



RIDGE

**SILK STREET,
GORTON**

CONDITION 13 DRAINAGE DISCHARGE REPORT

SEPTEMBER 2023

Document Control Sheet

Project No: 5015017

Project Title: Silk Street, Gorton

Report Title: Condition 13 Drainage Discharge Report

Report Reference: SSG-RDG-00-ZZ-RP-C-0002

Issue: 1

Status: Final

Date: 05.09.23

Record of Issue

Issue	Status	Author	Approved	Date
1	Final	Adam Matadar	Phil Barrett	04.09.2023

Distribution

Issue	Organisation	Quantity
1	RC/MCAU/MCC	1



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1.0 Introduction

Ridge and Partners has been commissioned by Rowlinson Construction Ltd to compile the information required to discharge Condition 13 of the approved planning application 130586/VO/2021.

2.0 Drainage Related Planning Condition and Ridge Response

Detailed below is each planning condition text in blue with Ridge response in black beneath.

2.1 Proposed Planning Condition 13

Prior to the first occupation of the development, details of the implementation, maintenance and management of the sustainable drainage scheme shall be submitted for approval in writing by the city Council, as the Local Planning Authority for the avoidance of doubt this shall:

- Verification reporting providing photographic evidence of construction.

- Management and maintenance plan for the lifetime of the development which shall include the arrangements adoption by any public body or statutory undertaker, or any other arrangements to secure the operation of the sustainable drainage scheme throughout its lifetime.

- Timescale for implementation the implementation of the management and maintenance plan shall be implemented in accordance with the timescales agreed and retained for as long as the development remains in use.

Reason - To manage flooding and pollution and to ensure that a managing body is in place for the sustainable drainage system and there is funding and maintenance mechanism for the lifetime of the development pursuant to policies SP1, EN14 and DM1 of the Manchester Core Strategy (2012).

Surface Water Design

The surface water drainage design for this development has been carried out in accordance with the planning approved Drainage strategy produced by Ridge (Ref SSG-RDG-00-ZZ-RP-C-0001).

The surface attenuation for the proposed development has been split into three separate areas. Attenuation for Plots 1 – 48 has been provided via a Geo cellular Storage Tank, this is within the private car park, along with the flow control serving this area. Attenuation for Plots 49 – 69 has been provided via permeable paving within the car parking areas. The flow control is not located within a private area (located within a communal bin storage area) and can be accessed for maintenance. Attenuation for Plots 59 – 63 has been provided via oversized pipes. The flow control is not located within a private area (located within a communal bin storage area) and can be accessed for maintenance. Due to limited space and the existing infrastructure within the existing highways, attenuation was located within the private areas.

Table 1 - Discharge Rate Calculations

Area	Proposed Discharge Rate
Plots 1- 48	5 l/s
Plots 49 – 69	5 l/s
Plots 59 -63	5 l/s

Surface water run off from the building is picked up via RWPs, the surrounding external areas have series of channel drains installed. All surface water flows up to the 1 in 100 year event including an allowance for climate change (40%) will be retained below ground.

Due to the nature of the site and the unfavourable ground condition (full infiltration not feasible) SUDs features are limited to attenuation storage tank, Permeable Paving, trapped gullies and catchpits.

A copy of the Constructed Drainage design can be found in **Appendix A**.

Construction Verification

The drainage was constructed in accordance with the proposed drainage design. The site was visited during construction. Construction stage photos for the installation of the attenuation tank can be found in **Appendix B**.

Managament and Maintenance

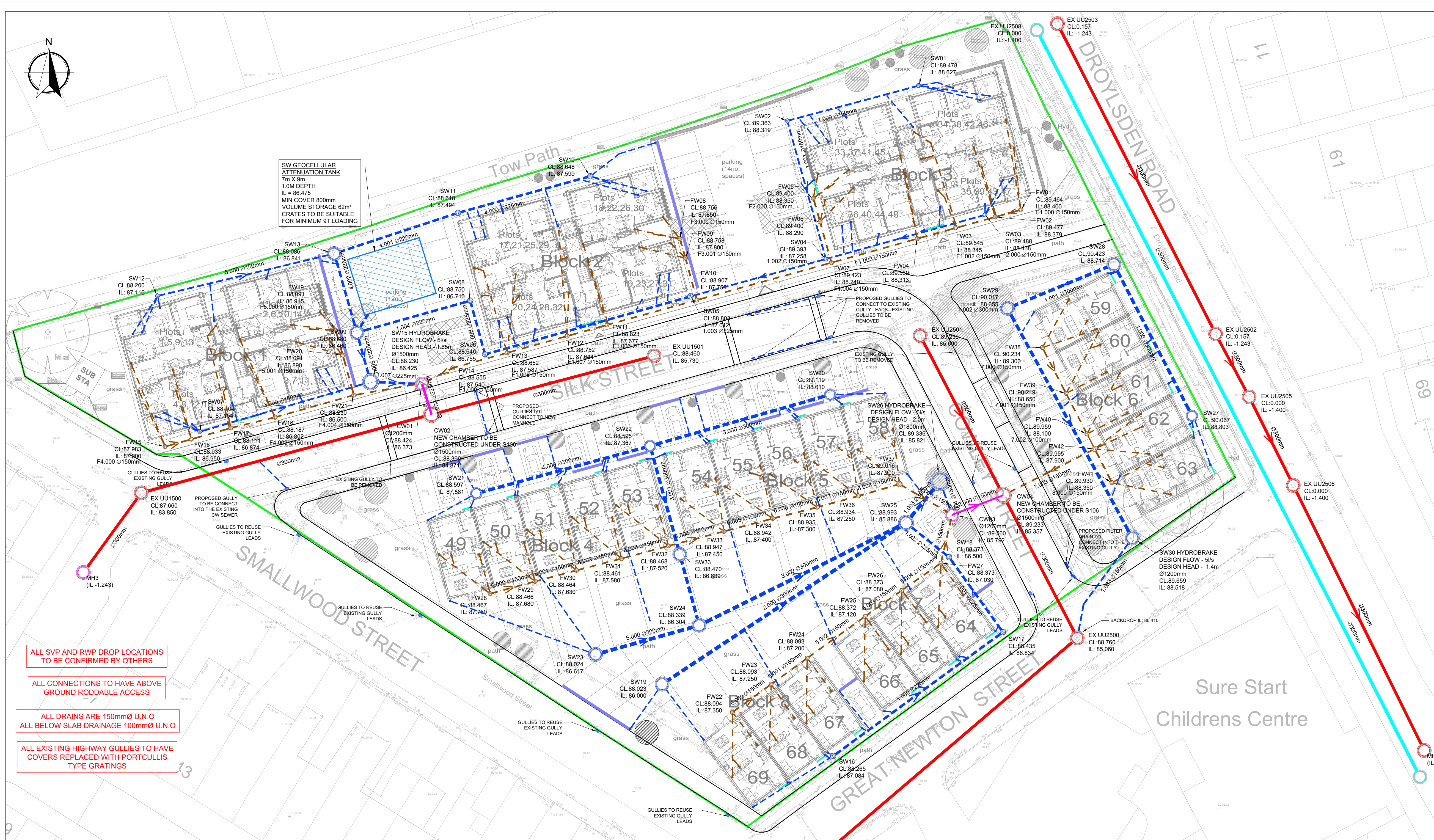
A Drainage Management and Maintenance document has been provided in **Appendix C** and will be included within the O&M manual at the site.

The long-term maintenance of the drainage infrastructure will be the responsibility of a Management Company for the apartments (to be appointed at build completion) and the maintenance responsibility for the houses will be Manchester City Council. To further future proof the drainage networks from potential build overs, pipes and manholes within the rear gardens have been aligned towards (close as possible) the rear entrance footpaths

Manufacturer's information for products used on the development can be found in **Appendix D**.

Appendix A – Ridge Design Drawings

CONTENTS	
Identifier	Name
SSG-RDG-XX-ZZ-DR-C-0001	Proposed Drainage Plan
SSG-RDG-XX-ZZ-DR-C-0006	Drainage Manhole Schedule
SSG-RDG-XX-ZZ-DR-C-0007	Proposed Drainage Details
SSG-RDG-XX-ZZ-DR-C-0008	Proposed Drainage Details



1. DRAWINGS ARE TO BE READ IN CONJUNCTION WITH ALL RELEVANT SPECIFICATIONS, ENGINEERS, ARCHITECTS & SERVICES DRAWINGS, INCLUDING APPROVED BUILDERS WORK DRAWINGS. CONTRACTOR TO NOTIFY ENGINEER OF DISCREPANCIES BETWEEN STRUCTURAL DRAWINGS AND SPECIFICATIONS OR OTHER DRAWINGS.
2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
3. DO NOT SCALE FROM THIS DRAWING. WORK TO DIMENSIONS OR CO-ORDINATES PROVIDED. ALL LEVELS ARE IN METRES AND ALL DIMENSIONS ARE IN MILLIMETRES, UNLESS OTHERWISE NOTED. ANY AMBIGUITIES, OMISSIONS AND ERRORS ON DRAWINGS, SHALL BE BROUGHT TO THE ENGINEERS ATTENTION IMMEDIATELY.

STATUS	PURPOSE OF ISSUE
CR	CONSTRUCTION RECORD
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1. THE CONTRACTOR SHALL ALLOW FOR THE PROTECTION, TEMPORARY AND PERMANENT SUPPORT AND DIVERSION WORKS AS NECESSARY, TO ALL EXISTING SERVICES TO THE SATISFACTION OF THE PUBLIC UTILITIES.
2. THE CONTRACTOR SHALL ALLOW FOR DEALING WITH SURFACE WATER RUN-OFF INTO EXCAVATIONS AND FROM GROUNDWATER BY MEANS OF SUMPS, PUMPING AND DE-WATERING AS APPROPRIATE, IN ORDER TO KEEP THE EXCAVATION AS REASONABLY DRY AS POSSIBLE DURING THE CONSTRUCTION OF THE WORKS.
3. ALL PRIVATE DRAINAGE WITHIN THE SITE IS TO COMPLY WITH THE REQUIREMENTS OF BS EN752 AND BUILDING REGULATIONS PART H. WHERE APPROPRIATE, ALL ADJACENT DRAINAGE SHALL BE DESIGN AND CONSTRUCTED IN ACCORDANCE WITH SEWERS FOR ADOPTION 6TH EDITION AND THE ADOPTING AUTHORITIES STANDARD REQUIREMENTS.
4. ALL PRIVATE DRAINAGE PIPES TO BE LAID IN TRENCHES BEDDED CLAY OR OF SINGLE SIZED AGGREGATE AND BACKFILLED WITH SPKILLER WITH 100mm (4" MIN) DOWNS REUSED FROM EXCAVATED MATERIAL. UNDER BUILDINGS AND WHERE COVER TO INVERT IS LESS THAN 1200mm UNDER TRAFFICKED AREAS PIPES TO BE CAST IN CONCRETE (CLASS 2 BEDDING), CLASS 'S' BED AND SURROUND MAY BE REQUIRED FOR SEWERS TO BE ADOPTED. REFER TO SPECIFIC DRAWINGS FOR FURTHER INFORMATION.
5. SELECTED BACKFILL MATERIAL SHALL CONSIST OF UNIFORM EXCAVATED MATERIAL, FREE FROM STONES LARGER THAN 40mm, CLAY LUMPS LARGER THAN 75mm, TREE ROOTS, CONTAMINATED MATERIAL. SELECTED BACKFILL MATERIAL IS TO BE PLACED IN LAYERS NOT EXCEEDING 150mm THICKNESS. THE MATERIAL SHALL BE COMPACTED TO

GROUND LEVELS. ALL EXTERNAL WORKS CONSTRUCTION AREAS TO BE AS LOCATED BY THE ARCHITECT.

MANHOLE COVERS AND FRAMES ARE TO BE IN ACCORDANCE WITH BSEN1214 AND THE FOLLOWING:

- a) VEHICULAR AREAS: CLASS D400 (E600 IN VULNERABLE SERVICE YARD LOCATIONS), DOUBLE TRIANGULAR, 150mm DEEP DUCTILE IRON COVER AND FRAME WITH THREE POINT COVER SEATING, BADGED FW OR SW FOR FOUL OR SURFACE WATER DRAINAGE.
- b) PEDESTRIAN AREAS: CLASS B125, 100mm DEEP, BADGED FW OR SW FOR FOUL OR SURFACE WATER DRAINAGE.

POSITIONS AND SIZES OF ABOVE GROUND FOUL AND SURFACE WATER DRAINAGE CONNECTIONS ARE TO BE CONFIRMED PRIOR TO CONSTRUCTION WITH THE ARCHITECT & M&E ENGINEER.

GULLY GRATINGS AND STEEL CHANNEL COVERS ARE TO BE IN ACCORDANCE WITH BSEN1214 AS FOLLOWS:

- a) AREAS SUBJECT TO VEHICULAR OVERRUN: CLASS D400 MINIMUM.
- b) AREAS NOT SUBJECT TO REGULAR VEHICLE OVERRUN (ADJACENT TO KERBS ETC): CLASS C250.
- c) GULLY GRATES ADJACENT TO KERBS SHALL BE HINGED ON THE SIDE OF THE TRAFFIC DIRECTION (LEFT HAND SIDE).

ALL BRICKWORK IN CONNECTION WITH DRAINAGE IS TO BE SOLID CLASS B ENGINEERING BRICK TO BS3921.

ALL PRECAST CONCRETE PIPES, CHAMBER PRODUCTS AND ROAD GULLIES SHALL BE TO BS5911 AND BE KITEMARKED.

ALL DRAINAGE INSITU CONCRETE SHALL BE GEN3 (U.N.O).

ALL INSITU AND CONCRETE PRODUCTS SHALL COMPLY WITH THE REQUIREMENTS FOR SULPHATE EXPOSURE IN ACCORDANCE WITH BRE SPECIAL DIGEST 1. CONCRETE IN

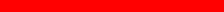
UNTREATED EFFLUENT FROM A COMMERCIAL KITCHEN CONTAINING GREASE AND OILS. REMOVAL OF GREASE AND OIL SHOULD BE MADE AT SOURCE USING A FLOOR MOUNTED ABOVE GROUND GREASE REMOVAL SYSTEM. IT IS RECOMMENDED THAT A MECHANICAL GREASE REMOVAL SYSTEM BE EMPLOYED FOR THIS PURPOSE NOT A PASSIVE SYSTEM.

8. PIPEWORK TO BE OF THE FOLLOWING MANUFACTURER: 100 / 150 / 225MM DIAMETER HEPWORTH SUPERSLEEVE VITRIFIED CLAY PIPES (40kN/mm CRUSHING STRENGTH), 300mm + TO BE CONCRETE CLASS M. ALTERNATIVELY 'POLYSEWER' UPVC DRAINAGE SYSTEM BY POLYPIPE WHEN INSTALLED IN LINE WITH THE MANUFACTURERS RECOMMENDATIONS. FILTER DRAINAGE TO BE PERFORATED HDPE.

9. ALL RWP, WPC & GULLY CONNECTIONS TO BE 100mm DIA UNCO & ARE RODDABLE AT LOCATIONS ABOVE GROUND LEVEL.

10. ALL INSPECTION CHAMBERS WITH A DEPTH GREATER THAN 1.2m TO HAVE A 350mm DIAMETER REDUCING PLATE LOCATED BENEATH COVER AND FRAME TO PREVENT ACCESS.

KEY

 EXISTING SW SEWER
 EXISTING CW SEWER
 PROPOSED FILTER DRAIN WITHIN PERMEABLE SUB BASE - 600mm DEEP
 PROPOSED SW IC
 PROPOSED SW MANHOLE
 PROPOSED FW IC
 PROPOSED FW MANHOLE
 PROPOSED CW DRAIN
 PROPOSED CW MH
 PROPOSED CHANNEL DRAINAGE (ACO MD100 OR SIMILAR APPROVED)

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PROJECT	SILK STREET, GORTON
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DRAFTER PB	ENGINEER PB
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TITLE	PROJECT REFERENCE:
PROPOSED DRAINAGE LAYOUT	

SCALE 1-250	SHEET A1	DRAWING No SSG-RDG-00-ZZ-DR-C-0001	REV CR
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GENERAL NOTES

1. DRAWINGS ARE TO BE READ IN CONJUNCTION WITH ALL RELEVANT SPECIFICATIONS, ENGINEERS, ARCHITECTS & SERVICES DRAWINGS, INCLUDING APPROVED BUILDERS WORK DRAWINGS. CONTRACTOR TO NOTIFY ENGINEER OF DISCREPANCIES BETWEEN STRUCTURAL DRAWINGS AND SPECIFICATIONS OR OTHER DRAWINGS.
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MANHOLE SCHEDULE									
MANHOLE NO.	MANHOLE CO-ORDINATES	COVER LEVEL (m)	DEPTH TO INVERT (m)	MANHOLE SIZE	MANHOLE TYPE	PIPE IN NAME, INVERT LEVEL (m) & DIA	PIPE OUT NAME, INVERT LEVEL (m) & DIA	COVER SIZE (mm) & GRADE	COMMENTS
SW09	E:388141.044 N:400555.233	88.680	2.220	1,200	TYPE A	From SW08, IL=86.460, 225mmØ From SW13, IL=86.460, 225mmØ From , IL=86.460, 225mmØ	To SW15, IL=86.460, 225mmØ	750 x 750 D400	
SW13	E:388138.332 N:400564.729	88.086	1.245	1,200	TYPE C	From SW11, IL=86.841, 225mmØ From SW12, IL=86.916, 150mmØ	To SW09, IL=86.841, 225mmØ	750 x 750 D400	
SW15	E:388142.695 N:400549.304	88.230	1.805	1,500	Hydrobrake Chamber	From SW07, IL=86.425, 150mmØ From SW09, IL=86.425, 225mmØ	To CW01, IL=86.425, 225mmØ	600x600 D400	FLOW CONTROL CHAMBER HYDROBRAKE FLOW - 5l/s HEAD - 1.65m
SW19	E:388177.755 N:400512.944	88.023	2.023	1,200	TYPE A	From ACO02, IL=86.150, 100mmØ From RWP23, IL=86.150, 100mmØ	To SW25, IL=86.000, 300mmØ	600x600 D400	
SW20	E:388197.970 N:400547.766	89.119	1.109	900	TYPE C	From ACO03, IL=88.160, 100mmØ From RWP27, IL=88.160, 100mmØ From MH467, IL=88.082, 100mmØ	To SW22, IL=88.010, 300mmØ	600x600 D400	
SW21	E:388155.413 N:400535.883	88.597	1.016	900	TYPE C	From ACO04, IL=87.731, 100mmØ From RWP30, IL=87.731, 100mmØ	To SW22, IL=87.581, 300mmØ	600x600 D400	
SW22	E:388176.316 N:400541.595	88.595	1.228	900	TYPE C	From SW21, IL=87.367, 300mmØ From SW20, IL=87.367, 300mmØ	To SW33, IL=87.367, 300mmØ	600x600 D400	
SW23	E:388169.750 N:400516.522	88.024	1.407	1,200	TYPE C	From RWP33, IL=86.767, 100mmØ From RWP34, IL=86.767, 100mmØ	To SW24, IL=86.617, 300mmØ	600x600 D400	
SW24	E:388182.220 N:400520.020	88.339	2.035	1,200	TYPE A	From SW23, IL=86.304, 300mmØ From SW33, IL=86.304, 300mmØ	To SW25, IL=86.304, 300mmØ	600x600 D400	
SW25	E:388207.089 N:400532.343	88.993	3.107	1,350	TYPE A	From SW24, IL=85.886, 300mmØ From SW19, IL=85.886, 300mmØ From SW18, IL=85.961, 225mmØ	To SW26, IL=85.886, 300mmØ	600x600 D400	
SW26	E:388211.169 N:400537.332	89.336	3.515	1,800	Hydrobrake Chamber	From SW25, IL=85.821, 300mmØ	To CW03, IL=85.821, 150mmØ	600x600 D400	FLOW CONTROL CHAMBER HYDROBRAKE FLOW - 5l/s HEAD - 2.0m
SW27	E:388241.473 N:400545.232	90.067	1.264	900	TYPE C	From RWP42, IL=88.803, 100mmØ	To SW28, IL=88.803, 300mmØ	600x600 D400	
SW28	E:388232.088 N:400563.445	90.423	1.709	1,200	TYPE A	From SW27, IL=88.714, 300mmØ	To SW29, IL=88.714, 300mmØ	600x600 D400	
SW29	E:388219.282 N:400558.138	90.017	1.362	1,200	TYPE C	From SW28, IL=88.655, 300mmØ	To SW30, IL=88.655, 300mmØ	600 x 600 D400	
SW30	E:388234.306 N:400530.513	89.659	1.141	1,200	Hydrobrake Chamber	From SW29, IL=88.518, 300mmØ	To , IL=88.518, 150mmØ	600x600 D400	FLOW CONTROL CHAMBER FLOW - 5l/s HEAD - 1.4m
SW33	E:388179.883 N:400528.557	88.470	1.631	1,200	TYPE A	From SW22, IL=86.839, 300mmØ	To SW24, IL=86.839, 300mmØ	600x600 D400	

MANHOLE SCHEDULE									
MANHOLE NO.	MANHOLE CO-ORDINATES	COVER LEVEL (m)	DEPTH TO INVERT (m)	MANHOLE SIZE	MANHOLE TYPE	PIPE IN NAME, INVERT LEVEL (m) & DIA	PIPE OUT NAME, INVERT LEVEL (m) & DIA	COVER SIZE (mm) & GRADE	COMMENTS
CW01	E:388148.895 N:400549.041	88.424	2.051	1,200	TYPE A	From SW15, IL=86.373, 225mmØ	To , IL=86.373, 225mmØ	600x600 D400	
CW02	E:388150.025 N:400545.379	88.399	3.528	1,500	TYPE A	From EX UU1501, IL=84.871, 300mmØ From , IL=86.000, 225mmØ	To EX UU1500, IL=84.871, 300mmØ	600x600 D400	NEW CHAMBER TO BE CONSTRUCTED UNDER S106
CW03	E:388212.630 N:400533.283	89.260	3.468	1,200	TYPE A	From SW26, IL=85.792, 150mmØ	To , IL=85.792, 150mmØ	600x600 D400	
CW04	E:388218.773 N:400535.663	89.233	3.876	1,500	TYPE A	From EX UU2501, IL=85.357, 300mmØ From , IL=85.507, 150mmØ From FW42, IL=86.857, 150mmØ	To EX UU2500, IL=85.357, 300mmØ	600x600 D400	NEW CHAMBER TO BE CONSTRUCTED UNDER S106

CR	17.08.23	AP	AM	CONSTRUCTION RECORD
C1	03.03.22	AM	PB	ISSUED FOR CONSTRUCTION
P2	20.01.22	AM	PB	UPDATED TO SUIT THE DRAINAGE LAYOUT
P1	28.09.21	AM	PB	ISSUED FOR INFORMATION
No	DATE	DRAWN	REV'D ENG.	AMENDMENT

STATUS	PURPOSE OF ISSUE
CR	CONSTRUCTION RECORD

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PROJECT

SILK STREET, GORTON

DRAFTER

AM

ENGINEER

AM

TITLE

PROJECT REFERENCE:

DRAINAGE
MANHOLE SCHEDULE

SCALE

SHEET

DRAWING No.

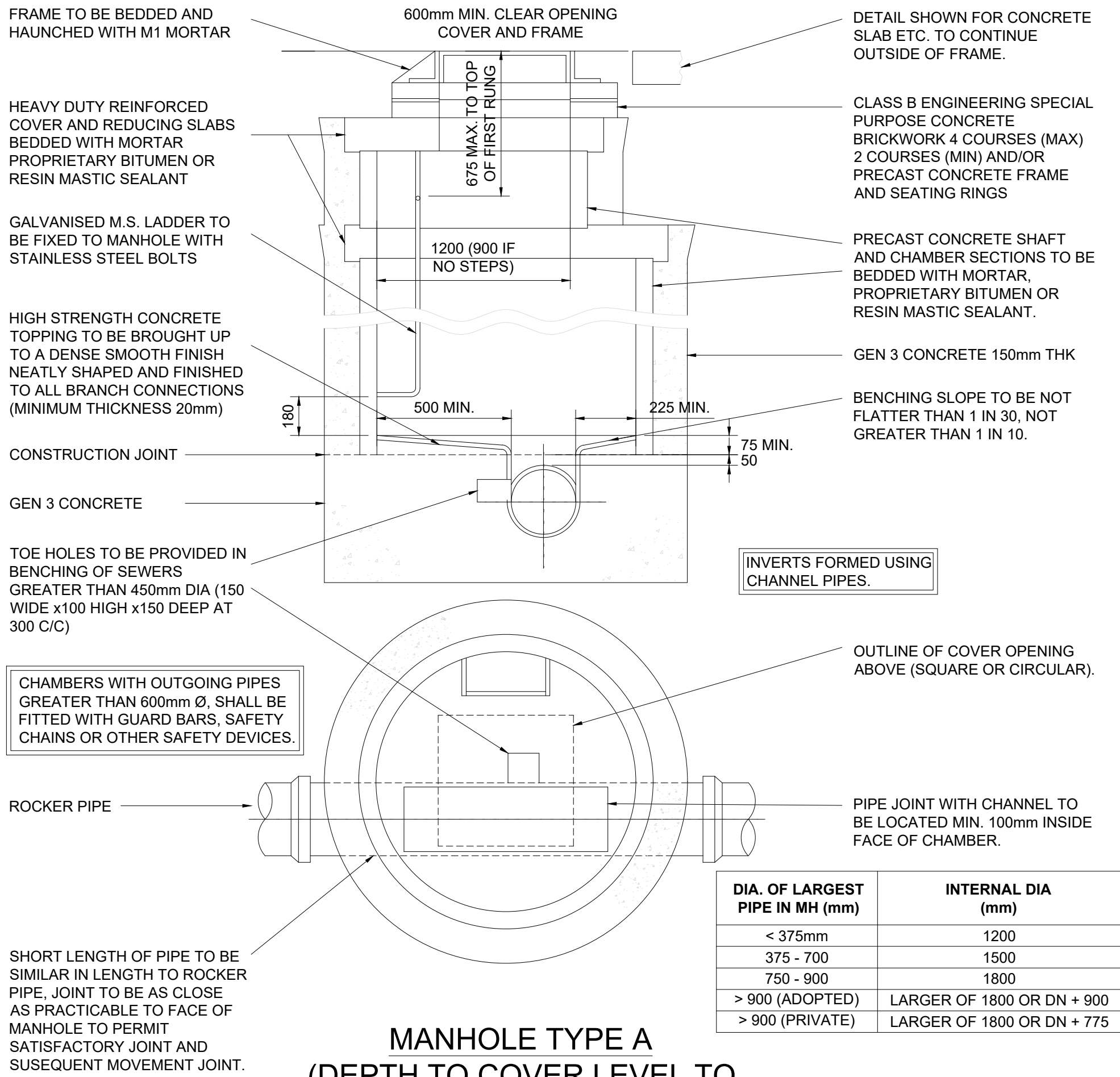
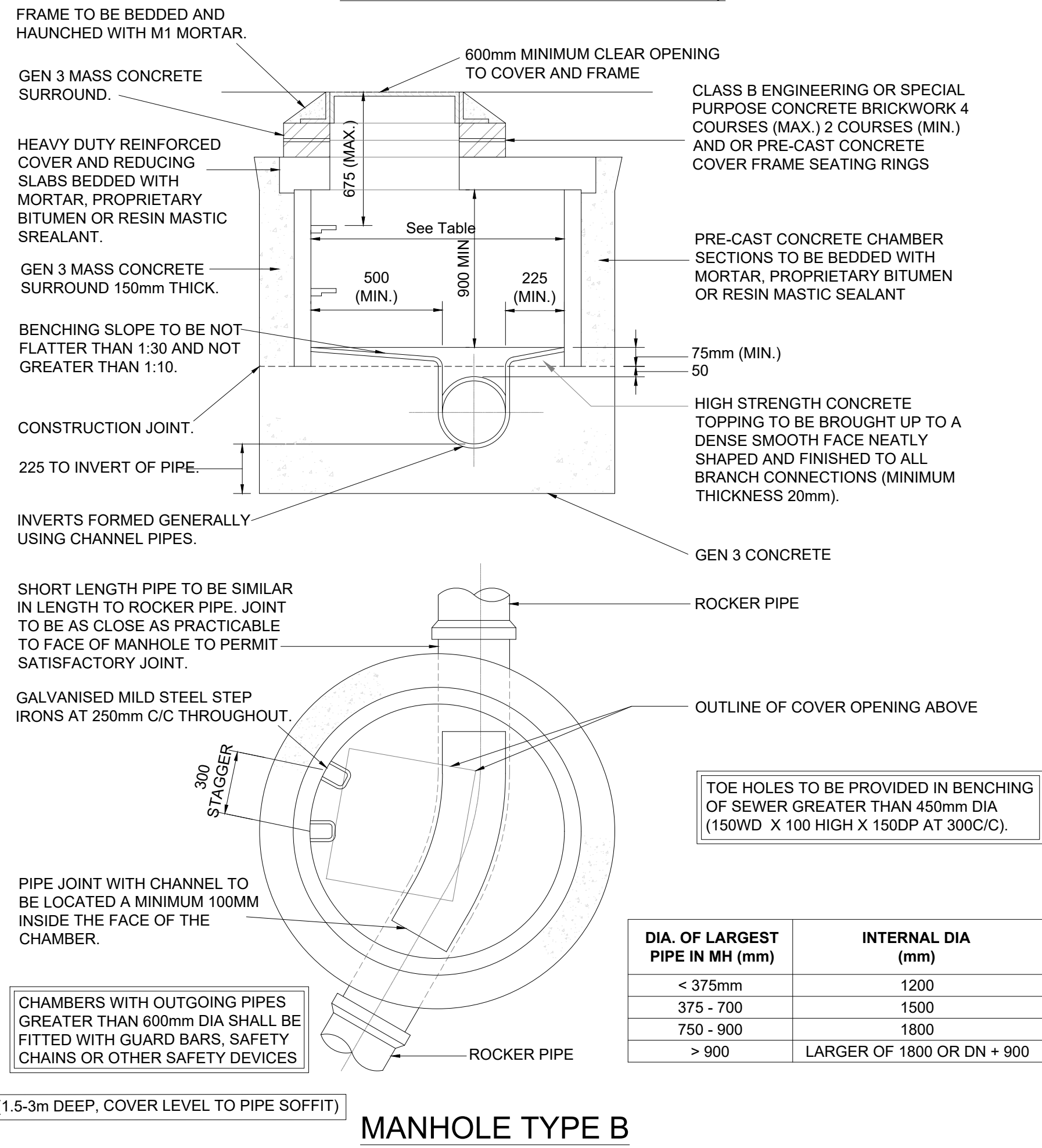
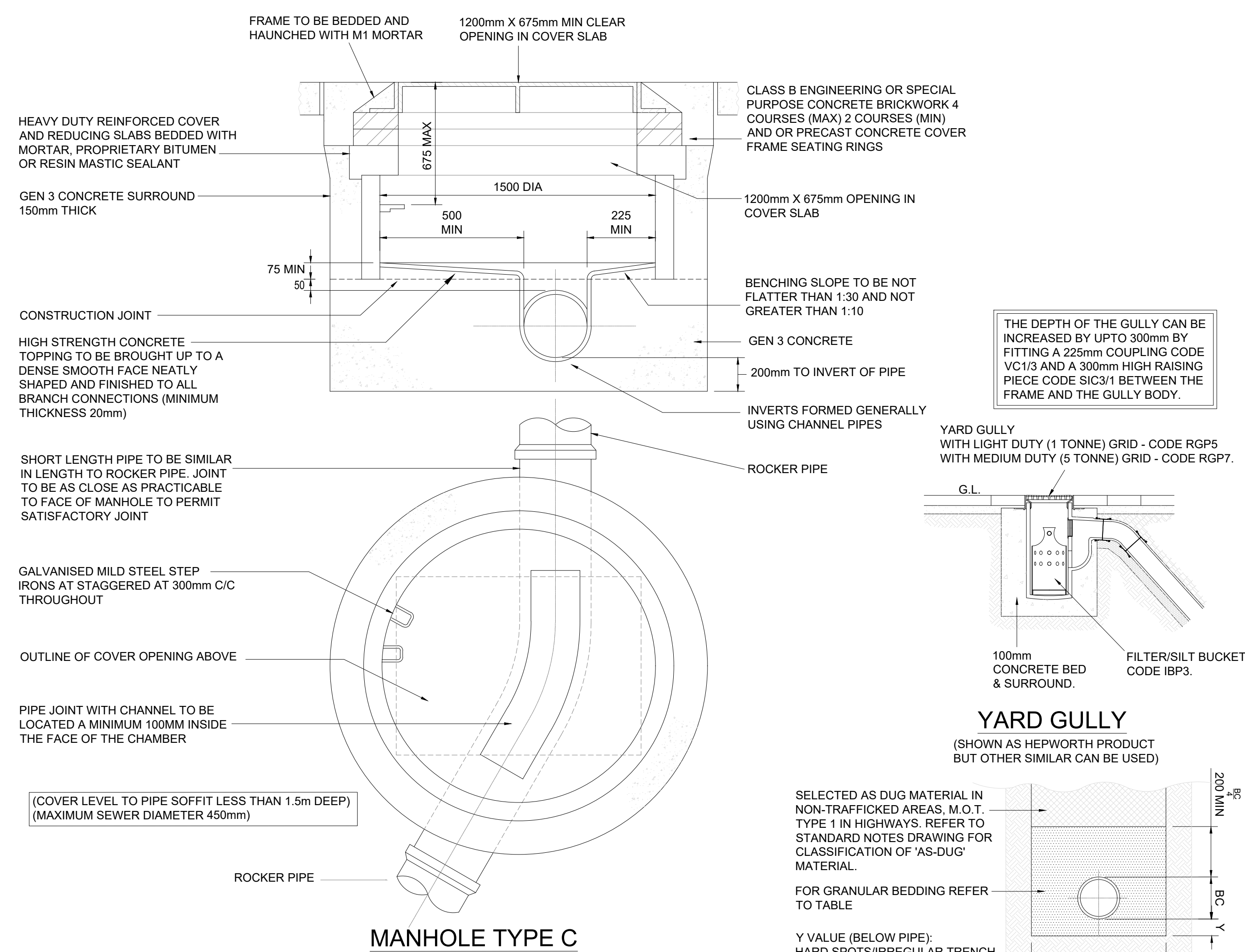
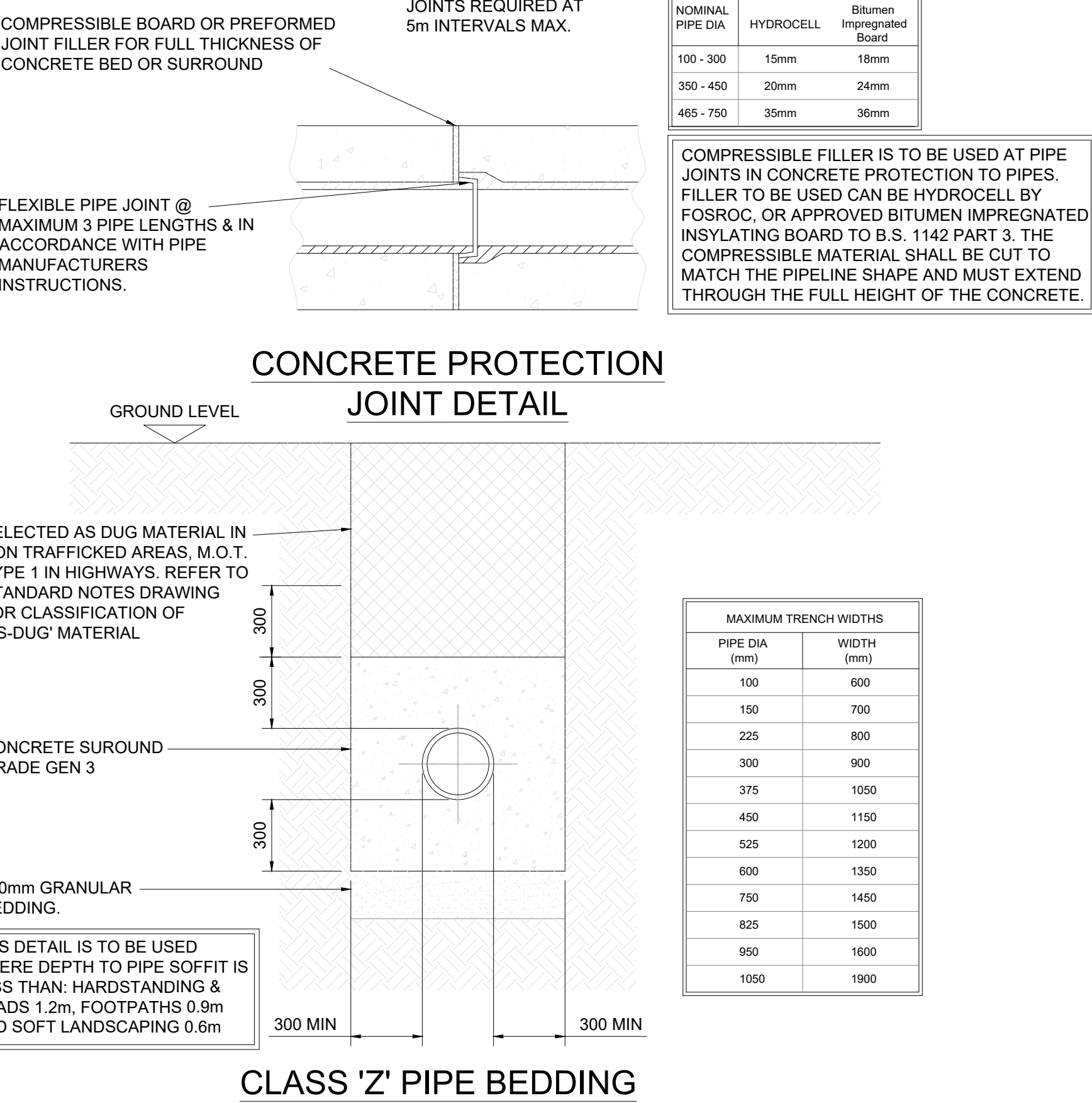
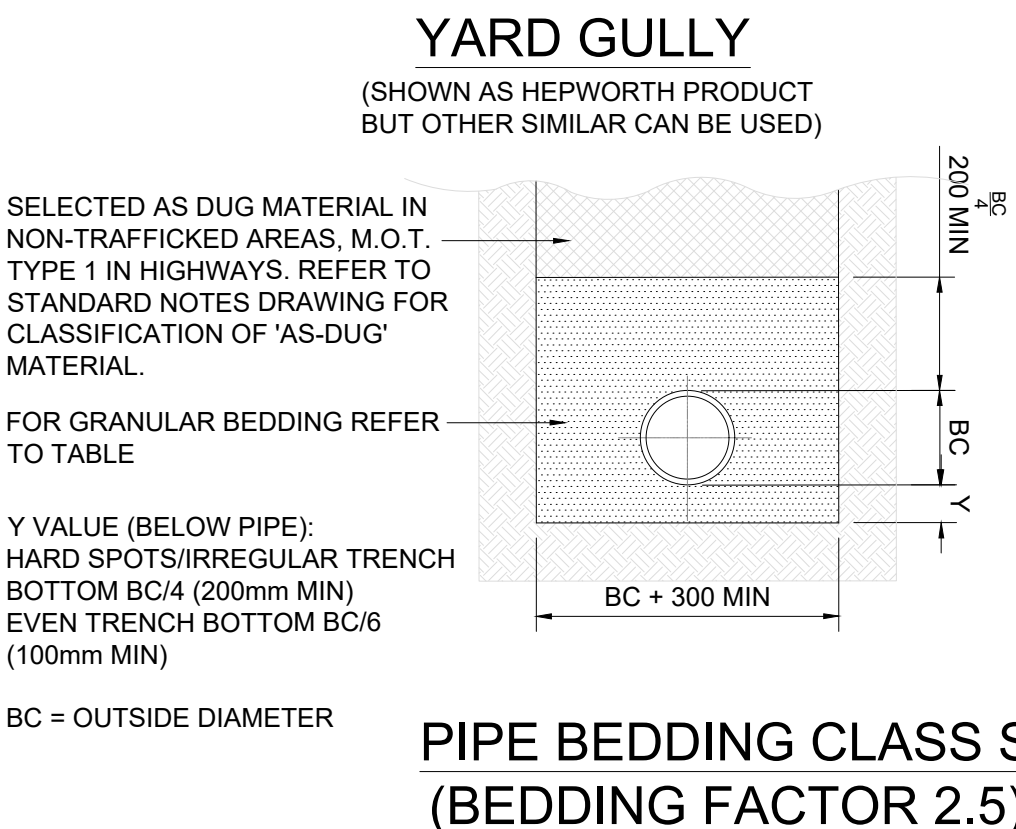
REV

NTS

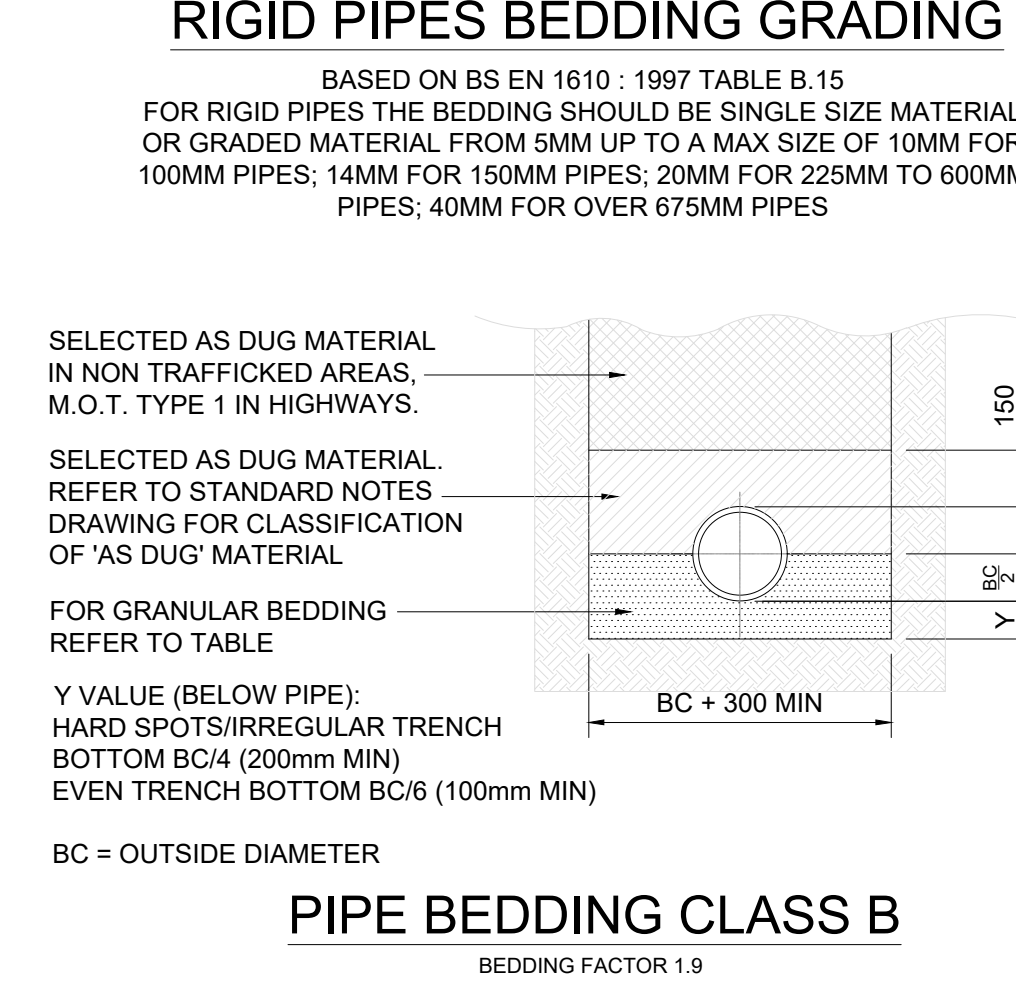
A1

SSG-RDG-00-ZZ-DR-C-0006

CR



BS EN 1610:1997 Annex B Table B.15 Coarse Aggregate - Pipe Bedding						
Sieve Size (mm)	Percentage by mass passing BS sieves for nominal sizes			Single-sized Aggregate (mm)		
	Graded Aggregate (mm)	14 to 5	20 to 5	40	20	14
50.0	100	-----	-----	100	-----	-----
37.5	90 - 100	100	-----	85 - 100	100	-----
20.0	35 - 70	90 - 100	100	0 - 25	85 - 100	100
14.0	-----	-----	90 - 100	-----	85 - 100	100
10.0	10 - 40	30 - 60	50 - 85	0 - 5	0 - 25	0 - 50
5.0	0 - 5	0 - 10	0 - 10	-----	0 - 5	0 - 10
2.36	-----	-----	-----	-----	-----	0 - 5



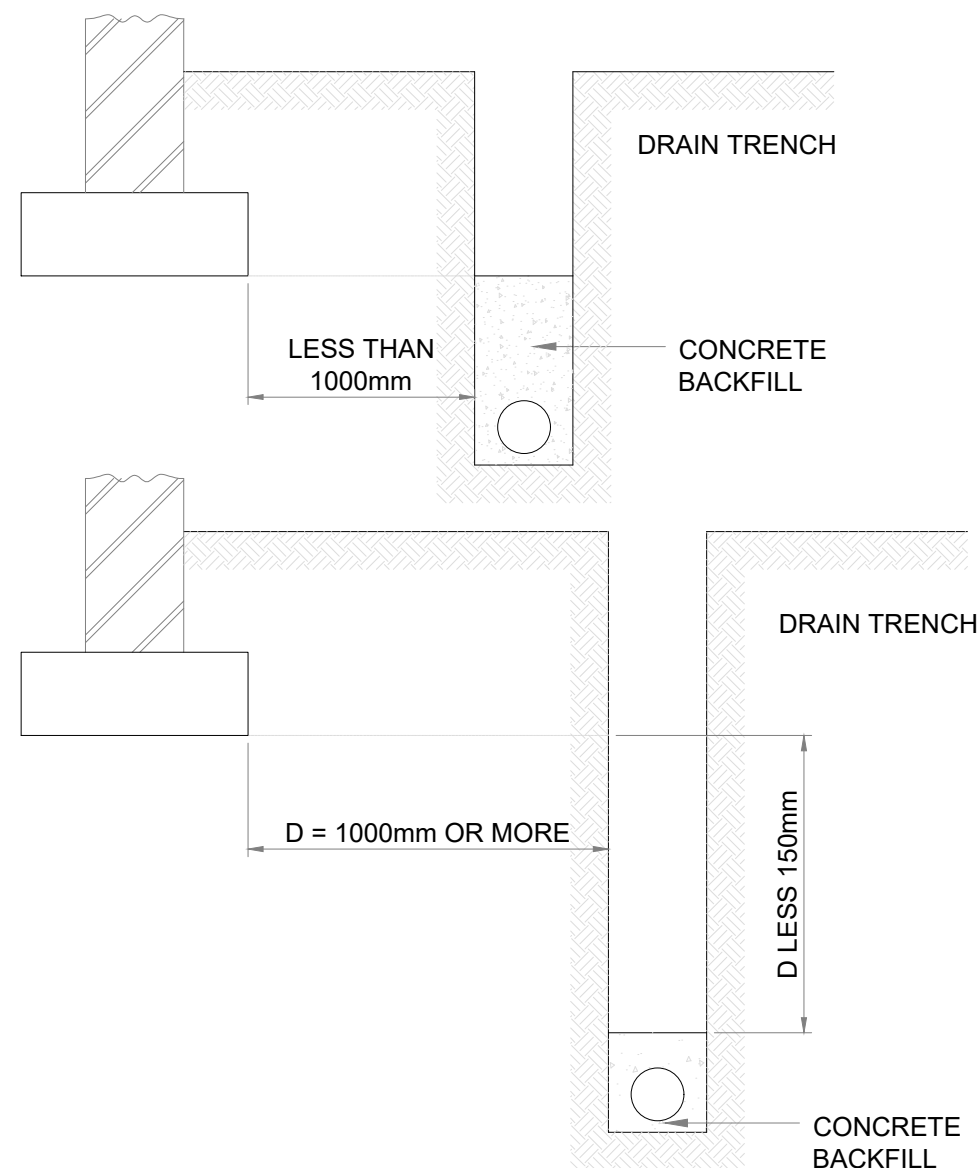
- ### GENERAL NOTES
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CONSTRUCTION RECORD DRAWING

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CR	20.07.23	AP	PB	CONSTRUCTION RECORD
C1	03.03.22	AM	PB	ISSUED FOR CONSTRUCTION
P2	20.01.22	AM	PB	ADDITIONAL DETAILS ADDED
P1	28.09.21	AM	PB	ISSUED FOR INFORMATION
No	DATE	DRAWN	REV'D ENG.	AMENDMENT
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CR		CONSTRUCTION RECORD		
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PROJECT			
SILK STREET, GORTON			
DRAFTER		AM	ENGINEER
		AM	
TITLE		PROJECT REFERENCE:	
DRAINAGE DETAILS			
SHEET 1			
SCALE	SHEET	DRAWING No	REV
1:20	A1	SSG-RDG-00-ZZ-DR-C-0007	CR



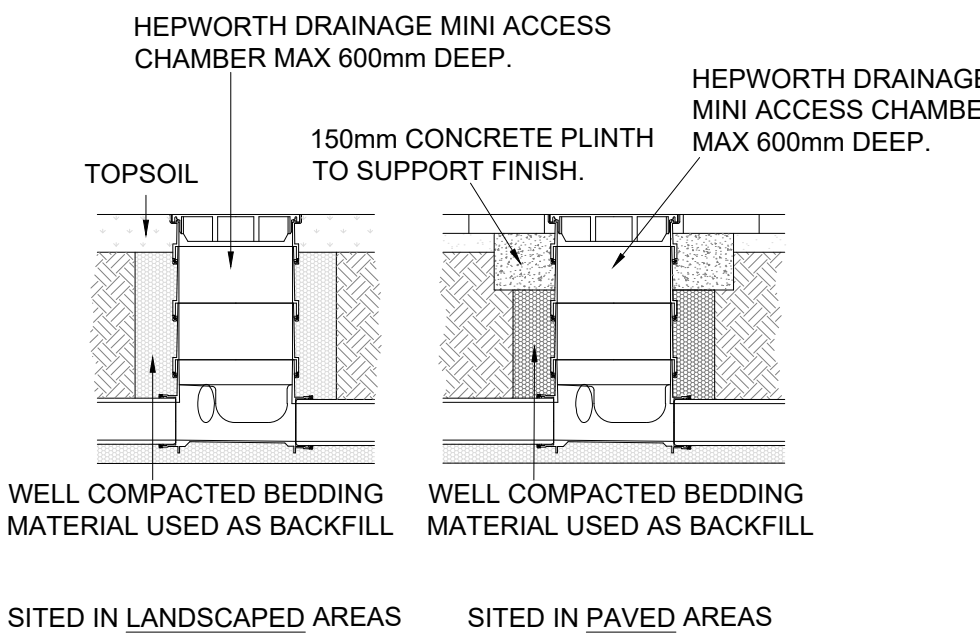
NOTES

1. CONCRETE TO BE GRADE GEN 3

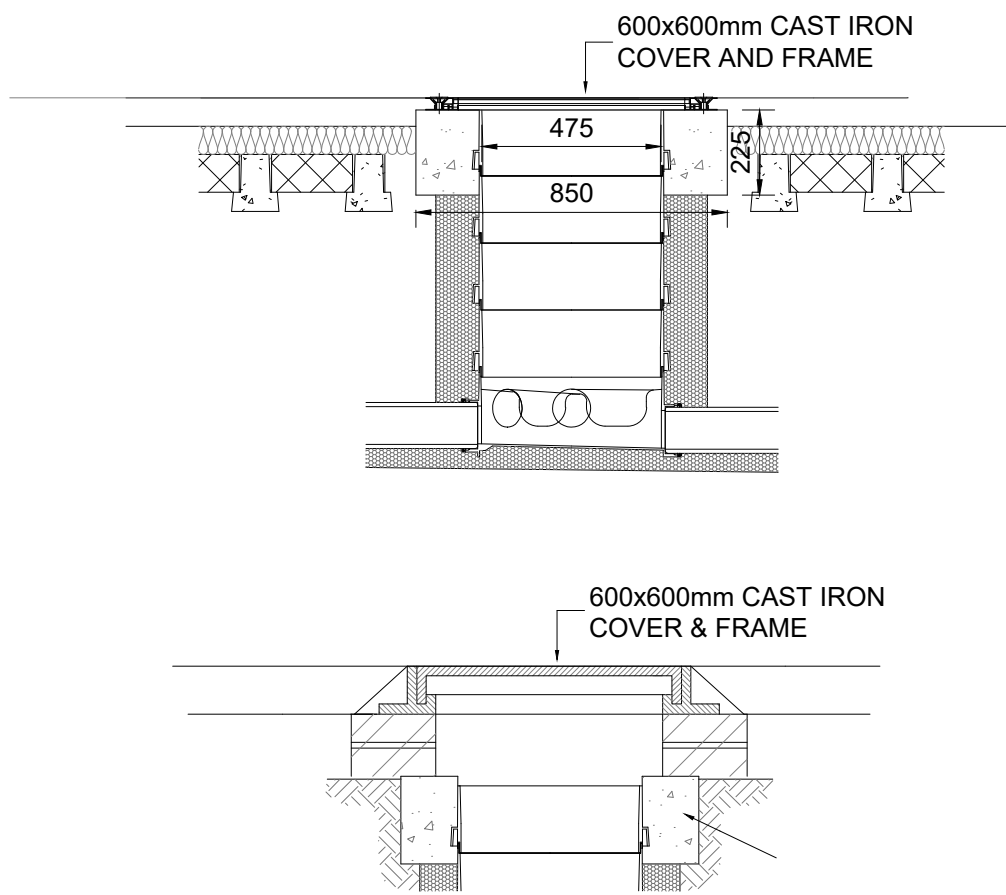
2. JOINTS TO BE PROVIDED IN CONCRETE SURROUND AT NOT GREATER THAN 5.0m CENTRES. BUILDING REGULATIONS PART H1 PARA A11

3. WHERE THE TRENCH IS WITHIN 1m OF THE BUILDING THE TRENCH SHALL BE FILLED WITH CONCRETE UP TO THE LOWEST LEVEL OF THE FOUNDATIONS. WHERE THE TRENCH IS FURTHER THAN 1000mm FROM THE BUILDING, THE TRENCH SHALL BE FILLED WITH CONCRETE UP TO A LEVEL, BELOW THE LOWEST LEVEL OF THE FOUNDATION, EQUAL TO THE DISTANCE FROM THE BUILDING LESS 150mm.

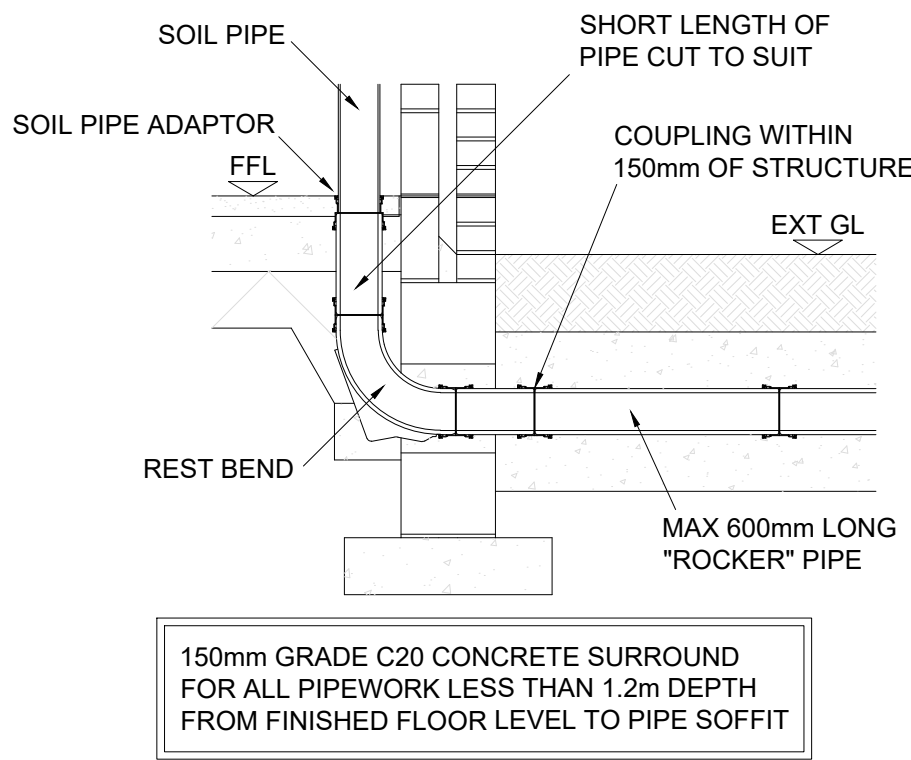
PIPE RUNS ADJACENT TO BUILDING



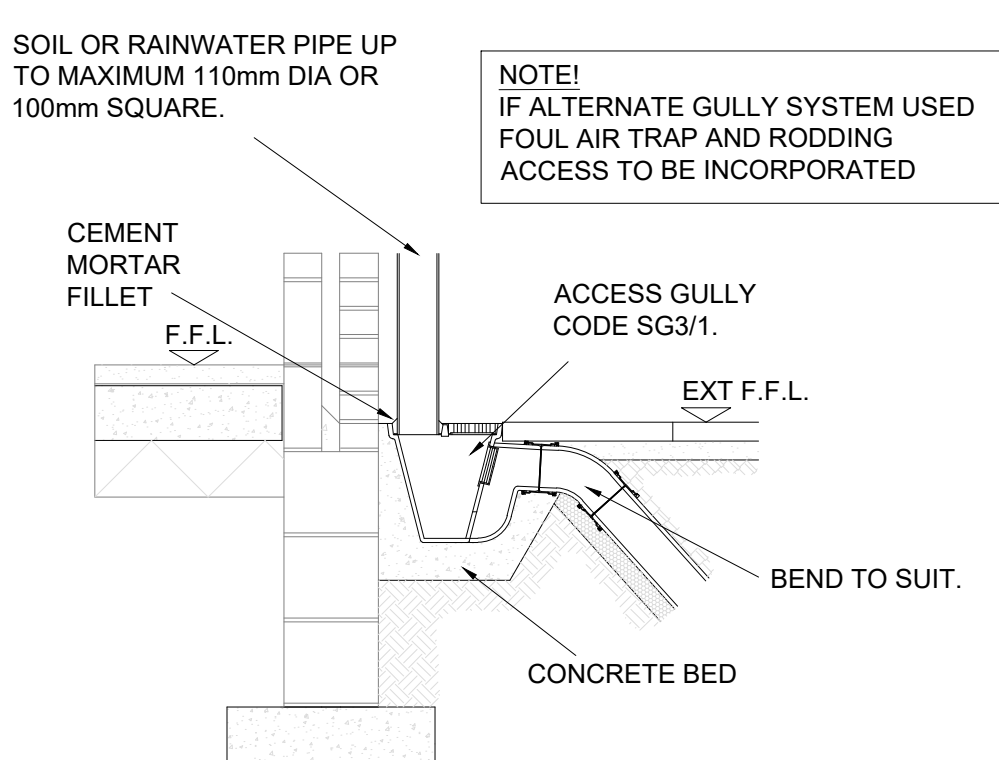
MINI ACCESS CHAMBERS
(600mm DEEP)



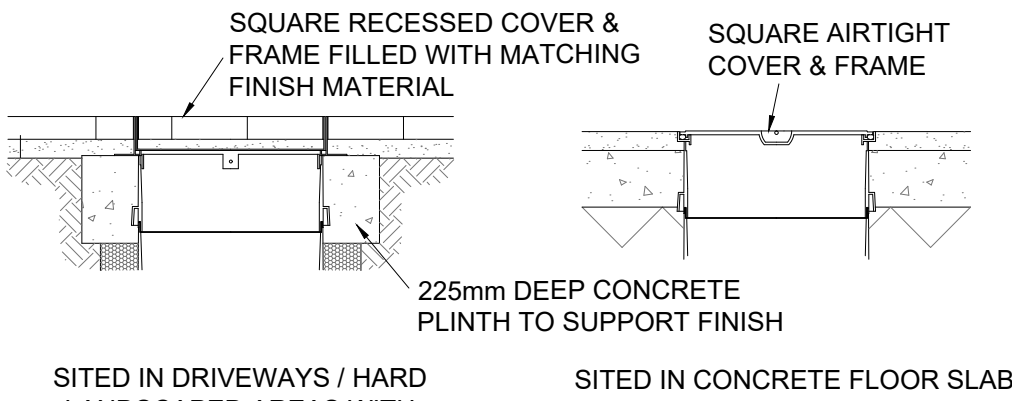
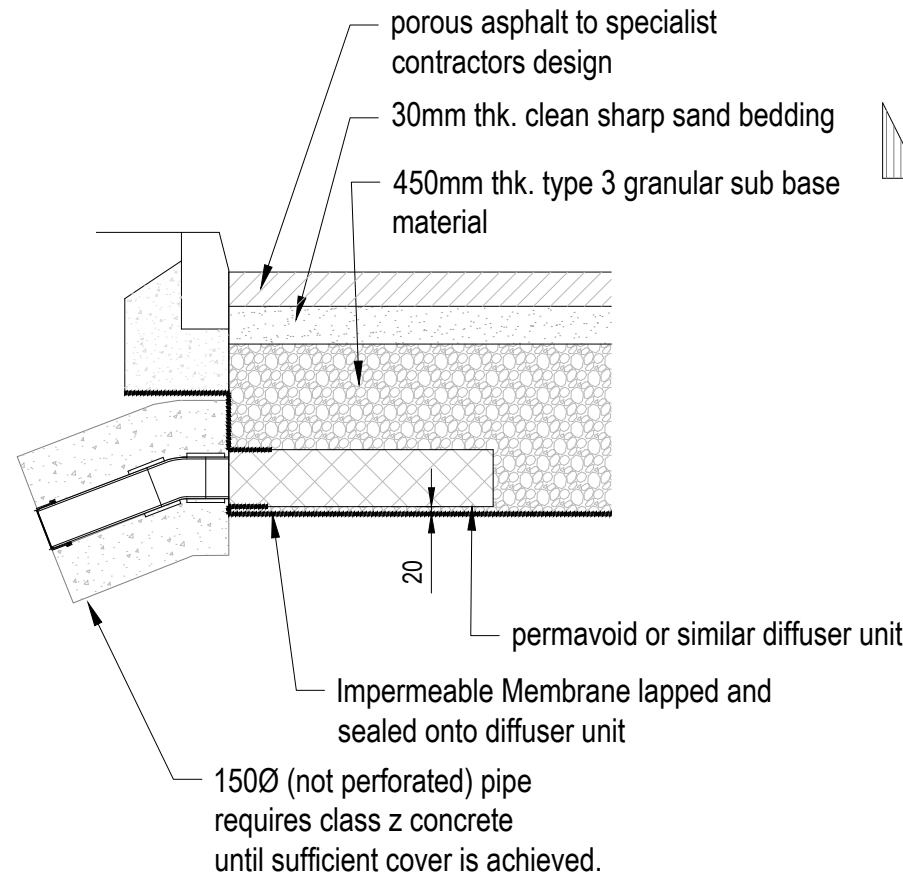
SITED IN EXTERNAL HARD
STANDING AREAS WITH 600x600
CAST IRON COVER



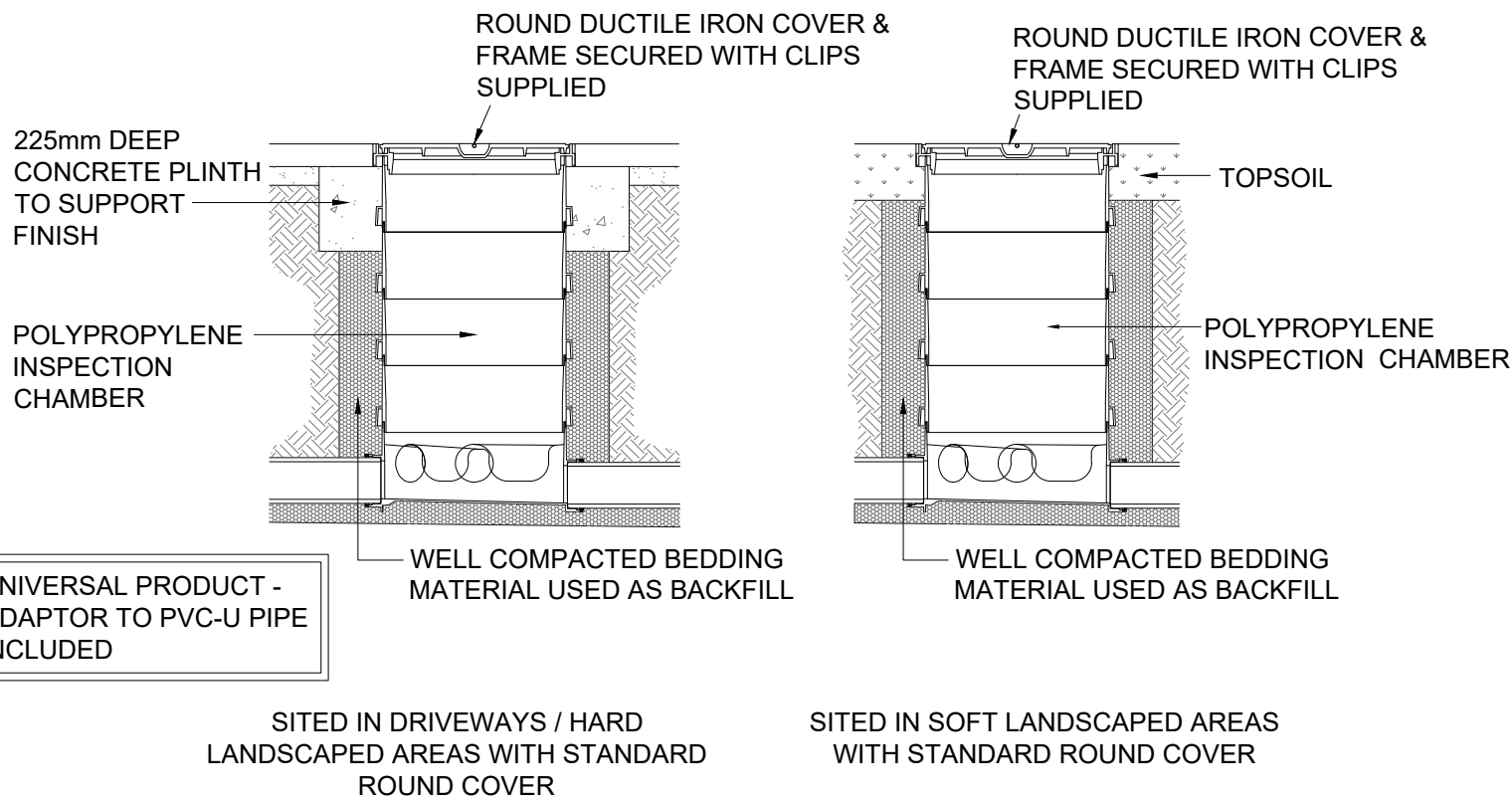
SOIL AND VENT PIPE CONNECTION



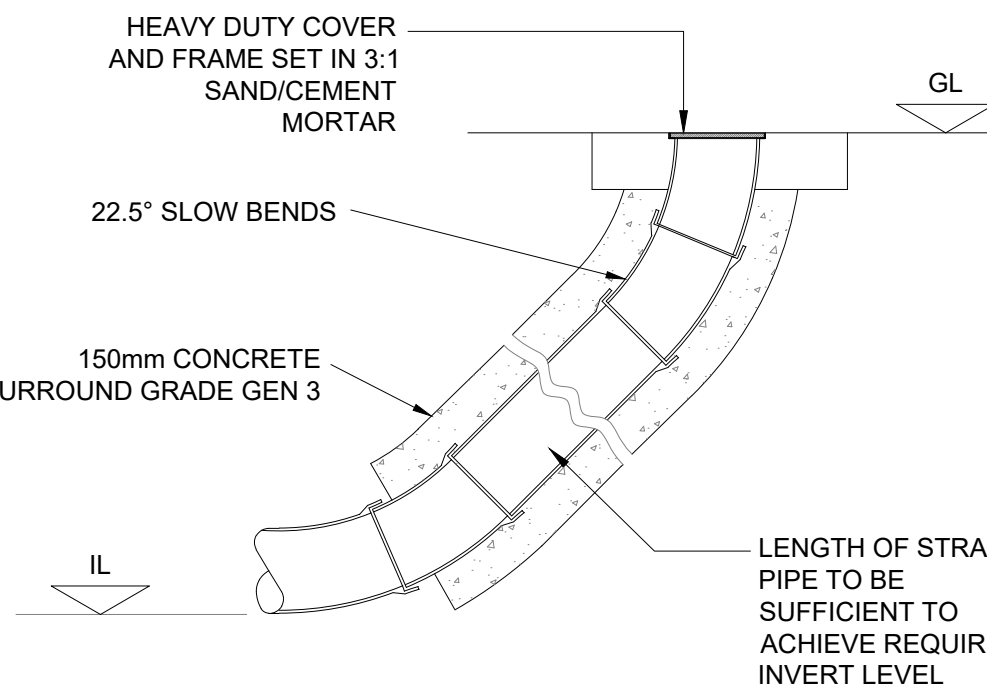
EXTERNAL RWP CONNECTION
AND GULLY
(SHOWN AS HEPWORTH BUT
SIMILAR CAN BE USED)



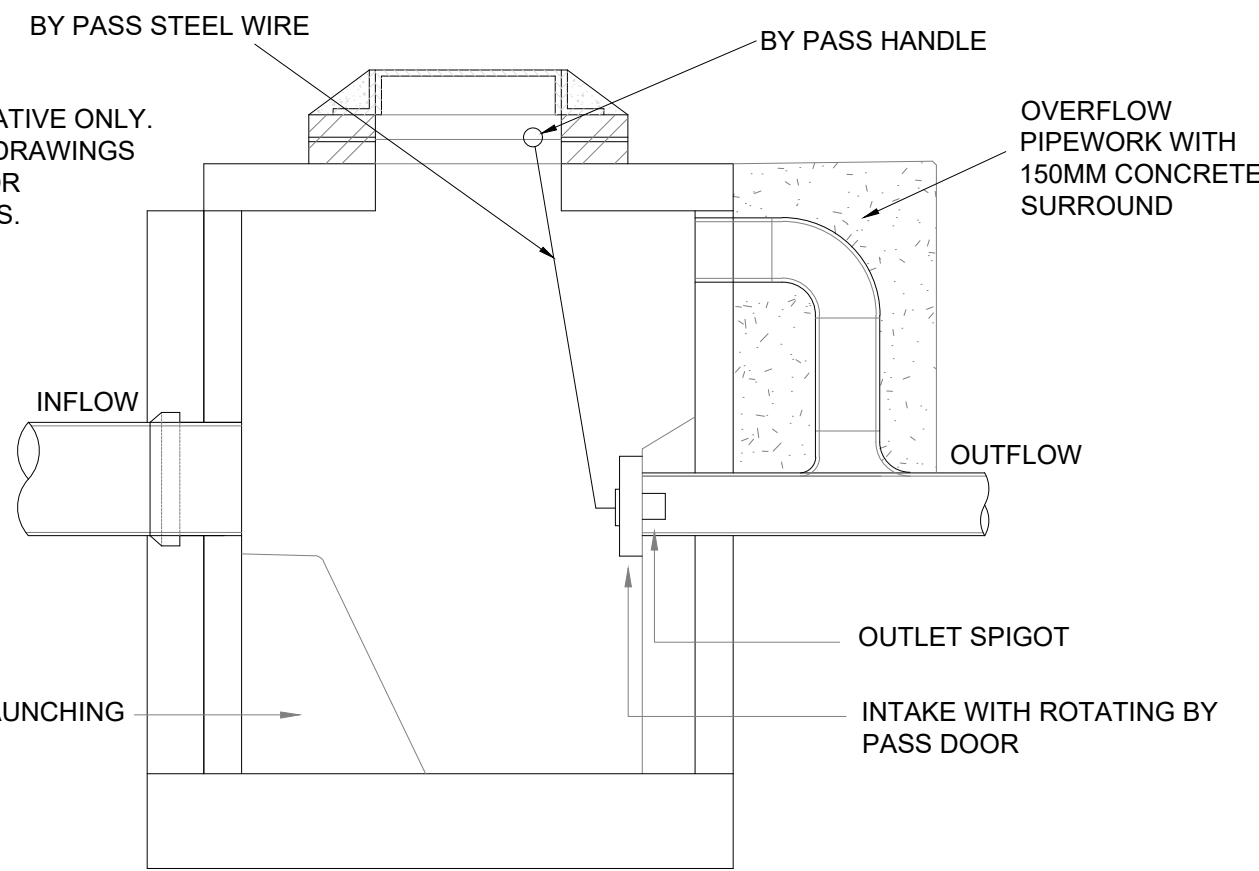
DIFFUSER OUTLET DETAIL



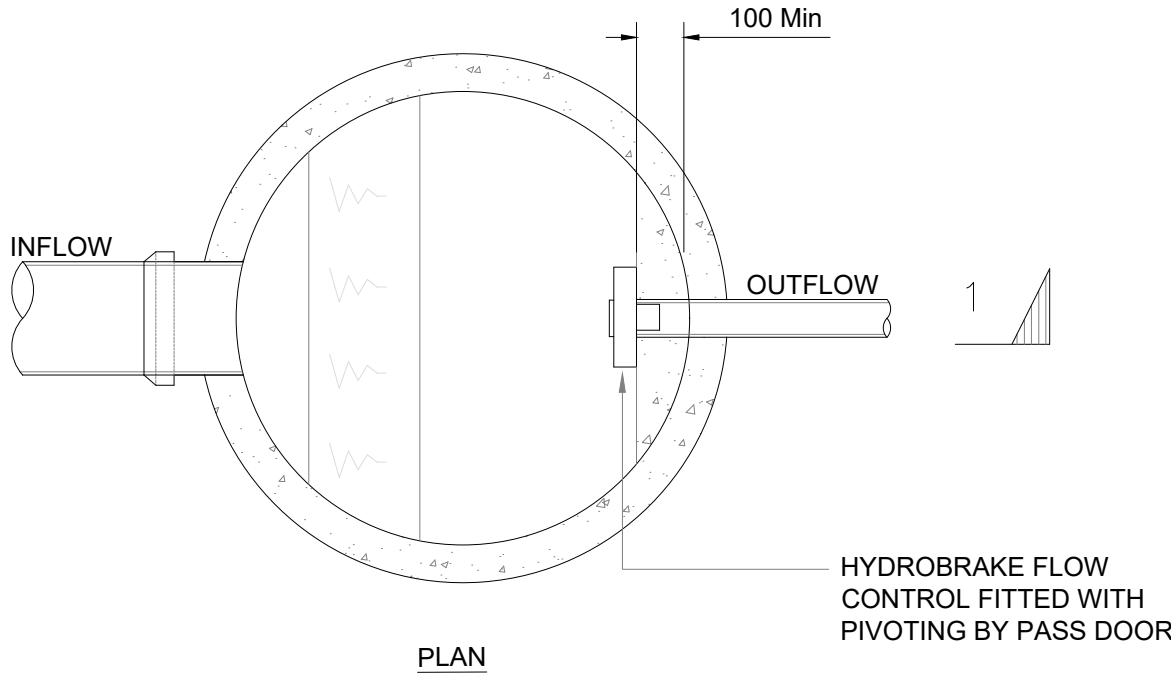
POLYPROPYLENE INSPECTION
CHAMBER INSTALLATION DETAIL



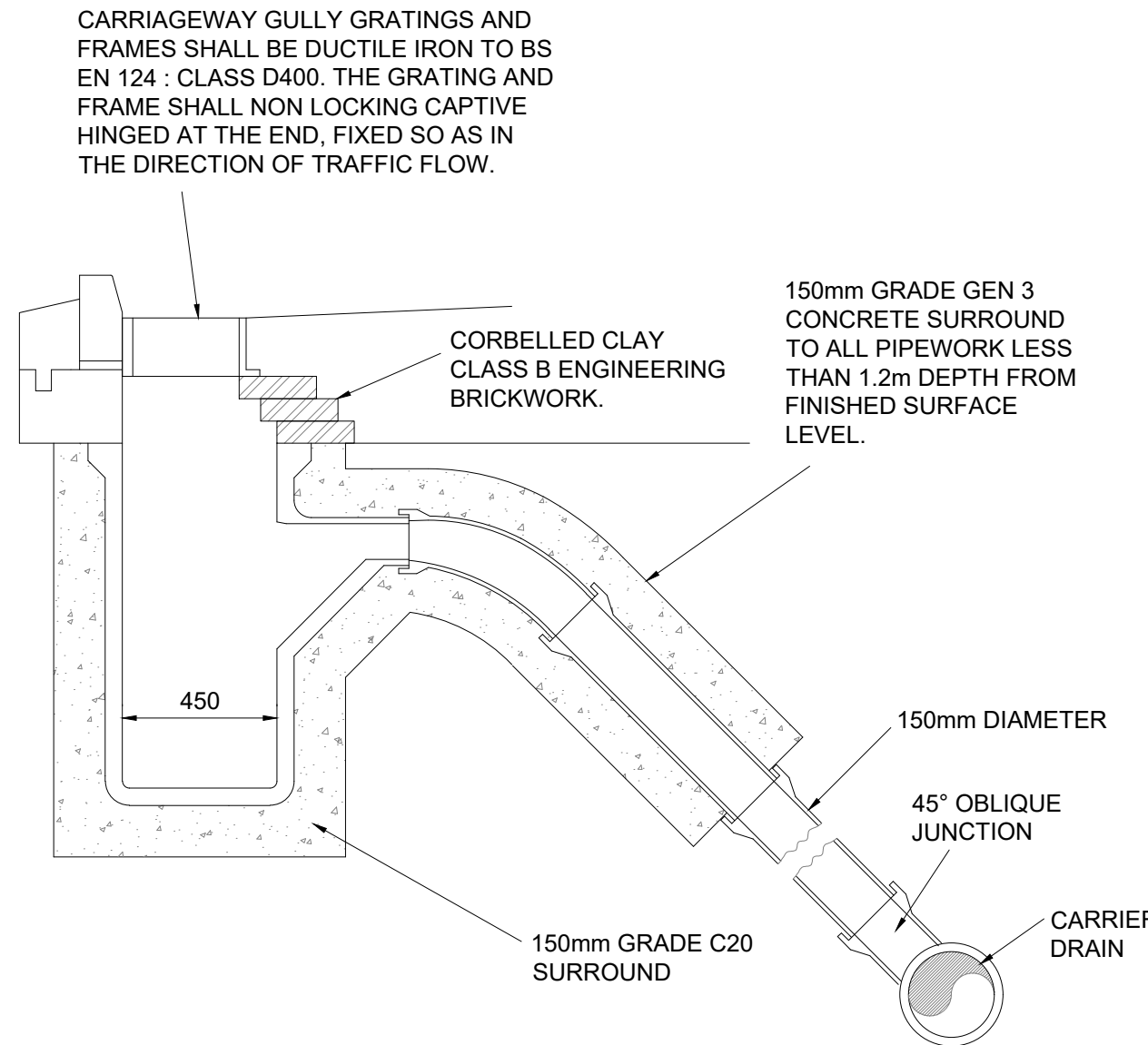
RODDING EYE DETAIL



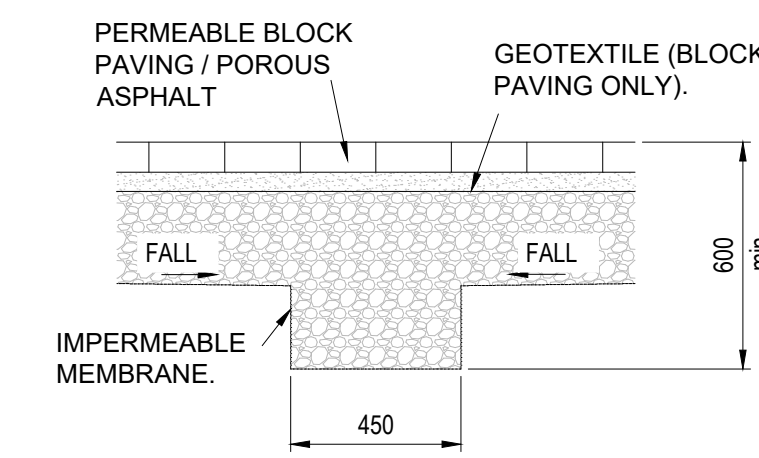
SECTION 1-1



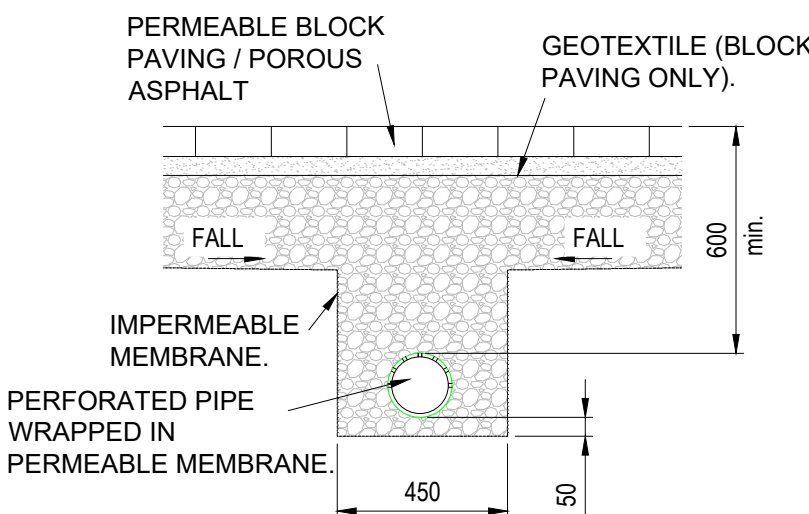
VORTEX CONTROL CHAMBER



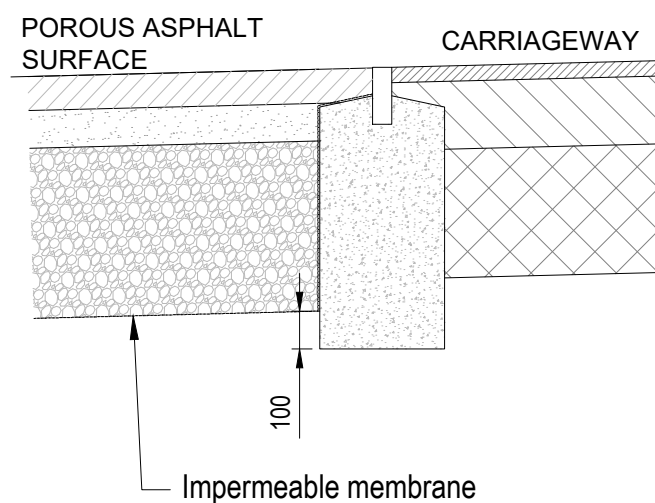
ROAD GULLY DETAIL



TYPICAL CONVEYANCE TRENCH
DETAIL



PERFORATED PIPE DETAIL



TYPICAL TRANSITION FROM
PERMEABLE BAYS TO
CARRAIGEWAY

GENERAL NOTES

1. DRAWINGS ARE TO BE READ IN CONJUNCTION WITH ALL RELEVANT SPECIFICATIONS, ENGINEERS, ARCHITECTS & SERVICES DRAWINGS, INCLUDING APPROVED BUILDERS WORK DRAWINGS. CONTRACTOR TO NOTIFY ENGINEER OF DISCREPANCIES BETWEEN STRUCTURAL DRAWINGS AND SPECIFICATIONS OR OTHER DRAWINGS.

2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.

3. DO NOT SCALE FROM THIS DRAWING. WORK TO DIMENSIONS OR CO-ORDINATES PROVIDED. ALL LEVELS ARE IN METRES AND ALL DIMENSIONS ARE IN MILLIMETRES, UNLESS OTHERWISE NOTED. ANY AMBIGUITIES, OMISSIONS AND ERRORS ON DRAWINGS, SHALL BE BROUGHT TO THE ENGINEERS ATTENTION IMMEDIATELY.

CONSTRUCTION RECORD DRAWING

Note:
The information shown on this Construction Record drawing is based on the latest issued Construction drawings which have been modified as necessary with information supplied by the Contractor to incorporate changes made during construction. Information obtained from third parties has not been verified by Ridge and Partners LLP and may not be wholly accurate. Any party seeking to use this drawing must first verify its fitness for the intended purpose with suitable site inspections/investigations as deemed appropriate.

CR	20.07.23	AM	PB	CONSTRUCTION RECORD
C1	03.03.22	AM	PB	ISSUED FOR CONSTRUCTION
P2	20.01.22	AM	PB	HYDROBRAKE DETAIL ADDED
P1	28.09.21	AM	PB	ISSUED FOR INFORMATION
No	DATE	DRAWN	REV'D ENG.	AMENDMENT

STATUS	PURPOSE OF ISSUE
CR	CONSTRUCTION RECORD

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RIDGE

CLIENT	ROWLINSON CONSTRUCTION		
PROJECT	SILK STREET, GORTON		
DRAFTER	AM	ENGINEER	AM
TITLE	PROJECT REFERENCE: DRAINAGE DETAILS SHEET 2		
SCALE	1:20	SHEET	A1
DRAWING No		SSG-RDG-00-ZZ-DR-C-0008	REV

Appendix B – Construction Photos







Appendix C – Drainage Maintenance Schedule

SILK STREET, GORTON - DRAINAGE MAINTENANCE SCHEDULE

Organisation responsible for maintenance: _____ Contact Details – Name: _____

Number: _____ Documents:

- Drainage Layout

SUDS have been specified for the site to promote sustainable management of surface water for both flow attenuation and water quality. This document outlines the maintenance schedules for each system in order to maintain the efficiency of the drainage network. The schedules have been created based on guidance from CIRIA C753.

Table 1: Pipes and Manholes Maintenance Schedule

Maintenance schedule	Required Action	Recommended Frequency
Occasional maintenance	Visual inspection of covers, gratings and manhole chambers.	Annually or as required.
	Cleaning out manholes.	Annually or as required.
	CCTV inspection of drainage pipes.	Annually or as required.
Remedial actions	Reactive cleaning of manholes and drains.	During flooding events.
	Cleaning out drains by water jetting.	As required.
	Replace damaged covers, grating and manhole components.	As required.
	Rehabilitation – repairs, relining or replacement.	As determined by inspections.

Table 2: Channel Drain

Maintenance schedule	Required Action	Recommended Frequency
Regular maintenance	Cleaning out Access Chamber.	Monthly or as required.
	inspect outlet for operation/blockages	Six Monthly
	Remove access chamber covers as required to flush the channels clean of debris. Remove this debris from the sump and dispose of	Six Monthly
	Inspect components for any wear or breakages.	Six Monthly

Table 3: Geocellular Tank Maintenance Schedule

Maintenance Schedule	Required Action	Recommended Frequency
Regular Maintenance	Inspect and identify areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then annually or as required
	Remove debris from the catchment surface	Monthly
	Remove sediment from pre-treatment structures	Annually
Remedial Actions	Repair / rehabilitate inlets/outlet and vents	As required
Monitoring	Inspect inlets, outlets and vents to ensure they are in good condition and operating as designed.	Annually
	Survey Inside of tank for sediment build up and remove is necessary	Every 5 years or where concerned about operation

Table 4: Filter Drains

Maintenance schedule	Required Action	Recommended Frequency
Regular maintenance	Remove litter and debris	Monthly or as required.
	Inspect Filter Material	Monthly or as required.
	Inspect inlets and Outlets and Pipework for Silt Accumulation and establish suitable silt removal frequencies.	Six Monthly
	Remove Sediment from Inlets, Outlets and Pipework	As Required
Occasional Maintenance	Remove or Control Tree Roots	See landscape maintenance strategy
	Remove surface geotextile and replace geotextile and filter medium	5 yearly.
	Clear perforated pipework of blockages	As Required

Table 5: Permeable Paving

Maintenance Schedule	Required Action	Recommended Frequency
Regular Maintenance	Brush and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required. Pay particular attention to areas where water runs from adjacent areas. This is most likely to cause sediment collection.
Occasional Maintenance	Stabilise and mow contributing and adjacent areas.	As required
	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying	As required
Remedial Actions	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance and to the user.	As required
	Rehabilitation of surface and upper sub structure by remedial sweeping	Every 10 to 15 years or as required (infiltration performance reduced / clogging issues)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for poor operation, weed growth. Remedial action required.	Three monthly, 48 hour after large storms in first six months
	Silt accumulation inspect and establish appropriate brushing frequencies	Annually

Hydro Water Management Solutions Maintenance Requirements

Regular inspection and maintenance is required to ensure the effective long term operation of below ground modular storage systems. The following table details the recommended maintenance requirements for modular systems.

Maintenance schedule	Required action	Frequency
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required take remedial action.	Monthly for 3 months then annually
	Debris removal from catchment surface (where may cause risk to performance)	Monthly or as required
	Remove sediment from pre-treatment structures and/or manifold connections	Monthly or as required
Remedial actions	Repair/rehabilitation of inlets/outlets, overflows and vents	Annual inspection or as required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually
	Survey inside of tank for sediment build up and remove if necessary	Annually and after large storms

The maintenance plan and schedule should be developed during the design phase. Specific maintenance requirements should be identified based on upstream drainage sedimentation controls and the schedule developed to suit these needs.

Maintenance details should be detailed in the project Health & safety file and a risk assessment should be undertaken and recorded.

Note,

It is generally recommended that the cells be flushed through with large volumes of water under low pressure.

Certain modular units will allow higher pressure jetting to remove larger objects or heavier deposits of sediment. These modules can be accessed via integral access chambers (where applicable) and surveyed/flushed in a linear fashion or alternately water can be flushed/jetted through via the inlet/outlet pipe connections.

Hydro Water Management Solutions Ltd

Randolph House 37-41 Longshut Lane West, Stockport, Cheshire, SK2 6RX

Tel: 01614 563476 Fax: 01614 565820 Email: sales@hydro-wms.co.uk

Appendix D – Supplier Product Information

Construction Sequence

Installation procedures should be carried out in accordance with the Health and Safety at Work Etc. Act (1974) and any other relevant legislation. Special attention should be paid to temporary work requirements in excavations.

Excavate to the required plan dimensions and level, ensuring that the excavation orientation will allow easy installation of connecting pipework. Consideration should be given to maintaining construction plant access for reinstating around the installed GRAF units. A minimum 300mm working space is required around the structure but 500mm is recommended for safe working practice.

Ensure that the ground bearing capacity at the formation level is sufficient for the proposed operational loads. The base of the excavation should be smooth and level, free of large stones and soft spots. Any soft spots should be excavated and replaced with suitable compacted granular material.

The type of geosynthetic material used to encapsulate the GRAF units will determine the installation requirements. Please note the following information is generic and advice from the geosynthetic manufacturer should be sought to ensure that the appropriate protective measures are taken to comply with any proprietary requirements.

Attenuation Application

Place and compact a 100mm thick bedding layer of coarse sand or Type 6H material. Line the base and sides of the excavation with a protective geotextile before placement of the impermeable geomembrane. Install the geomembrane, Hydro WMS Seal joints by wedge welding in accordance Ciria 698 site handbook for the construction of SUDS, making an allowance for the connecting pipework or adapters. To ensure that the integrity of the geomembrane has been maintained, it is recommended that an inspection of the material is carried out, and wedge welded joints are air tested in accordance with Ciria 698.

If water is present, we recommend that the excavation depth is over dug by 200mm, with a base layer of Geotextile, overlaid by 150mm of compacted 'Type 1 road stone', topped off with a 50mm layer of pipe bedding.

The ground plates are placed on the geo textile. Each joint between the ground plates is fixed with Eco connecting elements.

The EcoBloc Inspect flex 205 is placed on the ground plate. The Eco connecting elements are used to secure each layer. The EcoBloc Inspect flex 205 is preferably laid lengthwise with the Inspection channel (open side).

The Eco connecting elements are needed to fix in each layer of EcoBloc Inspect modules. In the second and following layers, the modules are placed on top of modules already in place as shown. The modules must be laid in the same direction creating Inspection tunnels. Due to the integrated locating points, the modules can only be positioned in one direction.

Then the end plates are fitted. These can simply be snapped into the opening on the EcoBloc Inspect flex 205. DN 100 (4" pipe), DN 150 (6" or DN 200 (8" pipe) connections can be produced for pipe connections on the Eco end plate. A Dremel drill, jig saw or similar tool is used to remove excess material from the modules to facilitate pipe connections.

Once all the blocks are positioned, complete the geosynthetic encapsulation of the entire GRAF structure, forming joints where appropriate. Re-examine the membrane and geotextile for damage and joint integrity.

Contractor

Backfill around the sides of the encapsulated units, forming a thick layer of coarse sand or Class 6H selected granular material immediately adjacent to the units. Where required, remaining excavated areas around the units should be backfilled with Class 6N or 6P selected granular material, in accordance with MCHW, Volume 1, or similarly approved specification.

Above the wrapped GRAF units, place and lightly compact a minimum 100mm thick layer of either coarse sand or Class 6H selected granular material (with 100% passing the 5mm sieve), in accordance with MCHW, Volume 1, Series 600.

Final backfilling of the installation is dependent on the expected operational loads. (NB Compaction plant over and immediately adjacent to the GRAF units shall not exceed 2300 kg/m width).

Field conditions (eg landscaped areas)

The backfill material that lies within 300mm above the GRAF units should be free from particles exceeding 40mm in diameter, in accordance with Class 8 material to Series 600, Volume 1, MCHW. Final backfilling up to finished ground level may be achieved using selected as-dug material. Backfill material should be placed and compacted in layers no greater than 300mm, or in compliance with the approved specification.

Lightly trafficked (eg restricted access car park)

Backfill with Class 1 or 2 material in accordance with MCHW, Volume 1, Series 600. Backfill material should be placed and compacted in layers not greater than 150mm. Where the GRAF units are installed beneath a paved area, the pavement sub-base may form part of the backfill material provided that minimum cover depths are maintained.

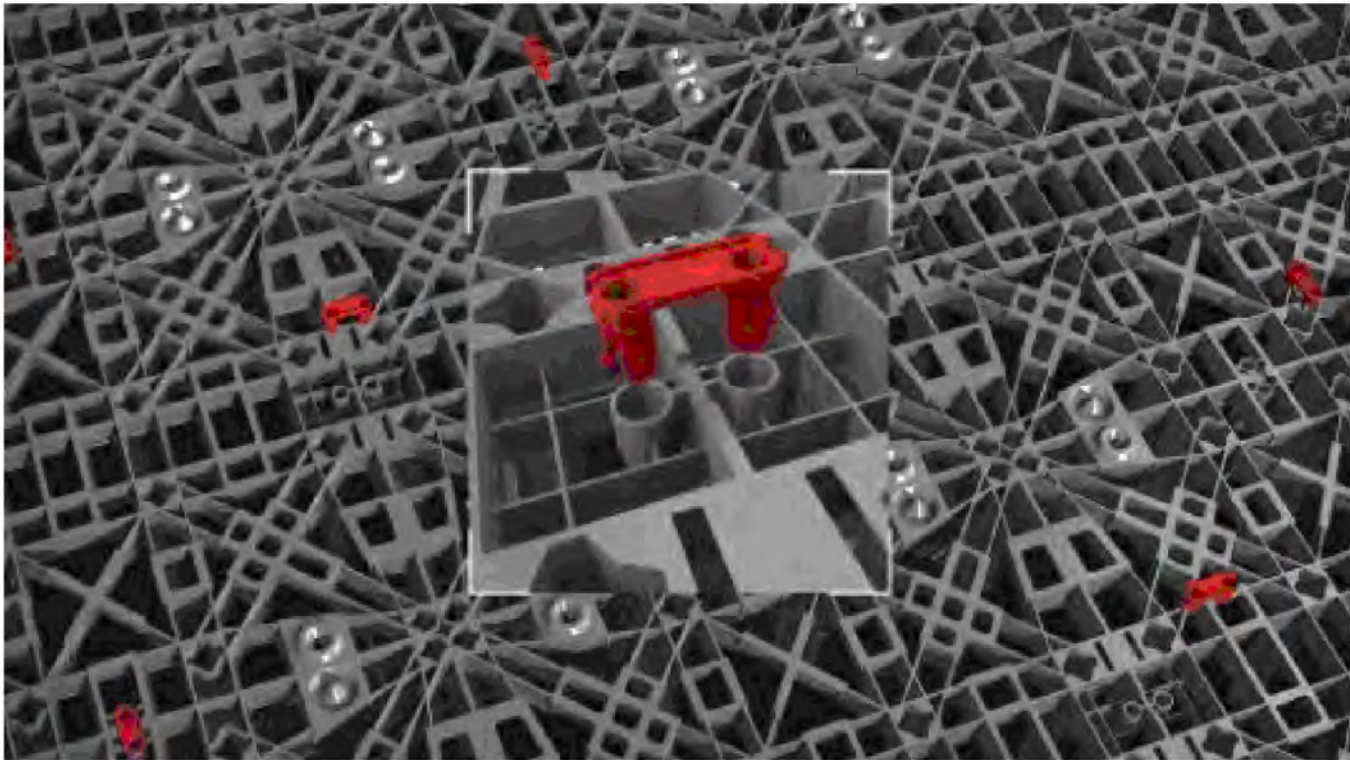
Heavily trafficked (eg service areas or roads)

Contact Hydro WMS Technical Services for further information and guidance.

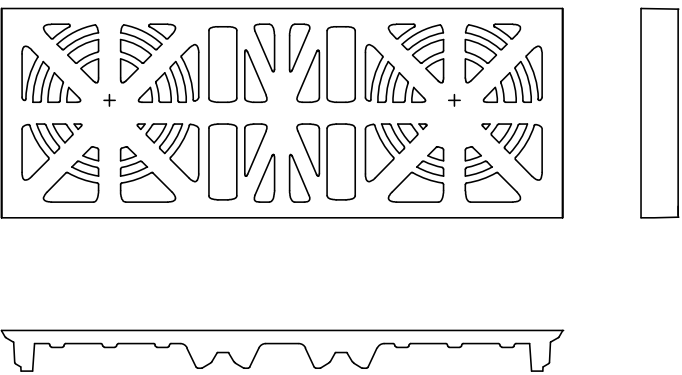
Complete pavement construction or landscaping over the GRAF system.

It should be noted that infiltration systems are not generally installed under roads due to the reduction in load bearing capacity of saturated soils. Specialist advice should be sought where this type of installation is proposed.

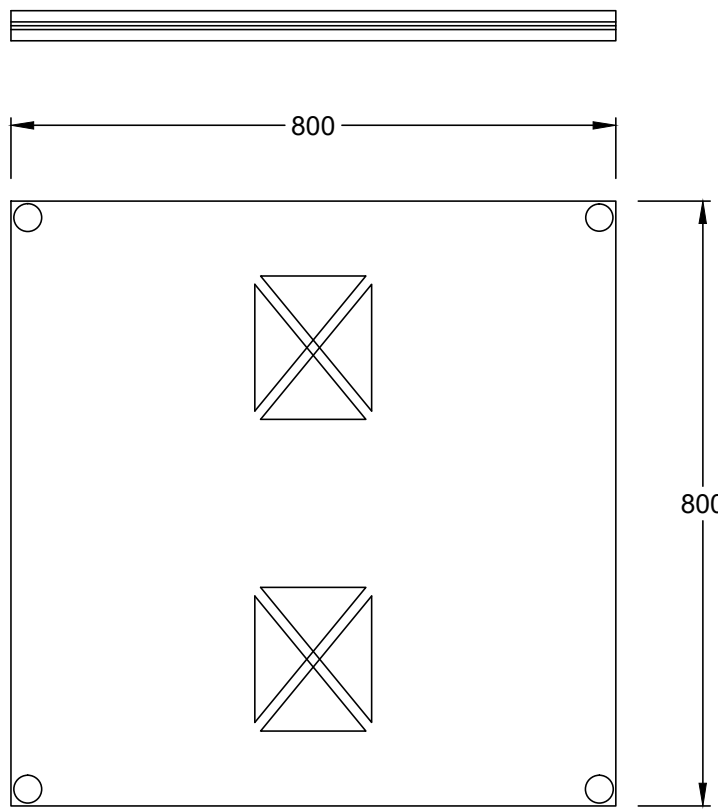
In attenuation systems, where groundwater may be present, a boyancy check should be undertaken to ensure that the imposed overburden pressure exceeds any uplift forces generated.



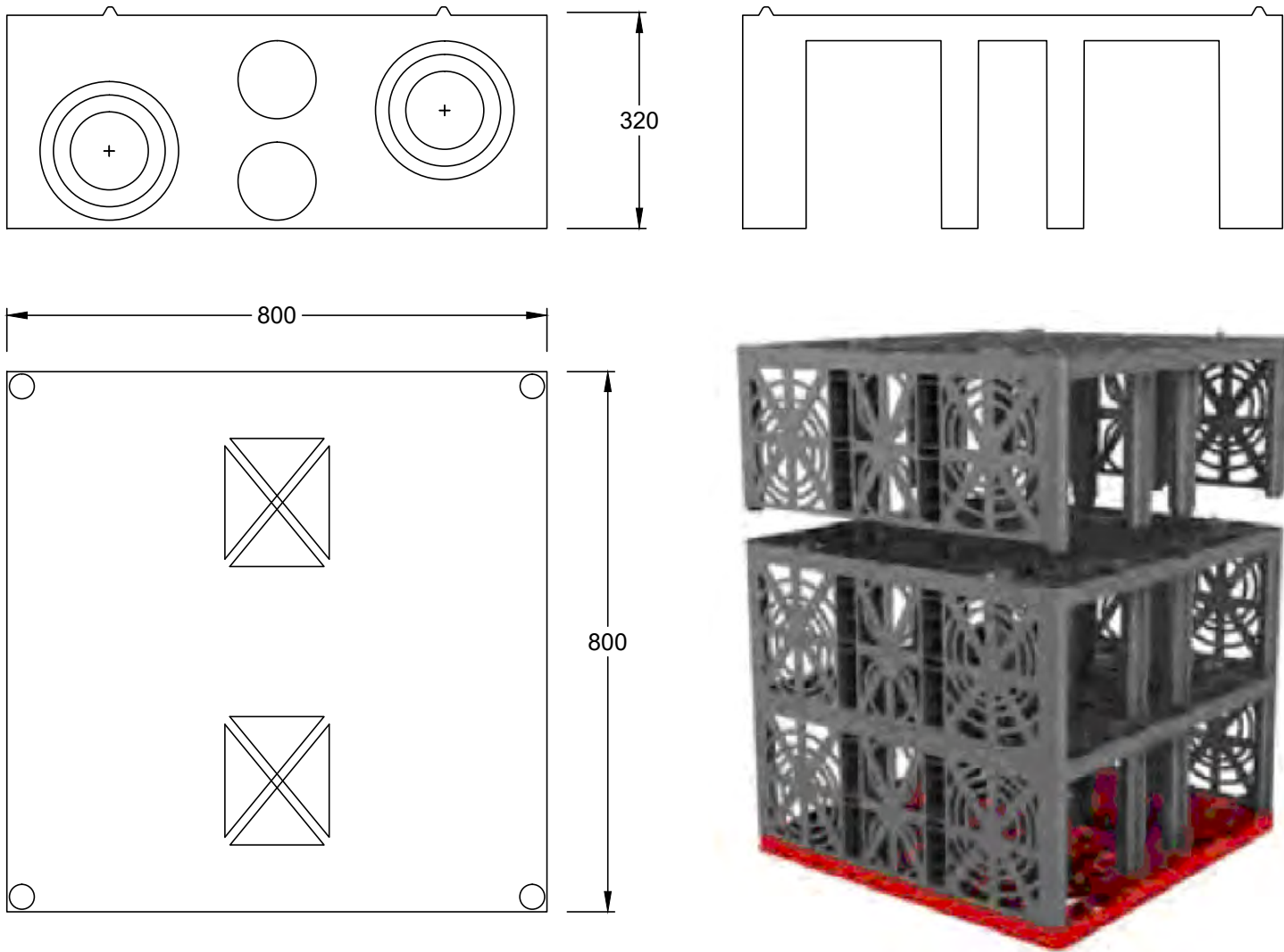
GRAF Connecting Element
(Scale NTS)



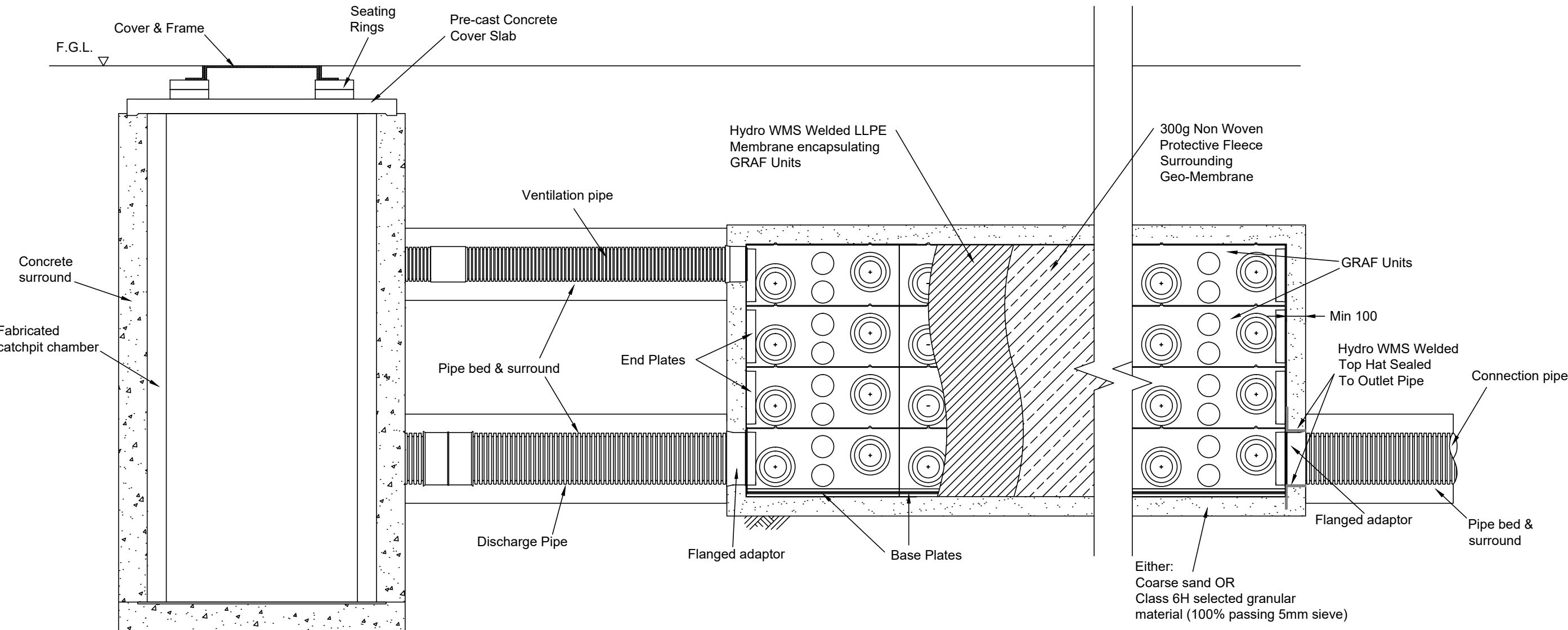
GRAF End Plate
(Scale 1:10)



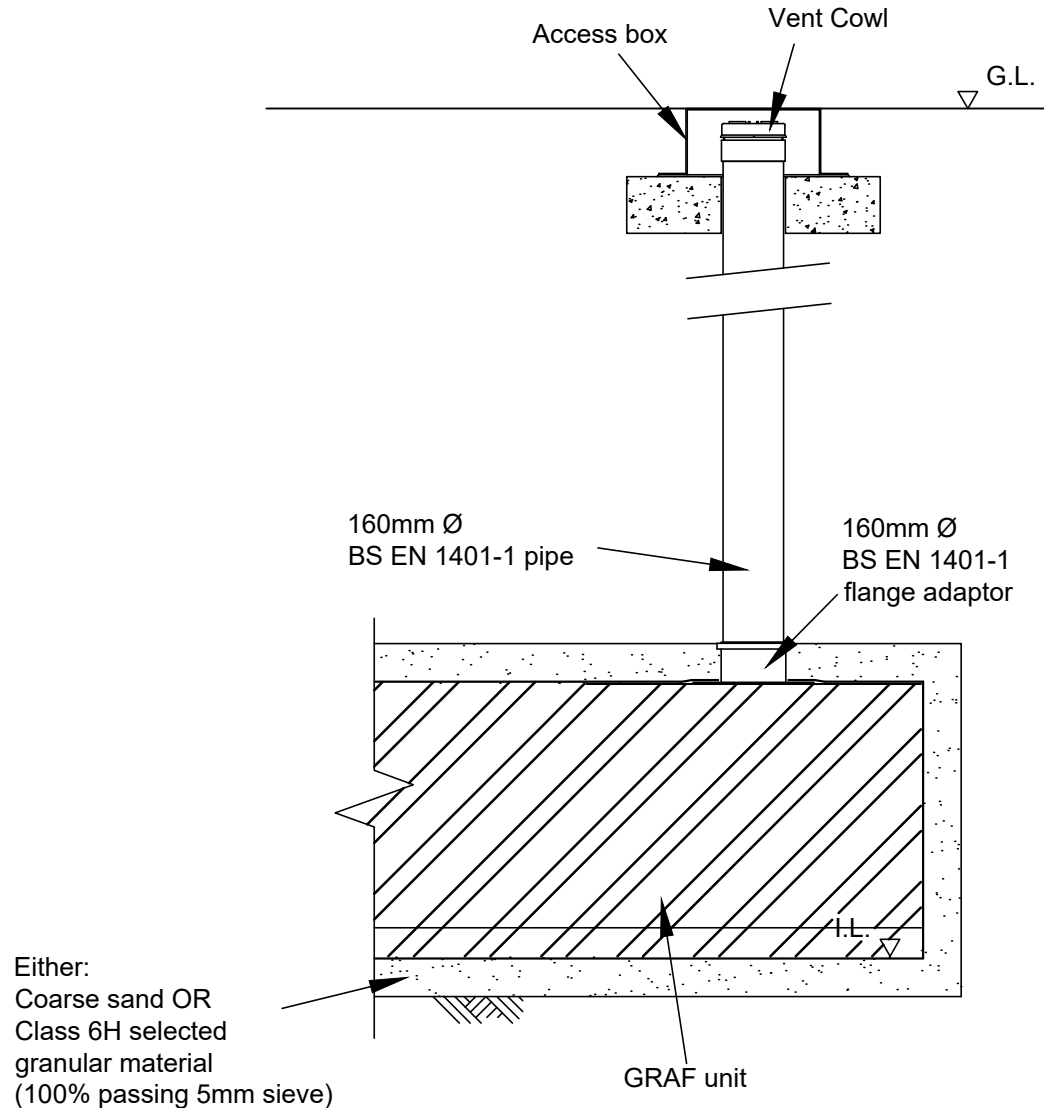
GRAF Base Plate
(Scale 1:10)



GRAF EcoBloc Flex
(Scale 1:10)



HYDRO WMS ATTENUATION
TYPICAL INSTALLATION DETAIL
(Scale 1:20)



VERTICAL VENT PIPE
CONNECTION
(Scale 1:10)

REV	AMENDMENT	DATE
<div><div>HydroWMS</div><div>Complete Water Management Solutions</div><div>HYDRO WMS LTD OFFICE 13, BRACONDAL HOUSE 141 BUXTON ROAD, STOCKPORT CHESHIRE, SK2 6EQ Tel/Fax: 0161 4563476 Brian.Byrne@hydro-wms.com</div></div>		
CLIENT		
JOB TITLE		
DRAWING TITLE		
STATUS		
FOR INFORMATION ONLY		
SCALE	DATE	DRAWN
Various	20/08/15	MB
PROJECT No.	DRAWING No.	REV.

Hydro WMS Ltd - 1.0mm PE Geomembrane Specification

Properties	Test Method	Nominal Values
Thickness (mm)	ASTM D 5199/ UNE-EN ISO 1849-2	1.0
Low temperature brittleness (°C)	ASTM D 746, cond B	70
Oxidative induction time (minutes)	ASTM D 3895/ EN ISO 11357-3 (200°C, Pure O ₂ 1Atm)	100
Dimensional stability (each direction) %	ASTM D 1204 (100°C 1 hour)	±2
Melt flow Index g/10 minutes	ASTM D 1238	≤1.2
Water Permeability (m ³ /m ² /day)	UNE-EN 14150	<1.1 ⁻⁶
Stress Crack Resistance (h)	UNE-EN 14576 ASTM D 5397	>300
		Minimum Values
Thickness (mm)	ASTM D 5199/ UNE-EN ISO 1849-2	0.91
Density (g/cm ³)	ASTM D 792/1505A/ UNE-EN ISO 1183	0.92
Tensile Strength at break (MPa)	UN-EN ISO 527-3 Type 5	30 (26)
Elongation at break (%)	UN-EN ISO 527-3 Type 5	800 (≥700)
Tear resistance (N/mm)	ASTM D 1004/ UNE-ISO 34-1	≤100
Puncture resistance (kN)	SM D 4833/ UNE-EN ISO 12236	2.5
Carbon Black content (%)	ASTM D 1603/ UNE 53375-2 ISO 18553	2.0 – 3.0

*Values shown are nominal with 95% confidence level

**pH - Resistant to all naturally occurring soil acids and alkalis

***Chemical/biological resistance - Resistance to all substances found to naturally occur in soils and rainwater. Detailed information would need to be provided to geomembrane manufacturer in instances of contaminated land.

Hydro WMS Ltd - 300gsm Protection Geotextile Specification

Needle punched, thermally bonded non-woven Polypropylene geotextile

	Test Method	Typical Value
Mechanical Properties		
Tensile strength MD	EN ISO 10319	24 kN/m
Tensile strength CD		24 kN/m
Elongation MD	EN ISO 10319	65%
Elongation CD		75.0%
Static puncture Resistance - CBR	EN ISO 12236	3.7 kN
Dynamic perforation resistance cone drop	EN ISO 13433	15.0 mm
Protection efficiency	EN ISO 14574	300 KPA – 2.17 600 KPA – 3.98 1200 KPA – 6.89
Hydraulic Properties		
Water permeability normal to the plane	EN ISO 11058	34 x10 ⁻³ m/s
Water flow normal to the plane	EN ISO 11058	34 l/m ² .s
Water flow capacity in the plane 20kPa	EN ISO 12958	8 x 10 ⁻⁶ m ² /s
Characteristic opening size (AO3)	EN ISO 12956	50.0µm
Physical Properties		
Thickness under 2 kPa	EN ISO 9853-1	1.25 mm
Weight	EN ISO 9864	300 g/m ²
Composition	100% Polypropylene non-woven geotextile	

Attenuation

Installation guide for rainwater attenuation



Overview

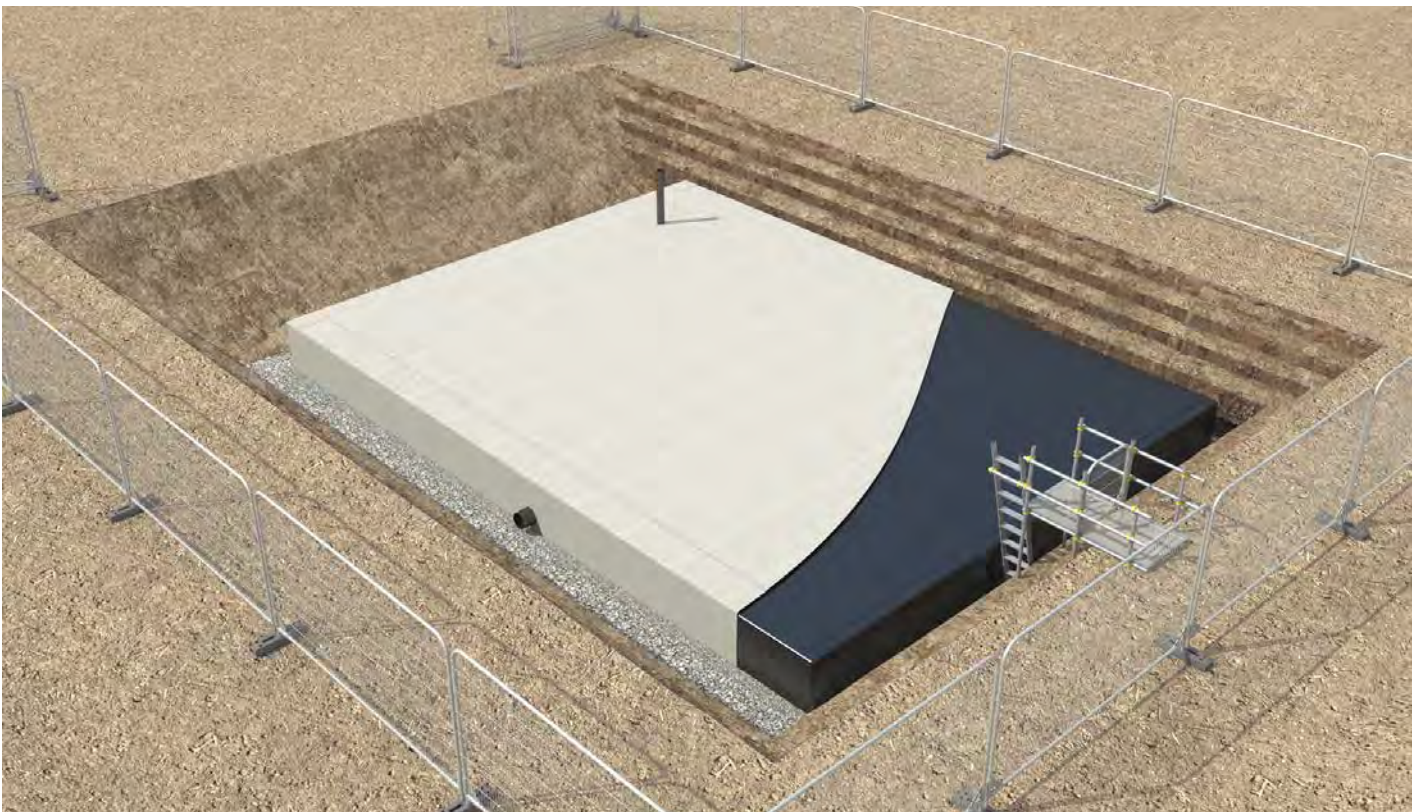
Attenuation tanks store surface water allowing it to be gradually released in a controlled way back into the environment or drainage system.

Effective water attenuation can be achieved with modular storage systems using high quality injection moulded units. We have a range of products and solutions to suit all design criteria, this includes:

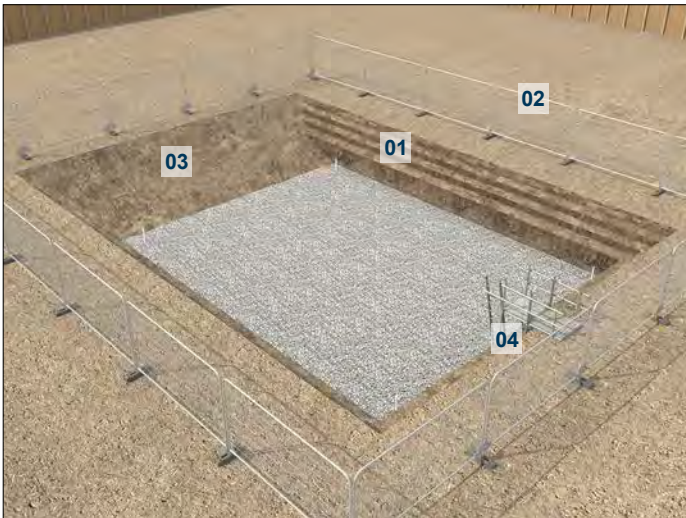
- Shallow installation
- Deep installation (5m+)
- Irregular shapes
- Systems requiring inspection and maintenance

All Hydro WMS attenuation tanks are fully welded using proprietary wedge welding techniques in accordance with CIRIA guidelines.

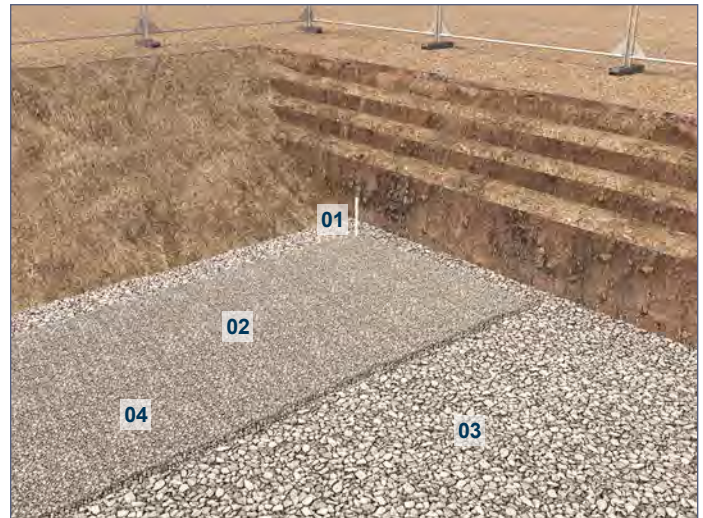
Hydro WMS soakaways are modular systems designed and installed utilising the same high quality injection moulded units combined with a non-woven geotextile.



Section diagram shown in greater detail and description on page 4



- 01**
1. Excavation suitably battered
 2. Safety barriers around excavation
 3. First point of access/egress is a ramp into excavation
 4. Second point of access/egress can be a ladder



- 02**
1. Corners measured and pegged with 300 - 500mm of workspace outside
 2. 100mm pipe bedding or Type 6H material
 3. Formation to have minimum CBR of 3 - 5%
 4. Ensure blinding layer is flat and free from sharp objects
 5. Soft spots to be dugout & replaced with appropriate material to give minimum CBR



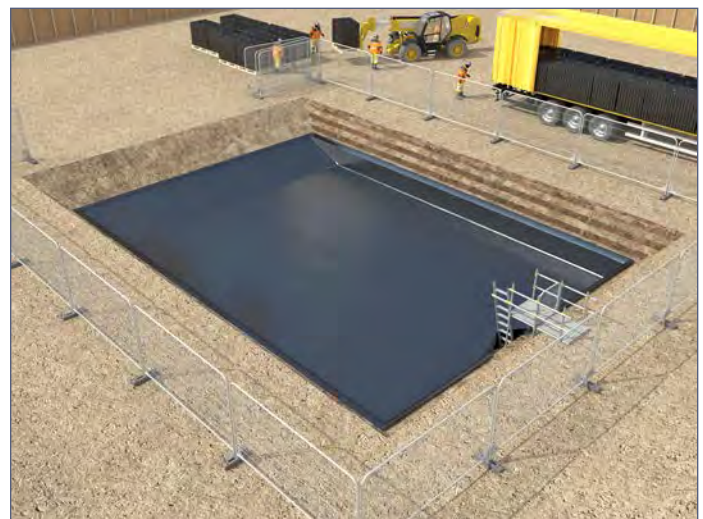
- 03**
- Attendance required to lift geo-textile protection layer into excavation using suitable mechanical lifting equipment
 - Geo-textile laid with suitable overlap by Hydro WMS operatives



- 04**
- Attendance required to lift rolls of geo-membrane into excavation using suitable mechanical lifting equipment
 - Maximum weight not exceeding 1,300kgs
 - Geo-membrane laid in excavation for welding by Hydro WMS operatives



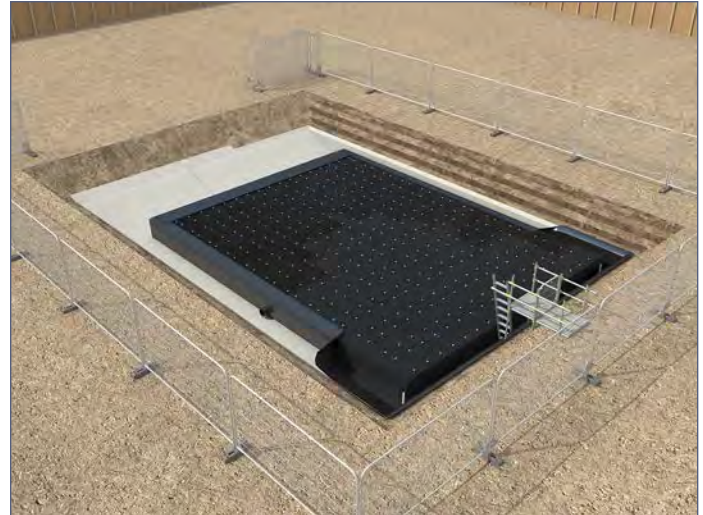
- 05**
- Geo-membrane wedge welded together
 - Joints tested with non-destructive method



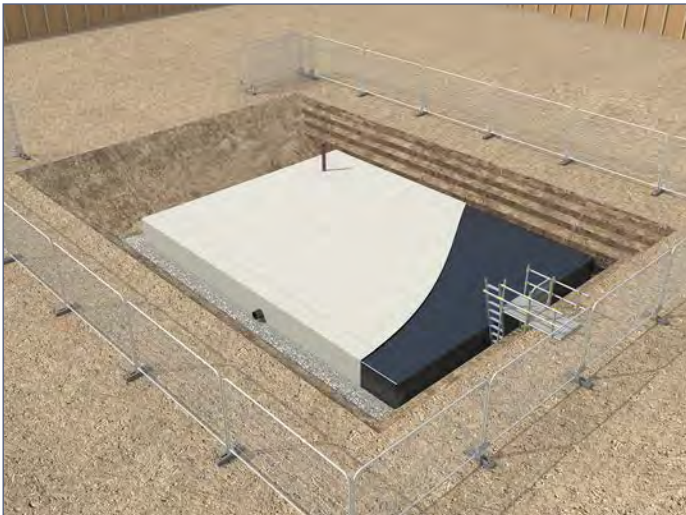
- 06**
- Delivery by articulated curtain sided vehicle
 - Ensure lift plan is in place
 - Palletised cellular tank components unloaded by telehandler with forks - by contractor
 - Placed beside excavation and within reach of the excavator - by contractor



- 07**
- Slinger banksman required to coordinate lowering cellular units into excavation
 - Attendance required to lift cellular units into excavation using suitable mechanical lifting equipment
 - Hydro WMS operatives to form tank



- 08**
- Geo-membrane is folded on top of tank
 - Low level pipe seal formed
 - Corners trimmed and formed
 - Staged backfill may be required



- 09**
- Attendance required to lift geo-membrane and geo-textile to complete tank
 - Lid of tank formed and wedge welded
 - Vent pipe installed
 - Geo-textile protection laid two top and sides of tank



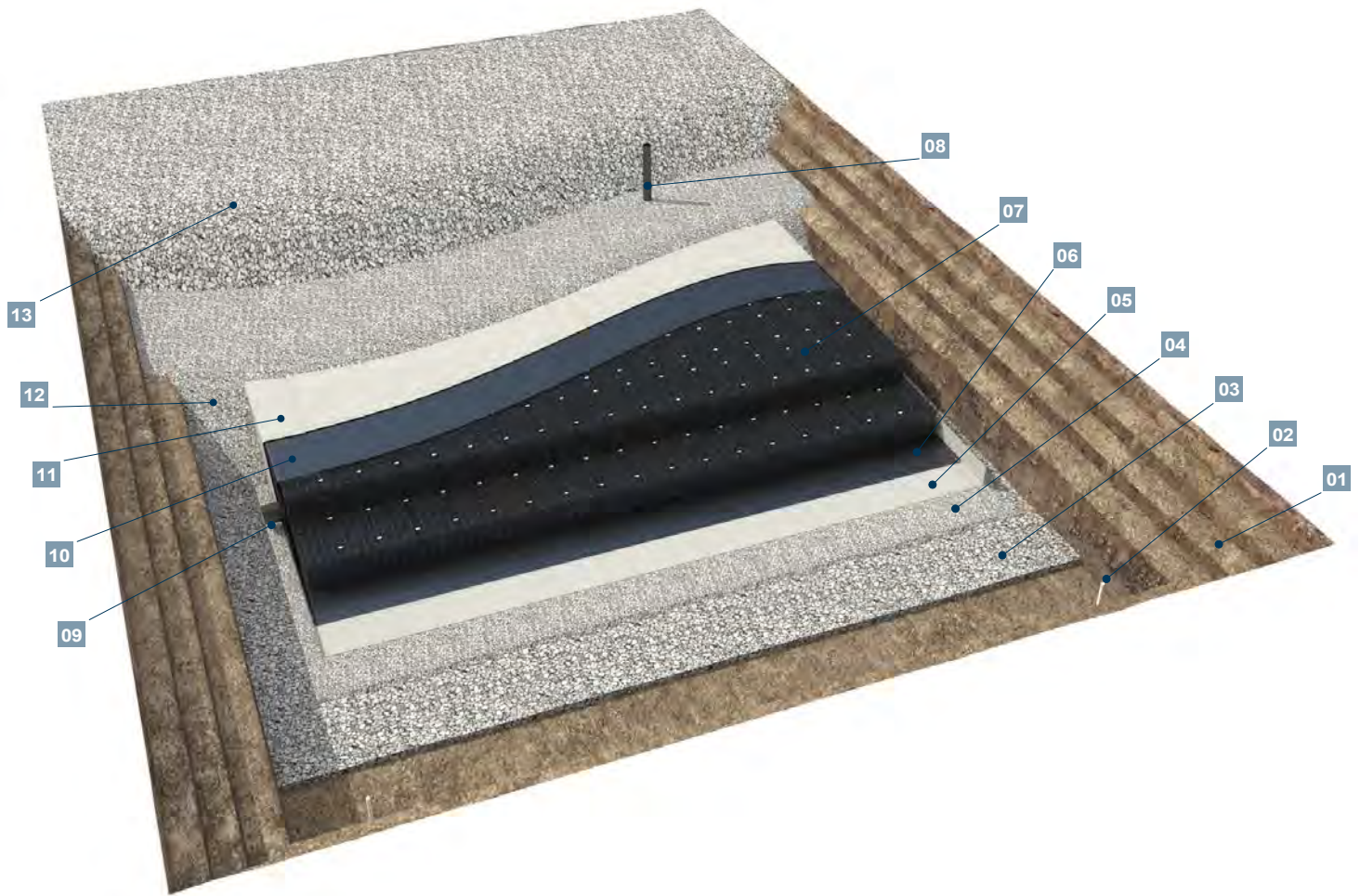
- 10**
- Minimum of 100mm protection layer over top of tank
 - Suitable small particle aggregate to be used
 - Contractor to backfill working space with agreed material
 - Protection board may be required for larger particle sizes



- 11** **IMPORTANT!**
- The construction loads from items of plant such as excavators and rollers are typically relatively low and deflections are not a significant consideration since the surfacing will not be completed when construction traffic is passing over

It is however recommended that other construction traffic is prevented from crossing the tank and in particular that cranes and other similar items are not located on the tanks (including any part of a mobile crane such as spreaders) unless a site-specific design check for this loading has been undertaken.

For light excavators, up to 14 tonnes and small double wheeled rollers a minimum of 300mm of cover fill should be placed over the units before trafficking; this is to prevent physical damage to them. Excavators should also be prevented from slewing when over the top of the units.



Component information

1. Excavation suitably battered
2. Corners measured and pegged with 300 - 500mm of workspace outside
3. Formation / capping layer (where required)
4. Pipe bedding / 6H aggregate blinding layer
5. Geo-textile protective fleece
6. Geo-membrane welded layer
7. Cellular units
8. Air vent pipe
9. Water outlet pipe
10. Geo-membrane welded layer
11. Geo-textile protective fleece
12. Small particle aggregate protection layer
13. Sub-base aggregate / bulk backfill

Disclaimer

This illustration is intended as a guide for information only. Please refer to the site specific Method Statement and Risk assessment issued prior to installation.

Hydro Water Management Solutions Limited reserve the right to change the specifications without prior notice.

Hydro WMS

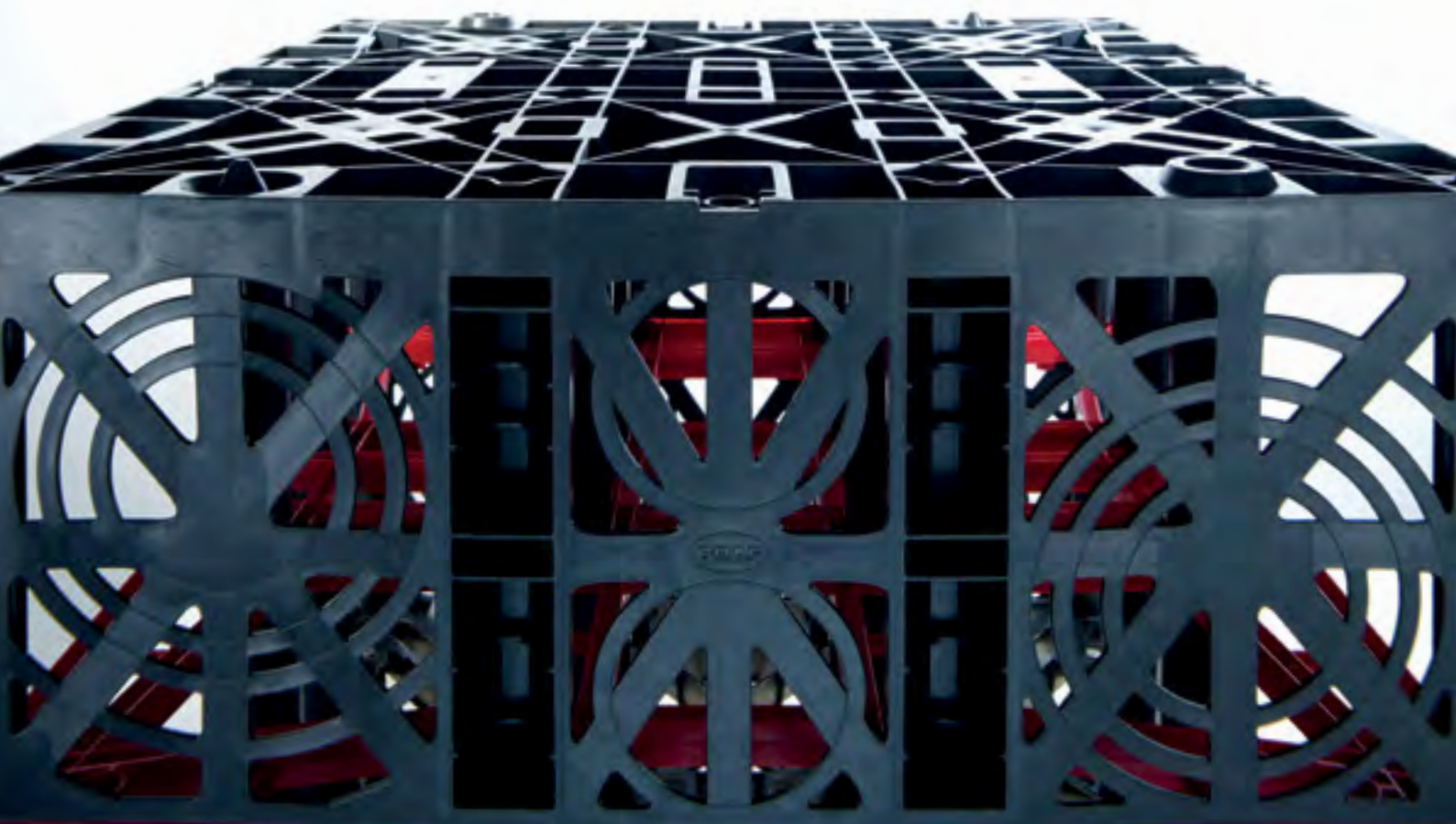
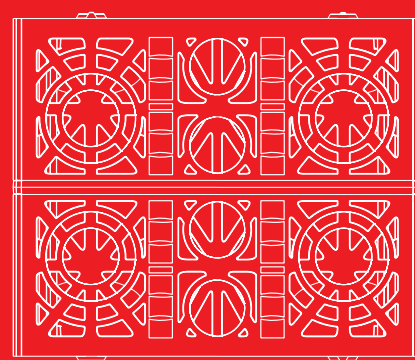
Randolph House 37-41 Longshut Lane West
Stockport, SK2 6RX

T: 0161 456 3476 | F: 0161 456 5820
E: info@hydro-wms.co.uk | www.hydro-wms.co.uk



GRAF EcoBloc flex

Stormwater management



GRAF EcoBloc flex

The third generation of GRAF infiltration and attenuation system



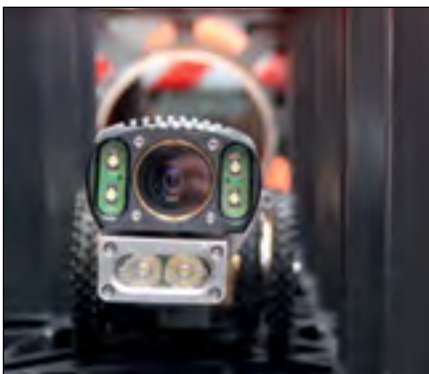
Twice the volume per truck

To save space during transport, two EcoBloc flex modules are stacked one inside the other. This halves transport costs and CO₂ emissions.



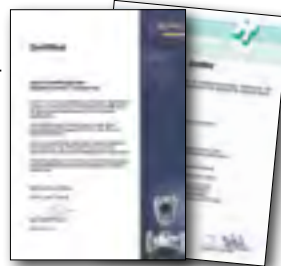
Easy to install

GRAF EcoBloc flex modules are easy to transport and install. The modular system structure requires few accessories.



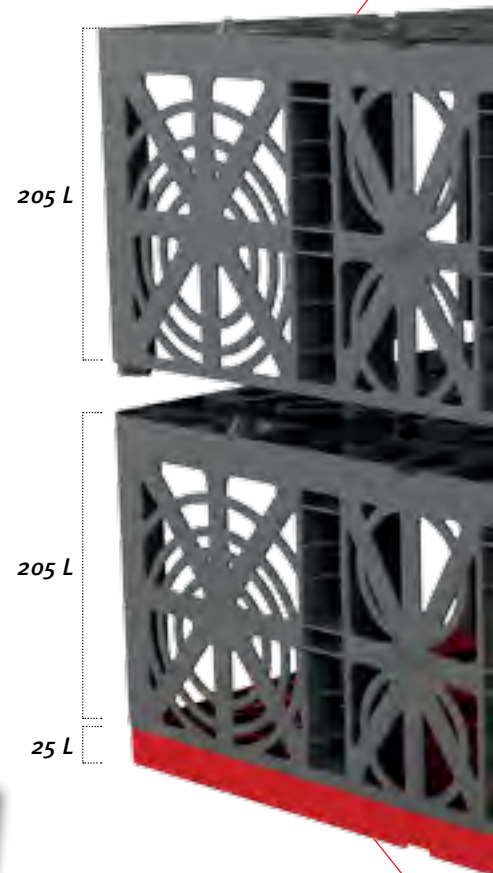
Easy to inspect

The standard inspection channel allows the entire percolation system to be effectively monitored. The ability of the EcoBloc system allow access by inspection cameras that are commonly found on the market. This has been confirmed, by several independent testing authorities.



Can be cleaned by high pressure jetting

GRAF EcoBloc system can be easily cleaned by high pressure jetting.



Highly flexible

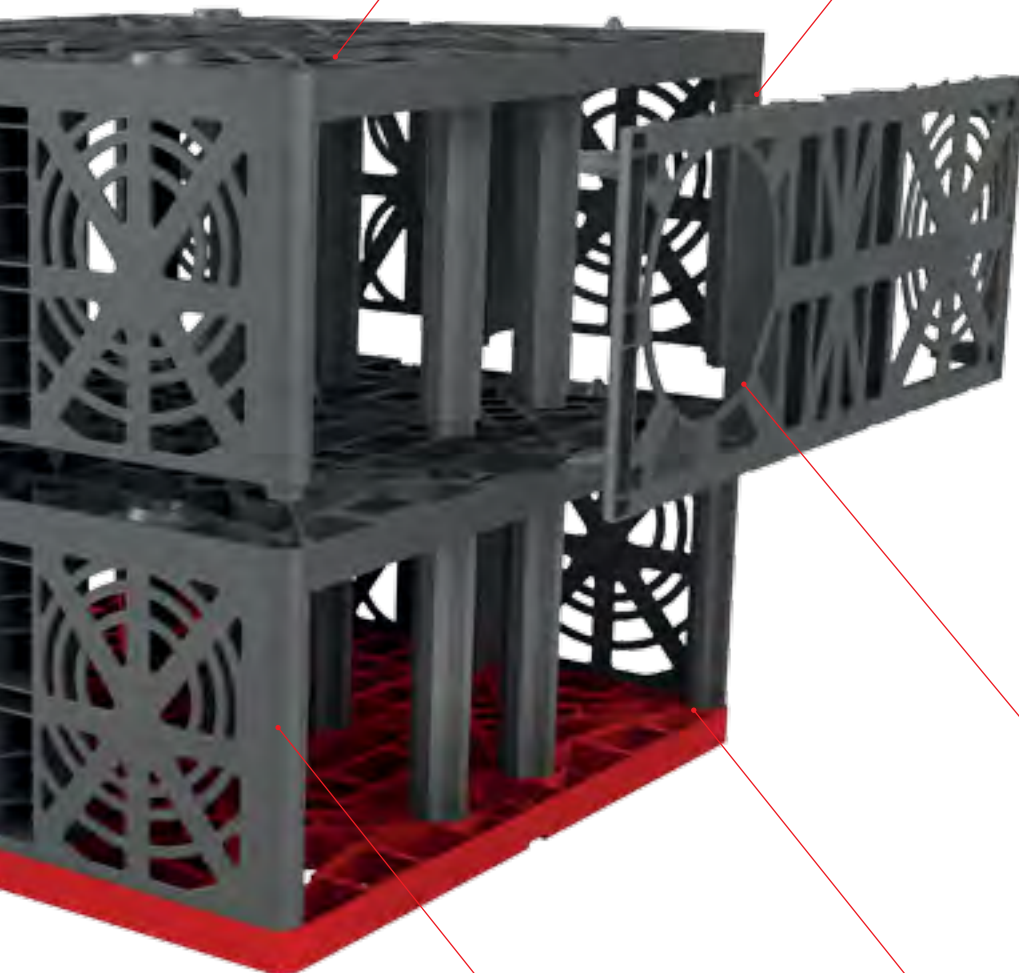
Each EcoBloc flex module has a volume of 205 l, a area of 800 x 800 mm and a height of 320 mm. The system size and load-bearing can be adjusted individually to suit requirements of traffic and of non-traffic area.

Lorry-bearing

The GRAF EcoBloc has a heavy-duty lorry-bearing capacity of 60 tons with a 800 mm earth covering.

Installation depth of up to 5 metres

Even under very heavy loads, GRAF EcoBloc system can be installed at a depth of up to 5 metres. This means that up to 14 layers are possible.



Connection up to DN 200

Large percolation volumes require large pipe cross-sections. This isn't a problem for GRAF EcoBloc: it has DN 100, 150 and 200 connections on all sides. DN 100 connections are positioned eccentrically at the side for complete deaeration.

Designed for decades of use

A durable product design ensures sustainability. Built to offer double safety, the GRAF EcoBloc is designed for a **service life of over 50 years**.

Universal use

For rainwater infiltration, retention or rainwater harvesting

High percolation rate

The GRAF EcoBloc system is designed to have high rate of percolation and barrier-free inspection.

The system at a glance

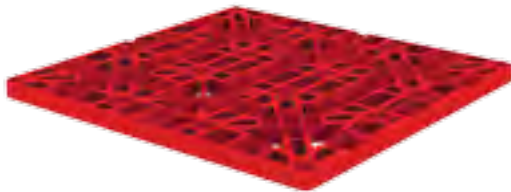


GRAF EcoBloc flex

For large storage volumes
DN 100/150/200 connecting faces

Volume [litres]	Length [mm]	Width [mm]	Height [mm]	Weight [kg]	Colour	Order no.
205	800	800	320	8	grey	402005

 **Webcode** G4105



GRAF EcoBloc baseplate

Forms the foundation of the EcoBloc flex system

Volume [litres]	Length [mm]	Width [mm]	Height [mm]	Weight [kg]	Colour	Order no.
25	800	800	40	4	grey	402006

 **Webcode** G4106



GRAF Eco end plates

The front ends of an EcoBloc flex system are sealed with end plates
DN 100/150/200 contact surfaces

Item	Colour	Order no.
Eco end plates (Set 2 units)	grey	402002

EcoBloc accessories



Eco connectors

For horizontal connection

Order no. 402010	Set 4 units
Order no. 402015	Set 10 units
Order no. 402018	Set 25 units
Order no. 402020	Set 50 units
Order no. 402025	Set 200 units

Deaeration end

DN 100

Order no. 369017



GRAF-Tex geotextile

For an EcoBloc,
size of 2.50 x 2.50 m

Order no. 231006

Sold by the metre, roll width 5 m

Order no. 231002



Flexible, stackable, easy assembly

Benefits of the EcoBloc System



**DOUBLE STORAGE
VOLUME PER TRUCK**

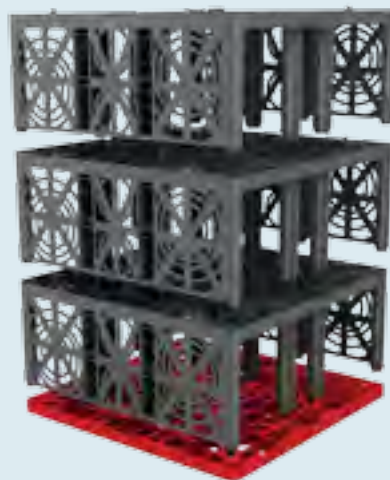


1. Stackable



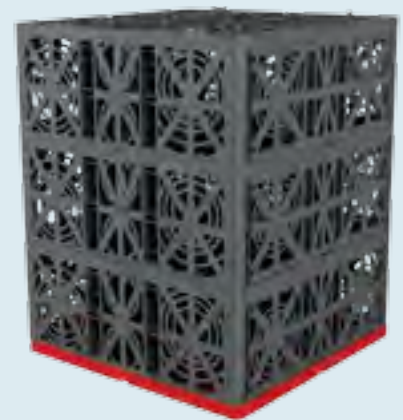
To save space during transport, two EcoBloc flex modules are stacked one inside the other. This halves transport costs and CO₂ emissions.

2. Easy assembly



The EcoBloc ground plate forms the foundations of the system. Up to 14 EcoBloc flex modules with a storage volume of 195 litres each can be fitted on one ground plate. The front ends are sealed with EcoBloc end plates.

3. Ready



The EcoBloc flex system can now be adjusted individually to suit the requirements and can be connected to DN 100, 150 or 200 pipes.



Benefits and application

**CAN HOLD 3 TIMES THE VOLUME OF
A CONVENTIONAL GRAVEL DITCH**



High storage volume

GRAF percolation modules have three times the storage volume of a standard gravel infiltration ditch. One module therefore takes the place of around 1300 kg of gravel or a 50 m drainage pipe.

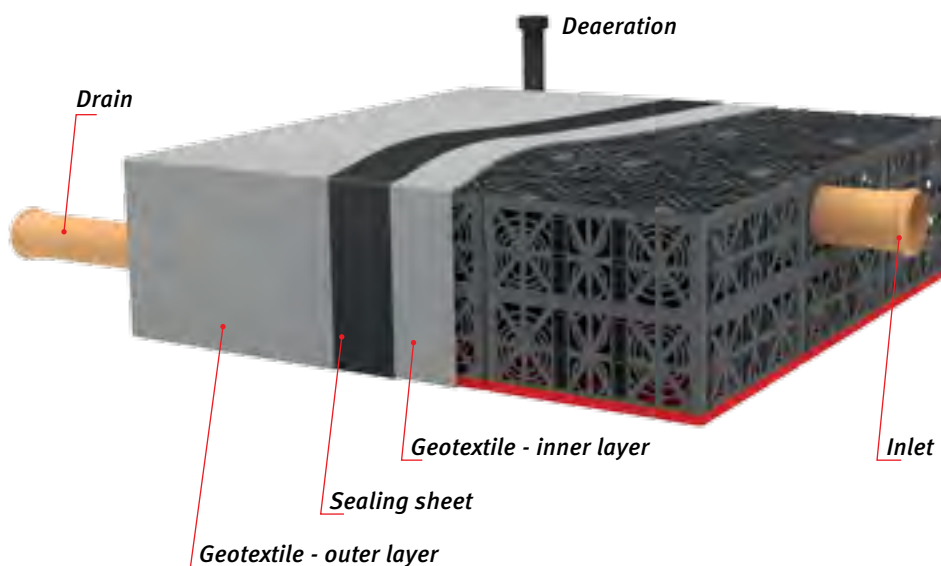
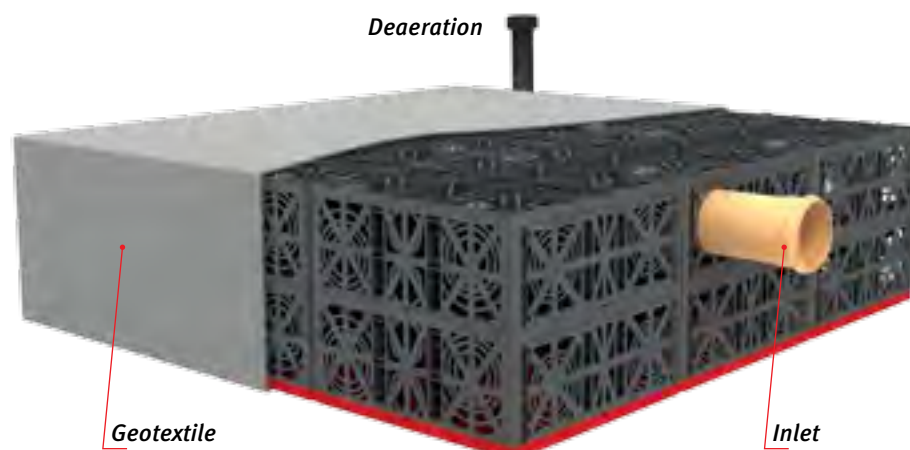
Since you don't have to excavate so much soil and enjoy great value for money compared with a standard gravel infiltration ditch, the GRAF modules save you hard-earned cash!

Easy to install

The modules are fitted simply, at speed and in various ways. They can be installed without heavy machinery – one EcoBloc flex module weighs just 8 kg.

Rain retention

The controlled discharge of rainwater is increasingly important during heavy rain. The GRAF EcoBloc is also surrounded by a sealing sheet, which prevents water from escaping from the system unchecked. Restricted drainage allows the water to be discharged into the sewage system in a controlled manner.



Rainwater percolation

Local percolation of rainwater is gaining in importance. As we cover over more and more ground with concrete, we are interrupting the natural water cycle. The GRAF EcoBloc combines environmental management of rainwater with the opportunity to protect against flooding. It stores rainwater and gradually releases it back into groundwater reserves.

Technical data

Load-bearing capacity and dimensions



Installation window

EcoBloc flex	Without traffic load	Vehicle	Lorry 12	Lorry 30	Lorry 40	Lorry 60
min. earth covering	250 mm	250 mm	500 mm	500 mm	500 mm	800 mm
max. earth covering	2750 mm	2750 mm	2750 mm	2500 mm	2250 mm	2000 mm
max. installation depth	5000 mm	5000 mm	5000 mm	5000 mm	5000 mm	5000 mm
max. number of layers	14	14	13	13	13	13

Technical data for EcoBloc flex

Weight	8 kg
Gross volume	205 L
Net volume	195 L
Storage coefficient	96%

Technical data for EcoBloc baseplate

Weight	4 kg
Gross volume	25 L
Net volume	20 L
Storage coefficient	95%



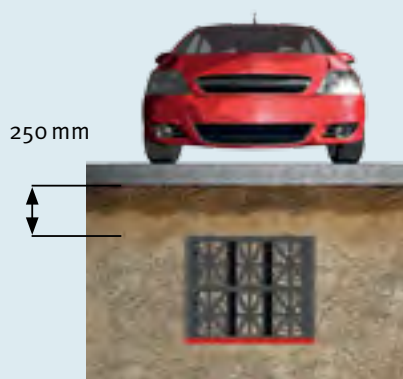
Percolating rainwater with GRAF EcoBloc

GRAF TV
www.graf.info

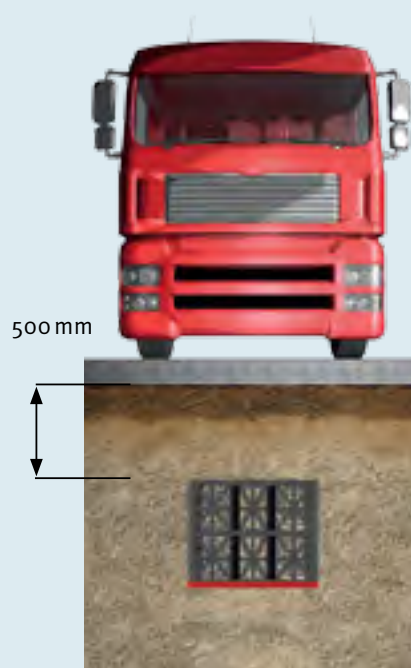
An EcoBloc system can be installed without any special tools or unreasonable effort. The video „Percolating rainwater with GRAF EcoBloc“ on GRAF TV provides a rough overview of how an EcoBloc infiltration ditch system works and is installed.

Load capacity

Short-term	max. 10 t/m ²
Long-term	max. 5 t/m ²



Vehicle loading



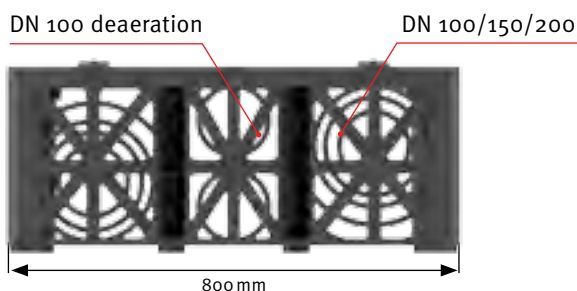
Lorry-bearing 40 t



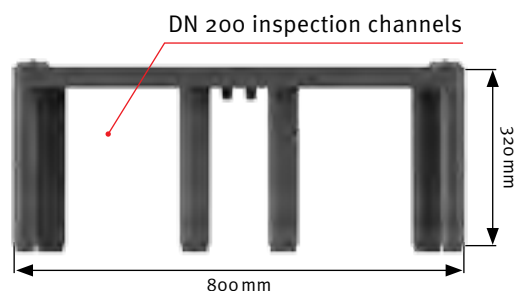
Lorry-bearing 60 t

Technical data

Side view



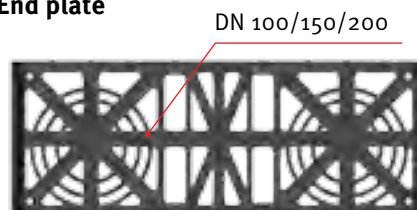
Front view



Baseplate



End plate



Rainwater harvesting solutions

For more information about our rainwater harvesting solutions, ask for our catalogue.



www.graf.info

RAINWATER HARVESTING



STORMWATER MANAGEMENT



WASTEWATER TREATMENT SOLUTIONS



MULTIPURPOSE CONTAINERS



Prices:

A price list with our export conditions is available on request.

Warranty clause:

The warranty mentioned in this brochure only refers to the tank in question and not to the accessories. Within the warranty period we grant free replacement of the material. Further benefits are excluded. Pre-condition for warranty benefits are proper handling, assembly and installation according to the mounting guidelines.

N.B. Protect tanks from frost when installed above-ground! In case of groundwater installation, please contact us for further information previous to the purchase!

For all indications of measurements in this brochure we reserve a tolerance of +/- 3 %. The useful volume of the tanks may be up to 10 % lower than the tank capacity, according to the connecting option.

Technical modifications and further development of the different products are subject to change. Errors excepted.

For all our offers and conclusions of contract are only valid our General Terms and Conditions of Business dated 01/10/2012 which we will send to you on request.