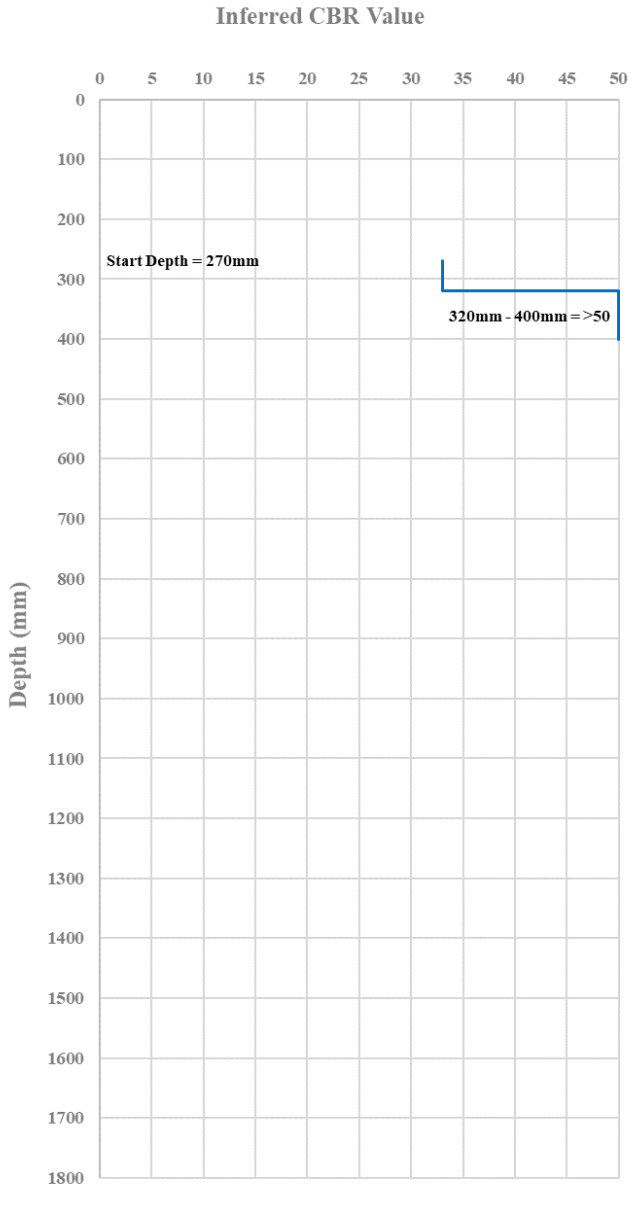
Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Pavement Pit 11, Millennium Track

SCALA PENETROMETER RESULTS (NZS 4402:1988, Test 6.5.2)

Depth (mm)	Penetration (mm/blow)	Inferred CBR [1]
270 - 320	7.1	33
320 - 370	2.6	>50
370 - 400	1.4	>50
Refusal		

Note: [1] CBR values have been inferred from AustRoads Pavement Design Manual (2012) – Fig 5.3 (Not IANZ Accredited).



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Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Pavement Pit 12, SH8 Increasing Lane, O/S 2.30m to 3.50m (see below)

FIELD LOG DESCRIPTIONS – Not IANZ Accredited (NZ Geotechnical Society Guidelines 2005)

Depth (mm)	Description	Depth (mm)	Description
0 - 70	Chip Seal.	220 - 340 (sampled)	Subbase – Light brown Sandy GRAVEL with minor / some silt. Moist. Compact. Gravel, subrounded to rounded, maximum particle size 53.0mm; Sand, fine to coarse. Silt, non-plastic.
70 - 220 (sampled)	Cement stabilised Basecourse – Light greyish brown Sandy GRAVEL with trace of silt. Dry / Moist. Compact. Gravel, subangular to rounded, maximum particle size 63.0mm; Sand, fine to coarse; Silt, non-plastic.	340 - 500 (sampled)	Subgrade – Blueish grey SILT with minor clay. Moist. Firm. Silt / clay, plastic.

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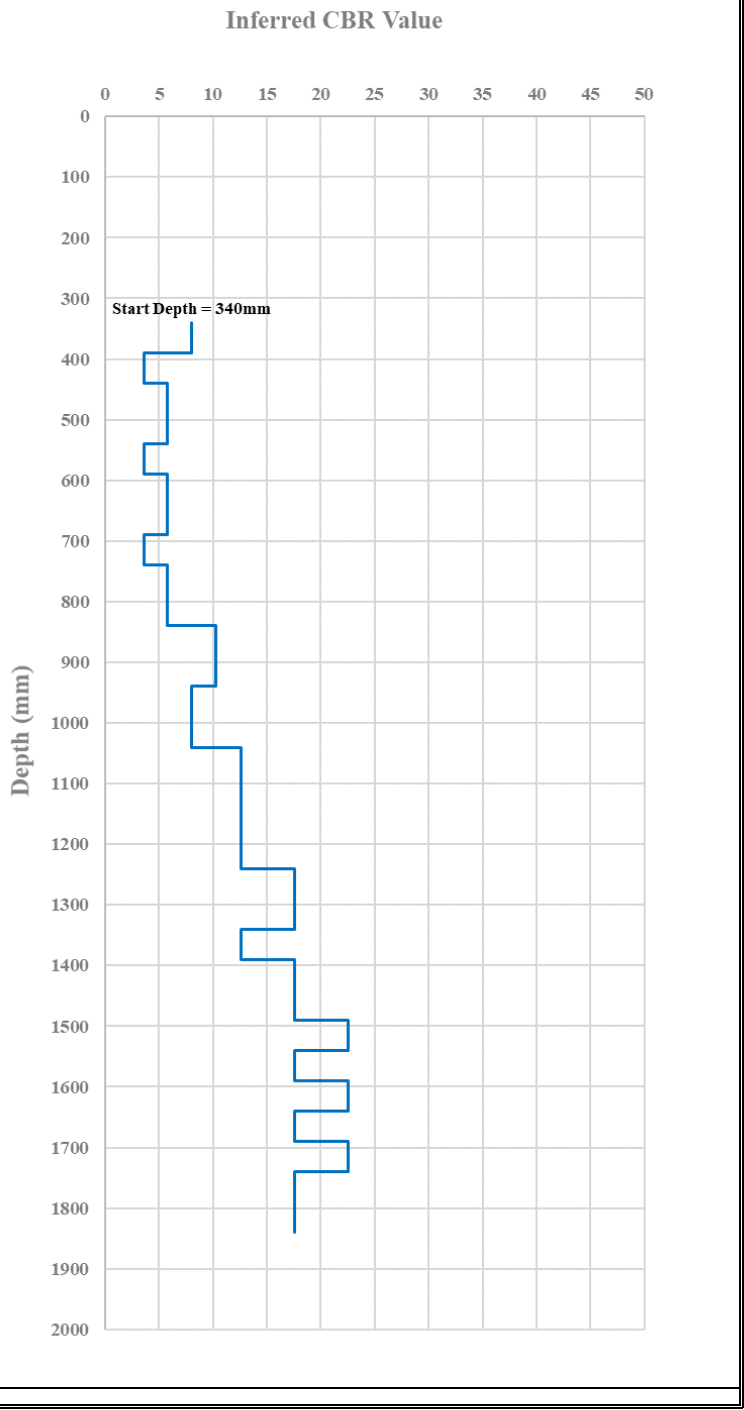
Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Pavement Pit 12, SH8 Increasing Lane, O/S 2.30m to 3.50m

SCALA PENETROMETER RESULTS (NZS 4402:1988, Test 6.5.2)

Depth (mm)	Penetration (mm/blow)	Inferred CBR [1]
340 - 390	25.0	8
390 - 440	50.0	3.5
440 - 490	33.3	6
490 - 540	33.3	6
540 - 590	50.0	3.5
590 - 640	33.3	6
640 - 690	33.3	6
690 - 740	50.0	3.5
740 - 790	33.3	6
790 - 840	33.3	6
840 - 890	20.0	10
890 - 940	20.0	10
940 - 990	25.0	8
990 - 1040	25.0	8
1040 - 1090	16.7	13
1090 - 1140	16.7	13
1140 - 1190	16.7	13
1190 - 1240	16.7	13
1240 - 1290	12.5	18
1290 - 1340	12.5	18
1340 - 1390	16.7	13
1390 - 1440	12.5	18
1440 - 1490	12.5	18
1490 - 1540	10.0	23
1540 - 1590	12.5	18
1590 - 1640	10.0	23
1640 - 1690	12.5	18
1690 - 1740	10.0	23
1740 - 1790	12.5	18
1790 - 1840	12.5	18

Note: [1] CBR values have been inferred from AustRoads Pavement Design Manual (2012) – Fig 5.3 (Not IANZ Accredited).



Tested By: N.P. Danischewski **Date: 13 to 17-Aug-18**

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Reference No: 18/2116-2

Date: 17 September 2018

TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Pavement Pit 13, SH8 Increasing Lane, O/S 2.50m to 3.70m

FIELD LOG DESCRIPTIONS – Not IANZ Accredited (NZ Geotechnical Society Guidelines 2005)

Depth (mm)	Description	Depth (mm)	Description
0 - 80	**Chip Seal. Trace of scabbing present.**	**180 - 270 (sampled)**	**Subbase – Light brown Sandy GRAVEL with some silt. Moist. Compact. Gravel, subrounded to rounded, maximum particle size 26.5mm; Sand, fine to coarse; Silt, non-plastic.**
80 - 180 (sampled)	**Basecourse (possibly stabilised) – Light greyish brown GRAVEL with some sand and trace of / minor silt. Dry / Moist. Compact. Gravel, angular to rounded, maximum particle size 53.0mm; Sand, fine to coarse; Silt, non-plastic.**	**270 - 440 (sampled)**	**Subgrade – Light orangish / yellowish brown SILT with minor clay and trace of sand. Moist. Firm. Silt / clay, plastic.**

Tested By: N.P. Danischewski **Date: 13 to 17-Aug-18**

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Reference No: 18/2116-2

Date: 17 September 2018

TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

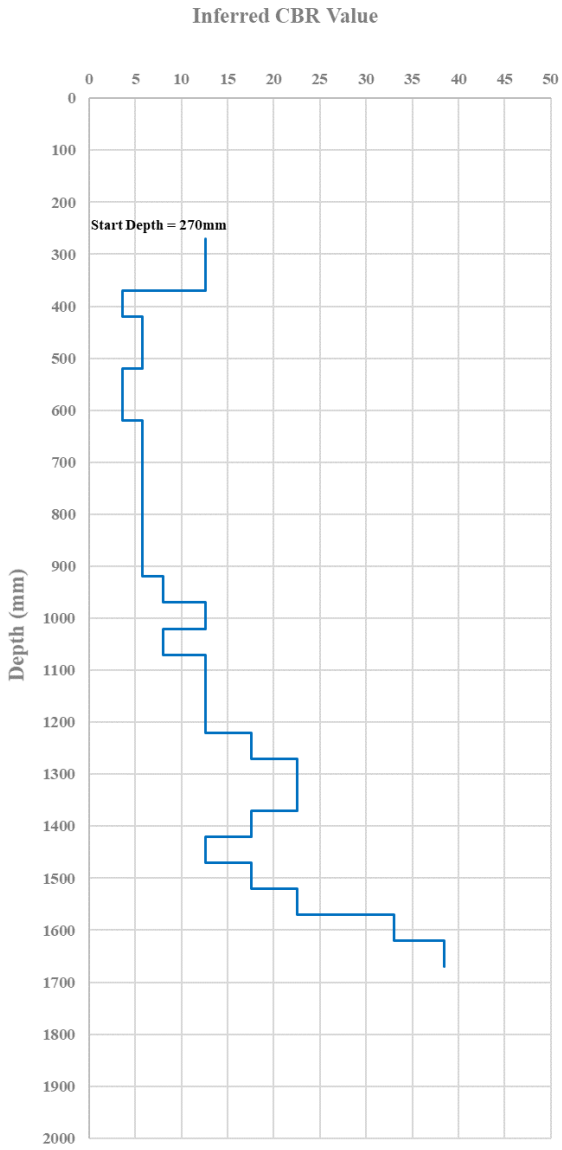
Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

Pavement Pit 13, SH8 Increasing Lane, O/S 2.50m to 3.70m

SCALA PENETROMETER RESULTS (NZS 4402:1988, Test 6.5.2)

Depth (mm)	Penetration (mm/blow)	Inferred CBR [1]
270 - 320	16.7	13
320 - 370	16.7	13
370 - 420	50.0	3.5
420 - 470	33.3	6
470 - 520	33.3	6
520 - 570	50.0	3.5
570 - 620	50.0	3.5
620 - 670	33.3	6
670 - 720	33.3	6
720 - 770	33.3	6
770 - 820	33.3	6
820 - 870	33.3	6
870 - 920	33.3	6
920 - 970	25.0	8
970 - 1020	16.7	13
1020 - 1070	25.0	8
1070 - 1120	16.7	13
1120 - 1170	16.7	13
1170 - 1220	16.7	13
1220 - 1270	12.5	18
1270 - 1320	10.0	23
1320 - 1370	10.0	23
1370 - 1420	12.5	18
1420 - 1470	16.7	13
1470 - 1520	12.5	18
1520 - 1570	10.0	23
1570 - 1620	7.1	33
1620 - 1670	6.3	38

Note: [1] CBR values have been inferred from AustRoads Pavement Design Manual (2012) – Fig 5.3 (Not IANZ Accredited).



Tested By: N.P. Danischewski **13 to 17-Aug-18**

Checked By:

Approved Signatory

A.P. Julius
Laboratory Manager

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Appendix F
Laboratory Testing Results
(excluding point load testing results)
SH8 Beaumont Bridge Realignment
Geotechnical Factual Report

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Reference No: 18/2116-3

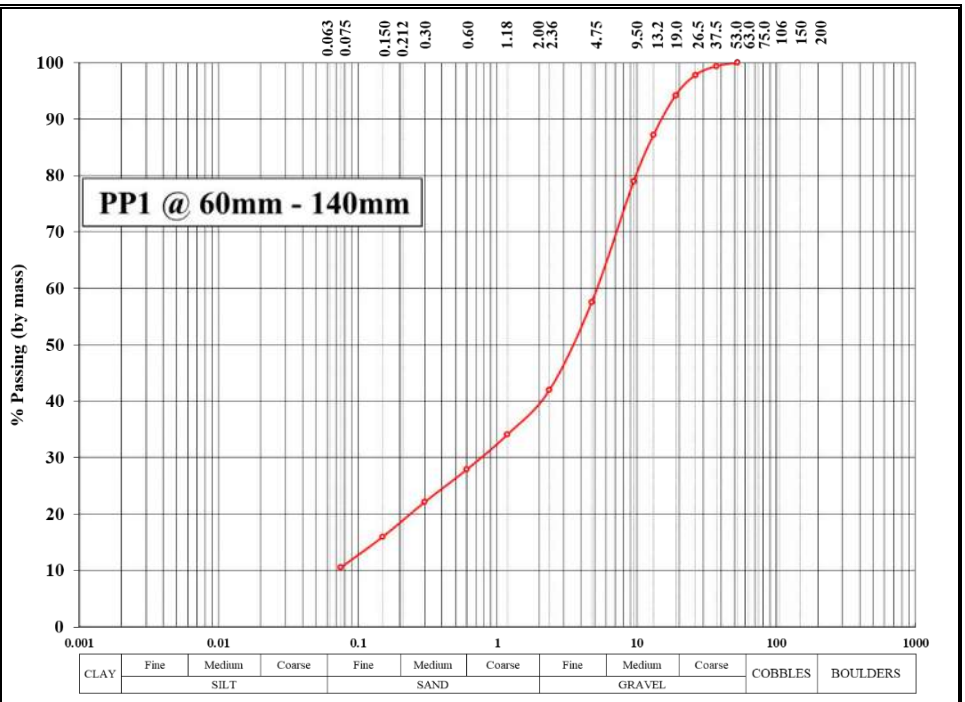
Date: 17 September 2018

TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations**		
Sample Description:	**Basecourse; Sandy GRAVEL with minor silt**	**Client Job No:**	**6-CT012.01 00008**
Sample Source:	**Pavement Pit 1; SH8, Decreasing Lane, O/S 2.25m to 3.40m @ 60mm - 140mm (See Page 35)**		
Date & Time Sampled:	**13 to 17-Aug-18**	**Sampled By:**	**N.P. Danischewski**
Sample Method:	**NZS 4407:2015, Test 2.4.2**	**Date Requested:**	**28-Aug-18**

PARTICLE SIZE ANALYSIS (NZS 4407:2015, Test 3.8.1)

Sieve Size (mm)	% Passing (by mass)
63.0	
53.0	100
37.5	99
26.5	98
19.0	94
13.2	87
9.50	79
4.75	58
2.36	42
1.18	34
0.60	28
0.30	22
0.150	16
0.075	11



The sample was received in a natural state. The percentage passing the 75µm test sieve was obtained by difference.

WATER CONTENT & PLASTICITY INDEX RESULTS - NZS 4407:2015, Test 3.1, 3.2, 3.3 & 3.4	
Water Content: ("All In" As Received)	**3.5 %**
Cone Penetration Limit: (CPL)	**18**
Plastic Limit: (PL)	**Non-Plastic (NP)**
Plasticity Index: (PI)	**Non-Plastic (NP)**
Note: The sample was received in a natural state. The plasticity index material tested was the fraction passing the 425 µm test sieve.	

Additional Notes:

- *Information contained in this report which is Not IANZ Accredited relates to the sample descriptions based on NZ Geotechnical Society Guidelines 2005.*
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Tested By: D. Pearson, L. Reiher, L.T. Smith & C. Julius **Date:** 28-Aug-18 to 13-Sep-18

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Reference No: 18/2116-3

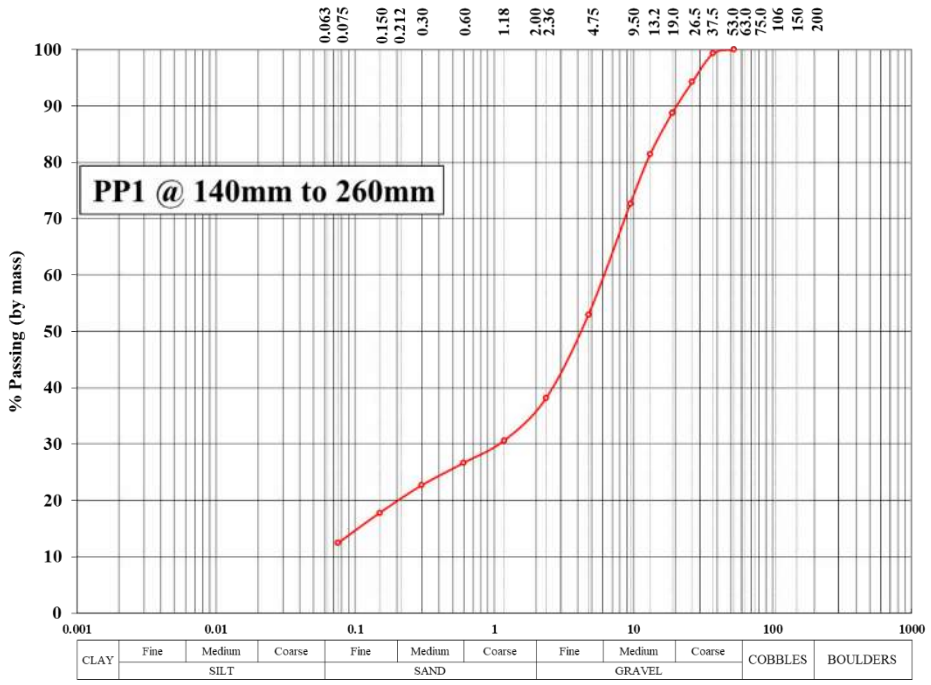
Date: 17 September 2018

TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations**		
Sample Description:	**Subbase; Sandy GRAVEL with minor / some silt**	**Client Job No:**	**6-CT012.01 00008**
Sample Source:	**Pavement Pit 1; SH8, Decreasing Lane, O/S 2.25m to 3.40m @ 140mm - 260mm (See Page 35)**		
Date & Time Sampled:	**13 to 17-Aug-18**	**Sampled By:**	**N.P. Danischewski**
Sample Method:	**NZS 4407:2015, Test 2.4.2**	**Date Requested:**	**28-Aug-18**

PARTICLE SIZE ANALYSIS (NZS 4407:2015, Test 3.8.1)

Sieve Size (mm)	% Passing (by mass)
63.0	
53.0	100
37.5	99
26.5	94
19.0	89
13.2	81
9.50	73
4.75	53
2.36	38
1.18	31
0.60	27
0.30	23
0.150	18
0.075	12



The sample was received in a natural state. The percentage passing the 75µm test sieve was obtained by difference.

Additional Notes:

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Tested By: D. Pearson, L. Reiher, L.T. Smith & C. Julius **Date:** 28-Aug-18 to 13-Sep-18

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Reference No: 18/2116-3

Date: 17 September 2018

TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations**		
Sample Description:	**Subgrade; Sandy GRAVEL with trace of / minor silt**	**Client Job No:**	**6-CT012.01 00008**
Sample Source:	**Pavement Pit 1; SH8, Decreasing Lane, O/S 2.25m to 3.40m @ 260mm - 390mm (See Page 35)**		
Date & Time Sampled:	**13 to 17-Aug-18**	**Sampled By:**	**N.P. Danischewski**
Sample Method:	**NZS 4407:2015, Test 2.4.2**	**Date Requested:**	**28-Aug-18**

LABORATORY CBR (NZS 4407:2015, Test 3.15)	
Test Description	**Sample Results**
Sample: Source:	**PP1 @ 260mm – 390mm**
Condition of Sample:	**Unsoaked**
Surcharge Mass:	**4.0 kg**
Water Content as Compacted:	**6.0 %**
Dry Density As Compacted:	**2.14 t/m^3**
CBR Value @ 2.5mm Penetration:	**85**
CBR Value @ 5.0mm Penetration:	**100**
Reported Soaked CBR Value:	**100**

Note:

- *The CBR sample tested was the fraction passing a 19mm test sieve.*
- *The sample was compacted to NZ Standard Compaction.*
- *The rate of penetration was 1.16 mm / min.*

Additional Notes:

- *Information contained in this report which is Not IANZ Accredited relates to the sample descriptions based on NZ Geotechnical Society Guidelines 2005.*
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Tested By: D. Pearson, L. Reiher, L.T. Smith & C. Julius **Date:** 28-Aug-18 to 13-Sep-18

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Reference No: 18/2116-3

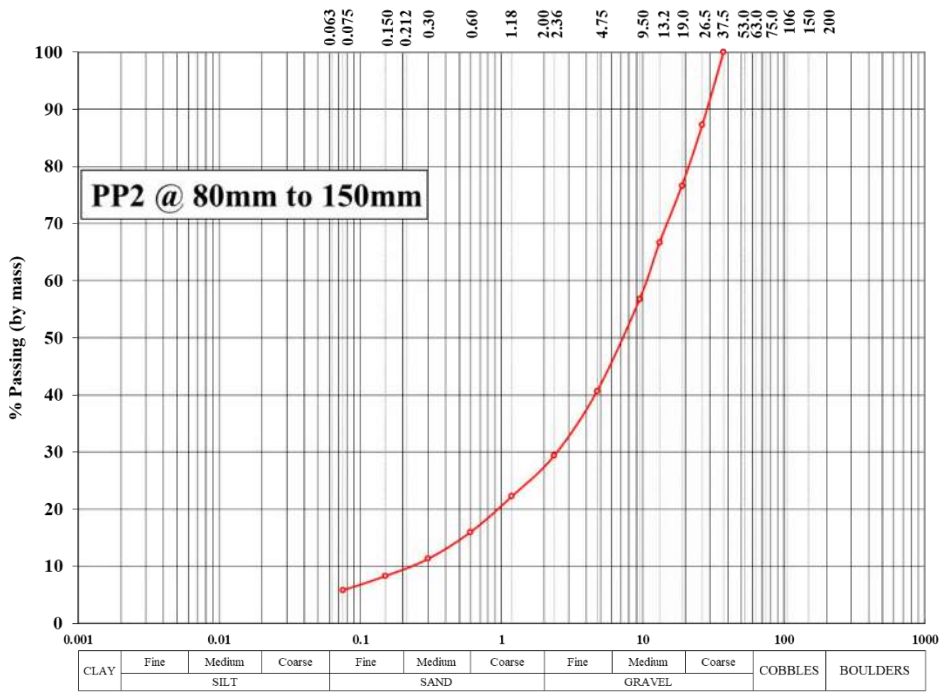
Date: 17 September 2018

TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations**		
Sample Description:	**Basecourse; Sandy GRAVEL with minor silt**	**Client Job No:**	**6-CT012.01 00008**
Sample Source:	**Pavement Pit 2; SH8, Increasing Lane, O/S 2.65m to 3.60m @ 80mm - 150mm (See Page 35)**		
Date & Time Sampled:	**13 to 17-Aug-18**	**Sampled By:**	**N.P. Danischewski**
Sample Method:	**NZS 4407:2015, Test 2.4.2**	**Date Requested:**	**28-Aug-18**

PARTICLE SIZE ANALYSIS (NZS 4407:2015, Test 3.8.1)

Sieve Size (mm)	% Passing (by mass)
63.0	
53.0	
37.5	100
26.5	87
19.0	77
13.2	67
9.50	57
4.75	41
2.36	29
1.18	22
0.60	16
0.30	11
0.150	8
0.075	6



The sample was received in a natural state. The percentage passing the 75µm test sieve was obtained by difference.

WATER CONTENT - NZS 4407:2015, Test 3.1	
Water Content: ("All In" As Received)	**2.6 %**
Note: The sample was received in a natural state.	

Additional Notes:

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Tested By: D. Pearson, L. Reiher, L.T. Smith & C. Julius **Date:** 28-Aug-18 to 13-Sep-18

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Reference No: 18/2116-3

Date: 17 September 2018

TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations**		
Sample Description:	**Subgrade; Silty Sandy GRAVEL with minor clay**	**Client Job No:**	**6-CT012.01 00008**
Sample Source:	**Pavement Pit 2; SH8, Increasing Lane, O/S 2.65m to 3.60m @ 260mm - 390mm (See Page 35)**		
Date & Time Sampled:	**13 to 17-Aug-18**	**Sampled By:**	**N.P. Danischewski**
Sample Method:	**NZS 4407:2015, Test 2.4.2**	**Date Requested:**	**28-Aug-18**

LABORATORY CBR (NZS 4407:2015, Test 3.15)	
Test Description	**Sample Results**
Sample: Source:	**PP2 @ 260mm – 390mm**
Condition of Sample:	**Unsoaked**
Surcharge Mass:	**4.0 kg**
Water Content as Compacted:	**11.8 %**
Dry Density As Compacted:	**1.96 t/m^3**
CBR Value @ 2.5mm Penetration:	**3.5**
CBR Value @ 5.0mm Penetration:	**6**
Reported Soaked CBR Value:	**6**

Note:

- *The CBR sample tested was the fraction passing a 19mm test sieve.*
- *The sample was compacted to NZ Standard Compaction.*
- *The rate of penetration was 1.16 mm / min.*

Additional Notes:

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Tested By: D. Pearson, L. Reiher, L.T. Smith & C. Julius **Date:** 28-Aug-18 to 13-Sep-18

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Reference No: 18/2116-3

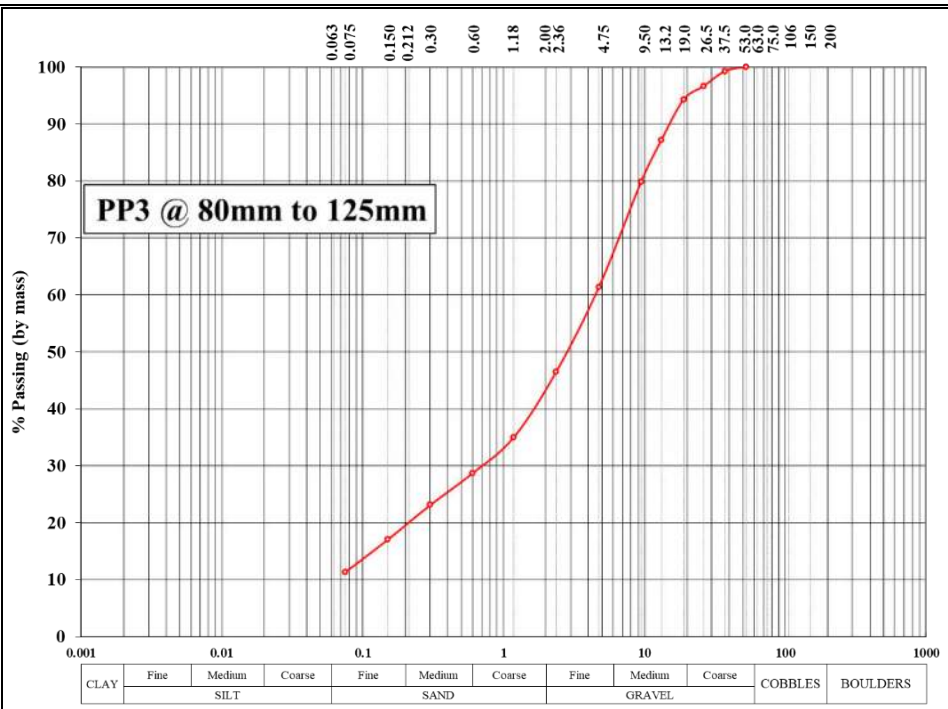
Date: 17 September 2018

TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations**		
Sample Description:	**Cement Stabilised Basecourse; Sandy GRAVEL with minor silt**	**Client Job No:**	**6-CT012.01 00008**
Sample Source:	**Pavement Pit 3; SH8, Decreasing Lane, O/S 2.25m to 3.40m @ 80mm - 125mm (See Page 35)**		
Date & Time Sampled:	**13 to 17-Aug-18**	**Sampled By:**	**N.P. Danischewski**
Sample Method:	**NZS 4407:2015, Test 2.4.2**	**Date Requested:**	**28-Aug-18**

PARTICLE SIZE ANALYSIS (NZS 4407:2015, Test 3.8.1)

Sieve Size (mm)	% Passing (by mass)
63.0	
53.0	100
37.5	99
26.5	97
19.0	94
13.2	87
9.50	80
4.75	61
2.36	47
1.18	35
0.60	29
0.30	23
0.150	17
0.075	11



The sample was received in a natural state. The percentage passing the 75μm test sieve was obtained by difference.

WATER CONTENT - NZS 4407:2015, Test 3.1	
Water Content: ("All In" As Received)	**4.1 %**
Note: The sample was received in a natural state.	

Additional Notes:

- ***Information contained in this report which is Not IANZ Accredited relates to the sample descriptions based on NZ Geotechnical Society Guidelines 2005.***
- ***This report may not be reproduced except in full.***

Tested By: D. Pearson, L. Reiher, L.T. Smith & C. Julius **Date:** 28-Aug-18 to 13-Sep-18

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Reference No: 18/2116-3

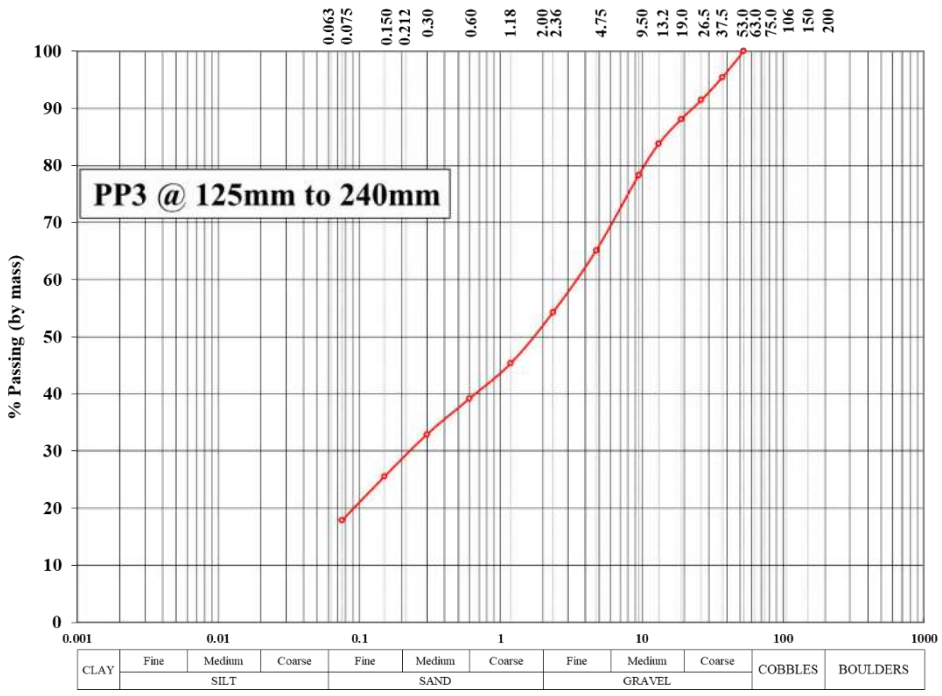
Date: 17 September 2018

TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations**		
Sample Description:	**Basecourse; Sandy GRAVEL with some silt**	**Client Job No:**	**6-CT012.01 00008**
Sample Source:	**Pavement Pit 3; SH8, Decreasing Lane, O/S 2.25m to 3.40m @ 125mm - 240mm (See Page 35)**		
Date & Time Sampled:	**13 to 17-Aug-18**	**Sampled By:**	**N.P. Danischewski**
Sample Method:	**NZS 4407:2015, Test 2.4.2**	**Date Requested:**	**28-Aug-18**

PARTICLE SIZE ANALYSIS (NZS 4407:2015, Test 3.8.1)

Sieve Size (mm)	% Passing (by mass)
63.0	
53.0	100
37.5	95
26.5	91
19.0	88
13.2	84
9.50	78
4.75	65
2.36	54
1.18	45
0.60	39
0.30	33
0.150	26
0.075	18



The sample was received in a natural state. The percentage passing the 75μm test sieve was obtained by difference.

WATER CONTENT & PLASTICITY INDEX RESULTS - NZS 4407:2015, Test 3.1, 3.2, 3.3 & 3.4	
Water Content: ("All In" As Received)	**4.7 %**
Cone Penetration Limit: (CPL)	**18**
Plastic Limit: (PL)	**Non-Plastic (NP)**
Plasticity Index: (PI)	**Non-Plastic (NP)**
Note: The sample was received in a natural state. The plasticity index material tested was the fraction passing the 425 μm test sieve.	

Additional Notes:

- *Information contained in this report which is Not IANZ Accredited relates to the sample descriptions based on NZ Geotechnical Society Guidelines 2005.*
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Tested By: D. Pearson, L. Reiher, L.T. Smith & C. Julius **Date:** 28-Aug-18 to 13-Sep-18

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Reference No: 18/2116-3

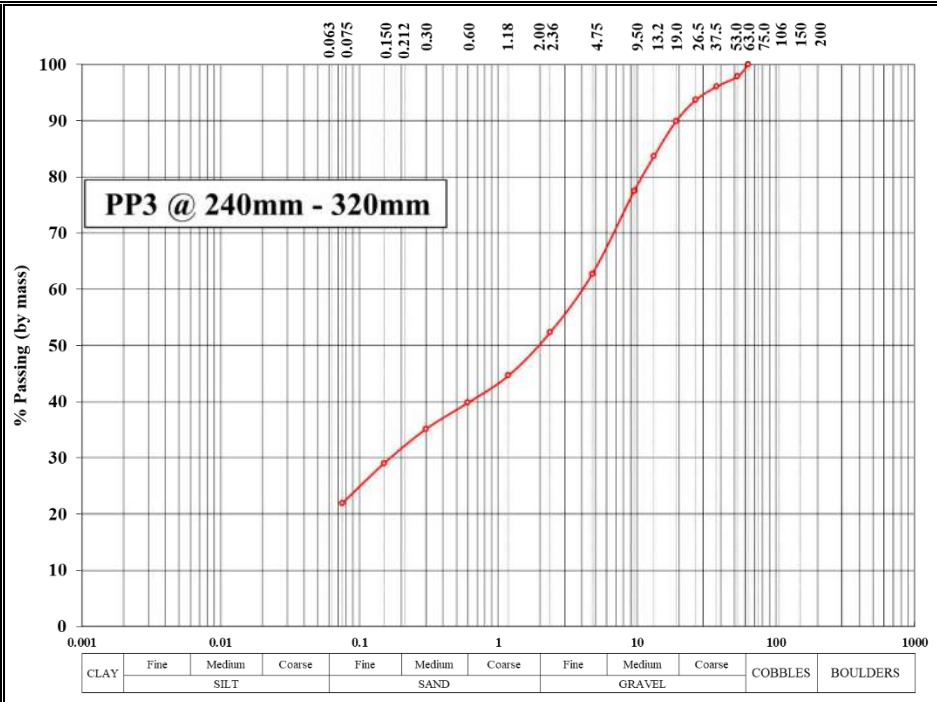
Date: 17 September 2018

TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations**		
Sample Description:	**Subbase; Silty Sandy GRAVEL**	**Client Job No:**	**6-CT012.01 00008**
Sample Source:	**Pavement Pit 3; SH8, Decreasing Lane, O/S 2.25m to 3.40m @ 240mm - 320mm (See Page 35)**		
Date & Time Sampled:	**13 to 17-Aug-18**	**Sampled By:**	**N.P. Danischewski**
Sample Method:	**NZS 4407:2015, Test 2.4.2**	**Date Requested:**	**28-Aug-18**

PARTICLE SIZE ANALYSIS (NZS 4407:2015, Test 3.8.1)

Sieve Size (mm)	% Passing (by mass)
63.0	100
53.0	98
37.5	96
26.5	94
19.0	90
13.2	84
9.50	77
4.75	63
2.36	52
1.18	45
0.60	40
0.30	35
0.150	29
0.075	22



The sample was received in a natural state. The percentage passing the 75µm test sieve was obtained by difference.

Additional Notes:

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- *This report may not be reproduced except in full.*

Tested By: D. Pearson, L. Reiher, L.T. Smith & C. Julius **Date:** 28-Aug-18 to 13-Sep-18

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TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations**		
Sample Description:	**Subgrade; Sandy GRAVEL with trace of / minor silt**	**Client Job No:**	**6-CT012.01 00008**
Sample Source:	**Pavement Pit 3; SH8, Decreasing Lane, O/S 2.25m to 3.40m @ 320mm - 410mm (See Page 35)**		
Date & Time Sampled:	**13 to 17-Aug-18**	**Sampled By:**	**N.P. Danischewski**
Sample Method:	**NZS 4407:2015, Test 2.4.2**	**Date Requested:**	**28-Aug-18**

LABORATORY CBR (NZS 4407:2015, Test 3.15)	
Test Description	**Sample Results**
Sample Source:	**PP3 @ 320mm – 410mm**
Condition of Sample:	**Unsoaked**
Surcharge Mass:	**4.0 kg**
Water Content as Compacted:	**6.0 %**
Dry Density As Compacted:	**2.13 t/m^3**
CBR Value @ 2.5mm Penetration:	**65**
CBR Value @ 5.0mm Penetration:	**75**
Reported Soaked CBR Value:	**75**

Note:

- *The CBR sample tested was the fraction passing a 19mm test sieve.*
- *The sample was compacted to NZ Standard Compaction.*
- *The rate of penetration was 1.16 mm / min.*

Additional Notes:

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Tested By: D. Pearson, L. Reiher, L.T. Smith & C. Julius **Date:** 28-Aug-18 to 13-Sep-18

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Reference No: 18/2116-3

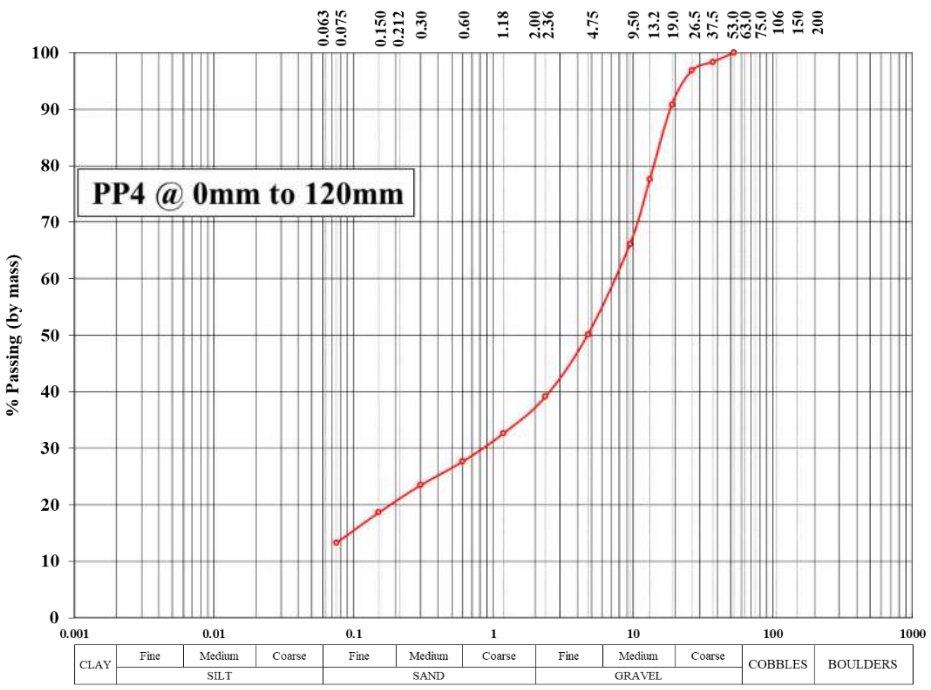
Date: 17 September 2018

TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations**		
Sample Description:	**Maintenance Metal; Sandy GRAVEL with some silt**	**Client Job No:**	**6-CT012.01 00008**
Sample Source:	**Pavement Pit 4; Dee Street, SH8 End @ 0mm - 120mm (See Page 35)**		
Date & Time Sampled:	**13 to 17-Aug-18**	**Sampled By:**	**N.P. Danischewski**
Sample Method:	**NZS 4407:2015, Test 2.4.2**	**Date Requested:**	**28-Aug-18**

PARTICLE SIZE ANALYSIS (NZS 4407:2015, Test 3.8.1)

Sieve Size (mm)	% Passing (by mass)
63.0	
53.0	100
37.5	98
26.5	97
19.0	91
13.2	78
9.50	66
4.75	50
2.36	39
1.18	33
0.60	28
0.30	23
0.150	19
0.075	13



The sample was received in a natural state. The percentage passing the 75µm test sieve was obtained by difference.

WATER CONTENT & PLASTICITY INDEX RESULTS - NZS 4407:2015, Test 3.1, 3.2, 3.3 & 3.4	
Water Content: ("All In" As Received)	**4.8 %**
Cone Penetration Limit: (CPL)	**24**
Plastic Limit: (PL)	**Non-Plastic (NP)**
Plasticity Index: (PI)	**Non-Plastic (NP)**
Note: The sample was received in a natural state. The plasticity index material tested was the fraction passing the 425 µm test sieve.	

Additional Notes:

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Tested By: D. Pearson, L. Reiher, L.T. Smith & C. Julius **Date:** 28-Aug-18 to 13-Sep-18

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Reference No: 18/2116-3

Date: 17 September 2018

TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations**		
Sample Description:	**See below**	**Client Job No:**	**6-CT012.01 00008**
Sample Source:	**Pavement Pit 4; Dee Street, SH8 End (See Page 35)**		
Date & Time Sampled:	**13 to 17-Aug-18**	**Sampled By:**	**N.P. Danischewski**
Sample Method:	**NZS 4407:2015, Test 2.4.2**	**Date Requested:**	**28-Aug-18**

LABORATORY CBR (NZS 4407:2015, Test 3.15)		
Test Description	**Sample Results**	
Sample Source:	**PP4 @ 120mm - 330mm**	**PP4 @ 330mm - 500mm**
Sample Description:	**Sandy GRAVEL with trace of / minor silt and trace of cobbles**	**Silty Sandy GRAVEL with some clay**
Condition of Sample:	**Unsoaked**	**Unsoaked**
Surcharge Mass:	**4.0 kg**	**4.0 kg**
Water Content as Compacted:	**5.3 %**	**14.9 %**
Dry Density As Compacted:	**2.14 t/m^3**	**1.84 t/m^3**
CBR Value @ 2.5mm Penetration:	**100**	**2.0**
CBR Value @ 5.0mm Penetration:	**115**	**3.5**
Reported Soaked CBR Value:	**115**	**3.5**

Note:

- *The CBR sample tested was the fraction passing a 19mm test sieve.*
- *The sample was compacted to NZ Standard Compaction.*
- *The rate of penetration was 1.16 mm / min.*

Additional Notes:

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Tested By: D. Pearson, L. Reiher, L.T. Smith & C. Julius **Date:** 28-Aug-18 to 13-Sep-18

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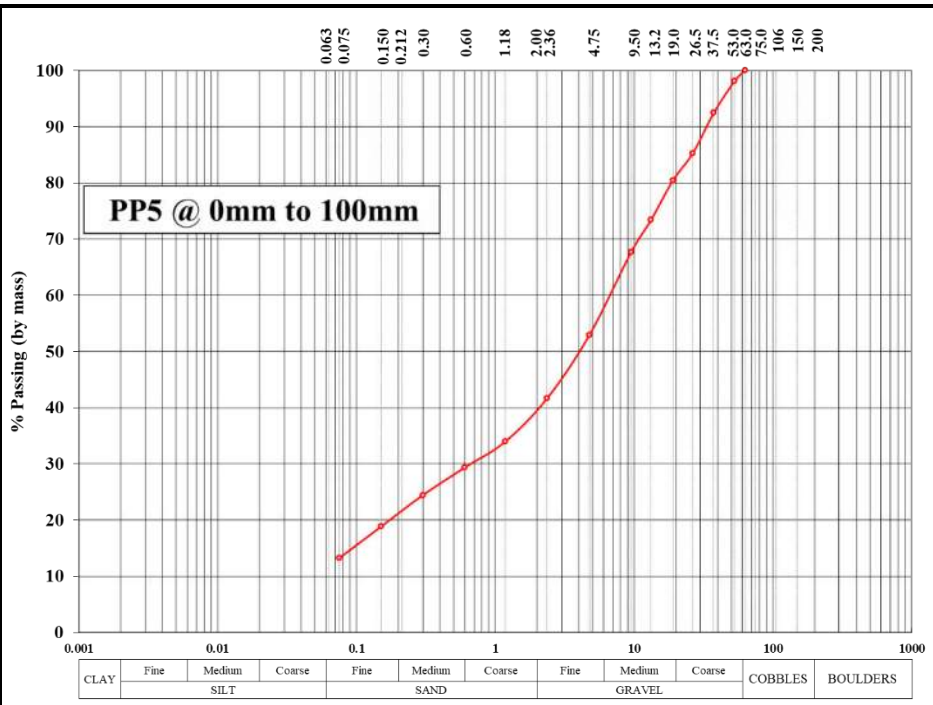
TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations**		
Sample Description:	**Maintenance Metal; Sandy GRAVEL with some silt**	**Client Job No:**	**6-CT012.01 00008**
Sample Source:	**Pavement Pit 5; Dee Street, Middle @ 0mm - 100mm (See Page 35)**		
Date & Time Sampled:	**13 to 17-Aug-18**	**Sampled By:**	**N.P. Danischewski**
Sample Method:	**NZS 4407:2015, Test 2.4.2**	**Date Requested:**	**28-Aug-18**

PARTICLE SIZE ANALYSIS (NZS 4407:2015, Test 3.8.1)

Sieve Size (mm)	% Passing (by mass)
63.0	100
53.0	98
37.5	92
26.5	85
19.0	80
13.2	73
9.50	68
4.75	53
2.36	42
1.18	34
0.60	29
0.30	24
0.150	19
0.075	13



The sample was received in a natural state. The percentage passing the 75µm test sieve was obtained by difference.

WATER CONTENT - NZS 4407:2015, Test 3.1	
Water Content: ("All In" As Received)	**5.0 %**
Note: The sample was received in a natural state.	

Additional Notes:

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Tested By: D. Pearson, L. Reiher, L.T. Smith & C. Julius **Date:** 28-Aug-18 to 13-Sep-18

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TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations**		
Sample Description:	**Sandy GRAVEL with some silt / clay**	**Client Job No:**	**6-CT012.01 00008**
Sample Source:	**Pavement Pit 5; Dee Street, Middle @ 100mm – 250mm (See Page 35)**		
Date & Time Sampled:	**13 to 17-Aug-18**	**Sampled By:**	**N.P. Danischewski**
Sample Method:	**NZS 4407:2015, Test 2.4.2**	**Date Requested:**	**28-Aug-18**

LABORATORY CBR (NZS 4407:2015, Test 3.15)	
Test Description	**Sample Results**
Sample Source:	**PP5 @ 100mm – 250mm**
Condition of Sample:	**Unsoaked**
Surcharge Mass:	**4.0 kg**
Water Content as Compacted:	**12.6 %**
Dry Density As Compacted:	**1.84 t/m^3**
CBR Value @ 2.5mm Penetration:	**20**
CBR Value @ 5.0mm Penetration:	**25**
Reported Soaked CBR Value:	**25**

Note:

- *The CBR sample tested was the fraction passing a 19mm test sieve.*
- *The sample was compacted to NZ Standard Compaction.*
- *The rate of penetration was 1.16 mm / min.*

Additional Notes:

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Tested By: D. Pearson, L. Reiher, L.T. Smith & C. Julius **Date:** 28-Aug-18 to 13-Sep-18

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Reference No: 18/2116-3

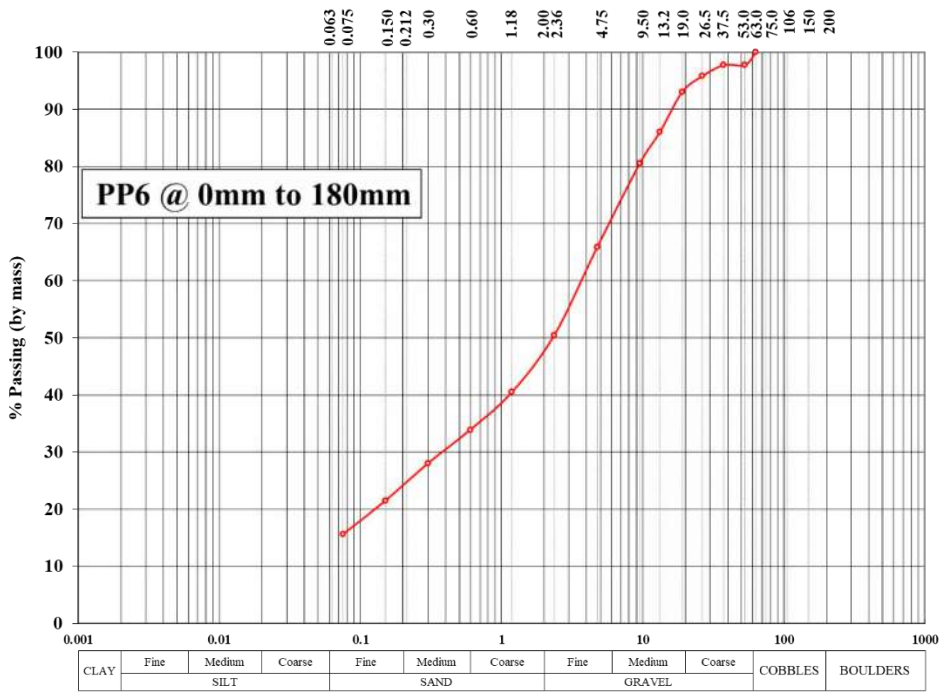
Date: 17 September 2018

TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations**		
Sample Description:	**Maintenance Metal; Sandy GRAVEL with some silt**	**Client Job No:**	**6-CT012.01 00008**
Sample Source:	**Pavement Pit 6; Dee Street, Westferry Street End @ 0mm - 180mm (See Page 35)**		
Date & Time Sampled:	**13 to 17-Aug-18**	**Sampled By:**	**N.P. Danischewski**
Sample Method:	**NZS 4407:2015, Test 2.4.2**	**Date Requested:**	**28-Aug-18**

PARTICLE SIZE ANALYSIS (NZS 4407:2015, Test 3.8.1)

Sieve Size (mm)	% Passing (by mass)
63.0	100
53.0	98
37.5	98
26.5	96
19.0	93
13.2	86
9.50	81
4.75	66
2.36	50
1.18	40
0.60	34
0.30	28
0.150	22
0.075	16



The sample was received in a natural state. The percentage passing the 75µm test sieve was obtained by difference.

WATER CONTENT & PLASTICITY INDEX RESULTS - NZS 4407:2015, Test 3.1, 3.2, 3.3 & 3.4	
Water Content: ("All In" As Received)	**6.9 %**
Cone Penetration Limit: (CPL)	**28**
Plastic Limit: (PL)	**24**
Plasticity Index: (PI)	**4**
Note: The sample was received in a natural state. The plasticity index material tested was the fraction passing the 425 µm test sieve.	

Additional Notes:

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TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations**		
Sample Description:	**Sandy GRAVEL with some silt**	**Client Job No:**	**6-CT012.01 00008**
Sample Source:	**Pavement Pit 6; Dee Street, Westferry Street End @ 180m - 400mm (See Page 35)**		
Date & Time Sampled:	**13 to 17-Aug-18**	**Sampled By:**	**N.P. Danischewski**
Sample Method:	**NZS 4407:2015, Test 2.4.2**	**Date Requested:**	**28-Aug-18**

LABORATORY CBR (NZS 4407:2015, Test 3.15)	
Test Description	**Sample Results**
Sample Source:	**PP6 @ 180mm - 400mm**
Condition of Sample:	**Unsoaked**
Surcharge Mass:	**4.0 kg**
Water Content as Compacted:	**14.3 %**
Dry Density As Compacted:	**1.82 t/m^3**
CBR Value @ 2.5mm Penetration:	**11**
CBR Value @ 5.0mm Penetration:	**15**
Reported Soaked CBR Value:	**15**

Note:

- *The CBR sample tested was the fraction passing a 19mm test sieve.*
- *The sample was compacted to NZ Standard Compaction.*
- *The rate of penetration was 1.16 mm / min.*

Additional Notes:

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Tested By: D. Pearson, L. Reiher, L.T. Smith & C. Julius **Date:** 28-Aug-18 to 13-Sep-18

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Reference No: 18/2116-3

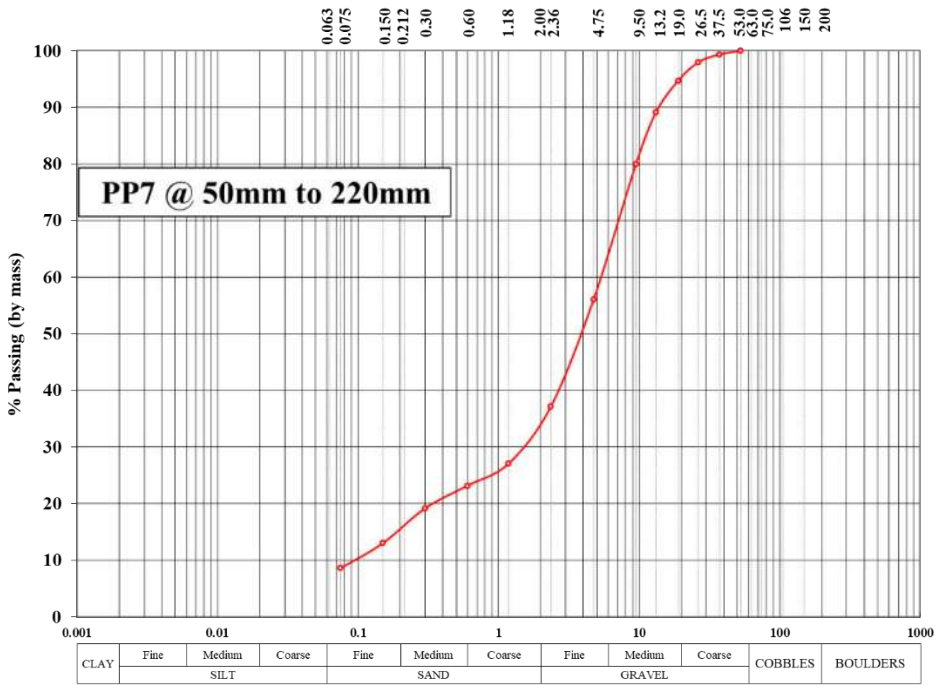
Date: 17 September 2018

TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations**		
Sample Description:	**Basecourse; Sandy GRAVEL with minor silt & trace of cobbles**	**Client Job No:**	**6-CT012.01 00008**
Sample Source:	**Pavement Pit 7; Westferry Street, O/S 1.50m to 2.70m @ 50mm - 220mm (See Page 35)**		
Date & Time Sampled:	**13 to 17-Aug-18**	**Sampled By:**	**N.P. Danischewski**
Sample Method:	**NZS 4407:2015, Test 2.4.2**	**Date Requested:**	**28-Aug-18**

PARTICLE SIZE ANALYSIS (NZS 4407:2015, Test 3.8.1)

Sieve Size (mm)	% Passing (by mass)
63.0	
53.0	100
37.5	99
26.5	98
19.0	95
13.2	89
9.50	80
4.75	56
2.36	37
1.18	27
0.60	23
0.30	19
0.150	13
0.075	9



The sample was received in a natural state. The percentage passing the 75µm test sieve was obtained by difference.

WATER CONTENT - NZS 4407:2015, Test 3.1	
Water Content: ("All In" As Received)	**5.3 %**
Note: The sample was received in a natural state.	

Additional Notes:

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Tested By: D. Pearson, L. Reiher, L.T. Smith & C. Julius **Date:** 28-Aug-18 to 13-Sep-18

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TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations**		
Sample Description:	**Subbase / Subgrade; Sandy GRAVEL with minor silt**	**Client Job No:**	**6-CT012.01 00008**
Sample Source:	**Pavement Pit 7; Westferry Street, O/S 1.50m to 2.70m @ 220mm - 520mm (See Page 35)**		
Date & Time Sampled:	**13 to 17-Aug-18**	**Sampled By:**	**N.P. Danischewski**
Sample Method:	**NZS 4407:2015, Test 2.4.2**	**Date Requested:**	**28-Aug-18**

LABORATORY CBR (NZS 4407:2015, Test 3.15)	
Test Description	**Sample Results**
Condition of Sample:	**Unsoaked**
Surcharge Mass:	**4.0 kg**
Water Content as Compacted:	**7.7 %**
Dry Density As Compacted:	**1.94 t/m^3**
CBR Value @ 2.5mm Penetration:	**55**
CBR Value @ 5.0mm Penetration:	**60**
Reported Soaked CBR Value:	**60**

Note:

- *The CBR sample tested was the fraction passing a 19mm test sieve.*
- *The sample was compacted to NZ Standard Compaction.*
- *The rate of penetration was 1.16 mm / min.*

Additional Notes:

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Tested By: D. Pearson, L. Reiher, L.T. Smith & C. Julius **Date:** 28-Aug-18 to 13-Sep-18

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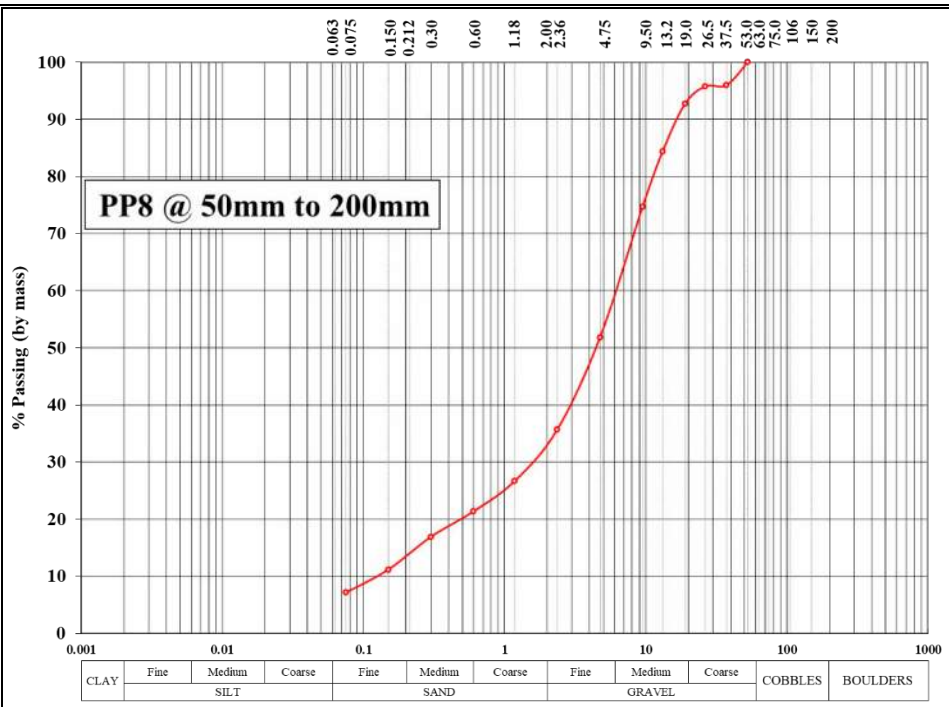
TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations**		
Sample Description:	**Basecourse; Sandy GRAVEL with minor silt**	**Client Job No:**	**6-CT012.01 00008**
Sample Source:	**Pavement Pit 8; Westferry Street, O/S 1.50m to 2.70m @ 50mm – 200mm (See Page 35)**		
Date & Time Sampled:	**13 to 17-Aug-18**	**Sampled By:**	**N.P. Danischewski**
Sample Method:	**NZS 4407:2015, Test 2.4.2**	**Date Requested:**	**28-Aug-18**

PARTICLE SIZE ANALYSIS (NZS 4407:2015, Test 3.8.1)

Sieve Size (mm)	% Passing (by mass)
63.0	
53.0	100
37.5	96
26.5	96
19.0	93
13.2	84
9.50	75
4.75	52
2.36	36
1.18	27
0.60	21
0.30	17
0.150	11
0.075	7



The sample was received in a natural state. The percentage passing the 75µm test sieve was obtained by difference.

WATER CONTENT & PLASTICITY INDEX RESULTS - NZS 4407:2015, Test 3.1, 3.2, 3.3 & 3.4	
Water Content: ("All In" As Received)	**3.6 %**
Cone Penetration Limit: (CPL)	**21**
Plastic Limit: (PL)	**Non-Plastic (NP)**
Plasticity Index: (PI)	**Non-Plastic (NP)**
Note: The sample was received in a natural state. The plasticity index material tested was the fraction passing the 425 µm test sieve.	

Additional Notes:

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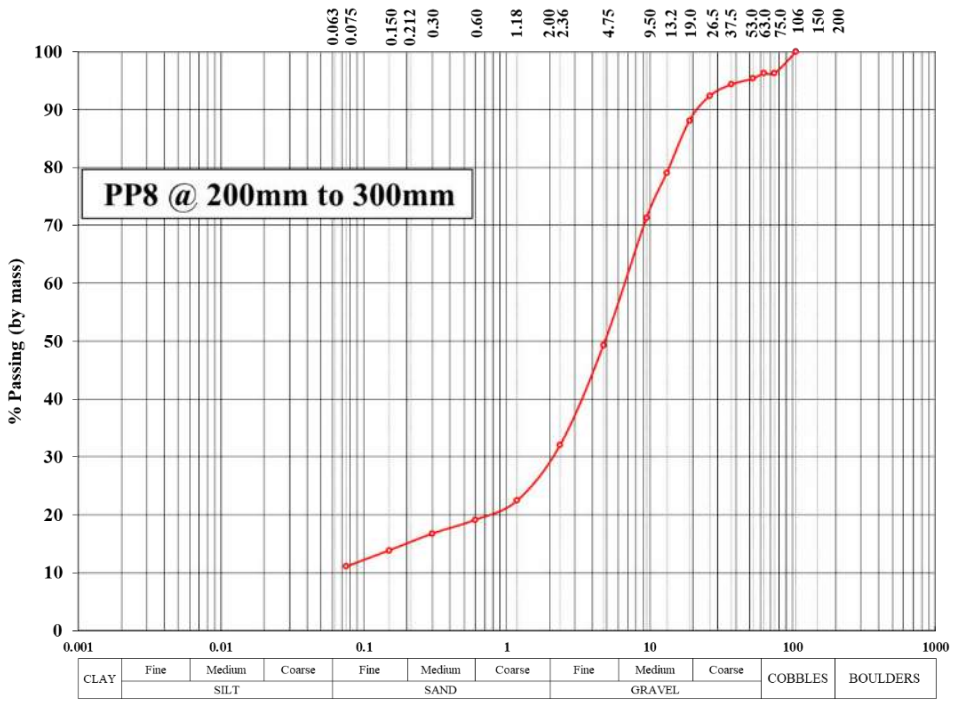
TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations**		
Sample Description:	**Subbase; Sandy GRAVEL with minor silt & trace of cobbles**	**Client Job No:**	**6-CT012.01 00008**
Sample Source:	**Pavement Pit 8; Westferry Street, O/S 1.50m to 2.70m @ 200mm - 300mm (See Page 35)**		
Date & Time Sampled:	**13 to 17-Aug-18**	**Sampled By:**	**N.P. Danischewski**
Sample Method:	**NZS 4407:2015, Test 2.4.2**	**Date Requested:**	**28-Aug-18**

PARTICLE SIZE ANALYSIS (NZS 4407:2015, Test 3.8.1)

Sieve Size (mm)	% Passing (by mass)
106.0	100
75.0	96
63.0	96
53.0	95
37.5	94
26.5	92
19.0	88
13.2	79
9.50	71
4.75	49
2.36	32
1.18	22
0.60	19
0.30	17
0.150	14
0.075	11



The sample was received in a natural state. The percentage passing the 75µm test sieve was obtained by difference.

Additional Notes:

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TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations**		
Sample Description:	**Subbase; Sandy GRAVEL with minor silt & trace of cobbles**	**Client Job No:**	**6-CT012.01 00008**
Sample Source:	**Pavement Pit 8; Westferry Street, O/S 1.50m to 2.70m @ 200mm - 300mm (See Page 35)**		
Date & Time Sampled:	**13 to 17-Aug-18**	**Sampled By:**	**N.P. Danischewski**
Sample Method:	**NZS 4407:2015, Test 2.4.2**	**Date Requested:**	**28-Aug-18**

LABORATORY CBR (NZS 4407:2015, Test 3.15)	
Test Description	**Sample Results**
Sample Source:	**PP8 @ 200mm - 300mm**
Condition of Sample:	**Unsoaked**
Surcharge Mass:	**4.0 kg**
Water Content as Compacted:	**8.1 %**
Dry Density As Compacted:	**2.08 t/m^3**
CBR Value @ 2.5mm Penetration:	**50**
CBR Value @ 5.0mm Penetration:	**75**
Reported Soaked CBR Value:	**75**

Note:

- *The CBR sample tested was the fraction passing a 19mm test sieve.*
- *The sample was compacted to NZ Standard Compaction.*
- *The rate of penetration was 1.16 mm / min.*

Additional Notes:

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Tested By: D. Pearson, L. Reiher, L.T. Smith & C. Julius **Date:** 28-Aug-18 to 13-Sep-18

Checked By: 

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Reference No: 18/2116-3

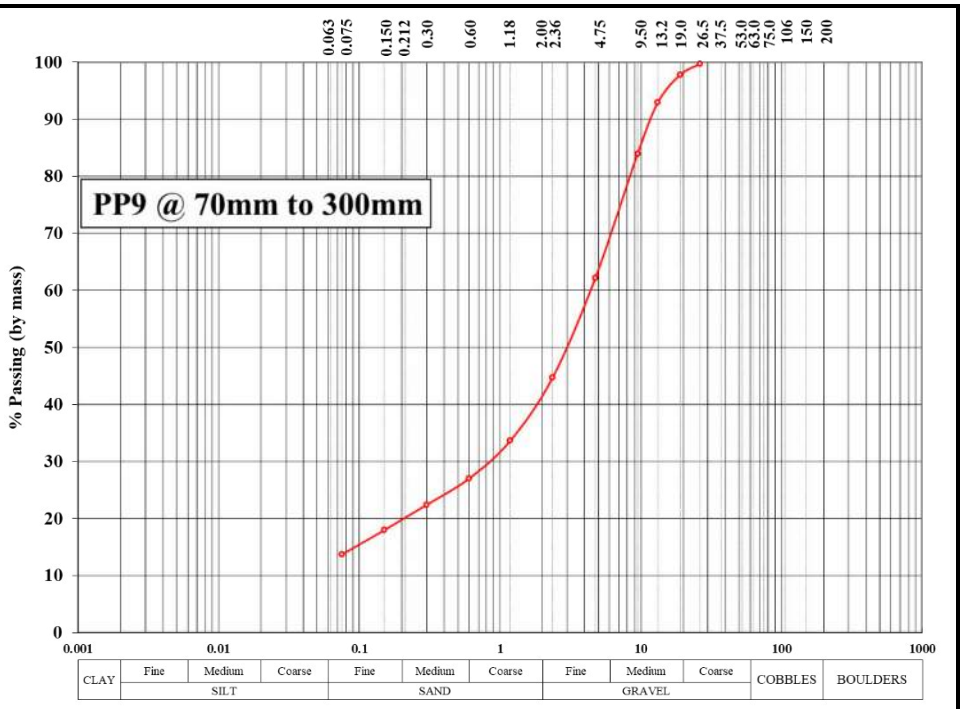
Date: 17 September 2018

TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations**		
Sample Description:	**Cement Stabilised Basecourse; Sandy GRAVEL with some silt**	**Client Job No:**	**6-CT012.01 00008**
Sample Source:	**Pavement Pit 9; SH8 Increasing Lane, O/S 2.05m to 2.90m @ 70mm - 300mm (See Page 35)**		
Date & Time Sampled:	**13 to 17-Aug-18**	**Sampled By:**	**N.P. Danischewski**
Sample Method:	**NZS 4407:2015, Test 2.4.2**	**Date Requested:**	**28-Aug-18**

PARTICLE SIZE ANALYSIS (NZS 4407:2015, Test 3.8.1)

Sieve Size (mm)	% Passing (by mass)
63.0	
53.0	
37.5	
26.5	100
19.0	98
13.2	93
9.50	84
4.75	62
2.36	45
1.18	34
0.60	27
0.30	22
0.150	18
0.075	14



The sample was received in a natural state. The percentage passing the 75µm test sieve was obtained by difference.

WATER CONTENT & PLASTICITY INDEX RESULTS - NZS 4407:2015, Test 3.1, 3.2, 3.3 & 3.4	
Water Content: ("All In" As Received)	**4.3 %**
Cone Penetration Limit: (CPL)	**18**
Plastic Limit: (PL)	**16**
Plasticity Index: (PI)	**2**
Note: The sample was received in a natural state. The plasticity index material tested was the fraction passing the 425 µm test sieve.	

Additional Notes:

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Reference No: 18/2116-3

Date: 17 September 2018

TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations**		
Sample Description:	**Subgrade; SILT with minor clay, trace of gravel & trace of sand**	**Client Job No:**	**6-CT012.01 00008**
Sample Source:	**Pavement Pit 9; SH8 Increasing Lane, O/S 2.05m to 2.90m @ 300mm - 440mm (See Page 35)**		
Date & Time Sampled:	**13 to 17-Aug-18**	**Sampled By:**	**N.P. Danischewski**
Sample Method:	**NZS 4407:2015, Test 2.4.2**	**Date Requested:**	**28-Aug-18**

LABORATORY CBR (NZS 4407:2015, Test 3.15)	
Test Description	**Sample Results**
Sample Source:	**PP9 @ 300mm- 440mm**
Condition of Sample:	**Unsoaked**
Surcharge Mass:	**4.0 kg**
Water Content as Compacted:	**26.6 %**
Dry Density As Compacted:	**1.51 t/m^3**
CBR Value @ 2.5mm Penetration:	**1.0**
CBR Value @ 5.0mm Penetration:	**1.5**
Reported Soaked CBR Value:	**1.5**

Note:

- *The CBR sample tested was the fraction passing a 19mm test sieve.*
- *The sample was compacted to NZ Standard Compaction.*
- *The rate of penetration was 1.16 mm / min.*

Additional Notes:

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Tested By: D. Pearson, L. Reiher, L.T. Smith & C. Julius **Date:** 28-Aug-18 to 13-Sep-18

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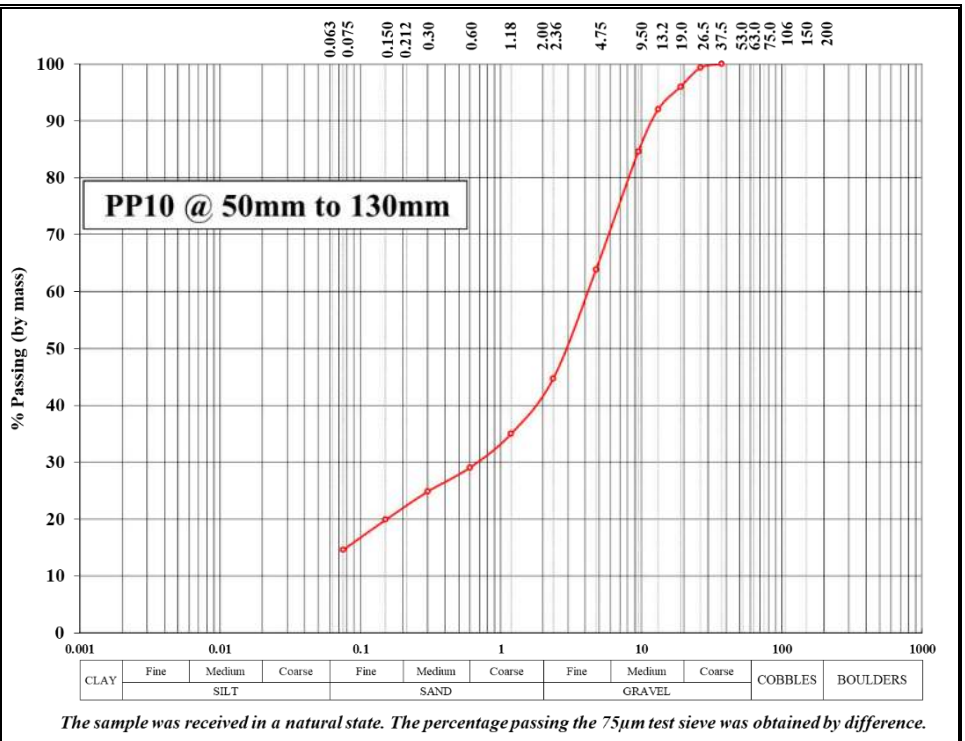
TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations**		
Sample Description:	**Cement Stabilised Basecourse; Sandy GRAVEL with some silt**	**Client Job No:**	**6-CT012.01 00008**
Sample Source:	**Pavement Pit 10; SH8 Increasing Lane, O/S 1.95m to 3.15m @ 50mm - 130mm (See Page 35)**		
Date & Time Sampled:	**13 to 17-Aug-18**	**Sampled By:**	**N.P. Danischewski**
Sample Method:	**NZS 4407:2015, Test 2.4.2**	**Date Requested:**	**28-Aug-18**

PARTICLE SIZE ANALYSIS (NZS 4407:2015, Test 3.8.1)

Sieve Size (mm)	% Passing (by mass)
63.0	
53.0	
37.5	100
26.5	99
19.0	96
13.2	92
9.50	85
4.75	64
2.36	45
1.18	35
0.60	29
0.30	25
0.150	20
0.075	15



The sample was received in a natural state. The percentage passing the 75μm test sieve was obtained by difference.

WATER CONTENT - NZS 4407:2015, Test 3.1	
Water Content: ("All In" As Received)	**3.8 %**
Note: The sample was received in a natural state.	

Additional Notes:

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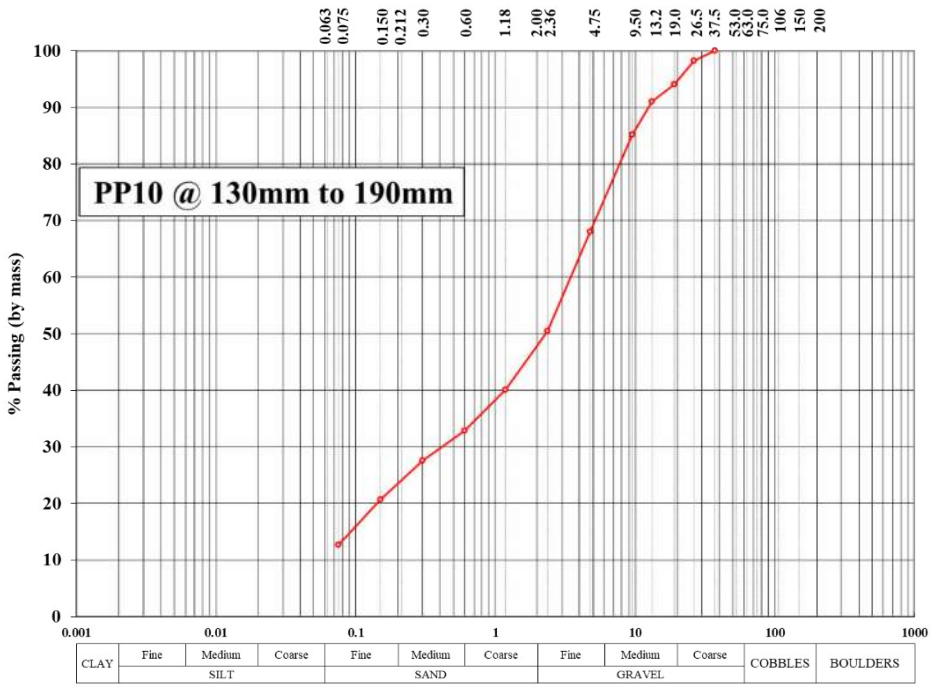
TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations**		
Sample Description:	**Subbase; Sandy GRAVEL with some silt**	**Client Job No:**	**6-CT012.01 00008**
Sample Source:	**Pavement Pit 10; SH8 Increasing Lane, O/S 1.95m to 3.15m @ 130mm - 190mm (See Page 35)**		
Date & Time Sampled:	**13 to 17-Aug-18**	**Sampled By:**	**N.P. Danischewski**
Sample Method:	**NZS 4407:2015, Test 2.4.2**	**Date Requested:**	**28-Aug-18**

PARTICLE SIZE ANALYSIS (NZS 4407:2015, Test 3.8.1)

Sieve Size (mm)	% Passing (by mass)
63.0	
53.0	
37.5	100
26.5	98
19.0	94
13.2	91
9.50	85
4.75	68
2.36	50
1.18	40
0.60	33
0.30	28
0.150	21
0.075	13



The sample was received in a natural state. The percentage passing the 75µm test sieve was obtained by difference.

Additional Notes:

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TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations**		
Sample Description:	**Subgrade; Sandy GRAVEL with minor silt**	**Client Job No:**	**6-CT012.01 00008**
Sample Source:	**Pavement Pit 10; SH8 Increasing Lane, O/S 1.95m to 3.15m @ 190mm - 320mm (See Page 35)**		
Date & Time Sampled:	**13 to 17-Aug-18**	**Sampled By:**	**N.P. Danischewski**
Sample Method:	**NZS 4407:2015, Test 2.4.2**	**Date Requested:**	**28-Aug-18**

LABORATORY CBR (NZS 4407:2015, Test 3.15)	
Test Description	**Sample Results**
Sample Source:	**PP10 @ 190mm – 320mm**
Condition of Sample:	**Unsoaked**
Surcharge Mass:	**4.0 kg**
Water Content as Compacted:	**5.4 %**
Dry Density As Compacted:	**2.11 t/m^3**
CBR Value @ 2.5mm Penetration:	**75**
CBR Value @ 5.0mm Penetration:	**90**
Reported Soaked CBR Value:	**90**

Note:
- *The CBR sample tested was the fraction passing a 19mm test sieve.*
- *The sample was compacted to NZ Standard Compaction.*
- *The rate of penetration was 1.16 mm / min.*

Additional Notes:
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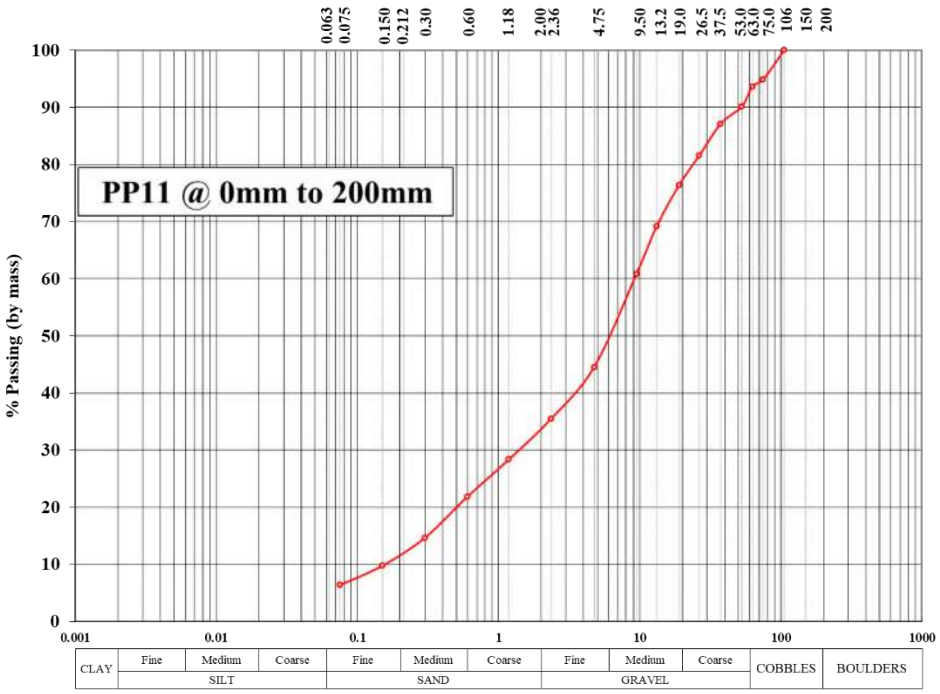
Date: 17 September 2018

TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations**		
Sample Description:	**Maintenance Metal; Sandy GRAVEL with minor cobbles & minor silt**	**Client Job No:**	**6-CT012.01 00008**
Sample Source:	**Pavement Pit 11; Millennium Track @ 0mm - 200mm (See Page 36)**		
Date & Time Sampled:	**13 to 17-Aug-18**	**Sampled By:**	**N.P. Danischewski**
Sample Method:	**NZS 4407:2015, Test 2.4.2**	**Date Requested:**	**28-Aug-18**

PARTICLE SIZE ANALYSIS (NZS 4407:2015, Test 3.8.1)

Sieve Size (mm)	% Passing (by mass)
106.0	100
75.0	95
63.0	94
53.0	90
37.5	87
26.5	82
19.0	76
13.2	69
9.50	61
4.75	44
2.36	35
1.18	28
0.60	22
0.30	15
0.150	10
0.075	6



The sample was received in a natural state. The percentage passing the 75µm test sieve was obtained by difference.

WATER CONTENT & PLASTICITY INDEX RESULTS - NZS 4407:2015, Test 3.1, 3.2, 3.3 & 3.4	
Water Content: ("All In" As Received)	**4.4 %**
Cone Penetration Limit: (CPL)	**21**
Plastic Limit: (PL)	**Non-plastic (NP)**
Plasticity Index: (PI)	**Non-plastic (NP)**
Note: The sample was received in a natural state. The plasticity index material tested was the fraction passing the 425 µm test sieve.	

Additional Notes:

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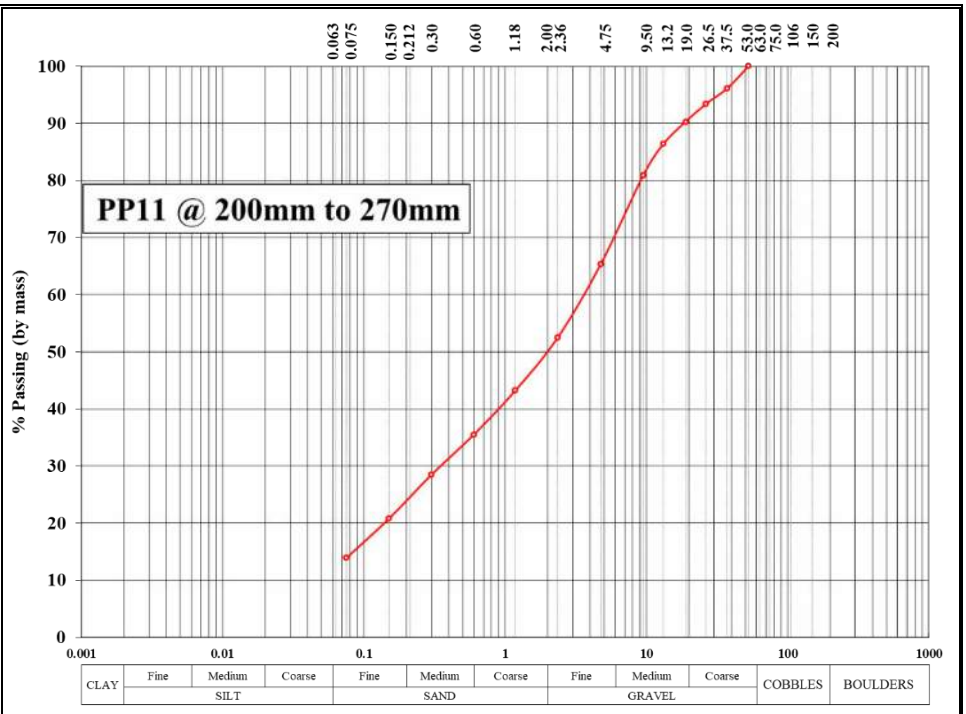
TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations**		
Sample Description:	**Sandy GRAVEL with some silt**	**Client Job No:**	**6-CT012.01 00008**
Sample Source:	**Pavement Pit 11; Millennium Track @ 200mm - 270mm (See Page 36)**		
Date & Time Sampled:	**13 to 17-Aug-18**	**Sampled By:**	**N.P. Danischewski**
Sample Method:	**NZS 4407:2015, Test 2.4.2**	**Date Requested:**	**28-Aug-18**

PARTICLE SIZE ANALYSIS (NZS 4407:2015, Test 3.8.1)

Sieve Size (mm)	% Passing (by mass)
63.0	
53.0	100
37.5	96
26.5	93
19.0	90
13.2	86
9.50	81
4.75	65
2.36	53
1.18	43
0.60	36
0.30	28
0.150	21
0.075	14



The sample was received in a natural state. The percentage passing the 75µm test sieve was obtained by difference.

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TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations**		
Sample Description:	**Sandy GRAVEL with trace of cobbles and trace of silt**	**Client Job No:**	**6-CT012.01 00008**
Sample Source:	**Pavement Pit 11; Millennium Track @ 270mm - 560mm (See Page 36)**		
Date & Time Sampled:	**13 to 17-Aug-18**	**Sampled By:**	**N.P. Danischewski**
Sample Method:	**NZS 4407:2015, Test 2.4.2**	**Date Requested:**	**28-Aug-18**

LABORATORY CBR (NZS 4407:2015, Test 3.15)	
Test Description	**Sample Results**
Sample Source:	**PP11 @ 270mm – 560mm**
Condition of Sample:	**Unsoaked**
Surcharge Mass:	**4.0 kg**
Water Content as Compacted:	**5.4 %**
Dry Density As Compacted:	**2.18 t/m^3**
CBR Value @ 2.5mm Penetration:	**110**
CBR Value @ 5.0mm Penetration:	**130**
Reported Soaked CBR Value:	**130**

Note:

- *The CBR sample tested was the fraction passing a 19mm test sieve.*
- *The sample was compacted to NZ Standard Compaction.*
- *The rate of penetration was 1.16 mm / min.*

Additional Notes:

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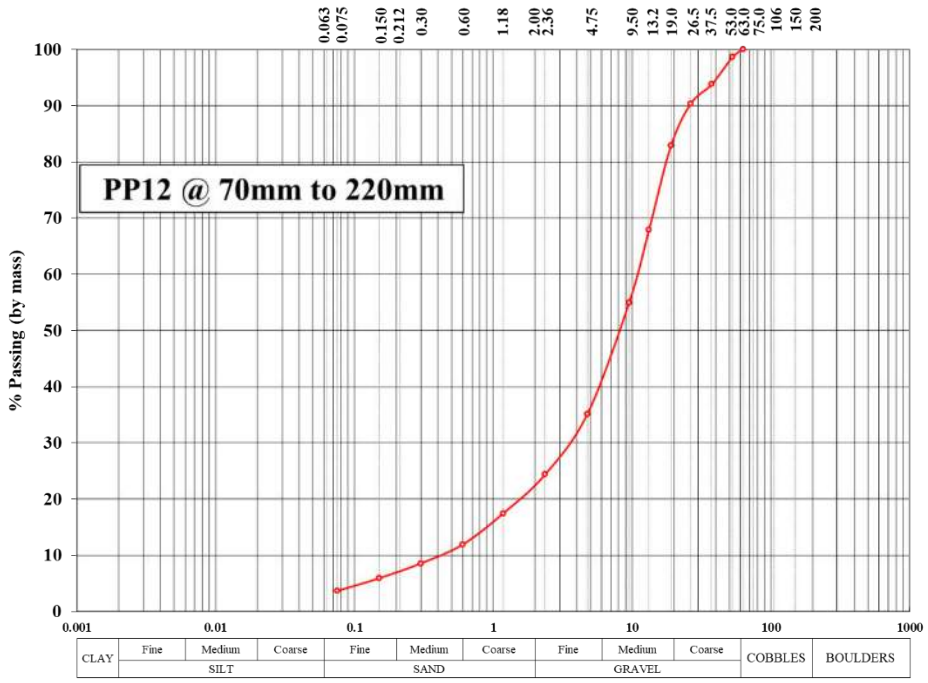
TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations**		
Sample Description:	**Cement Stabilised Basecourse; Sandy GRAVEL with trace of silt**	**Client Job No:**	**6-CT012.01 00008**
Sample Source:	**Pavement Pit 12; SH8 Increasing Lane, O/S 2.30m to 3.50m @ 70mm - 220mm (See Page 37)**		
Date & Time Sampled:	**13 to 17-Aug-18**	**Sampled By:**	**N.P. Danischewski**
Sample Method:	**NZS 4407:2015, Test 2.4.2**	**Date Requested:**	**28-Aug-18**

PARTICLE SIZE ANALYSIS (NZS 4407:2015, Test 3.8.1)

Sieve Size (mm)	% Passing (by mass)
63.0	100
53.0	99
37.5	94
26.5	90
19.0	83
13.2	68
9.50	55
4.75	35
2.36	24
1.18	17
0.60	12
0.30	9
0.150	6
0.075	4



The sample was received in a natural state. The percentage passing the 75µm test sieve was obtained by difference.

WATER CONTENT - NZS 4407:2015, Test 3.1	
Water Content: ("All In" As Received)	**5.2 %**
Note: The sample was received in a natural state.	

Additional Notes:

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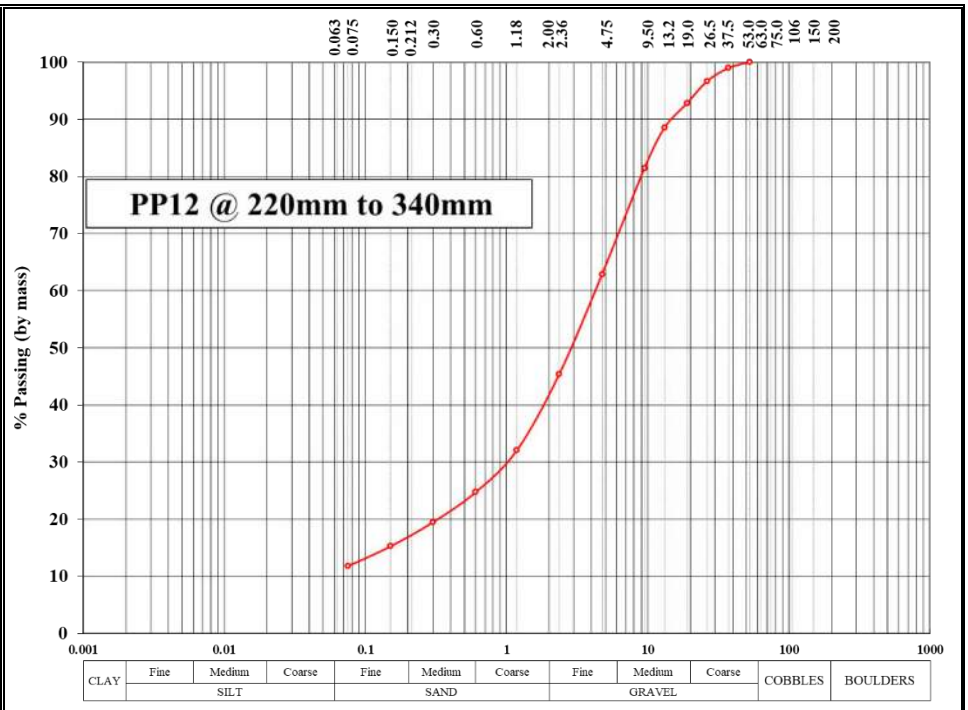
Date: 17 September 2018

TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations**		
Sample Description:	**Subbase; Sandy GRAVEL with minor / some silt**	**Client Job No:**	**6-CT012.01 00008**
Sample Source:	**Pavement Pit 12; SH8 Increasing Lane, O/S 2.30m to 3.50m @ 220mm - 340mm (See Page 37)**		
Date & Time Sampled:	**13 to 17-Aug-18**	**Sampled By:**	**N.P. Danischewski**
Sample Method:	**NZS 4407:2015, Test 2.4.2**	**Date Requested:**	**28-Aug-18**

PARTICLE SIZE ANALYSIS (NZS 4407:2015, Test 3.8.1)

Sieve Size (mm)	% Passing (by mass)
63.0	
53.0	100
37.5	99
26.5	97
19.0	93
13.2	89
9.50	81
4.75	63
2.36	45
1.18	32
0.60	25
0.30	19
0.150	15
0.075	12



The sample was received in a natural state. The percentage passing the 75µm test sieve was obtained by difference.

Additional Notes:

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TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations**		
Sample Description:	**Subgrade; SILT with minor clay**	**Client Job No:**	**6-CT012.01 00008**
Sample Source:	**Pavement Pit 12; SH8 Increasing Lane, O/S 2.30m to 3.50m @ 340mm - 500mm (See Page 37)**		
Date & Time Sampled:	**13 to 17-Aug-18**	**Sampled By:**	**N.P. Danischewski**
Sample Method:	**NZS 4407:2015, Test 2.4.2**	**Date Requested:**	**28-Aug-18**

LABORATORY CBR (NZS 4407:2015, Test 3.15)	
Test Description	**Sample Results**
Sample Source:	**PP12 @ 340mm – 500mm**
Condition of Sample:	**Unsoaked**
Surcharge Mass:	**4.0 kg**
Water Content as Compacted:	**29.0 %**
Dry Density As Compacted:	**1.49 t/m^3**
CBR Value @ 2.5mm Penetration:	**1.0**
CBR Value @ 5.0mm Penetration:	**1.5**
Reported Soaked CBR Value:	**1.5**

Note:

- *The CBR sample tested was the fraction passing a 19mm test sieve.*
- *The sample was compacted to NZ Standard Compaction.*
- *The rate of penetration was 1.16 mm / min.*

Additional Notes:

- *Information contained in this report which is Not IANZ Accredited relates to the sample descriptions based on NZ Geotechnical Society Guidelines 2005.*
- *This report may not be reproduced except in full.*

Tested By: D. Pearson, L. Reiher, L.T. Smith & C. Julius **Date:** 28-Aug-18 to 13-Sep-18

Checked By:

Tests indicated as Not Accredited are outside the scope of the laboratory's accreditation

IANZ ACCREDITED LABORATORY Accreditation No: 434

Central Testing Services
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Reference No: 18/2116-3

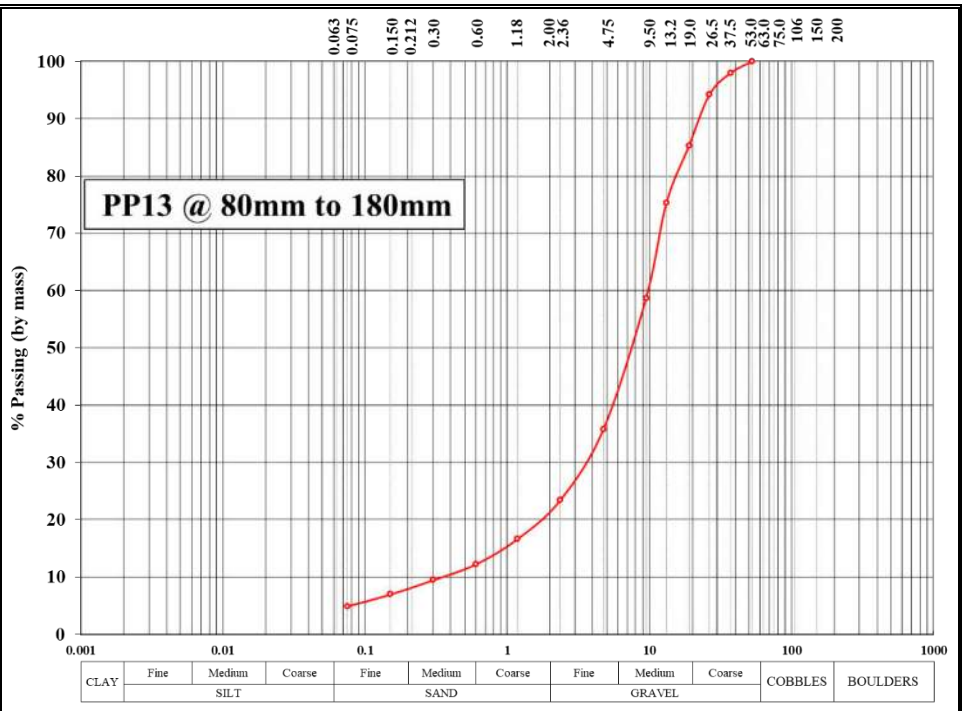
Date: 17 September 2018

TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations**		
Sample Description:	**Basecourse (possibly stabilised); GRAVEL with some sand and trace of / minor silt**	**Client Job No:**	**6-CT012.01 00008**
Sample Source:	**Pavement Pit 13; SH8 Increasing Lane, O/S 2.50m to 3.70m @ 80mm - 180mm (See Page 37)**		
Date & Time Sampled:	**13 to 17-Aug-18**	**Sampled By:**	**N.P. Danischewski**
Sample Method:	**NZS 4407:2015, Test 2.4.2**	**Date Requested:**	**28-Aug-18**

PARTICLE SIZE ANALYSIS (NZS 4407:2015, Test 3.8.1)

Sieve Size (mm)	% Passing (by mass)
63.0	
53.0	100
37.5	98
26.5	94
19.0	85
13.2	75
9.50	59
4.75	36
2.36	23
1.18	17
0.60	12
0.30	9
0.150	7
0.075	5



The sample was received in a natural state. The percentage passing the 75µm test sieve was obtained by difference.

WATER CONTENT & PLASTICITY INDEX RESULTS - NZS 4407:2015, Test 3.1, 3.2, 3.3 & 3.4

Water Content: ("All In" As Received)	**4.1 %**
Cone Penetration Limit: (CPL)	**33**
Plastic Limit: (PL)	**Non-Plastic (NP)**
Plasticity Index: (PI)	**Non-Plastic (NP)**

Note: The sample was received in a natural state. The plasticity index material tested was the fraction passing the 425 µm test sieve.

Additional Notes:

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Tested By: D. Pearson, L. Reiher, L.T. Smith & C. Julius **Date:** 28-Aug-18 to 13-Sep-18

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Reference No: 18/2116-3

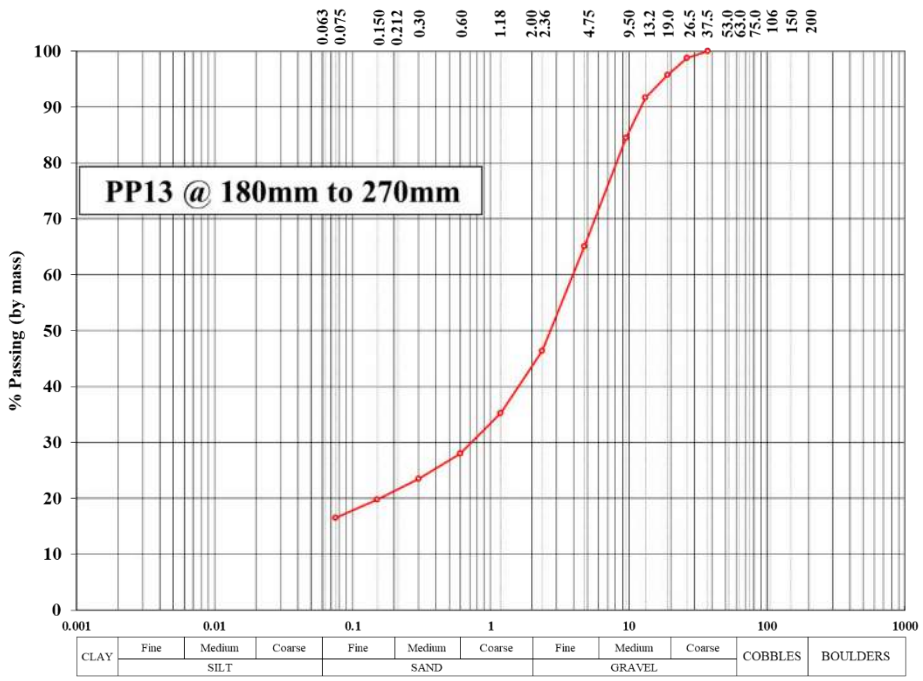
Date: 17 September 2018

TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations**		
Sample Description:	**Subbase; Sandy GRAVEL with some silt**	**Client Job No:**	**6-CT012.01 00008**
Sample Source:	**Pavement Pit 13; SH8 Increasing Lane, O/S 2.50m to 3.70m @ 180mm - 270mm (See Page 37)**		
Date & Time Sampled:	**13 to 17-Aug-18**	**Sampled By:**	**N.P. Danischewski**
Sample Method:	**NZS 4407:2015, Test 2.4.2**	**Date Requested:**	**28-Aug-18**

PARTICLE SIZE ANALYSIS (NZS 4407:2015, Test 3.8.1)

Sieve Size (mm)	% Passing (by mass)
63.0	
53.0	
37.5	100
26.5	99
19.0	96
13.2	92
9.50	84
4.75	65
2.36	46
1.18	35
0.60	28
0.30	23
0.150	20
0.075	17



The sample was received in a natural state. The percentage passing the 75μm test sieve was obtained by difference.

Additional Notes:

- *Information contained in this report which is Not IANZ Accredited relates to the sample descriptions based on NZ Geotechnical Society Guidelines 2005.*
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Tested By: D. Pearson, L. Reiher, L.T. Smith & C. Julius **Date:** 28-Aug-18 to 13-Sep-18

Checked By:

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Reference No: 18/2116-3

Date: 17 September 2018

TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations**		
Sample Description:	**Subgrade; SILT with minor clay and trace of sand**	**Client Job No:**	**6-CT012.01 00008**
Sample Source:	**Pavement Pit 13; SH8 Increasing Lane, O/S 2.50m to 3.70m @ 270mm - 440mm (See Page 37)**		
Date & Time Sampled:	**13 to 17-Aug-18**	**Sampled By:**	**N.P. Danischewski**
Sample Method:	**NZS 4407:2015, Test 2.4.2**	**Date Requested:**	**28-Aug-18**

LABORATORY CBR (NZS 4407:2015, Test 3.15)	
Test Description	**Sample Results**
Sample Source:	**PP13 @ 270mm - 440mm**
Condition of Sample:	**Unsoaked**
Surcharge Mass:	**4.0 kg**
Water Content as Compacted:	**20.2 %**
Dry Density As Compacted:	**1.69 t/m^3**
CBR Value @ 2.5mm Penetration:	**3.0**
CBR Value @ 5.0mm Penetration:	**4.5**
Reported Soaked CBR Value:	**4.5**

Note:

- *The CBR sample tested was the fraction passing a 19mm test sieve.*
- *The sample was compacted to NZ Standard Compaction.*
- *The rate of penetration was 1.16 mm / min.*

Additional Notes:

- *Information contained in this report which is Not IANZ Accredited relates to the sample descriptions based on NZ Geotechnical Society Guidelines 2005.*
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Tested By: D. Pearson, L. Reiher, L.T. Smith & C. Julius **Date:** 28-Aug-18 to 13-Sep-18

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Reference No: 18/2116-3

Date: 17 September 2018

TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		

- *This report may not be reproduced except in full.*

Tested By: D. Pearson, L. Reiher, L.T. Smith & C. Julius **Date:** 28-Aug-18 to 13-Sep-18

Checked By:

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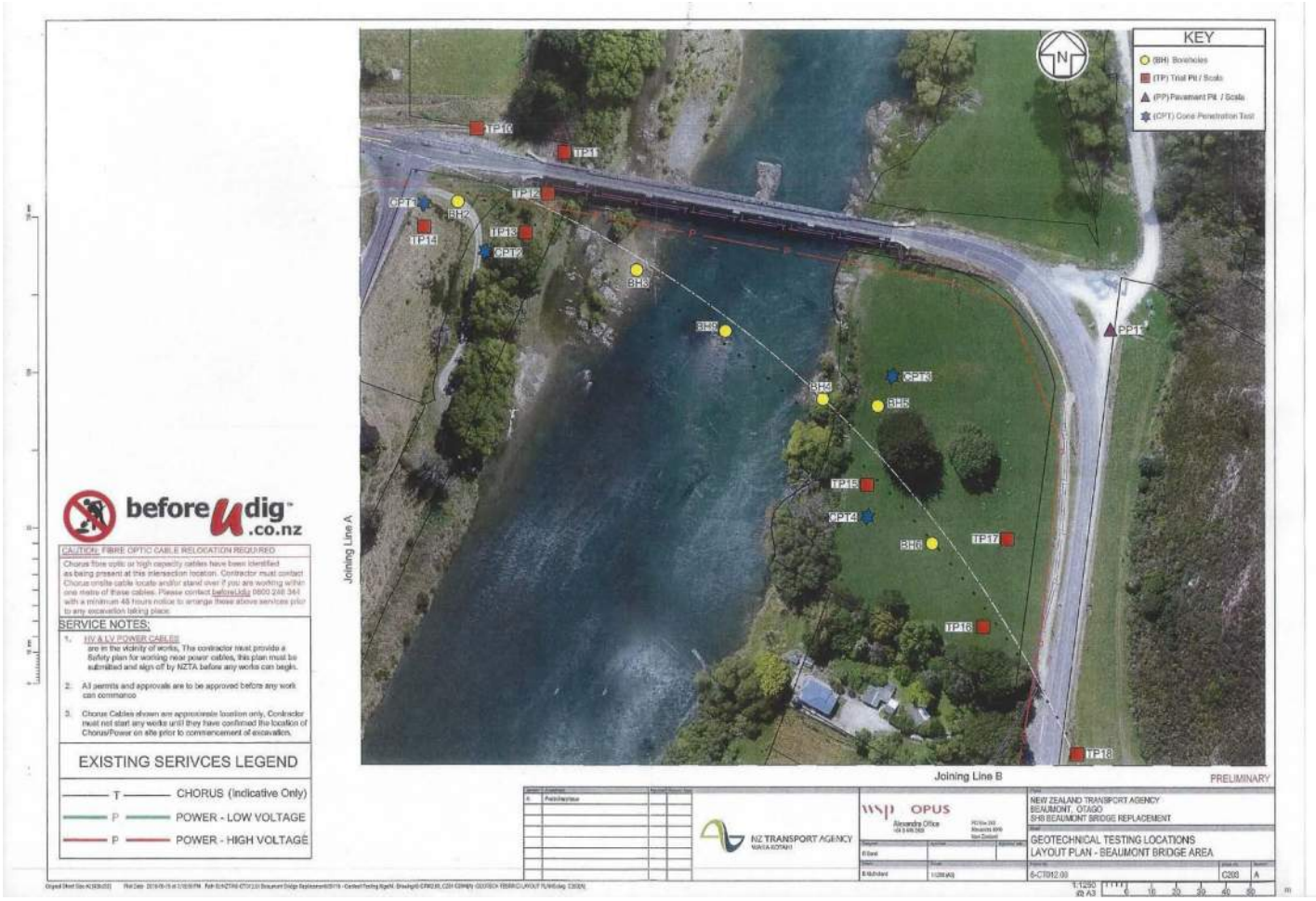
Reference No: 18/2116-3

Date: 17 September 2018

TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		



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Tested By: D. Pearson, L. Reiher, L.T. Smith & C. Julius **Date:** 28-Aug-18 to 13-Sep-18

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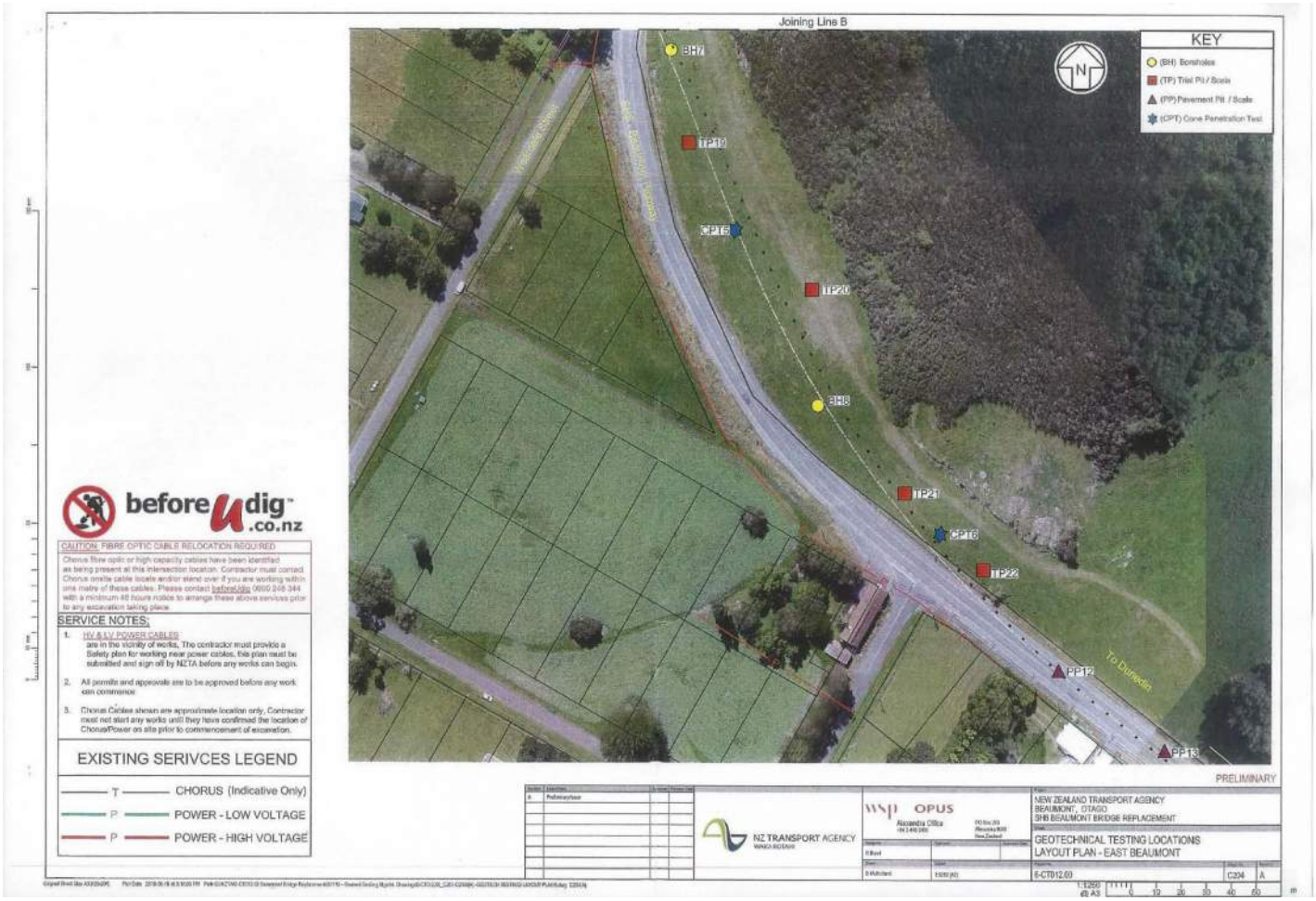
Reference No: 18/2116-3

Date: 17 September 2018

TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

Client Details:	**WSP Opus, P.O. Box 273, Alexandra**	**Attention:**	**R. Bond**
Job Description:	**SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008**		



- ***This report may not be reproduced except in full.***

Tested By: D. Pearson, L. Reiher, L.T. Smith & C. Julius **Date:** 28-Aug-18 to 13-Sep-18

Checked By:

Approved Signatory

A.P. Julius
Laboratory Manager

Tests indicated as Not Accredited are outside the scope of the laboratory's accreditation

IANZ ACCREDITED LABORATORY
Accreditation No: 434

ROCK COMPRESSION TEST REPORT

WSP | OPUS

Project:	**Material Investigation**
Location:	**SH8 Beaumont Bridge Replacement**
Client:	**NZTA**
Contractor:	**WSP-Opus Chrsirchurch**
Sampled by :	**McNeil Drilling**
Date sampled :	**Not Advised**
Sampling method :	**Diamond Rotary Coring**
Sample Conditioning:	**Tested as received**
Source :	**BH02**
Date received:	**6 March 2019**

Project No:	**6-CT012.00**
Lab Ref No:	**CH5411/1**
Client Ref No:	**James Grindley**

Test Results

Lab reference no		147/1			
Client reference no		**BH02 7.7m**			
Date made		-			
Date tested		13/03/2019			
Age of material	(days)	-			
Average diameter	(mm)	82.7			
Length	(mm)	245.5			
Mass of cylinder in air	(g)	3610			
Design strength	(MPa)	-			
Density	(kg/m³)	**2720**			
Height diameter ratio		2.97			
Compressive strength	(MPa)	**75.5**			
Number of ends capped		Both			
Defects prior to capping		Irregularities			

Comments

Test Methods	Notes
Density, NZS 3112 : 1986, Pt 3 Section 5 Capping NZS 3112 : 1986, Pt 2 Section 4 (amendment No 2 2000)	Density measured with samples in a saturated surface dry state.

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

Date reported : 14 March 2019

IANZ Approved Signatory

Designation : Assistant Laboratory Manager
Date : 14 March 2019

IANZ ACCREDITED LABORATORY

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

WSP Opus
Christchurch Laboratory
Quality Management Systems Certified to ISO 9001

52C Hayton Rd, Wigram
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Christchurch 8140, New Zealand

Telephone +64 3 343 0739
Facsimile
Website www.wsp-opus.co.nz

ROCK COMPRESSION TEST REPORT

WSP | OPUS

Project:	**Material Investigation**
Location:	**SH8 Beaumont Bridge Replacement**
Client:	**NZTA**
Contractor:	**WSP-Opus Chrsirchurch**
Sampled by :	**McNeil Drilling**
Date sampled :	**Not Advised**
Sampling method :	**Diamond Rotary Coring**
Sample Conditioning:	**Tested as received**
Source :	**BH03**
Date received:	**6 March 2019**

Project No:	**6-CT012.00**
Lab Ref No:	**CH5411/2**
Client Ref No:	**James Grindley**

Test Results					
Lab reference no		148/1	148/2		
Client reference no		**BH03 11.1m**	**BH03 16.88m**		
Date made		-	-		
Date tested		13/03/2019	13/03/2019		
Age of material	(days)	-	-		
Average diameter	(mm)	82.5	82.6		
Length	(mm)	152.5	248.5		
Mass of cylinder in air	(g)	2215	3681		
Design strength	(MPa)	-	-		
Density	(kg/m³)	**2700**	**2760**		
Height diameter ratio		1.85	3.01		
Compressive strength	(MPa)	**27.0**	**42.5**		
Number of ends capped		Both	Both		
Defects prior to capping		Irregularities	Irregularities		

Comments

Test Methods	**Notes**
Density, NZS 3112 : 1986, Pt 3 Section 5 Capping NZS 3112 : 1986, Pt 2 Section 4 (amendment No 2 2000)	Density measured with samples in a saturated surface dry state.

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

Date reported : 14 March 2019

IANZ Approved Signatory

Designation : Assistant Laboratory Manager
Date : 14 March 2019

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ROCK COMPRESSION TEST REPORT

WSP | OPUS

Project:	**Material Investigation**
Location:	**SH8 Beaumont Bridge Replacement**
Client:	**NZTA**
Contractor:	**WSP-Opus Chrsirchurch**
Sampled by :	**McNeil Drilling**
Date sampled :	**Not Advised**
Sampling method :	**Diamond Rotary Coring**
Sample Conditioning:	**Tested as received**
Source :	**BH04**
Date received:	**6 March 2019**

Project No:	**6-CT012.00**
Lab Ref No:	**CH5411/3**
Client Ref No:	**James Grindley**

Test Results					
Lab reference no		149/1	149/2	149/3	149/4
Client reference no		**BH04 9.55m**	**BH04 6.45m**	**BH04 14.75m**	**BH04 17.8m**
Date made		-	-	-	-
Date tested		13/03/2019	13/03/2019	13/03/2019	13/03/2019
Age of material	(days)	-	-	-	-
Average diameter	(mm)	82.7	82.7	82.6	82.5
Length	(mm)	122.5	231.5	248.5	73.0
Mass of cylinder in air	(g)	1806	3386	3664	1063
Design strength	(MPa)	-	-	-	-
Density	(kg/m³)	**2730**	**2720**	**2740**	**2730**
Height diameter ratio		1.48	2.80	3.01	0.88
Compressive strength	(MPa)	**58.5**	**17.5**	**58.5**	**117.5**
Number of ends capped		Both	Both	Both	Both
Defects prior to capping		Irregularities	Irregularities	Irregularities	Irregularities

Comments

Test Methods	Notes
Density, NZS 3112 : 1986, Pt 3 Section 5 Capping NZS 3112 : 1986, Pt 2 Section 4 (amendment No 2 2000)	Density measured with samples in a saturated surface dry state.

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

Date reported : 14 March 2019

IANZ Approved Signatory

Designation : Assistant Laboratory Manager
Date : 14 March 2019

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ROCK COMPRESSION TEST REPORT

WSP | OPUS

Project:	**Material Investigation**
Location:	**SH8 Beaumont Bridge Replacement**
Client:	**NZTA**
Contractor:	**WSP-Opus Chrsirchurch**
Sampled by :	**McNeil Drilling**
Date sampled :	**Not Advised**
Sampling method :	**Diamond Rotary Coring**
Sample Conditioning:	**Tested as received**
Source :	**BH05**
Date received:	**6 March 2019**

Project No:	**6-CT012.00**
Lab Ref No:	**CH5411/4**
Client Ref No:	**James Grindley**

Test Results

Lab reference no		150/1			
Client reference no		**BH05 10.15m**			
Date made		-			
Date tested		13/03/2019			
Age of material	(days)	-			
Average diameter	(mm)	82.3			
Length	(mm)	148.5			
Mass of cylinder in air	(g)	2186			
Design strength	(MPa)	-			
Density	(kg/m³)	**2750**			
Height diameter ratio		1.80			
Compressive strength	(MPa)	**59.5**			
Number of ends capped		Both			
Defects prior to capping		Irregularities			

Comments

Test Methods	Notes
Density, NZS 3112 : 1986, Pt 3 Section 5 Capping NZS 3112 : 1986, Pt 2 Section 4 (amendment No 2 2000)	Density measured with samples in a saturated surface dry state.

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

Date reported : 14 March 2019

IANZ Approved Signatory

Designation : Assistant Laboratory Manager
Date : 14 March 2019

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ROCK COMPRESSION TEST REPORT

WSP | OPUS

Project:	**Material Investigation**
Location:	**SH8 Beaumont Bridge Replacement**
Client:	**NZTA**
Contractor:	**WSP-Opus Chrsirchurch**
Sampled by :	**McNeil Drilling**
Date sampled :	**Not Advised**
Sampling method :	**Diamond Rotary Coring**
Sample Conditioning:	**Tested as received**
Source :	**BH06**
Date received:	**6 March 2019**

Project No:	**6-CT012.00**
Lab Ref No:	**CH5411/5**
Client Ref No:	**James Grindley**

Test Results					
Lab reference no		151/1			
Client reference no		**BH06 8.2m**			
Date made		-			
Date tested		13/03/2019			
Age of material	(days)	-			
Average diameter	(mm)	82.3			
Length	(mm)	193.5			
Mass of cylinder in air	(g)	2848			
Design strength	(MPa)	-			
Density	(kg/m³)	**2750**			
Height diameter ratio		2.35			
Compressive strength	(MPa)	**11.5**			
Number of ends capped		Both			
Defects prior to capping		Irregularities			

Comments

Test Methods	**Notes**
Density, NZS 3112 : 1986, Pt 3 Section 5 Capping NZS 3112 : 1986, Pt 2 Section 4 (amendment No 2 2000)	Density measured with samples in a saturated surface dry state.

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

Date reported : 14 March 2019

IANZ Approved Signatory

Designation : Assistant Laboratory Manager
Date : 14 March 2019

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M: 027 6565 317

TEST REPORT

Lab Job No:	8465-002
Your ref.:	-
Date of Issue:	09/04/19
Date of Re-Issue:	-
Page:	1 of 2

Test Report.

No. C19-189

PROJECT:	Beaumont Bridge – Point Load Testing
CLIENT:	WSP Opus International Consultants Ltd. 12 Moorehouse Avenue Addington, Christchurch 8011
ATTENTION:	James Grindley
INSTRUCTIONS:	Determination of the Point Load Strength Index of Rock
TEST METHOD:	ASTM D 5731 - 95
SAMPLING METHOD:	N/A
TEST RESULTS:	As Per Laboratory Sheets attached

Ben Lucas
Laboratory Technician

Nick Van Warmerdam
Laboratory Manager

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Christchurch Laboratory
18B Birmingham Drive
Middleton
Christchurch
P: 027 656 5317

Determination of the Point Load Strength Index of Rock

ASTM D 5731 -95

Lab Job No.:	8465-002	**Rep No:**	C19-189
Client:	WSP Opus - Christchurch	**Tested By:**	N.W/J.B
Project:	Beaumont Bridge	**Date Tested:**	4/05/19, 5/05/19
Reference:	-	**Page:**	2 of 2
Date Sampled:	Unknown	**Date Received:**	27/03/2019

Sample No.	Axial / Diametral	Type	Borehole No.	Depth (m)	D (mm)	W (mm)	Max Load Applied P (kN)	Point Load Strength I_s (MPa)	Size Correction Factor	Size Corrected Point Load Strength $I_{s(50)}$ (MPa)	Estimated Compressive strength δ_{uc} (MPa)
C19-422	Diametral	PASS	BH03	1.90	83	-	8.821	1.28	1.26	1.61	38.6
C19-424	Diametral	PASS	BH03	11.10	83	-	9.346	1.36	1.26	1.70	40.9
C19-425	Diametral	PASS	BH03	16.88	83	-	30.342	4.40	1.26	5.53	132.8
C19-428	Diametral	PASS	BH04	6.45	83	-	8.821	1.28	1.26	1.61	38.6
C19-431	Diametral	PASS	BH04	14.50	83	-	11.971	1.74	1.26	2.18	52.4
C19-434	Diametral	PASS	BH05	10.50	83	-	6.722	0.98	1.26	1.23	29.4
C19-435	Diametral	PASS	BH05	14.50	83	-	18.794	2.73	1.26	3.43	82.2
C19-436	Diametral	PASS	BH06	8.20	83	-	5.147	0.75	1.26	0.94	22.5
C19-421	Axial	PASS	BH02	7.70	31	83	24.043	7.34	1.06	7.80	187.2
C19-422	Axial	FAIL	BH03	1.90	47	83	11.971	2.41	1.17	2.81	67.5
C19-423	Axial	PASS	BH03	5.85	53	83	5.672	1.01	1.20	1.21	29.1
C19-424	Axial	FAIL	BH03	11.10	61	83	28.243	4.38	1.24	5.42	130.1
C19-425	Axial	PASS	BH03	16.88	65	83	26.668	3.88	1.26	4.87	117.0
C19-426	Axial	PASS	BH04	2.70	76	83	27.193	3.39	1.30	4.40	105.7
C19-427	Axial	PASS	BH04	4.55	56	83	14.595	2.47	1.21	2.99	71.9
C19-428	Axial	PASS	BH04	6.45	59	83	7.772	1.25	1.23	1.53	36.7
C19-429	Axial	PASS	BH04	7.00	46	83	11.446	2.35	1.16	2.73	65.6
C19-430	Axial	PASS	BH04	10.00	64	83	4.097	0.61	1.25	0.76	18.2
C19-431	Axial	FAIL	BH04	14.50	69	83	18.794	2.58	1.27	3.28	78.7
C19-432	Axial	PASS	BH04	17.80	71	83	14.070	1.88	1.28	2.40	57.6
C19-433	Axial	FAIL	BH05	7.75	31	55.5	8.296	3.76	0.97	3.66	87.8
C19-436	Axial	PASS	BH06	8.20	55	83	5.147	0.89	1.21	1.07	25.7

Notes: *On client request samples have been tested even if specimen did not meet test standard specified dimensional requirements*
Size correction factor is determined from the following formula in ASTM D5731 - 95: $F = (D_e/50)^{0.45}$
Compressive Strength is based on an assumed correction factor only. Assumed factor is 24.

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