



Plot H3, Tribe Hotel, Manchester, Chicago Avenue M90 3DQ

SuDS Maintenance Report



Revision	Report Name	Date	Comment	By
A	1513-SUDSMR-240709	10.07.24	Issued for Draft Information	S.Kanadia
B	1513-SUDSMR-240709	12.07.24	Issued for Draft Information	S.Kanadia
C	1513-SUDSMR-240709	22.07.24	Final Issue	S.Kanadia
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1. Executive Summary

1.1 Objectives

- 1.1.1** Spillways Ltd have been appointed to prepare a Sustainable Drainage (SuDS) Maintenance Report for the drainage works at the proposed development site at Plot H3 within the grounds of Manchester Airport, Chicago Avenue M90 3DQ by the contractor as part of the as-built installation package.
- 1.1.2** The as-built drainage design drawing should be read in conjunction with this report [1513-SPW-Z0-ZZ-DR-C-6000 - Below Ground Drainage – C20]. This draft drawing is to be verified by the contractor at the time of preparing this report and therefore this report is subject to updates before final issue.
- 1.1.3** A surface water drainage response was prepared by AECOM in August 2021 for the satisfaction of Condition No.12 for the works at the proposed development site.
- 1.1.4** This report has been based on readily available existing information, including the Ciria C697 – The SuDS Manual and Department for Environment, Food and Rural Affairs (DEFRA) website.
- 1.1.5** This report aims to provide the reader with a broad overview of the site, drainage techniques, SuDS devices as indicated in the drainage strategy for Plot H3, Tribe Hotel project and the nature of anticipated maintenance works required.

2. Introduction

2.1 Brief

- 2.1.1** Spillways Ltd have been appointed to prepare a Sustainable Drainage (SuDS) Maintenance Report for the drainage works at the proposed development site at Plot H3 within the grounds of Manchester Airport, Chicago Avenue M90 3DQ
- 2.1.2** The aim of this report is to provide an insight into the maintenance regime for the Sustainable Drainage (SuDS) devices proposed for this project during post-development and operational phases of the development.
- 2.1.3** The as-built drainage design drawing should be read in conjunction with this report [1513-SPW-Z0-ZZ-DR-C-6000 - Below Ground Drainage – C20].

2.2 Report Structure

- 2.2.1** This report has been written to provide the reader with an understanding of the maintenance process. Section 3.0 starts off with a background into drainage and design philosophy. The adoption of sewers and SuDS are then explained in Section 4.0. An insight into the maintenance aspect of SuDS is explained in Section 5.0. Section 6.0 lists the proposed SuDS devices used on the project with explanations of SuDS specific anticipated maintenance. Section 7.0 moves onto provide an outline explanation the maintenance acquisition process and Section 8.0 concludes the report with recommendations.

2.3 Limitations

- 2.3.1** This report has been prepared for assisting the client in understanding the anticipated maintenance regime associated with the site. Spillways Ltd accepts no liability for any use of this document other than by its client and only for the purposes, stated in the document, for which it was prepared and provided. No person other than the client may copy (in whole or in part) use or rely on the contents of this document, without the prior written permission of Spillways Ltd. Any advice, opinions, or recommendations within this document should be read and relied upon only in the context of the document as a whole
- 2.3.2** Spillways Ltd has endeavoured to assess all information provided to them during this appraisal. The report summarises information from several external sources and cannot offer any guarantees or warranties for the completeness or accuracy of information relied upon.
- 2.3.3** The report is based on the drainage design at the time of preparing this report along with the devices, materials and products used as informed by the contractor. This report has been undertaken with the assumption that the site has been developed in accordance with the proposals without significant change however this is to be confirmed by the client and their contractor. The conclusions resulting from this study are not necessarily indicative of future conditions or operating practices at or adjacent to the site.
- 2.3.4** No cost has been included within this report. Should estimate costs be required, it is recommended that a quantity surveyor or similarly experienced party to review

the contents of this document and price against the proposed drainage strategy. This will provide an indicative figure only and should be used for the purposes of estimates only until the final installation is complete and reviewed by a maintenance engineering company.

- 2.3.5** This report does not negate the need for additional maintenance works required where advised at any time by a specialist through good practise, and or through on-site practicality. Furthermore, this report does not override any such maintenance carried out as part of the site wide masterplan and/or site specific maintenance by MAG Manchester Airport.

3. Background to Drainage

- 3.1.1** The site gives space for the use as a hotel with associated landscaping and vehicular parking and access areas. The site is generally flat in nature with a mixture of soft and hard landscaping. An area to the front of the hotel is recessed into the ground forming a basin type landscaped area as part of the site. This area in particular should be inspected and maintained regularly to ensure water is able to drain away allowing the landscape feature to remain functional. The site will see a large number of vehicles; both large and small therefore the risk of pollution is high. Measures to prevent oil and grease entering the masterplan site wide drainage has been introduced however regular inspection and maintenance of spillages should be undertaken.
- 3.1.2** Due to the nature of the development use type; there is a likelihood of blockages within the foul water system from unwanted materials being flushed into the network. The users of the site must be reminded that non-flushable items are not to be disposed of into the foul water network. The foul water network has been designed on the basis of flushable tissue, and clean non-grease kitchen waste and non-hazardous chemicals. Sanitary facilities should be clearly noted to remind users of this.
- 3.1.3** The drainage has been designed to the 1 in 100 year + 40% climate change event without water breaching the surface level within the development site. Any external flooding outside of the development site forms control measures as part of each individual plot.
- 3.1.4** The drainage strategy for Plot H3 is of a temporary type whereby further works taking place to H3 will change the future permissible discharge rate.
- 3.1.5** The surface water run-off generated at this site has been restricted to 11.5 l/s as per the surface water drainage response prepared by AECOM in August 2021 for the satisfaction of Condition No.12 for the works at the proposed development site and formal agreement between AECOM and MAG.
- 3.1.6** Surface water is proposed to be captured from hardstanding areas and some soft landscaped areas and be routed into the below ground drainage system via collector units such as gully's, linear channels and filter drains. Surface water hereon would be conveyed downstream via the piped network towards a vortex flow control chamber restricted to 11.5 l/s. Where the flow rate entering the vortex flow control chamber exceeds 11.5 l/s; surface water will surcharge and purposely store within attenuation devices. Further downstream of the vortex flow control device; a Class 1 bypass separator has been installed which is designed to prevent oil and other hydrocarbons from entering the drainage system. The purpose of this device is to separate the oil from the water and safely retain the oil until it is removed. Hereon; the water enters the masterplan site wide surface water drainage system.
- 3.1.7** Foul water generated from this development site is routed via a dedicated foul water drainage network into the master site wide foul water drainage system. A foul flow monitoring system has been proposed to measure the flow rate of foul water prior to entering the master site wide foul water drainage system.

4. Adoption and Handover

- 4.1.1** Legislation covering the adoption of sewers, which includes pumping stations and other accessories, is contained within the Water Industry Act 1991 (the Act). Section 104 of the Act covers the adoption of private sewers to be constructed at a future date subject to an agreement with the sewerage undertaker. Once adopted they become public sewers and will be maintained by the Statutory Undertaker at their expense. Upon approval, SuDS may become the responsibility of the Statutory Undertaker or similar body with high level responsibility for the management of water management. It is important to note that the below ground drainage system is not an adopted sewer and therefore is privately owned and maintained by a body which the client and contractor must provide details for.
- 4.1.2** Post completion of the project; the below ground drainage will be part of a defects liability period of 12 months by the contractor. Thereafter; the responsibility of the below ground drainage will be that of the client/developer for lifetime of the development.
- 4.1.3** The maintenance works of the below ground drainage will be upto and including the boundary of the site whereafter the responsibility will be of MAG.
- 4.1.4** Upon completion of the below ground drainage system by the contractor; the Handover Checklist form in Appendix D should be used by the client to ensure that the system is fully operational, warranted and commissioned by any suppliers/manufacturers upon handover.
- 4.1.5** Section 5.0 and 6.0 explores the maintenance of SuDS devices.

5. Maintenance of SuDS

- 5.1.1** Like all drainage systems, SuDS components should be regularly inspected and maintained. This ensures that the SuDS device remains efficient throughout its design life and prevents undesired failure.
- 5.1.2** The maintenance of the SuDS devices is generally no more complex than the maintenance of piped systems. For below ground SuDS, such as modular geo-cellular storage, proprietary systems and flow control/monitoring units are more intensive and long-term actions are usually incorporated into a maintenance plan.
- 5.1.3** Section 6 describes the maintenance regime for the proposed SuDS within the drawing referenced 1513-SPW-Z0-ZZ-DR-C-6000 - Below Ground Drainage – C20
- 5.1.4** The maintenance recommendations proposed in the following section are based on devices assumed to have been handed over as fully operational. By this we refer to the cleaning of any construction silt and debris which may have accumulated within the network which may result in future blockages or failure.
- 5.1.5** It is recommended that underground networks are thoroughly checked using CCTV. Similarly, over ground devices and structures are to be visually inspected, certified and recorded. A copy of the installation is to be provided to Spillways Ltd.
- 5.1.6** At all times during the lifetime of this development; full records of maintenance must be kept in the form of physical paper copies, electronic copies and photographic evidence signed and dated upon each inspection, maintenance and remedial works. Copies of the responsible body carrying out the work should be retained along with detailed records of materials, work carried out and the method of works.
- 5.1.7** A copy of a high level SuDS and Drainage maintenance inspection checklist has been provided in Appendix E of this report. This form should be used for each and every inspection and supplemented with the information listed in 5.1.6 detailing the maintenance carried out.
- 5.1.8** Landscape and other external areas must be regularly maintained to a high standard. This specification is by others and please refer to the appropriate maintenance plan.

6. SuDS Devices

6.1 Cellular Storage for Attenuation

- 6.1.1** A below ground cellular attenuation structure is an effective technique for storing surface water compared to a conventional cellular storage.
- 6.1.2** Regular inspection and maintenance is required to ensure the effective long-term operation of below ground structure and its operation. Maintenance responsibility for systems should be placed with a responsible organisation.
- 6.1.3** Attenuation tanks have been provided with large accessible chambers for maintenance and inspection. The inspection chambers are situated in external areas and therefore any inspection work will need to be co-ordinated around working hours and times of safe access.
- 6.1.4** The anticipated maintenance of a cellular structure can be found in Table 1 (below)

Schedule	Action	Frequency
Regular Maintenance	• Inspect and identify any areas that are not operating correctly, if required take action	Monthly for 3 months, then annually
	• Remove debris from the catchment surface (where it may cause risk to performance)	Monthly
	• Remove sediment from pre-treatment structures / catchpits	Annually or as required
Remedial Actions	• Repair/rehabilitate inlets, outlets, and vents	As required
Monitoring	• Inspect all inlets, outlets and vents to ensure that they are in good conditions and operating as designed	Annually
	• Survey inside of perforated pipe for sedimentation build-up and operating as designed	Annually

Table 1 – Geocellular/Tank Maintenance

6.2 Oil Separators

6.2.1 Oil separators have been proposed to separate the oil from the water and safely retain the oil until it is removed from the device. This device is proposed to prevent hazardous chemical and petroleum products from entering the site wide sewer.

6.2.2 The location of the oil separator has been shown in the drainage strategy drawing.

6.2.3 The anticipated maintenance of oil separators can be found in Table 2 (below)

Schedule	Action	Frequency
Routine Maintenance	<ul style="list-style-type: none"> Remove litter and debris and inspect for sediment, oil and grease accumulation 	Six Monthly
	<ul style="list-style-type: none"> Change the filter media 	Manufacturer Recommended
	<ul style="list-style-type: none"> Remove sediment, oil, grease and floatables 	As necessary and as indicated by system inspections or following spillage
Remedial Actions	<ul style="list-style-type: none"> Replace malfunctioning parts or structures 	As required
Monitoring	<ul style="list-style-type: none"> Inspect for evidence of poor operation 	Six Monthly
	<ul style="list-style-type: none"> Inspect filter media and establish appropriate replacement frequencies 	Six Monthly
	<ul style="list-style-type: none"> Inspect sediment accumulation rates and establish appropriate removal frequencies 	Monthly during first half of the year of operation then every six months

Table 2 – Oil Separator Maintenance

6.2.4 It is vital to check the following specific items every six months:

- (i) Check volume of sludge
- (ii) Check thickness of light liquid
- (iii) Check function of automatic closure devices where given by manufacturer
- (iv) Empty the separator If required
- (v) Check the coalescing material and clean or change if necessary
- (vi) Check the function of the warning device

6.2.5 General inspection of the integrity of the unit should occur at a maximum frequency of five years and should cover the following:

- (i) Watertightness of the system
- (ii) Structural condition
- (iii) Internal coating

- (iv) In-built parts
- (v) Electrical devices and installations
- (vi) Adjustment of automatic closure devices

6.2.6 Most spillages on this site will not post a serious risk to the environment if they enter the drainage in a slow and controlled manner with the time available for natural breakdown/collection in a treatment system. Small spillages of oil, deliveries or other organic substances should be removed where possible using soak mats with residual spillage allowed to bioremediate as part of the drainage system. In the event of a serious spillage, either by volume or of unknown or toxic compounds, then isolate the spillage with soil, turf or fabric and block outlet pipes from chambers downstream of the spillage with a bung(s).

6.3 Silt Trap and Catchpits including Gullies, Channels and Inspection Chambers

6.3.1 Catchpits and silt traps are online/offline design localised lower points along the drainage to allow the settlement of debris and silt. These devices ensure the risk of blockage and impact on the performance of the drainage system is reduced.

6.3.2 Silt traps will be found on collector units such as gullies, channels and inspection chambers

6.3.3 Maintenance of silt traps is carried out by lifting the access covers to gullies and channels and any silt/debris is removed manually (by hand). The silt traps are often shallow units within gullies and channels. Catchpits would be accessed by lifting the access cover of the chamber and debris would need to be removed using mechanical suction as the catchpit can be deep.

6.3.4 The anticipated maintenance of catchpits and silt traps can be found in Table 3 (overleaf)

Schedule	Action	Frequency
Routine Maintenance	<ul style="list-style-type: none">• Lift all access covers and remove any debris & silt.	Three Monthly
	<ul style="list-style-type: none">• Check silt buckets and catchpits	Three Monthly
	<ul style="list-style-type: none">• Carry out any jetting required to remove leaves and other bound silt	As Required
	<ul style="list-style-type: none">• Check access covers for correct seating, sealing and lockability. Always carry spare bolts and grease sealing rings where needed. Clear frame of any debris before placing cover back.	Six Monthly
Inspections	<ul style="list-style-type: none">• Lift access covers and remove any debris & silt	Autumn Season Twice Monthly
	<ul style="list-style-type: none">• Check access covers for correct seating, sealing and lockability	
	<ul style="list-style-type: none">• Check silt buckets and catchpits	
	<ul style="list-style-type: none">• Carry out any jetting required to remove leaves and other bound silt.	
<ul style="list-style-type: none">• Any pipework with debris post completion of the project should be jetting out and cleansed prior to handover.		

Table 3 – Silt Trap / Catch pit Maintenance

6.4 Filter Drains

- 6.4.1** Filter drains will require regular maintenance to ensure continuing operation to design performance standards. Regular inspection and maintenance are important for the effective operation of filter drains as designed. Maintenance responsibility for a filter drain should always be placed with an appropriate organisation.
- 6.4.2** Litter (including leaf litter) and debris removal should be undertaken as part of general landscape maintenance for the site and before any other SuDS management task. All litter should be removed from site.
- 6.4.3** The anticipated maintenance of catchpits and silt traps can be found in Table 4 (right)

Schedule	Action	Frequency
Regular Maintenance	<ul style="list-style-type: none"> Remove litter (including lead litter) and debris from filter drain surface, access chambers and any pretreatment surfaces 	Monthly or as required
	<ul style="list-style-type: none"> Inspect filter drain surface, inlet and outlet pipework and control systems for blockages, clogging, standing water and structural damage 	Monthly
	<ul style="list-style-type: none"> Inspect pre-treatment systems, inlets and perforated pipework for silt accumulation and establish appropriate silt removal frequencies 	Six Monthly
	<ul style="list-style-type: none"> Remove sediment from pre-treatment device 	Six Monthly or as required
	<ul style="list-style-type: none"> Remove or control tree roots along with other vegetation where they are encroaching the sides of the filter drain, using recommended methods. 	As required
Occasional Maintenance	<ul style="list-style-type: none"> At locations with high pollution loads, remove surface geotextile and replace, and wash or replace overlaying filter medium 	Five yearly, or as required
	<ul style="list-style-type: none"> Clear perforated pipework of blockages 	As required

Table 4 – Silt Trap / Catch pit Maintenance

6.5 Vortex Flow Control Device

- 6.5.1** The vortex flow control unit regulates the flow of surface water. It is entirely self-activating and requires no manual intervention unless blockages occur.
- 6.5.2** The location of the vortex flow control device has been shown in the drainage strategy drawing.
- 6.5.3** The anticipated maintenance of vortex flow control device can be found in Table 5 (overleaf)

Schedule	Action	Frequency
Inspections	<ul style="list-style-type: none"> Lift access cover and check for debris or silt accumulation at base. 	Monthly
	<ul style="list-style-type: none"> Check visible fixing bolts to ensure they are not corroded or unsecure 	Six Monthly
	<ul style="list-style-type: none"> Check to see if vortex flow control is not damaged 	Six Monthly
	<ul style="list-style-type: none"> Check for any blockages of the outlet 	Monthly
	<ul style="list-style-type: none"> Check flow of water is freely leaving the vortex flow control unit 	Monthly
	<ul style="list-style-type: none"> Check wire cable for emergency drain down is operating with ease 	Monthly
Maintenance	<ul style="list-style-type: none"> Remove any Silt or debris accumulation 	As required

Table 5 – Vortex Flow Control Chamber Maintenance

7. Mechanism for Contract to Maintain

- 7.1.1** As stated in Section 4.1.3, the duration of time of responsibility for the maintenance of the drainage and SuDS network by the contractor is to be confirmed by the client.
- 7.1.2** During this time frame, it is advisory to carry out the monitoring and maintenance as per the guidance set out in this document.
- 7.1.3** It is recommended that monitoring and maintenance be initialised immediately via a maintenance regime. A detailed regime should be undertaken post completion of the network design once all design criteria have been obtained and construction details have been prepared. It is anticipated that all construction and site drawings will be shared post completion handover.
- 7.1.4** The handover documents can be used to prepare a maintenance regime for the SuDS devices and this can be carried out by a specialist maintenance management organisation.
- 7.1.5** All maintenance documents should be held on site and copies offsite with a maintenance engineering company.
- 7.1.6** It is recommended that three competitive quotations are obtained for the cost of maintenance.

8. Conclusion and Recommendations

- 8.1.1** Spillways Ltd have been appointed to prepare a Sustainable Drainage (SuDS) Maintenance Report for the drainage works at the proposed development site at Plot H3 within the grounds of Manchester Airport, Chicago Avenue M90 3DQ by the contractor as part of the as-built installation package.
- 8.1.2** The draft as-built drainage design drawing should be read in conjunction with this report 1513-SPW-Z0-ZZ-DR-C-6000 - Below Ground Drainage – C20.
- 8.1.3** Should a budget cost be required for the maintenance of SUDS, a suitably experienced surveyor and/or maintenance specialist is recommended to be appointed to price for any maintenance works using this document and the drainage strategy drawing.
- 8.1.4** If the building is unoccupied; a management firm should be employed to oversee the routine maintenance of the drainage network.
- 8.1.5** Any parts, products, materials and devices used by the contractor should be inserted into the maintenance handbook and the recommended manufactures maintenance should also be adhered to. The manufacturer's recommendations should supersede the information in this report.
- 8.1.6** All maintenance should be recorded to a detailed standard.
- 8.1.7** Should the drainage network be installed and laid as designed; by carrying out the maintenance; it is considered that the drainage system will serve the building for its intended design life.
- 8.1.8** Manufactures and specialist contractors are asked to provide a comprehensive maintenance schedule for all items. The maintenance schedules should form part of the operational manual for the building.
- 8.1.9** A post completion CCTV survey is to be carried out by the contractor.

APPENDIX A – Drainage Plan

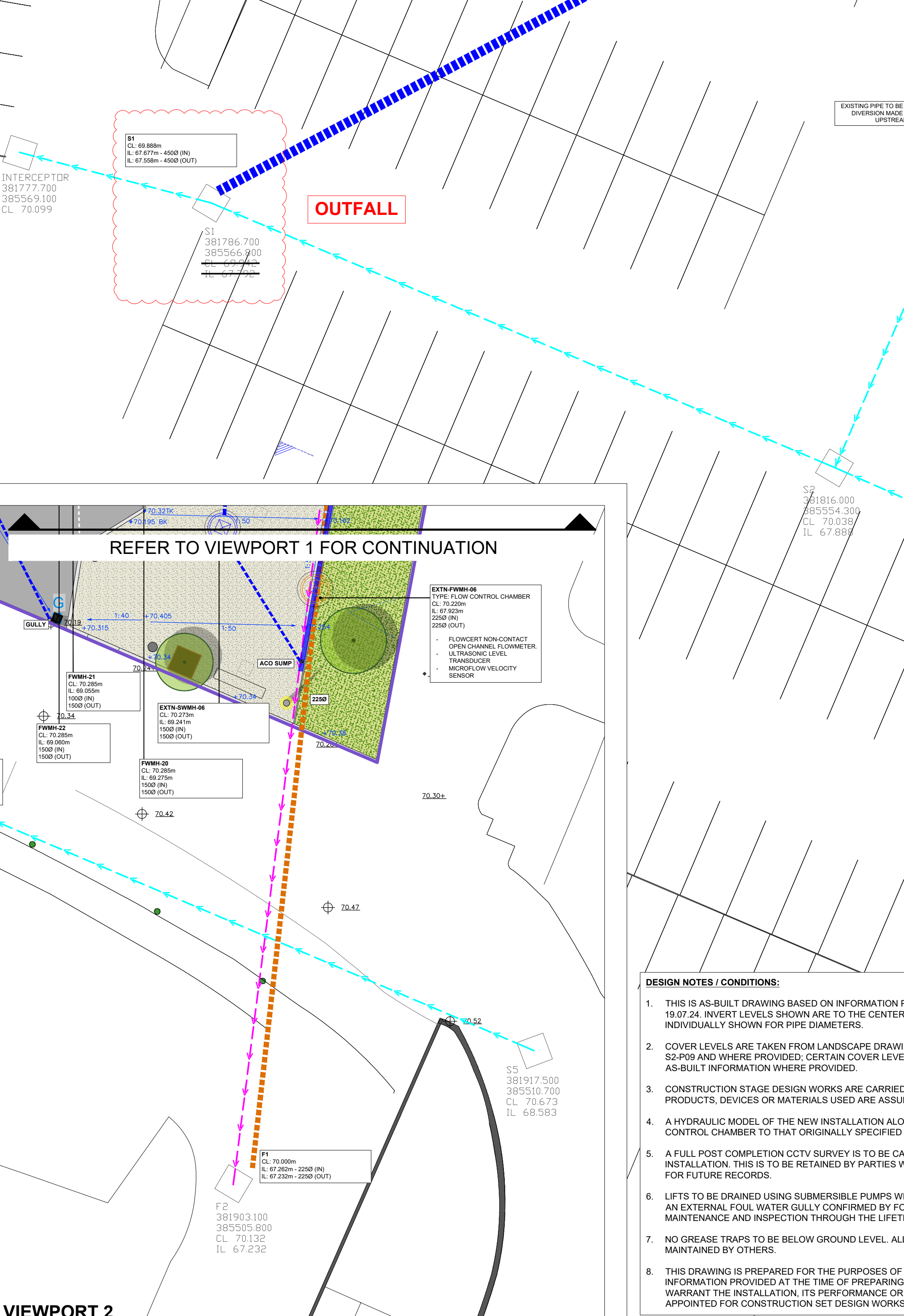
Building Perimeter Surface Water Manhole Schedule						
Reference No.	Manhole Size (mm)	Material	Cover Type	Size (mm)	Load Grade	Note
FWMH-01	4500	PPIC	Recessed	450x450	C250	Recessed Access Cover - Double Sealed and Bolted Cover
FWMH-02	4500	PPIC	Recessed	450x450	C250	Recessed Access Cover - Double Sealed and Bolted Cover
FWMH-03	4500	PPIC	Recessed	450x450	C250	Recessed Access Cover - Double Sealed and Bolted Cover
FWMH-04	4500	PPIC	Recessed	450x450	C250	Recessed Access Cover - Double Sealed and Bolted Cover
FWMH-05	4500	PPIC	Recessed	450x450	C250	Recessed Access Cover - Double Sealed and Bolted Cover
FWMH-06	4500	PPIC	Recessed	450x450	C250	Recessed Access Cover - Double Sealed and Bolted Cover
FWMH-07	4500	PPIC	Recessed	450x450	C250	Recessed Access Cover - Double Sealed and Bolted Cover
FWMH-08	4500	PPIC	Recessed	450x450	C250	Recessed Access Cover - Double Sealed and Bolted Cover
FWMH-09	4500	PPIC	Recessed	450x450	C250	Recessed Access Cover - Double Sealed and Bolted Cover
FWMH-10	4500	PPIC	Recessed	450x450	C250	Recessed Access Cover - Double Sealed and Bolted Cover
FWMH-11	4500	PPIC	Recessed	450x450	C250	Recessed Access Cover - Double Sealed and Bolted Cover
FWMH-12	4500	PPIC	Recessed	450x450	C250	Recessed Access Cover - Double Sealed and Bolted Cover
FWMH-13	1200x1000	CONCRETE (CAST IN-SITU)	Recessed	750x750	C250	Recessed Access Cover - Double Sealed and Bolted Cover
FWMH-14	1200x1000	CONCRETE (CAST IN-SITU)	Recessed	750x750	C250	Recessed Access Cover - Double Sealed and Bolted Cover
FWMH-15	4500	PPIC	Recessed	450x450	C250	Recessed Access Cover - Double Sealed and Bolted Cover
FWMH-16	4500	PPIC	Recessed	450x450	C250	Recessed Access Cover - Double Sealed and Bolted Cover
FWMH-17	4500	PPIC	Recessed	450x450	C250	Recessed Access Cover - Double Sealed and Bolted Cover
FWMH-18	4500	PPIC	Recessed	450x450	C250	Recessed Access Cover - Double Sealed and Bolted Cover
FWMH-19	4500	PPIC	Recessed	450x450	C250	Recessed Access Cover - Double Sealed and Bolted Cover
FWMH-20	4500	PPIC	Recessed	450x450	C250	Recessed Access Cover - Double Sealed and Bolted Cover
FWMH-21	4500	PPIC	Recessed	450x450	C250	Recessed Access Cover - Double Sealed and Bolted Cover
FWMH-22	4500	PPIC	Recessed	450x450	C250	Recessed Access Cover - Double Sealed and Bolted Cover
FWMH-23	1200x1000	CONCRETE (CAST IN-SITU)	Recessed	750x750	C250	Recessed Access Cover - Double Sealed and Bolted Cover
FWMH-24	4500	PPIC	Recessed	450x450	C250	Recessed Access Cover - Double Sealed and Bolted Cover
FWMH-25	4500	PPIC	Recessed	450x450	C250	Recessed Access Cover - Double Sealed and Bolted Cover
FWMH-26	4500	PPIC	Recessed	450x450	C250	Recessed Access Cover - Double Sealed and Bolted Cover
FWMH-27	4500	PPIC	Recessed	450x450	C250	Recessed Access Cover - Double Sealed and Bolted Cover
FWMH-28	4500	PPIC	Recessed	450x450	C250	Recessed Access Cover - Double Sealed and Bolted Cover
FWMH-29	4500	PPIC	Recessed	450x450	C250	Recessed Access Cover - Double Sealed and Bolted Cover
FWMH-30	4500	PPIC	Recessed	450x450	C250	Recessed Access Cover - Double Sealed and Bolted Cover
FWMH-31	4500	PPIC	Recessed	450x450	C250	Recessed Access Cover - Double Sealed and Bolted Cover
FWMH-32	4500	PPIC	Recessed	450x450	C250	Recessed Access Cover - Double Sealed and Bolted Cover
FWMH-33	4500	PPIC	Recessed	450x450	C250	Recessed Access Cover - Double Sealed and Bolted Cover
FWMH-34	4500	PPIC	Recessed	450x450	C250	Recessed Access Cover - Double Sealed and Bolted Cover
FWMH-35	4500	PPIC	Recessed	450x450	C250	Recessed Access Cover - Double Sealed and Bolted Cover

Building Perimeter Surface Water Manhole Schedule						
Reference No.	Manhole Size (mm)	Material	Cover Type	Size (mm)	Load Grade	Note
SWMH-01	4500	PPIC	Recessed	450x450	C250	Recessed Access Cover - Double Sealed and Bolted Cover
SWMH-02	4500	PPIC	Recessed	450x450	C250	Recessed Access Cover - Double Sealed and Bolted Cover
SWMH-03	4500	PPIC	Recessed	450x450	C250	Recessed Access Cover - Double Sealed and Bolted Cover
SWMH-04	4500	PPIC	Recessed	450x450	C250	Recessed Access Cover - Double Sealed and Bolted Cover
SWMH-05	4500	PPIC	Recessed	450x450	C250	Recessed Access Cover - Double Sealed and Bolted Cover
SWMH-06	4500	PPIC	Recessed	450x450	C250	Recessed Access Cover - Double Sealed and Bolted Cover
SWMH-07	4500	PPIC	Recessed	450x450	C250	Recessed Access Cover - Double Sealed and Bolted Cover
SWMH-08	4500	PPIC	Recessed	450x450	C250	Recessed Access Cover - Double Sealed and Bolted Cover
SWMH-09	4500	PPIC	Recessed	450x450	C250	Recessed Access Cover - Double Sealed and Bolted Cover
SWMH-10	4500	PPIC	Recessed	450x450	C250	Recessed Access Cover - Double Sealed and Bolted Cover
SWMH-11	4500	PPIC	Recessed	450x450	C250	Recessed Access Cover - Double Sealed and Bolted Cover
SWMH-12	4500	PPIC	Recessed	450x450	C250	Recessed Access Cover - Double Sealed and Bolted Cover
SWMH-13	4500	PPIC	Recessed	450x450	C250	Recessed Access Cover - Double Sealed and Bolted Cover
SWMH-14	4500	PPIC	Recessed	450x450	C250	Recessed Access Cover - Double Sealed and Bolted Cover
SWMH-15	4500	PPIC	Recessed	450x450	C250	Recessed Access Cover - Double Sealed and Bolted Cover

Site Wide Foul Water Manhole Schedule						
Reference No.	Manhole Size (mm)	Material	Cover Type	Size (mm)	Load Grade	Note
EXTRA-FWMH-01	12000	PRE-CAST CONCRETE	Ductile Iron Cover	600x600	D400	Heavy Duty Cover
EXTRA-FWMH-02	12000	PRE-CAST CONCRETE	Ductile Iron Cover	600x600	D400	Heavy Duty Cover
EXTRA-FWMH-03	6000	PPIC	Recessed	600x600	C250	Recessed Access Cover - Double Sealed and Bolted Cover
EXTRA-FWMH-04	6000	PPIC	Recessed	600x600	C250	Recessed Access Cover - Double Sealed and Bolted Cover
EXTRA-FWMH-05	12000	PRE-CAST CONCRETE	Ductile Iron Cover	600x600	D400	Heavy Duty Cover
EXTRA-FWMH-06	12000	PRE-CAST CONCRETE	Ductile Iron Cover	600x600	D400	Heavy Duty Cover
F1	EXISTING CHAMBER (REMEDIATION WORKS WHERE REQUIRED AND MAKE GOOD NEW CONNECTIONS MADE)					

Site Wide Surface Water Manhole Schedule						
Reference No.	Manhole Size (mm)	Material	Cover Type	Size (mm)	Load Grade	Note
EXTRA-SWMH-01	12000	PRE-CAST CONCRETE	Ductile Iron Cover	600x600	D400	Heavy Duty Cover
EXTRA-SWMH-02	12000	PRE-CAST CONCRETE	Ductile Iron Cover	600x600	D400	Heavy Duty Cover
EXTRA-SWMH-03	12000	PRE-CAST CONCRETE	Ductile Iron Cover	600x600	D400	Heavy Duty Cover
EXTRA-SWMH-04	12000	PRE-CAST CONCRETE	Ductile Iron Cover	600x600	D400	Heavy Duty Cover
EXTRA-SWMH-05	12000	PRE-CAST CONCRETE	Ductile Iron Cover	600x600	D400	Heavy Duty Cover
EXTRA-SWMH-06	12000	PRE-CAST CONCRETE	Ductile Iron Cover	600x600	D400	Recessed Access Cover - Double Sealed and Bolted Cover
EXTRA-SWMH-07	18000	PRE-CAST CONCRETE	Ductile Iron Cover	600x600	D400	Recessed Access Cover - Double Sealed and Bolted Cover
EXTRA-SWMH-08	12000	PRE-CAST CONCRETE	Ductile Iron Cover	600x600	D400	Recessed Access Cover - Double Sealed and Bolted Cover
EXTRA-SWMH-09	12000	PRE-CAST CONCRETE	Ductile Iron Cover	600x600	D400	Heavy Duty Cover
EXTRA-SWMH-10	12000	PRE-CAST CONCRETE	Ductile Iron Cover	600x600	D400	Recessed Access Cover - Double Sealed and Bolted Cover
EXTRA-SWMH-11	18000	PRE-CAST CONCRETE	Ductile Iron Cover	600x600	D400	Recessed Access Cover - Double Sealed and Bolted Cover
EXTRA-SWMH-12	18000	PRE-CAST CONCRETE	Ductile Iron Cover	600x600	D400	Recessed Access Cover - Double Sealed and Bolted Cover
EXTRA-SWMH-13	18000	PRE-CAST CONCRETE	Ductile Iron Cover	600x600	D400	Heavy Duty Cover
EXTRA-SWMH-14	18000	PRE-CAST CONCRETE	Ductile Iron Cover	600x600	D400	Heavy Duty Cover
EXTRA-SWMH-15	18000	PRE-CAST CONCRETE	Ductile Iron Cover	600x600	D400	Heavy Duty Cover
EXTRA-SWMH-16	18000	PRE-CAST CONCRETE	Ductile Iron Cover	600x600	D400	Heavy Duty Cover
EXTRA-SWMH-17	18000	PRE-CAST CONCRETE	Ductile Iron Cover	600x600	D400	Heavy Duty Cover
CHAMBER DETAILS PENDING						
EXISTING CHAMBER (REMEDIATION WORKS WHERE REQUIRED AND MAKE GOOD NEW CONNECTIONS MADE)						

Bypass Separator						
Reference No.	Manhole Size (mm)	Material	Cover Type	Size (mm)	Load Grade	Note
NSBP-15	N/A	PRE-FABRICATED UNIT				CHAMBER DETAILS PENDING



NOTES

ALL DRAINAGE SHALL COMPLY WITH THE TYPICAL DRAINAGE CONSTRUCTION DETAILS AND THE REQUIREMENTS OF BS EN 752

ACCESS COVERS AND FRAMES SHALL COMPLY WITH THE LOADINGS SPECIFIED AND TO BS EN 124 AND KITEMARKED OR IF RECESSED COVERS ARE SPECIFIED THEN IN ACCORDANCE WITH FACTA ASSOCIATION EQUIVALENT.

THE PROPOSED BUILDING OUTLINES SHOWN ON THIS DRAWING ARE FOR INFORMATION ONLY. REFER TO ARCHITECTS PLANS FOR PRECISE LOCATION SETTING OUT INFORMATION AND DETAILS.

ALL DRAINAGE PIPEWORK SHOWN SHALL BE 100mm DIAMETER UNLESS NOTED OTHERWISE.

ALL UNDERSLAB DRAINAGE SHALL BE Laid AT GRADIENTS OF 1:40 MM FOR FOUL, 1:100 MM FOR SURFACE WATER, AND 1:80 MM FOR SURFACE WATER UNLESS NOTED OTHERWISE.

ALL UNDERSLAB DRAINAGE SHALL BE CLEAR OF FOUNDATIONS UNLESS SHOWN OTHERWISE WITH LEAKING RADIUS BEING KEPT TO A MINIMUM AND USED WHERE UNAVOIDABLE.

AT LEAST ONE SOIL PIPE AT THE HEAD OF EACH FOUL RUN SHALL BE VENTED TO THE ATMOSPHERE.

ALL GUTTERS SHALL BE FITTED WITH A LEAF FILTER AT EACH OUTLET TO REDUCE THE RISK OF BLOCKAGE.

ALL RAINWATER DOWNPIPES SHALL BE ACCESSIBLE ABOVE GROUND FOR REDDING PURPOSES.

ANY PART OF THE EXISTING DRAINAGE SYSTEM TO BE RETAINED AS PART OF THE NEW SCHEME SHALL BE CLEANED AND INSPECTED BY CCTV SURVEY. ANY STRUCTURAL DEFECTS SHALL BE REPAIRED OR REPLACED AS MAY BE REQUIRED USING APPROPRIATE AND APPROVED METHODS.

WHERE EXISTING ACCESS LOCATIONS ARE TO BE RETAINED THE COVER AND FRAMES SHALL BE CHECKED TO ENSURE THEY ARE OF A SUITABLE DUTY FOR REUSE AND LEVELS ADJUSTED TO SUIT PROPOSED FINISHED GROUND LEVELS.

ALL INTERNAL AND EXTERNAL ACCESS COVERS SHALL BE RECESSED. DOUBLE SEALED AND LOCKABLE SUBJECT TO ARCHITECTS SPECIFICATION.

COVER LEVELS SHOWN ON THIS DRAWING ARE APPROXIMATE AND SHALL BE ADJUSTED TO SUIT FINISHED PAVEMENT LEVELS ON SITE BY CONTRACTOR. COVERS SHALL BE ORIENTED TO SUIT PAVEMENT FINISHES WHERE APPROPRIATE.

ALL PRIVATE DRAINAGE PIPEWORK FOR FOUL AND SURFACE WATER SYSTEMS HAVE BEEN DESIGNED ON THE BASIS OF CAST IRON.

ALL EXTERNAL (OUTSIDE OF BUILDING PERIMETER) DRAINAGE PIPEWORK FOR FOUL AND SURFACE WATER SYSTEMS SHALL BE DESIGNED ON THE BASIS OF CLAYWARE TO COMPLY WITH SEWERAGE SECTOR GUIDANCE APPROVED VERSION 1.0, INCLUDING APPENDIX C THE CODE APPROVED VERSION 2.0.

CONCRETE ENCASEMENT OF THE PIPEWORK SHALL BE REQUIRED WHERE THE VERTICAL CLEARANCE BETWEEN TWO PIPES CROSSING IS LESS THAN 300MM.

ALL EXISTING DRAINAGE SHALL BE ASSUMED TO BE 'LIVE' AND SHALL BE MAINTAINED AT ALL TIMES DURING THE WORKS. EXISTING DRAINAGE SHALL BE RECONNECTED TO THE NEW DRAINAGE SYSTEM UNLESS PROVEN TO BE REDUNDANT FOR ABANDONMENT. ALL EXISTING DRAINAGE TO BE ABANDONED SHALL BE SEALED BY APPROPRIATE MEANS.

ALL DRAINAGE CONNECTING TO THE PUBLIC SEWER NETWORK SHALL NOT COMMENCE UNTIL RECEIPT OF THE APPROVAL FROM THE DRAINAGE AUTHORITY AND SHALL COMPLY WITH REQUIREMENTS USING VERIFIED CLAY PIPEWORK TO BS EN 206 WITH PLAN SIGHTS OR SOCKETED FLEXIBLE JOINTS SUBJECT TO THEIR APPROVAL.

WHERE DRAINAGE WORKS ARE CARRIED OUT IN THE PUBLIC HIGHWAY THE RELEVANT NECESSARY APPROVALS AND ROAD OPENING NOTICES SHALL BE OBTAINED FROM THE HIGHWAY AUTHORITY AND UTILITY COMPANIES.

UPON COMPLETION ALL NEW DRAINAGE INSTALLATION TOGETHER WITH ANY EXISTING DRAINAGE RETAINED SHALL BE SETTED AND CCTV SURVEYED UPON COMPLETION. CONTRACTOR TO ENSURE THAT THE DRAINAGE SYSTEM IS FULLY OPERATIONAL, FREE OF EXCESS SEDIMENT, AND ALL IDENTIFIED FAULTS RECTIFIED.

AN AIR TIGHTNESS TEST MUST BE PERFORMED FOR THE PIPEWORK THAT SITS WITHIN THE BUILDING TO ENSURE NO LEAKS ARE PRESENT. THE CONTRACTOR IS EXPECTED TO PROVIDE ADDITIONAL WATER TIGHTNESS MEASURES TO PIPEWORK BELOW GROUND.

HEALTH & SAFETY: FUTURE WORKS SHALL BE CARRIED OUT BY SPECIALIST COMPETENT AND EXPERIENCED CONTRACTORS. ALL OPERATIVES SHALL HAVE RECEIVED FULL AND APPROPRIATE TRAINING WITH APPROPRIATE QUALIFICATIONS FOR THE OPERATIONS THEY ARE REQUIRED TO UNDERTAKE. ALL WORK SHALL BE CARRIED OUT IN ACCORDANCE WITH THE RELEVANT HEALTH & SAFETY REGULATIONS.

UTILITIES CO-ORDINATION AND CHECKING IS REQUIRED TO BE UNDERTAKEN BY A SPECIALIST TALK ENGINEER. THE CONTRACTOR AND DESIGN TEAM IS REMINDING NOT TO USE THIS DRAWING FOR CONSTRUCTION PURPOSES UNTIL FULL CO-ORDINATION AND VERIFICATION OF ALL UTILITIES INFORMATION SHOWN ON THIS PLAN AND SECTIONS IS UNDERTAKEN. UTILITIES TO BE NOT NOTED TO UNDERTAKE UTILITY DESIGN OR HAVE THE CAPACITY TO UNDERTAKE SUCH DESIGN FOR THE MAPPING OF EXISTING OR PROPOSED UTILITIES. NOT ALL UTILITY INFORMATION HAS BEEN SUPPLIED IN CAD FORMAT AND THEREFORE IT HAS BEEN TRANSCRIBED THE BEST POSSIBLE. THE UTILITY INFORMATION PRESENTED ON THIS PLAN OR SECTION IS NOT ACCURATE.

ISSUED FOR AS-BUILT INFORMATION

Rev	Description	Date	By
C21	ISSUED FOR AS-BUILT INFORMATION	23.08.24	SK
C20	ISSUED FOR AS-BUILT INFORMATION	22.07.24	SK
C19	ISSUED FOR APPROVAL	04.07.24	SK

Job Title: PLOT H3 ACCOR TRIBE HOTEL

Client: FORM SD

1513-SPW-Z0-00-DR-C-6000
BELOW GROUND DRAINAGE

Drawn: SK Date: 06.01.22 Scale: 1:150 @ A1 Checked: SK CAD Filename: C-6000

Job No: 1513 Drawing No: C-6000 Revision: C21

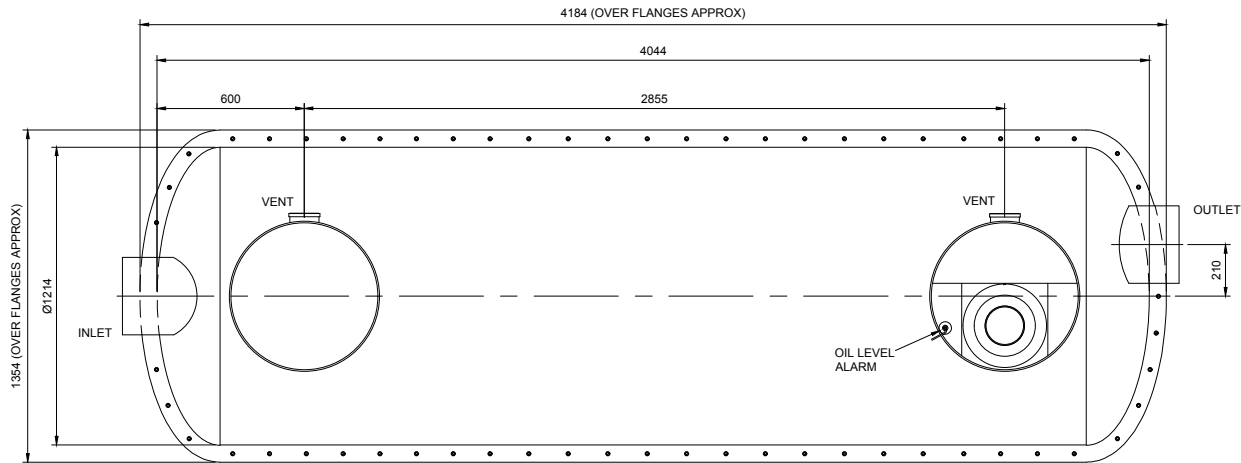
SPILLWAYS

WWW.SPILLWAYS.CO.UK
T: 0203 355 5644
E: SANJAY@SPILLWAYS.CO.UK
200 SHERWOOD PARK AVENUE,
SIDCUP, KENT, DA15 5JN

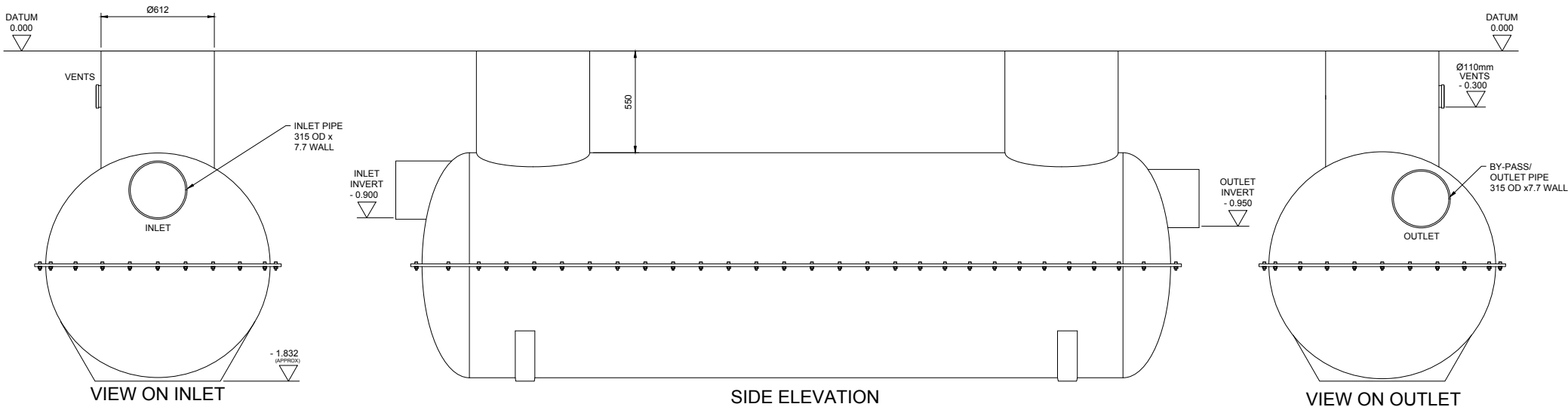
APPENDIX B – Construction Details

GENERAL NOTE:
All tanks are subject to a 2.5%
tolerance on all dimensions.
Any internals (if shown) are for
guidance only, and may vary due
to individual specifications.

MAX. FLOW RATE : 150 LPS.



PLAN



VIEW ON INLET

SIDE ELEVATION

VIEW ON OUTLET

REV	DESCRIPTION	DATE	SIG	REV	DESCRIPTION	DATE	SIG
A	For Approval	03.07.17	P.L.				
B	INLET / OUTLET PIPE SIZES AMENDED.	16.04.19	GLF				

THIS DRAWING IS THE PROPERTY OF MARSH INDUSTRIES LTD. AND MUST NOT BE REPRODUCED OR CIRCULATED FOR ANY PURPOSE WITHOUT FIRST OBTAINING WRITTEN CONSENT FROM THE MARSH INDUSTRIES LTD.			
ORIG.	CHRD	APPD	
SCALE	N.T.S.	DATE	03.07.2017
3 RD ANGLE PROJECTION		DO NOT SCALE IF IN DOUBT ASK	

CLIENT	
TITLE	MARSH NSBP15 (CLASS 1) BYPASS SEPARATOR Ø1.2m x 4.30m LONG.

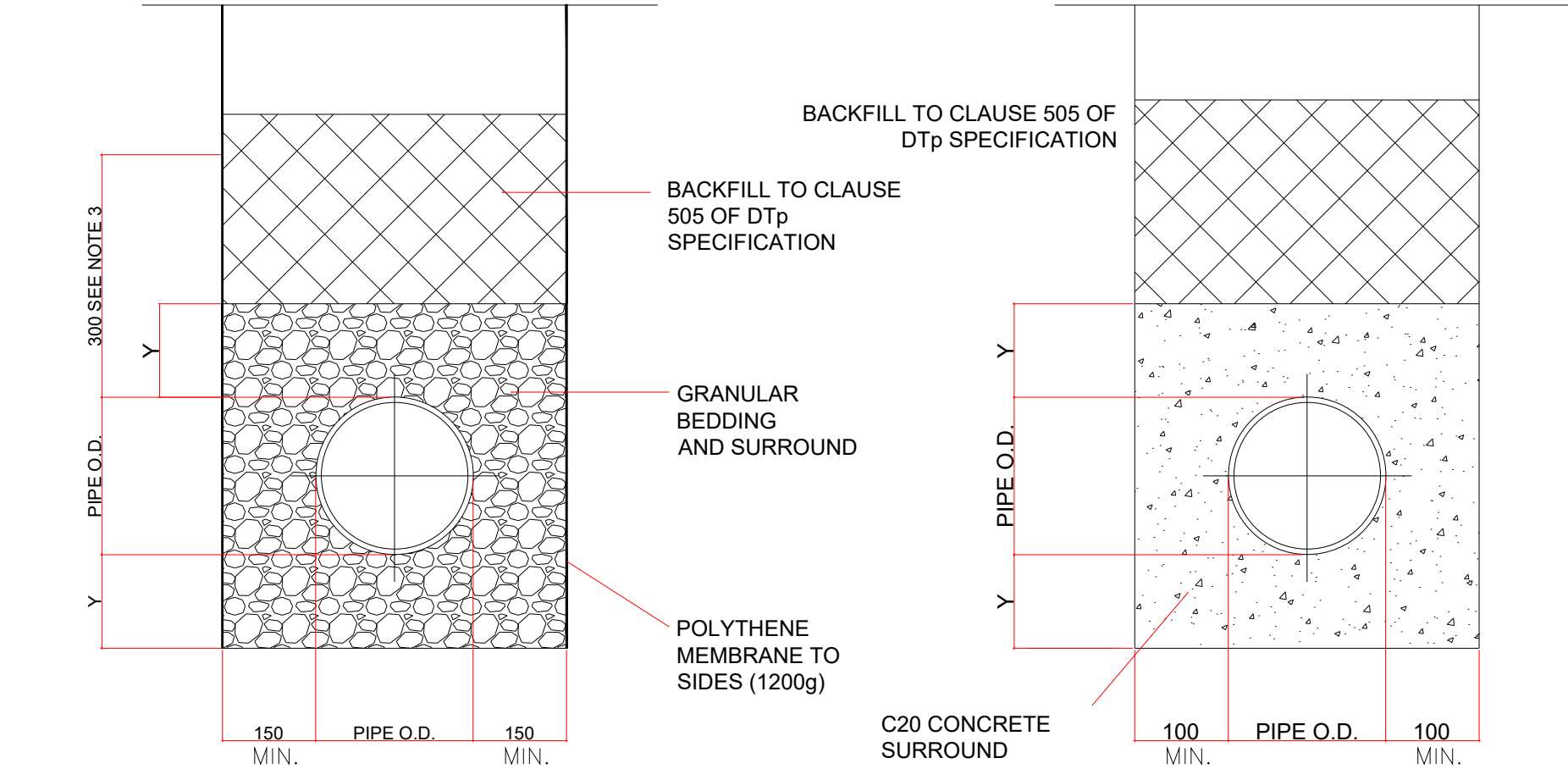
	UNITS 9-13 ADDINGTON PARK IND. EST., LITTLE ADDINGTON, KETTERING, NORTHAMPTONSHIRE, NN14 4AS.
	MARSH INDUSTRIES > Leaders in off-mains drainage
DRG.	CUST NSBP 15
REV	B

PIPE DIAMETER	CLASS OF BEDDING	IMPORTED GRANULAR MATERIAL (NOTE 1)
100	F S B	10mm nominal size
OVER 100 to 150	F S B	10 or 14mm nom. single size or 14 to 5mm graded
OVER 150 to 150	F S B	10,14,20mm nom. single size or 14 to 5mm graded or 20 to 5mm graded
OVER 500 (note 2)	F S B	10,14,20mm nom. single size crushed rock or 14 to 5mm graded or 20 to 5mm graded or 40 to 5mm graded

NOTES:

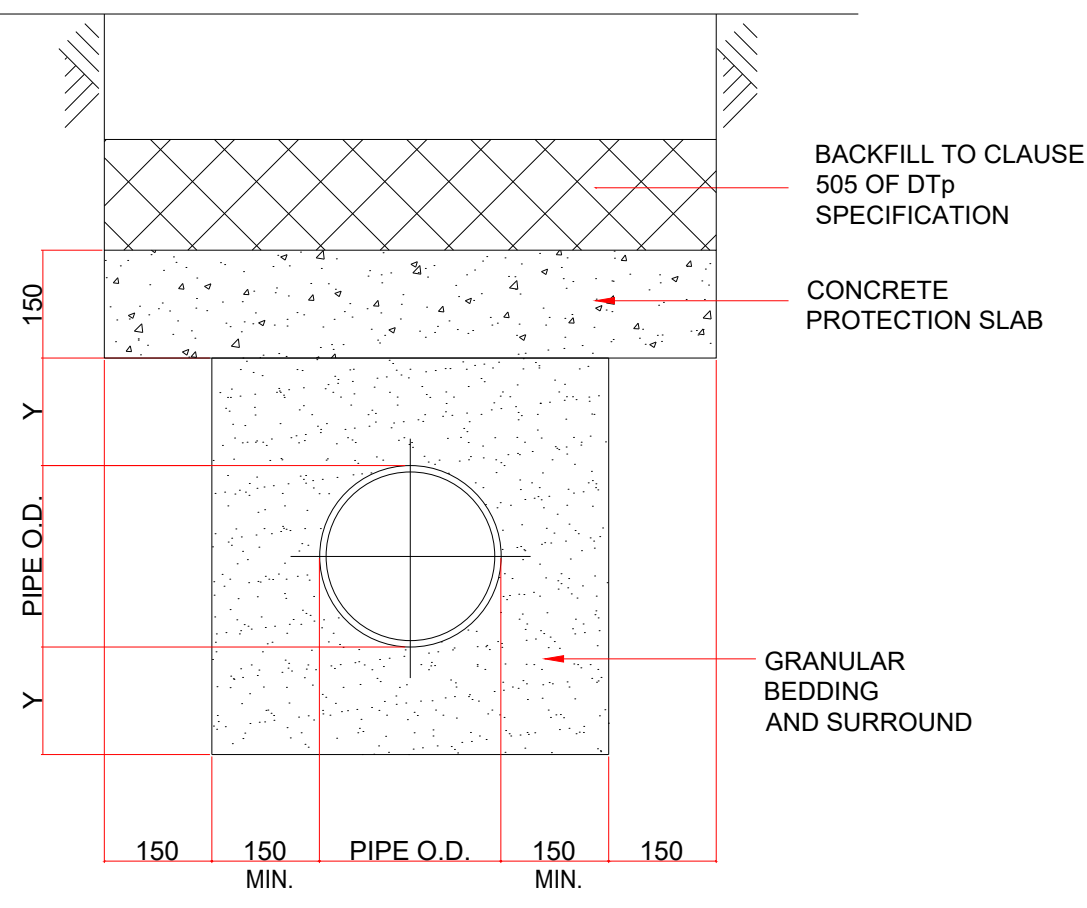
- IMPORTED GRANULAR MATERIALS TO INCLUDE AGGREGATES AND AIR COOLED BLAST FURNACE SLAG TO BSEN 12620:2002 AND SINTERED PULVERIZED FUEL ASH TO BSEN 13055-1:2002.
- ANGULAR MATERIALS SHOULD BE CHOSEN TO ENSURE SUFFICIENT SUPPORT IS PROVIDED TO HEAVIER PIPES
- CLASS S BEDDING SHALL BE USED WITH ALL FLEXIBLE PIPES

GRANULAR BEDDING & SIDEFILL MATERIALS FOR RIGID AND FLEXIBLE PIPES



CLASS S BEDDING
GRANULAR BED AND SURROUND
(COVER TO SOFFIT GREATER THAN 1200mm)
(BEDDING FACTOR = 2.2)

CLASS Z BEDDING
PLAIN CONCRETE BED & SURROUND
(COVER TO SOFFIT LESS THAN 1200mm)
(BEDDING FACTOR 4.5)

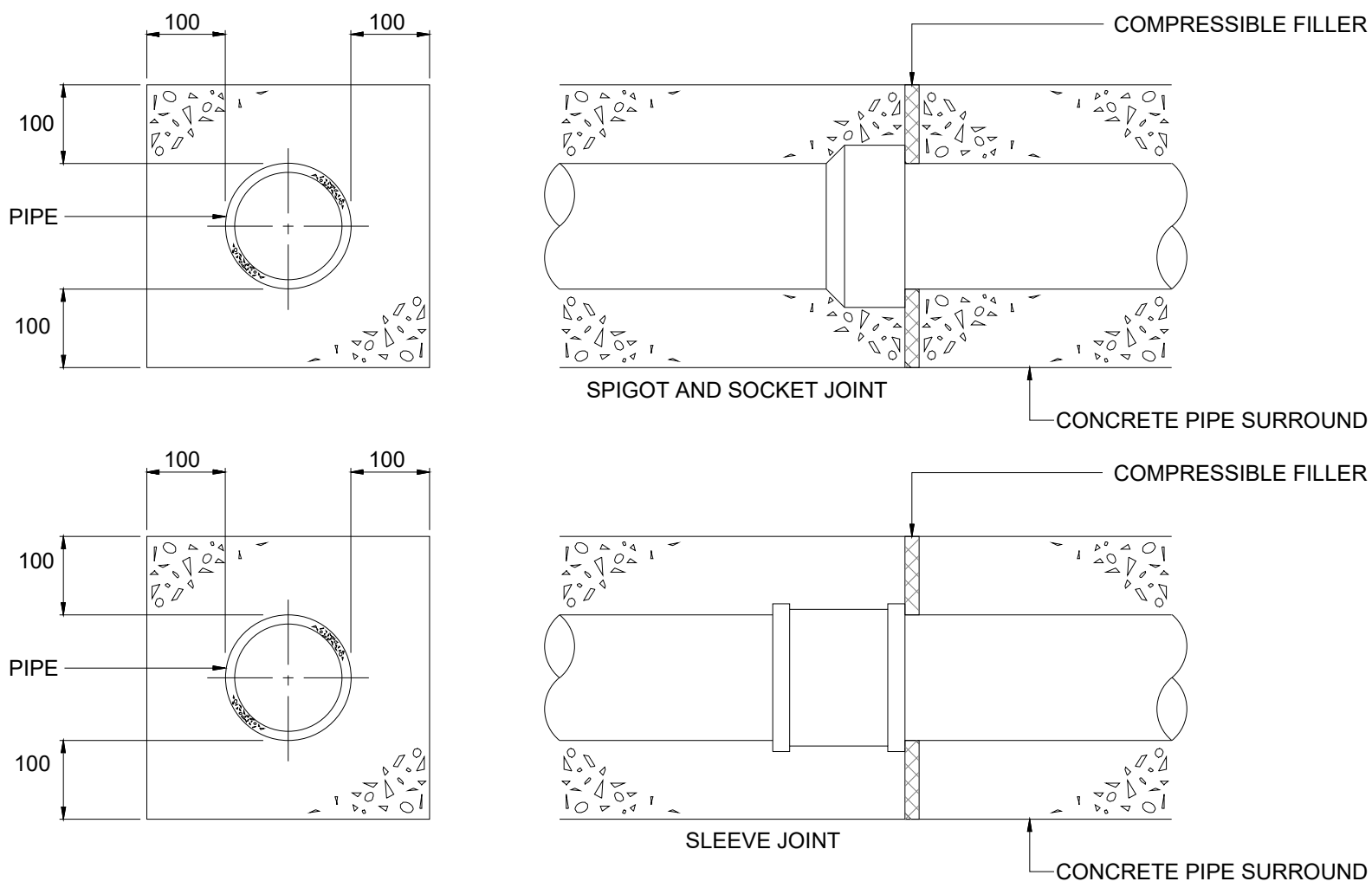


CONCRETE SLAB PROTECTION OF PIPES LAID AT SHALLOW DEPTHS

NOTES:

- REFER TO TABLES FOR DIMENSIONS AND BEDDING DETAILS.
- IMPORTED GRANULAR MATERIALS TO INCLUDE AGGREGATES AND AIR COOLED BLAST FURNACE SLAG TO BSEN 12620:2002 AND SINTERED PULVERIZED FUEL ASH TO BSEN 13055-1:2002.
- ANGULAR MATERIALS SHOULD BE CHOSEN TO ENSURE SUFFICIENT SUPPORT IS PROVIDED TO HEAVIER PIPES
- CLASS S BEDDING SHALL BE USED WITH ALL FLEXIBLE PIPES
- BEDDING BENEATH AND AT THE SIDES OF THE PIPE TO BE WELL COMPACTED.
- THE FIRST 300mm OF FILL ABOVE THE CROWN OF THE PIPE IS TO BE LIGHTLY TAMPED BY HAND. MECHANICAL MAY BE USED ONLY ABOVE THIS LEVEL.
- GEOTEXTILES MAY BE USED WHERE DIRECTED OR APPROVED BY THE ENGINEER TO CONTAIN BEDDING MATERIAL IN CERTAIN SOILS, eg. RUNNING SAND, ETC.
- IN VERY WET CONDITIONS, WHERE DIRECTED OR APPROVED BY THE ENGINEER A TEMPORARY LAND DRAIN MAY BE LAID WITHIN THE GRANULAR BEDDING.
- CONCRETE CRADLES AND ARCHES MAY BE EXTENDED TO THE SIDES OF THE TRENCH.
- WHERE PIPES WITH FLEXIBLE JOINTS ARE USED THE CONCRETE PROTECTION IS TO BE INTERRUPTED OVER ITS FULL CROSS SECTION AT INTERVALS NOT EXCEEDING 5.0m (OR AS INDICATED BY THE ENGINEER) BY A SHAPED FORMER OF BITUMEN IMPREGNATED COMPRESSIBLE FILLER. THESE INTERRUPTIONS SHALL COINCIDE WITH PIPE JOINTS. SEE DIMENSIONS IN PIPE BEDDING TABLE FOR THICKNESS OF COMPRESSIBLE FILLER.
- CONCRETE TO BE CLASS 2 SULPHATE RESISTING CONCRETE (GRADE GEN3).
- WHERE FLEXIBLE PIPES ARE USED, CARE MUST BE TAKEN TO PREVENT THE PIPES FROM FLOATING.

GRANULAR BEDDING & SIDEFILL MATERIALS FOR RIGID + FLEXIBLE PIPES



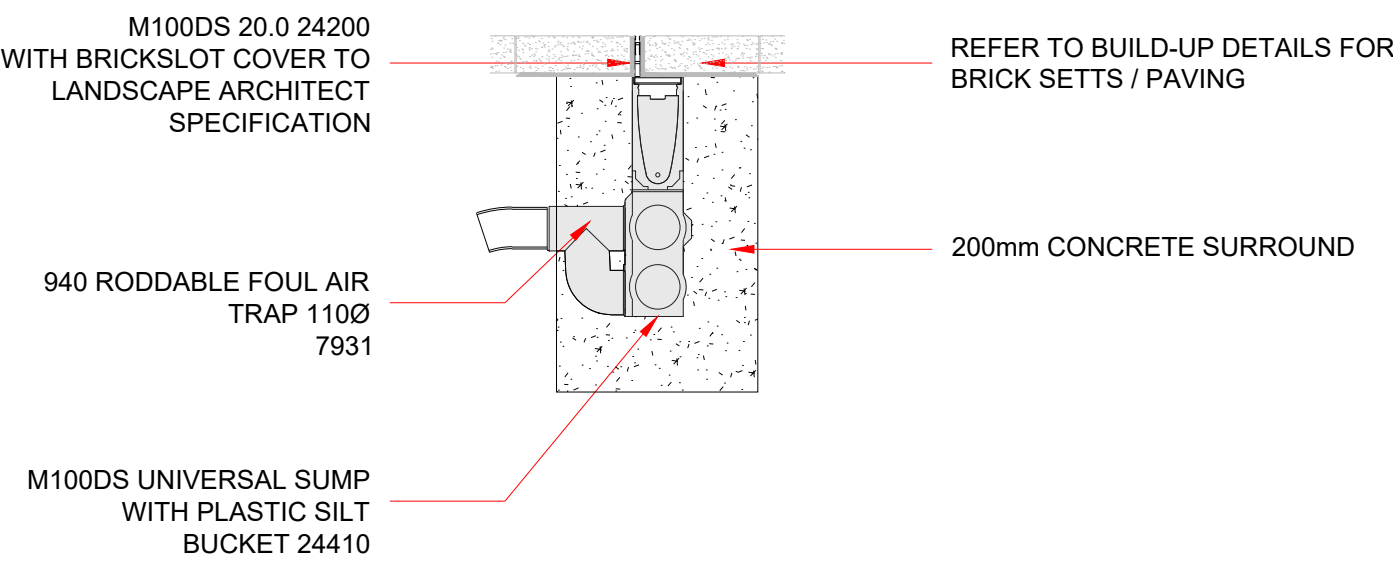
JOINTS FOR CONCRETE ENCASED PIPES

PIPE DIAMETER	Y minimum		MAXIMUM TRENCH WIDTH	L
	Y1 min.	Y2 min.		
100	100	200	700	18
150	100	200	750	18
200	100	200	800	18
225	100	200	825	18
300	100	200	925	18

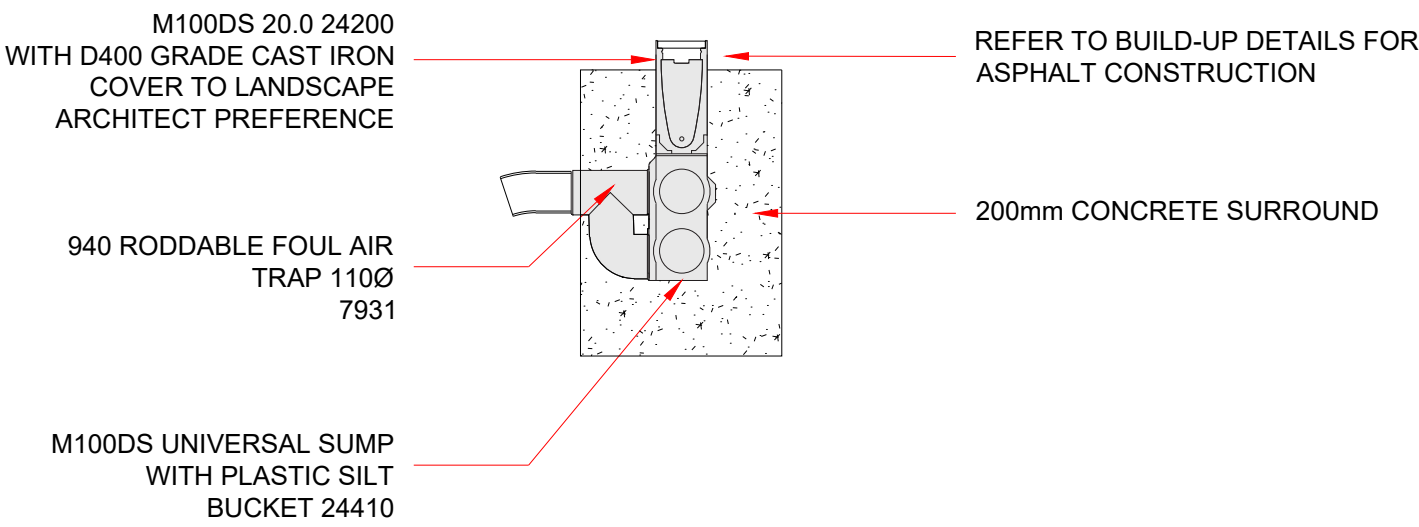
NOTES:

- DIMENSION Y1 SHALL BE USED UNLESS Y2 IS SPECIFIED OR IS DIRECTED BY THE ENGINEER.
- DIMENSION Y2 SHALL BE USED IN PLACE OF Y1 WHERE THE EXCAVATION IS IN ROCK OR IN MIXED SOILS CONTAINING ROCK BEDS, BOULDERS, LARGE FLINTS OR OTHER IRREGULAR HARD SPOTS.
- DIMENSION Y2 SHALL BE INCREASE BY 40mm FOR EACH ADDITIONAL 1.0m OF COVER IN EXCESS OF 5.0m.
- DIMENSION L IS THE WIDTH OF THE COMPRESSIBLE FILLER REQUIRED AT JOINTS IN CONCRETE PROTECTION TO PIPES.

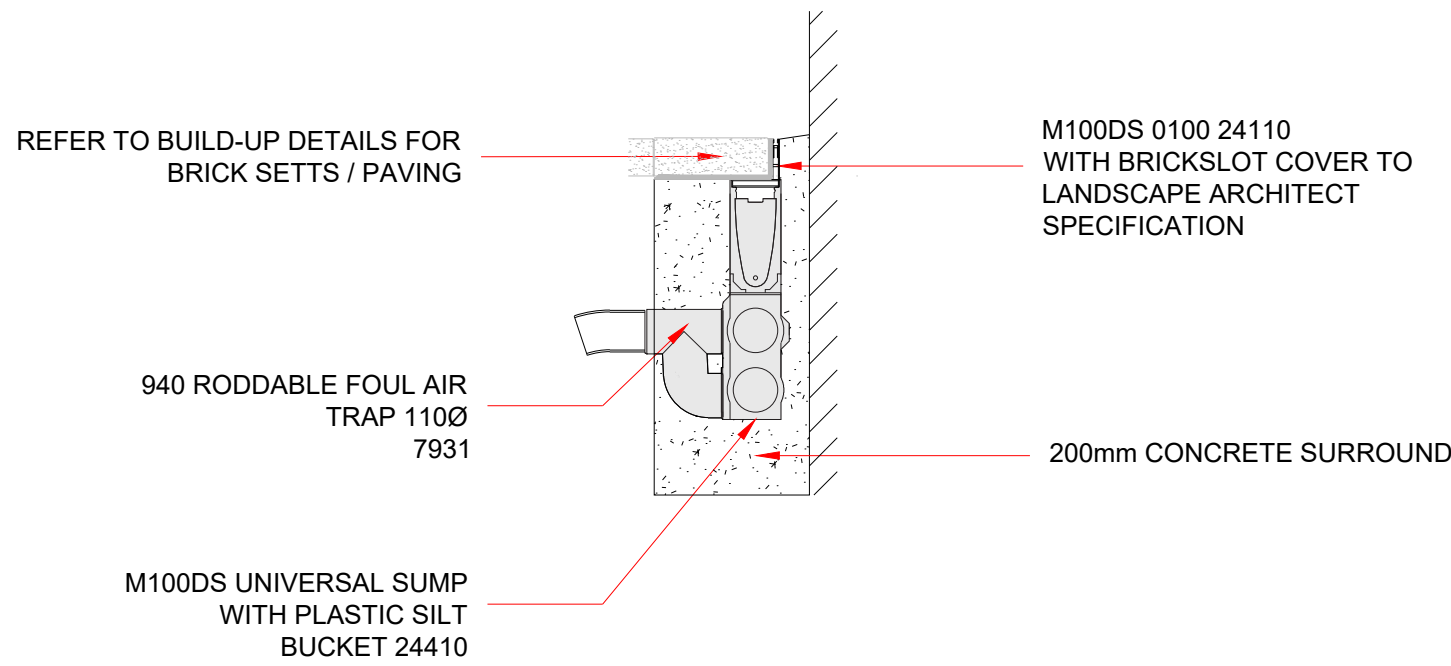
DIMENSIONS FOR PIPE BEDDING



LINEAR CHANNEL M100DS
BRICKSLOT CHANNEL TO ALL HARD
LANDSCAPED AREAS (NON-ROAD OR BUILDING
PERIMETER USAGE)



LINEAR CHANNEL M100DS
TO COACH AREA ONLY



LINEAR CHANNEL M100DS
TO BUILDING PERIMETER (DOOR THRESHOLD)

NOTES

GENERAL:

- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING THE APPROPRIATE STATUTORY UNDERTAKERS, PRIOR TO THE COMMENCEMENT OF THE WORKS, TO ESTABLISH THE EXACT POSITION OF THEIR PLANT, WHICH SHALL BE CONFIRMED BY HAND DUG TRIAL PITS.
- ALL WORKS SHALL BE UNDERTAKEN IN ACCORDANCE WITH WATER SERVICES ASSOCIATION, 'SEWERS FOR ADOPTION', 7th EDITION, DEPARTMENT OF TRANSPORTS 'SPECIFICATION FOR HIGHWAY WORKS' PUBLISHED BY HMSO AND TO THE SATISFACTION OF BUILDING REGULATIONS PART H.
- ALL CONCRETE AND CONCRETE PRODUCTS BELOW GROUND LEVEL SHALL BE SULPHATE RESISTING PORTLAND CEMENT CLASS GEN3 IN ACCORDANCE WITH BRE SPECIAL DIGEST 1.
- ALL PIPE CONNECTIONS SHALL BE MADE SOFFIT TO SOFFIT.
- THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO PROTECT THE DRAINAGE WORKS FOR THE DURATION OF THE CONTRACT.
- DRAINS TO BE CONSTRUCTED USING FLEXIBLY JOINTED VITRIFIED CLAY PIPES TO BS 65:1991 'SUPER STRENGTH' SPECIFICATION AND BS EN 295-1:1995 (HEP WORTH 'SUPERSELEVE' OR SIMILAR APPROVED) OR FLEXIBLY JOINTED CONCRETE PIPES TO BS 5911-1:2002 OR UPVC BUILDING DRAINAGE SYSTEM PIPE WORK TO BS EN 1401:2009, BEDDED AND BACK FILLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS, ALL TESTED IN ACCORDANCE WITH BS EN 1610:1998.
- PRIVATE FOUL WATER AND SURFACE WATER DRAINAGE IS TO BE CONSTRUCTED IN ACCORDANCE WITH THE BUILDING REGULATIONS PART H (BS 8301:1985), BS EN 752:2008 AND RELEVANT AGREEMENT CERTIFICATES, ALL TESTED IN ACCORDANCE WITH BS EN 1610:1998.
- ALL MANHOLE COVERS SHALL BE BADGED 'SW' FOR SURFACE WATER AND 'FW' FOR FOUL WATER ACCORDINGLY.
- GULLY POTS SHALL BE PROVIDED WITH A HOT DIP GALVANISED STOPPER AND CHAIN WITH A BAYONET TYPE FIXING WITH A 150mm Ø OUTLET PIPE.
- THE GULLY GRATING AND FRAME SHALL BE SET AT A LEVEL OF +46mm BELOW THE FINISHED GROUND LEVEL.
- ALL GULLY CONNECTIONS MUST BE AIR TESTED IN ACCORDANCE WITH CL 509 OF SHW.
- RIGID PIPES ENCASED IN CONCRETE SHALL HAVE A MOVEMENT JOINT CONSISTING OF 13mm COMPRESSIBLE BOARD AROUND THE SPIGOT NEXT TO THE SOCKET, EITHER AT EACH JOINT OR NOT EXCEEDING 5 METRE INTERVALS.
- CONCRETE COVER TO ANY OF THE PIPES MAY BE FORMED TO A RADIUS BATTER OR HORIZONTAL SURFACE.
- REINFORCED IN-SITU CONCRETE TO CL 1700 OF SHW, UNREINFORCED IN-SITU CONCRETE TO CL 2802 OF SHW.
- CEMENT MORTAR FOR BRICKWORK AND HAUNCHING TO MANHOLE COVERS AND FRAMES TO BE DESIGNATION (i) TO CL 2404 OF SHW.
- 'TOKSTRIP' SEALANT OR SIMILAR APPROVED TO BE USED IN ALL PRECAST JOINTS.

ISSUED FOR APPROVAL

Rev.	Description	Date	By
C5	ISSUED FOR APPROVAL	05.07.24	SK
C4	ISSUED FOR APPROVAL	01.08.22	SK



Job Title	PLOT H3 ACCOR TRIBE HOTEL			
Client	FORM SD			
1513-SPW-Z0-00-DR-C-6250 BELOW GROUND DRAINAGE TYPICAL DETAILS - SHEET 1				
Drawn	Date	Scale	Checked	CAD Filename
SK	06.01.22	NTS @ A1	SK	C-6250
Job No.	Drawing No.		Revision	
1513	C-6250		C5	

Refer to manhole schedule for cover type.

Mortar haunching to M.H. cover and frame refer to clause 5.6.7 of Sewers for Adoption 6th edition

See table 2.3 of sewers for adoption 6th edition

On manholes less than 1.5m diameter reducing slab not to be used and PC rings to continue up to cover slab.

In-situ concrete to be ST4 concrete mix(designed to BRE 363) and in accordance with BS8500/1/2006.

Lifting eyes in concrete rings to be pointed

High-strength concrete topping to be brought up to a dense, smooth face, neatly shaped and finished to all branch connections (minimum thickness 20mm)

Self-cleaning toe holes to be provided where channel exceeds 600mm wide

Inverts to be formed using channel pieces

2-4 Courses of class B engineering bricks in English bond, concrete blocks or precast concrete cover frame seating rings
Shaft diameter 900mm if no ladder or steps iron, otherwise 1200mm

Precast concrete manhole sections and cover slab to be bedded with mortar, proprietary bitumen or resin mastic sealant
Concrete surround 150mm thick

The bottom precast section to be built into base concrete minimum 75mm

Benching slope to be 1:10 to 1:30
Construction joint

Distance between top of pipe and underside of precast section to be minimum 50mm to 225mm to 300mm of pipe

COVER TO BE SEATED ON CONCRETE NIBS. ANY REQUIREMENTS FOR REINFORCEMENT OR TYING-IN OF NIBS TO STRUCTURAL SLAB TO BE SPECIFIED BY STRUCTURAL ENGINEER.

CONCRETE SLAB TO STRUCTURAL ENGINEER'S DETAILS.

ENCASEMENT TO PIPE BEDDING DETAILS
FLEXIBLE JOINT TO ROCKER PIPE

REFER TO STRUCTURAL ENGINEER'S DRAWINGS FOR DEPTH OF MANHOLE BASE.

ANY REQUIREMENTS FOR BLINDING AND HEAVE PROTECTION TO BE SPECIFIED BY STRUCTURAL ENGINEER.

COVER TO BE SEATED ON CONCRETE NIBS. ANY REQUIREMENTS FOR REINFORCEMENT OR TYING-IN OF NIBS TO STRUCTURAL SLAB TO BE SPECIFIED BY STRUCTURAL ENGINEER.

CONCRETE SLAB TO STRUCTURAL ENGINEER'S DETAILS.

HIGH-STRENGTH CONCRETE TOPPING TO BE BROUGHT UP TO A DENSE, SMOOTH FACE, NEATLY SHAPED AND FINISHED TO ALL BRANCH CONNECTIONS (MINIMUM THICKNESS 20mm)

REFER TO STRUCTURAL ENGINEER'S DRAWINGS FOR DEPTH OF MANHOLE BASE.

ANY REQUIREMENTS FOR BLINDING AND HEAVE PROTECTION TO BE SPECIFIED BY STRUCTURAL ENGINEER.

DEPTH OF COVER FRAME VARIES DEPENDING ON MANUFACTURER.

FLOOR BUILDUPS TO ARCHITECT'S SPECIFICATION

REFER TO MANHOLE SCHEDULE FOR COVER TYPE, DIMENSIONS AND LOAD GRADE.

REFER TO MANHOLE SCHEDULE FOR INTERNAL DIMENSIONS OF MANHOLES.

REFER TO BELOW GROUND DRAINAGE DRAWING FSD-Z0-B1-DR-C-6000 AND FSD-Z0-B1-DR-C-6001 FOR INCOMING AND OUTGOING PIPE INVERT LEVELS. INVERTS TO BE FORMED USING CHANNEL PIECES.

MAXIMUM 150mm. KEEP AS MINIMUM AS POSSIBLE

REFER TO STRUCTURAL ENGINEER'S DRAWINGS FOR THICKNESS OF MANHOLE WALLS.

Flexible Joints	
Pipe diameter	Max. length of rocker pipes
100 & 150 (All spigot)	300mm
150 - 600	625mm
675 - 900	1250mm

DEPTH OF COVER FRAME VARIES DEPENDING ON MANUFACTURER.

FLOOR BUILDUPS TO ARCHITECT'S SPECIFICATION

REFER TO MANHOLE SCHEDULE FOR COVER TYPE, DIMENSIONS AND LOAD GRADE.

REFER TO MANHOLE SCHEDULE FOR INTERNAL DIMENSIONS OF MANHOLES.

BENCHING TO BE 1:10 TO 1:30

REFER TO STRUCTURAL ENGINEER'S DRAWINGS FOR THICKNESS OF MANHOLE WALLS.

TYPICAL REINFORCED CONCRETE MANHOLE CHAMBER DETAIL FOR SURFACE WATER/ FOUL WATER MANHOLE CHAMBERS SCALE 1:20

Joint to be as close as possible to face of manhole to permit satisfactory joint and subsequent movement

Minimum width of benching for landing area to be 500mm

Note: opening to be located centrally over 900mm shaft and offset approximately 200mm for 1200mm diameter shaft with rungs/ladder

See clause 5.6.6.2 of sewers for adoption 6th edition for rocker pipe details

Minimum width of benching to be 225mm

Pipe joint with channel to be located minimum 100mm inside face of manhole

Typical Manhole Detail - Type A

Scale 1:20

Manhole cover and frame to BS EN 124:1994. For load category refer to manhole schedule.

150mm. Thick heavy duty reinforced concrete cover slab (B.S.5911) bedded with class m1 or m2 mortar or mastic sealant

Step irons or ladder To BS 1247. Max. 675mm from cover level to first step iron or ladder rung

Construction joint
Grade C20P concrete to base and benching

Refer to manhole schedule

Refer to manhole schedule

Class B engineering brickwork 4 courses max., 2 courses min. laid 215mm wide in English bond.

Precast concrete chamber sections
C20P Concrete surround 150mm. thick

Gravity drain

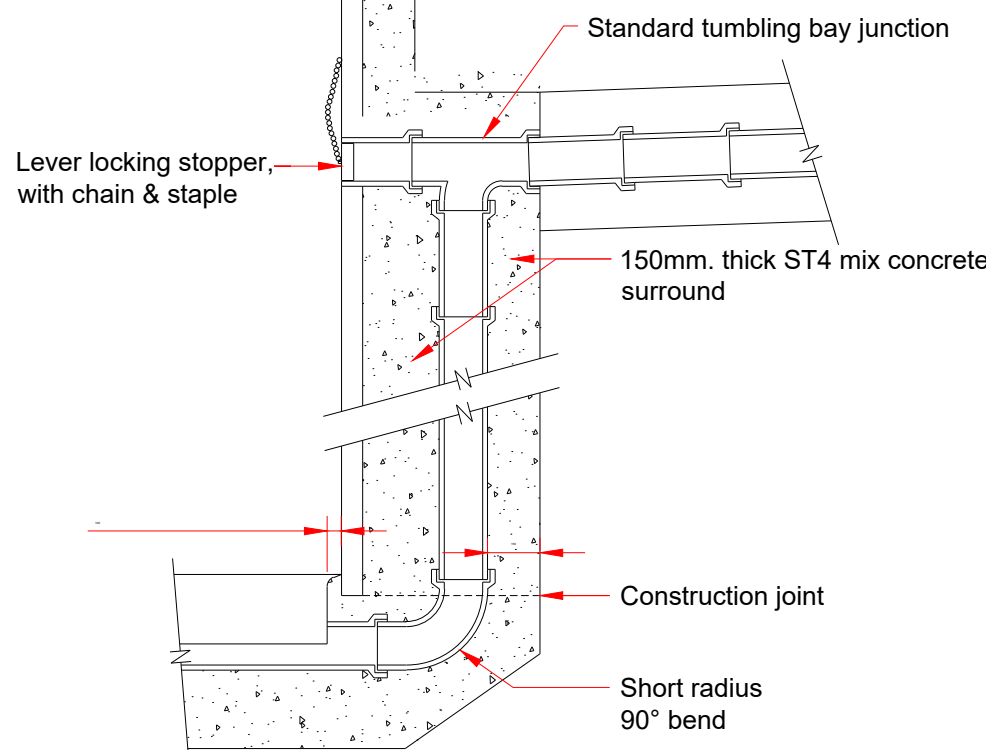
Gravity drain

450mm Sump below outlet invert

225mm

CATCHPIT MANHOLE

Scale 1:20



TYPICAL VERTICAL BACKDROP DETAIL

Scale 1:20

NOTES

GENERAL:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.

2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING THE APPROPRIATE STATUTORY UNDERTAKERS, PRIOR TO THE COMMENCEMENT OF THE WORKS, TO ESTABLISH THE EXACT POSITION OF THEIR PLANT, WHICH SHALL BE CONFIRMED BY HAND DUG TRIAL PITS.

3. ALL WORKS SHALL BE UNDERTAKEN IN ACCORDANCE WITH WATER SERVICES ASSOCIATION, 'SEWERS FOR ADOPTION', 7th EDITION, DEPARTMENT OF TRANSPORTS 'SPECIFICATION FOR HIGHWAY WORKS' PUBLISHED BY HMSO AND TO THE SATISFACTION OF BUILDING REGULATIONS PART H.

4. ALL CONCRETE AND CONCRETE PRODUCTS BELOW GROUND LEVEL SHALL BE SULPHATE RESISTING PORTLAND CEMENT CLASS GEN3 IN ACCORDANCE WITH BRE SPECIAL DIGEST 1.

5. ALL PIPE CONNECTIONS SHALL BE MADE SOFFIT TO SOFFIT.

6. THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO PROTECT THE DRAINAGE WORKS FOR THE DURATION OF THE CONTRACT.

7. DRAINS TO BE CONSTRUCTED USING FLEXIBLY JOINTED VITRIFIED CLAY PIPES TO BS 651991 'SUPER STRENGTH' SPECIFICATION AND BS EN 295-1:1995 (HEPWRTH SUPERSELEVE OR SIMILAR APPROVED) OR FLEXIBLY JOINTED CONCRETE PIPES TO BS 5911-1:2002 OR UPVC BUILDING DRAINAGE SYSTEM PIPE WORK TO BS EN 1401:2009, BEDDED AND BACK FILLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS, ALL TESTED IN ACCORDANCE WITH BS EN 1610:1998.

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9. ALL MANHOLE COVERS SHALL BE BADGED 'SW' FOR SURFACE WATER AND 'FW' FOR FOUL WATER ACCORDINGLY.

10. GULLY POTS SHALL BE PROVIDED WITH A HOT DIP GALVANISED STOPPER AND CHAIN WITH A BAYONET TYPE FIXING WITH A 150mmØ OUTLET PIPE.

11. THE GULLY GRATING AND FRAME SHALL BE SET AT A LEVEL OF +46mm BELOW THE FINISHED GROUND LEVEL.

12. ALL GULLY CONNECTIONS MUST BE AIR TESTED IN ACCORDANCE WITH CL 509 OF SHW.

13. RIGID PIPES ENCASED IN CONCRETE SHALL HAVE A MOVEMENT JOINT CONSISTING OF 13mm COMPRESSIBLE BOARD AROUND THE SPIGOT NEXT TO THE SOCKET, EITHER AT EACH JOINT OR NOT EXCEEDING 5 METRE INTERVALS.

14. CONCRETE COVER TO ANY OF THE PIPES MAY BE FORMED TO A RADIUS BATTER OR HORIZONTAL SURFACE.

15. REINFORCED IN-SITU CONCRETE TO CL 1700 OF SHW, UNREINFORCED IN-SITU CONCRETE TO CL 2802 OF SHW.

16. CEMENT MORTAR FOR BRICKWORK AND HAUNCHING TO MANHOLE COVERS AND FRAMES TO BE DESIGNATION (i) TO CL 2404 OF SHW.

17. TOKSTRIP SEALANT OR SIMILAR APPROVED TO BE USED IN ALL PRECAST JOINTS.

ISSUED FOR APPROVAL

Rev.	Description	Date	By
C5	ISSUED FOR APPROVAL	05.07.24	SK
C4	ISSUED FOR APPROVAL	01.08.22	SK



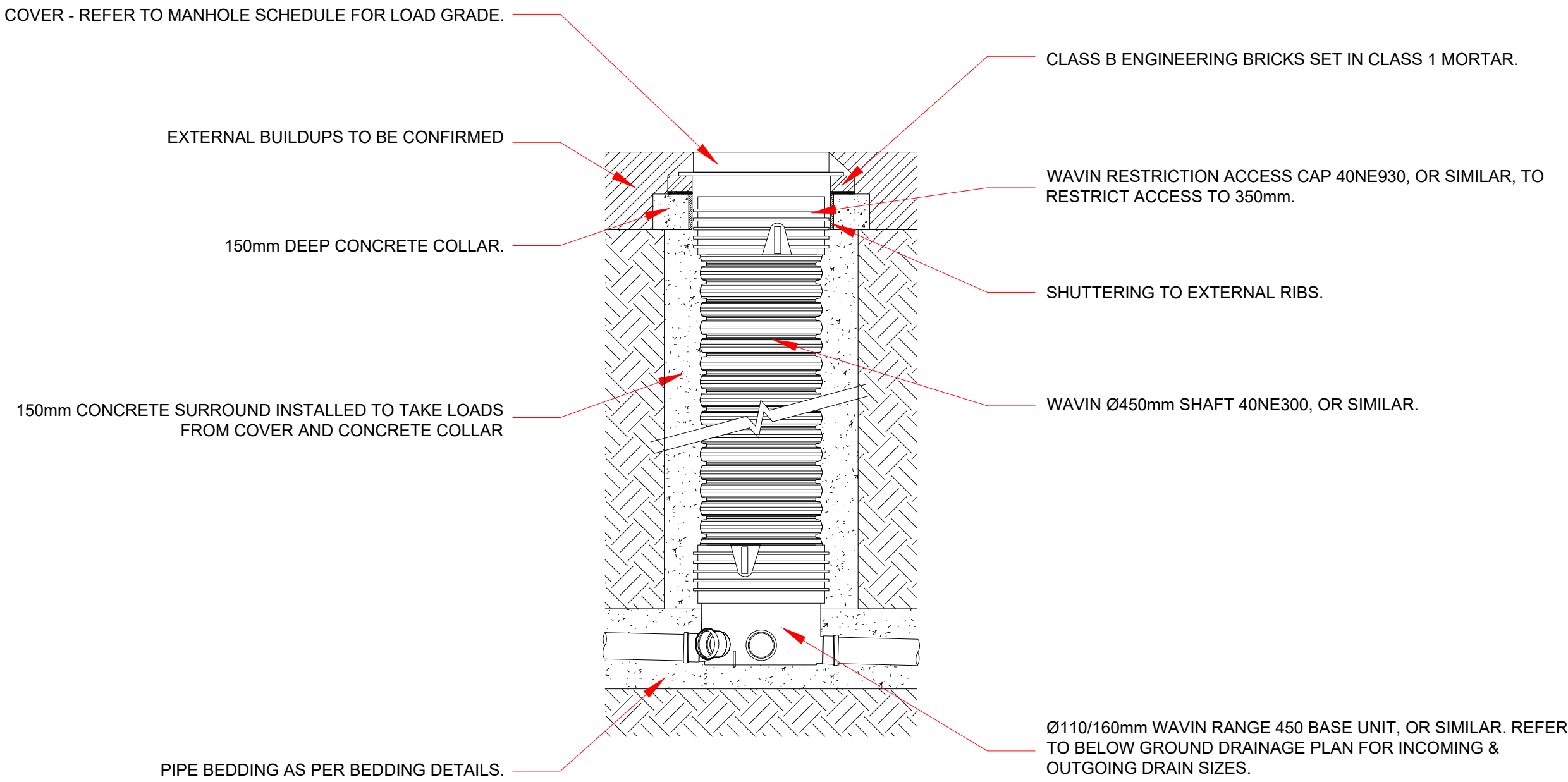
Job Title **PLOT H3 ACCOR TRIBE HOTEL**

Client **FORM SD**

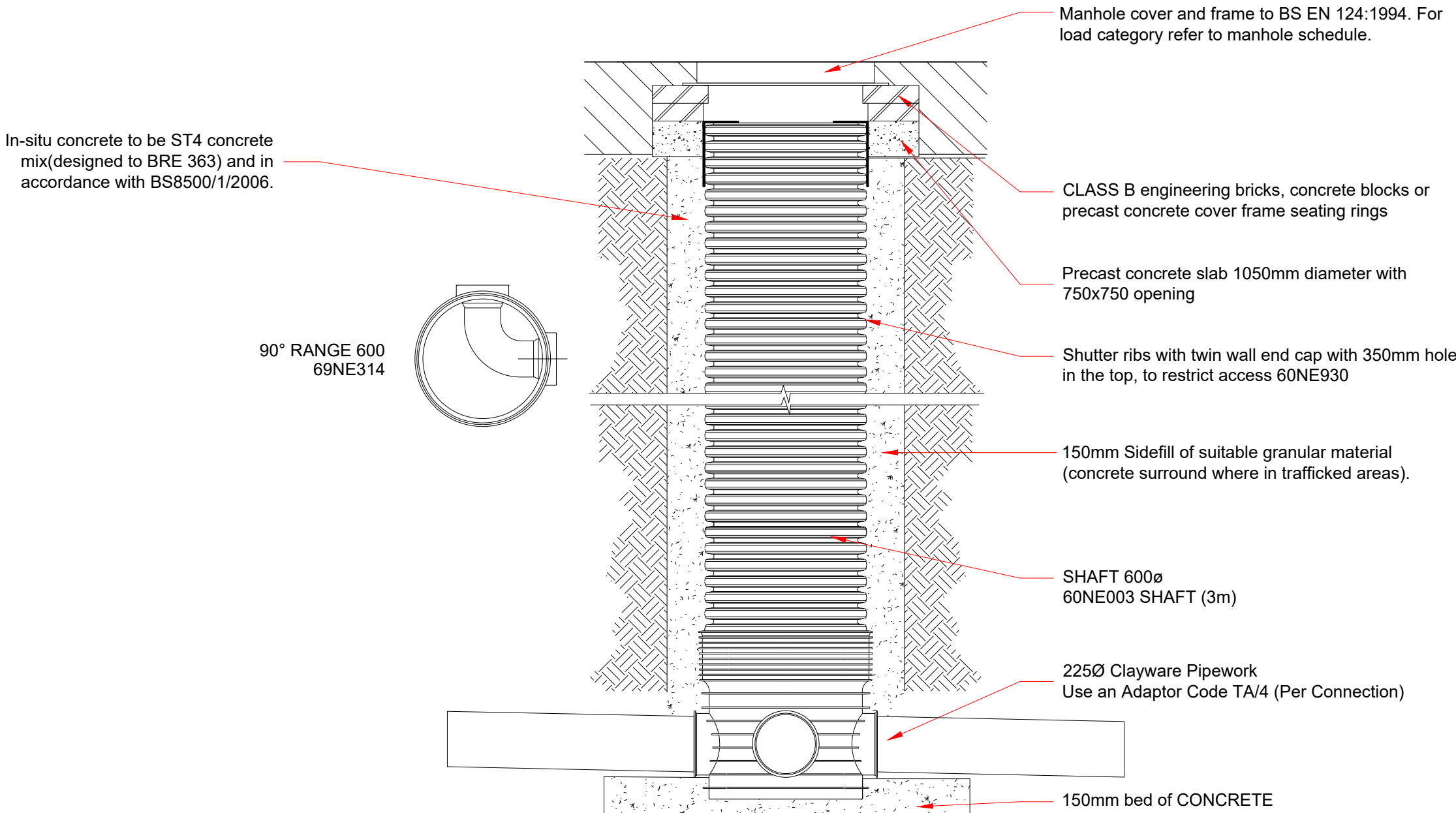
**1513-SPW-Z0-00-DR-C-6251
BELOW GROUND DRAINAGE
TYPICAL DETAILS - SHEET 2**

Drawn	Date	Scale	Checked	CAD Filename
SK	06.01.22	NTS @ A1	SK	C-6251

Job No.	Drawing No.	Revision
1513	C-6251	C5



WAVIN RANGE 450 IC
POLYPROPYLENE INSPECTION CHAMBER
MAXIMUM INSTALLATION DEPTH: 3.0m



TYPICAL 600Ø PPIC
INSPECTION CHAMBER DETAIL
1.2m - 5m DEPTH TO INVERT
SCALE 1:20

NOTES

- GENERAL:
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 2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING THE APPROPRIATE STATUTORY UNDERTAKERS, PRIOR TO THE COMMENCEMENT OF THE WORKS, TO ESTABLISH THE EXACT POSITION OF THEIR PLANT, WHICH SHALL BE CONFIRMED BY HAND DUG TRIAL PITS.
 3. ALL WORKS SHALL BE UNDERTAKEN IN ACCORDANCE WITH WATER SERVICES ASSOCIATION, 'SEWERS FOR ADOPTION', 7th EDITION, DEPARTMENT OF TRANSPORTS 'SPECIFICATION FOR HIGHWAY WORKS' PUBLISHED BY HMSO AND TO THE SATISFACTION OF BUILDING REGULATIONS PART H.
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 11. THE GULLY GRATING AND FRAME SHALL BE SET AT A LEVEL OF +/6mm BELOW THE FINISHED GROUND LEVEL.
 12. ALL GULLY CONECTIONS MUST BE AIR TESTED IN ACCORDANCE WITH CL. 509 OF SHW.
 13. RIGID PIPES ENCASED IN CONCRETE SHALL HAVE A MOVEMENT JOINT CONSISTING OF 13mm COMPRESSIBLE BOARD AROUND THE SPIGOT NEXT TO THE SOCKET, EITHER AT EACH JOINT OR NOT EXCEEDING 5 METRE INTERVALS.
 14. CONCRETE COVER TO ANY OF THE PIPES MAY BE FORMED TO A RADIUS BATTER OR HORIZONTAL SURFACE.
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 16. CEMENT MORTAR FOR BRICKWORK AND HAUNCHING TO MANHOLE COVERS AND FRAMES TO BE DESIGNATION (i) TO CL. 2404 OF SHW.
 17. 'TOKSTRIP' SEALANT OR SIMILAR APPROVED TO BE USED IN ALL PRECAST JOINTS.

ISSUED FOR
APPROVAL

C4	ISSUED FOR CONSTRUCTION	05.07.24	SK
Rev.	Description	Date	By

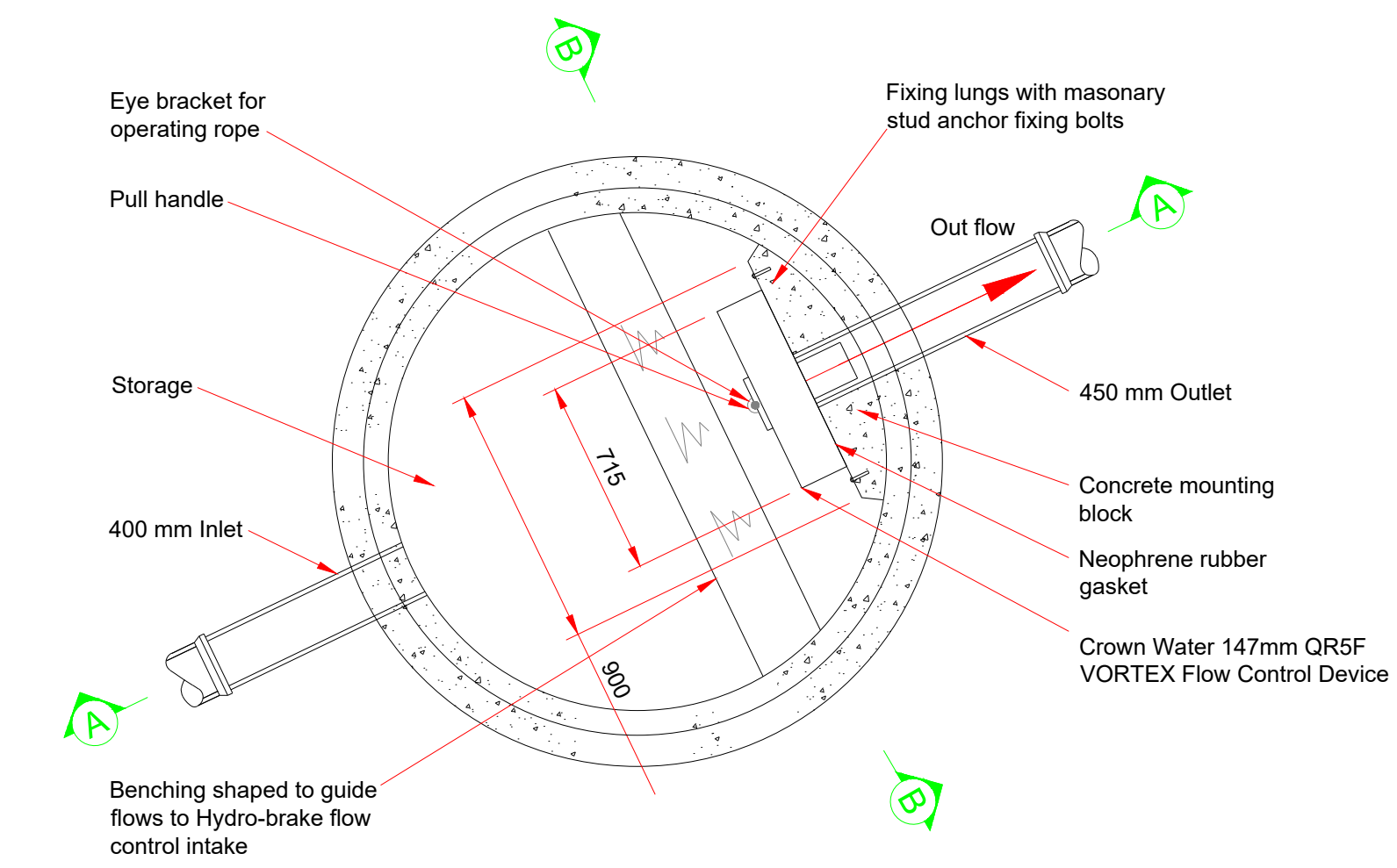
 <div>SPILLWAYS</div> <div>WWW.SPILLWAYS.CO.UK T: 0203 355 5544 E: SANJAY@SPILLWAYS.CO.UK STC HOUSE, 7 ELMFIELD ROAD BROMLEY BR1 1LT</div>

Job Title	PLOT H3 ACCOR TRIBE HOTEL
Client	FORM SD

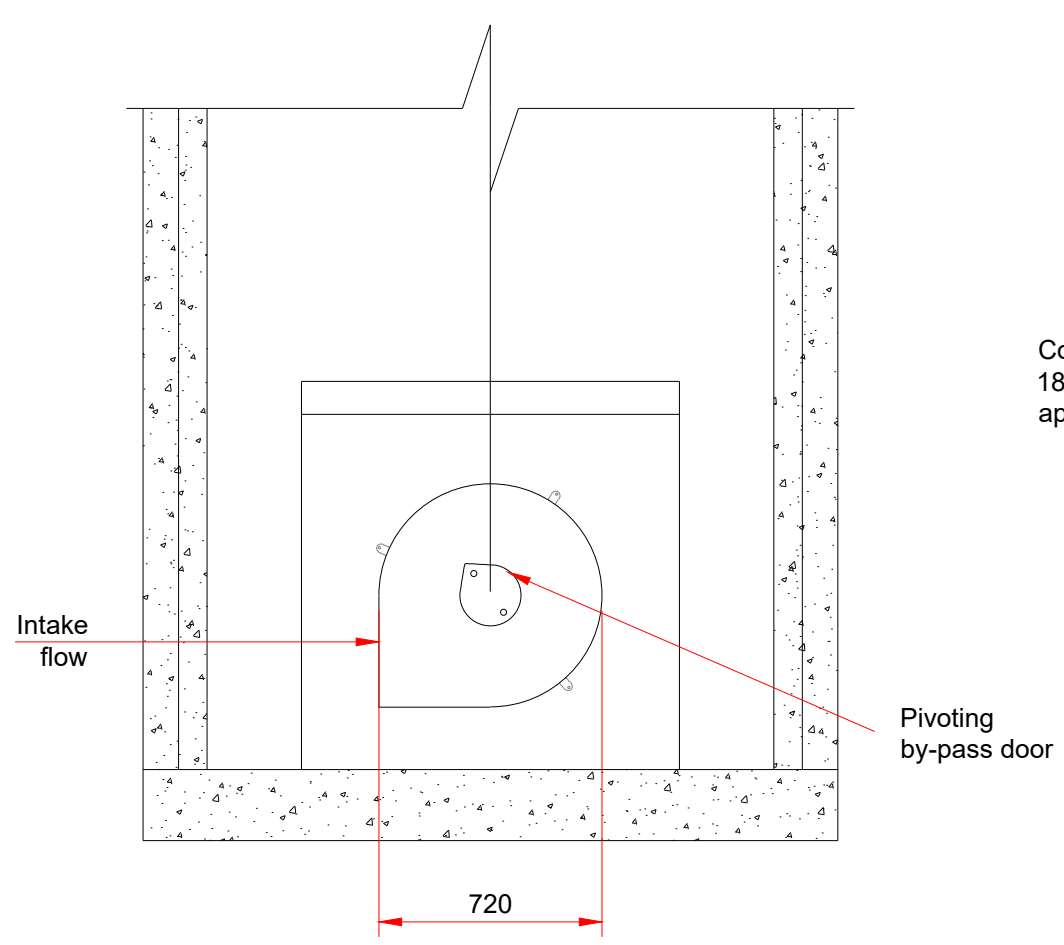
1513-SPW-Z0-00-DR-C-6252 BELOW GROUND DRAINAGE TYPICAL DETAILS - SHEET 3				
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SK	06.01.22	1:20 @ A1	SK	C-6252

Job No.	Drawing No.	Revision
1513	C-6252	C4

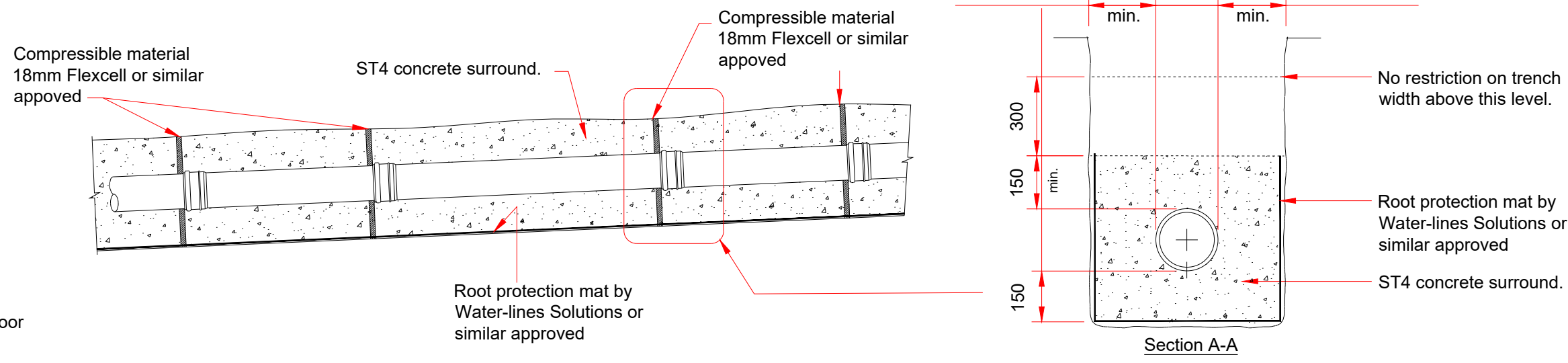


Plan



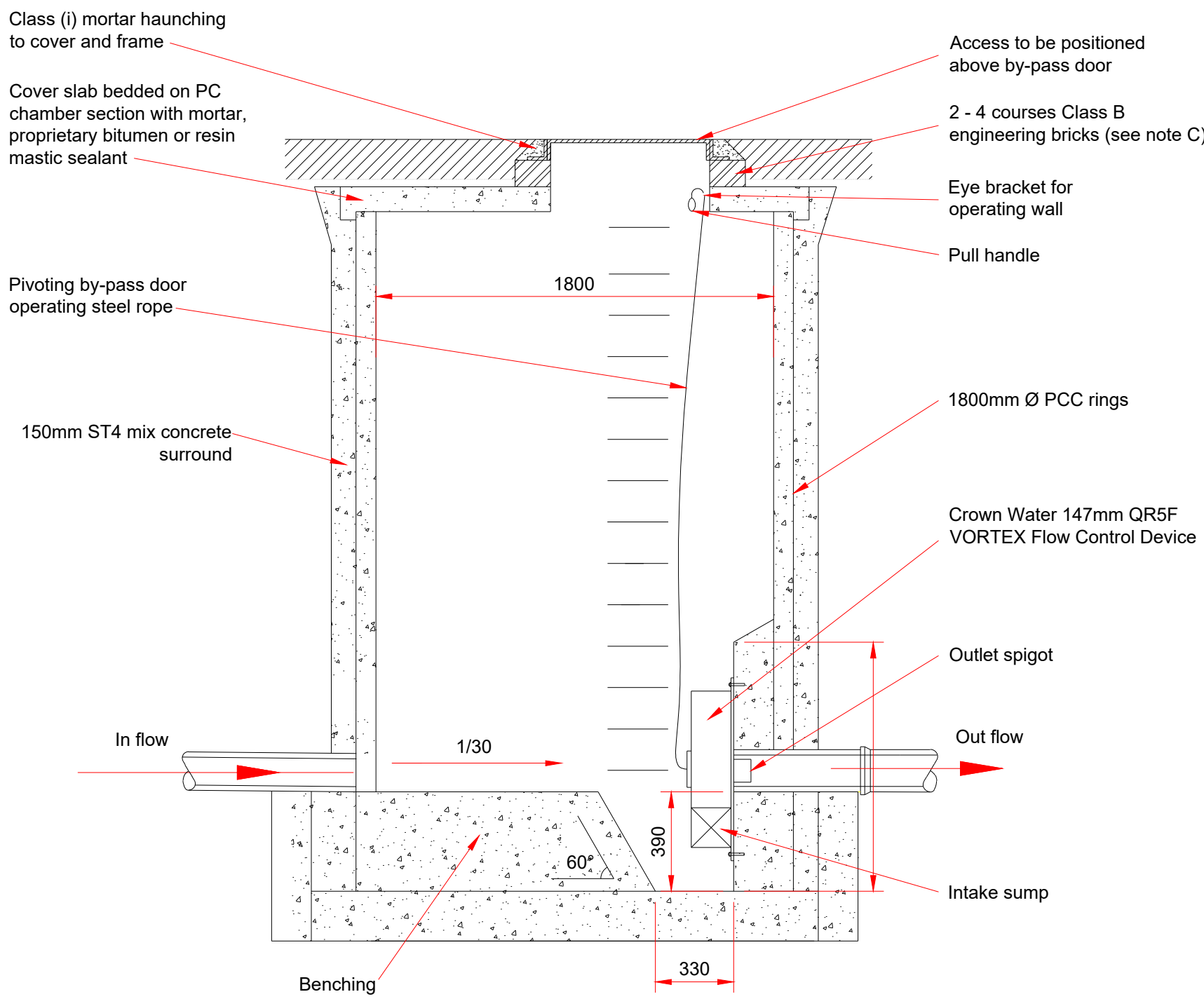
Section B - B

Refer to drainage drawing for discharge rate and operating head height



Pipe Protection Against Root Intrusion

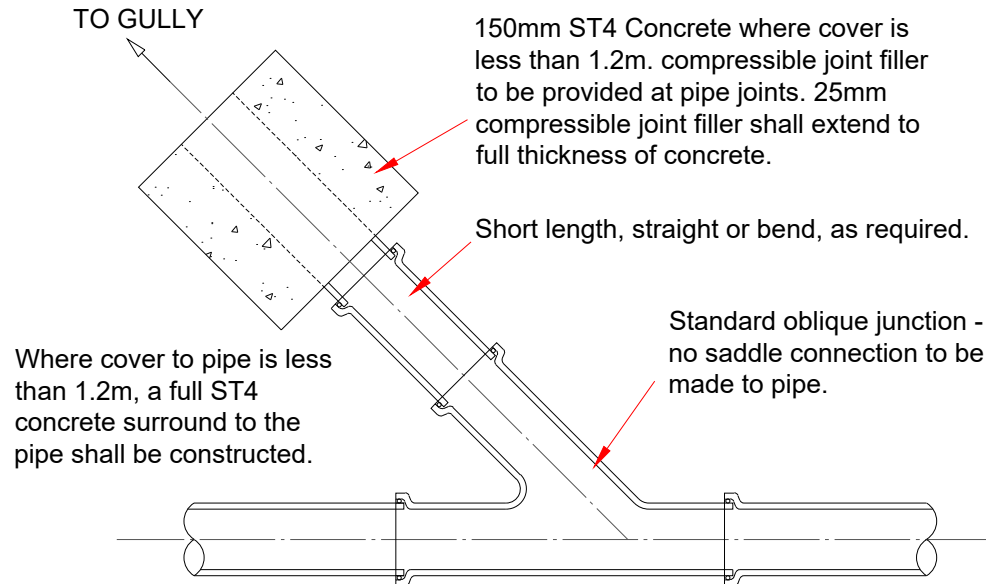
(Flexible joints at joint of pipes)
Scale NTS



Section A - A

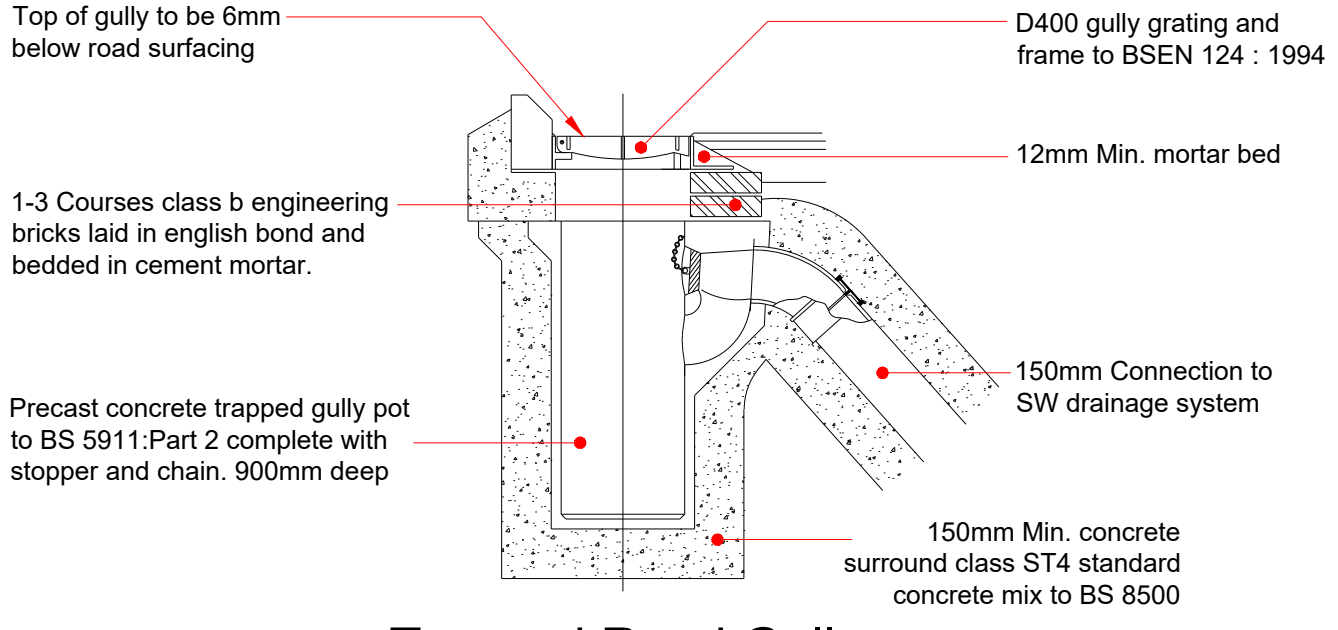
'Hydrobrake' Catchpit manhole Detail

Scale NTS



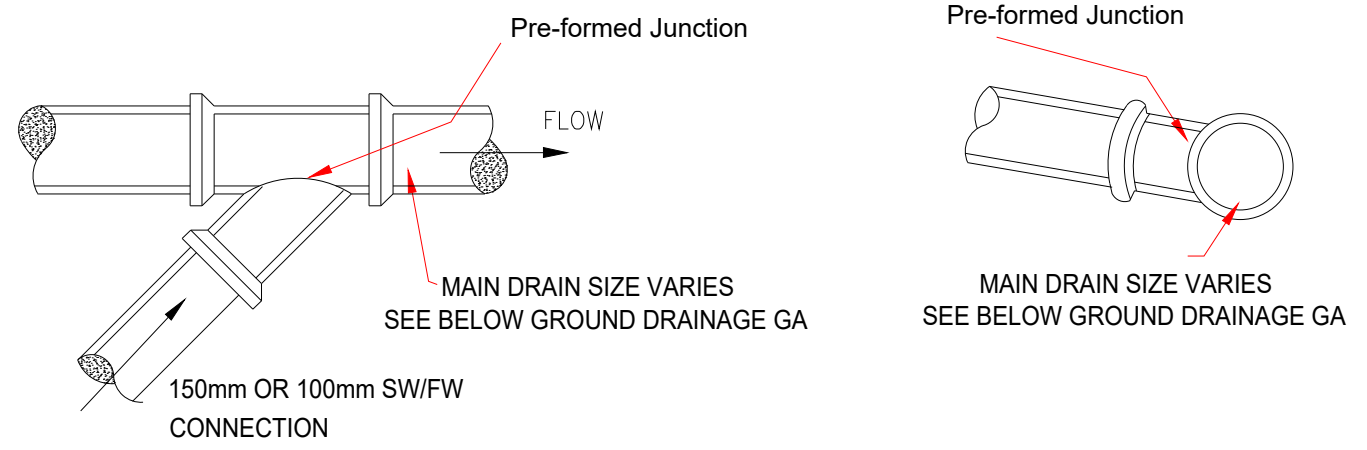
Gully Connection To New Pipe

Scale 1:20

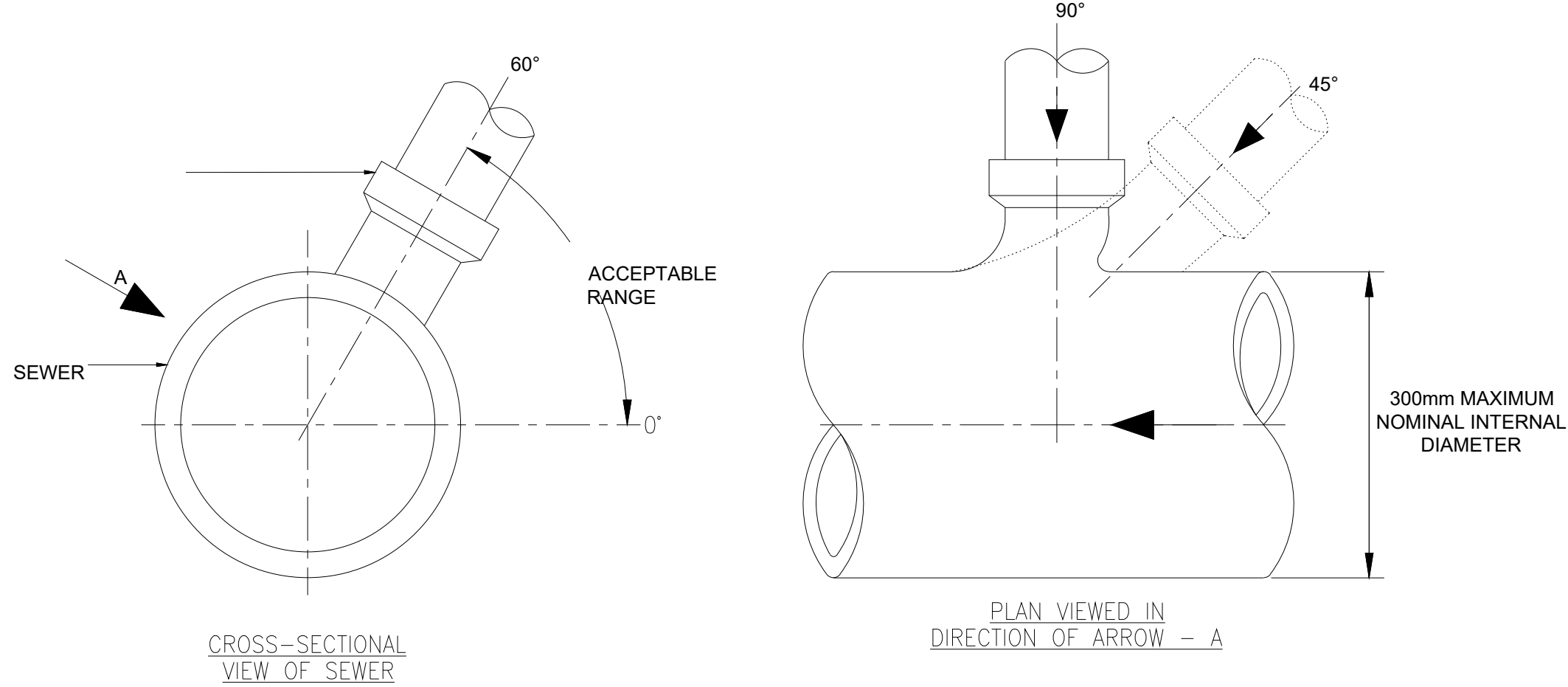


Trapped Road Gully

Scale 1:20



Typical 'Y' Junction Connection



CONNECTIONS TO SEWER

NOTES

GENERAL:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.

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6. THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO PROTECT THE DRAINAGE WORKS FOR THE DURATION OF THE CONTRACT.

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11. THE GULLY GRATING AND FRAME SHALL BE SET AT A LEVEL OF +46mm BELOW THE FINISHED GROUND LEVEL.

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16. CEMENT MORTAR FOR BRICKWORK AND HAUNCHING TO MANHOLE COVERS AND FRAMES TO BE DESIGNATION (i) TO CL 2404 OF SHW.

17. 'TOKSTRIP' SEALANT OR SIMILAR APPROVED TO BE USED IN ALL PRECAST JOINTS.

ISSUED FOR APPROVAL

C3	ISSUED FOR APPROVAL	05.07.24	SK
C2	ISSUED FOR APPROVAL	01.08.22	SK
C1	ISSUED FOR APPROVAL	27.06.22	SK
Rev.	Description	Date	By



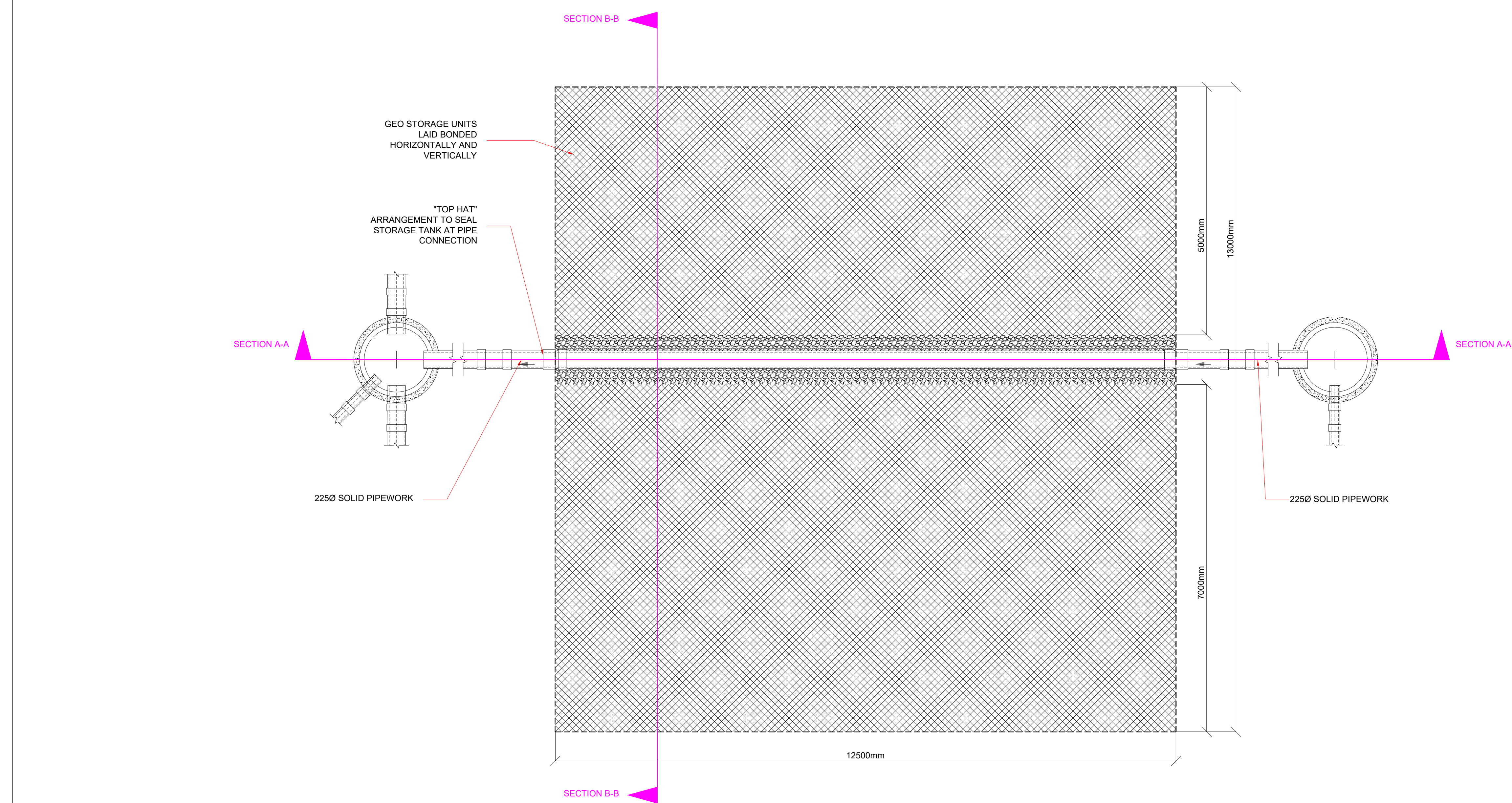
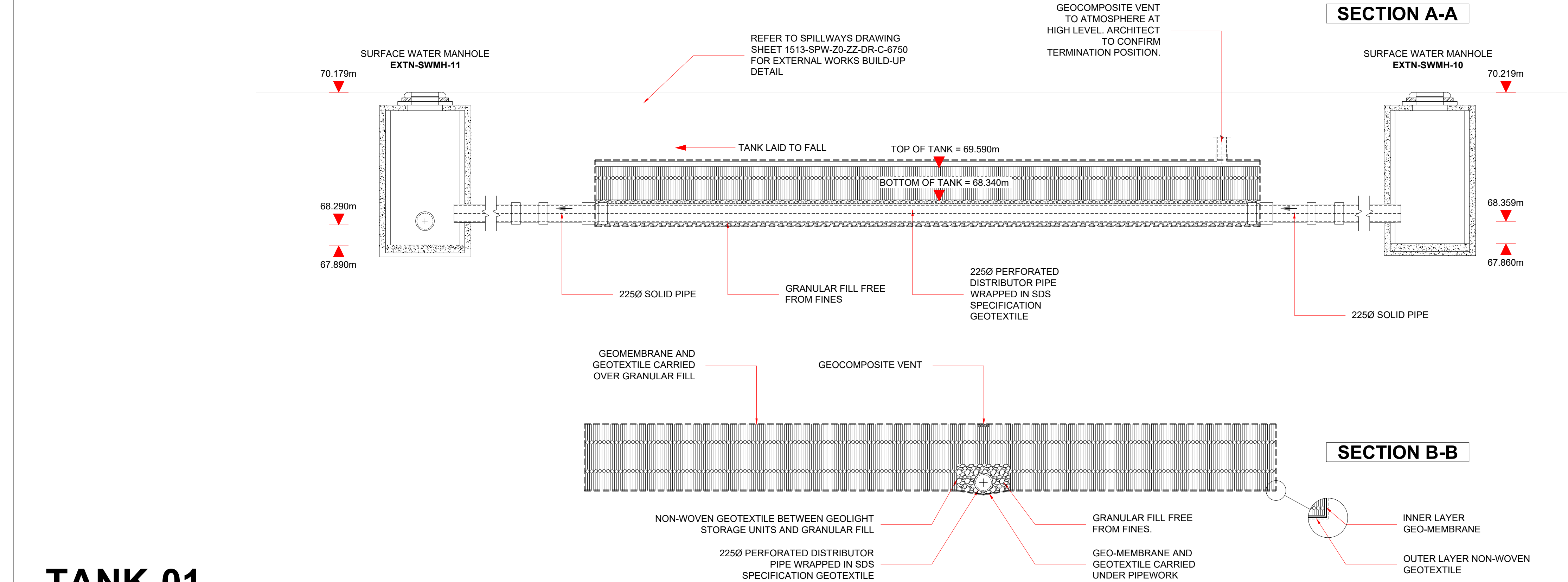
Job Title **PLOT H3 ACCOR TRIBE HOTEL**

Client **FORM SD**

1513-SPW-Z0-00-DR-C-6253
BELOW GROUND DRAINAGE
TYPICAL DETAILS - SHEET 4

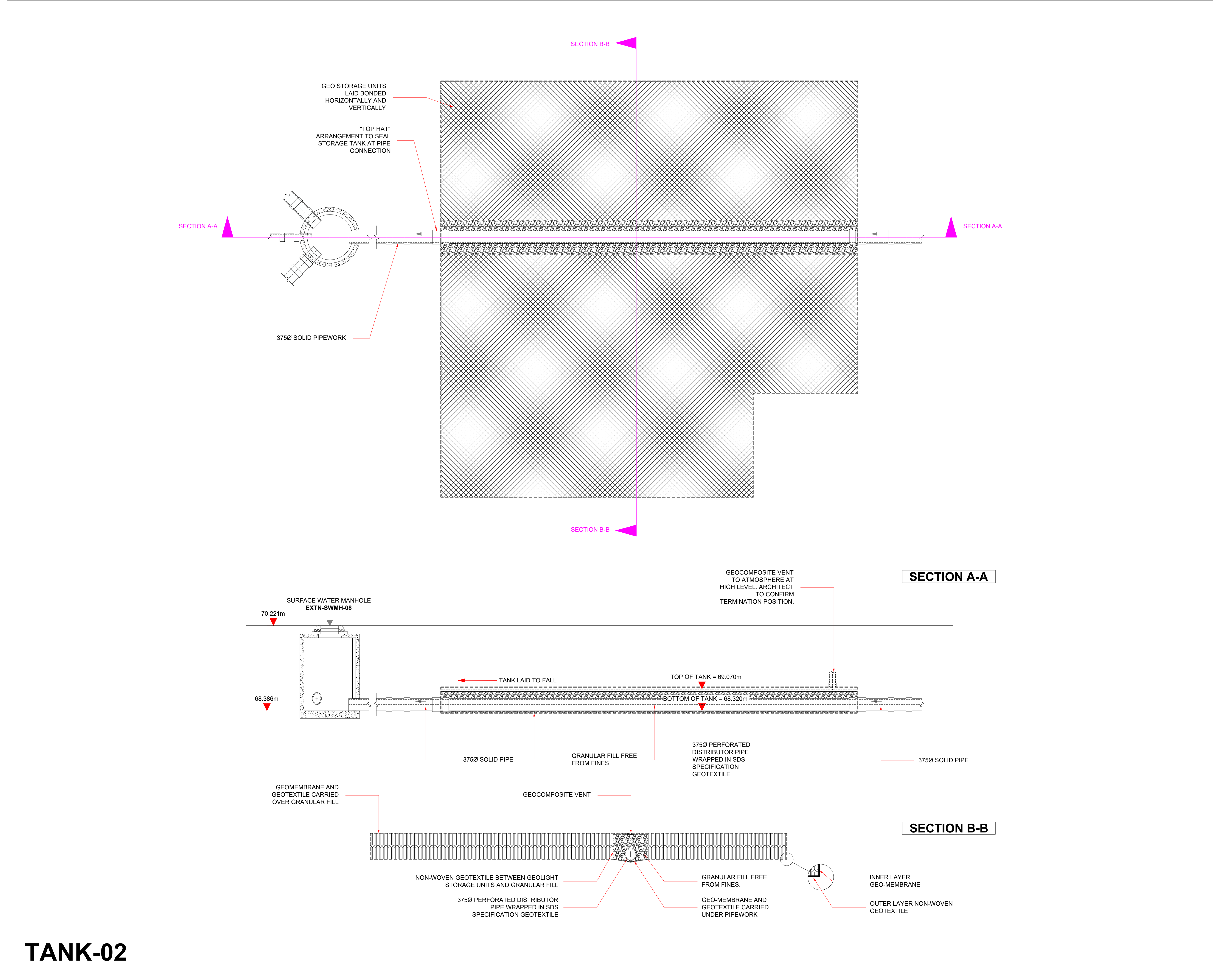
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SK	06.01.22	1:20 @ A1	SK	C-6253

Job No.	Drawing No.	Revision
1513	C-6253	C3



TANK-01

NOTES				
GENERAL:				
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.				
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16. CEMENT MORTAR FOR BRICKWORK AND HAUNCHING TO MANHOLE COVERS AND FRAMES TO BE DESIGNATION (i) TO CL. 2404 OF SHW.				
17. TOKSTRIP SEALANT OR SIMILAR APPROVED TO BE USED IN ALL PRECAST JOINTS.				
ISSUED FOR AS-BUILT INFORMATION				
C4	ISSUED FOR AS-BUILT INFORMATION	23.08.24	SK	
Rev.	Description	Date	By	
<div><div></div><div><p>WWW.SPILLWAYS.CO.UK T: 0203 355 5544 E: SANJAY@SPILLWAYS.CO.UK STC HOUSE, 7 ELMFIELD ROAD BROMLEY BR1 1LT</p></div></div>				
Job Title PLOT H3 ACCOR TRIBE HOTEL				
Client FORM SD				
1513-SPW-Z0-00-DR-C-6254 BELOW GROUND DRAINAGE TYPICAL DETAILS - SHEET 5				
Drawn	Date	Scale	Checked	CAD Filename
SK	06.01.22	1:20 @ A1	SK	C-6254
Job No.	Drawing No.		Revision	
1513	C-6254		C4	



TANK-02

NOTES

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ISSUED FOR AS-BUILT INFORMATION

C4	ISSUED FOR AS-BUILT INFORMATION	23.08.24	SK
Rev.	Description	Date	By



WWW.SPILLWAYS.CO.UK
T: 0203 355 5544
E: SANJAY@SPILLWAYS.CO.UK
STC HOUSE, 7 ELMFIELD ROAD
BROMLEY BR1 1LT

Job Title

PLOT H3 ACCOR TRIBE HOTEL

Client

FORM SD

1513-SPW-Z0-00-DR-C-6255

BELOW GROUND DRAINAGE

TYPICAL DETAILS - SHEET 6

Drawn	Date	Scale	Checked	CAD Filename
SK	06.01.22	1:20 @ A1	SK	C-6255
Job No.	1513	Drawing No.	C-6255	Revision
				C4

SPILLWAYS LIMITED 2014

APPENDIX C – Specialist Product Details

SDS

Water
Infrastructure
Systems

INNOVATORS IN
WATER TECHNOLOGY

SDS GEOLight®

Stormwater Management System



SDS GEOLight® is an ultra lightweight honeycombed modular structure, made from recycled PVC, that provides an underground storage facility for the application of stormwater attenuation or infiltration.

SDS
Water
Infrastructure
Systems

Stormwater Management

The Environment Agency is keen to promote the wider use of sustainable drainage systems, which reduce the impact of surface water runoff. There are two main ways of storing surface water for stormwater management:

- Stormwater attenuation tanks
- Soakaway infiltration systems

Stormwater Attenuation Systems

This consists of underground water storage facilities that hold excess water during periods of peak rainfall.

The stored water is gradually released in a controlled manner into the surface water drainage system or directly into watercourses, reducing the risk of upstream and downstream flooding.

Soakaway Infiltration Systems

Soakaways are designed to store surface water runoff until it can be gradually absorbed by the surrounding ground.

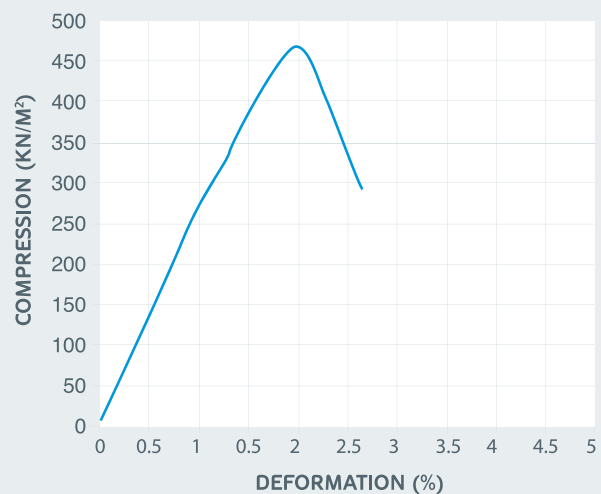
SDS GEOLight® – an efficient and economic solution for stormwater management.

SDS GEOLight® Attenuation

SDS GEOLight® has been specifically designed to form underground water storage reservoirs in stormwater management schemes. Its honeycombed structure gives it certain unique characteristics that make it ideal for this purpose:

- The high void rate (95%) of GEOLight® means that the maximum volume of water is stored in the minimum volume of storage unit.
- High compressive strength. GEOLight® is available in two strengths as standard: 200 and 400kN/m². Note: Higher compressive strengths available from 600 to 1000 kN/m². The graph on the right shows the results of a compression test, where samples of GEOLight® 400 were compressed at the rate of 1mm per minute. The deformation at 400kN/m² is about 1.6%.

RESULTS OF COMPRESSION TEST ON SDS GEOLIGHT® 400



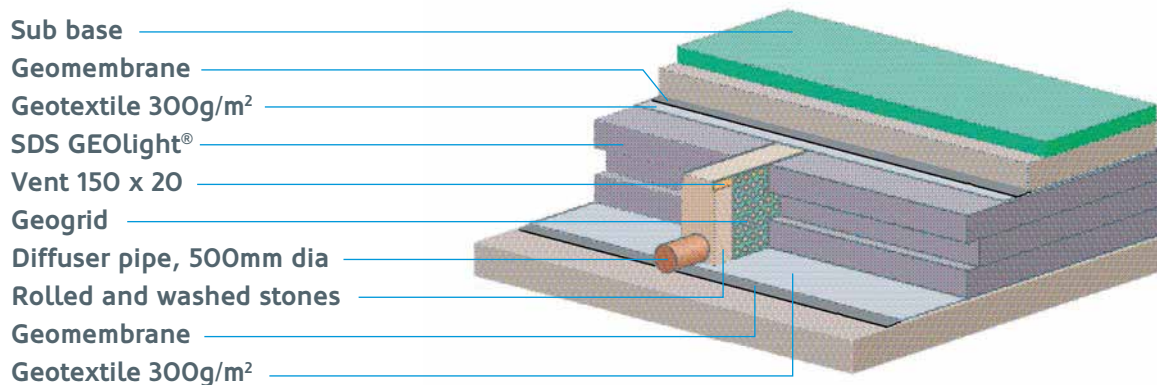
The GEOLight® Stormwater Attenuation System consists of two manholes (inspection chambers) connected by a length of perforated distribution pipe which feeds the stormwater storage reservoirs on either side formed from GEOLight®.

The distribution pipe is normally from 225mm up to 500mm diameter, generally covered in a trench that is filled with draining material such as 15/25 clean graded stone, free from fines.

The reservoirs and distribution pipe are wrapped in a waterproof membrane, such as butyl, to prevent seepage of water into the surrounding ground. The top of each GEOLight® reservoir has a vent which is connected back to the upstream manhole.

A geotextile or 10mm mesh geogrid is laid between the distribution pipe and GEOLight® to prevent the GEOLight® units being clogged by the draining materials.

SDS GEOLight® Attenuation



How does it work?

- 1. In normal conditions, water enters a back drop manhole. This is the upstream manhole and any silt or sediment will collect in the bottom of the chamber. The water then flows along the distribution pipe into the downstream manhole. The upstream pipework is sized to cope with normal flow conditions. The distribution pipe and attenuation tank are sized to cope with storm conditions. The outflow pipe is sized to cope with the permissible discharge.
- 2. In storm conditions the flow restrictor (vortex flow control or orifice plate) in the downstream manhole limits the amount of water flowing out of the manhole. This causes the water level in the distribution pipe to rise and water to spill into the GEOLight® reservoirs on either side. As the water level rises in the reservoirs, air is forced out of the high level vents into the upstream manhole.

- 3. Once the storm has passed, the water level in the GEOLight® reservoirs gradually falls as water passes through the flow restrictor in the downstream manhole. The vents now allow air to return into the GEOLight® reservoirs. Gradually the reservoirs empty. The flow restrictor prevents excess surges of flood water to pass downstream and uses the storage reservoirs to store the water for the period of the storm.

Calculating the storage capacity

The storage capacity of the GEOLight® reservoirs is determined by the maximum outflow permitted, (set by the water company or Environment Agency), the impermeable area of the site and the rainfall return period – normally 1 in 30 years, but again can be dictated by the water company. A full design service, including calculations, can be supplied via a third party consultant.

Please contact SDS for details.

Other uses

The water storage ability of SDS GEOLight® lends itself to a number of other uses:

- Water recycling combines with irrigation systems – this is increasingly popular: GEOLight® is used to retain stormwater which is then pumped as required to a network of standpipes for irrigation.
- Drainage channels – the natural permeability of GEOLight® lends itself for use as an underground drainage channel that collects and drains away groundwater.
- Pollution control – improved water runoff quality. When used in combination with oil / petrol separators, GEOLight® can replenish groundwater without the risk of contamination from oil, chemicals or suspended solids.
- To form lightweight embankments (slope stabilisation) – GEOLight® can be used to quickly form the base of embankments that only weigh a fraction of earth embankments.

Stormwater Attenuation System

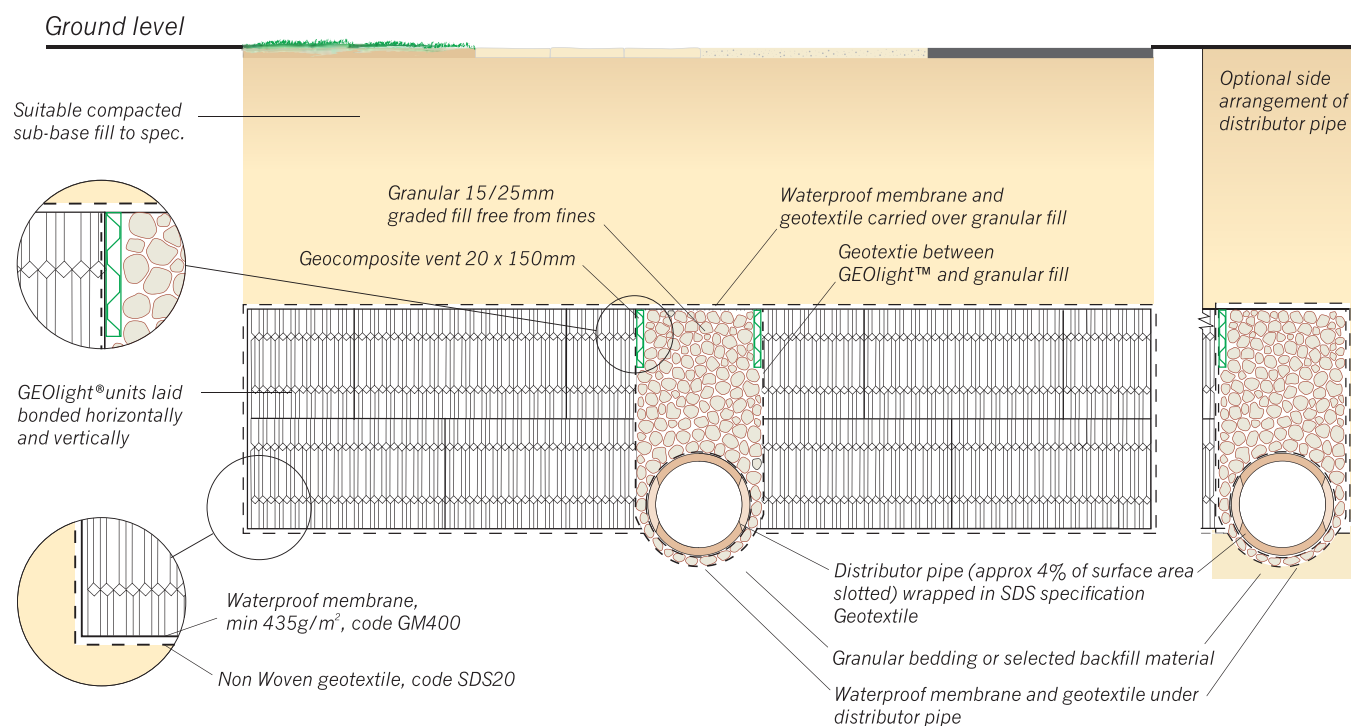
Design Details

The details on these two pages illustrate the construction of a typical SDS GEOLight® Stormwater Attenuation System. The length and height of the GEOLight® reservoirs is determined by the quantity of water to be stored.

The layout of each scheme is specifically designed to suit the characteristics and limitation of the site. Typically the distributor pipe would be arranged in the centre of the reservoir, but can alternatively be placed at the side where topographical constraints dictate.

The high performance waterproof membrane should be sealed continuously to encapsulate the GEOLight® reservoirs, distributor pipe and granular fill. It is protected by a heavyweight needle punched, non woven geotextile. To help with maintenance a high flow geotextile is placed between the granular fill and GEOLight® attenuation units to prevent silt and particles being washed into the reservoir. GEOLight® can be used under a range of surfaces e.g. grass, porous paving, standard paving block, tarmac and concrete.

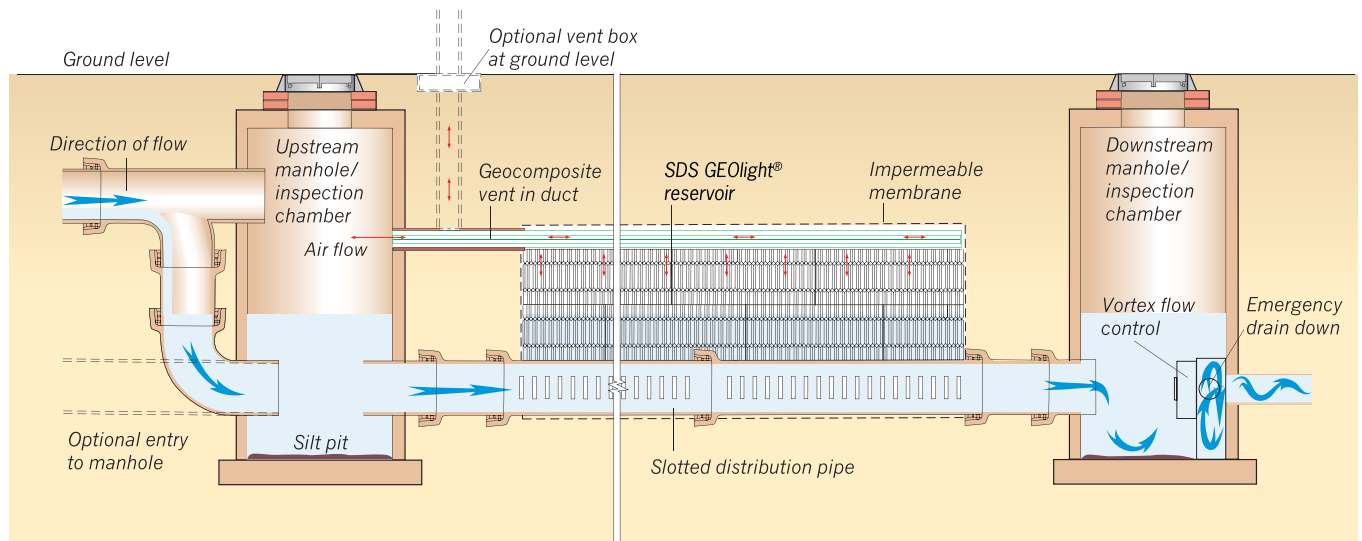
Cross Section



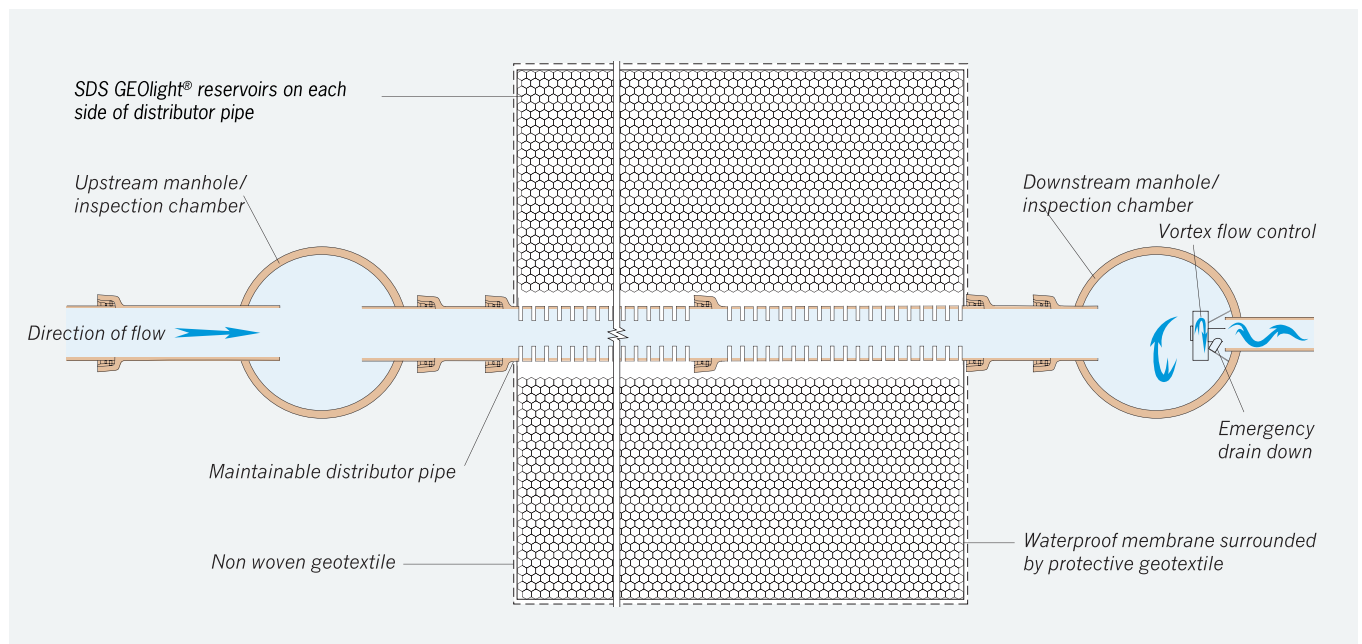
Stormwater Attenuation System

Design Details

Long Section



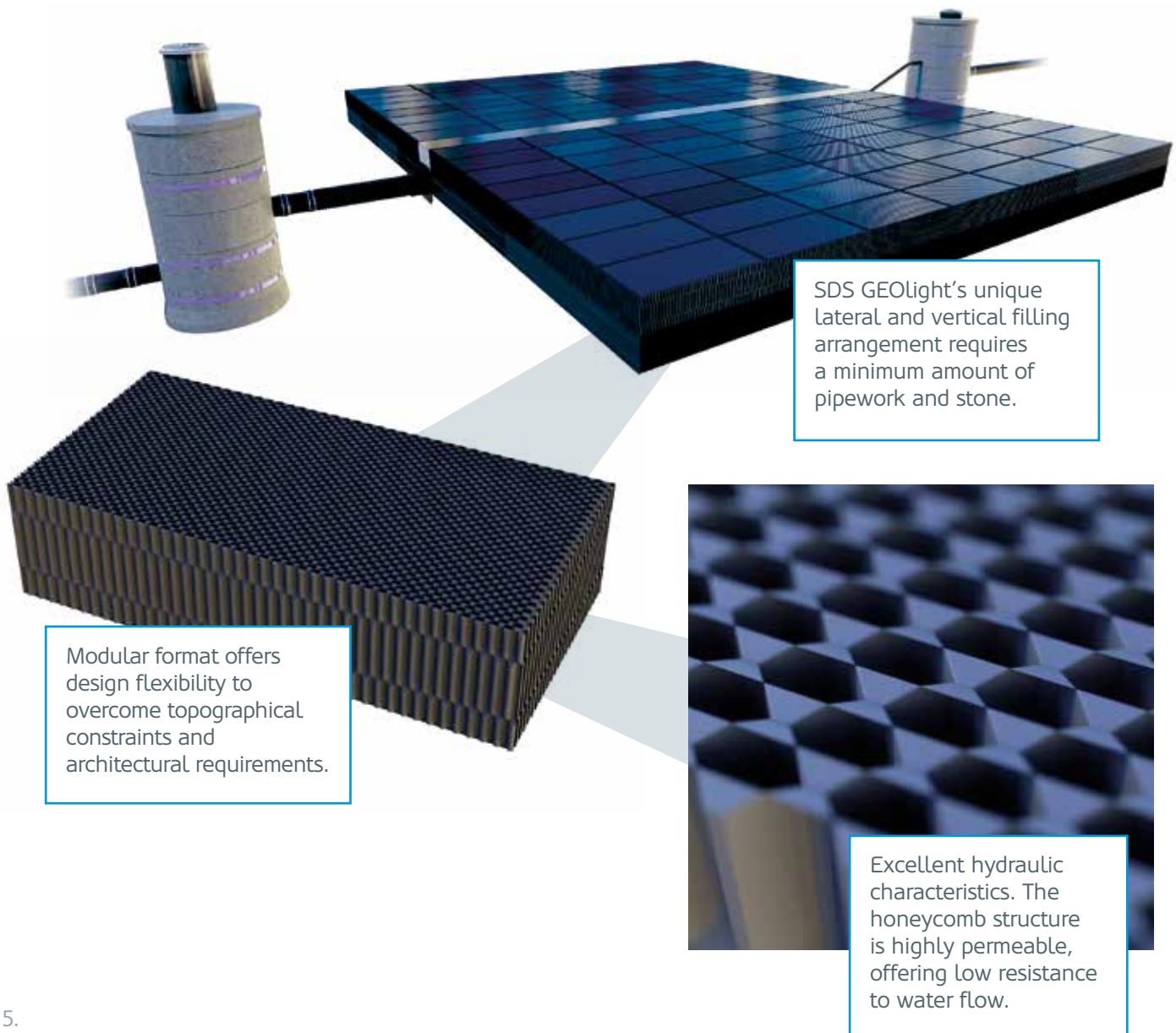
Plan



Benefits

- High compressive strength – can be located under all roads, car parks and amenity area surfaces.
- Reduced excavation costs – the very high void rate (95%) minimises the required volume of earthworks.
- Speed of installation – 1000m³ reservoir, completed in one week.
- Light and easy to handle.
- Depth of tank invert reduced by using patented lateral supply.
- Simplified distribution pipe network, easy maintenance – dispensing with costly and complicated pipework configurations.
- Greatly reduces the risk of flooding when used as stormwater storage.
- Can also be used for water recycling and combining with irrigation systems.
- Can virtually eliminate pollution when used in combination with specialist petrol / oil separators.
- Design service available, including calculations.

GEOLight® block



COSHH and Handling Information

1. COMPOSITION/INFORMATION ON INGREDIENTS:

Hazardous ingredients:

None as finished goods or products.

Types of materials:

Polyvinyl chloride (PVC)
MEK

2. HAZARDS IDENTIFICATION

Nature of hazard:

There are no health risks from the products during normal use. The products may contain various pigment colours and stabilisers that may be toxic. The chemicals are, however, bound within the product material and not easily extracted.

3. FIRST-AID MEASURES

Eye contact:

Plastic materials may cause physical irritation in the eyes. Wash out with large amounts of water. If irritation persists, seek medical advice.

Skin contact:

Not applicable.

Inhalation:

Not applicable.

Ingestion:

Not expected to have any toxic effects.

4. FIRE-FIGHTING MEASURES

Extinguishing media:

On small fires use any hand-held extinguisher type.
On large fires use water.

Fire and explosion hazards:

Melting plastics may flow and spread in a large fire.
Products of fire will be thick black toxic smoke.

Material characteristics:

PVC products will burn in the presence of a flame but are classed as self-extinguishing.

Protective equipment:

Wear self-contained breathing apparatus and protective clothing.

5. HANDLING AND STORAGE

Handling:

There are no hazards associated with the finished products. However, when cutting SDS GEOLight®, we recommend that the correct tools are used e.g. Handsaw or Alligator saw. When cutting, dust may be created; avoid inhaling these dusts. Take care of heat build-up within materials during cutting etc. The pallets of SDS GEOLight® units should be placed on level ground and should not be stacked on site. The maximum weight of the pallet of SDS GEOLight® units as delivered to site is 650kg (700kg on one copy), including packaging. Machines used to lift the pallet should be able to lift this weight safely. Loose individual units should not be stored more than three units high. SDS GEOLight® units are lightweight ranging from 23kg to 55kg and can be easily handled – one or two person lift.

Storage:

SDS GEOLight® units will resist the effects of UV light for up to six months; however, prolonged storage in direct sunlight should be avoided. SDS GEOLight® units should not be stored near to any fuel storage areas or any other solvents. SDS GEOLight® units are very robust and resistant to damage during normal handling; however, they should be secured in areas where impacts from vehicles or construction plant will be avoided.

Material characteristics:

PVC products will burn in the presence of a flame but are classed as self-extinguishing.

Protective equipment:

Wear self-contained breathing apparatus and protective clothing.

6. EXPOSURE CONTROLS / PERSONAL PROTECTION

Respiratory protection:

Not required under normal conditions of use. Where cutting etc. creates dust, wear a disposable half-mask to the standard FFP2S.

Hand protection:

Wear impervious strong gloves to prevent cuts to the hands while handling, cutting etc.

Eye protection:

Wear safety glasses when cutting etc.

Skin protection:

Wear overalls.

7. SITE HAZARDS

Other hazards for consideration:

Working in excavations and trenches – SDS GEOLight® may be designed with a shallow invert for infiltration (soakaway) or attenuation (storage) system. This negates the need for deep excavations or trenches, excavation near services e.g. gas, electricity or contaminated soil areas. N.B. All risk assessments should be undertaken by the main contractor for forklift, access to and working in excavations and trench support.

8. STABILITY AND REACTIVITY

Decomposition products:

Major thermal decomposition products are oxides of carbon. Relevant differences are (in addition): PVC may produce amounts of Hydrogen Chloride.

Stability:

These materials are stable at temperatures up to normal operating limits (moulding parameters).

9. ECOLOGICAL INFORMATION

Biodegradability:

Plastic products are not readily biodegradable but are not detrimental to terrestrial wildlife.

Aquatic toxicity:

Non-toxic to marine life.

10. DISPOSAL CONSIDERATIONS

Method:

The preferred method of disposal is collection and recycling. Plastics can safely be placed with regular industrial or household wastes where recycling is not available.

11. OTHER INFORMATION

As the handling, storage, use and disposal of the product are beyond our control SDS disclaims all liability for loss, damage, injury or expense in any way connected with such activities and further makes no warranties, expressed or implied, as to the suitability of the product for any particular use.

The preferred method of disposal is collection and recycling. Plastics can safely be placed with regular industrial or household wastes where recycling is not available.

SDS

Water
Infrastructure
Systems

INNOVATORS IN WATER TECHNOLOGY



SDS Limited
Clearwater House
Castlemills
Biddisham
Somerset
BS26 2RE

T +44 (0)1934 751303
E info@sdslimited.com



sdslimited.com

GSE UltraFlex Smooth Geomembrane

(available from 0.5 – 2.5 mm)

GSE UltraFlex is a smooth linear low density polyethylene (LLDPE) geomembrane manufactured with the highest quality resin specifically formulated for flexible geomembranes. This product is used in applications that require increased flexibility and elongation properties where differential or localized subgrade settlements may occur such as in a landfill closure application.



AT THE CORE:

An LLDPE geomembrane that is used in applications requiring increased flexibility and elongation properties, such as landfills, closures, and mining applications.

Product Specifications

These product specifications meet or exceed GRI GM17.

Tested Property	Unit	Test Method	Values(*)					
Thickness ^(a)	mm	DIN EN ISO 9863-1	0.5	0.75	1.0	1.5	2.0	2.5
Density	g/cm³	DIN EN ISO 1183-1/A	≤ 0.939	≤ 0.939	≤ 0.939	≤ 0.939	≤ 0.939	≤ 0.939
Tensile Properties (each Direction)		DIN EN ISO 527-3 (Type 5; 100 mm/min; l ₀ = 50 mm)						
Stress at Break Elongation at Break	MPa %		33 (26) 850 (700)	33 (26) 850 (700)	33 (26) 900 (750)	33 (26) 900 (750)	33 (26) 900 (750)	33 (26) 900 (750)
Tear Resistance	N	DIN ISO 34-1/B(a)	50 (45)	85 (80)	115 (110)	175 (165)	230 (220)	285 (275)
Puncture Resistance	N	DIN EN ISO 12236	1,110 (900)	2,700 (1,450)	2,350 (2,000)	3,500 (3,100)	4,600 (4,100)	5,700 (5,100)
Carbon Black Content	%	ASTM D 1603	2.0 – 3.0	2.0 – 3.0	2.0 – 3.0	2.0 – 3.0	2.0 – 3.0	2.0 – 3.0
Carbon Black Dispersion	Category	ASTM D 5596	1/2 ^(b)	1/2 ^(b)	1/2 ^(b)	1/2 ^(b)	1/2 ^(b)	1/2 ^(b)
Dimensional Stability (each Direction)	%	DIN 53377 (100°C/1 h)	± 2	± 2	± 2	± 2	± 2	± 2
Melt Flow Index ^(c)	g/10 min	DIN EN ISO 1133 (190°C / 5.0 kg) (190°C / 2.16 kg)	≤ 3.0 ≤ 1.0	≤ 3.0 ≤ 1.0	≤ 3.0 ≤ 1.0	≤ 3.0 ≤ 1.0	≤ 3.0 ≤ 1.0	≤ 3.0 ≤ 1.0
Oxidative Induction Time (OIT)	min	ASTM D 3895 (200°C; Pure O ₂ ; 1 atm)	≥ 100	≥ 100	≥ 100	≥ 100	≥ 100	≥ 100
Reference Property								
Multiaxial Elongation at Break	%	similar to ASTM D 5617; Ø = 500 mm	≥ 30	≥ 30	≥ 30	≥ 30	≥ 30	≥ 30
Low Temperature Brittleness	°C	ASTM D 746	- 77	- 77	- 77	- 77	- 77	- 77
UV Resistance ^(d)		GRI-GM 11						
HP-OIT retained after 1,600 hours ^(e)	%	ASTM D 5885	≥ 35	≥ 35	≥ 35	≥ 35	≥ 35	≥ 35
Roll Width (approx.) ^(f)	m	---	7.0	6.95	6.95/7.5			7.5
Surface	---	---	double-sided smooth					

NOTES:

(*): All values - unless otherwise noted - are nominal values. Values in brackets are minimum values within the 95% confidence interval.

(a): Tolerance ± 10% - Special thickness available upon request.

(b): Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be category 1 or 2. No more than 1 view from category 3.

(c): Standard test conditions: 190°C / 5.0 kg.

(d): Test-Conditions: 20 hours UV cycle at 75°C followed by 4 hours condensation at 60°C; total: 1,600 hours.

(e): UV Resistance is based on percent retained value regardless of the original High Pressure - OIT value.

(f): Roll widths and lengths have a tolerance of ± 1%.

GSE is a leading manufacturer and marketer of geosynthetic lining products and services. We've built a reputation of reliability through our dedication to providing consistency of product, price and protection to our global customers.

Our commitment to innovation, our focus on quality and our industry expertise allow us the flexibility to collaborate with our clients to develop a custom, purpose-fit solution.

[DURABILITY RUNS DEEP] For more information on this product and other, please visit us at GSEworld.com, call 49.40.767420 or contact your local sales office.



Bontec® NW

Needle punched and thermally bonded Nonwoven

Product Family Overview

	Test	Units	Bontec® NW 5	Bontec® NW 6	Bontec® NW 7	Bontec® NW 8	Bontec® NW 9	Bontec® NW 10	Bontec® NW 11	Bontec® NW 12
Mechanical Properties										
Tensile strength - MD	EN ISO 10319	kN/m	5	6	7	8	9	10	11	12
Tensile strength - CMD	EN ISO 10319	kN/m	5	6	7	8	9	10	11	12
Elongation at maximum load - MD	EN ISO 10319	%	45	45	45	45	45	45	45	45
Elongation at maximum load - CMD	EN ISO 10319	%	49	49	55	55	55	55	55	55
Static puncture resistance (CBR)	EN ISO 12236	kN	0.85	0.89	1.2	1.24	1.5	1.6	1.7	1.78
Dynamic perforation resistance (cone dr)	EN ISO 13433	mm	42	40	37	34	30	28	26	24
Hydraulic Properties										
Water permeability normal to the plane (	EN ISO 11058	l/m²s	125	120	115	110	108	106	105	105
Waterflow in the plane, @20 kPa	EN ISO 12958	m²/s			1x10-7		2x10-7	2x10-7	2x10-7	
Characteristic Opening Size (O90)	EN ISO 12956	µm	145	140	135	120	115	110	110	105
Physical Properties										
Thickness under 2 kPa	EN ISO 9863-1	mm	0.75	0.95	1,0	1	1.2	1.25	1.3	1.4
Weight	EN ISO 9864	g/m²	70	80	85	100	110	120	130	145
Roll Width (+/- 1%)		m	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25
Roll Length (+/- 1%)		m	200	100	100	100	100	100	100	100
Truck Load Volume (+/- 10%)		m²	117600	103950	94500	75600	75600	66150	46200	46200
Roll diameter (+/- 10%)		cm	33	25.5	26.5	29	30	31.5	34	35.5
Durability			Description							
Natural UV light	ASTM D 4355	100%	Polymer				PP			
Chemical Resistance	EN 14030	100%	Density				0.91			
Microbiological Resistance	EN 12225	100%	Melting Point				165			
Hydrolysis	EN 12447	100%	Construction				Fibres			
Oxidation resistance	EN ISO 13438	>90%								

The Quality Management System of Bonar has been approved to the ISO 9001 Quality Management System Standard. Certificates are available on request.



The information set forth in this data sheet reflects the best knowledge at the time of publication. The document is subject to change pursuant to new developments and findings. The same reservation applies to the properties of the products described. No liability is undertaken for results obtained by usage of the products and information.



Bonar
partners in performance

Bonar NV.
Industriestraat 39, 9240 Zele, Belgium
T: +32 (0) 52 457 487 / F: +32 (0) 52 457 495
info@bonar.com / www.bonar.com

Sustainable Drainage Systems Ltd

Operation and Maintenance Manual



PROJECT: 383-23-DI Plot H3 Accor Tribe Hotel

CONTRACTOR: GROUNDTECH (UK) LIMITED

Sustainable Drainage Systems Limited

Clearwater House, Castlemills, Biddisham, BS26 2RE

Tel: 01934751303 Fax: 01934751304

info@sdslimited.com

www.sdslimited.com

Site Supervisor: Robert Mead

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Operation and Maintenance Manual

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- Sign Off QA Sheet
- Drawing No. E247820
- GEOLight Brochure
- GEOLight Datasheet
- GEOLight Maintenance
- GSE Ultraflex Smooth GEOMembrane Datasheet
- GEOTextile Bontec NW Datasheet
- Pipe Datasheet

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1. Scope of Works / System Description

1.1. *Basis of Design*

Sustainable Drainage Systems (SDS) works were carried out in line with design information and requirements supplied by GROUNDTECH (UK) LIMITED

1.2. *Purpose of the Installation*

To supply and install a stormwater system as required and fulfilling the drainage requirements at Plot H3 Accor Tribe Hotel

1.3. *Installation Description*

SDS have installed 2 no attenuation tank.

1.3.1. *SDS GEOLight Attenuation Tank*

Installation Started: w/c 10-7-23

Installation Completed: 19-2-24

Tank Dimensions:

T1- 12.5 x 13 x 1.25

T2- various

Tank Volume:

T1= 203.13m³

T2=101.25m³

Location: Please refer to Drawing Drainage Layout for further information.

The excavation was dug (by others) to the dimensions of the tank plus an extra 0.5m to the length and width to allow for working space during installation. After excavation the hole was blinded to form a level ground with either sand or shingle (by others).

The excavation base was then lined with GEOTextile with additional allowance for the lining to be brought up and over the sides of the tank and allow for it to be completely encased on completion of the build.

Low density polyethylene (LLDPE) GEOMembrane was laid on top of the GEOTextile to cover the base and sides of the excavation. The membrane was sealed using an airtight twin edge weld using a hot air type welder (110v). For information on the welding, please refer to document Membrane Welded Joint Information Sheet.

GEOLight blocks were moved into position and installed following a layout plan. During installation a trench allowance was made to lay slotted twinwall distribution pipe through the tank with a length of solid pipe attached at each end of the slotted distribution pipe to allow for the tank system to be attached to the upstream and downstream stormwater manholes (by others). Pre-manufactured top hat seals were welded to the GEOMembrane at the entry and exit points of the solid pipe at each end of the tank to ensure a watertight seal. On each vertical face of the GEOLight blocks along the internal trench for the distribution pipe, additional GEOTextile was installed to prevent internal clogging of the lateral channels in the GEOLight blocks.

Sustainable Drainage Systems Ltd

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All pipe positions and levels within the system were confirmed and approved (by others) prior to the installation of pipe bedding being laid within the trench (by others).

After the tank was built to the layout drawing, GEOvent was laid along the length of the tank before the GEMembrane was pulled up and over the sides of the tanks to enclose and secure the GEOlight blocks where a panel of GEMembrane was welded to the top of the tank to form a watertight seal of the tank.

Once the tank was complete, the additional allowance of GEOTextile lining the excavation was pulled up and over the sides of the tanks to completely encase the tank. Backfilling around and over the tank was then completed (by others).

The installation method above is as detailed in the Method Statement

On completion, as detailed in the Method Statement, the attenuation tank was signed off by SDS and a client representative on site using the Sign Off QA Sheet.

For all datasheet information relating to specific materials used manufacturers' details in Section 7.

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2. Operating and Fault Finding Routines

2.1. *Operating Procedures*

Once installed this system is entirely inert and thus has no applicable operating procedures

2.2. *Fault Finding Routines*

Once installed this system is not a product that will develop faults over time

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3. Schedule of Materials Used

Attenuation Tank

Item Ref	Model Number	Supplier	Item Type	Description	Location
GEOlight	HG400	SDS	GEOlight block	Lightweight Polyvinyl Chloride (PVC) honeycomb modular block	Attenuation Tank
GEOvent	25SW.NW9-M.CE	ABG	Fildrain	GEOcomposite vent	Attenuation Tank
GEOtextile	Bontec NW9	Bonar Ltd	Bontec NW	Thermally bonded nonwoven GEOtextile	Attenuation Tank
GEOmembrane	Ultraflex Smooth	GSE Environmental	Waterproof Membrane	Smooth linear low density (LLDPE) GEOmembrane	Attenuation Tank
Top Hats	Ultraflex Smooth	GSE Environmental	Waterproof Membrane	Smooth linear low density (LLDPE) GEOmembrane Pipe Penetration Seal	Attenuation Tank
Pipe	JFC CorriPipe Twinwall	JFC Plastics Limited	Slotted Pipe	High-Density Polyethylene	Attenuation Tank
Pipe	JFC CorriPipe Twinwall	JFC Plastics Limited	Solid Pipe	High-Density Polyethylene	Attenuation Tank
Couplers	JFC CorriPipe Twinwall	JFC Plastics Limited	Coupling Collars	Black polypropylene	Attenuation Tank
T Pieces	JFC CorriPipe Twinwall	JFC Plastics Limited	Solid Pipe	High-Density Polyethylene	Attenuation Tank

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4. Planned Maintenance

4.1. *Planned Maintenance Procedure*

There are no specific steps for planned maintenance; however, it is recommended that the stormwater tank inspection chambers, including the stormwater drainage distribution pipes, are checked periodically in conjunction with general maintenance of the underground pipe network

Please refer to the document GEOLight Maintenance for further clarification

Sustainable Drainage Systems Ltd

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5. Safety Procedures

5.1. *CoSHH Data Sheets*

None of the materials used in this installation require reference to CoSHH

5.2. *Risk Assessments*

Maintenance of this installation does not pose any major risk and therefore has no applicable risk assessment requirements

5.3. *Disposal*

None of the materials used in this installation require specialist disposal

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6. Spares

6.1. *Spares & Lubricants Issued to the Client at Handover*

No spares were issued to the client at handover

6.2. *Recommended Spares / Lubricants for the Client to Hold*

It is not recommended that the client hold any spares as they are not required for this installation

6.3. *General Spares & Lubricants Lists*

There are no general spares lists available for these works

Sustainable Drainage Systems Ltd

Operation and Maintenance Manual



7. Manufacturers / Suppliers Details

7.1. Sustainable Drainage Systems Limited

MANUFACTURER/ SUPPLIER	ADDRESS	CONTACT DETAILS	TOTAL No. OF PAGES
Sustainable Drainage Systems	Clearwater House Castlemills Biddisham Somerset BS26 2RE	Tel: 01934 751303 e-mail: info@sdslimited.com	12
EQUIPMENT REF/ MODEL	PUBLICATION DETAILS		NO. OF PAGES
GEOlight	GEOlight Brochure		8
GEOlight	GEOlight Datasheet		2
GEOlight	GEOlight Maintenance		1
GEOmembrane	Membrane Welded Joint Information Sheet		1

7.2. ABG Limited

MANUFACTURER/ SUPPLIER	ADDRESS	CONTACT DETAILS	TOTAL No. OF PAGES
ABG Limited	E7 Meltham Mills Road Meltham Yorkshire HD9 4DS	Tel: 01484 852096 e-mail: geo@abgltd.com	1
EQUIPMENT REF/ MODEL	PUBLICATION DETAILS		NO. OF PAGES
GEOvent	ABG Fildrain 25SW.NW8-M.CE Datasheet		1

7.3. BONAR Limited

MANUFACTURER/ SUPPLIER	ADDRESS	CONTACT DETAILS	TOTAL No. OF PAGES
BONAR Limited	Unit 28, Bergen Way Sutton Fields Industrial Estate (West) Hull HU7 0YQ	Tel: 01482 863777 e-mail: info@bonar.com	1
EQUIPMENT REF/ MODEL	PUBLICATION DETAILS		NO. OF PAGES
GEOtextile	Bontec NW - Needle Punched and Thermally Bonded Nonwoven Datasheet		1

7.4. GSE Environmental (UK Office)

MANUFACTURER/ SUPPLIER	ADDRESS	CONTACT DETAILS	TOTAL No. OF PAGES
GSE Environmental	49C Fordham Road Soham Cambridge CB7 5AH	Tel: 01487 824339 e-mail: msmith@gseworld.com	1
EQUIPMENT REF/ MODEL	PUBLICATION DETAILS		NO. OF PAGES
GSE GEOmembrane	GSE Ultraflex Smooth Geomembrane Datasheet		1

7.5. JFC Plastics Limited

MANUFACTURER/ SUPPLIER	ADDRESS	CONTACT DETAILS	TOTAL No. OF PAGES
JFC Plastics Limited,	Unit 6 Goldicote Business Park, Ettington, Nr Stratford Upon Avon, Warks CV37 7NB.	Tel: + 44 1928 583 391 e-mail: infouk@jfccivils.com	1
EQUIPMENT REF/ MODEL	PUBLICATION DETAILS		NO. OF PAGES
CorriPipe	JFC CorriPipe Datasheet		9

015319
NSBE010-NSBE125 Class 1 Bypass Separator
Installation & Maintenance Guidelines



Kingspan Environmental Service Contact Numbers:

GB: 0844 846 0500

NI: 028 3025 4077

IRL: 048 3025 4077

Enclosed Documents

DS1155	NSBE010-NSBE030 Class 1 Bypass Separators
DS1254	NSBE036 Class 1 Bypass Separator
DS1224	NSBE040 & NSBE050 Class 1 Bypass Separators
DS1225	NSBE075-NSBE125 Class 1 Bypass Separators

Issue	Description	Date
05	CC1405 – Coalescer Chains were Pipes	Feb 2018

HEALTH & SAFETY

These warnings are provided in the interest of safety. You must read them carefully before installing or using the equipment.

It is important that this document is retained with the equipment for future reference. Should the equipment be transferred to a new owner, always ensure that all relevant documents are supplied in order that the new owner can be acquainted with the functioning of the equipment and the relevant warnings.

Installation should only be carried out by a suitably experienced contractor, following these guidelines.

We recommend the use of a dust mask and gloves when cutting GRP components.

Electrical work should be carried out by a qualified electrician.

Contaminated surface water can contain substances harmful to human health. Any person carrying out maintenance on the equipment should wear suitable protective clothing, including gloves. Good hygiene practice should also be observed.

Access covers should be selected with reference to the location of the unit and traffic loads to be accommodated. These are not (normally) part of the Separator supply.

When covers are removed precautions must be taken against personnel falling into the unit.

Should you wish to inspect the operation of the equipment, please observe all necessary precautions, including those listed below, which apply to maintenance procedures.

Ensure that you are familiar with the safe working areas and accesses. Ensure that the working area is adequately lit.

Take care to maintain correct posture, particularly when lifting. Use appropriate lifting equipment when necessary. Keep proper footing and balance at all times. Avoid any sharp edges.

OIL ALARM SYSTEMS

PPG3 requires that the oil level alarm be fitted, tested and commissioned by a competent Installer. This is to ensure that the excessive oil probe is calibrated correctly, raising an alarm when 90% of the recommended maximum oil storage volume is reached. Should the oil level alarm fail to provide an early warning, excessive oil could pass through the separator, thus polluting the environment. This could result in substantial cleanup costs and legal action being taken under the water resources act 1991.

MAINTENANCE

The correct ongoing maintenance is essential for the proper operation of the equipment. Operators who rely on oil level alarms to prompt them to service separators between maintenance intervals run the risk of polluting should the alarms not work, hence the ongoing functional assessment of the oil alarm systems is fundamental if pollution incidents are to be avoided.

The removal of sediment and retained oil/grease should be carried out by a contractor holding the relevant permits to transport and dispose of such waste. The contractor must refer to the guidelines in this document.

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Appendices

Separator Maintenance Log

	
<p>Kingspan Environmental College Road North Aston Clinton Aylesbury Buckinghamshire HP22 5EW United Kingdom</p>	
13	
En 858 : Separator systems for light liquids	
GRP Glass Reinforced Plastic Tank	
Bypass Separators NSB003 - NSB150	
Class 1	
Watertightness	Passed
Structural Testing	Passed
Hydraulic Efficiency	Passed

1 Introduction

- 1.1.1 These Guidelines represent Best Practice for the installation of the above Separator Units. Many years of specialist experience has led to the successful installation of thousands of separator units. It must be noted, however, that these Guidelines are necessarily of a general nature. It is the responsibility of others to verify that they are appropriate for the specific ground conditions and in-service loads of each installation. Similarly, any information or advice given by our employees or agents regarding the design of an installation must be verified by a qualified specialist (e.g. Civil engineering consultant).
- 1.1.2 For guidance of Separator selection and application, please refer to the most recent issue of Environment Agency Guidelines pollution prevention guidelines No. 3 (PPG3).and BS En 858

1.2 Handling & Storage

- 1.2.1 Care must be taken to ensure that units are not damaged during delivery and handling on site. Please take care and place unit so that it cannot fall and become damaged
- 1.2.2 The design requirements of these products will frequently mean that the centre of gravity of the unit is “offset”. Care must therefore be taken to ensure that the unit is stable when lifting. Rainwater may also collect inside units, particularly if they have been stored on site prior to installation, adding weight and increasing instability. Check units before lifting and pump out any excess water.
- 1.2.3 When lifting units, use webbing slings of a suitable specification. Do not use chains.
- 1.2.4 A suitable spreader bar should be used to ensure that units are stable and that loads are evenly distributed during lifting. When lifting separators, a spreader bar should be used where the slings would otherwise be at an angle > 30 degrees to the vertical.
- 1.2.5 Lifting equipment should be selected by taking into account the unit weight, length and the distance of lift required on site.
- 1.2.6 We accept no responsibility for the selection of lifting equipment.
- 1.2.7 Whenever units are stored or moved on site, ensure that the storage location is free of rock, debris and any sharp objects, which may damage the unit. The units must be placed on ground, which is flat, and level and the unit orientated onto its side with even support. Do not roll separators.

1.3 Site Planning

The following points should be considered before installation of the equipment:

- 1.3.1 The discharge must have the consent of the relevant Environmental Regulator.
- 1.3.2 The installation should have Planning and Building Control approval.
- 1.3.3 Consider installing flow cut-off valves to isolate the separator in an emergency or during site cleaning operations. See Environment Agency Guidelines PPG3.
- 1.3.4 We will fit a tube to receive the alarm probe. This tube provides protection and ensures that the probe is positioned at the correct level to sense the oil build up. The tube design and probe level setting assumes the use of our standard oil alarm system and may not be suitable for other alarm supplier's equipment. The probe tube may be fitted either within the neck or within the body of the unit. It should be extended to ground level when fitted in the body of the tank and you should make provision to extend the tube to the required height before backfilling. Consult the alarm supplier's instructions for their detailed fitting installation instructions.
- 1.3.5 Consider venting of the unit. Comply with local regulations. In the UK, comply with the following regulations. For Petrol Stations: Health and Safety Guidance Note 41 (HS(G)41). For other applications: BS8301: 1985 (obsolescent) BS EN 752 Building Drainage. Adequate ventilation should be provided to the separator. The ventilation pipe should be as short as is practicable and be terminated not less than 2.5m above paving nor less than 1m above the head of an openable window or other opening into a building within a horizontal distance of 3m. Each neck should be vented independently, we advise against joining these below ground prior to their rising as vent stacks.
- 1.3.6 Consider installation of a sampling point downstream of the separator. There is no suitable facility to effectively sample the wastewater from inside the unit.

- 1.3.7 Uncontaminated run off such as roof water should be excluded from separators. (EA Guidelines PPG3.)
- 1.3.8 Ground conditions and water table level should be assessed. If the water table will be above the base of the units at any time of the year, adequate concrete backfill must be provided to avoid flotation. In poorly draining ground, consideration should also be given to the likelihood of flotation due to surface water collecting in the backfill, and an appropriate installation method devised to avoid this.
- 1.3.9 If the discharge is to a soakaway, a porosity test should be carried out as part of the assessment of suitability for sub-soil drainage.
- 1.3.10 The separator must be installed at a level, which will allow connection to the incoming drain and a free discharge at the system outlet. The water table must be below the discharge outlet.
- 1.3.11 Do not install the unit deeper than necessary, ensure that you purchase extension shaft kits. The minimum invert depth of the unit is shown on the customer drawing.
- 1.3.12 Adequate access must be provided for routine maintenance. Vehicles should not be permitted within a distance equal to the depth of the unit, unless suitable structural protection is provided to the installation.
- 1.3.13 There must be at least 1 metre of clear, level ground all around the access covers to allow for routine maintenance.
- 1.3.14 It is essential that a mains water supply is accessible for routine cleansing and refilling after removal of waste material and liquid.
- 1.3.15 Provide electrical supply for alarm system.
- 1.3.16 Installation should only be carried out by suitably qualified and experienced contractors in accordance with current Health and Safety Regulations. Electrical work should be carried out by a qualified electrician, working to the latest edition of IEE wiring regulations.
- 1.3.17 This unit is designed to operate with gravity in and out flows. The unit is not designed to operate with a pumped influent.

2 Installation

2.1 Installation – General

- 2.1.1 When units are installed in unstable ground conditions where movement of the surrounding material and/or unit may occur, the connecting pipework should be designed to minimise the risk of damage from differential movement of the unit(s) and/or surrounding material.
- 2.1.2 For separators with burial depths greater than 1000mm from cover level to the top of the unit, specific site conditions should be taken into consideration and the backfill designed to bear any loads which may be applied during and after installation to prevent the tank being subjected to these loads.
- 2.1.3 The excavation must be deep enough to provide bedding and cover depth as determined by the type of surface pavement and loading. Asphalt and concrete pads should extend a minimum of 300mm horizontally beyond the unit in all directions.
- 2.1.4 In situations where the excavation will not maintain a vertical wall, it will be necessary to shore up the sidewalls of the excavation with suitable trench sheets and bracing systems to maintain a vertical wall from the bottom to the top of the excavation. DO NOT completely remove the shoring system until the backfilling is complete, but before the concrete fully hardens.
- 2.1.5 In areas where the water table is above the bottom of the excavation and/or the excavation is liable to flood, the excavation should be dewatered using suitable pumping equipment and this should continue until the installation is complete.
- 2.1.6 During installation care must be taken to ensure that the body of the unit is uniformly supported so that point loads through the unit are avoided.
- 2.1.7 The concrete Specification is not a site specific installation design.

GENERAL CONCRETE SPECIFICATION IN ACCORDANCE WITH BS EN 206-1 (BS 8500-1)		
TYPE OF MIX		(DC) DESIGN
PERMITTED TYPE OF CEMENT		BS 12 (OPC): BS 12 (RHPC): BS 4027 (SRPC)
PERMITTED TYPE OF AGGREGATE (coarse & fine)		BS 882
NOMINAL MAXIMUM SIZE OF AGGREGATE		20 mm
GRADES: C25 /30 C25 /30 C16 /20		REINFORCED & ABOVE GROUND WITH HOLDING DOWN BOLTS REINFORCED (EG. FOR HIGH WATER TABLE) UNREINFORCED (NORMAL CONDITIONS)
MINIMUM CEMENT CONTENT	C30 C20	270 - 280 Kg/M ³ 220 - 230 Kg/M ³
SLUMP CLASS		S1 (25mm)
RATE OF SAMPLING		READY MIX CONCRETE SHOULD BE SUPPLIED COMPLETE WITH APPROPRIATE DELIVERY TICKET IN ACCORDANCE WITH BS EN 12350-1
NOTE: STANDARD MIXES SHOULD NOT BE USED WHERE SULPHATES OR OTHER AGGRESSIVE CHEMICALS EXIST IN GROUND WATER		

2.2 Separator Installation

- 2.2.1 Excavate a hole of sufficient length and width to accommodate the tank and a minimum 225mm concrete surround and to a depth, which allows for the burial depth of the unit plus concrete base slab and haunch.
- 2.2.2 Construct a suitable concrete base slab appropriate to site conditions. Ensure that the slab is flat and level.
- 2.2.3 When the concrete base slab has set enough to support the installed load, add a concrete haunch so as to provide even support under the unit and then lower the unit onto the haunch using suitable webbing slings and lifting equipment.
- 2.2.4 **Pour no more than 300-mm depth of clean water into the unit, avoiding shock loads. For units with more than one chamber, add water to each chamber simultaneously. DO NOT OVERFILL; the unit is not designed to hold water whilst unsupported.**
- 2.2.5 **Place concrete backfill to approximately 300mm depth under and to the sides of the tank ensuring good compaction to remove voids. DO NOT use vibrating pokers. Continue adding concrete backfill, simultaneously keeping the internal water level no more than 200 mm above the backfill level at all times, until the backfill is just below the underside of the outlet drain, giving sufficient room to connect the inlet and outlet pipework.**
- 2.2.6 Connect inlet and outlet drains and vent pipes when safe access to the backfill can be gained.

2.3 Pipework Connections

- 2.3.1 In all cases, ensure that the outlet pipework level is maintained for correct operation. (Unless specified on the order, the fall across the unit will be as per the customer drawings).
- 2.3.2 Small units are generally fitted with **PVCu spigots** to both the outlet and the inlet.
- 2.3.3 Connect using the same size PVCu socket or a suitable reducer.
- 2.3.4 Larger units are generally fitted with **Our GRP** manufactured sockets.
- 2.3.5 The connecting pipework should be pushed into the socket. Ensure that the seal is secure and watertight before backfilling the pipe.

- 2.3.6 Alternatively, proprietary **flex seal couplings** can be obtained to fit over the outside of the site pipework and the outside of the GRP socket. When using this connection method, please be aware that the outside GRP laminate is not perfectly regular and that you may need to use a sealant on the outside diameter of the GRP. Take care not to over tighten the coupling when connecting to the GRP and ensure that the seal is secure before backfilling the pipe. Drawing 403144 provides the ID of our Bypass GRP sockets. The OD is variable, as the wall thickness can be up to 15-20 mm. If purchasing a flexseal coupling for use with clay /concrete, we suggest that a size 110 mm larger than the ID is selected.

2.4 Oil Level Alarm Neck Fitting

- 2.4.1 We will fit a tube to receive the oil alarm probe. This provides protection and ensures that the probe is positioned at the correct level to sense oil build up.
- 2.4.2 See alarm supplier information and ensure that the probe is placed within the tube and can be accessed from ground level.
- 2.4.3 Continue backfilling with concrete over the tank body to the required level. Build up a shell of concrete, minimum 225mm thick, around the access shaft(s). Temporarily strut the access shaft to avoid distortion.
- 2.4.4 Where we supply an extension shaft to meet a deeper invert requirement, a coalescer extension chain will be required. When fitting, ensure that the chain is fitted to just below the surface so that the coalescer can easily be removed. Remove the coalescer from the unit before adding the extension chain. When refitting, ensure that the coalescer is correctly inserted and fully pushed into the base fitting. This is important and you must ensure that the coalescer is correctly located before putting the unit in to operation.
- 2.4.5 It is advisable to seal the joints on the extension shafts (particularly on sites with high ground water) with proprietary sealant or by GRP lamination. Temporarily strut the extension neck(s) to avoid distortion during back filling. Where more than one neck section is required to suit a deep invert, consider back-filling section by section. If the extension neck is too long, it can be trimmed using a fine-toothed saw. The original fixing hole bolting the coalescer to the neck should be sealed.
- 2.4.6 Ensure that the vent socket if cut out, is replaced elsewhere. The maximum recommended inlet invert is 2000mm (using 500mm long extension sections). If you are installing a unit deeper than this then you must make your own arrangements for removing and replacing the coalescer. Consideration must be given to the depth of lift involved.
- 2.4.7 Continue back-filling, ensuring minimum 225mm concrete thickness around the access shaft/ extension neck and alarm access tube (as applicable).
- 2.4.8 Mains powered Alarm Systems. See alarm suppliers installation instructions. Lay 82mm diameter PVCu underground ducting between the alarm panel location and the alarm probe position. The ducting should be 500mm below ground level and fitted with a drawstring for later cable insertion. Any changes of direction should be by long radius bend. If necessary, drill a suitable hole in the access shaft adjacent to the alarm probe terminal box, to accept the ducting and seal.
- 2.4.9 In traffic areas a suitable top slab must be constructed. The top slab should bear on a suitable foundation to prevent superimposed loads being transmitted to the unit and access shafts. Loads applied to covers and frames must bear on the top slab, not the access shaft.
- 2.4.10 The unit should be filled with clean water up to the invert level of the outlet pipe. Ensure the unit identification is placed/ marked inside the neck for future information. The unit is now ready for use.

2.5 Alarm Installation

- 2.5.1 Install the alarm probe and control panel, as per the Suppliers Alarm Installation Guidelines. Ensure that the probe is positioned correctly for the required storage of oil. The table below indicates the maximum volume of oil to be stored and the depth of floating oil expected in the separation chamber.

Unit	Required Minimum Oil Storage volumes in litres	Max. (100%)Depth of floating oil (Static)
NSBE010	150 litres	320mm
NSBE015	225 litres	335mm
NSBE020	300 litres	335mm
NSBE025	375 litres	385mm
NSBE030	450 litres	385mm
NSBE040	600 litres	420mm
NSBE050	750 litres	430mm
NSBE075	1125 litres	430mm
NSBE100	1500 litres	435mm
NSBE125	1875 litres	435mm

3 Operation

- 3.1.1 The unit is sized on treating a defined area and rainfall (5 mm/hour) EN.858 Part 1 and using the factor provided in the Environment agency guidelines PPG3. (0.0018 = 6.5mm/hr) The unit will treat the entire flow i.e. NSBE015 will treat a flow of 15 litres per second. If the flow is greater than this then the excess flow will bypass the main treatment chamber. A NSBE015 unit will work in bypass mode over 15 and up to 150 litres per second. Flows in excess of this will back up on to the site. During a storm, the rain falls and flushes any surface debris, silt or oil into the tank. This first flush, up to the maximum rated flow is fully treated. As the severity of the storm increases, so does the rate of flow increase. The liquid entering the separator after the first flush tends to be cleaner and so, in lower risk applications, is allowed to bypass the oil separation chamber for directly discharge.
- 3.1.2 The bypass unit has three chambers. The entire flow up to the units listed flow rating is fully treated and passes through all chambers. (E.g. NSBE015 treats 15 litres per second.)
- 3.1.3 Flows in excess of this rating will bypass the separation chamber and the liquid passes untreated to the outlet chamber.
- 3.1.4 The first chamber will accumulate silt and grit. The maximum volume that can be retained is the rating x 100 e.g. a NSBE015 is capable of holding 1500 litres of silt.
- 3.1.5 The second / separating chamber is sized to separate oil at the rated flow rate and to accumulate the required oil storage volume. A NSBE015 maximum oil storage volume is 225 litres. An oil probe should be positioned to detect the accumulation of oil when there is no or low flow conditions. The probe should be positioned so that the alarm operates at 90% of the rated oil storage volume.
- 3.1.6 In bypass flow conditions, the flow moves directly from the inlet to the outlet chamber avoiding the separating chamber.
- 3.1.7 Separators are purchased as Class 1 units. Class 1 Bypass Separators are fitted with a removable coalescer which also includes media to further improve the discharge quality. The coalescer media requires maintenance.
- 3.1.8 Bypass Class 1 Separators are not effective for the removal of soluble or emulsified pollutants such as oil/detergent mixes found in vehicle wash effluents. With permission such discharges should be drained to the foul sewer. Consult our technical department for Separation equipment to meet these applications.

4 Maintenance

4.1 Waste Removal and Servicing

- 4.1.1 Separated light liquid **must** be removed from separator when the oil capacity has been reached.
- 4.1.2 An oil level alarm system is available for purchase which gives warning when the separated light liquid/water interface level reaches 90% of the maximum recommended oil storage volume.
- 4.1.3 Separators should be inspected at least every six months or more frequently if experience dictates. A log should be maintained detailing the depth of oil found, any oil volume removed and any silt removal or cleaning carried out. A specimen maintenance log is included in the appendices.
- 4.1.4 Every site is different, in respect to the amount and type of silt generated by the drain design and installation. Frequently, the construction programme itself generates large and perhaps unusual quantities of silt and grit. We do recommend that following the initial installation, an inspection of the separator contents be made to check that building rubble has not entered the unit. Further inspections at 3 and 6 months should be made so as to be able to assess the volumes of silt and oil accumulated. The inspection and emptying programme can then be defined following the first 6 months site experience. We recommend leaving a maximum interval between inspections of 6 months.
- 4.1.5 Alarm probes should be removed and cleaned with water whenever waste material is removed from the separator. Please note the alarm may alert until the liquid level is replaced.
- 4.1.6 **Separator waste is a “special waste” under the terms of The Waste Management Code of Practice. The Code imposes a duty of care on the waste producer to ensure that the Cleansing contractor is registered with the Environment Agency and that the final disposal of the waste is to a licensed facility.**
- 4.1.7 You should consider the purchase of a maintenance service, which includes bi-annual inspections, removal of oil and silt, cleaning of the alarm probe and cleaning or replacement of the coalescer (where appropriate).

4.2 Waste Removal Procedure – Oil & Silt

- 4.2.1 **Oil can only be effectively removed when there is no flow entering the unit. Isolate the unit and prevent flow from entering. Always remove the oil before attempting to remove the coalescer. If this is not done, when the coalescer is withdrawn the oil can coat the media surface and when replaced the oil may be forced through the media, contaminating the effluent.**
- 4.2.2 Remove the access cover and lower the desludging hose in to the separation chamber. Draw off the surface oil.
- 4.2.3 If removing the silt, lower the desludge hose to the base of the tank and empty the contents of the chamber. Ensure that you access and clean both the inlet and the separation compartments.
- 4.2.4 Remove the alarm probe, if fitted, clean with water and replace.
- 4.2.5 Consider the period of time that the coalescer has been installed and consider removing and inspecting (cleaning or replacing) the coalescer media. If removed, ensure that it is correctly replaced into position. Replace the access covers. It is best to lower the water level to aid re-fitting.
- 4.2.6 Re-fill the separator with clean water up to the outlet level.
- 4.2.7 If an alarm is fitted, it will display an alarm condition until the separator is re-filled. Check alarm operation when unit full.

4.3 Checking the Coalescer Assembly

- 4.3.1 Coalescers, where fitted, may be cleaned periodically to maintain efficiency. Coalescers should be checked following a major incident and replaced if necessary. Please contact us if you wish to purchase the coalescer media.
- 4.3.2 Identify the type and size of separator (shown on labels inside the access neck).

- 4.3.3 Assemblies weighing less than 25 Kg may be removed by hand. Heavier assemblies should be lifted by mechanical means. Any lifting device employed must be capable of lifting:
- 4.3.3.a In excess of the maximum assembly weight.
 - 4.3.3.b The assembly completely out of the access shaft.
 - 4.3.3.c Giving a smooth and controlled lift.
 - 4.3.3.d Swinging the assembly to one side clear of the access shaft.

Unit	Dry Weight (Kg)	Wet Weight (Kg)	Silted Weight (Kg)	Number Within unit	Replacement Media Part No.
NSBE010	5.7 kg	≈50 kg	≈60 kg	1	402862
NSBE015	6.2 kg	≈55 kg	≈65 kg	1	402864
NSBE020	6.2 kg	≈55 kg	≈65 kg	1	402864
NSBE025	12.0 kg	≈65 kg	≈75 kg	1	402866
NSBE030	12.0 kg	≈65 kg	≈75 kg	1	402866
NSBE040	21.0 kg	≈100 kg	≈200 kg	1	402885
NSBE050	21.0 kg	≈100 kg	≈200 kg	1	402885
NSBE075	21.0 kg	≈100 kg	≈200 kg	2	402885
NSBE100	21.0 kg	≈100 kg	≈200 kg	2	402885
NSBE125	21.0 kg	≈100 kg	≈200 kg	3	402885

- 4.3.4 Ensure that the area around the access shaft is clear and that there is space to place the assembly once removed. If space is not available it will be necessary to support the assembly over the access shaft. e.g. by scaffold poles and platform.
- 4.3.5 Only remove the access cover when necessary to remove the assembly. Do not leave the access shaft uncovered and unattended.
- 4.4 Removing the coalescer assembly.**
- 4.4.1 Undo and remove the bracket which secures the coalescer to the access shaft.
 - 4.4.2 Lift the assembly with a smooth and steady motion. Coalescers will become lighter as water drains from the exposed media. Allow the water to drain completely. Assemblies blocked with fine silt may be very heavy.
 - 4.4.3 Fully extract the assembly and set it down adjacent to the access shaft.
- 4.5 Cleaning the coalescer assembly/ Media Replacement.**
- 4.5.1 Hose down the assembly using clean water at normal pressure. If the media is heavily contaminated with oil and silt, it may not be possible to clean it effectively by hosing. Do not allow untreated cleaning water to pass out of the unit. Continue hosing until the water runs clear.
 - 4.5.2 To replace the media, undo the banding. Slide media off the core tube and slide new media on. Ensure all the apertures on the core tube are covered by the media. Re-secure or replace banding. Consider replacing media and banding every two years.
- 4.6 Replacing the coalescer assembly.**
- 4.6.1 Position it over the access shaft.
 - 4.6.2 Lower the assembly steadily into the access shaft ensuring that the end locates within the sump at the bottom of the tank.
 - 4.6.3 Replace the access cover.

5 Emergencies

- 5.1.1 At sites where there is a high risk of spillage, spill kits containing drain seals, absorbent materials, disposal containers and other appropriate equipment should be held. In the event of a spillage on site, the material should be contained, (if a spill kit is not available, sand or soil may be used) and the Environment Agency notified immediately using the appropriate emergency hotline number listed in the Agency Guideline PPG3. Year 2011 - **0800 80 70 60**

6 Warranty

The company will replace or, at its option, properly repair without charge any goods which are found to be defective and which cause failure in normal circumstances of use **within a period of twelve months from the date of delivery.**

This warranty is conditional upon:

- (a) the Buyer notifying the Company of any claim within Seven days of the failure becoming discernible.
- (b) the Company being allowed a reasonable opportunity to inspect the goods so as to confirm that they are defective.
- (c) the goods not having been modified, mishandled or misused and being used strictly in accordance with any relevant instructions issued by the Company.

The Company's liability under this Clause is limited to the repair or replacement of the defective goods, and does not cover costs of transport, installation or associated site costs, if applicable.

The Company's liability to replace or repair the goods is in lieu of and excludes all other warranties and conditions, and in particular (but without limitation) the Company shall have no liability of any kind for consequential loss or damage.

For any further advice, please us.

A warranty form is included in this package, to register your unit for warranty. Please complete ALL sections of the form, and return it at your earliest convenience.

SEPARATOR MAINTENANCE LOG



Site address/location

Separator location

Type of separator

Nominal Flow

Total capacity

[illegible]

ABG Ltd

E7 Meltham Mills Road
Meltham
Holmfirth
West Yorkshire HD9 4DS

Tel: 01484 852096 Fax: 01484 851562

e-mail: geo@abgltd.com

website: www.abgltd.com



HAPAS Certificate

14/H220

Product Sheet 2

ABG GEOCOMPOSITE HIGHWAY DRAINAGE SYSTEMS

ABG FILDRAIN 7DW, 7DWF, 7DWP, 12SW, 12SWP AND 25SW SYSTEMS

This HAPAS Certificate Product Sheet⁽¹⁾ is issued by the British Board of Agrément (BBA), supported by the Highways Agency (HA) (acting on behalf of the Overseeing Organisations of the Department for Transport; Transport Scotland; the Welsh Assembly Government and the Department for Regional Development, Northern Ireland), the Association of Directors of Environment, Economy, Planning and Transport (ADEPT), the Local Government Technical Advisers' Group and industry bodies. HAPAS Certificate Product Sheets are normally each subject to a review every three years.

(1) Hereinafter referred to as 'Certificate'.

This Certificate relates to ABG Fildrain 7DW, 7DWF, 7DWP, 12SW, 12SWP and 25SW Systems, a range of geocomposite Systems for the collection and/or disposal of surface and sub-surface water from road verges and foundations. The Systems comprise an outer geotextile material and a cusped high density polyethylene core for use in vertical applications such as cut-off drains and verge drains.

CERTIFICATION INCLUDES:

- factors relating to compliance with HAPAS requirements
- factors relating to compliance with Regulations where applicable
- independently verified technical specification
- assessment criteria and technical investigations
- design considerations
- installation guidance
- regular surveillance of production
- formal three-yearly review.



KEY FACTORS ASSESSED

Geotextile properties — the geotextile component meets the requirements of Manual of Contract Documents for Highway Works (MCHW) Volume 1, sub-clause 514.4 (see section 6).

Geocomposite — the geocomposite provides suitable flow characteristics provided the Systems are correctly installed in accordance with MCHW Volume 1, clause 514 (see section 7).

Durability — under normal soil conditions and temperatures, the Systems will have a service life in excess of 50 years (see section 10).

The BBA has awarded this Certificate to the company named above for the Systems described herein. These Systems have been assessed by the BBA as being fit for their intended use provided they are installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

B C Chamberlain

Claire

Date of First issue: 15 January 2015

Brian Chamberlain

Claire Curtis-Thomas

Head of Approvals — Engineering

Chief Executive

The BBA is a UKAS accredited certification body — Number 113. The schedule of the current scope of accreditation for product certification is available in pdf format via the UKAS link on the BBA website at www.bbacerts.co.uk

Readers are advised to check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA direct.

British Board of Agrément
Bucknalls Lane
Watford
Herts WD25 9BA

©2015

tel: 01923 665300
fax: 01923 665301
clientservices@bba.star.co.uk
www.bbacerts.co.uk

Requirements

In the opinion of the BBA, ABG Fildrain 7DW, 7DWF, 7DWP, 12SW, 12SWP and 25SW Systems, when used in accordance with the provisions of this Certificate, will meet or contribute to meet the requirements of the Manual of Contract Documents for Highway Works (MCHW)⁽¹⁾, Volume 1, Series 500, Clause 514.

Further information and guidance is given in the MCHW, Volume 2 and Volume 3 (Drawing B and F series), DMRB Volume 4, Section 2 (HD 33/06 document).

Additional site requirements may be included on particular contracts, and in general will be given in Appendix 5/4 of these contract documents.

- (1) The MCHW is operated by the Overseeing Organisations: the Highways Agency (HA), Transport Scotland, the Welsh Assembly Government and the Department for Regional Development (Northern Ireland).
- (2) This Certificate will be fully compliant with the new version of clause 514 expected to be published during 2015. In the meantime, the BBA has evaluated the physical characteristics as defined in the current clause 514, but the evaluation and testing has been in accordance with the appropriate BS EN test methods that have replaced the withdrawn British Standards referred to in the current Clause 514.

Regulations

Construction (Design and Management) Regulations 2007

Construction (Design and Management) Regulations (Northern Ireland) 2007

Information in this Certificate may assist the client, CDM co-ordinator, designer and contractors to address their obligations under these Regulations.

See section: 1 Description (1.2) of this Certificate.

Additional Information

CE marking

The Certificate holder has taken the responsibility of CE marking the Systems in accordance with harmonised European Standard BS EN 13252 : 2014. An asterisk (*) appearing in this Certificate indicates that data shown is given in the manufacturer's Declaration of Performance.

Technical Specification

1 Description

1.1 ABG Fildrain 7DW, 7DWF, 7DWP, 12SW, 12SWP and 25SW Systems comprise a range of geocomposite drainage Systems (see Table 1) consisting of a single- or double-cusped HDPE (high density polyethylene) core bonded to a non-woven geotextile filter on one side and fully wrapped over the opposite side. Double-cusped products permit the water to enter the geocomposite through both faces, single-cusped composite permits water to enter via one face only. The HDPE cusped core component allows the water to flow in all directions.

1.2 The Fildrain HDPE core components are available in standard widths of 0.3 m to 1.1 m and length⁽¹⁾ of 50 metres.

(1) Other lengths and widths may be manufactured to order.

1.3 The integral geotextile component is 1.1 mm thick (at 2 kPa), non-woven filtration material (ST 170).

1.4 The specific pipes used with Type 7DWF, 7DWP and 12SWP Systems are outside the scope of this Certificate.

1.5 Details of other components used with the Systems outside the scope of this Certificate are:

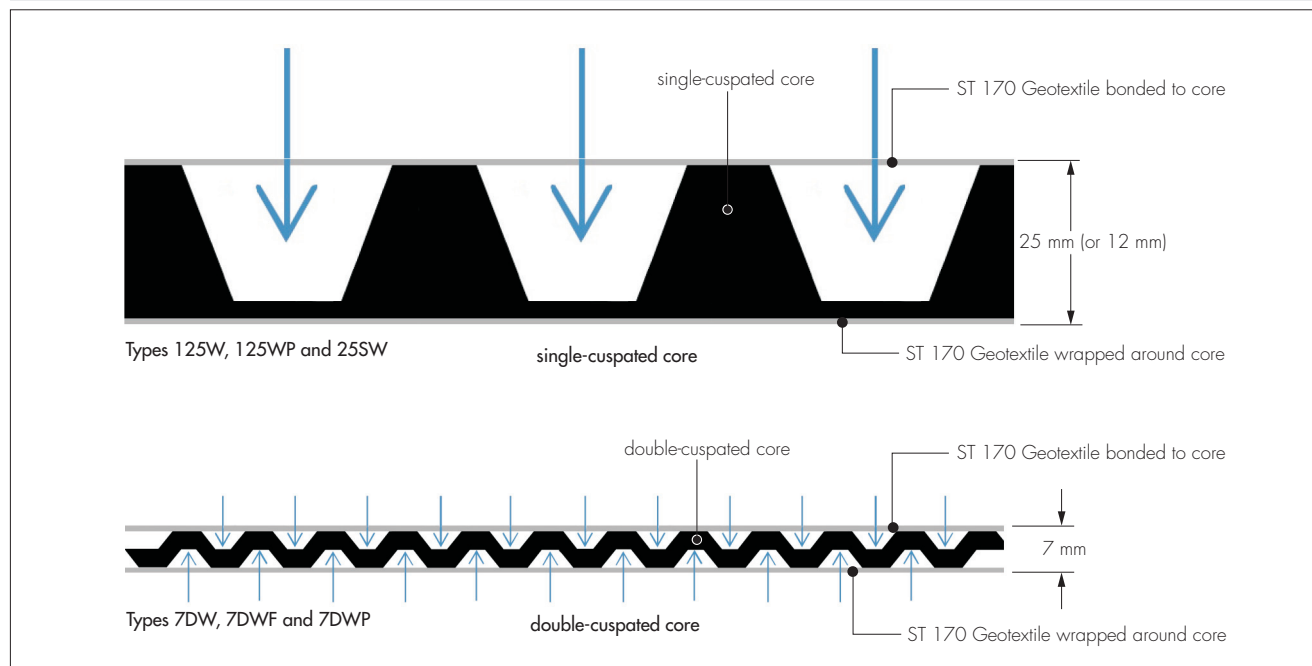
- backfill and surround material to pipe — granular material to a suitable specification compatible with the System type flow rate and CE marked to BS EN 13242 : 2013 and must comply with the requirements of the MCHW, volume 1, sub-clause 514.9. Trench backfill must be the original as dug material unless otherwise stated in Appendix 5/4
- jointing tape — for sealing geotextile material
- gulley bypass fittings or geotextile hoods.

Table 1 Fildrain range (see Figure 1)

Type	Description
7DW	A 0.6 mm thick, 600 g·m ⁻² membrane formed into a double-cuspated (7 mm dimple height) HDPE core which is fully wrapped with ST 170 geotextile. The geotextile is bonded to the core dimples on one side only, wrapped over the other side of the core and bonded to itself to hold the product together
7DWF ⁽¹⁾	A 0.6 mm thick, 600 g·m ⁻² membrane formed into a double-cuspated (7 mm dimple height) HDPE core which is fully wrapped with ST 170 geotextile. The geotextile is bonded to the core dimples on one side only, wrapped over the other side of the core and bonded to itself to hold the product together. Two flaps are sewn at the base of the System to enable wrapping of a perforated carrier pipe
7DWP ⁽¹⁾	A 0.6 mm thick, 600 g·m ⁻² membrane formed into a double-cuspated (7 mm dimple height) HDPE core which is fully wrapped with ST 170 geotextile. The geotextile is bonded to the core dimples on one side only, wrapped over the other side of the core and bonded to itself to hold the product together. A geotextile sleeve is stitched at the base to accommodate a perforated carrier pipe
12SW	A 0.9 mm thick, 900 g·m ⁻² membrane formed into a single-cuspated (12 mm dimple height) HDPE core which is fully wrapped with ST 170 geotextile. The geotextile is bonded to the core dimples on one side only, wrapped over the rear (flat) side of the core and bonded to itself to hold the product together
12SWP ⁽¹⁾	A 0.9 mm thick, 900 g·m ⁻² membrane formed into a single-cuspated (12 mm dimple height) HDPE core which is fully wrapped with ST 170 geotextile. The geotextile is bonded to the core dimples on one side only, wrapped over the rear (flat) side of the core and bonded to itself to hold the product together. A geotextile sleeve is stitched at the base to accommodate a perforated carrier pipe
25SW	A 1.5 mm thick, 1500 g·m ⁻² membrane formed into a single-cuspated (25 mm dimple height) HDPE core which is fully wrapped with ST 170 geotextile. The geotextile is bonded to the core dimples on one side only, wrapped over the rear (flat) side of the core and bonded to itself to hold the product together

(1) Type 7DWF, 7DWP and 12SWP are for use in conjunction with perforated or porous carrier pipe to MCHW Volume 1.

Figure 1 Cross section of geocomposite



2 Manufacture

2.1 The ST 170 component is a non-woven geotextile fabric comprising 100% virgin high tenacity polypropylene material mechanically bonded by needle-punching.

2.2 The cuspated core component is extruded from high-density polyethylene.

2.3 During assembly, the core is fully wrapped with the geotextile and bonded using hot-melt adhesive to the core dimples on one side only.

2.4 As part of the assessment and ongoing surveillance of product quality, the BBA has:

- agreed with the manufacturer the quality control procedures and product testing to be undertaken
- assessed and agreed the quality control operated over batches of incoming materials
- monitored the production process and verified that it is in accordance with the documented process
- evaluated the process for management of nonconformities
- checked that equipment has been properly tested and calibrated
- undertaken to carry out the above measures on a regular basis through a surveillance process, to verify that the specification and quality control operated by the manufacturer are being maintained.

2.5 The management System of ABG Limited has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2008 by ISOQAR (Certificate 570/QMS001).

3 Delivery and site handling

3.1 The geocomposite is delivered to site in rolls with a polythene protective wrapper, bearing a label including the manufacturer's name, product details, batch number and the BBA identification mark, incorporating the number of this Certificate. In addition, information associated with the identification of the System is supplied by the Certificate holder in accordance with MCHW, Volume 1, sub-clause 514.12.

3.2 When handling, rolls must be carried or rolled avoiding dragging as this will damage the geotextile material.

3.3 The geocomposite must be stored on a clean, level surface and protected from direct heat and/or sunlight. The polythene wrapper must not be removed until immediately before installation.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on the ABG Fildrain 7DW, 7DWF, 7DWP, 12SW, 12SWP and 25SW Systems.

Design Considerations

4 General

4.1 ABG Fildrain 7DW, 7DWF, 7DWP, 12SW, 12SWP and 25SW Systems, when installed in accordance with the requirements of the MCHW, Volume 1, sub-clause 514.11, the Certificate holder's instructions and the relevant parts of this Certificate are satisfactory as a drainage layer for use in a vertical plane adjacent to the edge of the carriageway for the conveyance of infiltration water from surrounding surfaces or substrates.

4.2 The Systems components are made from materials resistant to the adverse effects of short-term exposure to UV light. They are also resistant to degradation by acids, alkalis and other common chemicals and the effects of bacteria, fungi and mould found in soil or highway construction materials.

4.3 In the event of accidental exposure to chemicals (including spillage of oil, petrol and diesel), the installed Systems must be examined and assessed for possible damage. If necessary, the geocomposite should be replaced.

5 Practicability of installation

These Systems are designed to be installed by a competent highways contractor, experienced with using these types of products.

6 Geotextile properties

The ST 170 geotextile meet the requirements of the MCHW, volume 1, sub-clause 514.4 (i), (ii), (iii), (iv), (v) and (vi). The geotextile characteristics are given in Table 2.

Table 2 Geotextile nominal characteristics

Test (units) ⁽¹⁾	Test Standard	Declared values (tolerance)	Requirement ⁽²⁾ (MCHW clause 514)
Tensile strength* (kN·m ⁻¹)	BS EN ISO 10319	MD ⁽³⁾ 14.4 (±1.4) CD ⁽³⁾ 15.5 (±1.5)	>5.0
Elongation at maximum load* (%)	BS EN ISO 10319	MD ⁽³⁾ 65 (±13) CD ⁽³⁾ 75 (±14)	>10
Mean opening size O ₉₀ * (µm)	BS EN ISO 12956	70 (±20)	(see note 4)
Resistance to static puncture* (N)	BS EN ISO 12236	2050 (±200)	1200
Dynamic perforation* (Cone drop test) (mm)	BS EN ISO 13433	24 (±3)	<40
Water permeability normal to the plane* (l·m ⁻² ·s ⁻¹)	BS EN ISO 11058	75 (±15)	(see note 2)
Breakthrough head (mm)	BS 6906-3 ⁽⁴⁾	2.00	<50

(1) An asterisk (*) indicates that data shown is given in the manufacturer's Declaration of Performance under CE marking.

(2) Clause 514 requires the compiler of the site specific specification to state the required value in Appendix 5/4.

(3) Machine direction (MD) along the roll length, Cross Machine Direction across the width (CD).

(4) Refer to MCHW Volume 1, Cause 514, Section 4 (vi) and MCHW Volume 2, Clause NG 514, Section 1.

7 Geocomposite

ABG Fildrain 7DW, 7DWF, 7DWP, 12SW, 12SWP and 25SW Systems meet the requirements of the MCHW, volume 1, sub-clause 514.5 (i), (ii) and (iii). The declared performance/test results in relation to the characteristics of the geocomposite are given in Table 3.

Table 3 Geocomposite characteristics — Declared values (tolerances)

Test ⁽¹⁾	Test Standards	System type		
		7DW/7DWF/7DWP	12SW/12SWP	25SW
Tensile strength* (kN·m ⁻¹)	BS EN ISO 10319			
MD		32 (±3.2)	28 (±2.8)	40 (±4.0)
CD		31 (±3.1)	31 (±3.1)	31 (±3.1)
Elongation (%)	BS EN ISO 10319			
MD		50	45	63
CD		53	65	73
Static Puncture Resistance (kN)	BS EN ISO 12236	5.1 (±1.0)	4.5 (±0.9)	5.0 (±1.0)
Cone drop hole diameter (mm)	BS EN ISO 13433	7 (±3)	6 (±2)	3 (±1)
In-plane flow (l·m ⁻¹ ·s ⁻¹)	BS EN ISO 12958			
At 20 kPa, Hydraulic gradient 0.1		0.28	1.25	3.7
At 20 kPa, Hydraulic gradient 1.0*		1.35	4.25	11.5
At 50 kPa, Hydraulic gradient 0.1		0.24	1.05	3.4
At 50 kPa, Hydraulic gradient 1.0		1.20	3.75	10.0
At 100 kPa, Hydraulic gradient 0.1		0.18	0.85	3.0
At 100 kPa, Hydraulic gradient 1.0		0.95	3.20	8.5
Long-term In-plane flow ⁽²⁾ applicable where the maximum normal to the load is 50 kPa at HG 1.0 (0.1)		0.95 (0.18)	3.20 (0.85)	8.5 (3.0)
Durability* resistance to				
weathering		Satisfactory	Satisfactory	Satisfactory
chemical ageing		Satisfactory	Satisfactory	Satisfactory
microbiological degradation		Satisfactory	Satisfactory	Satisfactory

(1) An asterisk (*) indicates that data shown is given in the manufacturer's Declaration of Performance under CE marking.

(2) The long-term flow assessed by the BBA based on test data provided.

8 Joints

8.1 The jointing of Fildrain Systems must comply with the requirements of the MCHW, Volume 1, sub-clause 514.6 and must be formed to prevent the ingress of soil particles or other extraneous material into the drain. Drain joints must be parallel to the direction of flow and any exposed edges must be protected from the ingress of soil by a geotextile wrapping with a minimum overlap of 150 mm.

8.2 The Fildrain Systems should be jointed into pipe Systems or chambers for inflow and outflow purposes through purpose made attachment pieces for forming continuous drain lengths.

9 Maintenance

9.1 For Fildrain Systems, regular clearing/cleaning of the pipe by rodding or jetting may be necessary.

9.2 Pipeless Systems are confined within a soil structure and therefore, do not require maintenance.

10 Durability

10.1 The Systems are durable and sufficiently robust to resist the mechanical stresses imposed during installation and the design life. Under normal conditions of use (eg in soils with pH 4 to 9 at 25°C), the geocomposite will provide an effective barrier to the transmission of salts, liquid water and water vapour for a design life excess of 50 years.

10.2 Where the Systems are used in soils which could potentially be aggressive (ie outside the pH range indicated in 10.1), guidance from the Certificate holder must be sought.

Installation

11 General

11.1 ABG Fildrain 7DW, 7DWF, 7DWP, 12SW, 12SWP and 25SW Systems must be installed in accordance with the MCHW, volume 1, sub-clause 514.11; volume 3, Drawing numbers F18 and F19.

11.2 The main surface water drainage is installed with junctions at gully positions prior to laying Fildrain.

11.3 The line of the Fildrain is set out with the horizontal and vertical tolerances allowed taking into account any possible trench over-break on the capping layer.

11.4 Although the geocomposite is sufficiently robust to resist mechanical stresses imposed during the installation process, care must be taken to ensure damage is avoided.

11.5 The geocomposite can be cut to size using a sharp knife.

11.6 It is essential that no gaps are left in the installed Fildrain that could allow the soil to enter the core.

11.7 Once unwrapped, the Systems must be installed and backfilled within two weeks to prevent damage from ultra-violet sunlight.

12 Procedure

12.1 A trench is excavated and prepared using an excavator with a narrow bucket with a rounded invert to eliminate the use of bedding stone. Alternatively, trenching machinery may be used.

12.2 The Fildrain is unrolled alongside the trench and cut to length using a sharp knife or disc saw.

12.3 When unrolled, the upper side of Fildrain 12SW, 12SWP and 25SW is the permeable side intended for the water flow (ie the dimpled side placed facing the carriageway side).

12.4 The Fildrain must be lifted into the trench and held in a vertical position, ensuring the top edges of the Fildrain Systems are level with the top of the sub-base. Care must be taken to avoid damaging the trench excavation. Usually, Fildrain is placed against the capping layer side of the trench.

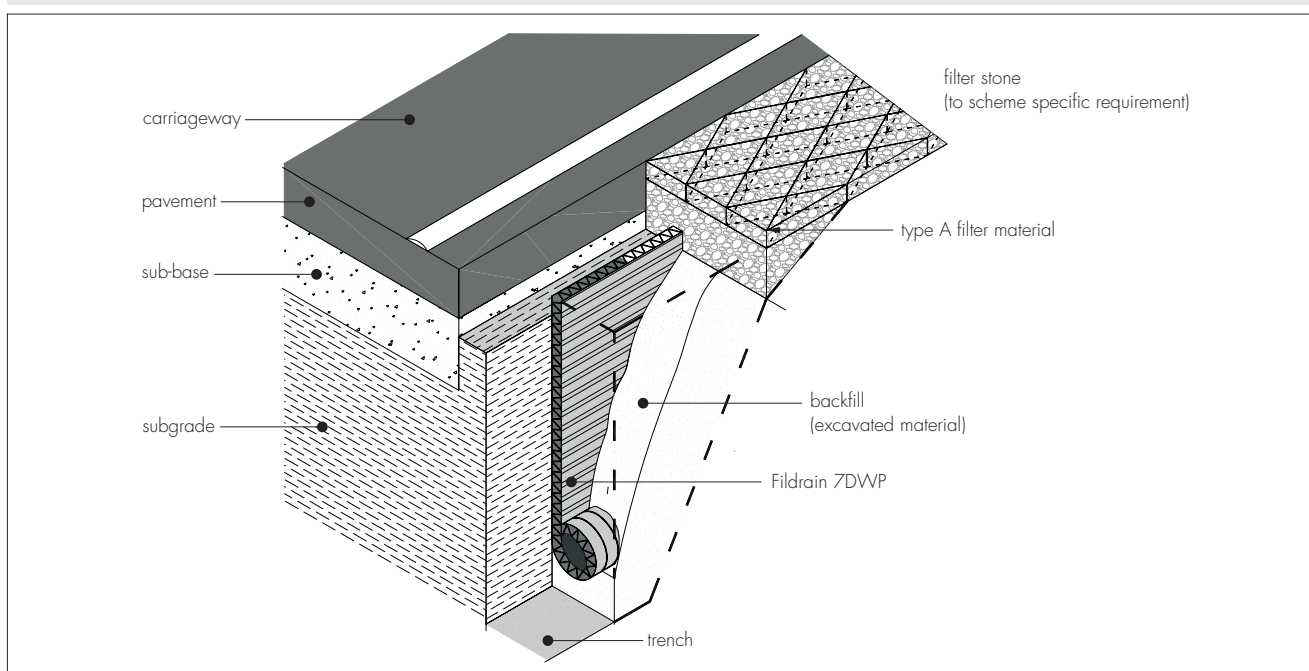
12.5 For Fildrain 25SW, special fittings are available for joining rolls and outfalls.

12.6 For 7DWF, 7DWP and 12SWP Fildrain Systems, where Fildrain sleeves join, they must be sealed together with jointing tape to prevent the ingress of soil. The pipe is inserted into the sleeve using a built-in draw cord and adjoining pipes connected together with standard couplings. The perforated or slotted pipe is installed at the base and connected to a suitable outfall.

12.7 The appropriate backfill (see section 1.4) is placed in layers max of 300 mm over the trench and, if filter stone is to be used should be to a depth of 300 mm. At least 100 mm of the Fildrain should project into the course of filter stone.

12.8 To accommodate crossing pipes, gully connections or ducts, special fittings may be used to maintain the longitudinal flow capacity. For more information, the advice of the Certificate holder should be sought.

Figure 2 Typical installation (Fildrain 7DWP shown)



13 Repair

13.1 In the event that the geotextile component material is damaged either before or after installation it must be repaired using a patch of new geotextile material taped in position over the hole, using jointing tape.

13.2 If the core is damaged, this is cut out and a new piece inserted and securely taped in position, using jointing tape.

14 Tests

14.1 Test data on the geotextiles were assessed to determine:

- tensile strength and elongation
- puncture resistance
- tear resistance
- pore size
- water flow
- breakthrough head.

14.2 Test data on the composite drain were assessed to determine:

- flow rate through composite
- compression under shear and normal load
- short-term equivalent load
- in-plane flow.

14.3 Test data were assessed in relation to the product's resistance to:

- the deleterious effects of short-term exposure to UV light
- degradation by acids, alkalis and other common chemicals (including oil, petrol and diesel)
- the effects of bacteria, fungi and moulds found in soil or highway construction materials.

15 Investigations

15.1 The manufacturing process was evaluated, including the methods adopted for quality control, and details were obtained of the quality and compositions of materials used.

15.2 A visit to a site in progress was carried out to assess the practicability of the installation procedures.

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- DMRB, Volume 4, Section 2 (HD 33/06 document)
- Manual of Contract Documents for Highway Works, Volume 1 *Specification for Highway Works*
- Manual of Contract Documents for Highway Works, Volume 2 *Notes for Guidance on the Specification for Highway Works*
- Manual of Contract Documents for Highway Works, Volume 3 *Highway Construction Details*

16 Conditions

16.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is issued only to the company, firm, organisation or person named on the front page — no other company, firm, organisation or person may hold or claim that this Certificate has been issued to them
- is valid only within the UK
- has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective
- is copyright of the BBA
- is subject to English Law.

16.2 Publications, documents, specifications, legislation, regulations, standards and the like referenced in this Certificate are those that were current and/or deemed relevant by the BBA at the date of issue or reissue of this Certificate.

16.3 This Certificate will remain valid for an unlimited period provided that the product/system and its manufacture and/or fabrication, including all related and relevant parts and processes thereof:

- are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA
- continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine
- are reviewed by the BBA as and when it considers appropriate.

16.4 The BBA has used due skill, care and diligence in preparing this Certificate, but no warranty is provided.

16.5 In issuing this Certificate, the BBA is not responsible and is excluded from any liability to any company, firm, organisation or person, for any matters arising directly or indirectly from:

- the presence or absence of any patent, intellectual property or similar rights subsisting in the product/system or any other product/system
- the right of the Certificate holder to manufacture, supply, install, maintain or market the product/system
- actual installations of the product/system, including their nature, design, methods, performance, workmanship and maintenance
- any works and constructions in which the product/system is installed, including their nature, design, methods, performance, workmanship and maintenance
- any loss or damage, including personal injury, howsoever caused by the product/system, including its manufacture, supply, installation, use, maintenance and removal
- any claims by the manufacturer relating to CE marking.

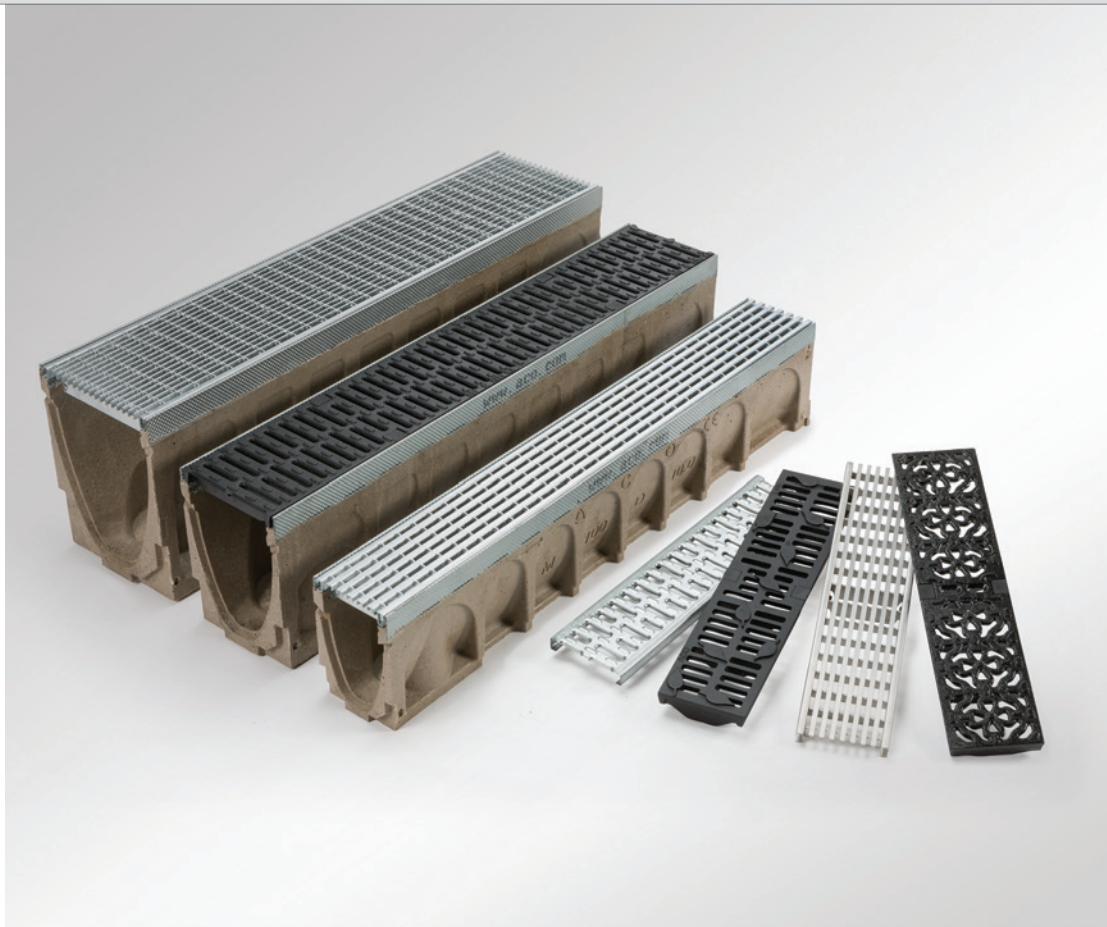
16.6 Any information relating to the manufacture, supply, installation, use, maintenance and removal of this product/system which is contained or referred to in this Certificate is the minimum required to be met when the product/system is manufactured, supplied, installed, used, maintained and removed. It does not purport in any way to restate the requirements of the Health and Safety at Work etc. Act 1974, or of any other statutory, common law or other duty which may exist at the date of issue or reissue of this Certificate; nor is conformity with such information to be taken as satisfying the requirements of the 1974 Act or of any statutory, common law or other duty of care.

ACO Water Management:

Civils + Infrastructure

Uniclass L2123 + L7315	EPIC J3413
CI/SfB (52.5)	

ACO MultiDrain® MD



ACO MultiDrain® MD

Medium duty channel drainage system



Introduction to the ACO Group

Throughout the world ACO branded drainage and surface water management systems are recognised for their innovative design, high quality manufacture, environmental excellence and industry leading performance.

Today the ACO Group has a research and production base that reaches across four continents. This unmatched resource pioneers the development of solutions that are tailored to individual applications, meeting the need for high performance, sustainable products that deliver optimum value throughout their operational life.

ACO Technologies plc

ACO operates as ACO Technologies plc in the United Kingdom. Founded over 30 years ago, the company has grown quickly on a reputation for design innovation and customer service.

There are now 2 divisions within ACO Technologies that serve every sector of the construction industry, providing solutions for applications as diverse as rail, highways, airports, landscaping, retail, distribution centres and environmentally sensitive projects.



To help architects, designers and contractors meet the legal requirements that now tightly control the way surface water is managed, ACO has created its unique system chain that combines a 'Surface Water Management Cycle' – Collect, Clean, Hold, Release, with the service support of Train, Design, Support and Care.

These processes enable ACO to offer a combination of product and service expertise necessary for the complete and sustainable management of surface water drainage.



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Introduction to ACO MultiDrain® MD

ACO MultiDrain® MD benchmarks a new approach in the planning, delivery and installation of general purpose channel drainage systems. Designed to provide an effective solution for a wide variety of applications, ACO MultiDrain® MD system maximises functionality whilst using the minimum number of components.

What is ACO MultiDrain® MD?

ACO MultiDrain® MD channel drainage system is manufactured from Vienite®, ACO's sustainable high strength material. It is available in three widths; 100mm, 150mm and 200mm, and has a variety of depths and slopes.

The channel units are certified to BS EN 1433: 2002 Load Class D 400* and form the main components of the system.

Depending on the load class and application requirement, a wide range of gratings are available to complete the system. You can now choose from a range of traditional and discreet slot drainage gratings, solid covers and cross footpath drainage units to ensure all applications are catered for.

All gratings within the system are fitted with ACO Drainlock™, a bar-less locking device which reduces the risk of blockage and improves hydraulic capacity. The mechanism also provides for easy installation and maintenance of the system.

As standard, channels are manufactured with UltraSTEEL™ protective edge rails. The UltraSTEEL™ rails, with their unique patented design, provide optimum channel protection and improved bonding between channel sides and the surrounding pavement material.



ACO MultiDrain® MD System can provide a channel drainage solution for many applications by simply selecting the appropriate channel depth and grating type. Some of the applications that can be catered for are listed below.

- ▶ Threshold drainage
- ▶ Public landscaping
- ▶ Car parking
- ▶ Light industrial
- ▶ HGV parking
- ▶ Petrol station forecourts
- ▶ SuDS

Discreet slot drainage

Apply the ACO Brickslot grating to the channel unit to form an unobtrusive drainage system. The off-set grating can be used as a solution for threshold drainage and also against buildings eliminating difficult installations. The gratings are suitable for BS EN 1433: 2002 Load Class C 250 and D 400* applications.

ACO Brickslot gratings are available for 100mm, 150mm and 200mm wide channels, in both galvanised or stainless steel. See page 18 for further details.

Services ducts

The ACO MultiDrain® MD System includes a solid cover grating which when applied to the main channel unit provides a secure shallow trench with easy access to services and cabling.

Cross footpath drainage

Where roof drainage from down pipes is required to cross the footpath into the road gutter, a range of down pipes connectors, kerb outlets and shallow channels are available within the ACO MultiDrain® MD System range. See page 38 for further details.

This system is only available in the ACO MultiDrain® M100D System.

Threshold drainage

The ACO MultiDrain® MD System can be used to provide unobtrusive drainage around building entrances, compliant with the building regulations (England and Wales Part M, Scotland Section 4, Northern Ireland Part R). Simply select the appropriate grating to meet your aesthetic requirements.

Why choose ACO MultiDrain® MD?

Made from sustainable materials

ACO MultiDrain® MD channel elements are manufactured from Vienite®. Vienite® is ACO's new high strength sustainable material that meets environmental and sustainability targets for construction products.

Vienite® utilises high levels of post consumer recycled waste, but unlike some recycled materials does not compromise on strength or long term performance.

Vienite's high strength characteristics means the material is four times stronger than traditional concrete and has a low water absorption rate. It is also resistant to freeze thaw attack and has excellent chemical resistance.

At the end of the products operational life, Vienite® can be collected, processed and returned to production as a raw material.



System benefits

- ▶ Provides an efficient drainage solution for a wide variety of applications
- ▶ Range of constant, sloped and shallow depth channels
- ▶ Caters for a range of catchment areas
- ▶ Strong and robust channel design
- ▶ Patented UltraSTEEL™ channel edge rail for improved strength and durability
- ▶ CE Marked and BS EN 1433: 2002 certificated to Load Class D 400*
- ▶ Extensive choice of gratings and accessories for many applications
- ▶ Choice of outlet options, gullies, sumps or channel knockouts
- ▶ Unique ACO Drainlock™ grating fixing improves hydraulic capacity
- ▶ Lightweight design is simple and fast to install
- ▶ 100% recyclable
- ▶ Ideal for use against building facades or as a Part M threshold drainage solution when used with ACO MultiDrain® Brickslot grating



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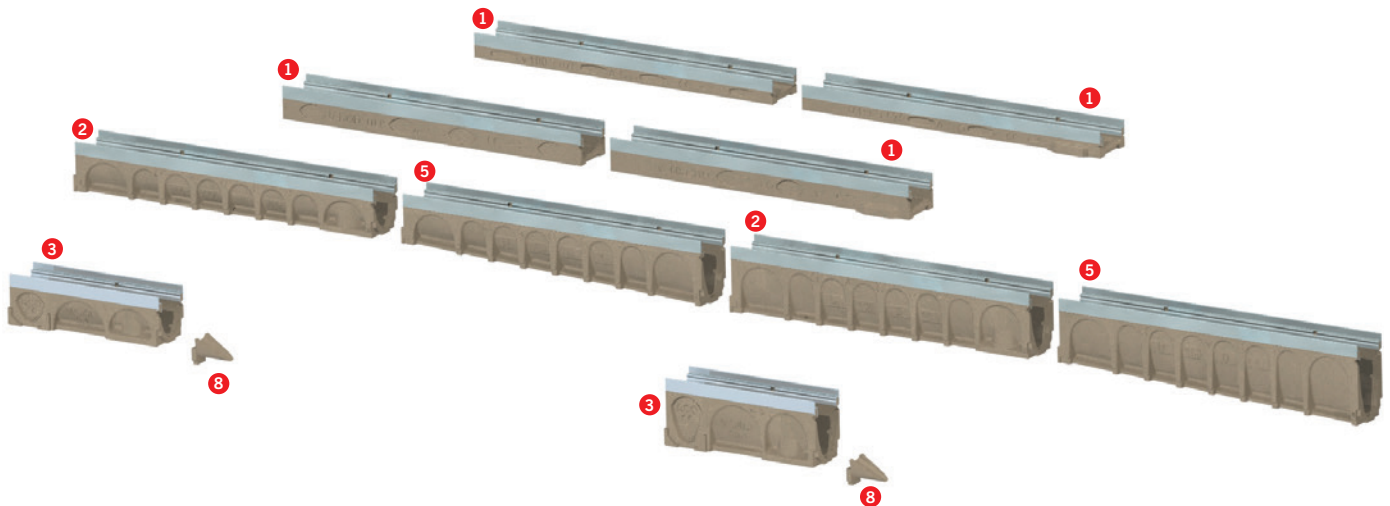
ACO MultiDrain® MD range layout

To support a wide variety of catchment depths, hydraulic capacities and applications, the system is available in three channel widths, 100mm, 150mm and 200mm and has a range of constant depths, shallow depth and sloping depth channels to suit the drainage design.

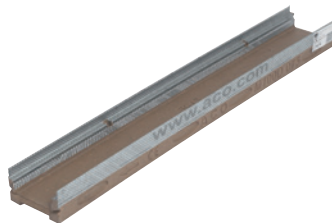
The layout below illustrates the channels and accessories available within the ACO MultiDrain® MD range and to aid product selection, a summary of the function and feature of each component is provided.

All ACO MultiDrain® MD channels can be purchased with galvanised or stainless steel edge rails.

Further details can be found on pages 13 – 37 of this brochure.



1 Shallow depth channels



- ▶ **100mm wide bore:** Four shallow channel units are available in 1m lengths with an overall depth of 75mm or 100mm.
- ▶ **150mm wide bore:** One shallow channel unit is available in 1m length with an overall depth of 100mm.
- ▶ **200mm wide bore:** One shallow channel unit is available in 1m lengths with an overall depth of 100mm.

Standard option available includes vertical cast-in TPE seal for connection to Ø110mm pipework.

2 Constant depth channels



- ▶ **100mm wide bore:** Four constant depth channel units are available in 1m lengths with overall depths ranging from 150mm to 300mm.
- ▶ **150mm wide bore:** Three constant depth channel units are available in 1m lengths with overall depths ranging from 210mm to 310mm.
- ▶ **200mm wide bore:** Three constant depth channel units are available in 1m lengths with overall depths ranging from 265mm to 365mm.

These channels include a vertical knockout for connection to Ø110mm (100mm wide bore channels) or Ø160mm (150mm and 200mm wide bore channels) pipework.

3 Constant depth channels – 0.5m



- ▶ **100mm wide bore:** Four 0.5m constant depth channel units are available with overall depths ranging from 150mm to 300mm.
- ▶ **150mm wide bore:** Three 0.5m constant depth channels with overall depths ranging from 210mm to 310mm.
- ▶ **200mm wide bore:** Three 0.5m constant depth channels with overall depths ranging from 265mm to 365mm.

These channels include vertical knockout for connection to Ø110mm (100mm wide bore) or Ø160mm (150mm and 200mm wide bore) pipework and side knockout for 90° channel connections.

4 Universal sump



Each system width has one 0.5m Universal sump for connection to all channels. Outlet options for Ø110mm and Ø160mm pipes and foul air traps. Plastic silt bucket provided with each unit.

5 Sloping depth channels

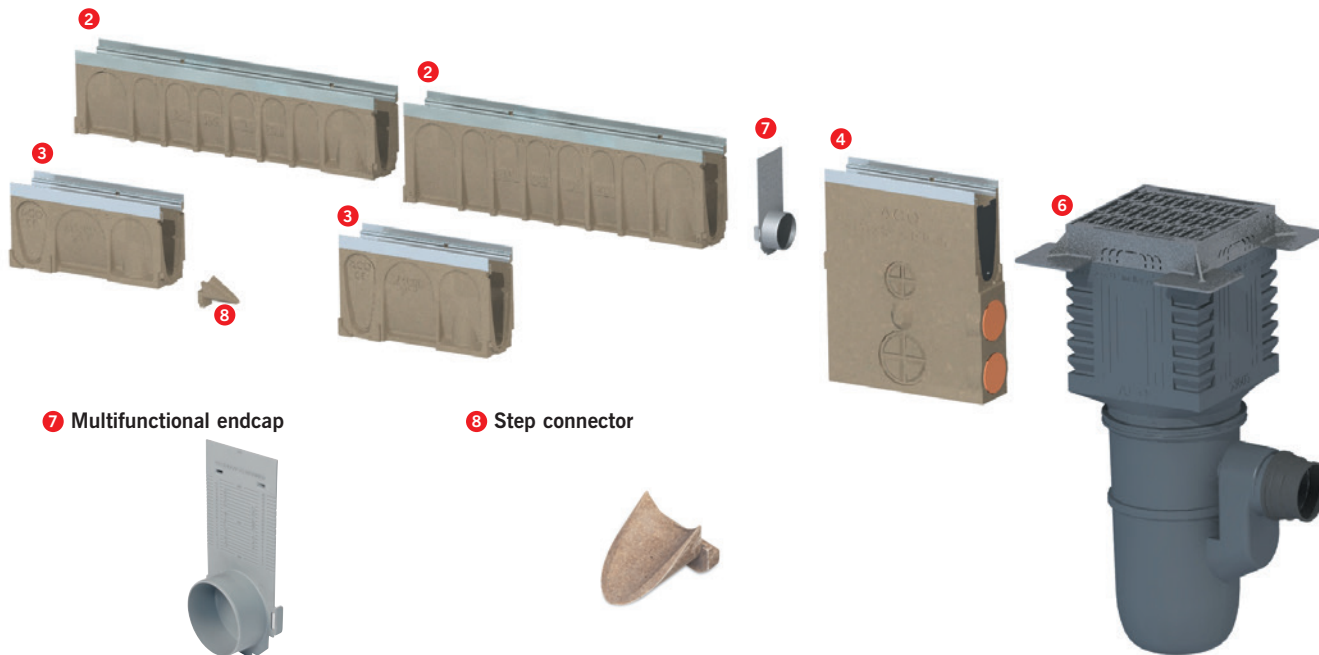


► **100mm wide bore:** Twenty 1m sloping channels with 0.5% fall in depths from 150mm to 250mm.

6 Universal gully



One Universal gully for all applications and channel widths from Load Class A 15 to D 400. Standard features include ductile cast iron cover, silt bucket and roddable foul air trap for connection to Ø160mm PVC-U pipe.



7 Multifunctional endcap



One plastic universal endcap for each channel width. Provides a closing or outlet option to Ø110mm (100mm wide bore channels) or Ø160mm (150mm and 200mm wide bore channels) pipes.

8 Step connector



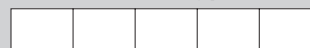
A polymer concrete unit which helps provide smooth water transition between constant depth channels when used in a stepped system design. The Step connector is suitable for the 50mm step between each of the constant channel depths.

Guidance for using the ACO MultiDrain® MD parts tables

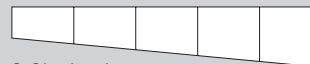
The ACO MultiDrain® MD parts tables are shown on the following pages. The product information is split down by channels widths and further by channel depth and edge rail type. This is to enable quick and simple product identification and selection.

The tables for ACO MultiDrain® MD channels list a number associated with the Invert Type. This number highlights the drainage design which can be achieved when using these channels. The key for the Invert Type is shown opposite.

Channel invert types



1 Constant Depth Invert



2 Sloping Invert



3 Stepped Invert

ACO MULTIDRAIN® FEATURES OVERVIEW



Anti shunt
feature holds
grating securely
in place

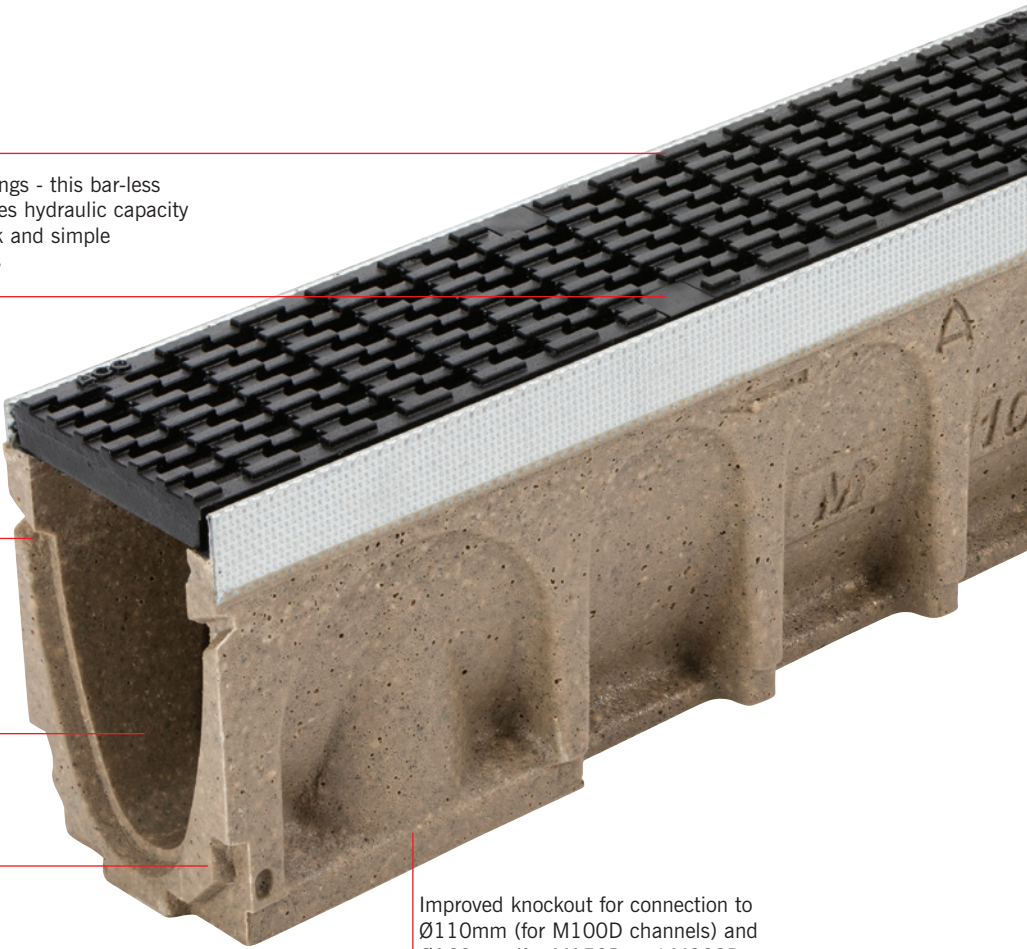


ACO Drainlock™ gratings - this bar-less
locking device improves hydraulic capacity
and provides for quick and simple
installation of gratings

Sealant groove for simple
watertight installations

V shaped channel bore improves
speed of water flow and promotes
self cleansing

Male and female channel
connections to aid fast installation.



Improved knockout for connection to
Ø110mm (for M100D channels) and
Ø160mm (for M150D and M200D
channels) PVC-U pipes.



LOAD CLASSES



A 15
Pedestrian, cycleways,
minimally trafficked
areas (light domestic
vehicles only).



B 125
Pedestrian precincts,
light vehicles, private
car parks and drives.

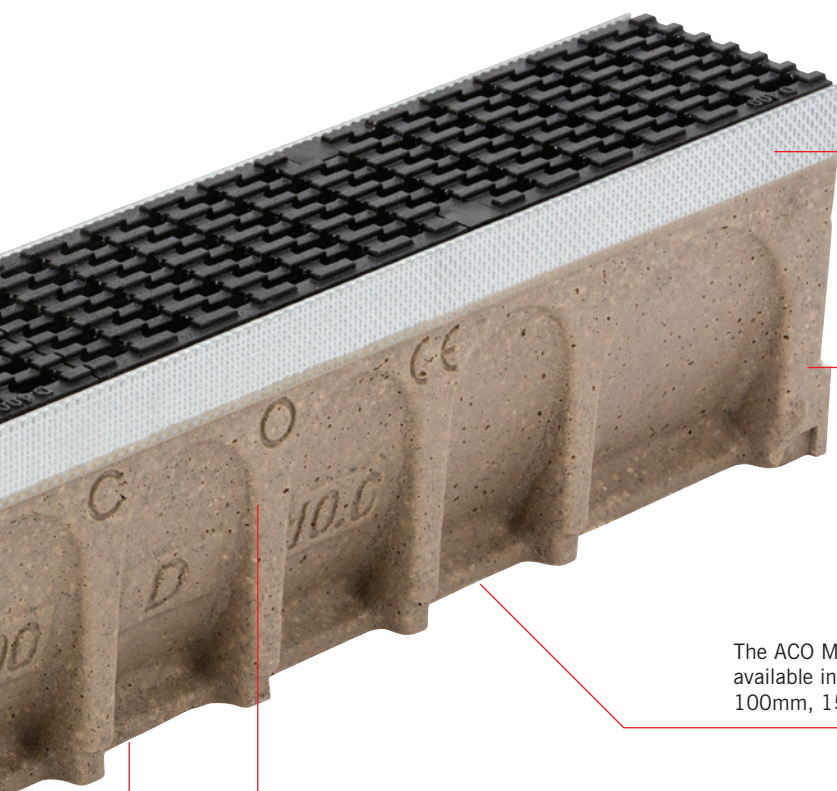


C 250
Parking areas, service
stations (cars) and
slow-moving light
commercial vehicles.



D 400
Parking areas for all
types of vehicles*

* Not suitable for carriageways of public roads or motorways.



Protective UltraSTEEL™ galvanised edge rails for improved strength and bonding between channel and surface materials. Also available in stainless steel.

Manufactured from Vienite®, a polymeric based recycled material, strong and lightweight design, improves stability and anchors product into concrete surround.



The ACO MultiDrain® MD system is available in three channel widths; 100mm, 150mm and 200mm.

Parking areas for all types of vehicles*

Internal channel marking for easy identification once installed.



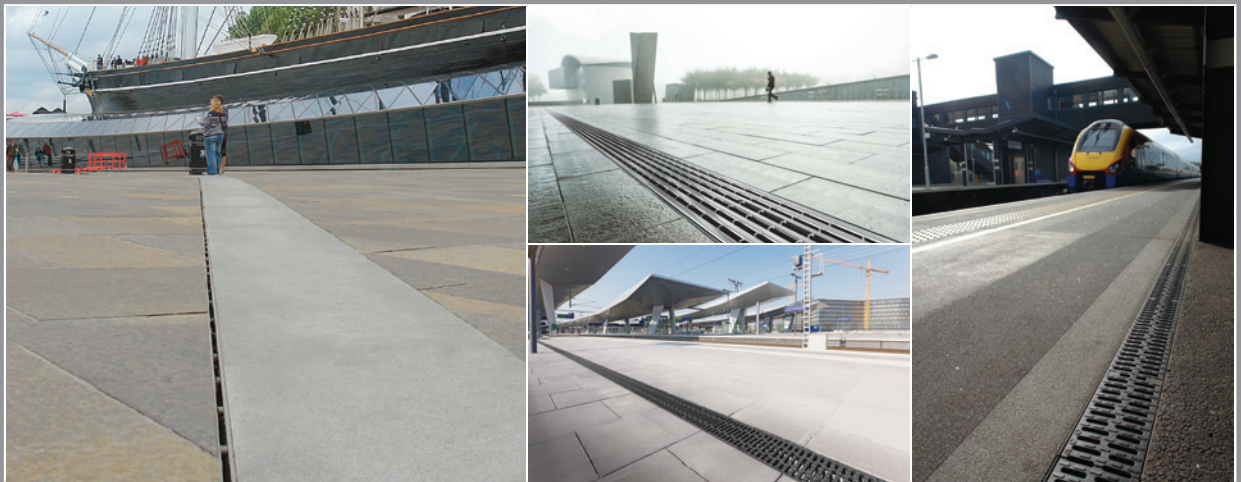
Gratings

ACO MultiDrain® MD System has a wide variety of gratings available that include cast iron, stainless steel and plastic slotted gratings, heelguard options (including the new ATec coated heelguard grating), solid covers and brickslot gratings. See pages 10 to 12 for further details.

EXPLORE THE WORLD'S LARGEST RANGE OF GRATING STYLES

Style, aesthetics, performance and reliability are all important factors when specifying surface water management systems. Globally recognised as the no. 1 choice in managing surface water, ACO provide designers with the widest range of channel and grating styles to choose from.

By using a range of different design options including light, form, texture, material and colour, ACO's grating and channel styles can be used to complement or enhance many landscape designs.



Multi applications provided for by ACO MultiDrain® MD

The breadth of the ACO MultiDrain® grating range provides designers with a wide choice of styles to complete their surface water drainage system.

Depending on the application requirement, Architects, Designers and Planners can choose from variety of popular, long establish designs in ductile iron, high tech composites, galvanised or stainless steel materials.

For applications which require discreet drainage to blend subtly with the design of the landscape, ACO Brickslot can provide an aesthetically-pleasing finish.

Supplied as standard with ACO Drainlock™ boltless locking, the range of grating styles is available in load classes A 15 – D 400 making them the idea choice for both pedestrian and vehicular applications.

To suit a range of hydraulic requirements, these grating styles are available for use with 100mm, 150mm and 200mm wide channels.

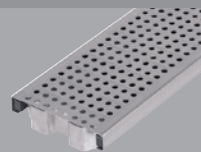
Slotted Steel

Available in Galvanised Steel.



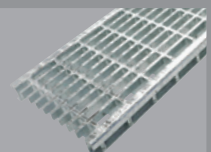
Perforated Steel

Available in Galvanised Steel.

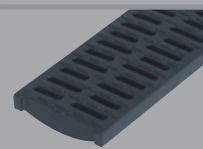


Mesh Steel

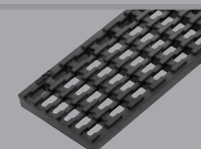
Available in Galvanised Steel.



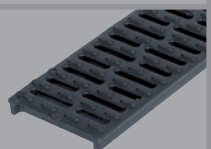
Heelguard™ Slotted Composite



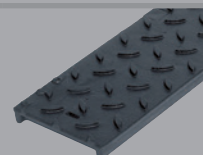
Intercept Ductile Iron D 400



Heelguard™ Slotted Ductile Iron



Ductile Iron Solid Cover

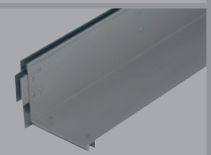


Slotted Ductile Iron



Brickslot

Available in Galvanised Steel.



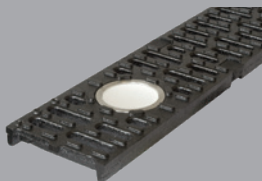
Technical information for these gratings is provided on page 15 onwards



Lighting & bespoke solutions

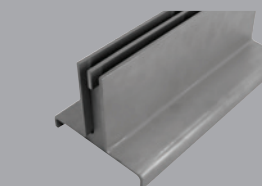
Lighting Solutions

Enhance and add definition to a space - see ACO Lighting Systems brochure for details.



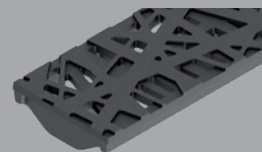
Bespoke Slot Solutions

Our Brickslot gratings can be provided in a range of bespoke heights and widths. Contact our Design Services Team for details.



Bespoke Freestyle Solutions

Realise your own design ideas. ACO Freestyle cast iron gratings offer you individual solutions for every project. Contact our design services team for more details.



Surface + Grating Visualiser

A clever, yet easy to use software program that visualises how our range of grating designs could enhance your project.



To make specification easier, the software will suggest our most suitable ranges based on the project requirements. You can then select from the available options and visualise how these may look in different surface finishes. Once a choice is made, a simple, yet detailed specification sheet provides full product information.



To launch the visualiser scan the QR code or visit www.aco.co.uk/gratingvisualiser

New grating styles

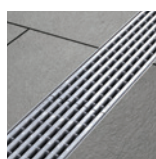
A new range of contemporary, elegant designs will add character and style to any landscape project.

Intercept Profile Stainless steel



High quality linear profile design provides a contemporary, long lasting finish to any prestigious landscaping project.

Intercept Profile Galvanised steel



High quality linear profile design provides a stylish option for those looking for an alternative to stainless steel.

Intercept Bar



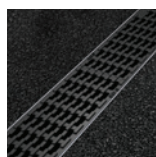
The sleek and elegant intercept bar design provides a classic, high end finish to any project.

Mosaic



The unique pattern of the Mosaic design provides an ideal finish to heritage or traditional landscapes.

Intercept



The Intercept D400 grating provides a minimalistic and widely appealing design.

Flag



The unusual character of the Flag design provides a fun alternative to traditional slotted gratings.



Surface design detail

Creating bespoke gratings

MultiDrain MD channels are compatible with a wide range of grating designs including a bespoke grating service from ACO.

Introducing the ACO Freestyle

The ACO Freestyle offering is a unique customer-led grating design solution, which gives you the freedom to create fully bespoke drainage grating designs for the external environment.

Who is Freestyle for?

Freestyle is relevant for clients who value first impressions – which starts with the approach to the building.

It is for clients who value something new being brought to the table and bespoke drainage gratings are something most clients have not considered. When looking at pedestrian areas with quality paving solutions, Freestyle is a complimentary and functional aesthetic solution.

Clients, who value branding opportunities, will appreciate the possibilities of incorporating their logo into the grating design.

Freestyle also works for those clients who are aiming for a traditional standing or wish to integrate into a historic setting, as the flowing forms of metal translate well when recreating Victorian grandeur.



- ▶ Inspiration can come from many different sources. Your building or landscape may naturally inspire or suggest particular designs. Alternatively you could look towards abstract shapes and patterns to inspire you.
- ▶ With customer design at the heart of the offering, ACO Freestyle begins with a design being submitted to ACO, who then create a design model from this template. Templates are available to download from the ACO website www.aco.co.uk/freestyle to help in this process.
- ▶ The Freestyle grating is overlaid on a grid design that has been tested for a Load class up to D400, which matches the load class strength of Multiline Sealín channels.
- ▶ With the option to access a number of pre-moulded designs, as well as create something completely unique, which ACO will manufacture for you, Freestyle allows greater creative control of the external landscape.



ACO. creating the future of drainage

Download your brochure + design templates: www.aco.co.uk/freestyle

ACO MultiDrain® M100D channels with UltraSTEEL™ galvanised edge rails.

ACO MultiDrain® M100D channels are manufactured from Vienite®, ACO's sustainable high strength material, which provides high chemical resistance. The channels are available in constant depth, sloping depth and shallow depth units.

ACO MultiDrain® M100D channels listed below are provided with integral galvanised steel protective edge rails.

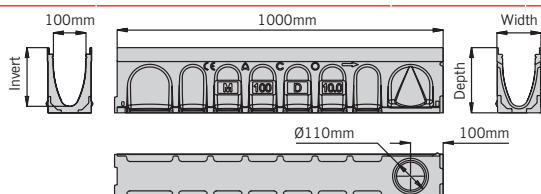
For enhanced durability these rails are manufactured from UltraSTEEL™, a unique material that has improved strength over plain steel.

The added benefit of UltraSTEEL™ is that its greater surface area improves the bond between rail and adjacent material where a sealed system is required.

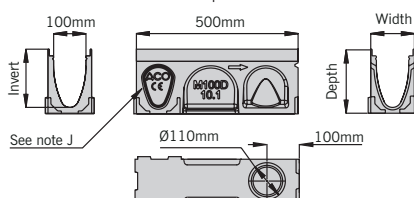
For the ACO MultiDrain® M100D range of gratings to suit these channels please refer to pages 20-23.

Constant and sloping depth channels with UltraSTEEL™ galvanised edge rails

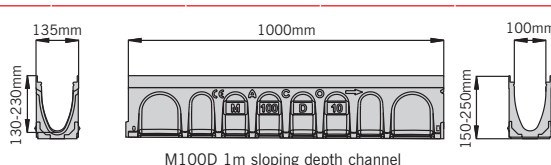
Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
23075	M100D No. 075	1000	135	75	55	1	9.2
23076	M100D No. 075V	1000	135	75*	55	1	8.9
23110	M100D No. 0100	1000	135	100	80	1	11.0
23111	M100D No. 0100V	1000	135	100*	80	1	10.7
23000	M100D No. 0.0*	1000	135	150	130	1/3	12.9
23050	M100D No. 0.1J*	500	135	150	130	1/3	7.6
23001	M100D No. 1	1000	135	150/155	130/135	2	13.5
23002	M100D No. 2	1000	135	155/160	135/140	2	13.8
23003	M100D No. 3	1000	135	160/165	140/145	2	14.1
23004	M100D No. 4	1000	135	165/170	145/150	2	14.4
23005	M100D No. 5	1000	135	170/175	150/155	2	14.7
23006	M100D No. 6	1000	135	175/180	155/160	2	15.0
23007	M100D No. 7	1000	135	180/185	160/165	2	15.3
23008	M100D No. 8	1000	135	185/190	165/170	2	15.6
23009	M100D No. 9	1000	135	190/195	170/175	2	15.9
23010	M100D No.10	1000	135	195/200	175/180	2	16.2
23100	M100D No.10.0*	1000	135	200	180	1/3	15.9
23101	M100D No.10.1J*	500	135	200	180	1/3	9.2
23011	M100D No.11	1000	135	200/205	180/185	2	16.5
23012	M100D No.12	1000	135	205/210	185/190	2	16.8
23013	M100D No.13	1000	135	210/215	190/195	2	17.1
23014	M100D No.14	1000	135	215/220	195/200	2	17.4
23015	M100D No.15	1000	135	220/225	200/205	2	17.7
23016	M100D No.16	1000	135	225/230	205/210	2	18.0
23017	M100D No.17	1000	135	230/235	210/215	2	18.3
23018	M100D No.18	1000	135	235/240	215/220	2	18.6
23019	M100D No.19	1000	135	240/245	220/225	2	18.9
23020	M100D No.20	1000	135	245/250	225/230	2	19.2
23200	M100D No.20.0*	1000	135	250	230	1/3	21.8
23201	M100D No.20.1J*	500	135	250	230	1/3	10.8
23300	M100D No.30.0*	1000	135	300	280	1/3	25.4
23301	M100D No.30.1J*	500	135	300	280	1/3	12.5



M100D 1m constant depth channel 0.0 to 30.0



M100D 0.5m constant depth channel



M100D 1m sloping depth channel

Note: The constant depth channels have an improved knockout feature, see page 41 for more information.

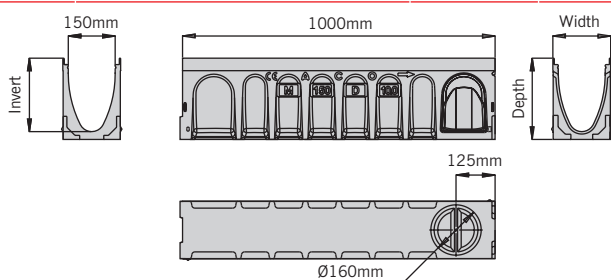
* Indicates channels supplied with a preformed Ø110mm knockout for vertical outlet.

J Indicates side knockout for 90° channel connection. Knockout on both sides of the channel.

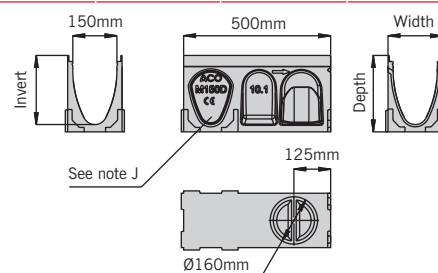
ACO MultiDrain® MD components

M150D Constant depth channels with UltraSTEEL™ galvanised edge rails

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
23156	M150D No. 0100	1000	185	100	75	1	15.0
23157	M150D No. 0100V	1000	185	100	75	1	14.9
23150	M150D No. 0.0*	1000	185	210	185	1/3	23.4
23153	M150D No. 0.1J*	500	185	210	185	1/3	12.7
23151	M150D No.10.0*	1000	185	260	235	1/3	26.2
23154	M150D No. 10.1J*	500	185	260	235	1/3	14.6
23152	M150D No.20.0*	1000	185	310	285	1/3	30.3
23155	M150D No. 20.1J*	500	185	310	285	1/3	16.4



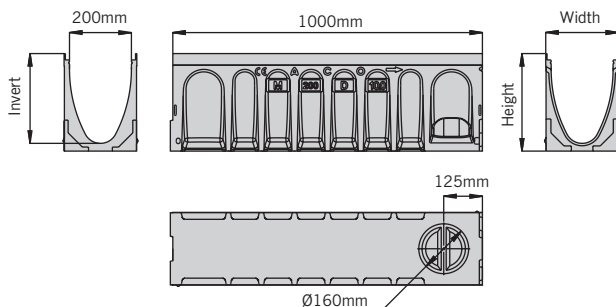
M150D 1m constant depth channel



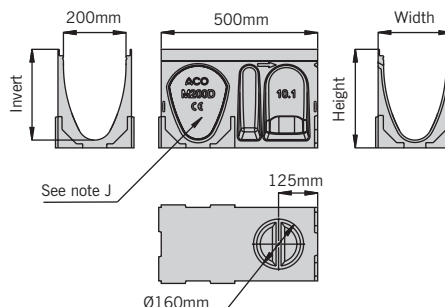
M150D 0.5m constant depth channel

M200D Constant depth channels with UltraSTEEL™ galvanised edge rails

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
23216	M200D No. 0100	1000	235	100	75	1	17.5
23217	M200D No. 0100V	1000	235	100	75	1	17.0
23210	M200D No. 0.0*	1000	235	265	240	1/3	33.0
23213	M200D No. 0.1J*	500	235	265	240	1/3	17.9
23211	M200D No.10.0*	1000	235	315	290	1/3	37.4
23214	M200D No. 10.1J*	500	235	315	290	1/3	19.9
23212	M200D No.20.0*	1000	235	365	340	1/3	40.4
23215	M200D No. 20.1J*	500	235	365	340	1/3	21.9



M200D 1m constant depth channel



M200D 0.5m constant depth channel

Note: The constant depth channels have an improved knockout feature, see page 41 for more information.

* Indicates channels supplied with a preformed Ø110mm knockout for vertical outlet.

J Indicates side knockout for 90° channel connection. Knockout on both sides of the channel.

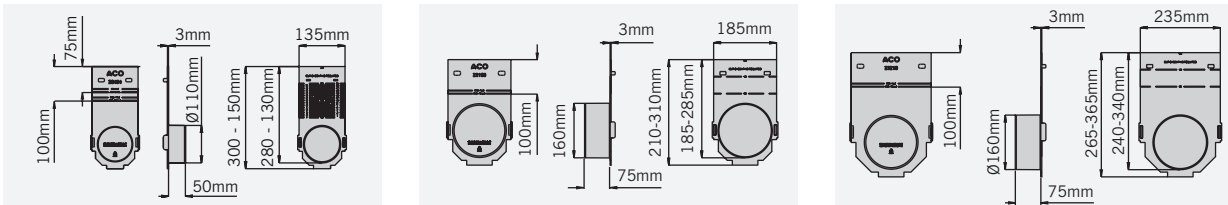
V Indicates channel with cast in TPE triple lipped seals for water tight connection. See page 41 for further information.

† 075V and 0100V channels have a depth overall around the outlet of 80mm (075V) and 105 (0100V).

These products are subject to weight and dimensional tolerances. The dimensions shown on this page are for guidance purposes only.

Multifunctional endcap (closing/inlet/outlet)

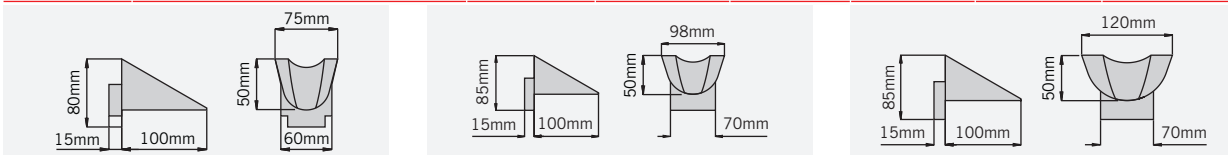
Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
23404	M100D No. 306 multifunctional endcap -	135	75/300	75/300	50	-	0.2
23159	M150D No. 306 multifunctional endcap -	185	310/100	310/100	75	-	0.3
23219	M200D No. 306 multifunctional endcap -	235	365/100	365/100	75	-	0.4



The multifunctional endcap can be cut down to suit all channels. See page 42 for further information.

Step connector

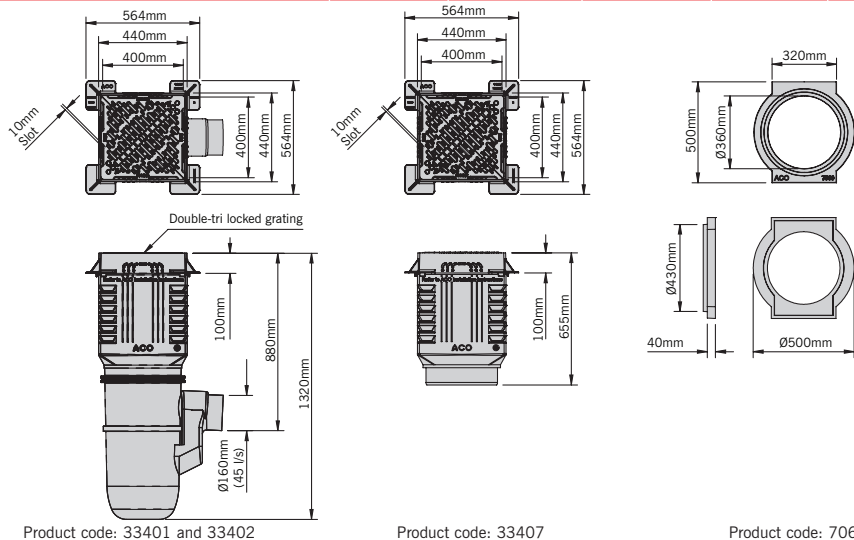
Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
12601	M100D 50mm Step connector	100	75	50	-	-	0.4
13001	M150D 50mm Step connector	100	98	50	-	-	0.5
13401	M200D 50mm Step connector	100	120	50	-	-	0.6



Note: For information on the Step connector functionality see page 42.

Universal gully and components

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
33401	Gully assembly and bucket 601D	440	440	1315	870	-	52.5
33402	Gully assembly no bucket 602D	440	440	1315	870	-	51.0
33407	Gully top assembly 607D	440	440	655	-	-	45.0
33605	Gully base unit 605	-	Ø375	750	310	-	4.3
33603	Gully intermediate unit 603	440	440	515	-	-	5.1
44355	Gully grating and frame 600D	400*	564††	100	-	-	40.0
7060	Gully connector 615	500	Ø500	40	-	-	7.0
33606	Bucket polyethylene 606	-	Ø275	245	-	-	1.4



Note. Plain U-PVC 150mm - 160mm Supersleeve adaptor supplied with 601D, 602D and 605 assemblies.

For information on Universal gully functionality see page 43. *Clear opening size. ††Over frame size.

These products are subject to weight and dimensional tolerances. The dimensions shown on this page are for guidance purposes only.

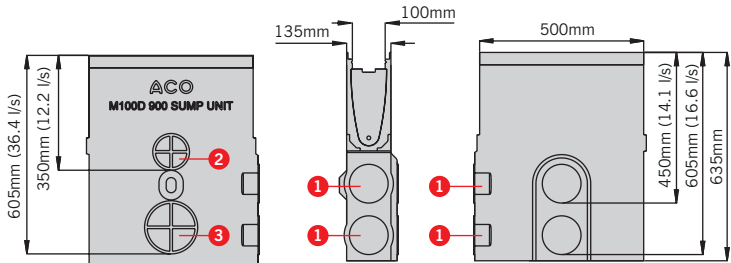
ACO MultiDrain® MD components

M100D sump unit with UltraSTEEL™ galvanised edge rails

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
23410	M100D Universal sump with plastic silt bucket	500	135	635	615	-	32.8

Standard sump outlets

- 1 = Ø110mm outlet with triple lipped seal
- 2 = Ø110mm knockout
- 3 = Ø160mm knockout



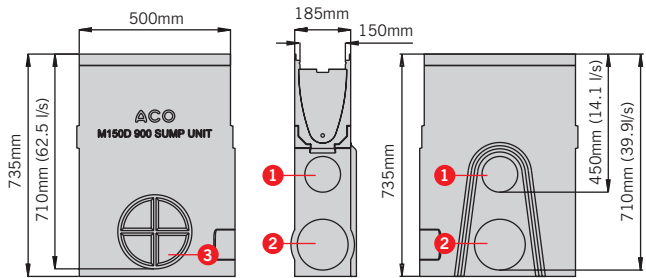
Note: Drawing shows flow through un-trapped unions. For information on the sump unit functionality see page 47.

M150D sump unit with UltraSTEEL™ galvanised edge rails

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
23158	M150D Universal sump with plastic silt bucket	500	185	735	715	-	43.4

Standard sump outlets

- 1 = Ø110mm outlet with triple lipped seal
- 2 = Ø160mm outlet
- 3 = Ø200mm knockout



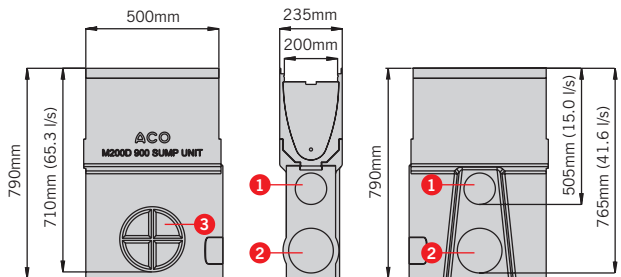
Note: Drawing shows flow through un-trapped unions. For information on the sump unit functionality see page 43.

M200D sump unit with UltraSTEEL™ galvanised edge rails

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
23218	M200D Universal sump with plastic silt bucket	500	235	790	765	-	47.0

Standard sump outlets

- 1 = Ø110mm outlet with triple lipped seal
- 2 = Ø160mm outlet
- 3 = Ø200mm knockout

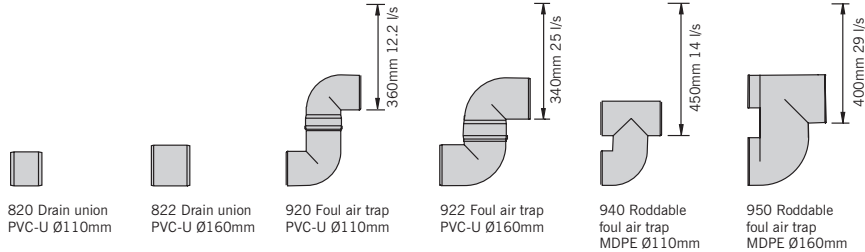


Note: Drawing shows flow through un-trapped unions. For information on the sump unit functionality see page 43.



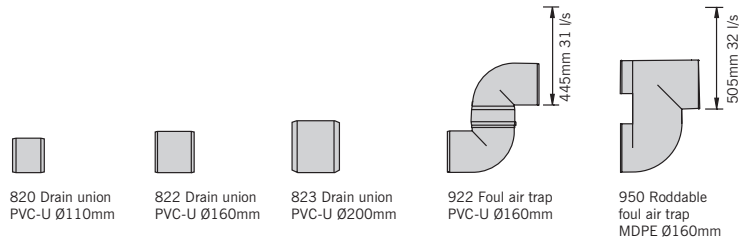
M100D Drain unions and foul air traps

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
0056	820 Drain union PVC-U Ø110mm (max 16.6 l/s)	100	110	-	605	-	0.1
0058	822 Drain union PVC-U Ø160mm (max 36.4 l/s)	100	160	-	605	-	0.5
2640	920 Foul air trap PVC-U Ø110mm (max 12.2 l/s)	-	110	-	360	-	0.5
2638	922 Foul air trap PVC-U Ø160mm (max 25 l/s)	-	160	-	340	-	1.9
7931	940 Roddable foul air trap MDPE Ø110mm (max 14 l/s)	-	110	-	450	-	0.4
7932	950 Roddable foul air trap MDPE Ø160mm (max 29 l/s)	-	160	-	400	-	0.8



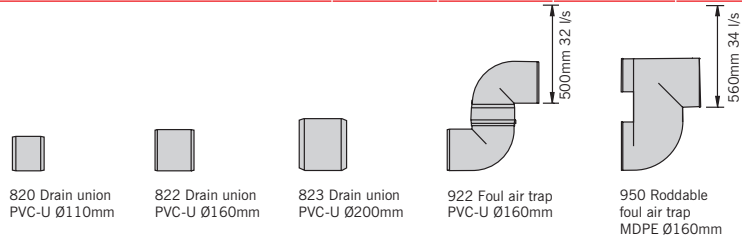
M150D Drain unions and foul air traps

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
0056	820 Drain union PVC –U Ø110mm (max 14.1 l/s)	100	110	-	450	-	0.1
0058	822 Drain union PVC –U Ø160mm (max 39.9 l/s)	100	160	-	710	-	0.5
2723	823 Drain Union PVC-U Ø200mm (max 69.5 l/s)	200	200	-	710	-	0.6
2638	922 Foul air trap PVC –U Ø160mm (max 31 l/s)	-	160	-	445	-	1.9
7932	950 Roddable foul air trap MDPE Ø160mm (max 32 l/s)	-	160	-	505	-	0.8



M200D Drain unions and foul air traps

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
0056	820 Drain union PVC –U Ø110mm (max 15.0 l/s)	100	110	-	505	-	0.1
0058	822 Drain union PVC –U Ø160mm (max 41.6 l/s)	100	160	-	765	-	0.5
2723	823 Drain Union PVC-U Ø200mm (max 72 l/s)	200	200	-	765	-	0.6
2638	922 Foul air trap PVC –U Ø160mm (max 32 l/s)	-	160	-	500	-	1.9
7932	950 Roddable foul air trap MDPE Ø160mm (max 34 l/s)	-	160	-	560	-	0.8



Accessories

Product code	Description	Weight (kg)
32599	Polymer concrete repair kit	1.0†



†Repair kit includes 0.5kg tin of natural colour polyester concrete repair resin, grey and black pigment, hardener paste, mixing instructions and material safety data sheets.

Problem solving drainage solutions: Discreet slot drainage



ACO MULTIDRAIN MD BRICKSLOT



Galvanised steel



Stainless steel



Access units



Load Class

ACO MultiDrain® MD has a range of gratings to complement installations which require discreet slot drainage.

Designed with a heelguard 10mm single offset drainage inlet, or a double Twinslot inlet in either offset or central. ACO Brickslot is a subtle and unobtrusive grating which when combined with an ACO MultiDrain® MD channel, can be used as a solution to complement discreet drainage applications and is ideal for use against buildings facades.

Compatible with most paving materials, the vertical sides of the grating enable pavements to be laid directly to the unit's edge. Once installed the system is totally secure and not vulnerable to vandalism or loose grates making it a suitable for applications such as schools and playgrounds where grating removal can become a hazard.

The channel and ACO Brickslot grating together provide an unobtrusive continuous slot drainage system, with high hydraulic efficiency for fast removal of surface water. ACO Brickslot gratings are available in galvanised or stainless steel and suitable for use with the 100mm, 150mm and 200mm wide channels in the ACO MultiDrain® MD range.

The system includes an ACO Brickslot access unit to ensure easy maintenance and access to the drainage system, and is also fully compatible with the range of ACO MultiDrain® MD accessories.

The system is suitable for applications up to and including Load Class D400 (This product is not suitable for carriageways of public roads or motorways).

Applications

- Threshold drainage
- Public landscaping
- Car parking
- Light industrial
- HGV parking
- Petrol station forecourts
- SuDS



Bespoke Brickslot

ACO Bespoke Brickslot is custom designed to suit specific customer requirements for MultiDrain 100, 150 and 200 channels. To accommodate specific sites, ACO Brickslot grates can be manufactured in different heights (30mm to 200mm) and also custom slot widths and lengths (up to 1m). The Brickslot can be manufactured from mild steel with a hot dipped galvanised finish or stainless steel for increased corrosion resistance. Please contact your sales representative to discuss.

Discreet slot drainage gratings

The ACO Brickslot grating system has an access unit for easy maintenance and cleaning of the drainage system.

The access unit is positioned within the channel; it has a removable tray section which is lifted out of the frame by a lifting tool to gain access to the system.

The access unit is 0.5m in length and is available in the galvanised and stainless steel finishes and is suitable for use with any ACO MultiDrain® M100D/M100DS, M150D/M150DS and M200D/M200DS wide channels.

The unit has a heelguard 10mm off set drainage inlet, providing continuous aesthetic and drainage performance once installed with the drainage system.

The ACO Brickslot access units are sold separately to the channel units. For information on the ACO MultiDrain® M100D/M100DS, M150D/M150DS and M200D/M200DS wide channels. Please refer to pages 13/14 and 28/29.

Removal instructions.

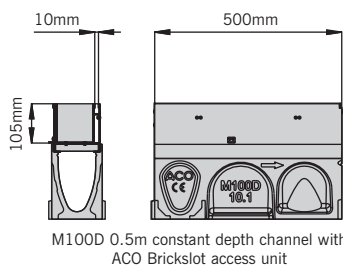
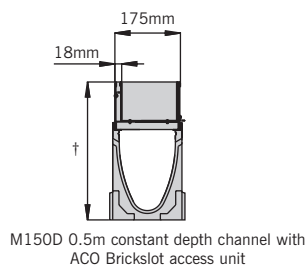
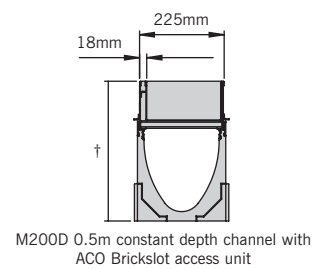
To remove the ACO Brickslot access unit tray, insert the lifting tools as shown in figure 1. Then lift the tray vertically from the frame (figure 2). Details on the lifting tools can be found on page 18.



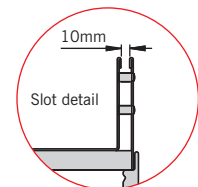
Figure 1



Figure 2



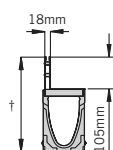
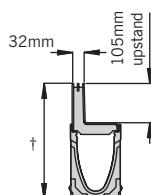
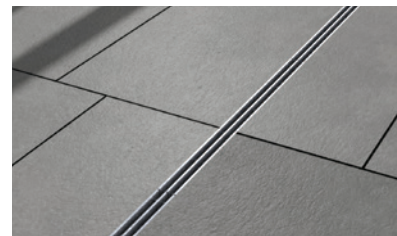
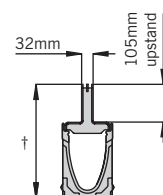
ACO Brickslot is available in two styles, single brickslot and twinslot. The location of the slot is commonly positioned offset to the centre of the channel, which allows the system to be installed discretely against building façades.



Brickslot Single - Offset

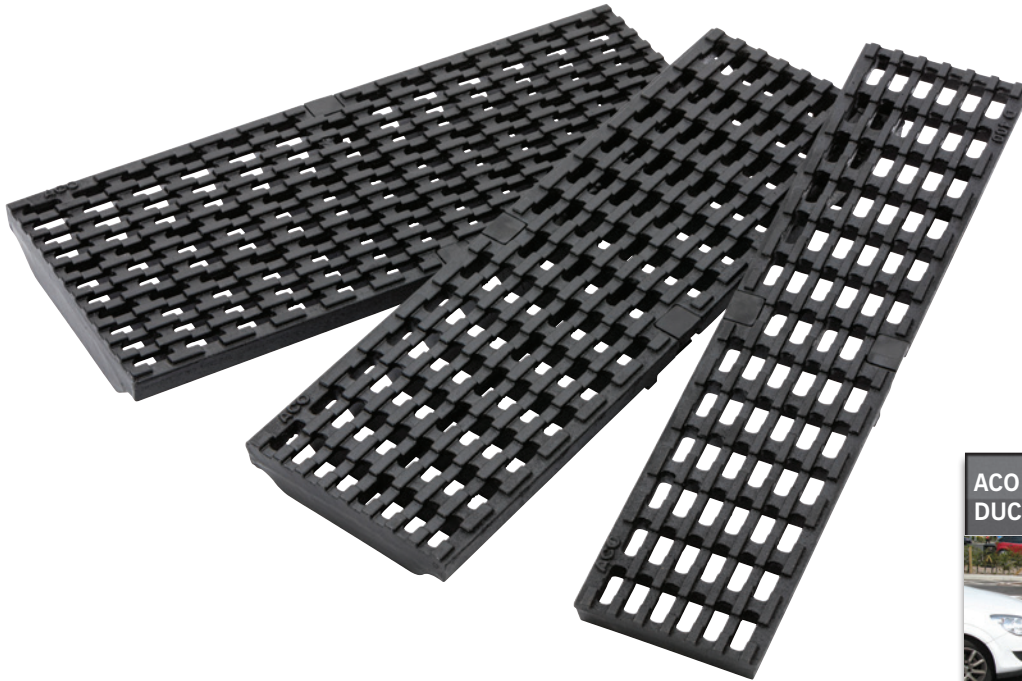
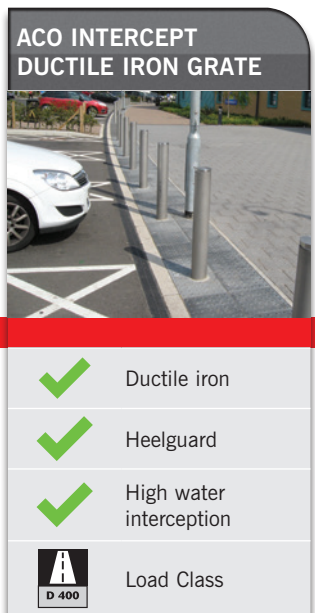
Brickslot Twinslot - Offset

Brickslot Twinslot - Central



Note: 105mm**refers to the height from the top edge to the horizontal plane of the grate. For exact overall height please measure on channel.
The overall depth of each channel can be found in the channel tables in this brochure.
*Not suitable for carriageways of public roads or motorways.

New Intercept grate: Minimalism for maximum water interception



ACO MultiDrain® MD has a new range of grates which encompass the principles of minimalist design. ACO Intercept ductile iron grates have clean lines and form, and meets the minimalist mantra of “Design stripped down to only its essential elements”

This grate has been designed to have superior water interception capabilities, and whilst it is functional it also achieves the goal of wide visual appeal.

James Canney, R&D Development Manager says “During the grates’ development we focused on achieving high level aesthetics and a sleek universal appeal. The ‘less is more’ approach to minimalistic design suits drainage grates, as it is important to have properly designed inlets for water to effectively enter the channel. The Intercept design combines functionality with timeless good looks”

ACO Intercept ductile iron grates are available in three widths and compatible with MultiDrain MD/PPD and Sealin channels.

They incorporate our unique ACO Drainlock™ fixings which improves hydraulic capacity of the channel

Combined with ACO MultiDrain® MD channels the system is suitable for applications up to and including Load Class D400 (This product is not suitable for carriageways of public roads or motorways).

Applications

- Public landscaping
- Car parking
- Light industrial
- HGV parking
- SuDS

Gratings for use with ACO MultiDrain® M100D channels with UltraSTEEL™ galvanised edge rails.

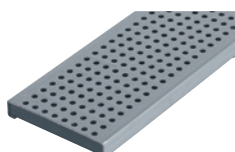


Gratings for Load Class A 15 applications

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width /hole dia (mm)	Heelguard™	Intake area (mm²/m)	Anti shunt feature	Weight (kg)
12610	Slotted galvanised steel 400DL	1000	123	21	10	Yes	25300	n/a	2.0
12611	Slotted galvanised steel 402DL	500	123	21	10	Yes	25300	n/a	1.0
12666	Perforated galvanised steel 12666DL	1000	123	21	6	Yes	16300	n/a	2.6
12667	Perforated galvanised steel 12667DL	500	123	21	6	Yes	16300	n/a	1.3



400DL / 402DL
Slotted galvanised steel



12666DL / 12667DL
Perforated galvanised steel



Gratings for Load Class B 125 applications

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width /hole dia (mm)	Heelguard™	Intake area (mm²/m)	Anti shunt feature	Weight (kg)
132555	Intercept Profile galvanised steel 132555DL 	1000	123	21	29 x 8	Yes	44500	Yes	4.1
132550	Intercept Profile galvanised steel 132550DL 	500	123	21	29 x 8	Yes	44500	Yes	2.0



132555DL / 132550DL
Intercept Profile galvanised steel



Gratings for Load Class C 250 applications

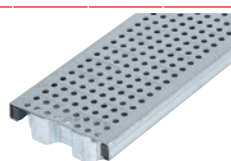
Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width /hole dia (mm)	Heelguard™	Intake area (mm²/m)	Anti shunt feature	Weight (kg)
132720	Heelguard™ composite - black 522DL	500	123	21	8	Yes	28500	Yes	1.0
12673	Intercept ductile iron 507DL* 	500	123	21	31 x 12	No	40100	Yes	3.7
12614	Slotted galvanised steel 423DL	1000	123	21	10	Yes	25300	n/a	5.0
12615	Slotted galvanised steel 424DL	500	123	21	10	Yes	25300	n/a	2.5
12656	Perforated galvanised steel 12656DL	1000	123	21	6	Yes	16300	n/a	4.8
12657	Perforated galvanised steel 12657DL	500	123	21	6	Yes	16300	n/a	2.4
132880	Heelguard™ mesh galvanised steel grating 410DL 	1000	123	21	29 x 9.5	Yes	80000	Yes	4.2
132881	Heelguard™ mesh galvanised steel grating 412DL 	500	123	21	29 x 9.5	Yes	80000	Yes	2.1
23460	Brickslot single slot offset galvanised steel 23460	1000	123	105	10	Yes	10000	n/a	6.6
23461	Brickslot single slot offset galvanised steel 23461	500	123	105	10	Yes	10000	n/a	3.4
23462	Brickslot single slot offset access unit galvanised steel 23462	500	123	105	10	Yes	10000	n/a	6.6



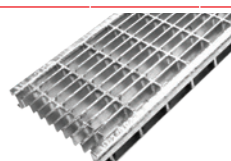
522DL
Heelguard™ composite



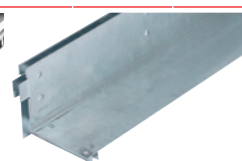
507DL
Intercept ductile iron*



12656DL / 12657DL
Perforated galvanised steel



410DL / 412DL
Mesh galvanised steel



23460 / 23461
Brickslot galvanised steel
single slot

 Indicates security locking available.

*Intercept ductile iron C250 grate is the original design, and differs aesthetically to the new D400 version

Gratings for use with ACO MultiDrain® M100D channels with UltraSTEEL™ galvanised edge rails.



Gratings for Load Class D 400* applications

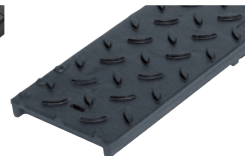
Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width /hole dia (mm)	Heelguard™	Intake area (mm²/m)	Anti shunt feature	Weight (kg)
23405	Heelguard™ ductile iron 23405DL 6	500	123	21	8	Yes	23900	Yes	4.1
23510	Heelguard™ Intercept ductile iron 23510DL	500	123	21	10	Yes	41400	Yes	3.7
23406	Ductile iron solid cover 23406DL	500	123	21	n/a	No	n/a	Yes	4.5
23408	Slotted ductile iron 23408DL	500	123	21	12	No	35700	Yes	3.8
132042	Flag ductile iron 132042DL	500	123	21	8	Yes	30400	Yes	4.9
132043	Leaf ductile iron 132043DL	500	123	21	10	Yes	34700	Yes	4.7
132885	Heelguard™ mesh galvanised steel 132885DL 6	1000	123	21	28 x 8.5	Yes	69100	Yes	5.1
132886	Heelguard™ mesh galvanised steel 132886DL 6	500	123	21	28 x 8.5	Yes	69100	Yes	2.5
23465	Brickslot single slot offset galvanised steel 23465	1000	123	105	10	Yes	10000	n/a	6.7
23466	Brickslot single slot offset galvanised steel 23466	500	123	105	10	Yes	10000	n/a	3.4
23467	Brickslot single slot offset access unit galvanised steel 23467	500	123	105	10	Yes	10000	n/a	6.4
23480	Brickslot Twinslot offset galvanised steel	1000	123	105	10 (x2)	Yes	20000	Yes	12.9
23481	Brickslot Twinslot offset galvanised steel	500	123	105	10 (x2)	Yes	20000	Yes	6.1
23482	Brickslot Twinslot offset access unit galvanised steel	500	123	105	10 (x2)	Yes	20000	Yes	8.1
23483	Brickslot Twinslot central galvanised steel	1000	123	105	10 (x2)	Yes	20000	Yes	12.5
23484	Brickslot Twinslot central galvanised steel	500	123	105	10 (x2)	Yes	20000	Yes	7.0
23485	Twinslot central access unit galvanised steel	500	123	105	10 (x2)	Yes	20000	Yes	8.2



23405DL
Heelguard™ ductile iron



23510DL
Heelguard™ Intercept ductile iron



23406DL
Ductile iron solid cover



23408DL
Slotted ductile iron



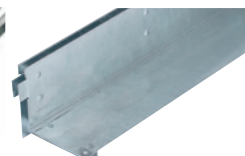
132042DL
Flag ductile iron



132043
Leaf ductile iron



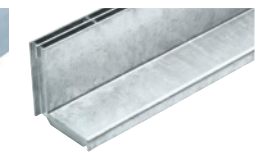
132885DL/132886DL
Heelguard™ mesh galvanised steel



23465 / 23466
Brickslot single slot galvanised steel



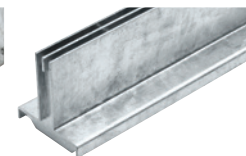
23467
Brickslot single slot access unit galvanised steel.



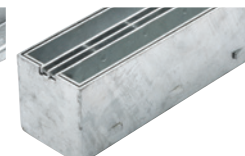
23480 / 23481
Brickslot Twinslot offset galvanised steel



23482
Brickslot Twinslot offset access unit galvanised steel



23483 / 23484
Brickslot Twinslot central galvanised steel



23485
Brickslot Twinslot central access galvanised steel

ACO ATec high performance finish



Gratings for Load Class D 400* applications with ACO ATec corrosion resistant coating

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width /hole dia (mm)	Intake area (mm²/m)	Anti shunt feature	Weight (kg)
23409	ATec coated Heelguard™ ductile iron 23409DL 6	500	123	21	8	23900	Yes	4.1
23417	ATec coated Mosaic ductile iron 23417DL 6	500	123	21	10	28000	Yes	4.1



23409DL
Heelguard™ ductile iron



23417
Mosaic ductile iron



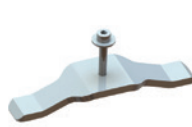
ACO ATec coating is a high performance finish that provides a superior resistance to corrosion. The electrochemically applied finish is strong and durable, making maintenance easier than on water-based surface coatings. The ATec finish also enhances long term durability in demanding environments and is particularly well suited for low trafficked areas. Please download our ATec datasheet for more information.

Grating accessories

Product code	Description	For use with	Length (mm)	Width overall (mm)	Depth overall (mm)	Weight (kg)
23415	Drainlock™ security locking assembly	132720, 23405, 23409, 23417	96	20	13	0.1
445828	Drainlock™ security locking assembly Mesh C250**	132880, 132881	96	27	13	0.07
445745	Drainlock™ security locking assembly Mesh D400**	132885, 132886	96	27	13	0.06
445830	Drainlock™ security locking assembly Profile**	132555, 132550	96	27	13	0.06
23416	Drainlock™ security key	23415	75	30	3	0.01
1367	Drainlock™ grating lifting tool	all	400	150	6	0.2



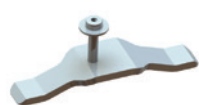
23415
Drainlock™ security locking assembly



445828
Drainlock™ security locking assembly
Mesh C250*



445745
Drainlock™ security locking
assembly Mesh D400*



445830
Drainlock™ security locking
assembly Profile*



23416
Drainlock security key



1367
Drainlock™ grating lifting tool 835

6 Indicates security locking available.

*Not suitable for carriageways of public roads or motorways

**Security key 23416 not compatible, allen key required

Note: 1m grates require 2pcs of Security locking assemblies and 0.5m grates require 1pc

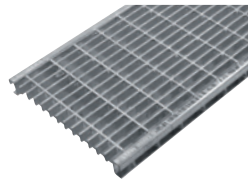


Gratings for use with ACO MultiDrain® M150D channels with UltraSTEEL™ galvanised edge rail



Gratings for Load Class B 125 applications

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width /hole dia (mm)	Heelguard™	Intake area (mm²/m)	Anti shunt feature	Weight (kg)
133601	Heelguard™ mesh galvanised steel 133601DL	1000	173	36	29 x 10	Yes	118200	Yes	5.4
133602	Heelguard™ mesh galvanised steel 133602DL	500	173	36	29 x 10	Yes	118200	Yes	2.7
133625	Intercept-Profile galvanised steel 133625DL	1000	173	30	29 x 9	Yes	68700	Yes	5.0
133626	Intercept-Profile galvanised steel 133626DL	500	173	30	29 x 9	Yes	68700	Yes	2.5



133601DL / 133602DL
Heelguard™ mesh galvanised steel

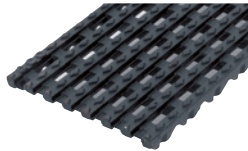


133625DL / 133626DL
Intercept-Profile galvanised steel

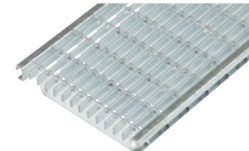


Gratings for Load Class C 250 applications

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width /hole dia (mm)	Heelguard™	Intake area (mm²/m)	Anti shunt feature	Weight (kg)
13073	Intercept ductile iron 13073DL**	500	173	21	30 x 12	No	59500	Yes	5.3
133605	Heelguard™ mesh galvanised steel 133605DL	1000	173	40	30 x 10	Yes	118200	Yes	5.8
133606	Heelguard™ mesh galvanised steel 133606DL	500	173	40	30 x 10	Yes	118200	Yes	2.8



13073DL
Intercept ductile iron**



133605DL / 133606DL
Heelguard™ mesh galvanised steel

ACO ATec high performance finish

Gratings for Load Class D 400* applications with ACO ATec corrosion resistant coating



Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width /hole dia (mm)	Heelguard™	Intake area (mm²/m)	Anti shunt feature	Weight (kg)
23169	ATec coated Heelguard ductile iron 23169DL	500	173	28	8	Yes	40000	Yes	6.8



23161DL
Heelguard™ ductile iron



ACO ATec coating is a high performance finish that provides a superior resistance to corrosion. The electrochemically applied finish is strong and durable, making maintenance easier than on water-based surface coatings. The ATec finish also enhances long term durability in demanding environments and is particularly well suited for low trafficked areas. Please download our ATec datasheet for more information.

⚙ Indicates security locking available.

*Not suitable for carriageways of public roads or motorways.

**Intercept ductile iron C250 grate is the original design, and differs aesthetically to the new D400 version

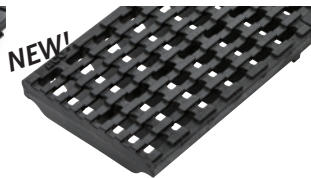


Traditional gratings for Load Class D 400* applications

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width /hole dia (mm)	Heelguard™	Intake area (mm²/m)	Anti shunt feature	Weight (kg)
23161	Heelguard™ ductile iron 23161DL	500	173	28	8	Yes	40000	Yes	6.8
23515	Heelguard™ Intercept ductile iron 23515DL	500	173	36	10	Yes	55500	Yes	6.4
23160	Solid cover ductile iron 23160DL	500	173	28	n/a	No	n/a	Yes	6.7
23164	Slotted ductile iron 23164DL	500	173	28	12	No	57664	Yes	6.4
133609	Heelguard™ mesh galvanised steel 133609DL	1000	173	46	30 x 10	Yes	103400	Yes	8.0
133610	Heelguard™ mesh galvanised steel 133610DL	500	173	46	30 x 10	Yes	103400	Yes	4.0
23175	Brickslot single slot offset galvanised steel 23175	1000	173	105	10	Yes	10000	No	7.7
23176	Brickslot single slot offset galvanised steel 23176	500	173	105	10	Yes	10000	No	3.9
23177	Brickslot single slot access unit galvanised steel 23177	500	173	105	10	Yes	10000	No	7.0



23161DL
Heelguard™ ductile iron



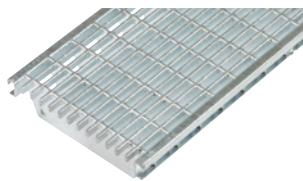
23515
Intercept ductile iron



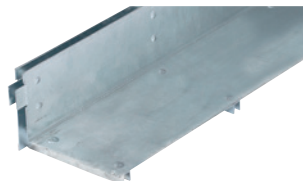
23160DL
Solid cover ductile iron



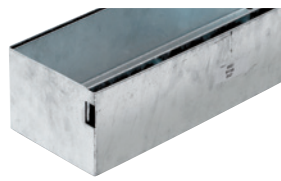
23164DL
Slotted ductile iron



133609DL / 133610DL
Heelguard™ mesh galvanised steel



23175 / 23176
Brickslot single slot galvanised steel



23177
Brickslot single slot access unit
galvanised steel



ACO can manufacture Brickslot grates in a wide range of sizes for specific site requirements. Twinslot grates (as seen in the M100D section) can also be manufactured for use with M150D channels. For more information please contact your sales representative.



Grating accessories

Product code	Description	For use with	Length (mm)	Width overall (mm)	Depth overall (mm)	Weight (kg)
23165	Drainlock™ security locking assembly	23161, 23169	146	20	13	0.1
445831	Drainlock™ security locking assembly Mesh**	133601, 133602, 133605, 133606, 133609, 133610	146	27	13	0.1
445833	Drainlock™ security locking assembly Profile**	133625, 133626	146	27	13	0.1
23416	Drainlock™ security key	23165	75	30	3	0.01
1367	Drainlock™ grating lifting tool	all	400	150	6	0.2

*Not suitable for carriageways of public roads or motorways.

**Security key 23416 not compatible, allen key required.

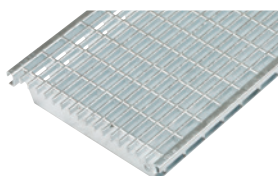
Note: 1m grates require 2pcs of Security locking assemblies and 0.5m grates require 1pc

Gratings for use with ACO MultiDrain® M200D channels with galvanised edge rails



Gratings for Load Class B 125 applications

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width /hole dia (mm)	Heelguard™	Intake area (mm²/m)	Anti shunt feature	Weight (kg)	
133613	Heelguard™ mesh galvanised steel 133613DL	6	1000	223	40	29 x 10	Yes	157500	Yes	7.2
133614	Heelguard™ mesh galvanised steel 133614DL	6	500	223	40	29 x 10	Yes	157500	Yes	3.6
133629	Intercept-Profile galvanised steel 133629DL	6	1000	223	39	29 x 8	Yes	84600	Yes	7.4
133630	Intercept-Profile galvanised steel 133630DL	6	500	223	39	29 x 8	Yes	84600	Yes	3.6



133613DL / 133614DL
Heelguard™ mesh galvanised steel

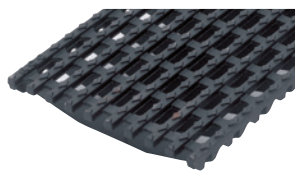


133629DL / 133630DL
Intercept-Profile galvanised steel

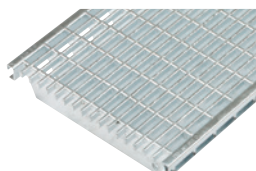


Gratings for Load Class C 250 applications

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width /hole dia (mm)	Heelguard™	Intake area (mm²/m)	Anti shunt feature	Weight (kg)
13473	Intercept ductile iron 13473DL**	500	223	35	30 x 14	No	90500	Yes	7.5
133617	Heelguard™ mesh galvanised steel 133617DL	1000	223	46	30 x 10	Yes	137700	Yes	10.7
133618	Heelguard™ mesh galvanised steel 133618DL	500	223	46	30 x 10	Yes	137700	Yes	5.2



13473DL
Intercept ductile iron**



133617DL / 133618DL
Heelguard™ mesh galvanised steel

ACO ATec high performance finish



Gratings for Load Class D 400* applications with ACO ATec corrosion resistant coating

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width /hole dia (mm)	Heelguard™	Intake area (mm²/m)	Anti shunt feature	Weight (kg)
23229	ATec coated Heelguard ductile iron 23229DL	500	223	32	8	Yes	47300	Yes	10.3



23229DL
Heelguard™ ductile iron



ACO ATec coating is a high performance finish that provides a superior resistance to corrosion. The electrochemically applied finish is strong and durable, making maintenance easier than on water-based surface coatings. The ATec finish also enhances long term durability in demanding environments and is particularly well suited for low trafficked areas. Please download our ATec datasheet for more information.

6 Indicates security locking available.

*Not suitable for carriageways of public roads or motorways.

**Intercept ductile iron C250 grate is the original design, and differs aesthetically to the new D400 version.



Gratings for Load Class D 400* applications

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width /hole dia (mm)	Heelguard™	Intake area (mm²/m)	Anti shunt feature	Weight (kg)
23221	Heelguard™ ductile iron 23221DL	500	223	32	8	Yes	47300	Yes	7.5
23520	Heelguard™ Intercept ductile iron 23520DL	500	223	43	10	Yes	76800	Yes	8.7
23220	Ductile iron solid cover 23220DL	500	223	32	n/a	No	n/a	Yes	11.0
23224	Slotted ductile iron 23224DL	500	223	32	12	No	72400	Yes	9.8
133621	Heelguard™ mesh galvanised steel 133621DL	1000	223	65	30 x 10	Yes	137700	Yes	12.9
133622	Heelguard™ mesh galvanised steel 133622DL	500	223	65	30 x 10	Yes	137700	Yes	6.4
408995	Brickslot single slot offset galvanised steel 408995	1000	223	105	10	Yes	10000	No	9.8
408996	Brickslot single slot offset galvanised steel 408995	500	223	105	10	Yes	10000	No	4.8
408997	Brickslot single slot access unit galvanised steel 408995	500	223	105	10	Yes	10000	No	8.5



23221DL
Heelguard™ ductile iron



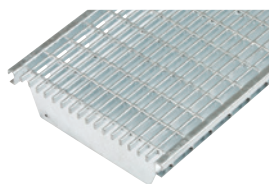
23520
Intercept ductile iron



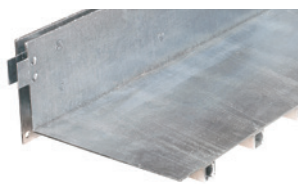
23220DL
Solid cover ductile iron



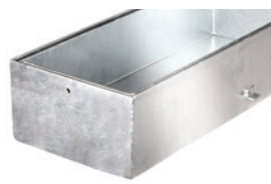
23224DL
Slotted ductile iron



133621DL / 133622DL
Heelguard™ mesh galvanised steel



408995/408996
Brickslot single slot galvanised steel



408997
Brickslot single slot access unit
galvanised steel



ACO can manufacture Brickslot grates in a wide range of sizes for specific site requirements. Twinslot grates (as seen in the M100D section) can also be manufactured for use with M200D channels. For more information please contact your sales representative.

Grating accessories

Product code	Description	For use with	Length (mm)	Width overall (mm)	Depth overall (mm)	Weight (kg)
23225	Drainlock™ security locking assembly	23221, 23229	195	20	13	0.1
445834	Drainlock™ security locking assembly Mesh**	133613, 133614, 133617, 133618, 133621, 133622	195	27	13	0.13
445836	Drainlock™ security locking assembly Profile**	133629, 133630	195	27	13	0.11
23416	Drainlock™ security key	23225	75	30	3	0.01
1367	Drainlock™ grating lifting tool	all	400	150	6	0.2

⚡ Indicates security locking available.

*Not suitable for carriageways of public roads or motorways.

**Security key 23416 not compatible, allen key required.

Note: 1m grates require 2pcs of Security locking assemblies and 0.5m grates require 1pc.



ACO MultiDrain® M100DS channels with stainless steel edge rails

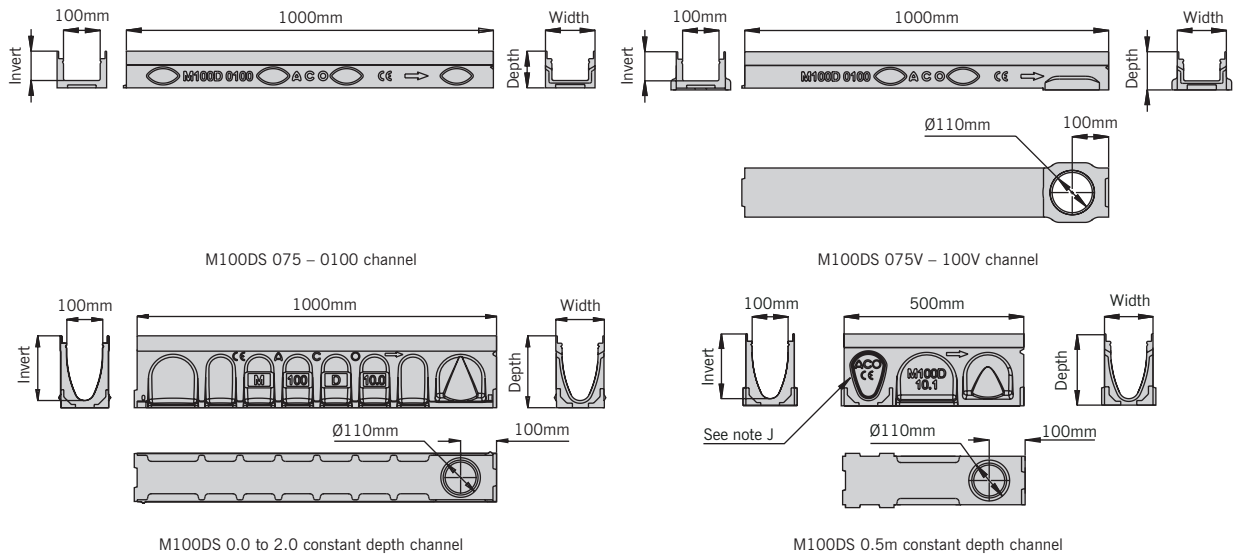
ACO MultiDrain® M100DS channels are manufactured from Vienite®, ACO's sustainable high strength material, which provides high chemical resistance. For improved aesthetics and performance, the channels listed below are provided with integral stainless steel (Grade 304) protective edge rails.

These channels are available in constant depth and shallow depth units.

For the ACO MultiDrain® M100DS range of gratings to suit these channels please refer to pages 32-37.

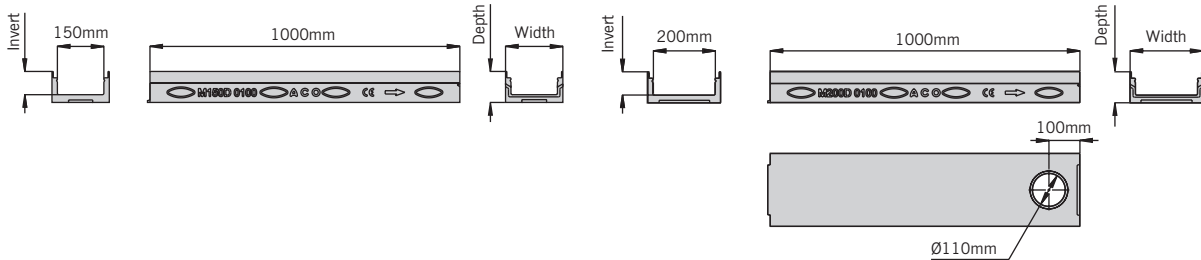
M100DS constant depth channels with stainless steel edge rails

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
24075	M100DS No. 075	1000	135	75	55	1	10.9
24076	M100DS No. 075V	1000	135	75†	55	1	10.6
24110	M100DS No. 0100	1000	135	100	80	1	12.7
24111	M100DS No. 0100V	1000	135	100†	80	1	12.4
24000	M100DS No. 0.0*	1000	135	150	130	1/3	14.9
24050	M100DS No. 0.1J*	500	135	150	130	1/3	8.6
24100	M100DS No.10.0*	1000	135	200	180	1/3	17.9
24101	M100DS No.10.1J*	500	135	200	180	1/3	10.2
24200	M100DS No.20.0*	1000	135	250	230	1/3	21.0
24201	M100DS No.20.1J*	500	135	250	230	1/3	11.8



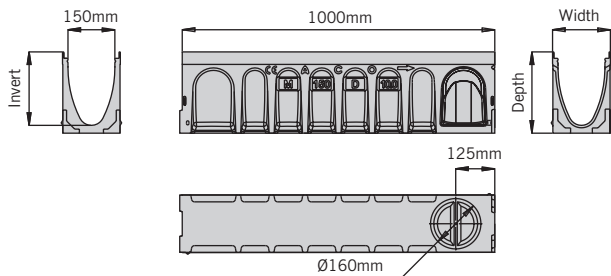
M150DS constant depth channels with stainless steel edge rails

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
24156	M150DS No. 0100	1000	185	100	75	1	16.7
24157	M150DS No. 0100V	1000	185	100	75	1	15.9
24150	M150DS No. 0.0*	1000	185	210	185	1/3	25.4
24153	M150DS No. 0.1J*	500	185	210	185	1/3	13.7
24151	M150DS No.10.0*	1000	185	260	235	1/3	28.0
24154	M150DS No. 10.1J*	500	185	260	235	1/3	15.6
24152	M150DS No.20.0*	1000	185	310	285	1/3	32.1
24155	M150DS No. 20.1J*	500	185	310	285	1/3	17.4

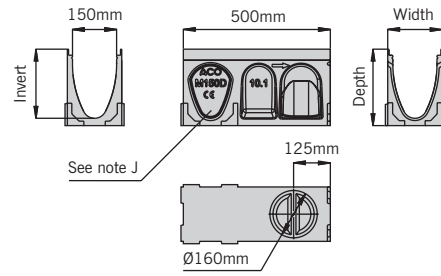


M150DS 0100 channel.

M150DS 0100V channel



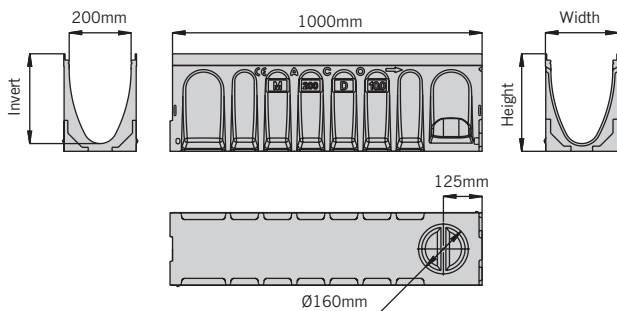
M150DS 0.0 to 2.0 constant depth channel



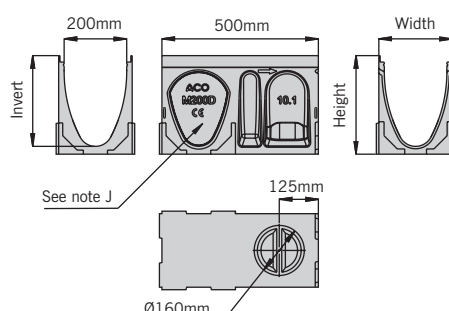
M150DS 0.5m constant depth channel

M200DS constant depth channels with stainless steel edge rails

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
24216	M200DS No. 0100	1000	235	100	75	1	19.4
24217	M200DS No. 0100V	1000	235	100	75	1	18.7
24210	M200DS No. 0.0*	1000	235	265	240	1/3	34.8
24213	M200DS No. 0.1J*	500	235	265	240	1/3	18.9
24211	M200DS No.10.0*	1000	235	315	290	1/3	39.2
24214	M200DS No. 10.1J*	500	235	315	290	1/3	20.9
24212	M200DS No.20.0*	1000	235	365	340	1/3	42.2
24215	M200DS No. 20.1J*	500	235	365	340	1/3	22.9



M200DS 0.0 to 2.0 constant depth channel



M200DS 0.5m constant depth channel

Note: The constant depth channels have an improved knockout feature, see page 41 for more information.

* Indicates channels supplied with a preformed Ø160mm knockout for vertical outlet.

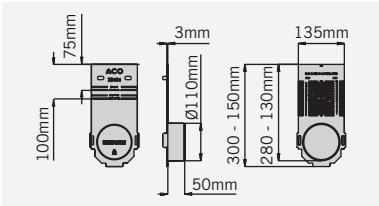
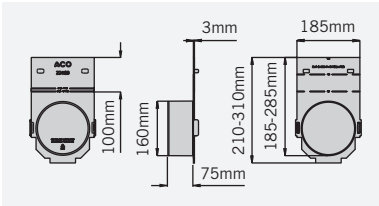
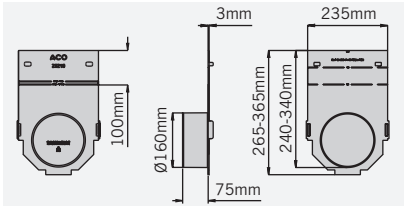
J Indicates side knockout for 90° channel connection. Knockout on both sides of the channel.

V Indicates channel with cast in TPE triple lipped seals for water tight connection. See page 41 for further information.

These products are subject to weight and dimensional tolerances. The dimensions shown on this page are for guidance purposes only.

Multifunctional endcap (closing/inlet/outlet)

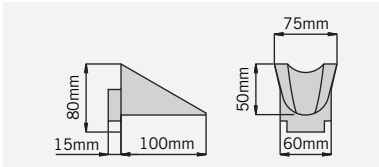
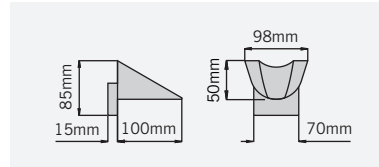
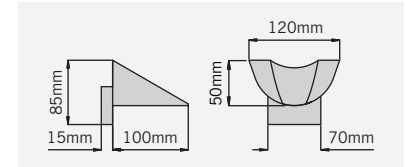
Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
23404	M100D multifunctional endcap	-	135	75/300	50	-	0.2
23159	M150D multifunctional endcap	-	185	310/100	75	-	0.3
23219	M200D multifunctional endcap	-	235	365/100	75	-	0.4



The multifunctional endcap can be cut down to suit all channels. See page 42 for further information.

Step connector

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
12601	M100D 50mm Step connector	100	75	50	-	-	0.4
13001	M150D 50mm Step connector	100	98	50	-	-	0.5
13401	M200D 50mm Step connector	100	120	50	-	-	0.6



Note: For information on the Step connector functionality see page 42.

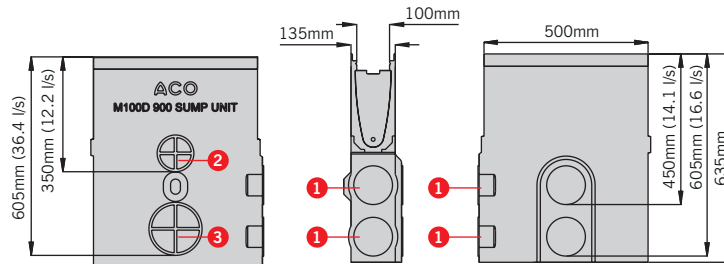


M100DS sump unit with stainless steel edge rails

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
24410	M100DS Universal sump with plastic silt bucket	500	135	635	615	-	33.9

Standard sump outlets

- ① = Ø110mm outlet with triple lipped seal
- ② = Ø110mm knockout
- ③ = Ø160mm knockout



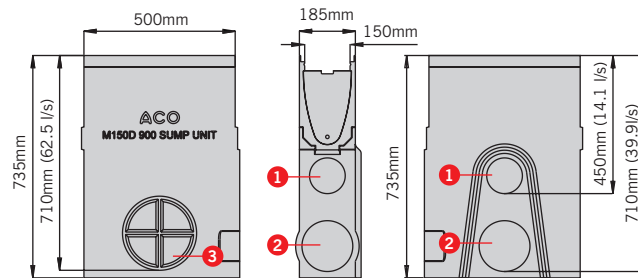
Note: Drawing shows flow through un-trapped unions. For information on the sump unit functionality see page 43.

M150DS sump unit with stainless steel edge rails

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
24158	M150DS Universal sump with plastic silt bucket	500	185	735	715	-	44.5

Standard sump outlets

- ① = Ø110mm outlet with triple lipped seal
- ② = Ø160mm outlet
- ③ = Ø200mm knockout



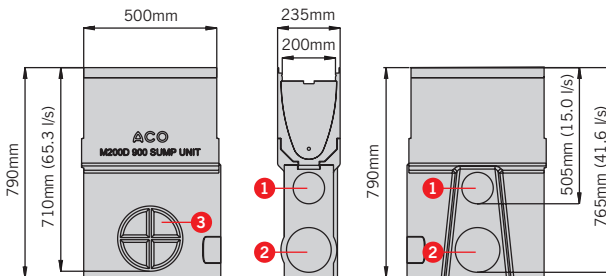
Note: Drawing shows flow through un-trapped unions. For information on the sump unit functionality see page 47.

M200DS sump unit with stainless steel edge rails

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
24218	M200DS Universal sump with plastic silt bucket	500	235	790	765	-	48.0

Standard sump outlets

- ① = Ø110mm outlet with triple lipped seal
- ② = Ø160mm outlet
- ③ = Ø200mm knockout



Note: Drawing shows flow through un-trapped unions. For information on the sump unit functionality see page 47.

Note: For ACO Universal gully details please refer to page 15. For Foul air trap details please refer to page 17.
For repair kit information please see page 17.

These products are subject to weight and dimensional tolerances. The dimensions shown on this page are for guidance purposes only.

Gratings for use with ACO MultiDrain® M100DS channels with stainless steel edge rails

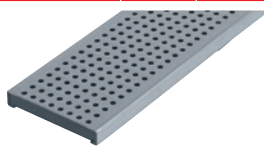


Gratings for Load Class A 15 applications

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width /hole dia (mm)	Heelguard™	Intake area (mm²/m)	Anti shunt feature	Weight (kg)
12640	Slotted stainless steel 460DL	1000	123	21	10	Yes	25300	n/a	2.0
12641	Slotted stainless steel 461DL	500	123	21	10	Yes	25300	n/a	1.0
12664	Perforated stainless steel 12664DL	1000	123	21	6	Yes	16300	n/a	2.6
12665	Perforated stainless steel 12665DL	500	123	21	6	Yes	16300	n/a	1.3



460/461DL
slotted stainless steel



12664/12665DL
perforated stainless steel

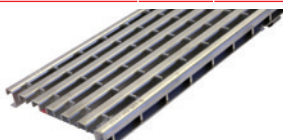


Gratings for Load Class B 125 applications

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width /hole dia (mm)	Heelguard™	Intake area (mm²/m)	Anti shunt feature	Weight (kg)
132557	Intercept Bar stainless steel 132557DL	1000	123	21	28 x 6	Yes	43000	Yes	3.8
132552	Intercept Bar stainless steel 132552DL	500	123	21	28 x 6	Yes	43000	Yes	1.9
132556	Intercept Profile stainless steel 132556DL	1000	123	21	29 x 8	Yes	44500	Yes	3.7
132551	Intercept Profile stainless steel 132551DL	500	123	21	29 x 8	Yes	44500	Yes	1.9



132557DL / 132552DL
Intercept Bar stainless steel



132556DL / 132551DL
Intercept Profile stainless steel

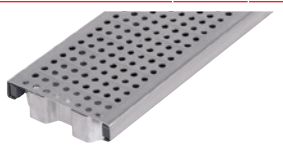


Gratings for Load Class C 250 applications

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width /hole dia (mm)	Heelguard™	Intake area (mm²/m)	Anti shunt feature	Weight (kg)
12644	Slotted stainless steel 470DL	1000	123	21	10	Yes	25300	n/a	5.0
12645	Slotted stainless steel 471DL	500	123	21	10	Yes	25300	n/a	2.5
12654	Perforated stainless steel 12654DL	1000	123	21	6	Yes	16300	n/a	4.8
12655	Perforated stainless steel 12655DL	500	123	21	6	Yes	16300	n/a	2.4
132882	Heelguard™ mesh stainless steel grating 430DL	1000	123	21	29 x 9.5	Yes	79000	Yes	4.2
132883	Heelguard™ mesh stainless steel grating 431DL	500	123	21	29 x 9.5	Yes	79000	Yes	2.1



470DL / 471DL
Slotted stainless steel



12654DL / 12655DL
Perforated stainless steel



430DL / 431DL
Heelguard™ mesh stainless steel

ACO MultiDrain® MD stainless steel gratings are manufactured from Grade 304 stainless steel and are fitted with ACO Drainlock™ as standard. See page 48 for installation details. For Drainlock™ grating lifting tool details please refer to page 33. *Not suitable for carriageways of public roads or motorways.

These products are subject to weight and dimensional tolerances. The dimensions shown on this page are for guidance purposes only.

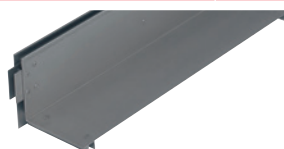


Gratings for Load Class D400* applications

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width /hole dia (mm)	Heelguard™	Intake area (mm²/m)	Anti shunt feature	Weight (kg)	
132887	Heelguard™ mesh stainless steel 132887DL	6	1000	123	21	28 x 8.5	Yes	69100	Yes	5.2
132888	Heelguard™ mesh stainless steel 132888DL	6	500	123	21	28 x 8.5	Yes	69100	Yes	2.5
23475	Brickslot single slot stainless steel 23475	1000	123	105	10		Yes	10000	No	6.6
23476	Brickslot single slot stainless steel 23476	500	123	105	10		Yes	10000	No	3.5
23477	Brickslot single slot access unit stainless steel 23477	500	123	105	10		Yes	10000	No	6.2
23490	Brickslot Twinslot offset stainless steel	1000	123	105	10 (x2)		Yes	20000	Yes	13
23491	Brickslot Twinslot offset stainless steel	500	123	105	10 (x2)		Yes	20000	Yes	6.5
23492	Brickslot Twinslot offset access unit stainless steel	500	123	105	10 (x2)		Yes	20000	Yes	11.3
23493	Brickslot Twinslot central stainless steel	1000	123	105	10 (x2)		Yes	20000	Yes	11.7
23494	Brickslot Twinslot central stainless steel	500	123	105	10 (x2)		Yes	20000	Yes	5.8
23495	Brickslot Twinslot central access unit stainless steel	500	123	105	10 (x2)		Yes	20000	Yes	14.2



132887/132888DL
Mesh stainless steel



23475/23476
Brickslot single slot stainless steel



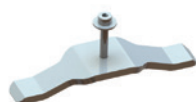
23490/23491
Brickslot Twinslot offset stainless steel



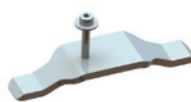
23493/23494
Brickslot Twinslot central stainless steel

Grating accessories

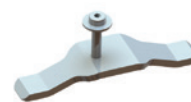
Product code	Description	For use with	Length (mm)	Width overall (mm)	Depth overall (mm)	Weight (kg)
445828	Drainlock™ security locking assembly Mesh** C250	132882, 132883	96	20	13	0.07
445745	Drainlock™ security locking assembly Mesh** D400	132887, 132888	96	27	13	0.06
445830	Drainlock™ security locking assembly Profile**	132551, 132556	96	27	13	0.06
445829	Drainlock™ security locking assembly Bar**	132552, 132557	96	27	13	0.07
1367	Drainlock™ grating lifting tool	all	400	150	6	0.2



445828
Drainlock™ security locking assembly Mesh**



445830
Drainlock™ security locking assembly Profile**



445829
Drainlock™ security locking assembly Bar**



1367
Drainlock™ grating lifting tool 835

6 Indicates security locking available.

*Not suitable for carriageways of public roads or motorways.

**Standard allen key required.

Note: 1m grates require 2pcs of Security locking assemblies and 0.5m grates require 1pc.

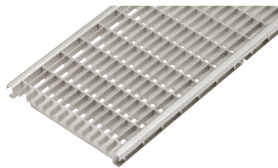


Gratings for use with ACO MultiDrain® M150DS channels with stainless steel edge rails



Grating for Load Class B 125 applications

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width /hole Ø (mm)	Heelguard™	Intake area (mm²/m)	Anti shunt feature	Weight (kg)
133603	Heelguard™ mesh stainless steel 133603DL	1000	173	36	29 x 10	Yes	118200	Yes	5.5
133604	Heelguard™ mesh stainless steel 133604DL	500	173	36	29 x 10	Yes	118200	Yes	2.7
133627	Intercept-Profile stainless steel 133627DL	1000	173	30	29 x 9	Yes	68700	Yes	5.1
133628	Intercept-Profile stainless steel 133628DL	500	173	30	29 x 9	Yes	68700	Yes	2.6
133633	Intercept-Bar stainless steel 133633DL	1000	173	27	29 x 6	Yes	66800	Yes	5.5
133634	Intercept-Bar stainless steel 133634DL	500	173	27	29 x 6	Yes	66800	Yes	2.8



133603DL / 133604DL
Heelguard™ mesh stainless steel



133627DL / 133628DL
Intercept-Profile stainless steel



133633DL / 133634DL
Intercept-Bar stainless steel



Grating for Load Class C 250 applications

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width /hole Ø (mm)	Heelguard™	Intake area (mm²/m)	Anti shunt feature	Weight (kg)
133607	Heelguard™ mesh stainless steel 133607DL	1000	173	40	30 x 10	Yes	118200	Yes	5.7
133608	Heelguard™ mesh stainless steel 133608DL	500	173	40	30 x 10	Yes	118200	Yes	2.9

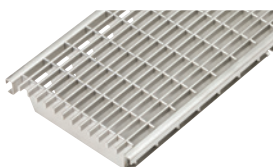


133607DL / 133608DL
Heelguard™ mesh stainless steel

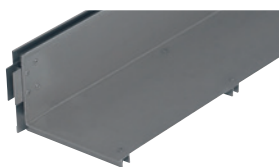


Grating for Load Class D 400* applications

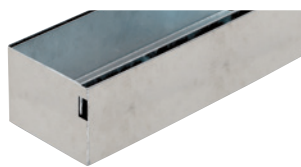
Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width /hole Ø (mm)	Heelguard™	Intake area (mm²/m)	Anti shunt feature	Weight (kg)
133611	Heelguard™ mesh stainless steel 133611DL	1000	173	46	30 x 10	Yes	103400	Yes	8.0
133612	Heelguard™ mesh stainless steel 133612DL	500	173	46	30 x 10	Yes	103400	Yes	4.0
23185	Brickslot single slot stainless steel 23185	1000	173	105	10	Yes	10000	No	8.0
23186	Brickslot single slot stainless steel 23186	500	173	105	10	Yes	10000	No	4.1
23187	Brickslot single slot access unit stainless steel 23187	500	173	105	10	Yes	10000	No	7.2



133611DL / 133612DL
Heelguard™ mesh stainless steel



23185 / 23186
Brickslot single slot stainless steel



23187
Brickslot single slot access unit stainless steel



ACO can manufacture Brickslot grates in a wide range of sizes for specific site requirements. Twinslot grates (as seen in the M100DS section) can also be manufactured for use with M150DS channels. For more information please contact your sales representative.

Grating accessories

Product code	Description	For use with	Length (mm)	Width overall (mm)	Depth overall (mm)	Weight (kg)
445831	Drainlock™ security locking assembly Mesh**	133603, 133604, 133607, 133608, 133611, 133612	146	20	13	0.1
445833	Drainlock™ security locking assembly Profile**	133627, 133628	146	27	13	0.1
445832	Drainlock™ security locking assembly Bar**	133633, 133634	146	27	13	0.1
1367	Drainlock™ grating lifting tool	all	400	150	6	0.2



445831
Drainlock™ security locking assembly Mesh**



445833
Drainlock™ security locking assembly Profile**



445832
Drainlock™ security locking assembly Bar**



1367
Drainlock™ grating lifting tool 835

⚙ Indicates security locking available.

*Not suitable for carriageways of public roads or motorways.

**Standard allen key required.

Note: 1m grates require 2pcs of Security locking assemblies and 0.5m grates require 1pc.

These products are subject to weight and dimensional tolerances. The dimensions shown on this page are for guidance purposes only.

Gratings for use with ACO MultiDrain® M200DS channels with stainless steel edge rails



Grating for Load Class B 125 applications

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width /hole Ø (mm)	Heelguard™	Intake area (mm²/m)	Anti shunt feature	Weight (kg)
133615	Heelguard™ mesh stainless steel 133615DL	1000	223	40	29 x 10	Yes	157500	Yes	7.3
133616	Heelguard™ mesh stainless steel 133616DL	500	223	40	29 x 10	Yes	157500	Yes	3.7
133631	Intercept-Profile stainless steel 133631DL	1000	223	39	29 x 8	Yes	84600	Yes	7.4
133632	Intercept-Profile stainless steel 133632DL	500	223	39	29 x 8	Yes	84600	Yes	3.6
133635	Intercept-Bar stainless steel 133635DL	1000	223	35	29 x 6	Yes	86600	Yes	8.0
133636	Intercept-Bar stainless steel 133636DL	500	223	35	29 x 6	Yes	86600	Yes	4.0



133615DL / 133616DL
Heelguard™ mesh stainless steel



133631DL / 133632DL
Intercept-Profile stainless steel



133635DL / 133636DL
Intercept-Bar stainless steel



Grating for Load Class C 250 applications

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width /hole Ø (mm)	Heelguard™	Intake area (mm²/m)	Anti shunt feature	Weight (kg)
133619	Heelguard™ mesh stainless steel 133619DL	1000	223	46	30 x 10	Yes	137700	Yes	10.7
133620	Heelguard™ mesh stainless steel 133620DL	500	223	46	30 x 10	Yes	137700	Yes	5.3

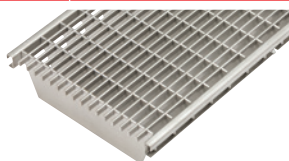


133619DL / 133620DL
Heelguard™ mesh stainless steel

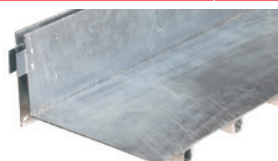


Grating for Load Class D 400* applications

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Slot width /hole Ø (mm)	Heelguard™	Intake area (mm²/m)	Anti shunt feature	Weight (kg)
133623	Heelguard™ mesh stainless steel 133623DL	6 1000	223	65	30 x 10	Yes	137700	Yes	13.0
133624	Heelguard™ mesh stainless steel 133624DL	6 500	223	65	30 x 10	Yes	137700	Yes	6.5
408998	Brickslot single slot stainless steel	1000	223	105	10	Yes	10000	No	9.8
408999	Brickslot single slot stainless steel	500	223	105	10	Yes	10000	No	4.8
409000	Brickslot single slot access unit stainless steel 409000	500	223	105	10	Yes	10000	No	8.5



133623DL / 133624DL
Heelguard™ mesh stainless steel



408998/408999 Brickslot
single slot stainless steel



409000
Brickslot single slot access unit stainless steel



ACO can manufacture Brickslot grates in a wide range of sizes for specific site requirements. Twinslot grates (as seen in the M100DS section) can also be manufactured for use with M200DS channels. For more information please contact your sales representative.

Grating accessories

Product code	Description	For use with	Length (mm)	Width overall (mm)	Depth overall (mm)	Weight (kg)
445834	Drainlock™ security locking assembly Mesh**	133615, 133616, 133619, 133620, 133623, 133624	195	20	13	0.1
445836	Drainlock™ security locking assembly Profile**	133631, 133632	195	27	13	0.13
445835	Drainlock™ security locking assembly Bar**	133635, 133636	195	27	13	0.11
1367	Drainlock™ grating lifting tool	all	400	150	6	0.2



445834
Drainlock™ security locking assembly Mesh**



445836
Drainlock™ security locking assembly Profile**



445835
Drainlock™ security locking assembly Bar**



1367
Drainlock™ grating lifting tool 835

6 Indicates security locking available.

*Not suitable for carriageways of public roads or motorways.

**Standard allen key required.

Note: 1m grates require 2pcs of Security locking assemblies and 0.5m grates require 1pc.

These products are subject to weight and dimensional tolerances. The dimensions shown on this page are for guidance purposes only.

Channel footpath drainage



CHANNEL FOOTPATH
DRAINAGE

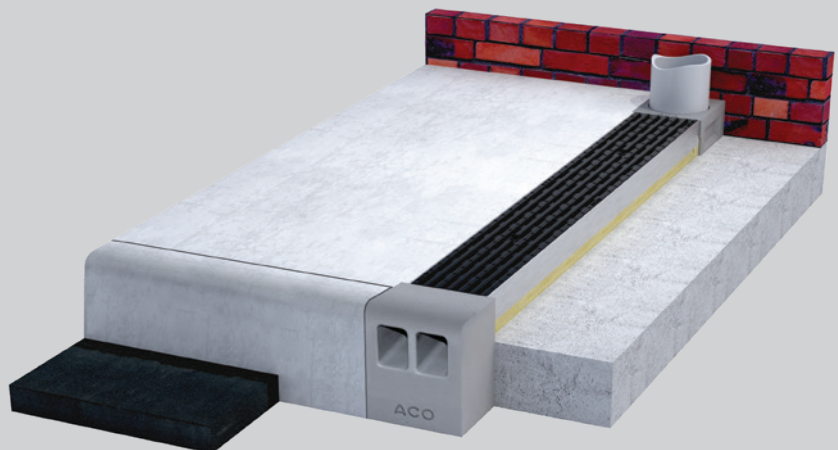
CHANNEL FOOTPATH DRAINAGE



Load Class

Channel footpath drainage is specifically used where roof drainage from down pipes is required to cross the footpath into the road gutter. Combining an ACO Downpipe connector and ACO Kerb outlet with ACO MultiDrain® M100D/M100DS channel creates a safer method for water to cross pedestrian areas.

The system can be installed with either a grated channel or solid cover and is suitable for Load Class D 400 applications. The high load class is required as vehicles may occasionally mount the kerb, and ACO's channel footpath drainage has been designed to withstand these loads.



Channel footpath drainage

The ACO MultiDrain® M100D/M100DS system includes a range of accessories which provide a drainage solution ideal for areas where down pipes from roofs and gutters exit on to the pavement. The ACO Channel Footpath drainage system effectively carries water away from paved areas and across into the adjacent carriageway.

The system uses ACO MultiDrain® M100D/M100DS shallow depth channels and has two types of kerb outlets and down pipe connectors to suit application requirements.

Shallow channels

ACO MultiDrain® MD shallow depth channels are available in two sizes, 75mm and 100mm total depths (ACO M100D / M100DS 075 and ACO M100D / M100DS 0100) and have the option of galvanised or stainless steel edge rails.

Downpipe connectors

Two down pipe connectors are available to suit channel depth. Manufactured from grey polymer concrete the down pipe connector has a clear opening of Ø75mm and connects to down pipes with outside diameters of up to 82mm.

Kerb outlets

Two outlets are available to suit the kerb profile of the application, a CFD half battered kerb outlet to suit standard HB kerbs and a CFD Bull nose kerb outlet to match BN kerbs. Manufactured from grey polymer concrete the kerb outlets allow rainwater to discharge into the road gutter from this system.

Gratings

Traditionally solid ductile iron covers are selected in channel footpath drainage applications but all ACO MultiDrain® M100D/M100DS gratings are suitable for use with this system. The system's load class rating is determined by the grating selected, further information of gratings within the range can be found on pages 21–27 and 32–37.

ACO MultiDrain® M100D shallow depth channels with UltraSTEEL™ galvanised edge rails

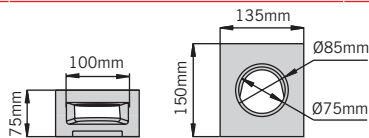
Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
23075	M100D No. 075	1000	135	75	55	1	9.2
23076	M100D No. 075V	1000	135	75*	55	1	8.9
23110	M100D No. 0100	1000	135	100	80	1	11.0
23111	M100D No. 0100V	1000	135	100*	80	1	10.7

ACO MultiDrain® M100DS shallow depth channels with stainless steel edge rails

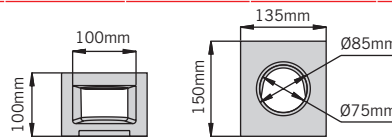
Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
24075	M100DS No. 075	1000	135	75	55	1	10.9
24076	M100DS No. 075V	1000	135	75*	55	1	10.6
24110	M100DS No. 0100	1000	135	100	80	1	12.7
24111	M100DS No. 0100V	1000	135	100*	80	1	12.4

Down pipe connectors

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
23450	CFD075 downpipe connector grey	150	135	75	n/a	n/a	2.4
23451	CFD0100 downpipe connector grey	150	135	100	n/a	n/a	3.0



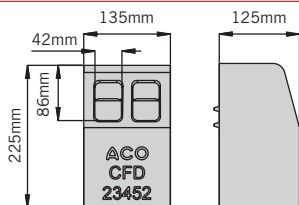
CFD 075 downpipe connector



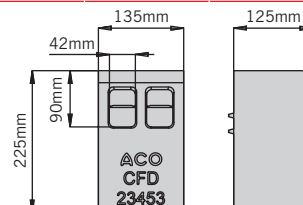
CFD 0100 downpipe connector

Kerb outlet profiles

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Invert depth (mm)	Invert Type	Weight (kg)
23452	CFD kerb outlet half batter grey	125	135	225	n/a	n/a	6.7
23453	CFD kerb outlet bull nose grey	125	135	225	n/a	n/a	7.0



CFD kerb outlet half batter



CFD bull-nose kerb outlet

Note: V Indicates channel with cast in triple lipped seals for water tight connection. See page 41 for further details.

* 075V and 0100V channels have a depth overall around the outlet of 80mm (075V) and 105 (0100V).

These products are subject to weight and dimensional tolerances. The dimensions shown on this page are for guidance purposes only.

ACO Downpipe connectors for use with the MultiDrain systems

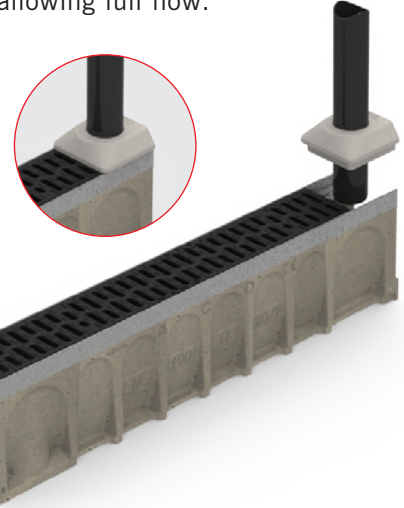
The ACO rainwater downpipe channel connector is an effective method for connecting downpipes directly into the channel body, eliminating the risk of blockages and allowing full flow.

The connector is maintenance friendly and can be easily lifted from the channel to clear localised blockages without the need to lift the entire grating. The connector can be positioned in line or perpendicular to the channel depending on the installation location and has an overhang lip to hide the cut edge of the adjacent grating – resulting in a tidy and safe installation.

The connector is offered in a range of sizes and colours for circular or square downpipes. The connectors can be used on a variety of channels including MultiDrain, MultiDrain PPD and Multiline Sealin.

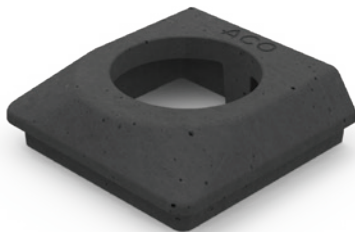
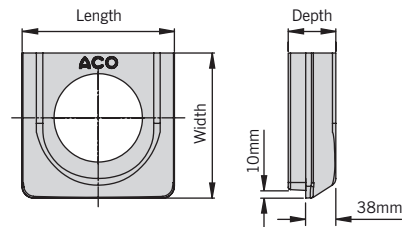
Details of the MultiDrain PPD and Multiline Sealin ranges can be found on the ACO website: www.aco.co.uk

- ▶ Direct connection into the channel eliminating blockages in the grating
- ▶ Quick and simple installation
- ▶ Easy maintenance
- ▶ Sizes, shapes and colours to suit most downpipes and installations



Black Downpipe connectors

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Weight (kg)
27132	Downpipe connector, M100D/PPD Ø68mm*	142	133	60	1.07
27138	Downpipe connector, M100D/PPD 65mm*	142	133	60	1.04
27150	Downpipe connector, M150D/PPD Ø110mm	192	183	60	1.65
27152	Downpipe connector, M150D/PPD 100mm	192	183	60	1.66
27155	Downpipe connector, M200D/PPD Ø110mm	242	233	60	2.58



Grey Downpipe connectors

Product code	Description	Length (mm)	Width overall (mm)	Depth overall (mm)	Weight (kg)
27133	Downpipe connector, M100D/PPD Ø68mm*	142	133	60	1.07
27139	Downpipe connector, M100D/PPD 65mm*	142	133	60	1.04
27151	Downpipe connector, M150D/PPD Ø110mm	192	183	60	1.65
27153	Downpipe connector, M150D/PPD 100mm	192	183	60	1.66
27154	Downpipe connector, M200D/PPD Ø110mm	242	233	60	2.58



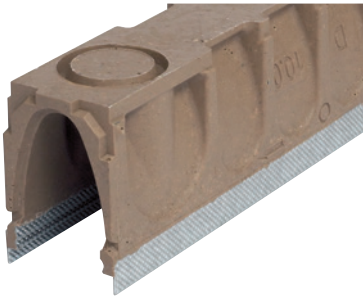
*Also compatible with ACO HexDrain Pro and ACO CivicDrain

These products are subject to weight and dimensional tolerances. The dimensions shown on this page are for guidance purposes only.

Preparing the system for installation

Channel base knockout details

All ACO MultiDrain® MD constant depth channels in the height range 0.0 to 30.0 are supplied with a pre formed knockout detail in the base of the channels. This knockout detail positioned at the male end of the channel allows a vertical connection to be made from the channel to a Ø110mm (100mm wide bore) or Ø160mm (150mm and 200mm wide bore) PVC-U pipe system. The knockout detail on the base of the channel is indicated by a "hammer" symbol. The method of removal and pipe connection is described below.



Knockout detail.

FUNCTIONS:

Step 1: Pre formed knockout detail



Step 2: Support channel around knockout detail by placing the channel on sand or soft earth for example. Tap the knockout panel from the side indicated by the Hammer symbol to remove panel.



Step 3: Push fit pipe into recess provided and seal as required. For recommended sealants refer to the section headed "watertight sealing".



Channel side wall connection detail

An additional feature provided on all 500mm long channels are removable side wall panels, which allow channel runs to be connected together to form "T" or "L" junctions for continuous water flow through the system. Where channel connections are to be made to the side wall of these units a female joint detail is provided to aid alignment and fast installation.



Removable side wall panel.

FUNCTIONS:

Step 1: Using a disc cutter as shown, cut a cross into the panel provided. Ensure cuts extend to but not beyond the perimeter recess surrounding the removable panel.



Step 2: Tap segments of panel between the cuts to remove the panel.



Step 3: Use a chisel to tidy up any remaining material. Channel connection can now be made and sealed as required.



Shallow Channels

The ACO MultiDrain® MD shallow channels are available in either 75mm or 100mm overall depths. These units are ideal for use where installation depths are restricted such as in structural slabs, bridge decks and roofs. All units can be sealed for watertight installations as each unit is supplied with a preformed sealant groove (see section headed watertight sealing for further details).

The shallow channels identified with a "V" such as the 075V and 0100V units have a cast-in triple lipped seal in their base for push fit watertight connections to Ø110mm PVC-U pipe. These triple lipped seals are manufactured from SEBS-TPE have excellent chemical, UV and weather resistance.



FUNCTIONS:

Step 1: Ensure Triple lipped seal and pipe spigot are clean and free from debris



Step 2: Lubricate joint faces as required and push fit pipe into the seal. The pipe is fully fitted when the end of the pipe is flush with the internal base of the channel.



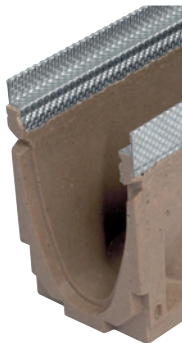
Step connector

Each width of MultiDrain® MD has available a Step connector manufactured from polymer concrete. This unit is used between constant depth channel joints where a stepped fall channel installation is required and takes up the 50mm height difference between units. The Step connector ensures a smooth water flow within the channel system.



Watertight sealing

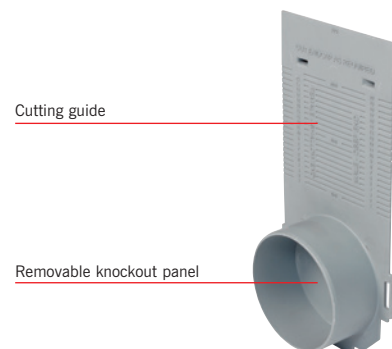
ACO MultiDrain® MD channels are generally installed without a particular water seal. Once butt jointed and with a concrete surround a fairly watertight installation is achieved. If however a watertight system is required each MultiDrain® MD channel is provided with a sealant groove allowing the system to be sealed by the application of a flexible sealant either during or following installation. For rainwater applications we recommend a single component, polyurethane based elastomeric joint sealant such as BASF Masterflex 472 or Sika Sikaflex 11FC or similar.



Application of sealant to be in accordance with the sealant manufacturers recommendations, but for guidance a typical method of application is as follows.

Multifunctional endcap

A Multifunctional endcap is provided for each channel width that is designed to be used with all channel heights in each range. Manufactured from polypropylene these versatile endcaps can be adjusted on site to perform the function of a closing endcap or as an inlet/outlet endcap for connection to Ø110mm (100mm wide bore) or Ø160mm (150mm and 200mm wide bore) PVC-U pipe.



FUNCTIONS:

Step 1: Place Step connector into the base of the deeper channel to be jointed as shown.



Step 2: Push channel joint together to lock Step connector in place forming a smooth transition between units as shown.



FUNCTIONS:

Step 1: Jointing faces of the channels to be sound and cleaned to remove all loose material, dust, oil and grease. This can be done by the use of a wire brush.



Step 2: Butt joint the channels & install as per ACO installation instructions. Ensuring joints are still clean (surfaces can be damp but no water droplets should be evident) apply sealant with a cartridge gun approximately 5mm thick to the end face of the channel & completely fill the sealant groove. Note this type of channel can be sealed either at or following installation.



Step 3: Wipe excess sealant from the inside faces of the channel & inspect sealant groove to ensure it has been fully filled with sealant. Leave sealant to cure before use as per the sealant manufacturers recommendations.



FUNCTIONS:

Closing endcap: The endcap supplied fits directly to the deepest channel within the system. All other channel heights can be accommodated by simply cutting the endcap to suit. A cutting guide is printed on the front of the endcap plate. The endcap is fastened to the channel by two clips and can be connected to either male or female channel end.



Adjusting endcap.

Fitting endcap to channel

Inlet & Outlet endcap: The endcap has a knockout panel which can be removed with a hammer. Once fitted to the channel the endcap performs either an inlet or outlet function and is designed to provide a connection to Ø110mm (100mm wide bore) or Ø160mm (150mm and 200mm wide bore) PVC-U pipes.

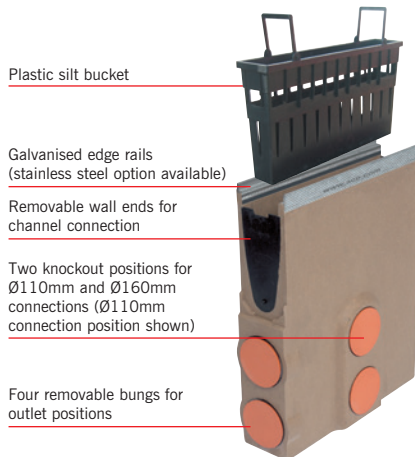


Adjusting endcap.

Fitting endcap to channel

Sump unit

A polymer concrete chamber unit which provides the capacity to hold water and silt, and also provides an outlet for the channel system.



Roddable foul air traps

A drain connector available in Ø110mm and Ø160mm for connection to foul or combined drainage. Foul air traps come complete with removable bung for rodding and are manufactured from highly durable recyclable MDPE.



ACO Universal gully

A recycled plastic & ductile iron modular system purposely designed for use with ACO channel drainage systems up to 200mm internal width. The system provides a high capacity for retaining water and also an outlet for the drainage system.



FUNCTIONS:

Step 1: Triple lipped seals for watertight connections.



Step 2: Unit wall ends can easily be removed using knife or saw.



Step 3: Two knockouts for Ø110mm and Ø160mm pipe connections. For knockout removal refer to method stated on page 45 headed 'Channel side wall connection detail'.



FUNCTIONS:

Step 1: Push the foul air trap into place.



Step 2: Bung can be removed for rodding



FUNCTIONS:

Step 1: Once installed ACO Universal gully can be cut to match channel depth



Step 2: The cut ACO Universal gully matches the profile of the ACO MultiDrain® MD channel.



Note: Full installation details are available to download from www.aco.co.uk



ACO's Polymer concrete repair kit is available for bonding applications, for instance where a mitred channel joint is to be made or for the repair of small areas of aesthetic damage. For further product details please see page 17.



ACO Drainlock™ Gratings

ACO Drainlock™

Fitted as standard to ACO MultiDrain® MD gratings, this fast locking device removes the need for bolts and bars and improves the channels hydraulic capacity. The Drainlock™ mechanism simply clips into the channel edge rail for rapid installation. An installation guide is shown opposite.



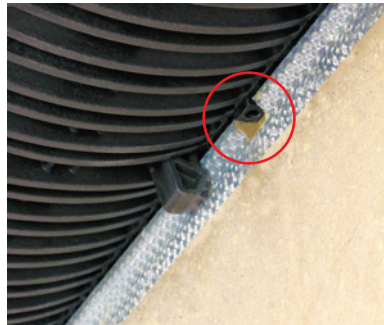
FUNCTIONS:



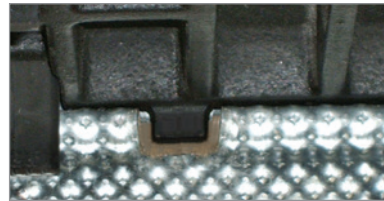
Push or stand on the grating until it clicks into place

Anti-shunt mechanism

A selection of the ACO Drainlock™ gratings are fitted with an anti-shunt mechanism that restricts unwanted grating movement when installed.



FUNCTIONS:



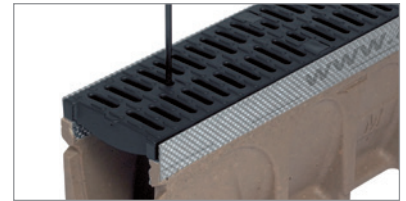
The anti-shunt lines the grate up to the channel and prevents the grates ability to move linearly. When cutting channels to required lengths, remember to also align the grate to the channel so the anti-shunt engages

Removal of grating

It is recommended that all ACO gratings are lifted with our Drainlock™ lifting tool, which allows quick and easy lifting of the grate close to the Drainlock™ mechanism.



FUNCTIONS:



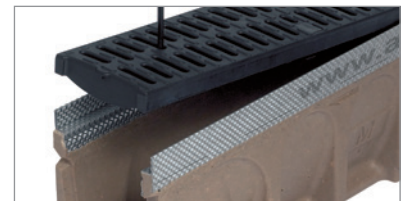
Insert tool as shown. Drainlock™ lifting tool available part no 1367



To install, align the grating onto the channel
Align anti-shunt detail with recess



If your installation requires the channel to be cut or mitred, ensure the grate still aligns with the anti-shunt. Photo shows a bad installation where the grate overlaps the channel junction



Pull upwards to unlock grating



ACO Drainlock™ locking mechanism fastens into the channel. Gratings should be fitted in the channels before the installation concrete is installed

Security Locking

In areas such as schools and prisons, where unwanted grating removal needs to be restricted, a security locking can be used in conjunction with the following gratings; and options are available for most styles of galvanised and stainless steel grates. The system is fitted to the gratings by one or two M5/M6 screws and clamps the grating in place preventing removal. Security locking key for installation and removal supplied separately.

FUNCTIONS:



For ductile iron gratings, fix the security screws and clamp the grating as shown.



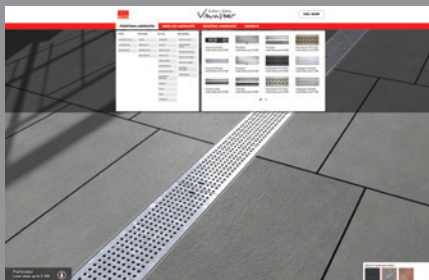
Place grating into the channel and tighten the fixing using the security locking key. Galvanised and stainless steel grate's security locking must be expanded rather than tightened to press against the Drainlock™ mechanism. Please refer to the Drainlock™ tables for more information.

Grating selection

All channels within the ACO MultiDrain® MD range are certified to BS EN 1433: 2002 Load Class D 400. The system has a wide range of gratings suitable for use in a variety of applications from Load Class A15 to D 400*. Refer to the information on page 8 for load classes and typical applications. Please note when selecting a grating careful consideration should be given to the application requirement. Each grating has a certified load class which, once installed with the channel determines the system's load class.

Surface + Grating Visualiser

A clever, yet easy to use software program that visualises how our range of grating designs could enhance your project.



To make specification easier, the software will suggest our most suitable ranges based on the project requirements.

You can then select from the available options and visualise how these may look in different surface finishes. Once a choice is made, a simple, yet detailed specification sheet provides full product information.



To launch the visualiser scan the QR code or visit www.aco.co.uk/gratingvisualiser



Heelguard™ applies to ACOs range of 'Heel-friendly' products with slot widths up to and including 10mm. Suitable for most pedestrian applications and compliant to BS EN1433:2002. For specific widths please refer to grating details.

*Not suitable for carriageways of public roads or motorways

Design Software

ACO QuAD Hydraulic Design Software

TRY OUR FREE DESIGN TOOL

The new free-to-use ACO QuAD Hydraulic Design software has unprecedented levels of choice and flexibility built-in, to enable the efficient and accurate hydraulic design of any surface water management scheme.

The hydraulic engine has been robustly tested and is the tool used by ACOs own internal Design Services team in modelling surface water solutions for customers.

ACO QuAD Hydraulic Design software uses differential equations for spatially varied flow that online alternative solutions cannot accurately match. For example the Manning's equation for steady uniform flow does not work with level channels and is grossly inaccurate on shallow gradients.



Here are some of the features it includes:

- Powerful project-based software
- Create catchment models that are fully editable
- PDF summary document output
- Cloud based – All designs are stored securely on our server against your login
- Integrated rainfall data for the whole of the UK

To use the QuAD Hydraulic Design software visit: www.aco.co.uk/quad-hydraulic-design-2.0

QUAD FEATURES OVERVIEW

Cloud based

The software means increased efficiency providing design resources you need when you need it, allowing you to deploy the same design capability consistently, with the same consistency in results every time.



Flexible download format

Output can be generated for all or parts of the project and can be generated in pdf or CSV formats.



Secure scheme filing

All designs created by registered users are stored on a secure server and are password protected. Past projects are easily retrieved from the personalised menu.



Flexible catchment design

QuAD is designed to support designers in the creation of catchment areas. Supplementary catchment areas can easily be added upstream and downstream of any previously designed channel run.



Application

Application selection ensure designers are able to get quick and accurate guidance in selection of the most suitable products based on the type of application the catchment is to cater for.



Knowledge database

There is support available either through a query submission or through self-help made possible by the comprehensive Knowledge database.



Product optimiser

Optimising the specific channel runs can be done with the optimiser feature selecting the smallest product suitable. Excavation and concrete requirements are also provided.



Attenuation assessments

Calculate the attenuation required for the project and compare it with the storage available in the channel design. Attenuation volume is presented along with suitable options for storage.



Rainfall assist

Rainfall intensity by location matters in design. QuAD provides a site locator map enabling the most accurate intensity to be input.



Resilience assessment

By inputting anticipated sedimentation rates and sedimentation density the QuAD software enables the designer to test their suggested maintenance schedules.



Register Now - It's Free

www.aco.co.uk/quad-hydraulic-design-2.0

Design Support Services

Surface water management system design can often be a complex task. Success in combining products and processes requires a thorough understanding of how these different elements work together.

The ACO Design Services Team is able to work closely with you through the entire design process to ensure accurate and cost-effective product selection is made.

Services we offer include (free and without obligation):

- Whole system design, from collection to the attenuation of surface water
- Hydraulic calculations and AutoCAD detailing
- Parts schedules

ACO has embraced the concept of value engineering as an approach to on-site construction that saves both time and money.

ACO will review any design to minimise the total scheme and life cost of a proposal. The team can suggest the most appropriate range depending on your requirements.

Some ranges like MultiDrain or MonoDrain allow water to be contained and conveyed close to the surface, which accords with the principles advocated for Sustainable Drainage (SuDS Manual, 2015), by removing the need for pumping. Other ranges like Qmax allow attenuation – the storage of large volumes of water during storm events, reducing overall site costs.

For detailed designs using the ACO Hydraulic Design Software, please contact the ACO Water Management Design Services Team.

If manual calculations are preferred to using our QUAD software, hydraulic tables and instructions for manual calculations can be provided.

ACO Water Management Design Services Team

Tel: 01462 816666

Email: technical@aco.co.uk

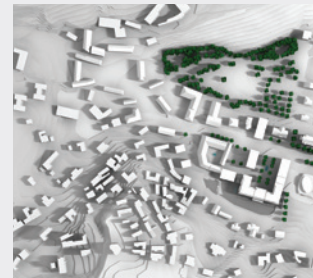
ACO BIM MODELS

BIM is the process of generating and managing data, and developing collaborative behaviours that will unlock new and more efficient ways of working at all stages of the project life-cycle. These files will help contractors specify and optimise drainage systems in line with the overall benefits of BIM-enabled

working, including faster project delivery, reduced costs, reduced waste and greater project predictability.

Depending on the product range Civils3D, IFC or Revit files are available for download.

www.aco.co.uk/aco-bim-models



Professional Development

Helping create knowledge champions

In today's ever-changing construction industry, it has never been more important to ensure you are up to date with current industry trends and new innovations. Surface water management is one of the most dynamic sectors of the construction industry with new legislation, innovative products and ground-breaking materials constantly emerging.

Depending on your professional body or employer, you may be required to undertake between 20 and 30 hours CPD per year. ACO understands this can be a daunting task and has developed a series of professional

development courses that can be accessed in a number of ways including online, in-office or at our state-of-the-art training facility at ACO UK office headquarters in Bedfordshire.

The courses have been carefully developed to provide essential learning and knowledge and are delivered by ACO's UK wide experienced Business Development Team ensuring that only the highest quality content is delivered.

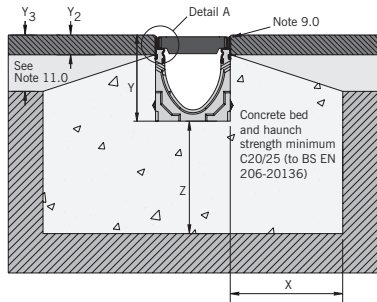


To find out more and book a professional development course, visit: www.aco.co.uk/professional_development

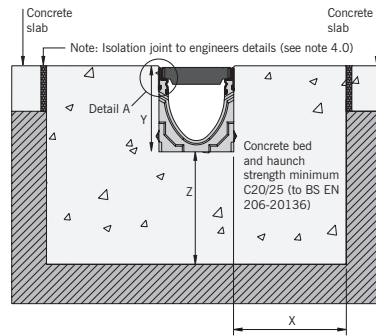
Installation detail

CHANNELS WITH TRADITIONAL GRATINGS

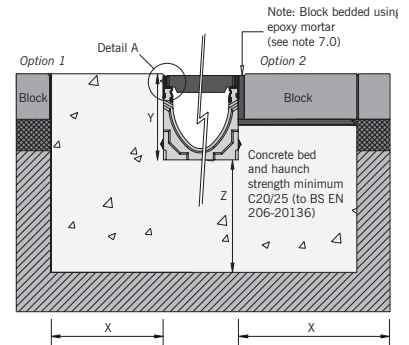
Asphalt pavement



Concrete pavement



Block pavement



1.0 Load Class

Installation recommendations shown are ACO minimum recommendations for BS EN 1433:2002 load class requirements.

2.0 Ground Conditions

The long term performance of a channel installation to sustain vertical and lateral loads depends upon a) ground conditions, b) stability of the adjacent pavement and c) a durable concrete bed and surround. The recommended installation detail may require the minimum dimensions to be revised to achieve site specific load class requirements (referred to in 1.0 above).

3.0 Cutting and Jointing

Mitre joints are formed by cutting the channels to the required angle and butting them together with the appropriate sealant (e.g. Sikaflex 11FC or similar) or ACO Repair Kit. Where possible 90° joints and T's should be formed so that gratings do not have to be cut. Angles can be formed by connecting them using proprietary PVCu pipework attached to the ACO inlet/outlet endcaps. For further details please contact ACO Design Services Team. Note: For load classes higher than C 250, mitred joints are not recommended in vehicular areas. Where requested ACO can custom manufacture angled joints to order.

4.0 Isolation Joints

The channel must be isolated from the surrounding environment. An isolation joint must be positioned up to 1500mm from the channel wall. Any dowel bars must be located no nearer than 150mm from the channel wall. Other isolation joints in surrounding slab must be continued through the channel. Additional crack control may be required to comply with specifier requirements.

5.0 installation into in-situ slab

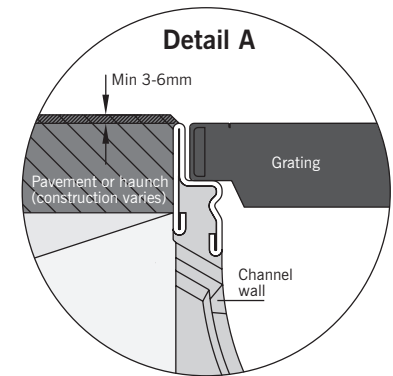
Where a channel is to be installed into an existing concrete slab it is necessary to cut a suitably sized pocket in the slab. The channel will then need to be bedded in polymer modified mortar of 25mm minimum thickness (this may vary depending on the type of mortar used). Engineering advice may be necessary.

6.0 Temporary installation

A channel installation is not complete until the final surfacing is laid. In any temporary condition, i.e., the channel walls projecting above adjacent ground, site traffic should not cross channels. Loose boards, stone fill or cover plates will not protect the channel walls or grating. A temporary channel crossing should be formed by raising the ground level locally, to 3-6mm above top of edge rail, either side of a channel for a distance of 750 to 1000mm, to form ramps. Note that the channel load class should be adequate to carry the site traffic.

7.0 Block pavements

The channel must be supported laterally. Blocks laid directly against the channel must be laid as a soldier course and restrained from movement by bedding securely on the concrete haunch e.g. by using a polymer modified mortar for bed and perpendicular joints (e.g.. RONAFIX mortar mix C or similar). Blocks or slabs bedded on sand remote from the channel should be set at a higher level to compensate for possible settlement of the paving in service.



8.0 Grate locking system

Gratings should be securely fixed to the channel, where required, using an appropriate grate lock system (where available).

9.0 Channel protection

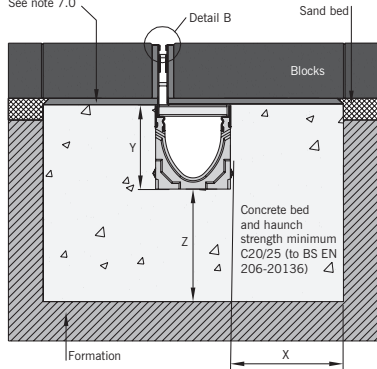
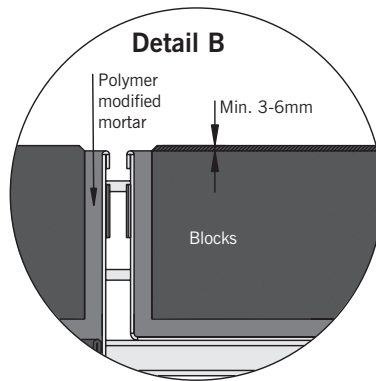
Avoid contact between compaction equipment and top of ACO channel edge rail. The installer must ensure that the finished surface level lies above the top of the edge rail (by at least 3-6mm). Covering or protecting the grating, before concreting the haunch or laying blocks, removes the time and cost associated with cleaning the channel and grating of cement material and embedded stones. (Please note that ACO channels must be installed with the grating in place to prevent deformation of the channel.)

Installation detail

CHANNELS WITH BRICKSLOT GRATINGS

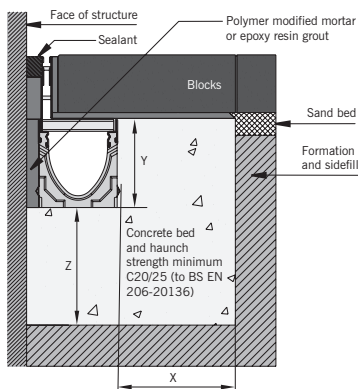
Block pavement

Blocks directly adjacent to frame to be bedded using an epoxy mortar. See note 7.0

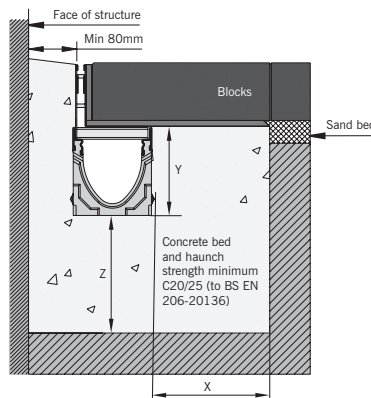


An electronic version of the ACO MultiDrain® MD installation detail is available to download from the ACO website. Visit www.aco.co.uk.

Adjacent to a structure - option 3



Adjacent to a structure - option 4



10.0 Watertight installation to BS EN 1433:2002

Where ACO channel joints/fittings and channel/pavement interfaces are to be sealed, an appropriate sealant must be used (e.g., Silkaflex 11FC or similar). Guidance on the necessary surface preparation and/or priming should be sought from the sealant manufacturer.

See page 46 for typical method of water tight sealing.

Best practice and workmanship

ACO can give guidance with respect to the most suitable methods of installation for each of the products in the ACO MultiDrain® MD range. ACO MultiDrain® MD should be installed using acceptable levels of workmanship and according

to the National Code of Practice (UK: BS8000: Part 14: 1989) in keeping with EN 1433:2002 (Drainage channels for vehicular and pedestrian areas).

Detailed installation statements and methodologies will vary for all sites as each will have different aspects deserving particular consideration, consequently the relevant approvals should be sought from the consulting engineer and/or the installer.

Note: Galvanised iron and steel products have good corrosion resistance to concrete and mortar products but may experience corrosion if high chloride an/or sulphate content is present. Use only good quality concrete and consider using corrosion inhibitors where necessary. The use of protective coatings, such as paint, can minimise the risk of corrosion.

For further information please contact our Design Services Team (technical@aco.co.uk) or the ACO website www.aco.co.uk

11.0 Minimum Dimensions of Concrete Surround

Load Class	A 15	B 125	C 250	D 400*
Minimum Dimensions (mm)				
x	100	150	150	200
y	Full channel height (less Y2 where necessary)			
z	15 100 0	150	150	200
Y2	35	35	35	35
Maximum Dimensions (mm)	35	35	35	35
Asphalt pavement only	Y3	100	60	60

*E.g., Parking areas for all types of road vehicle. Not suitable for carriageways of public roads or motorways.

Chemical resistance chart

Vienite®, ACO's sustainable high strength material, has a high resistance to dilute acids and alkalis, and are unaffected by road salt, fuel and oil, and other commonly encountered chemicals. Further details of the chemical resistance can be obtained from the ACO Water Management Design Services team or, for particular chemicals, samples of the polymer concrete can be supplied to customers for their own testing. The chemical resistance will also depend on the temperature of the effluent. Clean water should not exceed 80°C.

The resistance of the gratings and edge rails should also be considered, and stainless steel gratings and edge rails are available in the ACO MultiDrain® MD system for aesthetically pleasing installations and for specific chemical resistance.

This chemical resistance chart refers to chemicals at ambient temperatures (20°C) and the results are for general guidance only.

Chemical medium	% conc	Resistance: Polyester concrete
Acetic acid, glacial	100	No
Acetic acid	10	Yes
Acetic anhydride	100	No
Acetone	10	No
Acetone	100	No
Alum	100	Yes
Aluminium sulphate	100	Yes
Ammonium chloride	100	Yes
Ammonium nitrate	100	Yes
Ammonium phosphate	65	Yes
Ammonium sulphate	100	Yes
Aniline (aminobenzene)	100	No
Barium chloride	100	Yes
Benzaldehyde	100	No
Benzene	100	No
Benzyl alcohol	100	Yes
Benzyl chloride	100	No
Borax	100	Yes
Boric acid	100	Yes
Bromine	100	No
Bromine water	Saturated	No
Butyl acetate	100	No
Butyric acid	100	Yes
Calcium carbonate	100	Yes
Calcium chloride	100	Yes
Calcium chlorate	8	Yes
Calcium hydroxide	100	Yes
Calcium nitrate	100	Yes
Carbon disulphide	100	No
Carbon tetrachloride	100	Yes
Castor oil	100	Yes
Chlorine gas, wet	100	No
Chlorine water	Saturated	No
Chlorobenzene	100	Yes
Chloroform (trichloro-methane)	100	No
Chromic acid	12	Yes
Citric acid	100	Yes
Copper chloride	100	Yes
Copper nitrate	100	Yes
Cyclohexane	100	Yes
Diesel fuel (DERV)	100	Yes
Dimethyl formamide	100	No
Dimethyl phthalate	100	Yes
Diethyl phthalate	100	Yes
Ethanol	95	No
Ethanolamine	100	Yes
Ethyl acetate	100	No
Ethylene glycol	100	Yes
Ferrous chloride	100	Yes
Ferric chloride	100	Yes
Ferrous sulphate	100	Yes
Formaldehyde	30	Yes
Formic acid	10	Yes
Formic acid	100	No
Fuel oil	100	Yes
Gasoline	100	Yes
Glycerine	100	Yes
Hydrazine	50	No

Chemical medium	% conc	Resistance: Polyester concrete
Hydrobromic acid	48	Yes
Hydrochloric acid	10	Yes
Hydrofluoric acid	10	No
Hydrogen peroxide	30	Yes
Lactic acid	100	Yes
Lead acetate	100	Yes
Magnesium chloride	100	Yes
Magnesium sulphate	100	Yes
Maleic acid	100	Yes
Methyl ethyl ketone (MEK)	100	No
Motor oil	100	Yes
Nickel chloride	100	Yes
Nickel sulphate	100	Yes
Nitric acid	5	No
Nitrobenzene	100	No
Oleic acid	100	Yes
Oxalic acid	100	Yes
Perchloric acid	10	Yes
Perchloroethylene	100	Yes
Phosphoric acid	20	Yes
Phosphorus trichloride	100	No
Potassium carbonate	50	Yes
Potassium chloride	100	Yes
Potassium dichromate	100	Yes
Potassium hydroxide	10	Yes
Potassium nitrate	100	Yes
Potassium permanganate	10	No
Potassium sulphate	100	Yes
Pyridine	100	No
Sodium acetate	100	Yes
Sodium bromide	100	Yes
Sodium carbonate	35	Yes
Sodium chlorate	100	Yes
Sodium chloride	100	Yes
Sodium hydroxide (caustic soda)	50	No
Sodium hypochlorite	18	No
Sodium nitrate	100	Yes
Sodium nitrite	100	Yes
Sodium phosphate	10	Yes
Sodium sulphate	100	Yes
Sodium sulphide	100	Yes
Sodium sulphite	100	Yes
Sodium thiosulphate	100	Yes
Stearic acid	100	Yes
Styrene	100	No
Sulphuric acid	75	No
Sulphuric acid	50	Yes
Sulphuric acid at up to 40°C	10	Yes
Tetrachloroethylene	100	Yes
Thioglycolic acid	80	Yes
Thionyl chloride	100	No
Toluene	100	Yes
Toluene sulphononic acid (aqueous solution)	Saturated	Yes
Trichloroacetic acid	50	Yes
Turpentine	100	Yes
Water	100	Yes
Xylene	100	Yes
Zinc sulphate	100	Yes

Specification clause

The surface drainage system shall be ACO MultiDrain® (Insert channel description as appropriate e.g. ACO M100D) channel system as supplied by ACO Technologies plc; all materials and components within the scope of this channel system shall be obtained from this manufacturer. The system shall be CE marked and fully compliant with BS EN 1433:2002, certificated to Load Class (*) as defined in BS EN 1433:2002.

Declarations of Performance (DoP) shall be supplied to the Supervising Officer upon request. The system shall be of (100mm†, 150mm†, 200mm†) nominal internal width, manufactured in Vienite®, ACO's sustainable high strength material with cast-in (galvanised/stainless†) steel edge rails. The channels shall be installed with manufacturer's grating appropriate to the specified Load Class and locked securely in place using the manufacturer's Drainlock® boltless locking system.

The system shall be installed in accordance with the manufacturer's printed instructions, and the work carried out as specified in drawing no. (... ..) and in accordance with recognised good practice. Standards of workmanship shall generally be as specified in BS EN 752 and BS 8000:Part 14:1989.

† delete non-appropriate information.

* insert information C 250 or D 400 as appropriate.

Recycled content

ACO Technologies aim to incorporate as much recycled material or waste material as is practicable in their manufactured products. Typically, cast iron materials contain 40% to 90 % recycled iron, and steel products contain 25% to 33% recycled steel. The total recycled content of each product in the ACO MultiDrain® MD system will vary as the proportion of the different materials (in channels, edge rails, gratings etc) varies. As an example, ACO MultiDrain® MD channels with Heelguard™ ductile iron gratings will contain approximately 27% by weight recycled material.

The ACO MultiDrain® MD products are themselves intended for a long life with low maintenance, to reduce the need to recycle, but when eventually they are no longer needed, much of their content can be readily recycled with a very low risk of pollution to the environment.

NBS Specifications

ACO MultiDrain® MD should be specified in section Q10:180. Assistance in completing this clause can be found in the ACO Water Management entry in NBS Plus, or please contact the ACO Water Management Design Services Team.

Note: A specification in NBS format is available to download from www.thenbs.com or www.aco.co.uk

Conformity

The ACO MultiDrain® MD System is fully certified to BS EN 1433:2002 and CE marked in accordance with the Construction Products Regulation.

Declarations of Performance are available via the CPR Zone on our website (www.aco.co.uk), or on request. Please contact ACO Water Management Design Services Team on 01462 816666 for further information.

BS EN 1433:2002



General information

ACO products are subject to weight and dimensional tolerances. The weights and dimensions shown in this document are for guidance purposes only. ACO products are made from naturally occurring materials and may be subject to variations in colour, texture and marking. These aesthetic variations do not affect the performance or functionality of our Goods. The appearance of products shown in our company documentation are for illustration purposes only.

ACO Technologies plc

- ACO Water Management
Civils + Infrastructure
Building + Landscape
- ACO Building Drainage
- ACO Sport
- ACO Wildlife



ISO 9001
FM 13502



ISO 14001
EMS 538781



OHSAS 18001
OHS 524145

ACO Water Management

A division of ACO Technologies plc
ACO Business Park,
Hitchin Road,
Shefford,
Bedfordshire
SG17 5TE

Tel: 01462 816666

Fax: 01462 815895

e-mail Project pricing: awmprojects@aco.co.uk

e-mail Sales: customersupport@aco.co.uk

e-mail Technical: technical@aco.co.uk

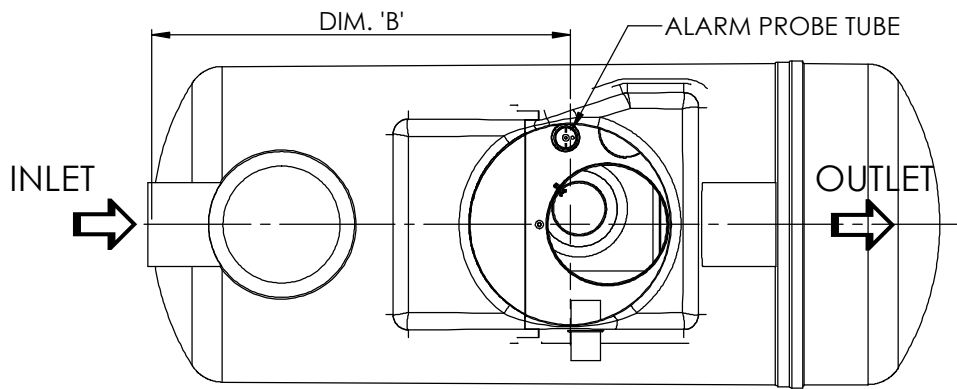
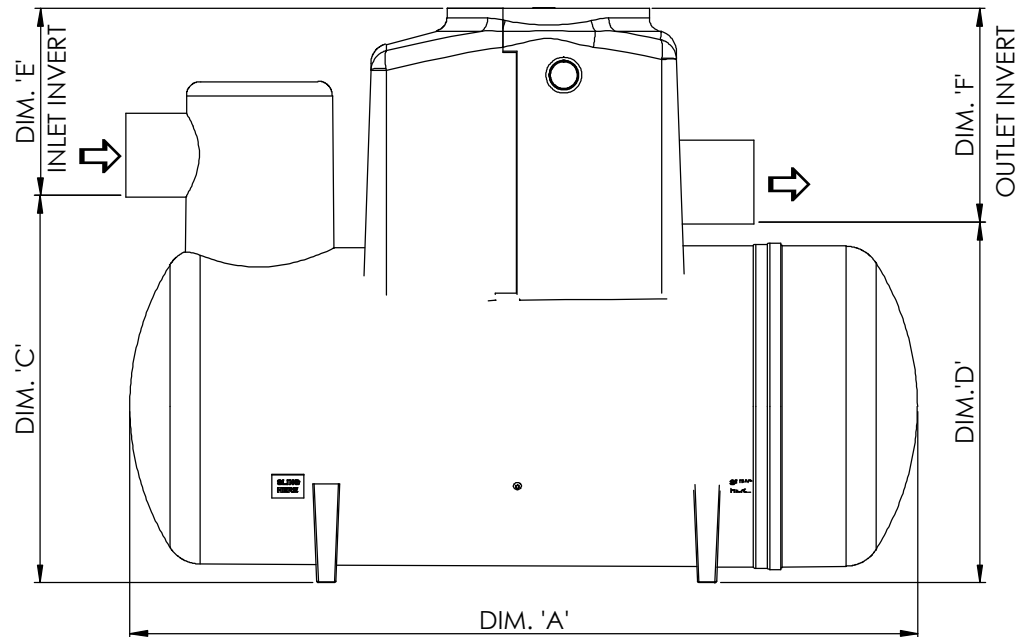
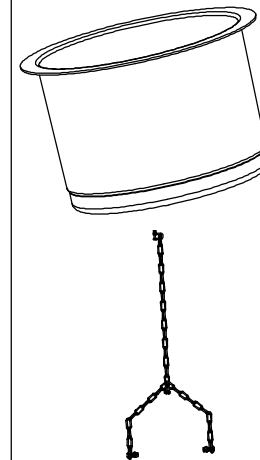
website: www.aco.co.uk

ACO. creating the future of drainage

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ACO CARES ABOUT THE ENVIRONMENT

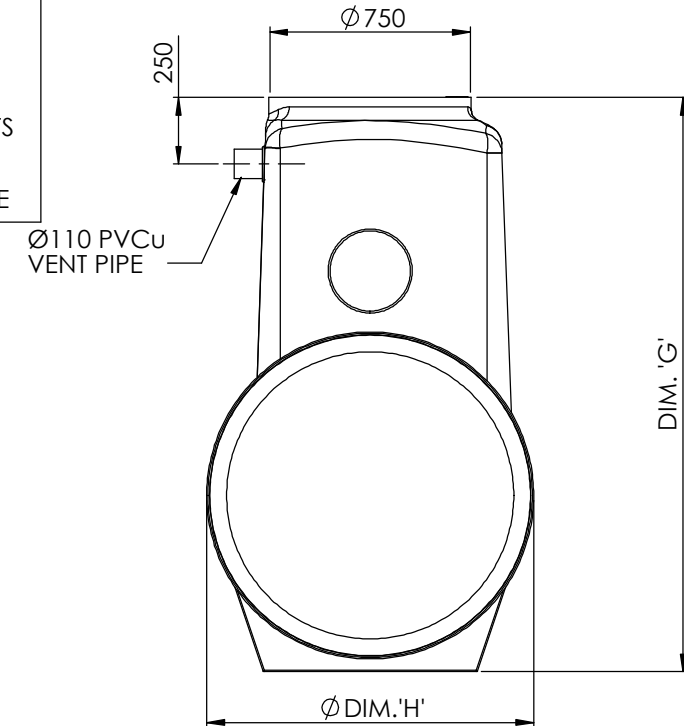
Printed on material certificated in accordance with the rules of the FSC who provide a means of assuring that products come from responsibly managed forest.



EXTENSION PARTS
(IF REQUIRED)
INCLUDED IN
PRODUCT CODE

NOTES

1. UNITS ARE SUPPLIED WITH THE STANDARD (MINIMUM) PIPEWORK SIZE, AND ORIENTATION SHOWN ON THE DRAWING. THE STANDARD EN858-1 STATES MINIMUM CONNECTION SIZES, UNITS ORDERED WITH DIFFERENT SIZE CONNECTIONS MAY NOT BE FULLY COMPLIANT WITH THE STANDARD. PLEASE CONSULT OUR SALES DEPARTMENT FOR DETAILS OF AVAILABLE OPTIONS, BUT PLEASE NOTE WE DO NOT ALTER INTERNAL PIPEWORK.
2. ALL UNITS SUPPLIED ARE CLASS 1 AND INCLUDE A COALESCER.
3. EXTENSION PARTS FOR DEEPER INVERTS CAN BE PROVIDED FOR ON SITE ASSEMBLY.
4. ALL UNITS REQUIRE APPROPRIATE CONCRETE BASE, COVER AND FRAME TO SUIT APPLIED LOADINGS.
5. THIS DRAWING SHOULD BE USED FOR DIMENSIONAL INFORMATION ONLY.
6. A Ø76mm TUBE IS SUPPLIED TO HOUSE AN OIL ALARM PROBE.



UNIT	NOMINAL FLOW (l/sec.)	DIM.'A'	DIM.'B'	DIM.'C'	DIM.'D'	DIM.'E'	DIM.'F'	DIM.'G'	DIM.'H'	STD. PIPE Ø	APPROX. EMPTY WEIGHT (kg)	FALL ACROSS UNIT
NSBE010	10.0	2070	1095	1450	1350	700	800	2150	1220	315	160	100
NSBE015	15.0	2950	1560	1450	1350	700	800	2150	1220	315	200	100
NSBE020	20.0	3893	2016	1450	1350	700	800	2150	1220	375	220	100
NSBE025	25.0	3575	1900	1680	1580	700	800	2380	1420	375	300	100
NSBE030	30.0	4265	2263	1680	1580	700	800	2380	1420	450	325	100

Please check with Kingspan Environmental that this drawing is the latest issue

Issue	Date	Drawn by	Approved by	Description
07	14.2.18	T.Kelly		CC1405 - Coalescer Extension Chains were Pipe
06	11.11.14	T.Kelly		CC1191 - Alarm Probe Tube Re-Positioned

Material : Various

Finish :

Weight :

Tolerance :

Thickness : n/a

Surface Area :

Drawing : DS1155

Page 1 of 2

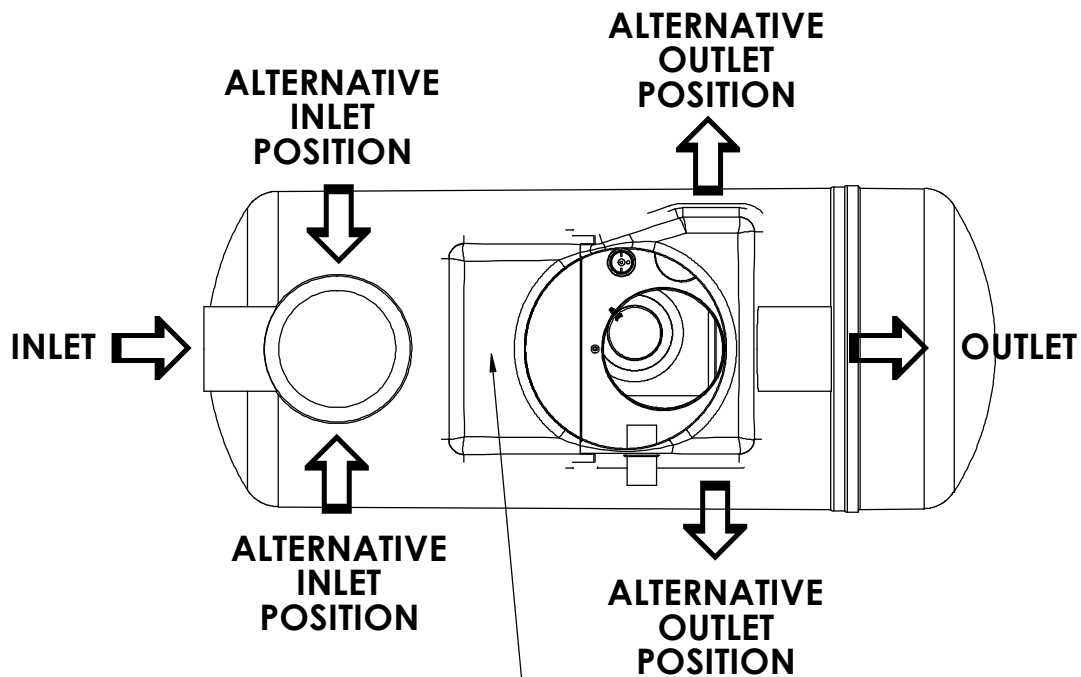
NSBE010 - NSBE030 Bypass Separators

All dimensions in mm

Scale: Not to scale

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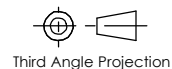


Please Note:-
 Due to the physically small size of the NSBE010,
 the inlet pipe, all orientation options, is fitted
 directly into this turret.

Pipe Orientation Options		
OPTION A 	OPTION B 	OPTION C
OPTION D 	OPTION E 	OPTION F
OPTION G 	OPTION H 	OPTION K

Material : Various	Tolerance (unless stated) :	Drawing : DS1155 NSBE010 - 030 BYPASS SEPARATORS
Finish :	Thickness : n/a	
Weight : 226.56 Kg	Surface Area : m ²	
Modelled By :		

All Dimensions In mm Scale: Do Not Scale



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 the written permission of Kingspan Environmental

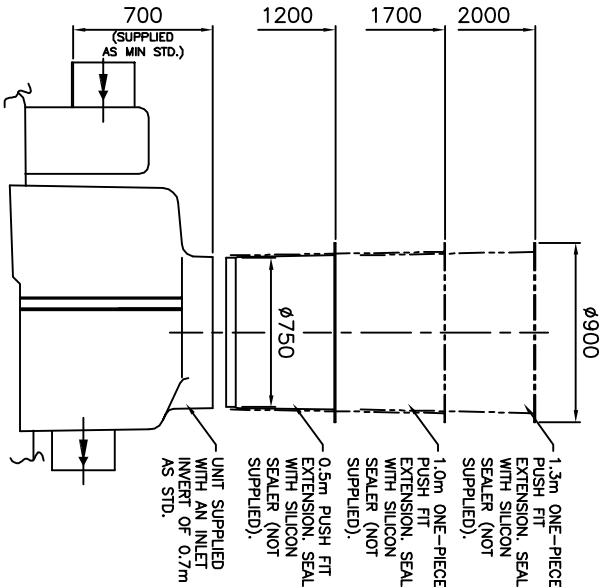
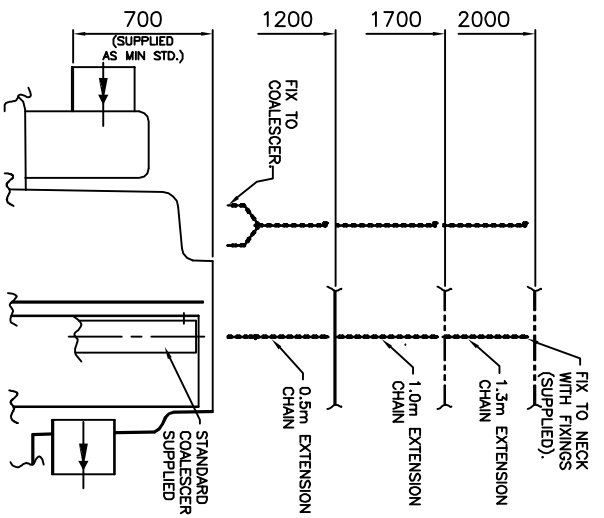
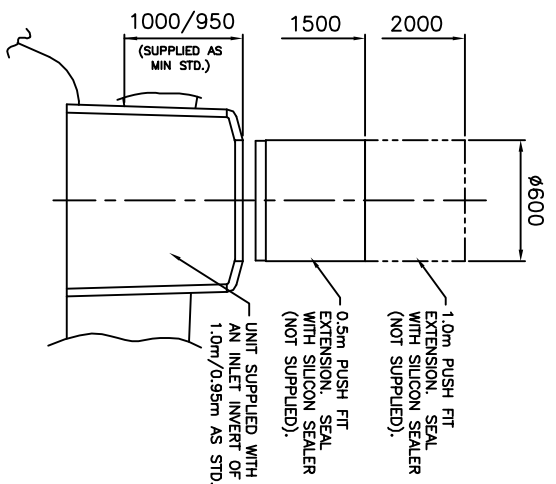
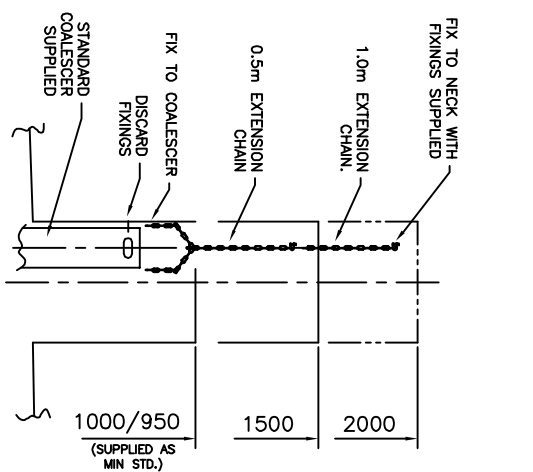


NSBE010-NSBE030
NECK EXTENSIONS

NSBE010-NSBE030
COALESCER EXTENSIONS

NSBE040-NSBE125
NECK EXTENSIONS

NSBE040-NSBE125
COALESCER EXTENSIONS



ALL DIMENSIONS ARE IN MILLIMETRES – DO NOT SCALE

04	15.02.18	T.K.	CC1405 – Coalescer Extension Chains were Pipes
03	08.07.13	T.K.	CC981 Phase 3 – NSBE040 – 125 included
02	15.02.13	T.K.	CC981 Phase 2 – NSBE025 & 030 included
01	01.10.12	T.K.	CC981 – INITIAL ISSUE
ISSUE	DATE	DRAWN	MODIFICATION

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KINGSPAN RESERVE THE RIGHT TO CHANGE SPECIFICATIONS WITHOUT NOTICE

NECK & COALESCER
EXTENSION DETAILS
NSBE SEPARATORS
(ALL UNITS CLASS 1)

TITLE	SCALE	SHEET SIZE
NTS	A3	

DRAWING No. DS1200P 04



SDS Limited
Company Address Clearwater House,
Castle Mills Industrial Estate, Biddisham,
Axbridge
BS26 2RE
United Kingdom

Created Date 07/07/2022

Enquiry Number E247820

Project Name Plot H3 - Accor Tribe Hotel

Prepared By Jason Cartwright
Phone 07801200634
Email jason.cartwright@sdslimited.com

Contact Name Sanjay Kanadia

Quote For Spillways Ltd
Client Address 260 Sherwood Park Avenue
Sidcup
DA15 9JN

Site Contact Name Spillways Ltd
Site Address 260 Sherwood Park Avenue
Sidcup
DA15 9JN

Product	Product Code	Line Item Description	Quantity	Quantity Unit Of Measure	Total Price
GEOlight 400 - Attenuation Install	GEOlight400AI	Supply & Installation 1no. Attenuation Tank L12.5m x W13.0m x H1.250m effective storage 187m3	204.00	m3	£28,560.00
GEOlight 400 - Attenuation Install	GEOlight400AI	Supply & Installation 1no. Attenuation Tank L15.0m x W9.0m x H0.750m effective storage 90m3	102.00	m3	£14,280.00
GEOmembrane	Included		1.00		£0.00
GEOtextile	Included		1.00		£0.00
GEOvent	Included		1.00		£0.00
Top Hat Seals	Included		1.00		£0.00
Internal tank Pipework	Included		1.00		£0.00

Subtotal £42,840.00

Total Price £42,840.00

Grand Total £42,840.00



This Quotation includes delivery to site. It is valid for 30 days from the above date and is subject to SDS's current Terms & Conditions of Sale enclosed. Please see below for further details of exclusions.

- SDS Limited proposes to sell to the customer the offered products and materials in accordance with the terms, conditions, specifications and prices detailed in this quotation / tender.
- All prices are nett and exclude VAT.
- Materials will be invoiced on delivery.
- Subject to credit approval all payments are due within 30 days of issue of invoice.
- Retention is not accepted; if retention is taken, the same percentage amount will be added to all monies due.

Delivery to a UK site from the date of order will be subject to lead times available on request.

Delivery is normally by articulated truck with curtain sides.

Unloading / offloading of materials, distribution and storage on site are the responsibility of the purchaser; please avoid any concentrated point loading. Please note that for offloading GEOLight® any forklift requires min 1.8m extension forks.

Flatbed / rigid-only vehicles are available on request and may carry an additional charge.

Specialist deliveries requiring vehicles to be registered with schemes such as FORS/CLOCS will incur a surcharge.

Separate call-off of multiple tanks/crates not detailed in the enquiry may incur surcharges.

Water Release Products

Included in the quotation price for water release products unless specifically stated otherwise:-

- Removable Bypass Mechanism with stainless steel rope and pull handle;
- Removable Maintenance Plate for downstream access;
- Neoprene Rubber Gasket;
- Stainless steel Fixing Bolt and Eyebolt;
- Drill Bit;
- Installation Instructions.

Treatment Products

SDS Aqua-Swirl TM Vortex Separator and SDS Aqua-Filter TM Filtration Unit meet with the New Jersey Department testing facility for the removal of particles from surface water discharge. The New Jersey testing procedure is accepted by the Environment Agency as a reputable accreditation. Oil, debris and sediment capacities can be provided by SDS in order that maintenance programmes can be planned. For further advice regarding maintenance schedules please contact SDS Sales Office. Backfill and coverage details, CAD drawings and specification are available on request.

Delivery to a UK site from the date of order will be subject to lead times of 6 to 8 weeks. SDS Aqua-Swirl TM and SDS Aqua-Filter TM are shipped to site on specific transport depending on size of units. Chains and lifting rig are supplied with the delivery. Specialist deliveries requiring vehicles to be registered with schemes such as FORS/CLOCS will incur a surcharge. Unloading / offloading of materials, distribution and storage on site are the responsibility of the purchaser; please avoid any concentrated point loading.



Conditions of Sale

1 Definitions

In these terms:

"Buyer" means the person who accepts a quotation of the Company for the sale of the Goods or whose order for the Goods is accepted by the Company

"Company" means Sustainable Drainage Systems Limited

"Conditions" means the terms and conditions of sale set out in this document and any special terms and conditions agreed in writing by the Company and the Buyer

"Contract" means the contract for the purchase and sale of the Goods

"Goods" means the goods which the Company is to supply and which the Buyer agrees to buy in accordance with these Conditions

"Price" means the price for the Goods

1.2 Any reference in these Conditions to any provision of a statute shall be construed as a reference to that provision as amended re-enacted or extended at the relevant time

1.3 The headings in these Conditions are for convenience only and shall not affect their interpretation

2 Basis of Sale

2.1 The Company shall sell and the Buyer shall purchase the Goods in accordance with:-

2.1.1 the Company's quotation if provided by the Company and accepted by the Buyer; or

2.1.2 (if the Company does not submit a quotation) the Buyer's order if accepted by the Company, subject in either case to these Conditions, which shall govern the Contract to the exclusion of any other terms, subject to which any such quotation is accepted, or purported to be accepted or any such order is made or purported to be made by the Buyer.

2.2 Any variation to these Conditions (including any special terms and conditions agreed between the parties) shall be inapplicable unless agreed in writing by the Company

2.3 Any advice or recommendation given by the Company or its employees or agents to the Buyer or its employees or agents as to the storage application or use of the Goods which is not confirmed in writing by the Company is followed or acted upon entirely at the Buyer's own risk and accordingly the Company shall not be liable for any such advice or recommendation which is not so confirmed

2.4 Any typographical clerical or other error or omission in any sales literature quotation price list acceptance of offer invoice or other document or information issued by the Company shall be subject to correction without any liability on the part of the Company

2.5 All specifications, drawings, particulars of weight and dimension and performance data contained in any of the Company's literature are approximate only.

2.6 The Company reserves the right to improve and/or modify any specifications, designs and dimensions without notice.

2.7 For the avoidance of doubt nothing in these Conditions or any Contract shall confer on any third party any benefit nor the right to enforce any term of these Conditions or any Contract whether pursuant to the Contracts(Rights of Third Parties) Act 1999 or otherwise

3 The Price and payment

3.1 The Price shall be either the Company's quoted price which shall only be valid for 60 days from its date after which time the Price may be altered by the Company and shall be subject to the Company re-quoting.

3.2 All prices are given by the Company to include the Company's charges for transport, packaging and insurance. It excludes all unloading and distribution unless specifically stated otherwise within the quote.

3.3 The Price and any other sums payable by the Buyer to the Company is exclusive of any applicable Value Added Tax, which the Buyer shall be additionally liable to pay to the Company.

3.4 Subject to any special terms agreed in writing between the Buyer and the Company, the Company may invoice the Buyer for the Price of the Goods on or at any time after delivery of the Goods, or any instalment of the Goods unless the Goods are to be collected by the Buyer or the Buyer wrongfully fails to take delivery of the Goods, in which event the Company shall be entitled to invoice the Buyer for the Price at any time after the Company has notified the Buyer that the Goods are ready for collection or (as the case may be) the Company has tendered delivery of the Goods.

3.5 Unless as otherwise agreed in writing payment of the Price and VAT shall be due within 30 days of the date of the invoice without deduction or set off.

3.6 Retention is not accepted and if retention is taken the same percentage is to be added to all monies due.

3.7 If the Buyer fails to make any payment on the due date then without prejudice to any other right or remedy available to the Company the Company shall be entitled to:

3.7.1 cancel the contract or suspend any further deliveries to the Buyer

3.7.2 appropriate any payment made by the Buyer to such of the Goods (or the Goods supplied under any other contract between the Buyer and the Company) as the Company may think fit (notwithstanding any purported



appropriation by the Buyer) and

3.7.3 charge the Buyer interest (both before and after any judgement) on the amount unpaid at the rate of 8% per cent per annum above Bank Of England base rate from time to time until payment in full is made (a part of a month being treated as a full month for the purpose of calculating interest).

3.7.4 Failure to pay the amount due by the due date will render the entire account to become immediately payable. Interest and recovery of all costs incurred in the collection of any overdue amount will be charged in accordance with The Late Payment of Commercial Debts (Interest) Act 1998 & Late Payment of Commercial Debts Regulations 2013.

3.8 All Operation and Maintenance Manuals, Warranties, Guarantees, Liabilities and/or any other form of Assurance are subject to full and complete payment, any outstanding monies owed will result in the company withdrawing and voiding these items at its sole discretion.

4 The Goods

4.1 The quantity and description of the Goods shall be as set out in the Company's quotation (if accepted by the Buyer) or the Buyer's order (if accepted by the Company).

4.2 The Buyer shall be responsible to the Company for ensuring the accuracy of the terms of any order and any information supplied for the Company as to its requirements (including but without limitation the use to which the Goods will be put and any applicable specification) submitted by the Buyer and for giving the Company any necessary information relating to the Goods within a sufficient time to enable the Company to perform the Contract in accordance with its terms

4.3 If the Goods are to be manufactured or any process is to be applied to the Goods by the Company in accordance with a specification or instructions submitted by the Buyer the Buyer shall indemnify the Company against all losses damages costs, claims, demands, liabilities and expenses awarded against or incurred by the Company in connection with or paid or agreed to be paid by the Company in settlement of any claim for infringement of any patent copyright design trade mark or other industrial or intellectual property rights of any other person which results from the Company's use of the Buyer's specification or from compliance by the Company with the Buyer's instructions whether express or implied.

4.4 No order which has been accepted by the Company may be cancelled by the Buyer except with the agreement in writing of the Company and providing that all costs already incurred by the Company are fully recovered.

5 Delivery of Goods

5.1 No deliveries will be made or Goods manufactured until a full order has been received and approved by the Company.

5.2 Company shall deliver the Goods to the address as outlined with the order.

5.3 The Buyer shall be responsible for offloading the Goods at the delivery address and shall advise the Company of any local or internal laws, byelaws or rules relating to parking or loading of vehicles at the delivery address.

5.4 All deliveries will be made on curtain sided articulated lorries unless stated otherwise with the Company quote.

5.5 The Buyer shall be responsible for ensuring that access to the delivery address is wholly by a road with a surface capable of withstanding the weight and size of a vehicle carrying the Goods.

5.6 If the Buyer fails for any reason whatsoever to take delivery of the Goods or fails to give the Company adequate delivery instructions at the time stated for delivery (otherwise than for any cause beyond the Buyer's reasonable control or by reason of the Company's fault) then without prejudice to any other right or remedy available to the Company the Company may:

5.6.1 store the Goods until actual delivery and charge the Buyer for the reasonable costs (including insurance) of returning the Goods to the Company's premises, storage and for transport, packaging and insurance for redelivery of the Goods; or

5.6.2 sell the Goods at the best price readily obtainable and (after deducting all reasonable storage and selling expenses) account to the Buyer for the excess over the Price or charge the Buyer for any shortfall below the Price

6 Installation of the Goods

6.1 No Goods or men will be sent to site until the Company have received a signed commencement to work sheet from the Buyer.

6.2 All unloading, distribution, setting out, pumping out, blinding, backfilling, fall protection and stoning up is the carried out by the Buyer unless agreed otherwise in writing with the Company.

6.3 If the Company is delayed on site due to no fault of their own the Buyer will be responsible for all additional costs incurred by the Company. Current daywork rates are £1500.00 per day.

6.4 The Buyer will not be allowed access to or the traffic over the Goods until they that sign a copy of the Companys sign off sheet.

6.5 The Buyer will need to supply a suitable 110V power source within 2 meters of the tank/SA location.

7 Risk and Title

7.1 Risk of damage to or loss of the Goods shall pass to the Buyer once all Goods arrive on site.

7.2 Notwithstanding delivery and the passing of risk in the Goods or any other provision of these Conditions the property in the Goods shall not pass to the Buyer until the Company has received payment in full.

7.3 The Company reserves the right to remove all Goods from site until they have been paid for regardless of whether they have been installed within the permanent works and



Buyer will responsible for the costs associated with removing the Goods from site and any making good if required

8 Warranties and liability

8.1 Subject to the following provisions, the Company warrants that the Goods will be free from defects in material and workmanship for a period of 12 months from their delivery to the Buyer.

8.2 The warranty in clause 8.1 is given by the Company subject to the following conditions:

8.2.1 the Company shall be under no liability in respect of any defect in the Goods arising from any information drawing design or specification supplied by the Buyer

8.2.2 the Company shall be under no liability in respect of any defect arising from fair wear and tear wilful damage negligence abnormal working conditions failure to follow the Company's instructions (whether oral or in writing)

misuse or alteration or repair of the Goods without the Company's approval

8.2.3 the Company shall be under no liability under the above warranty (or any other warranty condition or guarantee) if the Price and value added tax for the Goods has not been paid by the due date for payment

8.2.4 the above warranty does not extend to parts materials or equipment not manufactured by the Company in respect of which the Buyer shall only be entitled to the benefit of any such warranty or guarantee as is given by the manufacturer to the Company.

8.3 The Buyer shall not make any statement or representation or give any warranty to any third party in respect of any Goods other than in the terms made or given by the Company to the Buyer in these Conditions nor shall the Buyer have any authority to commit the Company to provide any service in relation to the Goods. The Buyer shall indemnify the Company against all losses, damages, costs, claims, demands, liabilities and expenses incurred or suffered by the Company in respect of or arising out of any such statement, representation or warranty made or given by the Buyer in contravention of this clause.

8.4 The Company's liability to the Buyer for -

8.4.1 death or injury resulting from its own or that of its employees' agents' or sub-contractors' negligence; and

8.4.2 damage suffered by the Buyer as a result of any breach of the obligations implied by Section 12 of The Sale of Goods Act 1979 shall not be limited

8.5 Subject as expressly provided in these Conditions all other warranties conditions or terms whether implied by statute or common law or otherwise are hereby excluded

8.6 The Buyer shall examine all Goods delivered forthwith following delivery. Any claim by the Buyer which is based on any defect in the quality or condition of the Goods or their failure to correspond with specification shall (whether or not delivery is refused by the Buyer) be notified to the Company within 7 days from the date of delivery or (where the defect or failure was not apparent on reasonable inspection) within a reasonable time after discovery of the defect or failure. If delivery is not refused and the Buyer does not notify the Company accordingly the Buyer shall not be entitled to reject the Goods and the Company shall have no liability for such defect or failure and the Buyer shall be bound to pay the Price as if the Goods had been delivered in accordance with the Contract. In no event shall the Buyer be entitled to reject the Goods on the basis of any defect or failure which is so slight that it would be unreasonable for the Buyer to reject them.

8.7 The Company shall be entitled to examine any Goods which are the subject of any claim by the Buyer and to remove such Goods or any part thereof for testing. No tests carried out by the Buyer will be recognised by the Company unless carried out strictly in accordance with a method previously agreed by the Company as being suitable for the purpose.

8.8 Where any valid claim in respect of any of the Goods which is based on any defect in the quality or condition of the Goods or their failure to meet specification is notified to the Company in accordance with these Conditions the Company shall be entitled to repair or replace the Goods (or the part in question) free of charge or at the Company's sole discretion refund to the Buyer the Price (or a proportionate part of the Price) but the Company shall have no further liability to the Buyer.

8.9 The Company shall not be liable to the Buyer by reason of any representation (unless fraudulent) or any implied warranty condition or other term or any duty at common law (including but without limitation the negligence of the Company its employees agents or otherwise) or under the express terms of the Contract for any loss of production loss of profits or anticipated profits loss of contracts operation time or anticipated savings loss of business or of expected further business loss of or corruption to data damage to the Buyer's reputation or goodwill damages costs or expenses payable by the Buyer to any third party or any other indirect special or consequential loss or damage or claim (whether caused by the negligence of the Company its employees agents or otherwise) which arise out of or in connection with the supply of the Goods or their use or resale by the Buyer

8.10 The liability of the Company under or in connection with the Contract shall not exceed the Price of the Goods and the Buyer acknowledges that by delivery of a copy of these Conditions to them before the date of the Contract that they have notice of the limitation and agree to it.

8.11 The Company shall not be liable to the Buyer or be deemed to be in breach of the contract by reason of any delay in performing or any failure to perform any of the Company's obligations in relation to the Goods if the delay or failure was due to any cause beyond the Company's reasonable control. Without limiting the foregoing, the following shall be regarded as causes beyond the Company's reasonable control:

8.11.1 act of god, explosion, flood, tempest, or inclement weather, fire or accident;

8.11.2 war or threat of war, sabotage, insurrection, civil disturbance or requisition;

8.11.3 acts, restrictions, regulations, by-laws, prohibitions or measures of any kind on the part of any Governmental, Parliamentary or Local Authority;

8.11.4 imports or exports, regulations or embargos;

8.11.5 strikes, lockouts or other industrial action or trade disputes (whether employees of the Company or of a third party);

8.11.6 difficulties in obtaining raw materials, labour, fuel, parts or machinery;

8.11.7 power failure, failure of tele-communications lines, failure or breakdown of plant, machinery or vehicles;

8.11.8 theft or malicious damage;



8.11.9 defaults for any reason whatsoever of suppliers or sub-contractors of the Company;

8.11.10 Incompleteness or inaccuracy of any technical information which it is the responsibility of the Buyer to provide

9 Insolvency of the Buyer

9.1 This clause applies if:

9.1.1 the Buyer makes any composition or voluntary arrangement with its creditors (being an individual or firm) becomes bankrupt or (being a company) becomes subject to an administration order or seeks an out of court route into administration or goes into liquidation (otherwise than for the purposes of amalgamation or reconstruction) or a moratorium comes into force in respect of the Buyer (within the meaning of the Insolvency Act 1986); or

9.1.2 an encumbrancer takes possession or a receiver or manager or administrative receiver or administrator is appointed of any of the property or assets of the buyer; or

9.1.3 the Buyer ceases or threatens to cease to carry on business or

9.1.4 the Company reasonably apprehends that any of the events mentioned above is about to occur in relation to the Buyer and notifies the Buyer accordingly.

9.2 If this clause applies then without prejudice to any other right or remedy available to the Company the Company shall be entitled to stop any goods in transit, cancel the Contract or suspend any further deliveries under the Contract without any liability to the Buyer and if the Goods have been delivered but not paid for the Price shall become immediately due and payable notwithstanding any previous agreement or arrangement to the contrary.

10 Health and Safety Information

The Buyer agrees and undertakes with the Company to ensure that the provisions of all instruction manuals including health and safety instructions and any other information or document relating to the use of the Goods provided by the Company with the Goods are fully implemented so as to ensure so far as is reasonably practicable that the Goods will be safe and without risk to health at all times, when it is being installed, set, used, cleaned, or maintained by a person at work and that all such manuals instructions or documents remain with the Goods.

11 General

11.1 The Contract is personal to the Buyer which may not assign or dispose of any of its rights or obligations or otherwise delegate any of its obligations under the Contract without the written consent of the Company.

11.2 The Company shall be entitled to assign its rights and obligations under the Contract and to sub-contract or otherwise delegate any of its obligations under the Contract.

11.3 Any notice required or permitted to be given by either party to the other under these Conditions shall be in writing including a facsimile addressed to that other party at its registered office or principal place of business or such other address as may at the relevant time have been notified pursuant to this provision to the party giving the notice and shall be deemed to have been received by the party to whom it was addressed, if sent by facsimile upon its transmission if during a normal business day and otherwise on the next business day and if sent by post 72 hours after posting.

11.4 No waiver by the Company of any breach of the Contract by the Buyer shall be considered as a waiver of any subsequent breach of the same or any other provision

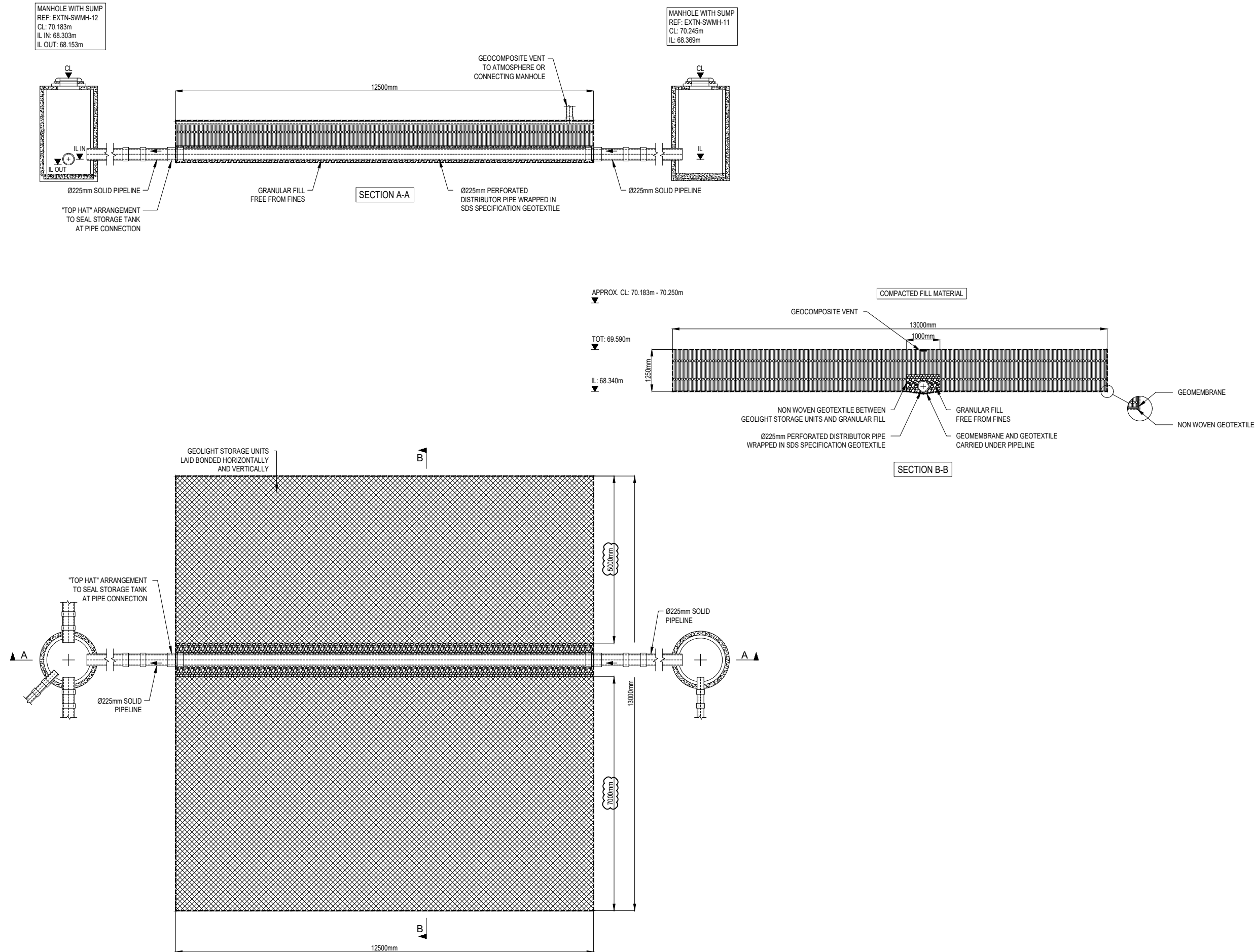
11.5 If any provision of these Conditions is held by a Court or other competent authority to be invalid or unenforceable in whole or in part the validity of the other provisions of these Conditions and the remainder of the provision in question shall not be affected thereby

11.6 The Contract and these Conditions shall be governed by the laws of England

11.7 The parties hereby submit to the non-exclusive jurisdiction of the English courts

12 Information

The Company will provide the Buyer on request with information as to the proper and safe use of the Goods and the Buyer shall at all times obey and comply with the Company's instructions or other information relating to the use of the Goods.



Notes:

This Drawing is to be read in conjunction with all relevant Architect's Engineer's and specialists' drawings and specifications.

Do not scale from this drawing in either paper or digital form. Use written dimensions only.

SDS to leave solid stub only, exiting tank for connection by others.

All external Manholes, Access Points, Junctions & Pipe are shown for guidance only and not part of the SDS program unless otherwise agreed.

-	ISSUED FOR CONSTRUCTION	15.01.24
A	DIMENSIONAL UPDATE	04.07.23
-	ISSUED FOR APPROVAL	RJ RJ
-	ISSUED FOR CONSTRUCTION	04.07.23
-	ISSUED FOR APPROVAL	RJ SP
-	ISSUED FOR APPROVAL	13.07.22
Rev	Comments	Date
		DRW CHK



Clearwater House
Castlemills
Biddisham
Somerset
BS26 2RE
+44 (0)1934 751303

sdslimited.com

Project
PLOT H3 ACCOR TRIBE HOTEL

Client
SPILLWAYS LTD

Title
ATTENUATION TANK 1 DETAIL

Scale
NTS

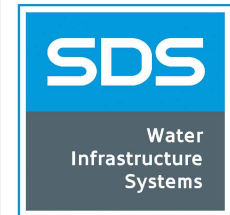
Date
13.07.22

Drawing No
E247820_01

Rev
A

REFERENCE DRAWINGS:			
Drawing Number	Revision	Drawing Title	Date
C-6000	C7	BELOW GROUND DRAINAGE	27.06.22

-	ISSUED FOR CONSTRUCTION	04.07.2017
A	DIMENSIONAL UPDATE	01.02.2018
-	ISSUED FOR APPROVAL	13.07.2018
Rev	Comments	Date
		DRW/C



Clearwater House
Castlemills
Biddisham
Somerset
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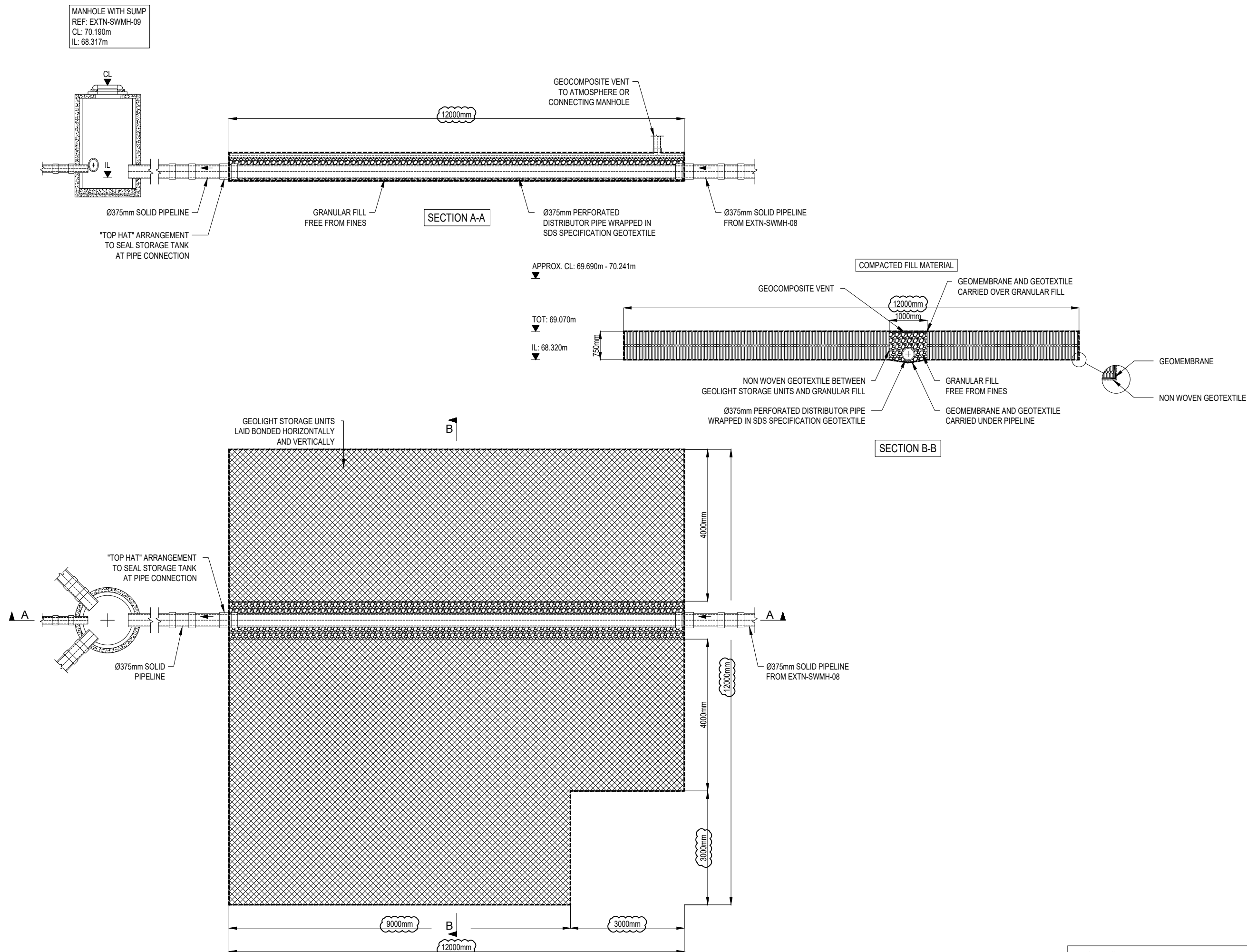
sdslimited.com

PLOT H3 ACCOR TRIBE HOTEL

SPILLWAYS LTD

ATTENUATION TANK 2 DETAIL

Scale NTS	Date 13.07.22
Drawing No E247820 02	Rev A



REFERENCE DRAWINGS:			
Drawing Number	Revision	Drawing Title	Date
C-6000	C7	BELOW GROUND DRAINAGE	27.06.22

SDS

Water
Infrastructure
Systems

INNOVATORS IN
WATER TECHNOLOGY

SDS GEOLight®

Stormwater Management System



SDS GEOLight® is an ultra lightweight honeycombed modular structure, made from recycled PVC, that provides an underground storage facility for the application of stormwater attenuation or infiltration.

SDS
Water
Infrastructure
Systems

Stormwater Management

The Environment Agency is keen to promote the wider use of sustainable drainage systems, which reduce the impact of surface water runoff. There are two main ways of storing surface water for stormwater management:

- Stormwater attenuation tanks
- Soakaway infiltration systems

Stormwater Attenuation Systems

This consists of underground water storage facilities that hold excess water during periods of peak rainfall.

The stored water is gradually released in a controlled manner into the surface water drainage system or directly into watercourses, reducing the risk of upstream and downstream flooding.

Soakaway Infiltration Systems

Soakaways are designed to store surface water runoff until it can be gradually absorbed by the surrounding ground.

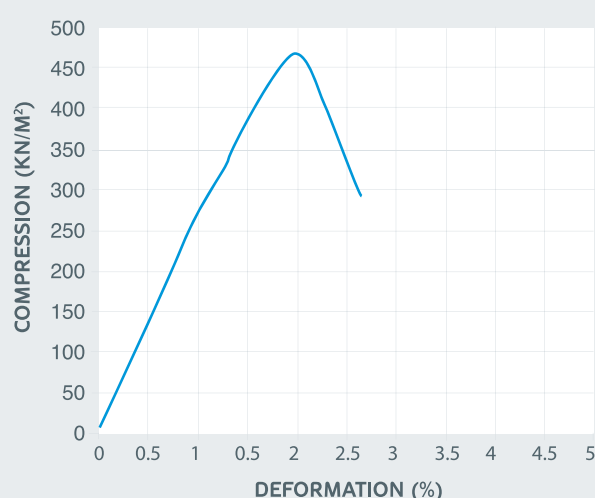
SDS GEOLight® – an efficient and economic solution for stormwater management.

SDS GEOLight® Attenuation

SDS GEOLight® has been specifically designed to form underground water storage reservoirs in stormwater management schemes. Its honeycombed structure gives it certain unique characteristics that make it ideal for this purpose:

- The high void rate (95%) of GEOLight® means that the maximum volume of water is stored in the minimum volume of storage unit.
- High compressive strength. GEOLight® is available in two strengths as standard: 200 and 400kN/m². Note: Higher compressive strengths available from 600 to 1000 kN/m². The graph on the right shows the results of a compression test, where samples of GEOLight® 400 were compressed at the rate of 1mm per minute. The deformation at 400kN/m² is about 1.6%.

RESULTS OF COMPRESSION TEST ON SDS GEOLIGHT® 400



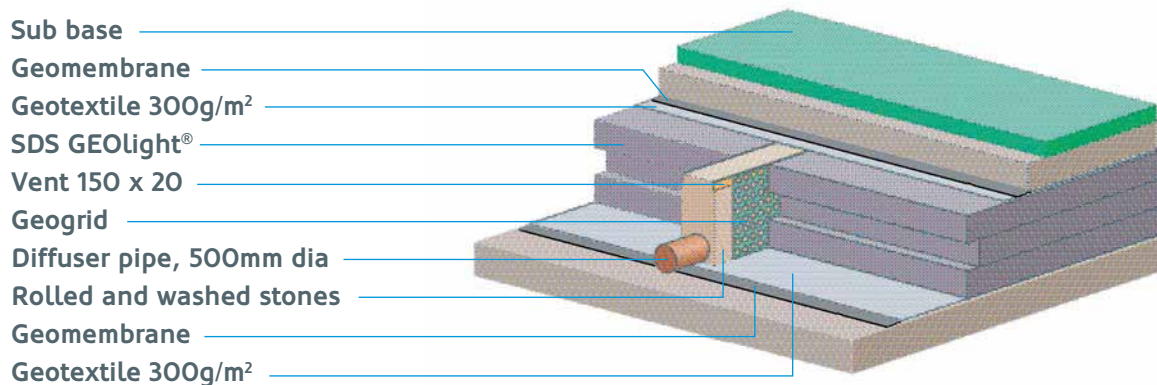
The GEOLight® Stormwater Attenuation System consists of two manholes (inspection chambers) connected by a length of perforated distribution pipe which feeds the stormwater storage reservoirs on either side formed from GEOLight®.

The distribution pipe is normally from 225mm up to 500mm diameter, generally covered in a trench that is filled with draining material such as 15/25 clean graded stone, free from fines.

The reservoirs and distribution pipe are wrapped in a waterproof membrane, such as butyl, to prevent seepage of water into the surrounding ground. The top of each GEOLight® reservoir has a vent which is connected back to the upstream manhole.

A geotextile or 10mm mesh geogrid is laid between the distribution pipe and GEOLight® to prevent the GEOLight® units being clogged by the draining materials.

SDS GEOLight® Attenuation



How does it work?

- 1. In normal conditions, water enters a back drop manhole. This is the upstream manhole and any silt or sediment will collect in the bottom of the chamber. The water then flows along the distribution pipe into the downstream manhole. The upstream pipework is sized to cope with normal flow conditions. The distribution pipe and attenuation tank are sized to cope with storm conditions. The outflow pipe is sized to cope with the permissible discharge.
- 2. In storm conditions the flow restrictor (vortex flow control or orifice plate) in the downstream manhole limits the amount of water flowing out of the manhole. This causes the water level in the distribution pipe to rise and water to spill into the GEOLight® reservoirs on either side. As the water level rises in the reservoirs, air is forced out of the high level vents into the upstream manhole.

- 3. Once the storm has passed, the water level in the GEOLight® reservoirs gradually falls as water passes through the flow restrictor in the downstream manhole. The vents now allow air to return into the GEOLight® reservoirs. Gradually the reservoirs empty. The flow restrictor prevents excess surges of flood water to pass downstream and uses the storage reservoirs to store the water for the period of the storm.

Calculating the storage capacity

The storage capacity of the GEOLight® reservoirs is determined by the maximum outflow permitted, (set by the water company or Environment Agency), the impermeable area of the site and the rainfall return period – normally 1 in 30 years, but again can be dictated by the water company. A full design service, including calculations, can be supplied via a third party consultant.

Please contact SDS for details.

Other uses

The water storage ability of SDS GEOLight® lends itself to a number of other uses:

- Water recycling combines with irrigation systems – this is increasingly popular: GEOLight® is used to retain stormwater which is then pumped as required to a network of standpipes for irrigation.
- Drainage channels – the natural permeability of GEOLight® lends itself for use as an underground drainage channel that collects and drains away groundwater.
- Pollution control – improved water runoff quality. When used in combination with oil / petrol separators, GEOLight® can replenish groundwater without the risk of contamination from oil, chemicals or suspended solids.
- To form lightweight embankments (slope stabilisation) – GEOLight® can be used to quickly form the base of embankments that only weigh a fraction of earth embankments.

Stormwater Attenuation System

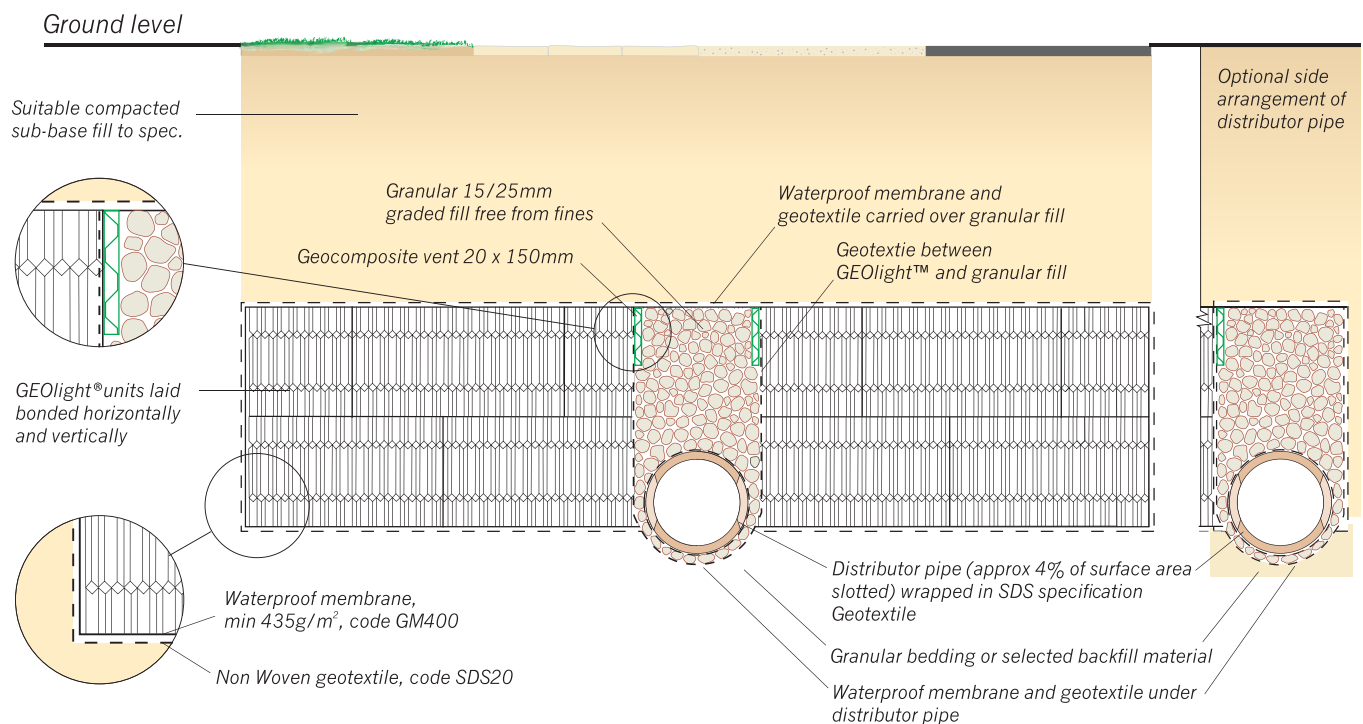
Design Details

The details on these two pages illustrate the construction of a typical SDS GEOLight® Stormwater Attenuation System. The length and height of the GEOLight® reservoirs is determined by the quantity of water to be stored.

The layout of each scheme is specifically designed to suit the characteristics and limitation of the site. Typically the distributor pipe would be arranged in the centre of the reservoir, but can alternatively be placed at the side where topographical constraints dictate.

The high performance waterproof membrane should be sealed continuously to encapsulate the GEOLight® reservoirs, distributor pipe and granular fill. It is protected by a heavyweight needle punched, non woven geotextile. To help with maintenance a high flow geotextile is placed between the granular fill and GEOLight® attenuation units to prevent silt and particles being washed into the reservoir. GEOLight® can be used under a range of surfaces e.g. grass, porous paving, standard paving block, tarmac and concrete.

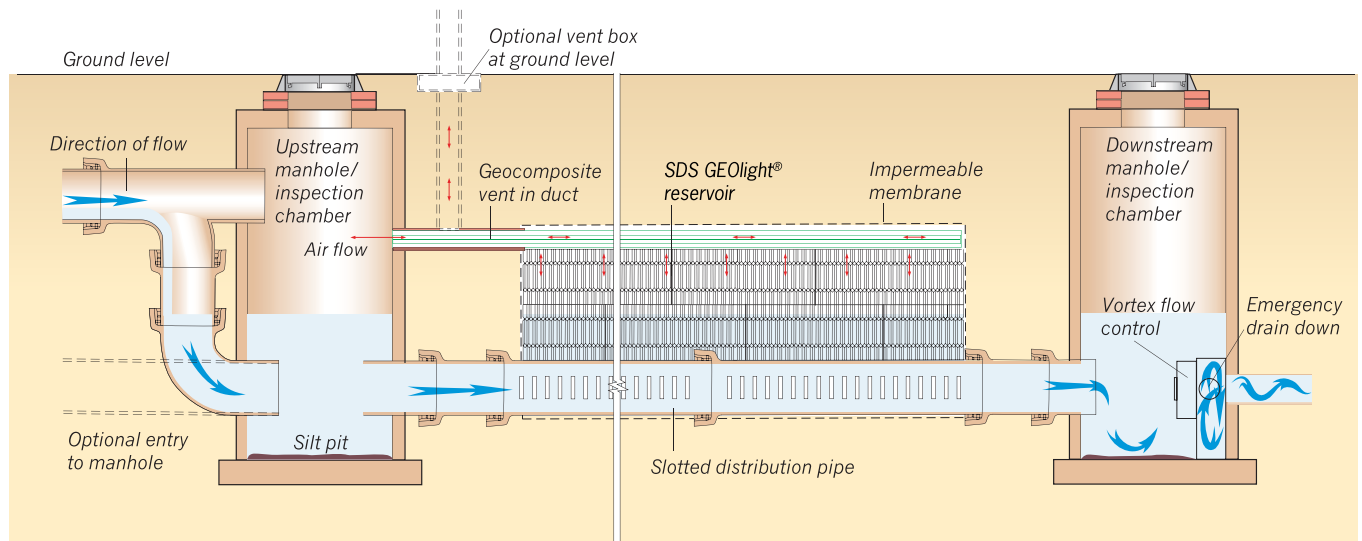
Cross Section



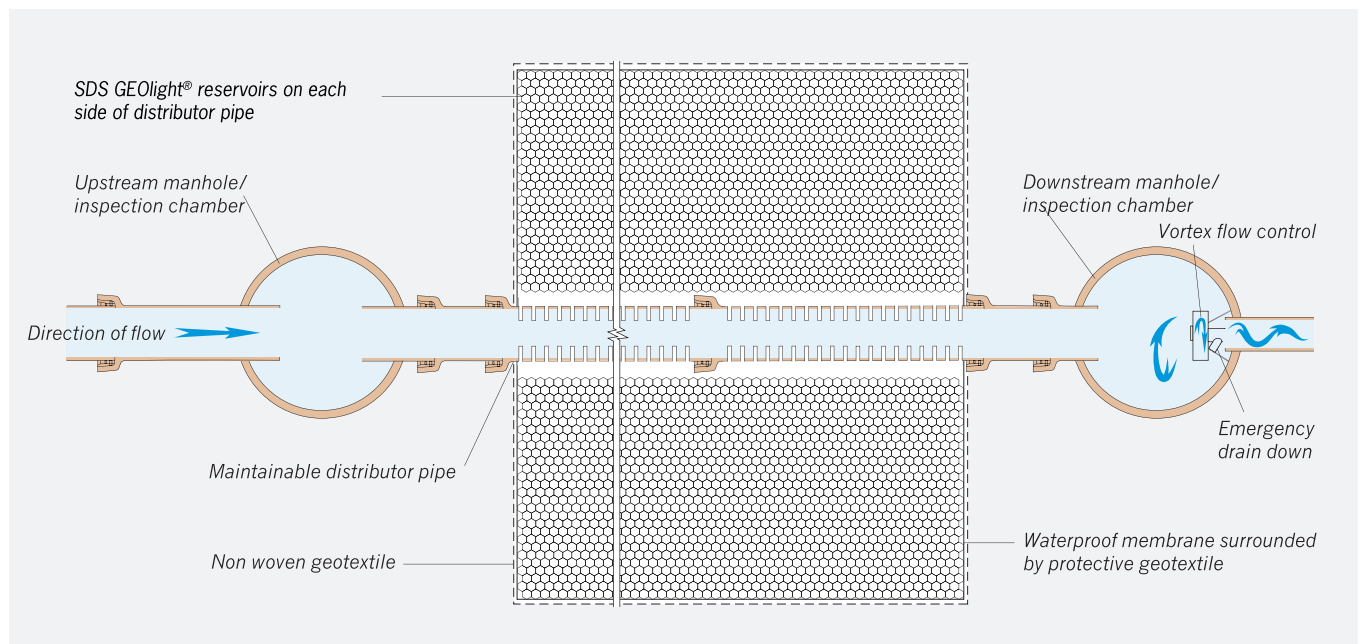
Stormwater Attenuation System

Design Details

Long Section



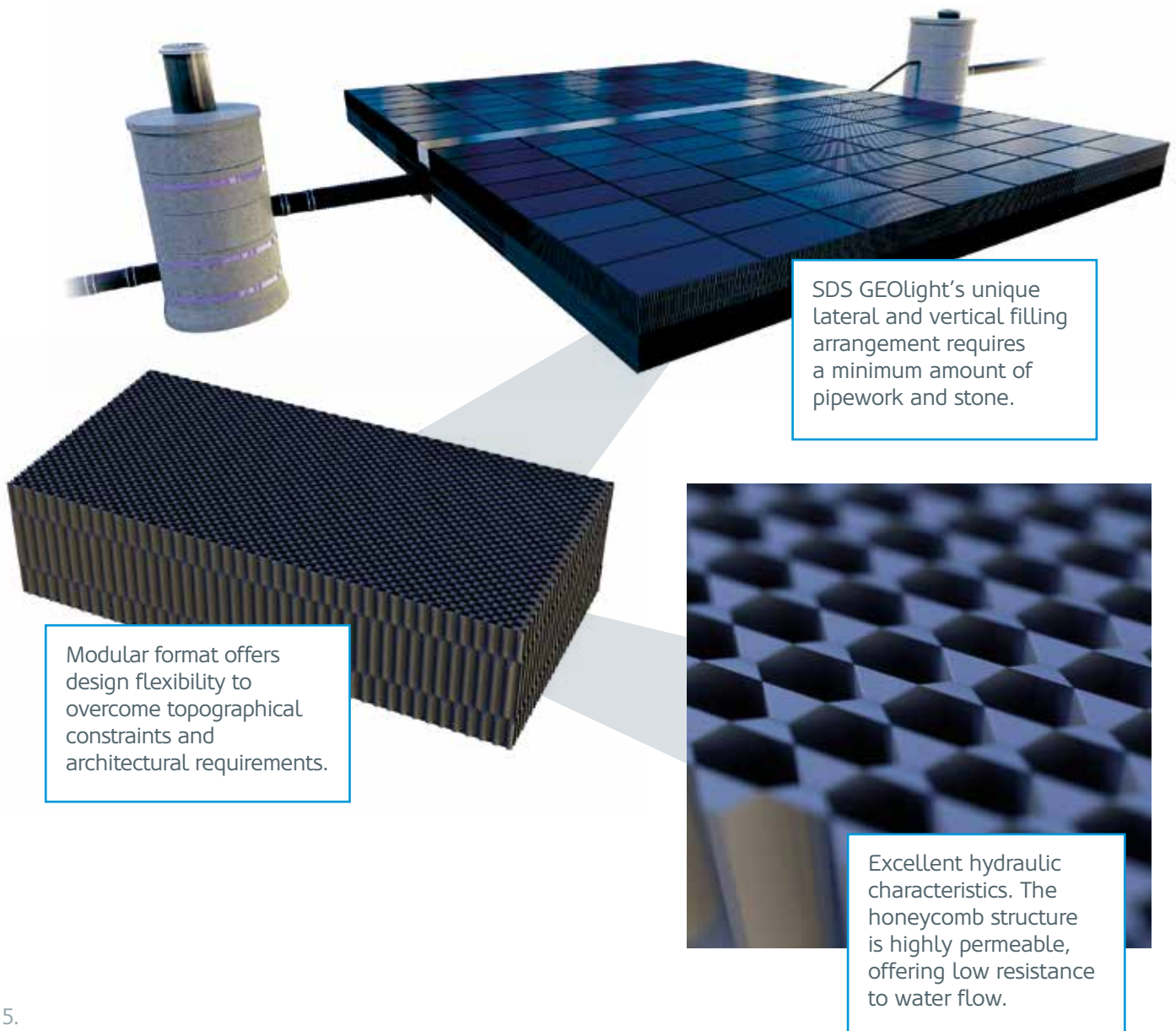
Plan



Benefits

- High compressive strength – can be located under all roads, car parks and amenity area surfaces.
- Reduced excavation costs – the very high void rate (95%) minimises the required volume of earthworks.
- Speed of installation – 1000m³ reservoir, completed in one week.
- Light and easy to handle.
- Depth of tank invert reduced by using patented lateral supply.
- Simplified distribution pipe network, easy maintenance – dispensing with costly and complicated pipework configurations.
- Greatly reduces the risk of flooding when used as stormwater storage.
- Can also be used for water recycling and combining with irrigation systems.
- Can virtually eliminate pollution when used in combination with specialist petrol / oil separators.
- Design service available, including calculations.

GEOLight® block



COSHH and Handling Information

1. COMPOSITION/INFORMATION ON INGREDIENTS:

Hazardous ingredients:

None as finished goods or products.

Types of materials:

Polyvinyl chloride (PVC)
MEK

2. HAZARDS IDENTIFICATION

Nature of hazard:

There are no health risks from the products during normal use. The products may contain various pigment colours and stabilisers that may be toxic. The chemicals are, however, bound within the product material and not easily extracted.

3. FIRST-AID MEASURES

Eye contact:

Plastic materials may cause physical irritation in the eyes. Wash out with large amounts of water. If irritation persists, seek medical advice.

Skin contact:

Not applicable.

Inhalation:

Not applicable.

Ingestion:

Not expected to have any toxic effects.

4. FIRE-FIGHTING MEASURES

Extinguishing media:

On small fires use any hand-held extinguisher type.
On large fires use water.

Fire and explosion hazards:

Melting plastics may flow and spread in a large fire.
Products of fire will be thick black toxic smoke.

Material characteristics:

PVC products will burn in the presence of a flame but are classed as self-extinguishing.

Protective equipment:

Wear self-contained breathing apparatus and protective clothing.

5. HANDLING AND STORAGE

Handling:

There are no hazards associated with the finished products. However, when cutting SDS GEOLight®, we recommend that the correct tools are used e.g. Handsaw or Alligator saw. When cutting, dust may be created; avoid inhaling these dusts. Take care of heat build-up within materials during cutting etc. The pallets of SDS GEOLight® units should be placed on level ground and should not be stacked on site. The maximum weight of the pallet of SDS GEOLight® units as delivered to site is 650kg (700kg on one copy), including packaging. Machines used to lift the pallet should be able to lift this weight safely. Loose individual units should not be stored more than three units high. SDS GEOLight® units are lightweight ranging from 23kg to 55kg and can be easily handled – one or two person lift.

Storage:

SDS GEOLight® units will resist the effects of UV light for up to six months; however, prolonged storage in direct sunlight should be avoided. SDS GEOLight® units should not be stored near to any fuel storage areas or any other solvents. SDS GEOLight® units are very robust and resistant to damage during normal handling; however, they should be secured in areas where impacts from vehicles or construction plant will be avoided.

Material characteristics:

PVC products will burn in the presence of a flame but are classed as self-extinguishing.

Protective equipment:

Wear self-contained breathing apparatus and protective clothing.

6. EXPOSURE CONTROLS / PERSONAL PROTECTION

Respiratory protection:

Not required under normal conditions of use. Where cutting etc. creates dust, wear a disposable half-mask to the standard FFP2S.

Hand protection:

Wear impervious strong gloves to prevent cuts to the hands while handling, cutting etc.

Eye protection:

Wear safety glasses when cutting etc.

Skin protection:

Wear overalls.

7. SITE HAZARDS

Other hazards for consideration:

Working in excavations and trenches – SDS GEOLight® may be designed with a shallow invert for infiltration (soakaway) or attenuation (storage) system. This negates the need for deep excavations or trenches, excavation near services e.g. gas, electricity or contaminated soil areas. N.B. All risk assessments should be undertaken by the main contractor for forklift, access to and working in excavations and trench support.

8. STABILITY AND REACTIVITY

Decomposition products:

Major thermal decomposition products are oxides of carbon. Relevant differences are (in addition): PVC may produce amounts of Hydrogen Chloride.

Stability:

These materials are stable at temperatures up to normal operating limits (moulding parameters).

9. ECOLOGICAL INFORMATION

Biodegradability:

Plastic products are not readily biodegradable but are not detrimental to terrestrial wildlife.

Aquatic toxicity:

Non-toxic to marine life.

10. DISPOSAL CONSIDERATIONS

Method:

The preferred method of disposal is collection and recycling. Plastics can safely be placed with regular industrial or household wastes where recycling is not available.

11. OTHER INFORMATION

As the handling, storage, use and disposal of the product are beyond our control SDS disclaims all liability for loss, damage, injury or expense in any way connected with such activities and further makes no warranties, expressed or implied, as to the suitability of the product for any particular use.

The preferred method of disposal is collection and recycling. Plastics can safely be placed with regular industrial or household wastes where recycling is not available.

SDS

Water
Infrastructure
Systems

INNOVATORS IN WATER TECHNOLOGY



SDS Limited
Clearwater House
Castlemills
Biddisham
Somerset
BS26 2RE

T +44 (0)1934 751303
E info@sdslimited.com



sdslimited.com

SDS GEOLight®

Stormwater Management System

Product Profile

SDS GEOLight® is an ultra lightweight honeycombed modular structure made from recycled PVC. The ready to install units are preformed to provide an underground stormwater storage facility, for the application of stormwater attenuation or infiltration.

The high void rate (>95%), high compressive strength (to 1000KN/m²) and low resistance to water flow makes

SDS GEOLight® an ideal material for cost efficient and maintainable underground water storage during storm conditions.

SDS GEOLight® Benefits

- High compressive strength – can be located under all roads, car parks and amenity area surfaces.
- Reduced excavation costs – the very high void rate (95%) minimises the required volume of earthworks.
- Speed of installation – 1000m³ reservoir, completed in one week.
- Light and easy to handle.
- Excellent hydraulic characteristics.
- The honeycomb structure is highly permeable, offering low resistance to water flow.
- SDS GEOLight®'s unique lateral and vertical filling arrangement requires a minimum amount of pipework and stone.
- Depth of tank invert reduced by using patented lateral supply.
- Simplified distribution pipe network, easy maintenance – dispensing with costly and complicated pipework configurations.
- Modular format offers design flexibility to overcome topographical constraints and architectural requirements.
- Greatly reduces the risk of flooding when used as stormwater storage.
- Can also be used for water recycling and combining with irrigation systems.
- Can virtually eliminate pollution when used in combination with specialist separation and filtration technology such as SDS Aqua-Swirl™ and SDS Aqua-Filter™.
- Design service available, including calculations.



APPLICATIONS



RETAIL



INFRASTRUCTURE



INDUSTRIAL



RESIDENTIAL



COMMERCIAL



PUBLIC SECTOR



Material	Recycled Rigid PVC		
Colour	Dark grey to black		
Standard length of a block	2000 mm	2000 mm	2000 mm
Standard width of a block	500 mm	500 mm	500 mm
Standard height of a block*	750 mm	750 mm	750 mm

Void Ratio	> 95%	> 95%	> 95%
Compressive Strength	420 kN/m ²	610 kN/m ²	800 kN/m ²



SDS GEOLight® 400	SDS GEOLight® 600	SDS GEOLight® 800
APPLICATIONS		
Stormwater Management		
Attenuation / Infiltration		
Bacterial filter-bed for biological treatment		
Hydrocarbon Separation		
Filtration and Separation Units		
SPECIFICATIONS		
Recycled Rigid PVC		
Dark grey to black		
2000 mm	2000 mm	2000 mm
500 mm	500 mm	500 mm
750 mm	750 mm	750 mm
*Other block sizes available on request		
> 95%	> 95%	> 95%
420 kN/m ²	610 kN/m ²	800 kN/m ²
ADVANTAGES		
Highly cost effective		
Reduced excavation costs		
High void capacity		
Good UV resistance		
Good hydrocarbon resistance		

JFC Plastics Ltd

Unit 6
Goldicote Business Park
Ettington
Stratford-upon-Avon
Warwickshire CV37 7NB
Tel: 01789 740102 Fax: 01789 740037
e-mail: info@jfc.ie
website: www.jfc.ie

Agrément Certificate
02/H069
Product Sheet 1

JFC CORRIPIPE TWINWALL DRAINAGE SYSTEM

**JFC CORRIPIPE TWINWALL HIGH-DENSITY POLYETHYLENE FILTER AND
CARRIER PIPES AND COUPLINGS**

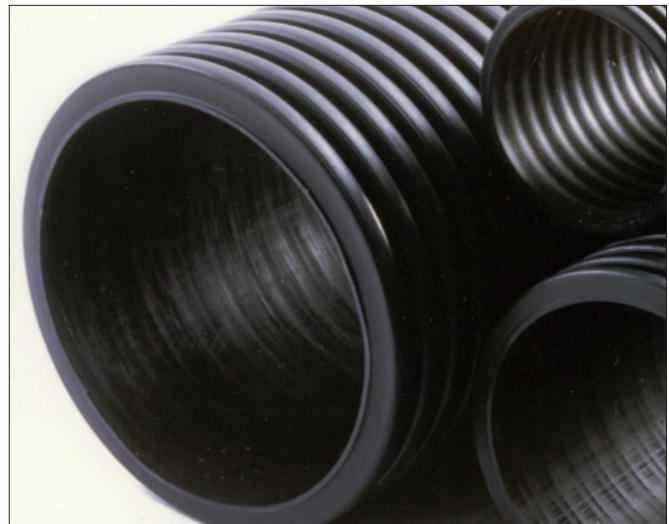
This Certificate is issued under the Highway Authorities' Product Approval Scheme (HAPAS) by the British Board of Agrément (BBA) in conjunction with the Highways Agency (HA) (acting on behalf of the overseeing organisations of the Department for Transport; the Scottish Executive; the Welsh Assembly Government and the Department for Regional Development, Northern Ireland), the Association of Directors of Environment, Economy, Planning and Transport (ADEPT), the Local Government Technical Advisers' Group and industry bodies. HAPAS Agrément Certificates are normally each subject to a review every five years.

PRODUCT SCOPE AND SUMMARY OF CERTIFICATE

This Certificate relates to JFC CorriPipe Twinwall High-Density Polyethylene Filter and Carrier Pipes and Couplings, in a range of sizes for use in highway drainage for the collection and disposal of surface and sub-surface water.

AGRÉMENT CERTIFICATION INCLUDES:

- factors relating to compliance with HAPAS requirements
- factors relating to compliance with Regulations where applicable
- independently verified technical specification
- assessment criteria and technical investigations
- design considerations
- installation guidance
- regular surveillance of production
- formal five-yearly review.



KEY FACTORS ASSESSED

Strength — the fittings have adequate strength to resist loads associated with installation and service (see section 5).

Performance of joints — the system will remain watertight under normal service conditions (see section 6).

Durability — the system will have a service life in excess of 50 years (see section 10).

The BBA has awarded this Agrément Certificate to the company named above for the system described herein. This system has been assessed by the BBA as being fit for its intended use provided it is installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Date of First issue: 18 July 2011

B C Chamberlain

Brian Chamberlain
Head of Approvals — Engineering

G N Cooper

Greg Cooper
Chief Executive

Originally certificated on 28 March 2002 (150 mm, 225 mm and 300 mm) and on 23 December 2005 (375 mm, 450 mm and 600 mm).

The BBA is a UKAS accredited certification body — Number 113. The schedule of the current scope of accreditation for product certification is available in pdf format via the UKAS link on the BBA website at www.bbacerts.co.uk

Readers are advised to check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA direct.

HAPAS Requirements

Requirements

The general requirements for drains are contained in the Manual of Contract Documents for Highway Works (MCHW), Volume 1.

The general requirements for structural wall pipes and fittings are contained in the MCHW, Volume 1, Clause 518.

Further information and guidance is given in the MCHW, Volume 2 and Volume 3 (Drawing Numbers F1 and F2).

Additional site requirements may be included on particular contracts.

Regulations

Construction (Design and Management) Regulations 2007

Construction (Design and Management) Regulations (Northern Ireland) 2007

Information in this Certificate may assist the client, CDM co-ordinator, designer and contractors to address their obligations under these Regulations.

See sections: 1 *Description* (1.3), 2 *Delivery and site handling* (2.1), 3 *General* and 11 *General of the Installation* part of this Certificate.

General

This Certificate relates to JFC CorriPipe Twinwall 150 mm, 225 mm, 300 mm, 375 mm, 450 mm and 600 mm High-Density Polyethylene Filter and Carrier Pipes and Couplings.

The system is for use in highway drainage for the collection and disposal of surface and sub-surface water in accordance with Highways Agency (HA) requirements, *Manual of Contract Documents for Highway Works* (MCHW), Volume 1, Clause 518, and Volume 2, and the conditions set out in the *Design Considerations* and *Installation* parts of this Certificate.

Technical Specification

1 Description

1.1 JFC CorriPipe Twinwall 150 mm, 225 mm, 300 mm, 375 mm, 450 mm and 600 mm Diameter High-Density Polyethylene Filter and Carrier Pipes and Couplings are manufactured from a blended, black polyethylene by a twin extrusion process. The two high-density polyethylene pipes are extruded simultaneously, one inside the other, and heat-welded together in one continuous process.

1.2 The products tested and covered by this Certificate are manufactured from material with the specification given in Table 1.

Table 1 Material properties/specification

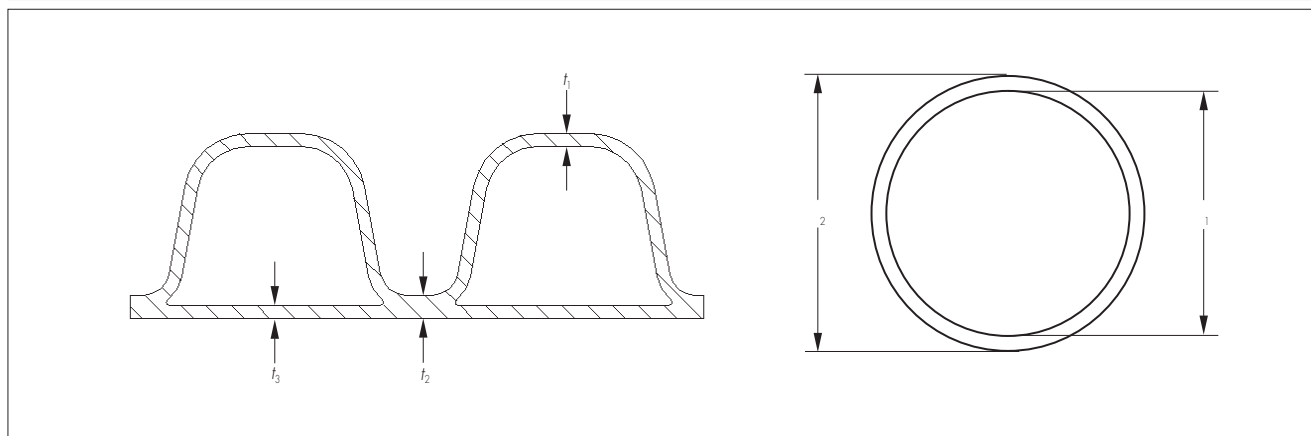
Property	Test method reference	Specification
Tensile properties	EN 638, ISO 527-2	≥18 MPa
Oxygen induction time	EN 728	≥4 mins
Melt flow rate	ISO 1133	≤0.75 g (10 mins) 2.16 kg at 190°C
Density	ISO 1183-3	≥935 kg·m ⁻³
Heat reversion	ISO 12091	N/A

1.3 The outer wall is corrugated and the inner wall is smooth finished. Details and dimensions are given in Table 2 and Figure 1.

Table 2 Pipe dimensions

Nominal internal pipe diameter d_1 (mm)	External pipe diameter d_2 (mm)	t_1 min (mm)	t_2 min (mm)	t_3 min (mm)	Nominal length (m)	Nominal weight (kg·m ⁻¹)	Pitch (mm)
150	178 ± 1.5	0.8	1.8	1.0	6	1.4	20.0
225	265 ± 2	0.9	2.6	1.2	6	3.0	25.5
300	354 ± 2.5	1.2	3.0	1.5	6	5.0	31.0
375	426 ± 3	1.5	3.5	1.5	6	6.0	39.9
450	512 ± 3	1.8	4.0	1.5	6	8.5	50.1
600	680 ± 4	2.1	4.3	1.8	6	14.5	66.9

Figure 1 Twinwall pipe



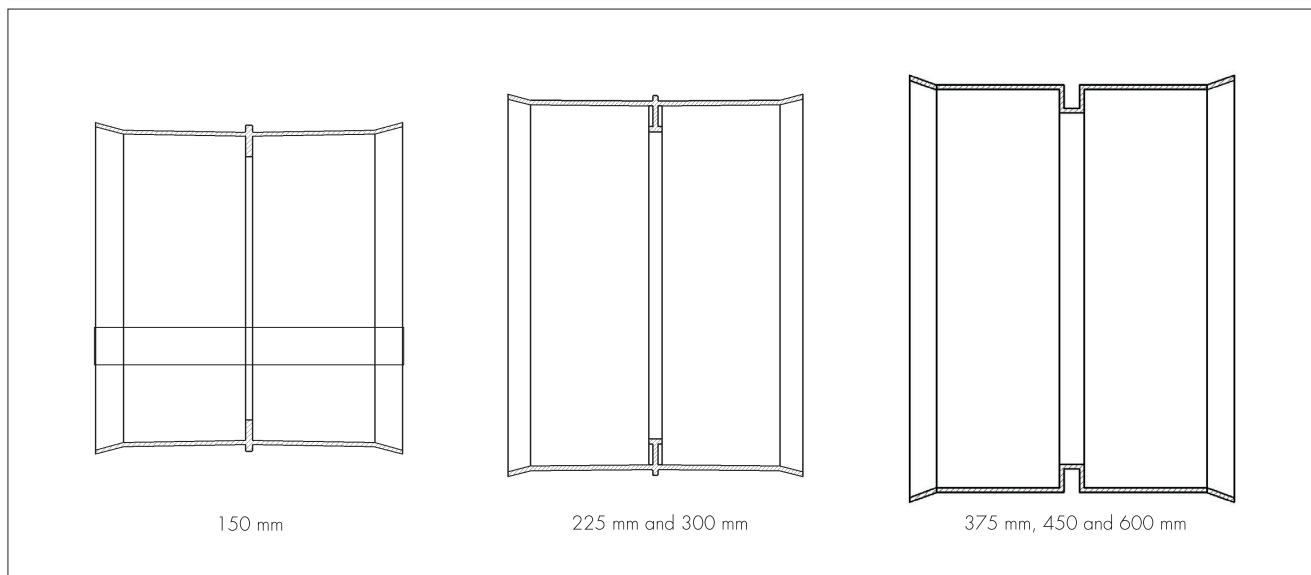
1.4 Black polypropylene couplings are available for the 150 mm, 225 mm and 300 mm sizes of pipe and black polyethylene for the 375 mm, 450 mm and 600 mm sizes (see Table 3 and Figure 2).

Table 3 Coupling dimensions

Nominal internal/external pipe diameter (mm)	Internal diameter		Nominal length (mm)	Nominal seal height (mm)
	at first dwell (mm)	at second dwell (mm)		
150/178	178	179	180	17.0
225/265	268	269	220	25.5
300/354	356	356.5	245	32.0
375/426	429	429	321	32.5
450/512	514	514	390	36.9
600/680	686	686	675	49.0

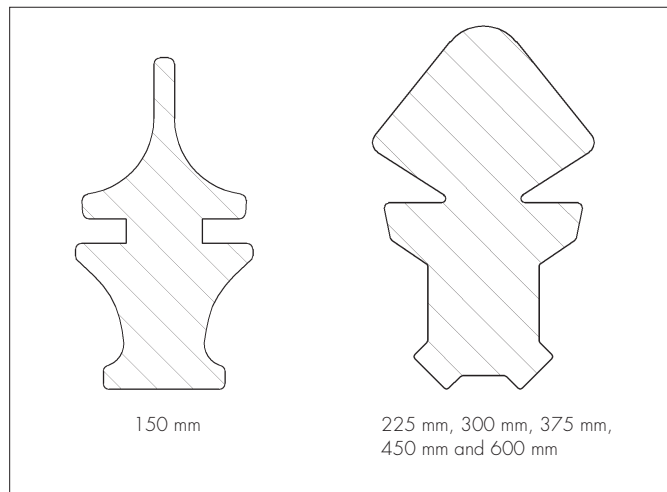
(1) Tapered along coupling length.

Figure 2 Couplings



1.5 Each coupling requires two rubber seals which are manufactured to BS EN 681-1 : 1996 (see Figure 3). The seals must be fitted in accordance with the installation instructions to ensure a watertight joint.

Figure 3 Seals

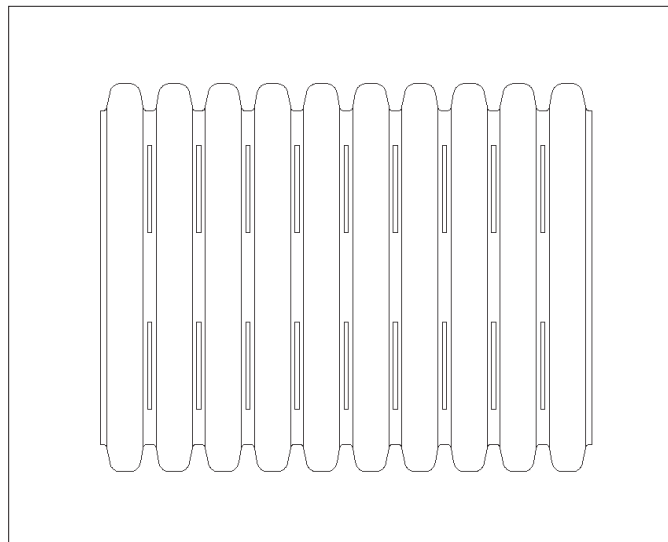


1.6 Pipes can be supplied either slotted or unslotted. Slotted pipe is available with the slots in the dwell between corrugations equally spaced around the circumference (see Table 4 and Figure 4).

Table 4 Slotted pipe details

Internal pipe diameter (nominal) (mm)	No of slots per alternate dwell	No of dwells per metre	Slot length (mm)	Slot width (mm)	Permeable area (minimum) (mm ² ·m ⁻¹)
150	4	51	15 to 20	2.0 to 2.5	6120
225	4	39	15 to 30	2.0 to 2.5	4680
300	4	32	20 to 40	2.0 to 2.5	5120
375	3	25	42 to 85	2.7 to 3.3	4263
450	3	20	48 to 85	2.8 to 3.5	4024
600	3	15	76 to 106	2.9 to 3.5	4942

Figure 4 Details of slots (optional)



1.7 Continuous quality control is exercised during manufacture. Checks include:

Pipes

- dimensional accuracy
- impact resistance
- short-term stiffness

Couplings

- dimensional accuracy/visual check.

1.8 A label bearing the BBA identification mark is attached to each pipe length and fitting or to each pack of pipes.

2 Delivery and site handling

2.1 Handling, storage and transportation should be in accordance with BS 5955-6 : 1980.

2.2 When long-term storage is envisaged, JFC CorriPipe twinwall slotted and unslotted pipes and couplings should be protected from direct sunlight. If protection cannot be provided, consideration must be given to the effects of daily exposure to direct sunlight:

- up to 3 months — negligible UV degradation but possible extreme surface temperatures of up to 80°C may cause some localised distortion
- 3 months to 12 months — may have significant effect on the impact resistance and physical properties
- over 12 months — damage will occur unless protection provided.

2.3 The manufacturer has the option of adding chemicals to provide enhanced UV stability on request.

2.4 Pipes are generally delivered in prepacked bundles and should be retained in their packaging until installation.

Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on JFC CorriPipe Twinwall 150 mm, 225 mm, 300 mm, 375 mm, 450 mm and 600 mm Diameter High-Density Polyethylene Filter and Carrier Pipes and Couplings.

Design Considerations

3 General

JFC CorriPipe Twinwall 150 mm, 225 mm, 300 mm, 375 mm, 450 mm and 600 mm Diameter High-Density Polyethylene Filter and Carrier Pipes and Couplings comply with the requirements of the Highways Agency (HA) *Manual of Contract Documents for Highway Works* (MCHW), Volume 1, Clause 518.5 for pipe, Clause 518.6 for couplings and Clause 518.7 for the system, and is suitable for use in highways for the collection and disposal of surface and sub-surface water.

4 Practicability of installation

The pipes are installed using traditional drain-laying methods in accordance with HA requirements and the MCHW, Volume 1, Clauses 503, 505, 518.7 and 518.8. Due to the lightweight nature of the pipe material, handling and jointing are easily performed.

5 Strength

5.1 The pipes have a ring stiffness in excess of 6 kN·m⁻², a creep ratio of less than 4 and adequate resistance to static loads.

5.2 The pipes have adequate resistance to impact loads to which they may be subjected during installation and in service.

6 Performance of joints

6.1 Joints on filter pipes made from pipe and couplings without the rubber seals are not partially watertight as defined in the MCHW, Volume 1, Clause 504.3.

6.2 Correctly made, the joints constructed from pipe and couplings with rubber seals remain watertight when subjected to deflection and distortion, and comply with the MCHW, Volume 1, Clauses 504.3 and 518.7 (see section 14).

7 Water infiltration

The slot area for the pipes exceeds the minimum requirement of 1000 mm² per metre length as given in the MCHW, Volume 1, Clause 518.3 (see Table 3).

8 Flow characteristics

8.1 The pipes will have normal flow characteristics associated with thermoplastics pipes.

8.2 Full-bore velocities are available from the *Tables for the Hydraulic Design of Pipes, Sewers and Channels*, Volume 2, 8th Edition, by H R Wallingford and D I H Barr. Appropriate values are based on the Colebrook-White equation. An appropriate value of roughness coefficient should be selected when designing the drainage system. For new pipes, a value of 0.006 is applicable, but for designs a value of 0.6 is generally used.

9 Maintenance

9.1 The slots are designed to restrict the ingress of silt into the drains.

9.2 Access to the system for cleaning should be provided by conventional methods.

9.3 The system can be rodded using flexible drain rods. In common with other standard plastic drainage systems, toothed root cutters and rods with metal ferrules, as used with some mechanical clearing systems, could damage the pipes and couplings and should not be used.

9.4 Tests indicate that the pipes have adequate resistance to cleansing using pressure jetting equipment (see section 13.1). It is recommended that low-pressure, high-volume systems are utilised in accordance with MCHW, Clause 520.

10 Durability

In the opinion of the BBA, the material from which the pipes and couplings are manufactured will not significantly deteriorate and the anticipated life of the system will be in excess of 50 years.

Installation

11 General

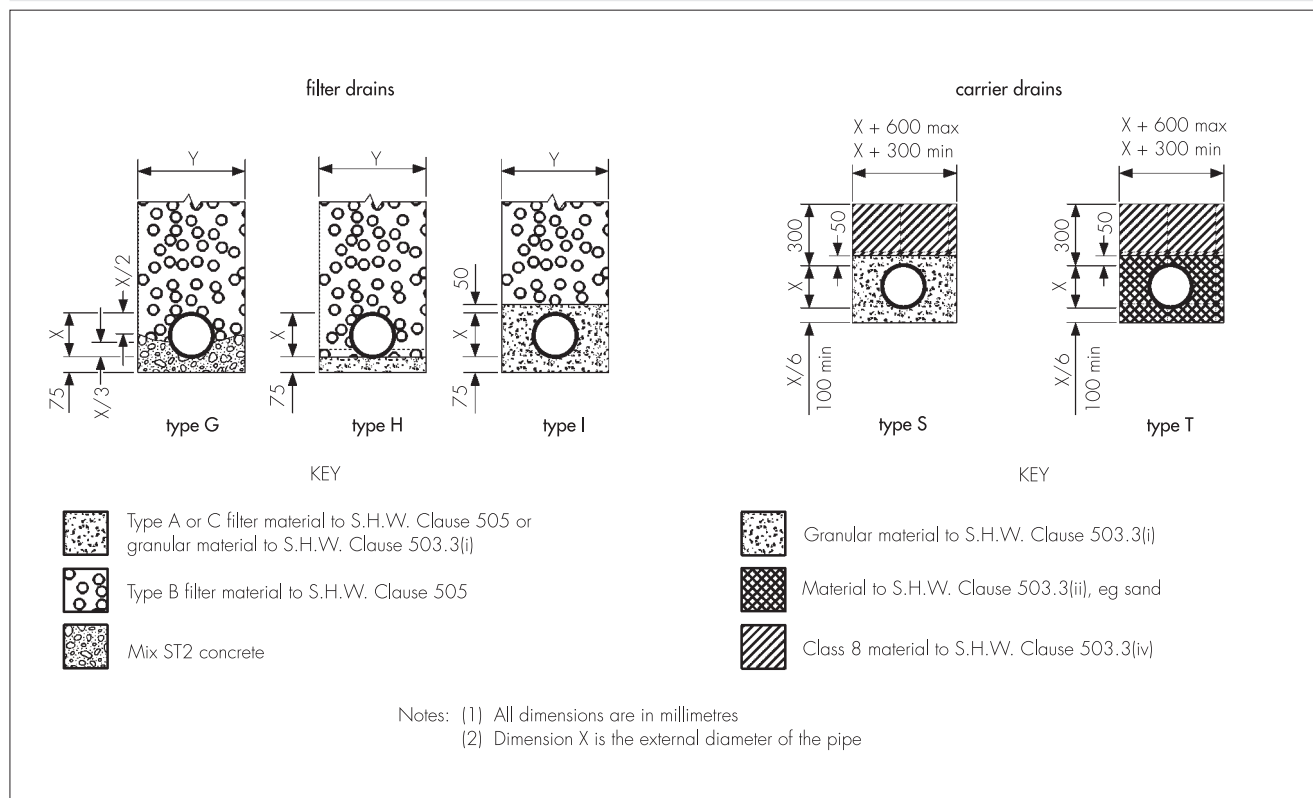
11.1 JFC CorriPipe Twinwall 150 mm, 225 mm, 300 mm, 375 mm, 450 mm and 600 mm Diameter High-Density Polyethylene Filter and Carrier Pipes and Couplings must be installed in accordance with HA requirements and the MCHW, Volume 1, Clauses 503, 505, 518.7 and 518.8.

11.2 The pipes and couplings must be protected against damage from site construction traffic.

12 Procedures

12.1 For typical laying, trench and backfilling specification details, reference should be made to Figure 5 and the MCHW, Volume 3, Drawings No F1 (Type T and S) and No F2 (Type G, H and I).

Figure 5 Installation details



12.2 Pipes are cut easily using conventional hand tools, and should be cut square between the corrugations.

12.3 For a watertight joint, the pipe ends and coupling should be cleaned and the rubber seal fitted externally in the first or second dwell. The seal and inside of the coupling should be lubricated and the pipe pushed fully home to the central register either by hand, or using a lever if necessary.

12.4 Care should be taken during backfill to maintain the line and level of the pipeline. If necessary, the pipe should be restrained to prevent uplift.

13 Tests

13.1 Tests were carried out on the pipe in accordance with the MCHW, Volume 1, Clause 518.5 to determine:

- ring stiffness to BS EN ISO 9969 : 1995
- creep ratio to BS EN ISO 9967 : 1995
- longitudinal bending to the MCHW, Volume 1, Clause 518.11
- rodding resistance to the MCHW, Volume 1, Clause 518.12
- impact resistance at 0°C and 23°C to BS EN 1411 : 1996 with a striker of 1.0 kg mass and 25 mm diameter conical head
- water jetting WRc method.

13.2 Tests were carried out on the system to establish:

- leaktightness of joint to BS EN 1277 : 2003, Method 4, Conditions A, B and C
- insertion force (ease of jointing).

13.3 Tests were carried out to establish the dimensional accuracy of the pipe, coupling and ring seal.

14 Investigations

14.1 An examination was made of data in relation to the effect of the production tolerances on the performance of the products.

14.2 An evaluation of existing data was made to assess material properties, chemical resistance and durability.

14.3 Calculations were carried out to determine slot area.

14.4 The manufacturing process was examined, including the methods adopted for quality control, and details were obtained of the quality and composition of the materials used.

Bibliography

BS 5955-6 : 1980 *Plastics pipework (thermoplastics materials) — Code of practice for the installation of unplasticized PVC pipework for gravity drains and sewers*

BS EN 681-1 : 1996 *Elastomeric seals — Material requirements for pipe joint seals used in water and drainage applications — Vulcanized rubber*

BS EN 763 : 1995 *Plastics piping and ducting systems — Injection-moulded thermoplastics fittings — Test method for visually assessing effects of heating*

BS EN 1277 : 2003 *Plastics piping systems — Thermoplastics piping systems for buried non-pressure applications — Test methods for leaktightness of elastomeric sealing ring type joints*

BS EN 1411 : 1996 *Plastics piping and ducting systems — Thermoplastics pipes — Determination of resistance to external blows by the staircase method*

BS EN ISO 9967 : 1995 *Thermoplastics pipes — Determination of creep ratio*

BS EN ISO 9969 : 1995 *Thermoplastics pipes — Determination of ring stiffness*

EN 638 : 1994 *Plastics piping and ducting systems — Thermoplastics pipes — Determination of tensile properties*

EN 728 : 1997 *Plastics piping and ducting systems — Polyolefin pipes and fittings — Determination of oxidation induction time*

ISO 527-2 : 1993 *Plastics — Determination of tensile properties — Test conditions for moulding and extrusion plastics*

ISO 1133 : 1997 *Plastics — Determination of the melt mass-flow rate (MFR) and the melt volume-flow rate (MVR) of thermoplastics*

ISO 1183-3 : 1999 *Plastics — Methods for determining the density of non-cellular plastics — Gas pyknometer method*

ISO 4440-1 : 1994 *Thermoplastics pipes and fittings — Determination of melt mass-flow rate — Test method*

ISO 4451 : 1980 *Polyethylene (PE) pipes and fittings — Determination of reference density of uncoloured and black polyethylenes*

ISO 12091 : 1995 *Structural wall thermoplastics pipes — Oven test*

Manual of Contract Documents for Highway Works, Volume 1 Specification for Highway Works, August 1998 (as amended)

Manual of Contract Documents for Highway Works, Volume 2 Notes for Guidance on the Specification for Highway Works, August 1998 (as amended)

Manual of Contract Documents for Highway Works, Volume 3 Highway Construction Details, March 1998 (as amended)

15 Conditions

15.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is issued only to the company, firm, organisation or person named on the front page — no other company, firm, organisation or person may hold or claim that this Certificate has been issued to them
- is valid only within the UK
- has to be read, considered and used as a whole document — it may be misleading and will be incomplete to be selective
- is copyright of the BBA
- is subject to English Law.

15.2 Publications, documents, specifications, legislation, regulations, standards and the like referenced in this Certificate are those that were current and/or deemed relevant by the BBA at the date of issue or reissue of this Certificate.

15.3 This Certificate will remain valid for an unlimited period provided that the product/system and its manufacture and/or fabrication, including all related and relevant parts and processes thereof:

- are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA
- continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine
- are reviewed by the BBA as and when it considers appropriate
- remain in accordance with the requirements of Highway Authorities' Product Approval Scheme.

15.4 The BBA has used due skill, care and diligence in preparing this Certificate, but no warranty is provided.

15.5 In issuing this Certificate, the BBA is not responsible and is excluded from any liability to any company, firm, organisation or person, for any matters arising directly or indirectly from:

- the presence or absence of any patent, intellectual property or similar rights subsisting in the product/system or any other product/system
- the right of the Certificate holder to manufacture, supply, install, maintain or market the product/system
- individual installations of the product/system, including their nature, design, methods, performance, workmanship and maintenance
- any works and constructions in which the product/system is installed, including their nature, design, methods, performance, workmanship and maintenance
- any loss or damage, including personal injury, howsoever caused by the product/system, including its manufacture, supply, installation, use, maintenance and removal.

15.6 Any information relating to the manufacture, supply, installation, use, maintenance and removal of this product/system which is contained or referred to in this Certificate is the minimum required to be met when the product/system is manufactured, supplied, installed, used, maintained and removed. It does not purport in any way to restate the requirements of the Health and Safety at Work etc. Act 1974, or of any other statutory, common law or other duty which may exist at the date of issue or reissue of this Certificate; nor is conformity with such information to be taken as satisfying the requirements of the 1974 Act or of any statutory, common law or other duty of care.



CIVILS

CorriPipe™

Technical Specification





1. Introduction

CorriPipe™ is a twin wall polyethylene drainage pipe manufactured from a black high density polyethylene by a twin extrusion process.

CorriPipes main application is filter and carrier pipe for surface and storm water drainage in civil engineering, construction, sports amenity, agricultural and other sub-soil applications.

CorriPipes excellent structural strength is achieved by the corrugate outer profile while the smooth inner wall ensures increased flow capacity.

CorriPipe™ is available in ring stiffness classes from SN2 to SN8 depending on the pipe size as per table 1 below.

NOMINAL ID (MM)	PIPE STIFFNESS (ISO 9969)
94	SN8
100	SN8
150	SN8
225	SN6 / SN8
300	SN6 / SN8
375	SN6
450	SN6
600	SN6
750	SN2 / SN4 / SN6
900	SN2 / SN4 / SN6
1050	SN2 / SN4 / SN6

Note – Contact JFC for other specifications

TABLE 1. – PIPE STIFFNESS

CorriPipe™ is manufactured to different standards depending on the pipe size and application in question. Pipe sizes from 150mm - 600mm are certified by the British Board of Agreement (BBA) under certificate number 02/H069.

CorriPipe™ is also manufactured to EN 61386-24 for use as cable protection duct, this product is known as CorriDuct.



2. Sizes

CorriPipe™ comes in a complete range of sizes between 94mm and 1050mm and is available in either carrier or filter pipe.

CorriPipe™ also has a complete range of fittings and junctions as detailed below.

TABLE 2. - CORRIPIPE™ DIMENSIONS

NOMINAL SIZE (MM)	NOM. ID (MM)	NOM. OD (MM)	PIPE LENGTH (M)
94	94.5	111.5	6
100	100	119	6
150	150	178	6
225	225	265	6
300	300	354	6
375	372	426	6
450	445	512	6
600	592	680	6
750	750	848	6
900	900	1024	6
1050	1050	1200	6

TABLE 3. - PERFORATED PIPE DETAIL

NOMINAL SIZE (MM)	NO. OF SLOTS PER DWELL*	NOM. SLOT WIDTH (MM)	PEF. AREA (MM²/M)
94	4	2.0-2.5	7920
100	n/a	n/a	n/a
150	4	2.0-2.5	6120
225	4	2.0-2.5	4680
300	4	2.0-2.5	5120
375	3*	2.7-3.3	4263
450	3*	2.8-3.5	4024
600	3*	2.9-3.5	4942
750	3	3.0-4.0	13716
900	4	3.0-4.0	14688
1050	4	3.0-4.0	10944

* Slots on alternate dwells

Fittings

TABLE 4. - CORRIPIPE™ FITTINGS

NOMINAL SIZE (MM)	CODE	FITTING TYPE
150	150TB15	15° Bend
150	150TB30	30° Bend
150	150TB45	45° Bend
150	150TB90	90° Bend
150	150TT90	Equal Tee
150	150TY45	Equal Wye
150	150SWSTT90	Single Wall Tee
225	225TB15	15° Bend
225	225TB30	30° Bend
225	225TB45	45° Bend
225	225TB90	90° Bend
225	225TT90	Equal Tee
225	225TY45	Equal Wye
225	225/150TT90	Unequal Tee 150
225	225/150TY45	Unequal Wye 150
225	225SWSTT90	Single Wall Tee
300	300TB15	15° Bend
300	300TB30	30° Bend
300	300TB45	45° Bend
300	300TB90	90° Bend
300	300TT90	Equal Tee
300	300TY45	Equal Wye
300	300/150TT90	Unequal Tee 150
300	300/150TY45	Unequal Wye 150
300	300/225TT90	Unequal Tee 225
300	300/225TY45	Unequal Wye 225
300	300SWSTT90	Single Wall Tee
375	375/150TT90	Unequal Tee 150
375	375/150TY45	Unequal Wye 150
375	375/SWS6"TT90	Single Wall Tee
450	450/150TY45	Unequal Tee 150

Note: Larger fitting sizes fabricated on request

Note: CorriPipe™ also available in various perforation specifications. e.g. half, full, extra, etc.

3. Hydraulic Capacity

There are two main formulas used in hydraulic calculations of gravity flow pipelines – Manning’s and Colebrook-White:

Manning’s

Manning’s is the most popular equation for stormwater design because it is simple to apply and it generally provides an acceptable level of accuracy.

$$Q = \frac{1}{n} AR^{\frac{2}{3}} S^{\frac{1}{2}}$$

Q = Water Discharge [m³/s]

n = Manning’s roughness factor

A = Cross-sectional area [m²]

R = Hydraulic radius [m]

S = Surface Water Slope [m/m]

Colebrook-White

A more accurate method for calculations is to utilize the Colebrook-White formula.

$$V = -2\sqrt{2gDS} \log \left(\frac{k}{3.7D} + \frac{2.51\nu}{d\sqrt{2gDS}} \right)$$

V = Velocity (m/s)

S = Hydraulic gradient (m/m)

k = Hydraulic roughness (m)

R = Hydraulic radius = D/4 (m)

D = Pipe internal diameter (m)

g = Gravitational acceleration (m/s²)

ν = Kinematic viscosity of water (m²/s)

4. Cover Depths

Minimum Cover Depths

JFC Manufacturing Limited recommends the following minimum cover depths.

- 0.6m for non-trafficked areas
- 0.9m to finished surface for trafficked areas not subject to Highways Agency or National Roads Authority requirements
- 1.2m to finished surface for trafficked areas subject to Highways Agency or National Roads Authority requirements.

For further information contact

IRL: Tel: + 353 93 24066 or email: info@jfccivils.com

UK: Tel: +44 1928 583 391 or email: infouk@jfccivils.com

In certain circumstances lower minimum cover levels may be allowed. e.g. installation with rigid pavement, concrete surround etc. Please contact JFC for more information.

Maximum Cover Depths

The maximum cover depths for CorriPipe™ are typically between 6-10 meters when installed in accordance with series 500 of the MCDHW Volume 1 as detailed in the CorriPipe™ BBA certificate.

The actual maximum allowable cover level is dependent on the following installation parameters and is often well in excess of 6-10 meters:

- The native soil stiffness
- The pipe bed and surround stiffness
- The size of the trench
- The density of the overburden
- Hydrostatic loading
- Factor of Safety
- Maximum allowable deflection limit

For further information contact

IRL: Tel: + 353 93 24066 or email: info@jfccivils.com

UK: Tel: +44 1928 583 391 or email: infouk@jfccivils.com

For specific site conditions JFC can calculate the maximum pipe deflection based on BS EN 1295-1. Contact JFC for more details.

5. Installation

JFC CorriPipe™ is to be installed in accordance with the following national guidelines. In countries outside that specified contact JFC for more details.

Ireland

The Specification of Road Works, series 500 as published by Transport Infrastructure Ireland.

United Kingdom

The Manual of Contract Documents for Highway Works, Volume 1 series 500 as published by the Highways Agency.

Trench Preparation

The trench width is generally between OD+300mm and OD+600mm but larger trenches are permissible. The trench (D) should provide for a minimum of 150mm pipe bed and local soft spots must be removed and replaced with hardcore. The pipe must sit evenly on the bed (C) and must be free of voids under the pipe. The trench should not be excavated too far in advance of pipe installation. All trenches are to be excavated in accordance with national health and safety regulations and local building regulations.

CorriPipe™ is to be backfilled in accordance with the relevant national guideline documents. Sidefill material is to be a well compacted single size coarse aggregate in accordance with BS EN 13242; Clause 4.3.2. Recommended grading to be 4/10mm (Ø94-Ø1050), 6/14mm (Ø450-Ø1050) and 10/20mm (Ø750-1050). The pipe surround material is to be installed at 150-300 layers to 95% compaction unless otherwise specified. Required compaction can be achieved using the correct combination of material type, layer thickness and compaction plant. Compaction equipment must not come in contact with the pipe. The sidefill material should extend to a minimum of 100mm over the crown of the pipe.

Backfill is to continue to a minimum of 300mm above the crown of the pipe with suitable material as per specification. The material should be free of any stone particles greater than 50mm. Compaction should not be carried out until a minimum cover of 300mm is achieved. Compaction equipment should be sized so as not to exert any undue stress in the pipe. Further backfill to the required level should be carried out in layers no greater than 300mm.

Sidefill (B)

Backfill (A)

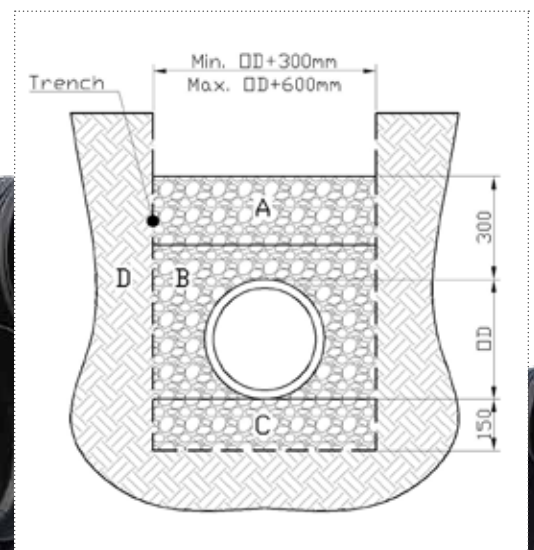


FIGURE 1. - TYPICAL INSTALLATION DETAILS

6. Jointing Plain Ended Pipe

All CorriPipe™ sizes are available as plain ended pipe.
This pipe type requires independent couplers for joining pipes together.

CorriPipe™ provides a fully watertight seal when installed in accordance with JFC guidelines in this document.

JFC recommends the following procedure for joining plain ended CorriPipe™ and associated fittings / couplers.

1. Cut the pipe to the require length with

a conventional handsaw. Ensure the pipe is cut square.
2. Clean the end of the pipe and accompanying coupler or fitting. Ensure no moisture or debris is present on either part.

3. Install a ring seal in the first dwell of the pipe. Ring seals are bi directional for plain ended pipe but need to be installed with the narrow end facing out from the pipe.

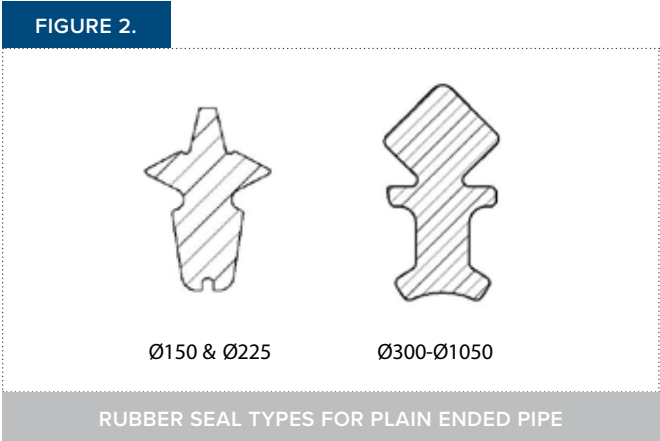
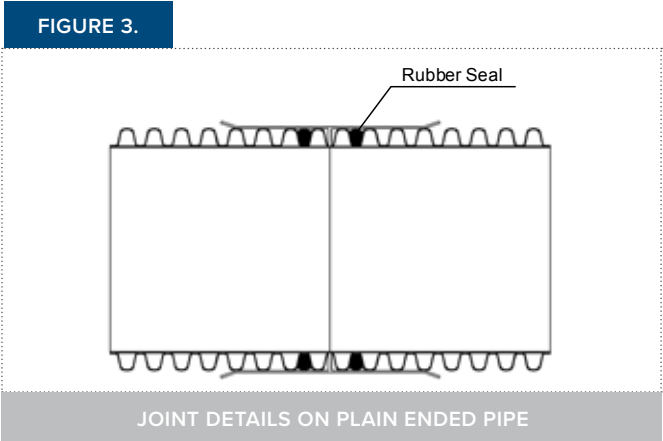
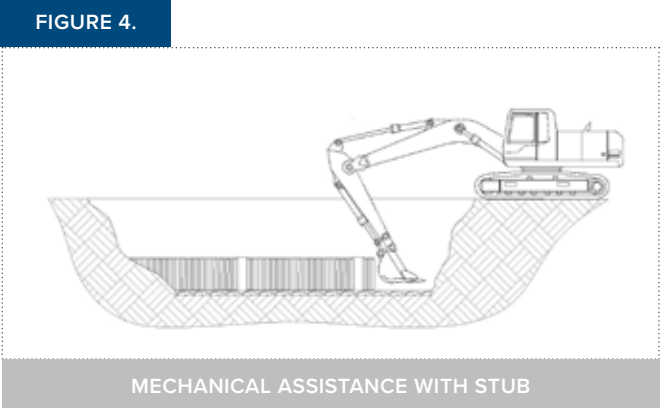
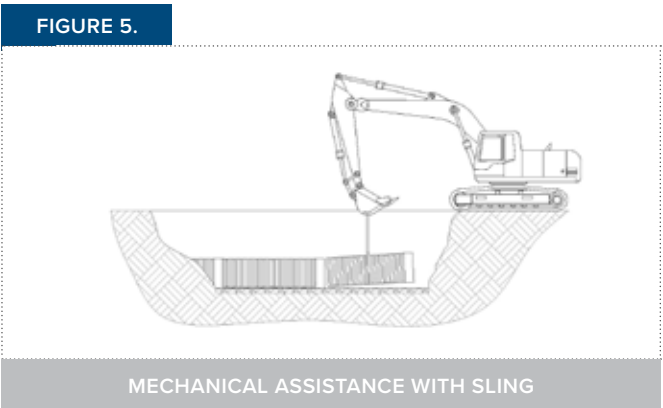
4. Lubricate the ring seal and accompanying coupler / fitting with pipe lubrication gel.

5. Measure the coupler / fitting and mark its depth on the pipe to show the home position.
6. Lever the fitting / coupler onto the pipe

with a piece of timber ensuring not to damage the pipe / coupler / fitting. Larger pipes may require mechanical assistance.
7. When using mechanical assistance there are two possible methods;

a. Push with a short pipe stub of equal diameter until home. See figure 4 below.

b. Use a sling wrapped between the corrugations to push the pipe home. See figure 5 below.
8. For joining pipes to the opposite side of the fitting /coupler follow the same steps as outlined above.



7. Jointing Bell and Spigot Pipe

CorriPipe™ sizes of Ø750, Ø900 and Ø1050 are available as bell and spigot i.e. integrated sockets. This pipe type does not require independent couplers for joining pipes together.

There are two pipe types available denoted by colour marks on the Bell and Spigot of each pipe.

Green Line – Suitable for use with ring seals

Yellow Line – Not suitable for use with ring seals

CorriPipe™ Green Line provides a fully watertight seal when installed in accordance with JFC guidelines in this document.

JFC recommends the following procedure for joining Bell and Spigot Pipe.

1. Clean both Bell and Spigot ends of the pipe. Ensure no moisture or debris is present on either part.
2. Install a ring seal in the first narrow dwell of the pipe as per figure 7. Ring seals are uni directional and must only be fitted as per Detail A in figure 7.
3. Generously lubricate the ring seal and accompanying Bell end with pipe lubrication gel.
4. Measure the spigot and mark its depth on the pipe to show the home position.
5. Rotate the pipe until the green or yellow lines on the Bell and Spigot are aligned as per figure 8. Do not insert unless marks are aligned.
6. Push the two pipes together using a small amount of mechanical assistance.
7. There are two methods in which the pipe can be installed with mechanical assistance
 - a. Push with a short pipe stub of equal diameter until home. See figure 9 below.
 - b. Use a sling wrapped between the corrugations to push the pipe home. See figure 10 below.

Care is required as excessive force can damage the pipe.

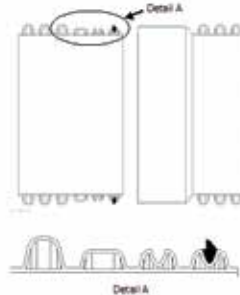
FIGURE 6.



Ø750 / Ø900 / Ø1050

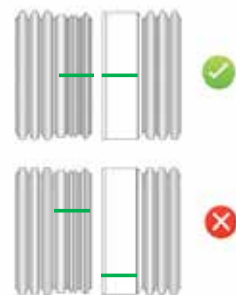
BELL AND SPIGOT SEAL

FIGURE 7.



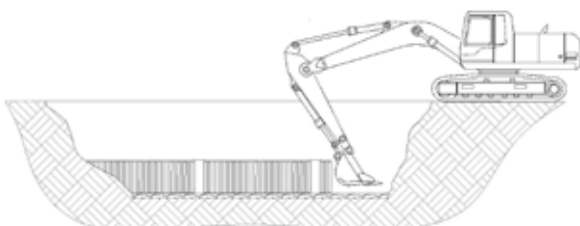
BELL AND SPIGOT SEAL INSTALLATION

FIGURE 8.



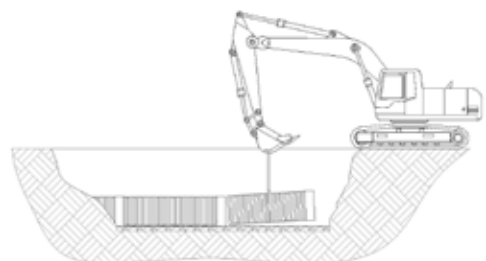
PIPE ALIGNMENT BEFORE INSERTION

FIGURE 9.



MECHANICAL ASSISTANCE WITH STUB

FIGURE 10.



MECHANICAL ASSISTANCE WITH SLING

8. Pressure Testing

There are two methods of pressure testing, the air test method and the water test method.

The most common method is the air test method and the test procedure is outlined below.

- Block the ends of the pipe / fitting with a suitable expanding stopper, ensuring both plug and pipe are thoroughly cleaned prior to fitting.
 - Fill a U-Tube manometer with water to the correct level, ensuring there are no trapped air bubbles in the water.
 - Connect the u-tube to the fitting on the expandable stopper
 - Increase the pressure in the pipe until a head of water of 100mm is reached
- Allow the pressure to stabilise for a number of minutes, increasing the pressure if it drops.
 - Record the pressure drop over a five minute period.
 - To pass the test the pressure should not drop below a 75mm head of water.

Note: Temperature has a critical effect on the test, a 1°C change in air temperature inside pipe is sufficient for the test to fail.

9. Transportation, Handling and Storage

General

Handling should be done carefully and in accordance with national health and safety guidelines. Dragging of pipes and fittings must be avoided. HDPE pipes and fittings become slippery in wet or in cold weather and extra precautions may be necessary.

Pipes up to 450mm in size are palletised with wooden frames and steel straps. 600mm pipes are generally steel banded in two's but can also be supplied loose. 750mm, 900mm and 1050mm are supplied as per order requirements.

TABLE 5. - CORRIPIPE™ PALLET QUANTITIES			
NOMINAL SIZE (MM)	PIPES PER PACK	PACKS PER LOAD	PIPES PER LOAD
94	100	12	1200
100	90	12	1080
150	33	12	396
225	14	12	168
300	8	12	96
375	5	12	60
450	4	12	48
600	2	14	28
750	n/a	n/a	18
900	n/a	n/a	18
1050	n/a	n/a	8

Storage

All materials should be carefully inspected at the time of delivery and any defects should be notified and reported immediately. All pipe stacks should be made on firm, flat ground to support the weight of the pipes and lifting equipment. For safety and Pipes and fittings should be transported and stored in their packaging.

Delivery vehicles should be provided with a clean, flat bed, free from sharp objects. Care must be taken to prevent slippage or excessive bowing of the pipes. Tie the load well to prevent rubbing. Use nylon straps, not chains or ropes.

The stacking height for pipes should be limited to not more than 3 meters. Pipes should be not be stored in open areas subject to high winds.

It is recommended that CorriPipe™ is not stored in direct sunlight for more than 3 months.





CIVILS

CorriPipe™

Technical Specification

For further information

visit our website
www.jfccivils.com
or contact us

JFC CIVILS UK

Registered Office

JFC Plastics Ltd.
Goldicote Business Park
Banbury Road, Goldicote
Stratford-Upon-Avon CV37 7NB
United Kingdom

Sales Office

JFC Civils UK
25 Goodlass Road, Speke
Liverpool L24 9HJ
United Kingdom

Phone: +44 1928 583 391

Email: infouk@jfccivils.com

JFC CIVILS IRELAND

JFC Manufacturing Co. Ltd.
Weir Road, Tuam, Co. Galway, H54 RX46 Ireland

Phone: +353 93 24066

Email: info@jfccivils.com

GEOLIGHT maintenance

Once received stormwater reaches the storage reservoir through one or more distribution pipes laid out on the side faces of the Geolight blocks.

These distribution pipes are covered in a trench filled with draining material requiring little compaction, like washed rolled pebbles, free from fines, and 15/25 grading.

A 10 mm mesh geogrid or GEOTextile, laid between the distribution pipe and Geolight, prevents the horizontal Geolight blocks being clogged by the draining materials.

The permeability of the supply and distribution pipe located on the periphery of the reservoir is designed to prevent any clogging of the system upstream of the stormwater drain.

This sizing is checked for each supply. It is obtained thanks to design programmes by SDS limited following testing of a size 1 reservoir in which all hydraulic configurations were studied.

These tests also made it possible to check the very good vertical and horizontal permeabilities of Geolight blocks and this general layout is usually accepted.

The choice of one of these layouts or a combination of them is according to:

- the place reserved for the reservoir
- available slopes
- hydraulic parameters (discharge)
- position of stormwater input and output systems.

The ends of feeder drains (distribution pipes) are connected to inspection chambers(manholes), acting as settling tanks and making inspection and maintenance of the whole distribution pipe possible.

For small discharges, stormwater does not penetrate Geolight blocks, but circulates either in an appropriate bypass, or in the distribution pipe drain. This is for draining the first water which will be handled downstream if required.

When the reservoir is drained, water is drained through a distribution pipe possibly the same as the one located at the input which operates in the opposite direction. Drainage discharge is controlled by the downstream system piping.

A ventilation system consisting of a drainage geocomposite is fresh air vented in the inspection pits. It is laid out in the upper part of the distribution pipes and the general space occupied by the reservoir.

We generally recommend that the stormwater tank inspection chambers are checked periodically in conjunction with general maintenance of the underground pipe network.

Service & Support Solutions

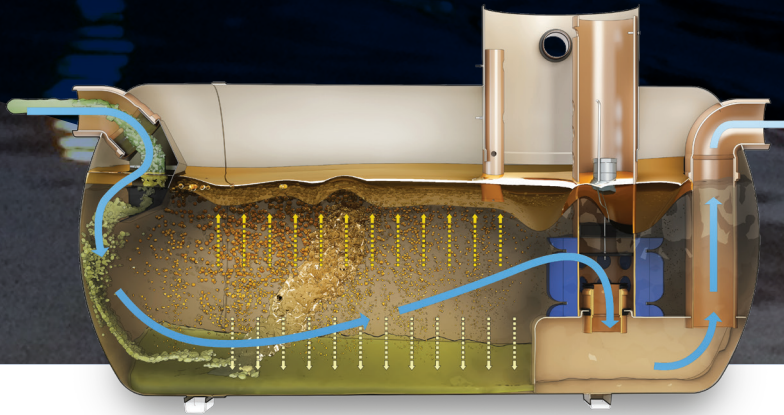
Avoid flooding and fines with effective maintenance planning

Separators trap hazardous substances to prevent them entering the local environment, therefore preventing pollution on your site. If they are not properly serviced and maintained they can become blocked, with the filters stopping the flow of water and causing overflow or flooding. Consequently, you could be fined for not complying to guidelines or prosecuted for polluting the local environment.

What is a Separator?

Separators are attached to surface water drainage systems to separate oil, or other hazardous fluids, from surface water. They are essential to help you avoid pollution on

your premises and therefore it is vital that they are serviced and maintained properly in accordance with manufacturer guidelines and ISO 14001.



Call now to book
your service visit on
0333 240 6868

kingspanservice.com


Kingspan®

Service & Support Solutions

How often should my separator be serviced?

Kingspan's service and maintenance plans have been developed using our knowledge of a range of separators and in accordance with the Environmental Agency Pollution Prevention Guidelines and EN858-2.



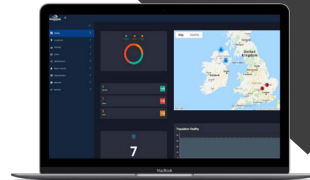
Call now to book
your service visit on
0333 240 6868

kingspanservice.com

SmartServ Pro

Monitor your separators
at the touch of a button

SmartServ Pro has been developed by Kingspan to help owners connect their buildings and equipment to the network through their building management or asset management software, improving the efficiency of the systems at the heart of your facility.



During our service visit we will;

-  Complete an internal inspection of the structure for internal damage.
-  Check closure device to ensure it is unrestricted by new filter.*
-  Remove oil probe to be cleaned and tested to ensure its operational.*
-  Fit all covers and check separator is fully operations.
-  Complete log book and sign off on site.*

*If applicable





Kingspan Oil/Water Separator

Commissioning details

It is important and part of planning/building regulation that you have your separator installed correctly and accompanied by a commissioning certificate.

Within the attached quote we offer 2 levels of commissioning, a 'FULL COMMISSIONING' or 'VISUAL'.

Below we include details of each.

Option 1: Full commissioning

This requires that the unit has been installed by the main contractor in line with the provided installation guidelines.

This includes the following:

- Tank installed flat and level with safe working area around the perimeter.
- All incoming and outgoing pipework has been connected.
- Alarm (if specified) has been fixed in a secure position with a live mains supply connected.
- Alarm cables have been ducted and laid between the alarm and separator.

The following will then be carried out by a Kingspan Service Engineer.

- Remove covers and allow the system to vent (only covers removable by one man can be lifted if the cover is deemed to be too heavy for one man then this should be noted on the check sheet.)
- Check the coalescer is fitted correctly.
- Connect the probe to the incoming cables.
- Ensure the junction box location is compliant with ATEX regulations and directive 94/9/EC.
- Place the probe in the correct aperture.
- Confirm location of vent points:
 - Vent should terminate 2.4m above ground & 1m away from opening windows
 - Covered to prevent debris access.

On completion we will provide a site specific commissioning certificate.

Option 2: Visual

With all the above having been carried out by the main contractor a Kingspan service engineer will visit the site do a visual inspection of the install and if all is in order provide a site specific Commissioning Certification based on a visual inspection. If any issues arise these will be reported in writing to the contractor and once rectified the certificate will then be issued.

SDS Ltd Sign off QA Sheet

ATTENUATION TANK		ATT:	DATE:		12/1/23
SITE:	Accor Tribe hotel		TANK VOLUME:		203.13m ³
LOCATION:	Manchester		DIMENSIONS:		
DRAINAGE:	ATTENUATION		JOB NO:		383-23-D1

SECTION 1 AND 7 TO BE SIGNED BY CLIENTS ENGINEER				
CHECK	DATE	COMMENT	SDS	
1. SETTING OUT and FORMATION	↑	Engineer to sign and date prior to laying of materials		↑
2. TANK BASE		Installed as per manufacturers recommendations		
3. EXTERNAL PROTECTIVE COVERINGS:		Installed as per manufacturers recommendations		
a. Base of Tank		Installed as per manufacturers recommendations		
b. Vertical sides		Installed as per manufacturers recommendations		
c. Top of tank	13/1/23	Installed as per manufacturers recommendations		↑
4. WELDED GEOMEMBRANE		Installed as per manufacturers recommendations		
a. Welded joint		Installed as per manufacturers recommendations		
b. Base of Tank		Installed as per manufacturers recommendations		
c. Vertical sides		Installed as per manufacturers recommendations		
d. Top of Tank	12/1/23	Installed as per manufacturers recommendations		↑
5. GEOLIGHT UNITS		Installed as per manufacturers recommendations		
6. GEOTEXTILE PIPE TRENCH		Installed as per manufacturers recommendations		
7. PIPEWORK: mm		Installed as per manufacturers recommendations		
a. Invert levels		Engineer to sign and date prior to laying of materials	N/A	
b. position	Engineer to sign and date prior to laying of materials	N/A		
c. diameter	Engineer to sign and date prior to laying of materials	N/A		
d. penetrations sealed	Installed as per manufacturers recommendations			
8. VENT SYSTEM	Installed as per manufacturers recommendations		↓	
9. BACKFILLING				

PLEASE NOTE: Only back fill around pipe after the connection between tank and manhole is complete so that the pipe is not compromised in any way with an open end. Failure to comply may result in the pipe being damaged. It may be necessary to put stone over pipe when filling pipe trench but make sure enough pipe is protruding so that stone is not directly on open end. SDS will not accept responsibility.

In signing this document, you are in agreement that the above work meets your specifications. Please note that changes to any project elements after sign-off may be subject to additional charges.

SUB CONTRACTOR	SUSTAINABLE DRAINAGE SYSTEMS LTD	Signed	
		Printed	Mark Gurney
MAIN CONTRACTOR	Groundtech UK	Signed	L-CP
		Printed	Levi

SDS Ltd Sign off QA Sheet

ATTENUATION TANK	ATT:	DATE:	20-2-24
SITE:	ACCOR TRIBE HOTEL	TANK VOLUME:	101.25m ³
LOCATION:	M90 3DP	DIMENSIONS:	
DRAINAGE:	ATTENUATION	JOB NO:	383-23

SECTION 1 AND 7 TO BE SIGNED BY CLIENTS ENGINEER

CHECK	DATE	COMMENT	SDS	
1. SETTING OUT and FORMATION	19.2.24	Engineer to sign and date prior to laying of materials	Aw	↑
2. TANK BASE	"	Installed as per manufacturers recommendations	Aw	
3. EXTERNAL PROTECTIVE COVERINGS:	"	Installed as per manufacturers recommendations	Aw	
a. Base of Tank	"	Installed as per manufacturers recommendations	Aw	
b. Vertical sides	20.2.24	Installed as per manufacturers recommendations	Aw	
c. Top of tank	"	Installed as per manufacturers recommendations	Aw	↓
4. WELDED GEOMEMBRANE 19-20/2/24		Installed as per manufacturers recommendations	Aw	
a. Welded joint	"	Installed as per manufacturers recommendations	Aw	
b. Base of Tank	N/A	Installed as per manufacturers recommendations	Aw	
c. Vertical sides	19.2.24	Installed as per manufacturers recommendations	Aw	
d. Top of Tank	20.2.24	Installed as per manufacturers recommendations	Aw	
5. GEOLIGHT UNITS	19.2.24	Installed as per manufacturers recommendations	Aw	↓
6. GEOTEXTILE PIPE TRENCH	"	Installed as per manufacturers recommendations	Aw	
7. PIPEWORK: mm	"	Installed as per manufacturers recommendations	Aw	
a. Invert levels	"	Engineer to sign and date prior to laying of materials	N/A	
b. position	"	Engineer to sign and date prior to laying of materials	N/A	
c. diameter	"	Engineer to sign and date prior to laying of materials	N/A	↓
d. penetrations sealed	20.2.24	Installed as per manufacturers recommendations	Aw	
8. VENT SYSTEM	"	Installed as per manufacturers recommendations	Aw	
9. BACKFILLING	"		Aw	↓

PLEASE NOTE: Only back fill around pipe after the connection between tank and manhole is complete so that the pipe is not compromised in any way with an open end. Failure to comply may result in the pipe being damaged. It may be necessary to put stone over pipe when filling pipe trench but make sure enough pipe is protruding so that stone is not directly on open end. SDS will not accept responsibility.

In signing this document, you are in agreement that the above work meets your specifications. Please note that changes to any project elements after sign-off may be subject to additional charges.

SUB CONTRACTOR	SUSTAINABLE DRAINAGE SYSTEMS LTD	Signed	Aw
		Printed	A. WATSON
MAIN CONTRACTOR	RUBY CIVILS	Signed	S. Molloy
		Printed	S. MOLLOY

TDS0033

Pipe work Orientations

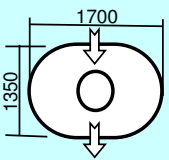
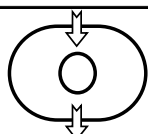
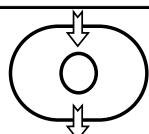
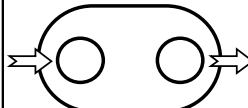
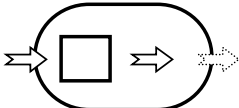
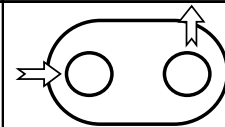
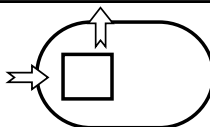
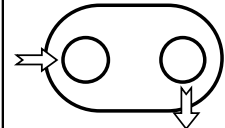
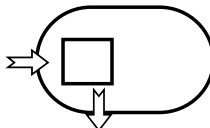
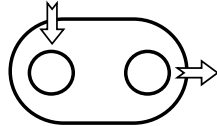
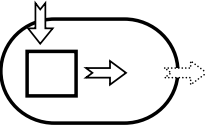
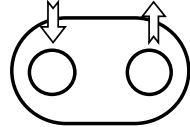
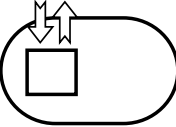
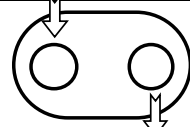
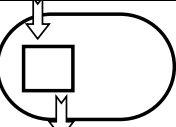
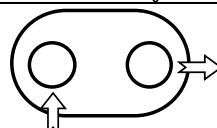
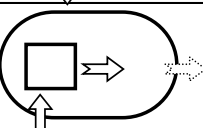
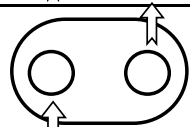
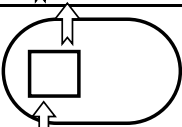
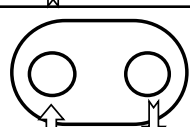
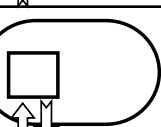
NSFP003 - NSFP006 Full Retention Class 1 & 2 Separators (Roto-Moulded)

NSFA010 – NSFA200 Full Retention Class 1 & 2 Separators (GRP)

NSBP003 – NSBP006 Bypass Class 1 & 2 Separators (Roto-Moulded)

NSBE010 – NSBE125 Bypass Class 1 Separators (GRP)



Plastic Tank Range								
	NSFP		NSBP		Additional Tank Orientations			
		003 - 006		003 - 006	Tank flow route cannot be changed. Tank may be rotated on installation.		Rotate Tank 	
A		●		●				
GRP Tank Range								
	NSFA					NSBE		
		010 - 015	020 - 065	080 - 200		010-030	040&050	075-125
A		●	●	●		●	●	●
B				○		○		
C				○		○	○	○
D				○		○	○	○
E				○		○		
F				○		○	○	○
G				○		○		○
H				○		○		
K				○		○		○
FLOW ARROWS ARE DIAGRAMATIC AND MAY NOT INDICATE THE EXACT POSITION OF THE INLET OR OUTLET								

Issue	Description	Date
16	CC 1232	July 2015

APPENDIX D – Handover Checklist

Site Handover Checklist

Site ID	
Date of Assessment	
Period of Developer Maintenance (defects liability period)	

Check	Details	Acceptable (Yes/No)	Details of corrective action required	Corrective action completed (Date)
GENERAL				
Design Approval Checks Satisfactory?				
Construction Inspection Checks Satisfactory?				
ASSET INFORMATION				
As-Constructed plans and survey submitted?				
As-Constructed drainage calculations/models submitted?				
Proprietary product information submitted?				
Asset listed on asset register or database?				
MAINTENANCE INFORMATION				
Full maintenance plan submitted?				
What is the duration of maintenance period prior to handover?				
HANDOVER INSPECTION				
Confirm that inlets and outlets are clear.				
Confirm that correct planting in accordance with approved design is fully established				
Confirm that no uneven settling of soil, channelling, unwanted ponding or erosion of bed or side slopes. If yes, give a reason for defect whether design or construction.				
Confirm that no evidence of construction sediment or unexpectedly rapid build-up of sediment				
Confirm that agreed maintenance access is clear.				
Confirm that permeable surfaces are draining effectively and that there is no unacceptable settlement.				
Confirm that any permanent water levels are in accordance with approved design.				
HANDOVER INSPECTION				
Good Condition - Acceptable				
Minor Defects - Acceptable subject to minor works (indicate, with reasons, whether cost should fall to developer or adopting body)				
Major Defects - Not acceptable without substantial repair works (indicate, with reasons, whether cost should fall to developer or adopting body)				

APPENDIX E – Maintenance Record Sheet

SuDS and Drainage Maintenance Checklist

Site ID	
Date of Inspection	
SuDS or Drainage Being Inspected	
Specific purpose or part of SuDS or Drainage being inspected	
Company or Person Inspecting	
Inspection Frequency	

	Details	Yes/No	Action Required	Date Completed
GENERAL INSPECTION ITEMS				
Is there any evidence of erosion, channelling, ponding (Where not desirable) or other poor hydraulic performance?				
Is there any evidence of accidental spillages, oils, poor water quality, odours or nuisance insects?				
Have any health and safety risks been identified to either the public or maintenance operatives?				
Is there any deterioration in the surfaces or materials				
SILT/ SEDIMENTATION ACCUMULATION				
Is there any sedimentation accumulation at inlets (or other defined accumulation zones such as the surface of filter drains or infiltration basins and within proprietary devices)? If yes, state depth (mm) and extent. Is removal required? If yes, state waste disposal requirements and confirm that all waste management requirements have been complied with. (consult environmental regulator)				
Is surface clodding visible (potentially problematic where water has to soak into the underlying construction or ground				
Does permeable or porous surfaces require sweeping to remove silt?				
SYSTEM BLOCKAGES AND LITTER BUILD-UP				
Is there evidence of litter accumulation in the system? If yes, is there a blockage risk?				
Is there any evidence of any other clogging or blockage of outlets or drainage paths?				
VEGETATION				
Is the vegetation condition satisfactory (density, weed growth, coverage etc?)				

Does any part of the system require weeding, pruning or mowing?				
Is there any evidence of invasive species becoming established? If yes, state action required				
INFRASTRUCTURE				
Are parts of the specific item in good condition, this can be mechanical or electronic parts?				
Is there evidence of any accidental damage to the system?				
Is there any evidence of tampering with the flow controls?				
Are there any other materials that could affect the performance of the system in relation to the design objective for hydraulic, water quality, biodiversity and visual aspects? (Specify)				
Is there any evidence of cross connections or other unauthorised inflows?				
OTHER OBSERVATIONS				
Information appended (Photograph reference), Date and records				
SUITABILITY OF CURRENT MAINTENANCE REGIME				
Continue as current Increase maintenance Decrease maintenance				
NEXT INSPECTION				
Proposed Date for Next Inspection				