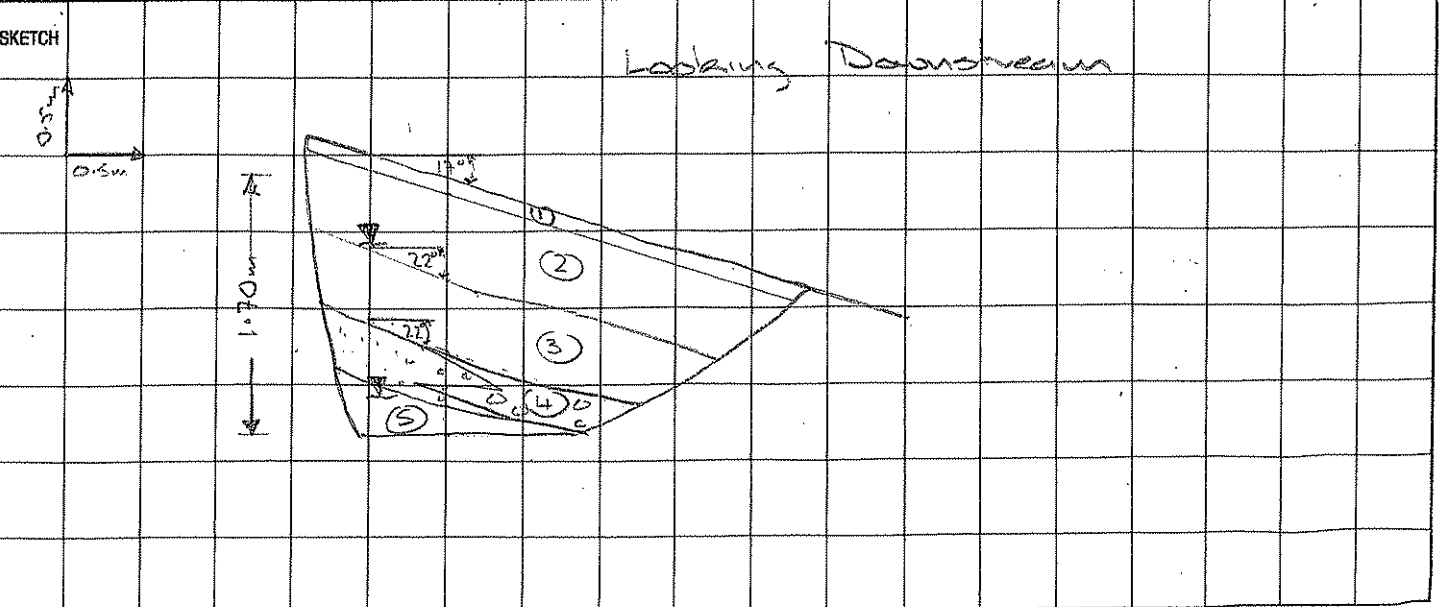


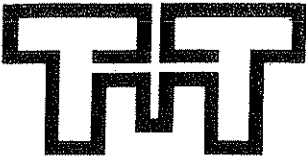
EXCAVATION LOG

EXCAVATION NO: TP 1  
SHEET 1 OF 1

PROJECT: WAIMEA 2 Dam LOCATION: LEE RIVER VALLEY, NELSON JOB NO: 22032-002  
 CO-ORDINATES: N 597 1428 EXPOSURE TYPE: TP HOLE STARTED: 17-05-06  
 E 252 3404 I6m EQUIPMENT: 20 tonne Zaxis HOLE FINISHED: 17-05-06  
 RL: OPERATOR: Fulton Hogan (Dareck) LOGGED BY: Jxmw  
 DATUM: EXCAVATION DIMENSIONS: 1700 x 3000 x 1700 CHECKED BY: MPD

EXCAVATION AND TESTS				ENGINEERING DESCRIPTION						GEOLOGICAL		
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS Collected Shear Vane (RPa)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION	SHEAR STRENGTH RELATIVE DENSITY	ESTIMATED SHEAR STRENGTH, kPa	ORIGIN TYPE, MINERAL COMPOSITION, DETECTS, STRUCTURE	UNIT
				0.0	W	PT	Root mat, non plastic, black, occ silt & gravel	W	VL		MULCH	①
				0.5		GP	SANDY GRAVEL, light orange-brown MW, rounded, fine - cobble, with silt & some clay	SAT	L		FLUVIAL GRAVEL	②
			63/27 51/11	1.0		CL	SANDY SILT CLAY, low plasticity blue-grey, with some rounded pebbles, rootlets & tree roots	M	S		OVERBANK DEPOSITS	③
				1.5		GP	SANDY GRAVEL, orange-brown mottled grey, loosely packed, predominantly fine grading, coarser laterally (towards river) up to large cobble	SAT	L		FLUVIAL GRAVEL	④
			Steady seepage Halong laminations 1x hammer blow	1.5		-	SILTSTONE, grey - black, laminated, HW - MW orange oxidation staining 213°/58° NW (Bedding)	M	NR		LAMINATED SILTSTONE (RAI FORMATION)	⑤
				2.0			E.O.H 1.70 m (In bedrock)					
				2.5								



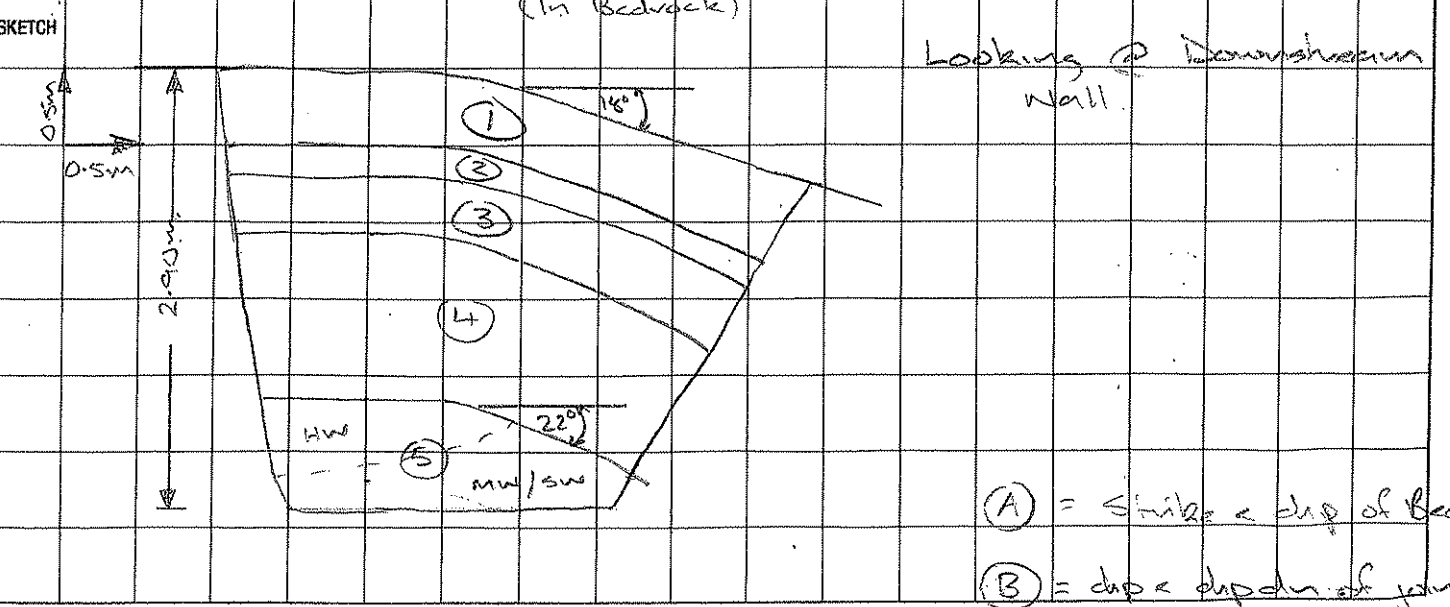


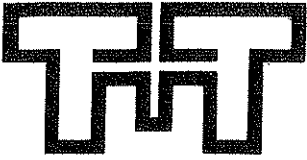
EXCAVATION NO: TP 2  
SHEET 1 OF 1

EXCAVATION LOG

PROJECT: **NAWMEA 2** LOCATION: **LEE RIVER VALLEY, NELSON** JOB NO: **22032-002**  
 CO-ORDINATES: **N 597 1428 ± 9m** EXPOSURE TYPE: **TP** HOLE STARTED: **17-05-06**  
**E 252 3381** EQUIPMENT: **20 tonne Zaxis** HOLE FINISHED: **17-05-06**  
 RL: OPERATOR: **Fulton Hogan (Nelson)** LOGGED BY: **Jxww/MPD**  
 DATUM: EXCAVATION DIMENSIONS: **2500 x 3600 x 2900** CHECKED BY: **MPD**

EXCAVATION AND TESTS				ENGINEERING DESCRIPTION					GEOLOGICAL			
1	2	3	SAMPLES, TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION	SHEAR STRENGTH OR RELATIVE DENSITY	ESTIMATED SHEAR STRENGTH, kPa	ORIGIN TYPE, MINERAL COMPOSITION, DETECTS, STRUCTURE	UNIT
			Corrected Shear Vane (KPa)	0.5		GL	CLAYEY GRAVEL, dark brown to gray, fine - pebble with occasional cobbles, angular platy siltstone clasts, in a low plasticity silt matrix. Pit walls collapsing.	M/W	VL		FILL (side cast)	①
				0.5 - 1.0		Pt	Buried grass & roots, & other organics in low plasticity matrix.	W	L/S		ROOT MAT	②
				1.0		GL	CLAYEY GRAVEL, loosely packed, medium to coarse with abundant cobbles & organics. Pit walls collapsing.	W	MD		COLLUVIUM	③
			33/148	1.5		CL	SILTY CLAY, low plasticity, yellow-brown with fine-med angular gravel & rootlets. Increasing gravel content with depth.	M	F		COLLUVIUM	④
			66/21 (soil)	2.0			- Buried log 100mm x 600mm. Pit walls collapsing.		F/S			
			Breaker with numerous blains (light)	2.5			SILTSTONE, gray with orange oxidation staining, thinly bedded. HW - mw shattered, 0.43°/57° NW. block size 400mm, facing closely jointed 60° to 42° < 66° to 334° (B). Excavates in SILTY GRAVEL, coarse, angular. * Overburden taken 2m from surface.	(A) W	VWk		SILTSTONE (RAI FORMATION)	⑤
				3.0			E.O.H 2.90m (In Bedrock)					



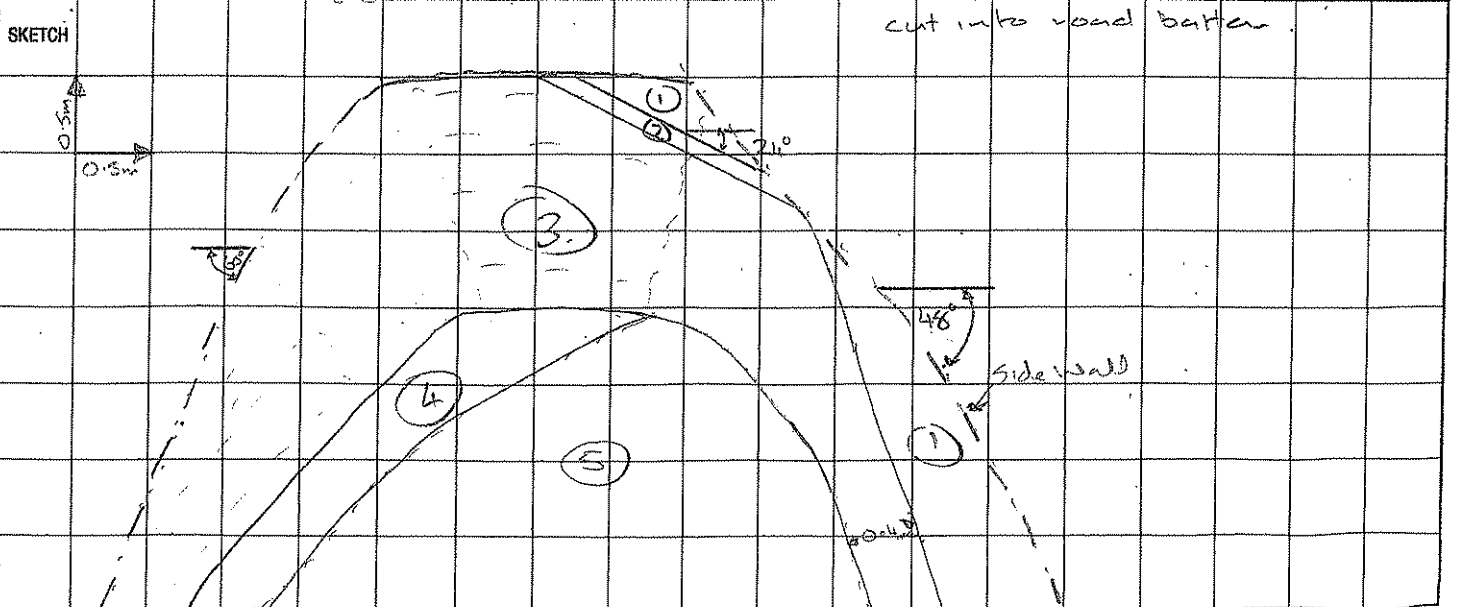


EXCAVATION LOG

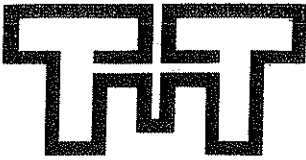
EXCAVATION NO: TP3  
SHEET 1 OF 2

PROJECT: NAIMĒA 2 LOCATION: LEE RIVER VALLEY, NELSON JOB NO: 22032 002  
 CO-ORDINATES: N 597 1509 15m EXPOSURE TYPE: TP HOLE STARTED: 17-05-06  
 E 252 3302 EQUIPMENT: Zotanne Zornis HOLE FINISHED: 17-05-06  
 RL: OPERATOR: Fulton Hogan (Devele) LOGGED BY: MPD/SXWW  
 DATUM: EXCAVATION DIMENSIONS: 2000 x 3500 CHECKED BY: MPO

EXCAVATION AND TESTS				ENGINEERING DESCRIPTION					GEOLOGICAL		
1	2	3	SAMPLES, TESTS	RL (m) DEPTH (m)	GRAPHIC LOG CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION	SHEAR STRENGTH OR RELATIVE DENSITY	ESTIMATED SHEAR STRENGTH, kPa	ORIGIN TYPE, MINERAL COMPOSITION, DETECTS, STRUCTURE	UNIT
				0.5	CP	CRANGL, red-brown, angular, medium-coarse with some clayey silt.	M	L		Colluvium	①
				1.0							
				1.5							
				2.0	GM	SILT CRANGL, red-orange- brown mottled grey, angular, fine-medium, slope parallel (35°) to gully side long axis orientated downslope	M-W	L/ML		Colluvium Residual soil	③
				2.5		SILTSTONE, grey-brown, blocky, open framework initial in unit 3, no single orientation mantle with side	M	WR		DISPLACED SILTSTONE	④
				3.0		SILTSTONE P.T.O	M	WR		SILTSTONE	⑤





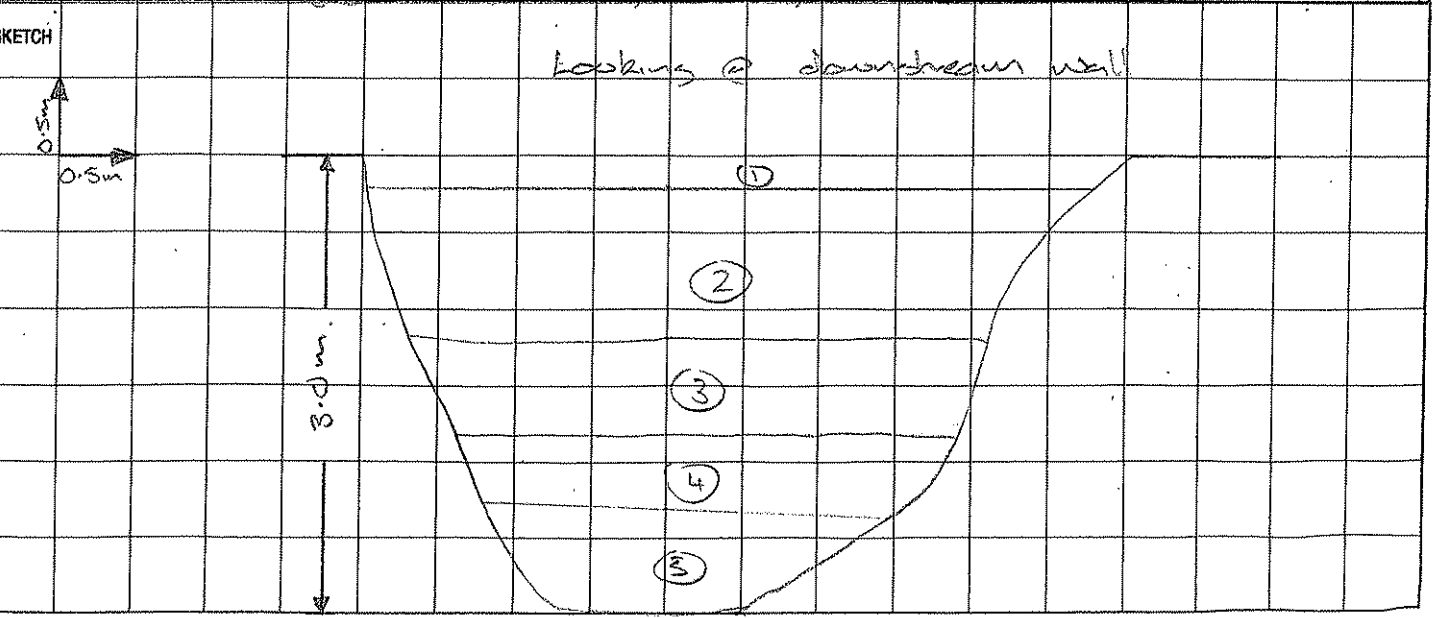


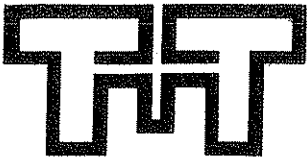
EXCAVATION NO: TP 4  
SHEET 1 OF 1

EXCAVATION LOG

PROJECT: WAIMEA 2 LOCATION: LEE RIVER VALLEY, NELSON JOB NO: 22032-002  
 CO-ORDINATES: EXPOSURE TYPE: TP HOLE STARTED: 17-05-06  
 EQUIPMENT: 20t 2axis HOLE FINISHED: 17-05-06  
 RL: OPERATOR: Fulton Hogan (Dev) LOGGED BY: JXNW/MPD  
 DATUM: At base of sidecast EXCAVATION DIMENSIONS: 2500x5500x3000 CHECKED BY: MPD

EXCAVATION AND TESTS				ENGINEERING DESCRIPTION						GEOLOGICAL		
1	2	3	SAMPLES, TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION	SHEAR STRENGTH OR RELATIVE DENSITY	ESTIMATED SHEAR STRENGTH, kPa	ORIGIN TYPE, MINERAL COMPOSITION, DETECTS, STRUCTURE	UNIT
				0.0		M	SANDY SILT, non plastic, dark brown, with some clay rootlets & grass debris	M	NL		Root MAT	①
				0.5		SM	SILTY SANDS, non plastic, coarse silt to fine sand root base @ 0.5m with rootlets to basal contact	M	L		ALLUVIUM	②
				1.0								
				1.5		GP	SANDY GRAVEL, MW, predominantly fine with some cobbles & boulders to 40mm unstable at walls.	M/W	L/MD		FLUVIAL GRAVEL	③
				2.0		GP	SANDY GRAVEL, rounded, coarse with cobbles & boulders, with discontinuous clay seams clay is low plasticity, yellow-brown mottled grey	Scat	L/MD		FLUVIAL GRAVEL	④
				2.5			SILTSTONE, blue-grey, fresh thinly bedded (< 5mm), (mod-slightly weathered) excavates as GRAVEL, angular, medium to coarse (bedding dips 20°/60° NW).	M	NR		LAMINATED SILTSTONE (RAI FORMATION)	⑤



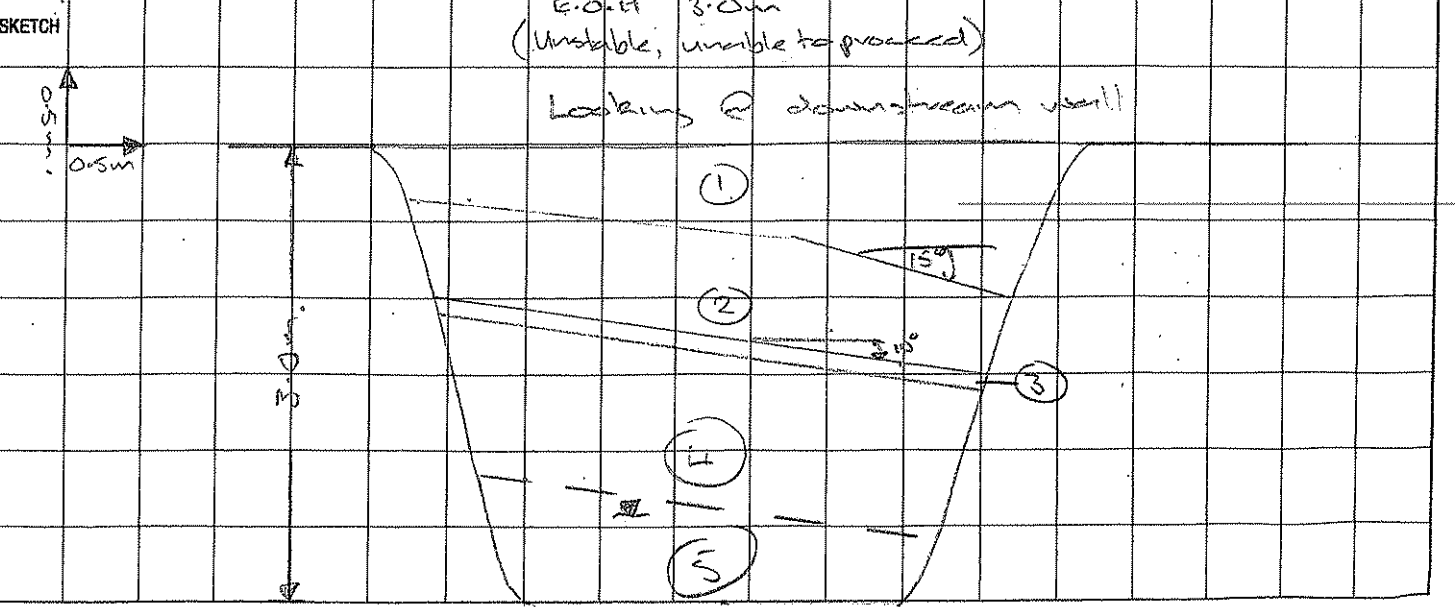


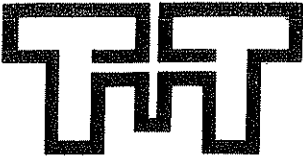
EXCAVATION NO: TPS  
SHEET 1 OF 1

EXCAVATION LOG

PROJECT: NAIMEA 2 LOCATION: LEE RIVER VALLEY, NELSON JOB NO: 22032-002  
 CO-ORDINATES: N 597 1321 ± 13m EXPOSURE TYPE: TP HOLE STARTED: 17-05-06  
 RL: E 252 3395 EQUIPMENT: 20tonne Zaxis HOLE FINISHED: 17-05-06  
 DATUM: OPERATOR: Fulton Hogan (Deneck) LOGGED BY: MPD/JXWW  
 EXCAVATION DIMENSIONS: 2200x4700x3000 CHECKED BY: MPD

EXCAVATION AND TESTS				ENGINEERING DESCRIPTION					GEOLOGICAL			
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	RL (m) DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION	SHEAR STRENGTH OR RELATIVE DENSITY	ESTIMATED SHEAR STRENGTH, kPa	ORIGIN TYPE, MINERAL COMPOSITION, DETECTS, STRUCTURE	UNIT
			Ses			GM	SILTY GRAVEL, orange-brown fine-course, angular, occasional roots & cobbles	M	VL		UNCONTROLLED FILL	①
				0.5		GM	SILTY GRAVEL, orange-brown fine-course, well graded, no cobbles	M	VL		UNCONTROLLED FILL	②
				1.0		PE	ROOT MAT, with flattened vegetation & some low plasticity silty clay & brown silt	M			BURIED ROOT MAT	③
				1.5		ML-GM	GRAVELLY SILT, low plasticity, grey-brown, orange-brown with clay & fine-course angular gravel & occasional cobbles	M	F		COLLUVIUM	④
				2.0			Abundant tree roots					
				2.5		GW	Cracks into SILTY SANDY GRAVEL, blue-grey fine-course with cobbles & boulders	M	W		FLUVIAL GRAVEL	⑤
				2.0								





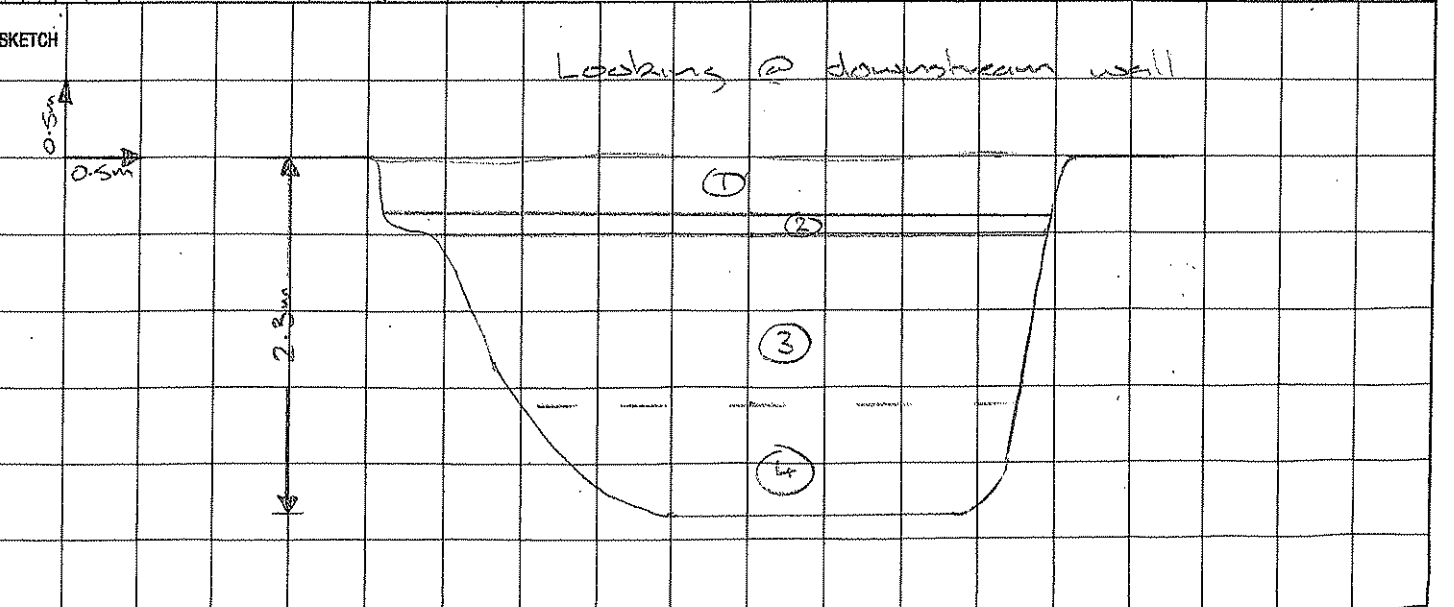
EXCAVATION LOG

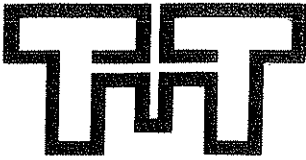
EXCAVATION NO: TP6

SHEET 1 OF 1

PROJECT: <b>WAIKIEAZ</b>	LOCATION: <b>LEE RIVER VALLEY, NELSON</b>	JOB NO: <b>22032-002</b>
CO-ORDINATES: <b>N 597 1232 ±5m</b>	EXPOSURE TYPE: <b>TP</b>	HOLE STARTED: <b>17-05-06</b>
RL: <b>E 252 3368</b>	EQUIPMENT: <b>20tonne Zaxis</b>	HOLE FINISHED: <b>17-05-06</b>
DATUM:	OPERATOR: <b>Fulton Hogan (Doveck)</b>	LOGGED BY: <b>JXW/MJD</b>
	EXCAVATION DIMENSIONS: <b>2300x4600x2300</b>	CHECKED BY: <b>MJD</b>

EXCAVATION AND TESTS			ENGINEERING DESCRIPTION					GEOLOGICAL					
PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION	SHEAR STRENGTH OR RELATIVE DENSITY	ESTIMATED SHEAR STRENGTH, kPa	ORIGIN TYPE, MINERAL COMPOSITION, DETECTS, STRUCTURE	UNIT
1 2 3			Insert finger				ML	CLAYEY SILT, low plasticity, with coarse gravel & occasional rootlets	M	S		SIDE CAST FILL	①
				0.5			OL	SILT, non plastic, organic, black with heavy rootmat, leaf & mulch	D	L		TOPSOIL	②
				1.0			GM	SILT GRAVEL, light yellow-brown tightly packed, gap graded, fine, rounded, predominantly coarse - cobble with minor low plasticity clay & boulders (400mm)	M	L/MD		FLUVIAL GRAVELS	③
				1.5			GM	grades coarser					
				2.0			GM	As ABOVE with increased cobbles & boulders	M	MD		FLUVIAL GRAVELS	④
				2.5				E.O.H 2-3m (Pit walls unstable)					



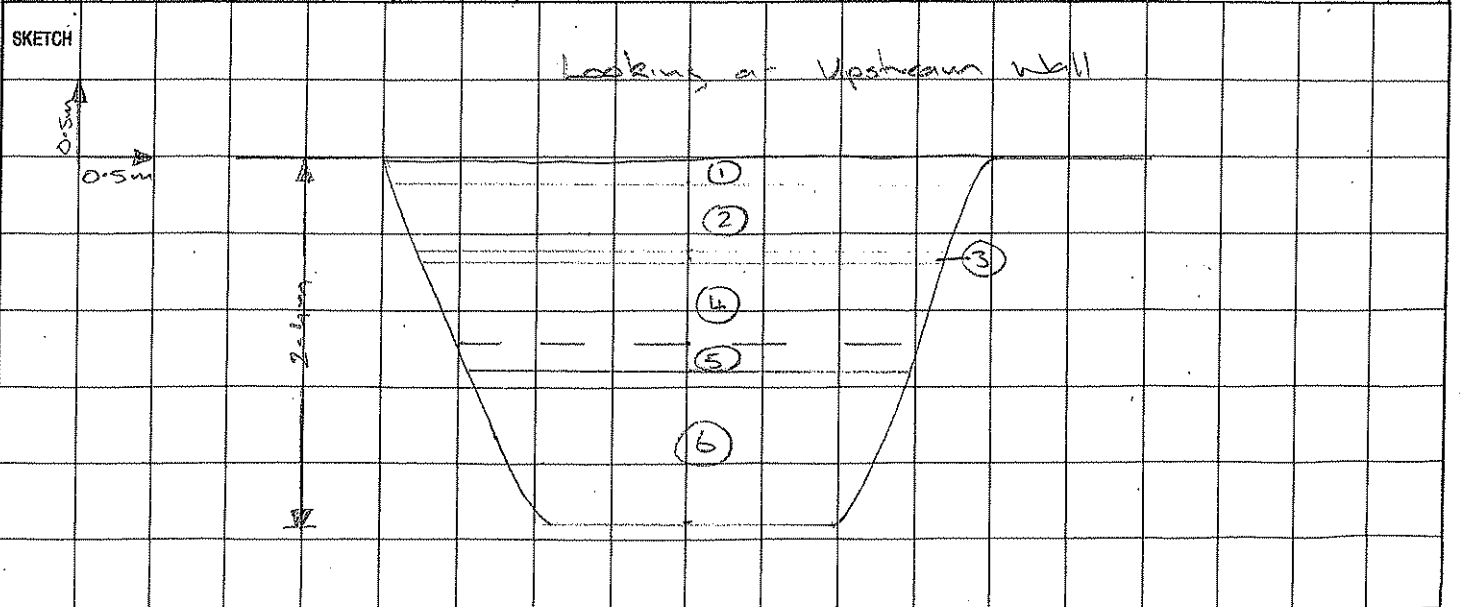


EXCAVATION LOG

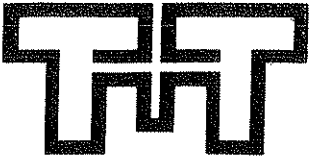
EXCAVATION NO: TP7  
SHEET 1 OF 1

PROJECT: WAIMEA 2 LOCATION: LEE RIVER VALLEY, NELSON JOB NO: 22032-002  
 CO-ORDINATES: N 597 1219 EXPOSURE TYPE: TP HOLE STARTED: 17-05-06  
 E 252 3327 E 4m EQUIPMENT: 20 tonne Zaxis HOLE FINISHED: 17-05-06  
 RL: OPERATOR: Fulton Hogan (Doveck) LOGGED BY: MPD/SXW  
 DATUM: EXCAVATION DIMENSIONS: 2300 x 4000 x 2400 CHECKED BY: MPD

EXCAVATION AND TESTS				ENGINEERING DESCRIPTION					GEOLOGICAL				
PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	REL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION	SHEAR STRENGTH OR RELATIVE DENSITY	ESTIMATED SHEAR STRENGTH, kPa	ORIGIN TYPE, MINERAL COMPOSITION, DETECTS, STRUCTURE	UNIT
1 2 3			Corrected Shear (RTS)										
			Indents with auger				CL	SANDY CLAY, low plasticity, brown with roots & occasional gravel & boulders	M	F		ROOT MAT	①
			165/39	0.5			ML	SILT, low plasticity, grey-brown with fine angular gravels & clay some rootlets	M	F-sk		OVERBANK DEPOSITS	②
			Indents easily				GC	CLAYEY GRAVEL, grey-brown, rounded, medium coarse, gap-graded in low plasticity matrix	M	MD		FLOOD DEPOSIT	③
			93/26	1.0			CL	SANDY CLAY, low plasticity, dark orange-brown, with silt & occasional rounded gravels	M	F-sk		OVERBANK DEPOSITS	④
							GC	CLAYEY GRAVEL, fairly tightly to tightly packed	M	MD		Walls collapsing	⑤
				1.5			GP	SANDY GRAVEL, gap-graded loosely packed with abundant cobbles, & boulders to 500 x 1000mm	M/SL	L		FLUVIAL GRAVELS	⑥
				2.5				E.O.H 2.4m (Too much overburden)					





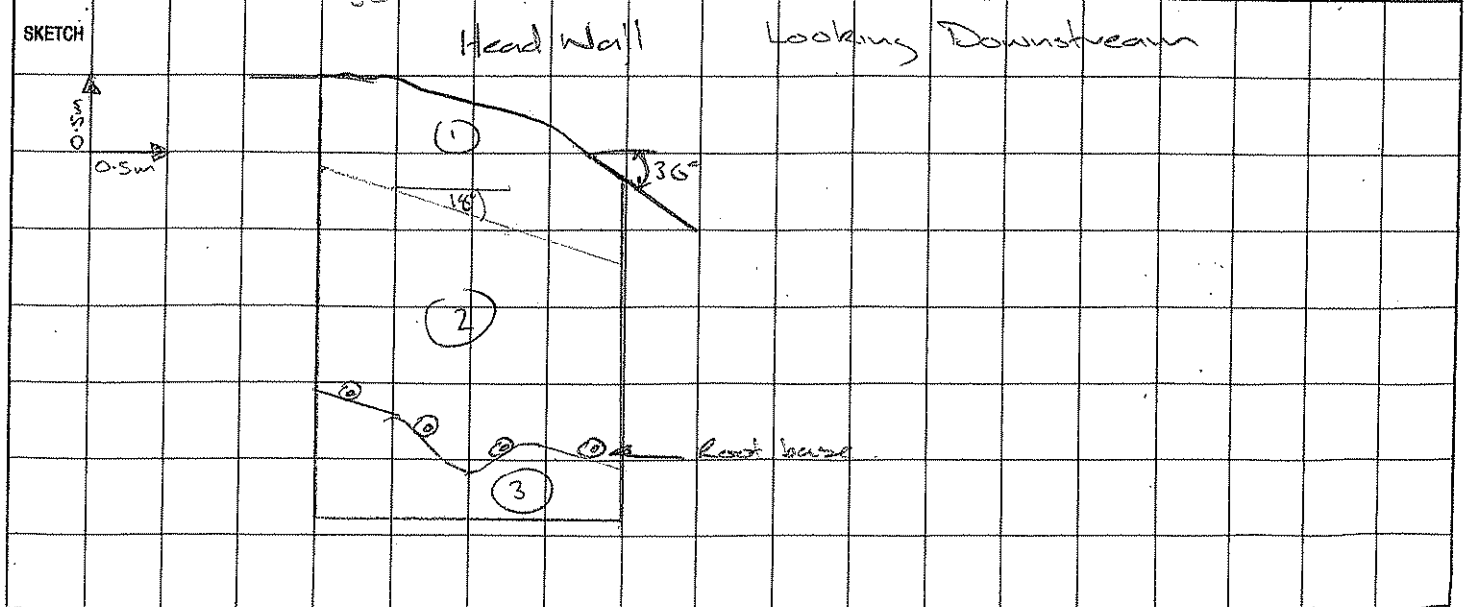


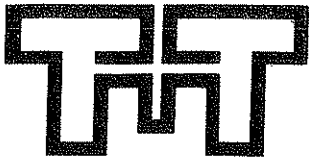
EXCAVATION LOG

EXCAVATION NO: TP8  
SHEET 1 OF 1

PROJECT: WAIMBEA 2 LOCATION: LEE RIVER VALLEY, NELSON JOB NO: 22032-002  
 CO-ORDINATES: N 547 0453 EXPOSURE TYPE: TP HOLE STARTED: 18-05-06  
 E 252 3116 ± 6m EQUIPMENT: 20t Zaxis HOLE FINISHED: 18-05-06  
 RL: OPERATOR: Fulham Program (Dereck) LOGGED BY: JWS  
 DATUM: EXCAVATION DIMENSIONS: 2000 x 3400 x 2400 CHECKED BY: MPD

EXCAVATION AND TESTS				ENGINEERING DESCRIPTION					GEOLOGICAL				
PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION	SHEAR STRENGTH OR RELATIVE DENSITY	ESTIMATED SHEAR STRENGTH, kPa	ORIGIN TYPE, MINERAL COMPOSITION, DETECTS, STRUCTURE	UNIT
1 2 3			Collected Shear Tests (RT)	15.8	0.5		CL	CLAYEY GRAVEL, loosely packed HW, angular, predominantly fine with medium & coarse occasional cobbles, siltstone clasts, with silt in a low-plasticity clay matrix	M	VL/L		SIDE CAST FILL	①
			165 >186 Indents with thumb nail 105/39		1.0		CL	SILTY CLAY, low plasticity, orange-brown with some HW-CW angular to coarse gravel, coarsening to cobble down section  Vehicle fissure, rootlets & extensive root disturbance to 1.5m depth Collapsing @ root base	M	VS		RESIDUAL SOIL	②
			breaks out easily with hammer		2.0		SL	SILTSTONE, yellow-brown very thin - thin bedded (10-30mm), CW-HW with black manganese staining becomes HW downhole 166°/42° SW pockets of clayey gravel Excavates an CLAYEY GRAVEL fine-coarse in silty clay low plasticity matrix	M	VM/D		HIGHLY WEATHERED SILTSTONE (RAI FORMATION)	③
					2.5		CL						
					3.0		CL						



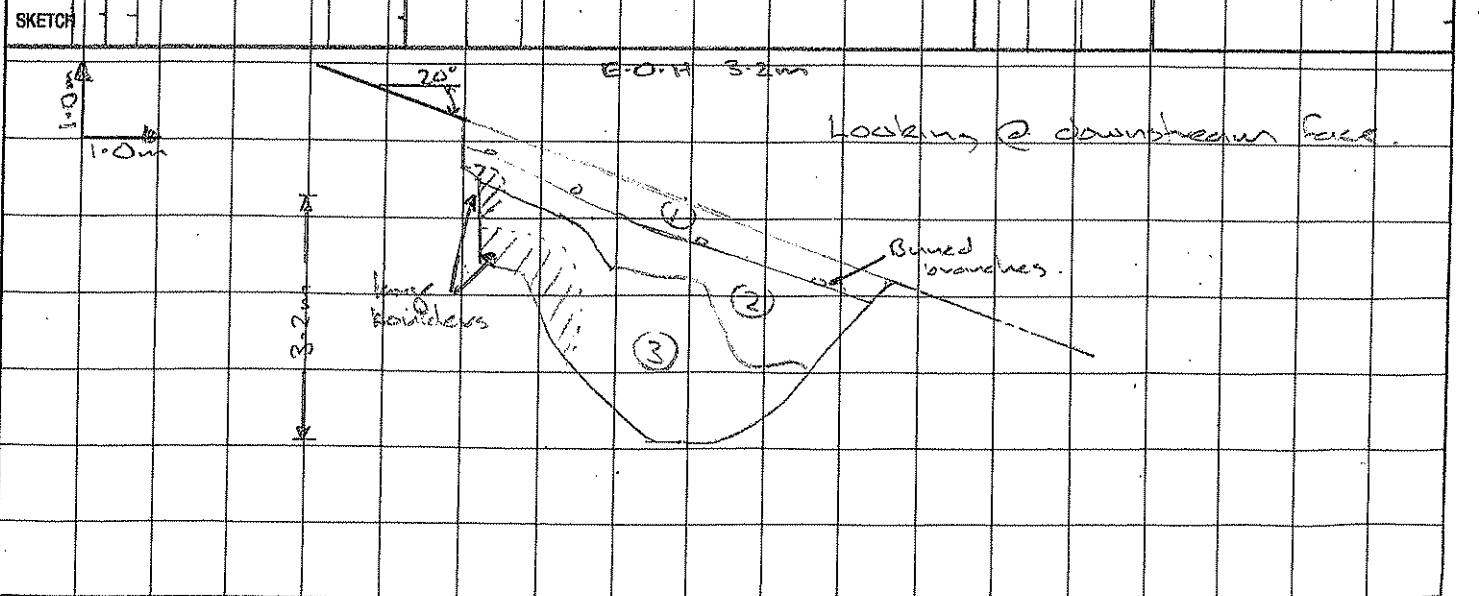


EXCAVATION LOG

EXCAVATION NO: TP 9  
SHEET 1 OF 1

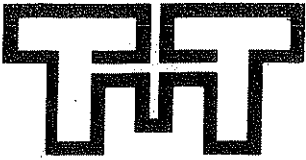
PROJECT: WAIMEA 2 LOCATION: LEE RIVER VALLEY, NELSON JOB NO: 22032-002  
 CO-ORDINATES: N 597 0953 EXPOSURE TYPE: TP HOLE STARTED: 18-05-06  
 E 252 3118 ±6m. EQUIPMENT: 20 tonne 2 axis HOLE FINISHED: 18-05-06  
 RL: OPERATOR: Fulton Hogan (Doveck) LOGGED BY: Jxww  
 DATUM: EXCAVATION DIMENSIONS: 4000 x 6000 x 3200 CHECKED BY: MPD

EXCAVATION AND TESTS				ENGINEERING DESCRIPTION					GEOLOGICAL				
PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION	SHEAR STRENGTH OR RELATIVE DENSITY	ESTIMATED SHEAR STRENGTH, kPa	ORIGIN TYPE, MINERAL COMPOSITION, DETECTS, STRUCTURE	UNIT
1 2 3	NIL	NIL	Corrected stream level (R.P.) Cungu inserts Indents from flyer III/36 81/21				CL	SILTY CLAY, low plasticity, orange-brown with rounded coarse gravels & occasional small boulders & burned fresh tree branches @ interface	M/W	S		SIDE CAST FILL	①
				1.0	1.0		CL	GRAVELLY CLAY, low plasticity orange-brown, with silt, rootlets to centre of layer. weathered gravels	M	St		COLLUVIUM	②
				1.5	1.5		GC	CLAYEY GRAVEL, orange-brown, fairly lightly packed, layered, predominantly medium to coarse with rounded cobbles & boulders up to 2m x 1.5m	M	MD		FLUVIAL GRAVEL	③
				2.0	2.0			These are fresh & angular where broken by chippies but rounded on intact surfaces underlain by rounded clay-bound gravels.	M	I V D			
				2.5	2.5								
				3.0	3.0								







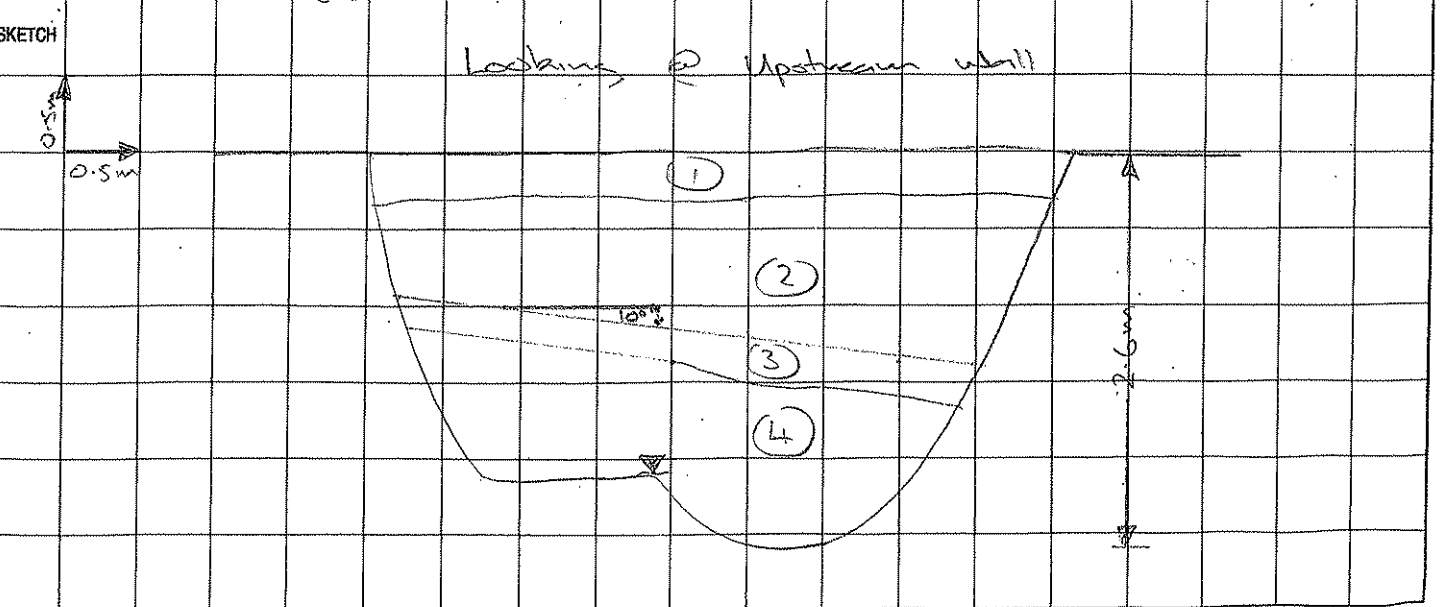


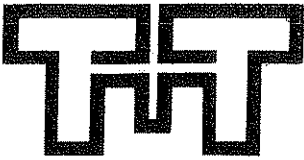
EXCAVATION NO: TP12  
SHEET 1 OF 1

EXCAVATION LOG

PROJECT: WAIMEA 2	LOCATION: Lee River Valley, Nelson	JOB NO: 22032-002
CO-ORDINATES: N 597 1450 E 252 3453	EXPOSURE TYPE: TP	HOLE STARTED: 18-05-06
RL:	EQUIPMENT: 20 tonne Zaxis	HOLE FINISHED: 18-05-06
DATUM:	OPERATOR: Fulton Hagan (Deveck)	LOGGED BY: JXWHL
	EXCAVATION DIMENSIONS: 1900 x 4600 x 2650	CHECKED BY: AMP

EXCAVATION AND TESTS			ENGINEERING DESCRIPTION					GEOLOGICAL					
PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION	SHEAR STRENGTH OR RELATIVE DENSITY	ESTIMATED SHEAR STRENGTH, kPa	ORIGIN TYPE, MINERAL COMPOSITION, DETECTS, STRUCTURE	UNIT
1 2 3				1.59	0.0	W X X W W X	OL	SILT, low plasticity, black, organic, open structure with rotten tree roots, abundant grass roots & twigs.	M	S		TOPSOIL	①
					0.5	X X X X X X X X X X X X X X X X X X X X	SM	SILT SANDS, dark brown, fine-medium coarseening down hole to medium-coarse abundant roots.	M	L		OVERBANK DEPOSITS	②
					1.0	O O O O O O O O O O O O O O O O O O O O	GP	SANDY GRAVEL, fairly tightly packed, imbricated, rounded, fine-coarse.	M	MD		FLUVIAL GRAVEL	③
					1.5	O O O O O O O O O O O O O O O O O O O O	GP	SANDY GRAVEL, fairly tightly to lightly packed, imbricated, rounded, fine to cobble with occasional boulders to 400mm	M	MD		FLUVIAL GRAVEL	④
					2.0	O O O O O O O O O O O O O O O O O O O O		Patches of blue-grey gravel layer of 0.5m boulders	Sat	D			
					2.5	O O O O O O O O O O O O O O O O O O O O							
					3.0			E.O.H 2.60m (Hard digging)					

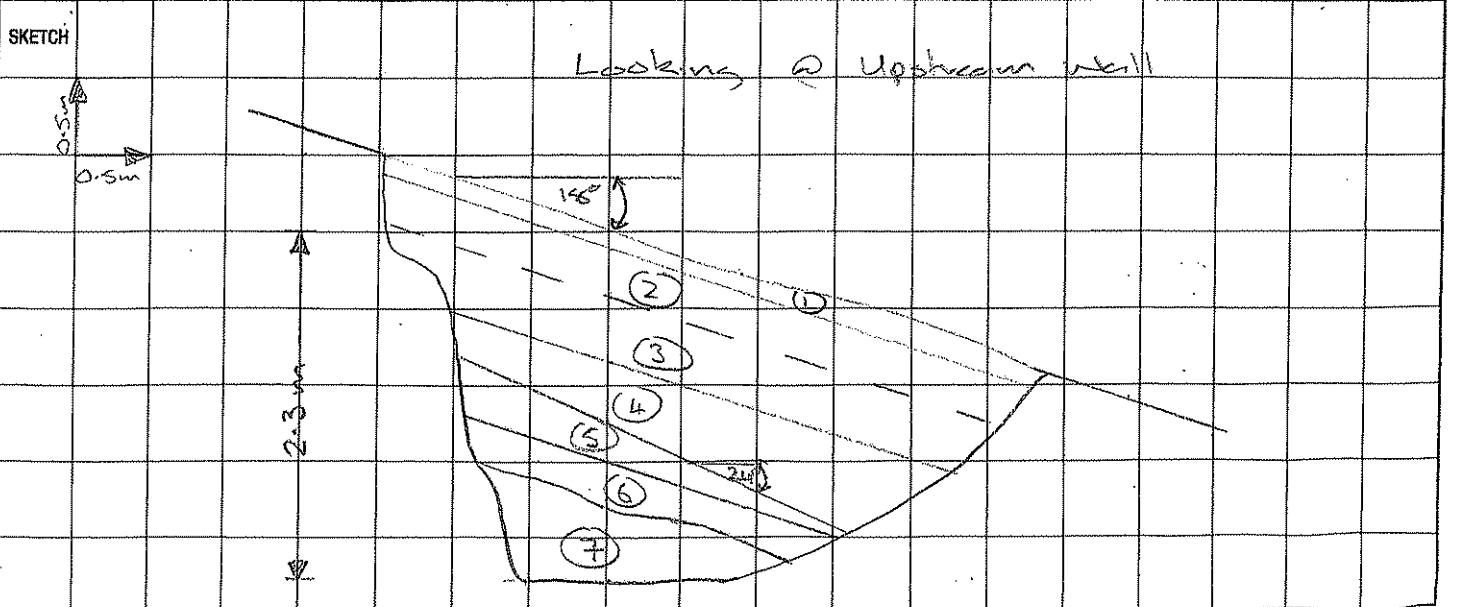


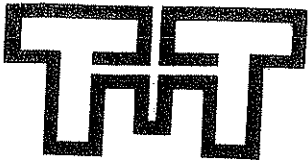


EXCAVATION LOG

PROJECT: NAIMGA 2 LOCATION: LEE RIVER VALLEY, NELSON JOB NO: 22032-002  
 CO-ORDINATES: N 597 1470 EXPOSURE TYPE: TP HOLE STARTED: 18-05-06  
 E 252 3490 EQUIPMENT: 20 tonne Zaxis HOLE FINISHED: 18-05-06  
 RL: OPERATOR: Fulton Hagan (Demolee) LOGGED BY: Jxw/w  
 DATUM: EXCAVATION DIMENSIONS: 2000 x 5000 x 2300 CHECKED BY: MPD

EXCAVATION AND TESTS				ENGINEERING DESCRIPTION						GEOLOGICAL		
PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION	SHEAR STRENGTH OR RELATIVE DENSITY	ESTIMATED SHEAR STRENGTH, kPa	ORIGIN TYPE, MINERAL COMPOSITION, DETECTS, STRUCTURE	UNIT
1 2 3			Consolidated Shear Tests (KPa)	0.0		PT-01	SILT, low plasticity, black, organic with leaf/wool mulch, open structure	M	S		TOPSOIL	①
				0.5		GP	GRAVEL, dark brown, loosely packed, angular - sub-rounded fine, poorly graded, with clay granules into	N	MD		ALLUVIAL GRAVEL	②
				1.0		GP	GRAVEL medium to coarse down hole with sand & decreasing clay content	N	MD		ALLUVIAL GRAVEL	③
			Secp 28/mm finger marks 60/148 90/27	1.5		CL	SILT CLAY, low plasticity, orange-brown with grey mottling	W / Sat	St		OVERBANK DEPOSITS	④
			Secp finger marks 120/45 (gutter)	2.0		GP	SANDY GRAVEL, orange-brown, tightly packed, unbricated, rounded, medium, in a sandy matrix	N	D		ALLUVIAL GRAVEL	⑤
			Secp	2.5		CL	SANDY CLAY, low-med plasticity orange-brown mottled grey	M/W	St		OVERBANK DEPOSITS	⑥
				2.5		GP	GRAVEL, dark brown - mottled orange, tightly packed, rounded, coarse silty-sand clasts in a sand & granule matrix with boulders > 300mm	M	D		ALLUVIAL GRAVEL & BOULDERS	⑦
				2.5			E.O.H 2.3m (Hard digging)					





EXCAVATION LOG

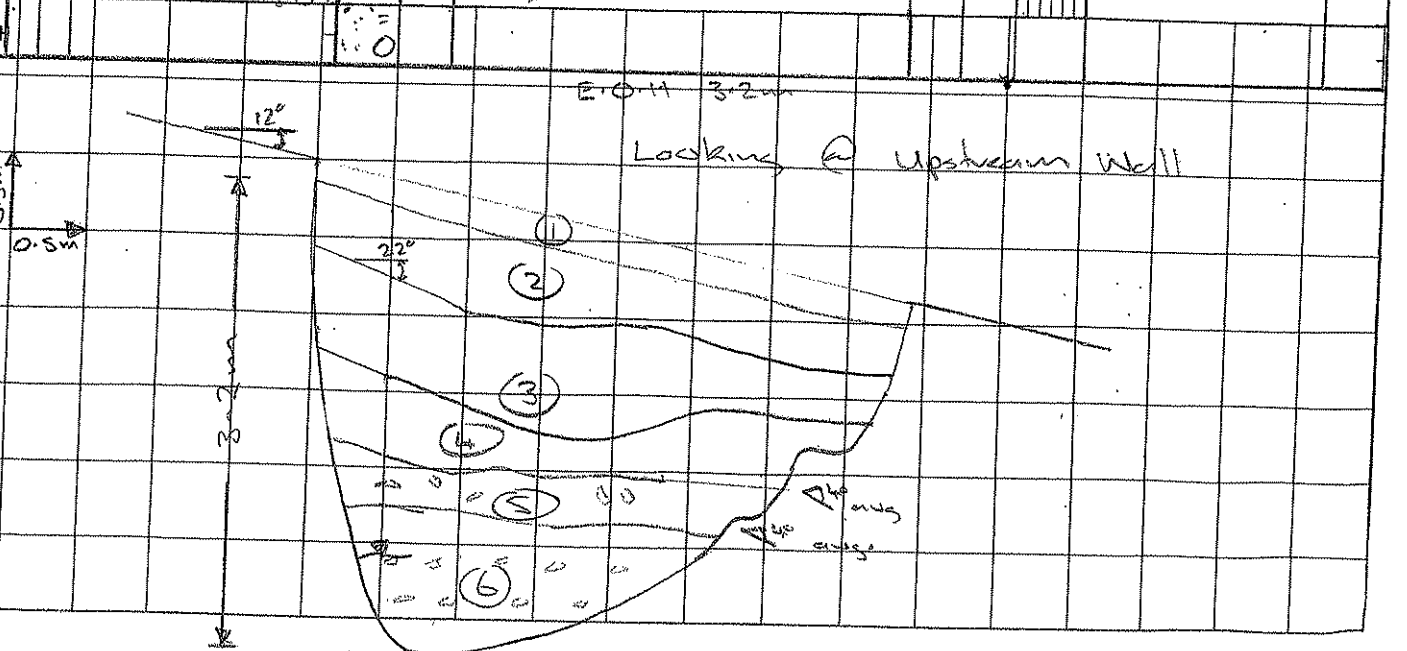
EXCAVATION NO: TP 14

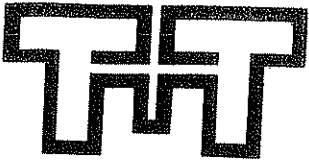
SHEET 1 OF 1

PROJECT: WAIMEA 2 LOCATION: LEE RIVER VALLEY, NELSON JOB NO: 22032-002  
 CO-ORDINATES: N 597 1407 EXPOSURE TYPE: TP HOLE STARTED: 06-06-06  
 E 252 3577 EQUIPMENT: 20 tonne Zaxis HOLE FINISHED: 06-06-06  
 RL: OPERATOR: Fulton Hogan (New Zealand) LOGGED BY: Jxww  
 DATUM: EXCAVATION DIMENSIONS: 1700 x 3200 CHECKED BY: MPP

EXCAVATION AND TESTS ENGINEERING DESCRIPTION GEOLOGICAL

PENETRATION 1 2 3	SUPPORT WATER	SAMPLES, TESTS Shear Vane (2.0m)	RL (m) DEPTH (m)	GRAPHIC LOG CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION	SHEAR STRENGTH OR RELATIVE DENSITY	ESTIMATED SHEAR STRENGTH, kPa	ORIGIN TYPE, MINERAL COMPOSITION, DETECTS, STRUCTURE	UNIT
			0.0	ML	CLAYEY SILT, low plasticity dark orange-brown, with some heavy silt	M			TOPSOIL / COLLUVIUM	①
		174 126/48	0.5	CL	SILTY CLAY, low plasticity, orange-brown, with some fine to 25mm s & silt Vertical fissures	M	SE USE		COLLUVIUM	②
		186 138/84	1.0	CL	SILTY CLAY, low plasticity, orange brown mottled grey, with CW, angular gravel & occasional HW cobble to 60mm vertical fissures, rootlets	M	USE		COLLUVIUM	③
		>186 147/57	1.5	CL	SILTY CLAY, low plasticity, orange brown mottled grey, no vertical fissure, rootlets or gravel.	M	VSE		OVERBANK DEPOSITS	④
			2.0	CL-GC	GRAVELLY CLAY, low plasticity orange-brown mottled yellow-brown & grey with rounded cobbles & coarse gravels, slight structure, no obvious preferred long axis orientation, open structure, Vertical fissures	M-W	VSE /MS		DEBRIS FLOW	⑤
			2.5	GP	SANDY GRAVEL, dark brown tightly packed, stratified, coarsening downwards, rounded, fine med gravels with some HW coarse (20mm) & low plasticity silty clay in matrix	M-W	D		FLUVIAL GRAVELS	⑥



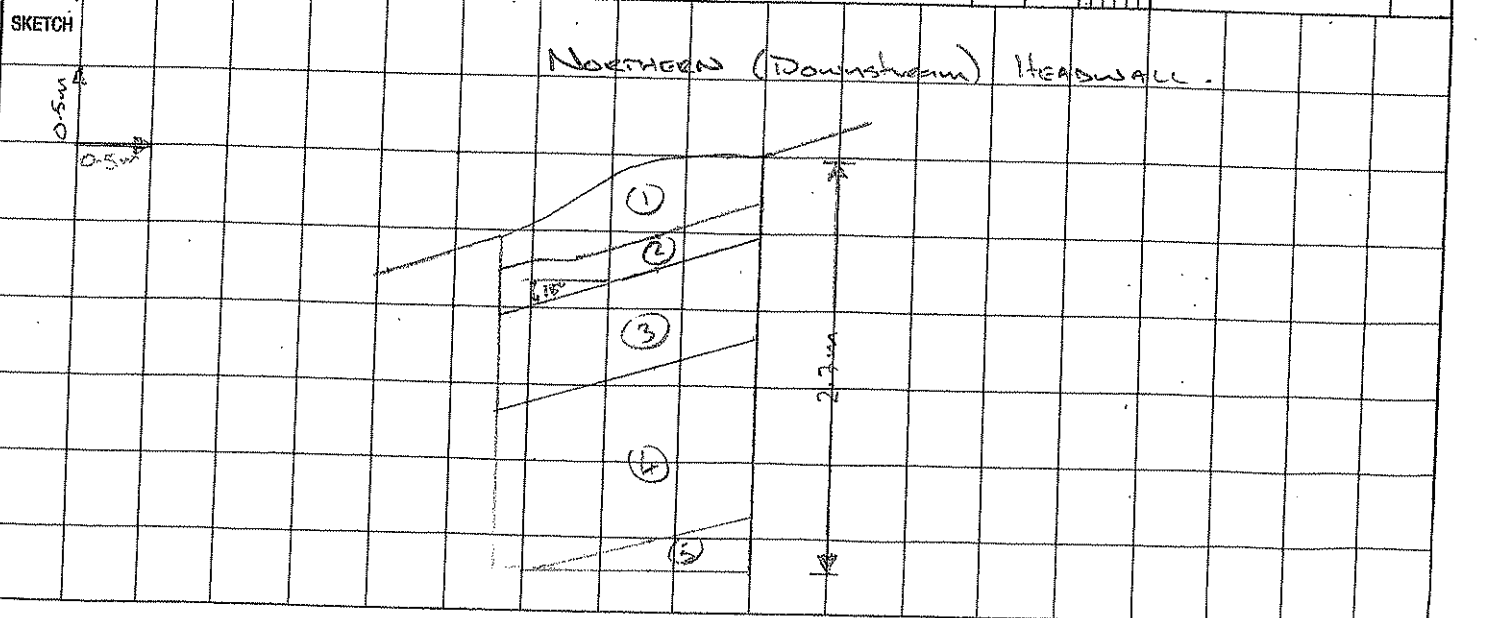


EXCAVATION LOG

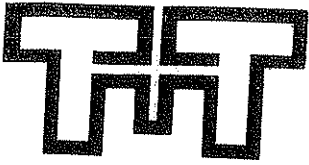
EXCAVATION NO: TP 15  
SHEET 1 OF 1

PROJECT: WAIMEA 2 LOCATION: LEE RIVER VALLEY, NELSON JOB NO: 22032-002  
 CO-ORDINATES: N 597 1479 EXPOSURE TYPE: TP HOLE STARTED: 18-05-06  
 E 252 3463 EQUIPMENT: 20 tonne Zaxis HOLE FINISHED: 18-05-06  
 RL: OPERATOR: Fulton Hogan (Danelek) LOGGED BY: J. [unclear]  
 DATUM: EXCAVATION DIMENSIONS: 1800 x 4700 x 2700 CHECKED BY: MPD

EXCAVATION AND TESTS				ENGINEERING DESCRIPTION					GEOLOGICAL				
PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION	SHEAR STRENGTH OR RELATIVE DENSITY	ESTIMATED SHEAR STRENGTH, kPa	ORIGIN TYPE, MINERAL COMPOSITION, DETECTS, STRUCTURE	UNIT
1 2 3			Corrected Swainson (RVA)					MULTI SILT, low plasticity, dark brown & black, organic vegetation & occasional angular medium gravel & rounded boulders chaotic.	M	S/L		DEBRIS (TRACK BREAKING SIDECAST)	①
			Indents with light finger pressure 99/48	0.5			OL	SILT, low plasticity, grey-black, organic	M	SE		TOPSOIL	②
			Indents with light finger pressure 75/33	1.0			ML	CLAYEY SILT, low plasticity, dark brown, with fine sand, voids & vehicle ruts	M	SE		OVERBANK OR SLOPEWASH DEPOSITS	③
				1.5			GM	SILT-SANDY GRAVEL, tightly packed, brown-grey mottled orange, rounded, medium-coarse with cobbles, small boulders in a low plasticity sandy-silty clay matrix. Pt becoming unstable.	M	D		FLUVIAL GRAVEL	④
				2.0				More bouldery towards base					
				2.5				SILTSTONE. Blue-grey, stained orange brown, (Not safe to take measurements)	M	NR		SILTSTONE (RAI FORMATION)	⑤
				3.0				E.O.M 2.7m (Bedrock)					







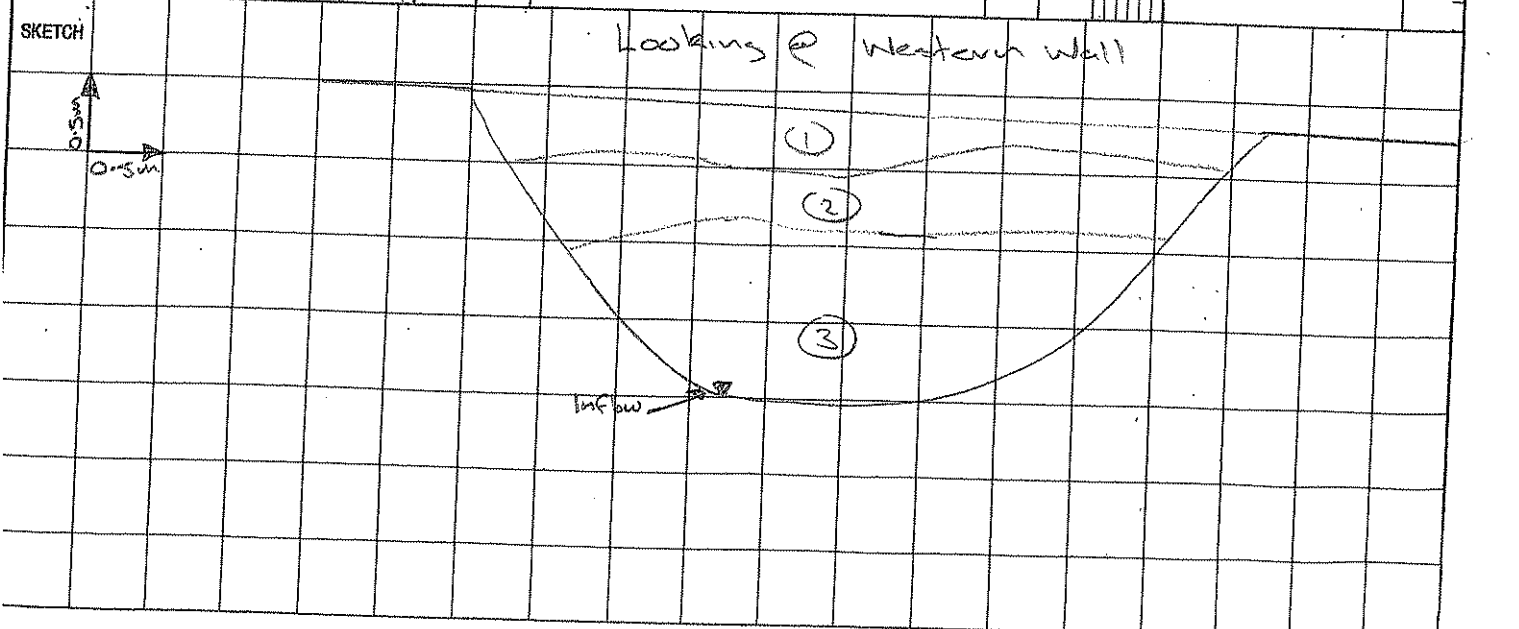
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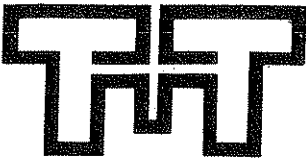
EXCAVATION LOG

EXCAVATION NO: TP 16  
SHEET 1 OF 1

PROJECT: WAIMCA 2 LOCATION: LEE RIVER VALLEY, NELSON JOB NO: 22032-002  
 CO-ORDINATES: N 597 1359 EXPOSURE TYPE: TP HOLE STARTED: 06-06-06  
 E 252 3453 ± 11m EQUIPMENT: 20 tonne Zaxis HOLE FINISHED: 06-06-06  
 RL: OPERATOR: Fulton Hogan (Beveck) LOGGED BY: Jxww  
 DATUM: EXCAVATION DIMENSIONS: 2100 x 5200 x 1900 CHECKED BY: MPD

EXCAVATION AND TESTS				ENGINEERING DESCRIPTION				GEOLOGICAL				
PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION	SHEAR STRENGTH OR RELATIVE DENSITY	ESTIMATED SHEAR STRENGTH, kPa	ORIGIN TYPE, MINERAL COMPOSITION, DETECTS, STRUCTURE	UNIT
1 2 3			ScB	0-0.5	L x x L Z x OM Z		SILT, non plastic, dark brown organic, rootlets with some low plasticity clay	M	VL F		TOPSOIL	①
				0.5-1.0	x x x x x	M	SILT, non plastic, light grey-brown, rootlets, vermicular fissures	M	L/D		OVERBANK DEPOSITS	②
				1.0-2.0	Δ O O O O O O O O O	CP	SANDY GRAVEL, loose - moderately tightly packed, dark brown, predominantly cobble & boulder clasts, gap graded, striated, some imbrication of cobbles, boulders up to 1m  Rt walls unstable, collapsing Sat	M	MD		FLUVIAL GRAVEL	③
				2.0-2.5			E.O.H 1.9m (collapsing)					





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EXCAVATION LOG

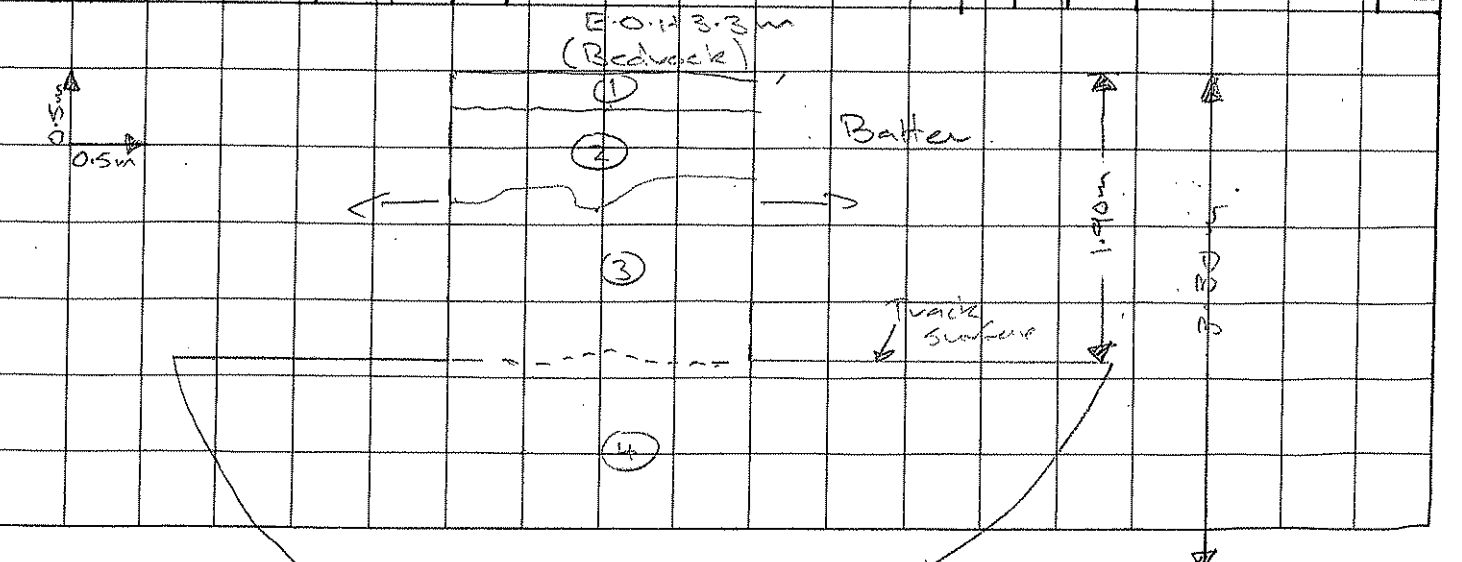
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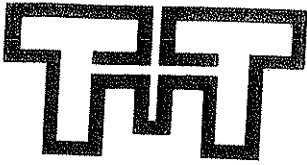
SHEET 1 OF 1

PROJECT: WAIMCA 2 LOCATION: LEE RIVER VAULT, NELSON JOB NO: 22032-002  
 CO-ORDINATES: N 597 1683 EXPOSURE TYPE: TP HOLE STARTED: 22-06-06  
E 252 3664 EQUIPMENT: 25 tonne Laxis HOLE FINISHED: 22-06-06  
 RL: OPERATOR: Taylor (Richard) LOGGED BY: Jxww  
 DATUM: EXCAVATION DIMENSIONS: 1700 X 4200 X 3300 CHECKED BY: MPD

EXCAVATION AND TESTS				ENGINEERING DESCRIPTION					GEOLOGICAL			
PENETRATION 1 2 3	SUPPORT	WATER	SAMPLES, TESTS	RL (m) DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION	SHEAR STRENGTH OR RELATIVE DENSITY	ESTIMATED SHEAR STRENGTH, kPa	ORIGIN TYPE, MINERAL COMPOSITION, DETECTS, STRUCTURE	UNIT
					X X	OL	SILT/ROOT MAT, non plastic, dark brown organic, abundant woody material roots to base	M			TOPSOIL	(1)
				0.5	X X	OL	CLAYEY SILT & GRAVEL, dark - orange - brown, CW-HW, angular, coarse to cobble slabs in low plasticity clay-silt matrix rootlets.	M			RESIDUAL SOIL	(2)
			Shatters with light hammer blow	1.0	X X		SILTSTONE, grey brown, blocky, HW, structure apparent but discontinuous becomes more defined downhole	M	Wk		HW SILTSTONE	(3)
			1-2 firm hammer blows.	2.0	X X		SILTSTONE, dark grey-brown closely jointed (40-120mm) blocky appearance becomes more competent with depth	M	Wk		MW SILTSTONE (Rai Formation)	(4)
				2.5	X X		rootlets in joints some silt infill 104/76° NG jut 48° to 230°	M	MS			
				3.0	X X							

SKETCH





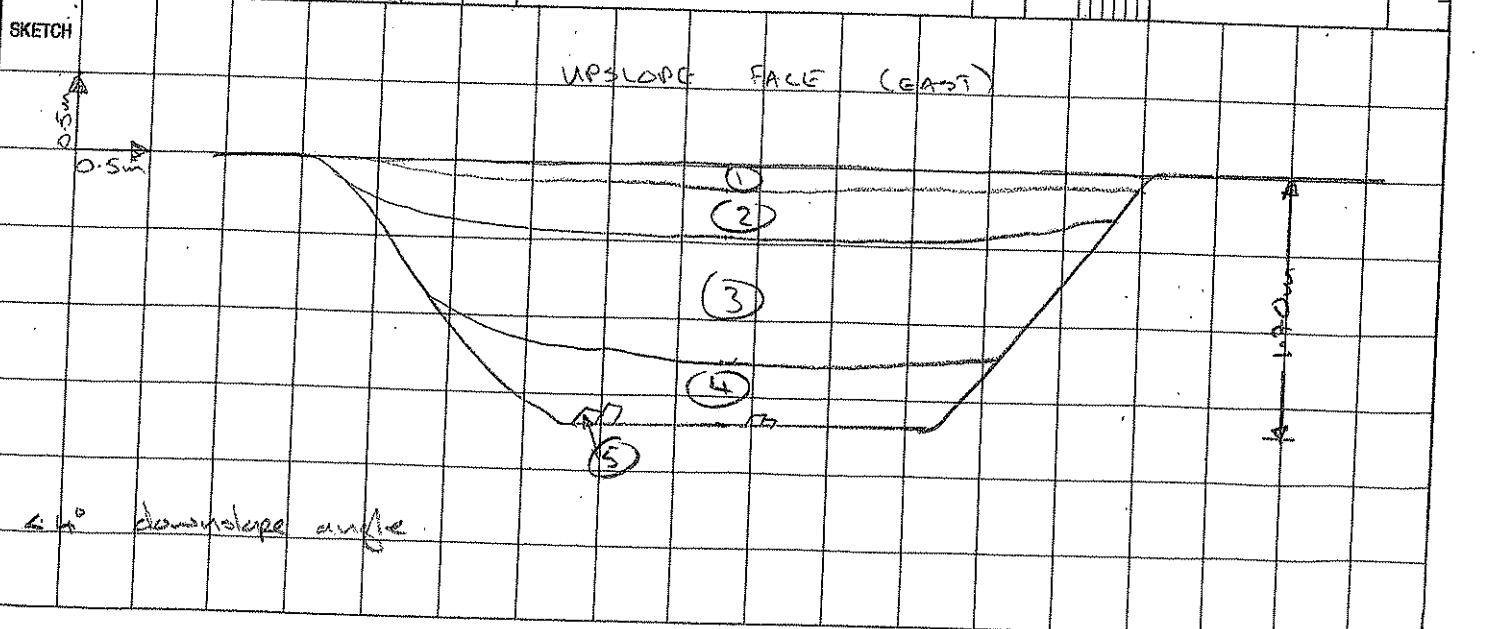
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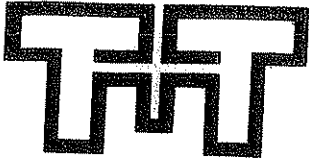
EXCAVATION LOG

EXCAVATION NO: TP 18  
SHEET 1 OF 1

PROJECT: WAIMEA 2 LOCATION: LEE RIVER VALLEY, NELSON JOB NO: 22032-002  
 CO-ORDINATES: N 5471785 EXPOSURE TYPE: TP HOLE STARTED: 23-06-06  
 E 2523582 16m EQUIPMENT: 25 tonne Zaxis HOLE FINISHED: 23-06-06  
 RL: OPERATOR: Taylors (Richard) LOGGED BY: Jxww  
 DATUM: EXCAVATION DIMENSIONS: 1700 x 5600 x 1700 CHECKED BY: MPD

EXCAVATION AND TESTS				ENGINEERING DESCRIPTION				GEOLOGICAL		
PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	DEPTH (m)	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION	ESTIMATED SHEAR STRENGTH, kPa	ORIGIN TYPE, MINERAL COMPOSITION, DETECTS, STRUCTURE	UNIT
1 2 3			SV PP Scell							
			72/30 150	0.5	OL	Silt, low plasticity, dark brown, organic with clay, abundant roots	M		TOPSOIL	①
					ML	LATE SILT, low plasticity, orange-brown with abundant roots, root mat @ basal contact	M SE		Colluvium	②
			63/29 150	1.0	ML	As above, no root disturbance, some rootlets	M SE		Colluvium	③
				1.5	GP	SANDY GRAVEL, orange-brown, fairly tightly packed, gap graded, fine-medium with cobbles & boulders, rounded, with silt.	M		FLUVIAL GRAVEL	④
				2.0		E.O.H 1.7m (Bedrock)			BLOCKY SILTSTONE	⑤





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EXCAVATION LOG

EXCAVATION NO: TP 19  
SHEET 1 OF 2

PROJECT: WAIMEAZ LOCATION: LEE RIVER VALLEY, NELSON JOB NO: 22032-002  
 CO-ORDINATES: N 5971705 EXPOSURE TYPE: TP HOLE STARTED: 23-06-06  
 E 2523581 17.7m EQUIPMENT: 25t 2axis HOLE FINISHED: 23-06-06  
 RL: OPERATOR: Taylors (Richard) LOGGED BY: J. [unclear]  
 DATUM: EXCAVATION DIMENSIONS: 1700 x 9000 x 4500 CHECKED BY: MPD

EXCAVATION AND TESTS				ENGINEERING DESCRIPTION					GEOLOGICAL				
PENETRATION	SUPPORT	WATER	SAMPLES, TESTS	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	SOIL NAME, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, SECONDARY AND MINOR COMPONENTS	MOISTURE CONDITION	SHEAR STRENGTH OR RELATIVE DENSITY	ESTIMATED SHEAR STRENGTH, kPa	ORIGIN TYPE, MINERAL COMPOSITION, DETECTS, STRUCTURE	UNIT
1 2 3								Root mat & leaf debris with some low plasticity organic silt.	M	VL		Root MAT	①
			Scale DNP		0.5	x D		Silty CLAYE, dark brown to grey, loosely packed, poorly graded, angular, blocky & elongate, coarse to boulder size, HW siltstone clasts in a sandy silt matrix.				Landslide Debris	②
					1.0	x D		slope parallel, chaotic					
					1.5	x D	GM	(potential hardfill)					
					2.0	x D							
					2.5	x D							
					3.0	x D		CLAYEY GRAVEL				Debris	③

