

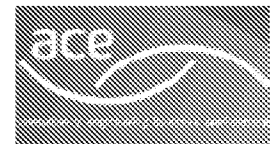
DRAINAGE MAINTENANCE PLAN
FOR
LINESIDE INDUSTRIAL ESTATE
ELDON WAY
LITTLEHAMPTON

PREPARED FOR:

Legal & General

DS/P19-439/JDC
16 December 2020

A Member Firm of the
Association for Consultancy
and Engineering



DOCUMENT HISTORY

Revision	Description	Date
-	First Issue.	07.08.19
A	Updated to suit comments from the Drainage Engineer.	16.12.20

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Reference	Revision	Client	Date	Author
DSP19-439/JDC	A	Legal & General	16 December 2020	JDC

1. INTRODUCTION

- 1.1 On occupation of the development, this maintenance and management plan should be incorporated into the sites *"Operational and Maintenance Manual"* with the as-built drainage system operated and maintained in accordance with the requirement set out in the following section of this report to prevent a reduction in the performance of the drainage system over the lifetime of the development.
- 1.2 Legal and General would be the owners of the units which will form part of the wider Lineside Industrial Estate. Savills are the managing agents for the estate and are responsible for the management / maintenance of the drainage across the wider development and would ensure that the sites drainage system is operated and maintained in accordance with this maintenance plan. Savills run a service charge agreement and set an annual service charge budget for the year which is collected from the estates tenants and is used to fund the maintenance and including any repair / replacement of components beyond their design life. Savills currently employ Metro Mechanical to carry out any maintenance.
- 1.3 A surface water drainage scheme has been developed for the site and is shown on the Engineering Layout included in *Appendix A* with a description of the system provided below.
- The car park will be drained via a series of channel drains and permeable block paved parking bays. The permeable paving would allow surface water to filter through a block paved surface into a filter zone of sub-base beneath the bedding layer. The filter zone of the sub-base would comprise of 30% voids, which would temporarily store runoff. This will then be collected via surface water diffuser units installed within the sub-base and discharge to a geocellular soakaway via a traditional network of below ground pipework. The geocellular soakaway allows runoff to naturally infiltrate into underlying soils whilst storing and attenuating excess flows for all rainfall return periods up to and including a 1 in 100-year event with a 40% allowance for climate change. Prior to discharging into the soakaway, surface water runoff will pass through a Klargester full retention separator.
 - Roof water from the industrial units will be drained via roof gutters and rainwater downpipes, which would discharge via a traditional network of below ground pipework which passes through the Klargester full retention separator prior to discharging into the geocellular soakaway located beneath the car park.
 - Areas of concrete hard standing along the rear and side elevations of the industrial units will be drained via a series of channel drains which will discharge into a permeable sub-base via surface water diffuser units. This will then be collected by perforated pipes installed within the sub-base and discharge to the geocellular soakaway via a network of below ground pipework.
- 1.4 The individual components of the surface water drainage system outlined above have been designed to work together in order to facilitate the overall design for the development. The surface water drainage system is connected via a network of manholes and chambers that incorporate catchpits / silt traps / channel drain trapped outlets which must be maintained to achieve optimal performance of the system. Refer to tables in Section 2 for operational and maintenance requirements.

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1.5 A foul water drainage scheme has been developed for the site and is shown on the Engineering Layout included in Appendix A with a description of the system provided below.

- Foul water runoff from the industrial units will be drained via soil vent pipes, which would discharge via a traditional network of below ground pipework prior to discharging into the Southern Water foul water sewer network located within Eldon Way.

1.6 The Site Manager should ensure that the Maintenance Contractor tasked with carrying out any maintenance works provides a risk assessment and method statement that adopts best practice health and safety policies for maintenance personnel throughout the duration of any maintenance works. Measures may include:

- Ensure the use of safe system of work and procedures are followed.
- Certificated operatives only to be used for all confined space entry.
- Ensure appropriate PPE is worn at all times including the use of safety goggles, ear defenders and other relevant equipment when using high pressure jetting.
- Do not work in weather conditions where flooding or surging is likely.
- Erect barriers where appropriate and provide adequate lighting.
- No operations to be carried out by operatives working alone.
- Time maintenance to not conflict with other on-site activities.
- Method statement to be prepared and approved prior to entry into confined space.

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2. MANAGEMENT & MAINTENANCE PLAN

- 2.1 On occupation of the development, it is recommended that each element of the as-built drainage system is maintained in accordance with the regime set out in the tables below.

Table 1: Below Ground Drainage System - Operation and Maintenance Requirements

Maintenance schedule	Required action	Frequency
Regular maintenance	Remove all litter and debris from external hard landscaped areas and adjacent landscaping, which may pose a risk to the performance of the system.	Monthly.
	Remove build-up of sediment / debris and dispose of oils / petrol residues within pipelines using safe standard practices.	As required.
	Remove build-up of sediment / silt in drainage channels and trapped outlets and dispose of oils / petrol residues using safe standard practices.	
	Remove build-up of sediment / silt in catch-pits and dispose of oils / petrol residues using safe standard practices.	
	Remove build-up of sediment / silt within the gully pots and dispose of oils / petrol residues using safe standard practices.	
	Stabilise and mow adjacent landscaped areas and remove weeds.	
Remedial actions	Repair or rehabilitate inlet and outlets to ensure they are in good condition and operating as designed.	
	Remediate any landscaping, which has raised to within 50mm of the level of adjacent hard landscaping.	
Monitoring	Check of all inlets / outlets for blockages or evidence of physical damage with any necessary remedial action or clearance carried out if required.	On a monthly basis for the first 3 months of operation, thereafter every 6 months & following severe rainfall events.
	Inspect all surfaces for ponding, or silt accumulation. Record areas where water is ponding for more than 48 hours and carry out any remedial work deemed necessary.	After severe storms.

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Table 2: Geocellular Storage Tanks - Operation and Maintenance Requirements

Maintenance schedule	Required action	Frequency
The following requirements should be read in conjunction with the Manufacturers Operation & Maintenance Manual included in <i>Appendix B</i> .		
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for first 3 months of operation, then every 6 months.
	Debris removal from catchment surface (where may cause risks to performance).	Monthly.
	Where rainfall infiltrates into blocks from above, check surface of filter for blockage by silt, algae or other matter. Remove and replace surface infiltration medium as necessary.	Monthly / after severe storms.
	Remove sediment from pre-treatment structures.	Annually, or as required.
Remedial actions	Repair/rehabilitation of 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 and after large storms.

Table 3: Full Retention Separator - Operation and Maintenance Requirements

Maintenance schedule	Required action	Frequency
The following requirements should be read in conjunction with the Manufacturers Operation & Maintenance Manual included in <i>Appendix C</i> .		
Regular maintenance	Cleaning of interceptor, inlets, and outlets of retained pollutants & silt.	Every 3, 6 or 12 months depending on site conditions (or following poor performance).
Remedial actions	Repair of erosion damage, or damage to tank.	As required.
	Interceptor repairs.	
Monitoring	Inspection of the tank for pollutants and silt.	Every 3, 6 or 12 months depending on site conditions (or following poor performance).
	Inspection of inlets and outlets	
	Inspection of areas receiving overflow, for evidence of erosion.	

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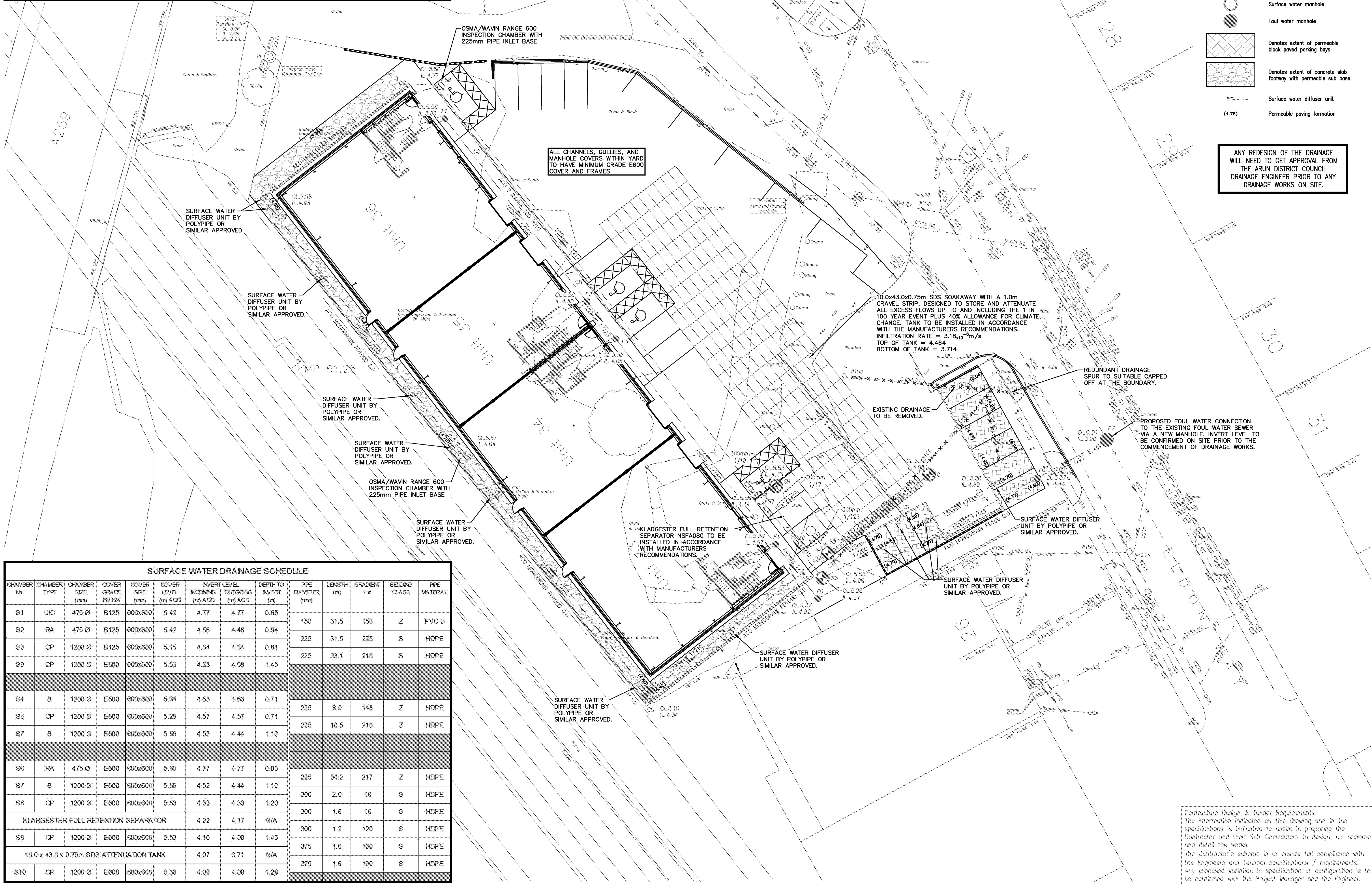
Table 4: Permeable Paving - Operation and Maintenance Requirements

Maintenance schedule	Required action	Frequency
The following requirements should be read in conjunction with the Manufacturers Operation & Maintenance Manual included in <i>Appendix D</i> .		
Regular maintenance	Remove all litter and debris from drained surfaces areas and adjacent hard / soft landscaping, which may pose a risk to the performance of the system.	Monthly.
	Sweep permeable paved areas. If necessary, use jet wash or suction sweeper. Any jointing aggregate lost from the joints must be replaced as necessary with 2/6.3mm single sized aggregate, brushed into joints.	Three times a year at end of winter, mid-summer, after autumn leaf fall, or as required based on site-specific observations of clogging.
	Stabilise and mow adjacent landscaped areas and remove weeds.	As required.
Remedial actions	Remediate any landscaping, which has raised to within 50mm of the level of adjacent hard landscaping.	
	Carry out remedial work to any depressions, rutting and cracked or broken paving blocks within the permeable paved areas that are considered detrimental to the structural performance or a hazard to users.	
Monitoring	Carry out repair / rehabilitation works to inlets, outlets, overflows and vents.	Annually.
	Inspect silt accumulation rates within the permeable paved areas and establish appropriate brushing frequencies.	
	Check of all inlets, outlets, overflows and vents for blockages or evidence of physical damage with any necessary remedial action or clearance carried out if required.	
	Inspect and identify any areas that are not operating correctly	On a monthly basis for the first 3 months of operation, thereafter every 6 months & following severe rainfall events.

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DS/P19-439/JDC	A	Whitbread Group PLC	16 December 2020	JDC

APPENDIX A ENGINEERING LAYOUT

FOUL WATER DRAINAGE SCHEDULE													
CHAMBER No.	CHAMBER TYPE	CHAMBER SIZE (mm)	COVER GRADE BH124	COVER SIZE (mm)	COVER LEVEL (m) AOD	INVERT LEVEL		DEPTH TO INVERT (m)	PIPE DIAMETER (mm)	LENGTH (m)	GRADIENT 1 in	BEDDING CLASS	PIPE MATERIAL
						INCOMING (m) AOD	OUTGOING (m) AOD						
F1	UIC	475 Ø	B125	600x600	5.58	5.05	5.05	0.53	150	24.0	150	Z	PVC-U
F2	UIC	475 Ø	B125	600x600	5.58	4.89	4.89	0.69		150	4.9	123	Z
F3	UIC	475 Ø	B125	600x600	5.58	4.85	4.85	0.73	150	27.0	150	Z	PVC-U
F4	UIC	475 Ø	B125	600x600	5.58	4.67	4.67	0.91		150	7.2	143	Z
F5	UIC	475 Ø	A15	525x525	5.37	4.62	4.62	0.75	150	26.0	145	Z	PVC-U
F6	UIC	475 Ø	E600	600x600	5.37	4.44	4.44	0.93		150	8.2	22	S
F7	B	1200 Ø	D400	600x600	5.35	4.06	3.98	1.37					



- Contractors Design & Tender Requirements**
The information indicated on this drawing and in the specifications is indicative to assist in preparing the Contractor and their Sub-Contractors to design, co-ordinate and detail the works.
The Contractor's scheme is to ensure full compliance with the Engineers and Tenant's specifications / requirements. Any proposed variation in specification or configuration is to be confirmed with the Project Manager and the Engineer.

ENGINEERING NOTES

- This drawing to be read in conjunction with all relevant Architects, Engineers and Subcontractors drawings and details.
- This drawing is based on topographical survey by Malcolm Hollis:
Drawing Number 75625-MHL-00-20-MZ-0-10100-A7
Dated 12/02/19
- All levels relate to levels given on survey drawing.
- Refer to Architects drawings for details of all paving types & patterns, soft landscaping, fences, gates & bollards.
- For lighting, service supplies & ducting requirements, refer to Architects drawings.
- All works to be carried out in accordance with Sewers for Adoption 7th Edition, "Drain and sewer systems outside buildings" and the current edition of The Building Regulations "Approved Document H".
- New drainage connections are to be made with appropriate lengths of rubber pipes & couplings.
- All manhole chamber covers to be installed parallel to final kerbs, edgings, paving joints or building lines as appropriate.
- This drawing details all below ground drainage up to finished floor level. For details of drainage above finished floor level, refer to Architects drawings.
- All stock connections under buildings to be minimum 100mm diameter solid PVC-U to BS EN 1401-1/BS4660 & laid at a minimum gradient of 1 in 40 unless otherwise noted. If the stock is greater than 100mm then the diameter of the connection is to be increased to match it
- All RWP connections to be minimum 100mm diameter solid PVC-U to BS EN 1401-1/BS4660 & laid at a minimum gradient of 1 in 80 unless otherwise noted. If the RWP is greater than 100mm then the diameter of the connection is to be increased to match it
- All private foul water pipework up to 150mm in diameter to be PVC-U to BS EN 1401-1/BS4660.
- All private surface water pipework up to 150mm in diameter to be solid PVC-U to BS EN 1401-1/BS4660. All private surface water pipework 225mm and above to be structured wall plastic sewer pipe complying with clause 518 of the specification for highway works.
- Plastic chambers shall comply with BS EN 1917 and BS 5911-3.
- On completion of development all drainage shall be jet cleaned and CCTV surveyed.
- Sewers marked to be removed are to be dug out with manholes demolished & well filled with suitable engineering fill material.
- All road gully connections to be minimum 150mm diameter solid PVC-U pipework to BS EN 1401-1/BS4660 and laid at a minimum gradient of 1 in 150.
- Drainage branch connections to be made with 45° angle to main run.

T5	Drainage approval note added.	JDC	09.06.20
T4	Drawing updated following comments from Arun District Council.	JDC	28.05.20
T3	Permeable paved parking bays, and permeable sub-base footway added.	JDC	21.04.20
T2	Manhole schedule added	JDC	31.10.19
T1	Tender Issue	JDC	16.08.19
Ref.	Revisions	By	Date

Lineside Industrial Estate
Eldon Way
Littlehampton

TENDER ISSUE

Drainage Layout Soakaway Design

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Scale at A1	Date	Drawn By	
1:200	25/07/19	JDC	

Project No.	Drg No.	Rev.
9261	PH_02	T5

APPENDIX B
GEOCELLULAR STORAGE TANK

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. The silts and sediments contained within the surface water network will remain within the distribution pipe which can be accessed for ongoing maintenance in line with the contract requirements. This means that this sediment cannot enter the crate structure of the attenuation tanks which will not require any maintenance.

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.

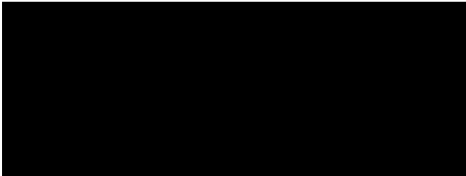
APPENDIX C
FULL RETENTION SEPARATOR

012299

**NSFA010 – NSFA015 Class 1 & 2 Full Retention Separator
Installation & Operation Guidelines**



Kingspan Environmental Service Contact Numbers:



Enclosed Documents

DS0848P	NSFA010 – NSFA015 Class 1 & 2 Full Retention Separators
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Issue	Description	Date
04	CC1087	September 2012

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 recommends 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 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.

	
Kingspan Environmental College Road North Aston Clinton Aylesbury Buckinghamshire HP22 5EW	
10	
EN 858 : Separator systems for light liquids	
GRP Glass Reinforced Plastic Tank	
Full Retention Separators NS003 - NS200	
Class 1 & 2	
Watertightness	Passed
Structural Testing	Passed
Hydraulic efficiency	Passed

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Appendices

Separator Maintenance Log

1.0 Introduction

These Guidelines represent Best Practice for the installation of the above Kingspan 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, a qualified specialist (e.g. Civil engineering consultant) must verify any information or advice given by employees or agents of Kingspan regarding the design of an installation.

For guidance of Separator selection and application, please refer to the most recent issue of Environment Agency Guidelines No.3 (PPG3) and BS EN 858. Our Units have been independently tested by BSI and are certified as meeting the standards.

2.0 Handling & Storage

- 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 can not fall and become damaged.
- 2.2. The design requirements of Kingspan 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.
- 2.3. When lifting units, use webbing slings of a suitable specification. Do not use chains.
- 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.
- 2.5. Lifting equipment should be selected by taking into account the unit weight, length and the distance of lift required on site.
- 2.6. Kingspan accept no responsibility for the selection of lifting equipment.
- 2.7. Whenever Kingspan 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 to evenly support the base of the unit. Do not roll separators.

3.0 Site Planning

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

- 3.1. The discharge must have the consent of the relevant Environmental Regulator.
- 3.2. The installation should have Planning and Building Control approval.
- 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.
- 3.4. Kingspan 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 Kingspan 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 they're detailed fitting installation instructions.
- 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.
- 3.6. Uncontaminated run off such as roof water should be excluded from separators. (EA Guidelines PPG3.)
- 3.7. Consider installation of a sampling point downstream of the separator. There is no suitable facility to effectively sample the waste water from inside the unit. EN 858 Pt 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.
- 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.
- 3.10. The separator must be installed at a level that will allow connection to the incoming drain and a free discharge at the system outlet.
- 3.11. Do not install the unit deeper than necessary, if required, ensure that you purchase extension necks and coalescer extensions. The minimum invert depth of the unit is shown on the customer drawing.
- 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.
- 3.13. There must be at least 1 metre of clear, level ground all around the access covers to allow for routine maintenance.
- 3.14. It is essential that a mains water supply is accessible for routine cleansing and refilling after removal of waste material and liquid.
- 3.15. Provide electrical supply for alarm system. (If required)
- 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.
- 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.

4.0 Installation – General

- 4.1. 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.
- 4.2. 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.
- 4.3. 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.
- 4.4. In situations where the excavation will not maintain a vertical wall, it will be necessary to shore up the side walls 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.
- 4.5. 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.
- 4.6. During installation care must be taken to ensure that the body of any unit is uniformly supported so that point loads through the unit are avoided.
- 4.7. 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		

5.0 Separator Installation

- 5.1. Excavate a hole of sufficient length and width to accommodate the tank and a minimum 225mm concrete surround and to a depth that allows for the burial depth of the unit plus concrete base slab.
- 5.2. Construct a suitable concrete base slab appropriate to site conditions. Ensure that the slab is flat and level.
- 5.3. When the concrete base slab has set enough to support the installed load, add a concrete haunch so as to provide even support under then unit, then lower the unit onto the haunch using suitable webbing slings and lifting equipment.
- 5.4. Locate the float valve in the coalescer unit. Lift float valve and secure in the open position before filling and release when full. If the valve is not lifted during filling, it may "seat". The valve is fitted with cord to aid lifting. Add cord if extending the invert and fasten end to a convenient point.
- 5.5. **Pour no more than 300mm 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. FILL THROUGH OUTLET AS WELL AS INLET.**

- 5.6. **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 200mm 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.**
- 5.7. Connect inlet and outlet drains and vent pipes when safe access to the backfill can be gained.

PIPEWORK CONNECTIONS

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). Small units are generally fitted with **PVCu spigots** to both the outlet and the inlet. Connect using the same size PVCu socket or a suitable reducer. Larger units are generally fitted with **Kingspan GRP** manufactured sockets. The connecting pipework should be pushed into the socket and a joint made to fill in the gap using rope/hemp with a cement mortar or bonding mix. Ensure that the seal is secure and watertight before backfilling the pipe.

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 DS0185 provides the ID of our 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.

- 5.8. Oil Level Alarm Neck fitting

Kingspan 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. See alarm supplier information and ensure that the probe is placed within the tube and can be accessed from ground level.

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.

- 5.9. Where Kingspan supply an extension shaft to meet a deeper invert requirement, a coalescer extension is also provided when needed. If there is a coalescer, remove it from the unit before adding the extension shaft(s). 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 (if skilled operatives are available). 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. 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.
- 5.10. If extending the neck, remember to add a suitable length of cord to enable the float valve to be lifted when the unit is emptied. If the valve is not raised during filling then the float valve may stick at the base.
- 5.11. Coalescer. When refitting, ensure that the core tube is correctly seated onto the base fitting.
- 5.12. Continue back-filling, ensuring minimum 225mm concrete thickness around the access shaft/extension neck and alarm access tube (as applicable).
- 5.13. 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.
- 5.14. 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.
- 5.15. 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.

6.0 Alarm Installation

- 6.1 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 volume of oil stored and the depth of floating oil expected in the separation chamber.

Unit	Recommended Maximum Oil Storage volume	Max. Depth of floating oil (100 %) (Static)
NSFA010	100 litres	55mm
NSFA015	150 litres	45mm

7.0 Operation

- 7.1 The unit is sized on treating a defined area and rainfall (50 mm/hour) EN 858 Part 1, and using the factor provided in the EA guidelines PPG 3. The entire flow up to the units listed flow rating is fully treated.
- 7.2 Class 1 units include a core tube with replaceable media. Separated Liquid enters the core tube after passing through the media, to the outlet. The coalescer media requires maintenance and replacement at intervals. See section 8.
- 7.3 Class 2 units do not include replaceable media
- 7.4 Both Class 1 and class 2 units are provided with a closure device, incorporating a float. As the level of oil builds up and forms a floating layer, so the float/closure device moves downward to prevent oily water being passed thorough the unit. The unit **MUST** be emptied after the closure device has operated. The coalescer media should be inspected and changed if fouled.
- 7.5 An oil probe should be positioned to detect the accumulation of oil when there is no or low flow conditions. It is a requirement to position the probe so that the alarm operates at 90% of the maximum recommended oil storage volume. **When the alarm operates, the oil should be removed. Accumulated silt should also be removed.**
- 7.6 These 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 may be drained to the foul sewer. See Environment Agency Guidelines PPG3. Or contact Kingspan Technical Sales Department for suitable alternative equipment.

8.0 Maintenance

Separated light liquid **must** be removed from separator when the oil capacity has been reached.

- 8.1. An oil level alarm system is available which gives warning when the separated light liquid/water interface level reaches 90% of the maximum recommended oil storage volume.
- 8.2. 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 volume removed and any silt removal or cleaning carried out. A specimen maintenance log is included in the appendices.
- 8.3. Every site is different, in respect to the amount and type of silt generated by the drain design and installation. Frequently, the site construction programme itself generates large and perhaps unusual quantities of silt and grit. We 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. An inspection and emptying programme can then be defined following the first 6 months site experience. We recommend a maximum inspection interval of 6 months.
- 8.4. Coalescer media is a replaceable item and is available as a spare.

- 8.5. Alarm probes where fitted, 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. Consult the alarm supplier's literature.
- 8.6. If the unit is emptied, the float/closure device should be raised and lowered only after the unit has been refilled. (Do not lower it into an empty unit as the closure device will self seat)
- 8.7. **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.**
- 8.8. You should consider the purchase of a maintenance service, from a competent installer, which includes bi-annual inspections, removal of oil and silt, cleaning of the alarm probe and cleaning or replacement of the coalescer media (where appropriate).

Waste Removal Procedure – Oil & Silt

Oil should only be 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, any excess oil may coat the media surface and when replaced could contaminate the effluent.

- 8.9. Remove the access cover and lower the desludging hose into the separation chamber. Draw off the surface oil.
- 8.10. When removing the silt, lower the desludging hose to the base of the tank and withdraw any grit or sludge that may be present. It is not necessary to remove all the liquid unless you need to ensure the unit has been fully emptied. Ensure that you access and clean all compartments.
- 8.11. Remove the alarm probe, if fitted, clean with water and replace. Ensure that it is working correctly
- 8.12. 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 and secured into position. It is best to lower the liquid level when refitting. Replace the access covers
- 8.13. Re-fill the separator with clean water up to the outlet level. If an alarm is fitted, it may display an alarm condition until the separator is re-filled. Check alarm operation when unit full.
- 8.14. Check the float/closure device and raise, if it has self-seated.

Checking the Coalescer Assembly

- 8.15. Coalescers should be checked and cleaned regularly, also following a major incident replaced if necessary. It may be possible to squeeze/rinse out silt contamination from the media, but it is impossible to remove oil. Please contact Kingspan if you wish to purchase replacement coalescer foam media. Identify the type and size of separator (shown on labels inside the access neck).
- 8.16. 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:
- In excess of the maximum assembly weight.
 - The assembly completely out of the access shaft.
 - Giving a smooth and controlled lift.
 - Swinging the assembly to one side clear of the access shaft.

Unit	Dry Weight (Kg) Core tube & media	Wet Weight (Kg) Core tube & media	Silted Weight (Kg) Core tube & media	Replacement media part no.
NSFA010	11 kg	21 kg	≈ 30 Kg	402672
NSFA015	11 kg	21 kg	≈ 30 Kg	402672

- 8.17. Ensure that the area around the access shaft is clear and that there is space to place the coalescer core tube 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.

- 8.18. Only remove the access cover when necessary to remove the assembly. Do not leave the access shaft uncovered and unattended.
- 8.19. Core tube from standard invert units may generally be lifted by hand, but should you suspect that the coalescer media be silted, additional lifting equipment should be employed.

8.20. Removing the coalescer assembly.

- 8.21. A hand hold cutout is provided in the top of the coalescer tube. When the unit is installed the coalescer tube is bolted to the neck. Deeper invert units are provided with a coalescer tube extension of the appropriate length. The coalescer tube must be bolted in place during use.
- 8.22. Lift the assembly with a smooth and steady motion. Core tubes and media 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.
- 8.23. Fully extract the assembly and set it down adjacent to the access shaft. Consider cleaning or replacement of the media.

8.24. Cleaning the coalescer assembly /Media Replacement.

- 8.25. Hose down the assembly using clean water at normal pressure. (You may be able to return the cleaning water into the separator, if there is sufficient separator capacity.) Do not allow untreated cleaning water to pass out of the unit. Continue hosing media until the water runs clear. If the media is heavily contaminated with oil and silt it may not be possible to clean effectively by hosing and should be replaced.
- 8.26. When replacing 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 every two years.

8.27. Replacing the coalescer assembly.

- 8.28. Position coalescer assembly over the access shaft and remove any safety coverings.
- 8.29. Lower the assembly steadily into the access shaft, orientate core tube correctly and locate over sump cone. Bolt core tube into place, check the float/closure device is free to operate.

9.0 Emergencies

- 9.1. 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 2012 – 0800 80 70 60

SEPARATOR MAINTENANCE LOG



Site address/location

Separator location

Type of separator

Nominal Flow

Total capacity

Inspection/ Maintenance Date	Comments	Waste Volumes Removed (if appropriate)

APPENDIX D PERMEABLE PAVING



MARSHALLS LANDSCAPE PRODUCTS
TECHNICAL ADVISORY SERVICES DEPARTMENT

0870 411 2233
advisory.services@marshalls.co.uk
www.marshalls.co.uk

GUIDELINES FOR THE MAINTENANCE OF
MARSHALLS PRIORA CONCRETE BLOCK PAVING

These notes are intended for general guidance and are not intended to be exhaustive.

Marshall's manufacture a range of paving materials in clay, concrete and natural stone which provide a durable, hardwearing surface. All surfacing materials may, during service, experience some degree of surface staining and therefore require regular maintenance and good cleaning practice to maintain the overall appearance of the paving.

MAINTENANCE

To ensure the performance of the Priora permeable paving, Marshalls recommend that there is a maintenance regime undertaken.

The maintenance of the pavement is to ensure the infiltration of the paving is not compromised. The following guidelines are offered as an initial regime, but maybe either increased or decreased depending on paving's local environment and any external contributing factors.

- A visual inspection of the paving should be carried out on a regular basis, ensuring that the joints are kept fully filled. This will confirm the effectiveness of the agitation maintenance due to variations between sites and allow any refinement of the regular agitation activity if necessary.
- The paving should be agitated (e.g. brushed, vacuumed, etc.) at least twice a year. This is to ensure no vegetation of any sort is allowed to grow and develop in the joints. Ideally, this activity should be carried out in the spring and autumn seasons.
- The paving should be inspected after any heavy precipitation to ensure no displacement of any organic matter onto the surface of the pavement.
- For winter maintenance, the controlled use of de-icing products may be used without causing significant detrimental effects towards the permeable pavements performance. When used carefully, the use of these chlorides will not result in an increase in the chloride levels in the local ground.
- Where non-infiltration systems have been employed, the inspection of the outfalls should be undertaken initially on a twice-yearly basis.
- Weed growth – when sedimentation occurs in areas of permeable paving then there is the potential for weed growth, this will typically occur where there are overhanging trees or soft landscaping slopes down on to the paving or in areas which do not receive over run from vehicles particularly frequently.
- Weeds can be removed from the surface through the application of weed killers containing Glyphosate. Glyphosate based weed killers are the most common for general-purpose use, they are most effective on grasses and perennial weeds with non-woody stems. Weeds should be sprayed when they are actively growing so that the Glyphosate will go down to the root and kill the weed completely. Glyphosate will be neutralized upon contact with the ground, which makes it safe to plant in the area soon after treatment. It is available ready mixed or as a concentrate. With the ready mix you will pay a lot for the water that it is diluted with, but if you only have a small plot or if you don't have a safe chemical storage cupboard, then ready mix is the best option.
- Glyphosate based weed killers include: ***Roundup, Tumbleweed and B&Q complete.***

Depending on the amount of usage and the environment the permeable pavement has received and been exposed to, the laying course material may require either cleaning after a 25 to 30 year period. This would be evident if the infiltration rate of

the paving became prolonged, allowing ponding to develop. Should this occur, the uplifting and cleaning (or replacing) of the laying course maybe considered. The laying course material, jointing and Piora blocks may be reused, minimising costs.

Marshalls would advise during the design stage of the project, consideration should be given to the placement and location of underground utilities. This is intended to minimise the need to carry out any excavation work within the main permeable pavement construction

Should a situation arise where access is required, Marshalls would suggest the following approach to the works.

- The initial trench width for excavating should be related to the depth of the sub-base material. For example, consideration to the width of the utility should be considered, plus a degree of working space. The utility undertaker will decide this. In addition to this figure, Marshalls would advise the overall width is determined by the depth of the open graded material plus 20%.
- When removing the first block, a suitable location, such as at the perimeter of the installation or where a unit exists with a larger joint width surrounding it should be considered. Next, as much jointing material should be cleared as possible to reduce the integrity being offered by this material.
- Once a block has become suitably loosened, a block lifter should used to remove it. Due to the interlock offered by the spacer nib profile, it may be necessary to have the block being lifted held in a lifted position, whilst a second person taps the adjacent blocks with a suitable lump hammer or rubber mallet. This may be repeated for the first few units during removal.
- Once the desired area of paving has been removed and carefully staked for reuse, a suitable surfacing material (e.g. membrane, wooden boards, etc.) should be placed on the surrounding paving for the laying course and sub-base materials to be separately stock-piled.
- Once completion of the utility work, the pavement should be reconstructed in accordance with the Marshalls Installation Guide.
- If the pavement construction contains any water-proof membranes or geotextiles, these should be sliced, folded back and weighed down during the opening of the pavement.
- Upon reinstatement, these should be folded back into their original position and be overlaid with a new corresponding material (overlap dimension to be determined between the utility contractor and the membrane/geotextile manufacturer; consideration to bonding/welding the reinstated material should be given depending on site conditions) which has been cut to an appropriate size, before continuing with the next layer of construction.

APPENDIX E DESIGN DRAWINGS



1. This Drawing to be read in conjunction with all other Engineers, Architects and Specialists drawings and specifications.
2. No dimensions are to be scaled from this drawing.
3. No deviation may be made from the details shown on this drawing without prior agreement of the Engineers.
4. Any discrepancy between this drawing and any other document should be referred immediately to the Engineer.

LEVELS LEGEND

FFL, 5.60

5.60 +

5.82

1 in 24.5

1/3

R300

Proposed finished floor level

Proposed level

Existing level

Proposed gradient

Proposed bank and gradient

Denotes extent of retaining wall with max. retaining height shown.

Contractors Design & Tender Requirements
The information indicated on this drawing and in the specifications is indicative to assist in preparing the Contractor and their Sub-Contractors to design, co-ordinate and detail the works.
The Contractor's scheme is to ensure full compliance with the Engineers and Tenants specifications / requirements. Any proposed variation in specification or configuration is to be confirmed with the Project Manager and the Engineer.

T2	Levels added to southern footpath, vehicle entrance updated.	JDC	31.10.19
T1	Tender Issue	JDC	16.08.19
Ref.	Revisions	By	Date

Lineside Industrial Estate
Eldon Way
Littlehampton

TENDER ISSUE

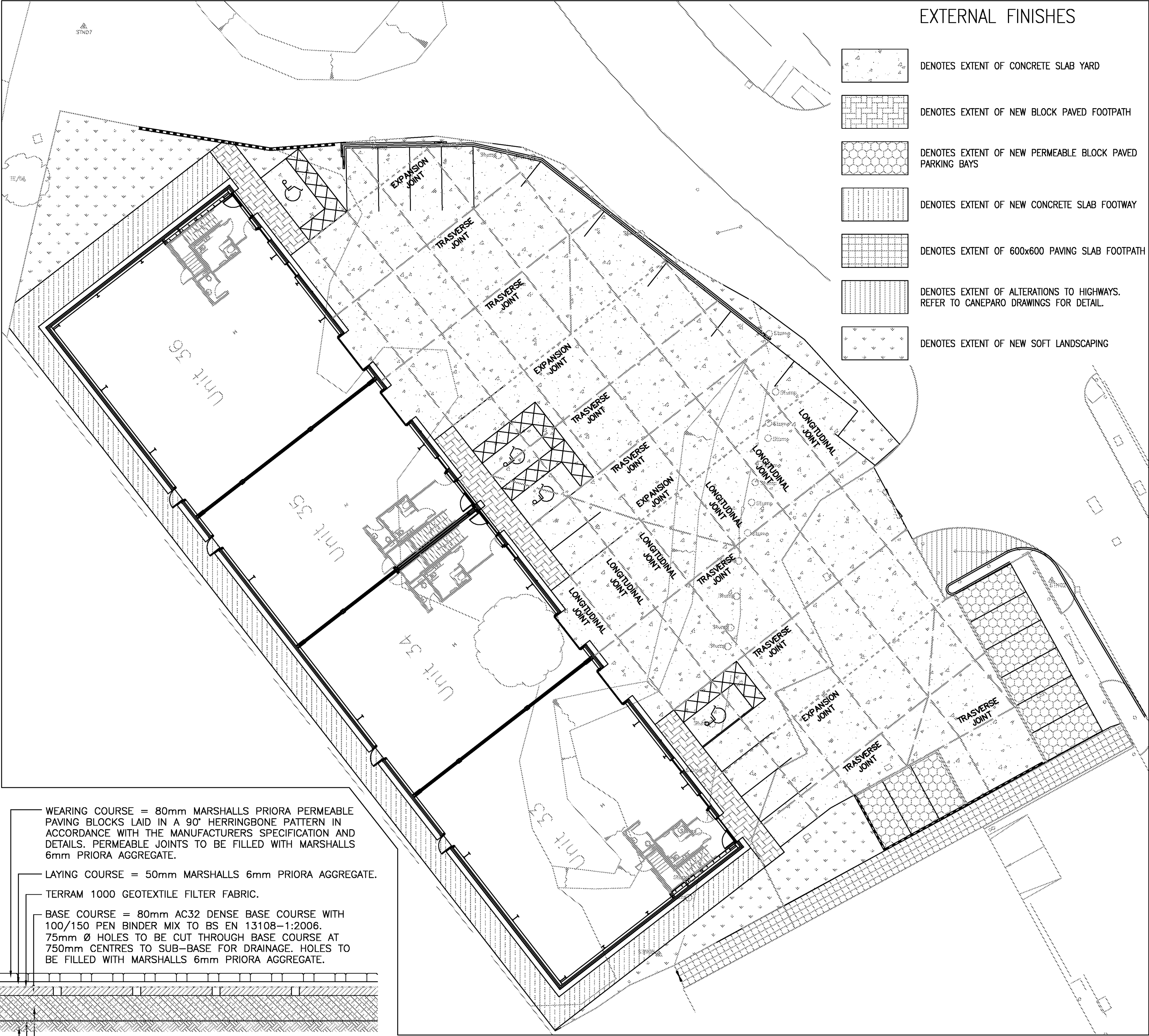
Levels Layout

taylor whalley spira

tws

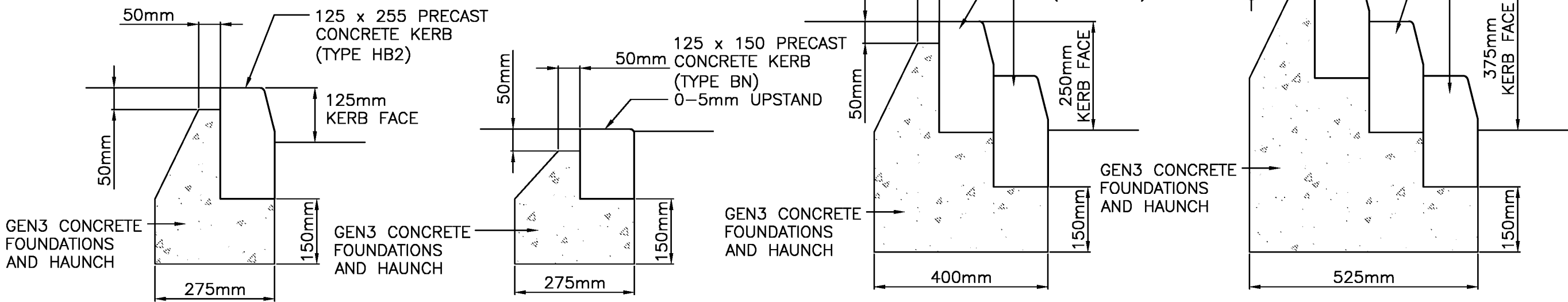
consulting civil and structural engineers
3 Dufferin Avenue, Barbican, LONDON EC1Y 8PQ
Tel (020) 7253 2925 Fax (020) 7253 2767
E-mail: tws@tws-uk.com Website: www.tws-uk.com

Scale at A1	Date	Drawn By	
1:200	25/07/19	JDC	
Project No.	Drg No.	Rev.	
9261	EX_01	T2	



SPECIFICATION FOR NEW PERMEABLE BLOCK PAVED PARKING BAYS

SCALE 1:25



Kerb Detail 1

Kerb Detail 2

Kerb Detail 3

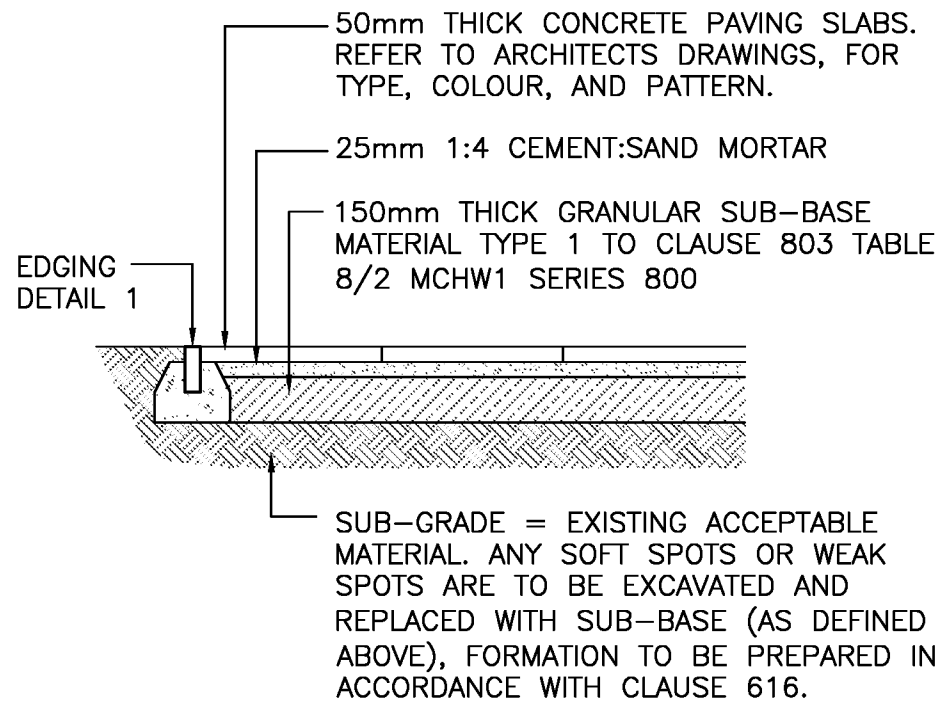
Kerb Detail 4

Kerb and Edging Details

SCALE 1:10

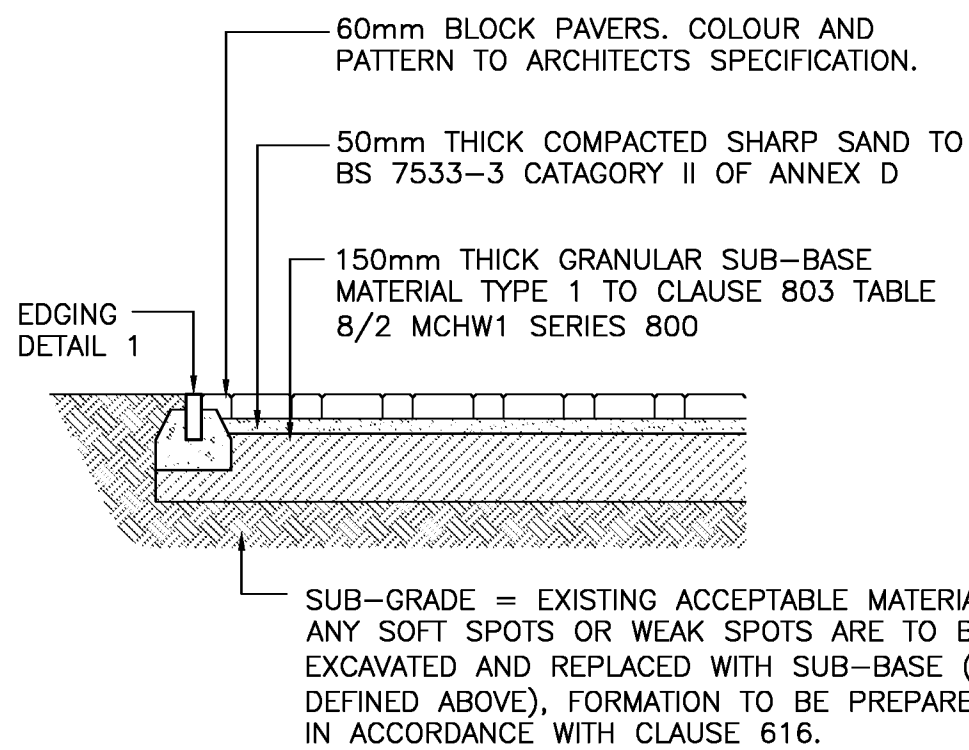
SPECIFICATION FOR NEW PAVING SLAB FOOTPATH

SCALE 1:25



SPECIFICATION FOR NEW BLOCK PAVED FOOTPATH

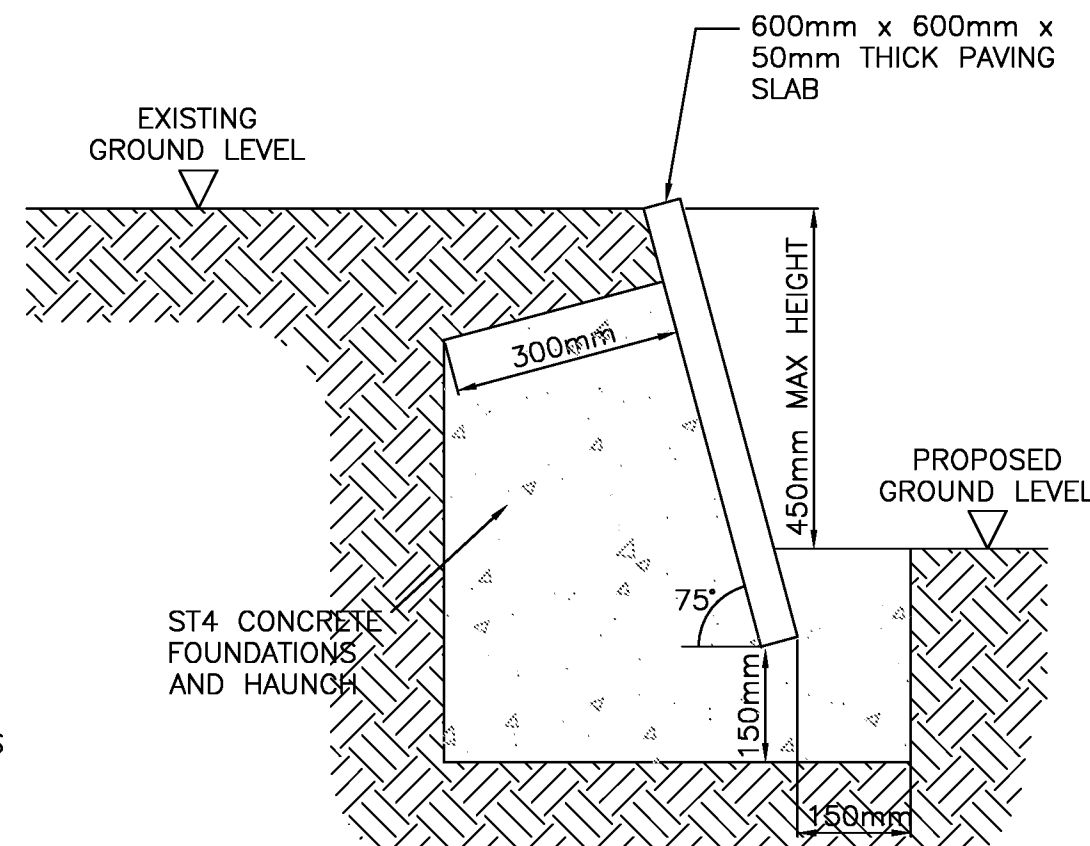
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Edging Detail 1

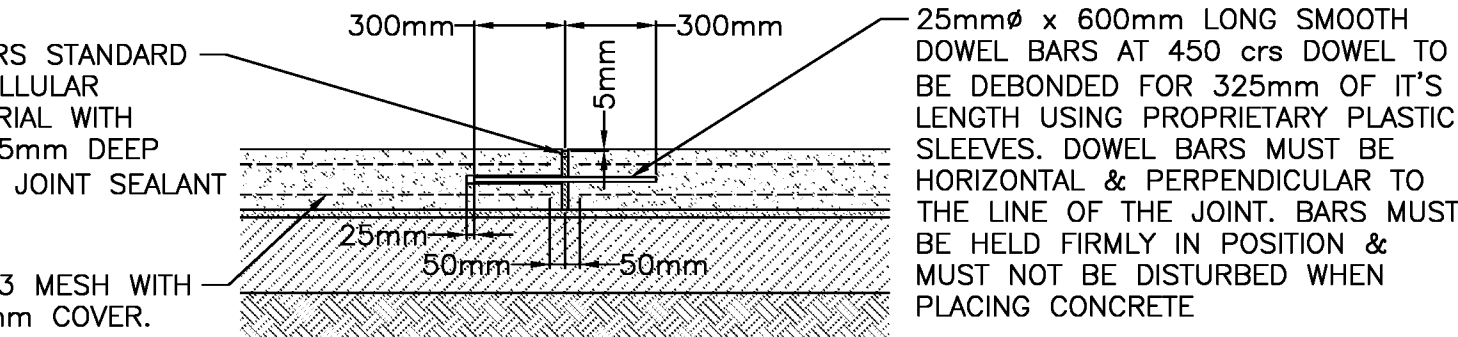
TYPICAL SECTION THROUGH SLAB ON EDGE DETAIL

SCALE 1:10



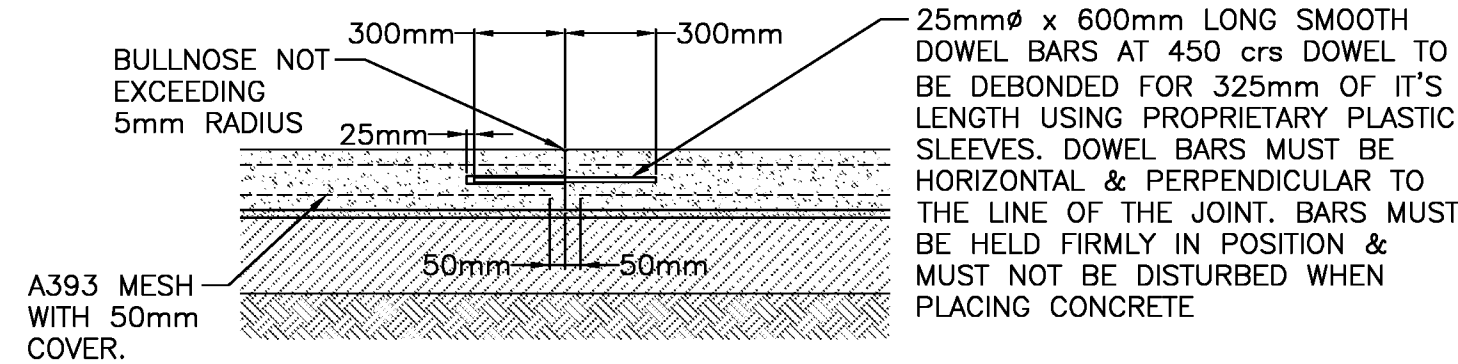
TYPICAL EXPANSION JOINT

SCALE 1:25



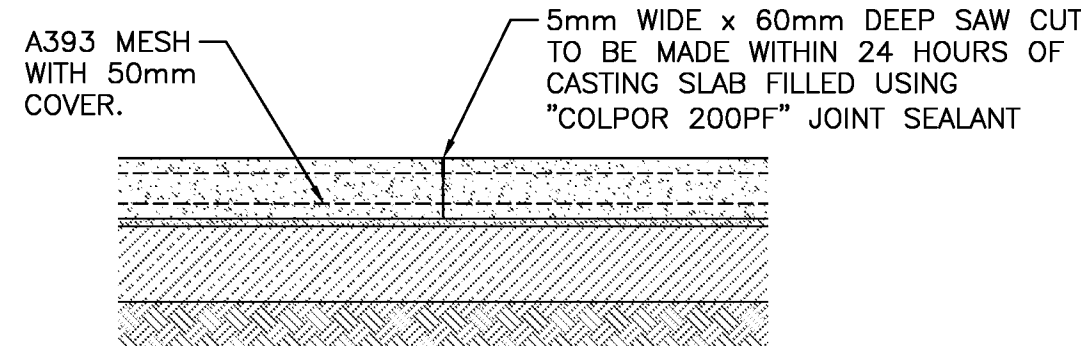
TYPICAL TRANSVERSE JOINT

SCALE 1:25



TYPICAL LONGITUDINAL JOINT

SCALE 1:25



EXTERNAL FINISHES NOTES

- This drawing to be read in conjunction with all relevant Architects, Engineers and Subcontractors drawings and details.
- This drawing is based on topographical survey by Malcolm Hallis:
Drawing Number 75625-MHL-00-Z0-M2-G-10100-A7
Dated 12/02/19
- Unless noted otherwise, clauses refer to The Specification for Highway Works: Volume 1 of the Manual of Contract Documents for Highway Works.
- Refer to Architects drawings for details of all paving types & patterns, soft landscaping, fences, gates & bollards.
- For lighting, service supplies & ducting requirements, refer to M&E drawings.
- If surface course is not constructed within 3 days of base course must be cleaned and tack coated prior to laying.
- Carriageway constructions is based on a CSR value of 2.0% in accordance with results found in Site Investigation RM 6544 by Risk Management, April 2019.

Contractors Design & Tender Requirements

The information indicated on this drawing and in the specifications is indicative to assist in preparing the Contractor and their Sub-Contractors to design, co-ordinate and detail the works.

The Contractor's scheme is to ensure full compliance with the Engineers and Tenants specifications / requirements. Any proposed variation in specification or configuration is to be confirmed with the Project Manager and the Engineer.

Ref.	Revisions	By	Date
T3	Permeable block paved parking bays added and concrete footway detail updated.	JDC	21.04.20
T2	Concrete slab joint details added, vehicle entrance updated.	JDC	31.10.19
T1	Tender Issue	JDC	16.08.19

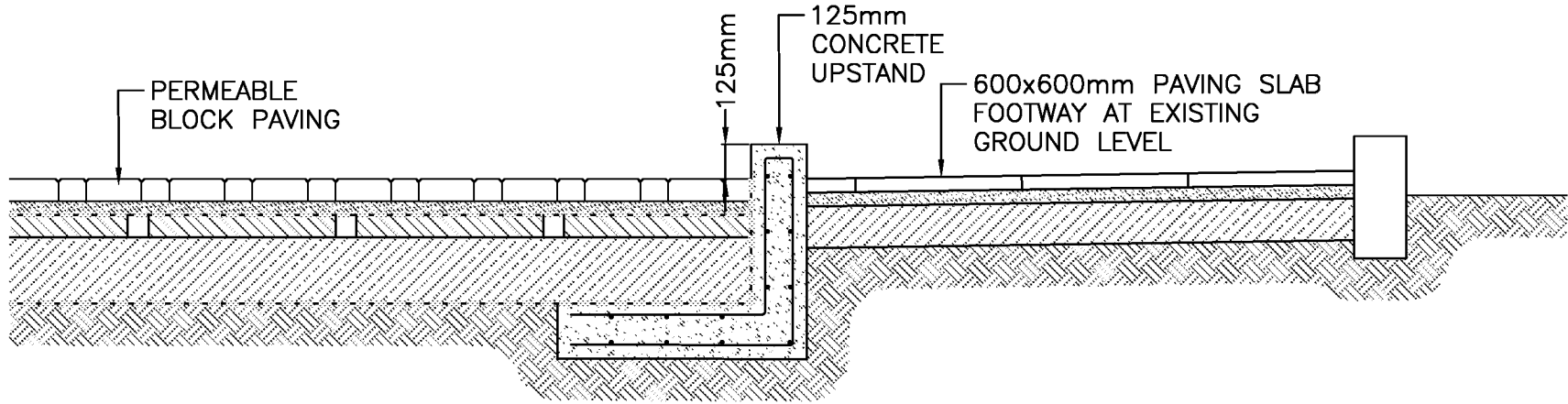
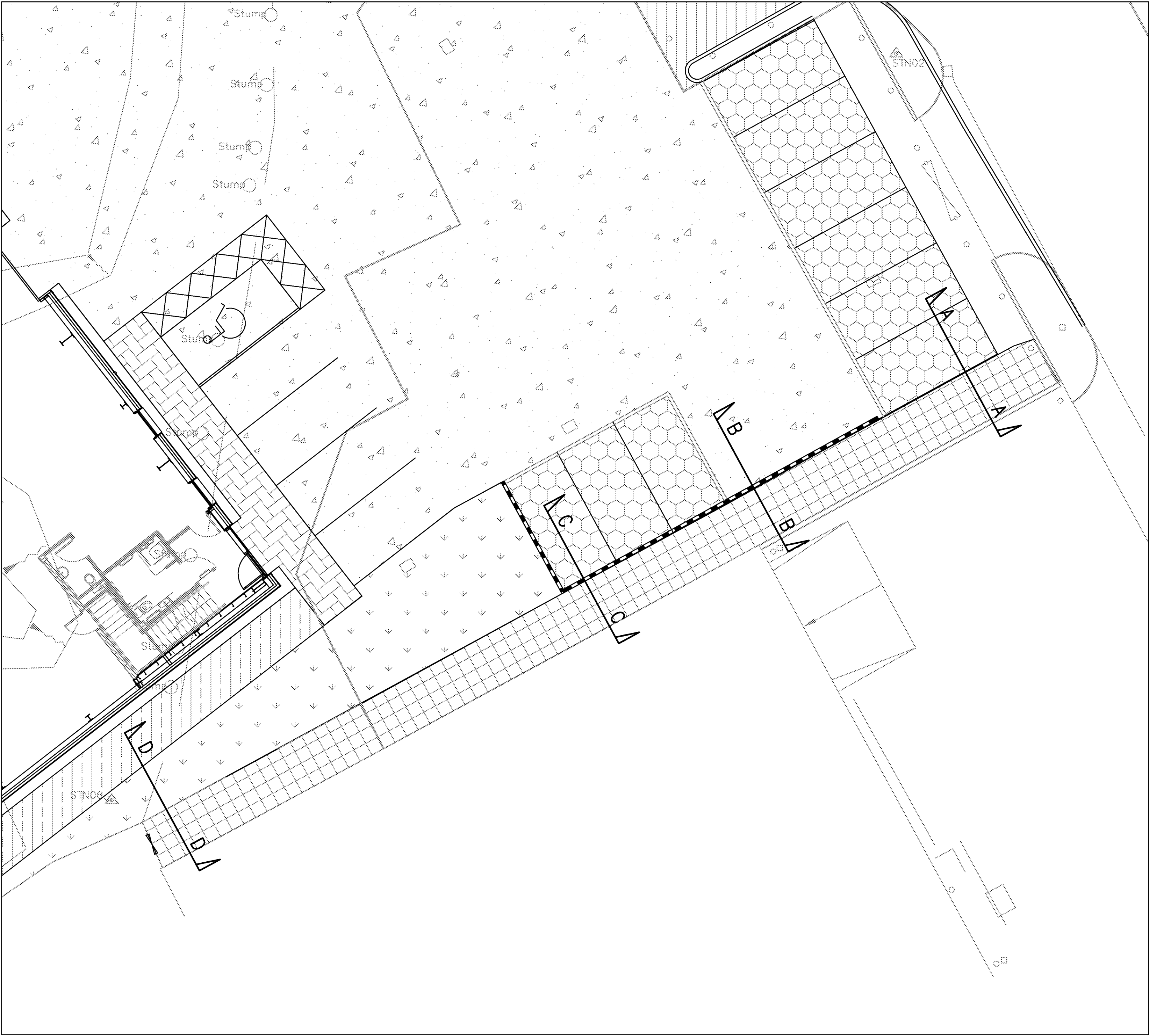
Lineside Industrial Estate
Eldon Way
Littlehampton

TENDER ISSUE

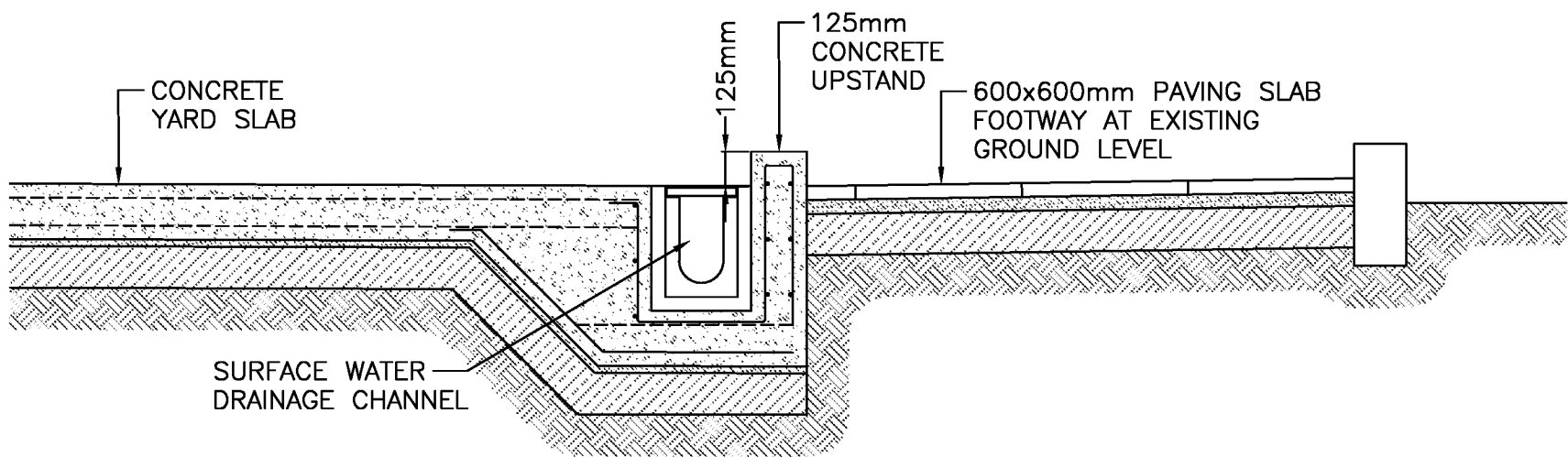
Surface Finishes

taylor whalley spira
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consulting civil and structural engineers
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Tel (020) 7253 8925 Fax (020) 7253 2767
E-mail: tws@tws-uk.com Website: www.tws-uk.com

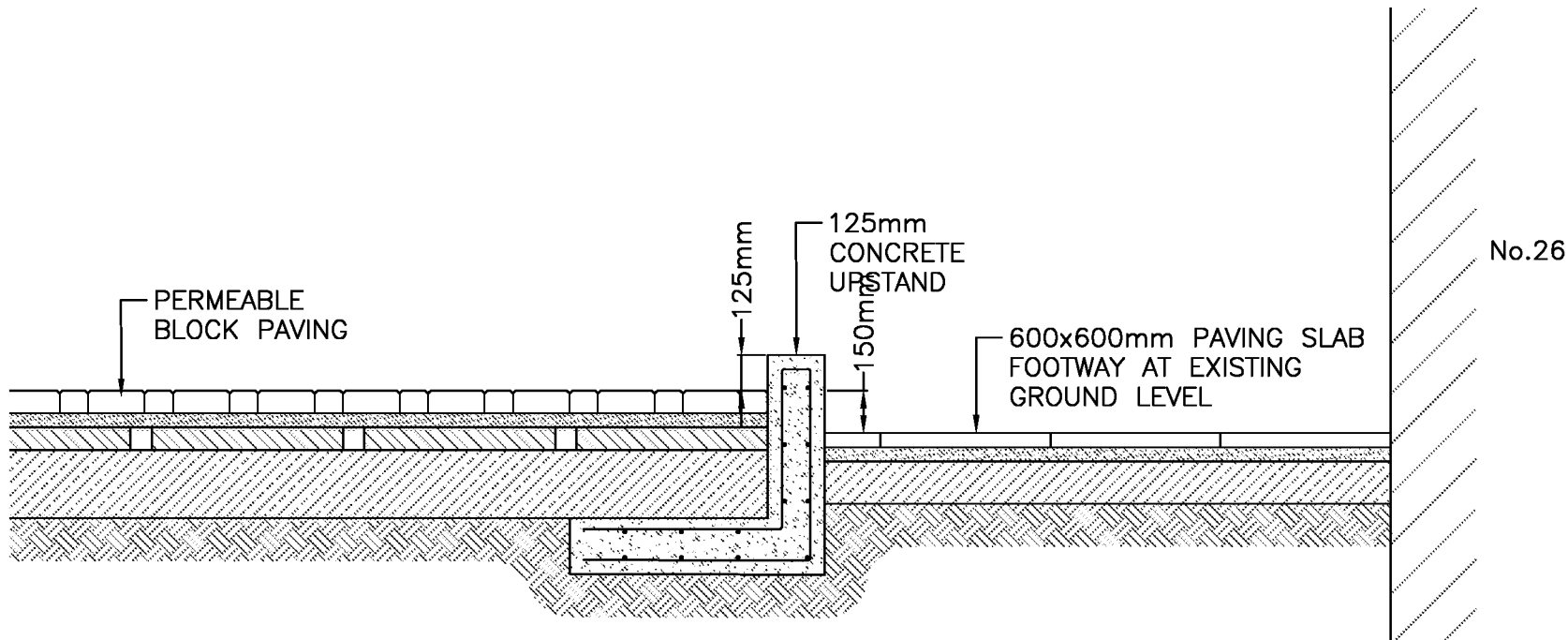
Scale at A1	Date	Drawn By
1:200	25/07/19	JDC
Project No.	Drg No.	Rev.
9261	EX_02	T3



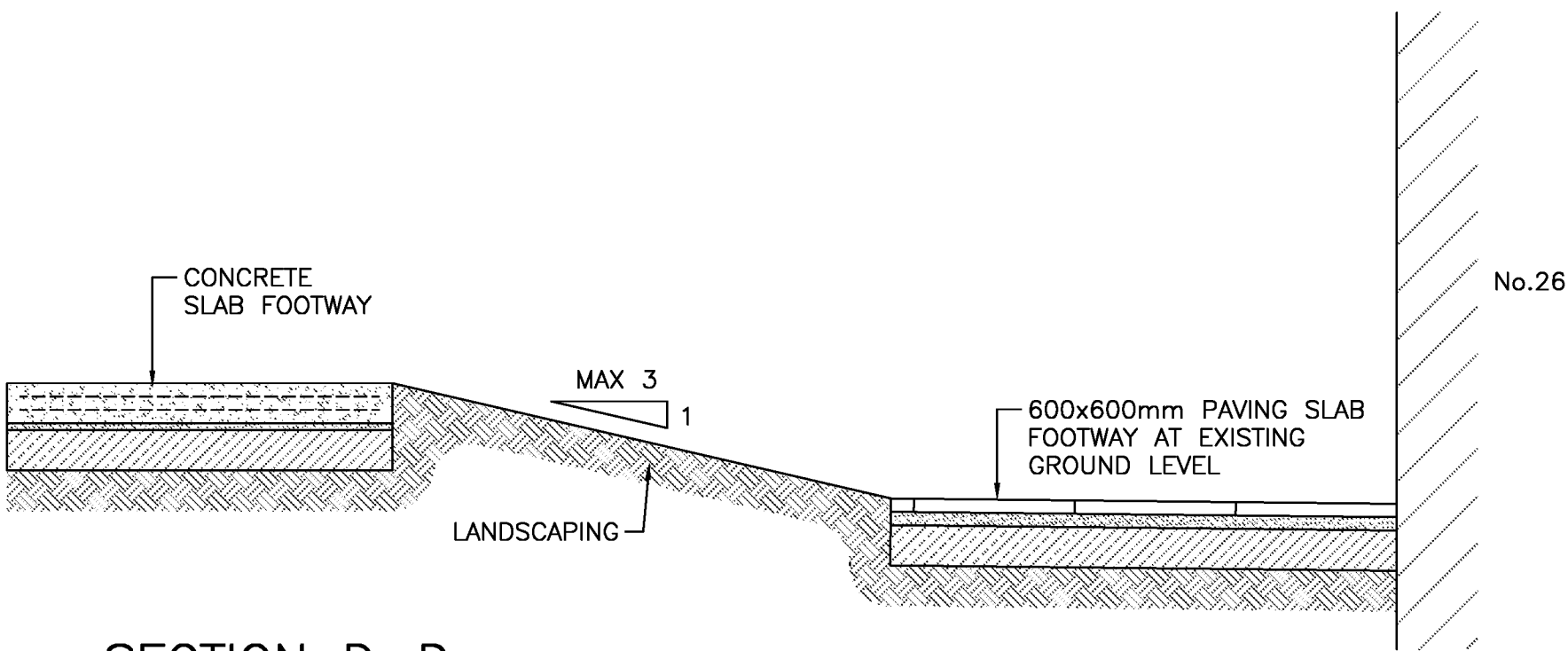
SECTION A-A



SECTION B-B



SECTION C-C



SECTION D-D

EXTERNAL FINISHES NOTES

1. This drawing to be read in conjunction with all relevant Architects, Engineers and Subcontractors drawings and details.
2. This drawing is based on topographical survey by Malcolm Hallis:
Drawing Number 75625-MHL-00-Z0-M2-G-10100-A7
Dated 12/02/19
3. Unless noted otherwise, clauses refer to The Specification for Highway Works: Volume 1 of the Manual of Contract Documents for Highway Works.
4. Refer to Architects drawings for details of all paving types & patterns, soft landscaping, fences, gates & bollards.
5. For lighting, service supplies & ducting requirements, refer to M&E drawings.
6. If surface course is not constructed within 3 days of base course must be cleaned and tack coated prior to laying.
7. Carriageway constructions is based on a CSR value of 2.0% in accordance with results found in Site Investigation RM 6544 by Risk Management, April 2019.

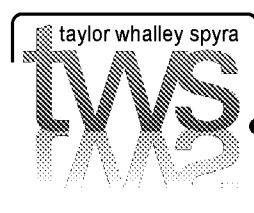
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The Contractor's scheme is to ensure full compliance with the Engineers and Tenants specifications / requirements. Any proposed variation in specification or configuration is to be confirmed with the Project Manager and the Engineer.

T3	Permeable block paved parking bays added, sections updated.	JDC	21.04.20
T2	Paving slab hatching added	JDC	31.10.19
T1	Tender Issue	JDC	16.08.19
Ref.	Revisions	By	Date

Lineside Industrial Estate
Eldon Way
Littlehampton

TENDER ISSUE

Boundary Line Sections

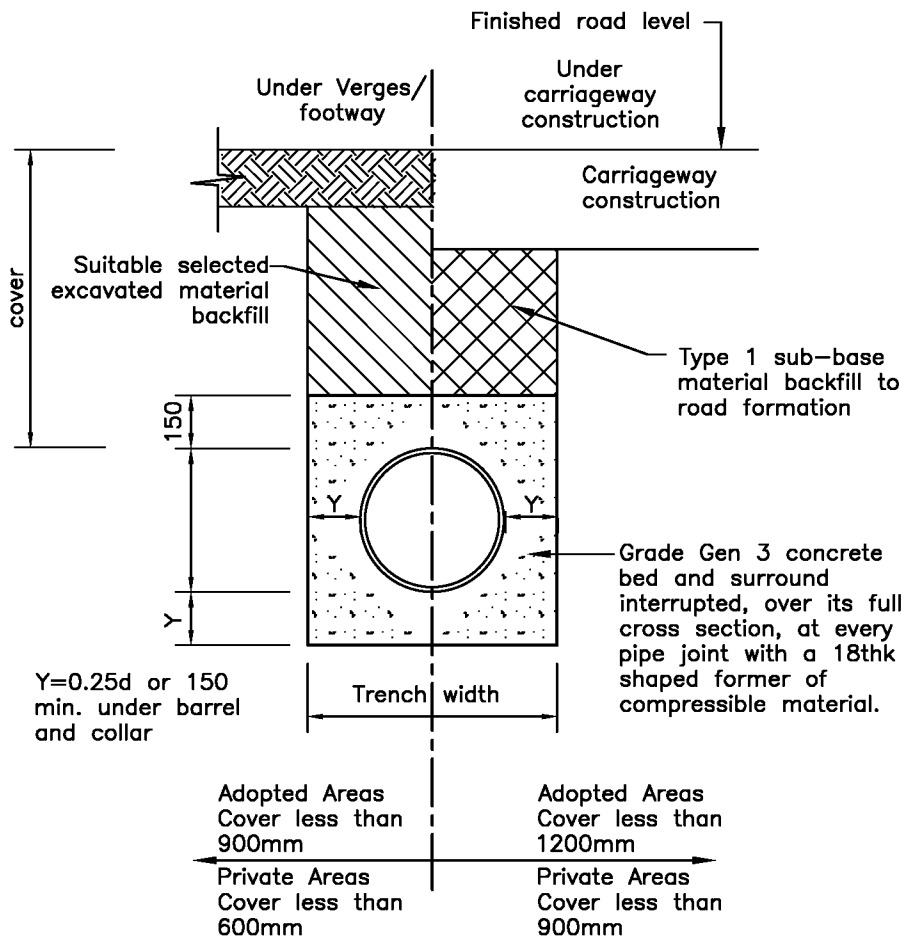
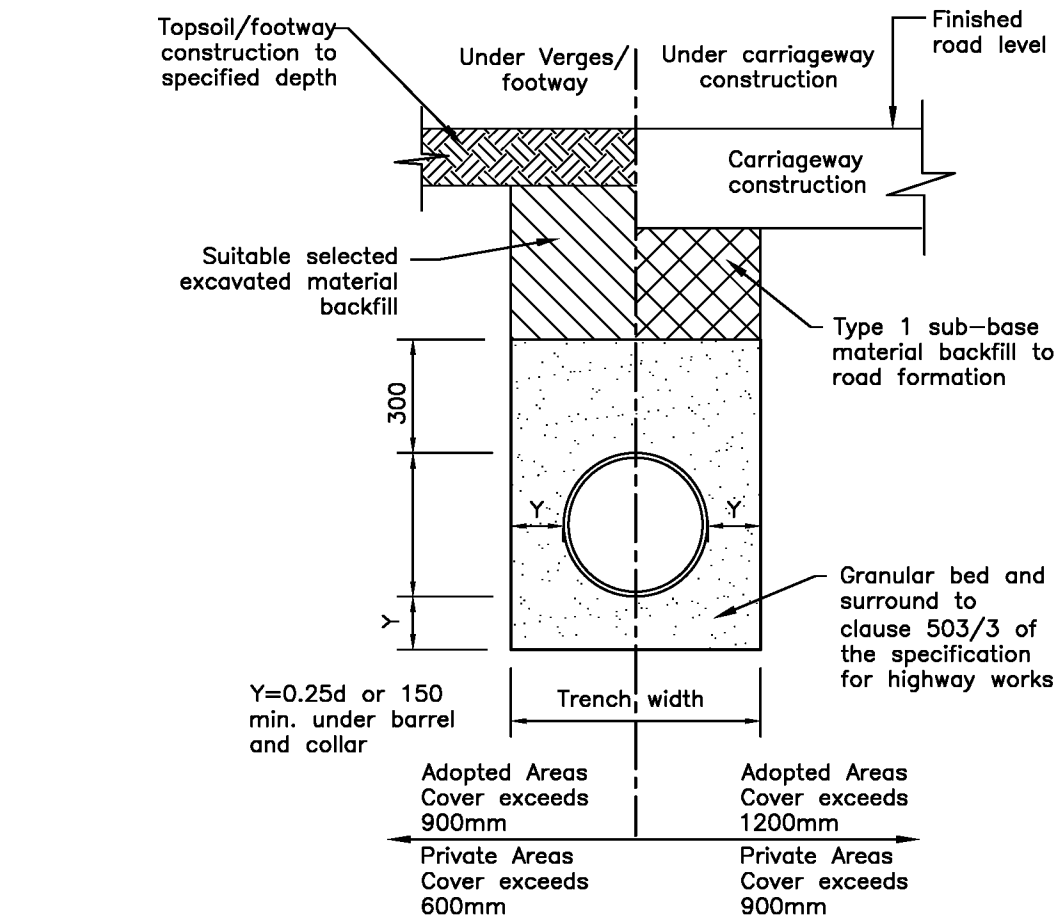


taylor whalley spira

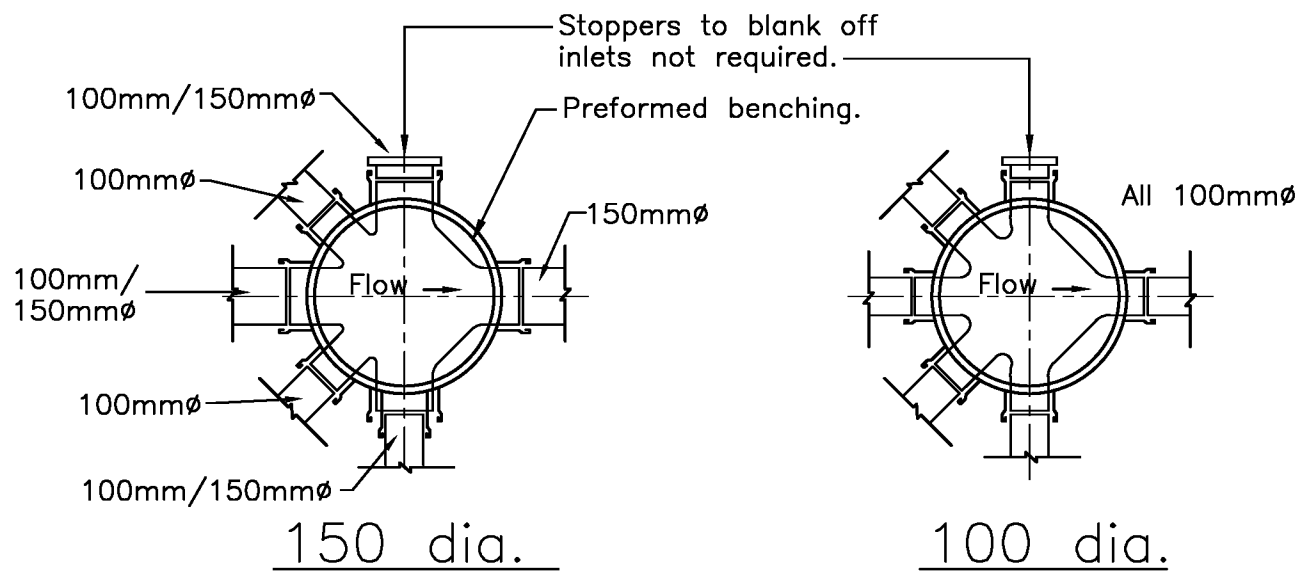
consulting civil and structural engineers
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Scale at A1	Date	Drawn By	
1:200	07/08/19	JDC	

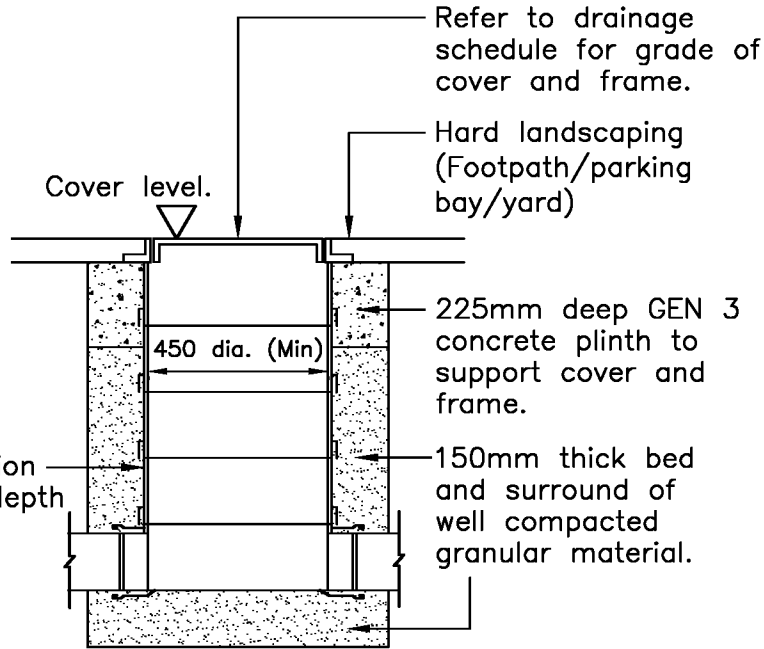
Project No.	Drg No.	Rev.
9261	EX_03	T3



UIC SITED IN SOFT LANDSCAPING



UIC SITED IN HARD LANDSCAPING



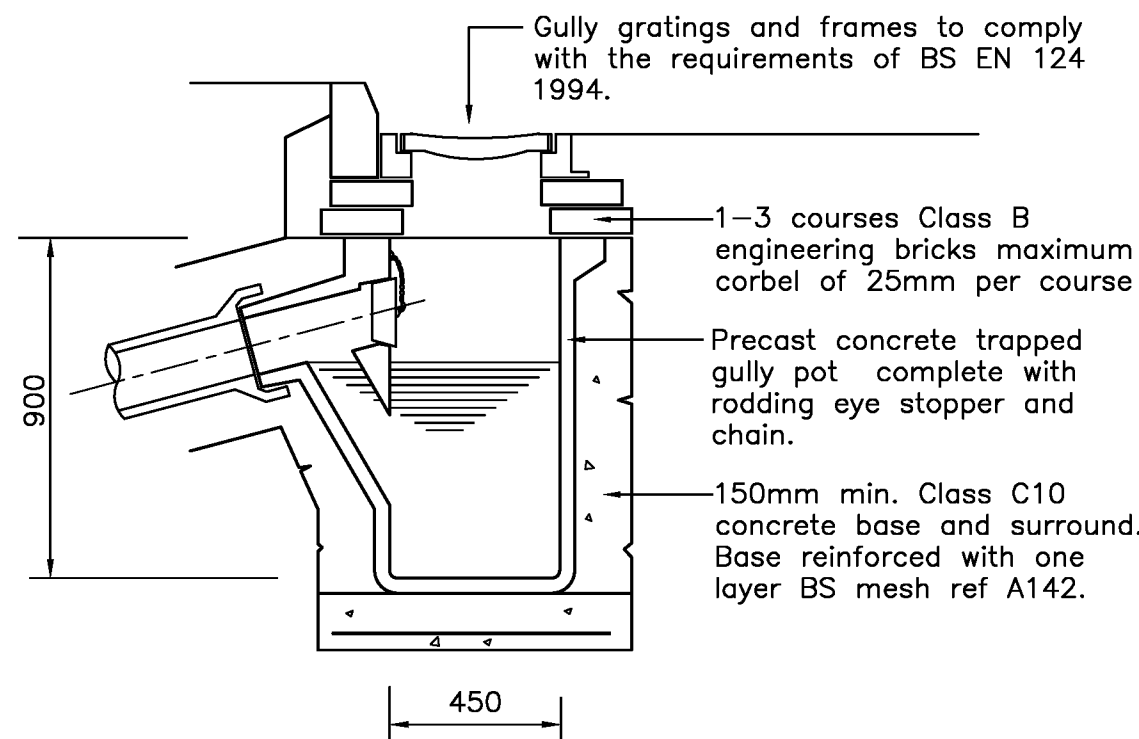
Class S Granular Surround

Class Z Concrete surround

UNIVERSAL INSPECTION CHAMBER (UIC) – POLYPROPYLENE

Max. Depth from cover level to invert of pipe 1.2m

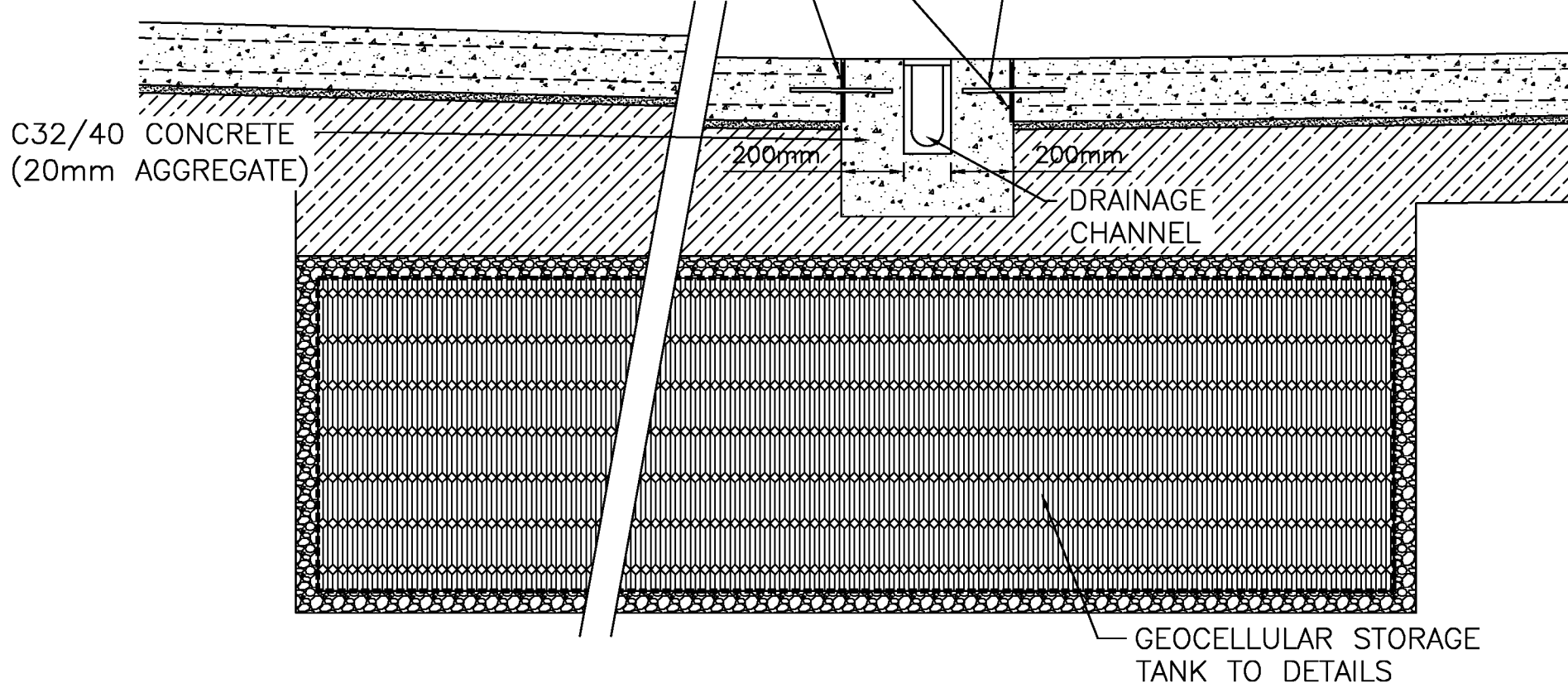
Manhole Diameters	
Diameter of largest pipe in manhole (mm)	Internal diameter of manhole (mm)
Less than 375	1200
375 – 700	1500
750 – 900	1800
Greater than 900	Consult Undertaker



PRECAST TRAPPED GULLY

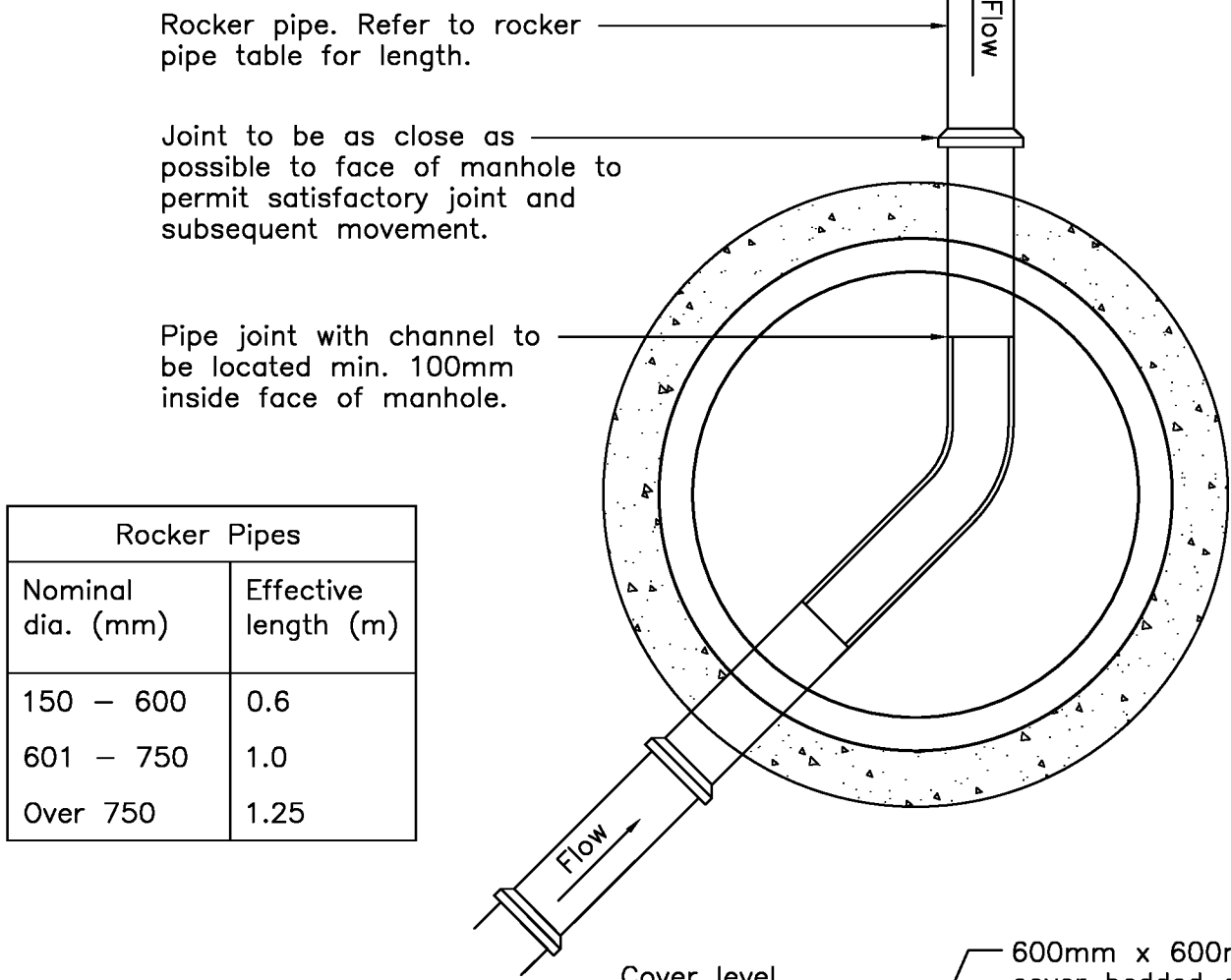
12mm WIDE JOINT WITH MIERS STANDARD 30 MOITHESE CELLULAR EXPANSION MATERIAL WITH 15mm DEEP "CORPOR 200PF" JOINT SEALANT.

R16x325 LONG SMOOTH DOWEL BARS @ 450 ctrs. DOWELS TO BE DEBONDED ONE SIDE USING PROPRIETARY PLASTIC SLEEVES. DOWEL BARS MUST BE HORIZONTAL & PERPENDICULAR TO THE LINE OF THE JOINT. BAR MUST BE HELD FIRMLY IN POSITION & MUST NOT BE DISTURBED WHEN PLACING CONCRETE.

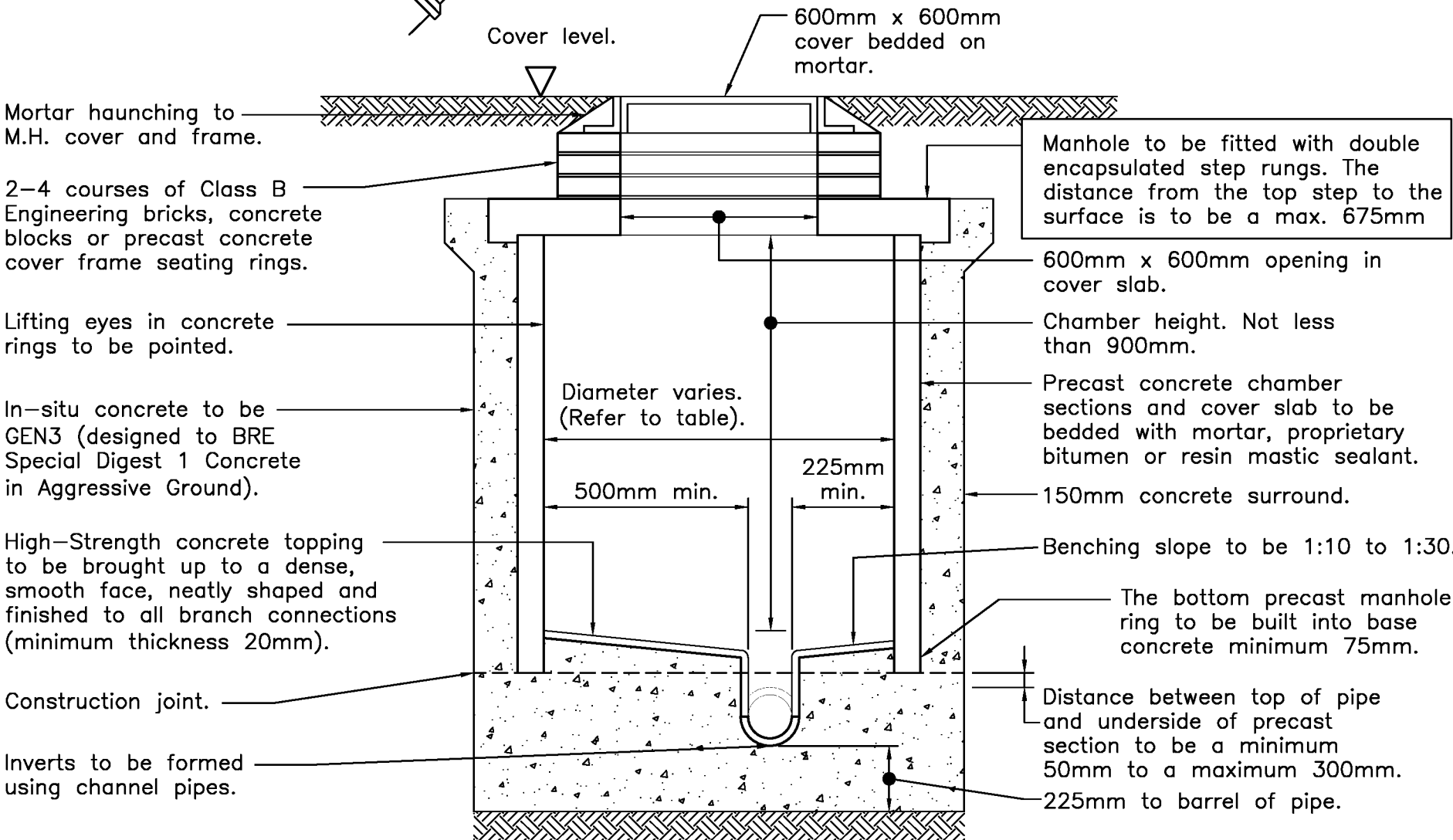


SECTION THROUGH GEOCELLULAR STORAGE TANK, CONCRETE SLAB, & DRAINAGE CHANNEL

ANY REDESIGN OF THE DRAINAGE WILL NEED TO GET APPROVAL FROM THE ARUN DISTRICT COUNCIL DRAINAGE ENGINEER PRIOR TO ANY DRAINAGE WORKS ON SITE.

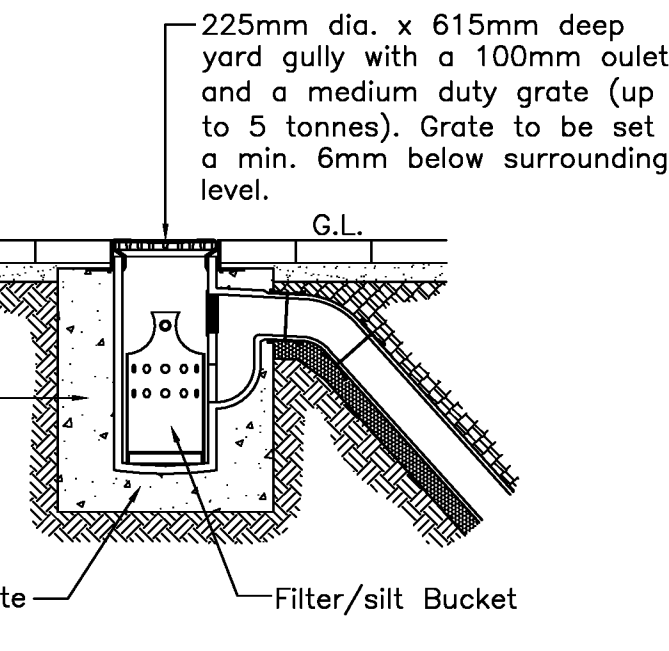


Rocker Pipes	
Nominal dia. (mm)	Effective length (m)
150 – 600	0.6
601 – 750	1.0
Over 750	1.25

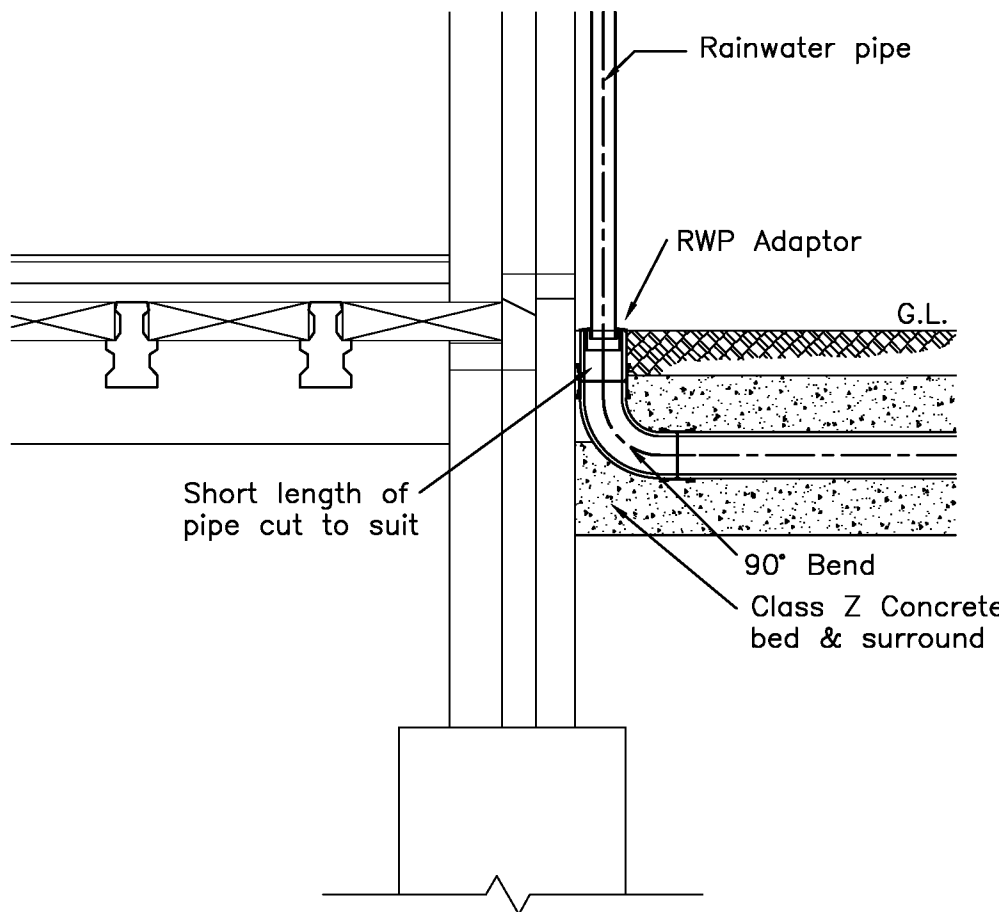


MANHOLE – TYPE B

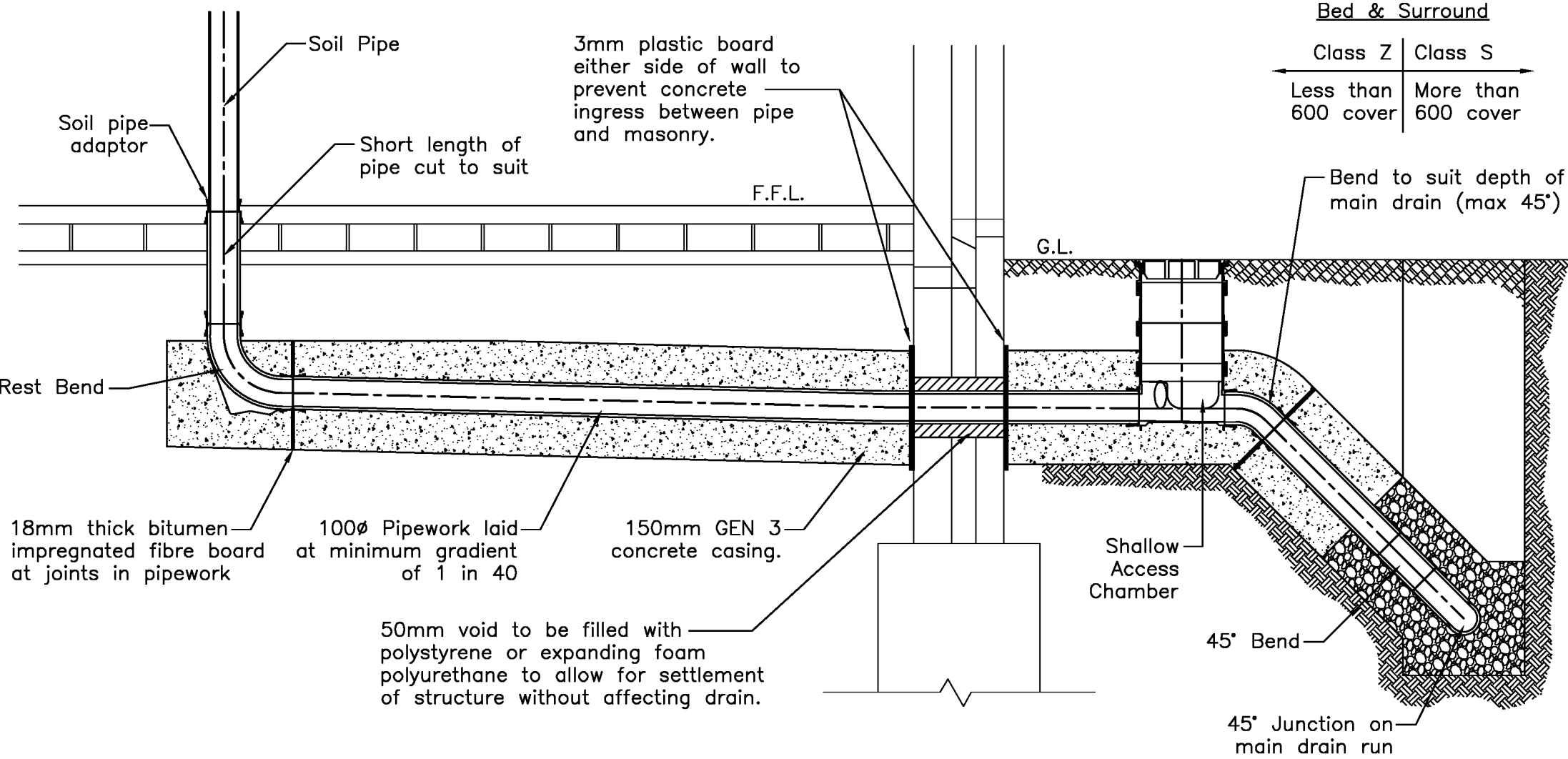
Max. depth from cover level to soffit of pipe 3.0m



YARD GULLY



EXTERNAL RAINWATER PIPE CONNECTION DETAIL



TYPICAL SOIL VENT PIPE & SHALLOW ACCESS CHAMBER DETAIL

NOTE

Adoptable sewers and manholes to be constructed in accordance with "Sewers for Adoption 7th Addition", and to the approval of the adopting water authority.

Private drainage to be constructed in accordance with the Building Regulations "Approved Document H".

Contractors Design & Tender Requirements
The information indicated on this drawing and in the specifications is indicative to assist in preparing the Contractor and their Sub-Contractors to design, co-ordinate and detail the works.
The Contractor's scheme is to ensure full compliance with the Engineers and Tenants specifications / requirements. Any proposed variation in specification or configuration is to be confirmed with the Project Manager and the Engineer.

Ref.	Revisions	By	Date
T5	Drainage approval note added.	JDC	09.06.20
T2	Storage tank detail updated.	JDC	22.04.20
T1	Tender Issue	JDC	16.08.19

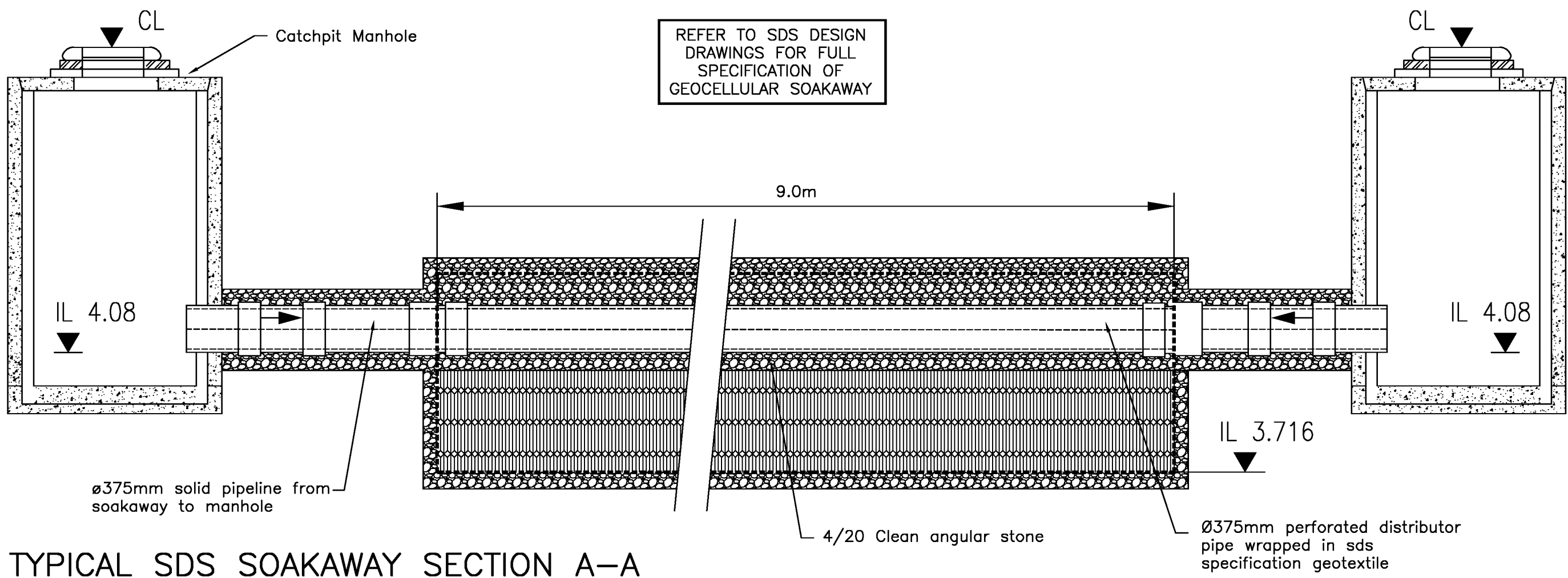
Lineside Industrial Estate
Eldon Way
Littlehampton

TENDER ISSUE

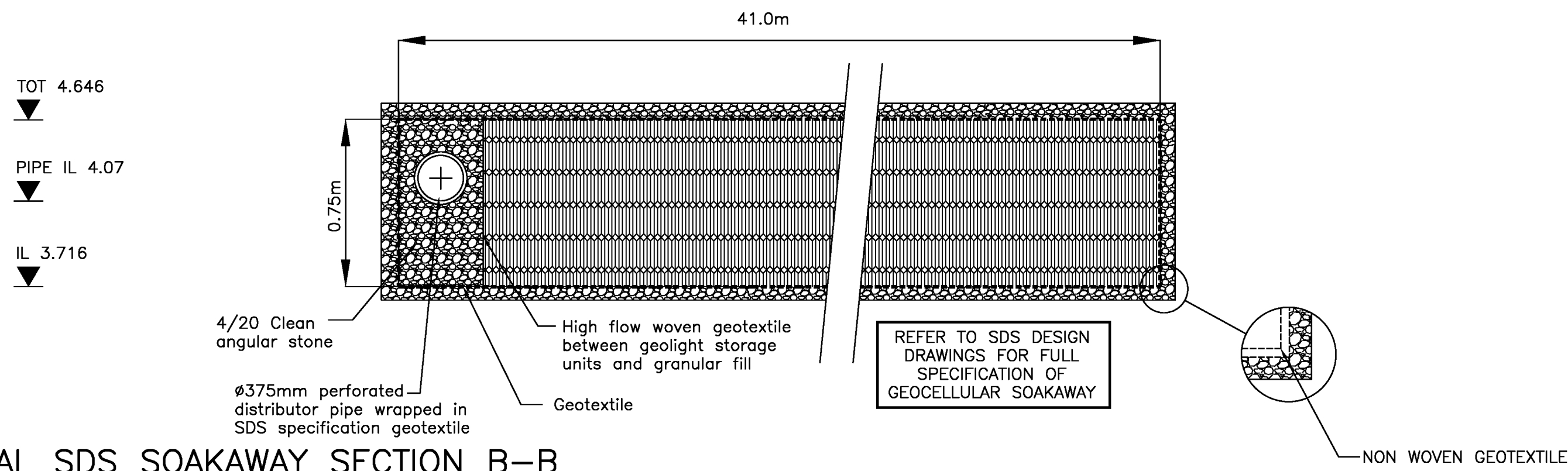
Drainage Details Sheet 1

taylor whalley spira
tws
consulting civil and structural engineers
3 Dufferin Avenue, Barbican, LONDON EC1Y 8PQ
Tel (020) 7253 2020 Fax (020) 7253 2167
E-mail: tws@tws-uk.com Website: www.tws-uk.com

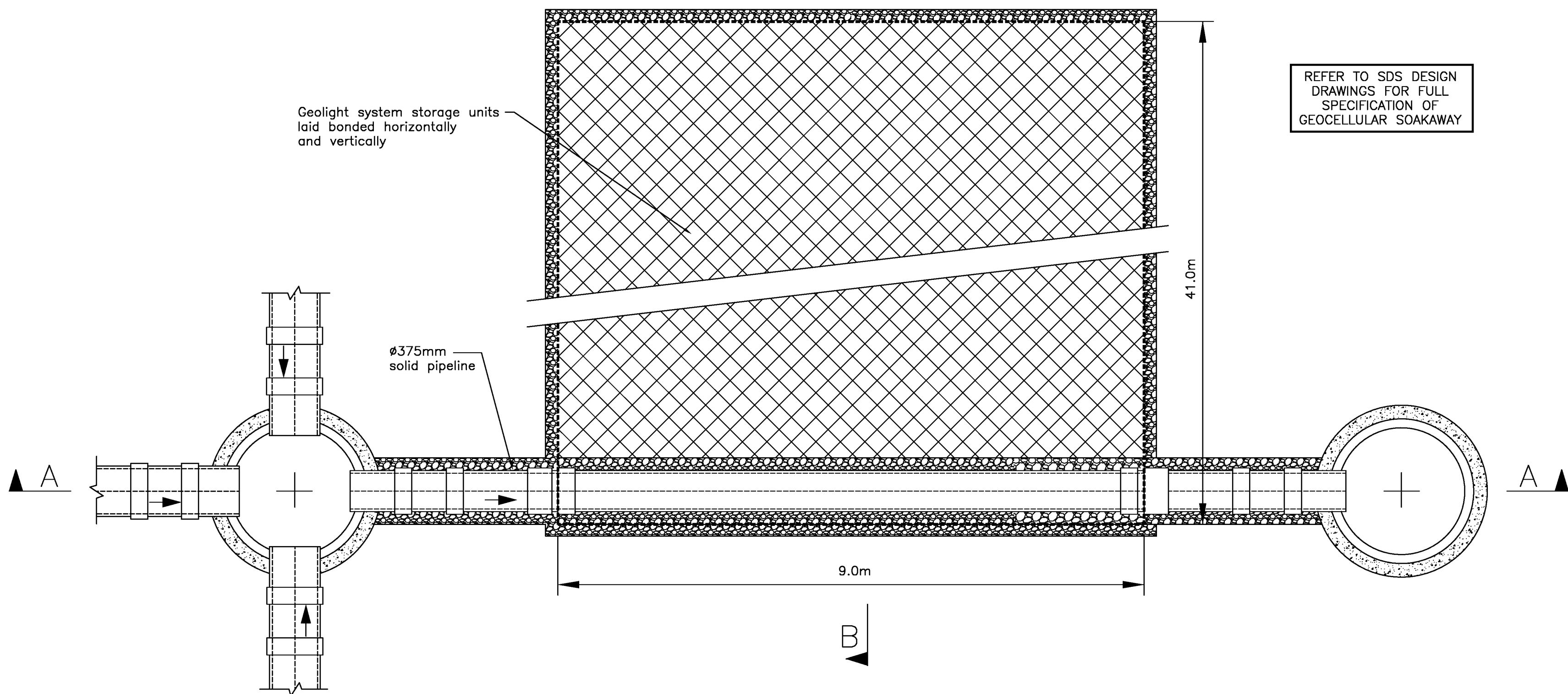
Scale at A1	Date	Drawn By	Rev.
1:200	16/08/19	JDC	
Project No.	Drg No.	Rev.	
9261	PH_03	T3	



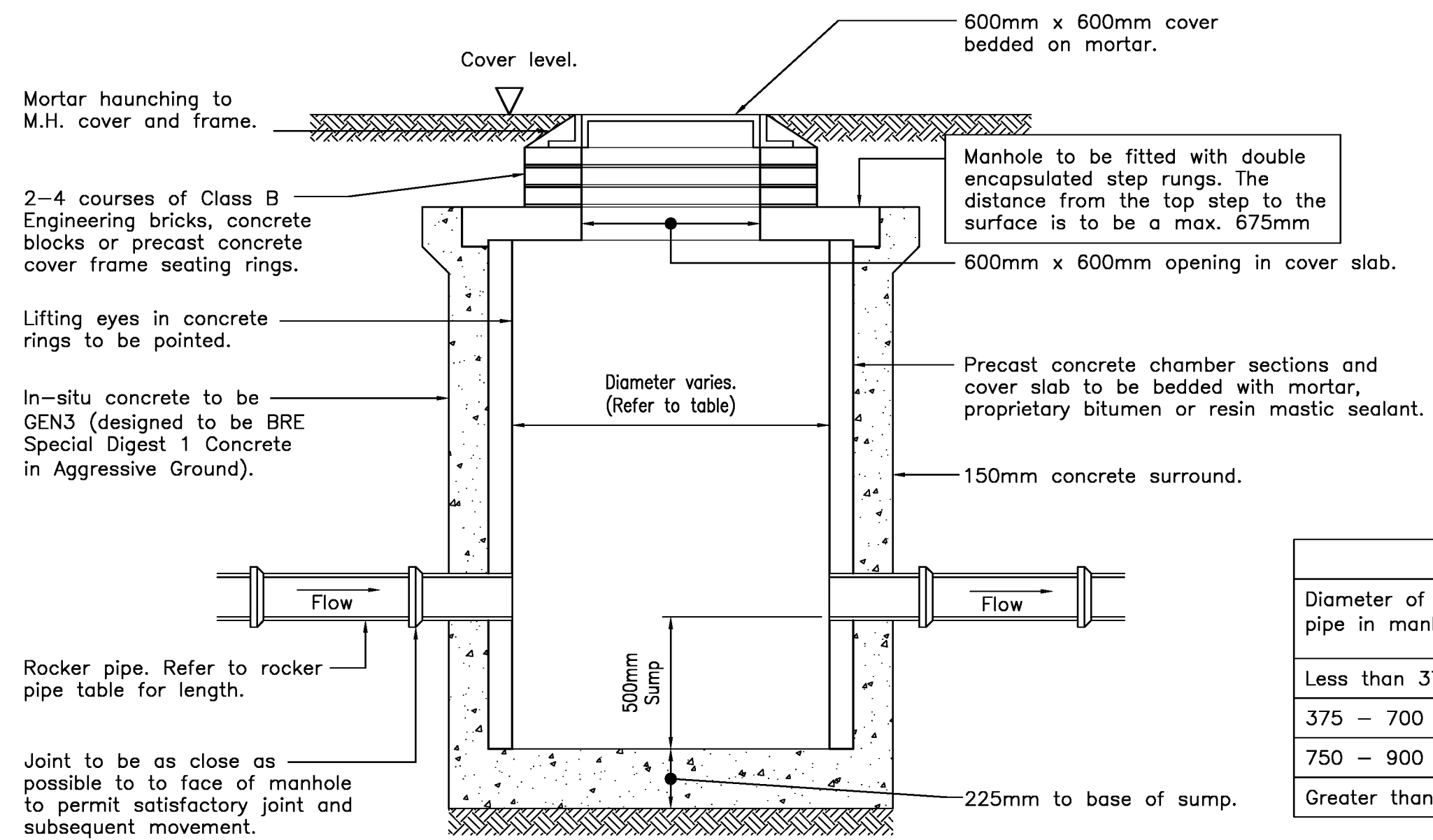
TYPICAL SDS SOAKAWAY SECTION A-A



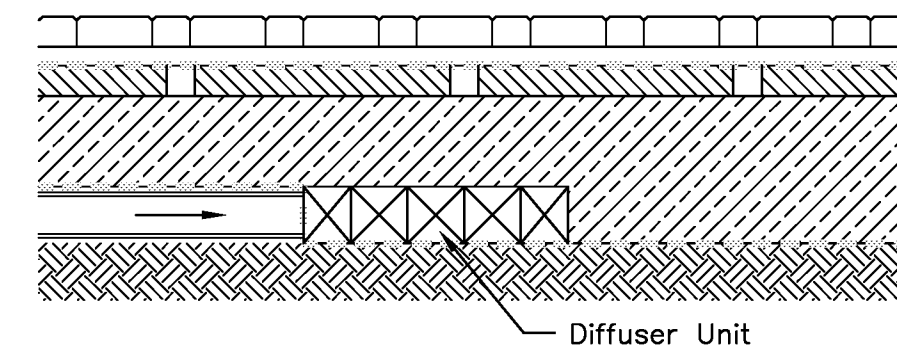
TYPICAL SDS SOAKAWAY SECTION B-B



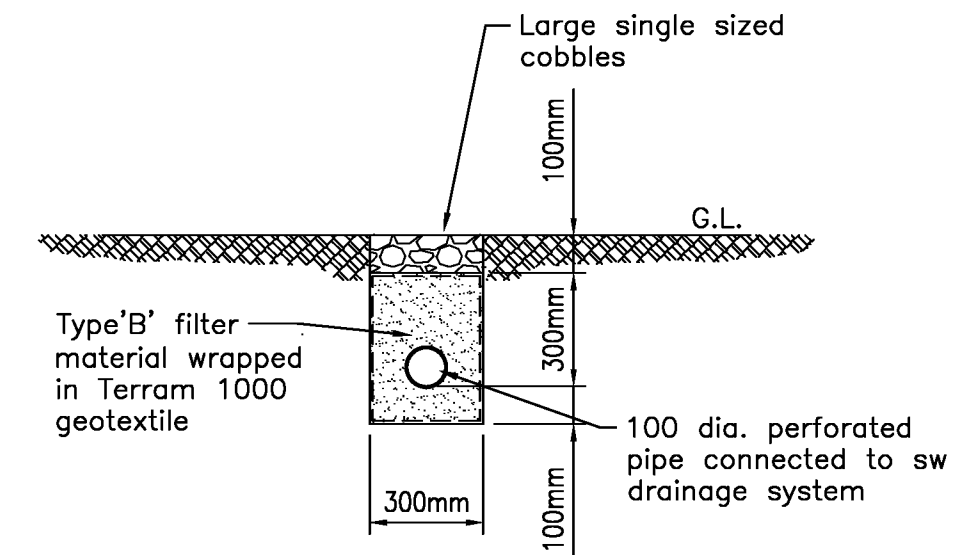
TYPICAL SDS SOAKAWAY (PLAN)



CATCHPIT MANHOLE



TYPICAL SECTION THROUGH DIFFUSER UNIT



GRAVEL DRAINAGE STRIP DETAIL

NOTE

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Rocker Pipes	
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Contractors Design & Tender Requirements

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Ref.	Revisions	By	Date
T4	Drainage approval note added.	JDC	09.06.20
T3	Details updated following comments from Arun District Council.	JDC	28.05.20
T2	Details updated.	JDC	21.04.20
T1	Tender Issue	JDC	16.08.19

Lineside Industrial Estate
Eldon Way
Littlehampton

TENDER ISSUE

Drainage Details Sheet 3
Soakaway Design



Scale at A1	Date	Drawn By
1:200	16/08/19	JDC

Project No.	Drg No.	Rev.
9261	PH_05	T4

ANY REDESIGN OF THE DRAINAGE WILL NEED TO GET APPROVAL FROM THE ARUN DISTRICT COUNCIL DRAINAGE ENGINEER PRIOR TO ANY DRAINAGE WORKS ON SITE.