

Gas Remediation Strategy Report

Rivermead Leisure Centre New Build, Reading



Imagery © 2021 Google Earth.

Contract No./Report Type: 21-069/RMS
Produced for Pellikaan Construction Ltd

AG Geo-Consultants Ltd

Report Title
Gas Remediation Strategy Report

Project	Project No./Report Type
Rivermead Leisure Centre New Build, Reading	21-069/RMS

Client Name
Pellikaan Construction Ltd

Issue Date/Version	Status	Comments, Description of Amendments
8 th December 2021	Preliminary	-
10 th December 2021	Final	-

Report Prepared by:			
André Gilleard	Director SiLC QP CSci CEnv BEng(Hons) andre@ag-geoconsultants.co.uk Tel: 07395 100 727	 The logo for SiLC (Specialist in Land Condition) features a stylized 'S' and 'i' in a green circle, followed by 'silk' in a brown box. Below this, it says 'SPECIALIST IN LAND CONDITION' and 'André Gilleard Reg No. A1201'.	 A handwritten signature in black ink, appearing to read 'A. Gilleard'.

[Specialist In Land Condition \(SiLC\) No.A1201](#) [Qualified Person \(QP\), No.086 \(Definition of Waste, Industry Code of Practice, DoWCoP\)](#)

This report is provided for the benefit of the Client. We do not accept responsibility in the event that the report contents are used in whole or in part by a third party and we exercise no duty of care to any such third party. © AG Geo-Consultants Ltd

AG Geo-Consultants Ltd

Gas Remediation Strategy Report
Rivermead Leisure Centre New Build, Reading

Contents

1	Introduction	2
1.1	Introduction.....	2
1.2	Proposed Development.....	2
1.3	Brief	2
1.4	Limitations.....	2
2	Phase 1 Desk Study & Phase 2 Site Investigation	3
2.1	Introduction.....	3
2.2	Significant Points	3
3	Further Work	6
3.1	Further Monitoring.....	6
3.2	Review & Additional Assessment	6
3.3	Radon Risk to Humans.....	7
4	Gas Protection	8
4.1	Design - General	8
4.2	Design - Pools Area.....	8
4.3	Design - Remaining Area	10
4.4	Verification	10

Appendices

1 Introduction

1.1 Introduction

AG Geo-Consultants Ltd (AGGC) were commissioned by and on behalf of Pellikaan Construction Ltd (the Client) to produce this *Gas Remediation Strategy Report* for a site known as *Rivermead Leisure Centre New Build*, Reading (the “Site”).

1.2 Proposed Development

The proposed development (see plan in Appendix A) comprises demolition of the existing leisure centre and construction of a new one nearby. The new building has two deep swimming pools and a further large floor area for indoor sports.

1.3 Brief

The planning permission (Ref 201734) contains the following contaminated land conditions:

- 8: Desk study and ground investigation.
- 9: unexpected contamination during construction
- 10: Remediation (and risk-reduction) strategy report (RMS) for only land gas risk.
- 11: implement gas RMS, validate and report the gas remediation.

The client’s brief was to:

- Prepare a suitable document to satisfy Condition 10, which relates to remediation for land gas risk.

1.4 Limitations

This report is provided for the benefit only of the party to whom it is addressed and we do not accept responsibility to any third party for the whole or any part of the contents and we exercise no duty of care in relation to this report to any third party.

Where intrusive investigations have been completed, information, comments and opinions given in this report are based on the ground conditions encountered during the site work and on the results of laboratory and field tests performed during the investigation. However, subsoils are inherently variable and hidden from view such that no investigation can be exhaustive to the extent that all soil conditions are revealed. Conditions may therefore be present beneath the site that were not apparent in the data reviewed as part of this assessment. In particular, it should be noted that groundwater levels vary due to seasonal and other effects and may at times differ to those measured during the investigation.

This assessment has been based to a large extent on data acquired from Third Parties. This data has been taken at face value and has not been subjected to any additional validation.

Unless specifically noted to the contrary, it should be assumed that this report has not been submitted to any regulatory authorities for approval.

2 Phase 1 Desk Study & Phase 2 Site Investigation

2.1 Introduction

Soils Ltd previously completed the following reports for the site owner, Reading Borough Council:

- *Preliminary Investigation Report* (Report ref: 17755/PIR, dated August 2019).
- *Contaminated Land Statement by Furness Partnership* (undated).
- *Main Investigation Report*, Rivermead Leisure Centre, Richfield Avenue, Reading, Ref 17755/MIR_R27 Rev1.01. This report is dated August 2019 but was actually written in January 2020.

The main findings from these that relate to gas risk are as summarised below.

2.2 Significant Points

Table 2.1 Desk Study

Historical Site Use	The site was used as a landfill from 1970 to 1979.
Current Use of Site	One to two storey leisure centre complex, with associated parking and public recreational play area. The site is relatively flat with a gentle slope down to the west and the northern part gently sloping down to the north towards the River Thames.
Potential Ground Conditions	<u>BGS Mapping Suggests:</u> • Made Ground (MG): historic landfill. • Drift Deposits: <i>Langley Silt Member</i> (sandy clay) (with <i>Kempton Park Gravel</i> (KPG)(sand & gravel) and <i>Alluvium</i> (sand, gravel silt and clay), in the surroundings). • Solid Geology: <i>Seaford and Newhaven Chalk Formation</i>.

Table 2.2 Site Investigation

Scope of Investigation	• 4no. dynamic sample holes to 1.5-4m depth. • 8no. cable percussion boreholes (BH), 4x 12m deep, 2x 15m and 2x 20m deep. • Installation of 3no. gas/groundwater monitoring wells to 15m depth, in BH1-BH3. • 12no. gas monitoring visits.
Actual Ground Conditions	• 0m to 2.2-4.3m depth: Made Ground (MG) containing anthropogenic components of brick, glass, tiles, slate, plastics, metals, wood, paper and fabric. • 2.2-4.3m to 8.5-10.5m: <i>Kempton Park Gravel</i> (KPG)(sand & gravel) • 8.5-10.5m to >20m: <i>Seaford and Newhaven Chalk Formation</i>. The <i>Langley Silt Member</i> was absent and no <i>alluvium</i> was found.
Indications of Contamination	Hydrocarbon type odours were noted in trial holes BH2, BH4, BH5, BH6, BH7, WS3 and WS4 (i.e. 7no. of 12no. boreholes). They were described at 2x <i>distinct, strong</i> , 3x <i>faint/decomposition</i> or <i>distinct/decomposition</i> , 2x <i>faint</i> , or just <i>odour</i> .
Groundwater	Struck at 0.7-4.5m depth during drilling. Standing at 2.4m to 3.0m depth during monitoring (25 th July 2019 to 3 rd January 2020).

AG Geo-Consultants Ltd

Gas Remediation Strategy Report Rivermead Leisure Centre New Build, Reading

Gas Results	- Monitoring was conducted from 25th July 2019 to 3rd January 2020. - The site investigation report states that: - during the monitoring period BH2 was damaged and the head works reinstated. - Initial testing of soil gas was followed by a period of gas monitoring up to January 2020. - Results are shown overleaf. - The results of the ternary plot indicate that BH1 and BH3 are generating soil gas concentrations that fluctuate between land gas and microbial respiration within the soils beneath the site. This indicates that this may be an artefact caused by the installation process whereby oxygen introduced into the underlying landfill has initiated aerobic activity into a system that was anaerobic prior to drilling. It also suggests some level of variability within the landfill materials themselves and their relative decomposition rates. - As noted on the ternary plot, BH2 exhibited a completely different gassing environment, where elevated methane and carbon dioxide were recorded along with low to very low concentrations of oxygen. This suggests bacterial activity is dominant with a process of methane oxidation occurring via the introduction of oxygen into the system probably by the construction of the monitoring well as it appears to reduce over time. The extent of this oxidation is considered to be primarily constrained by the movement of oxygen within the borehole. - Whereas the preliminary report suggested the site may fall into category CS4 for gas protection measures, results of the gas monitoring show that it falls under the less onerous CS3 category. - conditions giving rise to CS3 & CS4 only occurred on 3no. and 1no. occasions respectively, during the entire monitoring period. - The elevated flow readings and differential pressure recorded in BH1 and BH2 were attributed to high wind speeds during the monitoring. - Gas protection measures for the proposed development (sub-floor membranes, etc.) will therefore need to conform to a CS3 level.
-------------	--

Soils Ltd summarised the results as follows:

Monitoring Well	Highest Concentration		Flow Rate (l/h)	Hazardous Flow Rate (Q _h)
	Methane	Carbon Dioxide		
BH1	50.0	19.4	1.9	(Methane) 0.95 (Carbon Dioxide) 0.36 l
BH2	87	18	4.9	(Methane) 4.263 (Carbon Dioxide) 0.882
BH3	30	16	0.2	(Methane) 0.06 (Carbon Dioxide) 0.06

Note: Where flow rates were recorded below the detection limits of the gas monitor a flow rate of 0.1 l/hr has been adopted in line with current standards and guidance

Full results are presented overleaf.

AG Geo-Consultants Ltd

Gas Remediation Strategy Report Rivermead Leisure Centre New Build, Reading

Date	Trial Hole	CH ₄ (v/v %)	CO ₂ (v/v %)	O ₂ (v/v %)	H ₂ S (ppm)	CO (ppm)	LEL (%)	aP (mb)	Flow (l/h)	H ₂ O (m bgl)	VOC (ppm)	Dp (Pa)
25/07/19	ATM	<0.1	<0.1	20.4	<0.1	<0.1	<0.1	1000	<0.1	-	<0.1	-
	BH1	40.5	19.0	0.1	<0.1	1.0	>>>>	1000	<0.1	2.75	<0.1	0
	BH2	82.0	11.0	<0.1	1.0	<0.1	>>>>	1000	1.8	2.65	<0.1	4
	BH3	29.5	13.0	0.1	<0.1	<0.1	>>>>	1000	0.2	2.99	1.0	0
05/08/19	ATM	<0.1	<0.1	20.0	<0.1	<0.1	<0.1	1004	<0.1	-	<0.1	-
	BH1	23.0	17.0	3.2	<0.1	<0.1	>>>>	1004	0.5	2.75	<0.1	0
	BH2	85.0	12.0	<0.1	<0.1	<0.1	>>>>	1004	4.9	2.68	<0.1	12
	BH3	30.0	15.0	<0.1	<0.1	<0.1	>>>>	1002	<0.1	3.04	1.0	0
15/08/19	ATM	<0.1	<0.1	21.0	<0.1	<0.1	<0.1	1007	<0.1 ¹	-	<0.1	2 ¹
	BH1	<0.1	0.9	20.3	<0.1	<0.1	<0.1	1007	1.0 ¹	2.72	<0.1	2 ¹
	BH2	80.0	11.5	1.4	<0.1	<0.1	>>>>	1007	2.4 ¹	2.62	<0.1	5 ¹
	BH3	<0.1	2.7	19.3	<0.1	<0.1	<0.1	1007	<0.1 ¹	3.04	1.0	0 ¹
10/09/19	ATM	<0.1	<0.1	21.1	<0.1	<0.1	<0.1	1014	<0.1	-	<0.1	0
	BH1	7.7	12.0	1.1	<0.1	1.0	55.0	1014	0.6	2.75	<0.1	1
	BH2	Well damaged – not serviceable. Well repaired 27/09/19.										
	BH3	<0.1	4.5	13.3	<0.1	<0.1	<0.1	1014	<0.1	3.05	3.0	0
17/09/19	ATM	<0.1	<0.1	21.5	<0.1	<0.1	<0.1	1019	<0.1	-	<0.1	0
	BH1	17.0	17.0	0.1	<0.1	<0.1	81.0	1019	<0.1	2.77	<0.1	0
	BH2	Well damaged – not serviceable. Well repaired 27/09/19.										
	BH3	0.5	8.6	6.9	<0.1	<0.1	6.0	1019	<0.1	3.05	1.0	0
08/10/19	ATM	<0.1	<0.1	21.3	<0.1	<0.1	<0.1	1004	<0.1	-	<0.1	0
	BH1	41.0	18.0	<0.1	8.0	<0.1	>>>>	1004	1.2	2.64	<0.1	2
	BH2	80.0	18.0	<0.1	8.0	<0.1	>>>>	1004	<0.1	2.52	<0.1	0
	BH3	22.0	16.0	<0.1	<0.1	<0.1	>>>>	1004	<0.1	2.90	5.0	0
23/10/19	ATM	<0.1	<0.1	21.2	<0.1	<0.1	<0.1	1006	<0.1	-	<0.1	0
	BH1	42.0	17.0	<0.1	19	<0.1	>>>>	1006	1.2	2.62	<0.1	3
	BH2	77.0	12.0	2.1	<0.1	<0.1	>>>>	1006	<0.1	2.52	<0.1	0
	BH3	20.5	14.0	<0.1	<0.1	<0.1	>>>>	1006	<0.1	2.92	<0.1	0
31/10/19	ATM	<0.1	<0.1	20.3	<0.1	<0.1	<0.1	1013	<0.1	-	<0.1	0
	BH1	45.5	16.0	<0.1	19.0	<0.1	>>>>	1013	<0.1	2.60	<0.1	0
	BH2	80.0	12.0	1.7	<0.1	<0.1	>>>>	1013	<0.1	2.52	<0.1	0
	BH3	25.5	14.0	0.3	<0.1	<0.1	>>>>	1013	<0.1	2.88	1.0	0
11/11/19	ATM	<0.1	<0.1	21.3	<0.1	<0.1	<0.1	998	<0.1	-	<0.1	0
	BH1	50	15.0	<0.1	<0.1	<0.1	>>>>	998	1.9	2.48	<0.1	4
	BH2	87	12.0	<0.1	<0.1	<0.1	>>>>	998	<0.1	2.39	<0.1	0
	BH3	26.5	14.0	0.1	<0.1	<0.1	>>>>	998	<0.1	2.76	<0.1	0
28/11/19	ATM	<0.1	<0.1	20.1	<0.1	<0.1	<0.1	994	<0.1	-	<0.1	0
	BH1	26.8	15.0	5.5	<0.1	<0.1	>>>>	994	-0.4	2.52	1.0	-2
	BH2	72	10.9	1.6	<0.1	<0.1	>>>>	994	<0.1	2.41	<0.1	0
	BH3	<0.1	1.0	19.5	<0.1	<0.1	<0.1	994	<0.1	2.78	1.0	0
09/12/19	ATM	<0.1	<0.1	20.1	<0.1	<0.1	<0.1	1009	<0.1	-	<0.1	0
	BH1	12	8.7	13.3	<0.1	<0.1	>>>>	1009	-1.0	2.50	<0.1	-4
	BH2	79.5	11.3	0.1	<0.1	<0.1	>>>>	1009	<0.1	2.56	<0.1	0
	BH3	<0.1	0.4	19.8	<0.1	<0.1	<0.1	1009	<0.1	3.00	1.0	0
03/01/20	ATM	<0.1	<0.1	20.0	<0.1	<0.1	<0.1	1022	<0.1	-	<0.1	0
	BH1	<0.1	0.3	19.9	<0.1	<0.1	<0.1	1022	-2.0 ¹	2.56	<0.1	-7 ¹
	BH2	69.9	8.4	2.7	<0.1	<0.1	>>>>	1022	-0.8 ¹	2.44	<0.1	-3 ¹
	BH3	<0.1	0.70	19.4	<0.1	<0.1	<0.1	1022	<0.1 ¹	2.82	<0.1	0 ¹
Minimum		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	994	-2.0	2.39	<0.1	<0.1
Maximum		87.0	19.0	20.3	19.0	1.0	>>>>	1022	4.9	3.05	5	5.0
Note: reading of <0.1 = not detected (below detection level). VOC=Volatile Organic Compounds. Dp=Pressure Difference. ¹ Strong wind conditions recorded. >>>> = above instrument detection level.												

3 Further Work

3.1 Further Monitoring

1no. further return visit has have been made to site on the 5th November 2021 (by *Testing & Consultancy Services Ltd*). Gas and vapour concentrations were measured. Results were as follows.

	CH4 %	CO2 %	O2 %	LEL %	Flow (l/hr)	Atm Pressure mbar
BH1	0.0	0.1	20.7	0.0	-1.0	1028
BH2	65.5	4.1	5.8	0.0	-1.5	1028
BH3	0.4	0.2	19.9	0.0	-0.2	1028

Negative flow rates are taken as being zero since they do not indicate gas generation, but usually indicate dropping water levels within monitoring wells, or well/atmospheric pressures equalising.

Groundwater levels were not measured, nor were steady state flow rates.

The results are in line with previous findings.

3.2 Review & Additional Assessment

AGGC have reviewed the Soils Ltd findings and would comment as follows:

- The Soils Ltd investigation covers the entire footprint of the new build and found the made ground/landfill materials to be similar composition across all holes.
- Flow rates are given, but it is not stated whether they are **steady state** or **initial** flow rates.
- Something odd has gone on with well BH2. To start with it was giving high gas flow rates, but then it got damaged and it's headworks (stopcock cover and possibly gas tap and bung and the top of the well pipe) were repaired. After repair the flows rates were repeatedly zero. We asked Soils Ltd for comment and they replied.... *Our records indicate that it was simply replacement of the headworks i.e. the cover and surrounding concrete following damage by a lorry. As such, the repair should have had little or no effect on the results and the subsequent monitoring results show that the well was operational and not blocked, which could otherwise suggest the reason for the change in readings.*

Also that...*The report notes that gas in this location was locally generated and a result of simply opening the hole into a potentially active source. There is in such cases (and my experience) often a descending lag in flow and volume as the immediate gasses are used up. The triangular plot of the data indicates strong bacterial action as the likely source for these elevated results. That the hole was essentially left open for at least two weeks (in its damaged state) would mean that the rate of decline would increase even more during such a period as the bacteria went into overdrive in the free oxygen environment and used up their immediate local sources. So with nothing left to eat and generate gas you would expect flow and volumes to decrease as recorded. The seemingly very significant change is because it was open in that critical time period and so we could not see it reducing over time as it used up the local sources.*

Also that....*The monitoring technician and equipment remained the same.*

- The boreholes clearly have paper, wood, fabric that can generate gases, as well as faint hydrocarbon odours, which can also produce methane during degradation.

AG Geo-Consultants Ltd

Gas Remediation Strategy Report Rivermead Leisure Centre New Build, Reading

The new swimming pools are up to 4.5m deep and so in those areas will remove all of the gassing soils. Elsewhere, the pool bases are shallower, however **all made ground within the contiguous piled box is to be removed.**

Given that this is an old landfill (**the landfill material is now ≥ 42 yrs old**) and given some of the gas concentrations, then we agree that Class CS3 is probably an appropriate level of protection.

Given the very nature of landfill material, then some of the results are likely to be due to isolated and trapped pockets of gas, that well installations have intercepted and opened pathways that would not previously have existed

3.3 Radon Risk to Humans

Reference to the UK Radon atlas shows that the site lies in a 1km grid square where the highest risk is 0-1% (low risk) for which **no radon protection** is required for new buildings or extensions on site.

4 Gas Protection

4.1 Design - General

The building type from BS8485 Table 3 is considered to be Type C, due to (inter-alia) small to large room sizes and active ventilation.

For a Type C building and CS3 protection, the required score is 3.0.

BS8485 states that *protection should be provided by:*

1. **preventing gas entering buildings;**
2. **designing to avoid the build-up of hazardous gas beneath buildings or in subsurface infrastructure, e.g. inspection chambers and service runs; and**
3. **designing to avoid the build-up of hazardous gas within buildings.**

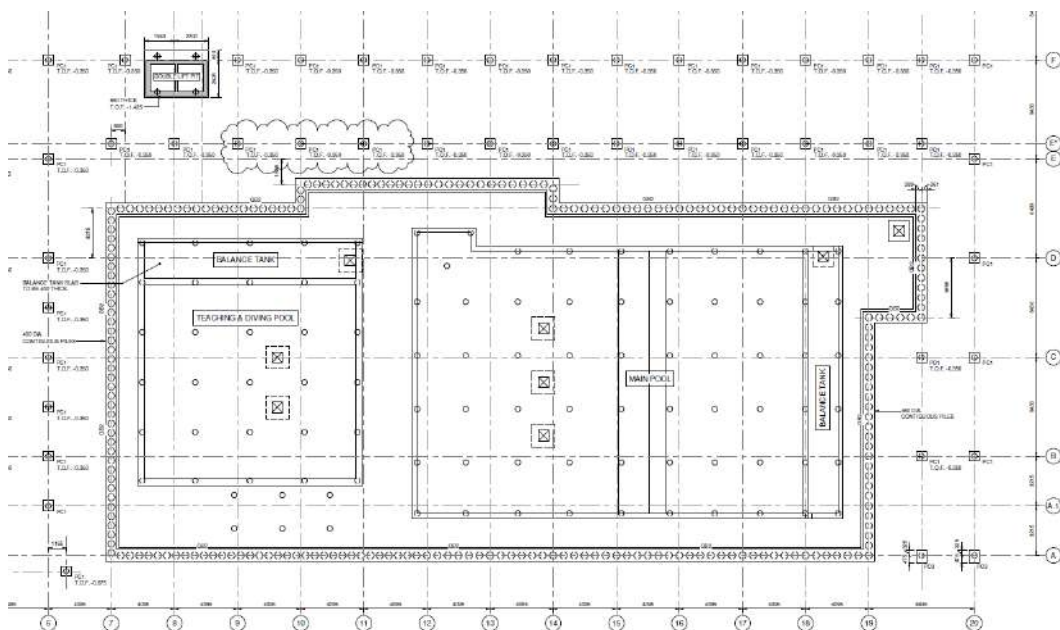
The new building can be spilt up into 2no. differing forms of construction:

1. The swimming pools area surrounded by a contiguous piled wall/box (see the line/box of circles on the *Foundation Layout* plan in Appendix A and below)
2. The remainder of the leisure centre (see the third plan in Appendix A).

4.2 Design - Pools Area

The depth of pool construction requires a contiguous pile retaining wall to permit such. Because that cut-off wall is not totally waterproof (nor gas proof), then dewatering inside the walled area is required.

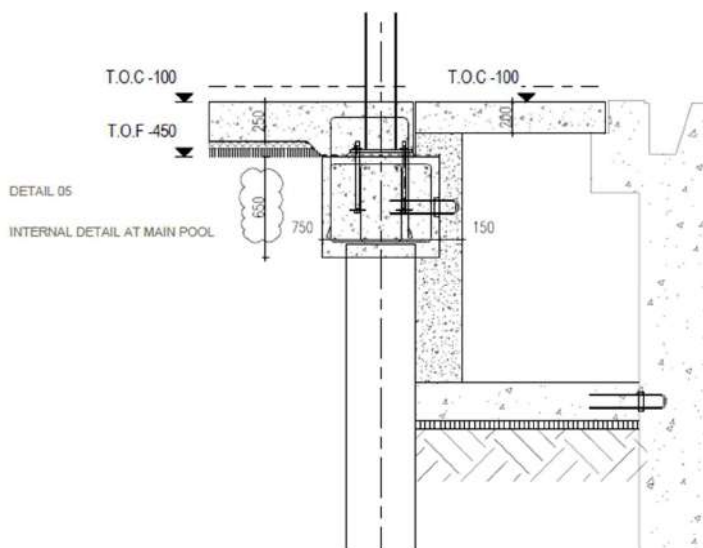
All made ground within the contiguous piled wall box is to be removed and will be replaced with engineered fill. That fill extends to the contiguous piled wall/box, that wall/box is not waterproof nor gas proof and so will permit pressure relief and connection with the sand blinding layer outside of the contiguous piled wall/box (see Section 4.3).



AG Geo-Consultants Ltd

Gas Remediation Strategy Report Rivermead Leisure Centre New Build, Reading

The main slabs within the contiguous piled wall/box, the pools and pool walls, are 0.3-0.5m thick and constructed from waterproof concrete. Such concrete has to be guaranteed to work to avoid loss of water from the pools. 99% of the time the pools will be full of water and so the only pathway could be into the air duct surrounding the pool (see below). That air duct will also use waterproof concrete.



The waterproof concrete floor slabs extend to the contiguous piled wall/box.

Our chosen protection for this area is as follows:

Protection Type	Protection Details	Score
Primary Protection: Structural barrier	Basement floor and walls conforming to BS 8102:2009, Grade 3 waterproofing (i.e. swimming pool grade concrete)	2.5
Secondary Protection: Ventilation	In lieu # of a pressure relief pathway (e.g. low fines gravel) our 2 nd protection is the robust active ventilation inside the building.	We consider that the in-building ventilation provides a score of 0.5 #.

#: unlike other building types in Class C (e.g. schools, hotels) the leisure centre has to control CO₂ concentrations and so has CO₂ monitors and active ventilation as follows.

The air-duct around the pool has 4-5 A/C (air changes per hr). Other air changes are:

VENTILATION RATES

Activity	10 l/s per Person
Breakout	10 l/s per Person
Seating/Reception	Natural Ventilation
Preparation area	15 A/C Extract
Toilets	10 A/C Extract
Dry Change	10 A/C Supply & Extract
Wet Change	10 A/C Supply & Extract
Cleaners	6 A/C Extract
Pool Hall	Specialist Design Min 4A/C
Pool Store	6 A/C Supply
First Aid	6 A/C Supply
Party Meeting	10 l/s per Person

There are no other rooms (such as offices) at ground level.

The score of 3.0 meets the required score of 3.0.

AG Geo-Consultants Ltd

Gas Remediation Strategy Report Rivermead Leisure Centre New Build, Reading

4.3 Design - Remaining Area

The remaining, non-pools parts of the leisure centre, outside of the contiguous piled wall/box, will have a cast-in-situ 0.25m thick slab, suspended upon a grid of pile caps. The pile caps are separate and have no ring beam.

Beneath the slab there will be an ATAL GP1 gas membrane, which is *a multi-layer, low-density polyethylene membrane, reinforced with a polypropylene reinforcing grid with an integral aluminium foil.....which meets the performance criteria for a gas resistant membrane as defined in BS 8485 : 2015* (see specification in Appendix D).

The membrane will be covered by 50mm of insulation, which reduces the risk of damaging the membrane, prior to the concrete slab being poured. This will lie on a sand blinding layer, which we recommend be used for **pressure relief** of any gas build up below the slab. For that to work, the sand blinding must connect across the full area of the slab and connect to ground levels around the building, via granular layers/fill, or other fill/materials that can permit the passage of gas to relieve pressure.

Our chosen protection for this area is as follows:

Protection Type	Protection Details	Score
Primary Protection: Structural barrier	Cast in situ monolithic reinforced ground bearing raft or reinforced cast in situ suspended floor slab with minimal penetrations	1.5 (well reinforced with minimal penetrations)
Secondary Protection: Gas Resistant Membrane	Pre-cast lifts pits: a liquid applied membrane will be applied to the underside of the <u>precast</u> lift pits. Elsewhere: an ATAL GP1 gas membrane is proposed.	2.0
Active ventilation inside the building	This provides a further level of protection	-

The score of 3.5 exceeds the required score of 3.0.

4.4 Verification

Verification shall be undertaken in accordance with BS8485 Section 8.

AG Geo-Consultants Ltd

Gas Remediation Strategy Report
Rivermead Leisure Centre New Build, Reading

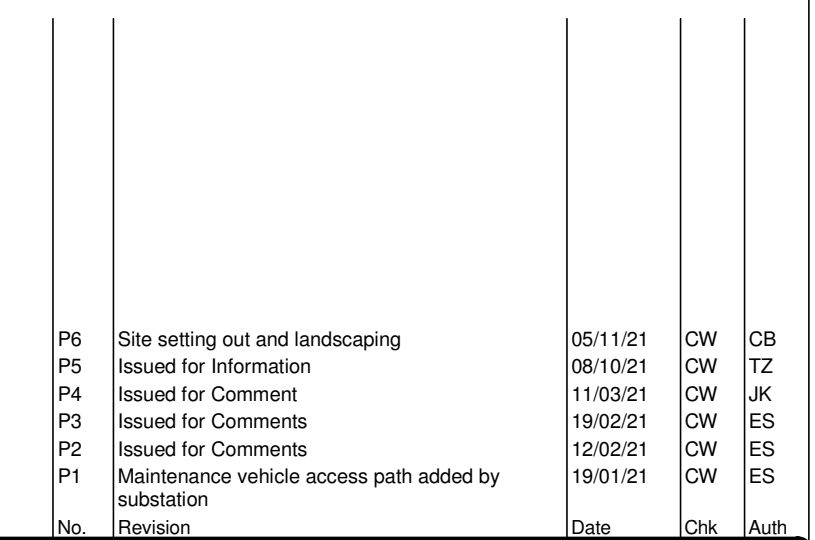
Appendices

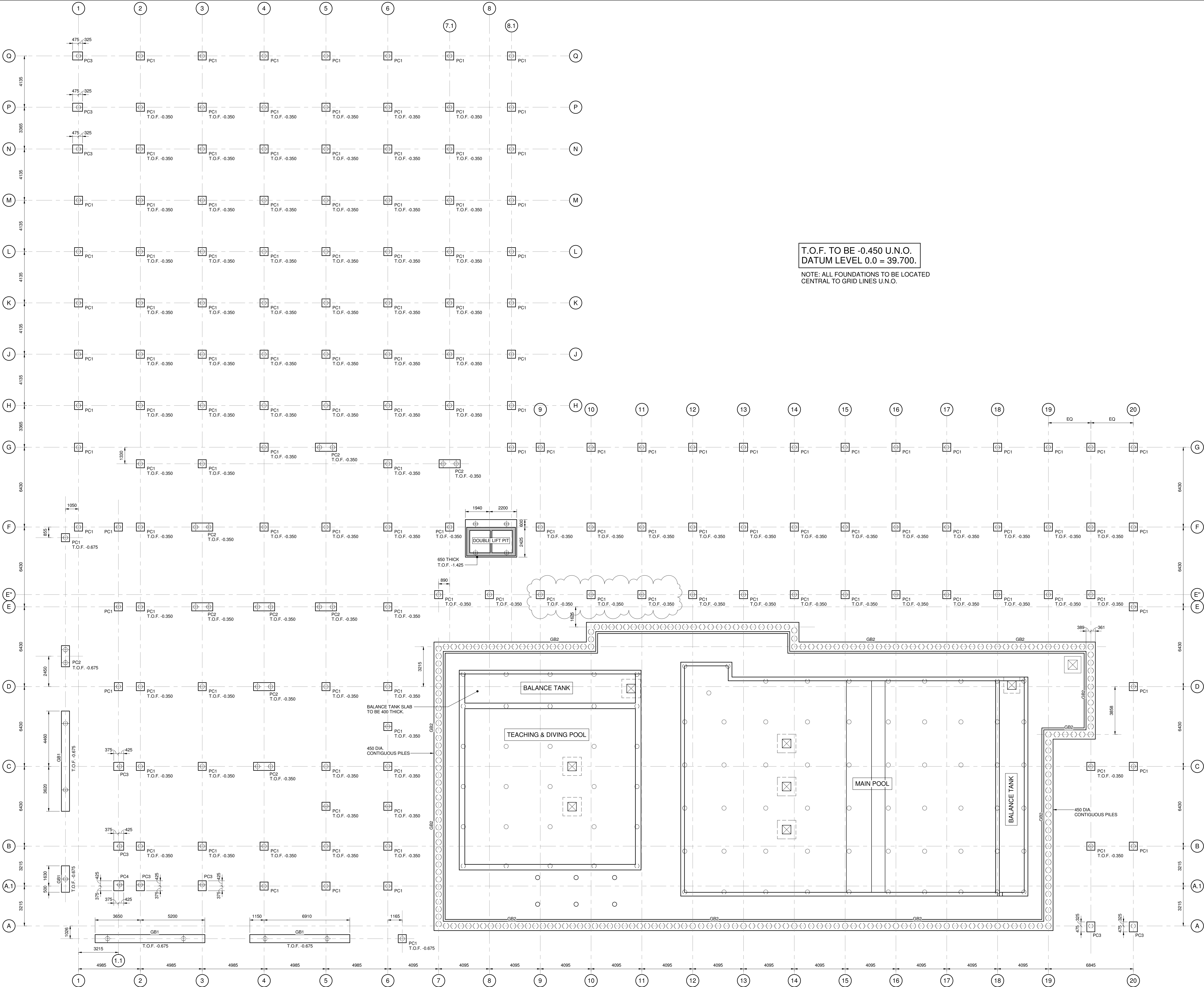
- A. Proposed Development Plans & Foundation Layout
- B. Pool Area: X-Sections
- C. Rest of Building: X-Sections
- D. ATAL GP1 Gas Membrane Specification

AG Geo-Consultants Ltd

Gas Remediation Strategy Report
Rivermead Leisure Centre New Build, Reading

Appendix A





FOUNDATION PLAN
SCALE 1 : 100

GENERAL NOTES

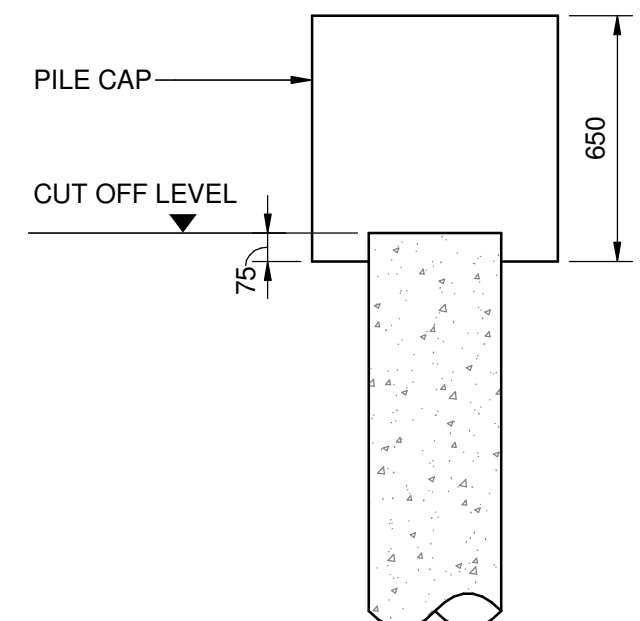
1. REFER TO DRAWING 6265-FUR-22-XX-DR-S-0001 FOR GENERAL NOTES.

PILE CAP SCHEDULE

MARK	FOUNDATION SIZE	No. OF PILES
PC1	650 x 650 x 650 DEEP	1
PC2	1700 x 650 x 650 DEEP	2
PC3	800 x 650 x 650 DEEP	1
PC4	800 x 800 x 650 DEEP	1

GROUND BEAM SCHEDULE

MARK	MEMBER
GB1	650 x 650 DEEP RC BEAM
GB2	750 x 650 DEEP RC BEAM

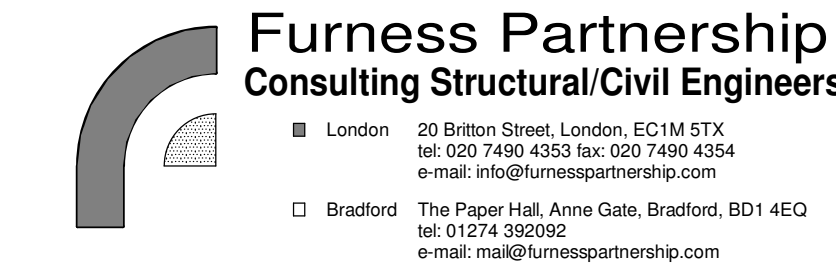


TYPICAL PILE DETAIL
SCALE 1 : 20

C05	23.11.21	T.O.F. REVISED WHERE CLOUDED	AR	MK
C04	04.11.21	FOUNDATIONS REVISED	AR	MK
C03	20.10.21	FOUNDATIONS REVISED	AR	MK
C02	11.10.21	FOUNDATIONS REVISED WHERE CLOUDED	AR	MK
C01	08.10.21	ISSUED FOR CONSTRUCTION	AR	MK
Rev	Date	Comment	By	Chk

Status Code	Drawing Status	CONSTRUCTION
A		

This drawing may only be used for construction/manufacture if status is CONSTRUCTION



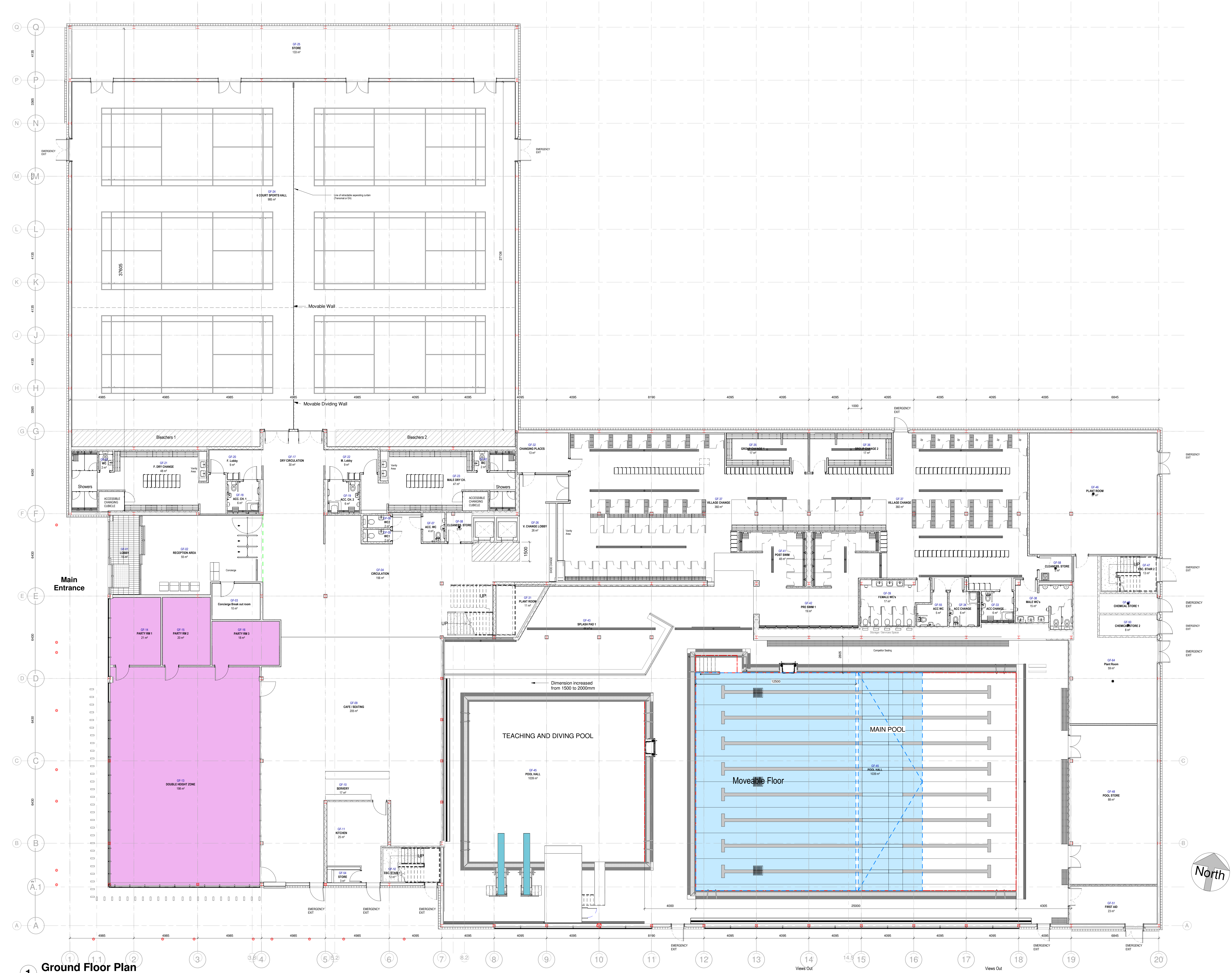
Project
RIVERMEAD LEISURE CENTRE

Drawing Title
FOUNDATION LAYOUT

FP Job No. 6265	Drawn A.R.	Date FEB. 2021	Checked M.K.	Scale @ A0 As indicated
PROJECT OPERATOR 61496 FUR	ZONE / VOLUME RM	LEVEL / LOCATION FN	FILE TYPE DR	ROLE S
				SHEET No. 0050
				Rev C05

HEALTH, SAFETY & ENVIRONMENTAL INFORMATION	
In addition to the hazards risks normally associated with the types of work detailed on this drawing, also note the following:	
CONSTRUCTION	
MAINTENANCE/CLEANING	
DECOMMISSION/DEMOLITION	
No.	Note
1	All dimensions to be verified on site by GENERAL CONTRACTOR prior to any work, setting out or other drawing being prepared.
2	© copyright SAUNDERS BOSTON LIMITED. All rights reserved. This drawing remains the property of SAUNDERS BOSTON LIMITED at all times and may not be reproduced, copied or used in whole or in part without their prior written consent.
3	This drawing and related specifications are for use only in the stated location.
4	This drawing is to be read in conjunction with all other Consultants drawings and specifications.
5	Drawings have not been surveyed and any/all pipe locations and below ground drainage runs are indicative.
6	It is assumed that all works will be carried out by a competent contractor who will be working, where appropriate, to an approved method statement.

GF Area Schedule		
Number	Name	Area
GF-11	KITCHEN	25 m²
GF-17	DRY CIRCULATION	30 m²
GF-24	6 COURT SPORTS HALL	985 m²
GF-01	LOBBY	15 m²
GF-13	DOUBLE HEIGHT ZONE	198 m²
GF-36	GROUP CHANGE 2	17 m²
GF-50	CHEMICAL STORE 2	8 m²
GF-08	CLEANERS. STORE	5 m²
GF-07	ACC. WC	4 m²
GF-19	ACC. CH. 2	6 m²
GF-06	WC2	2 m²
GF-05	WC1	2 m²
GF-18	ACC. CH. 1	6 m²
GF-25	STORE	133 m²
GF-14	PARTY RM 1	21 m²
GF-15	PARTY RM 2	20 m²
GF-16	PARTY RM 3	18 m²
GF-23	MALE DRY CH.	47 m²
GF-10	SERVERY	17 m²
GF-09	CAFE / SEATING	205 m²
GF-04	CIRCULATION	156 m²
GF-26	V. CHANGE LOBBY	26 m²
GF-12	ESC. STAIR 1	12 m²
GF-32	CHANGING PLACES	13 m²
GF-35	GROUP CHANGE 1	17 m²
GF-43	SPLASH PAD 1	44 m²
GF-44	SPLASH PAD 2	39 m²
GF-39	FEMALE WC's	17 m²
GF-34	ACC CHANGE	6 m²
GF-38	MALE WC's	15 m²
GF-49	CHEMICAL STORE 1	7 m²
GF-37	VILLAGE CHANGE	360 m²
GF-02	RECEPTION AREA	55 m²
GF-03	Concierge Break out room	10 m²
GF-55	ACC WC	5 m²
GF-33	ACC CHANGE	6 m²
GF-21	F. DRY CHANGE	48 m²
GF-20	F. Lobby	9 m²
GF-22	M. Lobby	9 m²
GF-31	PLANT ROOM	11 m²
GF-42	PRE SWIM 1	19 m²
GF-45	POOL HALL	1039 m²
GF-48	POOL STORE	88 m²
GF-47	ESC. STAIR 2	13 m²
GF-51	FIRST AID	23 m²
GF-46	PLANT ROOM	97 m²
GF-41	POST SWIM	48 m²
GF-54	STORE	3 m²
GF-58	CLEANERS. STORE	5 m²
GF-60	Accessible Change Cubicle	3 m²
GF-61	Accessible Change Cubicle	3 m²
GF-62	WC	2 m²
GF-63	WC	2 m²
GF-64	Plant Room	59 m²
GF-65	Maintenance Space	21 m²
FF-64	Lift Shaft	8 m²
N.I.F.A.		4062 m²

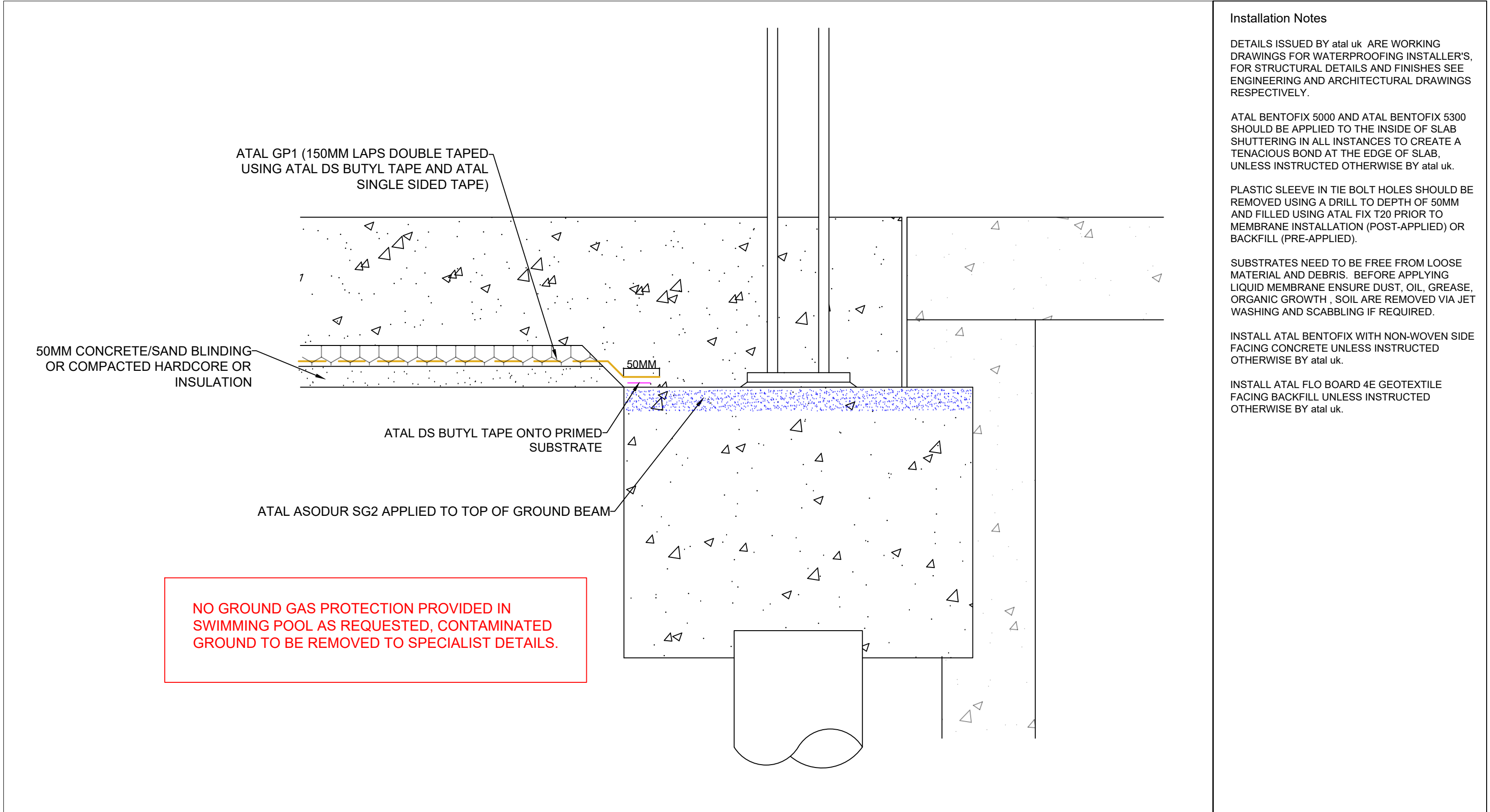


1 Ground Floor Plan
1 : 100

		C5 Updated Layouts19/11/21CWDB P7 Issued for GLL Preparation08/11/21CWDB P8 Issued for Discussion20/09/21CWDB C6 Issued for Comment29/07/21CWDB C3 Issued for Discussion08/07/21CWDB C2 Issued for Discussion07/07/21CWJK C1 Issued for discussion05/07/21CWJK P5 General revision30/04/21CWRES P4 Area Schedule added27/04/21CWITZ P3 Issued for Comments01/04/21CWJK P2 General Revision19/03/21CWJK P1 Issued for Comment20/02/21CWJK N5 RevisionTypeZnsA21	
		Pellikaan Construction Ltd JK Reading Rivermead Leisure Centre Ground Floor Plan	
Eastern Gate House, 119 Newmarket Road, Cambridge CB5 9BA 01223 367733 info@saundersboston.co.uk The Generator, The Gallery, King's Wharf The Quay, Exeter EX2 4AN 01392 348677 www.saundersboston.co.uk			
STAGE 4 SBA Project Code 1790		Drawn JK Checked CW Date 03/05/21 Submittal Code S3	Scale 1 : 100 @A0 project 1790-SBA-PM-00-DR-A-0013
		Revision C5	

AG Geo-Consultants Ltd

Appendix B



Installation Notes

DETAILS ISSUED BY atal uk ARE WORKING DRAWINGS FOR WATERPROOFING INSTALLER'S, FOR STRUCTURAL DETAILS AND FINISHES SEE ENGINEERING AND ARCHITECTURAL DRAWINGS RESPECTIVELY.

ATAL BENTOFIX 5000 AND ATAL BENTOFIX 5300 SHOULD BE APPLIED TO THE INSIDE OF SLAB SHUTTERING IN ALL INSTANCES TO CREATE A TENACIOUS BOND AT THE EDGE OF SLAB, UNLESS INSTRUCTED OTHERWISE BY atal uk.

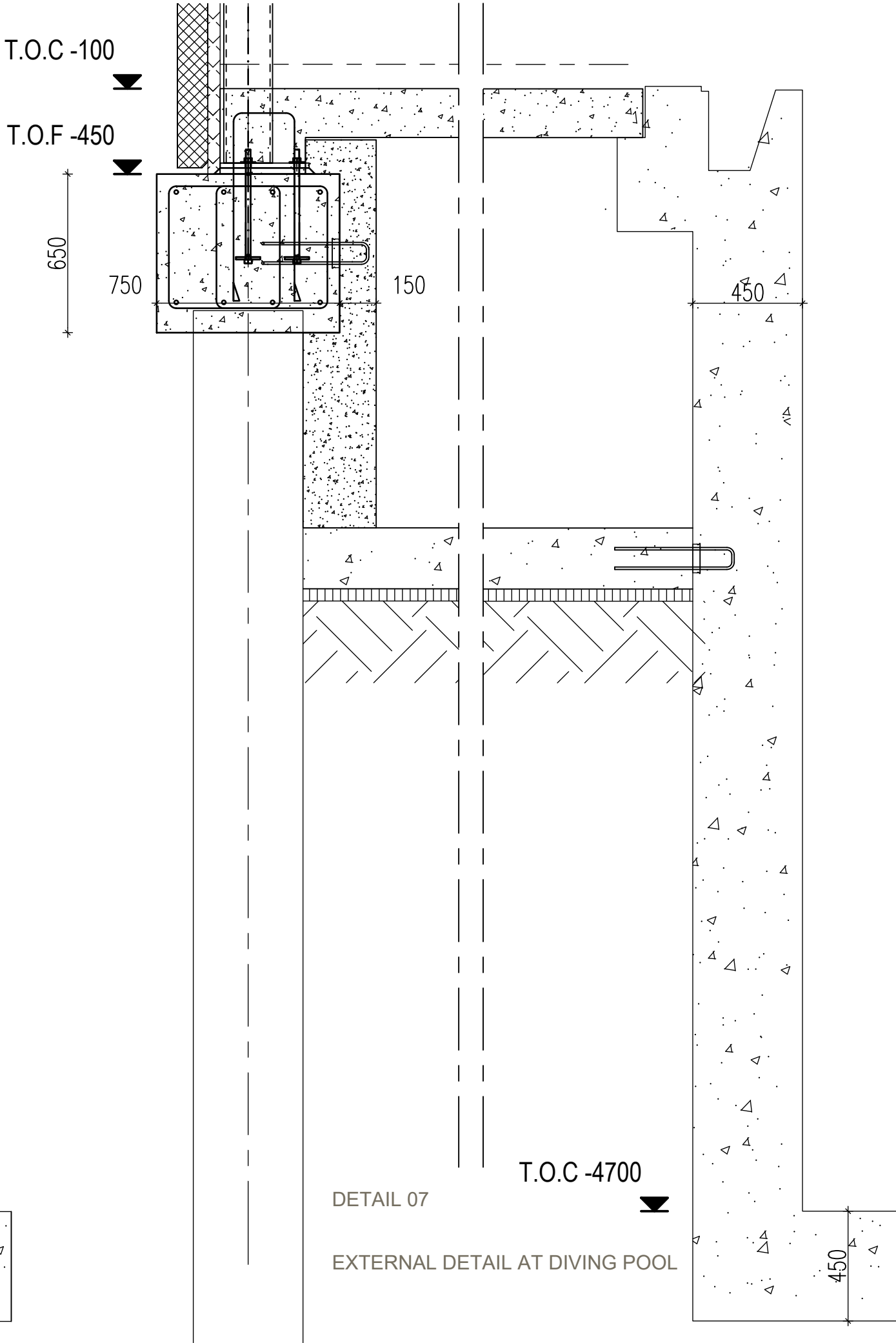
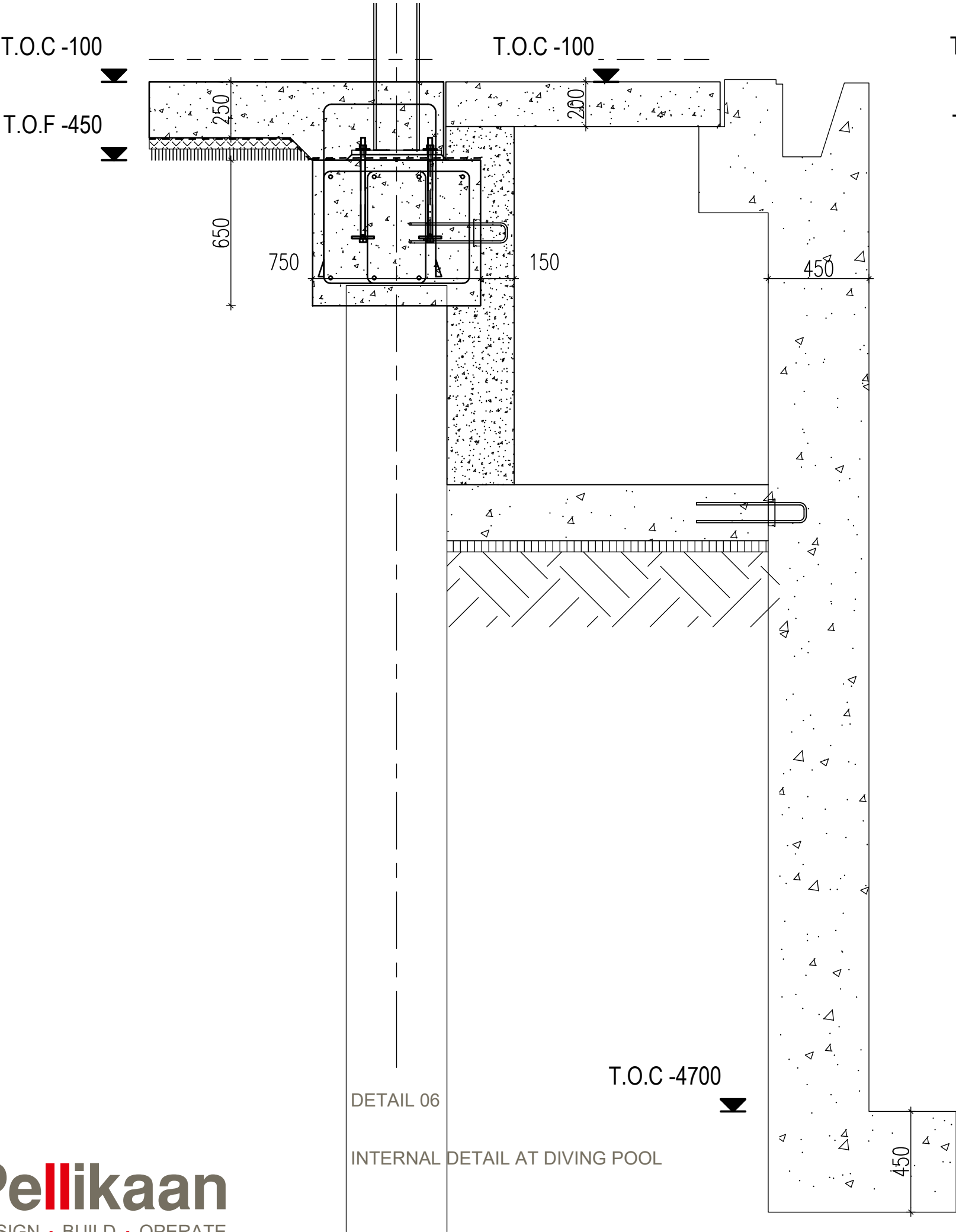
PLASTIC SLEEVE IN TIE BOLT HOLES SHOULD BE REMOVED USING A DRILL TO DEPTH OF 50MM AND FILLED USING ATAL FIX T20 PRIOR TO MEMBRANE INSTALLATION (POST-APPLIED) OR BACKFILL (PRE-APPLIED).

SUBSTRATES NEED TO BE FREE FROM LOOSE MATERIAL AND DEBRIS. BEFORE APPLYING LIQUID MEMBRANE ENSURE DUST, OIL, GREASE, ORGANIC GROWTH , SOIL ARE REMOVED VIA JET WASHING AND SCABBLING IF REQUIRED.

INSTALL ATAL BENTOFIX WITH NON-WOVEN SIDE FACING CONCRETE UNLESS INSTRUCTED OTHERWISE BY atal uk.

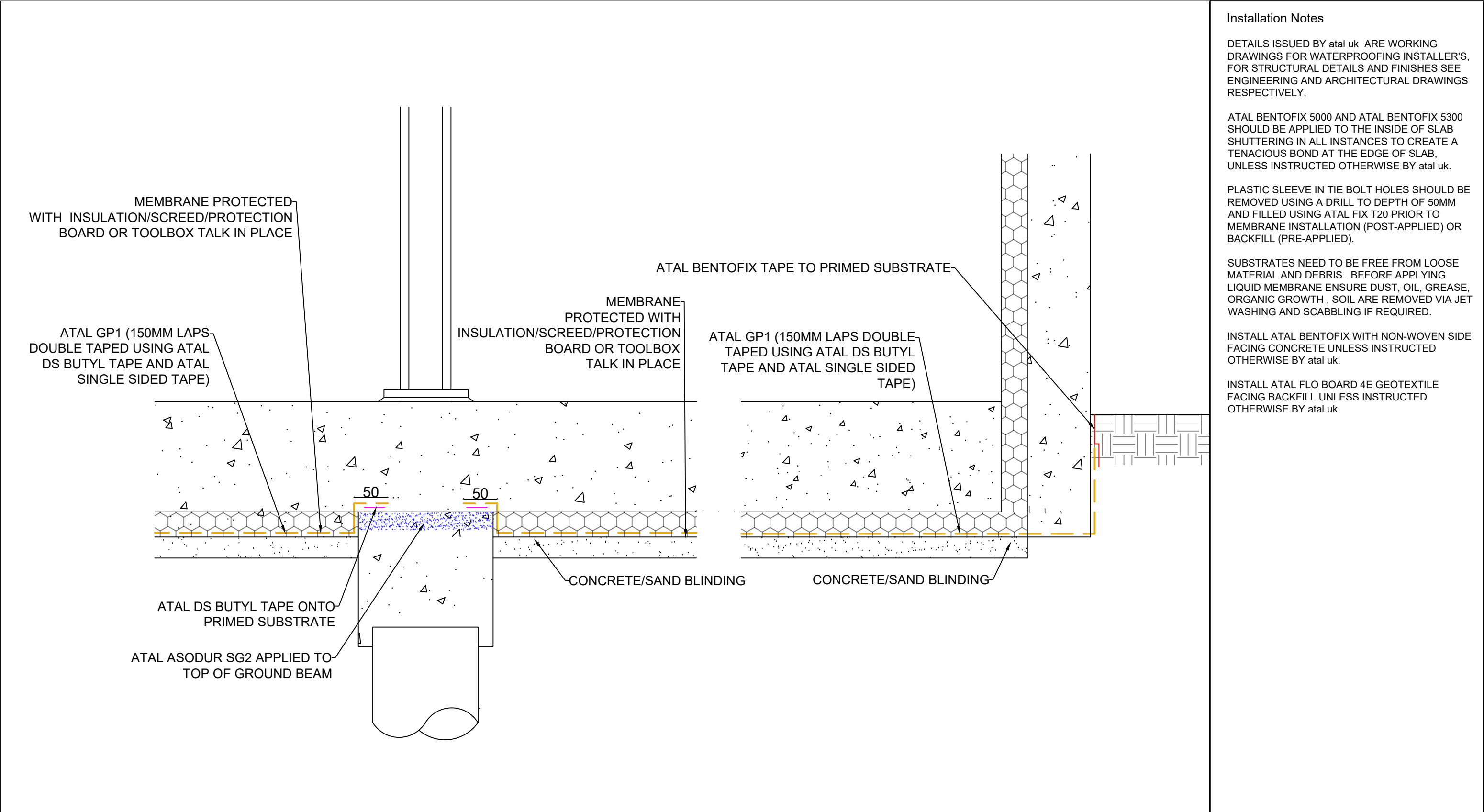
INSTALL ATAL FLO BOARD 4E GEOTEXTILE FACING BACKFILL UNLESS INSTRUCTED OTHERWISE BY atal uk.

Notes atal uk ARE SUPPLIERS OF BUILDING AND CIVIL ENGINEERING PRODUCTS AND OFFER A DESIGN AID SERVICE ONLY. ALL INFORMATION SHOWN ON THIS DRAWING IS PROVIDED IN GOOD FAITH AND IS BASED ON THIRD PARTY TECHNICAL LITERATURE AND BEST PRACTICE GUIDELINE. THIS DRAWING SHOULD NOT BE USED FOR CONSTRUCTION PURPOSES UNLESS IT HAS BEEN SIGNED OFF BY A DESIGN TEAM MEMBER.	Date	Description	Revision	Project Title	ataluk Unit 27, Tafarnabach Industrial Estate, Tafarnabach, Tredegar NP22 3AA +44 (0) 1495 717202 enquiries@ataluk.com Structural Waterproofing Systems		
	01/12/2021	Insulation added on top of the blinding.	B	ATAL3737C - Rivermead Leisure Centre, Richfield Avenue, Reading RG1 8EQ			
	02/12/2021	Atal GP1 moved under insulation	C				
					Drawing Title	Drawn By	Date
				Edge Of Pool And Capping Beam Detail	SB	02/12/2021	IP
					Drawing No.	Rev	Checked Date
					010	C	02/12/2021



AG Geo-Consultants Ltd

Appendix C



Installation Notes

DETAILS ISSUED BY atal uk ARE WORKING DRAWINGS FOR WATERPROOFING INSTALLER'S, FOR STRUCTURAL DETAILS AND FINISHES SEE ENGINEERING AND ARCHITECTURAL DRAWINGS RESPECTIVELY.

ATAL BENTOFIX 5000 AND ATAL BENTOFIX 5300 SHOULD BE APPLIED TO THE INSIDE OF SLAB SHUTTERING IN ALL INSTANCES TO CREATE A TENACIOUS BOND AT THE EDGE OF SLAB, UNLESS INSTRUCTED OTHERWISE BY atal uk.

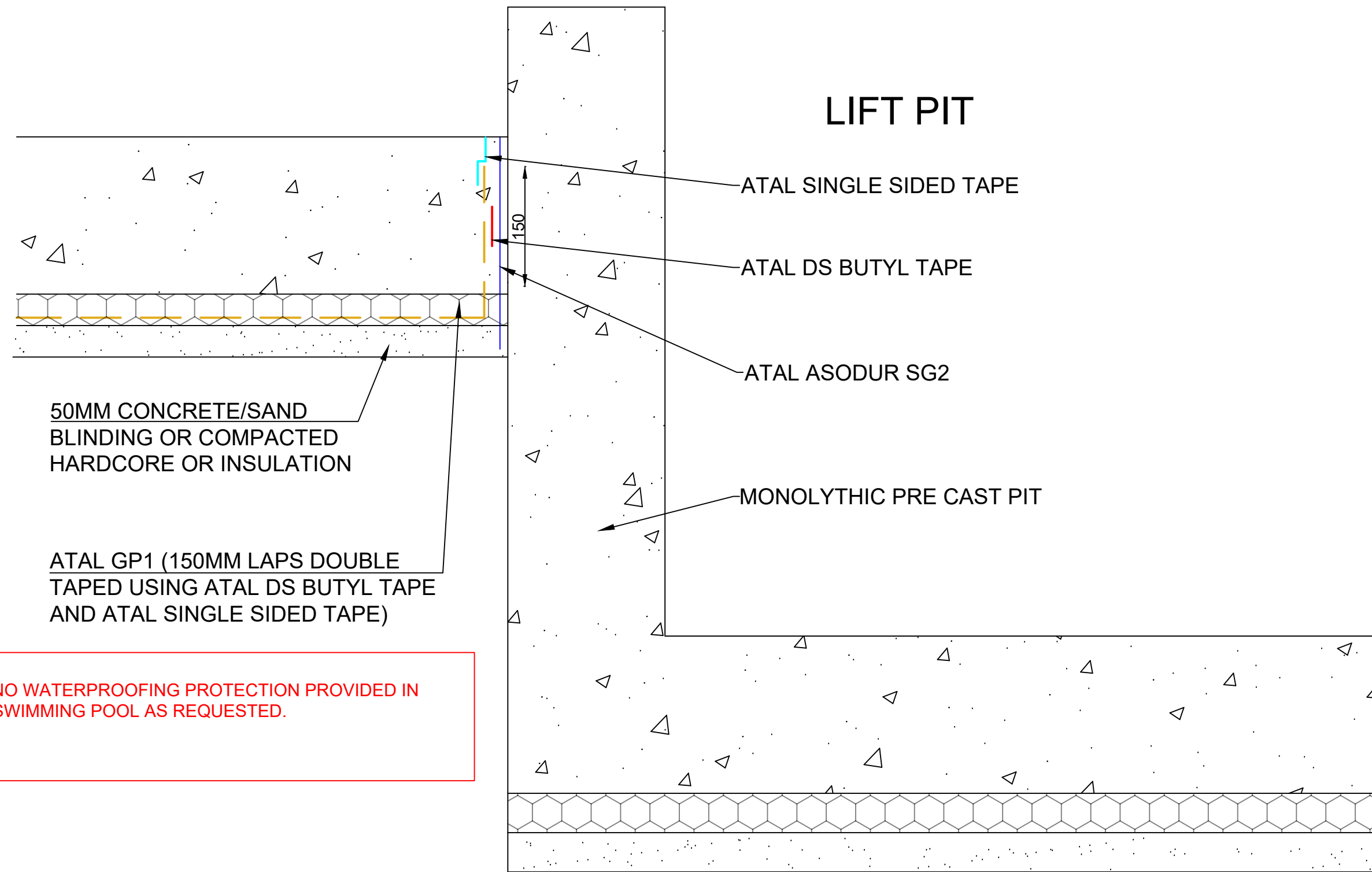
PLASTIC SLEEVE IN TIE BOLT HOLES SHOULD BE REMOVED USING A DRILL TO DEPTH OF 50MM AND FILLED USING ATAL FIX T20 PRIOR TO MEMBRANE INSTALLATION (POST-APPLIED) OR BACKFILL (PRE-APPLIED).

SUBSTRATES NEED TO BE FREE FROM LOOSE MATERIAL AND DEBRIS. BEFORE APPLYING LIQUID MEMBRANE ENSURE DUST, OIL, GREASE, ORGANIC GROWTH, SOIL ARE REMOVED VIA JET WASHING AND SCABBLING IF REQUIRED.

INSTALL ATAL BENTOFIX WITH NON-WOVEN SIDE FACING CONCRETE UNLESS INSTRUCTED OTHERWISE BY atal uk.

INSTALL ATAL FLO BOARD 4E GEOTEXTILE FACING BACKFILL UNLESS INSTRUCTED OTHERWISE BY atal uk.

Notes atal uk ARE SUPPLIERS OF BUILDING AND CIVIL ENGINEERING PRODUCTS AND OFFER A DESIGN AID SERVICE ONLY. ALL INFORMATION SHOWN ON THIS DRAWING IS PROVIDED IN GOOD FAITH AND IS BASED ON THIRD PARTY TECHNICAL LITERATURE AND BEST PRACTICE GUIDELINE. THIS DRAWING SHOULD NOT BE USED FOR CONSTRUCTION PURPOSES UNLESS IT HAS BEEN SIGNED OFF BY A DESIGN TEAM MEMBER.	Date	Description	Revision	Project Title ATAL3737C - Rivermead Leisure Centre, Richfield Avenue, Reading RG1 8EQ				ataluk Unit 27, Tafarnaubach Industrial Estate, Tafarnaubach, Tredegar NP22 3AA +44 (0) 1495 717202 enquiries@ataluk.com Structural Waterproofing Systems					
				Drawing Title Column Detail				Drawn By SB		Date 25/11/2021		Checked by IP	
								Drawing No. 009		Rev A		Checked Date 25/11/2021	



Installation Notes

DETAILS ISSUED BY atal uk ARE WORKING DRAWINGS FOR WATERPROOFING INSTALLER'S, FOR STRUCTURAL DETAILS AND FINISHES SEE ENGINEERING AND ARCHITECTURAL DRAWINGS RESPECTIVELY.

ATAL BENTOFIX 5000 AND ATAL BENTOFIX 5300 SHOULD BE APPLIED TO THE INSIDE OF SLAB SHUTTERING IN ALL INSTANCES TO CREATE A TENACIOUS BOND AT THE EDGE OF SLAB, UNLESS INSTRUCTED OTHERWISE BY atal uk.

PLASTIC SLEEVE IN TIE BOLT HOLES SHOULD BE REMOVED USING A DRILL TO DEPTH OF 50MM AND FILLED USING ATAL FIX T20 PRIOR TO MEMBRANE INSTALLATION (POST-APPLIED) OR BACKFILL (PRE-APPLIED).

SUBSTRATES NEED TO BE FREE FROM LOOSE MATERIAL AND DEBRIS. BEFORE APPLYING LIQUID MEMBRANE ENSURE DUST, OIL, GREASE, ORGANIC GROWTH, SOIL ARE REMOVED VIA JET WASHING AND SCABBLING IF REQUIRED.

INSTALL ATAL BENTOFIX WITH NON-WOVEN SIDE FACING CONCRETE UNLESS INSTRUCTED OTHERWISE BY atal uk.

INSTALL ATAL FLO BOARD 4E GEOTEXTILE FACING BACKFILL UNLESS INSTRUCTED OTHERWISE BY atal uk.

Notes atal uk ARE SUPPLIERS OF BUILDING AND CIVIL ENGINEERING PRODUCTS AND OFFER A DESIGN AID SERVICE ONLY. ALL INFORMATION SHOWN ON THIS DRAWING IS PROVIDED IN GOOD FAITH AND IS BASED ON THIRD PARTY TECHNICAL LITERATURE AND BEST PRACTICE GUIDELINE. THIS DRAWING SHOULD NOT BE USED FOR CONSTRUCTION PURPOSES UNLESS IT HAS BEEN SIGNED OFF BY A DESIGN TEAM MEMBER.	Date	Description	Revision	Project Title	atal uk Unit 27, Tafarnaubach Industrial Estate, Tafarnaubach, Tredegar NP22 3AA +44 (0) 1495 717202 enquiries@ataluk.com Structural Waterproofing Systems		
	01/12/2021	Insulation added to top of the blinding	B	ATAL3737C - Rivermead Leisure Centre, Richfield Avenue, Reading RG1 8EQ			
	02/12/2021	GP1 moved under the insulation	C	Drawing Title	Drawn By	Date	Checked by
				Lift Pit Detail	SB	01/12/2021	IP
					Drawing No.	Rev	Checked Date
					011	C	01/12/2021

AG Geo-Consultants Ltd

Appendix D

atal GP1

INTRODUCTION

Atal GP1 is a multi layer, low-density polyethylene membrane, reinforced with a polypropylene reinforcing grid with an integral aluminium foil. Atal GP1 is specifically designed and manufactured to perform as a Methane, Carbon Dioxide, Radon, VOC/Hydrocarbon vapour, air and Moisture protection system.

The membrane is manufactured by using a multi-layer extrusion/coating process and incorporate a tough polypropylene reinforcement grid. Atal GP1 is extremely flexible for ease of installation and is robust enough to cope with the site conditions. atal GP1 will also protect against damp and therefore will act as a DPM and satisfy Approved Document C.

USAGE

The product will restrict the ingress of radon, methane and carbon dioxide gases into buildings from landfill and naturally-occurring sources and meet the performance criteria for a gas resistant membrane as defined in BS 8485 : 2015.

INSTALLATION

Atal GP1 should be installed in accordance with the product installation guidelines and in accordance with BS8485:2015.

JOINTING AND SEALING

Atal GP1 is suited to sealing using atal DS Butyl Tape and atal Single Sided Tape or by means of welding. atal GP1 should be overlapped by at least 150mm. When taping the laps a silicon roller should be used to remove trapped air and ensure a good seal is achieved.

Welding should be carried out by competent personnel with suitable qualifications in accordance with best practice, and guidance contained within BS8485:2015. Atal Premsil GMA should be used to for sealing around pipe penetrations and termination into DPC.

INSTALLATION BELOW SLAB

A 50mm sand or concrete blinding should be laid when the membrane is installed below the slab. Atal GP1

should be protected after installation using atal Protection Board, insulation or a protective blinding to prevent puncture during the construction process.

INSTALLATION ABOVE SLAB AND TO SUSPENDED FLOORS

The substrate should be smooth and free from voids, projections, mortar deposits, dust and frost. Atal GP1 should be protected after installation using atal Protection Board, insulation or a protective blinding to prevent puncture during the construction process.

RESISTANCE TO PUNCTURE

The membrane can be punctured by sharp objects. Care should be taken during installation to not damage the membrane. If damage occurs the repair should be in accordance with atal guidance.

ANCILLARY PRODUCTS

- atal Termination Strap
- atal DS Butyl Tape
- atal Single Sided Tape
- atal Premsil GMA
- atal Premsil Primer
- atal Protection Board
- atal Gasflow 255

HANDLING

Roll weights are in excess 20 kg and hence appropriate care and equipment is required for unloading and handling.

STORAGE

Rolls of atal GP1 should be stored on stable/level ground and stacked not more than five rolls high, with no other material stacked on top. The rolls can be stored outdoors when packaged but should be protected from exposure to UV.

ADDITIONAL INFORMATION

For additional information or assistance please contact atal on 01495 717202.

CHARACTERISTIC	TEST METHOD	UNIT	ATAL GP1
PHYSICAL PROPERTIES			
Thickness	EN 1849 - 2	mm	0.6
Width	EN 1849 - 2	m	4
Length	EN 1849 - 2	m	25
Weight	EN 1849 - 2	g/m ²	370
HYDRAULIC PROPERTIES			
Water Column	EN 20811	-	>300
Resistance to Water Penetration	EN 13967, EN 1928	-	Pass
Water Tightness	EN 1296, EN 1367, EN 1928	-	Pass
MECHANICAL PROPERTIES			
Resistance to Static Load	EN 12730 - B	kg	20
Tensile Strength (MD)	EN 12311 - 1	N/50mm	600
Tensile Strength (CMD)	EN 12311 - 1	N/50mm	480
Tensile Elongation (MD)	EN 12311 - 1	%	20
Tensile Elongation (CMD)	EN 12311 - 1	%	20
Puncture Resistance	EN 12310 - 1	kN	1.25
Resistance to Tearing (Nail Shank) MD	EN 12310 - 1	N	330
Resistance to Tearing (Nail Shank) CMD	EN 12310 - 1	N	400
DURABILITY AND CHEMICAL RESISTANCE			
Transmission Rate of Volatile Liquids - Diesel	ISO 6179:2010 (B)	g/m ² /h	0.246
Transmission Rate of Volatile Liquids - Xylene	ISO 6179:2010 (B)	g/m ² /h	0.571
Transmission Rate of Volatile Liquids - Toluene	ISO 6179:2010 (B)	g/m ² /h	0.583
Transmission Rate of Volatile Liquids - Petrol	ISO 6179:2010 (B)	g/m ² /h	0.135
GAS PERMEABILITY			
Methane Permeability	BS EN ISO 15105 - 1	ml/m ² /day/atm	<0.09
Carbon Dioxide Permeability	BS EN ISO 15105 - 1	ml/m ² /day/atm	<0.09
Radon Permeability	K124/02/95	m ² /s	8.0 x 10 ⁻¹⁵
COMPLIANCE AND CERTIFICATION			
NHBC Standards Compliant			
BS8485:2015 Compliant			