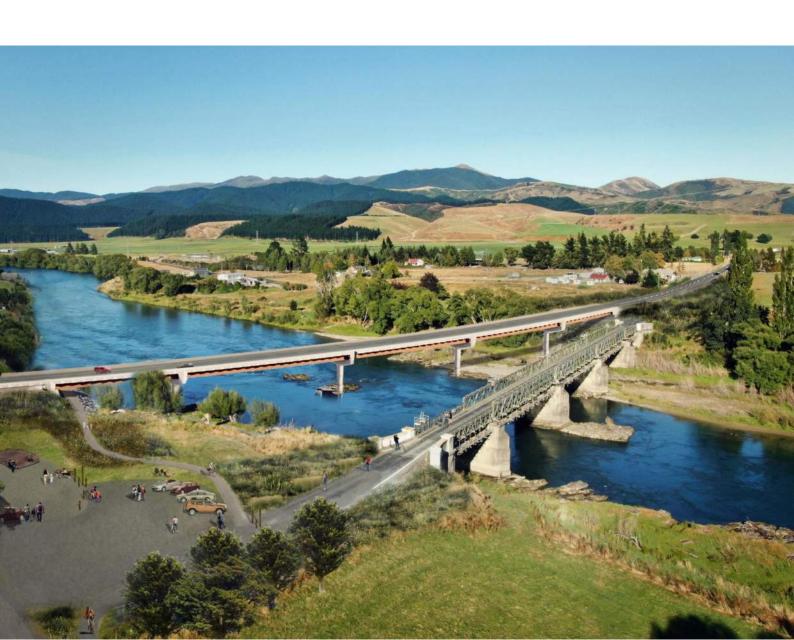


# SH8 Beaumont Bridge Realignment

Geotechnical Factual Report





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**Document Details:** 

Date: 2 April 2019 Reference: 6-CT012.00 Status: First Issue

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- A Geotechnical Investigation Location Plan
- B Machine Borehole Logs and Photographs
- C Cone Penetrometer Test Results
- D Test Pit Logs and Photographs
- E Pavement Pit Logs and Photographs
- F Laboratory Testing Results



#### 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.

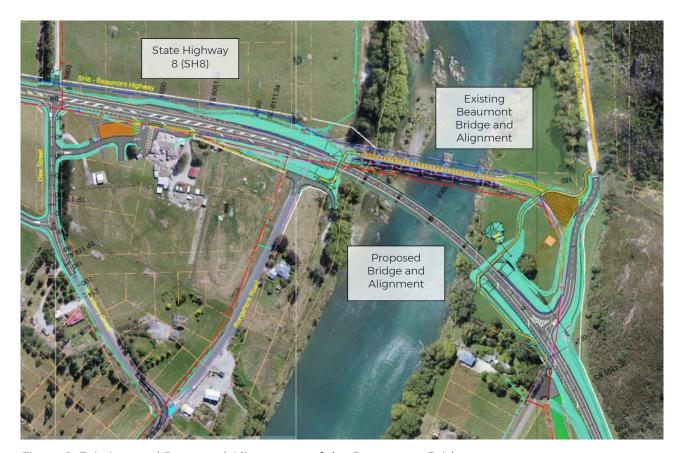


Figure 1: Existing and Proposed Alignments of the Beaumont Bridge



## 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.

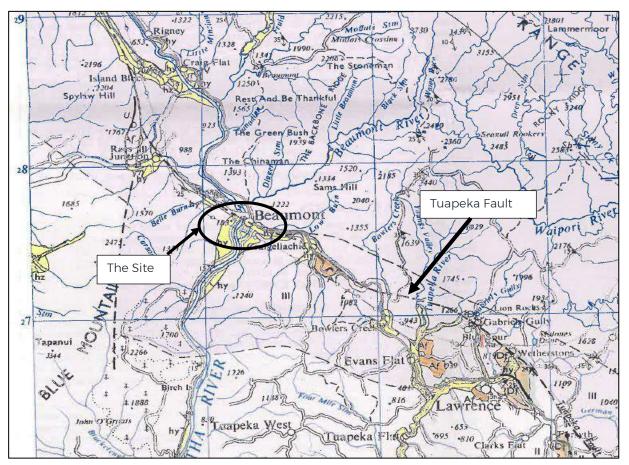


Figure 2: Extract of Geological Sheet 25, Dunedin, 1: 250,000 Scale

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.



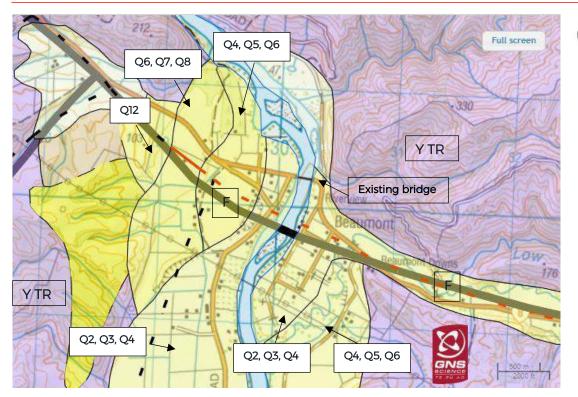


Figure 3: Extract of Geological Web Map (image courtesy of GNS Web Map)

#### <u>Key</u>

F = Tuapeka Fault line (two traces).

YTR = 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 (BHI 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 <sup>1</sup> (m)	Easting <sup>1</sup> (m)	Total Depth (m bgl)
ВН1	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
ВН3	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
вн6	Proposed east bridge approach	804346.3	341388.1	16.5
ВН7	Proposed east bridge approach	804251.2	341454.3	15.1
BH8	Proposed east bridge approach	804108.9	341513.5	13.3

<sup>&</sup>lt;sup>1</sup> 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 (CPTI 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<sup>2</sup> 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 <sup>1</sup> (m)	Easting <sup>1</sup> (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

<sup>&</sup>lt;sup>1</sup> 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 <sup>1</sup> (m)	Easting <sup>1</sup> (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
TPII	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

<sup>&</sup>lt;sup>1</sup> 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 <sup>1</sup> (m)	Easting <sup>1</sup> (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
PPII	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

<sup>&</sup>lt;sup>1</sup> 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
	1.90	Metasandstone	Point Load
	5.85	Metasandstone	Point Load
ВН3	11.10	Metasandstone	UCS
	16.88	Metasandstone/Phyllite	UCS
	2.70	Metasandstone	Point Load
	6.45	Metasandstone	UCS
	7.00	Metasandstone	Point Load
BH4	9.55	Metasandstone	UCS
	10.00	Metasandstone	Point Load
	14.75	Metasandstone	UCS
	17.80	Metasandstone	UCS
	7.00	Metasandstone	Point Load
BH5	7.75	Metasandstone	Point Load
DHO	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)
PPJ	0.14 - 0.26
PP2	0.08 - 0.15
	0.26 - 0.39
	0.08 - 0.13
PP3	0.13 - 0.24
	0.24 - 0.32
	0.32 - 0.41
	0.0 - 0.12
PP4	0.12 - 0.33
DDE	0.0 - 0.10
PP5	0.10 - 0.25
PP6	0.0 - 0.18
PP7	0.05 - 0.22
DDQ	0.05 - 0.20
PP8	0.20 - 0.30
DDO	0.07 - 0.30
PP9	0.30 - 0.44
PP10	0.13 - 0.19
DDII	0.0 - 0.20
PP11	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
			5.74	41.49	15/01/2019
ВН6	47.2	3.5 - 6.5	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.

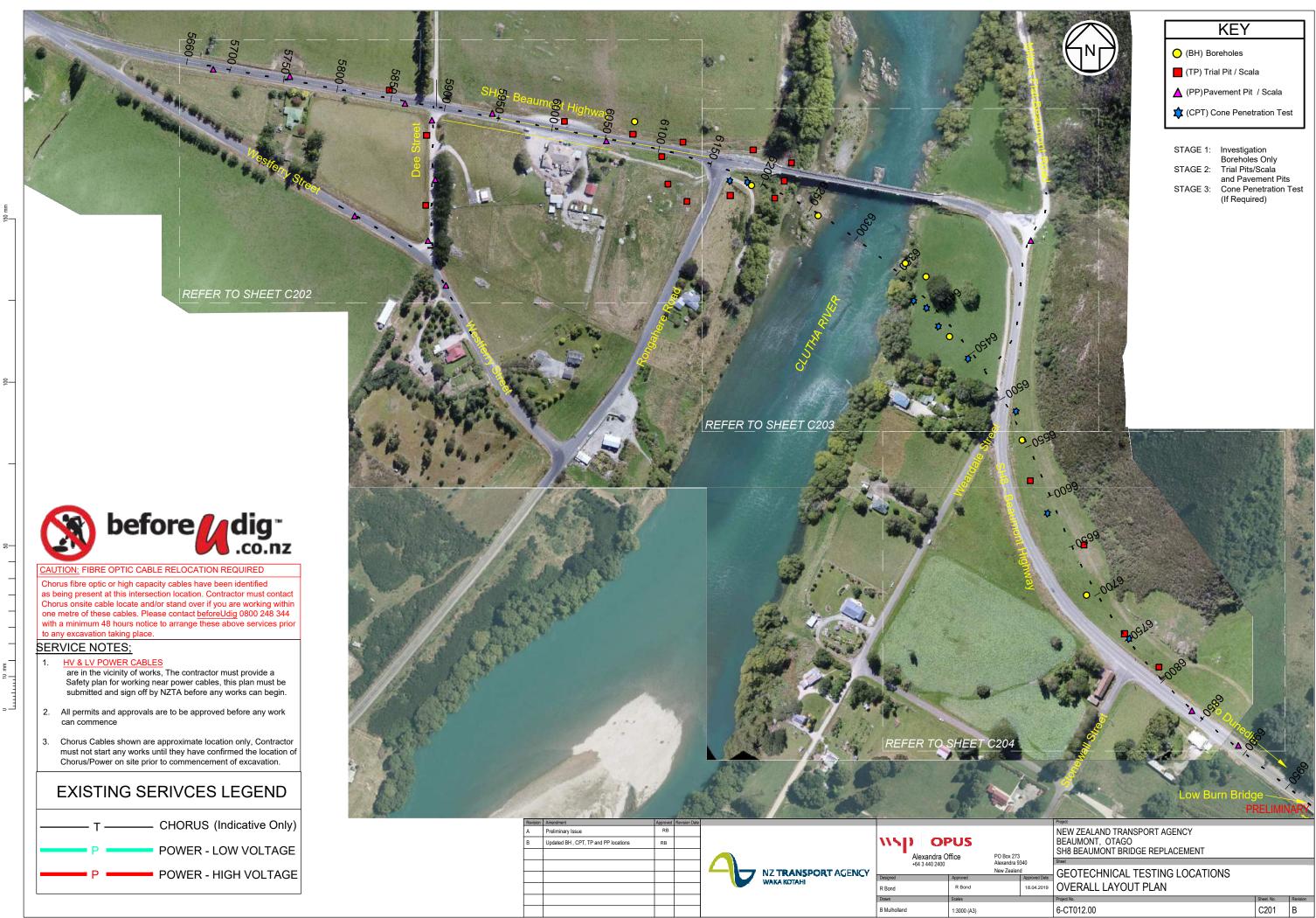
NZS 4402, 1988, Test 6.5.2. Determination of Penetration Resistance of the Soils.

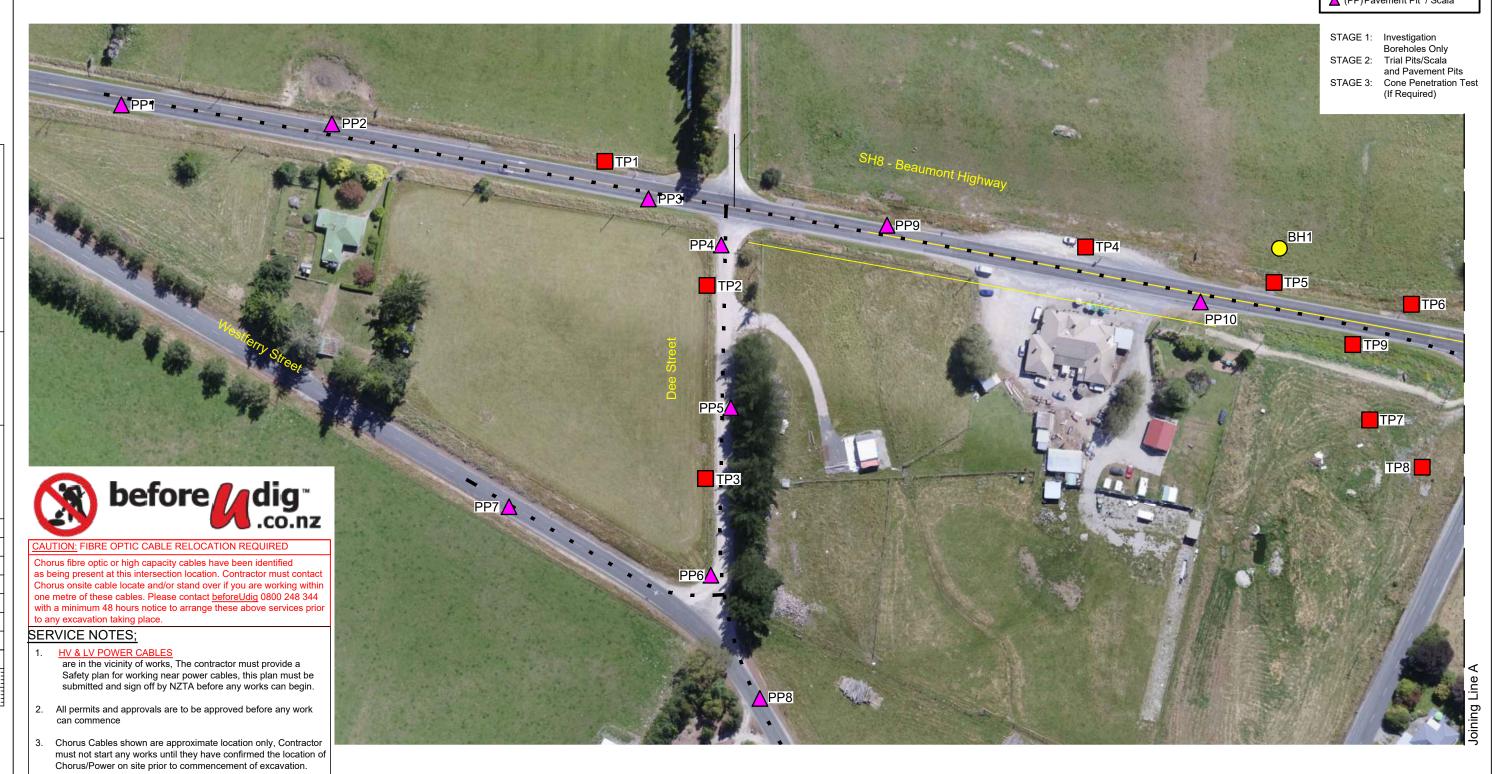
NZS 4407, 2015. Methods of Sampling and Testing Road Aggregates.



# Appendix A Geotechnical Investigation Location Plan

SH8 Beaumont Bridge Realignment Geotechnical Factual Report





#### **EXISTING SERIVCES LEGEND**

T — CHORUS (Indicative Only)

P — POWER - LOW VOLTAGE

P — POWER - HIGH VOLTAGE

A Preliminary Issue RB
B Updated BH , CPT, TP and PP locations RB



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**PRELIMINARY** 

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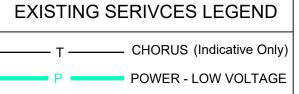


## CAUTION: FIBRE OPTIC CABLE RELOCATION REQUIRED

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;

- 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.
- All permits and approvals are to be approved before any work
- 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.



POWER - HIGH VOLTAGE

pdated BH, CPT, TP and PP locations



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KEY

(PP)Pavement Pit / Scala (CPT) Cone Penetration Test

STAGE 1: Investigation

STAGE 2: Trial Pits/Scala

Boreholes Only

and Pavement Pits STAGE 3: Cone Penetration Test (If Required)

**PRELIMINARY** 

(BH) Boreholes (TP) Trial Pit / Scala



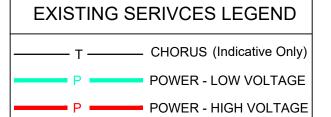


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Preliminary Issue RB
Updated BH , CPT, TP and PP locations RB

NZ TRANSPORT AGENCY
WAKA KOTAHI

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# Appendix B Machine Borehole Logs and Photographs

SH8 Beaumont Bridge Realignment Geotechnical Factual Report



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:

					TESTS	ļ_		G		T		(	CORI	•	DF	RILLI	NG	
GEOLOGY	MAIN DESCRIPTION / DETAIL DESCRIPTION	R.L. (m) DEPTH (m)	GRAPHIC LOG	SPT 'N' VALUE	SPT BLOW COUNTS OR SHEAR VALUE	ROCK STRENGTH	ROCK WEATHERING	유민	DEFEC DIP degree		DEFECTS / NOTES / OTHER TESTS	SAMPLE TYPE	TCR (%)	RQD (%)	DRILLING METHOD	CASING	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				
-	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)		× × ×	İ											_			
-	(washed via drilling)  Metasandstone Highly weathered, orangish brown, foliated.  Very weak, fine fabric.	1 <del>-</del> - - -		İ		vw	HW					PQ	80	0				
	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.	2										PQ	98	15				
	Moderately weathered, light grey. Very weak to weak, foliation steeply inclined laminated. Foliation - steeply inclined, moderately widely to	3—				W	MW											
	very closely spaced, undulating smooth, narrow.  J3 - steeply inclined, moderately widely spaced, slight infill with weathered schist.											PQ	98	52				
4/19		=																
OPUS2016_TEM.GDT 12/4/19		4-		 								PQ	100	18	y Coring			
:016_TEM		= = =		     							4.60-5.00m - Highly weathered crush zone				Wireline Rotary			
	Machine fractured to gravel, majority quartz remaining.	5 <del>-</del>													Tube, Wire			
ATION.GP	Metasandstone Moderately weathered, light grey. Very weak to weak, foliation steeply inclined laminated.			 		w	MW					PQ	95	0	Triple			
NFORM/	Foliation - steeply inclined, moderately widely to very closely spaced, undulating smooth, narrow.  33 - steeply inclined, moderately widely spaced, slight infill with weathered schist.	6-	× ×									PQ	80	0	PQ Size,			
GATION	(slight infill with weathered schist.  Metasandstone/Phyllite Moderately weathered, orangish grey.  Very weak to weak, foliation moderately to steeply inclined thinly laminated.	-										PQ	100	60				
INVEST	Foliation - Moderately to steeply inclined, very closely spaced, planar smooth, narrow, greasy.	- - - 7-				w	MW											
GE - SITI	J1 - Very steeply inclined, moderately widely spaced, undulating rough, iron oxide stained with minor infill  J3 - Very steeply inclined, moderately widely	_		İ								PQ	92	38				
ONT BRID	spaced, narrow, iron oxide stained, weak.  Silt infill possible cavity/vug	_ _ _ _		İ								PQ	80	0				
BEAUM	Moderately weathered, orangish grey. Very weak to weak, foliation moderately to steeply inclined thinly laminated.  Foliation - Moderately to steeply inclined, very	8 <del>-</del> - -		İ		W	MW											
KLOG A4	closely spaced, planar smooth, narrow, greasy.  J1 - Very steeply inclined, moderately widely spaced, undulating rough, iron oxide stained	=										PQ	90	0				
BOREHOLE SOIL/ROCK LOG A4 BEAUMONT BRIDGE - SITE INVESTGATION INFORMATION.GPJ	with minor infill  J3 - Very steeply inclined, moderately widely spaced, narrow, iron oxide stained, weak.  Metasandstone/Phyllite  Moderately to slightly weathered, grey.  Weak to moderately strong, foliation, thinly laminated, steeply inclined.	9				MS	MW				9.10-10.00m - Possible crush/ shear zone	PQ	94	0				
BOREH	Foliation - steeply inclined, closely spaced, stepped smooth, narrow, silt infill moderately	_																

 Notes:
 Started:
 24/08/2018
 Finished:
 28/08/2018

 Drilling Co.:
 McNeill
 Drilling Rig:
 UDR600

Logged by: Liam Abbot Checked by:



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:

					TESTS	_		g					COR	Ę	DF	RILLI		
GEOLOGY	MAIN DESCRIPTION / DETAIL DESCRIPTION	R.L. (m) DEPTH (m)	GRAPHIC LOG	SPT 'N' VALUE	SPT BLOW COUNTS OR SHEAR VALUE	ROCK STRENGTH	ROCK WEATHERING	ROCK DEFECT SPACING	DEF Di deg	ECT IP	DEFECTS / NOTES / OTHER TESTS	SAMPLE TYPE	TCR (%)	RQD (%)	DRILLING METHOD	CASING	BASE OF HOLE & WATER LEVEL	INSTALLATION DETAILS
	inclined.  J3 - very steeply inclined widely spaced, stepped		$\widetilde{\sim}$									PQ	94	0				
	J3 - very steeply inclined widely spaced, stepped smooth, on quartz band. 6.55-11.00m - Water level Metasandstone		$\approx$			MS	MW					PQ	87	13				
	Metasandstone Moderately weathered, grey. Weak to moderately strong, foliation, thinly laminated, moderately inclined. Quartzofeldspathic bands, folded, 150mm thick, very 300mm	11	$\widetilde{\sim}$									-						
	Foliation - moderately inclined, moderately widely spaced, planar rough, very narrow, weak surface.			i														
	J1 - sub vertical, moderately widely spaced, stepped rough, narrow			İ														
	J3 - very steeply inclined, moderately widely spaced, stepped rough, very narrow, weak.  Metasandstone Moderately weathered, grey.	12-		   														
	Wedsantstone 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.	13		i														
	J1 - sub vertical, widely spaced, stepped rough, moderately narrow(continued)  END OF BOREHOLE AT 11m - Target Depth Reached																	
64.110N INFORMATION: 6FJ 0F052010_1EW: 6D1 124/18		14-																
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0 0				i														
OFUSZ		15-																
0.NO				i														
		16-																
		=		i														
		17—																
		''=																
		<del>-</del>		İ														
		18-																
44 DEA																		
BOREHOLE SOLLNOON EUG 74 BEADWONI BNIDGE - SITE INVEST																		
SE/ACC		19-																
7 7																		
				Ŧ														

 Notes:
 Started:
 24/08/2018
 Finished:
 28/08/2018

 Drilling Co.:
 McNeill
 Drilling Rig:
 UDR600

Logged by: Liam Abbot Checked by:



Project: Beaumont Bridge Replacement

Client: NZTA

Project No.: 6-CT012.00

Location: SH1 - Beaumont

Coordinates: 341099 E 804543 N

Ref. Grid: n/a

R.L.:

Datum:

Not established

Depth: 11 m

Inclination: Vertical

#### **PHOTOGRAPHS**



Photo BH01.1 0.0-2.5m



Photo BH01.2 2.5-4.6m

Notes:

BOREHOLE SOIL/ROCK LOG A4 BEAUMONT BRIDGE - SITE INVESTGATION INFORMATION. GPJ OPUS2016\_TEM.GDT 12/4/19

Started: 24/08/2018

Finished:

28/08/2018

Drilling Co.: McNeill

Drilling Rig: UDR600

Logged by:

Liam Abbot

Checked by:

Sheet 3 of 5

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



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:

Drilling Co.: McNeill Drilling Rig: UDR600

Logged by: Liam Abbot Checked by:

28/08/2018



Project: Beaumont Bridge Replacement

Client: NZTA

Project No.: 6-CT012.00

Location: SH1 - Beaumont

Coordinates: 341099 E 804543 N

Ref. Grid: n/a

Not established

Depth: 11 m
Inclination: Vertical

THE STATE OF THE S

R.L.: Datum:

## **PHOTOGRAPHS**



Photo BH01.5 8.8-10.8m



Photo BH01.6 10.8-11.0m

Notes:

BOREHOLE SOIL/ROCK LOG A4 BEAUMONT BRIDGE - SITE INVESTGATION INFORMATION.GPJ OPUS2016\_TEM.GDT 12/4/19

Started: 24/08/2018

Finished:

28/08/2018

Drilling Co.: McNeill

Drilling Rig: UDR600

Logged by:

Liam Abbot

Checked by:

Sheet 5 of 5



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

Project No.: 6-CT012.00 R.L.:
Location: SH1 - Beaumont Datum:

					TESTS			o			CORE		=	DF	RILLI		N C
GEOLOGY	MAIN DESCRIPTION / DETAIL DESCRIPTION	R.L. (m) DEPTH (m)	GRAPHIC LOG	SPT 'N' VALUE	SPT BLOW COUNTS OR SHEAR VALUE	ROCK STRENGTH	ROCK WEATHERING	ROCK DEFECT SPACING	DEFECT DIP degrees	DEFECTS / NOTES / OTHER TESTS	SAMPLE TYPE	TCR (%)	RQD (%)	DRILLING METHOD	CASING	BASE OF HOLE & WATER LEVEL	INSTALLATION DETAILS
	Sandy fine to coarse GRAVEL with some silt; greyish brown. Moist, sub rounded.	46									PQ	10	0				
		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,	3-									PQ	86	14				
	Foliation - steeply inclined, closely spaced, planar rough, moderate narrow.  J1 - sub vertical, moderately widely spaced, undulating smooth, very narrow, highly weathered at surface.		$\sim$			W	MW				PQ	96	88				
	Metasandstone Slightly weathered, grey. Moderately strong, foliated, moderately inclined, thinly laminated.	4-[									PQ	100	38	tary Coring			
	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.	42				MS	SW				PQ	89	79	Triple Tube, Wireline Rotary			
	J1 - sub vertical, widely spaced, planar rough, tight, slight weathering.  J3 - moderately inclined, widely spaced, very narrow, silt infill, iron pyrite	- 6-									PQ	75	14	PQ Size, Triple			
	Metasandstone Slightly weathered, grey. Moderately strong to strong, foliated, moderately inclined, laminated.		$\approx$														
	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.	7-				S	sw				PQ	80	39				
	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.	8-								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	PQ	100	44				
		9-				S	MW			Axial Estimated Compressive strength Lab: UCS 75.7 MPa 8.40-8.90m - Crush zone on J1 slightly weathered							
			$\approx$								PQ	100	37				

 Notes:
 Started:
 29/08/2018
 Finished:
 30/08/2018

 Drilling Co.:
 McNeill
 Drilling Rig:
 UDR600

Logged by: Liam Abbot Checked by:



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:

					TESTS F G							CORE DRILLING					Z	
GEOLOGY	MAIN DESCRIPTION / DETAIL DESCRIPTION	R.L. (m) DEPTH (m)	GRAPHIC LOG	SPT 'N' VALUE	SPT BLOW COUNTS OR SHEAR VALUE	ROCK STRENGTH	ROCK WEATHERING	ROCK DEFECT SPACIN	DEFE( DIP	DEFECTS / NOTES	SAMPLE TYPE	TCR (%)	RQD (%)	DRILLING METHOD	CASING	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.	36				s	MW				PQ	100		Tube, Wireline Rotary Coring				
	Foliation - moderately inclined, very closely spaced, planar rough, very narrow, weak surface.  J1 - sub vertical, widely spaced, stepped rough, moderately narrow	12-									PQ	95	7	PQ Size, Triple Tube, Wir				
	END OF BOREHOLE AT 12.3m - Target Depth Reached	34																
		16—	1															

 Notes:
 Started:
 29/08/2018
 Finished:
 30/08/2018

 Drilling Co.:
 McNeill
 Drilling Rig:
 UDR600

Logged by: Liam Abbot Checked by:



Coordinates: 341207 E 804482 N Beaumont Bridge Replacement Project:

NZTA Ref. Grid: n/a Depth: 12.3 m Client:

Project No.: 6-CT012.00 46.68 m R.L.: Inclination: Vertical

SH1 - Beaumont Location: Datum:

## **PHOTOGRAPHS**



Photo BH02.1 0.0-4.0m



Photo BH02.2 4.0-6.0m

Notes:

Started: 29/08/2018 Finished:

30/08/2018

Drilling Co.: McNeill

UDR600 Drilling Rig:

Liam Abbot Logged by:

Checked by:

BOREHOLE SOIL/ROCK LOG A4 BEAUMONT BRIDGE - SITE INVESTGATION INFORMATION.GPJ OPUS2016\_TEM.GDT 12/4/19



Beaumont Bridge Replacement Project:

NZTA Client:

Project No.: 6-CT012.00

SH1 - Beaumont Location:

Coordinates: 341207 E 804482 N

Ref. Grid: n/a

46.68 m R.L.:

Datum:

Inclination: Vertical

Depth: 12.3 m

## **PHOTOGRAPHS**



Photo BH02.3 6.0-8.1m



Photo BH02.4 8.1-10.25m

Notes:

BOREHOLE SOIL/ROCK LOG A4 BEAUMONT BRIDGE - SITE INVESTGATION INFORMATION.GPJ OPUS2016\_TEM.GDT 12/4/19

Started: 29/08/2018

Finished:

30/08/2018

Drilling Co.: McNeill

UDR600 Drilling Rig:

Liam Abbot Logged by:

Checked by:



Depth: 12.3 m

Coordinates: 341207 E 804482 N Beaumont Bridge Replacement Project:

NZTA Ref. Grid: n/a Client:

Project No.: 6-CT012.00 46.68 m R.L.: Inclination: Vertical

SH1 - Beaumont Location: Datum:

## **PHOTOGRAPHS**



Photo BH02.5 10.25-12.3m

Notes:

Started: 29/08/2018 Drilling Co.: McNeill

Finished: 30/08/2018 UDR600 Drilling Rig:

Liam Abbot Logged by:

Checked by:

Logged in accordance with NZ Geotechnical Society Guidelines (2005). See attached key sheet for explanation of symbols. Scale 1:50 @ A4



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:

		TESTS I O CORE D							DF	RILLI		7					
GEOLOGY	MAIN DESCRIPTION / DETAIL DESCRIPTION  Cobbles and silt	R.L. (m) DEPTH (m)	GRAPHIC LOG	SPT 'N' VALUE	SPT BLOW COUNTS OR SHEAR VALUE	ROCK STRENGTH	ROCK WEATHERING	ROCK DEFECT SPACING	DEFECT DIP degrees	DEFECTS / NOTES / OTHER TESTS	SAMPLE TYPE	TCR (%)	RQD (%)	DRILLING METHOD	CASING	BASE OF HOLE & WATER LEVEL	INSTALLATION DETAILS
		- - - -									PQ	36					
-	Metasandstone Slightly weathered to unweathered, light greg.	1-				MS	sw				PQ	65					
-	Slightly weathered to unweathered, light greg, foliated. Moderately strong, foliation steeply inclined, undulating smooth.  Quartzofeldspathic banding, thin to very thin,	38 -	$\approx$							Lab: PLT 38.6 MPa	PQ	73	45				
	Quartzofeldspathic banding, thin to very thin, moderately to steep ly inclined, occurs both parallel to and crosscutting foliation.  J1 - (1.42m) Very steeply inclined, moderately narrow, undulating rough, infilled with quartz. No other information available due to drilling	2-								Diametral Estimated Compressive strength	PQ						
	damage.	_ =									PQ PQ	100	0 70				
	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	3-									PQ PQ	82 65	44				
	closely spaced.  Foliation separations - steeply inclined, closely spaced, moderately narrow, stepped smooth to rough, healed in placed.	36 -									PQ						
	J1 - Very steeply inclined, moderately widely spaced, narrow, undulating smooth to stepped rough.	4-			   	S	UW							oring			
	J2 (cross cutting foliation) - moderately inclined, widely spaced, narrow, undulating smooth.	- -									PQ	22		ne Rotary Coring			
	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	5-												Size, Triple Tube, Wireline			
	closely to very closely spaced. Significant drilling breakage on quartz banding, no other defect information available.	34 -									PQ	36		e, Triple T			
	Metasandstone	6-								Lab: PLT 29.1 MPa Axial Estimated Compressive Strength	PQ	73		PQ Siz			
	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 - - 8-				MS	SW				PQ	59	26				
		-									PQ	100	250				
											PQ	25	250				
		-									PQ	29					
		_30 -									PQ PQ	100	100 43				

 Notes:
 Started:
 29/01/2019
 Finished:
 1/02/2019

 Drilling Co.:
 McNeill
 Drilling Rig:
 UDR600

Logged by: J Grindley / L Checked by:

7: J Grindley / L Checked Abbot



Coordinates: 341273 E 804460 N Beaumont Bridge Replacement Project:

NZTA Ref. Grid: n/a Depth: 20 m Client:

Project No.: 6-CT012.00 39.76 m R.L.: Inclination: Vertical

SH1 - Beaumont Location: Datum:

					TESTS	-		ď				CORI	=	DF	RILLI	NG	_
GEOLOGY	MAIN DESCRIPTION / DETAIL DESCRIPTION	R.L. (m) DEPTH (m)	GRAPHIC LOG	SPT 'N' VALUE	SPT BLOW COUNTS OR SHEAR VALUE	ROCK STRENGTH	ROCK WEATHERING	ROCK DEFECT SPACING	DEFEC DIP degree	DEFECTS / NOTES s / OTHER TESTS	SAMPLE TYPE	TCR (%)	RQD (%)	DRILLING METHOD	CASING	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				
	Foliation shear - steeply inclined, moderately wide, undulating rough, infilled with non plastic silt with fine laminated fabric, surfaces are weak with platy alteration.	11-		  -  -  -						Lab: PLT 40.9 MPa Diametral Estimated Compressive strength							
	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 28 								Lab: UCS 27.0 MPa	PQ	97	67				
	J1 - sub vertical, widely spaced, very narrow, undulating smooth to roughy.			į													
	J2 - moderately inclined, widely spaced, narrow, undulating rough, clean surfaces with no infill. Foliation separations - widely spaced, closely to moderately spaced, moderately narrow,										PQ	100	100				
	undulating smooth to planar, healed in placed with otherwise minor weathering of feldspar on clean surfaces.	13 <del></del> - - - -				MS	UW				PQ	100	84				
4/19	Metasandstone Unweathered, light grey, Moderately strong, foliation, laminated, steeply inclined.	26									PQ	80	20				
GDT 12/	Quartzofeldspathic banding with foliation and perpendicular to foliation, thin, very closely spaced.	14-									r Q	00	20	, Coring			
16_TEM.	Foliation separation - steeply inclined, closely spaced, undulating smooth, very narrow, slight weathering on surface.	- - -	$\stackrel{\textstyle \sim}{\sim}$	-							PQ	88	20	ne Rotary			
OPUS20	J1 - very steeply inclined to sub vertical, moderately widely spaced, steeped smooth, very narrow.	15-									PQ	98	20	Tube, Wireline			
J.G	J3 - steeply inclined planar rough, narrow.  Metasandstone/Phyllite	=												Tub			
ATION.G	Weatasandsconter-Hymite Slightly weathered, grey, Weak to Moderately strong, foliation, thinly laminated, steeply inclined.	24 -				W	SW				PQ	63	0	Size, Triple			
ORM	Quartzofeldspathic banding perpendicular to foliation, thin, closely spaced.	16—	<b>*****</b>			••	• • • • • • • • • • • • • • • • • • • •				PQ	60	0	PQS			
TION INF	Foliation separation - steeply inclined, very closely spaced, undulating smooth, very narrow, slight weathering on surface, weak.	10       									PQ PQ	100	99	4			
VESTGA	J1 - very steeply inclined to sub vertical, widely spaced, steeped smooth, tight.  Metasandstone/Phyllite	_ = _ =		-							PQ	100	90				
BEAUMONT BRIDGE - SITE INVESTGATION INFORMATION.GPJ OPUS2016_TEM.GDT 12/4/19	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							
NT BRIDG	J3 - very steeply inclined, moderately weathered, weak, weathered feldspar, slight discolouration.	22								Compressive Strength Lab: UCS 42.5 MPa	PQ	100	36				
SEAUMOR	Metasandstone, dominated by Quartzofeldspathic banding Grey/white/green grey, unweathered, foliated. Moderately strong.	18-				S	UW										
0G A4 E	Foliation - steeply inclined, closely spaced, very narrow, weathered mica.	=									PQ	100	53				
OCKLC	J1 - very steeply inclined, widely spaced, stepped rough, very narrow, minor weathering of quartz.  Metasandstone	19-															
BOREHOLE SOIL/ROCK LOG A4	Unweathered, light grey, foliated.  Moderately strong, foliation, laminated, steeply inclined.	=									PQ	100	79				
REHOL	Chlorite banding. Foliation - Steply inclined, moderately widely spaced, undulating smooth very narrow,  J3 - very steeply inclined, moderately	_20 _		i													
BC	weathered, weak, weathered feldspar, slight								20					1/0			

Notes: Started: 29/01/2019 Finished: 1/02/2019 Drilling Co.: McNeill **UDR600** Drilling Rig:

> Checked by: Logged by:

J Grindley / L Abbot



Inclination: Vertical

Coordinates: 341273 E 804460 N Beaumont Bridge Replacement Project:

NZTA Ref. Grid: n/a Depth: 20 m Client:

Project No.: 6-CT012.00 39.76 m R.L.:

SH1 - Beaumont Location: Datum:

			TESTS # 0						CORE			DF	RILLI	7			
GEOLOGY	MAIN DESCRIPTION / DETAIL DESCRIPTION	R.L. (m) DEPTH (m)	GRAPHIC LOG	SPT 'N' VALUE	SPT BLOW COUNTS OR SHEAR VALUE	ROCK STRENGTH	ROCK WEATHERING	ROCK DEFECT SPACIN	DEFECT DIP degrees	DEFECTS / NOTES / OTHER TESTS	SAMPLE TYPE	TCR (%)	RQD (%)	DRILLING METHOD	CASING	BASE OF HOLE & WATER LEVEL	INSTALLATION DETAILS
BOREHOLE SOIL/ROCK LOG A4 BEAUMONT BRIDGE - SITE INVESTGATION INFORMATION.GPJ OPUS2016_TEM.GDT 12/4/19	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 - 25- -27- -27- -28- -10 - -10															

Notes: Started: 29/01/2019 Drilling Co.:

Finished: 1/02/2019 McNeill **UDR600** Drilling Rig:

J Grindley / L Logged by:

Checked by: Abbot

Scale 1:50 @ A4



Coordinates: 341273 E 804460 N Beaumont Bridge Replacement Project:

NZTA Ref. Grid: n/a Depth: 20 m Client:

Project No.: 6-CT012.00 39.76 m R.L.: Inclination: Vertical

SH1 - Beaumont Location: 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

McNeill

Finished:

1/02/2019 UDR600 Drilling Rig:

J Grindley / L Logged by:

Drilling Co.:

Checked by:

Abbot



Coordinates: 341273 E 804460 N Beaumont Bridge Replacement Project:

NZTA Ref. Grid: n/a Depth: 20 m Client:

Project No.: 6-CT012.00 39.76 m R.L.: Inclination: Vertical

SH1 - Beaumont Location: Datum:

## **PHOTOGRAPHS**



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



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

Notes:

Started: 29/01/2019 1/02/2019 Finished: McNeill UDR600 Drilling Co.: Drilling Rig:

J Grindley / L Logged by: Abbot

Checked by:

BOREHOLE SOIL/ROCK LOG A4 BEAUMONT BRIDGE - SITE INVESTGATION INFORMATION.GPJ OPUS2016\_TEM.GDT 12/4/19



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

Notes:

BOREHOLE SOIL/ROCK LOG A4 BEAUMONT BRIDGE - SITE INVESTGATION INFORMATION.GPJ OPUS2016\_TEM.GDT 12/4/19

Started: 29/01/2019

Drilling Co.: McNeill

Finished: 1/02/2019
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.



Coordinates: 341273 E 804460 N Beaumont Bridge Replacement Project:

NZTA Ref. Grid: n/a Depth: 20 m Client:

Project No.: 6-CT012.00 39.76 m R.L.: Inclination: Vertical

SH1 - Beaumont Location: 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

McNeill Drilling Co.:

UDR600 Drilling Rig:

Checked by:

BOREHOLE SOIL/ROCK LOG A4 BEAUMONT BRIDGE - SITE INVESTGATION INFORMATION.GPJ OPUS2016\_TEM.GDT 12/4/19

J Grindley / L Logged by: Abbot

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



Depth: 20 m

Beaumont Bridge Replacement Project:

Coordinates: 341273 E 804460 N NZTA Ref. Grid: n/a Client:

Project No.: 6-CT012.00 39.76 m R.L.: Inclination: Vertical

SH1 - Beaumont Location: Datum:

## **PHOTOGRAPHS**



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

Started: 29/01/2019 McNeill

Finished: Drilling Rig: 1/02/2019 **UDR600** 

J Grindley / L Logged by:

Drilling Co.:

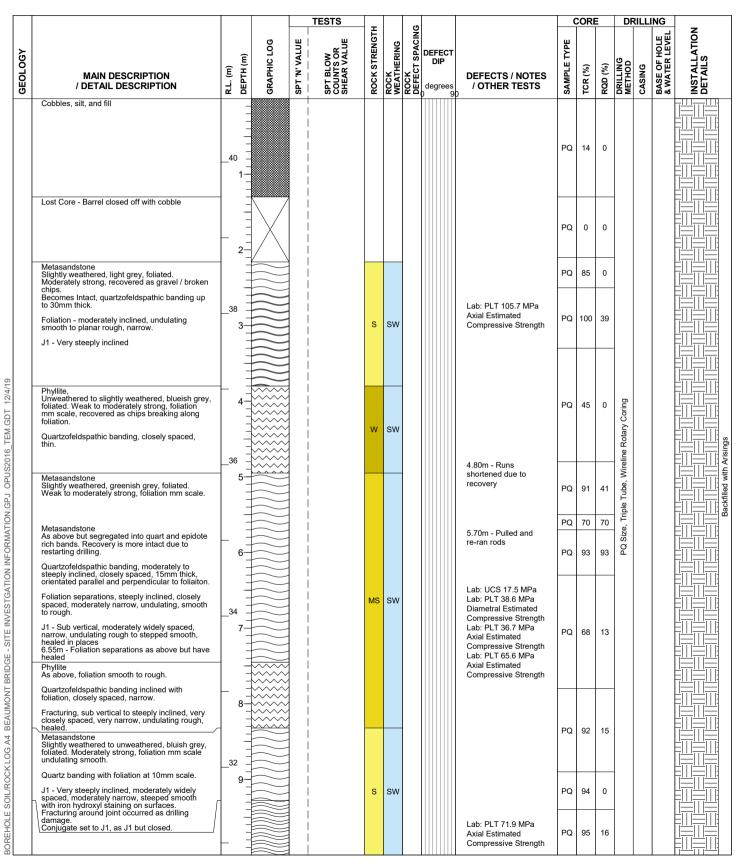
Checked by:

Notes:



Coordinates: 341350 E 804416 N Beaumont Bridge Replacement Project:

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



6/11/2018 8/11/2018 Notes: Started Finished. Drilling Co.: McNeill **UDR600** Drilling Rig:

> J Grindley / L Logged by: Checked by:



Coordinates: 341350 E 804416 N Beaumont Bridge Replacement Project:

NZTA Ref. Grid: n/a Depth: 20 m Client: Project No.: 6-CT012.00 40.84 m R.L.: Inclination: 90° SH1 - Beaumont Azimuth: 0° Location: Datum:

					TESTS	Ţ		g				ORI	=	DF	RILLI	NG	_
GEOLOGY	MAIN DESCRIPTION / DETAIL DESCRIPTION	R.L. (m) DEPTH (m)	GRAPHIC LOG	SPT 'N' VALUE	SPT BLOW COUNTS OR SHEAR VALUE	ROCK STRENGTH	ROCK WEATHERING	ROCK DEFECT SPACING	DEFECT DIP degrees	DEFECTS / NOTES / OTHER TESTS	SAMPLE TYPE	TCR (%)	RQD (%)	DRILLING METHOD	CASING	BASE OF HOLE & WATER LEVEL	INSTALLATION DETAILS
	As above but veining closely spaced, moderately narrow, both parallel and perpendicular to foliation.	=								Lab: UCS 58.5 MPa Lab: PLT 18.2 MPa Axial Estimated	PQ	95	16				
	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.	30				S	SW			Compressive Strength  10.90m - Bit changed due to prevous poor run	PQ	88	8				
	J2 - very steeply inclined, closely spaced, narrow to moderately narrow, undulating rough to stepped rough, infilled with quartz in places. (continued)  As above  Veining moderately to very steeply inclined, closely to very closely spaced, moderately				 						PQ	36	0				
	narrow to moderately wide  Metasandstone Slightly weathered, dark grey, foliated. Moderately strong, foliation, moderately inclined, mm scale. Alternating bands of chlorites and	28			 						PQ	92	30				
:	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.	- - - - -								13.60m - Bit change, not advancing	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-								J	PQ	91	13	Rotary Coring			
	Wide quartz band oriented with foliation Chlorite bands become closely spaced. J2 joint infilled with calcite, very steeply inclined, narrow, stepped smooth, no alteration of rock surface Metasandstone Slightly weathered, light grey, foliated.	26 26 15			 					Lab: UCS 58.5 MPa Lab: PLT 52.4 MPa Diametral Estimated Compressive Strength	PQ	100	81	Tube, Wireline			
	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.				 					15.90m - Lost core - fell out of barrel				PQ Size, Triple			
	narrow bands of chlorite rich materteral., very closely spaced, very thin.  Foliation separations - steeply inclined, widely	-				s	sw				PQ	65	28				
	spaced, very narrow, undulating, smooth, quartz infill that heals surface.  J1 - sub vertical, moderate widely spaced, very narrow, undulating rough to smooth, some	24 _ 24 _ 									PQ	92	72				
	quartz infill  J2 - gently inclined, moderately wildly spaced to closely spaced, very narrow, undulating smooth, slightly weathered surface with pyrite present.		$\approx$		 						PQ	100	58				
	slightly weathered surface with pyrite present.  Metasandstone Slightly weathered, greenish grey, foliated.  Moderately strong. Interbedded with thin beds of phyllite, moderately widely spaced. Foliation,	_ =			  - 					17.80m - New bit,	PQ	100	0				
	steepty inclined, undulating silckensided to undulating rough.  Segregation bands of epidote rich material, very thin. Quartzofeldspathic banding along foliation,	18-			  -  -					advacning speed increased Lab: PLT 57.6 MPa Axial Estimated	PQ	100	63				
	close to very closely spaced, thin,  Foliation separations, steeply inclined, moderately widely spaced, very narrow, undulating smooth with slight weathering on surfaces.				  -  -					Compressive Strength							
	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	100	32				

Notes: Started: 6/11/2018 Finished: 8/11/2018 McNeill **UDR600** Drilling Co.: Drilling Rig:

> J Grindley / L Logged by: Checked by:



Coordinates: 341350 E 804416 N Beaumont Bridge Replacement Project:

NZTA Ref. Grid: n/a Depth: 20 m Client: Project No.: 6-CT012.00 40.84 m Inclination: 90° R.L.: SH1 - Beaumont Azimuth: 0° Location: Datum:

	I			1	TECTO						1 ,	CORI	=	DE	RILLI	NC	
GEOLOGY	MAIN DESCRIPTION / DETAIL DESCRIPTION	R.L. (m) DEPTH (m)	GRAPHIC LOG	SPT 'N' VALUE	SPT BLOW COUNTS OR SHEAR VALUE	OCK STRENGTH	ROCK VEATHERING	ROCK DEFECT SPACING	DEFECT DIP degrees	DEFECTS / NOTES / OTHER TESTS	SAMPLE TYPE	TCR (%)		DRILLING METHOD		BASE OF HOLE & WATER LEVEL	INSTALLATION DETAILS
BOXEHOLE SULLYOCK LOG A4 BEAUMONI BRIDGE - SITE INVESTIGATION INFORMATION.GPJ OPOSZOTO TEM.GDT 1/24/19	Slightly weathered, light greenish grey, foliated. Weak to moderately strong, Segregation banding of epidote and chlorite tich 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																

Notes: Started: 6/11/2018

Finished:

8/11/2018

Drilling Co.: McNeill

**UDR600** Drilling Rig:

J Grindley / L Checked by: Logged by:



Coordinates: 341350 E 804416 N Beaumont Bridge Replacement Project:

NZTA Ref. Grid: n/a Depth: 20 m Client: Project No.: 6-CT012.00 40.84 m R.L.: Inclination: 90° SH1 - Beaumont Azimuth: 0° Location: Datum:

## **PHOTOGRAPHS**

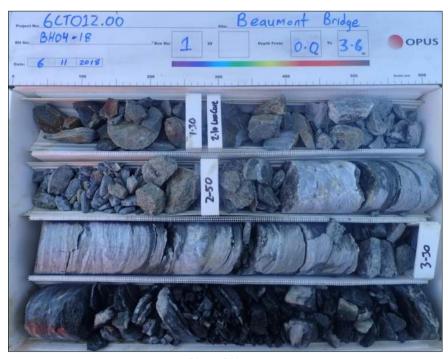


Photo BH04.1 Box 1 - 0.0m to 3.6m



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

Notes:

Started: 6/11/2018 8/11/2018 Finished: McNeill UDR600 Drilling Co.: Drilling Rig:

J Grindley / L Logged by:

Checked by: Abbot

BOREHOLE SOIL/ROCK LOG A4 BEAUMONT BRIDGE - SITE INVESTGATION INFORMATION.GPJ OPUS2016\_TEM.GDT 12/4/19



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**

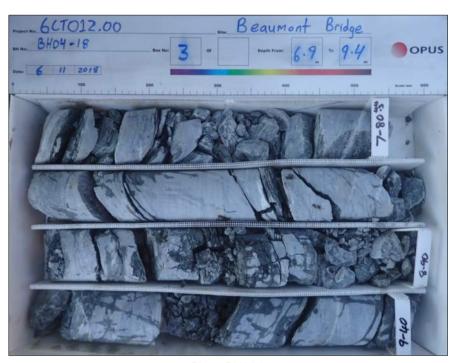


Photo BH04.3 Box 3 - 6.9m to 9.4m



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 Checked by:

Abbot

Sheet 5 of 7



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

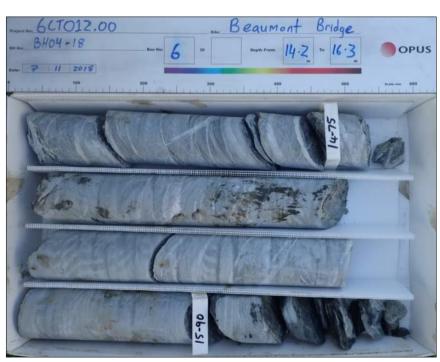


Photo BH04.6 Box 6 - 14.2m to 16.3m

Notes:

Started: 6/11/2018 Finished: 8/11/2018
Drilling Co.: McNeill Drilling Rig: UDR600

Logged by: J Grindley / L Checked by:



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**

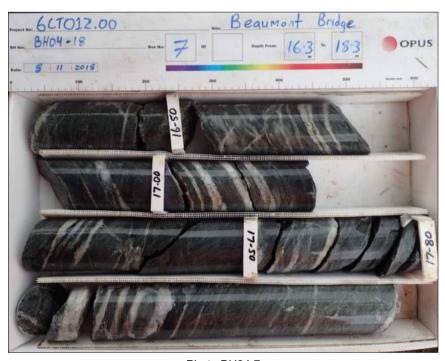


Photo BH04.7 Box 7 - 16.3m to 18.3m



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 Check

Abbot

Checked by:



Coordinates: 341370 E 804405 N Beaumont Bridge Replacement Project:

NZTA Ref. Grid: n/a Depth: 19.6 m Client: Inclination: Vertical

Project No.: 6-CT012.00 R.L.: 43.19 m

SH1 - Beaumont Location: Datum:

					TESTS	ı		g			(	CORE	<b>E</b>	DF	RILLI		7
GEOLOGY	MAIN DESCRIPTION / DETAIL DESCRIPTION	R.L. (m) DEPTH (m)	GRAPHIC LOG	SPT 'N' VALUE	SPT BLOW COUNTS OR SHEAR VALUE	ROCK STRENGTH	ROCK WEATHERING	CK FECT S	DEFECT DIP degrees	DEFECTS / NOTES / OTHER TESTS	SAMPLE TYPE	TCR (%)	RQD (%)	DRILLING METHOD	CASING	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)	L -	× × × × ×														
	Silty fine SAND; dark brownish grey. Very soft; wet.	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				
			000 000 000														
	Metasandstone Moderately weathered, bluish orangish grey. Weak, foliation, thinly laminated steeply inclined. Quartzofeldspathic banding moderately inclined, very thin, very closely spaced.	3 _40								3.00-4.60m - Machine fractured to gravel	PQ	0	0				
4/19	Foliation - steeply inclined, closely spaced, stepped smooth, narrow, weathered surfaces, iron oxide stained.		$\widetilde{\gtrsim}$			W	MW				PQ	25	7				
EM.GD1 12/4	J1 - sub vertical, widely spaced, undulating rough, narrow, weathered surface.	4-		 										Rotary Coring			
J OPUSZ016_1	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.	5-				MS	sw				PQ	64	13	Wireline			
ON GE	Foliation - steeply inclined, closely spaced, planar smooth, narrow, greasy.										1 0	04	10	Triple Tube,			
Z MA	J1 - very steeply inclined, moderately inclined, undulating smooth, narrow		$\approx$			MS	sw							PQ Size,			
NVESTGATION INFORMATION.GPJ OPUSZ016_TEM.GDT 12/4/19	J3 - very steeply inclined, moderately widely spaced, undulating rough, narrow, weathered surface.  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.	6-				w	MW				PQ	40	0	ď			
BOREHOLE SOIL/ROCK LOG A4 BEAUMON BRIDGE - SITE INVEST	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	7															
A4 BEAUMOIN	surface.   Metasandstone   Moderately weathered, Orangish light grey/greyish orange.   Weak, foliation, thinly laminated.   Highly machine fractured   Metasandstone	8-				MS	sw			8.10-8.45m - Machine fractured to gravel	PQ	64	0				
IL/ROCK LOC	Moderately weathered, bluish grey with dark grey bands. Moderately strong, foliation, moderately inclined, laminated. High quartzofeldpathic content.	9-								8.90-9.10m - Crush zone on J1 very steeply inclined,	PQ	68	0				
VEHOLE SC	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					S	sw			infilled with silts sands, gravels, very weak. Yellow colouring present with							
Ž	feldspar, iron oxide staining.		$\sim$	<u>i</u>						sulphur odour.	PQ	73	62				

Notes: Started: 8/11/2018 Finished: 9/11/2018 Drilling Co.: McNeill **UDR600** Drilling Rig:



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:

				<u> </u>	TESTS	I		ای			_ (	COR	E	UF	RILLII		7
מנסנסני	MAIN DESCRIPTION / DETAIL DESCRIPTION	R.L. (m) DEPTH (m)	GRAPHIC LOG	SPT 'N' VALUE	SPT BLOW COUNTS OR SHEAR VALUE	ROCK STRENGTH	ROCK WEATHERING	ROCK DEFECT SPACING	DEFECT DIP degrees	DEFECTS / NOTES / OTHER TESTS	SAMPLE TYPE	TCR (%)	RQD (%)	DRILLING METHOD	CASING	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.									9.10-9.80m - Machine fractured, closely spaced foliation separation, J1 also present Lab: PLT 29.4 MPa	PQ	73	62	_			
	J1 - Sub vertical, planar smooth, narrow.  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.	11— _32 —								Diametral Estimated Compressive Strength Lab: UCS 59.5 MPa	PQ	77	9				
	below 11.2m high machine fracture(continued)	12-								12.50-13.80m - Large quartzofeldspathic	PQ	92	0				
		13-								layer, some weathered fractures with weathered feldspar	PQ	28	0				
	Phyllite Slightly weathered, light grey, foliated. Strong, foliation, moderately inclined, thinly laminated.	14-									PQ	93	0	ary Coring			
	Foliation - moderately inclined, very closely spaced, undulating smooth, narrow, silt infill.  J1 - Sub vertical, very closely spaced, planar rough, very narrow, calcite fill	15—				S	sw			Lab: PLT 82.2 MPa Diametral Estimated Compressive Strength	PQ	25	0	Tube, Wireline Rotary			
ŀ	LOST CORE	-20									PQ	0	0	Size, Triple			
-	Metasandstone Slightly to moderately weathered, dark grey. Moderately strong, foliation, laminated, steeply inclined. Quartzofeldspathic banding steeply inclined, thin, very closely spaced.	16-									PQ	90	0	PQ Siz			
	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.	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



Coordinates: 341370 E 804405 N Beaumont Bridge Replacement Project:

NZTA Ref. Grid: n/a Depth: 19.6 m Client: Inclination: Vertical

Project No.: 6-CT012.00 43.19 m R.L.:

SH1 - Beaumont Location: Datum:

## **PHOTOGRAPHS**



Photo BH05.1 0.0-4.6m



Photo BH05.2 4.6-8.1m

Started: 8/11/2018 Finished: 9/11/2018 Notes: Drilling Co.: McNeill UDR600 Drilling Rig:

> Liam Abbot Logged by: Checked by:



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



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



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:

					TESTS	F		<u>o</u>				CORE	E I	DF	RILLI		z	
GEOLOGY	MAIN DESCRIPTION / DETAIL DESCRIPTION	R.L. (m) DEPTH (m)	GRAPHIC LOG	SPT 'N' VALUE	SPT BLOW COUNTS OR SHEAR VALUE	ROCK STRENGTH	ROCK WEATHERING	DEFECT SPACIN	DEFECT DIP degrees	DEFECTS / NOTES	SAMPLE TYPE	TCR (%)	RQD (%)	DRILLING METHOD	CASING	BASE OF HOLE & WATER LEVEL	INSTALLATION	DETAILS
	Clayey SILT with some sand; light brown. Firm; moist; sand, fine; non plastic.	146	× × × × × × × × × × × × × × × × × × ×								PQ	45	0				X 2000	Bentonite seal top up With paßsings cement
	Silty fine SAND with some clay; greyish brown. Medium dense; moist.	3-	× × × × × × × × × × × × × × × × × × ×	-							PQ	50	0				0°0°0°0°0°0°0°0°0°0°0°0°0°0°0°0°0°0°0°	ეიეაეიეაეიეაეიეაეიეიეიეიეიე ეიეაეიეიეიეი
12/4/19		4-	× × × × ×								PQ	29	0	Coring			0 0	
GATION INFORMATION.GPJ OPUS2016_TEM.GDT 12/4/19		5-	× × × × × × × × × × × × × × × × × × ×								PQ	6	0	Triple Tube, Wireline Rotary Co				Sand filter fill around slotted pipe
ON INFORMATION.GP.	Medium to coarse GRAVEL; grey/white/light orange. Rounded to angular. (any finer soils likely washed away during drilling)	6									PQ	43	0	PQ Size, Triple T				Sand filter 1
	Metasandstone Slightly weathered, grey. Moderately strong, foliation, thinly laminated, steeply inclined.											100				SWL 5.80m		
- SITE INV	steeply inclined.  Foliation - steeply inclined, closely spaced, undulating slickensided, narrow, weathered surface, weak, silt infill, greasy.	7— _40 —	$\stackrel{\sim}{\approx}$								PQ	67	0			SWL 1.00m		
IT BRIDGE	J1 - Very steeply inclined, widely spaced, planar smooth, calcite infill.		$\stackrel{\sim}{\sim}$								PQ	91	23					
EAUMON		8-	$\stackrel{\sim}{\sim}$			MS	SW			Lab: PLT 22.5 MPa	PQ	100	85					
OG A4 B			$\approx$							Diametral Estimated Compressive Strength Lab: PLT 25.7 MPa Axial Estimated	PQ	95	55					
BOREHOLE SOIL/ROCK LOG A4 BEAUMONT BRIDGE - SITE INVEST		9— 38								Compressive Strength Lab: UCS 11.5 MPa	PQ	67	0					
3OREHOI			$\approx$								PQ	100	0					

 Notes:
 Started:
 12/11/2018
 Finished:
 12/11/2018

 Drilling Co.:
 McNeill
 Drilling Rig:
 UDR600



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:

					TESTS	_		g				CORI	Ę	DI	RILLI		-
GEOLOGY	MAIN DESCRIPTION / DETAIL DESCRIPTION	R.L. (m) DEPTH (m)	GRAPHIC LOG	SPT 'N' VALUE	SPT BLOW COUNTS OR SHEAR VALUE	ROCK STRENGTH	ROCK WEATHERING	ROCK DEFECT SPACING	DEFECT DIP	DEFECTS / NOTES / OTHER TESTS	SAMPLE TYPE	TCR (%)	RQD (%)	DRILLING METHOD	CASING	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)									9.90-10.20m - CRUSH ZONE J1/J2 steeped rough, moderately narrow, infilled with sand and fine gravel. Weak moderately weathered	PQ	100	0	_			
		11— _36 —				w	MW				PQ	17	0				
	Phyllite Slightly weathered, grey with white banding. Moderately strong, foliation, steeply inclined, laminated. Quartzofeldspathic banding, very thin, very closely spaced.	12-									PQ	100	17	Wireline Rotary Coring			
	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.	13— 34									PQ	53	0	Size, Triple Tube, Wirelin			
	Intermittent Metasandstone below 14.9m	14-				MS	sw				PQ	96	72	PQ Size, T			
		15—									PQ	38	11	-			
		16—									PQ	83	0				
	END OF BOREHOLE AT 16.5m - Target Depth Reached	17															

 Notes:
 Started:
 12/11/2018
 Finished:
 12/11/2018

 Drilling Co.:
 McNeill
 Drilling Rig:
 UDR600



Coordinates: 341390 E 804348 N Beaumont Bridge Replacement Project:

NZTA Ref. Grid: n/a Depth: 16.5 m Client: Inclination: Vertical

Project No.: 6-CT012.00 47.23 m R.L.: SH1 - Beaumont Location:

Datum:

## **PHOTOGRAPHS**



Photo BH06.1 0.0-5.5m



Photo BH06.2 5.5-8.5m

Started: 12/11/2018 Finished: 12/11/2018 Notes: Drilling Co.: McNeill UDR600 Drilling Rig:



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



Depth: 16.5 m

Beaumont Bridge Replacement Project:

Coordinates: 341390 E 804348 N NZTA Ref. Grid: n/a Client:

Project No.: 6-CT012.00 47.23 m R.L.: Inclination: Vertical

SH1 - Beaumont Location: Datum:

## **PHOTOGRAPHS**



Photo BH06.5 13.9-16.5m

Notes:

Started: 12/11/2018 Drilling Co.: McNeill

Finished: 12/11/2018 **UDR600** Drilling Rig:

Logged by: Liam Abbot

Checked by:

BOREHOLE SOIL/ROCK LOG A4 BEAUMONT BRIDGE - SITE INVESTGATION INFORMATION.GPJ OPUS2016\_TEM.GDT 12/4/19



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:

					TESTS	_		, <u>n</u>				CORI	E	DI	RILLI	NG	_
GEOLOGY	MAIN DESCRIPTION / DETAIL DESCRIPTION	R.L. (m) DEPTH (m)	GRAPHIC LOG	SPT 'N' VALUE	SPT BLOW COUNTS OR SHEAR VALUE	ROCK STRENGTH	ROCK WEATHERING	ROCK DEFECT SPACING	DEFECT DIP degrees	DEFECTS / NOTES / OTHER TESTS	SAMPLE TYPE	TCR (%)	RQD (%)	DRILLING METHOD	CASING	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				
GDT 12/4/19	Silty fine SAND; greyish orange. Dense; saturated; high cohesion/adhesion.	3— ———————————————————————————————————	× × × × × × × × × × × × × × × × × × ×								PQ	57	0	/ Coring			
GATION INFORMATION.GPJ OPUS2016_TEM.GDT	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) 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.	5— 				W	MW			5.40-5.50m - Highly weathered J3 joint	PQ	83	0	PQ Size, Triple Tube, Wireline Rotary Coring			
	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	7—				w	MW				PQ	100	7				
ONT BRIDGE											PQ	98	0				
KLOG A4 BEAUM	Matagandatana	8— - - - - - -									PQ	90	29				
BOREHOLE SOIL/ROCK LOG A4 BEAUMONT BRIDGE - SITE INVES	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	100	8				

 Notes:
 Started:
 22/08/2018
 Finished:
 23/08/2018

 Drilling Co.:
 McNeill
 Drilling Rig:
 UDR600



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:

					TESTS	·		ی				(	COR	E	DF	RILLI		7
GEOLOGY	MAIN DESCRIPTION / DETAIL DESCRIPTION	R.L. (m) DEPTH (m)	GRAPHIC LOG	SPT 'N' VALUE	SPT BLOW COUNTS OR SHEAR VALUE	ROCK STRENGTH	ROCK WEATHERING	ROCK DEFECT SPACING	DEF Di deg	ECT IP rees	DEFECTS / NOTES / OTHER TESTS	SAMPLE TYPE	TCR (%)	RQD (%)	DRILLING METHOD	CASING	BASE OF HOLE & WATER LEVEL	INSTALLATION DETAILS
	Metasandstone Slightly weathered, grey. Moderately strong, foliation, laminated, steeply inclined.		$\approx$									PQ	100	8				
	inclined.  Foliation - moderately inclined, closely spaced, planar rough, very narrow, Moderately weathered.		$\approx$								10.40-11.40m - highly jointed and machine fractured, igh	PQ	60	20				
	weathered.  J1 - sub vertical, moderately widely spaced, planar rough, narrow, weathered mica infill.(continued)	11-									quartzofeldspathic content	PQ	90	0				
-	Phyllite Slightly weathered, dark grey with white banding. Moderately strong, foliation, steeply inclined, thinly laminated.			     								PQ	100	44	y Coring			
	Foliation - steeply inclined, very closely spaced to closely, undulating smooth, very narrow, weak at surface, moderately weathered, greasy.	12-										PQ	100	0	Size, Triple Tube, Wireline Rotary Coring			
	J1 - steeply inclined, moderately widely spaced, stepped smooth, very narrow, weak at surface, moderately weathered, greasy.		······································	i		MS	SW					PQ	100	0	Tube, M			
		13										PQ PQ	93	0	, Triple			
															PQ Size			
		14-										PQ	100	30				
		15—										PQ	80	0	_			
	END OF BOREHOLE AT 15.1m - Target Depth Reached	16																

 Notes:
 Started:
 22/08/2018
 Finished:
 23/08/2018

 Drilling Co.:
 McNeill
 Drilling Rig:
 UDR600



Project: Beaumont Bridge Replacement

Client: NZTA

Project No.: 6-CT012.00

Location: SH1 - Beaumont

Coordinates: 341454 E 804251 N

Ref. Grid: n/a

R.L.:

Not established

Depth: 15.1 m
Inclination: Vertical

Datum:

## **PHOTOGRAPHS**



Photo BH07.1 0.0-4.95m



Photo BH07.2 4.95-7.4m

Notes:

BOREHOLE SOIL/ROCK LOG A4 BEAUMONT BRIDGE - SITE INVESTGATION INFORMATION. GPJ OPUS2016\_TEM.GDT 12/4/19

Started: 22/08/2018

8

Finished:

23/08/2018

Drilling Co.: McNeill

Drilling Rig: UDR600

Logged by: Liam Abbot

Checked by:

Sheet 3 of 5



Project: Beaumont Bridge Replacement

Client: NZTA

Project No.: 6-CT012.00

Location: SH1 - Beaumont

Coordinates: 341454 E 804251 N

Ref. Grid: n/a

Not established

Depth: 15.1 m
Inclination: Vertical

R.L.: Datum:

# **PHOTOGRAPHS**



Photo BH07.3 7.4-9.35m



Photo BH07.4 9.35-11.3m

Notes:

BOREHOLE SOIL/ROCK LOG A4 BEAUMONT BRIDGE - SITE INVESTGATION INFORMATION.GPJ OPUS2016\_TEM.GDT 12/4/19

Started: 22/08/2018

Finished:

23/08/2018

Drilling Co.: McNeill

Drilling Rig: UDR600

Logged by: L

Liam Abbot

Checked by:



Project: Beaumont Bridge Replacement

Client: NZTA

Project No.: 6-CT012.00

Location: SH1 - Beaumont

Coordinates: 341454 E 804251 N

Ref. Grid: n/a

R.L.:

Datum:

•

Depth: 15.1 m

Not established Inclination: Vertical

#### **PHOTOGRAPHS**



Photo BH07.5 11.3-13.25m



Photo BH07.6 13.25-15.1m

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

Notes:

Started: 22/08/2018

Finished:

23/08/2018

Drilling Co.: McNeill

Drilling Rig: UDR600

Logged by: Liam Abbot Check

Checked by:



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:

					TESTS	_		(0		T			CORI	E	DF	RILLI	NG	
GEOLOGY	MAIN DESCRIPTION / DETAIL DESCRIPTION	R.L. (m) DEPTH (m)	GRAPHIC LOG	SPT 'N' VALUE	SPT BLOW COUNTS OR SHEAR VALUE	ROCK STRENGTH	ROCK WEATHERING	ROCK DEFECT SPACING	DEFEC DIP	:T	DEFECTS / NOTES / OTHER TESTS	SAMPLE TYPE	TCR (%)	RQD (%)	DRILLING METHOD	CASING	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)  Clayey SILT; light grey mottled orange. Stiff; moist; moderately plastic.	1-	\(\lambda \lambda								PQ	40	0					
	Silty fine SAND; light brown. Medium dense/firm; saturated.	2	× × × × × × × × × × × × × × × × × × ×									PQ	67	0				
	Lost core	4—	*									PQ	27	13	Coring		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.	5-										PQ	97	0	Triple Tube, Wireline Rotary C			
	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.	6-				W	MW								PQ Size, Triple			
	Phyllite Moderately weathered, light grey. Very weak to weak, foliation, laminated, steeply inclined.	7									7.40-8.00m - machine	PQ	97	0				
בסומרוסד בססומר מחוב בססומר מונים במחום מונים ביות במונים מינים מונים מונים מונים מונים מונים מונים מונים מונים	Quartzofeldspathic banding very thin, moderately widely spaced.  Foliation - moderately inclined, closely spaced, planar rough, very narrow, moderately weathered.  Probable J1/J3 jointing	8-				vw	MW				fractured turned to fine gravel  8.20-9.00m - Potential crush/shear zone, highly weathered and machine fractured	PQ	73	0				
	Metasandstone Moderately weathered, grey, foliated. Weak to moderately strong, foliation, laminated, moderately inclined. Quartzofeldspathic banding moderately inclined, very thin, moderately widely spaced.	9 <del></del>				w	MW					PQ	70	7				

 Notes:
 Started:
 21/08/2018
 Finished:
 22/08/2018

 Drilling Co.:
 McNeill
 Drilling Rig:
 UDR600



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:

					TESTS	ī		g			'	COR	E	DF	RILLI		7
GEOLOGY	MAIN DESCRIPTION / DETAIL DESCRIPTION	R.L. (m) DEPTH (m)	GRAPHIC LOG	SPT 'N' VALUE	SPT BLOW COUNTS OR SHEAR VALUE	ROCK STRENGTH	ROCK	ROCK DEFECT SPACING	DEFECT DIP degrees	DEFECTS / NOTES	SAMPLE TYPE	TCR (%)	RQD (%)	DRILLING METHOD	CASING	BASE OF HOLE & WATER LEVEL	INSTALLATION DETAILS
	weathered.  J - very steeply inclined, moderately widely spaced, undulating smooth, narrow, calcite infill.		$\widetilde{\mathbb{Z}}$			MS	SW				PQ	70	7				
	Ispaced, undulating smooth, narrow, calcite infili.  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.	11-									PQ	100	32				
_	J3 - very steeply inclined, closely spaced, planar rough, narrow, weathered surface, silt infill.  Metasandstone Slightly weathered, light grey. Moderately strong, foliation, laminated, steeply inclined.	10												Rotary Coring			
	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)  Phyllite	12-				MS	sw				PQ	95	15	Tube, Wireline Rotary			
	Phyllite Slightly weathered, grey. Moderately strong, foliation, laminated, moderately inclined. Quartzofeldspathic banding very thin, moderately widely spaced.  Foliation - moderately inclined, closely spaced,	13-												PQ Size, Triple			
	planar smooth, very narrow, weathered surface.  J1 - Sub horizontal, widely spaced, undulating rough, weathered weak surface.										PQ	59	0				
	J3 - Sub horizontal, widely spaced, undulating rough, weathered weak surface.  Metasandstone Slightly weathered, light grey.	14-	$\approx$														
	Metasandstone Slightly weathered, light grey. Moderately strong, foliation, laminated, moderately inclined. Quartzofe/dspathic banding moderately thin, moderately widely spaced.		$\approx$								PQ	82	0				
	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.  END OF BOREHOLE AT 14.8m - Target Depth Reached	16															

 Notes:
 Started:
 21/08/2018
 Finished:
 22/08/2018

 Drilling Co.:
 McNeill
 Drilling Rig:
 UDR600



Project: Beaumont Bridge Replacement

Client: NZTA
Project No.: 6-CT012.00

Location: SH1 - Beaumont

Coordinates: 341514 E 804109 N

Ref. Grid: n/a

Not established

Depth: 14.8 m
Inclination: Vertical

R.L.: Datum:

# **PHOTOGRAPHS**



Photo BH08.1 0.0-4.7m



Photo BH08.2 4.7-7.0m

Notes:

BOREHOLE SOIL/ROCK LOG A4 BEAUMONT BRIDGE - SITE INVESTGATION INFORMATION. GPJ OPUS2016\_TEM.GDT 12/4/19

Started: 21/08/2018

Finished:

22/08/2018

Drilling Co.: McNeill

Drilling Rig:

UDR600

Logged by: Liam

Liam Abbot

Checked by:



Beaumont Bridge Replacement Project:

NZTA Client:

Project No.: 6-CT012.00

SH1 - Beaumont Location:

Coordinates: 341514 E 804109 N

Ref. Grid: n/a

R.L.:

Datum:

Depth: 14.8 m

Not established

Inclination: Vertical

# **PHOTOGRAPHS**



Photo BH08.3 7.0-9.5



Photo BH08.4 9.5-11.8m

Notes:

BOREHOLE SOIL/ROCK LOG A4 BEAUMONT BRIDGE - SITE INVESTGATION INFORMATION. GPJ OPUS2016\_TEM.GDT 12/4/19

Started: 21/08/2018 Finished:

22/08/2018

Drilling Co.: McNeill

UDR600 Drilling Rig:

Liam Abbot Logged by:

Checked by:

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



Project: Beaumont Bridge Replacement

Client: NZTA

Project No.: 6-CT012.00

Location: SH1 - Beaumont

Coordinates: 341514 E 804109 N

Ref. Grid: n/a

n/a

Depth: 14.8 m

Not established Inclination: Vertical

R.L.: Datum:

## **PHOTOGRAPHS**



Photo BH08.5 11.8-14.5m



Photo BH08.6 Box 6 14.5-14.8m

Notes:

BOREHOLE SOIL/ROCK LOG A4 BEAUMONT BRIDGE - SITE INVESTGATION INFORMATION.GPJ OPUS2016\_TEM.GDT 12/4/19

Started: 21/08/2018

Finished:

22/08/2018

Drilling Co.: McNeill

Drilling Rig: UDR600

Logged by:

Liam Abbot

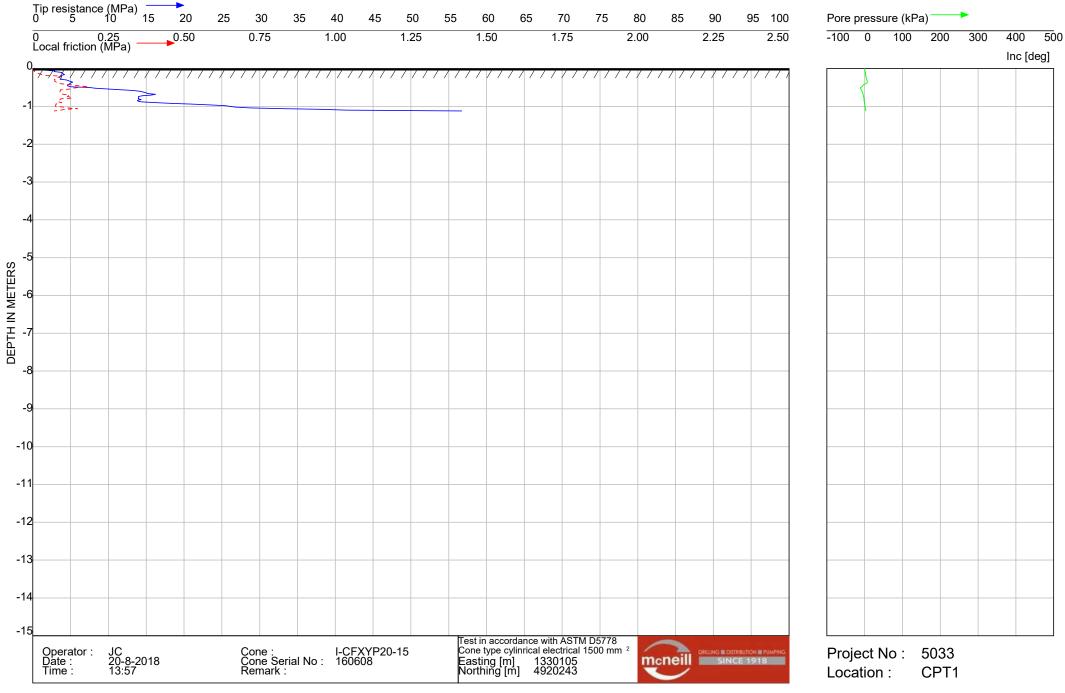
Checked by:

Sheet 5 of 5



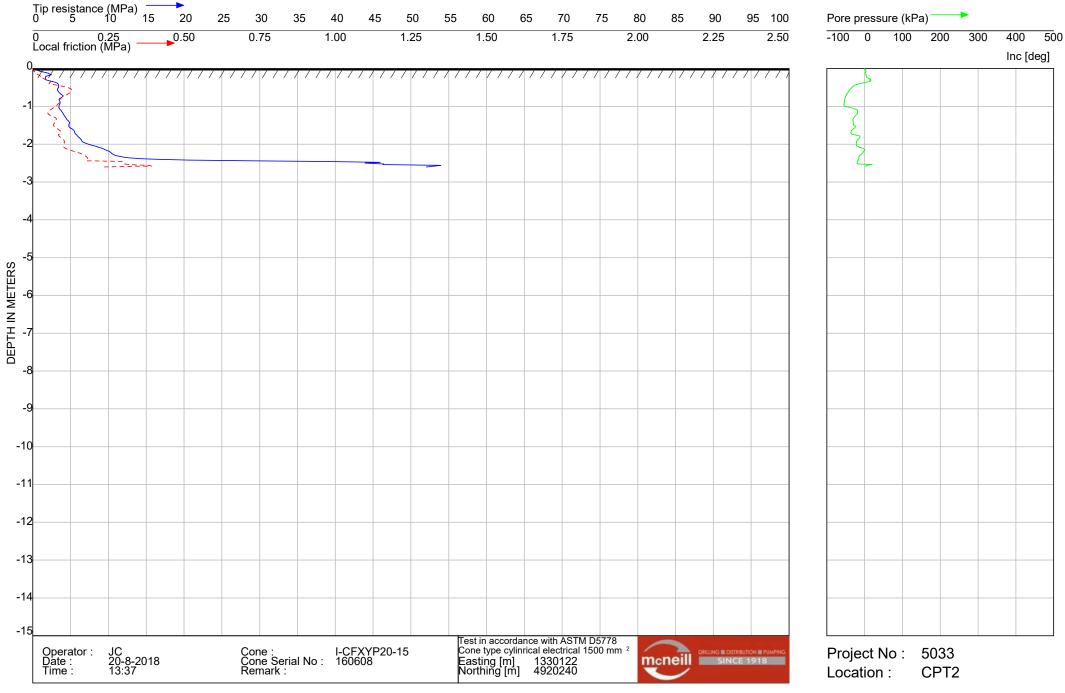
# Appendix C Cone Penetration Test Results

SH8 Beaumont Bridge Realignment Geotechnical Factual Report



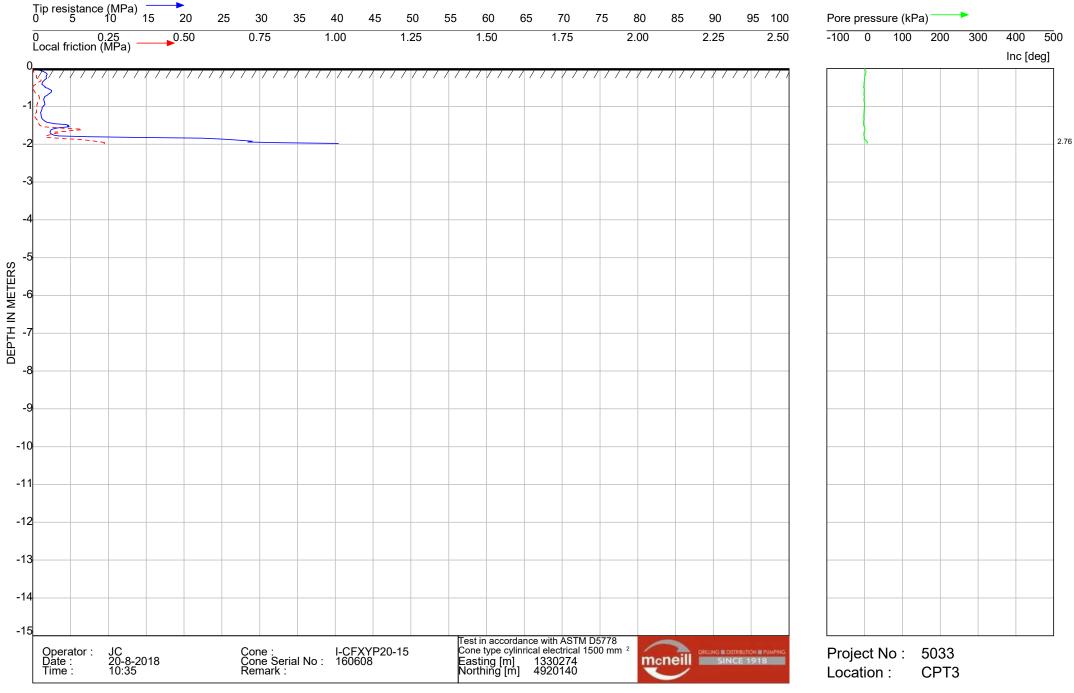
Client : Opus

Project: Beaumont Bridge



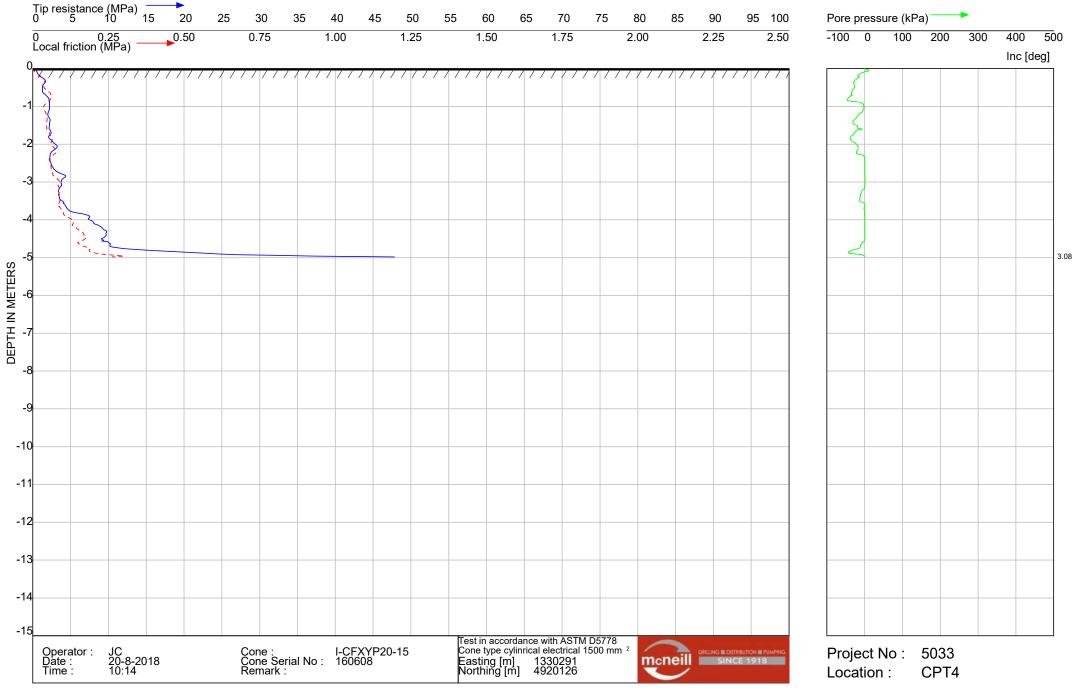
Client : Opus

Project : Beaumont Bridge



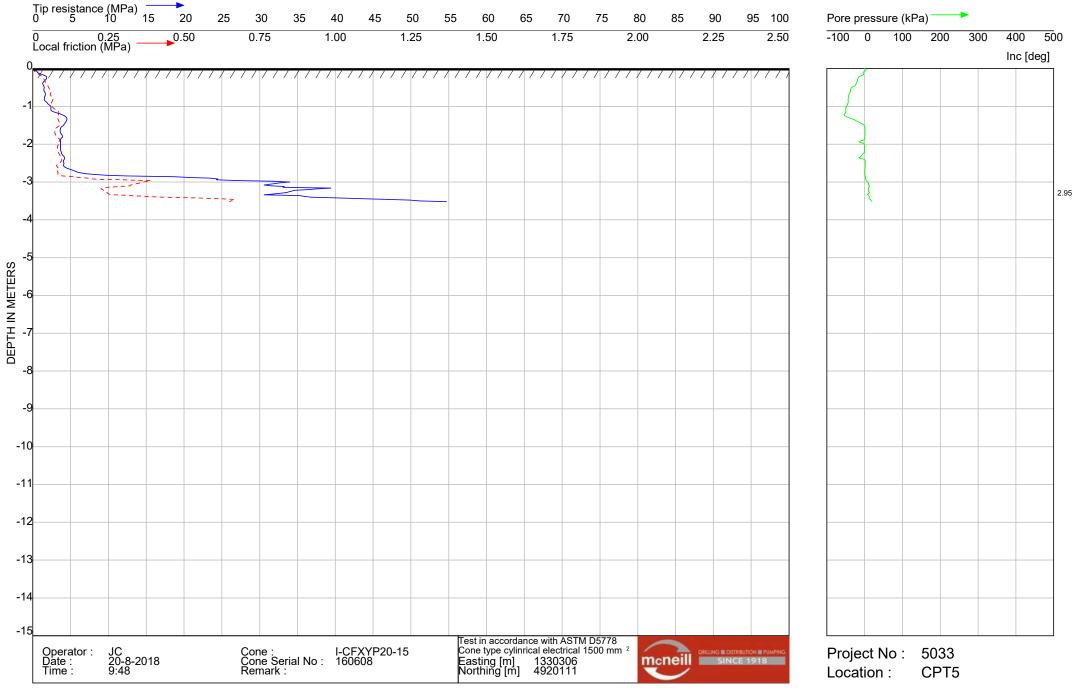
Client: Opus

Project: Beaumont Bridge



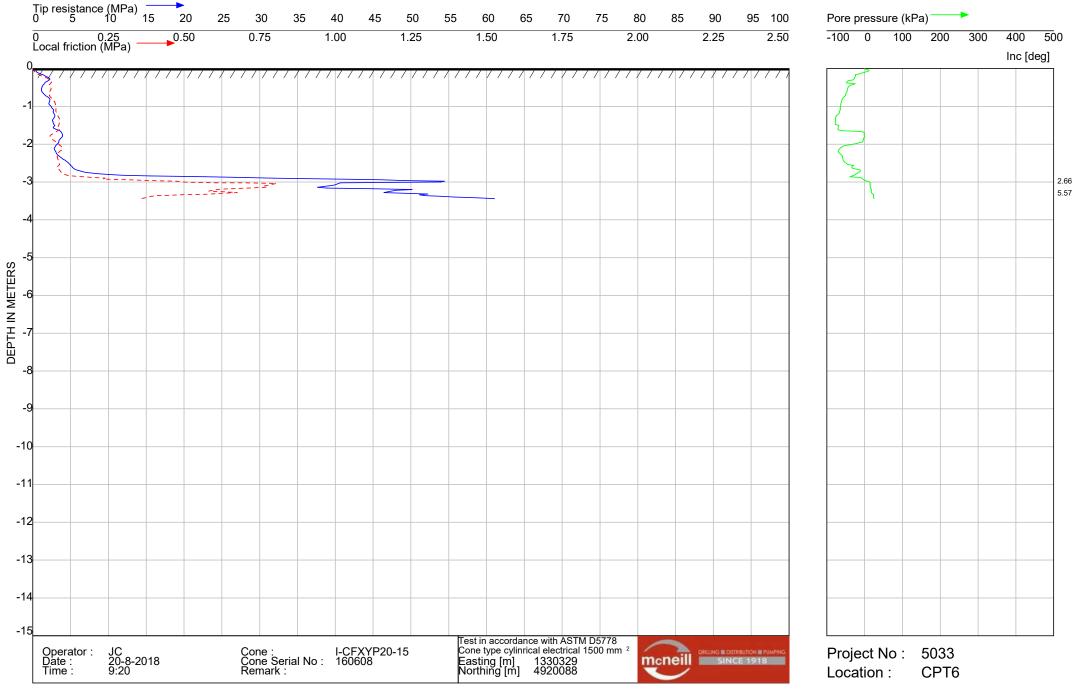
Client : Opus

Project : Beaumont Bridge



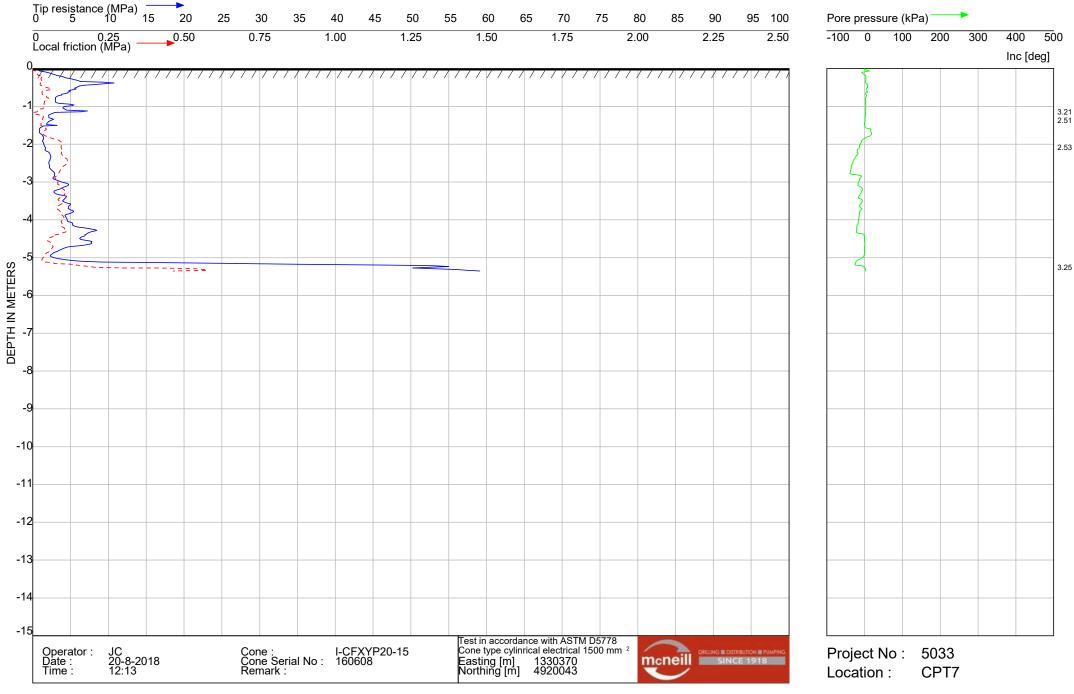
Client : Opus

Project : Beaumont Bridge



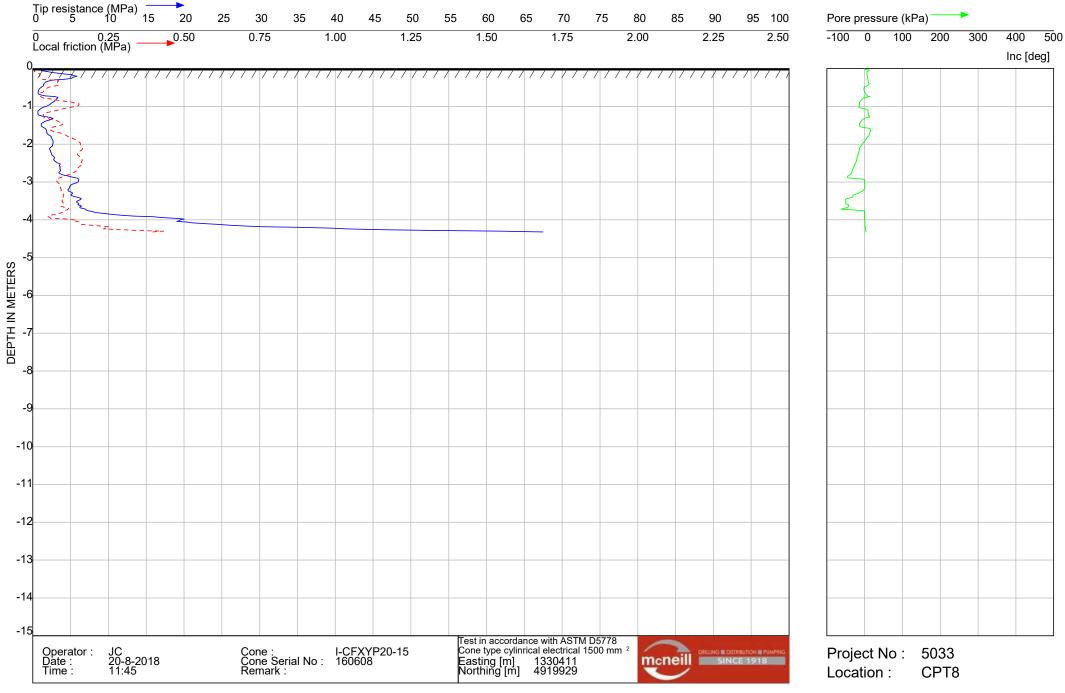
Client: Opus

Project: Beaumont Bridge



Client: Opus

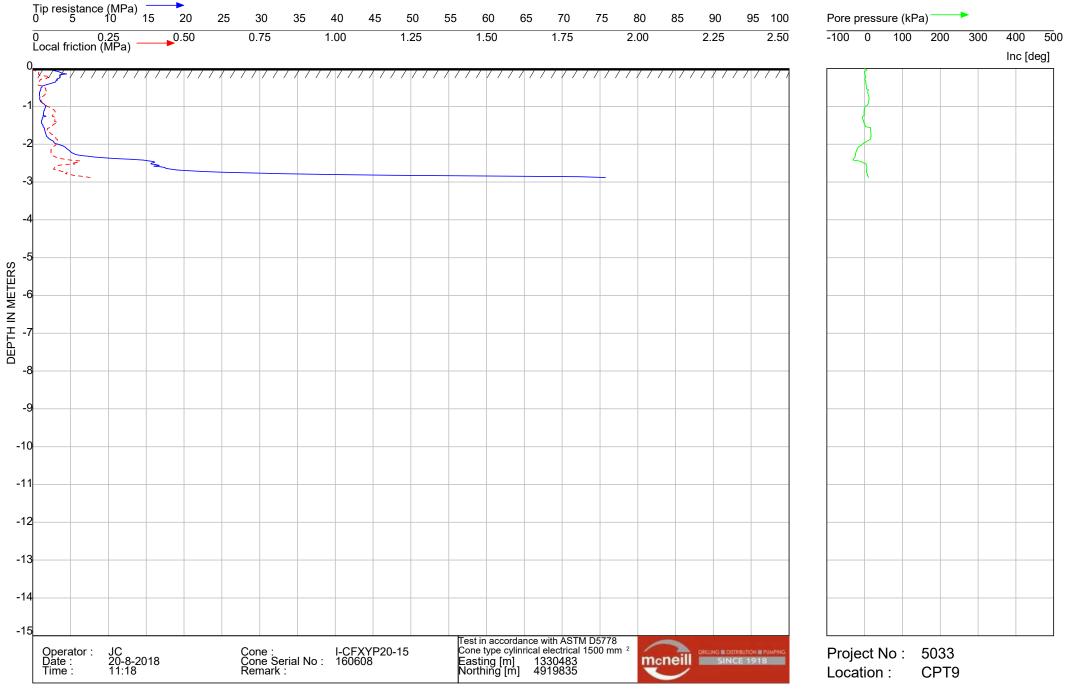
Project : Beaumont Bridge



PIEZO CONE PENETRATION TEST

Client : Opus

Project : Beaumont Bridge



PIEZO CONE PENETRATION TEST

Client : Opus

Project : Beaumont Bridge

# **TEST CERTIFICATE**

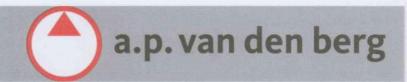
Icone (all versions)

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	/ GΩ
Straightness: Icone 5, 10 and 15 cm <sup>2</sup> 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.	8
Check alarm-settings Icone. Alarm values are set. (Kill Shutdown).	O.K.	8
Software version - check at opening screen. (from 18 Jan 2018 v. 2.3)	version: 2.3	5.3
Calibration date of Icone; check cone data [F1][F1].	Yes	7
Initial zero-Value Tip after calibration – within 1.0 % of nominal load.	O.K.	1
Initial zero-Value Local Friction after calibration – within 1.0% of nominal load.	O.K.	Š
Initial zero-Value Pore Pressure after calibration – within 1.0% of nominal load.	O.K.	8
Initial zero-Value Inclination X.	-1°< X <+1°	-0,4 0
Initial zero-Value Inclination Y.	-1° < Y <+1°	0.8 0
Measurements Tip resistance OK?	Tested range:	0-75 MP
Influence Tip load on Local Friction and Pore Pressure:	LF < 10 kPa	1 te Pa
Max. tip load: 5 cm <sup>2</sup> : 100 MPa; 10 cm <sup>2</sup> : 100 MPa; 15 cm <sup>2</sup> : 75 MPa.	PP <1/2% nom	1 KPa
Measurements local friction OK?	Tested range:	0- MP.
Local friction at max. load.	Tested value:	1,5 MP.
Measurements Pore Pressure OK?	Tested range:	0-2000 KI
Measure Pore Pressure to 150%.	Tested value:	3000 KI
Measurements Inclination OK?	Tested range:	±20°
Cone recognition on disconnecting and connecting Icone again?	Yes	8
Remarks:	1.00	

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

#### **Calibration Certificate**



Zero Value Cone Sleeve Pore(u2) 0.001 [MPa] 5, [kPa]

Ooll [MPa] Max. Deviation from Zero Value Cone

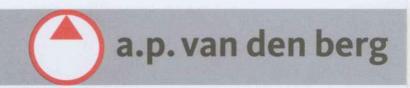
3.75 [MPa] Sleeve 0.05 [MPa]

Pore(u2) 100.0 [kPa]

Ref	Cone	Cone-Ref	Ref	Sleeve	Sleeve-Ref	
[MPa]	[MPa]	[kPa]	[MPa]	[MPa]	[kPa]	
0.006	0.008	2	0.000	0.001	1	
0.837	0.848	11	0.021	0.022	1	
1.559	1.578	19	0.043	0.044	1	
2.569	2.591	22	0.062	0.063	1	
5.443	5.471	28	0.121	0.123	2	
8.383	8.436	53	0.180	0.182	2	
13.760	13.829	69	0.266	0.269	3	
16.735	16.824	89	0.363	0.366	3	
28.115	28.199	84	0.474	0.477	3	
42.388	42.462	74	0.650	0.653	3	
54.335	54.383	48	0.831	0.834	3	
74.308	74.310	2	0.988	0.988	0	

Pore(u2)-Ref [kPa]	Pore(u2) [MPa]	Ref [MPa]
2	0.000	0.004
2	0.003	0.001
2	0.109	0.107
3	0.211	0.208
4	0.309	0.305
4	0.422	0.418
4	0.669	0.665
6	0.783	0.777
5	1.042	1.037
4	1.230	1.226
5	1.457	1.452
4	1.601	1.597
1	2.058	2.057

#### Data Sheet EN ISO 22476-1 2012 Class 2



A:

Cone Resistance

Accuracy Nom.Cone Resistance Max.Cone Resistance Effective Area 100.0 kPa or 5.0%

75 MPa 150 MPa 15 cm²

B:

**Local Friction** 

Accuracy Nom.Local Friction Max.Local Friction Effective Area 15.0 kPa or 15.0%

1.00 MPa 1.5 MPa 225 cm<sup>2</sup>

C:

Pore Water Pressure

Accuracy Nom.Pore Water Pressure Max.Pore Water Pressure 25.0 kPa or 3.0%

2 MPa 3 MPa

D:

Inclination X

Accuracy Nom.Inclination X Max.Inclination X 1.0°

20° 25°

E:

Inclination Y

Accuracy Nom.Inclination Y Max.Inclination Y 1.0° 20°

25°

Date : 01 February 2018

Ordernr : 78287 Regel/Pos. : 20



#### **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**



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 160608-2

Certificate number: Client:

McNeills Drilling Co Ltd

#### 1.2 Calibration equipment

Autolog 3000

SN2090011 SN2090011

SN2090011

calibrated

August 2016 (Peekel: EA 44251) August 2016 (Peekel: EA 44251)

August 2016 (Peekel: EA 44251)

Reference Loadcell 100kN H54435 Reference Loadcell 20kN D16200 Reference Sensor 40 Bar 4318470 Reference ACS-080-2-SC00-HE 08/11 470480 Reference ACS-080-2-SC00-HE 08/11 470480 August 2016 (HBM: 56471 2016-08) August 2016 (HBM: 56490 2016-08) August 2015 (Trescal: 1607-12075) February 2015 (Trescal: 1502-10558) 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 01/02/2018

Date: Signature:

QA Manager:

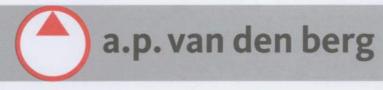
Date:

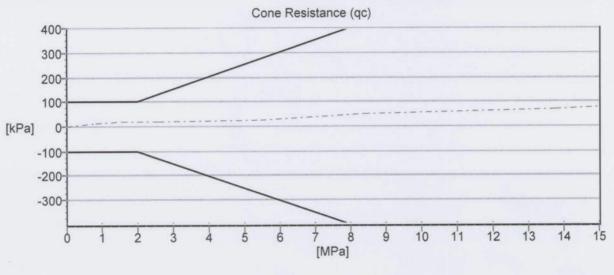
N.R.E. de Jong 01/02/2018

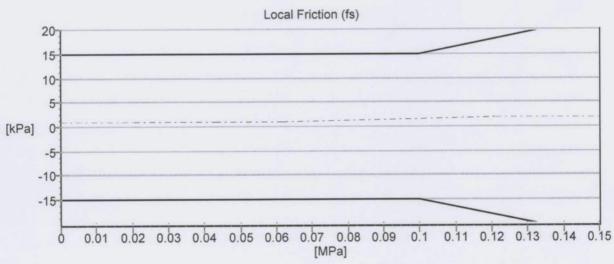
Signature:

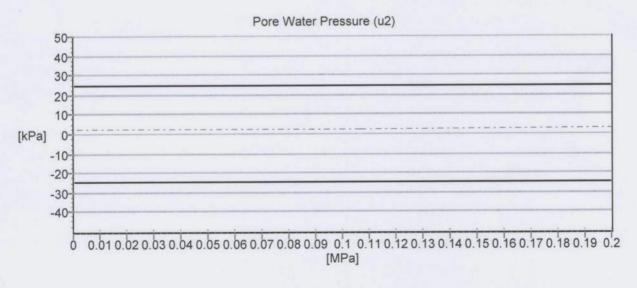
page 174

#### **Calibration Certificate**









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



# Appendix D Test Pit Logs and Photographs

SH8 Beaumont Bridge Realignment Geotechnical Factual Report

Page 1 of 30 Pages

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 Acci	redited (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.	





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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; A	djacent S	H8 - I	ncreasin	g Side	)							
	A PENETROMETER NZS 4402:1988, Test					In	nferr	ed CI	BR V	alue				
Depth (mm)	Penetration (mm/blow)	Inferred CBR <sup>1</sup>	-	0	5 Start Dep	10 t <b>h</b> = 0mr	15 n	20	25	30	35	40	45	50
0 - 50	25.0	8				J								
50 - 100	50.0	3.5		100										
100 - 150	25.0	8		100										
150 - 200	25.0	8												
200 - 250	25.0	8		200					-					
250 - 300	50.0	3.5				1								
300 - 350	25.0	8	]											
350 - 400	50.0	3.5	]	300										
400 - 450	33.3	6	]			J								
450 - 500	33.3	6		400										
500 - 550	12.5	18		400										
550 - 600	7.1	33	(mi											
600 - 650	8.3	28	Depth (mm)	500					_			_		_
650 - 700	3.6	>50	epth											
700 - 750	1.9	>50	Ã								]			
750 - 800	1.1	>50		600							-			
Refusal										4				_
				700							650mi	n - 8001	nm=>	50
Note: ¹ CBR value Design Ma	es have been inferred fron nual (2012) – Fig 5.3 (No	n AustRoads Pavement t IANZ Accredited).		800										
				900										
				1000										

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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		

Job Description	on:   SH8 Beaumont Bridge Replacement Investigation	ns; Job No: 0-C1012.01 00008
		- SH8 End (see below)
<b>D</b> 41 ( )		edited (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.	
before dig.		To the transfer to the state of
ENSTING SERVICES LEGISLATION OF PROPERTY OF THE PROPERTY OF TH	TOTAL STATE OF THE PROPERTY OF	

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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; De	ee Street -	SH8 I	End (see	below	7)							
	A PENETROMETER NZS 4402:1988, Test					In	ferr	ed Cl	BR V	alue				
Depth (mm)	Penetration (mm/blow)	Inferred CBR <sup>1</sup>		0		10 epth = 0	15 mm	20	25	30	35	40	45	50
0 - 50	100.0	1.5												
50 - 100	100.0	1.5		100										
100 - 150	50.0	3.5		100										
150 - 200	50.0	3.5												
200 - 250	25.0	8		200										
250 - 300	25.0	8												
300 - 350	12.5	18												
350 - 400	16.7	13		300		-								
400 - 450	12.5	18				١,								
450 - 500	10.0	23												
500 - 550	6.3	38		400										
550 - 600	8.3	28	m)						1					
600 - 650	8.3	28	Depth (mm)	500										
650 - 700	5.0	50	pth	200										
700 - 750	2.4	>50	De									1		
750 - 800	2.5	>50		600										
800 - 850	2.5	>50												
Refusal														
				700							700mm	950		
	s have been inferred fron nual (2012) – Fig 5.3 (No			800							700mm	1-83011	III 3	
Design Mui	mm (2012) – Fig 3.3 (N	n 12112 Attreuweu).		900										
				1000										

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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 3; Dee Street – West	
Depth (mm)	FIELD LOG DESCRIPTIONS – Not IANZ Accr Description	edited (NZ Geotechnical Society Guidelines 2005)
Deptii (iiiii)	Description	
0 - 230	Topsoil & vegetation (organic matter).	Sind Control of the C
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.	
Defore (dig. Cons.)  See 1997 Under Arte Cons.  When the Art 1997 In the Arte Cons.  When the Art 1997 In the Arte Cons.  Arte	THE INTERIOR OF THE PROPERTY OF THE INTERIOR O	

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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		

Job Description:	Sho beaumont bi	ridge Replacement Inv					1000					
	A PENETROMETER NZS 4402:1988, Test		ee Street –	westie	rry Stre	Inferre	ed CBI	R Valu	e			
Depth (mm)	Penetration (mm/blow)	Inferred CBR <sup>1</sup>		0		10 15 Depth = 0mm	20	25 30	35	40	45	50
0 - 50	50.0	3.5			4							
50 - 100	25.0	8		100								
100 - 150	25.0	8										
150 - 200	25.0	8										
200 - 250	10.0	23		200			_					-
250 - 300	6.3	38	_							_		
300 - 350	5.0	50	_									
350 - 400	2.3	>50	_	300								
400 - 450	1.3	>50	_									<b>\</b>
Note: <sup>1</sup> CBR value: Design Man	s have been inferred fron nual (2012) – Fig 5.3 (No	n AustRoads Pavement nt IANZ Accredited).	Depth (mm)	500 - 600 - 700 - 800 -								
				900								
				1000							ancana	

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# TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

<b>Client Details:</b>	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 - Increasi	ing Side (Opposite Beaumont Hotel)
		redited (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.	The state of the s
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.	Control of Control of
1850 - 2000	Bedrock – Schist.	
before dig.  Cons.  Con	THE LINE	
EXISTING SERVICES LEGEND  T CHARGE (PRINCE LEGEND  F POWER - LOW YOUTSEE  F POWER - HORY VOLTAGE  F POWER - HORY VOLTAGE	The state of the s	

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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		

	Toot	Pit 4; Adjacent SH8 -	Increasing Si	do (O	nno	rito D	001112	aont	Цо	tol)					
	A PENETROMETER NZS 4402:1988, Test	RESULTS	Thereasing Si	ue (O	ppos	site D				R Val	ue				
Depth (mm)	Penetration (mm/blow)	Inferred CBR <sup>1</sup>		0		5 1	0 15	5 2	0	25	30	35	40	45	50
0 - 50	8.3	28			Star	СОСРИ	- omm								
50 - 100	8.3	28		100						+					
100 - 150	16.7	13													
150 - 200	16.7	13		200											
200 - 250	16.7	13													
250 - 300	16.7	13		300		T									
300 - 350	25.0	8													
350 - 400	25.0	8		400											
400 - 450	100.0	1.5		500											
450 - 500	100.0	1.5		500											
500 - 550	25.0	8	(1)	600											
550 - 600	25.0	8	Depth (mm)	000			_								
600 - 650	25.0	8	epth	700				_							
650 - 700	16.7	13	Ď					L							
700 - 750	12.5	18	-	800											
750 - 800	7.1	33	-												
800 - 850	6.3	38		900											
850 - 900	7.1	33	_										+		
900 - 950	7.1	33	_	1000											
950 - 1000	3.3	>50	-								9	50mm	- 1150	nm=>5	50
1000 - 1050	2.1	>50		1100											
1050 - 1100	1.7	>50	-												
1100 - 1150	2.1	>50	-	1200									-		
	rs have been inferred from nual (2012) – Fig 5.3 (No			1300											

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Date: 14 September 2018

# TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

<b>Client Details:</b>	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)
		edited (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.	10000000000000000000000000000000000000
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.	The Part of the Pa
1200 - 1300	Bedrock – schist.	Control of the second
Defore ( dig. Co.n	The state of the s	Hananananan Bananan Ramanan Ra

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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	Increa	sing Si	de							
	A PENETROMETER NZS 4402:1988, Test				Infe	rred	CBR	Val	lue				
Depth (mm)	Penetration (mm/blow)	Inferred CBR <sup>1</sup>	0	5 Start	10 1  Depth = 0	5 20	0 2	5	30	35	40	45	50
0 - 50	50.0	3.5		1									
50 - 100	50.0	3.5	100										
100 - 150	50.0	3.5		۲									
150 - 220	70.0	2.5	200	_									
220 - 360	140.0	1.0											
360 - 460	100.0	1.5	300										
460 - 520	60.0	3.0	_										
520 - 565	45.0	4.0	400										
565 - 600	35.0	5		٦									
600 - 650	33.3	6	500	5									
650 - 700	33.3	6		4									
700 - 750	25.0	8	600										
750 - 800	25.0	8	<u> </u>										
800 - 850	25.0	8	Depth (mm)										
850 - 900	7.1	33	# \$00 B										
900 - 950	5.0	50	Del										
950 - 1000	3.3	>50	900										_
1000 - 1050	3.1	>50	900										
1050 - 1100	3.8	>50	1000										
1100 - 1150	5.0	50							9	50mm	- 1100n	nm=>50	0
1150 - 1200	4.5	>50	1100										J
1200 - 1250	3.8	>50											Į
1250 - 1300	1.3	>50	1200						_				
Refusal									1	150mn	ı - 1300n	nm=>5	0
	s have been inferred froi		1300										
Design Mar	nual (2012) – Fig 5.3 (No	ot IANZ Accredited).	1500										

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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		

		Increasing Side (see below)
		redited (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.	The state of the s
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.	Janaan Za
1500 +	Bedrock.	To the second se
Defore Adjournment of Control	TO THE PROPERTY OF THE PROPERT	TO TO THE TOTAL PROPERTY OF THE PARTY OF THE

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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 6; Adjace	nt SH2 - I	ncressin	o Sid	le (see l	elov	v)						
	A PENETROMETER NZS 4402:1988, Test	RESULTS	Inferred CBR Value											
Depth (mm)	Penetration (mm/blow)	Inferred CBR <sup>1</sup>		0	0	5 10 Start Dep	15 th = 0n	20 am	25	30	35	40	45	50
0 - 150	150.0	1.0												
150 - 320	170.0	1.0		100										
320 - 400	80.0	2.0		200										
400 - 465	65.0	2.5		200										
465 - 530	65.0	2.5		300										
530 - 590	60.0	3.0			ነ									
590 - 630	40.0	5		400	Ц									
630 - 670	40.0	5												
670 - 700	30.0	7		500										
700 - 750	16.7	13			1									
750 - 800	25.0	8	-	600	L									
800 - 850	12.5	18	-	(mi		L								
850 - 900	16.7	13	-	Depth (mm)							-		-	
900 - 950	7.1	33	-	)ept										
950 - 1000	1.9	>50	-	800										
1000 - 1050	1.9	>50	-				$\Box$	_						
1050 - 1100	1.6	>50	-	900							$\vdash$			
Refusal											۲			
				1000							950mm	- 1100n	ım =>5	50
Note: <sup>1</sup> CBR values have been inferred from AustRoads Pavement Design Manual (2012) – Fig 5.3 (Not IANZ Accredited).				1100										
				1200										
				1300										
				1400										

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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		

ŗ		; Corner Section SH8 and Rongahere Road (see below)
		edited (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.	Zin Zin
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.	
Defore Adjance Concerns to the	THE LITTLE STATE OF THE LI	ATT THE THE THE THE THE THE THE THE THE T

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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		

Job Description: SH8 Beaumont Bridge Replacement Investigations; Job No: 6-CT012.01 00008									
	Test Pit 7; Adjace	nt SH8 - Decreasing Si	ide in Paddock;	Corner Section SH8 and Rongahere Road					
	A PENETROMETER NZS 4402:1988, Test	RESULTS		Inferred CBR Value					
Depth (mm)	Penetration (mm/blow)	Inferred CBR <sup>1</sup>	0	5 10 15 20 25 30 35 40 45 50					
0 - 50	100.0	1.5	0 [	5 10 15 20 25 50 55 40 45 50					
50 - 100	100.0	1.5		Start Depth = 0mm					
100 - 150	16.7	13	100						
150 - 200	16.7	13	1						
200 - 250	16.7	13	200						
250 - 300	12.5	18							
300 - 350	8.3	28	300						
350 - 400	10.0	23							
400 - 450	7.1	33	400						
450 - 500	7.1	33							
500 - 550	4.2	>50	500	500mm - 550mm =>50					
550 - 600	25.0	8	-						
600 - 650	50.0	3.5	600						
650 - 700	50.0	3.5	700						
700 - 750	50.0	3.5	700						
750 - 800	25.0	8	900						
800 - 850	25.0	8	800						
850 - 900 900 - 950	25.0	8	900						
950 - 950	50.0 50.0	3.5 3.5	900						
1000 - 1050	25.0	8	1000						
1050 - 1100	25.0	8	1000						
1100 - 1150	25.0	8	<b>=</b> 1100						
1150 - 1200	16.7	13	mm 1200 - 1300 -						
1200 - 1250	16.7	13	= 1200						
1250 - 1300	16.7	13	th						
1300 - 1350	25.0	8	a 1300						
1350 - 1400	16.7	13	9						
1400 - 1450	12.5	18	1400						
1450 - 1500	16.7	13							
1500 - 1550	12.5	18	1500						
1550 - 1600	16.7	13							
1600 - 1650	10.0	23	1600						
1650 - 1700	12.5	18							
1700 - 1750	8.3	28	1700						
1750 - 1800	16.7	13							
1800 - 1850	10.0	23	1800						
1850 - 1900	8.3	28	4000						
1900 - 1950	12.5	18	1900						
1950 - 2000 2000 - 2050	16.7 12.5	13 18	2000						
2050 - 2100	12.5	18	2000						
2100 - 2150	12.5	18	2100						
2150 - 2200	12.5	18	2100						
2200 - 2250	10.0	23	2200						
2250 - 2300	10.0	23	2200						
2300 - 2335	1.8	>50	2300						
			1	2300mm - 2335mm =>50					
7			2400						
	es have been inferred from								
Design Ma	nual (2012) – Fig 5.3 (No	t IANZ Accredited).							
i			i e						

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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						

	EIELD LOC DESCRIPTIONS No.4 14 NZ	dock; Corner Section SH8 and Rongahere Road (see below) Accredited (NZ Geotechnical Society Guidelines 2005)
Depth (mm)	Description	Accredited (NZ Geotechnical Society Guidelines 2005)
0 - 150	Topsoil & vegetation (organic matter).	
150 +	Bedrock – Schist.	7 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
		3 26 29 24 25 25 25 25 25 25 25 25 25 25 25 25 25
		<b>2 2 3 3 3 3 3 3 3 3 3 3</b>
before dig. Co.ns.		
TO PRODUCE LEGENDARY STREET, TO THE PRODUCE LEGENDARY STREET, TO T	Hypopus Stayenson and Stayenso	PE JIM

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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. I	Box 273, Alexandra		Attention:	R. Bond
<b>Job Description:</b>	SH8 Beaumont Br	ridge Replacement Inv	vestigations; Job No: 6-CT012.01 00008		
	Test Pit 8: Adiacer	nt SH8 - Decreasing Si	ide in Paddock; Corner Section SH8 and	Rongahere Ro	ad
SCALA	PENETROMETER	RESULTS		<b>g</b>	
(1	NZS 4402:1988, Test	6.5.2)			
Depth	Penetration	Inferred			
(mm)	(mm/blow)	CBR <sup>1</sup>			
, ,	(				
			Bedrock - No scala pe	notromotor tos	<b>+ 1</b>
			Deurock - No scala pe	neti ometer tes	
	s have been inferred from nual (2012) – Fig 5.3 (No				
Design Man	nuai (2012) – Fig 5.5 (No	i 1AINL Accreatica).			

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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		

n		
		c; Corner Section SH8 and Rongahere Road (see below)
<b>D</b> (1 ( )		edited (NZ Geotechnical Society Guidelines 2005)
Depth (mm)	Description	SANTE STORY
0 - 200	Topsoil & vegetation (organic matter).	
	Grey Sandy GRAVEL with minor silt / clay. Wet. Compact / Loose. Gravel, subrounded to rounded,	
200 - 410	maximum particle size 19.0mm; Sand, fine to coarse;	
	Silt, slight plasticity.	A CONTRACT OF THE PARTY OF THE
	Grey SILT with minor sand, minor clay and trace of gravel. Gravel, subrounded to rounded, maximum	G G G G G G G G G G G G G G G G G G G
410 - 700	particle size 13.2mm; Sand, fine to coarse; Silt,	
	plastic.	
700 000	Mottled orange / light greyish brown SILT with trace	
700 - 900	of sand and trace of / minor clay. Moist / Wet. Soft. Sand, fine to coarse; Silt, plastic.	
	Greenish / brownish grey SILT with minor clay,	
900 - 1150	minor sand, trace of / minor gravel. Gravel,	B3 22 23 23 24 24 24 24 24 24 24 24 24 24 24 24 24
700 1100	subrounded to rounded, maximum particle size	到156日在15日间,15日间,15日间,15日间,15日间,15日间,15日间,15日间,
	63.0mm; Sand, fine to coarse; Silt, plastic.	75
1150 - 1400	Bedrock.	
before dig.  Con Time To Control Contr	THE INTERIOR OF THE INTERIOR O	P. P. P. P. P. P. P. P. P. P. P. P. P. P

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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		

Job Description:	•	ridge Replacement In										_	_			
	Test Pit 9; Adjace A PENETROMETER NZS 4402:1988, Test		ide in Pa	iddock; (	<u> or</u>	ner S				BR V			e Ko	ad		
Depth (mm)	Penetration (mm/blow)	Inferred CBR <sup>1</sup>		0	0	5 Start I	10 Depth = 0	15 mm	20	25	3	0	35	40	45	50
0 - 100	100.0	1.5														
100 - 150	50.0	3.5		100	L	1										
150 - 200	25.0	8				4	٦									
200 - 250	25.0	8		200												
250 - 300	25.0	8	_													
300 - 350	25.0	8		***												
350 - 400	12.5	18		300												
400 - 450	25.0	8							No. of Contrast of Contrast							
450 - 600	150.0	1.0		400					1							
600 - 650	50.0	3.5			┟┌		J									
650 - 700	50.0	3.5		500	#											
700 - 750	50.0	3.5		(I)												
750 - 800	50.0	3.5		Depth (mm)	L											
800 - 850	50.0	3.5		pth												
850 - 900	50.0	3.5														
900 - 950	10.0	23		700												
Refusal																
				800	-								-	-		
				900		Щ										
Note: 1 CRR value	s have been inferred fron	n AustRoads Pavement														
Design Mar	nual (2012) – Fig 5.3 (No	ot IANZ Accredited).		1000												
				1100	-	-		-								
				1200												
				1200											manual Control	

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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 10; Adjacent SH8 – Increasing Sid	le, Western Side of Existing Bridge (see below)
	FIELD LOG DESCRIPTIONS - Not IANZ Acc	credited (NZ Geotechnical Society Guidelines 2005)
Depth (mm)	Description (as per photograph – Clutha river side)	人名 · · · · · · · · · · · · · · · · · · ·
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.	George Co.
600 - 2200	Light orangish / yellowish brown SILT with trace of sand and trace of clay. Moist. Firm. Sand, fine; Silt, plastic.	0.0 mg 1.
Depth (mm)	Description (Hotel side of test pit – not visible)	444
0 - 2200	Schist bedrock	Page 1940
		a again





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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		

Job Description	: SH8 Beaumont B	ridge Replacement In	nvestigations; Job No: 6-CT012.01 00008
	SC	ALA PENETROMET	TER RESULTS (NZS 4402:1988, Test 6.5.2)
	Test Pit	10; Adjacent SH8 – I	Increasing Side, Western Side of Existing Bridge
Depth	Penetration	Inferred	
(mm)	(mm/blow)	CBR 1	Inferred CBR Value
0 - 50	10.0	23	
50 - 100	25.0	8	
100 - 150	33.3	6	0 5 10 15 20 25 30 35 40 45
150 - 200	33.3	6	0 Start Depth = 0mm
200 - 250	25.0	8	
250 - 300	50.0	3.5	100
300 - 350	33.3	6	200
350 - 400	33.3	6	200
400 - 450	50.0	3.5	300
450 - 500	50.0	3.5	
500 - 550	50.0	3.5	400
550 - 600	50.0	3.5	
600 - 650	33.3	6	500
650 - 700	33.3	6	600
700 - 750 750 - 800	33.3 33.3	6	-
800 - 850	25.0	8	700
850 - 900	25.0	8	-
900 - 950	25.0	8	800
950 - 1000	25.0	8	900
1000 - 1050	25.0	8	900
1050 - 1100	16.7	13	1000
1100 - 1150	16.7	13	<del> </del>
1150 - 1200	12.5	18	1100
1200 - 1250	16.7	13	1200
1250 - 1300	16.7	13	1200
1300 - 1350	16.7	13	<b>E</b> 1300
1350 - 1400	16.7	13	1300 1400 1500
1400 - 1450 1450 - 1500	16.7 25.0	13 8	1400
1500 - 1550	16.7	13	1500
1550 - 1600	25.0	8	0 1500
1600 - 1650	16.7	13	1600
1650 - 1700	16.7	13	
1700 - 1750	16.7	13	1700
1750 - 1800	12.5	18	1800
1800 - 1850	16.7	13	1800
1850 - 1900	16.7	13	1900
1900 - 1950	16.7	13	
1950 - 2000	25.0	8	2000
2000 - 2050	16.7	13	2100
2050 - 2100	12.5	18	2100
2100 - 2150 2150 - 2200	12.5 12.5	18 18	2200
2200 - 2250	12.5	18	_
2250 - 2300	12.5	18	2300
2300 - 2350	12.5	18	2400
2350 - 2400	12.5	18	2400
2400 - 2450	10.0	23	2500
2450 - 2500	10.0	23	
2500 - 2550	12.5	18	2600
2550 - 2600	10.0	23	2650mm - 2700mm = >50
2600 - 2650	10.0	23	2700 2650mm - 2700mm = >50
2650 - 2700	2.6	>50	2800
	es have been inferred from		
Design Ma	nual (2012) – Fig 5.3 (No	ot IANZ Accredited).	

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# **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

			40							:	SOII	L TE	STS		
GEOLOGY	DEPTH (m)	DESCRIPTION	GRAPHIC LOG	WATER LEVEL	R.L. (m)	DEPTH (m)	0 2	ows	per	mm			SHEAR STRENGTH (kPa)	OTHER TESTS	SAMPLES
	_	TOPSOIL; Sandy SILT with rootes and rootlets; dark brown. Soft; moist; sand, fine to medium.	7 717 7			_		İ				Ţ			
		Silty fine SAND; light brownish grey. Loose; moist.	× × × × × × × × × × × × × × × × × × ×			-									
	1— — — — —	Silty fine to coase GRAVEL; light brown. Loose moist; rounded to sub rounded.  Gravel decreasing  Silty fine SAND; light brownish grey. Loose; moist.	× × × × × ×	▼		1									
	2— - - - -	Fine to coarse GRAVEL with some sand and cobbles; orangish brown.  Loose; saturated; rounded to sub rounded.  Cobbles increasing		1.8m 25/10		- 2- - - -									
		SCHIST END OF PIT AT 2.61m - Target Criteria Achieved	/												
	3— - - - - -	END OF FIT AT 2.0 IIII - Target Official Achieved				3									
	4— - - - -					4— - - - -									
	_					- - -									

Notes:

Date Tested: 25/10/2018

Excavator:

Tested by: LA Checked by: NT





Project: SH 8 Beaumont Bridge Replacement

Client: NZTA

Project No.: 6-CT012.01

Location: Beaumont

Coordinates: 341243 E 804505 N
Ref. Grid: North Taieri 2000
R.L.: Not established

### PIT PHOTOGRAPH



TP 11

Excavator:

Notes: Date Tested: 25/10/2018

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

Checked by:

NT



# **Test Pit No. TP 12**

Coordinates: 341236 E 804489 N SH 8 Beaumont Bridge Replacement Project:

NZTA Ref. Grid: North Taieri 2000 Client: Project No.: 6-CT012.01 R.L.: Not established

Beaumont Location:

				,						S	OIL TI	ESTS		
GEOLOGY	DEPTH (m)		GRAPHIC LOG	WATER LEVEL	R.L. (m)	DEPTH (m)	sc		ENETI		TER	SHEAR STRENGTH (KPa)	OTHER TESTS	SAMPLES
9	ᆸ	DESCRIPTION		*	굔	8	0 2	4 6	8 10 1	2 14 10	18 20	동안동	5#	S
	- -	TOPSOIL; SILT with roots and rootlets; dark brown. Soft to firm; moist.	7 7 7 7 7 7 7 7			-								
	- - -	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								
	-		0000			-	1							
		END OF PIT AT 2.8m - Collapse					İ				İ			
	3-					3-								
	_ - -					_ - -		i i						
	4					4— - - -		i i			1			
	- - - - -					- - - -								
	-					+								

Notes:

25/10/2018 Date Tested:

Excavator:

LA Tested by: NT Checked by:

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





Project: SH 8 Beaumont Bridge Replacement

Client: NZTA

Project No.: 6-CT012.01

Location: Beaumont

Coordinates: 341236 E 804489 N
Ref. Grid: North Taieri 2000
R.L.: Not established

### PIT PHOTOGRAPH



TP 12

Excavator:

Notes: Date Tested: 25/10/2018

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

Checked by:

NT



# Test Pit No. TP 13

Coordinates: 341227 E 804473 N SH 8 Beaumont Bridge Replacement Project:

NZTA Ref. Grid: North Taieri 2000 Client: Project No.: 6-CT012.01 Not established R.L.:

Beaumont Location:

											5	SOIL	_ TE	STS		
GEOLOGY	DEPTH (m)		GRAPHIC LOG	WATER LEVEL	(m)	DEPTH (m)	S	CALA (BI		NETR			R	SHEAR STRENGTH (kPa)	TS TS	SAMPLES
GEO	DEP	DESCRIPTION	GRA	WAT	R.L. (m)	DEP	0 :	2 4 6	8 8	10 12	2 14 1	16 18	3 20	STR (KPa	OTHER TESTS	SAM
		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.	** Ox= Ox **			1— - - -										
	<u> </u>	SCHIST END OF PIT AT 1.41m - Target Criteria Achieved	/													
	- 2 <del>-</del> -					2— 										
	-					- - -										
	3— - -					3— - -										
						- - -		 		         						
	- 4- -					4 <del></del>										
	-					- - -					į					
	-					- - -			i		į					

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

LA Tested by: NT Checked by:

Date Tested:

Excavator:

25/10/2018





Project: SH 8 Beaumont Bridge Replacement

Client: NZTA

Project No.: 6-CT012.01

Location: Beaumont

Ref. Grid: North Taieri 2000 R.L.: Not established

Coordinates: 341227 E 804473 N

### 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

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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 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 Description	edited (NZ Geotechnical Society Guidelines 2005)
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.	
NEY  Call Charles  Refer the stress  A Call Charles  Refer the stress  Refer the str		The transfer to the transfer t

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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		

	A PENETROMETER NZS 4402:1988, Test	RESULTS		,		Section SH Inferre						
Depth (mm)	Penetration (mm/blow)	Inferred CBR <sup>1</sup>		0	5 Star	10 15	20	25 3	0 35	40	45	50
0 - 85	85.0	2.0			-							
85 - 150	65.0	2.5			Ĺ							
150 - 200	50.0	3.5		100								
200 - 250	50.0	3.5			Ц.							
250 - 340	90.0	2.0										
340 - 415	75.0	2.5		200								
415 - 480	65.0	2.5										
480 - 520	40.0	5		200								
520 - 550	10.0	23		300								
550 - 600	5.6	44			ነ							
600 - 650	3.1	>50		400								
650 - 700	3.6	>50		400	1							
700 - 750	2.2	>50	n)									
750 - 780	0.9	>50	Depth (mm)	500	5							
Refusal			pth		-							
Note: <sup>1</sup> CBR values have been inferred from AustRoads Pavement Design Manual (2012) – Fig 5.3 (Not IANZ Accredited).		Dé	600 - 700 - 800 -					6001	mm - 7801	mm=>5	0	
				900 -								

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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		

		easing Side in Paddock (see below)
D (I ( )		redited (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.	
	MATERIAL SET SET SET SET SET SET SET SET SET SET	Committee fills and the self south s

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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

Depth	; Adjacent SH8 – Inc Penetration	Inferred				697 - 11000		,			
(mm)	(mm/blow)	CBR 1			In	ierred (	CBR Val	ue			
0 - 75	75.0	2.5	22								
75 - 100	25.0	8	0	0 5	10	15 20	2.5	30 35	40	45 50	
100 - 150	10.0	23		Sta	rt Depth =	0mm					
150 - 200	4.2	>50	100								
200 - 250	3.1	>50	200					150n	nm - 350mr	m=>50	
250 - 300	3.3	>50	300			-	21	0.550	Ant, a processing		
300 - 350	4.2	>50	400								
350 - 400	8.3	28	500								
400 - 450	12.5	18	600								
450 - 500	25.0	8	- Money		_						
500 - 550	16.7	13	700								
550 - 600	25.0	8	800								
600 - 650	25.0	8	900								
650 - 700	50.0	3.5	1000				-	-			
700 - 790	90.0	2.0	1100		1						
790 - 850	20.0	10	1200								
850 - 900	5.6	44	1300					1150mm	n - 1400mm	a=>50	
900 - 950	12.5	18	10000							4 (000)	
950 - 1000	12.5	18	≘ 1400								
1000 - 1050	25.0	8	₫ 1500			_	_				
1050 - 1100	12.5	18	Depth (mm) 1500 troops 1700			-					
1100 - 1150	7.1	33	F 1700								
1150 - 1200	3.8	>50	1800								
1200 - 1250	3.8	>50	1900		-						
1250 - 1300	3.3	>50	COACHE								
1300 - 1350	2.9	>50	2000								
1350 - 1400	3.8	>50	2100								
1400 - 1450	6.3	38	2200			-		+	_		
1450 - 1500	7.1	33	2300	-		-	- 10	-	_	-	
1500 - 1550	25.0	8	2400								
1550 - 1600	25.0	8	2500								
1600 - 1650	33.3	6	2000								
1650 - 1700	33.3	6	2600								
1700 - 1750	25.0	8	2700		-						
1750 - 1800	25.0	8	2800						-		
1800 - 1850	25.0	8	2900					-			
1850 - 1900	25.0	8	3000								
1900 - 1950	16.7	13	3100								
1950 - 2000	12.5	18	5100								
2000 - 2050	16.7	13	Depth			Pener	tration			Infe	rred
2050 - 2100	12.5	18	(mm)				/blow)			CB	
2100 - 2150	10.0	23	2550 - 2600				2.5			18	8
2150 - 2200	8.3	28	2600 - 2650				2.5			18	
2200 - 2250	8.3	28	2650 - 2700				2.5			18	
2250 - 2300	10.0	23	2700 - 2750				2.5			18	
2300 - 2350	10.0	23	2750 - 2800				6.7			1.	
2350 - 2400	12.5	18	2800 - 2850				2.5			18	
2400 - 2450	10.0	23	2850 - 2900				0.0			2.	
2450 - 2500	10.0	23	2900 - 2950				2.5			18	
2500 - 2550	10.0	23	2950 - 3000				0.0			2.	

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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 20; Adjacent SH8 – Incre	easing Side in Paddock (see below)
	FIELD LOG DESCRIPTIONS - Not IANZ Accr	edited (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.	5
	ANNUGLINE  KEY  Printer Line  KEY  Printer Line  Arthropic Line  Arthropic Line	





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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

Depth	; Adjacent SH8 – Incr Penetration	Inferred			`		
(mm)	(mm/blow)	CBR 1		Inferr	ed CBR Value		
0 - 100	100.0	1.5	1				
100 - 150	5.0	50					
150 - 200	2.1	>50	0	5 10 15	20 25 30	35 4	40 45
200 - 250	2.3	>50	0	Start Depth = 0mm			
250 - 300	5.0	50	100			-	
300 - 350	2.3	>50	200				250
350 - 400	2.5	>50	200			150mm	- 250mm =>5
400 - 450	1.9	>50	300				
450 - 500	1.2	>50	400				
500 - 550	4.2	>50				300mm	-550mm=>50
550 - 600	10.0	23	500				
600 - 650	16.7	13	600				
650 - 700	50.0	3.5	1				
700 - 750	50.0	3.5	700	Ц			
750 - 800	33.3	6	800				
800 - 850	33.3	6		<u> </u>			
850 - 900	50.0	3.5	900				
900 - 950	50.0	3.5	1000				
900 - 930 950 - 1000	50.0	3.5	4400				
000 - 1050	50.0	3.5	1100				
050 - 1100	50.0	3.5	1200				
100 - 1150	50.0	3.5	1300				
150 - 1200	16.7	13	1300				
200 - 1250	16.7	13	<b>1400</b>				
250 - 1300	16.7		1500				
250 - 1300 300 - 1350	16.7	13 13	= 1000				
			9 1700 —				
350 - 1400	16.7	13	1700				
400 - 1450	12.5	18					
450 - 1500	12.5	18	1800				
500 - 1550	10.0	23	1900				-
550 - 1600	16.7	13	2000				
600 - 1650	12.5	18	2000				
650 - 1700	12.5	18	2100				
700 - 1750	12.5	18	2200				
750 - 1800	12.5	18	2200				
800 - 1850	10.0	23	2300				
850 - 1900	10.0	23	2400				
900 - 1950	10.0	23	4				
950 - 2000	8.3	28	2500				
000 - 2050	10.0	23	2600			=	
050 - 2100	8.3	28					
100 - 2150	10.0	23	2700				
150 - 2200	8.3	28	2800				
200 - 2250	8.3	28				$\neg \bot$	
250 - 2300	10.0	23	2900				
300 - 2350	8.3	28	3000				
350 - 2400	10.0	23	2100				
400 - 2450	7.1	33	3100				
450 - 2500	7.1	33					
500 - 2550	6.3	38	Depth	Pe	enetration		Infe
550 - 2600	8.3	28	(mm)		nm/blow)		СВ
600 - 2650	6.3	38	2800 - 2850	(-	8.3		2
650 - 2700	6.3	38	2850 - 2900		7.1		3
700 - 2750	6.3	38	2900 - 2950		7.1		3
750 - 2800	7.1	33	2950 - 3000		6.3		3
					~		

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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		

Job Description	on:   SH8 Beaumont Bridge Replacement Investigation	715, 300 100 0 0 101201 00000
	Test Pit 21; Adjacent SH8 – Incr	easing Side in Paddock (see below)
	FIELD LOG DESCRIPTIONS - Not IANZ Acci	redited (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.	
	150.0mm; Sand, fine to coarse; Silt, plastic.	

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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		

Job Description	: SH8 Beaumont Bi	ridge Replacement Inv	vestigatio	ns; Job	No: 6-0	T012	2.01 00	8000			•			
		Test Pit 21; Adjace	ent SH8 –	Increas	sing Sid	e in P	addoo	ck						
	A PENETROMETER (NZS 4402:1988, Test					Iı	ıferre	d CE	BR Va	alue				
(	(1125 4402.1700, 1est	0.3.2)												
Depth (mm)	Penetration (mm/blow)	Inferred CBR <sup>1</sup>		0	5 Start	10 Depth =	15	20	25	30	35	40	45	50
0 - 50	50.0	3.5			Start	рерии -	- Umm							
50 - 100	50.0	3.5												
100 - 150	25.0	8		100										
150 - 200	33.3	6		100										
200 - 250	33.3	6										A STATE OF THE STA		
250 - 300	12.5	18												
300 - 350	12.5	18		200										NATIONAL SALES
350 - 400	12.5	18												
400 - 450	12.5	18												
450 - 500	16.7	13		300										
500 - 550	25.0	8												
550 - 600	16.7	13												
600 - 650	12.5	18		400										
650 - 700	7.1	33	m	400										
700 - 725	1.1	>50	Depth (mm)			١.	$\perp$							
Refusal			pth											
			De	500 —										
				600 -										
Note: <sup>1</sup> CBR values have been inferred from AustRoads Pavement Design Manual (2012) – Fig 5.3 (Not IANZ Accredited).			700 -							700m	m - 725i	mm=>	50	
				800										
				900										

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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 22; Adjacent SH8 – Incre			2005)
Donth (mm)	FIELD LOG DESCRIPTIONS - Not IANZ Accr	edited (NZ Geotechnical	Society Guideli	nes 2005)
Depth (mm) 0 - 100	Description  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.		442	
340 - 1300	Light orangish / yellowish brown SILT with trace of clay. Moist. Soft / Firm. Silt, plastic.		and the same of th	
			28 28 18	
	According Line B.  KEY  Office Berman  A 19 Promotion in Transit Code  A 19 Promotion in Transit  Office of Particular field  Transit  Tra		P. P. P. P. P. P. P. P. P. P. P. P. P. P	
	Argi		TO I VI	

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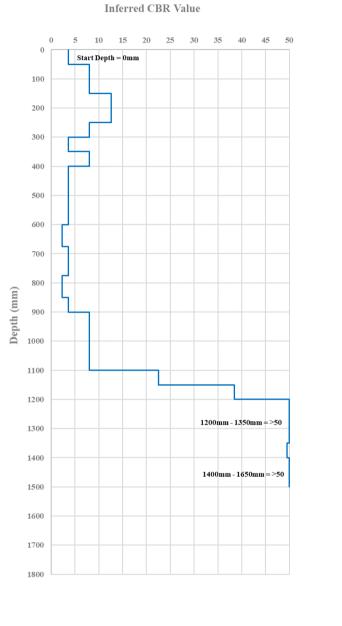
Reference No: 18/2116-1

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		

	A PENETROMETER (NZS 4402:1988, Test		ent SH8 – Increasin	g Side in Paddock Inferred
Depth (mm)	Penetration (mm/blow)	Inferred CBR <sup>1</sup>	0	0 5 10 15 2
0 - 50	50.0	3.5		Start Depta Jama
50 - 100	25.0	8	100	
100 - 150	25.0	8	200	
150 - 200	16.7	13		
200 - 250	16.7	13	300	
250 - 300	25.0	8		4
300 - 350	50.0	3.5	400	
350 - 400	25.0	8		
400 - 450	50.0	3.5	500	
450 - 500	50.0	3.5		
500 - 550	50.0	3.5	600	
550 - 600	50.0	3.5	700	4
600 - 675	75.0	2.5		
675 - 725	50.0	3.5	800	
725 - 775	50.0	3.5	nm	4
775 - 850	75.0	2.5	Depth (mm)	
850 - 900	50.0	3.5	ept	
900 - 950	25.0	8	A 1000	
950 - 1000	25.0	8	1100	
1000 - 1050	25.0	8		
1050 - 1100	25.0	8	1200	
1100 - 1150	10.0	23		
1150 - 1200	6.3	38	1300	
1200 - 1250	2.8	>50		
1250 - 1300	2.4	>50	1400	
1300 - 1350	3.1	>50	1500	
1350 - 1400	5.0	50	1000	
1400 - 1450	3.8	>50	1600	
1450 - 1500	2.9	>50		
1500 - 1550	3.8	>50	1700	
1550 - 1600	4.5	>50		
1600 - 1650	3.8	>50	1800	
Refusal				



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Checked By: emples

**Approved Signatory** 

A.P. Julius

A.P. Julius Laboratory Manager





# Appendix E Pavement Pit Logs and Photographs

SH8 Beaumont Bridge Realignment Geotechnical Factual Report

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Reference No: 18/2116-2

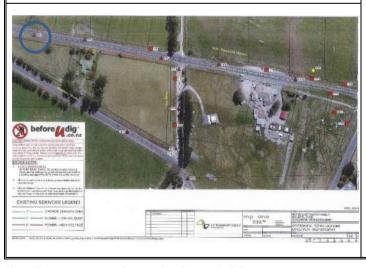
Date: 17 September 2018

# 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 La	ane, O/S 2.25m to 3.	40m (See below)
	FIELD LOG DESCRIPTIONS - Not IANZ Accr	edited (NZ Geotech	nical 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, nonplastic.	390 - 510	Subgrade – Light grey Sandy GRAVEL / Gravelly SAND with trace of / minor silt. Dry / Moiet York Compact Cravel angular to
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.	390 - 310	Moist. Very Compact. Gravel, angular to subangular, maximum particle size 37.5mm; Sand, fine to medium / coarse; Silt, non-plastic.







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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		

	S110 Deaumont Di		vestigatio													_
~~		Pavement Pit 1; SH8	, Decreas	ing L	ane, (	)/S 2.	25m	to 3.	40m							
	A PENETROMETER NZS 4402:1988, Test						In	ferr	ed C	BR V	alue					
(	1125 4402.1700, 1est	0.3.2)		(		5	10	15	20	25	30	35	40	45	50	
Depth (mm)	Penetration (mm/blow)	Inferred CBR <sup>1</sup>		0	,			15	20	25	30	35	40	45	30	
260 - 310	3.1	>50														
310 - 340	1.0	>50		100				-		and the second						
Refusal																
390 - 440	5.0	50		200												
440 - 470	1.0	>50		200												
Refusal					Start	Depth :	= 260n	nm						National Professional Professional		
	390 - 440     5.0     50       440 - 470     1.0     >50			300								260m	ım - 34(	0 <b>mm</b> =	>50	
				400	Start	Depth	= 390r	nm	-	Vanish of the last						
			mm)									440m	m - 470	)mm=	>50	
			Depth (mm)	500												
Note: <sup>1</sup> CBR value		n AustRoads Pavement	Q	600												
Design Man	nual (2012) – Fig 5.3 (No	ot IANZ Accredited).		700												
				800												
				900												
				1000											=>50	

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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 2; SH8, Increasing Lane, O/S 2	2.65m to 3.60m @ 80	0mm - 150mm (see below)
	FIELD LOG DESCRIPTIONS - Not IANZ Accr	edited (NZ Geotech	nical 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.
			51 50 43 45 47 46







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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: Job No: 6-CT012.01 00008		

SCAL	A PENETROMETER	Pavement Pit 2; SH8	s, Increas	sing La	ne, O	)/S 2.	65m	to 3.	60m						
	NZS 4402:1988, Test						Ir	ferr	ed C	BR V	alue				
Depth (mm)	Penetration (mm/blow)	Inferred CBR <sup>1</sup>		0		5	10	15	20	25	30	35	40	45	50
260 - 310	16.7	13													
310 - 360	25.0	8		100											-
360 - 410	12.5	18		200											
410 - 460	10.0	23		200	Start I	Depth	= 2601	nm							
460 - 510	12.5	18		300		-									
510 - 560	7.1	33													
560 - 610	5.6	44		400			-			1					
610 - 660	5.6	44		500											
660 - 710	6.3	38		500											
710 - 760	6.3	38		600							_				
760 - 810	7.1	33													
810 - 860	7.1	33		700											-
860 - 910	8.3	28		000									_		
910 - 960	7.1	33	m)	800											
960 - 1010	8.3	28	Depth (mm)	900											
1010 - 1060	7.1	33	pth								$\perp$	]			
1060 - 1110	5.6	44	De	1000							4	<b>-</b>			-
1110 - 1160	3.8	>50										4		$\neg$	
1160 - 1210	3.3	>50		1100										+	
1210 - 1260	3.6	>50		1200											
1260 - 1310	2.9	>50													
1310 - 1360	3.8	>50		1300								1110mn	1 - 1460	mm=>:	50
1360 - 1410	4.2	>50													
1410 - 1460	4.2	>50		1400											
1460 - 1510	3.8	50		1500											
1510 - 1560	4.2	>50		1000							:	1510mm	- 15601	nm =>5	60
	es have been inferred fron nual (2012) – Fig 5.3 (No			1600 - 1700 -											
				1800											

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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 3; SH8, Decreasing L	ane, O/S 2.25m to 3.4	40m (see below)
	FIELD LOG DESCRIPTIONS - Not IANZ Accr	edited (NZ Geotechr	nical 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	Subgrade – Light orangish / greyish brown Sandy GRAVEL with trace of / minor silt.
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.	(sampled)	Moist. Very compact. Gravel, angular to rounded, maximum particle size 75.0mm; 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 3; SH8	Docre	acina l	I and	O/S	2 25n	n to 3	40m										
SCA	LA PENETROMETER (NZS 4402:1988, Test	RESULTS	-		0	5			ed Cl	BR V	alue	35	40	45	50				
Depth (mm)	Penetration (mm/blow)	Inferred CBR <sup>1</sup>		0		3	10	15	20	25	30	33	40	45					
240 - 290	2.0	>50		100						_			_						
290 - 320	1.0	>50																	
Refusal				200															
				300	Start	t Deptl	h = 240	mm				240mm	ı - 320n	nm =>5	0				
				400															
			epth (m	Depth (mm)	epth (m	epth (m	epth (m	500											
Note: <sup>1</sup> CBR va Design l	lues have been inferred fron Manual (2012) – Fig 5.3 (No	n AustRoads Pavement et IANZ Accredited).	De	600															
				700															
				800															
				900															
				1000															

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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 4; Dee Stre	eet - SH8 End (see b	elow)
	FIELD LOG DESCRIPTIONS - Not IANZ Accr	edited (NZ Geotech	nical 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.







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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: Job No: 6-CT012.01 00008		

		Pavement	Pit 4;	De	ee St	reet -	SH	8 E	nd										
	A PENETROMETER								Tn	forr	ed C	'RR	Wa.	lua					
(	NZS 4402:1988, Test	6.5.2)				0	5	10		15	20	2		30	35	40	4	5 5	0
Depth (mm)	Penetration (mm/blow)	Inferred CBR <sup>1</sup>			0							_							
330 - 380	16.7	13			100														
380 - 430	25.0	8		2	200														
430 - 480	16.7	13		3	300	Star	t Dep	th=	330n	am				-		-			
480 - 530	7.1	33		4	400			Н		_									
530 - 580	1.7	>50			500					_					,				
Refusal															530m	m - 5	80mn	n=>50	
					600														
				,	700														
				8	800		-												
			Depth (mm)	9	900														
			də(	10	000		-			-									
			janeani	11	100					-									
	s have been inferred fron			12	200														
Design Ma	nual (2012) – Fig 5.3 (No	ot IANZ Accredited).		13	300														
				14	400														
				15	500														
				10	600		+			-						+			
				17	700		-												
				18	800														
				10	500														

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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; Job No: 6-CT012.01 00008		

	Pavement Pit 5; Dee Str	eet, Middle (see be	elow)
	FIELD LOG DESCRIPTIONS - Not IANZ Accre	dited (NZ Geotech	nnical 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.	270 770	Dark orangish brown Sandy GRAVEL with some silt / clay. Moist. Compact. Gravel,
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.	250 - 570	subrounded to rounded, maximum particle size 63.0mm; Sand, fine to coarse; Silt, plastic.
			67 66 65 64 63 62 63







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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		

		Pavemen	nt Pit s	5; Dee	Street	t, Mid	dle							
	A PENETROMETER (NZS 4402:1988, Test 6				0	5	Ir	ıferro	ed Cl	BR V	alue 30	35	40	45 50
Depth (mm)	Penetration (mm/blow)	Inferred CBR <sup>1</sup>		0 100					20		30		10	45 50
250 - 300	25.0	8												
300 - 350	10.0	23		200	Start	Depth	= 2501	mm						
350 - 400	4.2	>50		300	-									
400 - 450	2.8	>50		400			-					350mm	- 450mn	n=>50
Refusal		500												
Note: <sup>1</sup> CBR valu Design Me	es have been inferred from anual (2012) — Fig 5.3 (No	t AustRoads Pavement t IANZ Accredited).	Depth (mm)	600 700 800 900 1000 1100 1200 1300 1400 1500 1600 1700										

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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 6; Dee Street, W	estferry Street End (	(see below)
	FIELD LOG DESCRIPTIONS - Not IANZ Accr	edited (NZ Geotechr	nical 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.	400 740	Dark orangish brown Sandy GRAVEL with some silt. Moist. Compact. Gravel, subrounded
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.	400 - 560	to rounded, maximum particle size 19.0mm; Sand, fine to coarse; Silt, slight plasticity.







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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		

	A PENETROMETER NZS 4402:1988, Test			,		•			d CI	BR Va	alue				
(1	NZS 4402:1988, 1est	0.5.2)			_										
Depth (mm)	Penetration (mm/blow)	Inferred CBR <sup>1</sup>		0	5	1	10	15	20	25	30	35	40	45	50
400 - 450	25.0	8		100			-		-						
450 - 500	8.3	28		200											A THE PROPERTY OF THE PERSON NAMED IN
500 - 550	7.1	33		200											
550 - 600	5.6	44		300				-			-				
600 - 650	7.1	33		400	Start I	Depth	= 400	mm							
650 - 700	6.3	38		400							,				
700 - 750	7.1	33		500						-	-	1	-		
750 - 800	6.3	38		600											
800 - 850	3.8	>50		000									,		
850 - 900	2.0	>50		700											
900 - 920	0.7	>50		800									Ш		
Refusal			Depth (mm)	000								800m	m - 920	mm = >	-50
			) q	900								Joon	III - 320		50
			ept	1000											
				1100											
				1200											
lote: ¹CBR value	s have been inferred froi	n AustRoads Pavement		1300											
Design Man	nual (2012) – Fig 5.3 (No	ot IANZ Accredited).		1400											
				1500											
				1600	and the state of t							THE REAL PROPERTY AND ADDRESS OF THE PERSON ADDRESS OF THE PERSON AND ADDRESS OF THE PERSON AND ADDRESS OF THE PERSON ADDRESS OF THE PERSON ADDRESS OF THE PERSON ADDRESS OF THE PERSON ADDRESS OF THE PERSON ADDRESS OF THE PERSO			
			1700												
				1800								The state of the s			

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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		

Job Description	on.   Sito Deaumont Bridge Replacement Investigation	, 000 1101 0 0 101	
	Pavement Pit 7; Westferry Street	t, O/S 1.50m to 2.701	m (see below)
	FIELD LOG DESCRIPTIONS - Not IANZ Accre	edited (NZ Geotechi	nical Society Guidelines 2005)
Depth (mm)	Description	Depth (mm)	Description
0 - 50 50 - 220 (sampled)	Chip Seal.  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, nonplastic.	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.
Defore A Co. N.	PRICE LESS  TO THE LINE SECTION AND ADDRESS OF THE LINE SECTION ADDRESS OF THE LINE SECTION AND ADDRESS OF THE LINE SECTION AND ADDRESS OF THE LINE SECTION AND ADDRESS OF THE LINE SECTION AND ADDRESS OF THE LINE SECTION AND ADDRESS OF THE LINE SECTION AND ADDRESS OF THE LINE SECTION AND ADDRESS OF THE LINE SECTION ADDRESS OF THE LINE SECTION ADDRESS OF THE LINE SECTION ADDRESS OF THE LINE SECTION ADDRESS OF THE LINE SECTION ADDRESS OF THE LIN		

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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		

~~			ent Pit 7; West	erry Stree	et						
	PENETROMETER NZS 4402:1988, Test				Inf	erred	CBR V	alue			
Depth (mm)	Penetration (mm/blow)	Inferred CBR <sup>1</sup>	0	5	10	15	20 25	30	35	40	45 50
220 - 270	12.5	18									
270 - 320	4.2	>50	100								
320 - 370	4.5	>50	200	Start Dept	h = 220m	m					
370 - 420	3.8	>50									
420 - 470	4.2	>50	300								
470 - 520	3.8	>50									
520 - 570	5.0	50	400						270mm - :	520mm	=>50
570 - 620	6.3	38	500								
620 - 670	12.5	18									
670 - 720	10.0	23	600			-					
720 - 770	8.3	28				L					
770 - 820	4.5	>50	700					1			
820 - 870	4.5	>50	800			-					
870 - 920	8.3	28	n n						770mm	- 870mı	n=>50
920 - 970	12.5	18	Depth (mm)					<b>-</b>			
970 - 1020	10.0	23	ept			L	<b>—</b>				
1020 - 1070	10.0	23	1000								
1070 - 1120	10.0	23	1100								
1120 - 1170	12.5	18									
1170 - 1220	12.5	18	1200						<del></del>	-	
1220 - 1270	6.3	38	150-								
1270 - 1320	3.8	>50	1300								
1320 - 1370	3.8	>50	1400			-		1:	270mm - :	1420mn	n=>50
1370 - 1420	4.2	>50									
1420 - 1470	5.6	44	1500							-	
1470 - 1520	5.6	44									
Note: ¹ CBR values Design Man	have been inferred fron ual (2012) – Fig 5.3 (No	n AustRoads Pavement of IANZ Accredited).	1700								
			1800								

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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		

	Demonstra Did Q Woodforms Change	0/5 1 50 4- 2 70-	er (see beleen)
	Pavement Pit 8, Westferry Street FIELD LOG DESCRIPTIONS – Not IANZ Accordance	edited (NZ Geotechi	nical 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
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)	particle size 106.0mm; Sand, fine to coarse; Silt, slight plasticity.  Dark brown Silty Sandy GRAVEL. Moist. Compact. Gravel, subrounded to rounded, maximum particle size 37.5mm; Sand, fine to coarse; Silt, plastic.
before ( Gig See 1997 F. Visit II. See 1997 F. Cook III. See 1997	15 Three on Card State Control		56 55 54 53 52 51 50 49 48 47 46 45 44 43 42 41 40 40 40 40 40 40 40 40 40 40

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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, V	Vestferry St	treet,	O/S 1	l.50n	n to :	2.70ı	n						
	A PENETROMETER NZS 4402:1988, Test						Inf	erre	ed Cl	BR V	alue				
Depth (mm)	Penetration (mm/blow)	Inferred CBR <sup>I</sup>		0	5	10	0	15	20	25	30	35	40	45	50
200 - 250	16.7	13	10	0								7			
250 - 300	8.3	28	10												
300 - 350	8.3	28	20	0   S1	art De	pth =	200n	ım							
350 - 400	6.3	38	20				_								
400 - 450	10.0	23	30	U									_		
450 - 500	10.0	23	40	0				-		_					
500 - 550	12.5	18													
550 - 600	8.3	28	50	0											
600 - 650	8.3	28	60	0											
650 - 700	12.5	18						L			J				
700 - 750	6.3	38	70	0											
750 - 800	3.8	>50	<u> </u>	0											
800 - 850	3.8	>50	Depth (mm)									750m	ım - 950	)mm=>	>50
850 - 900	2.8	>50	90	0				-		-					
900 - 950	3.6	>50	100c												
950 - 1000	5.6	44	A 100												
1000 - 1050	8.3	28	110	0 -	-										
1050 - 1100	16.7	13										1100m	m - 123	0mm =	>50
1100 - 1150	3.1	>50	120	0								110011	120		
1150 - 1200	1.9	>50	130	0 -											
1200 - 1230	1.4	>50													
Note: <sup>1</sup> CBR values have been inferred from AustRoads Pavement Design Manual (2012) – Fig 5.3 (Not IANZ Accredited).		1400 1500 1600	0 —												
			180	0											

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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		

	D 4 D'4 0 CITO I 1 I	0/0.05 / 0.0	0 ( 1 1 )
	Pavement Pit 9; SH8, Increasing La FIELD LOG DESCRIPTIONS – Not IANZ Accre		
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.
Defore A dig.  Some of the stat	The state of the s		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
Iob Description:	SH8 Beaumont Bridge Replacement Investigations: Job No. 6-CT012.01 00008		

		Pavement Pit 9; SH8	3, Incre	easing I	ane,	O/S	2.05m	1 to 2	.90m						
	A PENETROMETE (NZS 4402:1988, Test								ed Cl						
Depth (mm)	Penetration (mm/blow)	Inferred CBR <sup>1</sup>		0	1	5	10	15	20	25	30	35	40	45	50
300 - 350	50.0	3.5		100											
350 - 400	50.0	3.5		200			-	-							
400 - 450	50.0	3.5		300	Start	Depth	= 300	mm							
450 - 500	50.0	3.5		300											
500 - 550	7.1	33		400											-
550 - 575	1.0	>50		500								_			
Refusal			_	600								550mi	n - 5751	nm=>50	
•			Depth (mm)	700 800 900 1000 1100 1200 1300 1400 1500 1700											

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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		

Job Description	on: SH8 Beaumont Bridge Replacement Investigation	ons; Job No: 6-CT012	2.01 00008
	Pavement Pit 10, SH8, Increasing L	ane. O/S 1.95m to 3.	15m (see below)
	FIELD LOG DESCRIPTIONS – Not IANZ Accr		
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,
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.	320 - 540	subrounded to rounded, maximum particle size 75.0mm; Sand, fine to coarse; Silt, non-plastic.
	PP 10		61 60 59 58 57 66 65 58







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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 10, SH	8. Increasing	Lane	, O/S	1.95m t	o 3.15	m					
	A PENETROMETER (NZS 4402:1988, Test	RESULTS		,	,	Inferi			alue				
Depth (mm)	Penetration (mm/blow)	Inferred CBR <sup>1</sup>	0	0 5	5 10	15	20	25	30	35	40	45	50
190 - 240	1.9	>50	400										
240 - 290	3.8	>50	100										
290 - 340	3.8	>50	200	Start D	epth = 1	90mm							
340 - 390	3.8	>50								100	m - 3901		
390 - 440	5.6	44	300							190111	III - 3901	um	,0
440 - 490	5.6	44	400										
490 - 540	6.3	38	400										
540 - 590	10.0	23	500								_	_	
590 - 640	7.1	33									_		
640 - 690	7.1	33	600							7			
690 - 740	6.3	38	700							Щ	<u>,                                    </u>		
740 - 790	7.1	33	700								J		
790 - 840	4.5	>50	800							790m	m - 8401	nm = >4	50
840 - 890	5.0	50	E E							75011	III - 0401		,,,
890 - 940	5.0	50	Depth (mm)										
940 - 990	5.0	50	D 1000										
990 - 1040	7.1	33	1000							4	٦		
1040 - 1090	6.3	38	1100								4		_
1090 - 1140	3.3	>50							] 1	1090mm	- 1175n	nm=>5	50
1140 - 1175	1.4	>50	1200										
			1300 1400										
	es have been inferred fro nual (2012) – Fig 5.3 (N		1500										
			1600 1700										
			1800										

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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 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	Light brown Sandy GRAVEL with trace of cobbles and trace of silt. Moist. Compact. Gravel / cobbles, subrounded to rounded, maximum							
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.	(sampled)	particle size 150.0mm; Sand, fine to coarse; Silt, non-plastic.							
	plastic.									







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Tested By: N.P. Danischewski

Checked By:

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		

Job Description:	Sno Deaumont Bi	ridge Replacement In	vesugations	; JOD	NO: O-C	1012.0	71 000	uo					
			nt Pit 11, M	illenni	um Tra	ck							
	A PENETROMETER NZS 4402:1988, Test	RESULTS					ferred	CBR	Value				
Depth (mm)	Penetration (mm/blow)	Inferred CBR <sup>1</sup>		0	0 5	10	15	20 25	30	35	40 45	5 50	
270 - 320	7.1	33		100									
320 - 370	2.6	>50											
370 - 400	1.4	>50		200						-			
Refusal				300	Start Dep	th = 270r	nm						
										320mm	- 400mm =	=>50	
				400									
		500											
				600									
				700									
			(m	800									
			m) 1	900							-		
			Depth (mm)										
			Ω	1000									
Note: <sup>1</sup> CBR value Design Mar	es have been inferred from nual (2012) – Fig 5.3 (No	n AustRoads Pavement ot IANZ Accredited).		1100							-		
	, , ,	ŕ											
				1200									
				1300							-		
				1400									
				1500						-	-		
				4.500									
				1600									
				1700							-		
				1900									
				1800									

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Checked By:



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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 12, SH8 Increasing Lane, O/S 2.30m to 3.50m (see below)							
	FIELD LOG DESCRIPTIONS - Not IANZ Accr	credited (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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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		

CCAT	A DENEMBON COMP	Pavement Pit 12, SH	8 Increasi	ng Lan	ie, O/S 2	2.30m	to 3.	50m						
	A PENETROMETER (NZS 4402:1988, Test		-			I	nferr	ed CI	BR Va	alue				
Depth (mm)	Penetration (mm/blow)	Inferred CBR <sup>1</sup>	-	0	5	10	15	20	25	30	35	40	45	50
340 - 390	25.0	8												
390 - 440	50.0	3.5		100										
440 - 490	33.3	6		200										
490 - 540	33.3	6												
540 - 590	50.0	3.5		300	Start Dep	th = 340	)mm							
590 - 640	33.3	6		400		<u> </u>								
640 - 690	33.3	6			4									
690 - 740	50.0	3.5	]	500										
740 - 790	33.3	6	]	600										
790 - 840	33.3	6												
840 - 890	20.0	10		700										
890 - 940	20.0	10		800										
940 - 990	25.0	8		800	L									
990 - 1040	25.0	8	<u> </u>	900		_								
1040 - 1090	16.7	13	(mn	4000		П								
1090 - 1140	16.7	13	Depth (mm)	1000			1							
1140 - 1190	16.7	13	Del	1100										_
1190 - 1240	16.7	13												
1240 - 1290	12.5	18		1200										
1290 - 1340	12.5	18		1300										
1340 - 1390	16.7	13												
1390 - 1440	12.5	18	]	1400										
1440 - 1490	12.5	18	]	1500										
1490 - 1540	10.0	23	]								in an extending the first desirable			
1540 - 1590	12.5	18	_	1600										
1590 - 1640	10.0	23	_	1700										
1640 - 1690	12.5	18	]											
1690 - 1740	10.0	23	]	1800										
1740 - 1790	12.5	18	]	1900										
1790 - 1840	12.5	18	]	1500										
	es have been inferred from nual (2012) – Fig 5.3 (No			2000										

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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		

Job Description	on:   SH8 Beaumont Bridge Replacement Investigation	ns; Job No: 6-CT012	2.01 00008						
	Pavement Pit 13, SH8 Increas	sing 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.						
			54 55 55 55 50 50 48 48 47 46 45 45 44 44 43 44 44 45						





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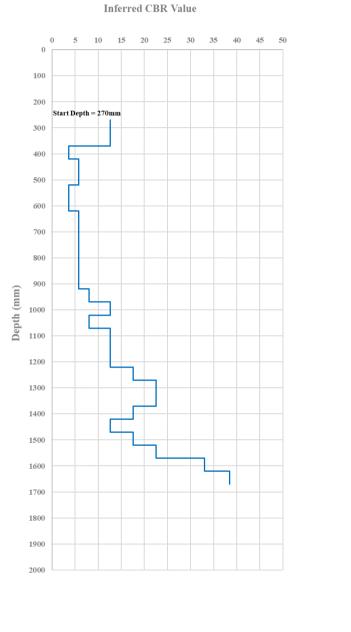
Reference No: 18/2116-2

Date: 17 September 2018

## TEST REPORT – SH8 BEAUMONT BRIDGE INVESTIGATIONS

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

SCAL	A PENETROMETER		H8 Increasing Lane,	O/S 2.			<b>70m</b> red Cl
	NZS 4402:1988, Test	6.5.2)			1	шеп	eu Ci
Depth (mm)	Penetration (mm/blow)	Inferred CBR <sup>1</sup>	0	0 5	10	15	20
270 - 320	16.7	13	100				
320 - 370	16.7	13	200				
370 - 420	50.0	3.5		Start Dep	th = 270	mm	
420 - 470	33.3	6	300				
470 - 520	33.3	6	400	-5		-	
520 - 570	50.0	3.5	500				
570 - 620	50.0	3.5					
620 - 670	33.3	6	600	14			
670 - 720	33.3	6	700				
720 - 770	33.3	6	800				
770 - 820	33.3	6					
820 - 870	33.3	6	900	L	7		
870 - 920	33.3	6	<u>a</u> 1000			]	
920 - 970	25.0	8	Depth (mm)		4	1	
970 - 1020	16.7	13					
1020 - 1070	25.0	8	1200			i i	1
1070 - 1120	16.7	13	1300				
1120 - 1170	16.7	13	1400				
1170 - 1220	16.7	13				中	-
1220 - 1270	12.5	18	1500				+
1270 - 1320	10.0	23	1600				
1320 - 1370	10.0	23	1700				
1370 - 1420	12.5	18					
1420 - 1470	16.7	13	1800				
1470 - 1520	12.5	18	1900				
1520 - 1570	10.0	23	2000				
1570 - 1620	7.1	33	2000				
1620 - 1670	6.3	38					
Note: 1 CBR value	es have been inferred from nual (2012) – Fig 5.3 (No						



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

Checked By: Implies

**Approved Signatory** 

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A.P. Julius Laboratory Manager



# 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			

	SIZE ANALYSIS 2015, Test 3.8.1)		100 T						0.063	6/0.0	0.150	0.30	09.0	1.18	2.00	2.36	4.75	9.50	19.0	37.5	63.0	106 150	200		
Sieve Size (mm)	% Passing (by mass)		90																A CONTRACTOR OF THE PARTY OF TH						
63.0			80															1							
53.0	100		80	PP	1 (	a	60n	ım -	14	0n	ım	1						1						П	
37.5	99		70		TÌ	Ĭ			П		П	1	$^{\dagger\dagger}$	#	+		/	4			Ш			H	Ш
26.5	98	mass)	60		+	+ +					1		$\parallel$		4		1							#	Щ
19.0	94	% Passing (by mass)	50		Ш	Ш							Ш								Ш				
13.2	87	assing																							
9.50	79	% P	40		Ħ	Ш							Ħ	8	/		П							Ħ	
4.75	58		30		++	+					Н		1		-		+	-						+	
2.36	42		20		Ш	Ш																		$\perp$	Ш
1.18	34		10																						
0.60	28		10																						
0.30	22		0.0	01		111	0.01			0.1			111	1				10			1	00		11	1000
0.150	16			CLAY	Fine		Medium SILT	Coar	se	Fine		Mediun SAND		Coars	se	Fine		Medium GRAVEI		oarse	COI	BBLES	ВО	ULDI	ERS
0.075	11		Th	e sampi	le wa	ıs re	ceived	in a na	itural	state	. The	perc	cent	agep	assii	ng th	e 75	um tes	t siev	e was	s obt	ained	by di	ffer	ence.

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)	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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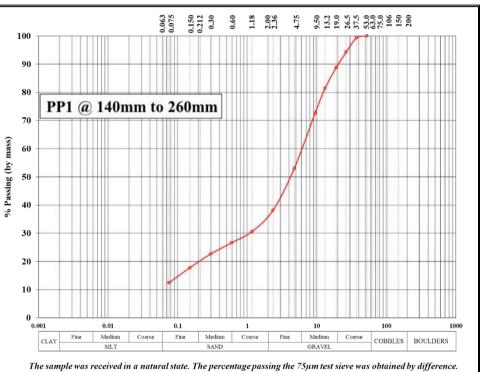
**Reference No: 18/2116-3** 

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	ob No:	6-CT012.01 00008	
Sample Source:	Pavement Pit 1; SH8, Decreasing Lane, O/S 2.25m to 3.40	m @ 140n	nm - 260mm (S	ee Page 35)
Date & Time Sampled:	13 to 17-Aug-18	Sampleo	l By:	N.P. Danischewski
Sample Method:	NZS 4407:2015, Test 2.4.2	Date Re	quested:	28-Aug-18

	SIZE ANALYSIS 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



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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:	8 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)						
Sample Results						
PP1 @ 260mm – 390mm						
Unsoaked						
4.0 kg						
6.0 %						
2.14 t/m³						
85						
100						
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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Checked By: emples



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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	ob No:	6-CT012.01 00008	
Sample Source:	Pavement Pit 2; SH8, Increasing Lane, O/S 2.65m to 3.60r	n @ 80mn	n - 150mm (Sec	e Page 35)
Date & Time Sampled:	13 to 17-Aug-18	Sampled	l By:	N.P. Danischewski
Sample Method:	NZS 4407:2015, Test 2.4.2	Date Re	quested:	28-Aug-18

	SIZE ANALYSIS 2015, Test 3.8.1)		100 -				1111		0.063	0.150	0.212	09.0	1.18	2.36	4.75	9.50	19.0 26.5 37.5	53.0 63.0 75.0 106	200	
Sieve Size (mm)	% Passing (by mass)		90 -					1 22-11							- Olaco		_/_			
63.0			80 -														1			
53.0			80 -	PF	2 (	a)	80m	m to	150	0m	m						1			
37.5	100		70 -		Ħ	Ī		Ш	III							1				
26.5	87	mass)	60 -			+			-						Н					
19.0	77	(by 1	50 -													/				
13.2	67	% Passing (by mass)	30												/					
9.50	57	% P	40 -			Ħ								/	1	#				$\parallel \parallel$
4.75	41		30 -			+				-							+			
2.36	29		20 -			Щ		Ш				Ш	1		Ш		Ш			
1.18	22											No.								
0.60	16		10 -		П				0	0										
0.30	11		0.0	001			0.01		0	.1			1			10		100		10
0.150	8			CLAY	Fine		Medium SILT	Coarse	]	Fine	Medit		Coarse	Fin	e	Medium GRAVEL	Coarse	COBBLE	s BOUL	DERS
0.075	6		Th	ie sam	ple we	ıs re	ceived i	n a natu	ral st	ate. T	he per	rcente	agepas	sing tl	he 7:	5μm tesi	t sieve wa	ıs obtaine	d by diff	erence

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:

- 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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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	ob No:	6-CT012.01 00008	
Sample Source:	Pavement Pit 2; SH8, Increasing Lane, O/S 2.65m to 3.60r	n @ 260m	m - 390mm (Se	ee Page 35)
Date & Time Sampled:	13 to 17-Aug-18	Sampleo	l By:	N.P. Danischewski
Sample Method:	NZS 4407:2015, Test 2.4.2	Date Re	quested:	28-Aug-18

LABORA	TORY 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/m³
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:

- 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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18/2116-3 **Reference No:** 

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 J	ob No:	6-CT012.01 00008
Sample Source:	Pavement Pit 3; SH8, Decreasing Lane, O/S 2.25m to 3.40m	m @ 80mı	m - 125mm (Se	e 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 Re	quested:	28-Aug-18

	SIZE ANALYSIS 2015, Test 3.8.1)		100						0.063	0.150	0.212	0.60	2.36	4.75	9.50	26.5 37.5 53.0	63.0 75.0 106 150	200	
Sieve Size (mm)	% Passing (by mass)		90																
63.0															1				
53.0	100		80	PI	P3	(a)	80m	m to	12	.5m	ım			Ħ	/				Ш
37.5	99		70	-									+++		/				$^{++}$
26.5	97	mass)	60											1					Ш
19.0	94	(by											/						
13.2	87	% Passing	50		П	Ш							1						П
9.50	80	% Pa	40			+						11/	4						H
4.75	61		30		H	Ш							1						Щ
2.36	47		20														3.550.0		
1.18	35		20							1									
0.60	29		10		H	+			ď				+++	Ħ					Ħ
0.30	23		0	001			0.01			0.1		1		Ш	10		100		
0.150	17		0.	CLAY	Fin	1e	Medium SILT	Coarse		Fine	Medium SAND	Coarse	Fir	ie	Medium GRAVEL	Coarse	COBBLES	BOULI	
0.075	11		T		٠.												obtained		

WATER CON	TENT - 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.
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D. Pearson, L. Reiher, L.T. Smith & C. Julius **Tested By:** 

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	Att	ention:	R. Bond
Job Description:	SH8 Beaumont Bridge Replacement Investigations			
Sample Description:	Basecourse; Sandy GRAVEL with some silt	Client Job N	0:	6-CT012.01 00008
Sample Source:	Pavement Pit 3; SH8, Decreasing Lane, O/S 2.25m to 3.40m	m @ 125mm -	240mm (S	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 Reques	ted:	28-Aug-18

														ıcu.				ug .				_
	SIZE ANALYSIS 2015, Test 3.8.1)	100						0.063	0.150	0.30	09.0	1.18	2.36	4.75	9.50	19.0	37.5	63.0	106	200		
Sieve Size (mm)	% Passing (by mass)	90															A					
63.0															1							
53.0	100	80	P	P3	a	125n	nm to	24	)m	m					1							П
37.5	95	70	_							T	+			1	4-	+						Н
26.5	91	mass 60									Ш			1		1					Ш	Ш
19.0	88	(by n											1									
13.2	84	Months of the control							П			1		П		T						Ш
9.50	78	g 40 %														+						H
4.75	65	30		-		-		-	/					4		+						Ш
2.36	54	20							p/													
1.18	45	20						O'		19												
0.60	39	10							Ħ							T						Ш
0.30	33	0	001			0.01		0.1		Ш		1			10			1	100			1000
0.150	26	0.	CLAY	Fin	e	Medium SILT	Coarse	Fine		Medium	_	oarse	F	ine	Medium		Coarse	Т	BBLES	BOU	LDER	
0.075	18	T	he sai	nple w	as re		n a natu	al state			entag	gepas	sing	the 7			ve wa	s obt	ained	by dij	ferer	nce.

WATER CONTENT & PLASTICITY I	NDEX 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 pl	lasticity 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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Date: 28-Aug-18 to 13-Sep-18

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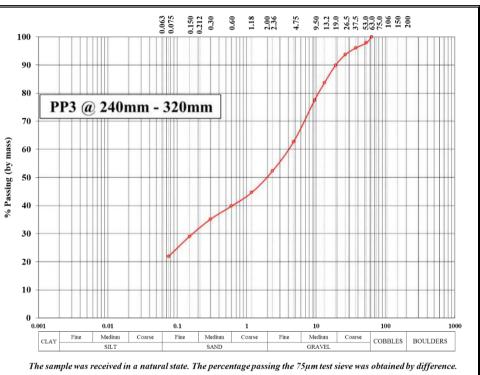
**Reference No: 18/2116-3** 

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	umont 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 3.40	m @ 240mm - 320mm (S	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					

	SIZE ANALYSIS 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
	l



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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 Jo	ob No:	6-CT012.01 00008				
Sample Source:	Pavement Pit 3; SH8, Decreasing Lane, O/S 2.25m to 3.40	m @ 320n	nm - 410mm (S	ee 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 Re	quested:	28-Aug-18				

LABORA	TORY 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 <sup>3</sup>
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:

- 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: emples



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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 Jo	ob No:	6-CT012.01 00008
Sample Source:	Pavement Pit 4; Dee Street, SH8 End @ 0mm - 120mm (S	ee 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 Rec	quested:	28-Aug-18

Sumple Method.	1128 110712010									are recy				iug 10		
	IZE ANALYSIS 2015, Test 3.8.1)	10	00 —					0.063	0.30	0.60	2.36	9.50	26.5 37.5	63.0 75.0 106 150	200	
Sieve Size (mm)	% Passing (by mass)		90													
63.0												/				
53.0	100	`	80	PP	4 (a)	0mr	n to 1	20m	m			1				
37.5	98	1	70		TĬ											
26.5	97	mass)	60	_												Щ
19.0	91	(by 1	50								1					
13.2	78	% Passing (by	30													
9.50	66	% Pa	40	+							8					
4.75	50	3	30	_	+++											
2.36	39		20		Ш											
1.18	33							0								
0.60	28		10													
0.30	23		0.001			0.01		0.1		1		10		100		100
0.150	19		CI	LAY	Fine	Medium SILT	Coarse	Fine	Medium SAND	Coarse	Fine	Medium GRAVEL	Coarse	COBBLES	BOULE	ERS
0.075	13		The	sampl	le was i	received	in a natu	ral state.	The perce	ntage pass	ing the	75µm test	sieve wa	s obtained	by diffe	rence.

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:

- 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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Date:

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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 J	ob 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	Sample	d By:	N.P. Danischewski
Sample Method:	NZS 4407:2015, Test 2.4.2	Date Re	quested:	28-Aug-18

Test Description	Sample 1	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/m³	1.84 t/m³
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:

- 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:	Maintenance Metal; Sandy GRAVEL with some silt	ob 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	Sampleo	l By:	N.P. Danischewski
Sample Method:	NZS 4407:2015, Test 2.4.2	Date Re	quested:	28-Aug-18

	IZE ANALYSIS 015, Test 3.8.1)		100 —				0.063	0.212	1.18	2.36	9.50	19.0 26.5 37.5	63.0 75.0 106 150	007	
Sieve Size (mm)	% Passing (by mass)		90									1			
63.0	100											1			
53.0	98		80	PP5	a 0m	m to	100m	m			1	4			Ш
37.5	92		70												Н
26.5	85	mass)	60								/				
19.0	80	(by n	50							1					
13.2	73	% Passing (by	50												
9.50	68	% Pa	40						/	1					
4.75	53		30												
2.36	42		20												Щ
1.18	34														
0.60	29		10 +												Ħ
0.30	24		0.00	)1	0.01		0.1		1		10		100		Ш
0.150	19		(	CLAY Fine	Medium SILT	Coarse	Fine	Medium SAND	Coarse	Fine	Medium GRAVEL	Coarse	COBBLES	BOUL	DER
0.075	13		The	e sample was	received i	n a natui	al state.	The percei	ntage pas:	sing the 7	5um test	sieve wa	s obtained	by diff	eren

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:

- 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:	Sandy GRAVEL with some silt / clay	Client J	ob No:	6-CT012.01 00008
Sample Source:	Pavement Pit 5; Dee Street, Middle @ 100mm – 250mm (S	See Page 3	5)	
Date & Time Sampled:	13 to 17-Aug-18	Sampleo	l By:	N.P. Danischewski
Sample Method:	NZS 4407:2015, Test 2.4.2	Date Re	quested:	28-Aug-18

Enbour	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/m³					
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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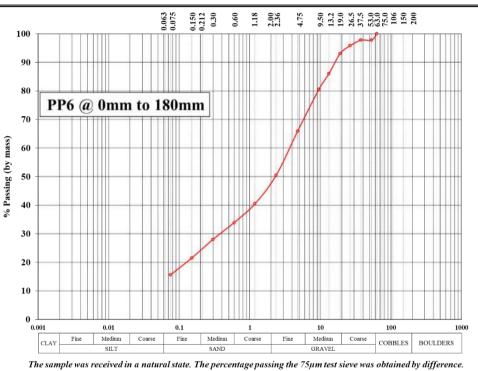
**Reference No: 18/2116-3** 

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 J	ob 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	Sampleo	l By:	N.P. Danischewski
Sample Method:	NZS 4407:2015, Test 2.4.2	Date Re	quested:	28-Aug-18

	SIZE ANALYSIS 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	ĺ
0.150	22	
0.075	16	



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 pla	isticity 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:	Sandy GRAVEL with some silt	Client J	ob No:	6-CT012.01 00008
Sample Source:	Pavement Pit 6; Dee Street, Westferry Street End @ 180n	i - 400mm	(See Page 35)	
Date & Time Sampled:	13 to 17-Aug-18	Sampled	l By:	N.P. Danischewski
Sample Method:	NZS 4407:2015, Test 2.4.2	Date Re	quested:	28-Aug-18

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 <sup>3</sup>								
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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18/2116-3 **Reference No:** 

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 J	ob No:	6-CT012.01 00008
Sample Source:	Pavement Pit 7; Westferry Street, O/S 1.50m to 2.70m @ 5	50mm - 22	20mm (See Pag	e 35)
Date & Time Sampled:	13 to 17-Aug-18	Sampleo	d By:	N.P. Danischewski
Sample Method:	NZS 4407:2015, Test 2.4.2	Date Re	quested:	28-Aug-18

	IZE ANALYSIS 015, Test 3.8.1)		100 ⊤			21111		0.063 0.075 0.150	0.212	1.18	2.36	9.50	19.0 26.5 37.5	53.0 63.0 75.0 106	200	
Sieve Size (mm)	% Passing (by mass)		90									/				
63.0			80													
53.0	100			I	PP7 (	a) 50n	ım to	220n	nm							
37.5	99		70		Ш		ПП		TT							Ħ
26.5	98	mass)	60													+
19.0	95	; (by 1	50								1					
13.2	89	% Passing (by														
9.50	80	% P.	40 +								1					Ħ
4.75	56		30	_												+
2.36	37		20 -													1
1.18	27															
0.60	23		10					0								T
0.30	19		0.00	01		0.01		0.1		1		10		100		
0.150	13			CLAY	Fine	Medium SILT	Coarse	Fine	Medium SAND	Coarse	Fine	Medium GRAVEL	Coarse	COBBLES	BOUL	DER
0.075	9		The	e sai	nple was	received	in a natur	al state. I	The percer	ıtage pas	sing the	75µm test	sieve wa	s obtained	by diffe	erei

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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**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 / 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 @ 2	220mm - 520mm (See Pa	ige 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

Test Description	Sample Results	
1	•	
Condition of Sample:	Unsoaked	
Surcharge Mass:	4.0 kg	
Water Content as Compacted:	7.7 %	
Dry Density As Compacted:	1.94 t/m <sup>3</sup>	
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:

- 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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**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	ob No:	6-CT012.01 00008		
Sample Source:	Pavement Pit 8; Westferry Street, O/S 1.50m to 2.70m @ :	50mm – 20	00mm (See Pag	ge 35)	
Date & Time Sampled:	13 to 17-Aug-18	Sampled	l By:	N.P. Danischewski	
Sample Method:	NZS 4407:2015, Test 2.4.2	Date Re	quested:	28-Aug-18	

	IZE ANALYSIS 015, Test 3.8.1)		100 ⊤					0.063	0.212	0.60	2.36	9.50	26.5 37.5 53.0	63.0 75.0 106 150	200	
Sieve Size (mm)	% Passing (by mass)		90										00			
63.0			80									1				
53.0	100		80	PP	8 (a)	50m	m to	200n	ım			<i>p</i>				
37.5	96		70		TĬ		ПП		T			/				H
26.5	96	mass)	60	-								/				-
19.0	93	(by)	50								1					Ш
13.2	84	% Passing (by														
9.50	75	% P.	40 +								1					Ħ
4.75	52		30	-	+++					1	1					Н
2.36	36		20		Ш											Ш
1.18	27															
0.60	21		10 +					0								Ħ
0.30	17		0.00	01		0.01		0.1		1		10		100		Ш
0.150	11			CLAY	Fine	Medium SILT	Coarse	Fine	Medium SAND	Coarse	Fine	Medium GRAVEL	Coarse	COBBLES	BOULE	DERS
0.075	7		The	e samp	le was	received i	n a natui	al state.	The percei	ntage pas	sing the	75um test	sieve wa:	s obtained	bv diffe	eren

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:

- 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: emples



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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 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 @ 200mn	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							

	SIZE ANALYSIS 2015, Test 3.8.1)							53 50	30 2	1.18	28 %	.2	ં હે હે હ	75.0 106 150	2
Sieve Size (mm)	% Passing (by mass)		100					0.063	0.212		<u> </u>	13 94	26 26 37 37 58 58 58 58 58 58 58 58 58 58 58 58 58	56 2 31	<del>7</del>
106.0	100		90 -										8		
75.0	96		80 -												
63.0	96		80	PP	3 (a	200	mm t	o 300	mm			/			
53.0	95		70 -						m	#		/			
37.5	94	nass)	60 -									/			
26.5	92	(by 1	50 -												
19.0	88	% Passing (by mass)	30												
13.2	79	% P:	40 -							111	/				
9.50	71		30 -							-	1				
4.75	49		20 -												
2.36	32														
1.18	22		10 -					0							
0.60	19		0.0	101		0.01		0.1		1		10	1	100	1000
0.30	17				ine	Medium SILT	Coarse	Fine	Medium	Coarse	Fine	Medium GRAVEL	Coarse	COBBLES	BOULDERS
0.150	14		Th	e sample	was r		n a natui	al state. T		tage pas.	sing the		sieve was	obtained	by difference.
0.075	11														

#### 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 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 @ 200mn	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)							
<b>Test Description</b>	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 <sup>3</sup>						
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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**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	Beaumont Bridge Replacement Investigations						
Sample Description:	Cement Stabilised Basecourse; Sandy GRAVEL with some silt	ob No:	6-CT012.01 00008					
Sample Source:	Pavement Pit 9; SH8 Increasing Lane, O/S 2.05m to 2.90m	n @ 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 Rec	quested:	28-Aug-18				

	SIZE ANALYSIS 2015, Test 3.8.1)		100 —					0.063	0.212	0.00	2.36	9.50	19.0 26.5 37.5	63.0 75.0 106	700	
Sieve Size (mm)	% Passing (by mass)		90									1				
63.0			80									1				
53.0				P	P9 @	70m	m to	300m	ım			/				
37.5			70		HĬ		TT		T			/				
26.5	100	nass)	60								1					
19.0	98	% Passing (by mass)	50													
13.2	93	ssing	30								9					
9.50	84	% Pa	40				+			11/						
4.75	62		30				+++									
2.36	45		20													
1.18	34							0								
0.60	27		10 +				Ш									
0.30	22		0.00	1		0.01		0.1		1		10		100		1000
0.150	18		Г	CLAY	Fine	Medium SILT	Coarse	Fine	Medium SAND	Coarse	Fine	Medium GRAVEL	Coarse	COBBLES	BOULI	
0.075	14		The	san	iple was i	received i	n a natur	ral state.	The percei	ntage pass	ing the	75µm test	sieve wa	s obtained	by diffe	erence.
	•										_					Ασουνίου

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	ob No:	6-CT012.01 00008	
Sample Source:	Pavement Pit 9; SH8 Increasing Lane, O/S 2.05m to 2.90m	n @ 300mr	n - 440mm (Se	ee 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 Rec	quested:	28-Aug-18

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 <sup>3</sup>
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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**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	ment Stabilised Basecourse; Sandy GRAVEL with some silt						
Sample Source:	Pavement Pit 10; SH8 Increasing Lane, O/S 1.95m to 3.15m @ 50	mm - 130mm (See Pa	nge 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					

	IZE ANALYSIS 2015, Test 3.8.1)		100 ¬						0.063	0.150	0.30	09.0	1.18	2.36	9.50	13.2	37.5	53.0	75.0 106 150	007			T1
Sieve Size (mm)	% Passing (by mass)		90 -													8					$\parallel$		
63.0			80 -												1								
53.0			80 -	F	P1	0 (	v 50	mm t	to 1.	30r	nm				/						П		
37.5	100		70 -			Ħ				П	T				/	Н	+	Ħ			+		
26.5	99	nass)	60 -											1						4	+	-	
19.0	96	(by 1	50 -																				
13.2	92	% Passing (by mass)	30											1									
9.50	85	% Pa	40 -			Ħ							/			П		Ħ			$^{\dagger}$		
4.75	64		30 -			+						No.								+	+		
2.36	45		20 -			Ш					1							Ш			Ш	Ш	
1.18	35																						
0.60	29		10 -			Ш				П			Ħ			П	11	Ш			T	П	
0.30	25		0.0	01			0.01		0.1				1		10				100		Ш	1	000
0.150	20			CLAY	Fin	ie	Medium SILT	Coarse	Fin		Medium		Coarse	Fine	Medit		Coarse	_ c	OBBLES	ВО	ULDE	ERS	
0.075	15		Th	e sar	nple w	vas re	ceived i	in a natu	ral stat	e. Th	ie perc	enta	gepass	sing the	75µm t	est s	ieve wa	as o	btained	by di	ffer	enc	e.

WATER CONT	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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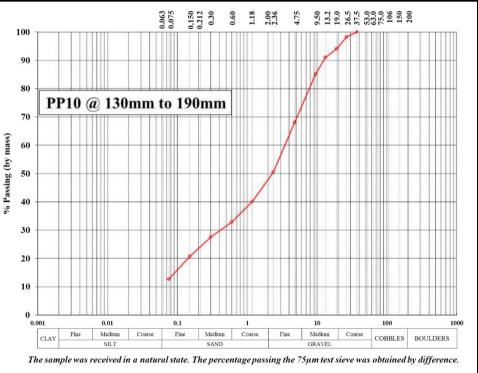
**Reference No: 18/2116-3** 

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 J	ob No:	6-CT012.01 00008
Sample Source:	Pavement Pit 10; SH8 Increasing Lane, O/S 1.95m to 3.15	m @ 130n	nm - 190mm (S	See Page 35)
Date & Time Sampled:	13 to 17-Aug-18	Sampleo	l By:	N.P. Danischewski
Sample Method:	NZS 4407:2015, Test 2.4.2	Date Re	quested:	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								
	•								



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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 minor silt	Client J	ob No:	6-CT012.01 00008
Sample Source:	Pavement Pit 10; SH8 Increasing Lane, O/S 1.95m to 3.15	m @ 190n	nm - 320mm (S	See Page 35)
Date & Time Sampled:	13 to 17-Aug-18	Sampleo	l By:	N.P. Danischewski
Sample Method:	NZS 4407:2015, Test 2.4.2	Date Re	quested:	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/m³			
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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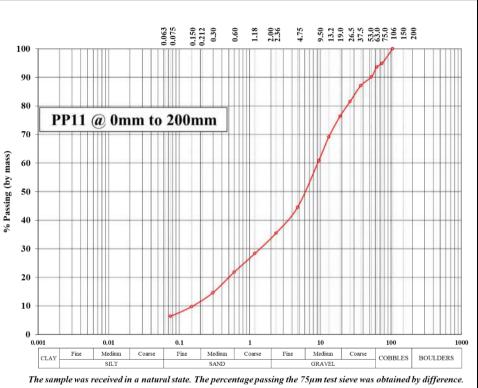
**Reference No:** 18/2116-3

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 minor cobbles & minor silt			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. Danisch		N.P. Danischewski
Sample Method:	NZS 4407:2015, Test 2.4.2	Date Requested: 28-Aug-18		28-Aug-18

Sumple Methods	1,25 110,12010,	
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	



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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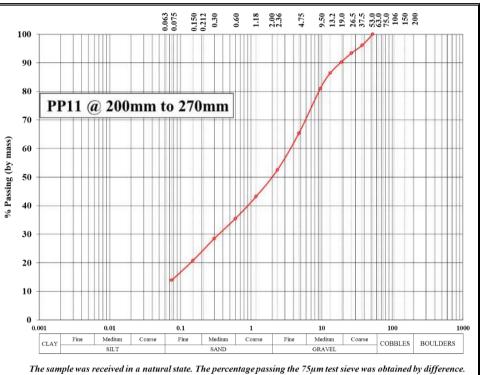
**Reference No: 18/2116-3** 

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:	Sandy GRAVEL with some silt  Client J		ob 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		l By:	N.P. Danischewski
Sample Method:	NZS 4407:2015, Test 2.4.2	Date Re	quested:	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	
0.150	21	



Additional Notes:

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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:	Sandy GRAVEL with trace of cobbles and trace of silt		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/m³	
CBR Value @ 2.5mm Penetration:	110	
CBR Value @ 5.0mm Penetration:	130	
Reported Soaked CBR Value:	130	
37 /		

#### 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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Date: 28-Aug-18 to 13-Sep-18

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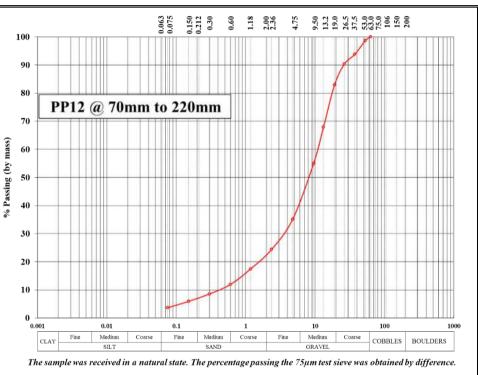
**Reference No: 18/2116-3** 

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 trace of silt Client Jo		ob 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.		N.P. Danischewski
Sample Method:	NZS 4407:2015, Test 2.4.2	Date Requested: 28-Aug-18		28-Aug-18

PARTICLE SIZE ANALYSIS		
(NZS 4407:2015, Test 3.8.1)		
Sieve Size	% Passing	
(mm)	(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	
·		



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:

- 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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Date:

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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 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		By:	N.P. Danischewski
Sample Method:	NZS 4407:2015, Test 2.4.2	Date Rec	quested:	28-Aug-18

	IZE ANALYSIS 015, Test 3.8.1)		100 ¬						0.075	0.150	0.30	09.0	1.18	2.36	4.75		13.2	26.5	37.5	63.0 75.0 106	150			
Sieve Size (mm)	% Passing (by mass)		90 -														1							
63.0			80 -																					
53.0	100		80 -		PP1	2	a 2	20mi	n to	34	0m	m				/								Ī
37.5	99		70 -			Ш	Ĭ			П	П	TII	Т					H			H		+	H
26.5	97	mass)	60 -			Ш						Ш		-	1			Ш	Ш		-		Ш	H
19.0	93	(by r	50 -											1										
13.2	89	% Passing (by	30											8										
9.50	81	% P2	40 -									Ħ	/					Ħ						H
4.75	63		30 -										1	-		Ш		-			+	-		
2.36	45		20 -			Ш										Ш		Ш	Ш				Ш	
1.18	32																							
0.60	25		10 -			Ш						$\parallel$		T		Ш		Ħ	П		T		Ħ	İ
0.30	19		0.0	001		Ш	0.01		0.1			Ш	1		Ш	Ш	.0			100	,		Ш	Щ
0.150	15			CLAY	Fine	2	Medium	Coarse	Fine		Medium SAND	_	Coarse	1	Fine	M	edium AVEL	Coa	urse	СОВВ		BOUI	LDER	
0.075	12		Th	e sam	ple was			ı a natuı	al state.			entas	e nas	sing	the ?			sieve	was	obtai	ined h	v dif	fere	nc

### 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: emples



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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	Client J	ob 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	l By:	N.P. Danischewski		
Sample Method:	NZS 4407:2015, Test 2.4.2	Date Re	quested:	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/m³			
CBR Value @ 2.5mm Penetration:	1.0			
CBR Value @ 5.0mm Penetration:	1.5			
Reported Soaked CBR Value:	1.5			
N				

### 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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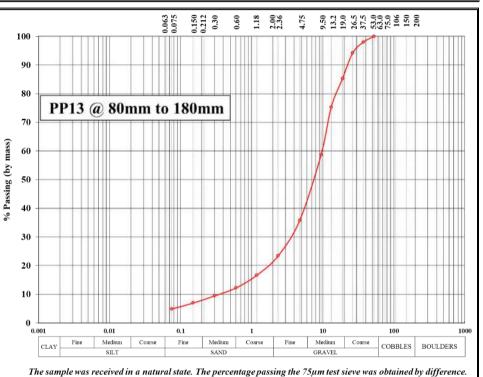
**Reference No: 18/2116-3** 

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 (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 (S	ee 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

	IZE ANALYSIS 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



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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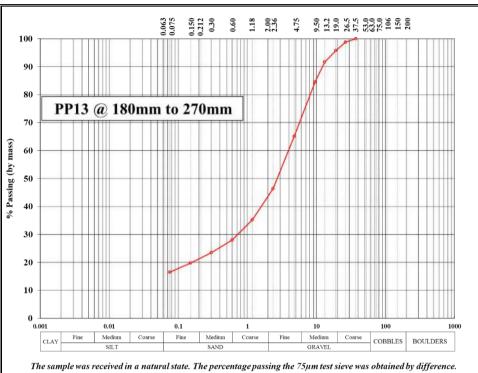
**Reference No: 18/2116-3** 

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					



### Additional Notes:

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Tested By: D. Pearson, L. Reiher, L.T. Smith & C. Julius Date:

Date: 28-Aug-18 to 13-Sep-18

Checked By: emples





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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 Jo	ob 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 Re	quested:	28-Aug-18	

LABORA	TORY CBR (NZS 4407:2015, Test 3.15)
<b>Test Description</b>	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/m³
CBR Value @ 2.5mm Penetration:	3.0
CBR Value @ 5.0mm Penetration:	4.5
Reported Soaked CBR Value:	4.5
N /	1

#### 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:





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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

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

Checked By: emples



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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-CT0	12.01 00008	



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Tested By: D. Pearson, L. Reiher, L.T. Smith & C. Julius

Date:

28-Aug-18 to 13-Sep-18

**Approved Signatory** 

A.P. Julius

Checked By:

Laboratory Manager





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)	H		
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	N 20 (N)	2.97		
Compressive strength	(MPa)	75.5		
Number of ends capped		Both		
Defects prior to capping		Irregularities		- 1

Comments				

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

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

Date reported: 14 March 2019

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IANZ Approved Signatory

Designation:

Assistant Laboratory Manager

Date:

14 March 2019

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

PF-LAB-092 (19/02/2015)

Page 1 of 1

WSP Opus

Christchurch Laboratory

Quality Management Systems Certified to ISO 9001 | Christchurch 8140, New Zealand

52C Hayton Rd, Wigram PO Box 1482, Christchurch Mail Centre, Telephone +64 3 343 0739 Facsimile Website www.wspopus.co.nz



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)	3,500	<u></u>	
Average diameter	(mm)	82.5	82.6	
Length	(mm)	152.5	248.5	
Mass of cylinder in air	(g)	2215	3681	
Design strength	(MPa)	-	2	
Density	(kg/m³)	2700	2760	
Height diameter ratio	0.78	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 measured with samples in a saturated surface dry state.
Density, NZS 3112: 1986, Pt 3 Section 5	
Capping NZS 3112: 1986, Pt 2 Section 4 (amendment No 2 2000)	

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

Date reported:

14 March 2019

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Designation:

Assistant Laboratory Manager

Date:

14 March 2019

ACCREDITED LABORATORY

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

PF-LAB-092 (19/02/2015)

Page 1 of 1

Telephone +64 3 343 0739 Facsimile Website www.wspopus.co.nz



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: Client Ref No:

CH5411/3 **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		-	-	-	<u>=</u>		
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)	=		=	原		
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		

Co	mme	nts

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

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

Date reported: 14 March 2019

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IANZ Approved Signatory

Designation:

Assistant Laboratory Manager

Date:

14 March 2019

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WSP Opus

Christchurch Laboratory

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opus.co.nz



Project:

**Material Investigation** 

Location:

SH8 Beaumont Bridge Replacement

Client:

**NZTA** 

Contractor:

WSP-Opus Chrsirchurch

Sampled by: Date sampled: McNeil Drilling

Not Advised

Sampling method:

**Diamond Rotary Coring** 

Sample Conditioning:

Tested as received

Source:

**BH05** 

Date received:

6 March 2019

Project No: Lab Ref No: 6-CT012.00

Client Ref No:

CH5411/4 James Grindley

				Results	
Lab reference no		150/1			
Client reference no		BH05 10.15m			
Date made		¥s			
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	$(kg/m^3)$	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 measured with samples in a saturated surface dry state.				
Density, NZS 3112 : 1986, Pt 3 Section 5					
Capping NZS 3112 : 1986, Pt 2 Section 4 (amendment No 2 2000)					

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Designation:

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Date:

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

opus.co.nz



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

	y is a part of		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)	8		
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 measured with samples in a saturated surface dry state.			
Density, NZS 3112 : 1986, Pt 3 Section 5				
Capping NZS 3112: 1986, Pt 2 Section 4 (amendment No 2 2000)				

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

Date reported: 14 March 2019

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Designation:

Assistant Laboratory Manager

Date:

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PF-LAB-092 (19/02/2015)

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Telephone +64 3 343 0739 Facsimile Website www.wspopus.co.nz



18B Birmingham Drive Middleton Christchurch E: info@geocivil.co.nz 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



### Determination of the Point Load Strength Index of Rock

ASTM D 5731 -95

Lab Job No.:

8465-002

Client:

WSP Opus - Christchurch

Project:

Beaumont Bridge

Reference:

Date Sampled: Unknown

Rep No:

C19-189

Tested By:

N.W/J.B

Date Tested: Page:

4/05/19, 5/05/19 2 of 2

Date Received: 27/03/2019

Sample No.	Axial / Diametral	Туре	Borehole No.	Depth (m)	D (mm)	W (mm)	Max Load Applied P (kN)	Point Load Strength I <sub>s</sub> (MPa)	Size Correction Factor	Size Corrected Point Load Strength I <sub>s(50)</sub> (MPa)	Estimated Compressive strength δ <sub>uc</sub> (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	107	9.346	1.36	1.26	1.70	40.9
C19-425	Diametral	PASS	BH03	16.88	83	7.2	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	3.5	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	1=1	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.

Nick van Warmerdam Laboratory Manager

