

DETAIL
FOUNDATION INVESTIGATION REPORT
LITTLE WHITE RIVER II BRIDGE REPLACEMENT
HIGHWAY 546, DISTRICT OF ALGOMA
G.W.P. 512-00-00, W.P. 513-00-01, SITE: 38S-056

Geocres Number: 41J-76

Report to

MMM Group

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TABLE OF CONTENTS

PART A: FOUNDATION INVESTIGATION REPORT

1	INTRODUCTION	1
2	SITE DESCRIPTION	1
3	SITE INVESTIGATION AND FIELD TESTING.....	2
4	LABORATORY TESTING	3
5	DESCRIPTION OF SUBSURFACE CONDITIONS	4
5.1	Topsoil	4
5.2	Sand Fill	4
5.3	Sand with Layers of Sandy Silt to Sand and Gravel	4
5.4	Silt to Clayey Silt.....	5
5.5	Groundwater Conditions	6
6	MISCELLANEOUS	7

Appendices

Appendix A	Record of Borehole Sheets
Appendix B	Laboratory Test Results
Appendix C	Factual Information from 2004 Investigation Report
Appendix D	Photographs, Figures and Tables
Appendix E	Borehole Locations and Soil Strata Drawings

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PART A: FOUNDATION INVESTIGATION REPORT

1 INTRODUCTION

This report presents the factual findings obtained from a foundation investigation conducted at the site of the proposed replacement bridge to carry Highway 546 over the Little White River in Algoma, Ontario.

The purpose of the investigation was to explore the subsurface conditions at the site and, based on the data obtained, to provide a borehole location plan, records of boreholes, stratigraphic profile and cross-sections, laboratory test results and a written description of the subsurface conditions. A model of the subsurface conditions was developed from the data obtained in the course of the investigation.

A Preliminary Foundation Investigation was completed by Thurber in the spring of 2007. The factual information obtained in the course of that investigation has been combined with that obtained in the course of the current investigation.

A previous investigation was reported in 2004 by Golder Associates Ltd. related to the replacement of the existing temporary modular bridge (TMB). The factual data from that investigation is included in Appendix C and has been considered in the analysis and preparation of recommendations contained in this report.

Thurber carried out the investigation as a sub-consultant to MMM Group, under the Ministry of Transportation Ontario (MTO) Agreement Number 5005-E-0042.

2 SITE DESCRIPTION

The site is located on Highway 546 approximately 50 km north of Highway 17 and 1.4 km south of the junction with Highway 639. In general, the Little White River flows towards the southwest, paralleling Highway 546 and joining the Mississagi River near Wharncliffe, approximately 40 km to the south. At the site, the river crosses northwest to southeast (project west to east) under the highway.

The river flows on a relatively gentle gradient at the site, with poorly developed meanders. The channel is approximately 21 m wide and 3 m deep (in the middle of the channel). The river banks are approximately 2 m high at the site, though higher, actively eroding banks were observed approximately 200 m upstream from the existing crossing. The river level was recorded as Elevation 297.2 m in October 2006.

Photographs of the site are included in Appendix D and show the existing bridge, the approaches and the soil exposure upstream from the bridge (in the background of Photo 1, just below the “Little White River” sign).

Geologically, the site lies within the Canadian Shield, which is characterized by Pre-Cambrian bedrock. Locally, however, the Little White River flows across post-glacial deposits of sand and gravel and the area is comparatively flat and well treed. There are no buildings or other developments in the immediate vicinity of the site.

3 SITE INVESTIGATION AND FIELD TESTING

Site investigation and testing for this project included preliminary and detailed design stages:

- During the preliminary investigation, six foundation boreholes (numbered 07-LW1 to 07-LW6) were drilled on three alternative bridge alignments and eight boreholes (07-LW7 to 07-LW14) were drilled along the proposed embankment. The depths of these boreholes ranged from 23.2 to 32.3 m at the structure and 2.9 to 3.7 m at the embankment. The fieldwork for the preliminary investigation was carried out during the period February 19 to March 17, 2007.

Logs for all boreholes drilled during the preliminary investigation have been included in this report for reference, though boreholes 07-LW5 and 07-LW6 are the most relevant to the foundations on the selected alignment.

- Investigation for detail design consisted of ten sampled boreholes (numbered 07-LW15 through 07-LW24) drilled to depths of 8.2 to 11.3 m at the structure and approaches to supplement those drilled during the preliminary investigation. The fieldwork for detail design was carried out during the period September 12 to September 20, 2007.

The approximate locations of the boreholes are shown on the attached Borehole Locations and Soil Strata Drawings in Appendix F. The Record of Borehole sheets are included in Appendix A.

Prior to commencing the site investigation, clearance was obtained from utility companies having plant in the area.

A combination of hollow-stem auger drilling and NW casing techniques were used to advance the boreholes. Samples were obtained at selected intervals using a split spoon sampler in conjunction with Standard Penetration Testing (SPT) in the overburden soils. Dynamic Cone Penetration Testing (DCPT) was undertaken adjacent to eight of the boreholes.

Groundwater conditions in the open boreholes were observed throughout the drilling operations. At each foundation location, one or more standpipe piezometers consisting of 19 mm PVC pipe with a slotted screen were installed and enclosed in filter sand to permit longer term groundwater level monitoring. Boreholes without piezometer installations were grouted with bentonite upon completion, or backfilled with drill cuttings if less than 3 m deep. The completion details of the piezometers and boreholes are shown in Table 3.1.

A member of Thurber's technical staff supervised drilling and sampling operations on a full time basis. The supervisor logged the boreholes and processed the recovered soil samples for transport to Thurber's laboratory for further examination and testing.

Table 3.1 – Borehole Completion Details

Borehole Location	Piezometer Tip Depth/ Elevation (m)	Completion Details
07-LW1 South Foundation	29.9 / 270.0	Piezometer with 1.5 m slotted screen installed with sand filter to 27.8 m, bentonite seal from 27.8 m to ground surface.
07-LW2 North Foundation	22.8 / 275.8	Piezometer with 1.5 m slotted screen installed with sand filter to 21.0 m, bentonite seal from 21.0 m to ground surface.
07-LW5 South Foundation	30.5 / 270.2	Piezometer with 1.5 m slotted screen installed with sand filter to 28.4 m, bentonite seal from 28.4 m to ground surface.
07-LW6 North Foundation	24.4 / 273.3	Piezometer with 1.5 m slotted screen installed with sand filter to 22.9 m, bentonite seal from 22.9 m to ground surface.
07-LW15 South Foundation	10.7 / 289.9	Piezometer with 1.5 m slotted screen installed at 10.7 m with sand filter to 8.1 m, bentonite seal to 6.7 m, grout to 0.6 m and sand to ground surface.
07-LW17 North Foundation	11.3 / 287.0	Piezometer with 1.5 m slotted screen installed at 11.3 m with sand filter to 9.3 m, bentonite seal to 8.3 m, grout to 0.6 m and sand to ground surface.
07-LW3 07-LW4	No Installation	Bentonite grout to ground surface.
07-LW7 to 07-LW-14	No Installation	Bentonite grout to depths of 0.3 to 0.6 m, auger cuttings to ground surface.
07-LW16 07-LW18 to 07-LW-24	No Installation	Bentonite grout to depths of 0.3 to 0.6 m, auger cuttings to ground surface.

4 LABORATORY TESTING

The recovered soil samples were subjected to Visual Identification (VI) and to natural moisture content determination. The results of this testing are shown on the Record of Borehole sheets in Appendix A.

Selected samples were subjected to gradation analysis and the results of this testing program are shown on the Record of Borehole sheets in Appendix A and on the figures contained in Appendix B. A summary of the results is provided in the following section.

5 DESCRIPTION OF SUBSURFACE CONDITIONS

Reference is made to the Record of Borehole sheets in Appendix A. Details of the encountered soil stratigraphy along the bridge and embankment alignments are presented in this appendix and on the “Borehole Locations and Soil Strata” drawings in Appendix F. An overall description of the stratigraphy is given in the following paragraphs. However, the factual data presented in the Record of Borehole Sheets governs any interpretation of the site conditions.

The description presented below relates to the selected alignment and is based on the boreholes specifically drilled on that alignment (boreholes 07-LW5, 07-LW6, 07-LW10, 07-LW-11 and 07-LW15 to 07-LW24).

The soil encountered in the boreholes consists primarily of a deep deposit of sand with layers grading from sand and gravel to sandy silt. On and adjacent to the existing highway alignment, the sand is overlain by granular fill forming the existing road embankments. On the north side of the river, the upper portion of the sand contains organics and appears to comprise alluvial material.

5.1 Topsoil

A layer of topsoil or organic material was encountered at 8 of 14 locations drilled along the proposed alignment. This material ranged from peaty deposits near the river to sandy topsoil above the riverbank. The topsoil/organic layer ranged in thickness from 75 to 200 mm.

The topsoil thickness may vary between and beyond the borehole locations and the data is not intended for the purpose of estimating quantities.

5.2 Sand Fill

Sand fill, grading locally to sand and gravel fill, was encountered at the south foundation and in three other boreholes along both embankments. The sand was typically described as brown and moist, with trace to some gravel and occasional cobbles.

SPT N-values obtained in the fill ranged from 19 to 106 blows/0.3 m, indicating a compact to very dense condition. In some cases, the high SPT values may reflect the presence of cobbles or boulders.

Moisture contents ranged from approximately 2 to 16 %.

The fill ranged in thickness from 0.2 to 2.4 m. The underside of the fill was recorded at elevations 297.3 to 299.9 m, generally rising towards the south.

5.3 Sand with Layers of Sandy Silt to Sand and Gravel

The soils encountered below the topsoil and fill predominantly consisted of sand with a trace of gravel and silt. The sand contains deposits grading locally from sandy silt to sand and gravel, as well as cobbles and boulders. The sand was described as brown and moist,

becoming grey and wet with depth in some boreholes, or grey and wet for the full depth of drilling in other boreholes.

Organics comprising decayed wood, roots and/or peat were observed in the upper part of the sand deposit in the boreholes drilled on the north side of the river. The organic material extended to depths of about 2.2 to 4.1 m (elevation 294.0 to 296.6 m, locally elevation 298.4 m in approach borehole 07-11). This zone appears to comprise alluvial material deposited in a former river meander.

SPT N-values obtained in the sand deposit varied widely from one blow/0.3 m to 100 blows/0.15 m, indicating very loose to very dense conditions. The loose to very loose conditions were typically encountered in the upper alluvial part of boreholes drilled on the north side of the river, extending to depths ranging from 2.2 to 5.7 m (elevation 292.4 to 298.4 m). In some cases, the high SPT values may reflect the presence of cobbles or boulders.

The results of laboratory tests carried out on 31 samples were as follows:

	Sand (<u>21 samples</u>)	Sand and Gravel (<u>6 samples</u>)	Silty Sand to Sandy Silt (<u>4 samples</u>)
Gravel (%)	0 to 20	29 to 68	0 to 7
Sand (%)	80 to 99	31 to 69	29 to 75
Silt (%)	0 to 8	1 to 5	18 to 66
Clay (%)	-	-	2 to 5

The grain size distribution curves for the samples tested are shown in Figures B2 to B10 and B13 to B15 in Appendix B.

The natural moisture content generally ranged from 2 to 28%. Higher moisture contents of 30 to 64% were measured in the upper alluvial zone containing organics on the north side of the river.

All boreholes except borehole 07-LW22 were terminated in the sand deposit at depths of 3.7 to 32.3 m (elevation 268.4 to 297.5 m).

5.4 Silt to Clayey Silt

A layer of cohesive silt to clayey silt was encountered in two boreholes drilled at the north approach. In borehole 07-LW6, the silt layer was 0.8 m thick with an underside at elevation 290.2 m. Borehole 07-LW22 was terminated 1.4 m into the clayey silt at a depth of 8.2 m (elevation 289.9 m).

A single SPT value of 26 blows/0.3 indicates that the silt is very stiff.

The grain size curve for the sample tested is shown in Figure B16, Appendix B. The results of a laboratory test carried out on a sample were as follows:

Gravel (%)	0
Sand (%)	2
Silt (%)	79
Clay (%)	19

Moisture contents of 19 to 23% were measured in the clayey silt.

5.5 Groundwater Conditions

Standpipe piezometers were installed in selected boreholes and water levels were measured after completion of drilling, prior to demobilization from the site. The levels in the piezometers installed during the preliminary investigation were also measured. The water level readings are presented in Table 5.1.

Table 5.1 – Water Level Measurements

Location	Borehole	Tip Depth (m)	Date	Water Level (m)	
				Depth	Elevation
South Foundation	07-LW5	30.5	15-Mar-07	3.7	297.0
			12-Sep-07	3.4	297.3
	07-LW15	10.7	13-Sep-07	3.5	297.1
North Foundation	07-LW6	24.4	08-Mar-07	0.8	296.9
			12-Sep-07	0.3	297.4
	07-LW17	11.3	20-Sep-07	1.2	297.1

The water level in Little White River, shown on the road profile drawing, is elevation 297.2 m. Based on the short-term piezometer readings, the groundwater level is near the water level in the river. The water table will be strongly influenced by the level of the river and will fluctuate seasonally and after severe weather events.

6 MISCELLANEOUS

Eastern Ontario Diamond Drilling Ltd. of Hawkesbury, Ontario supplied a track mounted CME 75 drill rig and conducted the drilling, sampling and in-situ testing operations.

The drilling and sampling operations in the field were supervised on a full time basis by Mr. Stephane Loranger and Mr. George Azzopardi of Thurber.

The coordinates for the boreholes and the ground surface elevations were provided by MMM Group.

Mr. Murray Anderson, P.Eng., prepared the Foundation Investigation Report. Mr. Alastair Gorman, P.Eng. directed the field operations and reviewed the report. Dr. P.K. Chatterji, P.Eng., a Designated Principal Contact for MTO Foundations projects, also reviewed the report.

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Review Principal, Designated MTO Contact



Appendix A

Record of Borehole Sheets

SYMBOLS, ABBREVIATIONS AND TERMS USED ON RECORDS OF BOREHOLES

1. TEXTURAL CLASSIFICATION OF SOILS

CLASSIFICATION	PARTICLE SIZE	VISUAL IDENTIFICATION
Boulders	Greater than 200mm	same
Cobbles	75 to 200mm	same
Gravel	4.75 to 75mm	5 to 75mm
Sand	0.075 to 4.75mm	Not visible particles to 5mm
Silt	0.002 to 0.075mm	Non-plastic particles, not visible to the naked eye
Clay	Less than 0.002mm	Plastic particles, not visible to the naked eye

2. COARSE GRAIN SOIL DESCRIPTION (50% greater than 0.075mm)

TERMINOLOGY	PROPORTION
Trace or Occasional	Less than 10%
Some	10 to 20%
Adjective (e.g. silty or sandy)	20 to 35%
And (e.g. sand and gravel)	35 to 50%

3. TERMS DESCRIBING CONSISTENCY (COHESIVE SOILS ONLY)

DESCRIPTIVE TERM	UNDRAINED SHEAR STRENGTH (kPa)	APPROXIMATE SPT ⁽¹⁾ 'N' VALUE
Very Soft	12 or less	Less than 2
Soft	12 to 25	2 to 4
Firm	25 to 50	4 to 8
Stiff	50 to 100	8 to 15
Very Stiff	100 to 200	15 to 30
Hard	Greater than 200	Greater than 30

NOTE: Hierarchy of Soil Strength Prediction

- 1) Laboratory Triaxial Testing
- 2) Field Insitu Vane Testing
- 3) Laboratory Vane Testing
- 4) SPT value
- 5) Pocket Penetrometer



4. TERMS DESCRIBING DENSITY (COHESIONLESS SOILS ONLY)

DESCRIPTIVE TERM	SPT 'N' VALUE
Very Loose	Less than 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very Dense	Greater than 50

5. LEGEND FOR RECORDS OF BOREHOLES

SYMBOLS AND ABBREVIATIONS FOR SAMPLE TYPE	SS Split Spoon Sample	WS Wash Sample	AS Auger (Grab) Sample
	TW Thin Wall Shelby Tube Sample	TP Thin Wall Piston Sample	
	PH Sampler Advanced by Hydraulic Pressure	PM Sampler Advanced by Manual Pressure	
	WH Sampler Advanced by Self Static Weight	RC Rock Core	SC Soil Core

$$\text{Sensitivity} = \frac{\text{Undisturbed Shear Strength}}{\text{Remoulded Shear Strength}}$$



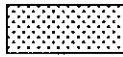


 Water Level
 C_{pen} Shear Strength Determination by Pocket Penetrometer

- (1) SPT 'N' Value Standard Penetration Test 'N' Value – refers to the number of blows from a 63.5kg hammer free falling a height of 0.76m to advance a standard 50 mm outside diameter split spoon sampler for 0.3 m depth into undisturbed ground.
- (2) DCPT Dynamic Cone Penetration Test – Continuous penetration of a 50 mm outside diameter, 60° conical steel point attached to "A" size rods driven by a 63.5 kg hammer free falling a height of 0.76 m. The resistance to cone penetration is the number of hammer blows required for each 0.3 m advance of the conical point into undisturbed ground.

UNIFIED SOILS CLASSIFICATION

MAJOR DIVISIONS		GROUP SYMBOL	TYPICAL DESCRIPTION
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	GW	Well-graded gravels or gravel-sand mixtures, little or no fines.
		GP	Poorly-graded gravels or gravel-sand mixtures, little or no fines.
		GM	Silty gravels, gravel-sand-silt mixtures.
		GC	Clayey gravels, gravel-sand-clay mixtures.
	SAND AND SANDY SOILS	SW	Well-graded sands or gravelly sands, little or no fines.
		SP	Poorly-graded sands or gravelly sands, little or no fines.
		SM	Silty sands, sand-silt mixtures.
		SC	Clayey sands, sand-clay mixtures.
FINE GRAINED SOILS	SILTS AND CLAYS $W_L < 50\%$	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays. ($W_L < 30\%$).
		CI	Inorganic clays of medium plasticity, silty clays. ($30\% < W_L < 50\%$).
		OL	Organic silts and organic silty-clays of low plasticity.
	SILTS AND CLAYS $W_L > 50\%$	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
		CH	Inorganic clays of high plasticity, fat clays.
		OH	Organic clays of medium to high plasticity, organic silts.
HIGHLY ORGANIC SOILS		Pt	Peat and other highly organic soils.
CLAY SHALE			
SANDSTONE			
SILTSTONE			
CLAYSTONE			
COAL			

EXPLANATION OF ROCK LOGGING TERMS

ROCK WEATHERING CLASSIFICATION		SYMBOLS	
Fresh (FR)	No visible signs of weathering.		
Fresh Jointed (FJ)	Weathering limited to the surface of major discontinuities.		CLAYSTONE
Slightly Weathered (SW)	Penetrative weathering developed on open discontinuity surfaces, but only slight weathering of rock material.		SILTSTONE
Moderately Weathered (MW)	Weathering extends throughout the rock mass, but the rock material is not friable.		SANDSTONE
Highly Weathered (HW)	Weathering extends throughout the rock mass and the rock is partly friable.		COAL
Completely Weathered (CW)	Rock is wholly decomposed and in a friable condition, but the rock texture and structure are preserved.		Bedrock (general)

DISCONTINUITY SPACING		STRENGTH CLASSIFICATION			
Bedding	Bedding Plane Spacing	Rock Strength	Approximate Uniaxial Compressive Strength		Field Estimation of Hardness*
			(MPa)	(psi)	
Very thickly bedded	Greater than 2m	Extremely Strong	Greater than 250	Greater than 36,000	Specimen can only be chipped with a geological hammer
Thickly bedded	0.6 to 2m				
Medium bedded	0.2 to 0.6m	Very Strong	100-250	15,000 to 36,000	Requires many blows of geological hammer to break
Thinly bedded	60mm to 0.2m				
Very thinly bedded	20 to 60mm	Strong	50-100	7,500 to 15,000	Requires more than one blow of geological hammer to break
Laminated	6 to 20mm				
Thinly Laminated	Less than 6mm	Medium Strong	25.0 to 50.0	3,500 to 7,500	Breaks under single blow of geological hammer.
		Weak	5.0 to 25.0	750 to 3,500	Can be peeled by a pocket knife with difficulty
		Very Weak	1.0 to 5.0	150 to 750	Can be peeled by a pocket knife, crumbles under firm blows of geological pick.
		Extremely Weak (Rock)	0.25 to 1.0	35 to 150	Indented by thumbnail

TERMS	
Total Core Recovery: (TCR)	Core recovered as a percentage of total core run length.
Solid Core Recovery: (SCR)	Percent Ratio of solid core of full cylindrical shape recovered. Expressed with respect to the total length of core run.
Rock Quality Designation: (RQD)	Total length of sound core recovered in pieces 0.1m in length or larger as a percentage of total core run length.
Uniaxial Compressive Strength (UCS)	Axial stress required to break the specimen
Fracture Index: (FI)	Frequency of natural fractures per 0.3m of core run.

SYMBOLS, ABBREVIATIONS AND TERMS USED ON RECORDS OF BOREHOLES

1. TEXTURAL CLASSIFICATION OF SOILS

CLASSIFICATION	PARTICLE SIZE	VISUAL IDENTIFICATION
Boulders	Greater than 200mm	same
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And (e.g. sand and gravel)	35 to 50%

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DESCRIPTIVE TERM	UNDRAINED SHEAR STRENGTH (kPa)	APPROXIMATE SPT ⁽¹⁾ 'N' VALUE
Very Soft	12 or less	Less than 2
Soft	12 to 25	2 to 4
Firm	25 to 50	4 to 8
Stiff	50 to 100	8 to 15
Very Stiff	100 to 200	15 to 30
Hard	Greater than 200	Greater than 30

NOTE: Hierarchy of Soil Strength Prediction

- 1) Laboratory Triaxial Testing
- 2) Field Insitu Vane Testing
- 3) Laboratory Vane Testing
- 4) SPT value
- 5) Pocket Penetrometer



4. TERMS DESCRIBING DENSITY (COHESIONLESS SOILS ONLY)

DESCRIPTIVE TERM	SPT 'N' VALUE
Very Loose	Less than 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very Dense	Greater than 50

5. LEGEND FOR RECORDS OF BOREHOLES

SYMBOLS AND ABBREVIATIONS FOR SAMPLE TYPE	SS Split Spoon Sample	WS Wash Sample	AS Auger (Grab) Sample
	TW Thin Wall Shelby Tube Sample	TP Thin Wall Piston Sample	
	PH Sampler Advanced by Hydraulic Pressure	PM Sampler Advanced by Manual Pressure	
	WH Sampler Advanced by Self Static Weight	RC Rock Core	SC Soil Core

$$\text{Sensitivity} = \frac{\text{Undisturbed Shear Strength}}{\text{Remoulded Shear Strength}}$$

 Water Level
 Shear Strength Determination by Pocket Penetrometer

- (1) SPT 'N' Value Standard Penetration Test 'N' Value – refers to the number of blows from a 63.5kg hammer free falling a height of 0.76m to advance a standard 50 mm outside diameter split spoon sampler for 0.3 m depth into undisturbed ground.
- (2) DCPT Dynamic Cone Penetration Test – Continuous penetration of a 50 mm outside diameter, 60° conical steel point attached to "A" size rods driven by a 63.5 kg hammer free falling a height of 0.76 m. The resistance to cone penetration is the number of hammer blows required for each 0.3 m advance of the conical point into undisturbed ground.

RECORD OF BOREHOLE No 07-LW01

1 OF 4

METRIC

G.W.P. 512-00-00 LOCATION Little White River N 5 167 794.62 E 394 842.35 ORIGINATED BY GA
 HWY 546 BOREHOLE TYPE Hollow Stem Auger / NW Casing COMPILED BY MFA
 DATUM Geodetic DATE 2007.03.10 - 2007.03.13 CHECKED BY AEG

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa					
299.9								20 40 60 80 100					
0.0	SAND AND GRAVEL, trace silt, occasional rootlets Very Dense Brown (SP)		1	SS	59			○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE				31 52 17 (SI+CL)	
			2	SS	74		299		○				
298.4								20 40 60 80 100					
1.5	SAND, trace gravel Dense Brown (SP)		3	SS	37			○					
							298		○				
297.6								20 40 60 80 100					
2.4	SAND AND GRAVEL Compact to Dense Brown (SP)		4	SS	45			○				28 68 4 (SI+CL)	
			5	SS	16		297		○				
							296						
295.3								20 40 60 80 100					
4.6	SAND, trace gravel Compact to Dense Brown Wet (SP)		6	SS	15			○				0 97 3 (SI+CL)	
							295						
							294						
			7	SS	31		293		○				8 81 11 (SI+CL)
							292		○				
			8	SS	19		291						
	9	SS	17				○				0 96 4 (SI+CL)		

Continued Next Page

+³, ×³: Numbers refer to
Sensitivity

20
16
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 07-LW01

2 OF 4

METRIC

G.W.P. 512-00-00 LOCATION Little White River N 5 167 794.62 E 394 842.35 ORIGINATED BY GA
HWY 546 BOREHOLE TYPE Hollow Stem Auger / NW Casing COMPILED BY MFA
DATUM Geodetic DATE 2007.03.10 - 2007.03.13 CHECKED BY AEG

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa	WATER CONTENT (%)					
	Continued From Previous Page													
289.3 10.7	SAND, trace gravel Compact to Dense Brown Wet (SP)													
	SAND AND GRAVEL Compact to Dense Brown Wet (SP)		10	SS	21		289						43 53 4 (SI+CL)	
							288							
			11	SS	27		287							
							286						43 54 3 (SI+CL)	
			12	SS	30		285							
							284							
			13	SS	27		283							
							282							
			14	SS	17		281							
							280							
			15	SS	30								29 62 9 (SI+CL)	

Continued Next Page

+³ × 3: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 07-LW01

3 OF 4

METRIC

G.W.P. 512-00-00 LOCATION Little White River N 5 167 794.62 E 394 842.35 ORIGINATED BY GA
 HWY 546 BOREHOLE TYPE Hollow Stem Auger / NW Casing COMPILED BY MFA
 DATUM Geodetic DATE 2007.03.10 - 2007.03.13 CHECKED BY AEG

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)						
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa										
								20 40 60 80 100										
Continued From Previous Page							20 40 60 80 100			20 40 60			GR SA SI CL					
274.0 25.9	SAND AND GRAVEL, occasional cobbles Compact to Dense Brown Wet (SP)		16	SS	43		279									70 29 1 (SI+CL)		
	SAND, some gravel Dense to Very Dense Brown Wet (SP)		17	SS	19		277									52 46 2 (SI+CL)		
														</				

Continued Next Page

+ ³ X ³ : Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 07-LW01

4 OF 4

METRIC

G.W.P. 512-00-00 LOCATION Little White River N 5 167 794.62 E 394 842.35 ORIGINATED BY GA
 HWY 546 BOREHOLE TYPE Hollow Stem Auger / NW Casing COMPILED BY MFA
 DATUM Geodetic DATE 2007.03.10 - 2007.03.13 CHECKED BY AEG

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT	NATURAL MOISTURE CONTENT	LIQUID LIMIT	UNIT WEIGHT γ KN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20 40 60 80 100	20 40 60 80 100					
	Continued From Previous Page													
269.1	SAND, some gravel Very Dense Brown Wet (SP)		20	SS	101									
30.8	END OF BOREHOLE AT 30.78m. Piezometer installation consists of 19mm diameter Schedule 40 PVC pipe with a 1.52m slotted screen. WATER LEVEL READINGS: DATE DEPTH(m) ELEV.(m) 13/03/07 4.88 295.02						269							

ONTMT4S 2393LW.GPJ 2/11/08

+³ ×³ Numbers refer to
Sensitivity

20
15-4-5
10 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 07-LW02

1 OF 3

METRIC

G.W.P. 512-00-00 LOCATION Little White River N 5 167 821.99 E 394 861.84 ORIGINATED BY GA
 HWY 546 BOREHOLE TYPE Hollow Stem Auger / NW Casing COMPILED BY MFA
 DATUM Geodetic DATE 2007.03.16 - 2007.03.17 CHECKED BY AEG

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20 40 60 80 100	20 40 60 80 100					
298.6 0.0	SAND , trace silt, trace to some gravel, occasional cobbles Very Dense Brown (SP)		1	SS	50/ .150									
297.8 0.8	SILT , trace clay, trace sand, occasional cobbles Firm Brown		2	SS	8									
297.1 1.5	SAND AND GRAVEL Dense Brown Wet (GP)		3	SS	32									61 38 1 (SI+CL)
296.3 2.3	SAND , trace to some gravel Very Dense Brown (SP)		4	SS	55									
			5	SS	50/ .075									
294.5 4.1	Sandy SILT , trace clay, trace gravel Compact Grey (SM-NP)		6	SS	16									5 27 63 5
292.9 5.6	SAND Compact to Dense Brown (SP)		7	SS	30									
			8	SS	27									
			9	SS	29									0 100 0 (SI+CL)

Continued Next Page

+³, X³: Numbers refer to
Sensitivity

20
15 10 5
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 07-LW02

2 OF 3

METRIC

G.W.P. 512-00-00 LOCATION Little White River N 5 167 821.99 E 394 861.84 ORIGINATED BY GA
 HWY 546 BOREHOLE TYPE Hollow Stem Auger / NW Casing COMPILED BY MFA
 DATUM Geodetic DATE 2007.03.16 - 2007.03.17 CHECKED BY AEG

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20 40 60 80 100	PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L	
	Continued From Previous Page							SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE	WATER CONTENT (%) 20 40 60			GR SA SI CL
	SAND Compact to Dense Brown (SP)											
	Very Dense		10	SS	84		288					
							287					
			11	SS	26		286					1 96 3 (SI+CL)
							285					
			12	SS	27		284					0 93 7 (SI+CL)
							283					
	occasional gravel seam 15.85 to 16.46m.		13	SS	23		282					0 100 0 (SI+CL)
							281					
280.7			14	SS	22		280					
17.8	SAND AND GRAVEL, occasional cobbles Very Dense Grey (SP)		15	SS	82		279					

Continued Next Page

+ 3, × 3: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 07-LW02

3 OF 3

METRIC

G.W.P. 512-00-00 LOCATION Little White River N 5 167 821.99 E 394 861.84 ORIGINATED BY GA
 HWY 546 BOREHOLE TYPE Hollow Stem Auger / NW Casing COMPILED BY MFA
 DATUM Geodetic DATE 2007.03.16 - 2007.03.17 CHECKED BY AEG

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20 40 60 80 100	PLASTIC LIMIT	NATURAL MOISTURE CONTENT	LIQUID LIMIT	
	Continued From Previous Page							SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE	W _p W W _L	WATER CONTENT (%)		
277.2	SAND AND GRAVEL, occasional cobbles Very Dense Grey (SP)		16	SS	102		278					
21.3	SAND, some gravel Very Dense Grey (SP)		17	SS	103		277					17 78 5 (SI+CL)
275.4			18	SS	108		276					
23.2	END OF BOREHOLE AT 23.16m. BOREHOLE OPEN TO 22.86m IN CASING. Piezometer installation consists of 19mm diameter Schedule 40 PVC pipe with a 1.52m slotted screen. WATER LEVEL READINGS: DATE DEPTH(m) ELEV.(m) 16/03/07 1.83 296.77											

+³ ×³: Numbers refer to
Sensitivity

20
15
10





(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 07-LW03

1 OF 3

METRIC

G.W.P. 512-00-00 LOCATION Little White River N 5 167 786.98 E 394 843.37 ORIGINATED BY SLI
 HWY 546 BOREHOLE TYPE Hollow Stem Auger / NW Casing COMPILED BY JHL
 DATUM Geodetic DATE 2007.02.20 - 2007.02.20 CHECKED BY AEG

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa		WATER CONTENT (%)				
								○ UNCONFINED + FIELD VANE	w _p w w _L					
								● QUICK TRIAXIAL × LAB VANE						
300.3							20 40 60 80 100	20 40 60						
0.0 0.1	TOPSOIL: (75 mm)													
	SAND AND GRAVEL, occasional cobbles Very Dense Brown		1	SS	50/ 125									
299.2														
1.1	SAND, trace gravel Compact Brown Moist		2	SS	21					○	○			
			3	SS	15					○				
			4	SS	7						○			
			5	SS	17						○			
294.8														
5.5	SAND AND GRAVEL, occasional cobbles Compact Grey Wet		6	SS	17						○			
			7	SS	20						○			
			8	SS	17						○			

Continued Next Page

+³ × 3³: Numbers refer to
Sensitivity

20
15 5
10 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 07-LW03

2 OF 3

METRIC

G.W.P. 512-00-00 LOCATION Little White River N 5 167 786.98 E 394 843.37 ORIGINATED BY SLL
 HWY 546 BOREHOLE TYPE Hollow Stem Auger / NW Casing COMPILED BY JHL
 DATUM Geodetic DATE 2007.02.20 - 2007.02.20 CHECKED BY AEG

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT Y kn/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa	WATER CONTENT (%)					
	Continued From Previous Page													
289.8	SAND AND GRAVEL, occasional cobbles Compact						290							
10.5	SAND, trace to some silt, trace gravel Compact Grey Wet		9	SS	17		289							2 94 4 (SI+CL)
							288							
			10	SS	23		287							
	some gravel, trace silt		11	SS	21		286							
							285							
	occasional cobbles		12	SS	21		284							
							283							
			13	SS	12		282							
							281							
			14	SS	20									

Continued Next Page

+³ ×³: Numbers refer to
Sensitivity

20
15 5
10 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 07-LW03

3 OF 3

METRIC

G.W.P. 512-00-00 LOCATION Little White River N 5 167 786.98 E 394 843.37 ORIGINATED BY SLL
HWY 546 BOREHOLE TYPE Hollow Stem Auger / NW Casing COMPILED BY JHL
DATUM Geodetic DATE 2007.02.20 - 2007.02.20 CHECKED BY AEG

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL						
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa											
								20 40 60 80 100											
								<div><div>20406080100</div><div>○ UNCONFINED + FIELD VANE</div><div>● QUICK TRIAXIAL × LAB VANE</div></div>				<div><div>PLASTIC LIMITNATURAL MOISTURE CONTENTLIQUID LIMIT</div><div>W P W W L</div><div>WATER CONTENT (%)</div><div>204060</div></div>							
Continued From Previous Page																			
	SAND , trace to some silt, trace gravel Compact Grey Wet		15	SS	20									1 97 2 (SI+CL)					
	occasion gravel seams loss of water in between 22.86m and 25.91 m																		
			16	SS	15														
275.0																			
25.3	AUGER REFUSAL AT 25.3m. DCPT REFUSAL AT 27.41m. BOREHOLE BACKFILLED WITH BENTONITE GROUT. WATER LEVEL READINGS: DATE DEPTH(m) ELEV.(m) 29/03/07 3.05 297.25																		

+³, X³: Numbers refer to
Sensitivity

20
15 5
10 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 07-LW04

1 OF 4

METRIC

G.W.P. 512-00-00 LOCATION Little White River N 5 167 821.16 E 394 872.30 ORIGINATED BY GA
 HWY 546 BOREHOLE TYPE Hollow Stem Auger COMPILED BY MFA
 DATUM Geodetic DATE 2007.03.08 - 2007.03.09 CHECKED BY AEG

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20 40 60 80 100	PLASTIC LIMIT	NATURAL MOISTURE CONTENT	LIQUID LIMIT		
300.5 0.0	SAND AND GRAVEL, occasional cobbles Compact to Very Dense Brown (FILL)(SP)		1	SS	84		300	20 40 60 80 100	W _P	W	W _L		
			2	SS	78		299	20 40 60 80 100					67 28 5 (SI+CL)
			3	SS	100/ .075		298	20 40 60 80 100					
			4	SS	11		297	20 40 60 80 100					
297.4 3.0	SAND, trace gravel, trace clay Loose to Very Dense Grey to Brown (SP)		5	SS	5		296	20 40 60 80 100					1 97 2 (SI+CL)
			6	SS	12		295	20 40 60 80 100					
			7	SS	50/ .150		294	20 40 60 80 100					
293.5 7.0	SILT, some clay, trace gravel, trace sand Hard (ML)		8	SS	41		293	20 40 60 80 100					3 9 69 19
			9	SS	45		292	20 40 60 80 100					
							291	20 40 60 80 100					

Continued Next Page

+³ ×³ Numbers refer to
Sensitivity

20
15
10
(%) STRAIN AT FAILURE

METRIC

+³, ×³: Numbers refer to Sensitivity

METRIC

+³, ×³: Numbers refer to Sensitivity

RECORD OF BOREHOLE No 07-LW05

1 OF 4

METRIC



G.W.P. 512-00-00 LOCATION Little White River N 5 167 778.62 E 394 853.61 ORIGINATED BY GA
 HWY 546 BOREHOLE TYPE Hollow Stem Auger / NW Casing COMPILED BY MFA
 DATUM Geodetic DATE 2007.03.14 - 2007.03.15 CHECKED BY AEG

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20 40 60 80 100	PLASTIC LIMIT W _P	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	
300.7 0.0	SAND AND GRAVEL, trace silt, occasional cobbles Very Dense Brown (FILL)(SP)		1	SS	106							
			2	SS	90							
299.2 1.5	SAND, trace silt, occasional gravel Very Dense Brown (FILL)(SP)		3	SS	78							
298.3 2.4	SAND, trace gravel, trace to some silt Compact Brown (SP)		4	SS	22							
			5	SS	11							
			6	SS	15							
			7	SS	33							
			8	SS	51							
			9	SS	17							
	Occasional dense or very dense seams											
	cobbles at 8.99 to 9.14m.											

Continued Next Page

+ 3, X 3 Numbers refer to
Sensitivity 20
15 5
10 (%) STRAIN AT FAILURE

METRIC

ELEV DEPTH	SOIL PROFILE		SAMPLES		GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT		UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			"N" VALUES	20 40 60 80 100	W _p W W _L	WATER CONTENT (%) 20 40 60		
	Continued From Previous Page											
							SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE					
							20 40 60 80 100					

[illegible]

+ 3, X 3: Numbers refer to Sensitivity

CONTMT4S 2333LW.GPJ 2/11/08

METRIC

+³, ×³: Numbers refer to Sensitivity

ONTMT4S 2333LW.GPJ 2/11/08

RECORD OF BOREHOLE No 07-LW05

4 OF 4

METRIC

G.W.P. 512-00-00 LOCATION Little White River N 5 167 778.62 E 394 853.61 ORIGINATED BY GA
 HWY 546 BOREHOLE TYPE Hollow Stem Auger / NW Casing COMPILED BY MFA
 DATUM Geodetic DATE 2007.03.14 - 2007.03.15 CHECKED BY AEG

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa						
	Continued From Previous Page							20 40 60 80 100						
								○ UNCONFINED + FIELD VANE						
								● QUICK TRIAXIAL x LAB VANE						
								20 40 60 80 100						
								PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT						
								w _p w w _L						
								WATER CONTENT (%)						
								20 40 60						
268.4	SAND, trace silt, trace gravel Very Dense													
			20	SS	104		270							5 91 4 (SI+CL)
							269							
32.3	END OF BOREHOLE AT 32.31m. BOREHOLE OPEN TO 32.00m IN CASING Piezometer installation consists of 19mm diameter Schedule 40 PVC pipe with a 1.52m slotted screen. WATER LEVEL READINGS: DATE DEPTH(m) ELEV.(m) 15/03/07 3.66 297.04 12/09/07 3.40 297.30													

RECORD OF BOREHOLE No 07-LW06

1 OF 3

METRIC

G.W.P. 512-00-00 LOCATION Little White River N 5 167 811.91 E 394 880.99 ORIGINATED BY SLI/GA
 HWY 546 BOREHOLE TYPE Hollow Stem Auger / NW Casing COMPILED BY MFA
 DATUM Geodetic DATE 2007.03.07 - 2007.03.07 CHECKED BY AEG

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE						
297.7								20 40 60 80 100	20 40 60					
0.0	ORGANICS, with roots and rootlets													
0.2	SAND, trace gravel, with wood fragments Loose to Dense Brown Wet													
			1	SS	1									
			2	SS	1									
			3	SS	15									
			4	SS	36									
			5	SS	26									
	trace gravel Very Dense Brown/Grey		6	SS	70									
291.0														
6.7	SILT, some clay Hard Grey Moist													
290.2														
7.5	SAND, trace silt, trace to some gravel Loose to Compact Grey Wet (SP)		7	SS	10									
			8	SS	23									
	becoming brown													

Continued Next Page

+ 3, × 3: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 07-LW06

2 OF 3

METRIC

G.W.P. 512-00-00 LOCATION Little White River N 5 167 811.91 E 394 880.99 ORIGINATED BY SLL/GA
 HWY 546 BOREHOLE TYPE Hollow Stem Auger / NW Casing COMPILED BY MFA
 DATUM Geodetic DATE 2007.03.07 - 2007.03.07 CHECKED BY AEG

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL		
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa								
								20 40 60 80 100								
	Continued From Previous Page							20 40 60 80 100								
	SAND, trace silt, some gravel Loose to Compact Brown Wet						287								20 80 0 (SI+CL)	
			9	SS	20											
			10	SS	30											
									</							

Continued Next Page

+³ × 3

Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 07-LW06

3 OF 3

METRIC

G.W.P. 512-00-00 LOCATION Little White River N 5 167 811.91 E 394 880.99 ORIGINATED BY SLL/GA
 HWY 546 BOREHOLE TYPE Hollow Stem Auger / NW Casing COMPILED BY MFA
 DATUM Geodetic DATE 2007.03.07 - 2007.03.07 CHECKED BY AEG

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa					
	Continued From Previous Page							20 40 60 80 100					
								○ UNCONFINED + FIELD VANE					
								● QUICK TRIAXIAL X LAB VANE					
								WATER CONTENT (%)					
								20 40 60					

+³, X³: Numbers refer to Sensitivity 20 15 10 (% STRAIN AT FAILURE

RECORD OF BOREHOLE No 07-LW07

1 OF 1

METRIC

G.W.P. 512-00-00 LOCATION Little White River N 5 167 596.63 E 394 857.60 ORIGINATED BY SLL
 HWY 546 BOREHOLE TYPE Hollow Stem Auger COMPILED BY JHL
 DATUM Geodetic DATE 2007.02.19 - 2007.02.19 CHECKED BY AEG

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa					
								20 40 60 80 100		PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			
301.8													
0.0	TOPSOIL: (50 mm)												
	SAND, trace gravel, occasional cobbles Very Dense Brown Moist		1	AS									
			1	SS	50/ .125								
			2	SS	23								
			3	SS	50/ .150								
			2	AS									
298.7													
3.1	END OF BOREHOLE AT 3.08 m. BOREHOLE OPEN TO 0.84 m AND DRY TO BOTTOM UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE GROUT TO SURFACE.		1	SS	60/ .025								

+³, X³: Numbers refer to
Sensitivity

20
15 5
10 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 07-LW08

1 OF 1

METRIC

G.W.P. 512-00-00 LOCATION Little White River N 5 167 645.13 E 394 850.56 ORIGINATED BY SLL
 HWY 546 BOREHOLE TYPE Hollow Stem Auger COMPILED BY JHL
 DATUM Geodetic DATE 2007.02.20 - 2007.02.20 CHECKED BY AEG

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa							
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE							
301.3							20	40	60	80	100	PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	
0.0	TOPSOIL: (50 mm)														
	SAND AND GRAVEL, occasional cobbles Compact Brown Moist Cobble		1	SS	50/ 100										
			2	SS	25										
299.1															
2.2	SAND, some silt Dense Brown Moist		3	SS	40										
			4	SS	30										
297.6															
3.7	END OF BOREHOLE AT 3.66 m. BOREHOLE OPEN TO 1.83 m AND DRY TO BOTTOM UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE GROUT TO SURFACE.														

RECORD OF BOREHOLE No 07-LW09

1 OF 1

METRIC

G.W.P. 512-00-00 LOCATION Little White River N 5 167 696.02 E 394 848.00 ORIGINATED BY SLL
 HWY 546 BOREHOLE TYPE Hollow Stem Auger COMPILED BY JHL
 DATUM Geodetic DATE 2007.02.20 - 2007.02.20 CHECKED BY AEG

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL		
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									WATER CONTENT (%)	
								○ UNCONFINED	+ FIELD VANE	● QUICK TRIAXIAL	× LAB VANE							
301.0																		
0.0	TOPSOIL: (50 mm)																	
	SAND AND GRAVEL, occasional cobbles Loose to Dense Brown Moist		1	AS														
	Cobble		1	SS	50/ .100													
			2	SS	8													
			3	SS	19													
			4	SS	36													
297.3																		
3.7	END OF BOREHOLE AT 3.66 m. BOREHOLE OPEN TO 1.60 m AND DRY TO BOTTOM UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE GROUT TO SURFACE.																	

+³ X³ Numbers refer to
Sensitivity

20
15
10
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 07-LW10

1 OF 1

METRIC

G.W.P. 512-00-00 LOCATION Little White River N 5 167 744.62 E 394 829.68 ORIGINATED BY SLL
HWY 546 BOREHOLE TYPE Hollow Stem Auger COMPILED BY JHL
DATUM Geodetic DATE 2007.02.20 - 2007.02.20 CHECKED BY AEG

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa						
301.2								20	40	60	80	100		
0.0	TOPSOIL: (75 mm)													
0.1	SAND, trace silt, trace gravel Very Loose to Compact Brown Moist		1	SS	1		301							
			2	SS	6		300							2 94 4 (Si+CL)
			3	SS	20		299							
			4	SS	23		298							0 97 3 (Si+CL)
297.5	END OF BOREHOLE AT 3.66 m. BOREHOLE OPEN TO 3.05 m AND DRY TO BOTTOM UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE GROUT TO SURFACE.													
3.7														

+³ ×³: Numbers refer to
Sensitivity

20
15 10 5
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 07-LW11

1 OF 1

METRIC

G.W.P. 512-00-00 LOCATION Little White River N 5 167 838.20 E 394 892.09 ORIGINATED BY GA
 HWY 546 BOREHOLE TYPE Hollow Stem Auger COMPILED BY MFA
 DATUM Geodetic DATE 2007.03.17 - 2007.03.17 CHECKED BY AEG

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					UNIT WEIGHT Y kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa							PLASTIC LIMIT W _P	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L
								20 40 60 80 100									
300.6																	
0.0																	
0.1	TOPSOIL		1	SS	6												
	Sandy SILT, trace clay, occasional rootlets and wood fibres Loose Brown (SM)																
			2	SS	5												
			3	SS	6												
298.4																	
2.2	SAND AND GRAVEL																
	Compact Grey Wet (SP)		4	SS	11												
			5	SS	28												
296.9																	
3.7	END OF BOREHOLE AT 3.7m. BOREHOLE OPEN TO 1.2m AND BACKFILLED WITH BENTONITE GROUT TO SURFACE.																
	WATER LEVEL READINGS: DATE DEPTH(m) ELEV.(m) 17/03/07 0.76 299.84																

+ 3. x 3. Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

METRIC

+ 3, X 3: Numbers refer to Sensitivity

RECORD OF BOREHOLE No 07-LW13

1 OF 1

METRIC

G.W.P. 512-00-00 LOCATION Little White River N 5 167 889.58 E 394 967.43 ORIGINATED BY GA
HWY 546 BOREHOLE TYPE Hollow Stem Auger COMPILED BY MFA
DATUM Geodetic DATE 2007.03.10 - 2007.03.10 CHECKED BY AEG

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC NATURAL LIQUID LIMIT MOISTURE CONTENT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			"N" VALUES	SHEAR STRENGTH kPa					WATER CONTENT (%)			
						○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL X LAB VANE										
						20	40	60	80	100	20	40	60			
305.3																
0.0	SAND, trace to some gravel, occasional rootlets Very Dense Brown (SP)		1	SS	50/ .125											
304.5																
0.8	SAND AND GRAVEL, Very Dense Brown (SP)		2	SS	50/ .150											
			3	SS	50/ .150											
			4	SS	50/ .150											
302.4																
2.9	END OF BOREHOLE AT 2.9m. BOREHOLE OPEN TO 2.9m AND BACKFILLED WITH BENTONITE GROUT TO SURFACE. WATER LEVEL READINGS: DATE DEPTH(m) ELEV.(m) 10/03/07 2.90 302.40															

RECORD OF BOREHOLE No 07-LW14

1 OF 1

METRIC

G.W.P. 512-00-00 LOCATION Little White River N 5 167 913.38 E 395 012.85 ORIGINATED BY GA
 HWY 546 BOREHOLE TYPE Hollow Stem Auger COMPILED BY MFA
 DATUM Geodetic DATE 2007.03.10 - 2007.03.10 CHECKED BY AEG

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
								20 40 60 80 100																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
307.3	SAND AND GRAVEL, occasional cobbles Very Dense Brown (SP) Wet		1	SS	50/ .150	307																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																

+³. X³: Numbers refer to
Sensitivity

20
15
10
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 07-LW15

1 OF 2

METRIC

G.W.P. 512-00-00 LOCATION Little White River N 5 167 778.33 E 394 849.56 ORIGINATED BY SLL
 HWY 546 BOREHOLE TYPE Hollow Stem Augers/NW Casing COMPILED BY ES
 DATUM Geodetic DATE 2007.09.12 - 2007.09.13 CHECKED BY AEG

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20 40 60 80 100	20 40 60 80 100					
300.6														
0.0	SAND, some gravel, occasional cobbles Dense Brown Moist (FILL)		1	SS	31									
299.2														
1.4	SAND, fine, trace gravel, trace silt Compact Brown Moist		2	SS	28									
			3	SS	20									
			4	SS	14									
296.8														
3.8	SAND, some gravel, trace silt, occasional cobbles Dense to Compact Brown Wet		5	SS	43									
			6	SS	19									
			7	SS	31									
291.8														
8.8	SAND and GRAVEL, trace silt Compact Grey		8	SS	16									
290.8														
9.8	SAND, some gravel, trace silt,													

Continued Next Page

+ 3 X 3: Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 07-LW15

2 OF 2

METRIC

G.W.P. 512-00-00 LOCATION Little White River N 5 187 778.33 E 394 849.56 ORIGINATED BY SLL
 HWY 546 BOREHOLE TYPE Hollow Stem Augers/NW Casing COMPILED BY ES
 DATUM Geodetic DATE 2007.09.12 - 2007.09.13 CHECKED BY AEG

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT	NATURAL MOISTURE CONTENT	LIQUID LIMIT	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa						
	Continued From Previous Page													
289.3	SAND, some gravel, trace silt, occasional cobbles Compact Grey Wet		9	SS	25		290							
11.3	END OF BOREHOLE AT 11.28m. Piezometer installation consists of 19mm diameter schedule 40 PVC pipe with a 1.52m slotted screen. WATER LEVEL READINGS: DATE DEPTH(m) ELEV.(m) 13/09/07 3.48 297.07													

RECORD OF BOREHOLE No 07-LW16

1 OF 2

METRIC

G.W.P. 512-00-00 LOCATION Little White River N 5 167 773.45 E 394 853.30 ORIGINATED BY SLL
HWY 546 BOREHOLE TYPE Hollow Stem Augers/NW Casing COMPILED BY ES
DATUM Geodetic DATE 2007.09.18 - 2007.09.18 CHECKED BY AEG

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE								WATER CONTENT (%)
299.0							20 40 60 80 100				20 40 60					
0.0	SAND , trace gravel Brown Moist (FILL)	⊗														
0.2	SAND , fine, trace silt Compact to Loose Brown Moist	⊗	1	SS	16											
			2	SS	21											
			3	SS	10											
			4	SS	7											
	Wet															
294.7																
4.3	SAND and GRAVEL , trace silt, occasional cobbles Compact to Dense Grey Wet	⊗	5	SS	18											
		⊗	6	SS	30											
			7	SS	13											
290.3																
8.7	SAND , trace gravel, trace silt Compact Grey Wet	⊗	8	SS	21											

Continued Next Page

+ 3. X 3: Numbers refer to
Sensitivity

20
15 0.5
10

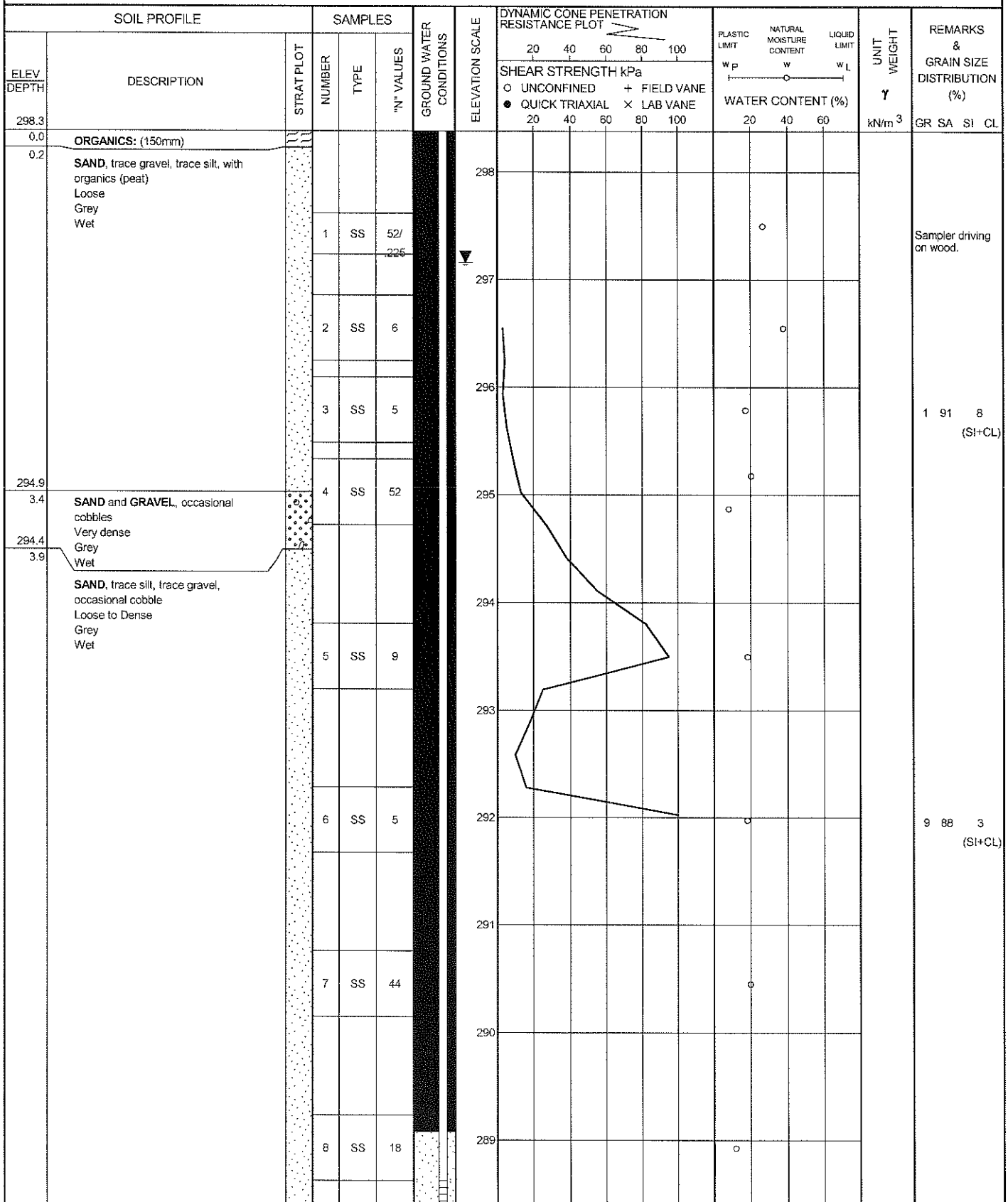
(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 07-LW17

1 OF 2

METRIC

G.W.P. 512-00-00 LOCATION Little White River N 5 167 812.26 E 394 872.95 ORIGINATED BY SLL
 HWY 546 BOREHOLE TYPE Hollow Stem Augers/NW Casing COMPILED BY ES
 DATUM Geodetic DATE 2007.09.19 - 2007.09.20 CHECKED BY AEG



Continued Next Page

+ 3, X 3: Numbers refer to
Sensitivity 20
15 5
10 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 07-LW17

2 OF 2

METRIC

G.W.P. 512-00-00 LOCATION Little White River N 5 167 812.26 E 394 872.95 ORIGINATED BY SLL
 HWY 546 BOREHOLE TYPE Hollow Stem Augers/NW Casing COMPILED BY ES
 DATUM Geodetic DATE 2007.09.19 - 2007.09.20 CHECKED BY AEG

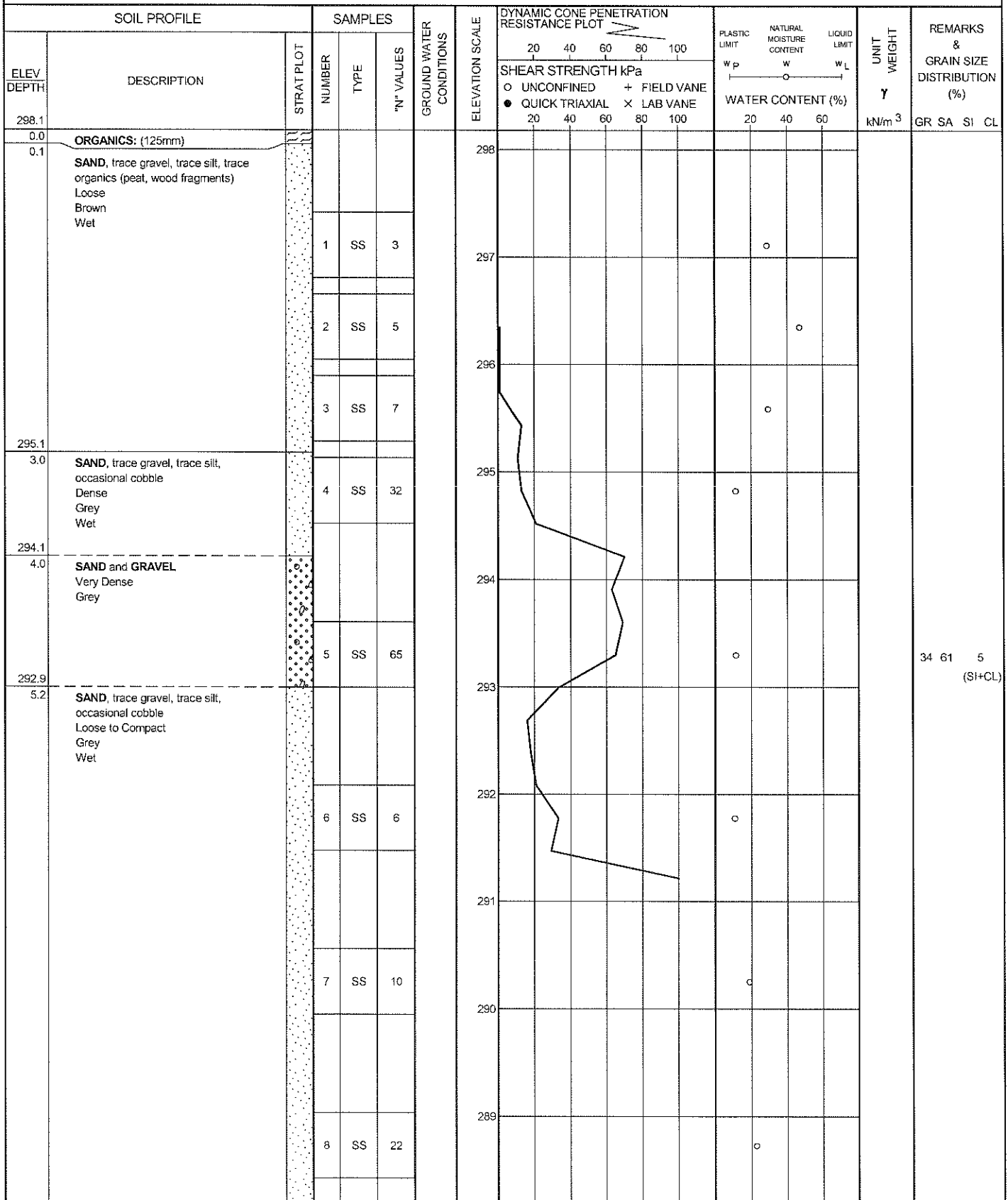
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _P	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa	WATER CONTENT (%)					
	Continued From Previous Page													
287.0	SAND, trace silt, trace gravel, occasional cobble Loose to Dense Grey Wet		9	SS	21		288							
11.3	END OF BOREHOLE AT 11.28m. Piezometer installation consists of 19mm diameter schedule 40 PVC pipe with a 1.52 slotted screen. WATER LEVEL READINGS: DATE DEPTH(m) ELEV.(m) 20/09/07 1.22 297.10													

RECORD OF BOREHOLE No 07-LW18

1 OF 2

METRIC

G.W.P. 512-00-00 LOCATION Little White River N 5 167 806.53 E 394 877.31 ORIGINATED BY SLL
 HWY 546 BOREHOLE TYPE Hollow Stem Augers/NW Casing COMPILED BY ES
 DATUM Geodetic DATE 2007.09.20 - 2007.09.20 CHECKED BY AEG



Continued Next Page

+³, X³: Numbers refer to Sensitivity
 20
 15
 10
 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 07-LW18

2 OF 2

METRIC

G.W.P. 512-00-00 LOCATION Little White River N 5 167 806.53 E 394 877.31 ORIGINATED BY SLL
 HWY 546 BOREHOLE TYPE Hollow Stem Augers/NW Casing COMPILED BY ES
 DATUM Geodetic DATE 2007.09.20 - 2007.09.20 CHECKED BY AEG

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa							
	Continued From Previous Page						<div>20 40 60 80 100</div> <div>○ UNCONFINED + FIELD VANE</div> <div>● QUICK TRIAXIAL x LAB VANE</div>					<div>PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT</div> <div>W_P W W_L</div> <div>WATER CONTENT (%)</div> <div>20 40 60</div>			
286.8	SAND, trace gravel, trace silt, occasional cobble Compact Grey Wet		9	SS	21		288								5 93 2 (SI+CL)
11.3	END OF BOREHOLE AT 11.28m. BOREHOLE BACKFILLED WITH BENTONITE TO SURFACE.						287								

+³ × 3³ Numbers refer to
Sensitivity

20
15
10

(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 07-LW19

1 OF 1

METRIC

G.W.P. 512-00-00 LOCATION Little White River N 5 167 749.89 E 394 836.67 ORIGINATED BY SLL
HWY 546 BOREHOLE TYPE Hollow Stem Augers COMPILED BY ES
DATUM Geodetic DATE 2007.09.18 - 2007.09.18 CHECKED BY AEG

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT W _P	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa								WATER CONTENT (%)
300.3								20	40	60	80	100				
0.0	SAND, trace gravel Brown Moist (FILL)															
299.9																
0.4	SAND, fine, trace gravel, trace silt Compact to Dense Brown Moist		1	SS	12											
			2	SS	37											
			3	SS	28											0 96 4 (SI+CL)
	Wet		4	SS	32											
			5	SS	11											
	Grey		6	SS	19											0 99 1 (SI+CL)
	Gravel seam		7	SS	48											
292.1																
8.2	END OF BOREHOLE AT 8.23m. BOREHOLE BACKFILLED WITH BENTONITE TO SURFACE.															

ONTMT4S 2333LW.GPJ 2/11/08

RECORD OF BOREHOLE No 07-LW20

1 OF 1

METRIC

G.W.P. 512-00-00 LOCATION Little White River N 5 167 762.21 E 394 842.15 ORIGINATED BY SLL
 HWY 546 BOREHOLE TYPE Hollow Stem Augers/NW Casing COMPILED BY ES
 DATUM Geodetic DATE 2007.09.18 - 2007.09.18 CHECKED BY AEG

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20	40	60	80	100		
300.0														
0.0	TOPSOIL: (125mm)						300							
0.1	SAND, fine, trace gravel, trace silt, occasional cobble Compact to Dense Brown Moist		1	SS	16		299							
			2	SS	35		298							
			3	SS	36		297							
	Wet		4	SS	21		296							
			5	SS	18		295							
			6	SS	37		294							
	with gravel layer		7	SS	34		293							
291.8							292							
8.2	END OF BOREHOLE AT 8.23m. BOREHOLE BACKFILLED WITH BENTONITE TO SURFACE.													

ONTMT4S 2333LW.GPJ 2/11/08

RECORD OF BOREHOLE No 07-LW21

1 OF 1

METRIC

G.W.P. 512-00-00 LOCATION Little White River N 5 167 770.12 E 394 847.59 ORIGINATED BY SLL
 HWY 546 BOREHOLE TYPE Hollow Stem Augers COMPILED BY ES
 DATUM Geodetic DATE 2007.09.13 - 2007.09.13 CHECKED BY AEG

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20 40 60 80 100	20 40 60 80 100	20 40 60 80 100	20 40 60 80 100	20 40 60 80 100		
299.7														
0.0	TOPSOIL: (150mm)													
0.2	SAND, fine to medium, trace gravel, trace silt Compact Brown Moist		1	SS	16		299							
			2	SS	19		298							
			3	SS	22		297							1 97 2 (SI+CL)
	Wet													
			4	SS	14		296							
	cobble													
			5	SS	50/ .125		295							
							294							
293.6														
6.1	SAND and GRAVEL, trace silt Compact Grey Wet		6	SS	19		293							55 43 2 (SI+CL)
292.2														
7.5	SAND, trace gravel, trace silt Compact Grey Wet		7	SS	11		292							
291.5														
8.2	END OF BOREHOLE AT 8.23m. BOREHOLE BACKFILLED WITH BENTONITE TO SURFACE.													

ONTMT4S 2333LW/GPJ 2/11/08

RECORD OF BOREHOLE No 07-LW22

1 OF 1

METRIC

G.W.P. 512-00-00 LOCATION Little White River N 5 167 812.72 E 394 877.77 ORIGINATED BY SLL
 HWY 546 BOREHOLE TYPE Hollow Stem Augers COMPILED BY ES
 DATUM Geodetic DATE 2007.09.19 - 2007.09.19 CHECKED BY AEG

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20	40	60	80	100		
298.1														
0.0	ORGANICS: (150mm)													
0.2	SAND, trace to some gravel, trace silt Compact to Very Loose Brown Wet		1	SS	15		298							
	wood fragment Dark Brown		2	SS	3		297							
	Grey		3	SS	5		296							
			4	SS	1		295							
							294							
			5	SS	7		293							
	Very Dense		6	SS	50/ 150		292							
291.3	SILT, clayey, trace sand Very stiff Grey						291							
6.8	250mm layer of sand		7	SS	26		290							
289.9	END OF BOREHOLE AT 8.23m. BOREHOLE BACKFILLED WITH BENTONITE TO SURFACE.													
8.2														

ONTMT4S 2333LWGPJ 2/11/08

+³ X³: Numbers refer to
Sensitivity





20
15 5
10 (%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 07-LW23

1 OF 1

METRIC

G.W.P. 512-00-00 LOCATION Little White River N 5 167 821.74 E 394 881.34 ORIGINATED BY SLL
 HWY 546 BOREHOLE TYPE Hollow Stem Augers COMPILED BY ES
 DATUM Geodetic DATE 2007.09.19 - 2007.09.19 CHECKED BY AEG

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa							WATER CONTENT (%)
300.2							20 40 60 80 100					20 40 60			
0.0 0.1	Surface treatment: (50mm) SAND , some gravel, occasional cobbles Compact Brown Moist (FILL)		1	SS	27										
			2	SS	27										
297.9															
2.3	SILT sandy, with black organics Loose Brown Wet		3	SS	4										
			4	SS	8										
296.1															
4.1	SAND , trace gravel, trace silt Compact Brown Wet		5	SS	15										
294.7															
5.5	SAND and GRAVEL , trace silt, occasional cobbles Dense to Compact Brown to Grey Wet		6	SS	49										
			7	SS	29										
292.0															
8.2	END OF BOREHOLE AT 8.23m. BOREHOLE BACKFILLED WITH BENTONITE TO SURFACE.														

ONTMT4S 2333LW/GPJ 2/11/08

+³, ×³: Numbers refer to
Sensitivity

20
15
10





(%) STRAIN AT FAILURE

RECORD OF BOREHOLE No 07-LW24

1 OF 1

METRIC

G.W.P. 512-00-00 LOCATION Little White River N 5 167 831.02 E 394 891.59 ORIGINATED BY SLL
 HWY 546 BOREHOLE TYPE Hollow Stem Augers COMPILED BY ES
 DATUM Geodetic DATE 2007.09.19 - 2007.09.19 CHECKED BY AEG

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL		
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa							WATER CONTENT (%)	
								20 40 60 80 100								
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE								
299.6																
0.0	SAND, some gravel, occasional cobbles Dense to Compact Brown Moist (FILL)		1	SS	39											
			2	SS	19											
297.3																
2.3	SAND, trace gravel, trace wood fragments Loose to compact Brown Moist becoming wet		3	SS	4											
			4	SS	64											
295.3																
4.3	SAND and GRAVEL, occasional cobbles Compact Grey Wet		5	SS	19											
294.2																
5.4	SAND, medium to coarse grained, some gravel, occasional cobbles Compact to Loose Grey Wet		6	SS	15											
			7	SS	8											
291.4																
8.2	END OF BOREHOLE AT 8.23m. BOREHOLE BACKFILLED WITH BENTONITE TO SURFACE.															

Sampler driving on possible wood

68 31 1
(SI+CL)

14 85 1
(SI+CL)

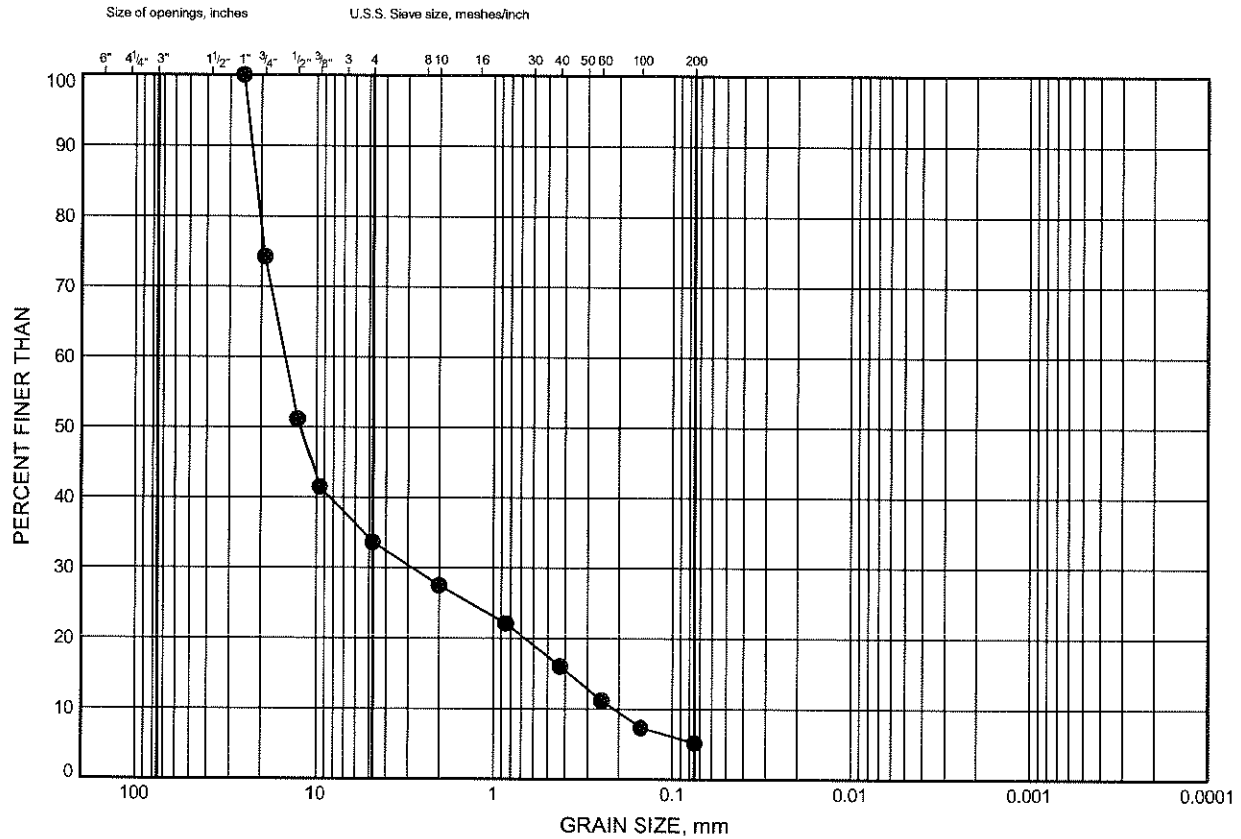
Appendix B

Laboratory Test Results

Little White River GRAIN SIZE DISTRIBUTION

FIGURE B1

FILL



COBBLE SIZE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT and CLAY
	GRAVEL		SAND			FINE GRAINED

SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	07-LW04	1.07	299.41

Date January 2008
Project 512-00-00

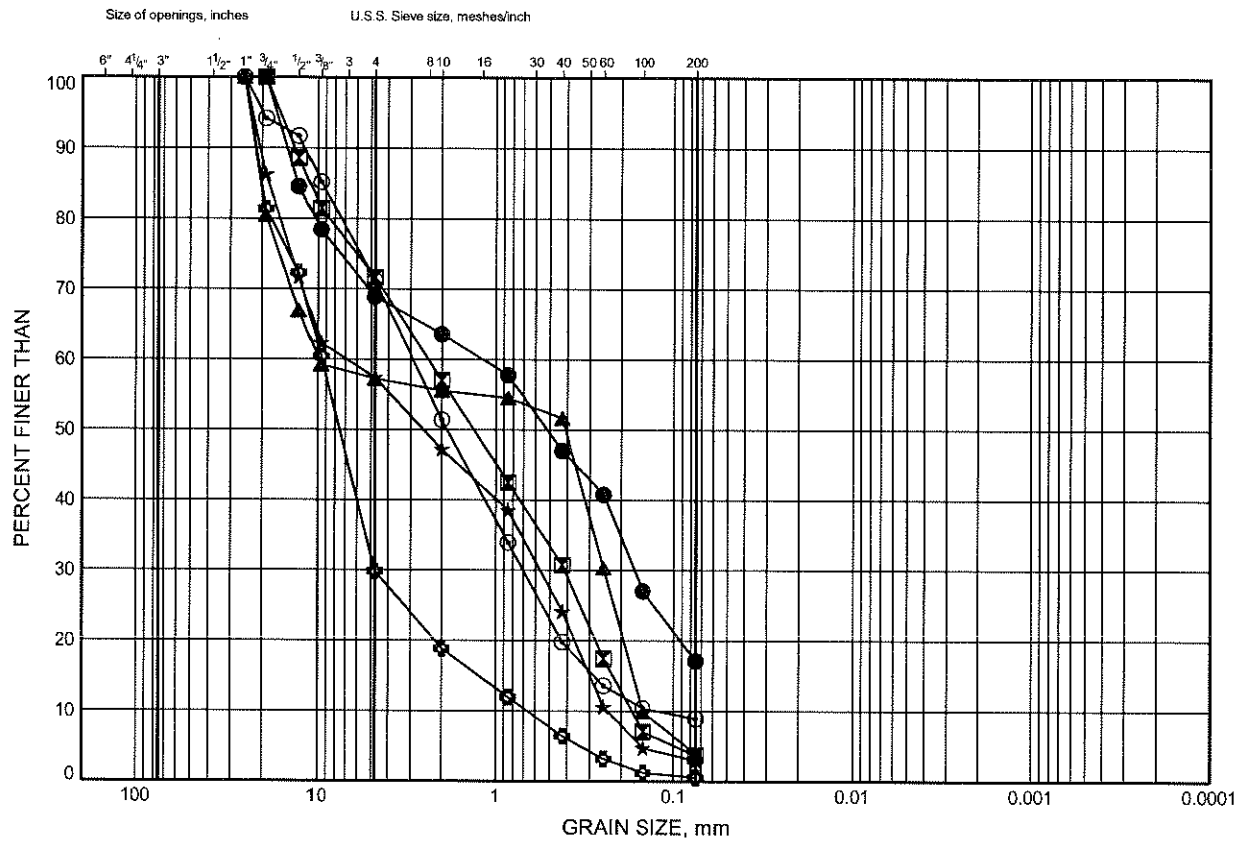


Prep'd MFA
Chkd. MRA

Little White River GRAIN SIZE DISTRIBUTION

FIGURE B2

SAND AND GRAVEL



COBBLE SIZE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT and CLAY
	GRAVEL		SAND			FINE GRAINED

SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	07-LW01	0.30	299.62
⊠	07-LW01	2.59	297.33
▲	07-LW01	10.97	288.95
★	07-LW01	14.02	285.90
⊙	07-LW01	18.59	281.33
⊕	07-LW01	20.12	279.80

Date January 2008
Project 512-00-00

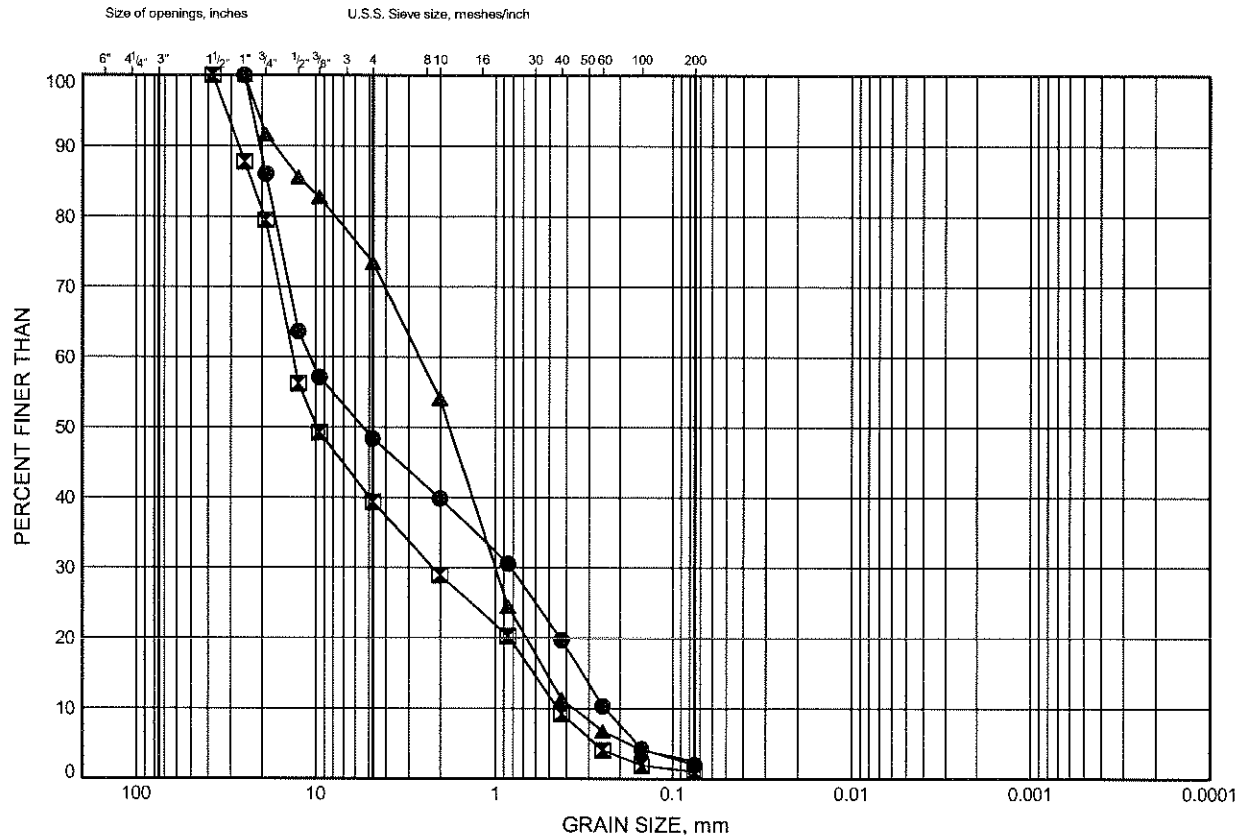


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Chkd. MRA

Little White River GRAIN SIZE DISTRIBUTION

FIGURE B3

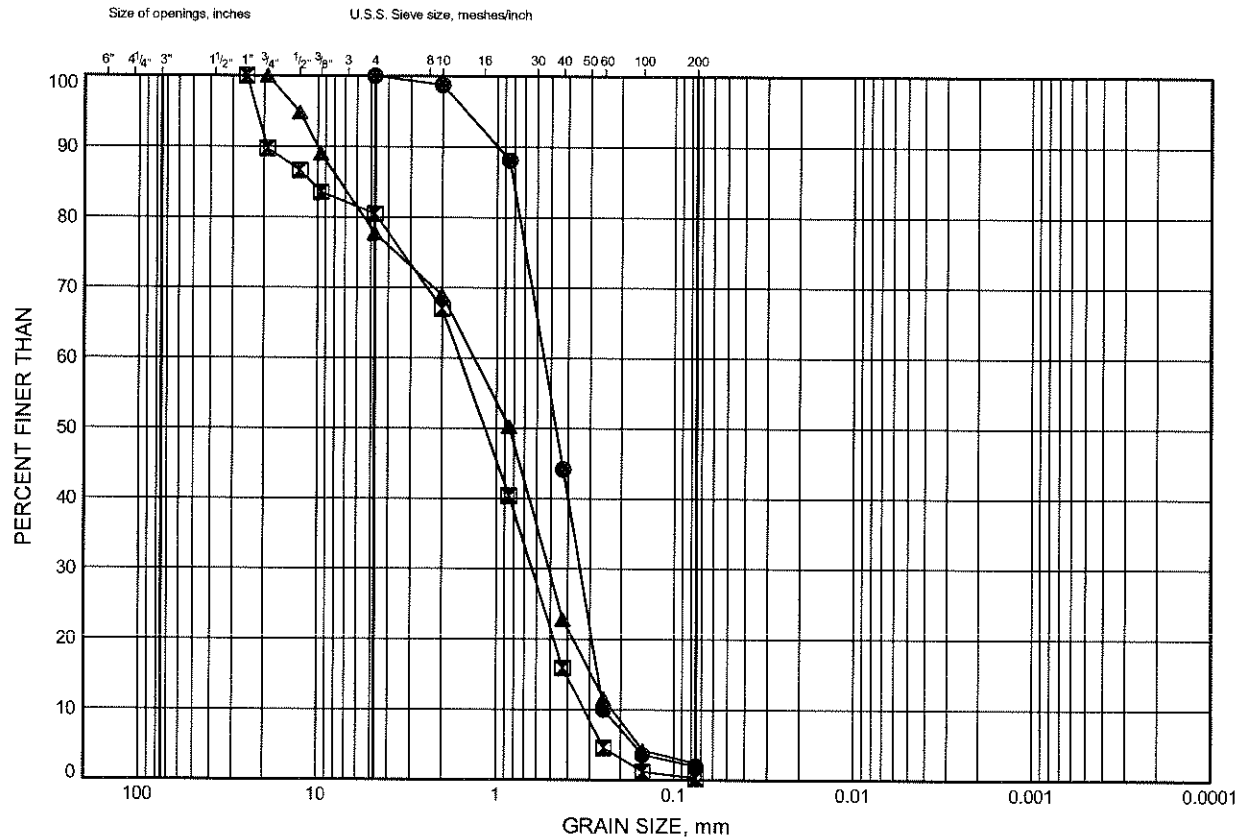
SAND AND GRAVEL



Little White River GRAIN SIZE DISTRIBUTION

FIGURE B4

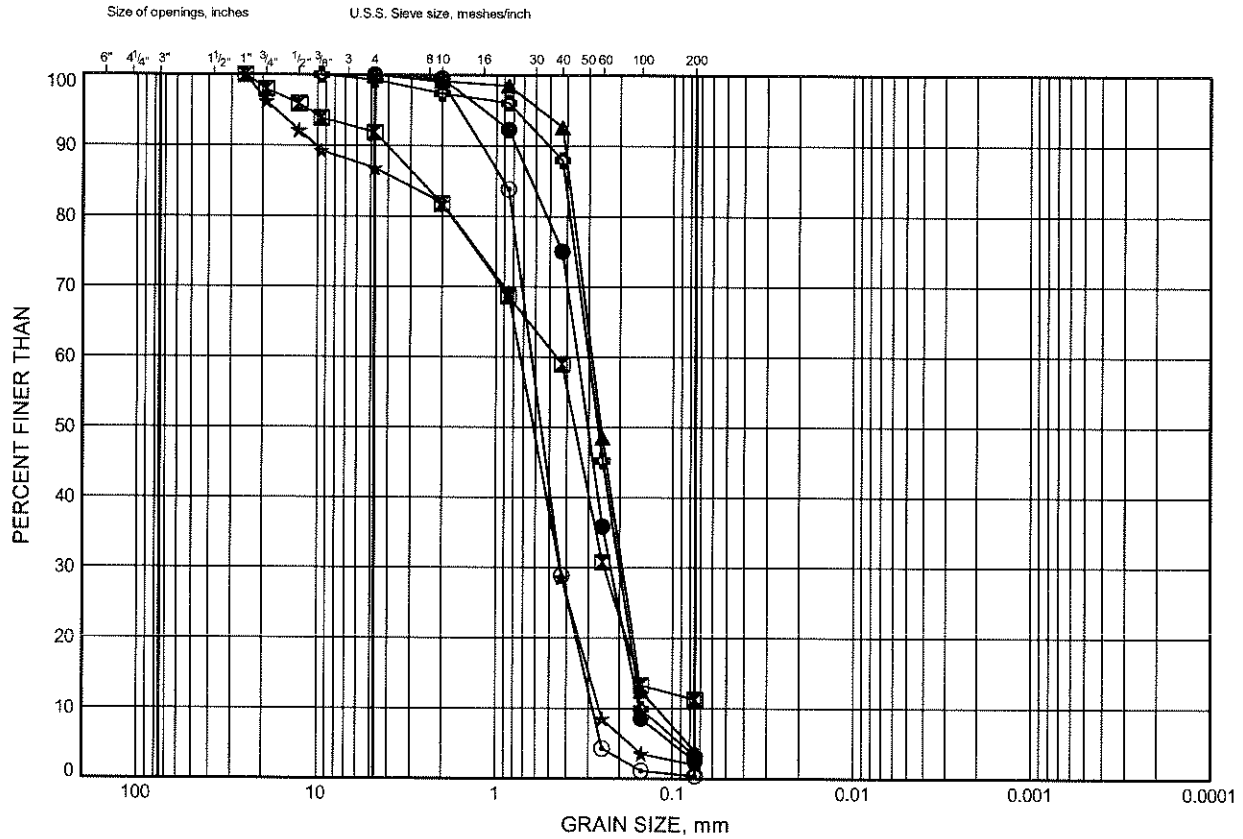
SAND



Little White River GRAIN SIZE DISTRIBUTION

FIGURE B5

SAND



COBBLE SIZE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT and CLAY
	GRAVEL		SAND			FINE GRAINED

SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	07-LW01	4.88	295.04
⊠	07-LW01	6.40	293.52
▲	07-LW01	9.45	290.47
★	07-LW01	29.26	270.66
⊙	07-LW02	9.45	289.13
⊕	07-LW02	12.50	286.08

Date January 2008
Project 512-00-00

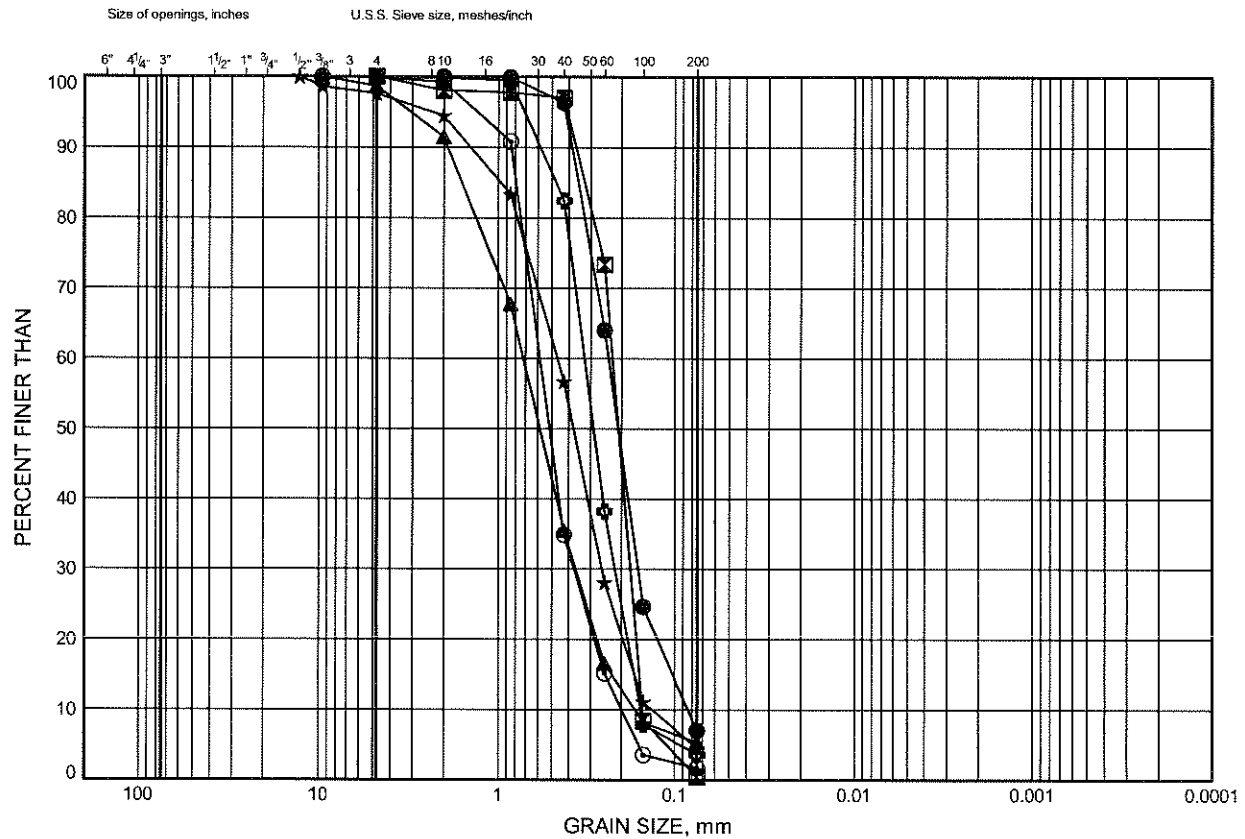


Prep'd MFA
Chkd. MRA

Little White River GRAIN SIZE DISTRIBUTION

FIGURE B6

SAND



COBBLE SIZE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT and CLAY
	GRAVEL		SAND			FINE GRAINED

SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	07-LW02	14.02	284.56
⊠	07-LW02	15.54	283.04
▲	07-LW03	2.59	297.74
★	07-LW03	10.97	289.36
⊙	07-LW05	2.59	298.11
⊕	07-LW05	6.40	294.30

Date January 2008
Project 512-00-00

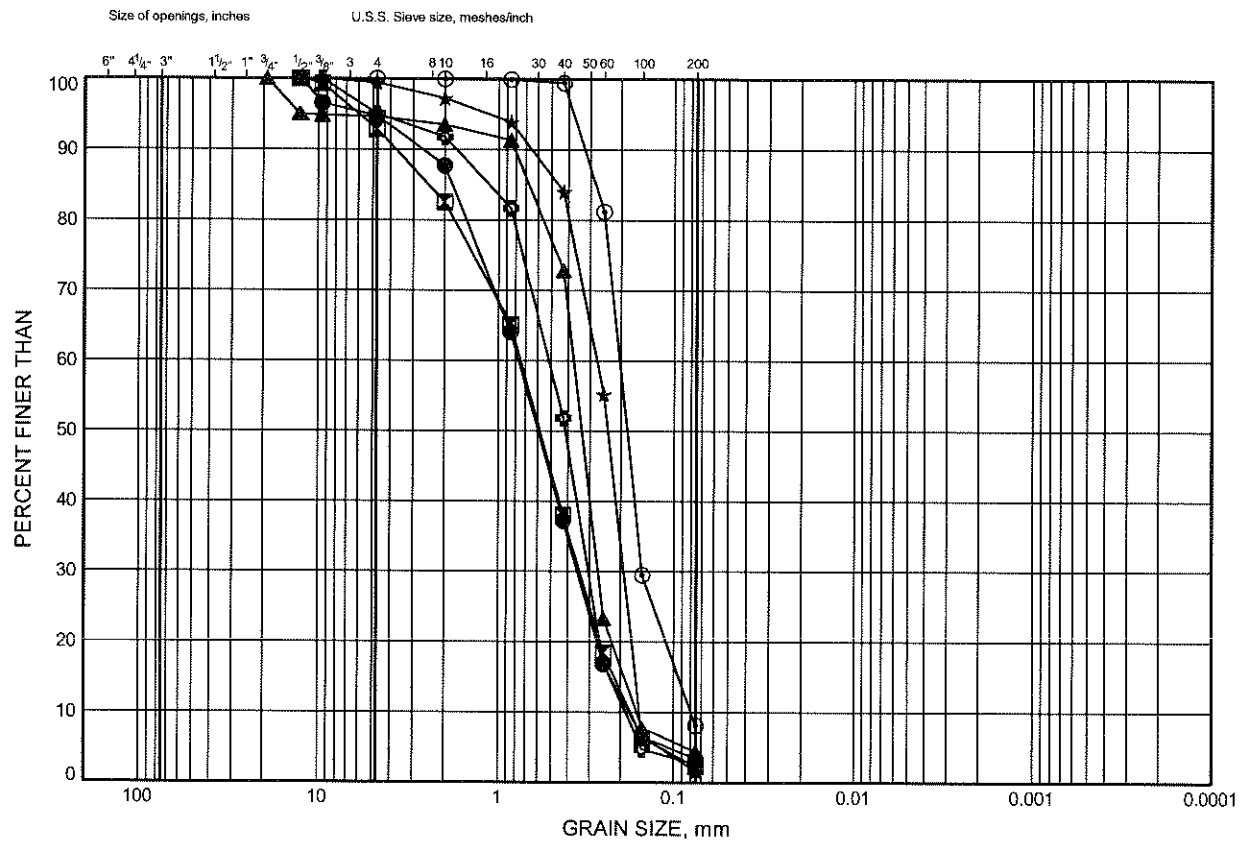


Prep'd MFA
Chkd. MRA

Little White River GRAIN SIZE DISTRIBUTION

FIGURE B7

SAND



COBBLE SIZE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT and CLAY
	GRAVEL		SAND			FINE GRAINED

SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	07-LW05	9.45	291.25
⊠	07-LW05	20.12	280.58
▲	07-LW05	30.63	270.07
★	07-LW06	4.88	292.79
⊙	07-LW06	15.54	282.13
⊕	07-LW07	1.83	299.97

Date January 2008
Project 512-00-00

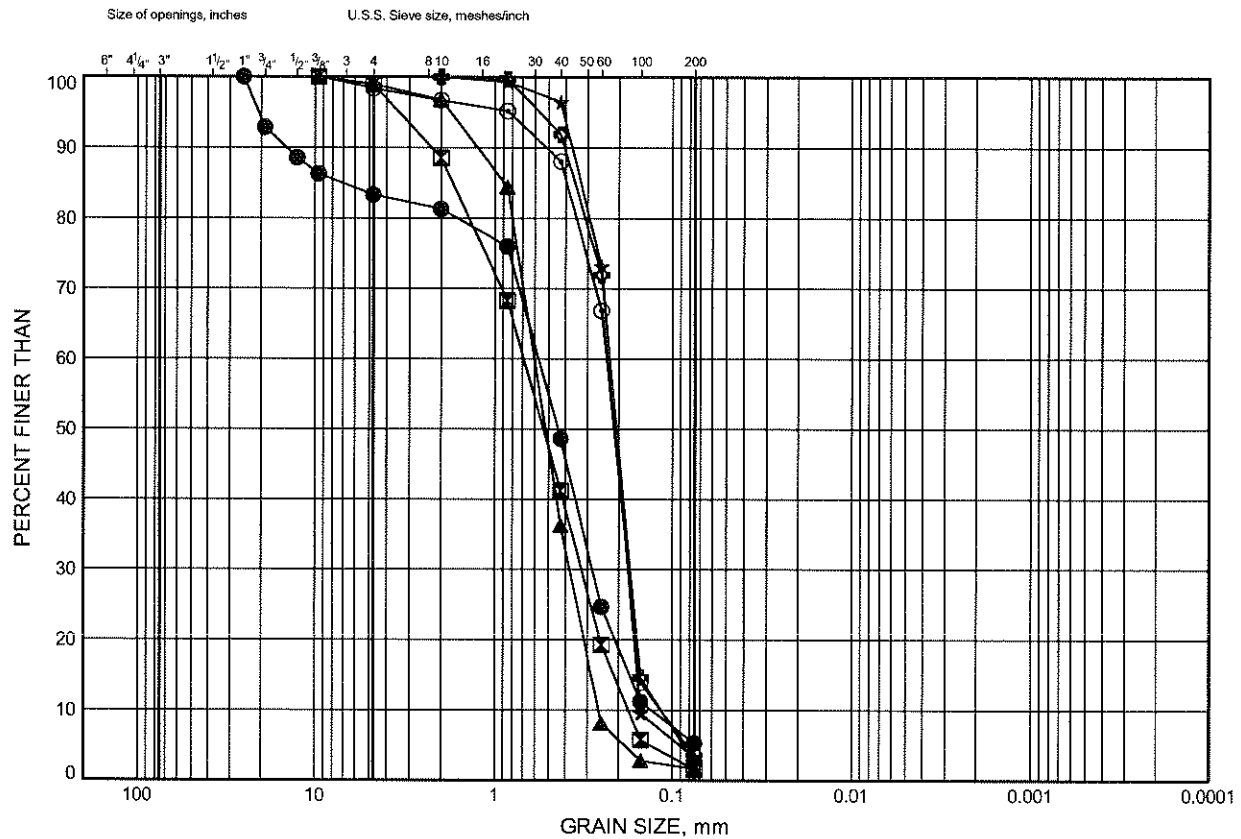


Prep'd MFA
Chkd. MRA

Little White River GRAIN SIZE DISTRIBUTION

FIGURE B8

SAND



COBBLE SIZE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT and CLAY
	GRAVEL		SAND			FINE GRAINED

SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	07-LW02	21.64	276.94
⊠	07-LW03	20.12	280.21
▲	07-LW04	4.88	295.60
★	07-LW08	2.59	298.71
⊙	07-LW10	1.83	299.37
⊕	07-LW10	3.35	297.85

Date January 2008
Project 512-00-00

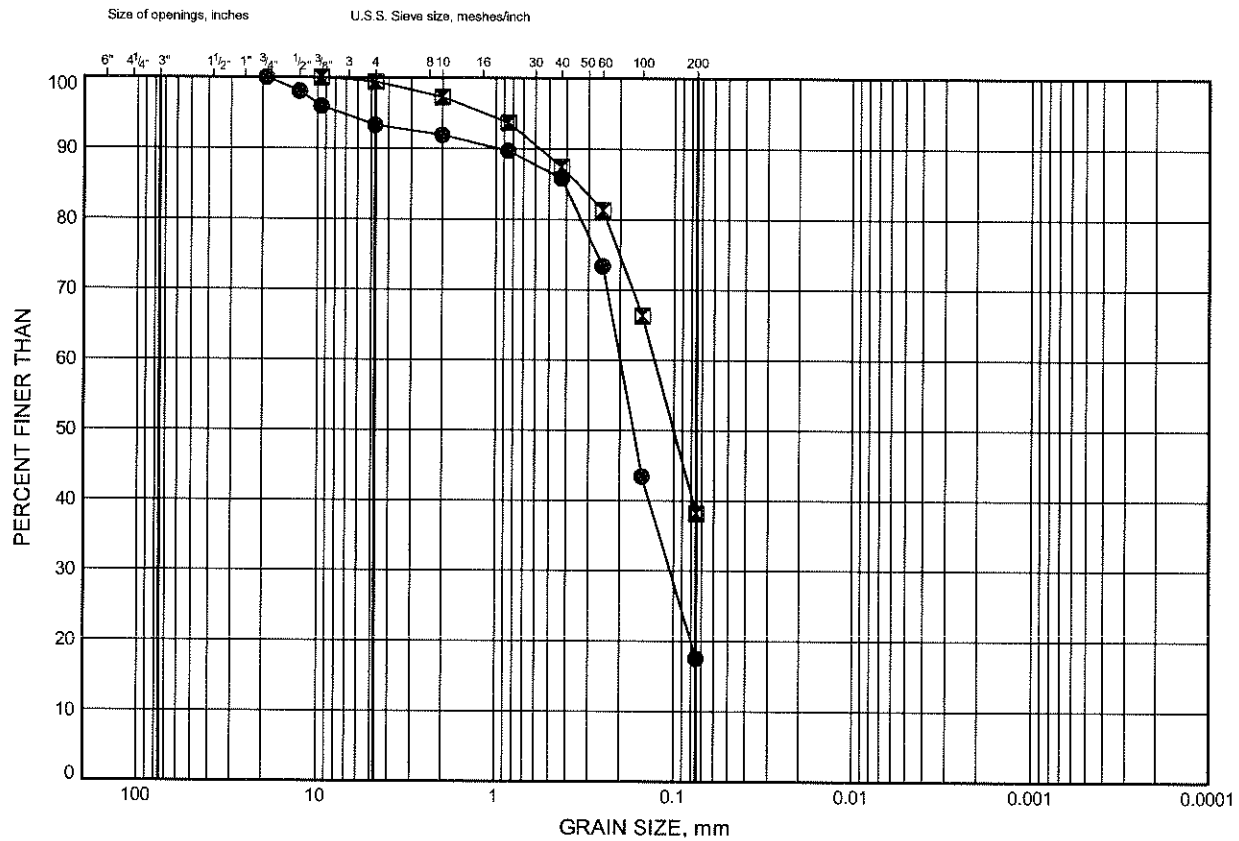


Prep'd MFA
Chkd. MRA

Little White River GRAIN SIZE DISTRIBUTION

FIGURE B9

SILTY SAND



COBBLE SIZE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT and CLAY
	GRAVEL		SAND			FINE GRAINED

SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	07-LW05	14.02	286.68
⊠	07-LW05	23.16	277.54

Date January 2008
Project 512-00-00

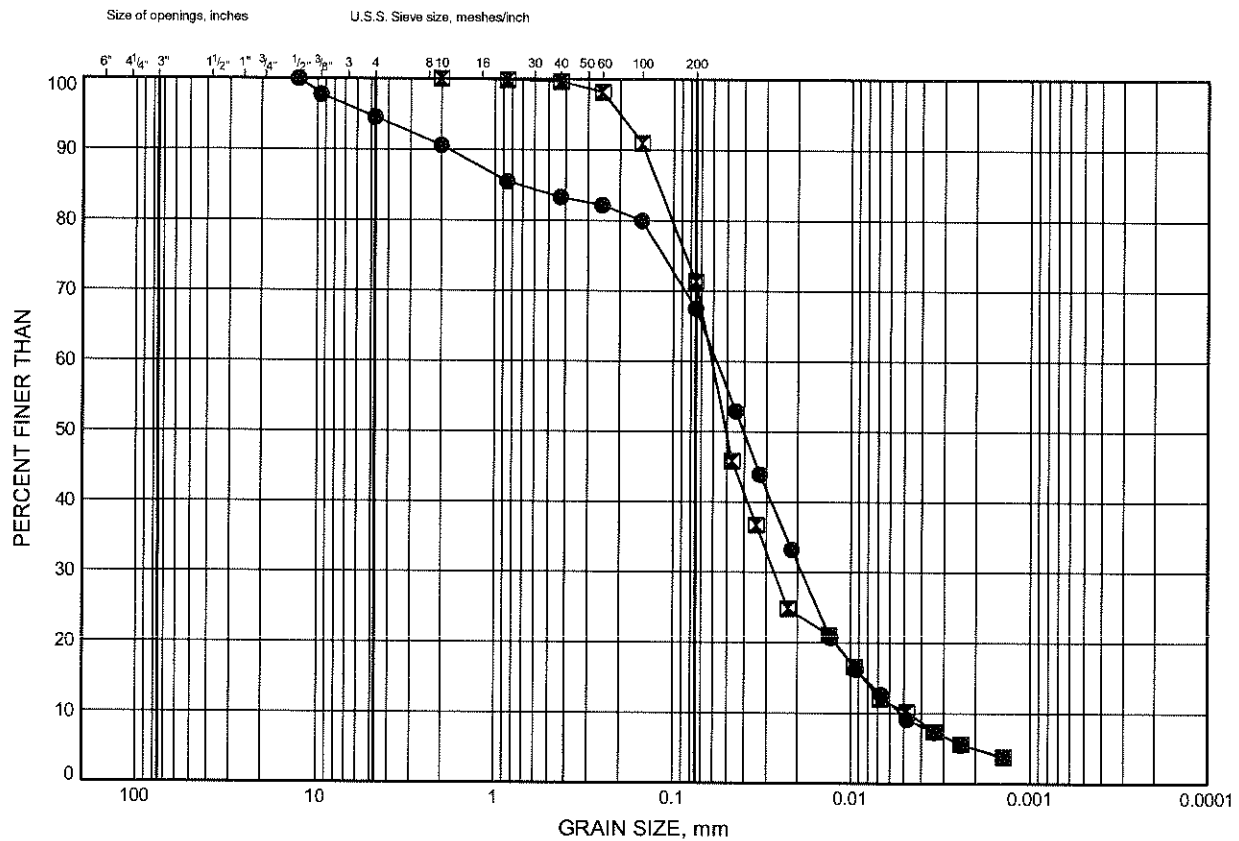


Prep'd MFA
Chkd. MRA

Little White River GRAIN SIZE DISTRIBUTION

FIGURE B10

SANDY SILT



COBBLE SIZE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT and CLAY
	GRAVEL		SAND			FINE GRAINED

SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	07-LW02	4.88	293.70
⊠	07-LW11	1.07	299.53

Date January 2008
Project 512-00-00

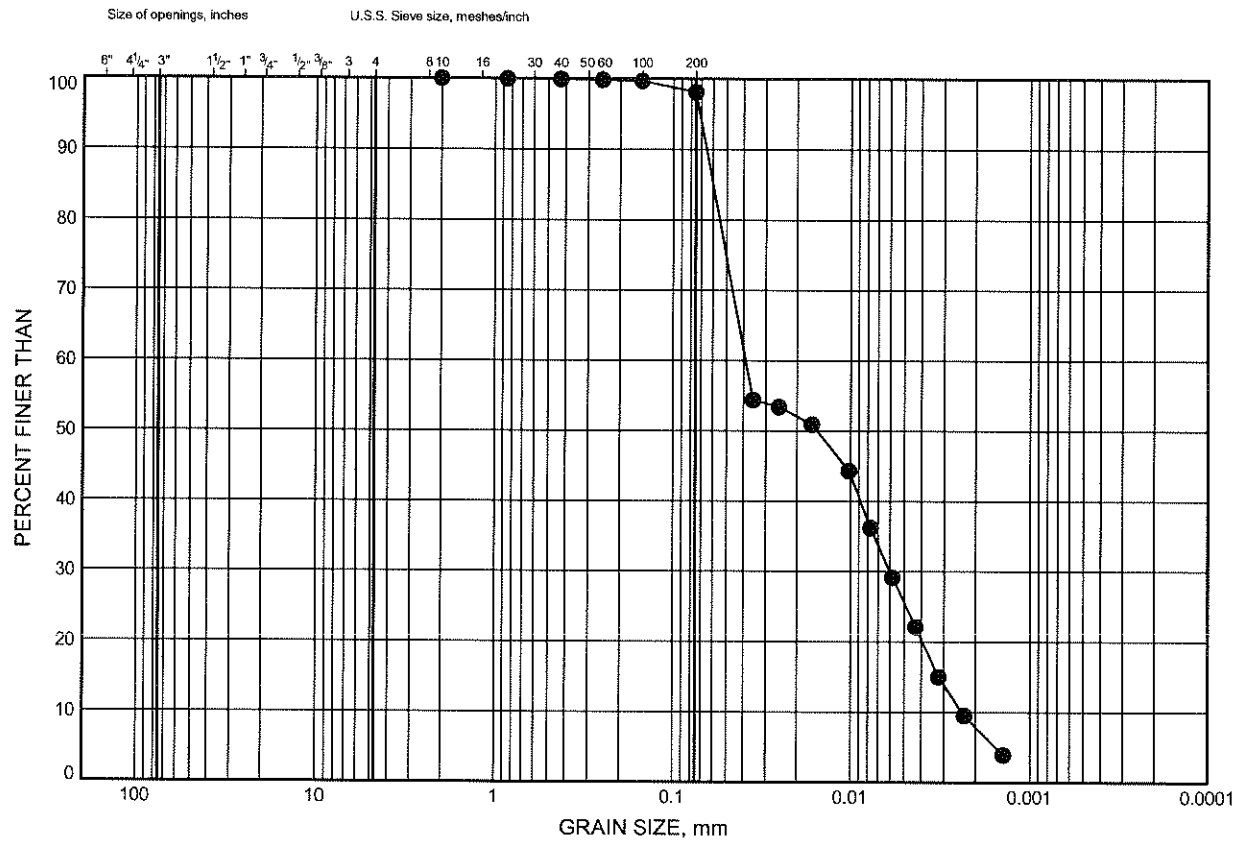


Prep'd MFA
Chkd. MRA

Little White River GRAIN SIZE DISTRIBUTION

FIGURE B11

SILT



COBBLE SIZE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT and CLAY
	GRAVEL		SAND			FINE GRAINED

SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	07-LW12	3.35	298.65

Date January 2008
Project 512-00-00



Prep'd MFA
Chkd. MRA

FIGURE B12

The graph displays the grain size distribution of a sample. The y-axis represents the percentage of material finer than a given grain size, ranging from 0 to 100. The x-axis represents the grain size in millimeters on a logarithmic scale, ranging from 100 mm down to 0.0001 mm. A series of data points are plotted, and a smooth curve is drawn through them, showing that approximately 100% of the sample is finer than 100 mm, and the percentage finer decreases as the grain size decreases, reaching about 12% finer than 0.0001 mm.

Grain Size (mm)	Percent Finer (%)
100	100
75	100
60	100
48	100
38	100
30	100
25	100
20	100
16	100
12	100
10	100
8	100
6	100
5	100
4	100
3	100
2.5	100
2	100
1.5	100
1.2	100
1	100
0.85	100
0.75	100
0.6	100
0.5	100
0.425	100
0.35	100
0.3	100
0.25	100
0.2	100
0.18	100
0.15	100
0.125	100
0.106	100
0.09	100
0.075	100
0.063	100
0.053	100
0.045	100
0.038	100
0.032	100
0.028	100
0.025	100
0.022	100
0.02	100
0.018	100
0.016	100
0.015	100
0.014	100
0.0125	100
0.0118	100
0.0106	100
0.01	100
0.009	100
0.008	100
0.0075	100
0.007	100
0.0063	100
0.0056	100
0.005	100
0.0045	100
0.004	100
0.0035	100
0.003	100
0.0028	100
0.0025	100
0.0022	100
0.002	100
0.0018	100
0.0016	100
0.0015	100
0.0014	100
0.00125	100
0.00118	100
0.00106	100
0.001	100
0.0009	100
0.0008	100
0.00075	100
0.0007	100
0.00063	100
0.00056	100
0.0005	100
0.00045	100
0.0004	100
0.00035	100
0.0003	100
0.00028	100
0.00025	100
0.00022	100
0.0002	100
0.00018	100
0.00016	100
0.00015	100
0.00014	100
0.000125	100
0.000118	100
0.000106	100
0.0001	100
0.00009	100
0.00008	100
0.000075	100
0.00007	100
0.000063	100
0.000056	100
0.00005	100
0.000045	100
0.00004	100
0.000035	100
0.00003	100
0.000028	100
0.000025	100
0.000022	100
0.00002	100
0.000018	100
0.000016	100
0.000015	100
0.000014	100
0.0000125	100
0.0000118	100
0.0000106	100
0.00001	100
0.000009	100
0.000008	100
0.0000075	100
0.000007	100
0.0000063	100
0.0000056	100
0.000005	100
0.0000045	100
0.000004	100
0.0000035	100
0.000003	100
0.0000028	100
0.0000025	100
0.0000022	100
0.000002	100
0.0000018	100
0.0000016	100
0.0000015	100
0.0000014	100
0.00000125	100
0.00000118	100
0.00000106	100
0.000001	100
0.0000009	100
0.0000008	100
0.00000075	100
0.0000007	100
0.00000063	100
0.00000056	100
0.0000005	100
0.00000045	100
0.0000004	100
0.00000035	100
0.0000003	100
0.00000028	100
0.00000025	100
0.0	

COBBLE SIZE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT and CLAY
	GRAVEL		SAND			FINE GRAINED

SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	07-LW04	7.92	292.56

Date January 2008
Project 512-00-00

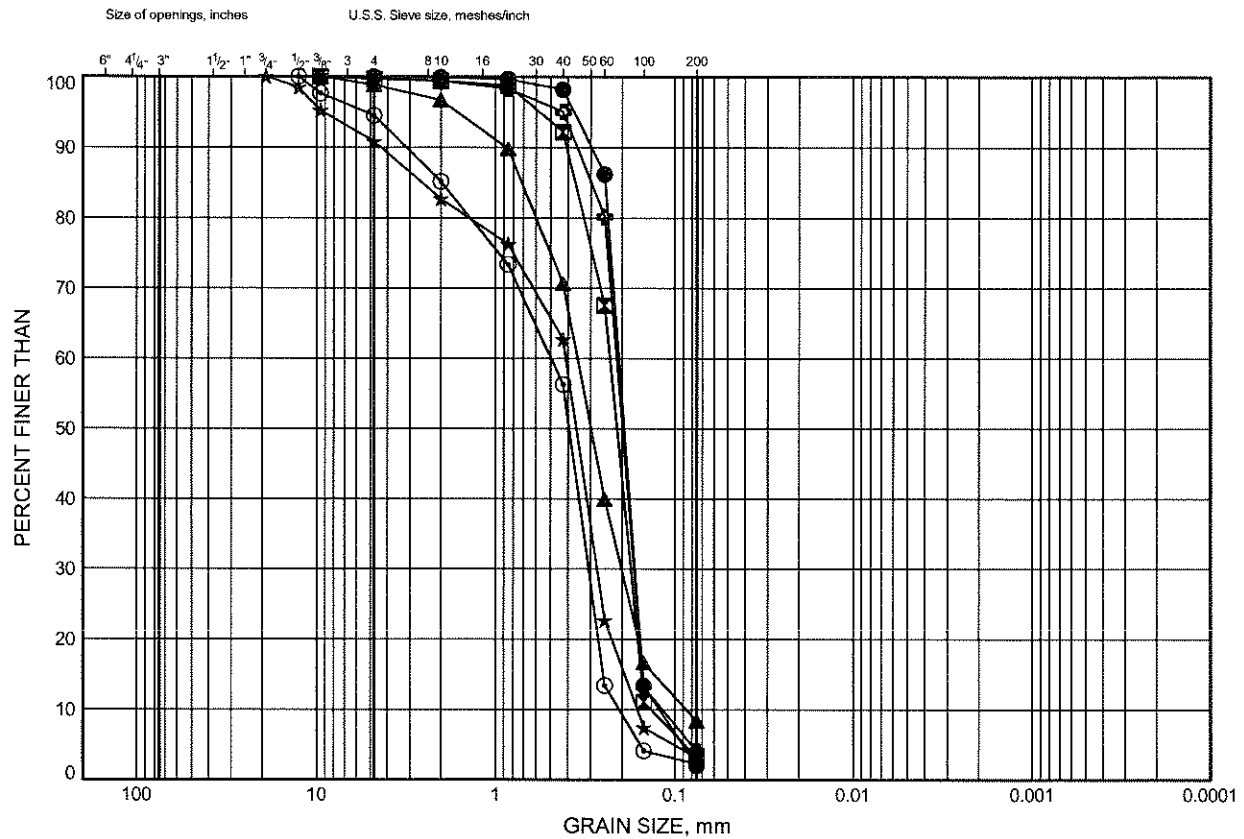


Prep'd MFA
Chkd. MRA

Little White River GRAIN SIZE DISTRIBUTION

FIGURE B13

SAND



COBBLE SIZE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT and CLAY
	GRAVEL		SAND			FINE GRAINED

SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	07-LW15	3.32	297.28
⊠	07-LW16	2.59	296.41
▲	07-LW17	2.59	295.71
★	07-LW17	6.40	291.90
⊙	07-LW18	10.97	287.13
⊕	07-LW19	2.59	297.71

Date January 2008
Project 512-00-00

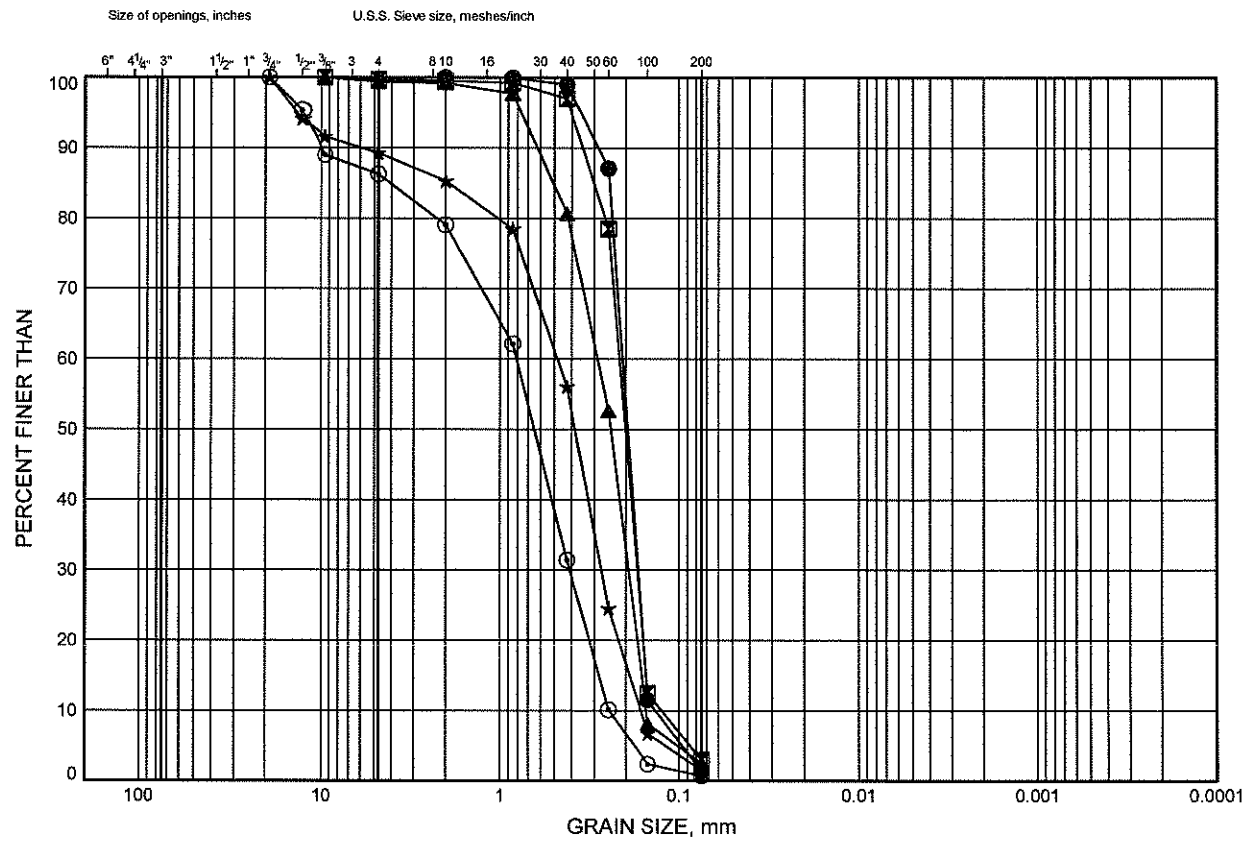


Prep'd MFA
Chkd. MRA

Little White River GRAIN SIZE DISTRIBUTION

FIGURE B14

SAND



COBBLE SIZE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT and CLAY
	GRAVEL		SAND			FINE GRAINED

SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	07-LW19	6.40	293.90
⊠	07-LW20	6.40	293.60
▲	07-LW21	2.59	297.11
★	07-LW22	6.40	291.70
⊙	07-LW24	7.92	291.68



Date January 2008

Project 512-00-00

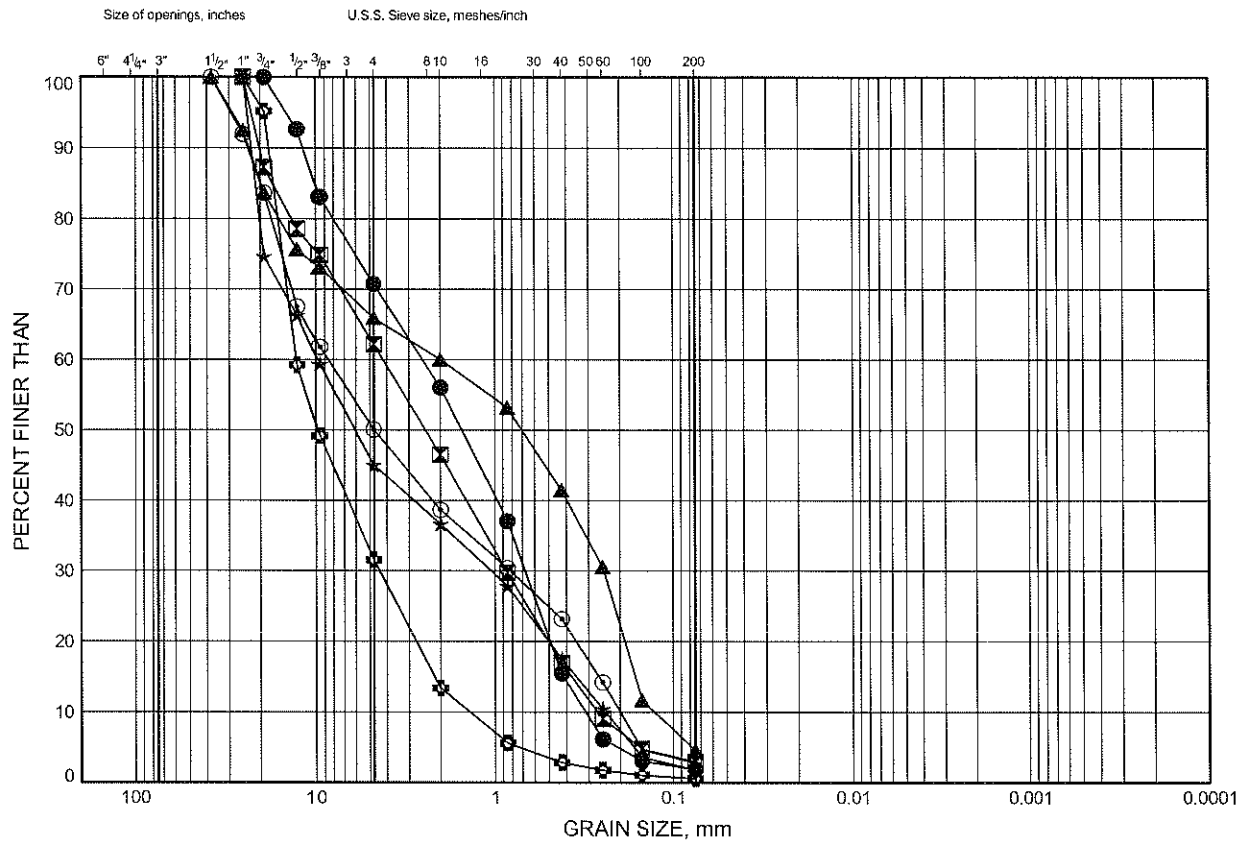
Prep'd MFA

Chkd. MRA

Little White River GRAIN SIZE DISTRIBUTION

FIGURE B15

SAND AND GRAVEL



COBBLE SIZE	COARSE	FINE	COARSE	MEDIUM	FINE	SILT and CLAY
	GRAVEL		SAND			FINE GRAINED

SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	07-LW15	9.45	291.15
⊠	07-LW16	7.92	291.08
▲	07-LW18	4.88	293.22
★	07-LW21	6.40	293.30
⊙	07-LW23	6.40	293.80
⊗	07-LW24	4.88	294.72

Date January 2008

Project 512-00-00



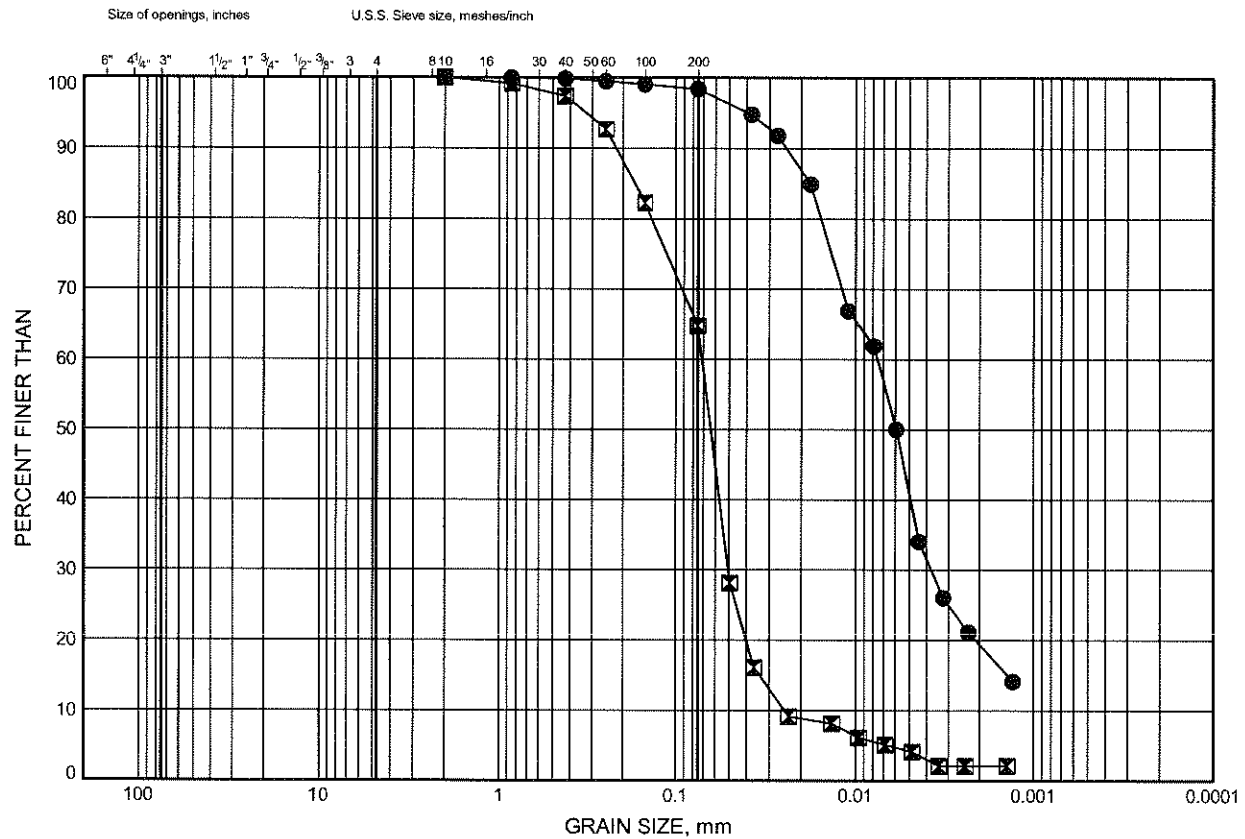
Prep'd MFA

Chkd. MRA

Little White River GRAIN SIZE DISTRIBUTION

FIGURE B16

SANDY SILT, CLAYEY SILT



SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	07-LW22	8.07	290.03
⊠	07-LW23	3.35	296.85

Date January 2008
Project 512-00-00



Prep'd MFA
Chkd. MRA

Appendix C

Factual Information from 2004 Investigation Report

PROJECT 03-1111-029

RECORD OF BOREHOLE No LW2-1

1 OF 3

METRIC

W.P. 513-00-01

LOCATION N 199995.9 :E 100009.8

ORIGINATED BY GB

DIST 62 HWY 546

BOREHOLE TYPE CME 55 POWER AUGER AND WET ROTARY WITH NO CORE BARREL

COMPILED BY KG

DATUM Local

DATE October 31, 2003

CHECKED BY JPD

SOIL PROFILE

SAMPLES

GROUND WATER CONDITIONS

ELEVATION SCALE

DYNAMIC CONE PENETRATION RESISTANCE PLOT

SHEAR STRENGTH kPa
 ○ UNCONFINED + FIELD VANE
 ● QUICK TRIAXIAL X REMOULDED

PLASTIC LIMIT
 NATURAL MOISTURE CONTENT
 LIQUID LIMIT
 WATER CONTENT (%)

UNIT WEIGHT
 γ

REMARKS & GRAIN SIZE DISTRIBUTION (%)

ELEV DEPTH

DESCRIPTION

STRAT PLOT

NUMBER

TYPE

"N" VALUES

100.7

0.0

GROUND SURFACE
 Silty Sand, some gravel and rootlets, occasional cobbles
 Loose
 Brown
 Moist
 (Fill)

1

SS

5

100

99.3

1.4

Sand and Gravel, trace silt, occasional cobbles
 Compact
 Brown
 Moist
 (Fill)

2

SS

7

99

97.7

3.0

Sand and Gravel, trace silt, occasional cobbles
 Loose to compact
 Brown
 Wet

3

SS

19

98

97

4

Sand and Gravel, trace silt, occasional cobbles
 Loose to compact
 Brown
 Wet

4

SS

11

97

96

5

Sand and Gravel, trace silt, occasional cobbles
 Loose to compact
 Brown
 Wet

5

SS

7

96

95

6

Sand and Gravel, trace silt, occasional cobbles
 Loose to compact
 Brown
 Wet

6

SS

12

95

94

7

Sand and Gravel, trace silt, occasional cobbles
 Loose to compact
 Brown
 Wet

7

SS

22

94

93

8

Sand and Gravel, trace silt, occasional cobbles
 Loose to compact
 Brown
 Wet

8

SS

22

93

92

9

Sand and Gravel, trace silt, occasional cobbles
 Loose to compact
 Brown
 Wet

9

SS

22

92

91

10

Sand and Gravel, trace silt, occasional cobbles
 Loose to compact
 Brown
 Wet

10

SS

22

91

90

11

Sand and Gravel, trace silt, occasional cobbles
 Loose to compact
 Brown
 Wet

11

SS

22

90

89

12

Sand and Gravel, trace silt, occasional cobbles
 Loose to compact
 Brown
 Wet

12

SS

22

89

88

13

Sand and Gravel, trace silt, occasional cobbles
 Loose to compact
 Brown
 Wet

13

SS

22

88

87

14

Sand and Gravel, trace silt, occasional cobbles
 Loose to compact
 Brown
 Wet

14

SS

22

87

86

15

Sand and Gravel, trace silt, occasional cobbles
 Loose to compact
 Brown
 Wet

15

SS

22

86

85

16

Sand and Gravel, trace silt, occasional cobbles
 Loose to compact
 Brown
 Wet

16

SS

22

85

84

17

Sand and Gravel, trace silt, occasional cobbles
 Loose to compact
 Brown
 Wet

17

SS

22

84

83

18

Sand and Gravel, trace silt, occasional cobbles
 Loose to compact
 Brown
 Wet

18

SS

22

83

82

19

Sand and Gravel, trace silt, occasional cobbles
 Loose to compact
 Brown
 Wet

19

SS

22

82

81

20

Sand and Gravel, trace silt, occasional cobbles
 Loose to compact
 Brown
 Wet

20

SS

22

81

80

21

Sand and Gravel, trace silt, occasional cobbles
 Loose to compact
 Brown
 Wet

21

SS

22

80

79

22

Sand and Gravel, trace silt, occasional cobbles
 Loose to compact
 Brown
 Wet

22

SS

22

79

78

23

Sand and Gravel, trace silt, occasional cobbles
 Loose to compact
 Brown
 Wet

23

SS

22

78

77

24

Sand and Gravel, trace silt, occasional cobbles
 Loose to compact
 Brown
 Wet

24

SS

22

77

76

25

Sand and Gravel, trace silt, occasional cobbles
 Loose to compact
 Brown
 Wet

25

SS

22

76

75

26

Sand and Gravel, trace silt, occasional cobbles
 Loose to compact
 Brown
 Wet

26

SS

22

75

74

27

Sand and Gravel, trace silt, occasional cobbles
 Loose to compact
 Brown
 Wet

27

SS

22

74

73

28

Sand and Gravel, trace silt, occasional cobbles
 Loose to compact
 Brown
 Wet

28

SS

22

73

72

29

Sand and Gravel, trace silt, occasional cobbles
 Loose to compact
 Brown
 Wet

29

SS

22

72

71

30

Sand and Gravel, trace silt, occasional cobbles
 Loose to compact
 Brown
 Wet

30

SS

22

71

70

31

Sand and Gravel, trace silt, occasional cobbles
 Loose to compact
 Brown
 Wet

31

SS

22

70

69

32

Sand and Gravel, trace silt, occasional cobbles
 Loose to compact
 Brown
 Wet

32

SS

22

69

68

33

Sand and Gravel, trace silt, occasional cobbles
 Loose to compact
 Brown
 Wet

33

SS

22

68

67

34

Sand and Gravel, trace silt, occasional cobbles
 Loose to compact
 Brown
 Wet

34

SS

22

67

66

35

Sand and Gravel, trace silt, occasional cobbles
 Loose to compact
 Brown
 Wet

35

SS

22

66

65

36

Sand and Gravel, trace silt, occasional cobbles
 Loose to compact
 Brown
 Wet

36

SS

22

65

64



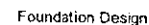
PROJECT <u>03-1111-029</u>		RECORD OF BOREHOLE No LW2-1		2 OF 3	METRIC
W.P. <u>513-00-01</u>	LOCATION <u>N 199995.9 E 100009.8</u>	ORIGINATED BY <u>GB</u>			
DIST <u>62</u> HWY <u>546</u>	BOREHOLE TYPE <u>CME 55 POWER AUGER AND WET ROTARY WITH NO CORE BARREL</u>	COMPILED BY <u>KG</u>			
DATUM <u>Local</u>	DATE <u>October 31, 2003</u>	CHECKED BY <u>JPD</u>			

SOIL PROFILE				SAMPLES		GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa							
— CONTINUED FROM PREVIOUS PAGE —							20	40	60	80	100				
							20	40	60	80	100	10	20	30	
							85								
							84								
							83								
							82								
							81								
							80								
							79								
							78								
							77								
							76								
							75								
							74								
							73								
							72								
							71								

Continued Next Page

Continued Next Page

+³, ×³: Numbers refer to Sensitivity ○³% STRAIN AT FAILURE



+³, ×³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

MISS_MTO 03-1111-029-BA-MTO.GPJ ON MOT.GDT 9/2/04

Appendix D

Photographs, Figures and Tables

Little White River II Bridge Replacement
Highway 546, Algoma

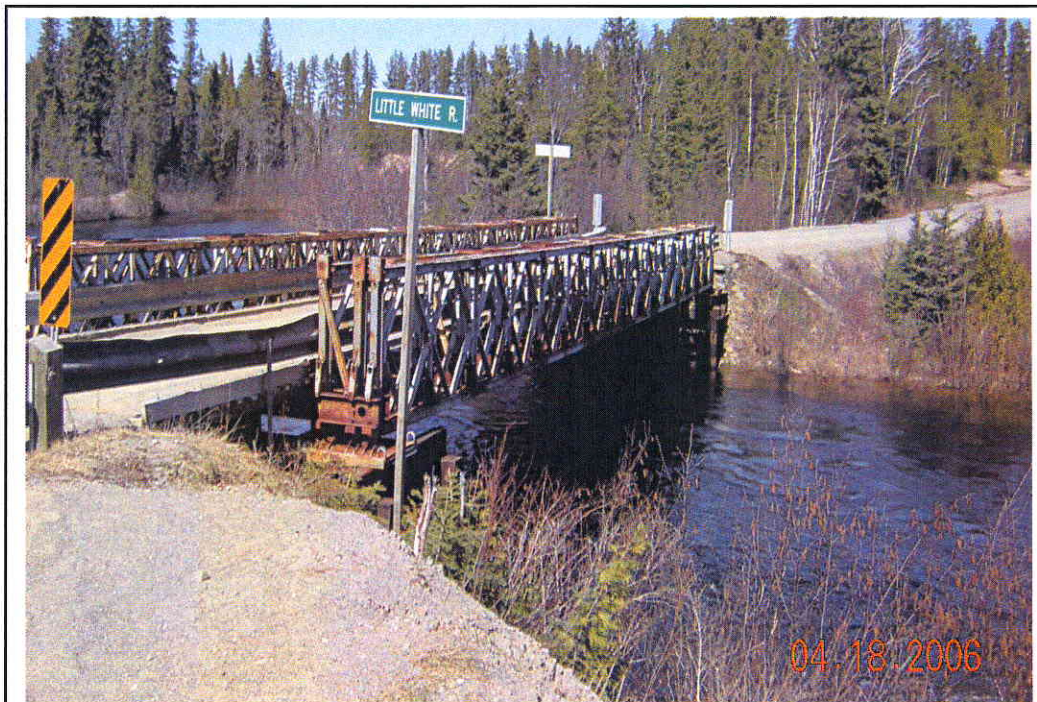


Photo 1. East side of existing bridge from southeast, April 2006.

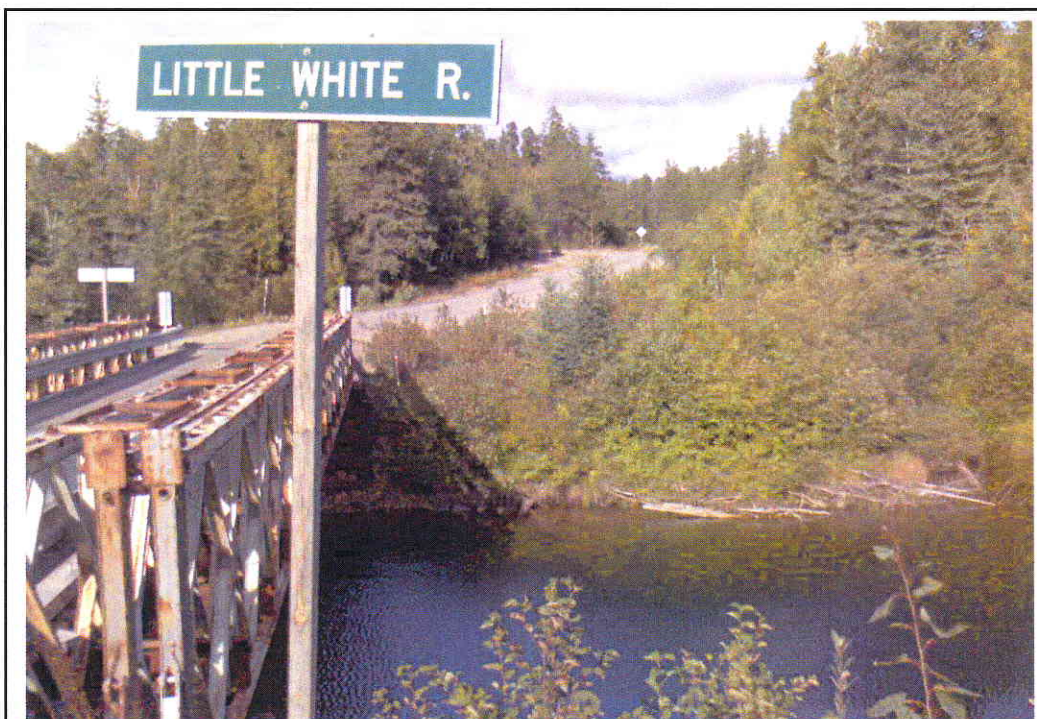


Photo 2. North approach on east side of existing bridge, September 2007.

Little White River II Bridge Replacement
Highway 546, Algoma



Photo 3. South approach on east side of existing bridge, September 2007.

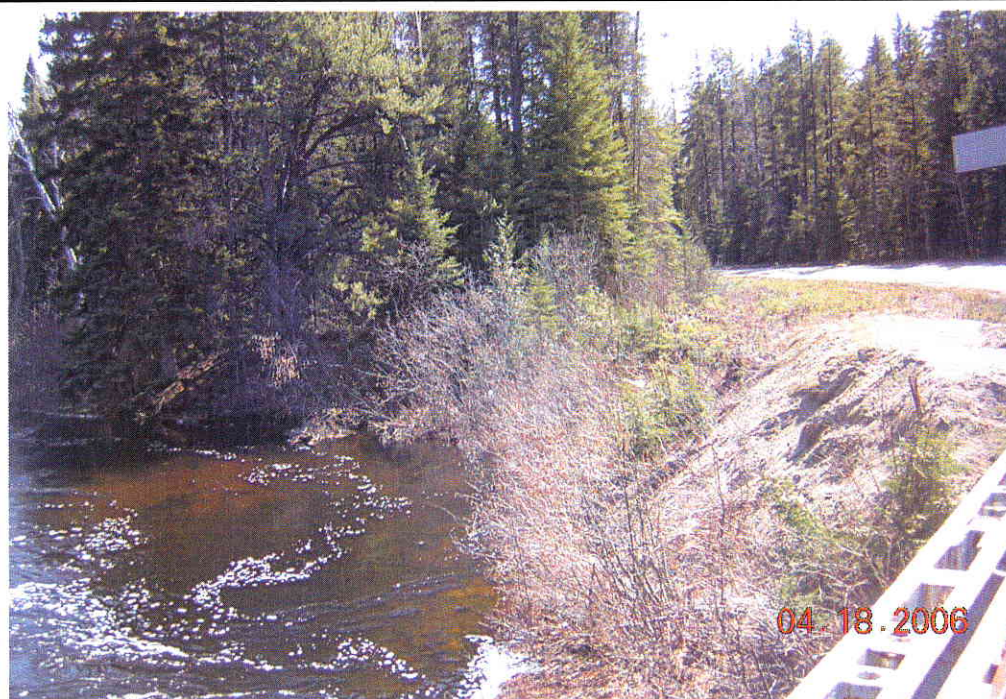


Photo 4. South approach on east side of existing bridge, April 2006.

Appendix E

Borehole Locations and Soil Strata Drawings

DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

SHEET



THURBER ENGINEERING LTD.
GEOTECHNICAL • ENVIRONMENTAL • MATERIALS



NO	ELEVATION	NORTHING	EASTING
07-LW1	299.9	5 167 794.62	394 842.35
07-LW2	298.6	5 167 821.99	394 861.84
07-LW3	300.3	5 167 786.98	394 843.37
07-LW4	300.5	5 167 821.16	394 872.30
07-LW5	300.7	5 167 778.62	394 853.67
07-LW6	299.7	5 167 811.91	394 880.95
07-LW7	301.8	5 167 596.63	394 857.60
07-LW8	301.3	5 167 645.13	394 850.56
07-LW9	301.0	5 167 696.02	394 848.00
07-LW10	301.2	5 167 744.62	394 829.66
07-LW11	300.6	5 167 838.20	394 892.05
07-LW12	302.0	5 167 854.29	394 930.36
07-LW13	305.3	5 167 889.58	394 967.43
07-LW14	307.3	5 167 913.38	395 012.85
07-LW15	300.6	5 167 778.33	394 849.56
07-LW16	299.0	5 167 773.45	394 853.30
07-LW17	298.3	5 167 812.26	394 872.95
07-LW18	298.1	5 167 806.53	394 877.33

- 1) The boundaries between soil strata have been established only at Borehole locations. Between Boreholes the boundaries are assumed from geological evidence.
- 2) This drawing is for subsurface information only. Surface details and features are for conceptual illustration.

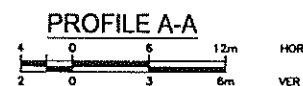
REVISIONS							
	DATE	BY	DESCRIPTION				DATE FEB 200
DESIGN	MRA	CHK	PKC	CODE	LOAD		FEB 200
DRAWN	MFA	CHK	MRA	SITE	STRUCT	BWG	

Source: U.S. Bureau of Economic Analysis.

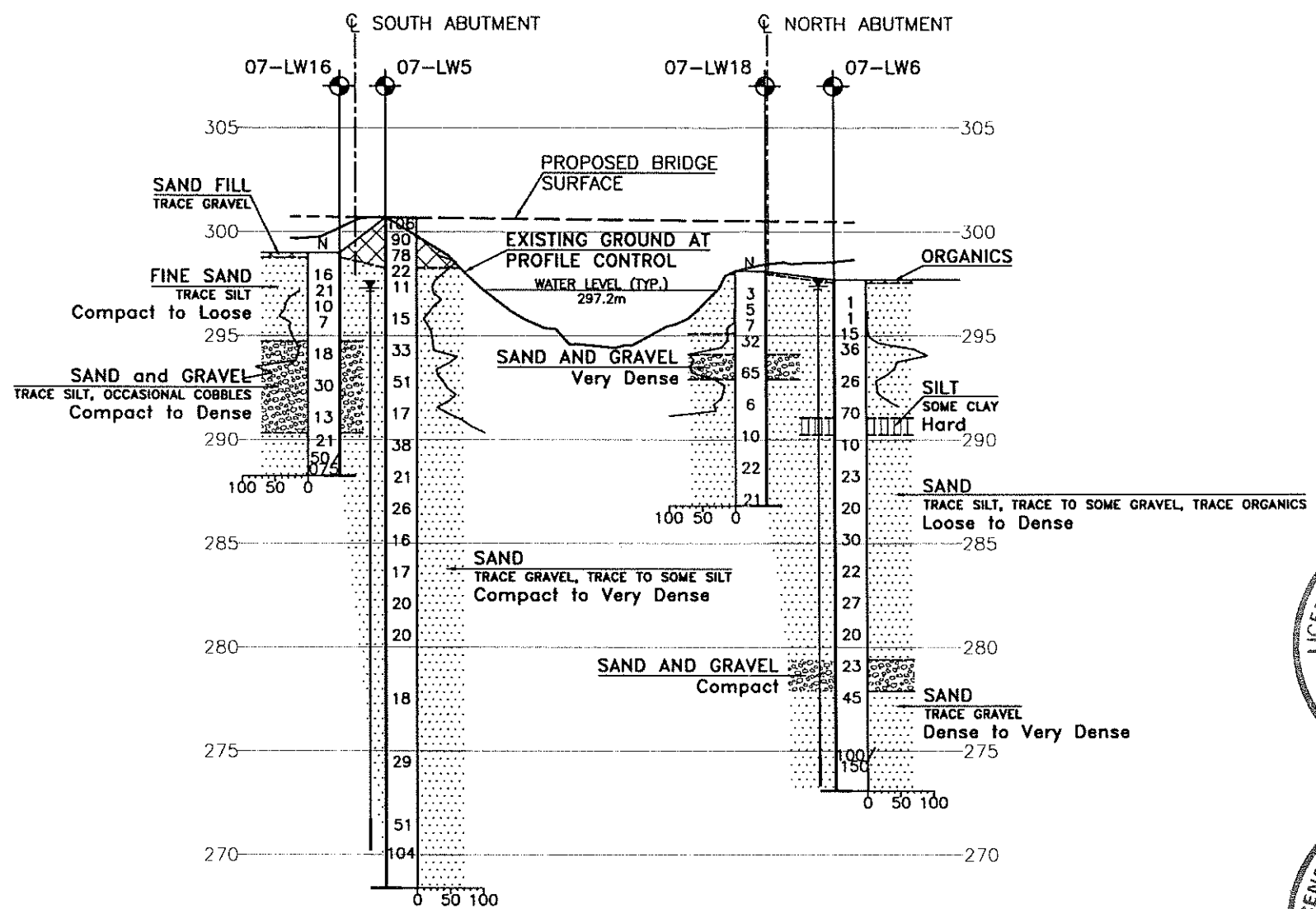
A circular professional engineer seal for the Province of Ontario. The outer ring contains the text "LICENSED PROFESSIONAL ENGINEER" at the top and "PROVINCE OF ONTARIO" at the bottom. The center of the seal features a stylized signature "M. R. Anderson" above the name "M. R. ANDERSON" in bold capital letters. Below the name is the license number "12127" and the date "June 2/08".

A circular professional engineer seal for the Province of Ontario. The outer ring contains the text "LICENSED PROFESSIONAL ENGINEER" at the top and "PROVINCE OF ONTARIO" at the bottom. In the center, the name "P. K. CHATTERJI" is printed. Overlaid on the seal is a handwritten signature "P. K. Chatterji" in a cursive script. Below the signature, the date "June 2/06" is handwritten.

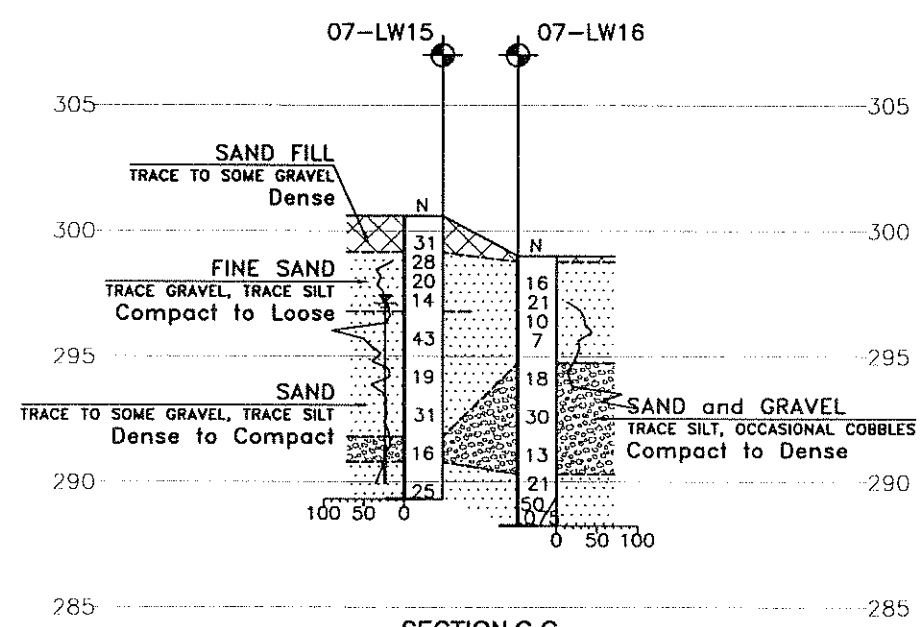
DRAWING NOT TO BE SCALED
100 mm ON ORIGINAL DRAWING



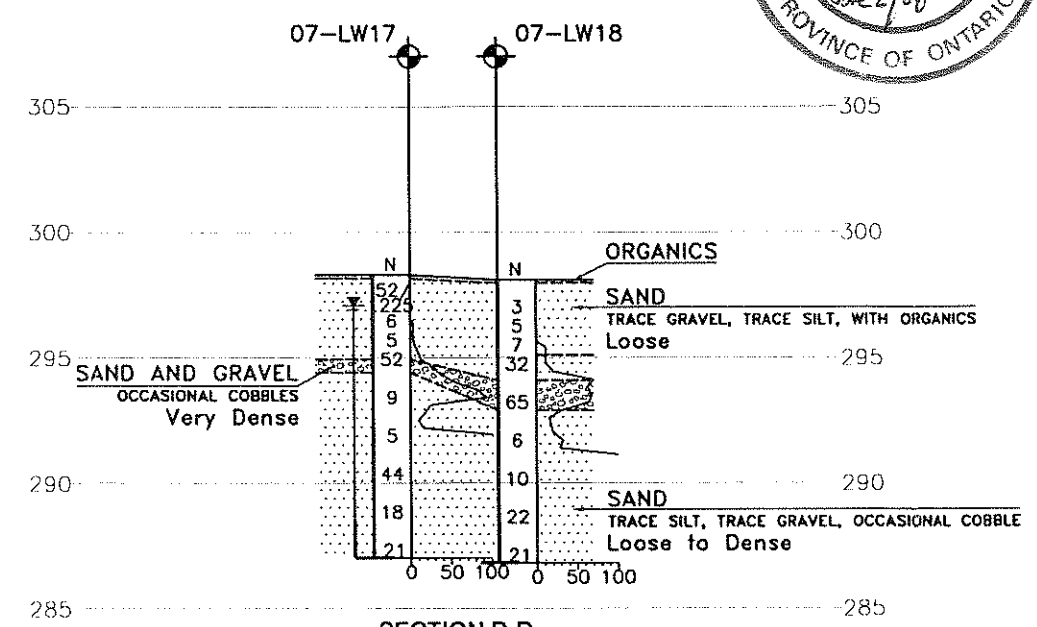
MINISTRY OF TRANSPORTATION, ONTARIO
PLOT SCALE 1:1
PLOT DATE 03/06/08



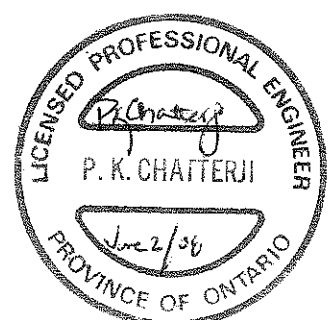
PROFILE B-B
HOR 12m
VER 6m



SECTION C-C
HOR 12m
VER 6m

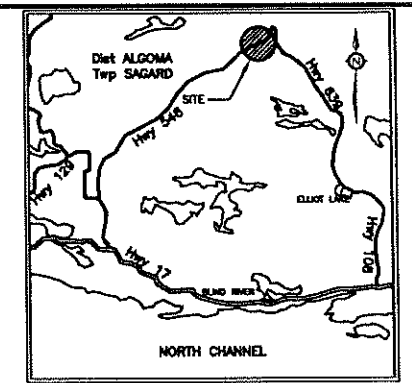


SECTION D-D
HOR 12m
VER 6m



METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

HIGHWAY 546
CONT No
GWP No 512-00-00
LITTLE WHITE RIVER II
BRIDGE REPLACEMENT
SOIL STRATA
SHEET



KEYPLAN

LEGEND

- ◆ Borehole
- ◆ Borehole and Cone
- N Blows /0.3m (Std Pen Test, 475J/blow)
- CONE Blows /0.3m (60° Cone, 475J/blow)
- PH Pressure, Hydraulic
- Water Level
- Head Artesian Water
- Piezometer
- 90% Rock Quality Designation (RQD)
- A/R Auger Refusal

NO	ELEVATION	NORTHING	EASTING
07-LW1	299.9	5 167 794.62	394 842.35
07-LW2	298.6	5 167 821.99	394 861.84
07-LW3	300.3	5 167 786.98	394 843.37
07-LW4	300.5	5 167 821.16	394 872.30
07-LW5	300.7	5 167 778.62	394 853.61
07-LW6	297.7	5 167 811.91	394 880.99
07-LW15	300.6	5 167 778.33	394 849.56
07-LW16	299.0	5 167 773.45	394 853.30
07-LW17	298.3	5 167 812.26	394 872.95
07-LW18	298.1	5 167 806.53	394 877.31
07-LW19	300.3	5 167 749.89	394 836.67
07-LW20	300.0	5 167 762.21	394 842.15
07-LW21	299.7	5 167 770.12	394 847.59
07-LW22	298.1	5 167 812.72	394 877.77
07-LW23	300.2	5 167 821.74	394 881.34
07-LW24	299.6	5 167 831.02	394 891.59

NOTES

- The boundaries between soil strata have been established only at Borehole locations. Between Boreholes the boundaries are assumed from geological evidence.
- This drawing is for subsurface information only. Surface details and features are for conceptual illustration.

GEOCRES No. 41J-76

REVISIONS	DATE	BY	DESCRIPTION
DESIGN	MRA	CHK PKC	CODE
DRAWN	MFA	CHK MRA	SITE
LOAD			
STRUCT			
DWG			

DRAWING NOT TO BE SCALED
100 mm ON ORIGINAL DRAWING

FILENAME: C:\008 FILES\191123\33 Little White & Rapid River\19112333le-bridge\08.dwg
PLOT DATE: Jun 03, 2008 - 11:21am