Princedom Street, Manchester

27th October 2024

PV2309-APP-92-XX-RP-C-1002-SuDS-Maintenance-Report

SuDS Maintenance Report

Princedom Street, Manchester

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Document history and status

Revision	Date	Description	Originator	Checked	Approved
P01	27/11/2024	Initial Issue	SA	ZS	BD

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1 Introduction

1.1 Terms of Reference

1.1.1 Align Property Partners have been commissioned by Mosscare St Vincents to undertake a drainage design for the proposed development off Princedom Street, Manchester.

1.1.2 Sustainable Urban Drainage Systems (SuDS) are a sequence of water management practices and facilities designed to drain surface water in a manner that will provide a more sustainable approach than what has been the conventional practice. SuDS are designed to mimic natural drainage flows and typically manage rainfall close to where it falls. Benefits include the effective management of runoff from hard standing surfaces, such as pavements and driveways, by reducing the volume, frequency and flow rate of surface water runoff during extreme storm events. They provide protection and/or enhancement of water quality (reducing pollution from runoff), are sympathetic to the environment and the needs of the local community

1.1.3 The purpose of this management plan is to demonstrate how SuDS, which have been implemented at this particular residential development will be maintained in compliance with various requirements and best practice guidance, including but not limited to, the National Planning Policy Framework (NPPF) and SuDS Manual (CIRIA, 2015).

1.1.4 The management plan aims to:

- Summarise the SuDS features used within the site;
- Establish who is responsible for the maintenance of the SuDS components;
- Set out how to maintain the incorporated SuDS components following construction;
- Ensure that all those involved in the maintenance and operation of the SuDS understand their functionality and maintenance requirements in terms of supporting long-term performance.

1.2 Site Description

1.2.1 The surface water drainage system for the site comprises of a variety of SuDS aiming to reduce flood risk and enhance biodiversity. The location of the SuDS is shown in Appendix A.

1.2.2 The drainage strategy of the new proposed Surface Water system demonstrates how surface water can be managed without increasing flood risk on site or elsewhere for storm events up to the 1.0% AEP + 45% climate change allowance. Based on an impermeable area of (0.119ha – North Parcel) and (0.087ha – South Parcel), including an allowance for 10% Urban creep. Approximate attenuation volumes of 57.6m^3 and 42.0m^3 respectively required to restrict discharge rates at 3 l/s for both parcels.

1.2.3 Plans illustrating the proposed drainage to be maintained are shown in Appendix A

2 SuDS Management and Maintenance Regime

2.1 General

2.1.1 Proposed Development is split into two parcels (North and South) which forms two distinct storm Networks. The comprehensive proposed storm system comprises of two attenuation tanks, two hydro-brakes, and a permeable paved parking bay per plot. Mosscare St Vincents Housing will be responsible for the maintenance of storm drainage systems highlighted above and will be either managed by the Mosscare St Vincents Housing's maintenance team or an appointed private management company.

2.1.2 Mosscare St Vincents Housing must fully understand their responsibilities outlined in this plan and be aware of any legally binding maintenance agreement.

2.1.3 Mosscare St Vincents Housing will ensure only trained personnel will be permitted to undertake maintenance of SuDS features. This work must be carried out in accordance with the Confined Space Regulations. To facilitate this maintenance, SuDS have been located in public open space, where possible, or where they are reasonably accessible.

2.1.4 Tables outlining the maintenance activities that should be undertaken for each SuDS feature, outlined in the following sections, in accordance with the SuDS Manual, CIRIA, 2015. These tables must be reviewed by Mosscare St Vincents Housing or the appointed private management company.

2.2 Hydro Brake

2.2.1 A hydro-brake is a flow control manhole, which restricts the velocity of water whereby the water enters through the inlet pipe with enough energy to create a vortex in the chamber. The vortex then controls the flow to the specified discharge rate. The main parameters that effect the hydro-brake specification is the design head (m) and the specified discharge rate (l/s).

2.2.2 This development includes the installation of two hydro-brakes, as illustrated in the Drainage Plan (Appendix A). Both Hydro-brakes will link onto a new surface water manhole that will be connected into the existing United Utilities storm drainage system on Princedom Street. One hydro-brake serves the northern section of the development, while the other is designated for the southern section.

2.2.3 Regular inspection and maintenance will be required to ensure the long-term effectiveness of the hydro-brakes

2.2.4 Hydro International have provided the following statement in terms of maintenance of the hydro-brake:

"Normally, little maintenance is required as there are no moving parts within the Flow Control. Experience has shown that if blockages occur, they do so at the intake, and the cause on such occasions has been due to a lack of attention to engineering detail such as approach velocities being too low, inadequate benching, or the use of units below the minimum recommended size. The Flow Control (where applicable) is fitted with a pivoting bypass door, which allows the manhole chamber to be drained down should blockage occur. The smaller conical units, below the minimum recommended size, are also supplied with rodding facilities or vortex suppressor pipes as standard."

Following installation of the Flow Control it is vitally important that any extraneous material i.e. building materials are removed from the unit and the chamber. After the system is made live, and assuming that the chamber design is satisfactory, it is recommended that each unit be inspected monthly for three months and thereafter at six monthly intervals with hose down if required. If problems are experienced, please do not hesitate to contact the company so that an investigation may be made.

2.3 Attenuation Tank

2.3.1 Attenuation storage tanks are used to create a below ground void space for the temporary storage of surface water before use, infiltration or controlled release. Attenuation storage tanks can help reduce flow rates from a site by providing significant attenuation storage. Storage tanks do not provide any form of treatment of surface water runoff and therefore need to be combined in a "management train" with other methods that do provide suitable treatment of all relevant pollutants (coarse sediment must always be removed upstream of a storage tank).

2.3.2 The inherent flexibility in size and shape of the typical attenuation storage tank systems means that they can be tailored to suit the specific characteristics and requirements of any site.

2.3.3 Two cellular detention tanks are proposed; one for each parcel and both located beneath parking areas near Princedom Street. The attenuation tank sizes are 24m(L) x 2m(W) x 1.2m(D), which has a volume of 57.6m^3 to cater for Northern Parcel and 17.5m(L) x 2m(W) x 1.2m(D), which has a volume of 42m^3 to cater for Southern Parcel.

2.3.4 Details and specifications of the tank are provided in Appendix A and D.

2.3.5 Regular inspection and maintenance would be required to ensure the long-term effectiveness of the attenuation tank.

2.3.6 A checklist for the maintenance of the attenuation tank proposed for the site, to be used by the party responsible for their maintenance, is provided in accordance with the 2015 SuDS Manual below:

Operation and maintenance requirements for attenuation storage tanks		
Maintenance schedule	*Required action*	*Typical frequency*
Regular Maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae or other matter; remove and replace surface infiltration medium as necessary	Annually
	Remove sediment from pre-treatment structures and/or internal forebays	Annually, or as required
Remedial actions	Repair/rehabilitate inlets, outlet, overflows and vents	As required
Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required

Table 2.3 – Attenuation Tanks (CIRIA, 2015)

2.4 Permeable Paving

2.4.1 Runoff is allowed to soak through structural paving. This can be paving blocks with gaps between solid blocks, or porous paving where water filters through the block itself. Water can be stored in the subbase and potentially allowed to infiltrate into the ground

2.4.2 This method provides attenuation and treatment from surface flows.

2.4.3 Regular inspection and maintenance would be required to ensure the long-term effectiveness of the paving.

2.4.4 A checklist for the maintenance of porous paving installed at the site and the party responsible for their maintenance, is provided in accordance with the 2015 SuDS Manual below:

Operation and maintenance requirements for Permeable Paving		
Maintenance schedule	*Required action*	*Typical frequency*
Regular Maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional Maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to used, and replace lost jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging.
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48hr after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

Table 3.3 – Permeable Paving (CIRIA, 2015)

2.4.5 Minor maintenance will be possible to be undertaken by the residents such as the removal of leaves that fall off trees. However, remedial works and monitoring will be undertaken by Mosscare St Vicents Housing maintenance team or a private management company as appointed.

Appendices

Appendix A

Drainage Layout



DRAINAGE

1. ALL DRAINAGE WORKS TO BE CONSTRUCTED FROM THE OUTFALL TOWARDS THE HEAD OF RUN TO ENSURE THE OUTFALL CAN BE ACHIEVED.
2. ALL EXISTING DRAINS & SERVICES (LINE & LEVELS) TO BE CHECKED & CONFIRMED BY THE CONTRACTOR PRIOR COMMENCEMENT OF ANY ON SITE DRAINAGE WORKS. ANY DISCREPANCY IN LEVELS IS TO BE REPORTED IMMEDIATELY TO APP.
3. ALL DRAINAGE WORK TO BE IN ACCORDANCE WITH THE BUILDING REGULATIONS, BS EN 752 & TO THE SATISFACTION OF THE BUILDING INSPECTOR.
4. ALL PROPRIETARY ITEMS TO BE INSTALLED STRICTLY IN ACCORDANCE WITH MANUFACTURER'S DETAILS, INSTRUCTIONS & SPECIFICATIONS.
5. ALL COVER LEVELS ARE APPROXIMATE. EXACT LEVELS TO BE DETERMINED FROM THE EXTERNAL WORKS LAYOUT.
6. INVERT LEVELS QUOTED AT MANHOLES & INSPECTION CHAMBERS ARE THOSE OF THE LARGEST CONNECTED PIPE DIAMETER. PIPES AT CHAMBERS TO BE LAID WITH SOFFITS LEVEL UNLESS NOTED OTHERWISE.
7. PIPE GRADIENTS WHERE STATED ARE APPROXIMATE - LEVELS AT THE CHAMBERS TAKE PRECEDENT.
8. REFER TO ARCHITECT'S DRAWINGS FOR PRECISE LOCATION OF ALL RAINWATER PIPES, INTERNAL CONNECTIONS ETC.
9. ALL INTERNAL CONNECTIONS TO HAVE AN ABOVE-FLOOR ACCESS POINT TO ENABLE FUTURE ACCESS FOR MAINTENANCE.
10. PIPES & FITTINGS TO BE:
    - CONCRETE PIPES & ANCILLARY PRODUCTS TO BS 5911:2022 & BS EN 1916:2002.
    - VITRIFIED CLAY PIPES & FITTINGS TO BS EN 295:2013
    - DUCTILE IRON TO BS EN 598:2007 & BS ISO 4179:2005.
    - PERFORATED VITRIFIED CLAY PIPES FOR LAND DRAINAGE TO BS 1196.
    - PLASTIC PIPES FOR LAND DRAINAGE TO BS 4962:1982.
    - PLASTIC PIPING SYSTEMS FOR NON-PRESSURE UNDERGROUND DRAINAGE & SEWAGE TO BS EN 1401 & BS 4660 – SOLID WALL, STRUCTURED WALL PIPES TO BS EN 13476.
    - PRECAST CONCRETE MANHOLE UNITS TO BS EN 1917:2002.
    - PLASTIC INSPECTION CHAMBERS FOR DRAINS & SEWERS TO BS EN 13598-1:2010.
    - GULLY & MANHOLE TOPS FOR VEHICULAR & PEDESTRIAN AREAS TO BS EN 124:1994.
    - DRAINAGE CHANNELS FOR VEHICULAR & PEDESTRIAN AREAS TO BS EN 1433:2002.
12. ALL MANHOLE COVERS, ROAD GULLY COVERS & FRAMES TO COMPLY WITH BS EN124 NON ROCKING TYPE.

    UNLESS NOTED OTHERWISE USE CLASS:

    A15 FOR USE IN PEDESTRIAN AREAS WHERE VEHICLES HAVE NO ACCESS.

    B125 FOR USE IN CAR PARKS & PEDESTRIAN AREAS WHERE INFREQUENT LIGHT VEHICLE ACCESS IS LIKELY (INCLUDING DRIVEWAYS).

    C250 FOR ACCESS COVERS & GULLY GRATINGS IN AREAS OF SLOW MOVING, HEAVY TRAFFIC, ALSO FOR GULLY GRATINGS IN CARRIAGEWAY WITHIN 500mm OF KERB & UP TO 200mm INTO THE FOOTWAY.

    D400 FOR USE IN CARRIAGEWAYS OF ROADS & PARKING AREAS ACCESSED BY ALL TYPES OF VEHICLES.

    E600 FOR USE IN AREAS WHERE HIGH WHEEL LOADS ARE PRESENT.

    F900 FOR USE IN AREAS WHERE EXTREMELY HIGH WHEEL LOADS ARE PRESENT SUCH AS AIRCRAFT PAVEMENTS, DOCKS, HEAVY INDUSTRIAL SITES.
13. MANHOLES IN INTERNAL AREAS REQUIRE DOUBLE SEALED COVERS WITH LOCKING SCREWS, RECESSED WHERE REQUIRED TO ACCOMMODATE FLOOR FINISHES TO ARCHITECT'S SPECIFICATION.
14. PIPE BEDDING

    USE CLASS S BEDDING UNLESS NOTED OTHERWISE. NB PROTECT AGAINST CONSTRUCTION TRAFFIC AS NECESSARY

    USE CLASS Z CONCRETE BED & SURROUND OR CONCRETE SLAB PROTECTION AS FOLLOWS:
    - CLASS 120 CLAYWARE OR CLASS M CONCRETE (100 - 600ØD PIPES)

      LANDSCAPING - LESS THAN 600mm COVER TO CROWN.

      HARDSTANDING - LESS THAN 1200mm COVER TO CROWN
    - PLASTIC (100 - 300ØD PIPES)

      LANDSCAPING - LESS THAN 600mm COVER TO CROWN.

      HARDSTANDING - LESS THAN 900mm COVER TO CROWN
15. PIPES BELOW CONCRETE GROUND FLOOR SLABS:

    WHERE THE CROWN OF THE PIPE IS WITHIN 300mm OF THE UNDERSIDE OF SLAB, SPECIAL PROTECTION TO BE PROVIDED IN ACCORDANCE WITH BUILDING REGULATIONS H1 2.44 OR 150mm GEN3 CONCRETE BED & SURROUND CAST INTEGRALLY WITH SLAB.

    OTHERWISE USE CLASS S BEDDING.
16. MAIN BACKFILL TO BE WELL COMPACTED IN 150mm LAYERS OF:

    SELECTED BACKFILL MATERIAL IN ALL SOFT LANDSCAPED AREAS

    TYPE 1 GRANULAR MATERIAL IN ALL HARDSTANDING AREAS & PUBLIC HIGHWAYS
17. BACKFILL TO DRAINS NEAR FOUNDATIONS TO BE IN ACCORDANCE WITH BUILDING REGULATIONS H1 DIAGRAMS 8 & 12.
18. CCTV TO BE CARRIED OUT TO VERIFY CONDITION OF ANY DRAINAGE TO BE RE-USED.

Notes

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GENERAL NOTES

1. THE STRUCTURAL DRAWINGS ARE TO BE READ IN CONJUNCTION WITH ALL RELEVANT CLIENT, ARCHITECT, SERVICES ENGINEER, AND SPECIALIST CONTRACTOR DRAWINGS, REPORTS AND SPECIFICATIONS.
2. FOR SETTING OUT AND LEVELS REFER TO ARCHITECTS DRAWINGS.
3. FOR THE PURPOSE OF CONSTRUCTION ALL DRAWINGS MUST NOT BE SCALED AND ONLY WRITTEN OR CALCULATED DIMENSIONS USED. LEVEL DATUMS TO BE CONFIRMED BY THE ARCHITECT.
4. ANY REVISIONS TO THE LAYOUT DETAILS REQUIRED BY THE CONTRACTOR TO BE AGREED AND APPROVED BY THE ALIGN PROPERTY PARTNERS ENGINEER.
5. FINISHED FLOOR LEVELS TO BE DETERMINED.
6. ALL PROPRIETARY PRODUCTS ARE TO BE USED STRICTLY IN ACCORDANCE WITH THE MANUFACTURER'S DETAILS AND REQUIREMENTS.
7. GENERALLY, ONLY KNOWN PENETRATIONS, HOLES, POCKETS AND RECESSES ETC. WITH ANY DIMENSIONS GREATER THAN 150 ARE SHOWN ON THE DRAWINGS. FOR CONFIRMATION OF THESE AND FOR DETAILS OF SMALLER HOLES PLUS INSERTS, FIXINGS ETC. REFERENCE SHALL BE MADE TO THE ARCHITECT'S, SERVICES ENGINEER'S OR THE RELEVANT SUBCONTRACTOR'S BUILDERS WORK DRAWINGS.
8. THE CONTRACTOR SHALL ENSURE THAT TEMPORARY LOADS ONTO THE NEW STRUCTURES/DRAINAGE SHALL BE LESS THAN THOSE FOR WHICH IT HAS BEEN DESIGNED.
9. THE CONTRACTOR IS RESPONSIBLE FOR ESTABLISHING AND CHECKING THE SETTING OUT OF GRIDLINES, LEVELS AND DATUMS.
10. ANY DISCREPANCIES BETWEEN THE STRUCTURAL AND ARCHITECTURAL DRAWINGS SHOULD IMMEDIATELY BE BROUGHT TO THE ATTENTION OF THE CONTRACT ADMINISTRATOR.
11. THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO ENSURE THAT NOISE, VIBRATION AND DUST RESULTING FROM THE WORKS ARE KEPT WITHIN REASONABLE LIMITS.
12. THE CONTRACTOR IS TO ALLOW A MINIMUM OF 10 WORKING DAYS IN THEIR PROGRAMME FOR THE REVIEW OF ANY CONTRACTOR'S DESIGN PORTIONS OF WORK FOR REVIEW BY THE ALIGN PROPERTY PARTNERS ENGINEER.
13. IRRESPECTIVE OF ANY NAMED MANUFACTURERS OF ANY PRODUCT/MATERIAL NOTED ON DRAWINGS, THE CONTRACTOR IS FREE TO PROPOSE AN EQUAL OR APPROVED PRODUCT/MATERIAL PROVIDED THAT ANY SUCH CHANGE TO THE SPECIFICATION MEETS A SIMILAR LEVEL OF PERFORMANCE AND IS NOTED ON ALL M TENDER RETURNS AND DOCUMENTATION FOR ALIGN PROPERTY PARTNERS.

IMPORTANT:

DRAWING PROVIDED FOR INFORMATION ONLY AND IS SUBJECT TO THE FOLLOWING STATUTORY APPROVALS:

- UNITED UTILITIES APPROVAL
- PLANNING APPROVAL
- BUILDING CONTROL

ALL CONSTRUCTION WORKS PRIOR TO APPROVALS ABOVE WILL BE UNDERTAKEN AT CLIENTS/CONTRACTORS RISK

0 1 2 4 6 8 10m
SCALE 1 : 250

DRAINAGE KEY:

- PROPOSED FOUL DRAINAGE PIPE
- PROPOSED FOUL WATER PPIC INSPECTION CHAMBER (SIZE VARIES)
- PROPOSED STORM DRAINAGE PIPE
- PROPOSED STORM INSPECTION CHAMBER (SIZE VARIES)
- PROPOSED DIVERTED DRAINAGE PIPE
- PROPOSED DIVERTED WATER INSPECTION CHAMBER (SIZE VARIES)
- PROPOSED ATTENUATION TANK
- PROPOSED PERMEABLE PAVING (LINED)
- PROPOSED ACCO CHANNEL
- EXISTING UNITED UTILITIES COMBINED WATER SEWER
- ABANDONED EXISTING UNITED UTILITIES COMBINED WATER SEWER
- EXISTING UNITED UTILITIES STORM WATER SEWER
- SEWER EASEMENT
- FLOW EXCEEDANCE ROUTE
- 77.600 INDICATIVE FFL

Rev	Details	Author & Date	Checked & Date	Approved & Date
P02	Amendments following LLFA discussion. Attenuation tank width reduced and chamber numbering.	MD 12/12/23	LF 12/12/23	BD 12/12/23
P01	Initial Issue.	ZS 29/06/23	BD 29/06/23	BD 29/06/23

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Client: Mosscare St Vincents

Project Name: Princedom Street, Manchester

Drawing Title: Drainage Strategy

Purpose: Planning

Scale	Drawn	Checked	Approved
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Original Size	Date	Date	Date
A1	29/06/23	29/06/23	29/06/23

Drawing Number: PV2309-APP-92-XX-DR-C-2001 Rev. P02

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Align Drawing Number: PV2309-APP-92-XX-DR-C-2001 P02

Appendix B

Hydro-Brake Technical Information

Technical Specification

Control Point	Head (m)	Flow (l/s)
Primary Design	1.500	3.000
Flush-Flo™	0.329	2.578
Kick-Flo®	0.671	2.076
Mean Flow		2.415

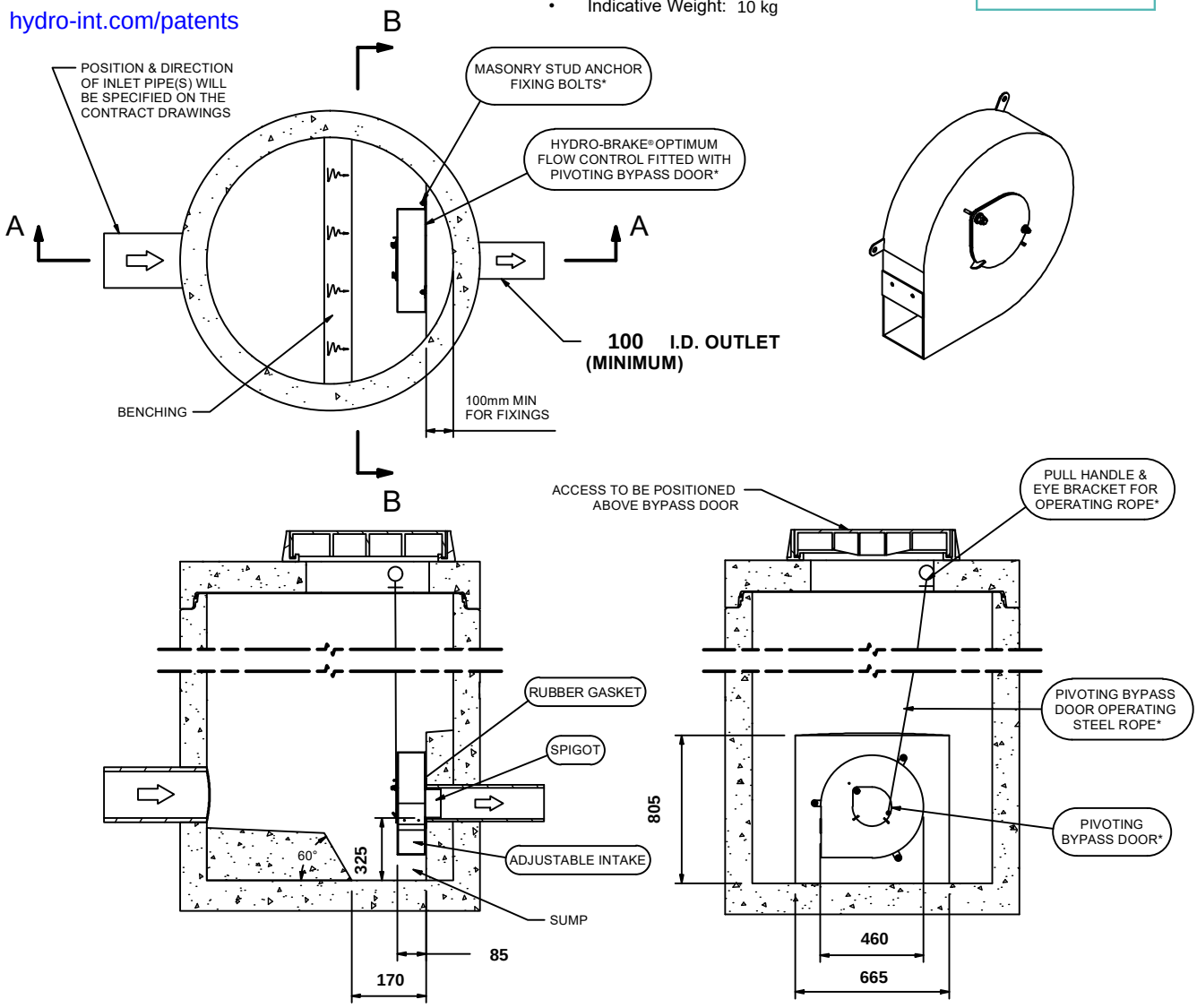
hydro-int.com/patents

Hydro-Brake® Optimum Flow Control including:

- 3 mm grade 304L stainless steel
- Integral stainless steel pivoting by-pass door allowing clear line of sight through to outlet, c/w stainless steel operating rope
- Beed blasted finish to maximise corrosion resistance
- Stainless steel fixings
- Rubber gasket to seal outlet
- Variable flow rate post installation via adjustable inlet
- Indicative Weight: 10 kg

BBA APPROVAL INSPECTION TESTING CERTIFICATION CERTIFICATE 08/4596

wrc approved PT/503/0422 Valid: 01/04/2022 - 31/03/2027



SECTION A-A

SECTION B-B

IMPORTANT:
LIMIT OF HYDRO INTERNATIONAL SUPPLY
THE DEVICE WILL BE HANDED TO SUIT SITE CONDITIONS
FOR SITE SPECIFIC DETAILS AND MINIMUM CHAMBER SIZE REFER TO HYDRO INTERNATIONAL
ALL CIVIL AND INSTALLATION WORK BY OTHERS
* WHERE SUPPLIED
HYDRO-BRAKE® FLOW CONTROL & HYDRO-BRAKE® OPTIMUM FLOW CONTROL ARE REGISTERED TRADEMARKS FOR FLOW CONTROLS DESIGNED AND MANUFACTURED EXCLUSIVELY BY HYDRO INTERNATIONAL

THIS DESIGN LAYOUT IS FOR ILLUSTRATIVE PURPOSES ONLY. NOT TO SCALE.

DESIGN ADVICE

The head/flow characteristics of this SHE-0075-3000-1500-3000 Hydro-Brake® Optimum Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.
The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.

Hydro International
A CRH COMPANY

DATE	02/09/2024 11:32
SITE	Princedom Street - North / South Parcels
DESIGNER	saif Alqatarneh
REF	MD-SHE-0075-3000-1500-3000

SHE-0075-3000-1500-3000
Hydro-Brake® Optimum

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Appendix C

Maintenance Data Sheets

Sustainable Drainage Systems Limited

SDS GEOlight Maintenance Datasheet

Once received, stormwater reaches the storage reservoir through one or more distribution pipes laid out between the GEOlight units.

The distribution pipes generally consist of 150mm to 600mm fully perforated twinwall pipe installed within a trench filled with draining material (washed rolled pebbles, free from fines, and 15/25 grading) requiring little compaction.

A high flow, non-woven GEOtextile is laid between the distribution pipe and the GEOlight units preventing the horizontal GEOlight units from being clogged by the draining materials.

The permeability of the supply and distribution pipe located within the reservoir is designed to prevent any clogging of the system upstream of the stormwater drain. The ends of the distribution pipes are generally connected to inspection chambers (manholes) acting as settling tanks, enabling inspection and maintenance of the whole distribution pipe.

For small discharges, stormwater does not penetrate the GEOlight blocks, but circulates either in an appropriate bypass, or in the distribution pipe drain itself. This allows draining of the first water which will be handled downstream if required.

When the reservoir is drained, water is drained through the distribution pipe, possibly the same as the one located at the input which operates in the opposite direction. Drainage discharge is controlled downstream either by the system piping or a flow control device. A drainage geocomposite is installed in the upper part of the reservoir allowing air to ventilate into the inspection chamber.

SDS generally recommend that the stormwater tank inspection chambers are checked periodically in conjunction with general maintenance of the underground pipe network

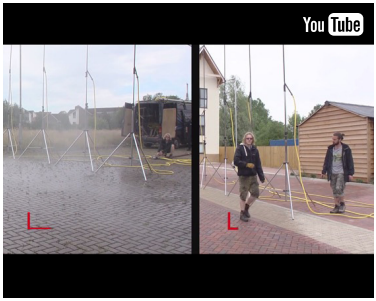


MARSHALLS PRIORA: MAINTENANCE

Maintaining your Marshalls Priora Permeable Paving System is easy: simply ensure that the voids between the blocks don't get blocked and prevent water from flowing through the surface and into the sub-base.

However, it's important to remember that even if the voids do appear to be blocked, it's unlikely to stop the system working. This is because the voids on a Marshalls Priora surface have been specially engineered to be far wider than they need to be – so blocked voids are likely to only slow the flow of water, not stop it completely.

A Marshalls Priora surface made of 200mmx100mm blocks provides infiltration rates in excess of 18,000 litres per second per hectare (l/s/h). The average rainfall event in the UK provides flow at approximately 180 l/s/h. Independent research in 2006 by Soenke Borgwardt concluded that after 10 years, in a worst case scenario with absolutely zero maintenance, a permeable pavement might be reduced to 10% of its original permeability. In Priora's case, this would be 1,800 l/s/h – still TEN TIMES more permeable than it needs to be!



See for yourself!

Visit YouTube and search for "Marshalls Priora Maintenance Test" to see a real time infiltration test on an unmaintained Priora system!



5 SIMPLE STEPS TO MAINTAIN A MARSHALLS PRIORA SURFACE IN OPTIMUM CONDITION:

- **NEVER dump sand, cement, soil or other loose material directly onto a Marshalls Priora surface. This could block the joints or even fall into the sub-base.** *If you do need to store any loose material on a Marshalls Priora surface, make sure you put down a tarpaulin or impenetrable sheet first.*
- **Every twelve months or so, undertake a visual inspection to check that the voids aren't blocked with dirt or other debris.** *This is usually best undertaken after a period of heavy rainfall. If any voids are blocked, ponding on the surface will be apparent.*
- **If you notice ponding, the joints in that area are blocked. To clear them, either sweep the joints with a stiff brush or vacuum the contaminated aggregate out and replace it.** *If using an automatic suction brush, angle the brushes at 30° to avoid aggregate migration.*
- **Any vegetation growing in the joints can be removed manually, or treated with a Glyphosate-based weedkiller.** *Glyphosate will be neutralised upon contact with the ground, so it will be safe to plant in the area soon after treatment*
- **For winter maintenance, pure (white) rock salt is an effective and readily available de-icer. However, avoid using salts which contain an additional abrasive such as sand or grit.** *For heavy ice, should an abrasive be required, mix pure (white) rock salt with 6mm Priora jointing aggregate. This can be brushed safely back into the joints once thawed. (nb – Use of chlorides is highly unlikely to increase chloride levels in the local ground).*

Appendix D

Drainage Details

Notes

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DRAINAGE

1. ALL DRAINAGE WORKS TO BE CONSTRUCTED FROM THE OUTFALL TOWARDS THE HEAD OF RUN TO ENSURE THE OUTFALL CAN BE ACHIEVED.
2. ALL EXISTING DRAINS & SERVICES (LINE & LEVELS) TO BE CHECKED & CONFIRMED BY THE CONTRACTOR PRIOR COMMENCEMENT OF ANY ON SITE DRAINAGE WORKS. ANY DISCREPANCY IN LEVELS IS TO BE REPORTED IMMEDIATELY TO APP.
3. ALL DRAINAGE WORK TO BE IN ACCORDANCE WITH THE BUILDING REGULATIONS, BS EN 752 & TO THE SATISFACTION OF THE BUILDING INSPECTOR.
4. ALL PROPRIETARY ITEMS TO BE INSTALLED STRICTLY IN ACCORDANCE WITH MANUFACTURERS DETAILS, INSTRUCTIONS & SPECIFICATIONS.
5. ALL COVER LEVELS ARE APPROXIMATE, EXACT LEVELS TO BE DETERMINED FROM THE EXTERNAL WORKS LAYOUT.
6. INVERT LEVELS QUOTED AT MANHOLES & INSPECTION CHAMBERS ARE THOSE OF THE LARGEST CONNECTED PIPE DIAMETER. PIPES AT CHAMBERS TO BE LAID WITH SOFFITS LEVEL UNLESS NOTED OTHERWISE.
7. PIPE GRADIENTS WHERE STATED ARE APPROXIMATE - LEVELS AT THE CHAMBERS TAKE PRECEDENT.
8. REFER TO ARCHITECTS DRAWINGS FOR PRECISE LOCATION OF ALL RAINWATER PIPES, INTERNAL CONNECTIONS ETC.
9. ALL INTERNAL CONNECTIONS TO HAVE AN ABOVE-FLOOR ACCESS POINT TO ENABLE FUTURE ACCESS FOR MAINTENANCE.
10. PIPES & FITTINGS TO BE:
    - CONCRETE PIPES & ANCILLARY PRODUCTS TO BS 5911-2:2022 & BS EN 1916:2002.
    - VITRIFIED CLAY PIPES & FITTINGS TO BS EN 295:2013
    - DUCTILE IRON TO BS EN 598:2007 & BS ISO 4179:2005.
    - PERFORATED VITRIFIED CLAY PIPES FOR LAND DRAINAGE TO BS 1196
    - PLASTIC PIPES FOR LAND DRAINAGE TO BS 4962:1982.
    - PLASTIC PIPING SYSTEMS FOR NON-PRESSURE UNDERGROUND DRAINAGE & SEWAGE TO BS EN 1401 & BS 7671 - SOLID WALL STRUCTURED WALL PIPES TO BS EN 13476.
    - PRECAST CONCRETE MANHOLE UNITS TO BS EN 1917:2002.
    - PLASTIC INSPECTION CHAMBERS FOR DRAINS & SEWERS TO BS EN 13598-1:2009.
    - GULLY & MANHOLE TOPS FOR VEHICULAR & PEDESTRIAN AREAS TO BS EN 124:1994.
    - DRAINAGE CHANNELS FOR VEHICULAR & PEDESTRIAN AREAS TO BS EN 1433:2002.
12. ALL MANHOLE COVERS, ROAD GULLY COVERS & FRAMES TO COMPLY WITH BS EN124 NON ROCKING TYPE.

    UNLESS NOTED OTHERWISE USE CLASS:

    A15 FOR USE IN PEDESTRIAN AREAS WHERE VEHICLES HAVE NO ACCESS.

    B125 FOR USE IN CAR PARKS & PEDESTRIAN AREAS WHERE INFREQUENT LIGHT VEHICLE ACCESS IS LIKELY (INCLUDING DRIVEWAYS).

    C250 FOR ACCESS COVERS & GULLY GRATINGS IN AREAS OF SLOW MOVING, HEAVY TRAFFIC, ALSO FOR GULLY GRATINGS IN CARRIAGEWAY WITHIN 500mm OF KERB & UP TO 200mm INTO THE FOOTWAY

    D400 FOR USE IN CARRIAGEWAYS OF ROADS & PARKING AREAS ACCESSED BY ALL TYPES OF VEHICLES.

    E600 FOR USE IN AREAS WHERE HIGH WHEEL LOADS ARE PRESENT

    F900 FOR USE IN AREAS WHERE EXTREMELY HIGH WHEEL LOADS ARE PRESENT SUCH AS AIRCRAFT PAVEMENTS, DOCKS, HEAVY INDUSTRIAL SITES.
13. MANHOLES IN INTERNAL AREAS REQUIRE DOUBLE SEALED COVERS WITH LOCKING SCREWS, RECESSED WHERE REQUIRED TO ACCOMMODATE FLOOR FINISHES TO ARCHITECT'S SPECIFICATION.
14. PIPE BEDDING

    USE CLASS S BEDDING UNLESS NOTED OTHERWISE. NB PROTECT AGAINST CONSTRUCTION TRAFFIC AS NECESSARY

    USE CLASS Z CONCRETE BED & SURROUND OR CONCRETE SLAB PROTECTION AS FOLLOWS:
    - CLASS 120 CLAYWARE OR CLASS M CONCRETE (100 - 600Ø PIPES)

      LANDSCAPING - LESS THAN 600mm COVER TO CROWN.

      HARDSTANDING - LESS THAN 1200mm COVER TO CROWN
    - PLASTIC (100 - 300Ø PIPES)

      LANDSCAPING - LESS THAN 600mm COVER TO CROWN.

      HARDSTANDING - LESS THAN 900mm COVER TO CROWN
15. PIPES BELOW CONCRETE GROUND FLOOR SLABS:

    WHERE THE CROWN OF THE PIPE IS WITHIN 300mm OF THE UNDERSIDE OF SLAB, SPECIAL PROTECTION TO BE PROVIDED IN ACCORDANCE WITH BUILDING REGULATIONS H1 2.44 OR USE CLASS Z CONCRETE BED & SURROUND CAST INTEGRALLY WITH SLAB.

    OTHERWISE USE CLASS S BEDDING.
16. MAIN BACKFILL TO BE WELL COMPACTED IN 150mm LAYERS OF:

    SELECTED BACKFILL MATERIAL IN ALL SOFT LANDSCAPED AREAS

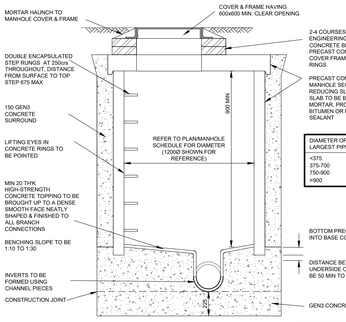
    TYPE 1 GRANULAR MATERIAL IN ALL HARDSTANDING AREAS & PUBLIC HIGHWAYS
17. BACKFILL TO DRAINS NEAR FOUNDATIONS TO BE IN ACCORDANCE WITH BUILDING REGULATIONS H1 DIAGRAMS 8 & 12.
18. CCTV TO BE CARRIED OUT TO VERIFY CONDITION OF ANY DRAINAGE TO BE RE-USED.

GENERAL NOTES

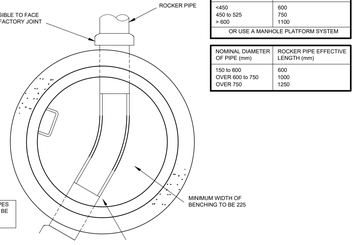
1. THE STRUCTURAL DRAWINGS ARE TO BE READ IN CONJUNCTION WITH ALL RELEVANT CLIENT, ARCHITECT, SERVICES ENGINEER, AND SPECIALIST CONTRACTOR DRAWINGS, REPORTS AND SPECIFICATIONS.
2. FOR SETTING OUT AND LEVELS REFER TO ARCHITECTS DRAWINGS.
3. FOR THE PURPOSE OF CONSTRUCTION ALL DRAWINGS MUST NOT BE SCALED AND ONLY WRITTEN OR CALCULATED DIMENSIONS USED. LEVEL DATUMS TO BE CONFIRMED BY THE ARCHITECT.
4. ANY REVISIONS TO THE LAYOUT DETAILS REQUIRED BY THE CONTRACTOR TO BE AGREED AND APPROVED BY THE ALIGN PROPERTY PARTNERS ENGINEER.
5. FINISHED FLOOR LEVELS TO BE DETERMINED.
6. ALL PROPRIETARY PRODUCTS ARE TO BE USED STRICTLY IN ACCORDANCE WITH THE MANUFACTURER'S DETAILS AND REQUIREMENTS.
7. GENERALLY, ONLY KNOWN PENETRATIONS, HOLES, POCKETS AND RECESSES ETC. WITH ANY DIMENSIONS GREATER THAN 150 ARE SHOWN ON THE DRAWINGS. FOR CONFIRMATION OF THESE AND FOR DETAILS OF SMALLER HOLES PLUS INSERTS, FIXINGS ETC. REFERENCE SHALL BE MADE TO THE ARCHITECTS, SERVICES ENGINEER'S OR THE RELEVANT SUBCONTRACTOR'S BUILDERS WORK DRAWINGS.
8. THE CONTRACTOR SHALL ENSURE THAT TEMPORARY LOADS ONTO THE NEW STRUCTURES/DRAINAGE SHALL BE LESS THAN THOSE FOR WHICH IT HAS BEEN DESIGNED.
9. THE CONTRACTOR IS RESPONSIBLE FOR ESTABLISHING AND CHECKING THE SETTING OUT OF GRIDLINES, LEVELS AND DATUMS.
10. ANY DISCREPANCIES BETWEEN THE STRUCTURAL AND ARCHITECTURAL DRAWINGS SHOULD IMMEDIATELY BE BROUGHT TO THE ATTENTION OF THE CONTRACT ADMINISTRATOR.
11. THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO ENSURE THAT NOISE, VIBRATION AND DUST RESULTING FROM THE WORKS ARE KEPT WITHIN REASONABLE LIMITS.
12. THE CONTRACTOR IS TO ALLOW A MINIMUM OF 10 WORKING DAYS IN THEIR PROGRAMME FOR THE REVIEW OF ANY CONTRACTOR'S DESIGN PORTIONS OF WORKS FOR REVIEW BY THE ALIGN PROPERTY PARTNERS ENGINEER.
13. IRRESPECTIVE OF ANY NAMED MANUFACTURERS OF ANY PRODUCT/MATERIAL NOTED ON DRAWINGS, THE CONTRACTOR IS FREE TO PROPOSE AN EQUAL OR APPROVED PRODUCT/MATERIAL PROVIDED THAT ANY SUCH CHANGE TO THE SPECIFICATION MEETS A SIMILAR LEVEL OF PERFORMANCE AND IS NOTED ON ALL M TENDER RETURNS AND DOCUMENTATION FOR ALIGN PROPERTY PARTNERS.

DRAWING REFERENCES THAT THIS IS BASED ON:

- ALIGN PROPERTY PARTNERS - 'DRAINAGE LAYOUT- 'PV2309-APP-00-00-DR-C- 2001-P01'



DIAMETER OF LARGEST PIPE (mm)	INTERNAL DIAMETER OF MANHOLE (mm)
<375	1200
375-700	1500
750-900	1800
>900	PIPE DIAMETER +900



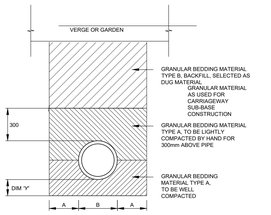
DIAMETER OF LARGEST PIPE (mm)	MINIMUM WIDTH OF LANDING BENCHING (mm)
<450	600
450 to 525	750
> 600	1100
OR USE A MANHOLE PLATFORM SYSTEM	

NOMINAL DIAMETER OF PIPE (mm)	ROCKER PIPE EFFECTIVE LENGTH (mm)
150 to 600	600
OVER 600 to 750	1000
OVER 750	1250

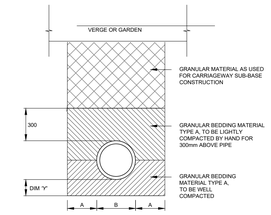
REFER TO PLAN/MANHOLE SCHEDULE FOR PIPE SIZES (225Ø SHOWN FOR REFERENCE)

TYPICAL MANHOLE TYPE B

SEWERAGE SECTOR GUIDANCE - FIGURE B10
MAXIMUM DEPTH FROM COVER TO SOFFIT OF PIPE 3.0m
(SCALE 1:20)



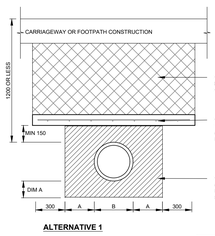
UNDER VERGE OR GARDEN



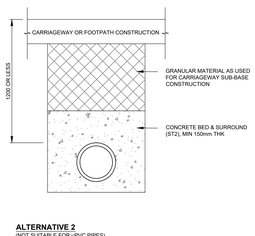
UNDER CARRIAGEWAY OR FOOTPATH

NOTE: A=B/4 BUT WITH A MIN OF 200mm AROUND THE BARRELS AND A MIN OF 150mm AROUND THE SOCKETS

BEDDING METHOD CLASS S



ALTERNATIVE 1



ALTERNATIVE 2

(NOT SUITABLE FOR uPvC PIPES)

NOTE: A=B/4 BUT WITH A MIN OF 200mm AROUND THE BARRELS AND A MIN OF 150mm AROUND THE SOCKETS

GRANULAR/CONCRETE RED SURROUND - FOR USE UNDER CARRIAGEWAY OR FOOTPATH

(WHERE COVER TO CROWN OF PIPE IS 1200mm OR LESS)

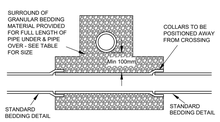
PIPE BEDDING MATERIAL DETAILS

MATERIAL DESIGNATED TYPE A SHALL CONSIST OF ANGULAR GRAVEL OR CRUSHED ROCK GRADED IN ACCORDANCE WITH BS 882 OR AIR COOLED BLAST FURNACE SLAG TO BS 1047 OR SINTERED PULVERISED FUEL ASH TO BS 3797 SELECTED ACCORDING TO PIPE SIZE AS FOLLOWS:-

NOMINAL SIZE OF PIPES (mm)	MAXIMUM PARTICAL SIZE (mm)	IMPORTED GRANULAR MATERIALS
100-125	10	10mm NOMINAL SINGLE SIZE
150-200	15	10 OR 14mm SINGLE SIZE 14mm TO 5mm GRADED
225-300	20	10, 14 OR 20mm SINGLE SIZE 14mm TO 5mm GRADED 20mm TO 5mm GRADED
375-500	20	14 OR 20mm SINGLE SIZE 14mm TO 5mm GRADED 20mm TO 5mm GRADED
OVER 500	40	14, 20 OR 40mm SINGLE SIZE 14mm TO 5mm GRADED 20mm TO 5mm GRADED 40mm TO 5mm GRADED

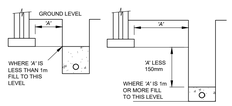
MATERIAL DESIGNATED TYPE B: USED UNDER GARDENS AND VERGES SHALL CONSIST OF UNIFORM READILY COMPACTABLE MATERIAL FREE FROM TREE ROOTS, VEGETABLE MATTER, RUBBISH AND FROZEN SOIL, AND EXCLUDING CLAY LUMPS RETAINED ON A 75mm SIEVE AND STONES LARGER THAN 37mm. BEDDING TO BE COMPACTED IN 225mm LAYERS.

MATERIAL DESIGNATED TYPE B: USED UNDER ROADS AND FOOTPATHS SHALL CONSIST OF GRANULAR MATERIAL AS USED FOR CARRIAGEWAY SUB-BASE CONSTRUCTION.



PIPE CROSSINGS

(SCALE 1:20)



MINIMUM 150mm GEN3 CONCRETE SURROUND/TRENCH FILL WITH 13 th'k COMPRESSIBLE BOARD MOVEMENT JOINTS PROVIDED AT EACH SOCKET/SLEEVE JOINT FACE OR AT NOT MORE THAN 5m INTERVALS

PIPE RUNS NEAR BUILDINGS

BASED ON BUILDING REGULATIONS H1 DIAGRAMS 8 & 12
(NOT TO SCALE)



COVER/ LID OPTIONS PLAN
(NTS)

COVERS
A) CODE SPK6 - ROUND DUCTILE IRON COVER & FRAME SECURED WITH CLIPS SUPPLIED
OR
B) CODE SPCR8 - SQUARE RECESSED COVER & FRAME FILLED WITH MATCHING FINISH MATERIAL
OR
C) CODE SPK58 SQUARE AIRTIGHT COVER & FRAME IF INTERNAL

TYPICAL PLAN

WHERE CHAMBERS ARE POSITIONED ON 90° CORNERS ALWAYS USE THE MAIN CHANNELS BY FITTING A 45° BEND ON INLET & OUTLET

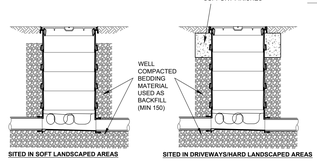
BENDS OF UP TO MAX 45° CAN BE USED ON ANY INLET OR THE OUTLET

SHORT STEEP BRANCH CONNECTIONS TO BE CONNECTED VIA A 45° INLET USING A BEND WHERE NECESSARY

INLET STOPPERS TO REMAIN WHERE CONNECTION NOT REQUIRED

COMPRESSIBLE FILLER AND PACKING FOR PIPELINES
AT EACH FLEXIBLE PIPE JOINT A JOINT FILLER (EG. FIBREBOARD OR POLYSTYRENE) SHALL BE USED (SEE TABLE BELOW), AND SHALL EXTEND THROUGH THE FULL THICKNESS OF ANY CONCRETE IN CONTACT WITH THE PIPE. THE CONCRETE BED SHALL BE CUT AWAY AT EACH JOINT TO GIVE A CLEARANCE OF AT LEAST 50mm, SO THAT THE JOINT DOES NOT BEAR ON THE BED

NOMINAL DIAMETER OF PIPE (mm)	THICKNESS OF COMPRESSIBLE FILLER (mm)
LESS THAN 450	18
450 - 1200	36
GREATER THAN 1200	54



SITED IN SOFT LANDSCAPED AREAS | **SITED IN DRIVEWAYS/HARD LANDSCAPED AREAS** | **SITED IN COMMUNAL PARKING AREAS**

HEPWORTH PPIC (475Ø) WITH 100Ø MAIN FLOW & 4NO 100Ø CONNECTIONS

CODE SPIC6/1 (245 DEEP) WITH CODE SPIC4 RAISING PIECES (@175 DEEP) TO SUIT DEPTH
OR
CODE SPIC1/1 (940 DEEP) CUT TO SUIT DEPTH
CODE SPIC2/1 (595 DEEP) CUT TO SUIT DEPTH

OR EQUIVALENT

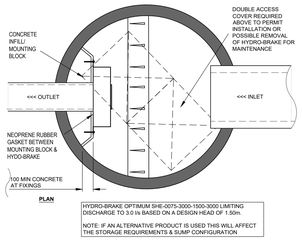
HEPWORTH PPIC (475Ø) WITH 150Ø MAIN FLOW, 2NO 150Ø CONNECTIONS AT 90° & 2NO 100Ø CONNECTIONS AT 45°

CODE SPIC6/2 (335 DEEP) WITH CODE SPIC4 RAISING PIECES (@175 DEEP) TO SUIT DEPTH
OR
CODE SPIC1/2 (1030 DEEP) CUT TO SUIT DEPTH

OR EQUIVALENT

475Ø POLYPROPYLENE INSPECTION CHAMBER (PPIC)

MAX DEPTH TO INVERT 1.2m
(SCALE 1:20)



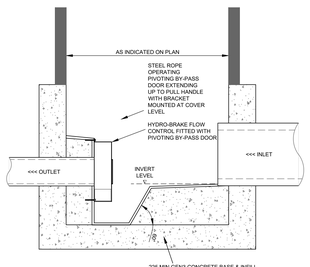
PLAN

HYDRO-BRAKE OPTIMUM SHE-0075-3000-1500-3000 LIMITING DISCHARGE TO 3.0 l/s BASED ON A DESIGN HEAD OF 1.50m.

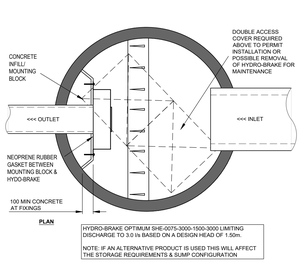
NOTE: IF AN ALTERNATIVE PRODUCT IS USED THIS WILL AFFECT THE STORAGE REQUIREMENTS & SUMP CONFIGURATION

SWIC4 HYDRO-BRAKE OPTIMUM SHE-0075-3000-1500-3000 FLOW CONTROL CHAMBER

(SCALE 1:20)



SECTION



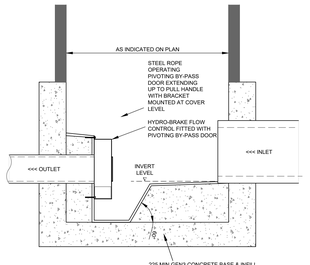
PLAN

HYDRO-BRAKE OPTIMUM SHE-0075-3000-1500-3000 LIMITING DISCHARGE TO 3.0 l/s BASED ON A DESIGN HEAD OF 1.50m.

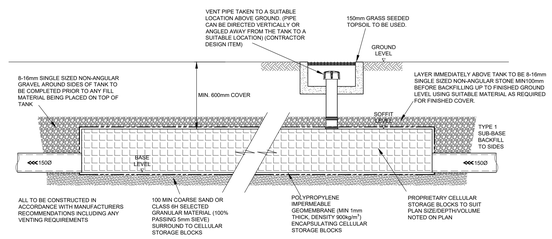
NOTE: IF AN ALTERNATIVE PRODUCT IS USED THIS WILL AFFECT THE STORAGE REQUIREMENTS & SUMP CONFIGURATION

SWIC10 HYDRO-BRAKE OPTIMUM SHE-0075-3000-1500-3000 FLOW CONTROL CHAMBER

(SCALE 1:20)

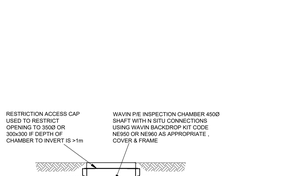


SECTION



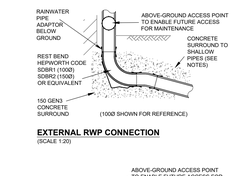
INDICATIVE ATTENUATION TANK

(SCALE 1:20)



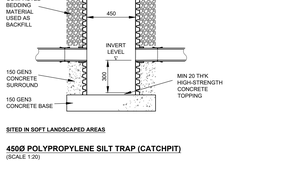
INTERNAL SOIL PIPE CONNECTION

(PIPE RUN BENEATH GROUND FL OOR SLAB)
(SCALE 1:20)



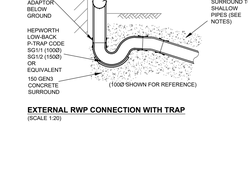
EXTERNAL RWP CONNECTION

(SCALE 1:20)



INTERNAL IN-LINE SOIL PIPE CONNECTION

(PIPE RUN BENEATH GROUND FLOOR)
(SCALE 1:20)



EXTERNAL RWP CONNECTION WITH TRAP

(SCALE 1:20)



SITED IN SOFT LANDSCAPED AREAS

450Ø POLYPROPYLENE SILT TRAP (CATCHPIT)

(SCALE 1:20)

P02	UPDATED ATTENUATION TANK AND HYDRO-BRAKE CAPPING. ADDED TYPE B MH AND 450Ø CATCHPIT DETAIL. REVISED DWG SIZE.	ZS 09/10/24	BD 09/10/24	BD 09/10/24
P01	Initial Issue	LF 04/09/23	BD 04/09/23	BD 04/09/23
Rev.	Details	Author & Date	Checked & Date	Approved & Date

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Client	MOSSCARE, ST VINCENTS
Project Name	PRINCEDOM STREET, MANCHESTER
Drawing Title	PRIVATE DRAINAGE DETAILS
Purpose	FOR INFORMATION

Scale	Drawn	Checked	Approved
1:20	LF	BD	BD
Original Size	Date	Date	Date
A0	28/06/2023	29/06/2023	29/06/2023

Drawing Number: PV2309-APP-92-XX-DR-C-3401 — Rev. P02

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