



## **The Crescent, Cudworth**

31<sup>st</sup> October 2025

BC2509-APS-92-XX-RP-C-1002-SuDS-Maintenance-Report

# **SuDS Maintenance Report**

## The Crescent, Cudworth

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### Document history and status

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P01	31/10/2025	Initial Issue	LF	ZS	ZS

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## **1 Introduction**

### **1.1 Terms of Reference**

1.1.1 Align Property Services have been commissioned by Barnsley Metropolitan Borough Council (BMBC) to undertake a drainage design for the proposed development off The Crescent, Cudworth.

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 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 + 40% climate change allowance. Based on an impermeable area of (0.037Ha). Approximate attenuation volume of circa. 10m<sup>3</sup> is required to restrict discharge rates at 7.5 l/s for the development although the proposed permeable paving storage surpasses this volume at circa. 35m<sup>3</sup>.

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 The proposed storm system comprises of permeable paving and a hydro-brake. Barnsley Metropolitan Council will be responsible for the maintenance of storm drainage systems highlighted above and will be either managed by BMC's maintenance team or an appointed private management company.
- 2.1.2 Barnsley Metropolitan Borough Council (BMBC) must fully understand their responsibilities outlined in this plan and be aware of any legally binding maintenance agreement.
- 2.1.3 BMBC 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 BMBC 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 The hydro-brake proposed for this development:
- With a discharge rate of 7.5l/s and a design head of 1.00m located within the existing driveway discharging into the existing sewer network within Barnsley Road.
- 2.2.3 Regular inspection and maintenance will be required to ensure the long-term effectiveness of the hydro-brake
- 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 Permeable Paving**

- 2.3.1 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

- 2.3.2 This method provides attenuation and treatment from surface flows.
- 2.3.3 Regular inspection and maintenance would be required to ensure the long-term effectiveness of the paving.
- 2.3.4 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:

<b>Operation and maintenance requirements for Permeable Paving</b>		
<i>Maintenance schedule</i>	<i>Required action</i>	<i>Typical frequency</i>
<i>Regular Maintenance</i>	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
	Stabilise and mow contributing and adjacent areas	As required
<i>Occasional Maintenance</i>	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
	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of the paving	As required
<i>Remedial actions</i>	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).
	Initial inspection	Monthly for three months after installation
<i>Monitoring</i>	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

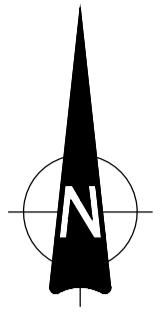
**Table 3.3 – Permeable Paving (CIRIA, 2015)**

- 2.3.5 Minor maintenance will be possible to be undertaken by the residents, which includes the removal of leaves, which fall off trees. However, remedial works and monitoring will be undertaken by BMBC's maintenance team or private management company as appointed.
- 2.3.6 Maintenance regime to consider access to area with vehicular access if required.

# Appendices

## Appendix A

Drainage Layout



**DRAINAGE**

- ALL DRAINAGE WORKS TO BE CONSTRUCTED FROM THE OUTFALL TOWARDS THE HEAD OF RUN TO ENSURE THE OUTFALL CAN BE ACHIEVED.
- 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.
- CCTV SURVEY TO BE CARRIED OUT TO VERIFY CONDITION OF ANY EXISTING DRAINAGE TO BE RE-USED.
- ALL DRAINAGE WORK TO BE IN ACCORDANCE WITH THE BUILDING REGULATIONS, BS EN 752 & TO THE SATISFACTION OF THE BUILDING INSPECTOR.
- IN ADDITION, ALL SEWERS INDICATED FOR ADOPTION TO BE BUILT IN ACCORDANCE WITH SEWERAGE SECTOR GUIDANCE PUBLISHED BY THE WATER SERVICES ASSOCIATION. SEE SEPARATE NOTES.
- ALL PROPRIETARY ITEMS TO BE INSTALLED STRICTLY IN ACCORDANCE WITH MANUFACTURER'S DETAILS, INSTRUCTIONS & SPECIFICATIONS.
- ALL COVER LEVELS ARE APPROXIMATE. EXACT LEVELS TO BE DETERMINED FROM THE EXTERNAL WORKS LAYOUT.
- 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.
- PIPE GRADIENTS WHERE STATED ARE APPROXIMATE - LEVELS AT THE CHAMBERS TAKE PRECEDENT.
- REFER TO ARCHITECT'S DRAWINGS FOR PRECISE LOCATION OF ALL GULLIES, RAINWATER PIPES, SOIL PIPES ETC.
- ALL SURFACE WATER GULLIES & RAINWATER PIPES ARE TO BE TRAPPED WHERE CONNECTING TO COMBINED DRAINS/SEWERS.
- ALL CONNECTIONS ARE TO HAVE AN ABOVE-GROUND OR FLOOR ACCESS POINT TO ENABLE FUTURE ACCESS FOR MAINTENANCE.
- PIPES & FITTINGS TO BE:
  - CONCRETE PIPES & ANCILLARY PRODUCTS TO BS 5911:2022 & BS EN 1926:2002
  - 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 4882:1982
  - PLASTIC PIPING SYSTEMS FOR NON-PRESSURE UNDERGROUND DRAINAGE & SEWAGE TO BS EN 1401 & BS 4880 - SOLID WALL ONLY. STRUCTURED WALL PIPES ARE NOT ACCEPTABLE FOR USE IN DRAINAGE SYSTEMS UNLESS AGREED.
  - PRECAST CONCRETE MANHOLE UNITS TO BS EN 1917:2002
  - PLASTIC INSPECTION CHAMBERS FOR DRAINS & SEWERS TO BS EN 13598:12010
  - GULLY & MANHOLE TOPS FOR VEHICULAR & PEDESTRIAN AREAS TO BS EN 124:1994
  - DRAINAGE CHANNELS FOR VEHICULAR & PEDESTRIAN AREAS TO BS EN 1433:2002
  - ALL MANHOLE COVERS, ROAD GULLY COVERS & FRAMES TO COMPLY WITH BS EN 124 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.
- THE INTEGRITY OF ANY REMAINING EXISTING MANHOLE COVERS, ROAD GULLY COVERS & FRAMES WITHIN THE SITE ARE TO BE CHECKED BY THE CONTRACTOR IN TERMS OF CONDITION AND COMPLIANCE WITH THESE REQUIREMENTS. REPAIR OR REPLACE AS NECESSARY, ADJUSTING FRAME LEVELS TO ACCOMMODATE ANY CHANGES REQUIRED TO SITE LEVELS.
- MANHOLES IN INTERNAL AREAS REQUIRE DOUBLE SEALED COVERS WITH LOCKING SCREWS, RECESSED WHERE REQUIRED TO ACCOMMODATE FLOOR FINISHES TO ARCHITECT'S SPECIFICATION.
- PIPE BEDDING
  - USE CLASS S BEDDING UNLESS NOTED OTHERWISE. NB PROTECT AGAINST CONSTRUCTION TRAFFIC AS NECESSARY
  - USE CLASS Z CONCRETE BED & SURROUND CONCRETE SLAB PROTECTION AS FOLLOWS:
    - CLASS 120 CLAYWARE OR CLASS M CONCRETE (100 - 6000 PIPES)
    - LANDSCAPING - LESS THAN 600mm COVER TO CROWN
    - HARDSTANDING - LESS THAN 1200mm COVER TO CROWN
    - PLASTIC (100 - 3000 PIPES)
    - LANDSCAPING - LESS THAN 600mm COVER TO CROWN
    - HARDSTANDING - LESS THAN 900mm COVER TO CROWN
- 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 GEN'S CONCRETE BED & SURROUND CAST INTEGRALLY WITH SLAB.
  - OTHERWISE USE CLASS S BEDDING.
- 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 OR PUBLIC HIGHWAYS
- BACKFILL TO DRAINS NEAR FOUNDATIONS TO BE IN ACCORDANCE WITH BUILDING REGULATIONS H1 DIAGRAMS 8 & 12.

**GENERAL**

- THIS DRAWING MUST BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT PROJECT DOCUMENTATION.
- OVERALL SETTING OUT DIMENSIONS AND LEVEL DATUMS TO BE CONFIRMED BY THE ARCHITECT.
- ANY DISCREPANCIES BETWEEN THIS DRAWING AND THE ARCHITECTURAL DRAWINGS SHOULD IMMEDIATELY BE BROUGHT TO THE ATTENTION OF THE CONTRACT ADMINISTRATOR, ARCHITECT & ENGINEER.
- UNLESS NOTED OTHERWISE, ALL DIMENSIONS ON DRAWINGS ARE IN MILLIMETRES, LEVELS ARE IN METRES.
- DO NOT SCALE OFF DRAWING. ONLY WRITTEN OR CALCULATED DIMENSIONS MUST BE USED FOR THE PURPOSE OF CONSTRUCTION.
- ALL DETAILS AND DIMENSIONS, PARTICULARLY THOSE RELATING TO EXISTING STRUCTURES, ARE TO BE CHECKED OR VERIFIED ON SITE BY THE CONTRACTOR PRIOR TO COMMENCEMENT OF CONSTRUCTION OR FABRICATION AND ANY DISCREPANCIES REPORTED TO THE CONTRACT ADMINISTRATOR, ARCHITECT & ENGINEER.
- MATERIALS AND WORKMANSHIP MUST COMPLY WITH ALL RELEVANT BS SPECIFICATIONS, NATIONAL/UK CODES OF PRACTICE AND LOCAL AUTHORITY & STATUTORY APPROVALS.
- ANY NAMED PROPRIETARY PRODUCT OR MATERIAL IS PROVIDED AS A REFERENCE ONLY. CONTRACTORS MAY PROPOSE AN ALTERNATIVE PROVIDED THAT THE PRODUCT OR MATERIAL IS OF EQUIVALENT STANDARD SUBJECT TO AGREEMENT OF THE ENGINEER.
- ALL PROPRIETARY PRODUCTS ARE TO BE USED STRICTLY IN ACCORDANCE WITH THE MANUFACTURER'S DETAILS AND REQUIREMENTS.
- CONTRACTORS MUST IDENTIFY IN THEIR TENDER SUBMISSION, ANY PRODUCTS THAT HAVE LONG LEAD-IN PERIODS FOR WHICH THE MATERIALS WOULD NEED TO BE PRE-ORDERED PRIOR TO THE AWARD OF THIS CONTRACT.

**ABANDONED/REDUNDANT DRAINAGE**

- CONTRACTORS MUST UNDERTAKE A CCTV SURVEY OF THE DRAINS TO BE ABANDONED TO CONFIRM THAT THERE ARE NO LIVE CONNECTIONS REMAINING.
- ALL ABANDONED DRAINAGE PIPES MUST BE EITHER GRUBBED OUT OR FILLED WITH A GROUT CONSISTING OF ONE OF THE FOLLOWING:
  - CLASS G3 GROUT TO CONSIST OF 1:10 CEMENT:SAND - MIXED WITH THE MINIMUM AMOUNT OF WATER TO ENSURE FLUIDITY.
  - CLASS G4 GROUT TO CONSIST OF 1:10 CEMENT:PPA - MIXED WITH THE MINIMUM AMOUNT OF WATER TO ENSURE FLUIDITY.
- GROUT TO BE PUMPED UNDER PRESSURE FROM THE HIGHER END OF THE PIPE BEING FILLED ENSURING THAT NO LENGTH OF PIPE IS FILLED UNTIL ALL UPSTREAM CONNECTING LENGTHS HAVE BEEN COMPLETED.
- SEALS AT THE LOWER END OF EACH PIPE LENGTH TO BE FITTED WITH A FLEXIBLE BREATHER PIPE, FIXED AT THE PIPE SOFFIT AND TURNED VERTICALLY UPWARDS TO A HEIGHT OF 600mm ABOVE THE SOFFIT OF THE HIGHER END OF THE PIPE.
- THE HEAD OF EXISTING PIPE LENGTHS 'CUT-OFF' AND EXPOSED DURING EXCAVATIONS FOR NEW WORKS SHALL BE SUITABLY SEALED AND A 150mm FLEXIBLE INJECTION PIPE CONSTRUCTED THROUGH THE SEAL AT THE PIPE SOFFIT. THIS SHALL BE TURNED VERTICALLY AND EXTENDED UPWARDS FOR AT LEAST 1m.
- ON COMPLETION OF GROUTING OPERATIONS, THE INJECTION PIPE SHALL BE SEALED WITH A PLUG OF CONCRETE AT LEAST 150mm DEEP AND HAVING 150mm BEARING OUTSIDE THE INJECTION PIPE.
- SURPLUS WATER SHALL BE DISPOSED OF WITHOUT CAUSING A NUISANCE.
- SHAFTS OF ABANDONED/REDUNDANT MANHOLES ARE TO BE BROKEN DOWN TO A LEVEL OF 1m BELOW FINISHED GROUND LEVEL AND THE REMAINING VOID FILLED WITH GENC CONCRETE.

**Notes**

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PROPOSED LEVELS SHOWN INDICATIVELY. A TOPOGRAPHIC SURVEY IS REQUIRED POST-DEMOLITION TO CONFIRM THE FINAL AS BUILT LEVELS.

EXISTING SERVICES TO BE DIVERTED DUE TO POTENTIAL CLASHES WITH THE PROPOSED PERMEABLE PAVING. FURTHER CCTV REQUIRED.

EXISTING YORKSHIRE WATER NETWORK TO BE ABANDONED UP TO EXCMH4. S116/S116 APPLICATION IS REQUIRED DEPENDING IF THE NETWORK IS LIVE OR NOT.

A FURTHER CCTV SURVEY IS REQUIRED TO CONFIRM IF EXISTING DRAINAGE IS LIVE OR CAN BE ABANDONED. A S185 OR S116 WOULD BE REQUIRED DEPENDING ON WHETHER IS USE OR NOT.

ADDITIONAL SHARED AREA HIGHLIGHTED TO BE ADOPTED UNDER S278 AGREEMENT. ADDITIONAL AREA TO BE DRAINED INTO EXISTING HIGHWAYS GULLY ARRANGEMENT.

ADDITIONAL SHARED AREA HIGHLIGHTED TO BE ADOPTED UNDER S278 AGREEMENT. ADDITIONAL AREA TO BE DRAINED INTO EXISTING HIGHWAYS GULLY ARRANGEMENT.

EXCMH4. INVERT LEVEL TO BE CONFIRMED ON SITE BY THE CONTRACTOR.

LEVELS AT NORTHWEST BOUNDARY NOT KNOWN DUE TO ACCESS LIMITATIONS DURING TOPOGRAPHIC SURVEY.

A FURTHER CCTV SURVEY IS REQUIRED TO CONFIRM IF EXISTING DRAINAGE IS LIVE OR CAN BE ABANDONED. A S185 OR S116 WOULD BE REQUIRED DEPENDING ON WHETHER IS USE OR NOT.

DUE TO EXPECTED LEVEL DIFFERENCE, 3NO. STEPS REQUIRED. IN ACCORDANCE WITH BUILDING REGULATIONS PART M. MIN. 150mm RISER 300mm-425mm GOING ALTERNATIVE GOINGS/RISERS SUBJECT TO AGREEMENT WITH BUILDING CONTROL.

ADDITIONAL SHARED AREA HIGHLIGHTED TO BE ADOPTED UNDER S278 AGREEMENT. ADDITIONAL AREA TO BE DRAINED INTO EXISTING HIGHWAYS GULLY ARRANGEMENT.

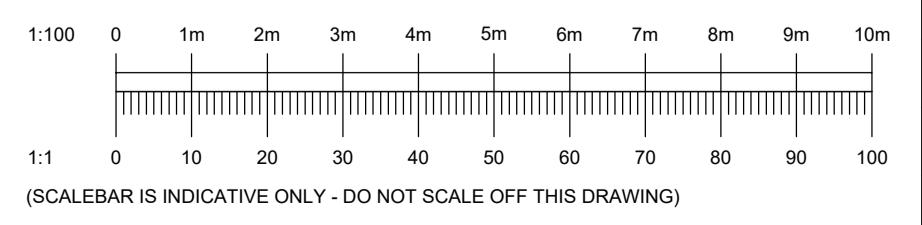
S1 HYDRO-BRAKE CL TO BE BASED ON THE LEVEL OF THE RAISED PLANTED. CURRENT CL IS TAKEN THAT THE RAISED PLANTED IN MAX 100mm ABOVE THE PROPOSED LEVELS.

S106 APPROVAL IS REQUIRED FOR THE FINAL CONNECTION. THIS IS TO BE CARRIED OUT BY THE CONTRACTOR.

S278 REQUIRED DUE TO ALTERATIONS TO EXISTING HIGHWAYS FOOTWAYS AND DROPPED KERB TO ALLOW NPG ACCESS.

**KEY**

- SITE BOUNDARY
- EXISTING LEVELS
- PROPOSED LEVELS
- GRADIENT
- SUB-BASE LEVEL
- EXISTING DRAINAGE TO BE ABANDONED
- NEW ADOPTABLE STORM INSPECTION CHAMBER (SIZE VARIES). TO BE CONSTRUCTED IN ACCORDANCE WITH SSG APPENDIX C, DCG
- NEW PRIVATE STORM DRAIN
- NEW PRIVATE PERFORATED PIPE WITHIN PERMEABLE AREAS (PIPE TO BE STANDARD CONSTRUCTION OUTSIDE PERMEABLE AREAS)
- NEW PRIVATE PERMEABLE PAVING (LINED) 380mm<sup>2</sup>
- ADDITIONAL SHARED AREA ADOPTED UNDER S278 AGREEMENT
- 0.5m CONTOURS
- 0.1m CONTOUR
- STEPS (SHOWN AS 0.15m HEIGHT AND 0.3m WIDTH)



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Client: **BARNESLEY MB COUNCIL**

Project Name: **THE CRESCENT, CUDWORTH**

Drawing Title: **ENGINEERING LAYOUT**

Purpose: **PRELIMINARY**

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## **Appendix B**

### Hydro-Brake Technical Information

## Technical Specification

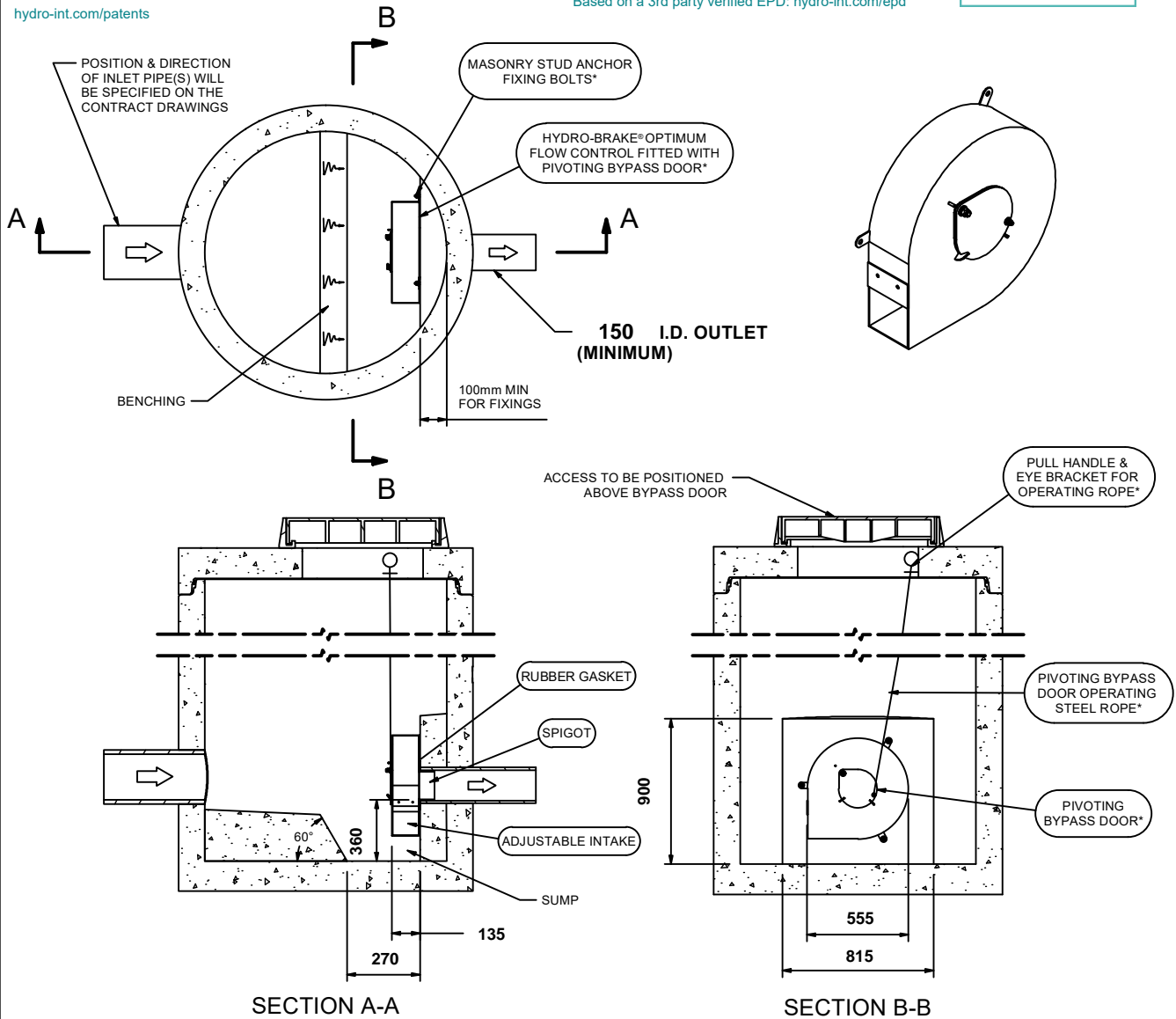
Control Point	Head (m)	Flow (l/s)
Primary Design	1.000	7.500
Flush-Flo™	0.297	7.496
Kick-Flo®	0.656	6.165
Mean Flow		6.472

[hydro-int.com/patents](http://hydro-int.com/patents)

This Hydro-Brake® Optimum includes:

- All in 3 mm Grade 304L stainless steel
- Integral pivoting by-pass door allowing clear line of sight through to outlet, c/w operating rope
- Media blasted for corrosion resistance
- Variable flow rate post installation via adjustable inlet (if necessary)
- Indicative Weight: 20 kg
- Product Carbon Footprint: 76.27 kgCO2e

Based on a 3rd party verified EPD: [hydro-int.com/epd](http://hydro-int.com/epd)



**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® IS A REGISTERED TRADEMARK 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-0128-7500-1000-7500 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 31/10/2025 14:32

SITE The Crescent, Cudworth

DESIGNER Louis Ford

REF BC2509

SHE-0128-7500-1000-7500

Hydro-Brake® Optimum

## **Appendix C**

### Maintenance Data Sheets



## 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!



**Marshalls**  
Creating Better Spaces

## 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

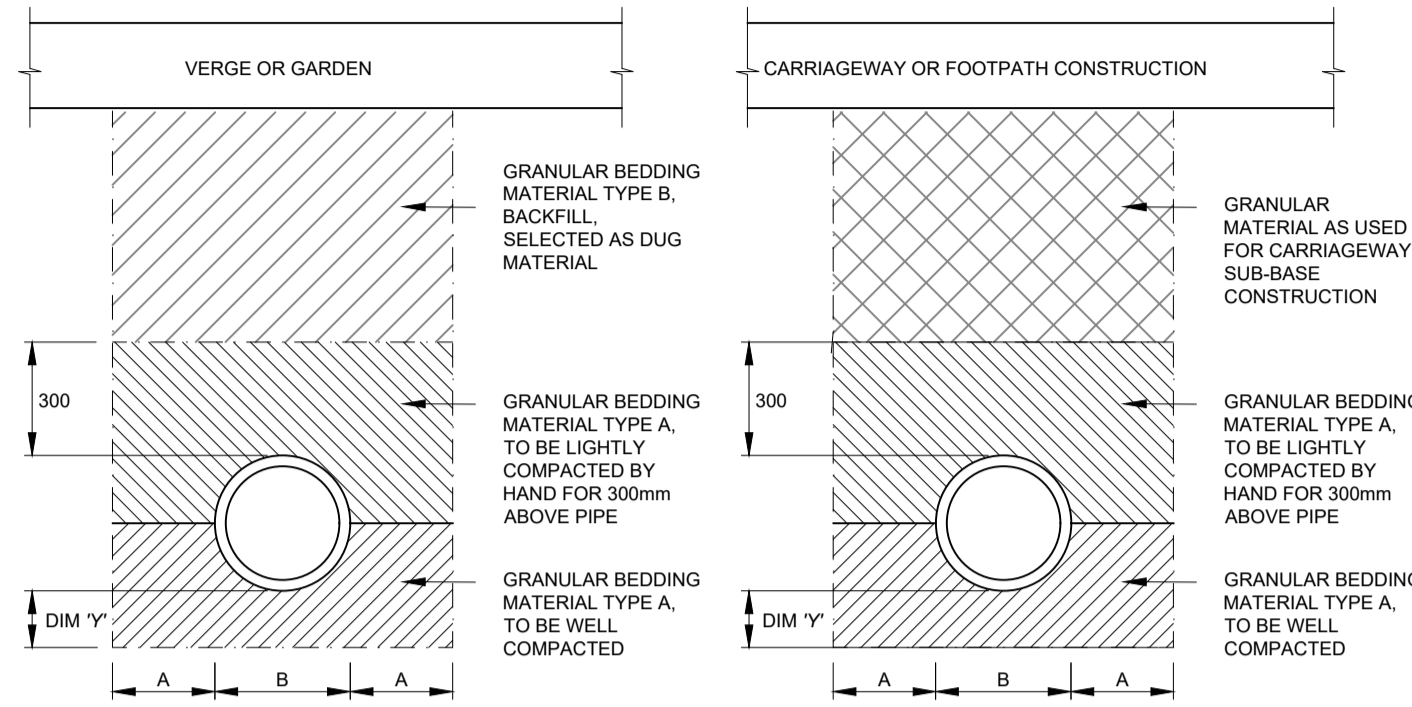
MATERIAL DESIGNATED TYPE A TO BE ANGULAR GRAVEL OR CRUSHED ROCK GRADED IN ACCORDANCE WITH BS 882 OR AIR COOLED BLAST FURNACE SLAG TO BS 1047 OR SINTERED PULVERISED FUEL ASH TO BS 3797 SELECTED ACCORDING TO PIPE SIZE AS FOLLOWS:-

NOMINAL SIZE OF PIPES (mm)	MAXIMUM PARTICLE 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
> 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 TO BE 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.

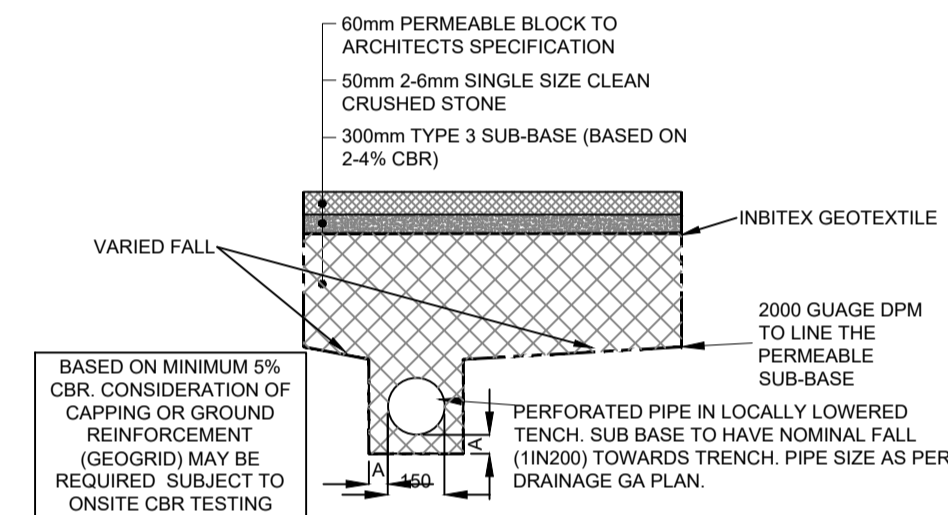
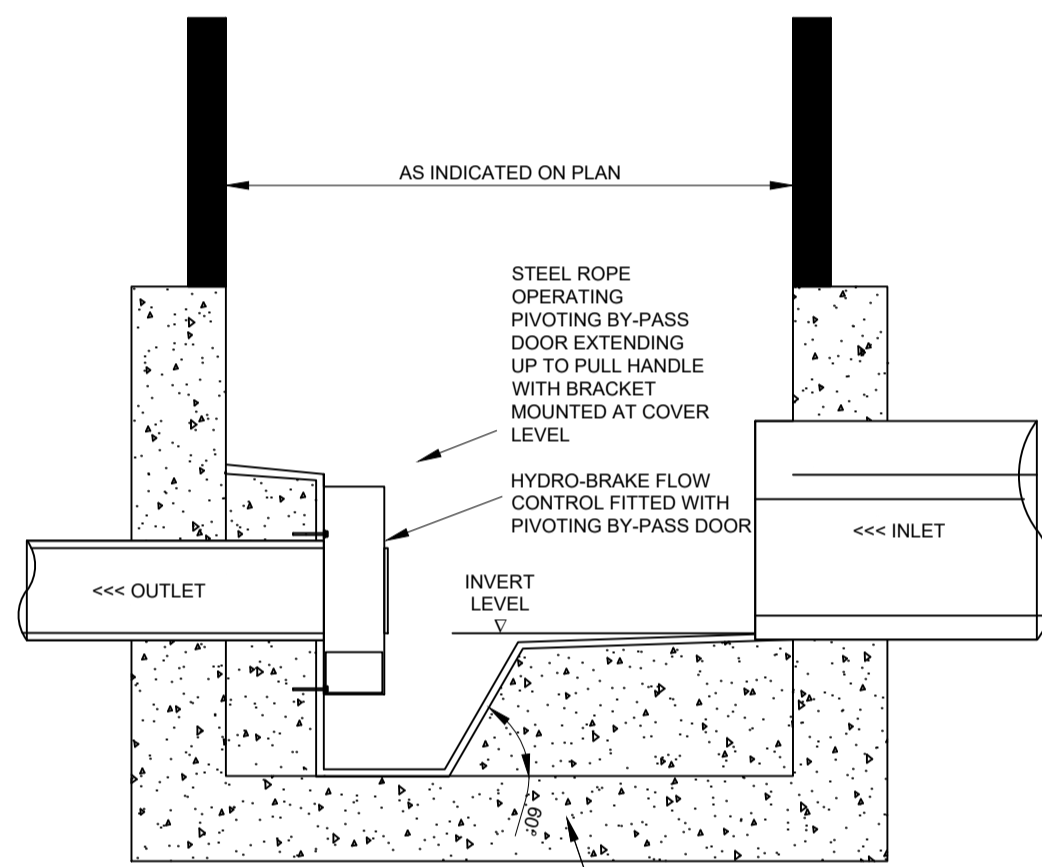
MATERIAL DESIGNATED TYPE C: USED UNDER ROADS AND FOOTPATHS TO BE GRANULAR MATERIAL AS USED FOR CARRIAGEWAY SUB-BASE CONSTRUCTION.

**PIPE BEDDING MATERIAL DETAILS**

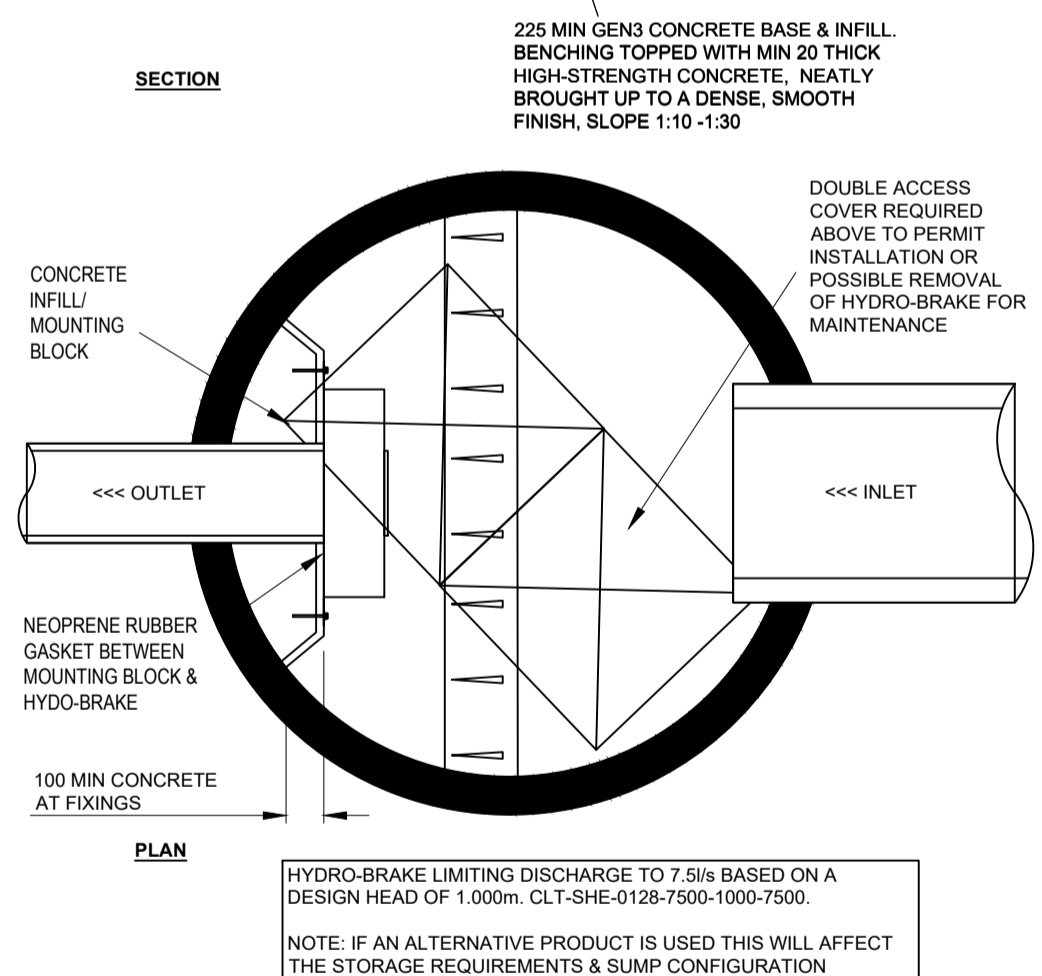


**CLASS S - UNDER VERGE OR GARDEN**      **CLASS S - UNDER CARRIAGEWAY OR FOOTPATH**

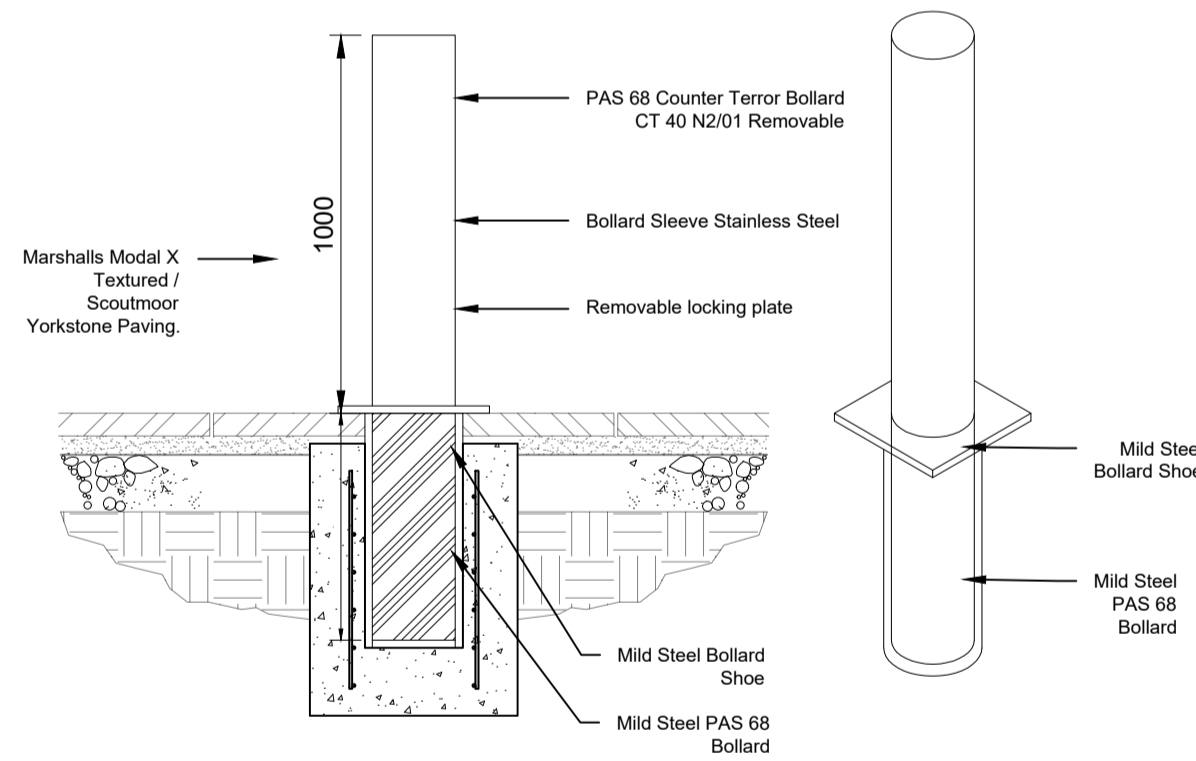
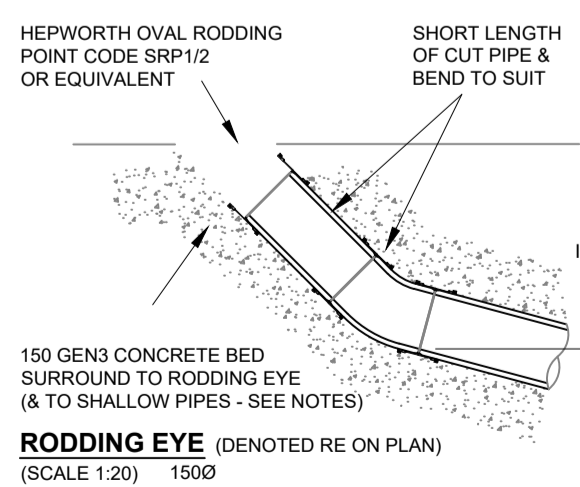
NOTE: A=B/4 BUT WITH A MIN OF 200mm AROUND THE BARRELS AND A MIN OF 150mm AROUND THE SOCKETS



**LINED PERMEABLE FOOTWAY**  
Scale 1:20



**INDICATIVE FLOW CONTROL CHAMBER**  
(SCALE 1:20)



**MARSHALLS RHINO GUARD - STAINLESS STEEL REMOVABLE PROTECTIVE BOLLARD**  
Scale 1:20

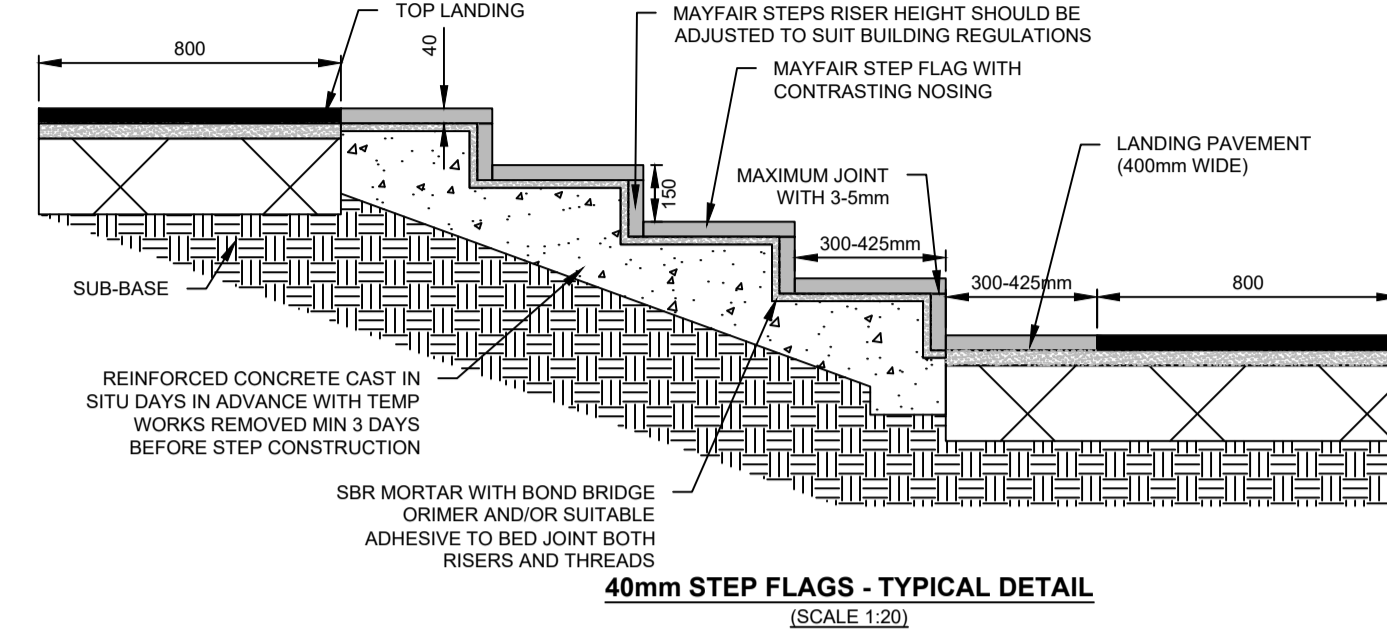
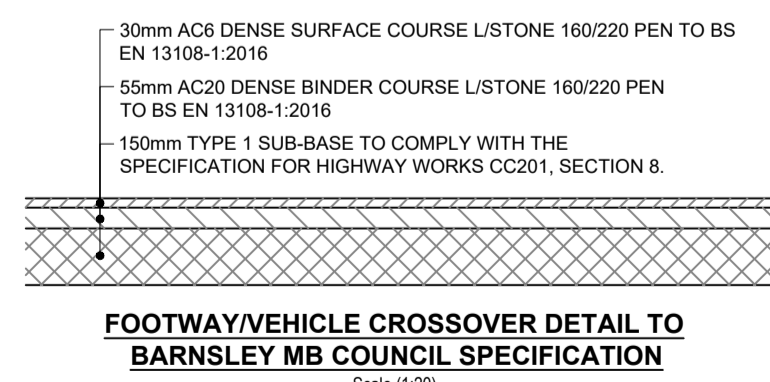


Table 1 - Foundation Class 2

CBR%	Modulus(MPa)	Capping (mm)	+	Sub-base (mm)	Sub-base (mm)
2.5	30	425	+	250	420
3	35	380	+	230	370
5	50	250	+	200	270
7	60	230	+	170	250
10	75	200	+	150	225
12	85	180	+	150	215

**Construction Notes:**

- Table 1 is based on CD 225 Revision 1 (Fig 3.18 and Fig 3.20).
- Pavement foundation classes selection are based on CD225 Table 3.7.
- Foundation Class 1 ≥50MPa
- Foundation Class 2 ≥100MPa
- Foundation Class 3 ≥200MPa
- Foundation Class 4 ≥400MPa
- Bond coat in accordance with BS 5948:7 should be applied to ensure effective bonding of the asphalt layers.
- If the binder course is subjected to an extensive period of trafficking before the surface course is applied, a recipe mixture containing a higher bitumen content will be more durable/resistant to fretting/raveling under traffic.
- Where laid to either a 90 or 45 degree herringbone pattern, the edge perimeter should be laid with one single row of stretcher bond set parallel to the edge restraint. Where block pavers are laid abutting drainage channels, gully grates, etc. the upper surface of the block pavers should be set 3-5mm above the grating. Manufacturer's declared values markings W3 and S4 are acceptable. Where W3 is 1.0g/m<sup>2</sup> or less and S4 is 42 or more based on 'C' scale unit' (for abrasion, class A2 = maximum result is 20mm, class A1 = no performance determined).
- A 38mm thickness of graded 15/20mm unbound aggregate to BS EN 12620 (gravel), well rolled and compacted, should be used.
- Asphalt contractors should be certified in accordance with the National Highway Sector Schemes for Quality Management in Highway Works - Scheme 16.
- Frost susceptible soils are present overall construction shall be a minimum of 450mm. Where the standard detail is less the sub-base thickness shall be increased as necessary.
- All details are based on a sub-base solution, in accordance with Table 3. If a capping layer is specified then sub-base thickness can be reduced. CD225 Rev1 Foundations Chapter 3
- Capping and Sub-base gives guidance on capping and sub base thickness design based on CBR/Modulus values and with and without a capping layer.
- Geotextile layer to be laid, within foundation layer 50mm from formation.
- Wearing course colour to Architect's/Client's specification.

**DRAINAGE**

- ALL DRAINAGE WORKS TO BE CONSTRUCTED FROM THE OUTFALL TOWARDS THE HEAD OF RUN TO ENSURE THE OUTFALL CAN BE ACHIEVED.
- 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.
- ALL DRAINAGE WORK TO BE IN ACCORDANCE WITH THE BUILDING REGULATIONS, BS EN 752 & TO THE SATISFACTION OF THE BUILDING INSPECTOR.
- ALL PROPRIETARY ITEMS TO BE INSTALLED STRICTLY IN ACCORDANCE WITH MANUFACTURERS DETAILS, INSTRUCTIONS & SPECIFICATIONS.
- ALL COVER LEVELS ARE APPROXIMATE. EXACT LEVELS TO BE DETERMINED FROM THE EXTERNAL WORKS LAYOUT.
- 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.
- PIPE GRADIENTS WHERE STATED ARE APPROXIMATE - LEVELS AT THE CHAMBERS TAKE PRECEDENT.
- REFER TO ARCHITECTS DRAWINGS FOR PRECISE LOCATION OF ALL RAINWATER PIPES, INTERNAL CONNECTIONS ETC.
- ALL INTERNAL CONNECTIONS TO HAVE AN ABOVE-FLOOR ACCESS POINT TO ENABLE FUTURE ACCESS FOR MAINTENANCE.
- 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.
- 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.
- FOR USE IN CAR PARKS & PEDESTRIAN AREAS WHERE INFREQUENT LIGHT VEHICLE ACCESS IS LIKELY (INCLUDING DRIVEWAYS).
- 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.
- FOR USE IN CARRIAGEWAYS OF ROADS & PARKING AREAS ACCESSED BY ALL TYPES OF VEHICLES.
- FOR USE IN AREAS WHERE HIGH WHEEL LOADS ARE PRESENT.
- FOR USE IN AREAS WHERE EXTREMELY HIGH WHEEL LOADS ARE PRESENT SUCH AS AIRCRAFT PAVEMENTS, DOCKS, HEAVY INDUSTRIAL SITES.
- MANHOLES IN INTERNAL AREAS REQUIRE DOUBLE SEALED COVERS WITH LOCKING SCREWS, RECESSED WHERE REQUIRED TO ACCOMMODATE FLOOR FINISHES TO ARCHITECTS SPECIFICATION.
- 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 (100-6000 PIPES)
    - LANDSCAPING - LESS THAN 600mm COVER TO CROWN.
    - HARDSTANDING - LESS THAN 1200mm COVER TO CROWN.
    - PLASTIC (100 - 3000 PIPES)
    - LANDSCAPING - LESS THAN 600mm COVER TO CROWN.
    - HARDSTANDING - LESS THAN 900mm COVER TO CROWN.
- 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 GENS CONCRETE BED & SURROUND CAST INTEGRALLY WITH SLAB.
  - OTHERWISE USE CLASS S BEDDING.
- 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.
- BACKFILL TO DRAINS NEAR FOUNDATIONS TO BE IN ACCORDANCE WITH BUILDING REGULATIONS H1 DIAGRAMS 8 & 12.
- CCTV TO BE CARRIED OUT TO VERIFY CONDITION OF ANY DRAINAGE TO BE RE-USED.

**Notes**

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**GENERAL NOTES**

- THE STRUCTURAL DRAWINGS ARE TO BE READ IN CONJUNCTION WITH ALL RELEVANT CLIENT, ARCHITECT, SERVICES ENGINEER, AND SPECIALIST CONTRACTOR DRAWINGS, REPORTS AND SPECIFICATIONS.
- FOR SETTING OUT AND LEVELS REFER TO ARCHITECTS DRAWINGS.
- 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.
- ANY REVISIONS TO THE LAYOUT DETAILS REQUIRED BY THE CONTRACTOR TO BE AGREED AND APPROVED BY THE ALIGN PROPERTY PARTNERS ENGINEER.
- FINISHED FLOOR LEVELS TO BE DETERMINED.
- ALL PROPRIETARY PRODUCTS ARE TO BE USED STRICTLY IN ACCORDANCE WITH THE MANUFACTURERS DETAILS AND REQUIREMENTS.
- 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, FININGS ETC. REFERENCE SHALL BE MADE TO THE ARCHITECT'S SERVICES ENGINEERS OR THE RELEVANT SUBCONTRACTORS BUILDERS WORK DRAWINGS.
- THE CONTRACTOR SHALL ENSURE THAT TEMPORARY LOADS ONTO THE NEW STRUCTURES/DRAINAGE SHALL BE LESS THAN THOSE FOR WHICH IT HAS BEEN DESIGNED.
- THE CONTRACTOR IS RESPONSIBLE FOR ESTABLISHING AND CHECKING THE SETTING OUT OF GRIDLINES, LEVELS AND DATUMS.
- ANY DISCREPANCIES BETWEEN THE STRUCTURAL AND ARCHITECTURAL DRAWINGS SHOULD IMMEDIATELY BE BROUGHT TO THE ATTENTION OF THE CONTRACT ADMINISTRATOR.
- THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO ENSURE THAT NOISE, VIBRATION AND DUST RESULTING FROM THE WORKS ARE KEPT WITHIN REASONABLE LIMITS.
- 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.
- 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.

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**align PROPERTY SERVICES**

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Client: **BARNSELY MB COUNCIL**

Project Name: **THE CRESCENT, CUDWORTH**

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Purpose: **PRELIMINARY**

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AS SHOWN	JSM	ZS	LF
Original Size	Date	Date	Date
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