

Site: Morris Street, Radcliffe
Plots: 10-25
Date: February 2023



1 INTRODUCTION

LK Consult (LKC) has been appointed by Watson Construction Ltd to provide verification of the gas protection measures installed at the development at Morris Street, Radcliffe.

The requirement for remedial works across the site are outlined in the Remediation Strategy carried out by LKC (ref. CL-602-LKC 21 1616-01, dated October 2021).

The Remediation Strategy identified that gas protection measures should be installed in Plots 10-25 in line with CS2 as per UK guidance^{1,2}. This should include:

- Passive subfloor or active subfloor ventilation system.
- Methane and carbon dioxide resistant membrane installed as per manufacturer's instructions.
- Ventilation of confined spaces within the building.
- Well-constructed reinforced suspended, raft or cast in situ ground slab.
- Minimum penetration of ground slab by services.
- All joints and penetrations to be sealed.

Validation requirements include photographic evidence of the sub floor void, ventilation and suitably sealed gas membrane. Validation of gas protection measures should be in line with CIRIA 735³.

2 GAS PROTECTION MEASURES

The gas protection measures have been independently verified by LKC on 18th June 2022. Photographic evidence of gas protection measures is provided in Appendix B.

Following an inspection of the membrane, it was observed that all joints and service penetrations were sealed with appropriate tape and top hats and that there were no visible rips or tears.

3 CONCLUSIONS

LKC considers that the gas protection has been installed correctly for Plots 10-25 are suitable for use.

Enc:

Appendix A: Membrane Specification

Appendix B: Photographic Evidence

¹ CIRIA (2007). "Assessing Risks Posed by Hazardous Ground Gases to Buildings." CIRIA C665

² BSI (2015). "Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for new buildings." BS8485:2015.

³ CIRIA (2014). "Good Practice on the Testing and Verification of Protection Systems for Building Against Hazardous Ground Gas". CIRIA C735.

Disclaimer

This report has been prepared by LKC who have exercised such professional skill, care and diligence as may reasonably be expected of a properly qualified and competent consultant experienced in preparing reports of a similar scope. However, to the extent that the report is based on or relies upon information contained in records, reports or other materials provided to LKC which have not been independently produced or verified, LKC gives no warranty, representation or assurance as to the accuracy or completeness of such information.

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Appendix A – Membrane Specification



**GP®
TITANFLEX®**

GP® TITANFLEX® is a loose laid multi-layer, low polyethylene membrane. GP® TITANFLEX® is specifically designed, manufactured and tested and certified to perform as a methane, carbon dioxide, radon, ground gas, VOC air & moisture and hydrocarbon protection system. GP® TITANFLEX® is used as a loose laid membrane for the gas/VOC protection of ground level structures.

Features and benefits:

- Can be a fully welded system.
- Exceptional chemical resistance.
- Long term durability - performance is guaranteed for the lifetime of the building.
- Conform with the latest codes of practice as published by BRE, CIRIA and BSI.
- High resistance to ground gases.

Part of the GP® TITANTECH® family of membranes, the GP® TITANFLEX® is a high performance, hydrocarbon barrier, manufactured from a unique HDPE resin. The primary membrane has excellent chemical resistance and is ideal for use on sites affected by hydrocarbon and VOC contamination. It will also effectively prevent the ingress of a number of other harmful gases, including radon, methane and carbon dioxide.

Accessory Products

- GP® TITAN Tape
- GP® TITAN Overtape
- GP® TITANTECH®
- 300TT
- DPC

Physical Properties

Thickness	0.5 mm
Width	2 m
Length	50 m
Weight	500 g/m ²

Gas Permeability

Methane	0.13
Carbon Dioxide	3.01
Radon	1 x 10 ⁻¹²

Compliance and Certification

CE MARK - EN13967:2012
NHBC Standards Compliant
B58485:2015 +A1 2019 Accordant
CIRIA C748 Accordant
BBA Certified - Certificate No. 18/5581 P1

Specification Clauses

Uniclass 2015 - PR_25_57_65_90
Plastic Sheets
CAWS - J40/145 Loose laid weldable polyethylene gas retardant damp proofing
J40/140 loose laid plastics or rubber sheet gas retardant damp proofing
D21/350 Gas retardant membrane



Please
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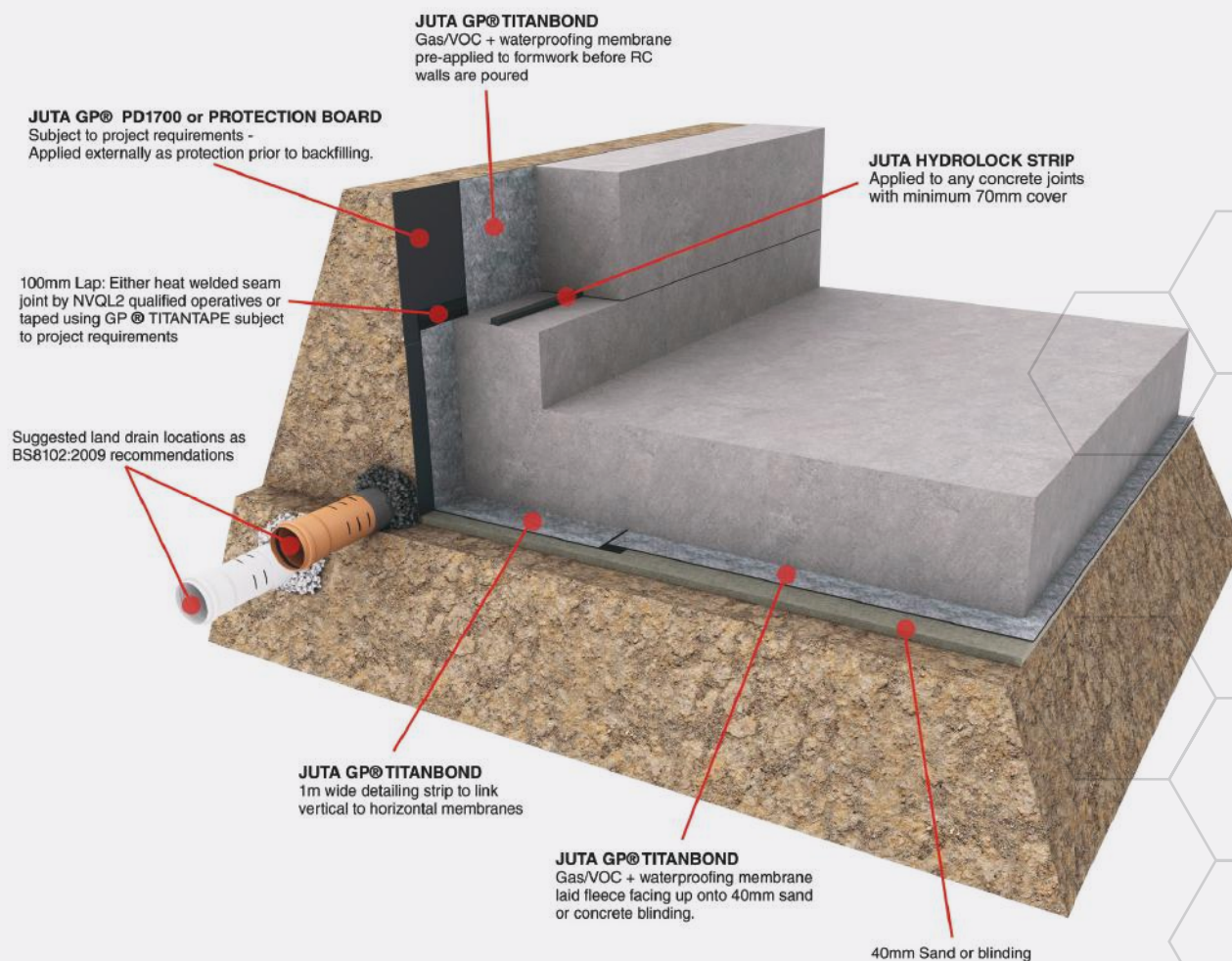
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CA**



GP® TITANFLEX® Vapour Permeability 100% Concentration

Benzene	< 3.6 mg /m ² / day	Vinyl Chloride	< 0.05 mg /m ² / day
Toulene	< 13.8 mg /m ² / day	Trichlorothene (TCE)	< 54.7 mg /m ² / day
Ethyl Benzene	< 2.7 mg /m ² / day	tetrachlorothene (PCE)	< 26.2 mg /m ² / day
Xylenes (M,P,O)	< 7.7 mg /m ² / day	Napthalene	< 0.0006 mg /m ² / day
Hexane	< 0.6 mg /m ² / day	CIS-1,2-Dichloroethylene	< 1.1 mg /m ² / day

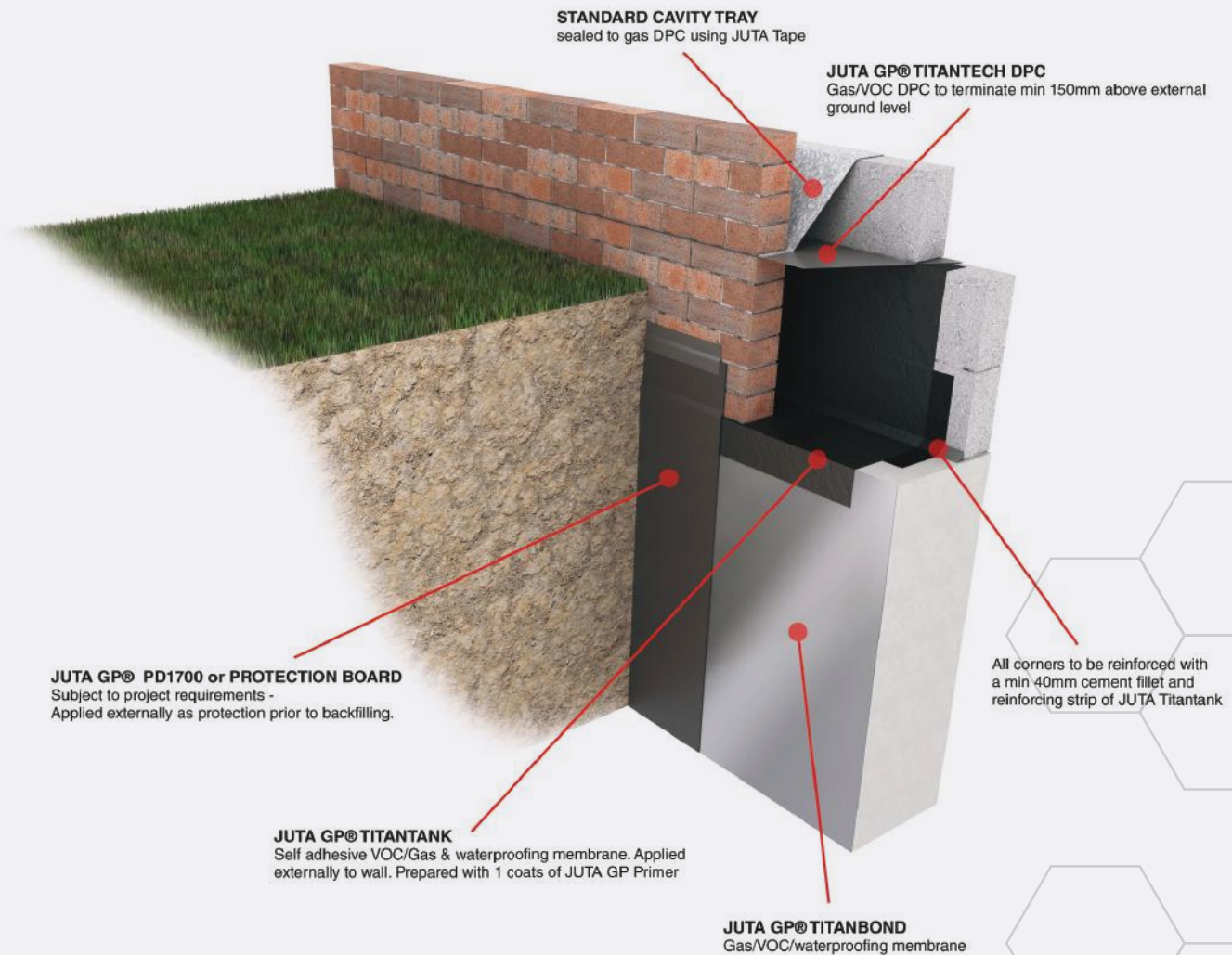
Standard Detail - Slab / Wall Kicker Joint



Various typical details available on
request. Please contact
technical@juta.co.uk for further
information



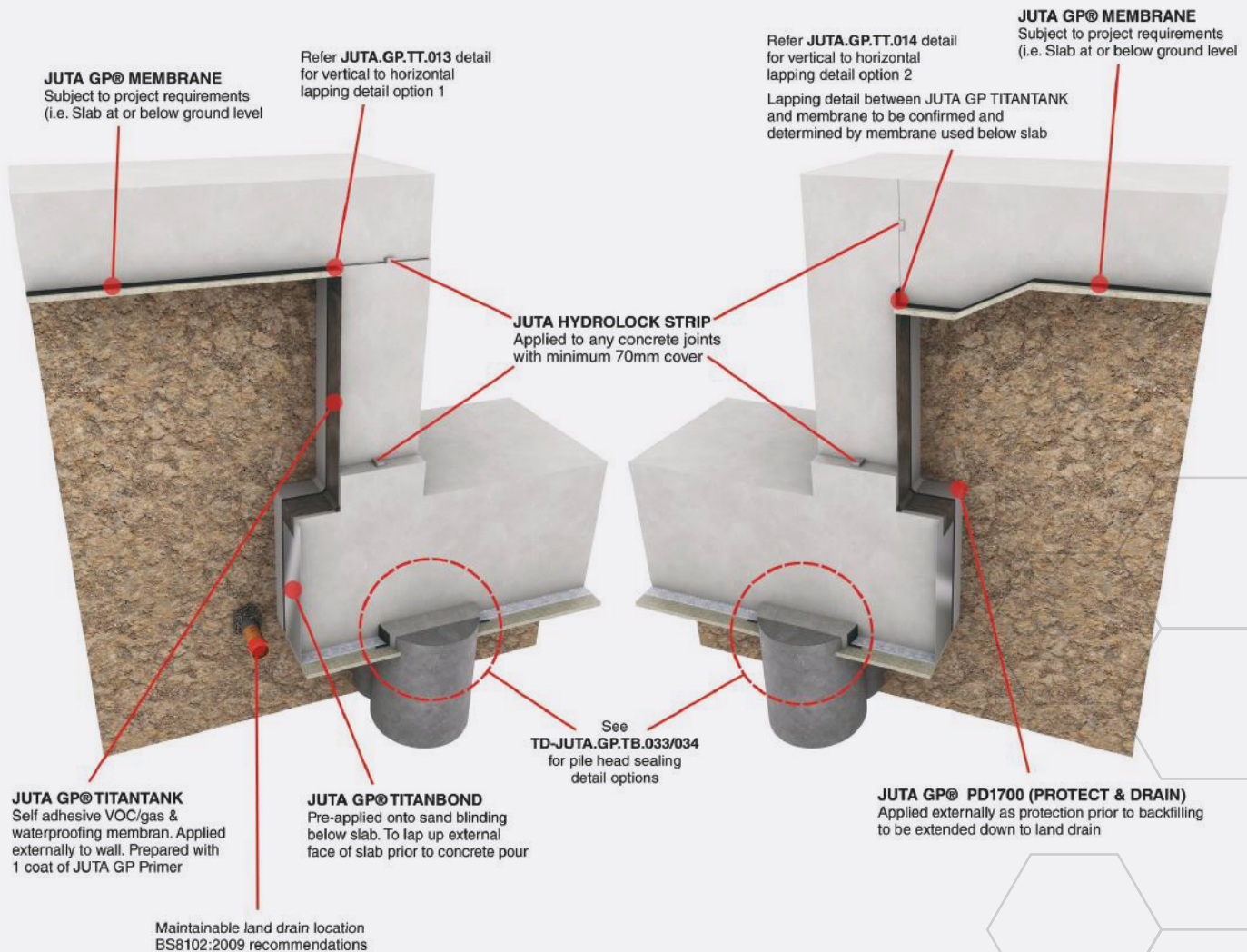
Standard Detail - Head of Retaining Wall



Various typical details available on request. Please contact **technical@juta.co.uk** for further information



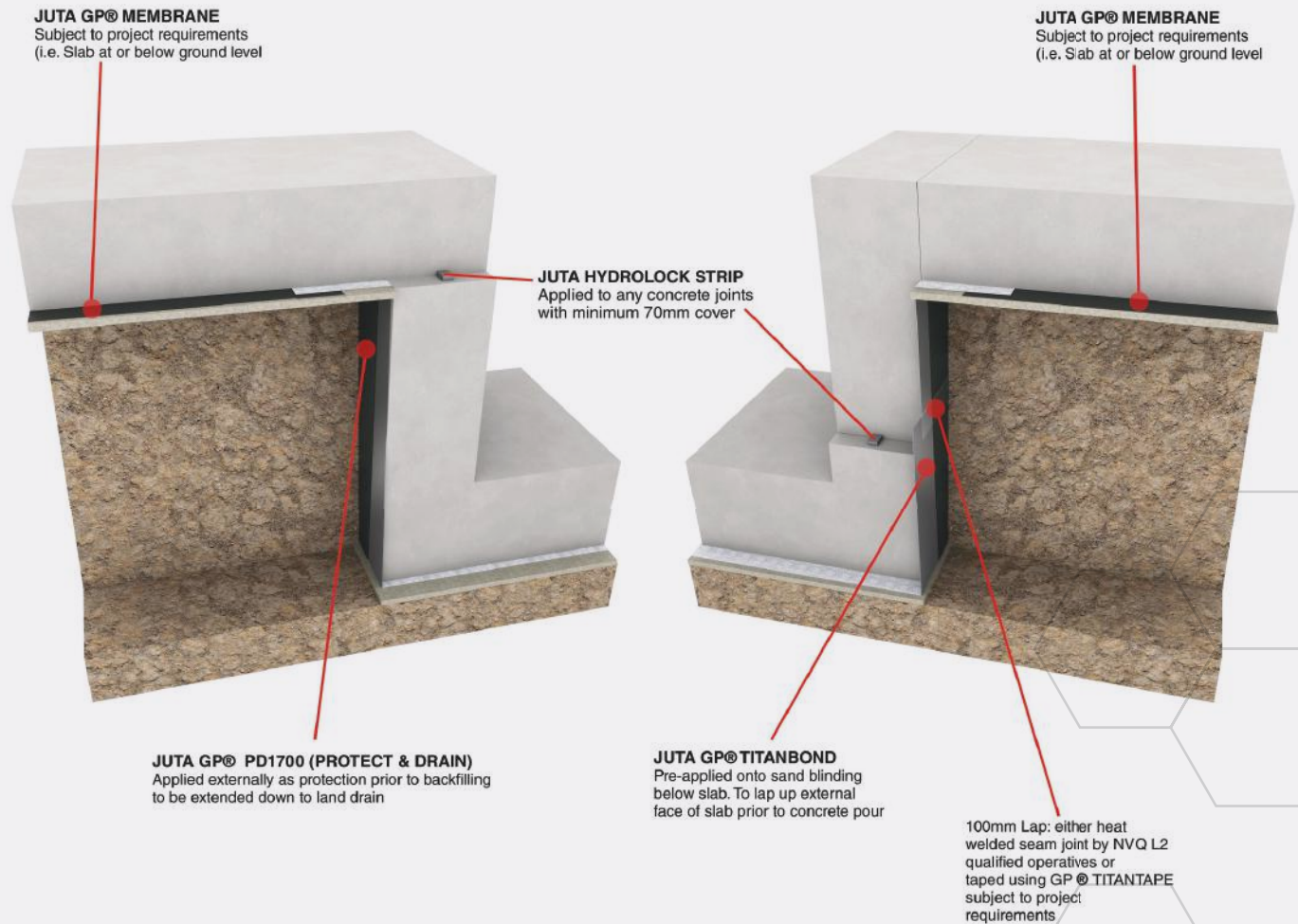
Standard Detail - Typical Piled Pit



Various typical details available on
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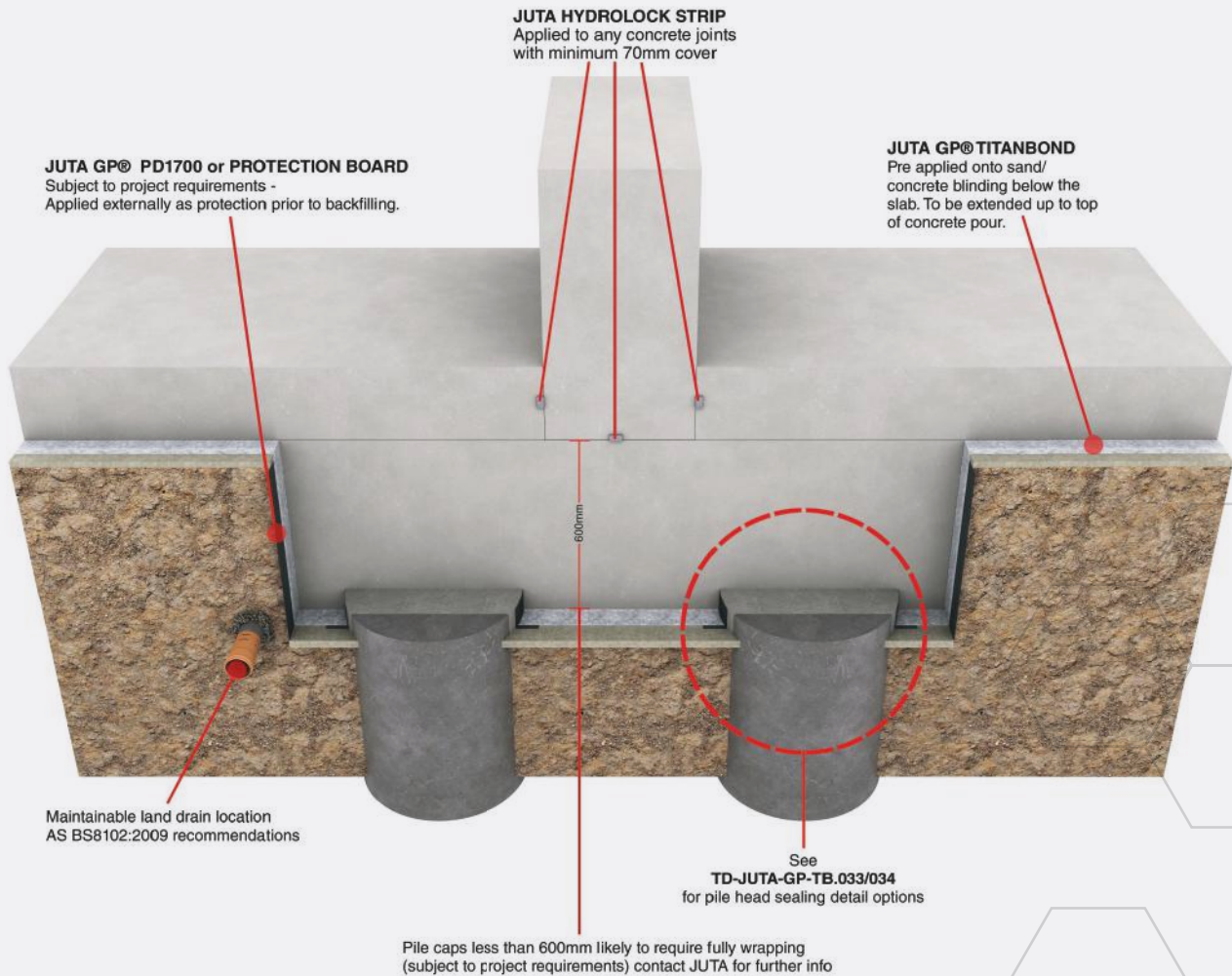
Standard Detail - Typical RC Pit



Various typical details available on
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Standard Detail - Typical Capping Beam



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Appendix B – Photographic Evidence

Plot 10

	Photograph 1: Evidence of gas membrane installed across the plot.
	Photograph 2: Example of overlapping and sealing of gas membrane appropriately sealed at joints.
	Photograph 3: Evidence of top hats and sealing at service entry points.
	Photograph 4: Evidence of installation of air bricks.

Plot 11

	Photograph 1: Evidence of gas membrane installed across the plot.
	Photograph 2: Example of overlapping and sealing of gas membrane appropriately sealed at joints.
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	Photograph 4: Evidence of installation of air bricks.

Plot 12

		Photograph 1: Evidence of gas membrane installed across the plot.
		Photograph 2: Example of overlapping and sealing of gas membrane appropriately sealed at joints.
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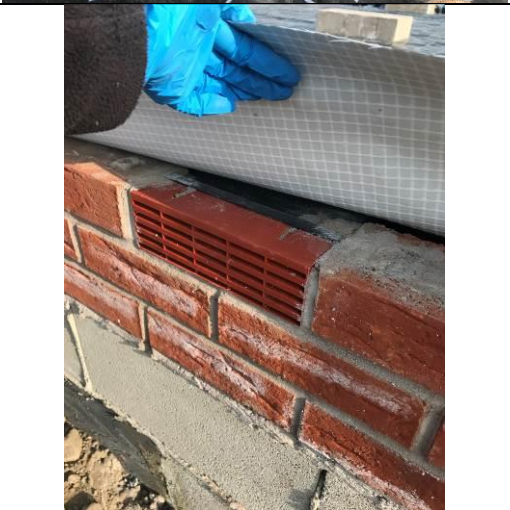
Plot 13

		Photograph 1: Evidence of gas membrane installed across the plot.
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Plot 14

	Photograph 1: Evidence of gas membrane installed across the plot.
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	Photograph 4: Evidence of installation of air bricks.

Plot 15

	Photograph 1: Evidence of gas membrane installed across the plot.
	Photograph 2: Example of overlapping and sealing of gas membrane appropriately sealed at joints.
	Photograph 3: Evidence of top hats and sealing at service entry points.
	Photograph 4: Evidence of installation of air bricks.

Plot 16

	Photograph 1: Evidence of gas membrane installed across the plot.
	Photograph 2: Example of overlapping and sealing of gas membrane appropriately sealed at joints.
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	Photograph 4: Evidence of installation of air bricks.

Plot 17

		Photograph 1: Evidence of gas membrane installed across the plot.
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Plot 18

		Photograph 1: Evidence of gas membrane installed across the plot.
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Plot 19

	Photograph 1: Evidence of gas membrane installed across the plot.
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Plot 20

	Photograph 1: Evidence of gas membrane installed across the plot.
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	Photograph 4: Evidence of installation of air bricks.

Plot 21

	Photograph 1: Evidence of gas membrane installed across the plot.
	Photograph 2: Example of overlapping and sealing of gas membrane appropriately sealed at joints.
	Photograph 3: Evidence of top hats and sealing at service entry points.
	Photograph 4: Evidence of installation of air bricks.

Plot 22

	Photograph 1: Evidence of gas membrane installed across the plot.
	Photograph 2: Example of overlapping and sealing of gas membrane appropriately sealed at joints.
	Photograph 3: Evidence of top hats and sealing at service entry points.
	Photograph 4: Evidence of installation of air bricks.

Plot 23

	Photograph 1: Evidence of gas membrane installed across the plot.
	Photograph 2: Example of overlapping and sealing of gas membrane appropriately sealed at joints.
	Photograph 3: Evidence of top hats and sealing at service entry points.
	Photograph 4: Evidence of installation of air bricks.

Plot 24

	Photograph 1: Evidence of gas membrane installed across the plot.
	Photograph 2: Example of overlapping and sealing of gas membrane appropriately sealed at joints.
	Photograph 3: Evidence of top hats and sealing at service entry points.
	Photograph 4: Evidence of installation of air bricks.

Plot 25

	Photograph 1: Evidence of gas membrane installed across the plot.
	Photograph 2: Example of overlapping and sealing of gas membrane appropriately sealed at joints.
	Photograph 3: Evidence of top hats and sealing at service entry points.
	Photograph 4: Evidence of installation of air bricks.

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