IRISH DRILLING LIMITED



LOUGHREA, CO. GALWAY, IRELAND

CONTRACT DRILLING SITE INVESTIGATION

Phone: Fax:

(091) 841 274 (091) 847 687

email:

info@irishdrilling.ie

PROPOSED DEVELOPMENT AT LOUGH ATALIA ROAD

SITE INVESTIGATION REPORT

Galway Harbour Company, Galway Harbour, Galway. Tobin, Consulting Engineers, Fairgreen House, Fairgreen Road, Galway.

July 2011

FOREWORD

The borehole and trial pit records have been compiled from an examination of the trial pit and borehole samples by a Geotechnical Engineer and from the Driller's descriptions.

The report presents an opinion on the configuration of the strata within the site based on the borehole and trial pit results. The assumptions, though reasonable, are given for guidance only and no liability can be accepted for changes in conditions not revealed by the boreholes and trial pits.

The fieldwork was carried out in accordance with BS 5930:1999 Code of Practice for Site Investigations.



Contents:

1.0		Introduction
2.0		The Site & Geology
3.0		Fieldwork
4.0		Laboratory Testing
5.0		Drawings
6.0		Ground Conditions
	6.1	Groundwater
7.0		Proposed Road Realignment

Book 1 of 2

Appendix 1	Borehole Records (Cable Percussive)
Appendix 2	Borehole Records (Rotary Core)
Appendix 3	Trial Pit Records
Appendix 4	Inspection Pit Records
Appendix 5	Laboratory Test Results
Appendix 6	Photographs

1.0 Introduction.

Irish Drilling Ltd. (IDL) was instructed by Tobin Consulting Engineers, on behalf of Galway Harbour Company to carry out a site investigation on the site of a proposed civil works at Lough Atalia Road.

The proposed works includes for the lowering of the existing road under Lough Atalia Bridge by a depth of 1.20m.

The fieldwork commenced on June 13th 2011 and was completed on June 23rd 2011.

This site investigation was carried out to assess the feasibility of lowering the road under Lough Atalia Bridge, to assess the ground conditions and provide data to assist in the design of road formation.

In order to carry out the fieldwork at a busy road location Traffic Management Plans approved by the Local Authority would only allow fieldwork operations to be carried out and completed daily before noon.

2.0 Site & Geology

The site is located at Lough Atalia Bridge, Lough Atalia Road, Galway.

A Site plan (prepared by Tobin and amended by IDL to show 'as-built' locations in plan) is included with this report and shows the approximate fieldwork positions.

Geological Survey maps of the area indicate that the site is underlain by Glacial Till overlying Igneous Rock Formations.

3.0 Fieldwork.

The fieldwork consisted of the following:

Two light cable percussion (Shell & Auger) boreholes were bored to 'refusal' or to depths as instructed by the Client's Engineer, using a Dando 2000 Cable Percussion Drilling Rig.

In-Situ testing consisting of Standard Penetration Tests were carried out at regular intervals (predominantly 1.00m intervals).

Disturbed bulk soil samples were taken at each change in strata and were returned to the laboratory for logging and testing.

Four rotary core boreholes were completed using a BBS 37 Wireline Hydreq Drilling Rig.

The rotary core boreholes were carried out to establish rockhead and to establish the nature and integrity of the underlying rock.

NQ size (50mm diameter) coring was carried out, with samples stored in wooden boxes and returned to the laboratory where there were logged and photographed by a Geotechnical Engineer and presented for testing.

Four trial pits were excavated using a JCB excavator. The pits were logged and photographed by an Engineer with observations made on ground conditions, pit stability and water ingress.

The pits were also carried out to expose the foundations to the existing bridge abutments and the records of the foundations as exposed in the trial pits are included in Appendix 4 of this report.

Small and bulk disturbed soil samples were recovered at each change in strata and returned to the laboratory and presented for testing.

Prior to commencement of the boreholes and trial pits eight hand-dug inspection pits were carried out by John Madden & Sons Limited. Four of the pits were carried out at the trial pit locations with the remaining four completed at the rotary core borehole locations.

The inspection pits were carried out to observe and record the locations and depths of existing underground services. Observations were also made of ground conditions and whether any groundwater ingress was encountered.

The fieldwork was carried out in accordance with BS5930, 1999 Code of Practice for Site Investigations.

The soil and rock descriptions as noted on the borehole and trial pit logs are in general visual descriptions as observed and logged by our Engineers and are described in accordance with BS5930, 1999 Code of Practice for Site Investigations.

Where laboratory classification tests have been carried out on soil or rock samples then these visual descriptions have been amended accordingly to take into account the results of these classification tests.

4.0 Laboratory Testing

Representative samples recovered from the fieldwork were tested in the laboratory.

The test schedules were prepared by the Client's Engineer and included the following tests:

- Natural Moisture Content.
- * Atterberg Limits.
- Particle Size Distribution.
- * Sedimentation.
- Chemical Tests (pH, Sulphate, Organic Content).

The test schedule also included the following tests on rock cores:

- Point Load.
- * Uniaxial Compressive Strength.

The records of all fieldwork and laboratory test results are included in the Appendices of this Report.

5.0 Drawings

The report and logs should be read in conjunction with the following drawing:

Drawing No.

Description

1254-1011

Site Location Map ('as-built').

6.0 Ground Conditions.

Generally the soils are typical of Glacial Till with cohesive and non-cohesive materials encountered and with cobbles and large boulders being frequently encountered.

Made ground was encountered at many of the locations. The made ground generally comprised of hardcore and/or Clause 804 type material over silty gravelly sand and/or sandy gravelly clay with cobbles and boulders and concrete rubble.

Rock is generally very strong to extremely strong fresh granite.

For accurate details of Made Ground, sub-soil and rock conditions the logs should be consulted (see Appendices of the Report).

6.1 Groundwater.

There was no standing water in the trial pits, however water ingress was encountered in Trial Pit 2 at a depth of 0.80m (b.g.l.) which may have been seeping from the elevated ground to the west. Reference should be made to the logs in the Appendices of the Report for water observations.

Groundwater was not encountered during the boring of the cable percussive boreholes but it is considered possible that groundwater was sealed off from entering the boreholes by the steel casing used during the completion of these boreholes.

Groundwater inflows may occur during the excavation of trenches for the proposed pipelines and the rate of inflow will vary with the permeabilities of the soils and rock.

The following table summarises typical permeability values:

Coefficient of Permeability (m/sec)

SOILS	
Gravel	$1 - 10^{-1}$
Clean sands and sand-gravel mixtures	$10^{-1} - 10^{-4}$
Very fine sands, silts and silt/clay laminates	$10^{-4} - 10^{-7}$
Unfissured clays and silt/clay (>20% clay)	$10^{-7} - 10^{-10}$
Dessicated and fissured clays	$10^{-1} - 10^{-7}$
ROCK	
Heavily fractured rock	$I - 10^{-1}$
Open-jointed rock	$10^{-1}-10^{-3}$
Jointed rock	$10^{-3} - 10^{-6}$

It should be noted that where cavities are encountered that local permeabilities are likely to be higher than those quoted above.

7.0 Proposed Road Realignment

The light cable percussion boreholes 'refused' at depths ranging from 1.90m to 4.60m.

Bedrock was encountered in the rotary core boreholes at depths ranging from 6.60m to 8.60m below ground level and therefore rock will not be required to be excavated as part of the relocation of services or for the road realignment works.

For road formations, any loose or soft pockets of overburden should be removed and replaced with adequately compacted hardcore fill or 'lean-mix' concrete.

Excavations close to the existing bridge abutments will have to be carefully excavated, using appropriate machinery and temporary works, to avoid damaging the integrity of the existing structure.

In the interest of safety, personnel should not be allowed enter unsupported excavations deeper than 1.0m.

Excavations are likely to be unstable and some form of side supports are likely to be required to maintain stable temporary excavations.

The walls of excavations of depth in excess of 1.0m (with the exception of excavations in compact rock) may be secured be means of:

Producing the excavation with inclined (escarpment) walls
Installation of shoring, sheeting or bracing to the vertical walls to prevent
movement that could cause damage to adjacent services, pavements and

structures

Lough Atalia Road Irish Drilling Ltd.

Furthermore, the following requirements are recommended:

 Where possible at the crest of excavations, rainwater should be directed away from the excavation

- The escarpments should be checked after every rainfall and after a long break in work, as well as every time before starting work
- Safe distances must be maintained between the excavations and existing buildings
- The state of the lining or the escarpments must be inspected each time before works start in the excavation.

The use of sumps and pumping may be required to deal with groundwater inflows. This may be particularly likely during high tides, bearing in mind the very close proximity of the sea and during periods of high rainfall.

Excavations in the overburden and/or made ground are also likely to be difficult as the presence of boulders and cobbles was noted during the investigation.

The following parameters are recommended for retaining structures (lateral earth pressures)

Strata	Unit Wt. saturated/dry kN/m³	Cohesion (undrained) kPa	Angle of internal friction
Fill	22/20	0	20
Loose Sand and Gravel	20/16	0	28
Dense Sand and Gravel	21/17	0	35
Soft slightly organic clay	16/10	20	0
Firm sandy clay	17/12	40	0
Firm to stiff glacial till	20/17	75	0
Stiff glacial till	20/17	100	0
Very stiff glacial till	20/17	200	0
Rock	23	1,000	30 (drained)

The results of Sulphate and pH tests indicate that in general no special precautions are required with regard to protection of foundation concrete from chemical attack. Class 1 conditions apply.

It would be prudent, based on the structural engineer's recommendation, to carry out a vibration, noise and structural movement monitoring process before, during and after the construction works, in order to monitor and control excessive movements and vibrations with regard to the existing bridge structure. The advice of specialists should be obtained with regard to all types of monitoring.

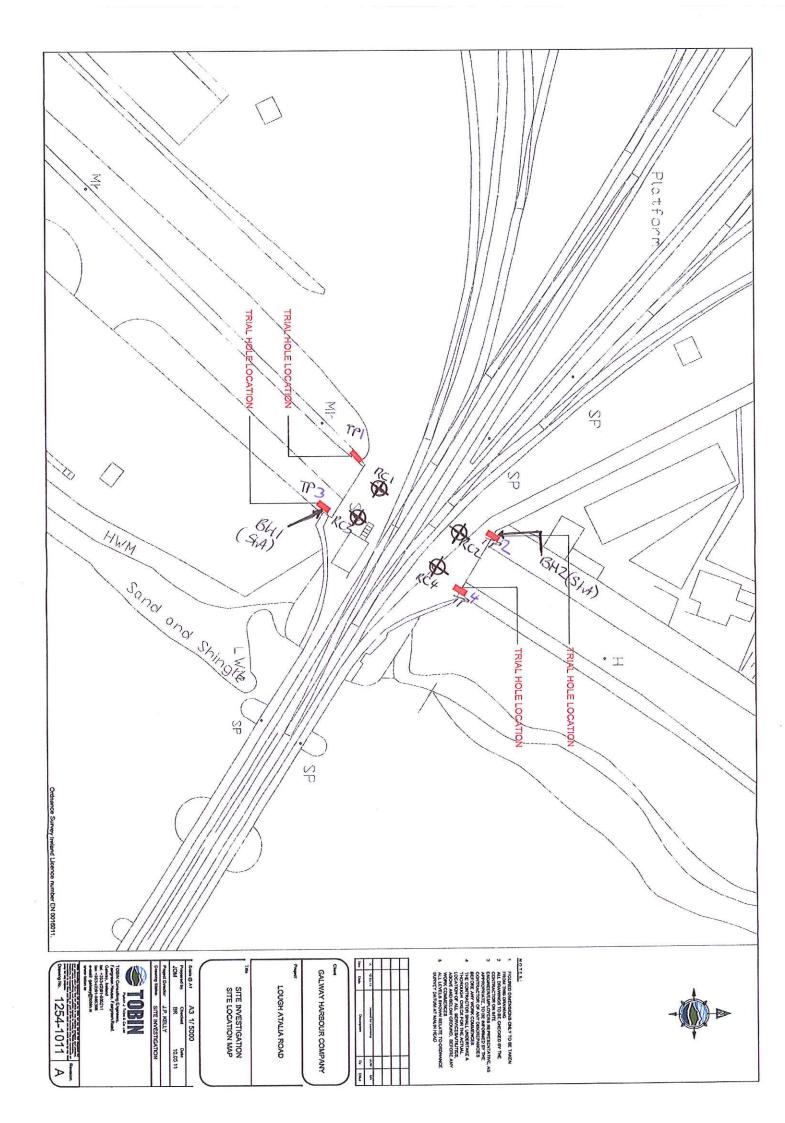
Lough Atalia Road Irish Drilling Ltd.

Prior to construction works further site investigation operations could be considered, for example it would be prudent to carry out some Plate Bearing tests to confirm that road formation has been compacted adequately and to provide CBR values of formation before placing a sub-base.

Ronan Killeen Chartered Engineer

REFERENCES:

- (1) B.S.5930:(1999), Code of Practice for Site Investigation.
- (2) B.S.1377:(1990), Methods of Test for Soils for Civil Engineering Purposes.
- (3) B.S.8004:(1986), <u>Foundations</u>.
- (4) Terzaghi, K. and Peck, R.B (1967) <u>Soil Mechanics in Engineering Practice</u>, 2nd ed., John Wiley, New York
- (5) Tomlinson M.J. (1980) <u>Foundation Design and Construction</u>, 4th ed., Pitman, London.



APPENDIX 1 BOREHOLE RECORDS (SHELL & AUGER)



BOREHOLE LOG

Project L	ough Ata	alia Bridge						Location				BO	REH	OLE	No
					12-			Lough Ata		у		_	ВН	I 1	
Job No		Date 13-0	06-1	ļ	Grou		vel (m)		dinates ()	7 N.22	E 146.6			•	
Engineer		13-0	06-1	l		4. 	.09 groundy	VATER Water	r strikes: R	.7 N 22:	0,140.0 nin.): Sealed at:	Sheet	t l c	of 1	
_	bin						STRIKES	2nd:	dry			Rev.		,, ,	
		& TESTS	T]				3rd: STRA	тл			I ROY.	I		<u> </u>
- SAN			Water			De	epth	SIKA	1/1					ogy	fill
Depth	Type No	Test Result	W	Reduced Level	Legen	(Thic	Ŕ-		DES	SCRIPTIO	N			Geology	Instrument/ Backfill
-						,	МА	DE GROU	ND: Clause	804 type i	naterial.				XXX
-						-									
-						(1.70	0)								
-						<u> </u>									88
[2.39	\bowtie	<u>-</u> 1	1.70								
Ē					$[\odot]$	}- -	Loc	ose light bro velly slightly	wn slightly v sandv CI	sandy CO AY, Cobb	BBLES with les are round	i brown : led to	slightly 	,	
2.00	CPT B	N = 7 (3, 2, 1, 2, 2, 2)			$\frac{1}{2}$	ŧ	sub	rounded and	angular.						
- 2.00) 	-									88
3.00	СРТ	N = 10				<u> </u>		0m; becomi	. a madium	danaa			1		
3.00	В	(2, 2, 3, 2, 2, 3)			.Ŭ. ⊝	(2.9	0) 3,01	om; becomi	ig medium	i dense.					
- -						<u>.</u> [-									
4.00	СРТ	N = 19			50										88
4.00	В	(3, 4, 5, 4, 5, 5)		-0.51		<u> </u>	4.60								
4.60	СРТ	50 for 0 mm (25, -, 50)		-0.51	1	-	TP	terminated a	nt 4.60m bį	gl - refusal.	•				
-		(23, 2, 30)				E									
Ē						[
<u> </u>						:									
È.						_									
-						Ę							ĺ		
Ė				ļ		E	ļ								
						<u> -</u>									
į.						Ē									
						-									
5771						-									
10						[
ATE.						ļ.									
J-1-						E									
# - # -						<u>}</u>									
直					<u> </u>	<u> </u>									
Boi	ring Pro	gress and Wat	er C	bserva	ations			Chisellin	g	Water	Added		ENE		
Date	Time	Depth Dept	Casir h 1	ig Dia. mm	Water Dept	(bgl) h, m	From	То	Hours	From	То	R	EMA		
BRID						4.6	4.6	1			BH bacl	kfilled.			
YELA JALIA		VO.													
H A I			ľ												
ron															
띺			/												
AGSS IX BH LOUGH ATALIA BRIDGE S&A.GPJ IDL TP TEMPLATE.GOT 15/7/11 Bol Date Bol Date Bol Date	ions in I	lient Galway H	arbo	112	Metho	ıd/ I	Dando 2	000		Bit	Drille	·	Logged	l Rv	
of Scale 1:	8 62.5	Company	ar UU	rii.	Plant	Used	Zanu0 Z			Design	DK		egut	,,	****



BOREHOLE LOG

	Project Lou	ıgh At	alia Bridge					Loc	ation		•			BOF	REHOLE	E No
i	Job No		Data			Gran	nd Level	1		ılia, Galwa rdinates ()	ıy				BH 2	
	300 RO		1 14	-06-1 -06-1	1 1	Grou	iki Levei	(111)	C0-01	ramates ()						
	Engineer					1	GR6 STF	OUNDWAT HKES	ER Wate	er strikes: F	Rose to (@ 20	min.): So	caled at:	Sheet	1 of 1	
	Tobi	n							2nd: 3rd:					Rev.		
	SAMI	PLES	& TESTS	_ is		1			STRA	TA					>	ent/
	Depth	Type No	Test Result	Water	Reduced Level	Legen	Depth (Thick- ness)				SCRIPTIO				Geology	Instrument/
							-	MADE	GROUI	ND: Clause	e 804 type i	materia	al.			
	الملت						[: (1.50)									
	[- -															LOC P
	<u> </u>						1.50									
	- 1,50 -	В				× × ×	1.90				ly gravelly	·	CLAY.			
٠.	- 1.90 -	CPT	50 for 0 mm (25, -, 50)				-	TP tern	ninated a	at 1.90m b	gl - refusal.					
	<u>.</u>						<u>.</u>									
	-						[[]									
	-						<u>-</u>									
							<u>.</u>									
	-						-									
	<u>[</u>						-									
	-						-									
:							-									
							<u>}</u> } }									
	- - -						<u>{</u> }-									
							<u>;</u>									
	<u> </u>					, ,	Ē									
7/11	-						<u>-</u>									
)T 15/							Ē									
TEG	<u> </u>						<u> </u>									
MPL	- -						-									
다	£						<u> </u>								***************************************	
2	<u> </u>						<u> </u>									
38.A.G	Borin		gress and Wa			tions	71-15	Ch	isellin	T	Water			GE	ENERAL	,
DGES	Date 1	l'ime	Depth Dep	g Dia. mm	Water Dept		rom	То	Hours	From	To			MARKS	<u>S</u>	
A BRI								1.9	1.9	1			B	H backfi	illed.	
Boring Progress and Water Observations Date Time Depth Dia. mm Depth, m All dimensions in metres Scale 1:62.5 Client Galway Harbour Company Method/ Plant Used								-								
OUGH																
HH I																
S3 UK	[A 11 a 2 1					<u> </u>						<u></u>				
IDL AG	All dimension metres Scale 1:62.	s in C	lient Galway 1 Company		nr [Metho Plant U	d/ Dan Ised	do 2000			Bit Design		Driller DK	Lo	gged By	
-,			· · · · · · · · · · · · · · · · · · ·								4					

APPENDIX 2 BOREHOLE RECORDS (ROTARY CORE)



Project	Lough	h Atalia	Bridge				Loca	ation					I	DRILL	HOL	E No
							Lo	ugh Atalia, (R	C 1	
Job No			Date 20	-06-11		Ground Level (m)		Co-Ordina	ites ()					• •		
Engine	er		20	-06-11									SI	neet	1 0	f 1
l -	Гobin													ev.	1 0	1 1
L		TAILS					5	STRATA								15
Depth	TCD		Red'cd	T	Dept	h			CRIP	TION					Geology	, lame
Date	(SCR) RQD	Fracture Spacing	Lovel	II.egend	(Thick- ness)	Discontinuities		Deta			M	Sai n				Instrument
0.00				<u>a -</u>		0.00 m to 8.30m:	overl	ourden.	Ar	igular an	id subai	ngular	medi	um to		
				9.0	<u> </u>				lin	iestone o	cobbles	and s	ome b	rown		贸
	11				Ē				Gr	ghtly sar avel is s e and m	ubangu	lar an	d subr	ounded		
	(-)			<u> </u>					In	e and m	eaum (or asso	ortea i	mestor	le	
				D	[
				0-2	} 											
2.30				0	Ė											
	60			() O	<u>{</u>											B
	(-)			3 3	<u>.</u>	Artumote Ways and										
3.30				0 0	<u>[</u>	WHITE COLUMN TO THE COLUMN TO										
	21 (-)		-	\$_ <u></u>	 											
4.00	-			0 0	F											器
	25	NA		<u>O</u>	(8.30)											
	(-)			<u>. O</u>	<u> </u>											8
5.00					-											
	56 (-)			<u></u>												级
5.90	-			8-0	Ę											滋
3.70				<u>0</u>	-											
	(-)			0	£											
7.00	-			<u> </u>	+											鎫
7,00				<u></u>	_											
	25 (-)			<u>a</u>	1											83
8.00	-															
8.30	,,,,			<u>a</u>	├ - 8.3	0										
3.50	100			+ +	E	8.30 m to 9.20m:	Clos	ely spaced,	Ex	tremely	strong	appar	ently i	nassive	:	
8.90	(99) 98 100	3		+++	E (0.90)	dipping 0, undur	aung,	sinoon.	wi	th green uigranul	black a	and gr	evish	white		
9.20	(99)			+	9.2	0	<u> </u>		Fi	esh.	•	•			<u>'</u>	
					<u> </u>					I termin struction		9.20n	on R	E's		
		112 5		1 111 /	<u> </u>			II -		D1 1		<u> </u>				<u></u>
Date	Dri Ti			id Wat Casing th D		servations re Dia Water mm Strike Stai	1.		Cotary To (m	Flush Type	Retur	n (%)			IERA IARK	
Date	1.0	De	Depi	in D)1a 1	mm Strike Stai	nding	11011 (11)	10 (111	1 - 7 80		(,,,,,	Bore	hole rei		
	-															
All dim	ensions	in Client	Galway 1	Harbou	ır T	Method/ Hydreq	·. ·			Bit N	1Q	Dril	ler	Logs	ged By	
Scale	etres : 1:62.5		Compan		"	Plant Used				Design	. ~	DK		2068	, 5, E/	ΑT



Project	Lough	h Atalia l	Bridge				Loca							RILL	HOL	E No
Job No			Date 21	-06-11		Ground Level (m)		gh Atalia, Ga Co-Ordinate					-	R	C 2	
Engine			21	-06-11										eet	1 of	7 1
	Fobin	TAILC						TD ATA					Re	v.		
	TCD	TAILS (SPT)			Depth	<u>,</u>		TRATA DESC	DIDT	'ION					66	Instrument/
Depth Date	(SCR) RQD	Fracture Spacing	Red'ed Level	Legenati	Thick- ess)	Discontinuities		Detail		1011	Mair	n			Geology	nstru
0.00		ориств			0.05		: overb		TAI	RMAC. SSIBLE angular		GRC	OUND: vel.	•		
	13 (-) -				(2.75)										The state of the s	
2.20	25															
2.80	(-)				2.80											安
2.00	40 (-)				2.00				Gre SIL sub	y slight T/CLA rounded	ly sandy g Y. Gravel I fine and nestone cl	grav is s med	elly ubang dium (ular an of	d	
3.80									usse	nica iii	110310110 01	iusti	,,			宽
4.50	43 (-) -	.NA														2000年
	50 (-) -				(5 00)											
5.90	35 (-)				(5.80)										— Arada waa muja saa a	
6.90	60]		0-3												敛
7.40	30															窓
7.90	(-)															8
8.60	57 (-)				8.60											
0.40	100 (81) 0 15 ++					8.60 m to 9.60m dipping 6 to 8, u with a little brow 8.61 m to 9.40m irregular, locally	mdulat vn silt. : Joint	ing, smooth, vertical dip,	grey with equ	yish red n green igranul:	strong appledish brow black and ar phenoc	vn g I gre	round eyish v	mass vhite		2000
9,60	9,60				9.60	with a little grey	clay,	open.	/ BH	termina	ated at 9.6	60m	on RE	E's	-	-300
	D.:	lling Dec	Auther of	d Water	· Obe	ervations		D.	inst otary l	ruction.		7		ODV	<u> </u>	
Date				Casing th Dia		e Dia Water	mdi		To (m)		Return (<u>"</u>			ERAI ARK	
Date	Date Time Depth Cas				n	mm Strike Sta	mding	rioiii (III)	i O (III)	Туре	i vetui i (701	Boreh		nstated.	
All dime me Scale	ensions etres 1:62.5	Onom	Galway : Compan	' Harbour y	N P	Method/ Hydred Plant Used	l	1	I	Bit N Design		rille K	er	Logg	ed By EA	 -



Project	Lough	Atalia l	Bridge					Loca	ition						DR	ILLH	IOLE	. No
									ıgh Atalia							RC	3	
Job No			Date 22	-06-11		Grour	nd Level	(m)	Co-Ordi	nates	()						, ,	
Engine			22	-06-11											Shee	f	l of	2
1	robin														Rev.		1 01	2
<u> </u>	N DE'I	PATLO							TRATA	A					Rev.			<u>=</u>
		(SPT)	1	T	Depth						PIPT	'ION					53	Instrument/ Backfill
Depth Date	TCR (SCR) RQD	Fracture Spacing		Legend(T	hick- ss)		continuit	ies		etail		1011		lain			Geology	nstr. 3ack
0.00		opacing		(9.)	23)			60m; overb			Ass	orted li	neston	e gravel	and co	obbles		50
											with SIL	n some (T/CLA	grey sli Y. Grav	ightly sa vel is su nd medi	ındy gr bangul	avelly ar and		
				3							sub	rounded orted lin	l fine a restone	nd medi clasts.	um of			超
	9			<u> </u>														欧姐
	(-)																·	
2.60				<u> </u>														
1.5																		数组
	20 (-)																	
3.60	-	NA			6.60)													
	50																	
	(-)																	
4.40																		
	30 (-)																	
	-																İ	
5.40																		X
	25																	
	(-)																	欧河
6.60					6.60)												
	100	4		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	0,00	6.60	0 m to 9.	70m: Close	ely spaced	1,	Ver	y strong	g to ext	remely green fir	strong	thinly		
	(88) 39	4				smo	oth, witl	o 14, undu h minor ora	ianng, inge brow	vn	MA	RBLE:	lype m	aterial v	vith mu	iea ich		
7.50						iror	ı stain.				fine Fre	ely disse sh.	minate	d pyrite).			
_	75	15																
8.30	(59) 29			**************************************	3.10)	0.14	n to 0	20 No										
-	100	NR?	_	 	,	Pro	bable are	30m: No re a of core l	oss as wa	shout								
9.10	(97) 71	6				oft	ines duri	ng drilling	•									
9.10				******F														\$
-	100 (97) 71	5		***** <u></u>														
9.70	71				9.70)					BH	termina	nted at	9.70m c	n RE's			\$3.7°
, , ,	D.:1	1: D		1 37/2424	Olea		:		П	D -4				7.70			<u></u>	<u> </u>
Date	Dr11 Tin			d Water Casing h Dia		e Dia		ater Standing	From (n			Flush Type	Retur	0 (%		GENE REM <i>A</i>		
<u> </u>	1111	ie Del	Dept	h Dia	n	ım	Strike	Standing	FIOR (I	117 19	o (m)	Турс	Ketui		3oreho!			
A BRID															, or cito;	io rollis	vaccu.	
4																		
F 5													Name and Address of the State o					
3																		
5																		
All dime	ensions i	n Client	Galway I	Harbour	l N	/lethod	1/ Hyc	dreq			Ţ	Bit N	Q	Driller	.	Logge	d By	
Scale	tres 1:62.5		Compan		P	lant U	Ised , .	1			I	Design	-	DK			ÉA	Т



Project	Lough	h Atalia	Bridge				Loca		~ .				D	RILL	HOLE	. No
Job No			Date 22	-06-11		Ground Level (m)	Lou	ngh Atalia, (Co-Ordina		**************************************				R	C 3	
Engine	er		22	-06-11									Sh	eet	2 of	2
	Tobin	T. II. O.						TD ATTA					Re	v		<u> </u>
		TAILS (SPT)		1	Den	tis	3	TRATA	CRIP	LIUN					- Kij	Instrument/
Deptl Date	TCR (SCR) RQD	(SPT) Fractur Spacin	e Red'cd Level	Legeno	(Thick ness)	Discontinuities		Deta		HOIV	N	/Iain			Geology	Instru
									ins	truction.						
					- - -										İ	
					-											
, t		***************************************														
					-											
		:			-											
					-											
					-											ĺ
					<u>-</u>											
					<u> </u>				***************************************							
					<u> -</u>											
					Ē											

***************************************				***************************************	-											
					-											
					-											
						11.00 P. 10.00 P. 10.										
					-											
					-				1							
					Ė Į											
					<u> -</u> -											
					L L											
					-											
					er Ob	servations		R		Flush	l n	70.1		GEN	ERAL	,
Date	Ti	me De	pth Dep	Casing th T	Dia C	ore Dia Water mm Strike Star	nding	From (m)	To (m)	Туре	Retur	n (%	— —	KEM nole rei	ARKS)
													20101	1011	.outcu.	
Date					Parasan management											
All dim	ensions etres	in Clien	Galway I	Tarbou	ır	Method/ Hydreq Plant Used		<u> </u>		Bit N Design	IQ	Dril DK	ler	Logg	ed By EA'	т



	Project	Lougl	h Atalia 1	Bridge					Loc	ation							DRILLI	HOLE	E No
	Job No						I 0	ınd Level	l l	ugh Atali			######################################			_	R	C 4	
	J00 N0			Date 23-	06-11 06-11		Grou	ind Level	(m)	Co-Ord	inates	s ()							
,	Engine	er		2,5	00-11											S	heet	1 of	2
	า	lobin														R	tev.		
	RU	N DE	TAILS						(STRAT	<u>——</u>							<u> </u>	nt/
	Depth	TCR (SCR)	(SPT) Fracture	Red'cd		Dept	h			DI	ESCI	RIP	TION					Geology	rume Kfili
	Date	RQD	Spacing	Level	Legeno	(Thick- ness)	Di	scontinui			etail				1ain			geo	Instrument/
	2.40 2.60	100 (-)					0.0	10 m to 8	.50m: over	burden.		tin	ey sligh LT/CLA avel is s e and m ists.	tly sand Y with ubangu edium	ty gra limes lar an of ass	velly stone o id sub orted	cobbles. rounded limestone	T PARTITION TO THE PARTITION THE PARTITION TO THE PARTITION TO THE PARTITION THE PARTITION TO THE PARTITION TO THE PARTITION TO THE PARTITION TO THE PARTITION	
	3,40	(-) - 25 (-)	NA		수.수. '우. 수. 수 * 이. 상 -6. '현.	(8.50)												Annual management of the control of	
	5.40	20 (-)	IVA															ANALYMPIN THOMPSON	
	6.80	39 (-)		1000000 1100000	7.@. \$- \$ © & \$ \$		- The second sec												
		25 (-) -			<u>a</u> 0	-													
DT 18/7/11	7.80 8.40	8 (-)				8.5	0												
TEMPLATE.C	0.50	100 (95) 76	2			(1.00)	dip a li	0 m to 9. ping 8, t ttle grey	50m: Close indulating, clay.	ely spaced smooth, v	l, vith	app gro phe	oundmas	massiv s with s fine a	e ligh black	it pink and p	ing iish grey ink white grained		
IDL TI	9.50			-	~~~	9.5	V					Fre	esh. 5m to 9		rev th	inly f	foliated /		
E.GPJ		D.:'1	the D		1 117 -	- 01	<u> </u>			TT .	Y -	∐fin	e graine	d xeno	lith.				<u> </u>
COR	Date	Dril Tin	 	gress and	asing	er Obs	re Dia		ater	From (n			Flush	Retur	n (%		GENE REMA		
DL AGS3 UK DHILLOUGH ATALIA BRIDGE CORE,GPJ IDL TP TEMPLATE,GDT 18/7/11	Date	l'in	ne Dep	th Depth	D	ia i	mm	Strike	ater Standing	From (n	ny To	o (m)	Туре	Retur	n (%)	Bore	REMA		· · · · · · · · · · · · · · · · · · ·
IDL AGS	All dimer met Scale	nsions i res 1:62.5	Onone (Galway H Company	arboui	r M	Method Plant U	d/ Hyo Jsed	ireq]	Bit N Design	Q	Drill DK	er	Logged	By EAT	Γ



	Project	Loug	h Atalia	Bridge				Loc	ation					DRILL	HOLI	E No
	Job No								ough Atalia			~~.		R	C 4	
	jon Mo			Date 23	-06-11 -06-11		Ground Level	(m)	Co-Ordi	nates ()	ı			11	U 4	
	Engine	er		23.	-00-11				<u> </u>					Sheet	2 - 0	
		Гobin												Rev.	2 of	2
			TAILS						STRATA	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \				Kev.	1	<u> </u>
	Depth	TOD		Red'cd		Depth					PTION			· · · · · · · · · · · · · · · · · · ·	- Kigo	umer fill
	Date	RQD	Spacing	Level	Legend (ess)	Discontinuit	ies	De	etail		Main			Geology	Instrument/ Backfill
										i	3H termir	nated at 9.50	m on l	RE's		
					[E											
					ļ Ė											
					[-											
					-											
					<u> </u>											
					-											
					<u>[</u>											
					<u> </u>											
					[- [-											
					F											
					F											
					Ę					İ						
					ļ.											
					-											
	Ì				Ē											
					F											
					È E											
7111					<u>-</u>											
T 18/					-	ļ										
TE.GD					<u>[</u>	İ										
MPLA					-											
PTE																
101					Ę											
GP.					F								, ,			
IDL AGS3 UK DH LOUGH ATALIA BRIDGE CORE, GPJ IDL TP TEMPLATE, GDT 18/7/11	13-4-			gress and	Water	Obsei	vations	ler			/ Flush	1		GENE		
	Date	Tim	ne Dep	in Depth	asing Dia	Core	n Strike	ter Standing	From (m	To (n	n) Type	Return (%		REMA		
A BR													Bore	ehole reins	tated.	
ATAL																
텡																
기				all de la constant de									ľ			
3 CK D																
AGS	All dimer	isions ir		alway H	arbour	Me	thod/ Hydr nt Used	req	,		Bit N	Q Dri		Logged	l By	
直	met Scale I	:62.5		Company		Pla	nt Used	-			Design	DK		"	ĚAT	7

APPENDIX 3 TRIAL PIT RECORDS



Project Lough	Atalia Bridge		Lo	ecation	TRIAL PIT No				
			ough Atalia, Galwa		TP 1				
Job No	Date 09-06-11	evel (m)	Co-Ordinates ()		** *				
P. I	09-06-11 4.26 E 130,377.8 N 225,151.9 GROUNDWATER Water strikes: Rose to (@ 20 min.): Sealed at:						Ct. 4		
Engineer			STRIKES	lst: dry 2nd:			Sheet		
Tobin				3rd:			Rev. 1 of 1		
2 - 3 - 3 - 3 - 3 - 3 - 3 - 3 - 3 - 3 -		В		C	D	2	Legend		
_5		STRATA				<u>E 5</u>	MPLES & TESTS		
Depth No		DESCRIP	TION		In Situ Tests Water	Depth (m	· · · · · · · · · · · · · · · · · · ·		
0.00-0.12 0.12-0.30 0.30-2.30	CONCRETE: Footpath. MADE GROUND: Claus Firm light brown slightly Cobbles are subangular a	e 804 type material		vith many cobbles.		0.60 0.80	В		
2.30	TP terminated at 2,30m b	gl.							
Shoring/Supp Stability: Pit	ort: N/A stable.				1	GENERAL REMARKS			
D	4.00 → A B 2.50 L						it dry during excavation.		
All dimensions in metres Scale 1:62.5 Company Method/ JC Plant Used					Bit Design	Driller DF	er Logged By		



Project Lo	ation					TRIAL PIT No							
Joh No. Date Ground Le					Lough Atalia, Galway (m) Co-Ordinates ()						TP 2		
Job No		Date 09-06-11 09-06-11	Ground Le			•							
Engineer		02-00-11		GROUND STRIKES	WATE	R Water strikes: Ro 1st: 1.20m	se to (@ 2	0 min.): S	Sealed at:	She	eet		
Tob	in					2nd: 3rd:				Rev	, 1 of 1		
0 —	A		3		C		I)	_ 0		Legend		
									E				
1 =									F 1				
2									E				
2 =									E_2				
3 - 11 11 11 11 11 11 11 1									E				
: =									E				
3 =									3				
							-		~				
4									E 4				
' =									E .				
									E				
5 =			STRATA						<u> </u>	MDI	LES & TESTS		
Depth	No		DESCRIP	TION			In Situ Tests	Water	Depth (1		
0.00-0.55		E GROUND: Tarmae o			rial.		Tests		<u> </u>		a A of Primary Article Observable State of Letters State on State of State		
0.55-1.20	MADE	GROUND: Medium	loose brown and	l grev and	black	silty sand with							
0.80	abundant angular cobbles and concrete debris and boulders with pockets of soft 0.8							0.80 0.80	B				
1.20-2.45	0.80m	compacted cobbles at stiff grey slightly sar	nd boulders.	elly CLA	Y wit	h some cobbles an	d	₹	0.00	,			
- 1	boulde	rs. Cobbles and bould	ers are subangul	iar and sul	oroun	ded.	-		1.50	В	3		
2.45	TP ten	ninated at 2.45m bgl.											
	-												
5													
Shoring/S	Support: N	/A									GENERAL		
Stability:	ru unstab	le. Sidewall collap	SC.								REMARKS ingress of water at		
§ 									1.20m	bgl. Hydrocarbon from water.			
	A												
D		B 1.70											
	С	<u> </u>											
All dimension	ons in Client	Galway Harbour	Method/	JCB			Bit	· · ·	Drille	r	Logged By		
metres Scale 1:6	I	Company	Plant Used				Design		DF	l	-		



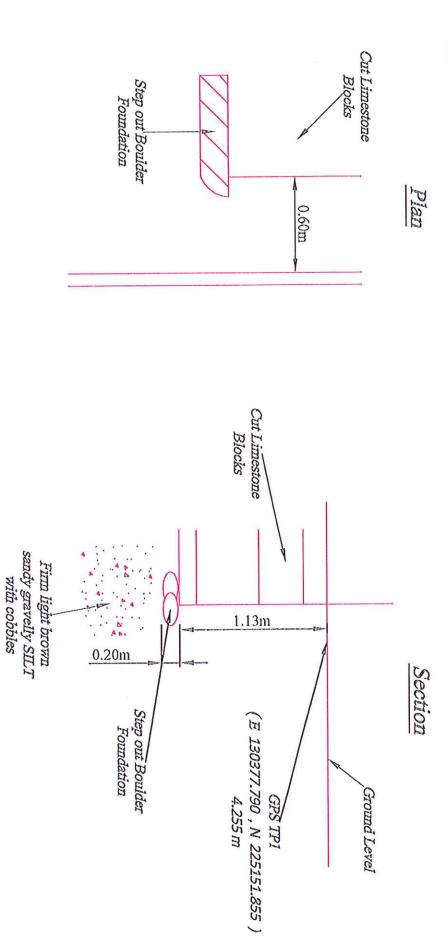
	Project Lough Atalia Bridge Location									TRIAL PIT No				
	Lough Atalia, Galw									_	TP 3			
	Job No	10-06-11				Co-Ordinates	() 89.2 N 225,146.9							
. -	Engineer			10-06	-11	4.05	WATER Water strikes:	89.2 N Rose to (@	225,14 20 min.):	Sealed at	: Sh	eet		
	Tot	oin				STRIKES	1st: dry 2nd: 3rd;				Re		of 1	
ř	Λ		A		В	······································	C		D	^			egend	
	2 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3									2				
	5 =					TDATA		1		<u>5</u>	A A A D	LEC	0- TEC	те
-	Depth	No				TRATA DESCRIPTION		In Site	il Water	Depth			& TES' Remarks/	
	0.00-0.10	140		RETE: Footpat				Tests		2 op	(, .			
	0.10-0.70		MADE	GROUND: Cl	ause 804 ty	ype material with grey	silty sand.							
	0.70-1.75 MADE GROUND: light brown silty sand & gravel with cobbles and concrete debris.						0.70		В					
			debiis.											

	1.75		TP tern	ninated at 1.751	n bgl - obs	truction as top of fou	ndation.		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,					
									4					
ŀ														
5/1/11														
501														
83.1														
AG -														
PSG	Shoring/S	Supp	ort: N/	'A								GE	NERAL	<u> </u>
DGE 1	Stability:	rit	stable.								D; 1		MARKS	
IA BR		?	3.25 —								ru di	y auri	ng excav	auon,
ATAL	, , , _		Α	-1 										
OUGH	D			B 2.30										
TP L			С											
33 CK	All diament									1				
IDL AGS3 UK TP LOUGH ATALIA BRIDGE TPS.GPJ AGS 3, 1.GDT 15/7/11	All dimensions in metres Client Galway Harbour Method/ JCB Scale 1:62.5 Company							Bit Desig	Bit Driller Design DF			Log	ged By	

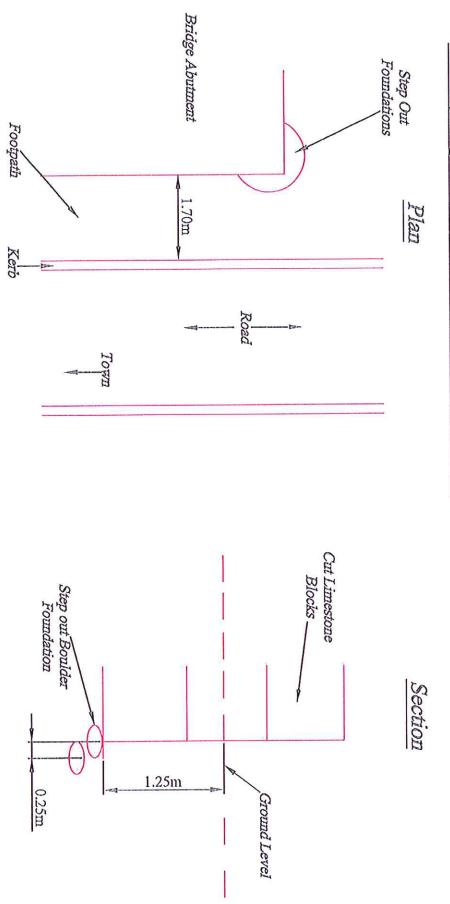


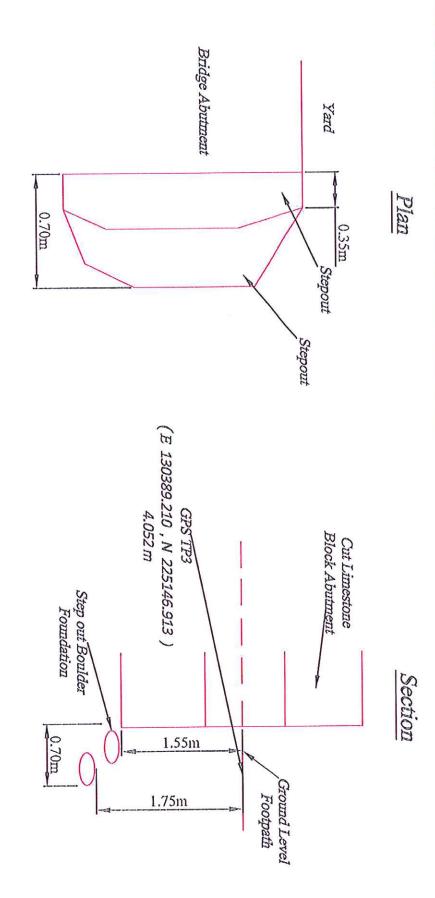
Project	Lough	Atalia Bridge			Loc	ation				,	TRIA	L PIT No			
				Lough Atalia, Galway						P 4					
Job No	10-06-11				n)	Co-Ordinates ()						•• •			
Engine	~=	10-	06-11	CRO	UNDWAT	ER Water strikes: 1	Rose to (@ 2)) min):	Sealed a	<u> </u>		• •			
_				STRI	UNDWATI KES	1st: dry 2nd:		,	ocaled a	311	eet				
	Гоbin					3rd:				Re		of 1			
0 —		A	В		C		<u>I</u>)	0		Le	gend			
									Ė						
									E						
1 = 1									E ₁		(x)	ý×°Φ× Σ×°Φ×			
											×°	9× 0°×			
									F		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	5°°C			
2 =									E_2		OX S	Ś×o [⊗] ×			
"									-						
=									3						
3 = 3									<u>-3</u>						
									E,						
									E						
4									Ė,						
"									= 4						
									E						
									E						
			S	TRATA					<u>5</u> S	4 МРІ	FS &	TESTS			
Depth	No			DESCRIPTION			In Situ Tests	Water		(m) N		marks/Tests			
0.00-0.1	10	MADE GROUND:	Tarmac over	Clause 804 type m	aterial.		Tests								
0.10-0.7	⁽⁰	MADE GROUND:	Loose grey b	rown and black sli	ghtly silt	y sand & gravel.				İ					
0.70-2.0)5	MADE GROUND: with some cobbles a	Soft light and	l dark brown slight	ly grave	Ily sandy CLAY			0.00						
		with some cobbles a	and concrete	debris.	-	•			0.80	E	'				
2.05		TP terminated at 2.0	Sm hel				_								
			,,,,,,												
								İ							
10															
11/11															
5 2								ļ							
10.1															
ဗြိ															
2															
Shoring	g/Suppo ty: Pit s	ort: N/A										ERAL			
Staonin	iy. I it i	stable.										ARKS			
A BR	•									Pit dry	during	excavation,			
ATAL.		.20 ——► A													
휠 _ [<u>.</u>												
를 D		B 2.													
¥		C	-												
DLAGSS UKTP LOUGH ATALIA BRIDGE TPS.GPJ AGS 3-1.GDT 15/7/11 COLORIA TALIA BRIDGE TPS.GPJ AGS 3-1.GDT 15/7/11 D D D D D D D D D D D D D D D D D D	nsions in	Client Galway Ha	arbour 1	Method/ ICD			Bit		Drille	, T	T a.c.	d D.,			
d met Scale	res 1:62.5	Company		Method/ JCB Plant Used			Design		DF	Ç1	Logge	а Бу			

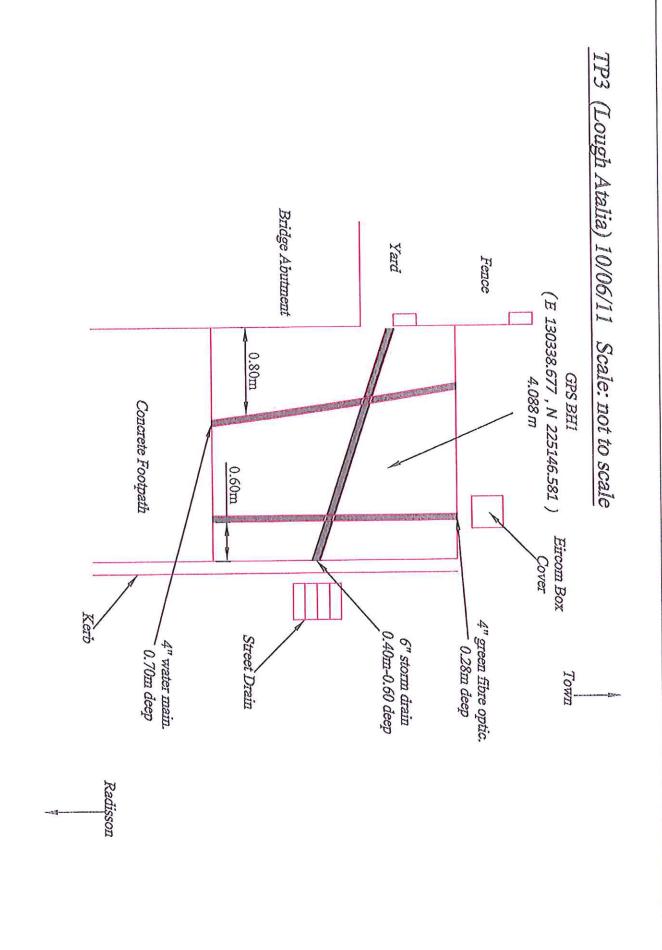
APPENDIX 4 INSPECTION PIT RECORDS



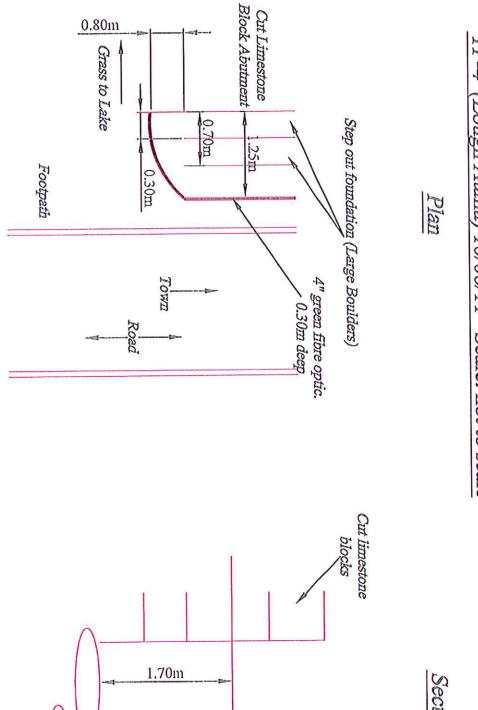
TP-2 (Lough Atalia) 9/06/11 Scale: not to scale





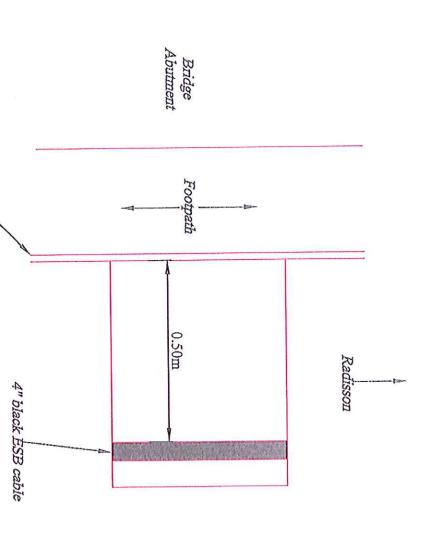


TP-4 (Lough Atalia) 10/06/11 Scale: not to scale



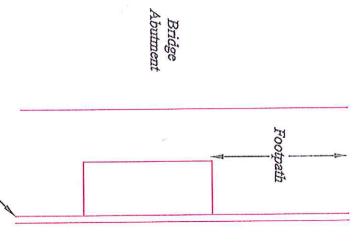
Ground Level

2.05m



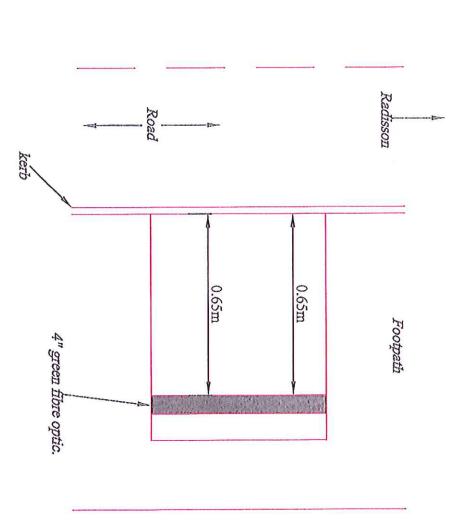
Note: Pit excavated on road

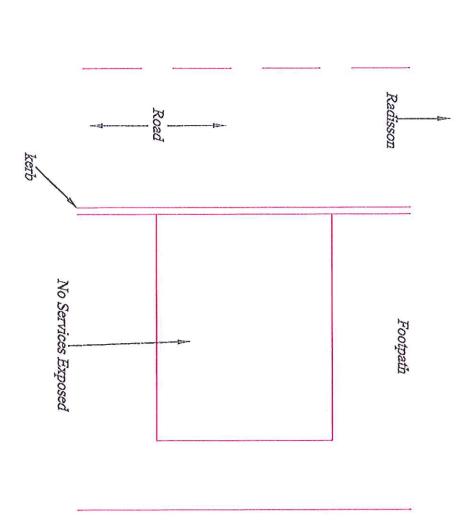
kerb



Note: No Services Exposed

kerb





APPENDIX 5 LABORATORY TEST RESULTS

CONTRACT: Lough Atalia
Client GHC
Engineer Tobin

Office Code
Date:
Scheduled By:

11G109 04/07/2011 rk/idl 001

				_		 	 		 						_	 _	_	 ,	
		Remarks/Loading																	
	ganic	າ0 ວວ							γ-		۲				-			3	3
	loride	CL																0	0
Chemical		Ηđ	1			-	1		1		1				1			6	\vdash
င်ာ	50		1		Ц	1	1		۳.		٠	_			-		L	9	9
	Shear	Box																0	0
	Ę	Vane																0	0
	Triaxial	Col-C																0	0
Strength	Triaxial	(o-c)																0	0
Settlement Strength	Consol																	0	0
	5 Point Comp																	0	0
	5 Point Comp	only																0	0
	MCV 1	Point																0	0
rks	CBR 1	point																0	0
Earthworks	5-point	MC<												. :				0	0
		Hydro	-			1	1		1		1							2	2
		PSD	-			1	1		٦		1		_		-			^	-
	Bulk	Density PSD																0	0
ication	Atterberg	Limits	1			1	1		1		1		1		-			7	7
Classification		(%)	1			1	1		1		-		-		-			^	\
	Sample	Depth	2	က	4	1.5	0.6	0.8	0.8	0.8	1.5		0.7		0.8			LED	TED
	Sample Sample	Type	В	В	В	В	В	יי	В	٦	В		മ		a			CHEDU	OMPLE
		BH/TP No.	BH 1			BH 2	TP 1		TP 2				TP 3		TP 4			TOTAL SCHEDULED	TOTAL COMPLETED

IRISH DRILLING LTD. Loughrea Co. Galway.	Contract: Loug Client: Engineer: Tobin	Contract: Lough Atalia Bridge Client: Engineer: Tobin	ø.	
Tel: (091)841274 Fax: (091) 847687 Lab@IrishDrilling.ie	Date: Tested By:	06/07/2011 KC	Code: Checked:	11G109 DCD

Summary of Soil Classification Tests BS1377: Part 2: 1990

		П	П	П	П	П		Т
BS5930:19990 Section 6	Description of fraction passing 425 micron sieve.	Clay - Low Plasticity	Clay - Low Plasticity	Clay - Low Plasticity	Oley Lear Doctions	Clay - Low Plasticity	Clay - Low Plasticity	Clay - Low Plasticity
Clause 9	% passing 425 micron %	57	09	α	8 6	52	46	59
Clause 5.4	Plasticity Index %	8.8	0.80	α «	3	9.4	11.8	13.6
Clause 5.3	Plastic Limit %	9.4	11.5	, ,	2	11.1	20.8	19.2
Clause 4.3	Liquid Limit %	18.2	20.4	2	5	20.5	32.6	32.8
	Particle Density Mg/m3							
Clause 7.2 Clause 3.2 Clause 8.2	Moisture Content %	8.2	26	C	7:0	10.3	16.7	22.9
Clause 7.2	Bulk Density Mg/m3							
	Depth m	2.0-2.5	21.9	4	200	1.5	0.7	0.8
	Type	ω	+		١	m m	m	m
	Borehole/ Trialpit	BH 1	RH 2	, c		TP2	TP 3	TP 4

New: Printed 14/07/2011

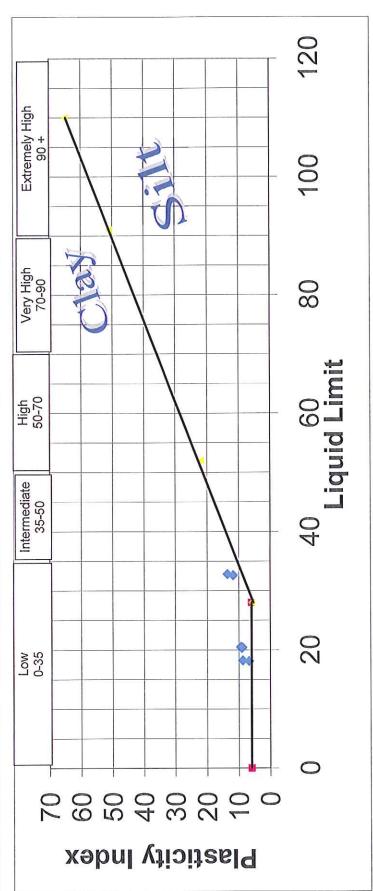
IRISH DRILLING LTD.	Lough Atalia Bridge
Loughrea Co. Galway.	0
	Tobin
Tel: (091)841274	06/07/2011
Fax: (091) 847687	KC
Lab@IrishDrilling.ie	0

Soils are described using BS5930 :1999.Clause 41. V: visual only description
P: description using values obtained from PSD results. Note:

Borehole/ Trialnit	Type	Depth		Visual Description of Natural soil	I ioniidity Index	Consisency Limit
1		٤		00000		(wl-w)/(IP)
BH 1	В	2.0-2.5	۵	Light olive-brown slightly gravelly slightly sandy SILT.	-0.14	1.14
BH2	В	1.5-1.9	А	Multicoloured slightly gravelly sandy SILT.	-0.26	1.26
TP 1	В	9.0	۵.	Yellowish-brown slightly gravlely slightly sandy SILT.	-0.31	1.31
TP 2	В	0.8	۵	Yellowish-brown slightly sandy gravelly SILT.	0.05	0.95
TP 2	В	1.5	Д	Multicoloured slightly gravelly slightly sandy SILT.	-0.09	1.09
TP 3	В	0.7	а	Yellowish-brown very silty SAND and GRAVEL.	-0.35	1.35
TP 4	В	8.0	d.	Yellowish-brown slightly gravelly sandy SILT / CLAY.	0.27	0.73

New: Printed 14/07/2011

IRISH DRILLING LTD.	Contract:	Lough Atalia Bridge	Sridge	
Loughrea Co. Galway.	Client:	0		
	Engineer:	Tobin		
Tel: (091)841274	Date:	06/07/2011		
Fax. (091) 847687	Tested By:	KC	Checked:	DCD
<u>Lab@IrishDrilling.ie</u>				



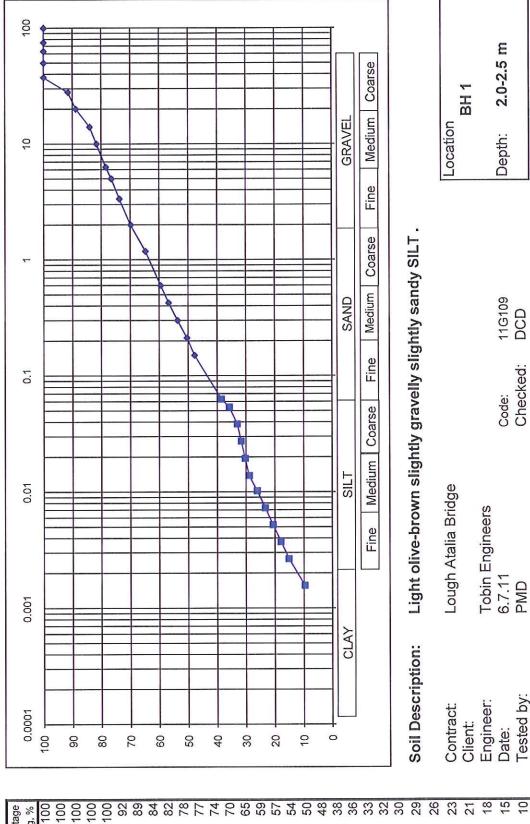
PARTICLE SIZE DISTRIBUTION

Percentage passing, %

Sieve size

шш

BS 1377: 1990: PART 2 (9.2, 9.5)



100 75 63 37.5 28 28 20 14 10 6.3 3.35 3.35 0.600 0.212 0.212 0.027 0.003 0.003 0.003 0.003

Light olive-brown slightly gravelly slightly sandy SILT. Soil Description:

0.010

0.0052

0.0037 0.0027

0.007

Lough Atalia Bridge		Tobin Engineers	6.7.11	PMD
Contract:	Client:	Engineer:	Date:	Tested by:

2.0-2.5 m BH1 Location Depth:

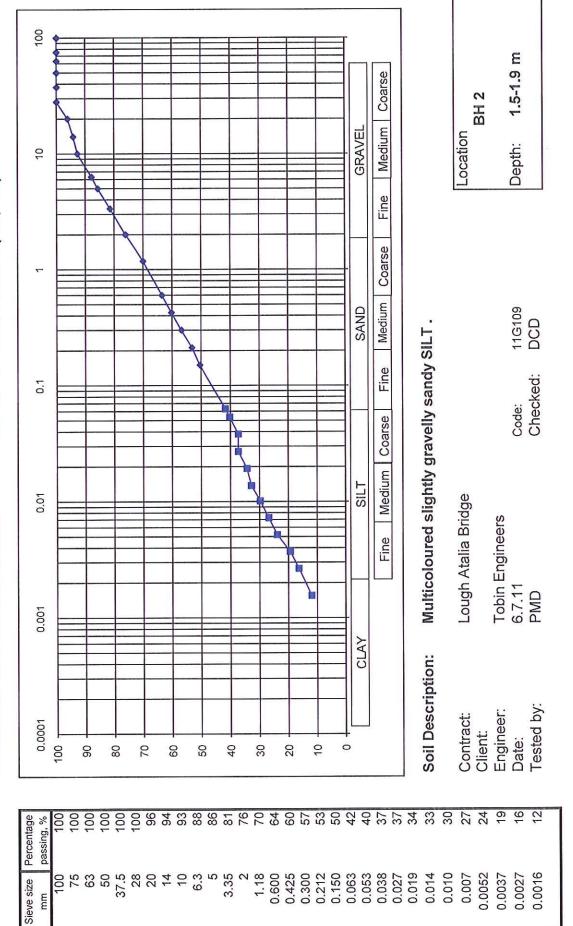
11G109 DCD

Checked:

Code:

PARTICLE SIZE DISTRIBUTION

BS 1377: 1990: PART 2 (9.2, 9.5)

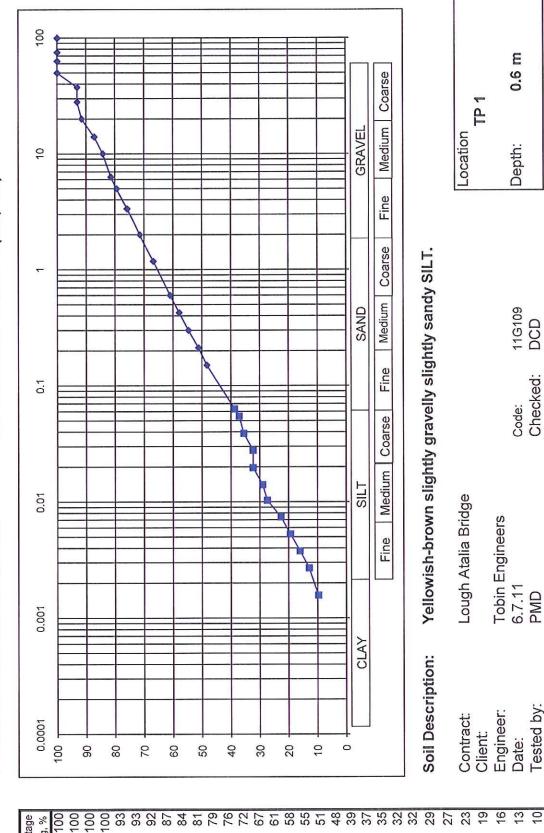


PARTICLE SIZE DISTRIBUTION

Percentage passing, %

Sieve size mm

BS 1377: 1990: PART 2 (9.2, 9.5)



100 75 63 37.5 28 20 20 14 10 6.3 3.35 3.35 0.000 0.000 0.0150 0.003 0.003 0.003 0.003 0.003

Yellowish-brown slightly gravelly slightly sandy SILT. Soil Description:

> 0.010 0.007

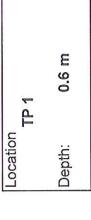
0.0038

0.0027

0.0053

0.0016

		Code:	Checked:
Lough Atalia Bridge	Tobin Engineers	6.7.11	PMD
Contract: Client:	Engineer:	Date:	Tested by:



11G109

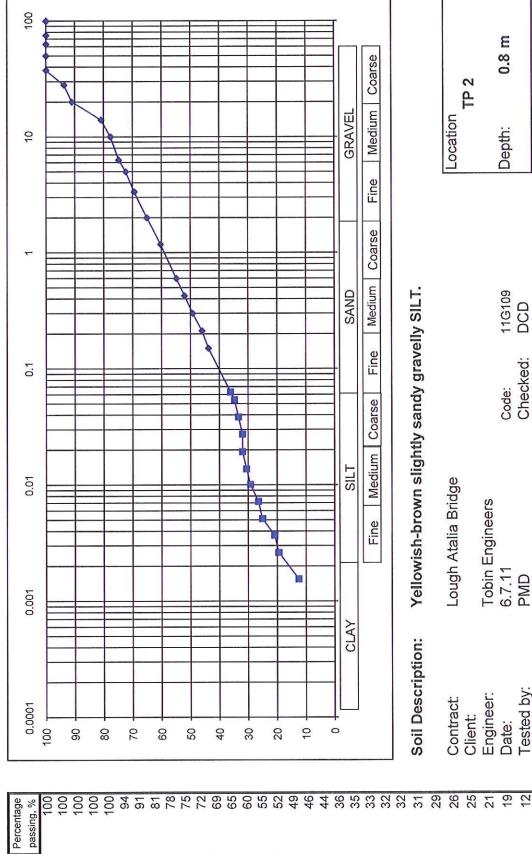
DCD

Sieve size

E

PARTICLE SIZE DISTRIBUTION

BS 1377: 1990: PART 2 (9.2, 9.5)



100 75 63 50 37.5 28 20 14 10 6.3 3.35 1.18

Tobin Engineers Engineer: Client:

0.300 0.212 0.150 0.063 0.054 0.038 0.027 0.019

0.425

0.010

0.007 0.0051 0.0037 0.0026

6.7.11 PMD Tested by: Date:

11G109 DCD

Checked:

Code:

0.8 m TP 2 Depth:

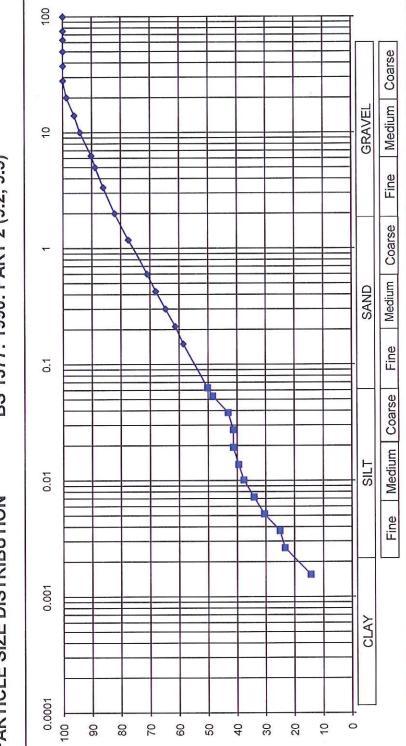
PARTICLE SIZE DISTRIBUTION

Percentage passing, %

Sieve size

E

BS 1377: 1990: PART 2 (9.2, 9.5)



100 75 63 37.5 28 28 20 14 10 6.3 3.35 3.35 0.000 0.212 0.212 0.027 0.003 0.003 0.003

Multi-coloured slightly gravelly slightly sandy SILT. Soil Description:

Lough Atalia Bridge Tobin Engineers 6.7.11 PMD Tested by: Engineer: Contract: Client: Date:

0.0037

0.0026

0.010 0.007 0.0052

1.5 m **TP 02** Location Depth:

11G109 DCD

Checked:

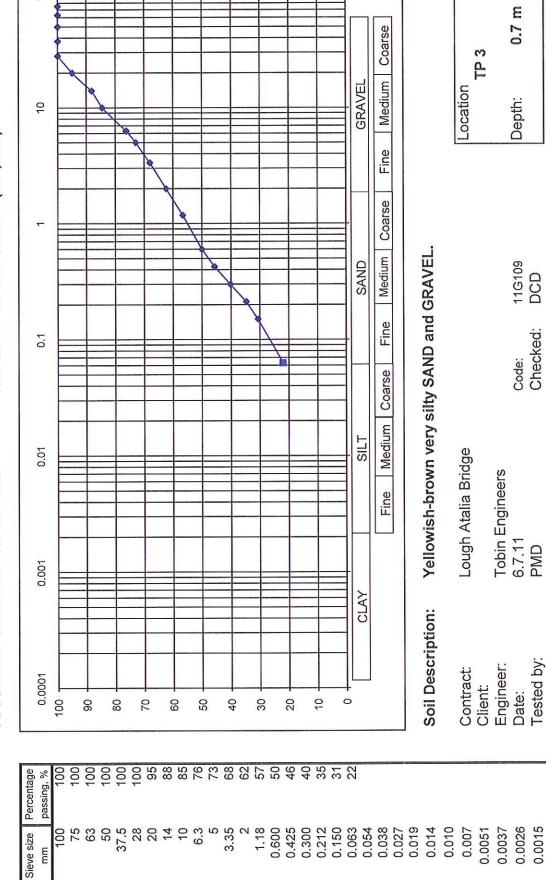
Code:

\text{\text{\lab\$\text{\text{\lab}}\text{\tin}\xint{\texi}\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\t

PARTICLE SIZE DISTRIBUTION

BS 1377: 1990: PART 2 (9.2, 9.5)

100

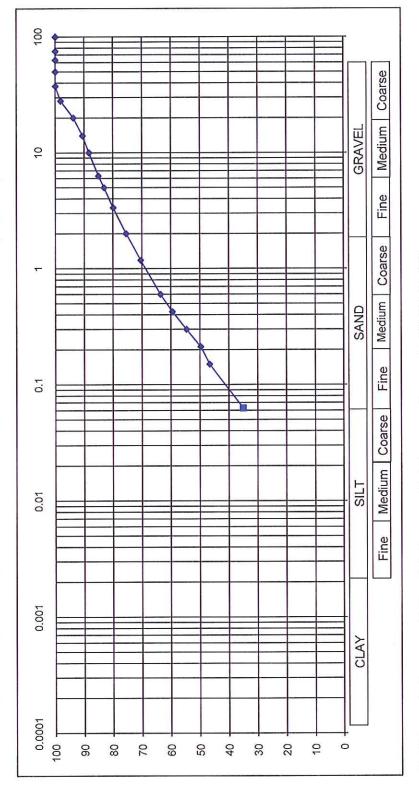


PARTICLE SIZE DISTRIBUTION

Percentage passing, %

Sieve size mm

BS 1377: 1990: PART 2 (9.2, 9.5)



100 75 63 37.5 28 20 20 14 10 6.3 3.35 3.35 0.060 0.070 0.070 0.063 0.063 0.063

Soil Description: Yellowish-brown slightly gravelly sandy SILT / CLAY.

0.014

0.007 0.0052 0.0037

Contract: Lough Atalia Bridge Client: Tobin Engineer: 6.7.11

Location

TP 04

Depth: 0.8 m

11G109

DCD

Checked:

PMD

Tested by:

0.0026

Code:

\idlsrv1\lab\$\My Documents\Dympna\11G109_LoughAtaliaBridge\ R2.PSD_TP4@0.8.xls

Lough Atalia Contract: Client:

JOD 5.7.11 Engineer: Date: Tested by:

ОС

11 G 109 DcD Code: Checked:

Chemical And Electro-chemical Tests: BS1377:Part 3:1990

Note: Sulphate expressed as SO3. If SO4 required, multply by 1.2.

ı			1	 1	1	ı	_		T		ı	
	Percent passing	2mm sieve %										
Clause 3	Organic Content	Oxidation) 2m %										
Clause 4	Loss on Ignition	%						0.91	1.39	3.4		
Clause 7.2	Water Soluble Chloride in Soil (as 2:1 water	soil extract) mg/kg										
Clause 5.2, 5.5	Acid Soluble Sulphate	in soil % SO ₃										
Clause 5.3, 5.5 Clause 5.3, 5.5 Clause 5.2, 5.5	Water soluble Sulphate	in soil % SO ₃		0.037	0.023	0.003		0,003	0.04	0.011		
Clause 5.3, 5.5	Water soluble Sulphate	in 2:1 extract g/l SO ₃		0.185	0.117	0.014		0.014	0.199	0.055		
Clause 9	Hd	pH units		8.9	8.53	8.83		8.77	8.36	8.44		
	Depth	Œ		2.0-2.5	1.5	9.0		9.0	1.5	0.8		
Clause	Sample			BH 1	BH 2	TP 01		TP 02	TP 02	TP 04		

New:Printed 14/07/2011

CONTRACT: Client Engineer

Lough Atalia

Tobins

Date: 6.7.11 Scheduled By: BH @ Tobin Office Code 11G109

			 										_
		Remarks/Loading				* UCS test not possible where scheduled							
	Conten												
		Chloride t											
ca	1	Ηd											
Slake [Chemical		SO3											
Slake		Depth Depth			 	ļ	 		 		 	 	
		Depth											
	mic Stiffne	SS					 						
	, ,	ncs				*			4				
	Point	Load		7		5		2	2				
		MC (%)											
	Sample	Type	OB	R	OB			R	R				
	Sample Depth		8.30	9.20	8.60	9.60		9.70	9.5				
	Sample Depth	(Lop)	00.0	8.30	00.0	8.60		00'0	0.0				
		BH/TP No.	RC 1		RC 2			RC 3	RC 4				

Total Completed Total Scheduled

00 00 00 00 **←** α ∞ ∞ 00

00

00

00

IRISH DRILLING LTD.	Contract:	Lough Atalia Bridge		
Loughrea Co. Galway	Client:			
Lab@IrishDrilling.ie	Engineer:	JOD		
Tel: (091) 841274	Date:	7.7.11		
Fax: (091) 847687	Tested by:	KC	Checked:	DCD

Point Load Tests ISRM Methods

(UCS by calculation from Rock Slope Engineering: E.Hoek and JW Bray)

Diametrical Tests:

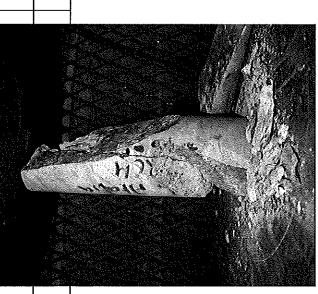
Borehole	Depth	D	W	De ²	Р	ls MPa	F	Is ₍₅₀₎ MPa	Factor	UCS (calc) MPa	Remarks
RC 1	8.42-8.62	47.4	47.4	2249	31.3	13.92	0.976	13.59	22.40	304.45	Extremely Strong Extremely Strong
RC 1	8.91-9.10	47.4	47.4	2246	35.0	15.58	0.976	15.21	22.40	340.77	
RC 2	8.82-9.0	47.4	47.4	2245	30.4	13.54	0.976	13.22	22.40	296.08	Extremely Strong Extremely Strong
RC 2	9.29-9.4	47.4	47.4	2247	30.7	13.66	0.976	13.34	22.40	298.81	
RC 3	3.6-3.82	47.3	47.3	2234	11.4	5.10	0.975	4.98	22.40	111.47	Very Strong
RC 3	9.28-9.48	47.3	47.3	2239	20.6	9.20	0.976	8.97	22.40	201.03	Extremely Strong
RC 4	2.6-3.4	47.2	47.2	2231	7.0	3.14	0.975	3.06	22.40	68.51	Strong
RC 4	9.28-9.5	47.2	47.2	2229	18.4	8.26	0.974	8.05	22.40	180.21	Very Strong

Note: UCS calculated as 21.4 x Point Load is an estimate of expected strength for a 42mm core. Note: UCS calculated as 25.4 x Point Load is an estimate of expected strength for a 63mm core. Note: UCS calculated as 29.4 x Point Load is an estimate of expected strength for a 85mm core.

Unconfined Compressive Strength of rock cores: ASTM D7012-07 Irish Drilling Ltd

Contract	Lough Atalia Brdge.	Job Code:	11G109
Client		Date:	11.7.11
Engineer	OOL	Tested By:	KC

Strength Designation	Strong	
Maximum Uniaxial Load (kN) Compressive Strength Strength (Mpa) Designation	90.5	
Maximum Load (kN)	158.70	
Mode of Failure	190.0 Vertical Shear	
y Test Duration (secs)	190.0	
Sample Bulk density Length . (Ma/m3)	2.764	
Sample Length (mm)	136.25	
Sample Diameter (mm)	47.25	
Depth (m)	7.9-8.15	
Borehole No:	RC 4	



APPENDIX 6 PHOTOGRAPHS











