Contract Documents

COLLEEN NOTT & MAX RUTLAND

Anchored Retaining Wall Construction
87 Harbour View Road,
Omokoroa

Document prepared for:
COLLEEN NOTT & MAX RUTLAND

Document prepared by:
TONKIN & TAYLOR LTD

Distribution:

COLLEEN NOTT & MAX RUTLAND	1 copy
SITE SOLUTIONS (BOP) LTD	2 copies
TONKIN & TAYLOR	2 copies

March 2009

Job no: 851148.002

P:\851148\851148.002\WorkingMaterial\Contract Docs\Conditions of Contract.docx

Tonkin & Taylor

1959 - 2009 50 YEARS

T&T Ref : 851148.002
18 March 2009

Site Solutions (BOP) Ltd
64a Oropi Gorge Road
RD3 Tauranga

Dear Conrad Carroll

Anchored Retaining Wall 87 Harbour View Road
Notification of Acceptance of Tender

We refer to your tender for the above works dated 12 March 2009 and acting on behalf of the Principal, Colleen Nott & Max Rutland, advise their acceptance of your offer for the sum of $137,625.36.

We bring to your attention the immediately relevant contract requirements, which are listed, where applicable, by reference to clause numbers in the Conditions of Contract.

We acknowledge receipt of 1fair copy of your priced schedule sheets which will enable us to complete assembling the Contract Document. Please arrange for your authorised signatory to execute your part of the Contract Agreement and to initial every page, following which you should return all three copies to us for onward transmission to the Principal for execution of the Principal's part.

Please advise if you require additional sets of drawings and other documents in excess of two sets. Two sets of the Drawings (issued for construction) will be sent to you under separate cover. Note that any extra sets of documents required will be at your cost.

Clause 2.13	It is not necessary to provide a bond which must be made available to the Engineer before any payments can be certified.
Clause 5.4.1	You will become entitled to possession of the Site 3 days after acceptance.
Clause 12.1	The Contract Period starts on 23 March 2009, and the Due Date for Completion is 24 April 2009.
Clause 2.3	Please provide your site specific Safety Plan and hazard identification schedule before any work starts on site.

C C M R

Tonkin & Taylor Ltd - Environmental and Engineering Consultants, Level 1, 36 Grey Street, Tauranga, New Zealand
PO Box 317, Tauranga 3140, Ph: 64-7-571 7360, Fax: 64-7-571 7390, Email: tga@tonkin.co.nz, Website: www.tonkin.co.nz

Clause 2.9 Please provide to the Engineer before any work starts on site, evidence that all the insurances have been effected.

Specification Clause 1.18.2 -You are required to provide a construction programme prior to commencing work.

The Engineer is Mr David Bouma, BE(Hons), ME(Dist.), MIPENZ(Civil & Envt), CPEng, INTPE(NZ).

The name of the Engineer's Representative is Ms Sarah Karlsen to whom you should refer for all day to day matters of contract supervision. A separate letter will be sent to you setting out details of the Engineer's delegation of powers to Ms Karlsen and in referring any matters to the Engineer you are invited to contact Ms Karlsen in the first instance.

We look forward to the successful completion of the works.

Yours faithfully

David Bouma
Engineer to the Contract

cc Max Rutland

Form of Tender

Principal name: Colleen Nott & Max Rutland

Contract name: 87 Harbour View Road Anchored Retaining Wall

Contract No.: 851154.002

I/We have inspected the location of the Works and read the documents for this Contract.
I/We hereby tender the sum of
ONE HUNDRED & THIRTY SEVEN THOUSAND,
SIX HUNDRED & TWENTY FIVE DOLLARS AND
THIRTY NINE CENTS ($137,625-39) excluding GST to perform the Works as specified.

I/We understand that late tenders may be returned unopened.

The name and address of the proposed Surety (Clause 2.13) is:
NATIONAL BANK - GREY ST TAURANGA

This tender remains valid for the period of 4 weeks from the due date.

Name CONRAD CARRELL

Position DIRECTOR

Authorised to sign tenders on behalf of:

Company name SITE SOLUTIONS (BOP) LTD

Address 64A CARGI GORGE RD
R03 TAURANGA

Contact telephone No 07 543 3331 027 270 4414

Signature

Dated this 12th day of MARCH 2009

Item	Description	Quantity	Unit	Rate	Amount
1.0	PRELIMINARY & GENERAL				
1.1	**Establishment,** including mobilisation and establishment on site of all manpower, equipment, plant, vehicles, accommodation, temporary services, and all overhead costs for arranging and providing contract insurances, site inductions, meeting initial H&S requirements and the like.	1	LS		2,500.00
1.2	**Construction administration costs,** including site supervision, communications, liaison, provision of insurance, insurance charges, financing costs, vehicles, traffic management, minor items of plant and equipment (e.g. shovels, hand tools etc.), head office back up and observation and implementation of H&S procedures during construction period to Practical Completion.	1	LS		2,520.00
1.3	**Services Location**	1	LS		500.00
1.4	**Access,** supply all materials, plant and labour, form access to construction area, including clearing all obstructions and reinstating upon completion. Access to be via client's property as per drawing 851148-01.	1	LS		1,000.00
1.5	**Surveying** to set out all works in accordance with drawings.	1	LS		1,500.00
1.6	Provide **as-built drawings**- marked up copies of latest issues of construction drawings.	1	LS		500.00
1.7	**Environmental Control,** supply all materials, plant and labour, construct and maintain sediment and erosion control for the duration of the project.	1	LS		1,350.00
1.8	**Dis-establishment,** including clean up, removal from site, making good all disturbed surfaces not scheduled as a separate item, demobilisation of all manpower, equipment, plant and vehicles and removal of all temporary services, drainage and fencing.	1	LS		3,700.00
2.0	CLEARING & EARTHWORKS				
2.1	Supply all plant and labour, remove and dispose offsite remaining section of failed wall as per drawing 851148-01. Approx. 3m section of 2m high retaining wall.	1	LS		2,300.00
2.2	Supply all plant and labour, excavate and remove offsite topsoil and organic material from wall construction area and form cut platform as per drawings 851148-01 & 851148-03.	1	LS		1,320.00

Contractor's Initials.....

C M R

Item	Description	Quantity	Unit	Rate	Amount
2.3	**Clear Landslip Debris,** supply all plant and labour, remove slip debris from at base of slope, including that on client's property and adjacent properties. Access for removal is to be from the client's property. Estimated site volume from survey contours is 65 cu.m.	1	L.S		9,860.00
3.0	**WALL CONSTRUCTION**				
3.1	Supply all materials, plant and labour, construct anchored section of retaining wall as per specification & drawings 851148-01 to 851148-04. Including backfill with sand where required and clay cap.	13	L.m	6,150.02	79,950.28
3.2	Supply all materials, plant and labour, construct cantilever section of retaining wall as per specification & drawings 851148-01 to 851148-04. Including backfill with sand where required and clay cap.	3	L.m	2,132.70	6,398.11
3.3	Supply all materials, plant and labour, construct handrail as per drawing 851148-04.	16	L.m	110.00	1,760.00
4.0	**DRAINAGE-** access for all drainage works is to be via client's property.				
4.1	Supply all materials plant and labour, construct 110 dia. non perforate Novoflo pipe from subsoil drain outlet, as per specification & drawings 851148-01 & 851148-05.	22	L.m	35.00	770.00
5.0	**REINSTATEMENT**				
5.1	Supply all materials, plant and labour, place 100mm topsoil and seed exposed area of slope below wall as per specification.	180	sq.m	14.85	2,673.00
5.2	Supply all materials, plant and labour place 100mm topsoil and seed construction area as per specification.	90	sq.m	7.60	684.00
5.3	Supply all plant and labour, move shed from temporary position to location identified on drawing 851148-01.	1	LS		140.00
6.0	**DAYWORKS (provisional)**				
6.1	Working Day Rate (As per NZS 3910:2003)	2	Days	1,500.00	3000.00
6.2	Labour - Site Representative	16	Hr	45.00	720.00
6.3	Labour - Foreman	16	Hr	40.00	640.00
6.4	Labour - Labourer	32	Hr	35.00	1120.00
6.5	Materials	1	PS	$ 1,000.00	$1,000.00
6.6	Percentage on nett cost to materials	1,000	%	10	100.00

Item	Description	Quantity	Unit	Rate	Amount
6.7	**Plant Rates** Plant rates are to include for establishment, operator costs, and standby time. Tenderer to specify rating/size (ie. Excavator, 20T.) that is proposed for the road formation works. Any additional plant deemed to be required is to be listed under item 6.7.5				
6.7.1	Excavator 12 ton - -	8	Hr	110	880.00
6.7.2	Bobcat - -	8	Hr	95	760.00
6.7.3	Dump Truck - -	8	Hr	100	800.00
6.7.4	Crane -(INCLUDES PUR BOARD STAND OVER).	8	Hr	400.	3,200.00
6.7.5	Additional Plant - - -				
7.0	**List Any Unscheduled Items**				
				TOTAL (Excl. GST)	

$137,625.39.

NOTE: Failure to price any item in the Schedule of Prices shall be taken to mean that the cost of that item is included in the prices and rates for other items.

Contractor's Initials.....

C M R

6. Methodology

We propose to start with the site access which includes investigation and possible filling of the neighbours old under ground water tank. Temporary re-site small shed and begin to form an access track to the base of the new wall. Using a 12 ton excavator form the track of approx 9m long over 4.5m high to retrieve the pieces of retaining wall and spoil to waste.

While we still have the access track to the lower level we will ferry in the topsoil required for reinstatement. At this point we will install silt fencing to the lower levels.

Next a working platform directly at the base of the new wall will be formed for augering and placement of the poles which will be installed perhaps 2 at a time depending on reach, securely braced ready for concrete, cleaning up the spoil as we go, repeating this process as we work our way back out.

Obviously inspections of holes etc before pumping the concrete, build the wall as per plan up to the anchor height, a scaffold working platform erected for their installation. Continue with the wall construction including backfill etc, followed by the hand rail.

Drainage to the lower area completed then reinstate topsoil and grass, move to the top area and reinstate all effected areas including a new boundary fence and concrete pad for the neighbours and new outside tap installed.

Finally upon completion of the maintenance period and a reasonable grass take remove the silt fencing.

Sub Contractors

Earthworks:
Vern Boothby
Contour Excavations

Steel Work:
Jensens Steel Fabricators Ltd

Anchors:
Ancor Loc

Crane:
McLeod

C m R

Site Solutions (BOP) Ltd

Programme

Week 1 will be the excavation and clearing of the site.

Week 2-4 wall construction including handrail and anchor curing.

Week 5 reinstatement.

6 CMR

Communication Systems & References

We have an open communication system within Site Solutions where it is encouraged to communicate with the client and engineers where ever possible, This makes for a good working relationship with all concerned.

We are on email, fax and have cell phones on and off site.

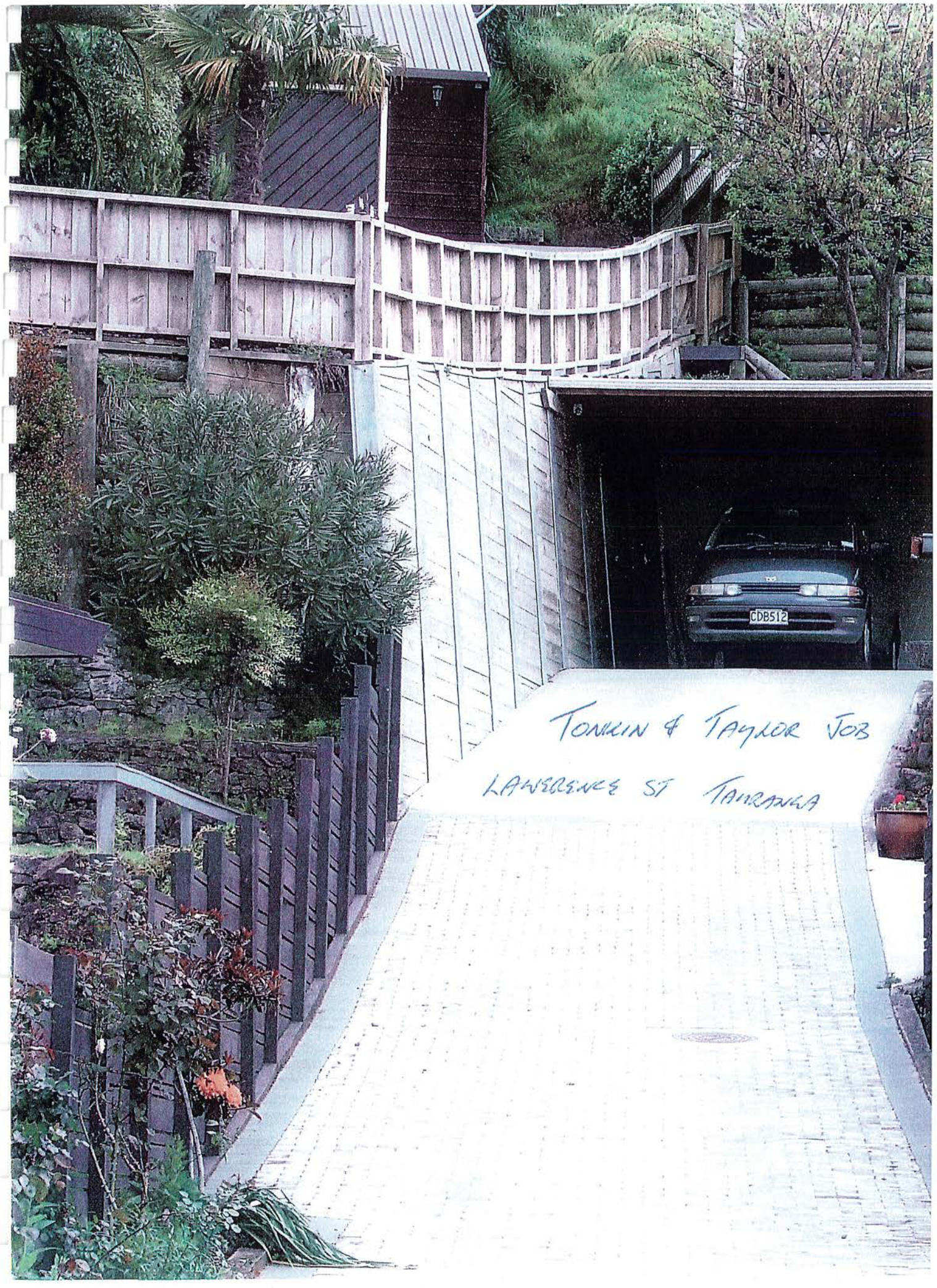
References can be supplied from local engineers and from council upon request.

C m R

Site Solutions BOP Ltd - Safety & Environmental Hazard Identification Sheet

Nov-08		Location (Worksite):SAMPLE	PLEASE READ AND SIGN REVERSE
Job No.		Contract Name: Tay St Boardwalk	
Completed By: Conrad Carroll		Date Revised:	

	PLANT	RISK (low, Med or Hi)	CONTROL METHOD (E,I,M)		WORKSITES	RISK (low, Med or Hi)	CONTROL METHOD (E,I,M)		MATERIALS PERSONAL	RISK (low, Med or Hi)	CONTROL METHOD (E,I,M)		Control Steps to be Taken
1	Reversing Plant	L	M	23	O/H Power lines			48	Fumes			4/5	Use PPE. Trained operator
2	Climbing on/off	L	M	24	Underground cables	H	M	49	Dust	L	M	15	Experienced operator/hard hats/keep clear swing
3	Exposed moving parts			25	Gas/Water Mains			50	Spills/Leaks	L	M		area/eye contact
4	Chainsaws/concrete	H	M	26	Residential Properties	L	M	51	Heat/burns			24	Service locations, pot holing, isolate if required
	cutter											12	Ear protection with plant
5	Small/Plant/skill saw	H	I	27	Waste Disposal			52	Fire/Explosion			31	Caution when wet
6	Daylight level			28	Steep terrain			53	Vapours			29/30	TMP, wear day glo, awareness of movements
7	Plant condition			29	Vehicle movements	H	M	54	Smoke			64	RCD keep leads dry
8	Wrong plant for job			30	Traffic flow	H	M	55	Gases			65	Regular short intervals
9	Vibration of Plant			31	Weather conditions	M	M	56	Spray drift			1	Day glo - keep clear
10	Exposure to heat			32	Site/Plant visibility			57	Frothing/Foaming			2	3 Point enter/exit
11	Exhausts			33	Slippery Surface			58	Silt Control			26	Awareness, control site access
12	Noise levels	M	M	34	Falling Debris			59	Sediment Control			36	Watch footing
13	Incorrect start up/shut			35	Site Access			60	Water Courses			37	Restrict access, attempt to keep driveways clear
	down											38	Experienced Contractors, Hazard awareness
14				36	Loose Metal	L	M	61	Drainage System			49	Dust prevention - cover/dampen/small stock piles
	OTHER HAZARDS			37	People and Animals	L	M	62	Stacking and storage			50	Refuel away from water courses
15	Bobcat/Excavator/roller	H	M	38	Other Contractors	L	M	63	Hazardous Substances			66	Slip slop slap and wrap
16	Reinforcing			39	Open Excavators			64	Electric Shock	M	I		
17	Housekeeping			40	Trenches			65	Repetitive Work Pattern	M	M		
18	Ramset Gun			41	Lifting			66	Sun and UV exposure	L	M		
19				42	Temp Props			67	Skin contact				
20				43				68	Infections				
21				44				69	Stress				
22				45				70					
				46				71					
				47				72					


CDB512
TONKIN & TAYLOR JOB
LAWRENCE ST TAURANGA

Tonkin & Taylor

1959 - 2009 50 YEARS

Fax

To:	Site Solutions	**Your fax no:**	
Attention:	Conrad Carroll	**T&T Ref:**	851148.002
From:	David Bouma	**Reply fax no:**	64-7-571 7390
Page:	1 of 2	**Date:**	05 Mar 2009
cc:		**cc fax no:**	
Subject:	851148.002 Anchored Retaining Wall 87 Harbour View Road Notice to Tenderers 1 Subject of Change of Close Date for Tenders and Lagging Treatment		

Please acknowledge receipt by completing and returning the attached form, or alternatively, by emailing SKarlsen@tonkin.co.nz advising the contract number and name and the NTT number.

You are hereby notified that the tender period has been extended. The tender will now close at 4pm on Thursday the 12th March 2009 at the Tauranga Tonkin & Taylor Office. Situated on Level 1, 36 Grey Street, Tauranga.

Please note also, all timber lagging is to be H4 treated as per item 2.21 of the Specification, not H5 treated as specified on Drawing 851148-03

Regards

David Bouma

Engineer to the Contract
Tonkin & Taylor Ltd

C m R

Tonkin & Taylor Ltd - Environmental and Engineering Consultants, Level 1, 36 Grey St, Tauranga, New Zealand
PO Box 317, Tauranga, Ph: 64-7-571 7360, Fax: 64-7-571 7390, Email: tga@tonkin.co.nz, Website: www.tonkin.co.nz

T&T Ref:851148.002

Notice To Tenderers acknowledgement

TO: Tonkin & Taylor Ltd

Facsimile: 64-7-571-7390

Attention: Sarah KarlsenDavid Bouma

We acknowledge receipt of :

851148.002 Anchored Retaining Wall 87 Harbour View Road
Notice to Tenderers 1
Subject of Change of Close Date for Tenders and Lagging Treatment

Signature: .....

Name .....CONRAD CARROLL.....

Name of Company: .....SITE SOLUTIONS LTD.....

08 March 2009
P:\851\148\851148.002\Communications\SiteSolNTT1.doc

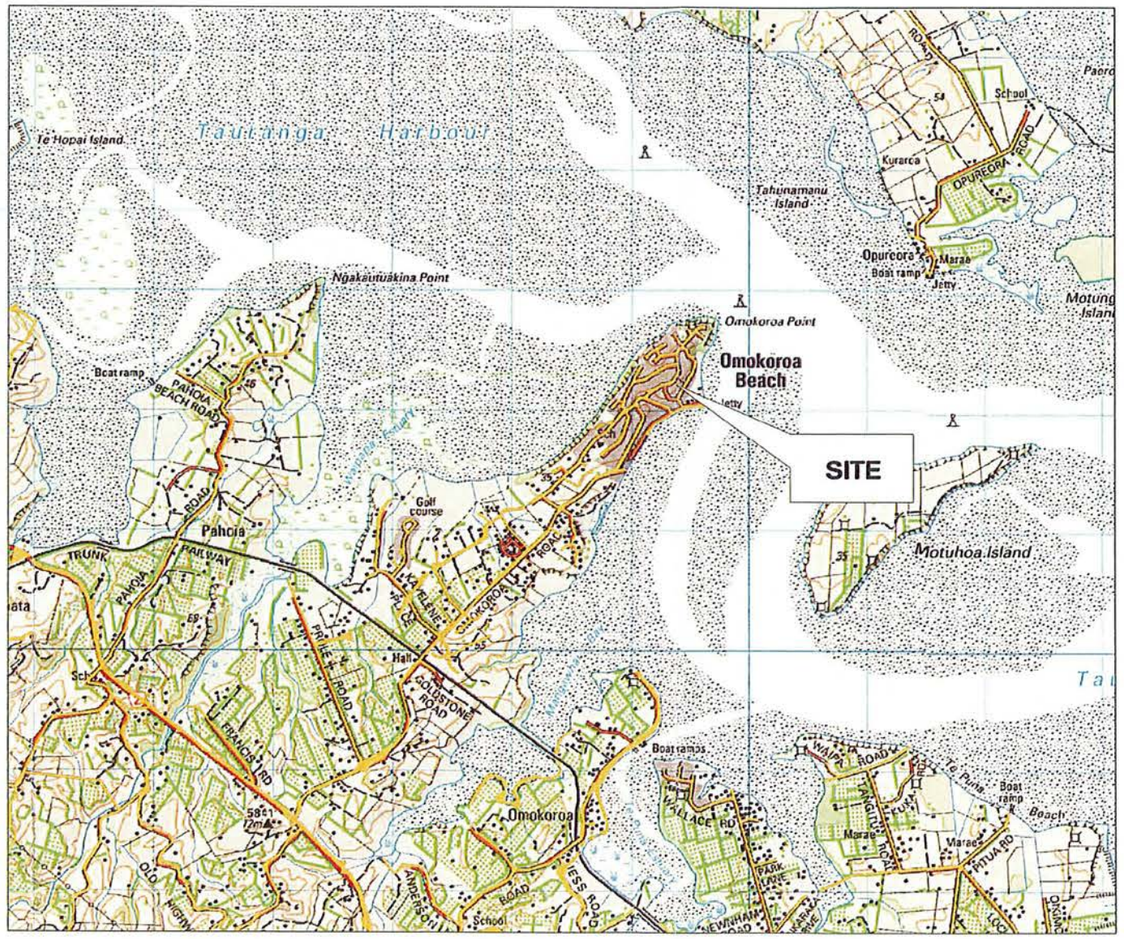
CMR

Colleen Nott & Max Rutland

ANCHORED RETAINING WALL

87 HARBOUR VIEW ROAD, OMOKOROA

DRAWING NO.	Rev.	DESCRIPTION
851148-00	B	Location Plan
851148-01	B	Site Plan & Wall Location
851148-02	B	Wall Longsection
851148-03	B	Wall Cross Section
851148-04	B	Anchor Detail



Topo map sourced from Terraview (Crown Copyright Reserved)

SCALE 1:50,000

0 500 1000 1500 2000 2500(m)

cmR

DRAWING STATUS: CONSTRUCTION ISSUE

REVISION	DESCRIPTION	BY	DATE
B	Construction Issue	DAB	3/09
A	Tender Issue	DAB	03/09

DESIGNED :	SJK	Dec.08
DRAWN :	smbj	Dec.08
DESIGN CHECKED :	DAB	3/9
DRAFTING CHECKED :	DAB	3/9
CADFILE : \\851148.001-00.dwg		
APPROVED :		29/3/09

This drawing is not to be used for construction purposes unless signed as approved

NOTES :

REFERENCE :

Tonkin & Taylor
Environmental & Engineering Consultants

Tauranga, Level 1, 36 Grey Street,
Ph: (07) 571 7360. Fax: (07) 571 7390
Email : tga@tonkin.co.nz
Web : www.tonkin.co.nz

CLIENT, PROJECT: Colleen Nott & Max Rutland
ANCHORED RETAINING WALL

TITLE: 87 HARBOUR VIEW ROAD, OMOKOROA
Location Plan

SCALES (AT A3 SIZE)	DWG. No.	REV.
AS SHOWN	851148.001-00	B

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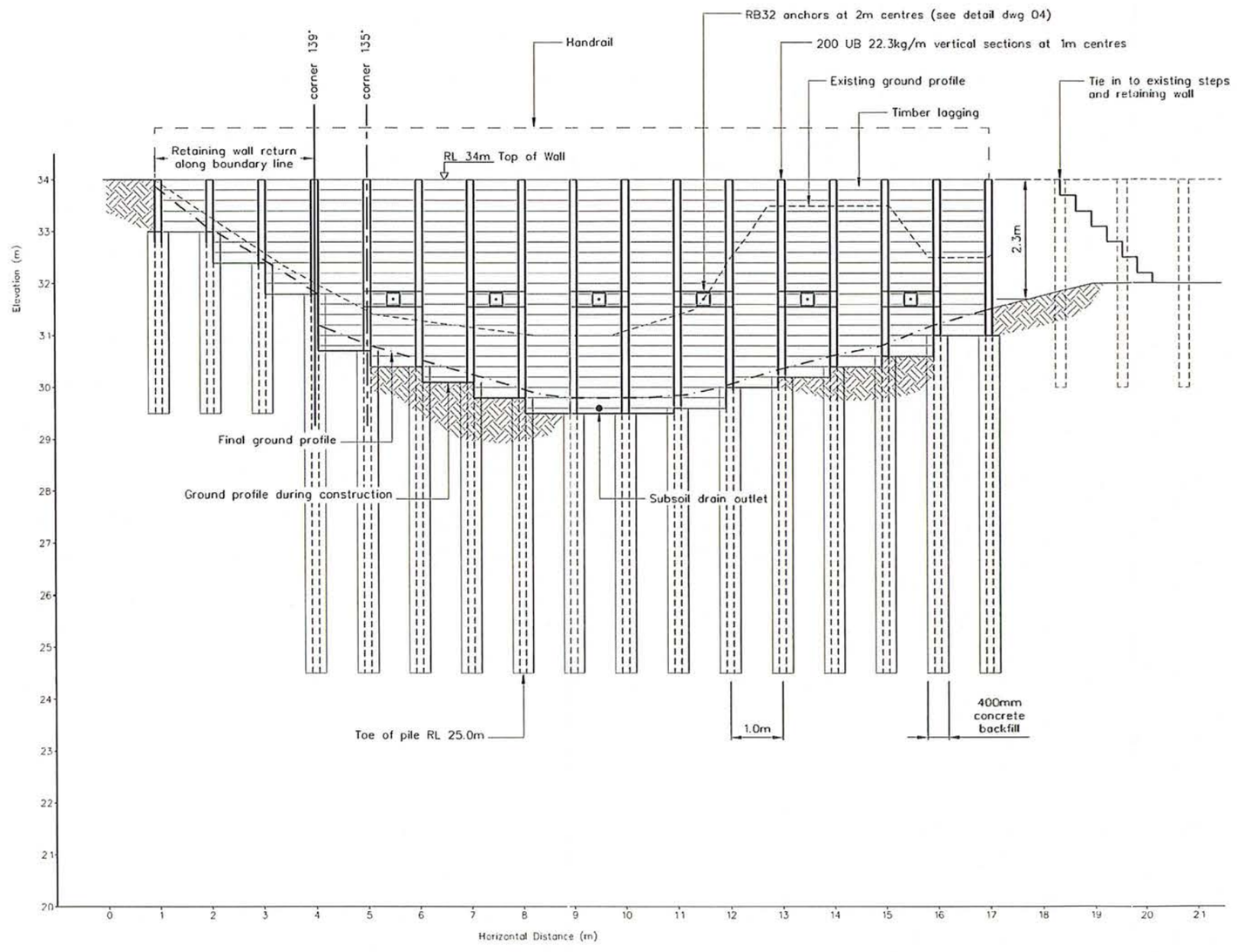

SECTION 1/01 SCALE 1: 100 — WALL LONGSECTION (DEVELOPED)

SCALE 1: 100

0 1 2 3 4 5 (m)

P:\851148\851148.001\WorkingMaterial\CAD\851148.001.01-04.dwg, 02, 20/03/2009 2:02:22 p.m., drt, 1:1

REVISION	DESCRIPTION	BY	DATE
B	Construction Issue	DAB	3/9
A	Tender Issue	DAB	03/08

DESIGNED :	sjk	Mar.09
DRAWN :	smbj	Mar.09
DESIGN CHECKED :	DAB	3/9
DRAFTING CHECKED :	DAB	3/9

CADFILE : \\851148.001\01-04.dwg

APPROVED : 24/3/09

This drawing is not to be used for construction purposes unless signed as approved

NOTES :

1. All dimensions are in millimetres unless noted otherwise.
2. All structural steel works to be grade 300+ to NZS34 14.
3. All steel work to be hot dip galvanised with minimum 600g/m² galvanised coating.
4. All steel construction is to be in accordance with NZS3404.
5. All timber construction is to be in accordance with NZS3603.
6. Elevations to Moturiki vertical datum 1953.
7. All cut or drilled surfaces in timber to be protected by applying a liberal brush application of 'ensele' or equivalent.

REFERENCE :

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Email : tga@tonkin.co.nz
Web : www.tonkin.co.nz

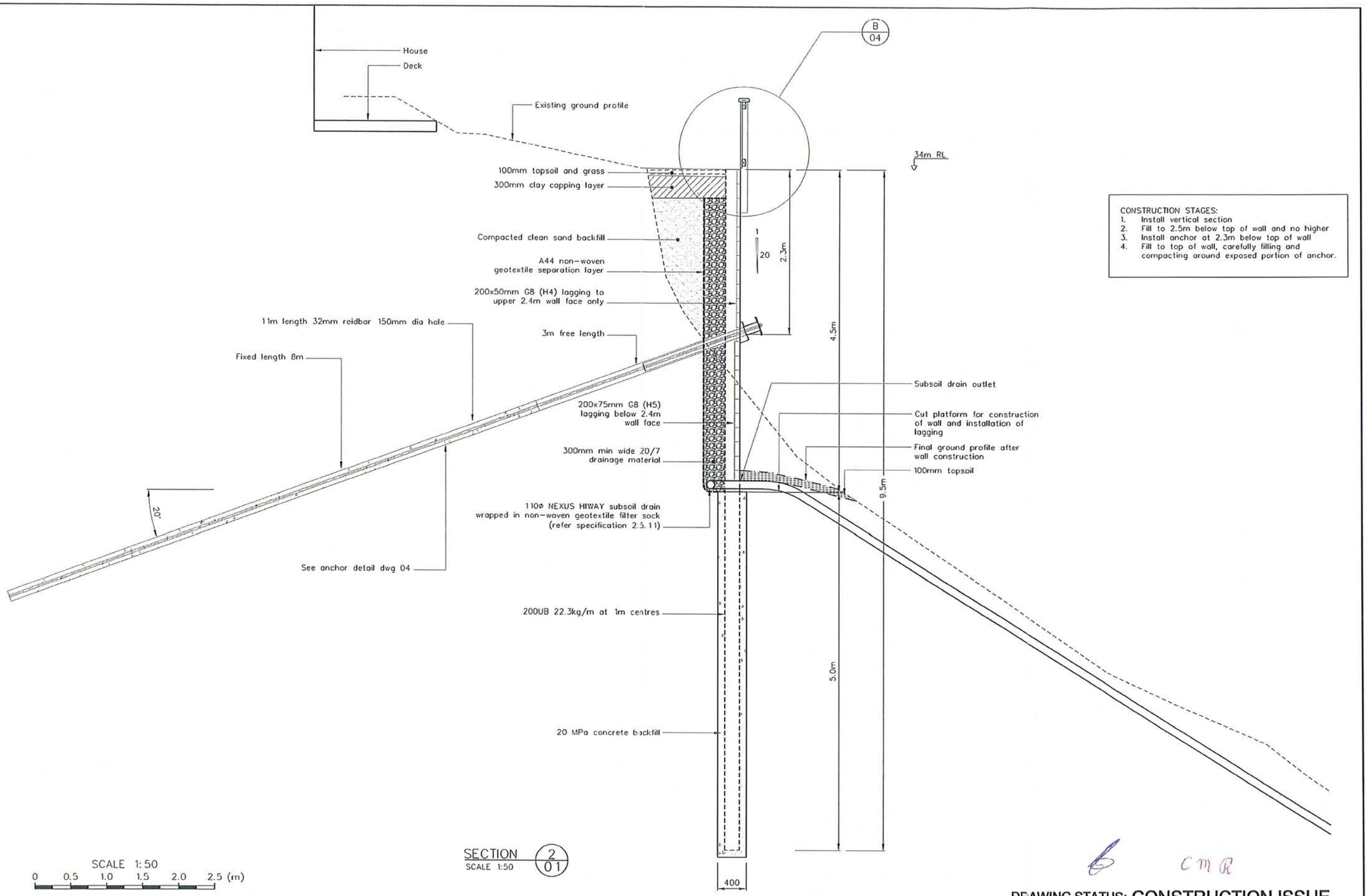
CMR

DRAWING STATUS: CONSTRUCTION ISSUE

CLIENT, PROJECT
Colleen Nott & Max Rutland
ANCHORED RETAINING WALL

TITLE
87 HARBOUR VIEW ROAD, OMOKOROA
Wall Longsection

SCALES (AT A3 SIZE)	DWG. No.	REV.
1: 100	851148–02	B



SECTION 2/01
SCALE 1:50

CONSTRUCTION STAGES:
1. Install vertical section
2. Fill to 2.5m below top of wall and no higher
3. Install anchor at 2.3m below top of wall
4. Fill to top of wall, carefully filling and compacting around exposed portion of anchor.

CMR

DRAWING STATUS: CONSTRUCTION ISSUE

REVISION	DESCRIPTION	BY	DATE
B	Construction Issue	DAB	3/9
A	Tender Issue	DAB	03/09

DESIGNED :	sjk	Mar.09
DRAWN :	smbj	Mar.09
DESIGN CHECKED :	DAB	3/9
DRAFTING CHECKED :	DAB	3/9
CADFILE : \\851148.001\01-04.dwg		
APPROVED :		24/3/09

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5. All timber construction is to be in accordance with NZS3603.
6. All cut or drilled surfaces in timber to be protected by applying a liberal application of 'Ensele' or equivalent.

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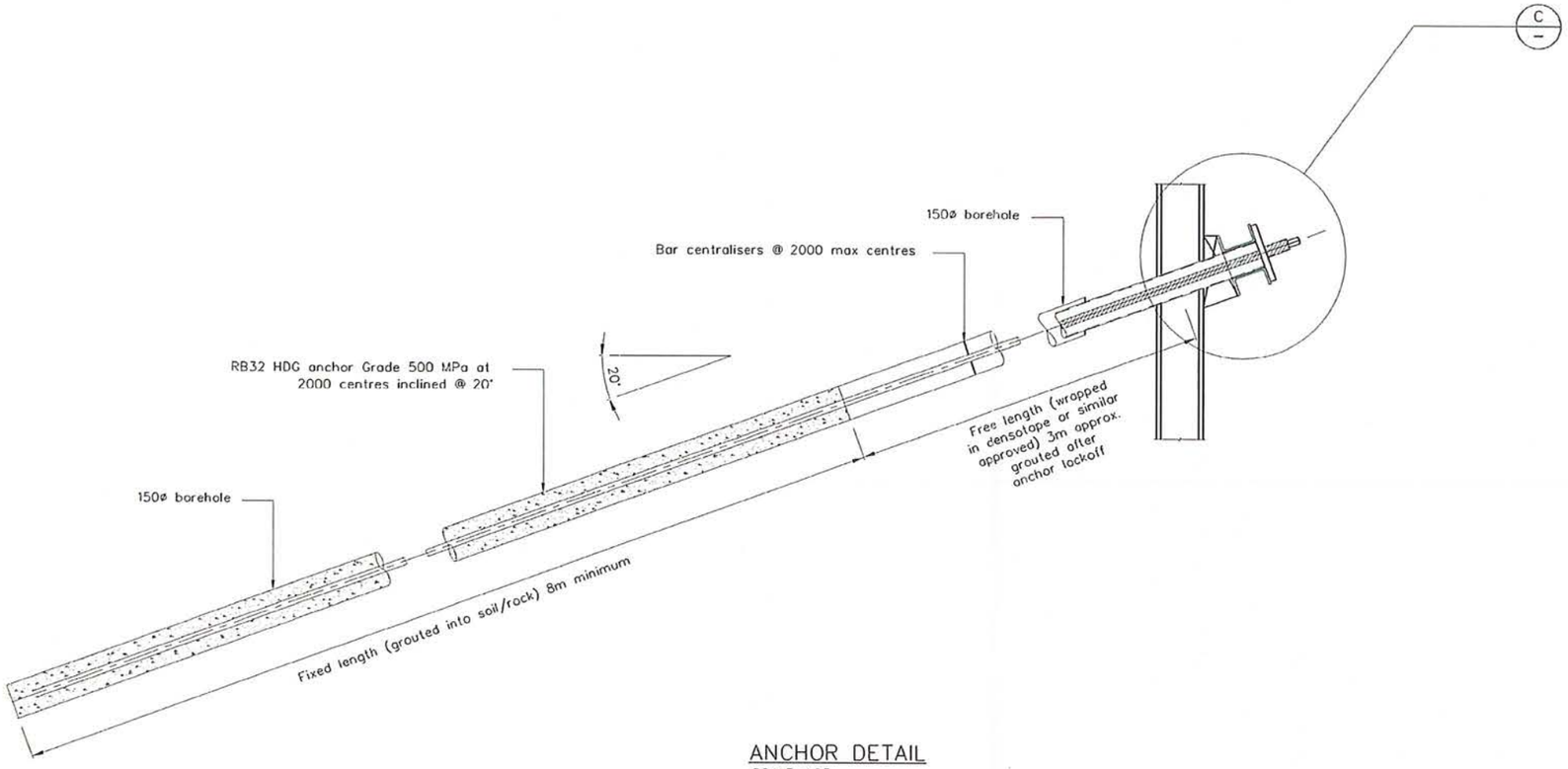
CLIENT, PROJECT
Colleen Nott & Max Rutland
ANCHORED RETAINING WALL

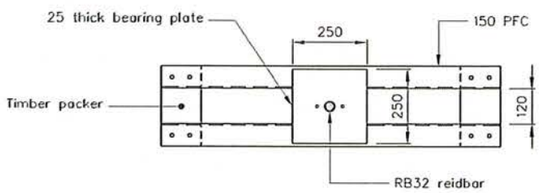
TITLE
87 HARBOUR VIEW ROAD, OMOKOROA
Wall Cross Section

SCALES (AT A3 SIZE)	DWG. No.	REV.
1:50	851148-03	B



ANCHOR DETAIL
SCALE 1:25

SCALE 1:25
0 0.5 1.0 1.5 (m)



ELEVATION 1
SCALE 1:20

SCALE 1:20
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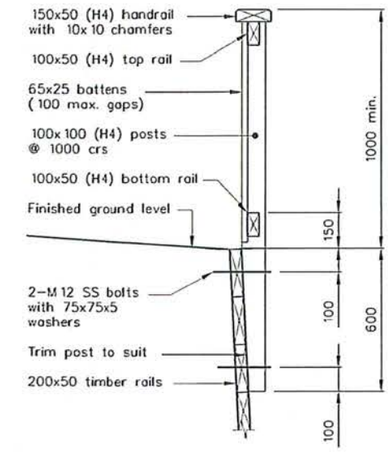
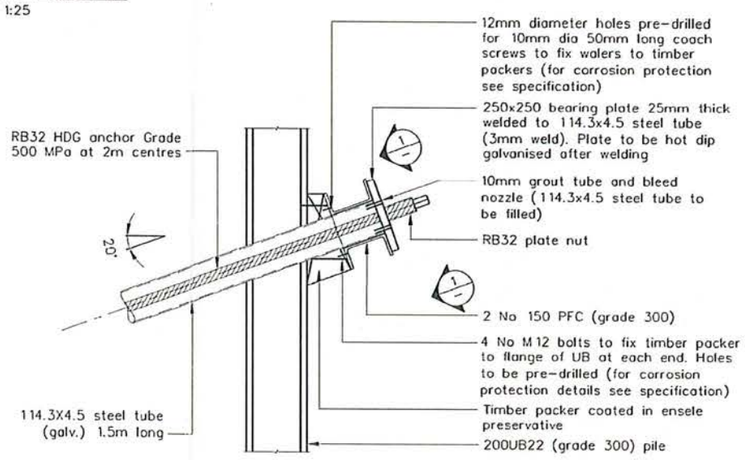
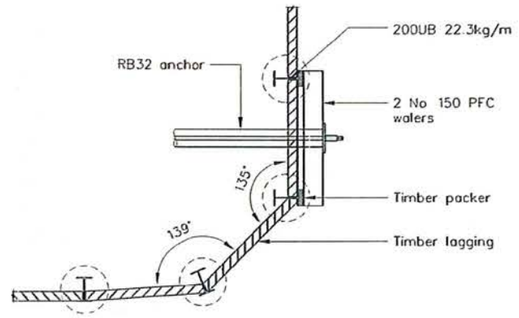


DETAIL B 03 HANDRAIL
SCALE 1:25



DETAIL C WALER DESIGN
SCALE 1:20



DETAIL A 01 WALL CORNER
SCALE 1:50

SCALE 1:50
0 0.5 1.0 1.5 2.0 2.5 (m)

C M R

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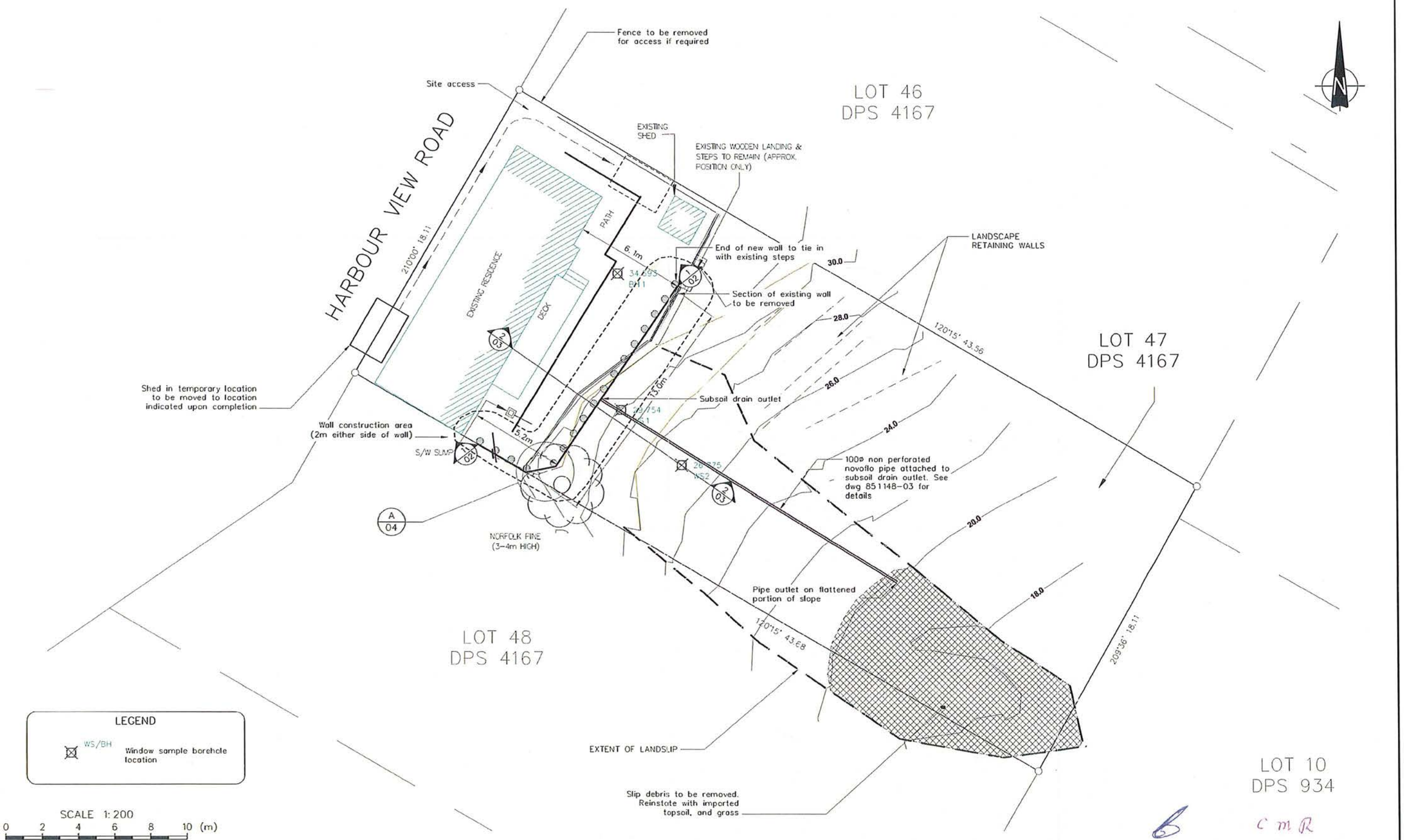
CLIENT, PROJECT
Colleen Nott & Max Rutland
ANCHORED RETAINING WALL

TITLE
87 HARBOUR VIEW ROAD, OMOKOROA
Anchor Detail

SCALES (AT A3 SIZE)	DWG. No.	REV.
AS SHOWN	851148-04	B



DRAWING STATUS: **CONSTRUCTION ISSUE**

B	Construction Issue	DAB	3/9
A	Tender Issue	DAB	03/09
REVISION DESCRIPTION		BY	DATE

DESIGNED :	sjk	Mar.09
DRAWN :	smbj	Mar.09
DESIGN CHECKED :	DAB	3/9
DRAFTING CHECKED :	DAB	3/9
CADFILE : \\851148.001\01-04.dwg		
APPROVED :		24/3/09

This drawing is not to be used for construction purposes unless signed as approved

NOTES :

1. All dimensions are in millimetres unless noted otherwise.
2. Base drawing supplied by Map Surveying Ltd, dated 15 October 2008 (project no. T08-002).

REFERENCE :

Tonkin & Taylor
Environmental & Engineering Consultants
Tauranga, Level 1, 36 Grey Street,
Ph: (07) 571 7360. Fax: (07) 571 7390
Email : tga@tonkin.co.nz
Web : www.tonkin.co.nz

CLIENT, PROJECT
Colleen Nott & Max Rutland
ANCHORED RETAINING WALL

TITLE
87 HARBOUR VIEW ROAD, OMOKOROA
Site Plan & Wall Location

SCALES (AT A3 SIZE)	DWG. No.	REV.
1:200	851148-01	B

C M R

Appendix B: Information to Tenderers

Information to Tenderers

The information in this section is provided for the use of tenderers and the Contractor. The information was obtained from the stated sources and has been used in development of the project design and proposals. The information and its sources are:-

1. (Info) Window Sample Borehole Logs	(Source) Logged by Geotechnics Ltd, locations are as indicated on drawing 851148-01.
2. (Info) Borehole Logs	(Source) Logged by T&T, Drilled by Perry Drilling.

The methods of derivation of factual data and the basis for interpretation and opinion are as set out in the source material. Tenderers shall review the information thoroughly and shall make their own interpretations to satisfy themselves that construction proposals and costs are appropriate and cover all matters affected by the ground and other conditions.

If at any time prior to Practical Completion , the Contractor should become aware of any signs of distress, excessive settlement or deflection, conflict of components or any other indications whatsoever of actual or potential damage to the Contract Works or any part thereof, it shall forthwith notify the Engineer in writing.

GEOTECHNICS LTD

BOREHOLE LOG

BOREHOLE No: WS 1
Hole Location:

SHEET 1 OF 2

PROJECT: HARBOUR VIEW REMEDIAL DES | LOCATION: OMOKOROA | JOB No: 851148.001

CO-ORDINATES mN mE | DRILL TYPE: 36mm Window Sampler | HOLE STARTED: 30/09/08

R.L. m | DRILL METHOD: Window Sampling | HOLE FINISHED: 30/09/08 | DRILLED BY: LRA/RWM

DATUM | DRILL FLUID: N/A | LOGGED BY: LRA | CHECKED:

GEOLOGICAL																ENGINEERING DESCRIPTION
GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MINERAL COMPOSITION.	FLUID LOSS	WATER	CORE RECOVERY (%)	METHOD	CASING	TESTS	SAMPLES	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	COMPRESSIVE STRENGTH (MPa) 1 20 50 150 250	DEFECT SPACING (mm) 50 200 1000 2000	SOIL DESCRIPTION: Soil type, minor components, plasticity or particle size, colour. ROCK DESCRIPTION: Substance: Rock type, particle size, colour, minor components. Defects: Type, inclination, thickness, roughness, filling.
Fill									0			M	S				SILT with some sand, mixed brown, dark brown, black and yellow, soft as recovered, moist, slightly plastic, insensitive. Sand is fine to medium, poorly graded.
Note: Piezometer installed.									0.5								0.5
																	- 0.8 - 0.9m shell fragments
						• 37/24KPa			1.0				F				1.0
												M	S				Clayey SILT with some silt clasts, dark brown, soft as recovered, moist, highly plastic, insensitive, slightly sticky. Clasts are fine, weathered silt. 1.5
									1.5			M	S-F				SILT, yellowish brown, soft to firm as recovered, moist, moderately plastic, insensitive.
												M	St				SILT with some clay, mixed brown and light yellow with fine black mottles, stiff as recovered, moist, moderately to highly plastic, insensitive. 2.0
						• 137/40KPa			2.0			M	VSt				CLAY with some silt, brown with fine orange mottles, firm as recovered, moist, highly plastic, insensitive.
									2.5								2.5
												M-W	F-S				CLAY with some silt, light yellow with fine black mottles, firm to soft as recovered, moist to wet, moderately to highly plastic, slightly sensitive, sticky.
												M	S-F				SILT, dark brown, soft to firm as recovered, moist, highly plastic, insensitive. 3.0
						• 115/45KPa			3.0			W	VSt				- 3m becomes soft, wet, sticky
												M	F				Clayey SILT, brown with black mottles, firm as recovered, moist, highly plastic, insensitive. 3.5
									3.5			M	VSt				SILT, orange-brown, very stiff as recovered, moist, highly plastic, insensitive.
													F-St				- 3.8m becomes firm to stiff as recovered, light brownish orange, moderately plastic
						• 170/60KPa			4.0				VSt				- 4m some clay, becomes soft to firm as recovered, highly plastic, slightly sensitive, sticky 4.0
									4.5				F				- 4.5m becomes firm as recovered, insensitive, not sticky 4.5
													S				- 4.7m becomes soft as recovered, slightly sensitive, sticky
									5								

eak

Log Scale 1:25

BORELOG BORELOGS.GPJ 08/10/08

GEOTECHNICS LTD

BOREHOLE LOG

BOREHOLE No: WS 1
Hole Location:

SHEET 2 OF 2

PROJECT: HARBOUR VIEW REMEDIAL DES | LOCATION: OMOKOROA | JOB No: 851148.001

CO-ORDINATES mN mE | DRILL TYPE: 36mm Window Sampler | HOLE STARTED: 30/09/08

DRILL METHOD: Window Sampling | HOLE FINISHED: 30/09/08 | DRILLED BY: LRA/RWM

R.L. m | DRILL FLUID: N/A | LOGGED BY: LRA | CHECKED:

DATUM

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MINERAL COMPOSITION.

FLUID LOSS | WATER | CORE RECOVERY (%) | METHOD | CASING | TESTS | SAMPLES | R.L. (m) | DEPTH (m) | GRAPHIC LOG | CLASSIFICATION SYMBOL | MOISTURE CONDITION / WEATHERING | STRENGTH/DENSITY CLASSIFICATION | SHEAR STRENGTH (kPa) 10 25 50 100 200 | COMPRESSIVE STRENGTH (MPa) 5 20 50 100 250 | DEFECT SPACING (mm) 50 250 1000 2000

SOIL DESCRIPTION
Soil type, minor components, plasticity or particle size, colour.

ROCK DESCRIPTION
Substance: Rock type, particle size, colour, minor components.
Defects: Type, inclination, thickness, roughness, filling.

DEPTH (m)	TESTS	MOISTURE CONDITION	STRENGTH/DENSITY CLASSIFICATION	DESCRIPTION
	• 139/61KPa		VSt	
		M	St	- 5.40m becomes bluish red
5.5		M	F-St	SILT, reddish brown, firm to stiff as recovered, moist, moderately plastic, insensitive.
				- 5.7m slightly plastic
6.0	• 226+KPa		H	- 6m becomes light yellowish brown with some fine orange mottling
				Silty CLAY, brown, stiff as recovered, moist, highly plastic, insensitive
6.5				Silty CLAY, light yellowish brown, firm as recovered, moist, highly plastic, slightly sensitive, slightly sticky.
7.0				
7.5				- 7.5m becomes insensitive
8.0				**End of borehole at 8m.**
8.5				
9.0				
9.5				
10				

Log Scale 1:25

BORELOG BORELOGS.GPJ 08/10/08

GEOTECHNICS LTD

BOREHOLE LOG

BOREHOLE No: WS 2
Hole Location:

SHEET 1 OF 2

PROJECT: HARBOUR VIEW REMEDIAL DES | LOCATION: OMOKOROA | JOB No: 851148.001

CO-ORDINATES mN mE | DRILL TYPE: 36mm Window Sampler | HOLE STARTED: 30/09/08

R.L. m | DRILL METHOD: Window Sampling | HOLE FINISHED: 30/09/08 | DRILLED BY: LRA/RWM

DATUM | DRILL FLUID: N/A | LOGGED BY: LRA | CHECKED:

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MINERAL COMPOSITION.	FLUID LOSS	WATER	CORE RECOVERY (%)	METHOD	CASING	TESTS	SAMPLES	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	WEATHERING / MOISTURE CONDITION	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	COMPRESSIVE STRENGTH (MPa) 1 5 20 50 100 250	DEFECT SPACING (mm) 50 250 1000 2000	SOIL DESCRIPTION: Soil type, minor components, plasticity or particle size, colour. ROCK DESCRIPTION: Substance: Rock type, particle size, colour, minor components. Defects: Type, inclination, thickness, roughness, filling.
Topsoil, Landslide debris									0								TOPSOIL, landslide debris.
Note: Piezometer installed.									0.5			D	D				Sandy SILT with sea shells, dark brown/black. 0.5
												D-M	F-St				Medium to coarse SAND with some silt, orange, dense as recovered, dry, well graded.
						• 133/32KPa			1.0			M	St-VSt				Sandy SILT, dark brown with black specks, firm as recovered, moist, plastic, insensitive. 1.0
																	SILT with minor sand, brownish orange, firm to stiff as recovered, dry to moist, moderately plastic, insensitive.
									1.5								Clayey SILT with minor sand, light yellow brown, stiff to very stiff as recovered, dry, non-plastic, insensitive. 1.5
						• 137/45KPa			2.0								2.0 Clayey SILT with some sand, reddish brown, firm to soft as recovered, moist, highly plastic, slightly sensitive.
									2.5				St				- 2.5m becomes orange, stiff as recovered 2.5
																	- 2.8m becomes moderately plastic
						• 129/37KPa			3.0			M-W	S-F				3.0 Clayey SILT with trace sand, light yellow-brown, soft to firm as recovered, moist to wet, slightly plastic, slightly sensitive. Sand is fine to medium.
									3.5								3.5 - 3.8m becomes firm as recovered
						• 68/49KPa			4.0				St				4.0 - 4m becomes stiff as recovered
									4.5								4.5
									5				S				

Log Scale 1:25

BORELOG BORELOGS.GPJ 08/10/08

GEOTECHNICS LTD

BOREHOLE LOG

BOREHOLE No: WS 2
Hole Location:

SHEET 2 OF 2

PROJECT: HARBOUR VIEW REMEDIAL DES | LOCATION: OMOKOROA | JOB No: 851148.001

CO-ORDINATES mN mE | DRILL TYPE: 36mm Window Sampler | HOLE STARTED: 30/09/08

DRILL METHOD: Window Sampling | HOLE FINISHED: 30/09/08

R.L. m | DRILLED BY: LRA/RWM

DATUM | DRILL FLUID: N/A | LOGGED BY: LRA | CHECKED:

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MINERAL COMPOSITION.

FLUID LOSS | WATER | CORE RECOVERY (%) | METHOD | CASING | TESTS | SAMPLES | R.L. (m) | DEPTH (m) | GRAPHIC LOG | CLASSIFICATION SYMBOL | MOISTURE CONDITION / WEATHERING | STRENGTH/DENSITY CLASSIFICATION | SHEAR STRENGTH (kPa) 10 25 50 100 200 | COMPRESSIVE STRENGTH (MPa) 1 5 10 50 100 250 | DEFECT SPACING (mm) 50 250 1000 2000

SOIL DESCRIPTION
Soil type, minor components, plasticity or particle size, colour.

ROCK DESCRIPTION
Substance: Rock type, particle size, colour, minor components.
Defects: Type, inclination, thickness, roughness, filling.

- 113/37KPa

- 162/45KPa

6ppm

- 4.9 - 5m some fine to coarse sand, becomes soft as recovered
- 5.1m trace fine sand, becomes soft to firm as recovered

5.5 6.0 6.5 7.0 7.5 8.0

Sandy SILT, light orange, wet, soft as recovered, non-plastic, sensitive. Sand is fine to coarse.

- 7.3 -7.4m silty, medium to coarse sand, light yellow-brown, recovered as loose, wet, well graded

- 7.6 - 7.7m silty, medium to coarse sand, light yellow-brown, loose as recovered, wet, well graded
- 7.7 - 7.9m becomes sandy silt, brown, recovered as soft, moist to wet, slightly plastic, slightly sensitive

SILT with minor sand, light yellow-brown, recovered as firm, slightly plastic, sensitive.

End of borehole at 8m.

8.5 9.0 9.5 10

Log Scale 1:25

BORELOG BORELOGS.GPJ 08/10/08

TONKIN & TAYLOR LTD

BORE CONSTRUCTION LOG

BOREHOLE No: BH1
Instrument:

SHEET 1 OF 5

PROJECT: Harbour View Rd Rem Des | LOCATION: 87 Harbour View Rd, Omokoroa | JOB No: 851148.001

CO-ORDINATES mN mE | DRILL TYPE: Tractor Rotary Bore | HOLE STARTED: 30/9/08

DRILL METHOD: Triple-tube | HOLE FINISHED: 30/9/08

R.L. m | DRILLED BY: Perry Drilling

DATUM | COLLAR RL: | LOGGED BY: SJK | CHECKED: DMMM

INTERPRETIVE GEOLOGICAL LOG | USCS DESCRIPTION

OBSERVATION and INTERPRETATION	CASING	WELL GRAPHIC LOG	WATER LEVEL	R.L. (m) / DEPTH (m)	SAMPLES	TEST RESULTS	GRAPHIC LOG	SOIL DESCRIPTION (Soil type, minor components, plasticity or particle size, colour. / ROCK DESCRIPTION — Substance: Rock type, particle size, colour, minor components. Defects: Type, inclination, thickness, roughness, filling.)
TOPSOIL				0.0				Sandy SILT with minor rootlets, dark brown. Friable, soft, moist, non-plastic and insensitive.
FILL								Silty fine SAND, orange brown. Dense, wet, well graded.
				0.5				SILT with shell fragments, some sand and trace rootlets, dark brown. Firm, moist, plastic and insensitive. No recovery 0.45m -1.5m
				1.0				
				1.5				1.5m recovered as wet, soft and slightly sensitive 1.6m becomes sandy SILT with trace shell fragments, dark orange brown, moist, soft-firm. 1.85m becomes light orange brown, some coarse sand. 1.9M 100mm band of Medium to coarse SAND with some silt, light brown. Medium dense, moist, well graded.
				2.0				SILT with minor sand, brownish orange. Firm, moist, highly plastic, slightly sensitive.
				2.5				2.8m becomes light brownish orange.
				3.0				Clayey SILT with minor fine sand, light yellow brown with black specks. Soft-firm, wet, plastic, sensitive.
				3.5				3.8m Sand becomes fine to medium.
				4.0				4.1m becomes firm to stiff.
				4.5				4.4m low plasticity. 4.5m - 5.1m PUSH TUBE
				5				

Log Scale 1:25

TONKIN & TAYLOR LTD

BORE CONSTRUCTION LOG

BOREHOLE No: BH1
Instrument:

PROJECT: Harbour View Rd Rem Des		LOCATION: 87 Harbour View Rd, Omokoroa	JOB No: 851148.001
CO-ORDINATES	mN mE	DRILL TYPE: Tractor Rotary Bore	HOLE STARTED: 30/9/08 HOLE FINISHED: 30/9/08
R.L.	m	DRILL METHOD: Triple-tube	DRILLED BY: Perry Drilling
DATUM		COLLAR RL:	LOGGED BY: SJK CHECKED: DMMM

INTERPRETIVE GEOLOGICAL LOG | USCS DESCRIPTION

OBSERVATION and INTERPRETATION	CASING	WELL GRAPHIC LOG	WATER LEVEL	R.L. (m)	DEPTH (m)	SAMPLES	TEST RESULTS	GRAPHIC LOG	SOIL DESCRIPTION Soil type, minor components, plasticity or particle size, colour. ROCK DESCRIPTION Substance: Rock type, particle size, colour, minor components. Defects: Type, inclination, thickness, roughness, filling.
					5.5				Silty CLAY with trace fine sand, light brown orange with black specks. Firm to stiff, moist, plastic and sensitive. 5.5
					6.0				6.0m - 6.9m No recovery (washed out) 6.0
					6.5				6.5
					7.0				6.9m -7.5m PUSH TUBE (likely disturbed at top) 7.0
					7.5				7.5m -8.1m PUSH TUBE Material not captured in PT (highly disturbed) - Clayey SILT,light brown and light pinkish brown. Very soft - firm, wet, plastic, sensitive. Bottom of PT - Sand Layer 8.0
					8.0				SILT with trace fine sand, dark brown. Firm to Stiff, moist to wet, plastic, insensitive. 8.5
					8.5				SILT with trace sand, orange brown. Stiff, moist, highly plastic, slightly sensitive. 8.7m becomes friable and very stiff 9.0
					9.0				Clayey SILT with trace sand, light whitesh brown with black specks. Stiff, wet, plastic, sensitive. 9.4m becomes yellow brown with minor sand, firm. Black specks become trace. 9.5
					9.5				
					10				

TONKIN & TAYLOR LTD

BORE CONSTRUCTION LOG

BOREHOLE No: BH1
Instrument:

PROJECT: Harbour View Rd Rem Des		LOCATION: 87 Harbour View Rd, Omokoroa	JOB No: 851148.001
CO-ORDINATES	mN mE	DRILL TYPE: Tractor Rotary Bore	HOLE STARTED: 30/9/08 HOLE FINISHED: 30/9/08
R.L.	m	DRILL METHOD: Triple-tube	DRILLED BY: Perry Drilling
DATUM		COLLAR RL:	LOGGED BY: SJK CHECKED: DMMM

INTERPRETIVE GEOLOGICAL LOG								USCS DESCRIPTION
OBSERVATION and INTERPRETATION	CASING	WELL GRAPHIC LOG	WATER LEVEL	R.L. (m) / DEPTH (m)	SAMPLES	TEST RESULTS	GRAPHIC LOG	SOIL DESCRIPTION Soil type, minor components, plasticity or particle size, colour. ROCK DESCRIPTION Substance: Rock type, particle size, colour, minor components. Defects: Type, inclination, thickness, roughness, filling.

10.0m becomes firm - stiff.

10.5m -11.1m No Recovery

SILT with trace sand, brown with black specks. Firm, moist, plastic, sensitive.

11.6m becomes reddish brown and stiff.

SILT with trace sand, brownish yellow with black Specks. Firm, moist - wet, low plasticity, sensitive.

12.5m Becomes plastic.

13.2m becomes sandy SILT, firm to stiff, slighty sensitive, non plastic.

SILT with trace sand, light yellow brown with black specks. Firm-stiff, wet, low plasticity, sensitive.

14.3m becomes orange brown and stiff.

TONKIN & TAYLOR LTD

BORE CONSTRUCTION LOG

BOREHOLE No: BH1
Instrument:

SHEET 4 OF 5

PROJECT: Harbour View Rd Rem Des		LOCATION: 87 Harbour View Rd, Omokoroa	JOB No: 851148.001
CO-ORDINATES	mN mE	DRILL TYPE: Tractor Rotary Bore	HOLE STARTED: 30/9/08 HOLE FINISHED: 30/9/08
R.L.	m	DRILL METHOD: Triple-tube	DRILLED BY: Perry Drilling
DATUM		COLLAR RL:	LOGGED BY: SJK CHECKED: DMMM

INTERPRETIVE GEOLOGICAL LOG								USCS DESCRIPTION
OBSERVATION and INTERPRETATION	CASING	WELL GRAPHIC LOG	WATER LEVEL	R.L. (m) / DEPTH (m)	SAMPLES	TEST RESULTS	GRAPHIC LOG	SOIL DESCRIPTION: Soil type, minor components, plasticity or particle size, colour. ROCK DESCRIPTION: Substance: Rock type, particle size, colour, minor components. Defects: Type, inclination, thickness, roughness, filling.
				15.5				Slightly cemented sandy SILT, orange with black staining. Stiff to very stiff, wet, non plastic, insensitive.
								15.8m white specks
				16.0				
				16.5				Clayey SILT with minor fine sand, brownish orange. Firm to stiff, moist to wet, low plasticity, sensitive.
								16.5m - 17.3m Lost Core
				17.0				
				17.5				
				18.0				
				18.5				
				19.0				
				19.5				SILT with some sand, white brown with black specks. Firm to stiff, moist, low plasticity, insensitive.
				20				Silty CLAY with trace sand, light orange brown with black specks. Firm, moist, sensitive.

TONKIN & TAYLOR LTD

BORE CONSTRUCTION LOG

BOREHOLE No: BH1
Instrument:

PROJECT: Harbour View Rd Rem Des	LOCATION: 87 Harbour View Rd, Omokoroa	JOB No: 851148.001
CO-ORDINATES mN mE	DRILL TYPE: Tractor Rotary Bore	HOLE STARTED: 30/9/08 HOLE FINISHED: 30/9/08
R.L. m	DRILL METHOD: Triple-tube	DRILLED BY: Perry Drilling
DATUM	COLLAR RL:	LOGGED BY: SJK CHECKED: DMMM

INTERPRETIVE GEOLOGICAL LOG							USCS DESCRIPTION	
OBSERVATION and INTERPRETATION	CASING	WELL GRAPHIC LOG	WATER LEVEL	R.L. (m) / DEPTH (m)	SAMPLES	TEST RESULTS	GRAPHIC LOG	SOIL DESCRIPTION: Soil type, minor components, plasticity or particle size, colour. ROCK DESCRIPTION: Substance: Rock type, particle size, colour, minor components. Defects: Type, inclination, thickness, roughness, filling.
				20.5				20.5
								Sandy SILT, orange with black staining. Stiff, wet, non plastic, insensitive.
				21.0				21.0
								Clayey SILT with minor sand, light ornge grey. Firm, wet, non plastic, sensitive.
								Clayey SILT with trace sand, orange brown with black specks. Firm to stiff, moist to wet, low plasticity, sensitive.
				21.5				21.5
				22.0				22.0
								22.0m 100mm band of SILT with trace sand, light white grey with black specks. Firm, moist to wet, non plastic, very sensitive.
				22.5				22.5
								EOH at 22.5m
				23.0				23.0
				23.5				23.5
				24.0				24.0
				24.5				24.5

Appendix A: Insurance Declaration Form

HAMILTON BRANCH

LEVEL 5, KPMG BUILDING
85 ALEXANDRA STREET
PO BOX 84
HAMILTON
NEW ZEALAND
TELEPHONE: 0-7-838 2504
FACSIMILE: 0-7-839 3133

CERTIFICATE OF INSURANCE

QBE Insurance (International) Ltd confirms the policy details as follows:

Insured:	Site Solutions Ltd	
Policy Type:	General Liability	
Policy Number:	20 4046024 PUL	
Period of Insurance:	FROM: 01/11/08 TO: 01/11/09	both days at 4pm
Limit of Indemnity:	NZ$2,000,000	
Territory:	As per Policy	
Contract:		
Principal:		
Interested Parties:		

Cover is subject to the terms and conditions of the policy. For a full description of the coverage please refer to the policy document.

Signed on behalf of QBE by: Megan Bloomfield

Dated: 24 March 2009

CROMBIE LOCKWOOD
New Zealand's Insurance Brokers

Crombie Lockwood (NZ) Limited
6th Floor, Westpac Building
The Strand
PO Box 13483, Tauranga
PHONE: 07 578-7852
FAX: 07 577-1987
www.crombielockwood.co.nz

INVOICE

BROADFORM LIABILITY INSURANCE

Expiry **ADVICE** 822481 31/10/07 **GST No:** 87-749-657

Insured:
Site Solutions (BOP) Ltd
64a Oropi Gorge Road
RD 3
Tauranga 3173

Policy Charge includes a Brokers Administration & Service Fee.
Renewal of Public Liability Policy with QBE

Provided that you have disclosed all material details pertaining to this risk, then this EXPIRY ADVICE will become a TAX INVOICE (GST NO 87-749-657) on payment of the renewal premium.
Policy charge includes a brokers administration & service charge.

Period: 01/11/2007 to 01/11/2008

Policy: 20-4046024-PUL

Refs.: PUB13084 C19110 SITE SOL JMB A15355

Insurer: QBE Insurance Intl Ltd

Excess: AS SHOWN

Insured/occupation
Insured: Site Solutions (BOP) Limited
Occupation: Civil Construction / Landscaping

Definitions

THE INSURED: As detailed above and/or subsidiary companies and/or any Director or Officer of the Insured or Directors Family Trust and any other company subsequently acquired by the Insured.

THE PERIOD OF INSURANCE: The period above and any subsequent period for which the Insured shall have paid or agreed to pay as the Company shall have accepted or agreed to accept a premium.

THE BUSINESS: As detailed any other occupation in which the Insured is now or in the future becomes involved.

THE PREMISES: Anywhere in New Zealand

Scope Of Cover

Subject to QBE Insurance (International) Ltd General Liability Wording

	Limit of Indemnity	Deductible
General Indemnity	$2,000,000	$ 500
Products Liability (Worldwide excluding USA & Canada)	$2,000,000	$ 500

CROMBIE LOCKWOOD
New Zealand's Insurance Brokers

Crombie Lockwood (NZ) Limited
Level 6, Westpac Building
The Strand
PO Box 13483, Tauranga 3141
PHONE: 07 578 7852
FAX: 07 577 1987
www.crombielockwood.co.nz

SCHEDULE

BUSINESS INSURANCE PACKAGE

Insured:
Site Solutions (BOP) Ltd
64A Oropi Gorge Road
RD 3
Tauranga 3173

CONTRACTORS ALL RISKS

(Expiry)

Policy Charge includes a Brokers Administration & Service Fee.
Renewal of Annual Contract Works Policy

Provided that you have disclosed all material details pertaining to this risk, then this EXPIRY ADVICE will become a TAX INVOICE (GST NO 87-749-657) on payment of the renewal premium.
Policy charge includes a brokers administration & service charge.

Period: 12/05/2008 to 12/05/2009

Policy: 20-4045245-CON

Refs.: BUS15014 CAR11417 C19110 SITE SOL JMB A15355 Reprint

Insurer: QBE Insurance Intl Ltd

Excess: $500

The Insured

The Insured and all Contractors, Sub Contractors, Principals, Employers, Labour Only Contractors & Employees & any other Party involved in the construction or erection of the Contract Works or components of the Works.

Property Covered

Annual Contract Works - Estimated Annual Turnover $ 600000.00
- Limit per Contract $250,000

Note premium charged based on estimated Turnover for next twelve months. Additional Turnover will be charged at the end of the Contract Period.

Property Insured

As per Sum Insured shown above in respect of the contract works whether permanent or temporary including formwork, falsework and supports including all materials on site and materials for the contract works away from the site, including whilst in transit within N.Z.

Broker Notes

The period of cover is from the time of acceptance of the Insured's tender to the time of practical completion plus any relevant maintenance or defects liability period/or until the

Lumley

To: **Conrad Carroll**

Fax:

Certificate of Currency

Insured:	Site Solutions (BOP) Limited
Vehicle:	Isuzu Bighorn, Toyota Prado, 2 x Tandem Trailers
Sum Insured:	Third Party Liability Limited to $5,000,000
Type of Policy:	National Bank Business Cover
Your ref:	C19110
Policy Number:	YAC10067
Interested Party:	
Situation of Risk:	Anywhere in New Zealand
Period of Cover:	12 May 2008 to 12 May 2009 at 4pm
Excess:	1% with a minimum of $500 plus Underage as applicable

Signed on Behalf of the Company:

Date: **15 May 2008**

Name **Khala Managh**

DDI **07 579 5952**

Fax **07 577 1987**

Mobile **N/A**

Lumley General

Lumley General Insurance (N.Z.) Limited
Level 1
BNZ Centre
354 Victoria Street
PO Box 9043
Hamilton
New Zealand
Telephone
07 839 4288
Facsimile
07 839 4955

CERTIFICATE OF CURRENCY

To: Khala Managh

at: Crombie Lockwood

We certify that: Commercial Motor

Policy No: 3006319

Has been issued for: 1993 Komatsu PC75U $30,000; Third Party Liability $10mill

Period: 12 May 2008 **to:** 12 May 2009

Insured: Site Solutions (BOP) Ltd

Situation Of Risk:. Anywhere in New Zealand

Financially Interested Party(ies): nil

Dated: 15 May 2008
At: Hamilton Branch

Wendy Maggs
For Lumley General Insurance

Appendix C: Provisions for Mediation

Provisions for Mediation

C1 The provisions of this Appendix shall apply unless otherwise provided in the Special Conditions.

C2 A dispute or difference may be referred to mediation by one or both of the parties at any time, and without the need to serve a notice requiring arbitration. Any time limit for serving a notice requiring arbitration shall then be extended until mediation of that dispute or difference is completed.

C3 The parties agree to appoint _____, of _____ (phone _____), as mediator. In the event that the named mediator is unable to act, the mediator for that period of time shall be the person appointed by the named mediator or otherwise agreed to by the parties.

C4 The parties shall comply with the mediator's reasonable directions to attend meetings and to provide documents, information, evidence and legal submissions.

C5 The mediator is authorised to conduct joint and separate meetings with the parties, and at any time (whether jointly or separately), to comment on any aspect of the submissions and evidence, to make oral and written recommendations for settlement, and to provide oral and written assessments of any matters in dispute (i.e. or any factual or legal questions, or the likely outcome of all or any aspect of a dispute at arbitration).

C6 If the mediator meets separately with any party, he may hear information which he is asked to keep confidential from other parties. If so, he shall keep the matter confidential, and exclude consideration of it from any assessment he provides on the matters in dispute.

C7 The mediator may from time to time invoice the parties for fees and expenses incurred and for reasonable amounts by way of security for future fees and expenses. Such invoices shall be paid within 14 days.

C8 Where both parties agree to mediation of a particular dispute, the parties undertake to pay the mediator's invoices in equal shares, save that they shall be jointly and severally liable to the mediator for the whole of his invoices. Alternatively, with the prior consent of the mediator, one party may agree to pay the mediator's invoices in full.

C9 The mediator shall not be liable to anyone for any act or omission in connection with mediation.

C10 Either of the parties may withdraw from the mediation of a dispute or difference at any time. However, if this happens, the mediator may, if he considers it appropriate in the circumstances and at the request of the other party, continue to provide to both parties a written preliminary assessment on any matters in dispute.

Appendix D: Provisions in Relation to Options Available to the Parties under the Arbitration Act 1996

Provisions in Relation to Options Available to the Parties under the Arbitration Act 1996

In the event of a submission to arbitration pursuant to clause 13.4 of the Conditions of Contract the arbitration shall be conducted pursuant to the Arbitration Act 1996 (referred to in this clause as the Arbitration Act) provided that:-

a For the purposes of the Arbitration Act, the following provisions shall apply:

i. **Article 11(2) (of the First Schedule) and Clause (1) (of the Second Schedule):** The sole arbitrator shall be such person as may be agreed upon in writing by the parties or, failing such agreement being reached within 20 days of the first nomination (by either one of the parties), shall be the person nominated for appointment as arbitrator by the President for the time being of The Arbitrators and Mediators Institute of New Zealand Incorporated, (referred to in this clause as the President), at the request of either party, and such consultation with the parties as the President considers appropriate.

ii. **Article 20(1):** The place of arbitration shall be as nominated in the First Schedule to the Conditions of Contract.

iii. **Article 21:** The date on which arbitral proceedings shall commence shall be the date on which the dispute between the parties is submitted to arbitration in accordance with Clause 13.4.2 of the Conditions of Contract.

iv. **Article 22:** The language used in the arbitral proceedings shall be English.

v. **Article 28(1):** The law applicable to the substance of the dispute shall be New Zealand law.

vi. **Article 31(5):** The rate of interest payable in respect of any such sum directed to be paid by an arbitration award shall be 10% per annum.

b The arbitration shall be deemed to not be an international arbitration for the purposes of the Arbitration Act, and the Second Schedule of the Arbitration Act shall apply.

c (Optional)

Article 3 (1) (a): The addresses for delivering written communications shall be the addresses set out in the First Schedule to the Conditions of Contract.

Article 4 The time limit for objecting to any non-compliance under the arbitration agreement shall be one week from the time of becoming aware of any such non-compliance.

Article 11 (1): The arbitrator shall be a permanent resident of New Zealand.

Article 19 (1): The Rules of Procedure shall be those set out in Section F of Brooker's "Arbitration Law & Practice" current at the time of the commencement of the Proceedings.

Article 23 (1): The Statement of Claim shall be submitted within four weeks of commencement of the arbitration and the Statement of Defence within a further four weeks after receipt of the Statement of Claim by the Respondent.

Article 25 (1) (a): The arbitrator may appoint any legal or other expert advisor to report to him/her on specific issues, the cost of so doing to be shared equally between the parties.

Schedule of Prices

Item	Description	Quantity	Unit	Rate	Amount
1.0	PRELIMINARY & GENERAL				
1.1	**Establishment,** including mobilisation and establishment on site of all manpower, equipment, plant, vehicles, accommodation, temporary services, and all overhead costs for arranging and providing contract insurances, site inductions, meeting initial H&S requirements and the like.	1	LS		2,500.00
1.2	**Construction administration costs,** including site supervision, communications, liaison, provision of insurance, insurance charges, financing costs, vehicles, traffic management, minor items of plant and equipment (e.g. shovels, hand tools etc.), head office back up and observation and implementation of H&S procedures during construction period to Practical Completion.	1	LS		2,520.00
1.3	**Services Location**	1	LS		500.00
1.4	**Access,** supply all materials, plant and labour, form access to construction area, including clearing all obstructions and reinstating upon completion. Access to be via client's property as per drawing 851148-01.	1	LS		7,000.00
1.5	**Surveying** to set out all works in accordance with drawings.	1	LS		1,500.00
1.6	Provide **as-built drawings**- marked up copies of latest issues of construction drawings.	1	LS		500.00
1.7	**Environmental Control,** supply all materials, plant and labour, construct and maintain sediment and erosion control for the duration of the project.	1	LS		1,350.00
1.8	**Dis-establishment,** including clean up, removal from site, making good all disturbed surfaces not scheduled as a separate item, demobilisation of all manpower, equipment, plant and vehicles and removal of all temporary services, drainage and fencing.	1	LS		3,700.00
2.0	CLEARING & EARTHWORKS				
2.1	Supply all plant and labour, remove and dispose offsite remaining section of failed wall as per drawing 851148-01. Approx. 3m section of 2m high retaining wall.	1	LS		2,300.00
2.2	Supply all plant and labour, excavate and remove offsite topsoil and organic material from wall construction area and form cut platform as per drawings 851148-01 & 851148-03.	1	LS		1,320.00

Contractor's Initials.....

C M R

Item	Description	Quantity	Unit	Rate	Amount
2.3	**Clear Landslip Debris,** supply all plant and labour, remove slip debris from at base of slope, including that on client's property and adjacent properties. Access for removal is to be from the client's property. Estimated site volume from survey contours is 65 cu.m.	1	L.S		9,860.00
3.0	WALL CONSTRUCTION				
3.1	Supply all materials, plant and labour, construct anchored section of retaining wall as per specification & drawings 851148-01 to 851148-04. Including backfill with sand where required and clay cap.	13	L.m	6,150.02	79,950.28
3.2	Supply all materials, plant and labour, construct cantilever section of retaining wall as per specification & drawings 851148-01 to 851148-04. Including backfill with sand where required and clay cap.	3	L.m	2,132.70	6,398.11
3.3	Supply all materials, plant and labour, construct handrail as per drawing 851148-04.	16	L.m	110.00	1,760.00
4.0	**DRAINAGE-** access for all drainage works is to be via client's property.				
4.1	Supply all materials plant and labour, construct 110 dia. non perforate Novoflo pipe from subsoil drain outlet, as per specification & drawings 851148-01 & 851148-05.	22	L.m	35.00	770.00
5.0	REINSTATEMENT				
5.1	Supply all materials, plant and labour, place 100mm topsoil and seed exposed area of slope below wall as per specification.	180	sq.m	14.85	2,673.00
5.2	Supply all materials, plant and labour place 100mm topsoil and seed construction area as per specification.	90	sq.m	7.60	684.00
5.3	Supply all plant and labour, move shed from temporary position to location identified on drawing 851148-01.	1	LS		140.00
6.0	DAYWORKS (provisional)				
6.1	Working Day Rate (As per NZS 3910:2003)	2	Days	1,500.00	3,000.00
6.2	Labour - Site Representative	16	Hr	45.00	720.00
6.3	Labour - Foreman	16	Hr	40.00	640.00
6.4	Labour - Labourer	32	Hr	35.00	1120.00
6.5	Materials	1	PS	$ 1,000.00	$1,000.00
6.6	Percentage on nett cost to materials	1,000	%	10	100.00

Contractor's Initials.....

C M R

Item	Description	Quantity	Unit	Rate	Amount
6.7	**Plant Rates** Plant rates are to include for establishment, operator costs, and standby time. Tenderer to specify rating/size (ie. Excavator, 20T.) that is proposed for the road formation works. Any additional plant deemed to be required is to be listed under item 6.7.5				
6.7.1	Excavator 12 ton -	8	Hr	110	880.00
	-				
6.7.2	Bobcat -	8	Hr	95	760.00
	-				
6.7.3	Dump Truck -	8	Hr	100	800.00
	-				
6.7.4	Crane - (INCLUDES PWR BOARD STAND OVER).	8	Hr	400.	3,200.00
6.7.5	Additional Plant -				
	-				
	-				
7.0	**List Any Unscheduled Items**				
				TOTAL (Excl. GST)	

$137,625.39.

NOTE: Failure to price any item in the Schedule of Prices shall be taken to mean that the cost of that item is included in the prices and rates for other items.

Contractor's Initials.....

C M R

SPECIFICATION

COLLEEN NOTT & MAX RUTLAND

Anchored Retaining Wall
87 Harbour View Road

Report prepared for:

COLLEEN NOTT & MAX RUTLAND

Report prepared by:

TONKIN & TAYLOR LTD

Distribution:

COLLEEN NOTT & MAX RUTLAND	1 copy
TONKIN & TAYLOR LTD	2 copies
SITE SOLUTIONS (BOP) LTD	2 copies

March 2009

T&T Ref: 851148.002

Table of contents

1 Preliminary & General

1.1 Location

The work included in this contract and to which the Specification and Drawings refer is located at 87 Harbour View Road, Omokoroa.

1.2 Extent of contract

The Contract Works comprise construction of an anchored vertical section retaining wall in accordance with the Drawings and this Specification. The work includes but is not limited to:

- Preparation and implement Health & Safety Plan
- Prepare and implement Environmental Controls
- Create access to the site
- Prepare site for construction
- Construction of an Anchored Vertical Universal Beam Section Retaining wall and cantilevered wing wall
- Clear landslip debris
- Reinstate all disturbed areas
- Maintenance of works

1.3 Drawings

The following drawings (collectively known as the Drawings) are included in and form part of the Contract Documents:

- 851148-00 Location Plan
- 851148-01 Site Plan & Wall Location
- 851148-02 Wall Longsection
- 851148-03 Wall Cross Section
- 851148-04 Anchor Detail

The Contractor shall inform the Engineer immediately of any apparent errors, inconsistencies or omissions in any of the Drawings. The Engineer will respond to any such information within two Days by means of clarification, confirmation or instruction.

The Contractor shall maintain one full set of drawings at the Site at all times specifically for recording As-Built locations and details. One full set of the marked up drawings shall be supplied to the Engineer by the Contractor on completion of construction with all as-built information marked up legibly in red.

1.4 Standard specifications

The standard specifications referred to herein shall be deemed to be incorporated in the Specification and shall apply to those sections of the Contract Works to which they are relevant. Reference to a standard specification refers to the latest edition at the date of closing of tenders and includes the latest amendments or revisions to that standard specification. The Contractor shall maintain on the Site of the Works a complete set of all standard specifications referred to in the Specification.

1.5 Survey and setting out

The Principal has established survey stations and other marks within and adjacent to the Site from which the extent of the Contract Works can be determined. Details of these stations and marks are shown on the Drawings. In case of any discrepancy between one mark and another, the ruling survey mark shall be as shown on the Drawings for which the co-ordinates are also set out. The Contractor shall be responsible for setting out the Contract Works from the ruling survey mark.

Where specific setout data is not provided on the Drawings, then the Contractor may scale from the Drawings to setout the Works. Any such setout must be confirmed on-site by the Engineer before construction of that section of the Works commences. The Contractor shall take particular care to ensure that all survey stations are protected in accordance with the requirements of the Conditions of Contract, until such time that they must be removed in order to allow the Works to be completed. The Contractor shall give the Engineer 48 hours notice before removing such benchmarks, so that the Engineer can establish new benchmarks if required.

Until such survey benchmarks are approved to be removed, the same survey benchmarks may be used by others and the Contractor shall take every reasonable precaution to ensure that no disturbance of them occurs. Should some such disturbance occur or be thought to have occurred or should the Contractor consider a benchmark to be in error, the Contractor shall notify the Engineer immediately. The Engineer will check any such marks and, where necessary, reinstate the marks before they are used for any subsequent setting out. Where it can be shown that the Contractor was responsible for the disturbance, any costs incurred due to the disturbance and/or by the Engineer in checking and reinstating will either be deducted from monies due to the Contractor or charged to the Contractor.

In the event that the Contractor desires to fix alternative and/or additional pegs for ease of setting out, he shall obtain the approval of the Engineer before installing such additional pegs. The Contractor shall be entirely responsible for ensuring and checking the accuracy of such additional pegs.

1.6 Hours of work

Normal Construction hours for this Contract are half an hour before sunrise to half an hour after sunset but:

Monday to Saturday: no earlier than 7:00 a.m. and no later than 7.00 p.m.

Sun. & Public Holidays: no earlier than 8.00 a.m. and no later than 6:00 p.m.

The Contractor shall allow for any other restrictions to the working hours described in the Consent conditions, heath and safety legislation or regulations and any other relevant documents.

1.7 Noise levels

Permitted construction noise levels shall be the lesser of those required by the local District Plan and those set out in NZS 6803:1999 "Acoustics - Construction Noise". The NZS 6803 limits are as follows:

Time of Week	Time of Day	Duration of Construction					
		Construction Duration 2 weeks to 20 weeks		Construction Duration less than 2 weeks		Construction Duration more than 20 weeks	
		L_{eq} (dBA)	L_{max} (dBA)	L_{eq} (dBA)	L_{max} (dBA)	L_{eq} (dBA)	L_{max} (dBA)
At Residential / Rural Dwellings							
Weekdays	0630-0730	60	75	65	75	55	75
	0730-1800	75	90	80	95	70	85
	1800-2000	70	85	75	90	65	80
	2000–0630	45	75	45	75	45	75
Saturdays	0630-0730	45	75	45	75	45	75
	0730-1800	75	90	80	95	70	85
	1800-2000	45	75	45	75	45	75
	2000–0630	45	75	45	75	45	75
Sundays and Public Holidays	0630-0730	45	75	45	75	45	75
	0730-1800	55	85	55	85	55	85
	1800-2000	45	75	45	75	45	75
	2000–0630	45	75	45	75	45	75
At Industrial/Commercial Boundaries							
Every Day	0730-1800	75		80		70	
	1800–0730	80		85		75	

1.8 Contractor's working area

The Contractor shall confine his operations to within the area shown on the Drawings as the "Extent of Site", and the Contractor's plant and materials shall not pass beyond the limits shown without the written approval of the Principal.

1.9 Access

Access to the Site shall be via the Harbour View Road and the Principal's property as shown on the Drawings.

1.10 Contractor's amenities

This section covers the provision of amenities for the Contractor's site staff and facilities. It does not include the supply of power, water and the like, necessary for carrying out the construction works.

1.10.1 Power supply

The Contractor may connect into the supply at the dwelling at 87 Harbour View Road, Omokoroa, and power will be supplied for site staff facilities, free of charge.

1.10.2 Water supply

The Contractor may obtain staff facility potable water from the Principal's nearest source of supply, faucet, tap or hydrant. The cost of any hoses, pipework and the fitting of the same from the said faucet, tap or hydrant shall be borne by the Contractor.

1.10.3 Contractor's facilities

The Contractor shall make arrangements for the provision of all services for construction works and amenities and facilities for site staff. These shall be located in a position within the site boundaries approved by the Engineer. All rubbish and wastewater shall be removed from the site.

1.11 Existing services

Existing services, such as stormwater lines, telecom or power cables, are indicated on the Drawings. However, the completeness and accuracy of the positions cannot be guaranteed and the positions and depths of services shown on the Drawings are to be taken as approximate only. The Contractor shall proceed with all due care to avoid disruption to or damage to any of the services or utilities on the Site, and shall be responsible for the care of all utilities in accordance with the Conditions of Contract.

1.12 Protection of adjoining public and private property

The Contractor shall take all necessary care to prevent damage to adjoining public and private property. Any material and rubbish dropped on public or private property shall be removed immediately. No plant, buildings, rocks, earth, slurry, vegetation or other materials shall be placed or allowed to roll, wash, slide or blow across the "Extent of Site" boundaries. The boundaries will be indicated to the Contractor by the Engineer prior to the commencement of work.

1.13 Maintenance of traffic

The normal flow of traffic, including pedestrian traffic, on any public road or private access road, rail, or property affected by the Works shall not be unreasonably interrupted during any operations under the contract. Adequate safeguards to the public in respect of temporary fences, signals, signs and lights shall be provided at all times. Where traffic signs are necessary, these shall be provided and operated by the Contractor in keeping with the local authorities' (or Transit NZ as applicable) guidelines, but erected only with the approval of the local authorities and the Engineer.

Where a Traffic Management Plan is required, the Contractor shall prepare, operate and update this plan as necessary throughout the duration of the works. The plan shall conform to the requirements of the local authority or Transit New Zealand (as applicable) and the Contractor shall be responsible for obtaining the approval of the appropriate authorities and maintaining the plan to their satisfaction.

1.14 Environmental considerations

In all areas where the Contractor intends to refuel plant or park plant overnight he shall provide such temporary stormwater contamination control provisions that will prevent pollution of stormwater courses, or natural water.

The Contractor shall take steps to ensure that no hydrocarbons are allowed to drain to ground during any operation, and that all are collected in drain trays or collection vessels.

Any soils which may have been hydrocarbon contaminated must not be transferred off site or spread in any uncontrolled manner to other areas of the Site. Any contaminated soil excavation materials shall be disposed of in a manner suited to the type and level of contamination (including, but not limited to, double bagging and disposal at a registered contaminated landfill, if appropriate).

1.15 Resource Management Act

Resource Consent is being sought for the Works. A copy of the consent will be given to the Contractor upon its approval. The Contractor shall hold a copy of these consents onsite at all times and shall ensure that its employees and Subcontractors are aware of the consent conditions and measure required to ensure compliance with these conditions.

The Contractor shall execute the Contract Works in accordance with the Resource Management Act.

The Contractor shall programme his operations and construct the Works to ensure that he fully complies with dust, sediment and erosion control methods outlined in the EBOP erosion and sediment control guidelines.

1.16 Safety during construction of the works

The Contractor shall be responsible for all matters which affect the safety and security of the Site and its employees on the Site. The Contractor shall recognise its accountability and responsibility for the safety of its staff and the staff of others within the confines of the Site.

The Contractor shall observe and comply with all relevant legislative safety precautions including:-

- the Health and Safety in Employment Act and its Regulations
- the Guidelines for the provision of facilities and general safety in the Construction Industry
- the approved Code of Practice for Safety in excavation and shafts for foundations, where relevant
- the requirements of the relevant local authorities,
- specified operating procedures and
- any other conditions which may be agreed to at the Site prior to the issue of any work permit.

The Contractor shall submit for approval a site specific Safety Plan and Site Hazard Identification Schedule, prior to commencement of the work, in accordance with the Health & Safety in Employment Act and its Regulations. The Contractor's Health and Safety Plan shall include:

a the identification of a suitably qualified and experienced full-time on site Safety Supervisor

b details of how the Contractor will advise his employees of both general and site specific hazards, the means of mitigation and his method of continual monitoring and recording of employees knowledge of and protection from such hazards

A copy of the Contractor's site specific safety plan, including site related training programmes and reporting arrangements shall be provided to the Principal and another copy shall be kept on site at all times for inspection by employees, contractors, the

Principal, site visitors and the Engineer. The Contractor shall also forward Health and Safety Plans for all on-site sub-contractors (if any) to the Principal along with the Contractors formal review and acceptance thereof.

The Contractor shall furnish the Engineer with written advice of every personal injury to its own and/or sub contract staff and other accidents that result in loss of progress and/or damage to property.

1.17 Construction Methodology

The Contractor must submit with its original programme a Methodology Statement which shall include his preferred sequence of carrying out the Works. Any such statement shall be subject to the approval of the Engineer. The Methodology Statement shall be updated from time to time as required by the Engineer.

The Contractor shall provide a construction methodology that details the following;

i. Details of temporary access that needs to be introduced and reinstated. Including the removal of any fencing or other infrastructure that needs to be removed and replaced.
ii. Type, weight and size of heavy construction equipment working onsite.
iii. Details of any staging or temporary works required to support the construction equipment.
iv. Construction Sequence.
v. Methodology for removing landslip debris including reinstatement of slope.
vi. Any other fencing, infrastructure or vegetation which needs to be removed and replaced to carry out the works.

1.18 Programme

1.18.1 General

The Contractor shall maintain close liaison with the Engineer so as to avoid interference to operations of the Principal's existing installations and to minimise any delays to the Contract Works.

The Contractor shall employ as many workers as are necessary to complete the Works by the Due Date for Completion.

The Contractor shall at all times maximise efficient use of its workforce having regard to actual and expected weather conditions and shall keep the Engineer informed of the planned use of the workforce.

1.18.2 Submission of programme

Prior to commencing work the Contractor shall submit a programme in the form of a bar chart programme and schedule of the proposed work flow.

The programme shall clearly delineate each activity for timing and duration of inputs required from other parties and the earliest and latest starting and finishing times for each activity. The Contractor shall allow to resource the work such that the Due Date for Completion given in the First Schedule to the Conditions of Contract is met, and mobilise additional resources as necessary.

1.18.3 Acceptance of programme

The Engineer will review the programme within 2 Days after receipt of the programme and if, in the opinion of the Engineer, the programme requires amendment so as to make it comply with the requirements of the contract, or to take account of changed or changing circumstances, or for any other reason, then the Engineer will require the Contractor to effect such amendments within 2 Days.

1.18.4 Amendments to programme

Where in the opinion of the Engineer the Contractor's progress has deviated from the programme to the extent that it no longer reflects the true situation, the Contractor shall prepare, within the next review period, an amended programme incorporating the latest information. When agreed, this programme shall become the current programme. Acceptance by the Engineer of any programme does not relieve the Contractor of any of his obligations and liabilities under the contract.

1.19 Inspection and approval

In addition to the requirements for inspection contained elsewhere in the contract, the Contractor shall give the Engineer at least 1 working day's notice that he wishes to proceed to the following stages of the Works.

a Commencement of work.
b Laying of pipelines.
c Laying of basecourse or filters
d Placing of UB vertical sections.
e Placing of fill.
f Installation and testing of ground anchors.
g Completion of the anchored retaining wall and cantilevered wing wall.
h Testing of any part of the Works as required under the Contract.
i Placing of topsoil.
j Inspection for Practical Completion

The Contractor shall not proceed to any stage of the Works until the Engineer has inspected, approved and where necessary measured the Works at the previous stage.

The Contractor shall be responsible for notifying the local council and arranging any Building Consent inspections by the council staff.

1.20 Approved materials

In all cases where plant or equipment of "approved" design or make is required by the terms of the Specification and/or Drawings, the Contractor shall obtain the approval of the Engineer in writing before such plant or equipment is constructed or ordered.

Where the Contract requires the Contractor to work in accordance with a given manufacturer's recommendations or requirements, the Contractor shall contact the manufacturer(s) and/or supplier(s) concerned, ascertain the relevant criteria and where appropriate arrange for the manufacturer's representative to be on Site while the relevant work is undertaken.

In all cases where a particular brand or product is specified, the Contractor may, subject to the approval of the Engineer, and at no additional cost to the Principal, substitute an alternative product or brand of the same kind, size and equal or better quality.

1.21 Cleaning up and reinstatement

During the course of construction the Site shall be kept as clean and as tidy as possible, and any damage caused to any property or existing works or services shall be rectified immediately.

On completion of the Works, the Contractor shall remove all temporary access or storage facilities, construction plant and debris. The Contractor shall leave the Site in a neat and tidy condition throughout to the satisfaction of the Engineer.

1.22 As-builts

One full set of the drawings shall be supplied to the Engineer by the Contractor on completion of construction with all as-built information marked up legibly in red.

1.23 Advertising and publicity

The Contractor shall not use or cause to be used any advertising or publicity matter, photographs, notice boards or other media in connection with the Contract Works without the prior approval in writing of the Principal.

2 Technical

2.1 Scope

This section of Specification covers all requirements for the supply of materials and construction of bored, set in concrete cast in-situ steel I section retaining wall with ground anchors and timber lagging. It covers all structural steelwork and metal work, including the supply of materials, delivery to site and erection.

2.2 Standard specifications

This Specification shall be read in conjunction with the following standards, guidelines, and other documents which are deemed to form part of this Specification. All materials and workmanship shall comply with these documents unless expressly noted otherwise.

- AS 2159 Piling Design and Installation
- OSH Code of Practice Excavation and Shafts for Foundations
- AS 2439 Perforated Plastic Drainage and Effluent Pipe and Fitting
- NZS 3109 Concrete Construction
- NZS 3404 Code for Design of Steel Structures
- AS/NZ 1554.1 Welding of Steel Structures
- TNZ Specification F/02 Specification for Pipe Subsoil Drain Construction
- TNZ Specification F/07 Geotextiles
- BS 8081 Code of Practice for Ground Anchors
- AS 1163 Structural Steel Hollow Sections
- AS 1214 Hot-dip galvanised coatings on threaded fasteners (ISO metric coarse thread series)
- AS 1237.1 Plain washers for metric bolts, screws and nuts for general purposes - General Plan
- AS 1237.2 Plain washers for metric bolts, screws and nuts for general purposes - Tolerances
- AS 2205.1 Methods for destructive testing of welds in metal - General requirements for tests
- AS 2205.2.1 Methods for destructive testing of welds in metal - Transverse butt tensile tests
- AS 2205.2.2 Methods for destructive testing of welds in metal - All-weld-metal tensile test
- AS 2205.2.3 Methods for destructive testing of welds in metal - Transverse joggle-butt tensile test
- AS 2205.3.1 Methods for destructive testing of welds in metal - Transverse guided bend test
- AS 2205.3.2 Methods for destructive testing of welds in metal - Transverse free bend test
- AS 2205.3.3 Methods for destructive testing of welds in metal - Longitudinal guided bend test

- AS 2205.3.4 Methods for destructive testing of welds in metal - Transverse joggle-butt wrap-around bend test
- AS 2205.3.5 Methods for destructive testing of welds in metal - Tongue bend test
- AS 2205.4.1 Methods for destructive testing of welds in metal - Nick-break test
- AS 2205.4.2 Methods for destructive testing of welds in metal - Fillet break test
- AS 2205.5.1 Methods for destructive testing of welds in metal - Macro metallographic test for cross-section examination
- AS 2205.6.1 Methods for destructive testing of welds in metal - Weld joint hardness test
- AS 2205.7.1 Methods for destructive testing of welds in metal - Charpy V - notch impact fracture toughness test
- AS/NZS 1110.1 ISO metric hexagon bolts and screws - Product grades A and B - Bolts
- AS/NZS 1110.2 ISO metric hexagon bolts and screws - Product grades A and B - Screws
- AS/NZS 1111.1 ISO metric hexagon bolts and screws - Product grade C - Bolts
- AS/NZS 1111.2 ISO metric hexagon bolts and screws - Product grade C - Screws
- AS/NZS 1112.1 ISO metric hexagon nuts - Style 1 - Product grades A and B
- AS/NZS 1112.2 ISO metric hexagon nuts - Style 2 - Product grades A and B
- AS/NZS 1112.3 ISO metric hexagon nuts - Product grade C
- AS/NZS 1112.4 ISO metric hexagon nuts - Chamfered thin nuts - Product grades A and B
- AS/NZS 1252 High strength steel bolts with associated nuts and washers for structural engineering
- AS/NZS 1553.1 Covered Electrodes for Welding - Low carbon steel electrodes for manual metal-arc welding of carbon steels and carbon-manganese
- AS/NZS 1553.2 Covered Electrodes for Welding - Low and intermediate alloy steel electrodes for manual metal-arc welding of carbon steels and low and intermediate alloy steels
- AS/NZS 1554 Structural Steel Welding Set
- AS/NZS 1554.1 Structural Steel Welding - Welding of steel structures
- AS/NZS 1554.2 Structural Steel Welding - Stud welding (steel studs to steel)
- AS/NZS 1554.3 Structural Steel Welding - Welding of reinforcing steel
- AS/NZS 1554.4 Structural Steel Welding - Welding of high strength quenched and tempered steels
- AS/NZS 1554.5 Structural Steel Welding - Welding of steel structures subject to high levels of fatigue welding

- AS/NZS 1554.6 Structural Steel Welding - Welding structural steels for structural purposes
- AS/NZS 1559 Hot-dip galvanised steel bolts with associated nuts and washers for tower construction
- AS/NZS 1594 Hot-rolled steel flat products
- AS/NZS 3678 Structural Steel - Hot-rolled plates, floor plates and slabs
- AS/NZS 3679 Structural Steel - Hot-rolled bars and sections
- AS/NZS 4680 Hot-dip galvanised (zinc) coatings on fabricated ferrous articles
- AS/NZS 4791 Hot-dip galvanised (zinc) coatings on ferrous open sections, applied by an in-line process
- AS/NZS 4792 Hot-dip galvanised (zinc) coatings on ferrous hollow sections, applied by a continuous or a specialised process
- BS 4395 - 1 Specification for high strength friction grip bolts with associated nuts and washers for structural engineering
- BS 4395 - 2 Specification for high strength friction grip bolts with associated nuts and washers for structural engineering. Higher grade bolts and nuts for general grade washers
- AS/NZS 4600 Cold-formed steel structures
- BS 7613 Hot rolled quenched and tempered weldable structural steel plates
- BS 7668 Weldable structural steels. Hot finished structural hollow sections in weather resistant steels
- NZS 3401 Specification for hot-rolled sections
- NZS 3404 Specification for structural steel
- NZS 4711 Qualification tests for metal arc welders
- NZS 4781 Safety in cutting and welding
- Swedish Standard 515 05 59 00 - 1967
- HERA Structural Steelwork Connections Guide (Parts I & II)

All standards, guides and documents referenced in this Specification shall be the latest revision, complete with current amendments as at the commencement of the Contract Works.

2.3 Existing conditions

The contractor shall review all existing geotechnical data prior to submitting his tender rates.

2.4 Materials

2.4.1 Steelwork and metalwork

2.4.1.1 General

All steel required to complete the structure shall comply with the standards listed. The grades of steel shall be as shown on the Drawings, and shall be protected from corrosion in accordance with the durability requirements of the New Zealand Building Code and of the following Steelwork Specification.

2.4.1.2 Hot Rolled Steel

Steelwork required to complete the structure shall be steel complying with the standards listed in section 2 of this specification. All structural members are grade 300 plus.

2.4.1.3 Fabrication

All structural steelwork shall be fabricated and erected in accordance with NZS 3404 and shall be carried out by tradesmen skilled in their work.

The Contractor shall employ suitable quality control and checking procedures during fabrication and the subsequent erection of all structural steelwork and metalwork. All quality control and checking procedures shall be subject to the approval of the Engineer. Following the fabrication and erection of a particular component the Contractor shall promptly forward to the Engineer the results of all the quality control checks undertaken for a particular component.

2.4.1.4 Cutting

Steel may be cut by shearing, cropping, sawing or machine flame cutting. Hand flame cutting may be permitted subject to approval. The cut edges shall be free of gouges, burrs and other defects which in the opinion of the Engineer could adversely affect the serviceability of the member or its protective coatings.

2.4.1.5 Inaccessible surfaces

Surfaces not in contact but inaccessible after shop assembly shall receive the full specified protective treatment before assembly. This does not apply to the interior of sealed hollow sections.

2.4.1.6 Dimensions

Before ordering or cutting steel, the Contractor shall check and verify all dimensions shown on the Drawings. He shall also check the location and level of bolts and foundations, by actual measurement on the Site.

2.4.1.7 Welding

If any welding of members is necessary, then prior approval by the Design Engineer is required.

2.4.1.8 Bolts and nuts

All bolts and nuts shall be Grade 8.8 unless stated otherwise on the Drawings, complying with AS/NZS 1111 and AS/NZS 1252. The Contractor shall provide written certification from the manufacturer that the bolts have been manufactured to AS/NZS 1252 and confirm the bolt, nut and washer set carry the correct markings. Unmarked bolts shall not be used. If there is no certification provided the Engineer may reject the bolts and nuts or request them to be tested in accordance with AS/NZS 1252 Appendix A. All nuts and bolts shall be corrosion protected and meet the durability requirements of the New Zealand Building Code.

2.4.1.9 Washers

All flat metal washers shall comply with AS 1237 and AS/NZS 1252 and shall be corrosion protected to meet New Zealand Building Code durability requirements.

2.4.1.10 Galvanising

Where shown on the Drawings, fixings and assemblies shall be hot dip galvanised after fabrication in accordance with AS/NZS 4680, AS/NZS 491 and/or AS/NZS 4792 as appropriate. All bolts, nuts and washers for the fixings are to be similarly galvanised and female threads shall be oversize tapped by plus 0.4 mm. Prior to galvanising the article shall be pickled in a dilute acid bath.

Care shall be taken to prevent hydrogen embrittlement of the steel. Vent holes in sealed sections shall only be drilled in positions agreed with the Engineer.

The zinc coating shall be of uniform thickness corresponding to a deposit of 600 grammes per square metre. The minimum thickness of coating shall be 75 microns. No bare area will be permitted. All rags, fins and other protuberances in the zinc coating shall be removed. After erection or installation of galvanised steel components all damaged areas where steel is exposed or rusting is visible shall be treated by thoroughly cleaning by hand wire brushing, scrapping, chipping and degreasing as necessary followed by two coats of an approved inorganic zinc silicate paint. Apart from accidentally damaged areas, this treatment shall also apply generally to bolts and nuts where the galvanising has been affected by tools. The use of cold galvanising paint for touch up shall only be with the approval of the Engineer.

2.4.1.11 Retensioning

Retensioning of bolts which have been fully tensioned shall be avoided, except that if retensioning is carried out, it shall only be permitted once and only where the bolt remains in the same hole in which it was originally tensioned and with the same grip. Retensioning of galvanised bolts will not be permitted. Under no circumstances shall bolts which have been fully tensioned be reused in another hole. Retightening of previously tensioned bolts which may have been loosened by the tensioning of adjacent bolts shall not be considered as retensioning.

2.4.1.12 Miscellaneous steelwork

Angles, plates and any other steelwork not specifically identified in the preceding sections shall be protected by a surface treatment.

2.4.2 Concrete

All concrete for the construction of reinforced concrete bored vertical section retaining walls shall meet the relevant requirements of section 5.5 in this Specification.

2.4.3 Subsoil drainage pipes

All subsoil drainage pipes shall meet the requirements of TNZ Specification F/02 for Class 500 pipe unless otherwise on the drawings or directed on site by the Engineer.

All subsoil drainage pipes shall be of the diameters shown on the drawings.

Subsoil drain collection pipes shall not be slotted at the discharge level.

All connectors, elbows, tee connections and reducers shall meet the relevant requirements of AS 2439 and be factory manufactured and fully compatible with the installed drainage pipe.

All perforated subsoil drainage pipe shall be wrapped in non-woven geotextile fabric.

Drainage aggregate when sieved in accordance with NZS 4402 Part 1, test 9B shall comply with the following gradings:

Standard Sieve Aperture Size	Percentage Passing
26.5mm	100%
9.5mm	10% max
0.075mm	0%

2.4.4 Geotextile fabric

All geotextile fabric shall comprise Engineer approved non-woven geotextile that meets the requirements of TNZ Specification F/07 for Strength Class C and Filtration Class 1 unless noted otherwise on the drawings or specified on site by the Engineer.

2.4.5 Timber rails and fixings

Rails, or lagging, shall be Radiata pine (or approved equivalent), bored, cut, machined and processed in accordance with the requirements of the Timber Preservation Council and NZS 3605 treated to H4 hazard class.

Bolts and fixings shall be galvanised and shall be thoroughly greased prior to installation.

Surfaces exposed after pressure treatment including the inside surface of bolt holes shall be protected by a liberal brush application of "Ensele" or equivalent as approved by the Engineer.

2.5 Construction

2.5.1 Construction sequence

The contractor shall construct the wall in the following sequence and as specified in the 'For Construction' issue of the construction drawings:

- Install vertical sections
- Fill to 2.5m below ground level behind the wall and no higher
- Install ground anchors 2.3m below ground level top of wall
- Fill behind wall to ground level, carefully compact fill around exposed anchor.

2.5.2 Construction records

The Contractor shall make detailed and accurate construction records for each vertical section as construction progresses.

Each vertical section construction record shall include the following:

- Vertical section reference number
- Date and time that vertical section installation construction commenced
- Date and time that installation was completed

- Weather conditions
- Confirmation of cleaning of bored hole base
- Water level, if any, in bored hole at the time of vertical installation
- Founding level of the vertical section, and the finished level of the head
- Any other details pertinent to the vertical section installation

2.5.3 Storage, protection and handling

The Contractor shall at all times protect all materials from damage or contamination.

All materials shall be stored on site in accordance with the Manufacturer's recommendations and to the satisfaction of the Engineer.

Damaged or contaminated materials shall not be incorporated into the permanent works in any circumstances.

The Contractor shall be responsible for delivering the materials to Site in a safe manner and without causing delay.

The Contractor shall lay down the steelwork on the Site at the position agreed with the Engineer. All steel shall be placed on timber packing to avoid ground contact. All steel at the Site shall be stored and handled so that members are not subject to excessive stresses or damage. Prior to erection all steelwork shall be cleaned as necessary to the satisfaction of the Engineer.

Padded slings shall be used to handle all corrosion-protected steelwork.

2.5.4 Steelwork and metalwork

2.5.4.1 Bolting

2.5.4.1.1 Holes

Flame cutting of bolt or screw holes will not be permitted. Holes shall be drilled, punched or drilled and reamed.

2.5.4.1.2 Minimum edge distance

Unless otherwise detailed, the minimum edge distance from the centre of a fastener to the edge of a plate shall be in accordance with NZS 3404 Table 9.6.2.

2.5.4.1.3 Bolts - General

Bolts in their final position shall be perpendicular to the assembled members. Where necessary, washers shall be tapered or otherwise suitably shaped to ensure the heads and nuts of bolts have complete bearing. The threaded portion of each bolt shall project through the nut at least one complete thread. Structural bolts shall be as specified on the Drawings.

2.5.4.1.4 Washers

Each bolt and nut shall be assembled with at least one washer. A washer shall be placed under the rotating component. Hardened or plate washers shall be used under both nut and bolt head for any slotted or oversize holes.

2.5.4.1.5 Snug tight nuts

Nuts shall be tightened sufficiently to draw the members firmly together. Wherever there is a risk of nuts becoming loose due to vibration or reversal of stress, they shall be securely locked. Nuts shall be tapped oversize to allow for galvanising where applicable. Bolts shall be tightened to snug-tight condition by a few impacts of an impact wrench or the effort of a person using a standard podger spanner.

2.5.4.1.6 Fully tensioned bolts

All bolts required to be fully tensioned shall be tightened in accordance with the part-turn method as given in clause 15.2.5.2 of NZS 3404.

Nut rotation from the snug tight condition given in section 6.6.5 of this Specification shall be as given below:

Bolt length (underside of head to end of bolt)	**Disposition of outer face of bolted parts (see Notes 1, 2, 3 and 4)**		
	Both faces normal to bolt axis	**One face normal to bolt axis and other sloped**	**Both faces sloped**
Up to and including 4 diameters	1/3 turn	1/2 turn	2/3 turn
Over 4 diameters but not exceeding 8 diameters	1/2 turn	2/3 turn	5/6 turn
Over 8 diameters but not exceeding 12 diameters (see Note 5)	2/3 turn	5/6 turn	1 turn

Note:

(1) Tolerance on rotation: for 1/2 turn or less, one-twelfth of a turn (30°) over and nil under tolerance; for 2/3 turn or more, one-eighth of a turn (45°) over and nil under tolerance.

(2) The bolt tension achieved with the amount of nut rotation specified above will be at least equal to the minimum bolt tension specified in Table 15.2.5.1 of NZS 3404.

(3) Nut rotation is the rotation relative to the bolt, regardless of the component turned.

(4) Nut rotations specified are only applicable to connections in which all material within the grip of the bolt is steel.

(5) No research has been performed to establish the turn-of-nut procedure for bolt lengths exceeding 12 diameters. Therefore, the required rotation shall be determined by actual test in a suitable tension measuring device which simulates conditions of solidly fitted steel.

Tensioning of bolts using a direct tension indication device may be permitted providing the Contractor demonstrates by calibration testing of a representative sample of not less than 3 bolts for each diameter and class of bolt in a calibration device capable of indicating bolt tension. The calibration test shall demonstrate that the device indicates a tension not less than 1.05 times the minimum bolt tension specified in Table 15.2.5.1 of NZS 3404.

2.5.4.1.7 Holding down bolts

The Contractor shall ensure anchor bolts are restrained in both horizontal and vertical direction during setting-in operations. They shall be installed to tolerances shown in NZS 3404 Figure 15.3.1 which are compatible with 6 mm diameter oversize baseplate holes. Anchor bolt lengths shall be longer than minimum length required to allow for the bolts

being set too low. The bolts shall not be tightened up until the grout/concrete under the baseplate has cured (28 days). Levelling of the column baseplate using levelling nuts on the anchors under the baseplate will not be permitted. The Contractor shall use shims or similar to achieve required tolerances. Holding down bolts shall be tightened to an initial bolt pre-tension of one half the bolt yield strength.

2.5.5 Concrete

Concrete shall be mixed, placed and cured in accordance with NZS 3109 (Concrete Construction). Concrete shall be obtained from a ready mixed supplier with a current high grading and shall be in its final position in the Works no later than one and one half hours after being discharged from the mixer. The wet surface of the finished concrete shall be protected from rain, and shall be finished with a curing compound to the approval of the Engineer. Control test results from the supplier's records shall be provided to the Engineer upon request, but in any case, a total of three compression test samples shall be formed and tested at 28 days for each pour in excess of five cubic metres.

Concrete characteristics such as strength and slump shall be as shown on the Drawings.

The Contractor shall not use admixtures in the concrete without the consent of the Engineer.

2.5.6 Vertical section installation

The Contractor shall at all times be wholly responsible for the efficiency and the safety of all erection operations and procedures.

The Contractor shall provide all the necessary resources in plant and personnel to complete the erection work in the shortest reasonable time. Extra resources shall be readily available to the Contractor in the event of plant breakdown. The Contractor shall take every care to avoid damage to the adjacent buildings, and shall expedite any repair work caused by its own actions.

Vertical sections shall not be tipped, rolled or dropped from the delivery vehicle. Any UB with evidence of handling damage shall be removed from the Site.

Holes shall be drilled in the locations shown on the Drawing to the specified depth and to sufficient diameter to accommodate the concrete backfill at a uniform thickness.

All excavated material shall be disposed of in a suitable stockpile for subsequent removal from site. Excavated material shall not be placed in a location that may compromise the stability of any excavation.

An inspection to confirm the founding level and condition of the hole shall be carried out by the Engineer prior to installation of the vertical supports.

Vertical sections shall then be installed onto a concrete pad of the specified thickness, sufficiently braced and the concrete encasement placed.

The placement tolerance shall be +-50mm from the wall alignment with a 1 in 20 slope inwards towards the retained surface.

No attachments may be made to the structural steelwork for the support of services etc, without the express approval of the Engineer. In general, the Engineer will not approve attachments by means of explosive driven fastenings.

During erection, members shall fit together in their proper position with ease. No straining of members in order to bring them into proper position will be allowed. All matching holes shall register with each other so that the field bolts will pass freely through the assembled contact faces at right angles to them. Snug tightening and final tensioning of bolts in a connection shall proceed from the stiffest part of the connection towards the free edges. Site cutting and welding will not be permitted without the express approval of the Engineer.

2.5.7 Earthworks – general

Earthworks shall be carried out in fully drained conditions with no free water on the working surfaces. Where it is impracticable to maintain excavations of unsuitable material deposits in a fully drained condition, the Engineer shall have discretion to relax this requirement to the degree that is necessary. Cut areas shall be sloped and graded adequately so that they do not pond water or allow water to infiltrate. Any filling which has been allowed to become too wet or soft shall be removed and dried, or replaced.

2.5.8 Excavation

All loose slide deposits, turf and organic topsoil shall be stripped from the areas subject to earthworks before other operations commence in these areas.

The depth of topsoil stripping shall be sufficient to remove all organic material, turf and significant plant roots. The Contractor shall cooperate with the Engineer ahead of and during stripping operations to determine the stripping depth and avoid unnecessary over-excavation of loss of topsoil.

All cut material other than topsoil and that required for fill or backfill shall be removed from site and disposed of.

2.5.9 Fill placement

Fill material shall comply with the requirements for fill as shown on the drawings. Fill material shall be broken into fragments of less than 100mm prior to compaction. The material shall be spread uniformly in layers of less than 200mm loose thickness, and conditioned to appropriate average water content and compacted. Organic matter shall not be included in fill. Approved compactors are required in addition to earthmoving plant.

New fill shall not be spread over surfaces which have deteriorated from their specified condition, and where necessary, the old surface shall be scarified and conditioned and re-compacted before placing new fill.

Completed earthworks areas shall be covered with not less than 100 mm of topsoil and sown and fertilised with a grass seed and fertiliser mix suited to the soil and climate of the district. As a minimum the grass mix shall be no less that:

25gm/m^2 of rye clover grass seed

25gm/m^2 of 3:1 mix of sulphate of ammonia to super-phosphate

Topsoil shall be clean, black, friable soil free from sand, gravel and stones. Spreading shall not be done when the ground or the topsoil is excessively wet or otherwise in a condition detrimental to the work.

The seed and fertiliser shall be uniformly distributed and harrowed into the topsoil leaving a smooth, evenly graded, open textured surface which will not hold water.

The Contractor shall maintain, dress up and re-sow as necessary, the top soiled and grassed surfaces until all surfaces are completely covered with a good strike of grass and free from runnels. He shall also cut the grass by suitable mowing methods until the end of the contract maintenance period.

2.5.10 Fill compaction

Compaction on each layer of loose fill material shall be sufficient to obtain the appropriate following standard:

- Scala penetrometer minimum 5 blows / 150 mm (cohesionless fill)
- Minimum undrained shear strength 80 kPa (cohesive fill)

Prior to fill placement the base of the excavation shall also be compacted to the standard specified above for fill.

The Engineer may carry out check tests of compaction at any time. The Contractor shall stop or divert his machines as required by the Engineer to allow the tests to be carried out.

2.5.11 Drainage pipes

All subsoil drains, slotted PVC pipes and vertical slot drains, shall be wrapped in an Engineer-approved non-woven geotextile fabric that meets the requirements of TNZ Specification F/7 for Strength Class C and Filtration Class 1 unless noted otherwise on the drawings or specified on site by the Engineer.

2.5.12 Geotextile fabric

All geotextile fabric shall be supplied, placed and lapped in accordance with TNZ Specification F/7.

2.5.13 Temporary support of excavated faces

The Contractor shall be fully responsible for the design, supply and installation of all temporary support, props and struts that are required to construct the proposed works in a safe and stable environment.

2.6 Tolerances, inspections and testing

2.6.1 Tolerances

2.6.1.1 General

The following tolerances shall apply for the construction of all vertical retaining wall:

a. The centre of the as-built vertical section shall be within 50mm of the specified plan position at vertical section cut off level

b. The rake of the as-built shall be within 1.0° of that specified on the drawings.

Tighter tolerances may be specified for other works related to the vertical sections.

The Contractor shall demonstrate correct vertical section location and alignment to the satisfaction of the Engineer by measurement or other means.

The Contractor shall make good at its own expense any vertical sections that are outside the above tolerances to the satisfaction of the Engineer.

2.6.1.2 Fabrication of Steelwork

Fabrication tolerances shall not exceed those given below. The component parts shall be assembled in such a manner that they are neither twisted nor otherwise damaged.

General Tolerances

Straightness	length/500
Structural dimensions	± 3 mm
Plan position of structural members	± 5 mm
Level of structural members	± 5 mm

Where the tolerance of the assembled item does not comply with this clause, agreement shall be reached between the Contractor and the Engineer of the method of reaching acceptable tolerances.

Notwithstanding the above clauses, fabrication shall be carried out in such a way as to ensure that structural members will fit together or be attached to cast in items as shown on the Drawings.

2.6.2 Inspections

The following inspections are required by the Engineer:

a. Completion of set-out.

b. All hole excavations shall be inspected and approved by the Engineer prior to placement of vertical sections.

c. The as-built founding level of each vertical section shall be approved by the Engineer based on an assessment of the Contractor's construction records and inspection of the boring by the Engineer.

d. The Engineer shall inspect the installation of soil anchors.

e. The Engineer shall inspect the placement of drainage material.

f. The Engineer shall inspect the placement of backfill.

The Contractor shall provide all plant, equipment, safety equipment and attendance personnel necessary to enable the safe and thorough inspection of the bored vertical section retaining wall construction by the Engineer.

The Contractor shall give the Engineer no less than 24 hours notice when any part of the works will be ready for inspection.

2.6.3 Testing of concrete

The Contractor shall undertake on-site slump tests and compressive strength testing of the concrete in accordance with the relevant requirements stipulated in the "Concrete" section of this Specification.

2.7 Protection of existing structures & property

The Contractor shall take all care to ensure that no damage is caused by any of the piling works to any existing structure or adjoining public or private property and shall undertake to make good, at no cost to the Principal, any damage caused by piling operations. If at any stage the Contractor suspects that the piling operation may cause any damage to existing structures or property it shall notify the Engineer immediately.

2.8 Existing services

The Contractor shall give all required notices to the appropriate utility company's and territorial authorities and pay all relevant fees and charges.

The Contractor shall also locate and protect existing services, rectify any damage or interference to them and provide temporary support while repairs are being carried out.

2.9 Ground anchors

2.9.1.1 General

All construction and testing for ground anchors shall be completed in accordance with BS 8081:1989 "Code of Practice for Ground Anchorages" except where amended by this document.

Details of the ground anchor retention system will be provided by the Engineer.

2.9.1.2 Tolerances

The tolerance on the location of all ground anchors shall be:

i) 50 mm in plan,
ii) 50 mm in elevation, and,
iii) No more than 1 degree from the given inclination

The Contractor shall make good all ground anchors that do not meet the specified tolerances to the satisfaction of the Engineer.

The Contractor shall be fully responsible for all costs and consequences associated with rectifying works that do not meet the specified tolerance requirements.

2.9.1.3 Cement grout

The mix design for the ground anchor grout shall be calculated by the Contractor and submitted for the Engineer's approval prior to use onsite. All ground anchor grout shall comply with Section 7.1 of BS 8081. All ground anchor grout shall have a water / cement ratio no greater than 0.4.

All water that is used during preparation of the ground anchor grout shall comply with NZS 3121 "Specification for water and aggregate for concrete".

All cement that is used during preparation of the ground anchor grout shall comply with NZS 3122 "Specification for Portland and blended cements".

All admixtures that are used during preparation of the ground anchor grout shall comply with NZS 3113 "Specification for chemical admixtures for concrete".

The minimum 28 day strength of the grout shall be 30 MPa unless noted otherwise on the drawings.

The grout shall not be subject to bleeding in excess of 0.5% by volume three hours after mixing or 1% maximum when measured at 20 degrees Celsius in a covered glass or metal cylinder of 150mm internal diameter and a grout depth of approximately 150mm.

2.9.2 Reinforcement, face plates and locking nuts

All grouted reid bar shall comprise 500MPa steel. These are to be surrounded by a grout sleeve of 150mm diameter

All steelwork shall be transported, fabricated, galvanised and handled in accordance with NZS 3404 "Steel structures".

All ground anchor strands and / or ground anchor bars shall be incorporated into the works in strict accordance with the manufacturer's recommendations and to the satisfaction of the Engineer.

In no circumstances shall ground anchor strands and / or anchor bars be bent.

All cut edges of steel components shall be free of gouges, burrs and all other defects that in the opinion of the Engineer could adversely affect the long term durability of the member.

2.9.3 Construction sequence

Construction of the retaining wall and installation all ground anchors shall be completed in accordance with section 5.2 of this specification and as stated in "For Construction" issue of the contract drawings.

2.9.4 Drill holes

The finished diameter of all ground anchor drill holes shall be no less than that shown on the Drawings.

All drilling for ground anchors shall be completed using Engineer approved drilling techniques and equipment.

The Contractor shall supply, install and extract temporary casing as appropriate during the construction of all ground anchor drill holes to minimise the risk of ground collapse.

2.9.5 Insertion of reinforcement

All ground anchor reinforcement shall be inserted and grouting commenced within 2 hours of the completion of drilling except where otherwise agreed by the Engineer.

All ground anchor reinforcement shall be positioned with the aid of Engineer approved centralising spacers or supports located at an interval of no less than 2.0m.

If the ground anchor reinforcement becomes jammed in a hole before reaching its final position and cannot be removed, the Contractor shall immediately seek the approval of the Engineer for the proposed remedial works before such work commences.

2.9.6 Placement of grout

All ground anchors shall be grouted in two stages:

i) The fixed length shall be grouted first then tested as required.

ii) After testing the free length of the anchor shall be grouted.

During the final grouting the Contractor shall ensure that the drill hole is totally filled with grout.

Where secondary grouting is required it shall be completed at a pressure of at least 1,000kPa. If the grout pressure is unable to be maintained following the application of 0.1m3 of grout, further post-grouting will be required to the satisfaction of the Engineer.

Grout shall not be used more than 30 minutes after first mixing.

The mixing and injection of all grout shall be completed using an Engineer approved mixer and pump.

2.9.7 Construction records

The Contractor shall complete a quality assurance checklist for each ground anchor.

The format of the ground anchor quality assurance checklist shall be proposed by the Contractor and approved by the Engineer prior to the commencement of construction works.

A copy of each ground anchor quality checklist shall be forward to the Engineer within 2 days of the completion of grouting.

The Contractor shall make detailed construction records for each ground anchor constructed.

The Contractor's ground anchor construction records shall include the following:

i) Anchor number.
ii) Anchor location.
iii) Record keepers name, date and signature.
iv) Date and time of the start and finish of drilling.
v) List of drilling crew and plant.
vi) Depth, diameter and inclination of hole.
vii) Fixed and free lengths of anchor installed.
viii) Flushing medium.
ix) Method of drilling hole.
x) Depth at which groundwater is encountered.
xi) Ground conditions encountered and ease of drilling.
xii) Date and time that the ground anchor reinforcing steel was installed in to the drill hole.
xiii) Details of the ground anchor reinforcing steel.
xiv) Date and time of the start and finish of fixed length grouting.
xv) Date and time of the start and finish of free length grouting.
xvi) Date and time of the start and finish of final grouting.
xvii) List of grouting crew and plant.
xviii) Details of concrete batch and test cube samples.
xix) Volume of grout used at each grouting stage to the nearest litre.
xxi) A description of all problems encountered during construction such as drill hole caving, excessive grout loss, jammed reinforcing, etc.

2.9.8 Pre-construction proving tests

No pre-construction proving tests will be required.

2.9.9 On-site acceptance tests

All production ground anchors that are not subjected to an on-site suitability test shall be subject to an on-site acceptance test.

All on-site acceptance tests shall be undertaken in accordance with Clause 11.4 of BS 8081: 1989.

For the purposes of the on-site acceptance tests 150% x T_w shall be taken as the greater of 150% x working load or 100% x ultimate seismic load that is stated on the drawings.

2.9.10 Acceptance criteria for on-site acceptance tests

The acceptance criteria for all on-site suitability tests and on-site acceptance tests shall be as stipulated in Section 11 of BS8081: 1989.

2.9.11 Testing equipment

All ground anchor stressing equipment shall comply with Section 9 of BS 8081:1989.

Two dial gauges shall be used to monitor deformation of the ground anchor head:

i) Dial gauge (No. 1): To measure the deformation between the anchor head and adjacent soil - outside the influence of the bearing plate.

Current calibration certificate shall be made available to the Engineer on request.

Accuracy $\pm$ 0.01mm.

ii) Dial gauge (No. 2): To measure the extension between the bearing plate and the jack.

Current calibration certificate shall be made available to the Engineer on request.

Accuracy $\pm$ 0.01mm.

The minimum travel of all dial gauges shall be the twice the anticipated stretch of the anchor over a load increment - calculated as follows:

$$travel = \frac{F \times L}{207{,}000 \times A}$$

where :F = force increment (kN)
L = free length of anchor (m), and,
A = cross-section area of anchor (mm2)

2.9.12 On-site test records

The Contractor shall keep a detailed record of every ground anchor test.

Each ground anchor test record sheet shall be faxed or emailed to the Engineer or his nominated representative within 24 hours of the completion of testing.

Each ground anchor test record sheet shall include the following:

a. Anchor number
b. Anchor location

c. Date and time of testing
d. Name and signature of testing technician
e. List of testing crew, plant and equipment
f. Description of weather conditions
g. Number of anchor strands
h. Detailed records of anchor head deflection and applied load versus time since start of test for each load increment, and
i. A record of the final lockoff load.

2.10 Completion

On completion, the Contractor shall leave the Site and the Contract Works safe, tidy and ready for immediate use by following contractors.

3 Methods of measurement and basis of payment

3.1 General

3.1.1 Scheduled quantities

For a Measure and Value Contract the Contract Price is determined with reference to the measured quantities of work actually carried out by the Contractor in accordance with the provisions of the Contract.

The quantities set out in the Schedule of Prices are estimates only of how much of each kind of work is included in the Contract. Such quantities will not be considered as final measurements. All work will be measured by the Engineer, in the field or from the Drawings, upon completion of the relevant work. Payment will be at the rates entered in the Schedule of Prices or at prices otherwise determined in accordance with the terms of the Contract.

The Contractor shall not use the Schedule of Prices for ordering.

3.1.2 Basic methods of measurement

Except where qualified otherwise in this Section and/or the Specification, measurements will generally be determined in accordance with NZS 4224:1983, "Code of Practice for Measurement of Civil Engineering Quantities".

Earthworks volumes will be calculated using the method of end areas. Prismoidal corrections will be used where judged appropriate by the Engineer. The positioning of sections will be appropriate to the shape and scale of the volume being measured to satisfy the Engineer that volumes are reliably measured.

3.1.3 Abbreviations

The following abbreviations are used to describe "units" in the Schedule of Prices:

L.m	-	linear metre
Sq.m	-	square metre
Cu.m	-	cubic metre
Prov. Item	-	Provisional Item
Prov. Sum	-	Provisional Sum
LS	-	Lump Sum
No.	-	number
hr	-	hour
kg	-	kilogram
Wk	-	week
%	-	percentage
t	-	tonne
Mth	-	month

3.1.4 Descriptions of schedule items

The descriptions entered against the several items in the Schedule of Prices are given only to identify the items. Reference must be made elsewhere in the Contract Documents for a

full description of the work and general liabilities covered by the rates and prices entered against each item.

3.1.5 Adequacy of rates and sums

The items in the Schedule of Prices together with the rates and sums entered against them cover everything necessary for the completion and maintenance of the Works to the complete satisfaction of the Engineer. Items have been provided in the Schedule of Prices for all major operations, and the rates and sums entered against them cover all accessories and minor items together with the cost of complying with all general obligations imposed by the Contract. Except where identified separately in the Schedule of Prices, all miscellaneous items, supervision, contingencies, maintenance, conveyance of plant and incidental work, plus general overhead administration are incorporated in the rates and sums entered in the Schedule of Prices. All rates and sums entered in the Schedule of Prices are proportioned, having regard to the special conditions of the work in each case. It will be deemed that all indirect costs, risk and profit are distributed among the rates and prices entered in the Schedule of Prices in proportion to the direct costs allowed for by the Contractor in each rate and price.

The positions shown on the Drawings may be varied. Each price, rate or sum entered in the Schedule of Prices covers the scope of work defined regardless of where the work is performed on the Site.

3.1.6 Provisional sums, provisional items

Provisional Items shall be treated as Provisional Sums for payment purposes.

Each Provisional Item or Sum is priced so that the application of the tendered rate to the actual quantity of work completed under the item (including nil work) provides full compensation to the Contractor.

The Contractor shall when required by the Engineer produce all quotations, invoices, vouchers, time sheets and accounts or receipts in connection with expenditure in respect of Provisional Sums.

3.1.7 Unscheduled obligations

The cost of any item not specifically referred to in the Schedule of Prices is spread over and included in the price or prices for other items in the Schedule of Prices which are most closely appropriate for the work not specifically referred to.

No claims will be entertained on the basis of omissions of items from the Schedule of Prices which are shown on or to be inferred from the Drawings or which are referred to in the Specification or which are an integral part of an item measured or referred to in the Schedule of Prices.

3.2 Preliminary and general

3.2.1 Establishment

The establishment item includes for the Contractor's mobilisation, establishment on Site of all manpower, equipment, plant, vehicles, accommodation, temporary services, temporary drainage and fencing, and all overhead costs such as arise from mobilising resources and plant, arranging insurances and bond, permit costs, the preparation and

supply of the Site Specific Safety Plan and the initial programme, the provision of all notifications and information required before commencing work on the Site and the like.

The proportion of the sum to be certified from time to time, will be assessed by the Engineer in accordance with the stage of Contract completion. The final 25% of the Lump Sum for demobilisation will not be paid until the Contractor has removed all facilities from the Site and a Certificate of Practical Completion has been issued for the contract.

3.2.2 Construction administration

The Lump Sum or rate entered in the Schedule of Prices, covers all administrative and ongoing overhead costs such as Health & safety, Resource Management Act compliance (except items scheduled separately), Site superintendence, survey requirements, communications, bond and insurance charges, ongoing permitting costs, financing costs, vehicles, head office backup, revision and upgrading of the programme of works, observation of health and safety procedures and the like during the Time for Practical Completion. The Lump Sum or rate also covers the maintenance of services for the running of the Site, and minor hand held items of plant and equipment such as shovels, skilsaws, electric drills and the like.

The proportion of the Lump Sum to be certified from time to time, will be assessed by the Engineer in accordance with the stage of contract completion.

3.2.3 Other overheads

Any other overhead and administration charges not included as described in the establishment item and construction administration item above will be deemed to be fully included in all other rates and sums in the Schedule of Prices including the Daywork section.

Additional works at new negotiated rates shall allow for all overheads and margins.

3.2.4 Liaison, location and protection of existing services

The Lump Sum includes for all probing, exploratory excavation, backfilling and compacting, survey, plotting and repairs due to any Contractor's damage.

The Lump Sum does not include for the cost of any unspecified protection or relocation work required in order to carry out construction which, if deemed necessary by the Engineer, will be a Variation.

The proportion of the Lump Sum to be certified from time to time, will be assessed by the Engineer in accordance with the stage of contract completion.

3.2.5 Site Access

This is a Lump Sum item that includes all Temporary Works required to gain access to and from the site. It includes removal and reinstatement of any fencing or any other infrastructure and replacing upon completion, removal and reinstatement of topsoil and vegetation were required and any other materials required in gaining access to the site. The rates allow for all labour, excavation, cutting, cartage, uplifting from temporary stockpile and all other operations to re-erect the fencing, including straining and supply of new `top-up' wire and materials to compensate for missing or damaged lengths.

50% of the Lump Sum will be certified once access has been formed onsite and the balance once a certificate of Practical Completion has been issued.

3.2.6 Site cleanup and disestablishment

The item includes for the Contractor's demobilisation and removal of all manpower equipment, plant, vehicles, accommodation, temporary services, temporary drainage and fencing from the Site, all reinstatement and making good of all disturbed surfaces. Also included is the removal of all remaining debris and materials no longer required and not nominated to be retained by the Principal.

50% of the Lump Sum will be certified once a certificate of Practical Completion has been issued for the Contract and the balance once the Defects Liability Certificate has been issued

3.3 Earthworks and related works

3.3.1 General

Excavation including the removal of vegetation and topsoil and clearance of landslip debris will be paid for as lump sum items as per the schedule of prices. An approximate in situ net cubic metre volume as measured from the contours is given in the Schedule of Prices. The Contractor shall verify, from the drawings and viewing onsite, the scheduled volume. Should the Contractor disagree with the levels as shown on the Drawings, then the Contractor shall submit to the Engineer the drawings he proposes as measurement drawings and the proposed basis of payment for acceptance. Should the Contractor commence the next stage of construction before the Engineer has accepted the Contractor's proposal in writing, then the Contractor's proposal will immediately become null and void and payment will be made at the scheduled quantity, or as measured by the Engineer. Claims for costs or delays resulting from surveys by the Engineer will not be allowed.

The rates include for all over-excavation, shoring and filling required to ensure the satisfactory completion of the Works. Fill to replace working excavation or unauthorised excavation beyond prescribed lines which are the responsibility of the Contractor will not be measured.

Earthworks will only be paid for once, either as excavation or as filling as scheduled and described in these Specifications.

3.3.2 Removal of existing retaining wall

Removal of existing retaining wall shown on the Drawings will be paid as a lump sum item. The rates allow for all labour, excavation, cutting, cartage, disposal, temporary stockpiling if required, and all other operations to remove the existing fencing including (if required) reinstatement and filling of empty postholes.

3.4 Wall Construction

Construction of the anchored and cantilevered sections of wall are scheduled as separate, linear metre rate, items. The rates shall include all materials, plant and labour required to construct the wall in accordance with the Drawings and Technical Specification, including sand backfill where required and clay cap.

3.4.1 Handrail Construction

Handrail construction is scheduled as a linear metre rate. The rate shall include all materials, plant and labour to construct the handrail in accordance with the Drawings and Technical Specification.

3.5 Drainage

3.5.1 General

The scheduled quantities do not include for the Contractor's temporary drainage requirements. The cost of all temporary drains, pipes, culverts and the like necessary for the Contractor to carry out his construction, are deemed to be included for in the rates which also allow for the removal and backfilling upon completion, of all such temporary works.

3.5.2 Piping

Payment for all pipework including, culverts and underground pipelines will be made at the rate entered in the Schedule of Prices for each type and size at the various depth ranges specified, and measured as the total number of lineal metres along the line of the pipe between the inside face of manholes, chambers and cesspits installed in accordance with the Drawings and specifications. The rates allow for traffic control, obtaining drainage permits, barricading the excavations and all excavation below existing ground level, removing excess excavated material off Site, dewatering, supply of all pipework, supply compaction, bedding, haunching of all backfilling materials and concrete, trimming, laying, jointing, bedding and haunching the pipes, cleaning, sterilising (if specified), testing and backfilling to finished level.

3.5.3 Unsuitable material

Should the Engineer decide that any of the excavated material is unsuitable for backfilling by reason of its natural qualities, and not by reason of the Contractor's failure to take adequate steps to control its water content, then the Contractor will be paid at the appropriate rate entered in the Schedule of Prices for the disposal of the unsuitable material off Site and for the provision of more suitable material. The quantities of earthwork paid for, in this case, will be based on the nominal trench width as shown on the Drawings and specified herein. Removal and disposal off Site of excavated material unsuitable for use as backfill will only be measured and paid for when there is no other excavated material on Site that is suitable for use as backfill. Removal and disposal off Site of surplus excavated material, whether suitable for backfill or not, is payable under a separate item. Any excavation of unsuitable material, disposal and replacement with suitable material, outside the nominal trench width will be entirely at the Contractor's expense.

3.6 Topsoiling and grassing

Topsoiling and grassing will be measured in square metres plan area or linear metres of areas to be regrassed within the limits of construction works shown on the Drawings. The rates for topsoiling allow for all picking up and/or the supply and spreading of topsoil, levelling, preparing for seeding, and maintaining during the maintenance period.

The rates allow for grassing, for soil testing of all separate sources of topsoil, the supply and spreading of all fertilisers, the supply, certification and drilling of grass seed, and the

maintenance and reinstatement of bare patches during the Defects Liability Period. Half the price for grassing will be paid upon completion of grassing, with a further 20% payable after a strike of at least 95% of the area to be grassed. The remaining 30% will be paid after the first satisfactory mowing and the repair and establishment of grass on any ungrassed areas from the initial sowing.

Topsoiling and regrassing all areas disturbed outside the limits of construction works shown on the Drawings, as a result of the Contractor's own construction operations is deemed to be included in the rates and hence any areas disturbed outside the limits of construction works will not be measured for payment purposes.

3.7 Daywork

3.7.1 Labour

The rates for Labour on Daywork are rates at which payment will be made for labour employed on Daywork on the instruction of the Engineer. Payment will be made in respect of the actual hours worked by the labour.

The rates allow for taxes, pensions, training, travelling time, insurances, holiday pay, payment in respect of time loss due to inclement weather, executive superintendence, non working foremen, the use and maintenance of all small tools not classified as plant, all establishment charges, profit, overheads, and any other payments which the Contractor may be required to make to the workmen under the relevant employment agreements. Plant operators are included for under the rates for Plant.

A Provisional Quantity has been provided for the number of hours expected to be worked.

3.7.2 Plant

Payment for plant will be the actual hours worked on Daywork by a nominated item of plant on the Engineer's instruction, multiplied by the rate for that item of plant as determined by the edition of the NZCF "Blue Book" current at close of tenders, then multiplied by the percentage factor entered by the Contractor under the rate columns in the Daywork section of the Schedule of Prices. The "Blue Book" rate current at the time the work is carried out will be used in the payment calculation. The rates apply whether the plant is already on Site or brought to the Site on the Engineer's instruction.

Full payments for working plant will only be for the actual hours worked. In the event that plant is brought to the Site on the written instructions of the Engineer and used only for Daywork, the net cost of haulage to and from Site will be paid to the Contractor. Where such plant brought to the Site is retained on standby on the Engineer's instruction, a standby rate equal to 60 per cent of the full rate (calculated as above) applicable for up to 8 hours on any Working Day, will be payable. The rates for plant are for use of the plant inclusive of all fuel and consumable stores, overhauls, repairs and replacements, and for haulage to and from the Site (except as stated above) and inclusive of operator.

The time necessarily spent in moving plant within the Site as a result of the Engineer's instruction to use it on Daywork will be added to the actual hours worked, provided that no time spent in moving for purposes of maintenance, repair or refuelling will be added.

A Provisional Quantity has been provided for the number of hours expected to be worked.

3.7.3 Materials

A Provisional Item has been allowed to cover the net cost of materials used on Daywork. Payment for materials will be certified and paid for on the net cost of the materials and the net quantities and weights of the materials actually used in accordance with the Engineer's instruction.

The percentage rate entered in the Schedule of Prices provides percentage additions to the net cost of materials used on Daywork and allows for all overhead charges, profit and all incidental costs whatsoever.

The percentage addition will apply to all materials delivered to Site and instructed by the Engineer to be used in Daywork. The net quantities and weights actually used in accordance with the Engineer's instructions only, will be certified and paid for, together with any material necessarily and unavoidably cut to waste with the Engineer's knowledge and consent and any surplus material which the Contractor is unable to use for its own use and which the Engineer instructs to be delivered to the Principal's store.

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