

Calcinotto

Calcinotto

civil and structural engineers

114378

Unit 9, Saltbox, Bognor Regis
Drainage Management and Maintenance Report

3rd January 2023
Revision 1.2

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1 Background

This document has been produced to aid and inform the maintenance and inspection regimen required to maintain the performance of the foul and surface water drainage systems designed to serve the proposed development over the lifetime of the finished site.

The guidance highlighted within this report has been referenced from the CIRIA document C753 SuDS Manual and CIRIA RP992.

- A detailed breakdown of the 'Drainage Components, Inspection & Maintenance Regime Can be viewed in Appendix A.
- A drawing showing the site drainage proposals and construction details can be view in Appendix B.

2 Description

2.1 Drainage Infrastructure

The development comprises of the following:

- Car Showroom and Sales Facility.
- Car parking for 227 vehicles.
- Dry/Wet Valet Building
- Permeable paved parking bays to the western side of the site
- A below ground corrugated steel pipe attenuation tank, vortex flow control and bypass/washdown separators.
- New drainage infrastructure.

The proposed drainage layout can be viewed on drawings 114378-CAL-XX-XX-DR-D-0100 and 0101 included with the construction details within Appendix B.

2.1.1 Foul Drainage

The development is served by a network of 100mm and 150mm diameter foul water pipework. The system will discharge into an existing 150mm diameter stub connection into the wider Saltbox development foul drainage system located on the northern site boundary, of which some capacity had been allocated for Unit 9 at outline planning for the wider development.

The proposed foul water drainage system contains an element which will need to be inspected and maintained, as outlined in Appendix A, to retain the performance of the system. This element is as follows:

Washdown and Silt Separator – The site drainage proposals specify a 19,000 litre Klargester Washdown and Silt Separator unit to be located within the foul drainage system downstream of the valet building and upstream of the building foul water main sewer line.

Klargester maintenance guidelines suggests the following approach to maintaining the separator: -

- Separators should be inspected at least every six months or more frequently if experience dictates. A log should be maintained detailing any silt removal or cleaning carried out. A specimen maintenance log is included in the appendices.
- Every site is different, in respect to the amount and type of silt generated by the drain design and installation. Frequently, the construction programme itself generates large and perhaps unusual quantities of silt and grit. We do recommend that following the initial installation, an inspection of the separator contents be made to check that building rubble has not entered the unit. Further inspections at 3 and 6 months should be made so as to be able to assess the volumes of silt accumulated. The inspection and emptying programme can then be defined following the first 6 months site experience. We recommend leaving a maximum interval between inspections of 6 months.

2.1.2 Surface Water Drainage

The development is served by a network of 100mm up to 375mm diameter pipework. The system will discharge into an existing 450mm diameter surface water sewer located within the site boundary which forms part of the wider development site surface water drainage system prior to discharge into a tributary of the Aldingbourne Rife. The connection into the site wide drainage system will be managed by a hydrobrake flow control device, that will limit the off-site flow to a maximum of 2.46 l/s, in accordance with the agreed outline planning permission surface water drainage strategy. The surface water system will work via gravity alone.

The proposed surface water drainage system contains several principal elements which will need to be individually inspected and maintained, as outlined in Appendix A, to retain the performance of the system. These elements are as follows:

Permeable Paving – The permeable paved aisles have been designed to act as both a drainage collection system and an attenuation system. The permeable paving will not be allowed to infiltrate to ground due to the existing on-site conditions.

Flow Control Device – A Hydrobrake vortex flow control has been used to manage the proposed surface water drainage system. The flow control device will be built into the Tubosider steel corrugated pipe tank and will therefore share its maintenance with the tank with regards to the removal of silt.

Corrugated Steel Pipe Tank – The primary storage method uses a Tubosider tank located beneath the western side of the car park. This tank will provide sufficient storage for a 1:100 year + 40% climate change storm event. The flow control device is to be accommodated within one of the access chambers to the tank.

Gravel Strip – There is a narrow gravel margin proposed to the building line which will contain a perforated pipe outfall to the site surface water drainage system. This margin will act as an overflow into the drainage system should the car park pipes flood and overflow towards the building line.

Road Gully's (With internal smart sponges) – The road gully's serving the eastern side of the car park are to be installed with smart gully adaptors which will contain smart sponges. These sponges will filter out any hydrocarbons picked up from the car park preventing them from reaching the off-site drainage system.

The proposed surface water drainage system has been designed to minimise the risk of any flooding occurring on-site by using the range of recommended storm return periods. Where appropriate for more extreme long-term events an allowance for climate change has also been allowed for to protect the site over the lifetime of the development.

Design storm return periods used:

1 in 1 Year Storm

1 in 30 Year Storm + 20% Climate Change Allowance

1 in 100 Year Storm + 40% Climate Change Allowance

In addition to the attenuation storage provided for the design storm return periods listed above, some additional storage space is available within the permeable paving for an extreme exceedance event. This will ensure that all run-off is retained within the site only.

3 Maintenance Items

The following is a list of components included within the foul and surface water drainage system which will need to be regularly inspected and maintained:

- Foul and Surface Water Pipework
- Foul and Surface Water Chambers
- Permeable Block Paved Car Park Isles
- Corrugated Steel Pipe Attenuation Tank
- Gravel Drainage Margin
- Flow Control Chambers
- Bypass and Silt Separators
- Gully Pots and Drainage Channel Deep Sump Units

Refer to Appendix A for the recommended frequency of inspection works.

This will be a live document and any changes to inspection periods should be recorded and a reason given for future reference.

Appropriate safety fencing and barriers should be erected during any servicing and maintenance works on any part of the drainage system to ensure the safety of all site users, visitors as well as the maintenance staff carrying out the works. Timing for these works should be programmed in with notifications given to the site users.

Specific maintenance information from the manufacturers of proprietary product such as separators, Hydrobrake and Tubosider can be found in **Appendix C**.

Schedule of Changes

This schedule has been provided to enable those responsible for the maintenance of the drainage systems to document changes made to the actions and frequencies of maintenance, in direct response to changing site / drainage conditions:

Drainage Feature	Change of Action	Change of Frequency	Comments

5 Conclusion

The maintenance guidelines are live documents and will be monitored through the lifetime of the development and will be amended and addressed as necessary.

Any changes to the schedule are to be recorded in the Schedule of Chambers Table included.

The occupier (Richmond Motor Group) will have direct responsibility for the maintenance and management of the Unit 9 site foul and surface water drainage system within their site boundary including ensuring compliance with any regulatory requirement with regards to the quality of surface water drainage.

A Drainage Components Inspection & Maintenance Regime

SuDS Components Operation and Maintenance Activities

Operation and Maintenance Activity	SuDS Component												
	NOTE: Only components highlighted in BLUE are relevant to this project.												
	Pond	Wetland	Detention Basin	Infiltration Basin	Soakaway	Infiltration Trench	Filter Drain	Attenuation Storage	Permeable Paving	Swale / Bioretention / Trees	Gravel Margin Strip	Green Roofs	Proprietary Treatment Systems
Regular Maintenance													
Inspection	●	●	●	●	●	●	●	●	●	●	●	●	●
Litter and Debris Removal	●	●	●	●	○	●	●	○	●	●	●		○
Grass Cutting	●	●	●	●	○	●	●	○	○	●	●		
Weed and Invasive Plant Control	○	○	○	○		○	○		○		○	●	
Shrub Management (Including Pruning)	○	○	○	○					○	○	○		
Shoreline Vegetation Management	●	●	○										
Aquatic Vegetation Management	●	●	○										
Occasional Maintenance													
Sediment Management ¹	●	●	●	●	●	●	●	●	●	●	●		●
Vegetation Replacement	○	○	○	○						○	○	●	
Vacuum Sweeping and Brushing									●				
Remedial Maintenance													
Structure Rehabilitation / Repair	○	○	○	○	○	○	○	○	○	○	○	○	
Infiltration Surface Reconditioning				○	○	○	○		○	○			

¹ Sediment should be collected and managed in pre-treatment systems, upstream of the main device

Legend: ● Will be required ○ May be required

General Foul and Surface Water Drainage Maintenance

Piped Network/Chambers Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	The entire on-site foul and surface water drainage system should be visually inspected by lifting all manhole covers and checking the silt traps of catchpits, sump units and gullys.	Every six months
	The entire on-site foul and surface water drainage system should be CCTV surveyed to identify any damage, blockages or silt build-up. Any obstructions to be jet cleaned and any damage repaired.	Every 5 Years
Remedial Maintenance	Any identified blockages within the drainage system to inspected via a CCTV survey, jet cleaned and repaired if necessary.	As required

Piped Network/Chambers

Piped Network/Chambers Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect and identify any features that are not operating correctly. If required take remedial action.	Monthly for three months, then six monthly.
	Debris removal from catchment surface/gratings (where may cause risks to performance)	Monthly (and after large storms)
	Remove sediment from trapped sumps, manholes and catchpits.	Annually or as required
Remedial Maintenance	Repair/rehabilitation of gratings, inlets and outlets.	As required
Monitoring	Inspect/check all gratings, trapped sumps, manholes and catchpits to ensure that they are in good condition and operating as designed.	Annually and after large storm events
Structure Rehabilitation/Repair	Regular maintenance and monitoring to identify if repair and/or replacement of features or pipework is required.	As required

Corrugated Steel Pipe Storage Tank

Cellular Storage Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect and identify any features that are not operating correctly. If required take remedial action.	Monthly for three months, then annually.
	Remove debris from catchment surface (where may cause risks to performance)	Annually or as required
Remedial Maintenance	Repair/rehabilitate inlets, outlets, 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 storm events
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required
Structure Rehabilitation/Repair	Regular maintenance and monitoring to identify if repair and/or replacement of storage units is required.	As required
The SuDS Manual Table 21.3: Operation and maintenance requirements for attenuation storage tanks.		

Permeable Pavements

Permeable Pavement Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Brushing and vacuuming (standard cosmetic sweep over the whole surface). Care should be taken in adjusting vacuuming equipment to avoid removal of jointing material if present. Any lost material should be replaced	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturers' recommendations – pay particular attention to areas where water runs from adjacent impermeable areas, as this area is most likely to collect the most sediment
Occasional Maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weed or management using glyphosate applied directly to the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial Maintenance	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of the level of paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structured performance or a hazard to users, 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 and filtration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, forty-eight hours after large rainfall events in the first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually
The SuDS Manual Table 20.15: Operation and maintenance requirements for pervious pavements		

Bypass and Wash-down Separators

P.T.S. Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspection of the accumulated oil / silt build-up within the PTS and removal if necessary	Annually or as required
	Physical inspection of the PTS including all mechanical parts and maintenance as required	Annually or as required
	All electrical equipment such as alarms and management systems to be services	Annually or as required
	The entire PTS is to be emptied and given a general inspection to test the integrity and performance of the system. Following the inspection, the PTS is to be re-filled with clean water.	Every 5 Years
Remedial Maintenance	Repair/rehabilitate inlets, outlets, overflows and vents.	As required
	The PTS system is to be emptied as soon as a significant amount of oil / silt has built-up. The retained materials are to be removed and the PTS re-filled with clean water. This is to be done immediately if an alarm system is triggered.	As required
	Any coalescing devices to be checked and replaced as necessary	As required
Monitoring	Inspect/check all gratings, trapped sumps, manholes and catchpits to ensure that they are in good condition and operating as designed.	Annually and after large storm events
Structure Rehabilitation/Repair	Regular maintenance and monitoring to identify if repair and/or replacement of features or pipework is required.	As required

Road Gully's with Smart Gully's Adaptors

P.T.S. Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspection of the silt build-up within the road gully sumps and removal if necessary	Annually or as required
	Inspection of the smart sponges housed within the Smart gully's adaptors and replacement if necessary	Annually or as required
Remedial Maintenance	Inspect/check all gratings, trapped sumps, manholes and catchpits to ensure that they are in good condition and operating as designed.	Annually and after large storm events
	Regular maintenance and monitoring to identify if repair and/or replacement of features or pipework is required.	As required
Monitoring	The smart sponges should be weighed to determine when they require replacement. Once the smart sponges reach 2-3 times their original starting weight of 0.5 kg (Due to absorbing hydrocarbons) they must be replaced.	Annually or as required
Structure Rehabilitation/Repair	Regular maintenance and monitoring to identify if repair and/or replacement of features or pipework is required.	As required

B Proposed Drainage Plans and Construction Details

NORTH

Drainage Legend

- Site Boundary
- Existing Private SW Sewer (& Manhole)
- Existing Private FW Sewer (& Manhole)
- Proposed Private SW Sewer (& Manhole)
- Proposed Private FW Sewer (& Manhole)
- 4500 Trapped Gully with Smart Sponge Filter
- Square Trapped Yard Gully + Shallow Bucket
- Rodding Eye
- Rainwater collection Pipe (with Access)
- Gatic Facade Drain or Similar (Revolving door drain to Architect spec)
- Stub Stack
- Soil & Vent Pipe
- Perforated Distributor / Collection Pipe
- ACO M1000 Drainage Channel (with Sump Unit)
- Porous Paving (Finish to Architect Spec)

Refer to architects / M&E drawings for exact positions of internal connections and RWPS.

Notes:

- This drawing is to be read in conjunction with all relevant architects, engineers and specialist sub-contractors drawings and the specification.
- All setting out to be in accordance with the schedules, any discrepancies between the engineers and the architects drawings to be referred to the architect before proceeding. Dimensions must not be scaled.
- All private drainage is to be in accordance with BS EN 752-1-2-3-4, BS EN 1295-1, BS EN 1610 and all relevant sections of approved document H of the building regulations (2015 Edition).
- Where drainage pipework is to be flexibly jointed extra strength vitrified clay it should be to BS EN 295-1, Hepworth 'Supersleve' or equivalent.
- Where drainage pipework is plastic i.e. PVC-U it shall be to BS EN 1401-1 Osma or equivalent. Private pipework to be type SN4 and all adoptable pipework to be type SN8.
- Where drainage pipework is cast iron it shall be to BS EN 877 and for ductile iron it shall be to BS EN 598.
- All concrete pipework, shall be to BS EN 1916 and BS 5911-1. Manholes and fittings shall be to BS 5911 parts 3 and 4 and BS EN 1917.
- Where drains pass through foundations or connect to manholes, flexible pipe joints are to be provided within 150mm of the face of the structure and within a further 600mm to form a rocker pipe.
- Where pipes pass through screen walls, footings or retaining walls, lintels are to be provided.
- Where pipelines pass within 1.0m of buildings or walls the foundations are to be taken down below the bottom of the trench. Where pipelines are more than 1.0m away from foundations the trench shall be backfilled with concrete up to a point that meets a 45° angle line taken from the bottom corner of the nearest foundation.
- Where depth to invert does not exceed 600mm and the pipe size does not exceed 100mm diameter, 300mm dia. polypropylene access chambers may be used. Elsewhere, proprietary polypropylene or precast concrete manholes are to be used.
- Where connections are to be made to existing manholes / sewers, invert levels, pipe sizes and orientation should be checked prior to the commencement of the works and any variance reported to the engineer immediately. Where connections are to be made on or off site the contractor is to check the line and level of any services / mains, to ensure that no clashes exist prior to works commencing.
- Where pipelines cross, each is to be surrounded with grade ST4 mass concrete for a distance not less than 1.0m centred on the crossing point. Length of surround to be extended as necessary to within 150mm of the next nearest flexible joints.
- For private drainage, concrete protection is to be provided where the effective cover to the crown of the pipe(s) is less than 1.2m in trafficked areas and 0.6m in soft landscaped or pedestrianised areas.
- The contractor is to ensure that protective measures are taken to ensure that drainage pipework and fittings are not damaged by site traffic prior to oversite filling operations being completed around buildings.
- The top run of each private foul drainage network is to be laid to falls no slacker than 1:40, the head of each run is to be vented to atmosphere in accordance with approved document H.
- All surface water drainage to be min 100mm dia, laid at a gradient no slacker than 1:40. And all foul water drainage to be min 100mm dia, unless stated otherwise.
- The contractor is to ensure that all pipework connections are arranged to direct flows down or into the main channel in the direction of the main flow. Where necessary 3/4 bends are to be used on oblique connections inside the manhole benching where sufficient room exists or the pipelines on oblique connections are arranged outside the chamber to be able to divert flows down the main channel. Connections brought in perpendicular to the main channel are not acceptable.
- The contractor is to ensure that when preformed polypropylene manhole bases are used that they are orientated such that the main flow is through the main channel of the base. This should be achieved by incorporating long radius bends outside of the manhole.
- The contractors attention is drawn to the need to ensure that any trenches excavated through previously compacted filled areas, in particular under the building footprint and immediately around the outside, are re-compacted to ensure localised differential settlement does not occur.
- Where new connections are to be made into existing manholes or sewers, all invert levels, pipe orientation and sizes should be checked on-site prior to the commencement of the works, with any variance reported to the engineer once identified. Where new connections are to be made either on or off-site, the contractor is to check the line and level of any existing services / mains, to ensure that no clashes exist prior to the works commencing.
- Porous paving surface finish 'to the architects spec'. Any alteration to the extents of the porous paving may have an adverse affect upon the Surface water drainage design and must therefore be discussed with the engineer.
- Unscheduled inspection chambers are to be minimum 300mm dia, non-access shallow inspection chambers to provide rodding access into building. Invert level provided on plan.
- Existing foul and surface water invert levels taken from Greenhatch survey 41405A.1. Any variance from these levels are to be notified to the drainage engineer prior to works commencing.
- All pipes to be laid soffit to soffit unless otherwise specified within the manhole schedule.
- All direct pipe connections to be made using oblique 45 degree junctions.
- Perforated pipe ends in permeable paving to be capped.
- Manhole references denoted as 'CP' to have catch pits.

I	27.06.22	F3 and F4 cover level amended.
H	15.06.22	Site Plan Updated, F6 & F7 moved. S7 cover level amended.
G	05.05.22	Site Plan Updated, Drainage Remains Unchanged Per Rev F
F	04.04.22	Further amendments to address LLFA comments.
E	15.03.22	Amended to pick up LLFA comments.
D	02.03.22	Issued for Condition 12 Approval
C	24.02.22	Bypass separator levels amended.
B	10.02.22	Tubosider tank added S18 and S21 removed.
A	08.02.22	Construction Issue
Rev	Date	Description



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Client:
RICHMOND MOTOR GROUP

Project Title:
Saltbox

Drawing Title:
**Drainage Layout
Sheet 1 of 2**

Drawing Status:
Construction

Originator No.	Rev by	Chk by	Scale
114378	DB	PW	1:250 @A1

PROJECT ORIGINATOR ZONE LEVEL TYPE ROLE NO	Revision
114378-CAL-XX-XX-DR-D100	1

Notes:

1. This drawing is to be read in conjunction with all relevant architects, engineers and specialist sub-contractors drawings and the specification.
2. All setting out to be in accordance with the schedules. any discrepancies between the engineers and the architects drawings to be referred to the architect before proceeding. Dimensions must not be scaled.
3. All private drainage is to be in accordance with BS EN 752-1-2-3-4, BS EN 1295-1, BS EN 1610 and all relevant sections of approved document H of the building regulations (2015 Edition).
4. Where drainage pipework is to be flexibly jointed extra strength vitrified clay it should be to BS EN 295-1, Hepworth 'Supersleve' or equivalent.
5. Where drainage pipework is plastic i.e. PVC-U it shall be to BS EN 1401-1 Osma or equivalent. Private pipework to be type SN4 and all adoptable pipework to be type SN8.
6. Where drainage pipework is cast iron it shall be to BS EN 877 and for ductile iron it shall be to BS EN 598.
7. All concrete pipework, shall be to BS EN 1916 and BS 5911-1. Manholes and fittings shall be to BS 5911 parts 3 and 4 and BS EN 1917.
8. All materials for adoptable drainage are to be Kitemarked as appropriate.
9. Where drains pass through foundations or connect to manholes, flexible pipe joints are to be provided within 150mm of the face of the structure and within a further 600mm to form a rocker pipe.
10. Where depth to invert does not exceed 600mm and the pipe size does not exceed 100mm diameter, 300mm dia. polypropylene access chambers may be used. Elsewhere, proprietary polypropylene or precast concrete manholes are to be used.
11. Where connections are to be made to existing manholes / sewers, invert levels, pipe sizes and orientation should be checked prior to the commencement of the works and any variance reported to the engineer immediately. Where connections are to be made on or off site the contractor is to check the line and level of any services / mains, to ensure that no clashes exist prior to works commencing.
12. Where pipelines cross, each is to be surrounded with grade ST4 mass concrete for a distance not less than 1.0m centred on the crossing point. Length of surround to be extended as necessary to within 150mm of the next nearest flexible joints.
13. For private drainage, concrete protection is to be provided where the effective cover to the crown of the pipe(s) is less than 1.2m in trafficked areas and 0.6m in soft landscaped or pedestrianised areas.
14. The contractor is to ensure that protective measures are taken to ensure that drainage pipework and fittings are not damaged by site traffic prior to oversite filling operations being completed around buildings.
15. The top run of each private foul drainage network is to be laid to falls no slacker than 1:40. the head of each run is to be vented to atmosphere in accordance with approved document H.
16. All surface water drainage to be min 100mm dia, laid at a gradient no slacker than 1/80. And all foul water drainage to be min 100mm dia. unless stated otherwise.
17. The contractor is to ensure that all pipework connections are arranged to direct flows down or into the main channel in the direction of the main flow. Where necessary 3/4 bends are to be used on oblique connections inside the manhole benching where sufficient room exists or the pipelines on oblique connections are arranged outside the chamber to be able to divert flows down the main channel. Connections brought in perpendicular to the main channel are not acceptable. Where possible the main channel flow shall be from any connections with WC's to ensure a flush through the main channel is achieved.
18. The contractor is to ensure that when preformed polypropylene manhole bases are used that they are orientated such that the main flow is through the main channel of the base, this should be achieved by incorporating long radius bends outside of the manhole.
19. The contractors attention is drawn to the need to ensure that any trenches excavated through previously compacted filled areas, in particular under the building footprint and immediately around the outside, are re-compacted to ensure localised differential settlement does not occur.
20. Where new connections are to be made into existing manholes or sewers, all invert levels, pipe orientation and sizes should be checked on-site prior to the commencement of the works, with any variance reported to the engineer once identified. Where new connections are to be made either on or off-site, the contractor is to check the line and level of any existing services / mains, to ensure that no clashes exist prior to the works commencing.
21. Porous paving surface finish 'to the architects spec'. Any alteration to the extents of the porous paving may have an adverse affect upon the Surface water drainage design and must therefore be discussed with the engineer.
22. Contractor to allow for threshold channel drainage to building access points where required by Architect.
23. The rising main should be laid with a minimum Cover of 1.2m within trafficked areas and 0.9m within pedestrianised areas.
24. The private rising main trench is to have a warning tape fitted. Allow for 1.0m of tape coiled inside the pump chamber at the upstream end.
25. Unscheduled inspection chambers are to be minimum 300mm dia. non-access shallow inspection chambers to provide rodding access into building. Invert level provided on plan.
26. Existing foul and surface water invert levels taken from Greenhatch survey 14405A. T. Any variance from these levels are to be notified to the drainage engineer prior to works commencing.
27. All pipes to be laid soffit to soffit unless otherwise specified within the manhole schedule.

I	27.06.22	F3 and F4 cover level amended.
H	15.06.22	Site Plan Updated, F6 & F7 moved. S7 cover level amended.
G	19.04.22	S22 manhole type amended to reflect built in chamber.
F	04.04.22	Further amendments to address LLFA comments.
E	15.03.22	Amended to pick up LLFA comments.
D	02.03.22	Issued for Condition 12 Approval
C	24.02.22	S11 amended.
B	10.02.22	Tubosider tank added S18 and S21 removed.
A	08.02.22	Construction Issue
Rev.	Date	Description



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Client

RICHMOND MOTOR GROUP

Project Title

Saltbox

Drawing Title

Drainage Layout

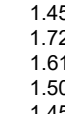
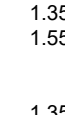
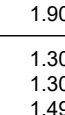
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Drawing Status

Construction

Originator No.	Rev by	CHK by	Scale
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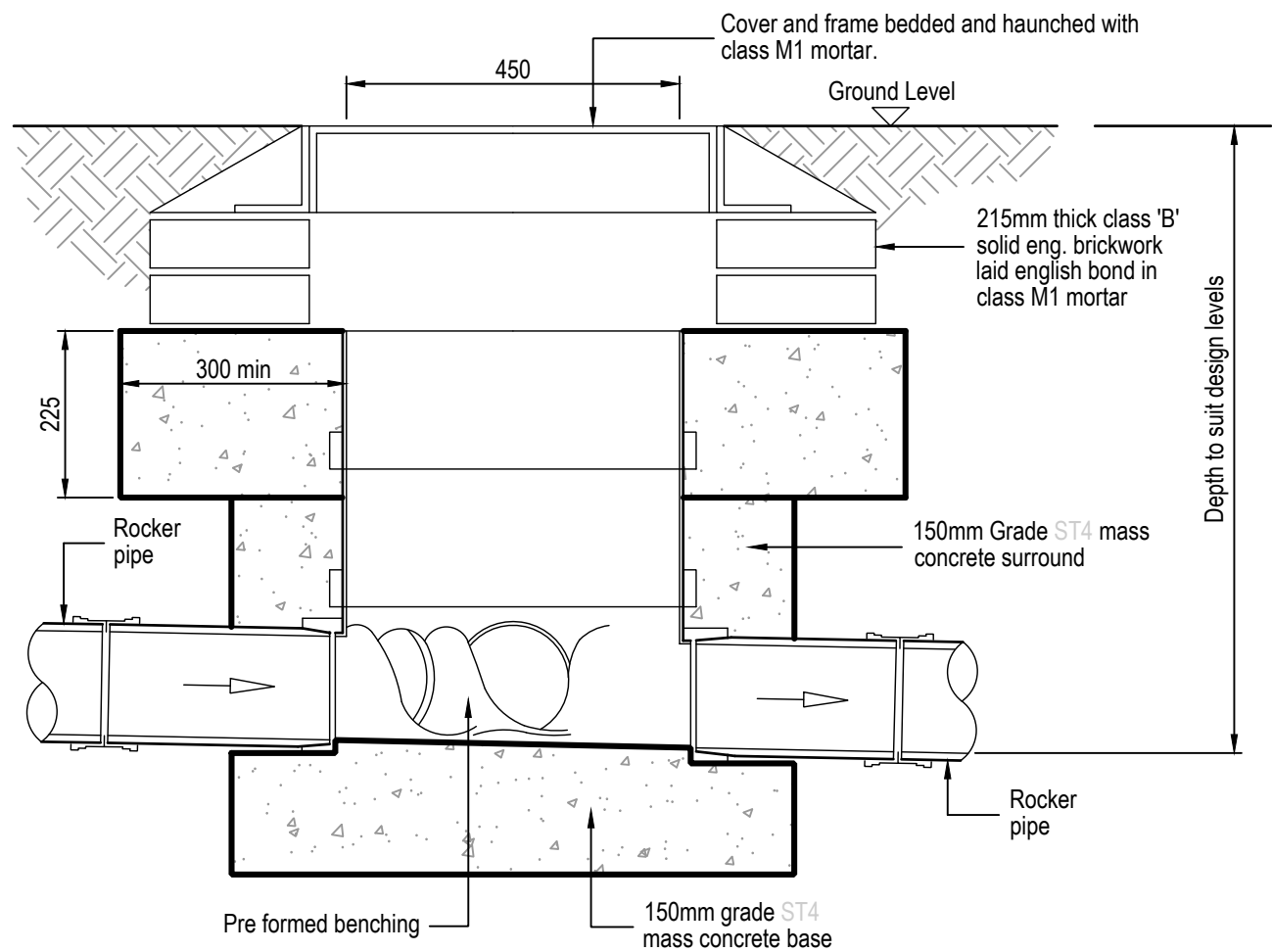
PROJECT / ORIGINATOR / ZONE / LEVEL / TYPE / ROLE / NO.	Revision
114378-CAL-XX-XX-DR-D-0101	1

Node ID	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	MH Type	Connections	Link ID	IL (m)	Dia (mm)	Cover Type
S1	493987.503	101566.187	2.784	0.970	1200	PCC Rings (Catchpit)	 0	S1.000	1.814	225	D400
S3	493982.341	101586.310	2.953	1.231	1200	PCC Rings (Catchpit)	 1 0	S1.000 S1.001	1.722 1.722	225 375	D400
S5	493969.018	101573.728	2.715	0.515	150	Rodding Eye	 0	S3.000	2.200	100	Rodding Eye
S6	493941.865	101566.794	2.715	0.704	450	PP Inspection Chamber (Catchpit)	 1 0	S3.000 S3.001	2.011 2.011	150 150	B125
S7	493911.789	101559.106	2.575	0.756	450	PP Inspection Chamber	 1 0	S3.001 S3.002	1.819 1.819	150 150	B125
S8	493903.294	101566.222	2.687	1.237	1200	PCC Rings (Catchpit)	 1 2 3 4 0	S1.001 S3.002 S5.000 S6.000 S1.002	1.450 1.725 1.612 1.500 1.450	375 150 100 100 375	D400
S9	493864.964	101567.472	2.500	0.784	450	PP Inspection Chamber (Catchpit)	 0	S7.000	1.716	100	B125
S10	493905.645	101559.137	2.600	0.750	450	PP Inspection Chamber (Catchpit)	 0	S5.000	1.850	100	B125
S11	493889.040	101559.066	2.780	1.430	1200	PCC Rings (Catchpit)	 1 2 0	S1.002 S7.000 S1.003	1.350 1.550 1.350	375 100 Tank	D400
S13	493975.485	101571.247	2.715	0.615	150	Rodding Eye	 0	S8.000	2.100	150	Rodding Eye
S14	493982.255	101544.587	2.846	0.954	600	PP Inspection Chamber	 1 0	S8.000 S8.001	1.992 1.916	150 225	B125
S15	493952.938	101536.840	2.684	0.944	600	PP Inspection Chamber	 1 0	S8.001 S8.002	1.779 1.779	225 225	B125
S16	493921.024	101528.738	2.699	1.199	600	PP Inspection Chamber	 1 0	S8.002 S8.003	1.662 1.587	225 300	B125
S17	493911.361	101547.078	2.568	0.750	450	PP Inspection Chamber (Catchpit)	 0	S9.000	1.818	100	D400
S19	493874.290	101531.171	2.576	0.750	450	PP Inspection Chamber (Catchpit)	 0	S10.000	1.826	100	D400
S20	493975.807	101577.062	2.650	0.750	450	PP Inspection Chamber (Catchpit)	 0	S2.000	1.900	100	D400
S22	493886.816	101525.369	2.806	1.506	1200	Tubosider Built-In Access Chamber (with Hydrobrake)	 1 2 3 4 5 0	S1.003 S6.003 S7.000 S8.000 RWP S1.004	1.300 1.300 1.490 1.584 1.990 1.300	Tank 300 100 100 100 150	D400
S23	493929.865	101565.367	2.600	0.750	450	PP Inspection Chamber (Catchpit)	 0	S4.000	1.850	100	D400
S24	493904.928	101570.521	2.700	0.750	450	PP Inspection Chamber (Catchpit)	 0	S6.000	1.950	100	D400
SW900	493878.000	101523.000	2.707	1.457	Existing MH	Existing MH	 1 0	S1.004 EX PIPE	1.270 1.250	300 450	D400

* CP - Catchpit arrangement, depth in schedule does not include minimum 450mm catchpit depth
N.B. Recessed covers and frames to manholes/chambers in feature paved areas
S2, S4, S12, S18 and S21 manholes omitted and no longer required.
EXSW900 amend cover level to suit new proposed external levels.
Tubosider covers to be vented in line with manufactures recommendations

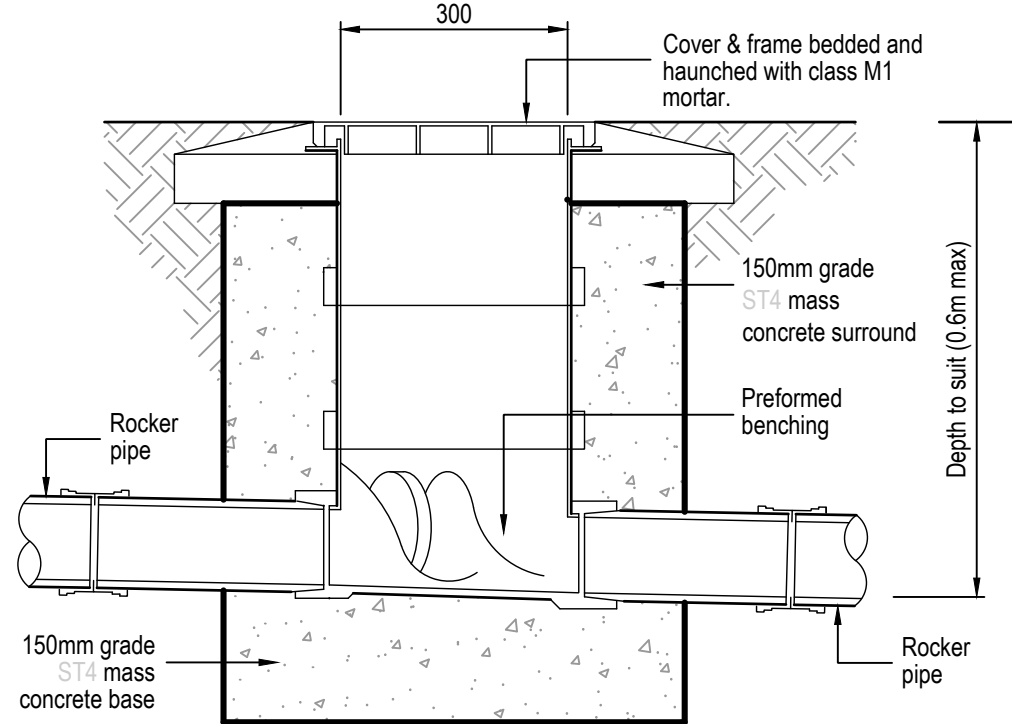
Node ID	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	MH Type	IL (m)	Dia (mm)	Cover
F1	493958.339	101539.574	2.700	0.580	450	PP Inspection Chamber	2.120	100	D400
F2	493945.966	101536.352	2.700	0.840	450	PP Inspection Chamber	1.860	150	D400
F3	493908.956	101524.671	2.720	1.170	450	PP Inspection Chamber	1.550	150	B125
F4	493917.778	101526.992	2.700	1.250	450	PP Inspection Chamber	1.450	150	B125
F5	493919.612	101529.489	2.700	1.330	450	PP Inspection Chamber	1.370	150	B125
F6	493910.103	101558.068	2.700	1.630	450	PP Inspection Chamber	1.070	150	B125
F7	493904.541	101577.605	2.950	2.100	1200	PCC Rings	0.850	150	B125

- Recessed covers and frames to manholes/chambers in feature paved areas



Plastic Inspection Chamber Section Detail

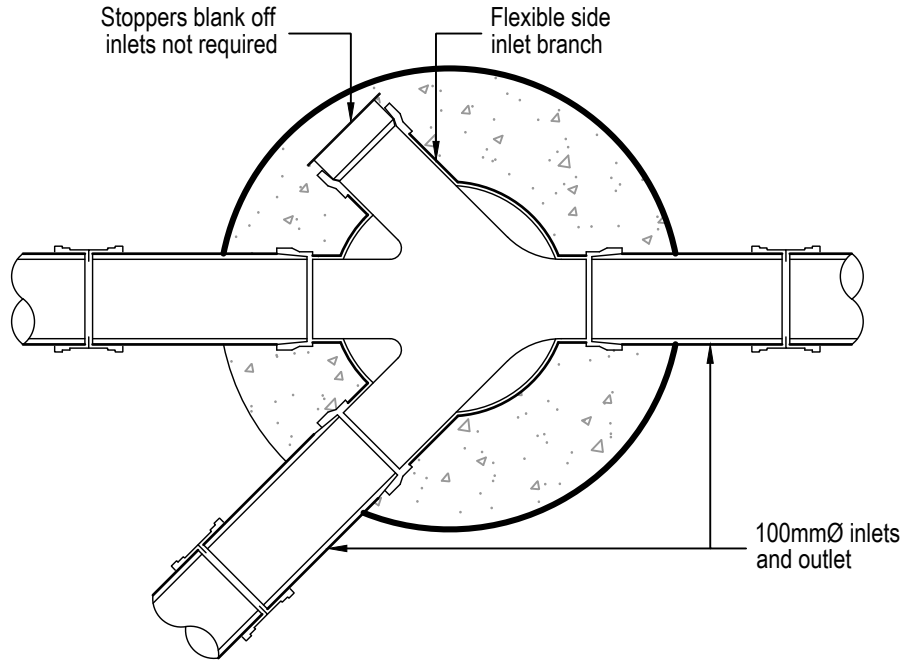
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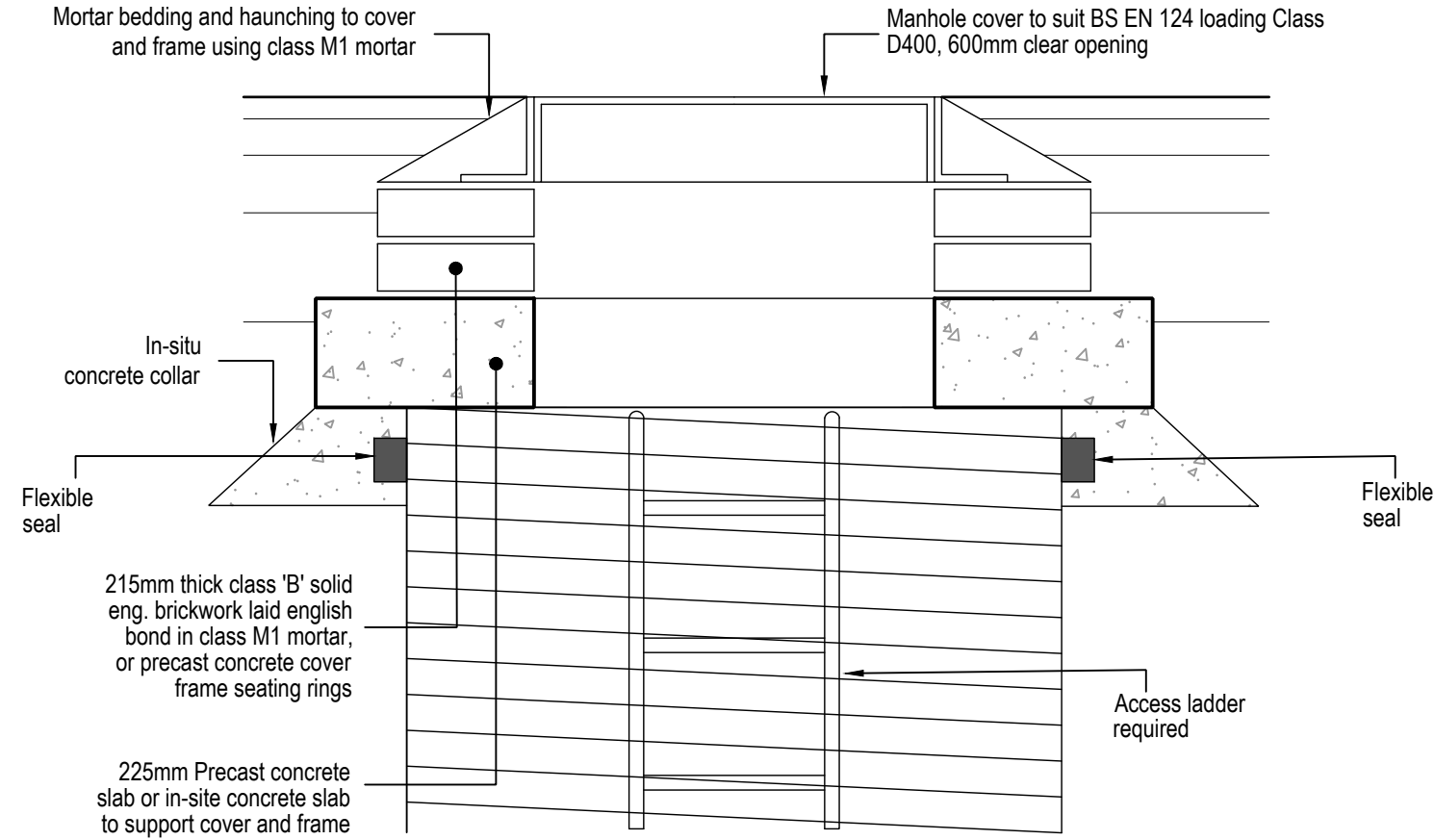
Plastic A.C. Section Detail

Plastic Access Chamber Detail

SCALE = 1:10

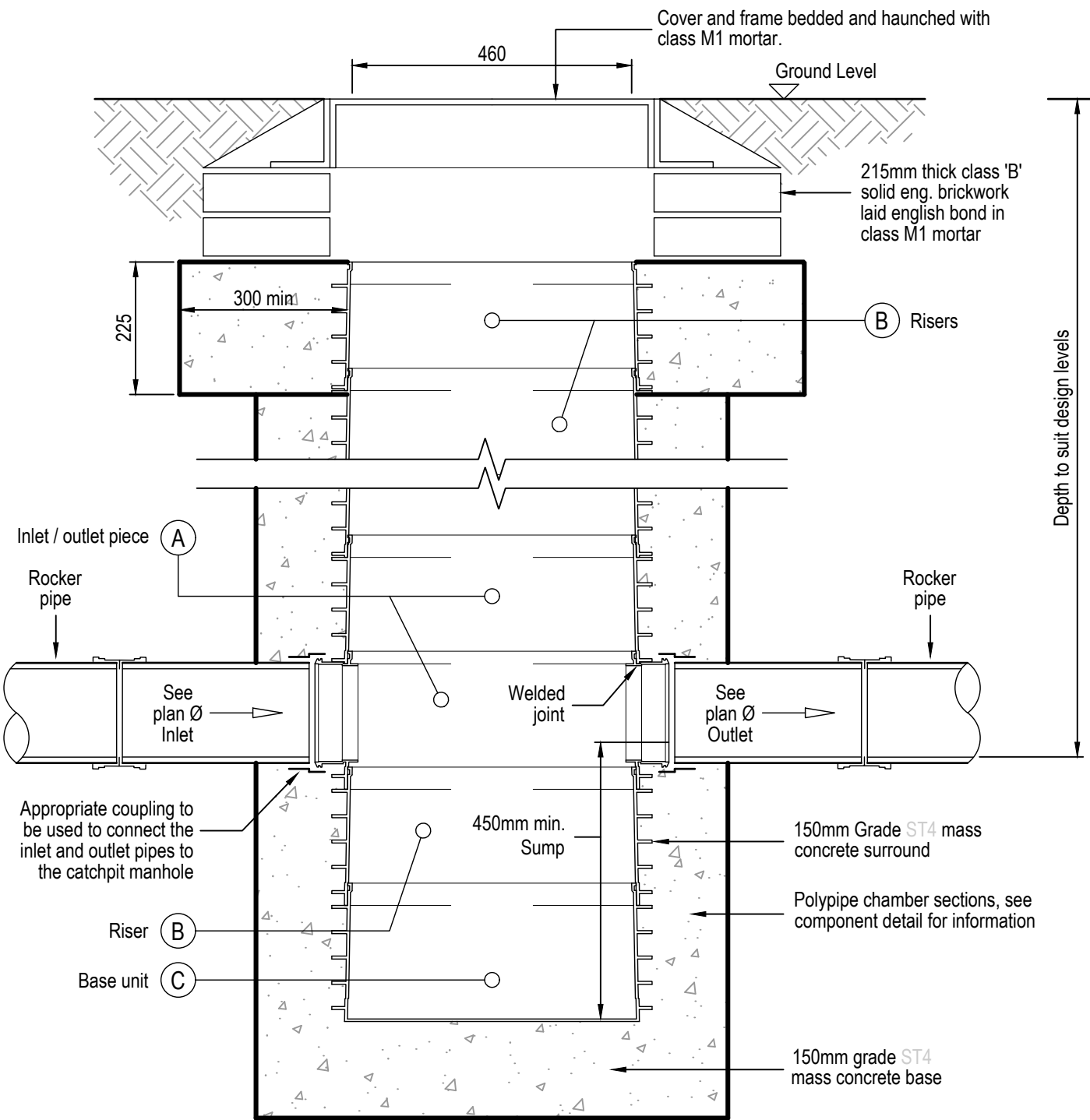


Plastic A.C. Base Detail

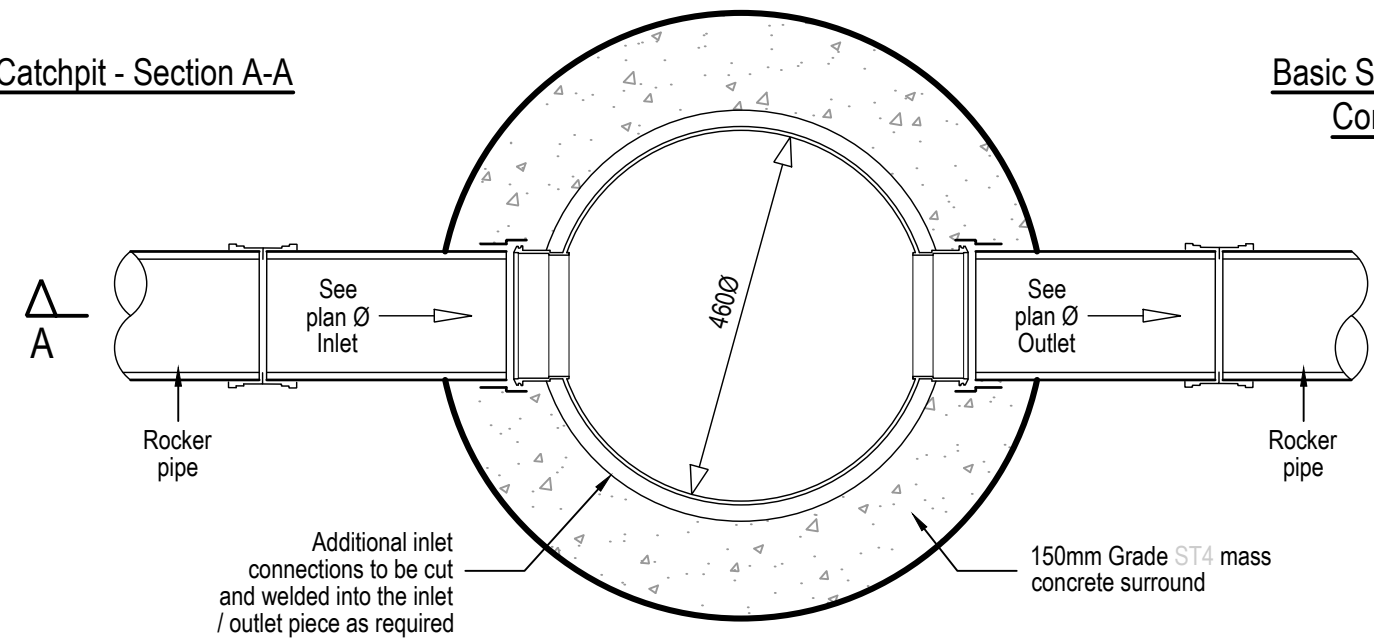


Tubosider Access Cover Detail

SCALE = 1:10



Plastic Catchpit - Section A-A

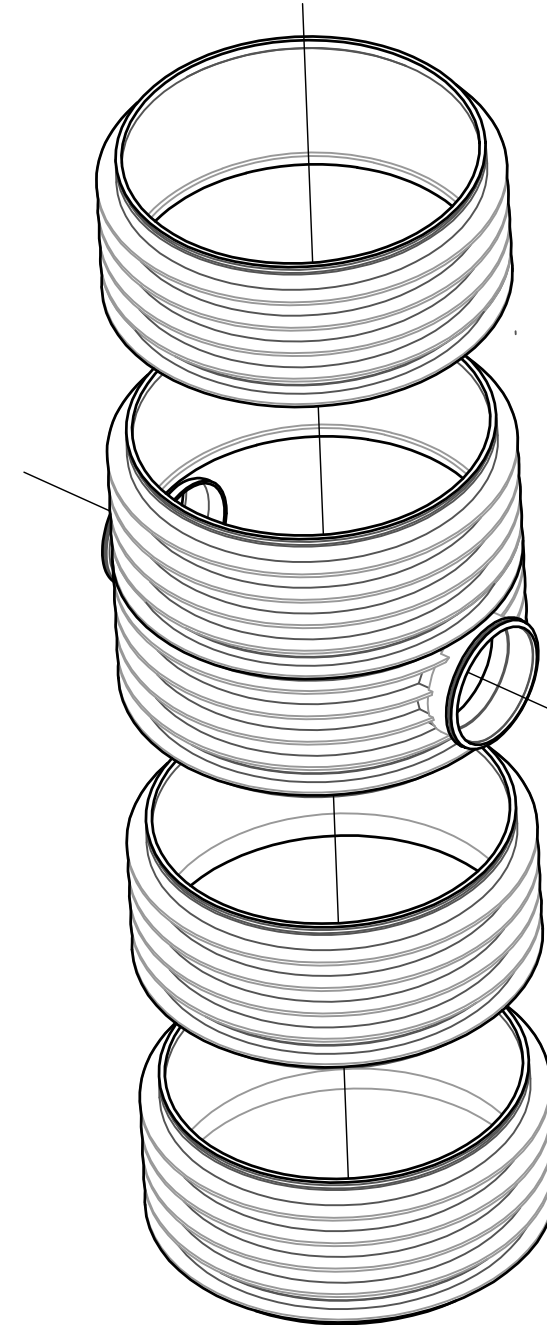


Plastic Catchpit Chamber - Plan Detail

Plastic Catchpit Construction Detail

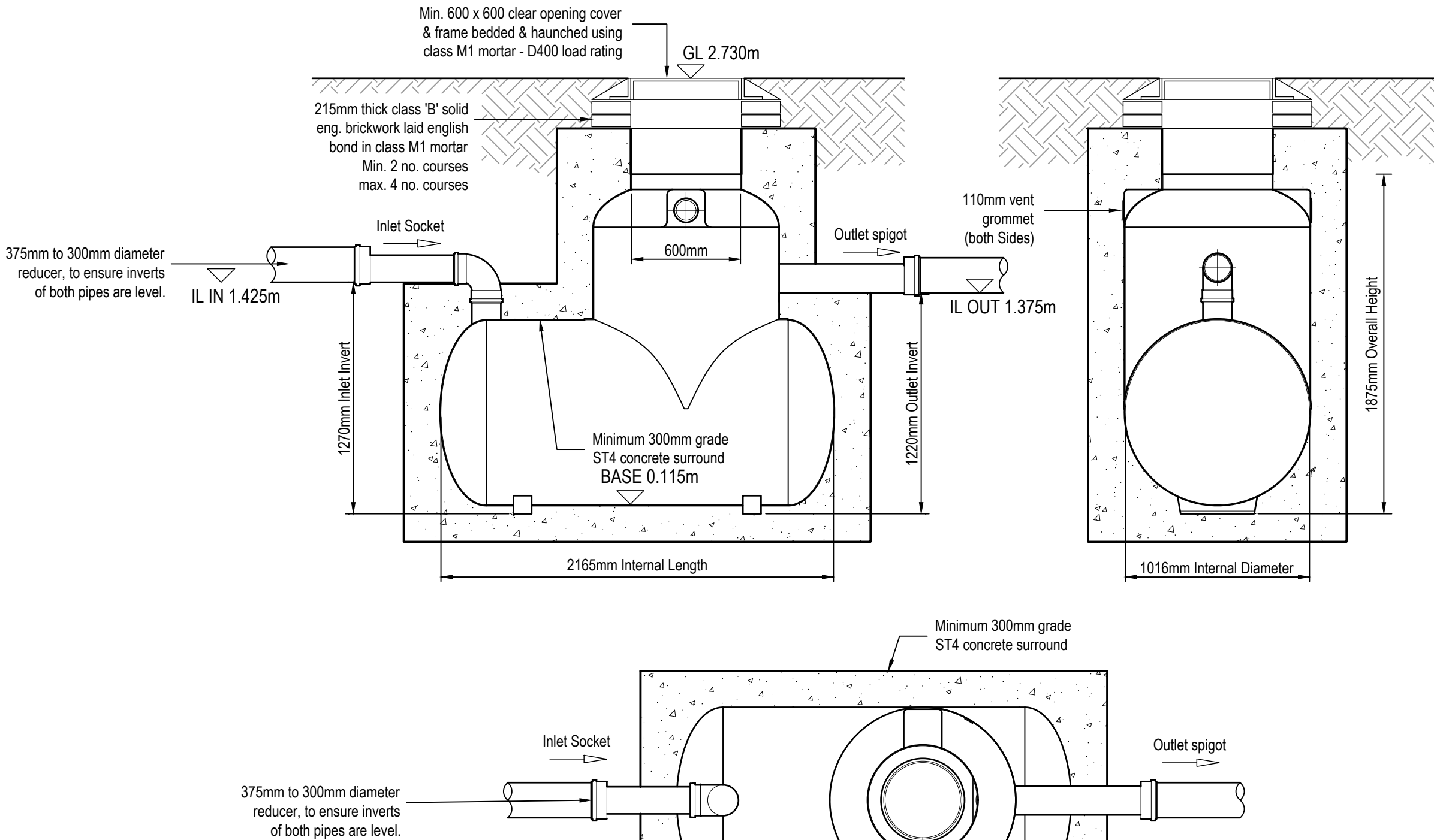
SCALE = 1:10

Note:
This detail is for a basic silt trap produced by 'Polypipe' however an alternative product can be used providing that it meets the needs for the site. The engineer to be consulted for comment should any alternative products be requested.



Basic Silt Trap by Polypipe

Component Detail



Bypass Separator Construction Detail

Model: CNSB8s/21 by Conder

SCALE = 1:25

Notes:

1. It is important to recognise that light liquid separators require regular maintenance. The period between maintenance operations can vary depending on the location and use of the separator, therefore routine inspections shall be undertaken at least every six months and a log maintained of inspection date, depth of oil, depth of silt and any cleaning that is undertaken.
2. A Conder Envirotector should be fitted to every separator to give automatic warning that the light liquid capacity has been reached
3. Access to the separator should be kept clear and not used for storage.
4. Allowance to be made for power to alarm linked back to control panel.
5. Pipe reducers at the inlet and outlet of the bypass separator are to have level inverts with the reduced pipe.

Notes:

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2. All setting out to be in accordance with the schedules, any discrepancies between the engineers and the architects drawings to be referred to the architect before proceeding. Dimensions must not be scaled.
3. All private drainage is to be in accordance with BS EN 752-1-2-3-4, BS EN 1295-1, BS EN 1610 and all relevant sections of approved document H of the building regulations (2015 Edition).
4. Where drainage pipework is to be flexibly jointed extra strength vitrified clay it should be to BS EN 295-1, Hepworth 'Supersleve' or equivalent.
5. Where drainage pipework is plastic i.e. PVC-U it shall be to BS EN 1401-1 Osmo or equivalent. Private pipework to be type SN4 and all adoptable pipework to be type SN8.
6. Where drainage pipework is cast iron it shall be to BS EN 877 and for ductile iron it shall be to BS EN 598.
7. All concrete pipework shall be to BS EN 1916 and BS 5911-1. Manholes and fittings shall be to BS 5911 parts 3 and 4 and BS EN 1917.
8. All materials for adoptable drainage are to be Kitemarked as appropriate.
9. Where drains pass through foundations or connect to manholes, flexible pipe joints are to be provided within 150mm of the face of the structure and within a further 600mm to form a rocker pipe.
10. Where pipes pass through screen walls, footings or retaining walls, lintels are to be provided.
11. Where pipelines pass within 1.0m of buildings or walls the foundations are to be taken down below the bottom of the trench. Where pipelines are more than 1.0m away from foundations the trench shall be backfilled with concrete up to a point that meets a 45° angle line taken from the bottom corner of the nearest foundation.
12. Where depth to invert does not exceed 600mm and the pipe size does not exceed 100mm diameter, 300mm dia. polypropylene access chambers may be used. Elsewhere, proprietary polypropylene or precast concrete manholes are to be used.
13. Where connections are to be made to existing manholes / sewers, invert levels, pipe sizes and orientation should be checked prior to the commencement of the works and any variance reported to the engineer immediately. Where connections are to be made on or off site the contractor is to check the line and level of any services / mains, to ensure that no clashes exist prior to works commencing.
14. Where pipelines cross, each is to be surrounded with grade ST4 mass concrete for a distance not less than 1.0m centred on the crossing point. Length of surround to be extended as necessary to within 150mm of the next nearest flexible joints.
15. For private drainage, concrete protection is to be provided where the effective cover to the crown of the pipe(s) is less than 1.2m in trafficked areas and 0.6m in soft landscaped or pedestrianised areas.
16. The contractor is to ensure that protective measures are taken to ensure that drainage pipework and fittings are not damaged by site traffic prior to oversite filling operations being completed around buildings.
17. The top run of each private foul drainage network is to be laid to falls no slacker than 1:40, the head of each run is to be vented to atmosphere in accordance with approved document H.
18. All surface water drainage to be min 100mm dia. laid at a gradient no slacker than 1:80. And all foul water drainage to be min 100mm dia. unless stated otherwise.
19. The contractor is to ensure that all pipework connections are arranged to direct flows down or into the main channel in the direction of the main flow. Where necessary 3/4 bends are to be used on oblique connections inside the manhole benching where sufficient room exists or the pipelines on oblique connections are arranged outside the chamber to be able to divert flows down the main channel. Connections brought in perpendicular to the main channel are not acceptable. Where possible the main channel flow shall be from any connections with WC's to ensure a flush through the main channel is achieved.
20. The contractor is to ensure that when preformed polypropylene manhole bases are used that they are orientated such that the main flow is through the main channel of the base, this should be achieved by incorporating long radius bends outside of the manhole.
21. The contractors attention is drawn to the need to ensure that any trenches excavated through previously compacted filled areas, in particular under the building footprint and immediately around the outside, are re-compacted to ensure localised differential settlement does not occur.
22. Where new connections are to be made into existing manholes or sewers, all invert levels, pipe orientation and sizes should be checked on-site prior to the commencement of the works, with any variance reported to the engineer once identified. Where new connections are to be made either on or off-site, the contractor is to check the line and level of any existing services / mains, to ensure that no clashes exist prior to the works commencing.
23. Porous paving surface finish 'to the architects spec'. Any alteration to the extents of the porous paving may have an adverse affect upon the Surface water drainage design and must therefore be discussed with the engineer.
24. For bespoke attenuation tank detail, please refer to Tubosider detail EN21_20881 Tub17547 and accompanying design information. Tubosider tank to be installed to manufacturers instructions.

D	06.10.22	Invert levels added to separator detail.
C	04.04.22	Reducers and note regarding level inverts added to separator
B	15.03.22	D400 rating added to interceptor cover.
A	31.01.22	Construction Issue
Rev.	Date	Description



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Client
RICHMOND MOTOR GROUP

Project Title
Saltbox

Drawing Title
Construction Details

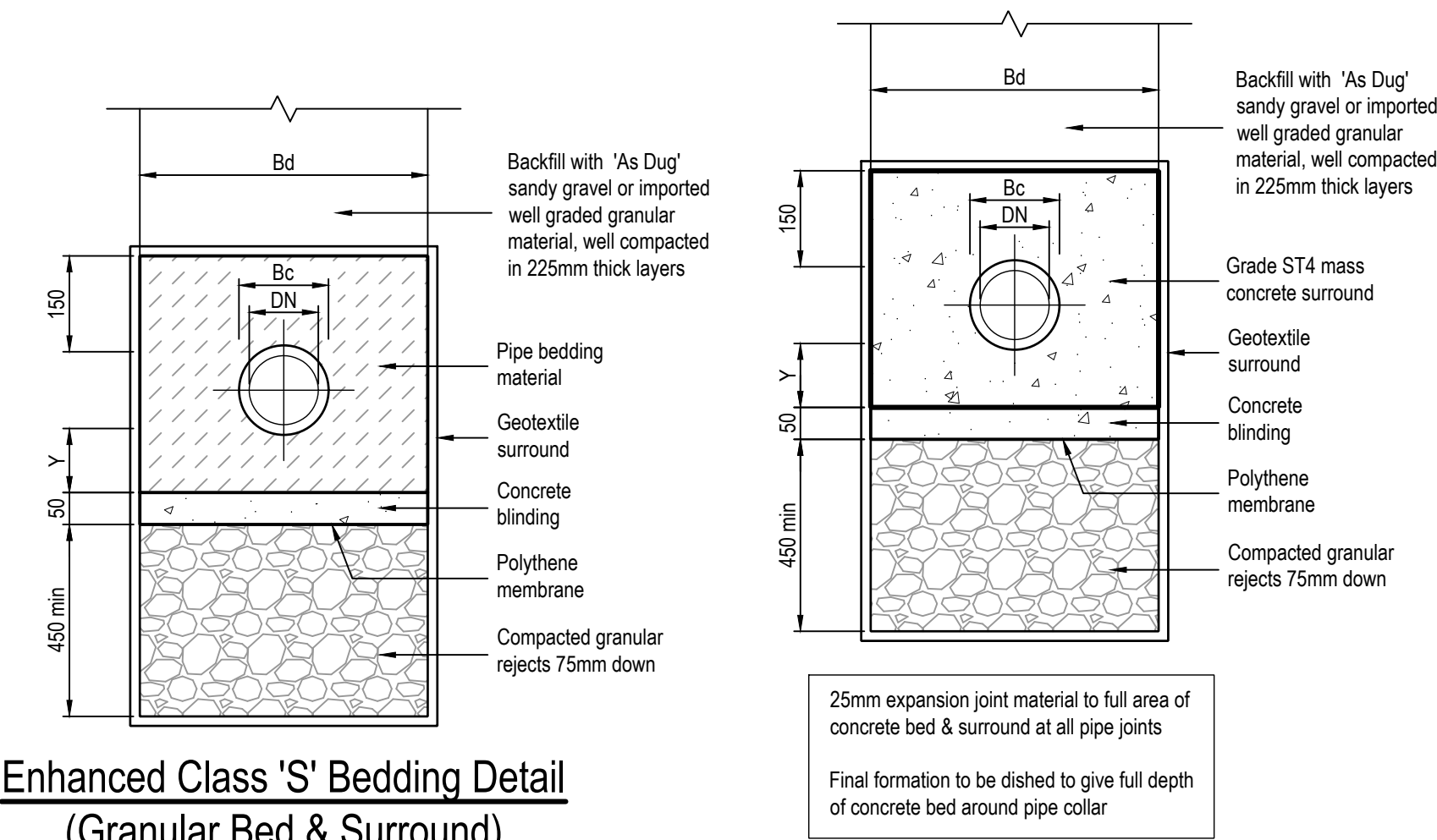
Sheet 1 of 5

Drawing Status
Construction

Originator No.	Rev By	Drawn By	Scale
114378	DB	PW	As Shown

PROJECT / ORIGINATOR / ZONE / LEVEL / TYPE / PROJECT NO.
114378-CAL-XX-XX-DR-D-0500

Revision
D

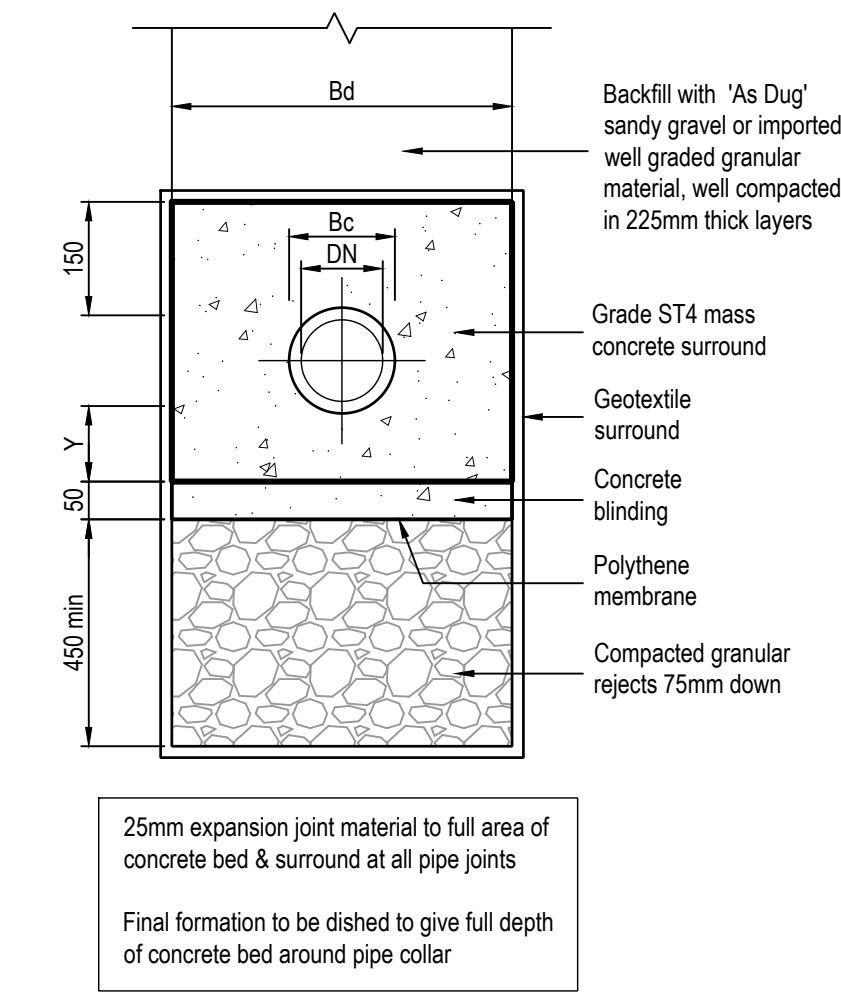


**Enhanced Class 'S' Bedding Detail
(Granular Bed & Surround)**

SCALE = 1:10

Note: Enhanced bedding details only to be used within areas of poor ground.

Nominal maximum aggregate size (mm) B.S. 882 Grading			
Pipe bore (mm)	Aggregate	Bedding class	
100	Single size graded	10	-
150	Single size graded	10 or 14	14 to 5
225	Single size graded	10, 14 or 20	14 to 5 or 20 to 5
300	Single size graded	10, 14 or 20	14 to 5 or 20 to 5
375	Single size graded	14 or 20	14 to 5 or 20 to 5

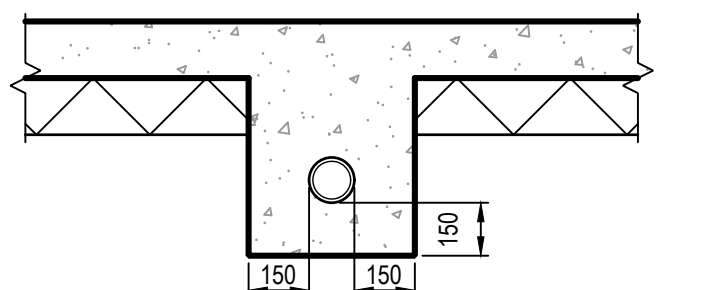


**Enhanced Class 'Z' Bedding Detail
(Concrete Bed & Surround)**

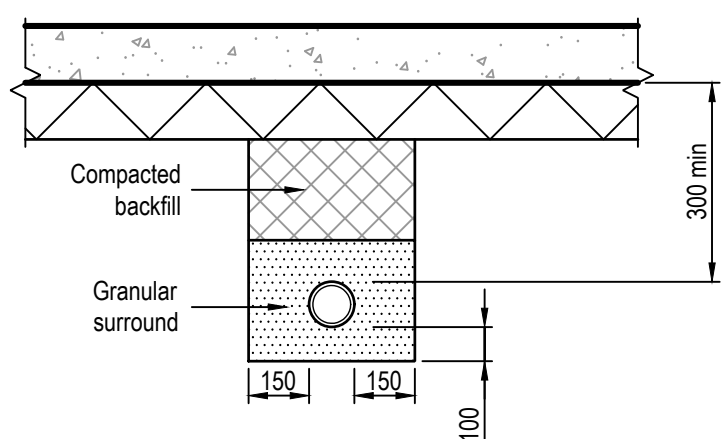
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Nominal internal Ø DN (mm)	Assumed external Ø Bc (mm)	Assumed max. permissible trench width Bd (mm)	Dimension 'Y' for uniform soils
100	130	550	100
150	190	600	100
225	280	700	100
300	388	750	125
375	500	1050	125

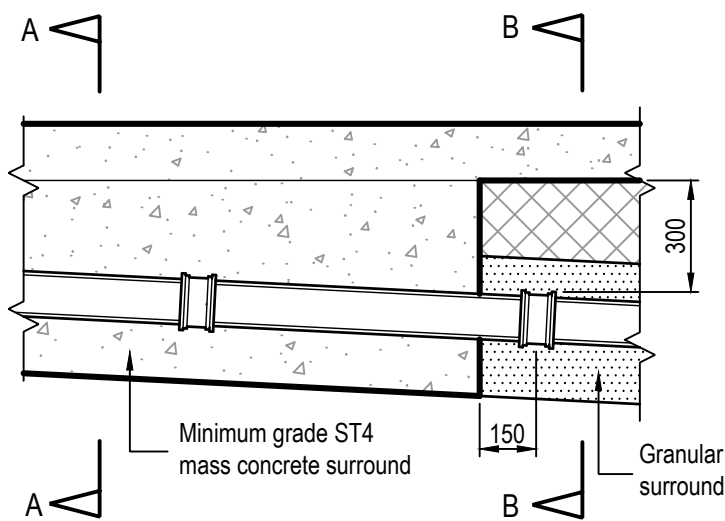
Pipe Bedding Tables



Section A-A

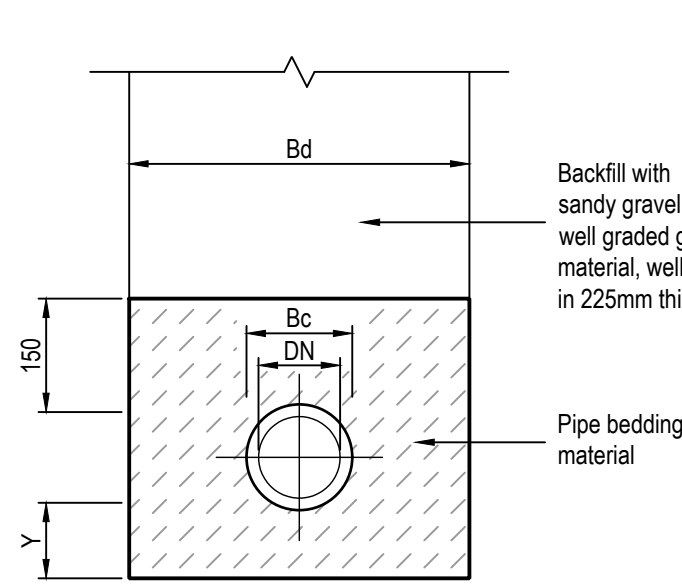


Section B-B



Pipework Under Slabs

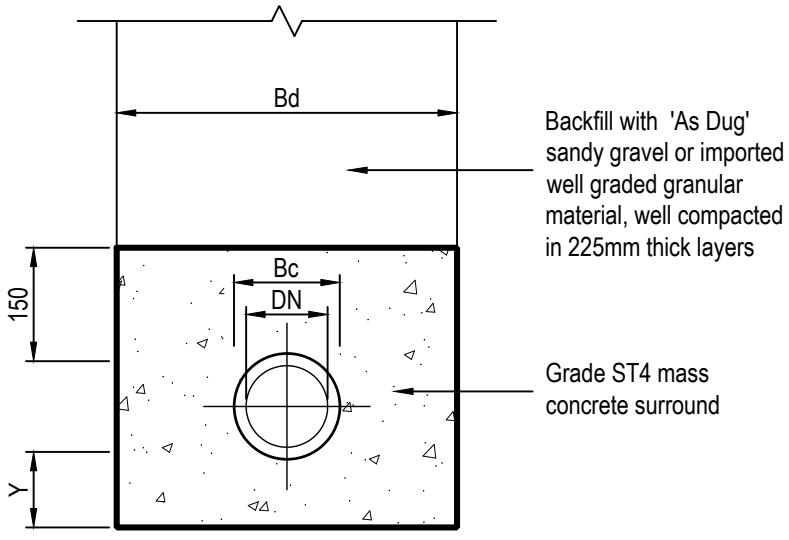
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**Class 'S' Bedding Detail
(Granular Bed & Surround)**

SCALE = 1:10

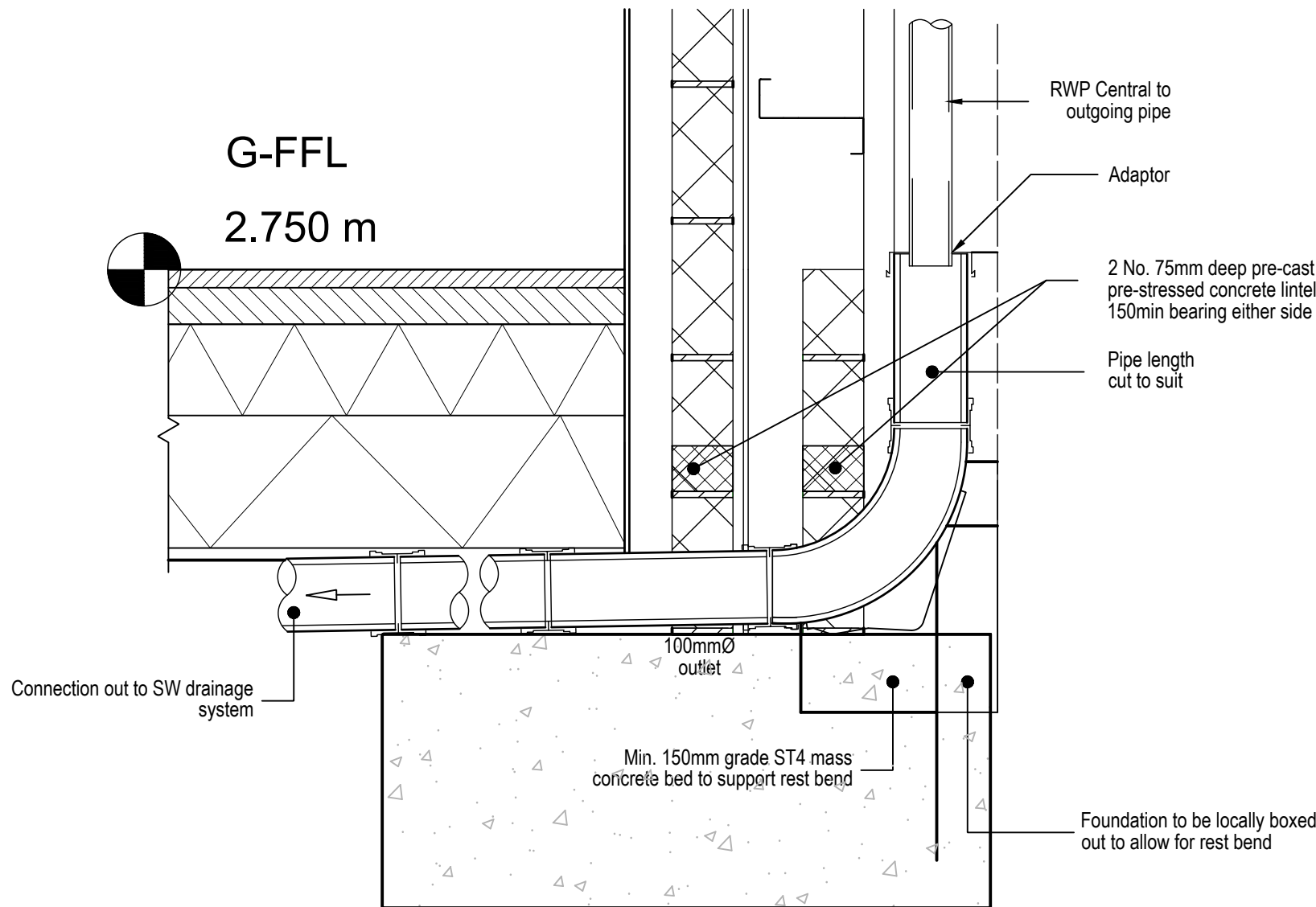
Note - For use on all pipework with:
More than 0.6m of cover in all landscaped and pedestrianised areas.
More than 1.2m of cover in all trafficked areas.



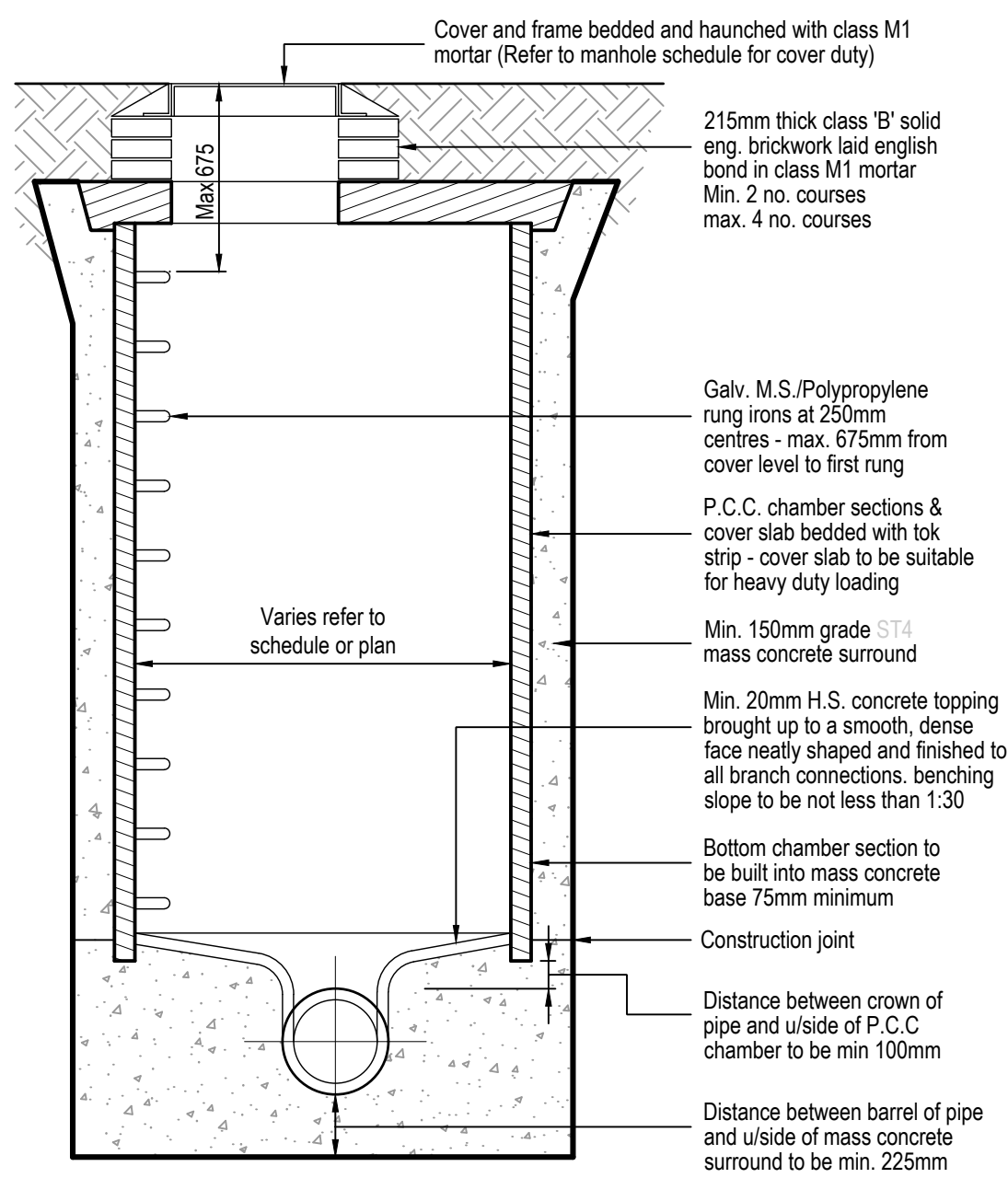
**Class 'Z' Bedding Detail
(Concrete Bed & Surround)**

SCALE = 1:10

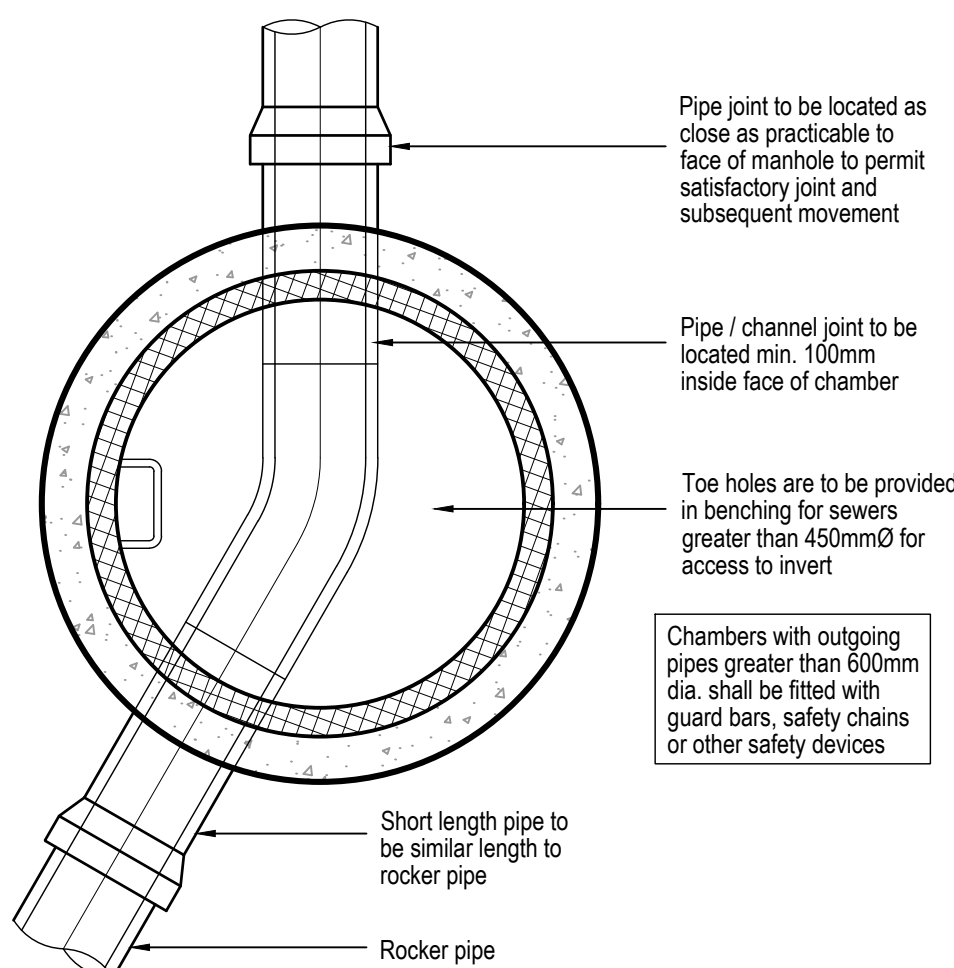
Note - For use on all pipework with:
Less than 0.6m of cover in all landscaped and pedestrianised areas.
Less than 1.2m of cover in all trafficked areas.



**Non-Roddable RWP Connection through Valet
Detail Scale 1:10**



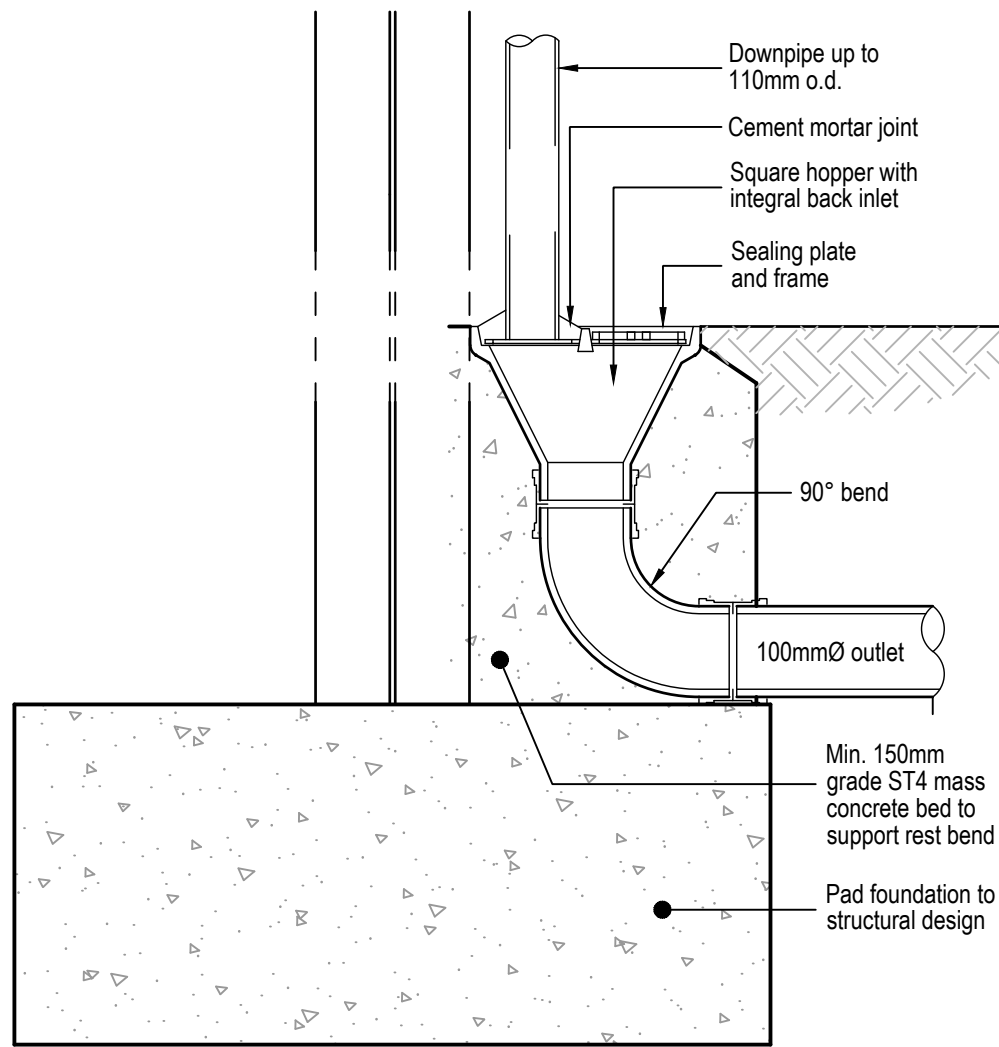
Type B Manhole Section Detail



Type B Manhole Base Detail

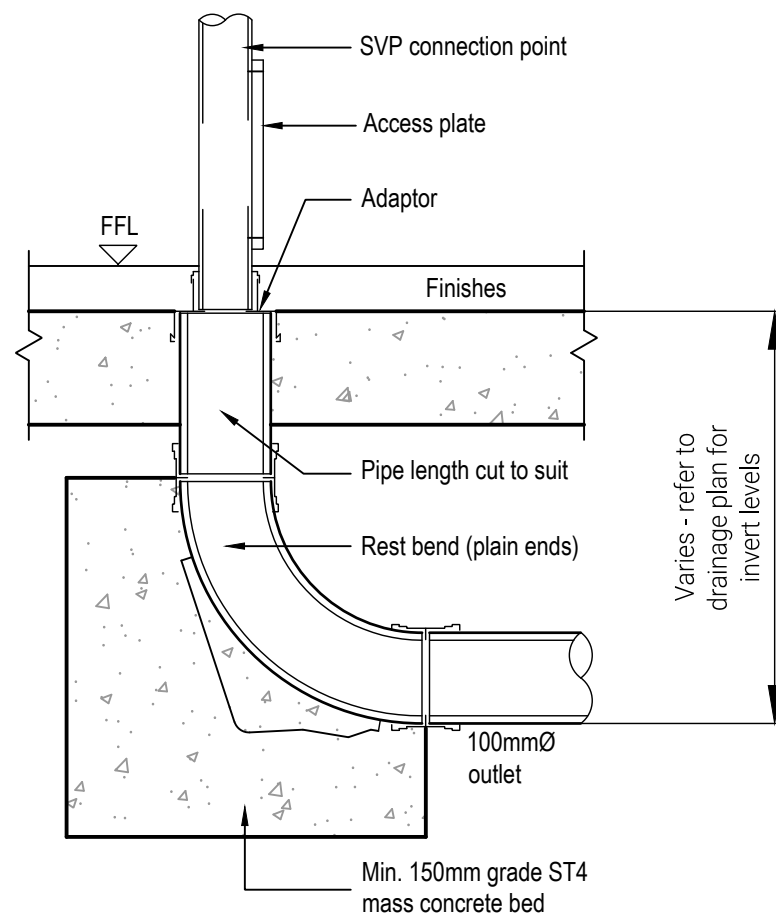
**Type B - P.C.C Ring Manhole Detail
(Depth to Soffit = 3.0m Max.)**

SCALE = 1:25



Roddable RWP Connection Detail

SCALE = 1:10



**Roddable
Internal SVP Detail**

SCALE = 1:10

Notes:

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- Where drainage pipework is to be flexibly jointed extra strength vitrified clay it should be to BS EN 295-1, Hepworth 'Supersleeve' or equivalent.
- Where drainage pipework is plastic i.e. PVC-U it shall be to BS EN 1401-1 Osma or equivalent. Private pipework to be type SN4 and all adoptable pipework to be type SN8.
- Where drainage pipework is cast iron it shall be to BS EN 877 and for ductile iron it shall be to BS EN 598.
- All concrete pipework, shall be to BS EN 1916 and BS 5911-1. Manholes and fittings shall be to BS 5911 parts 3 and 4 and BS EN 1917.
- All materials for adoptable drainage are to be Kitemarked as appropriate.
- Where drains pass through foundations or connect to manholes, flexible pipe joints are to be provided within 150mm of the face of the structure and within a further 600mm to form a rocker pipe.
- Where pipes pass through screen walls, footings or retaining walls, lintels are to be provided.
- Where pipelines pass within 1.0m of buildings or walls the foundations are to be taken down below the bottom of the trench. Where pipelines are more than 1.0m away from foundations the trench shall be backfilled with concrete up to a point that meets a 45° angle line taken from the bottom corner of the nearest foundation.
- Where depth to invert does not exceed 600mm and the pipe size does not exceed 100mm diameter, 300mm dia. polypropylene access chambers may be used. Elsewhere, proprietary polypropylene or precast concrete manholes are to be used.
- Where connections are to be made to existing manholes / sewers, invert levels, pipe sizes and orientation should be checked prior to the commencement of the works and any variance reported to the engineer immediately. Where connections are to be made on or off site the contractor is to check the line and level of any services / mains, to ensure that no clashes exist prior to works commencing.
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- The top run of each private foul drainage network is to be laid to falls no steeper than 1:40. The head of each run is to be vented to atmosphere in accordance with approved document H.
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- For bespoke attenuation tank detail, please refer to Tubosider detail EN21 20881 Tub17547 and accompanying design information. Tubosider tank to be installed to manufacturers instructions.

B	15.03.22	Rising main detail removed. 375mm pipe details added.
A	31.01.22	Construction Issue
Rev.	Date	Description

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Client
RICHMOND MOTOR GROUP

Project Title
Saltbox

Drawing Title
Construction Details

Sheet 2 of 5

Drawing Status
Construction

Originator No.	Rev By	Drawn By	Scale
114378	DB	PW	As Shown

PROJECT ORIGINATOR / OWNER / USER / TYPE / PROJECT NO.
114378-CAL-XX-XX-DR-D-0501

Revision
B

1. This drawing is to be read in conjunction with all relevant architects, engineers and specialist sub-contractors drawings and the specification.
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5. Where drainage pipework is plastic i.e. PVC-U it shall be to BS EN 1401-1 Osmo or equivalent. Private pipework to be type SN4 and all adopted pipework to be type SN6.
6. Where drainage pipework is cast iron it shall be to BS EN 877 and for ductile iron it shall be to BS EN 598.
7. All concrete pipework, shall be to BS EN 1916 and BS 5911-1. Manholes and fittings shall be to BS 5911 parts 3 and 4 and BS EN 1917.

10. Where pipes pass through screen walls, footings or retaining walls, lintels are to be provided.

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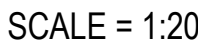
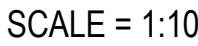
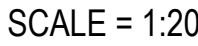
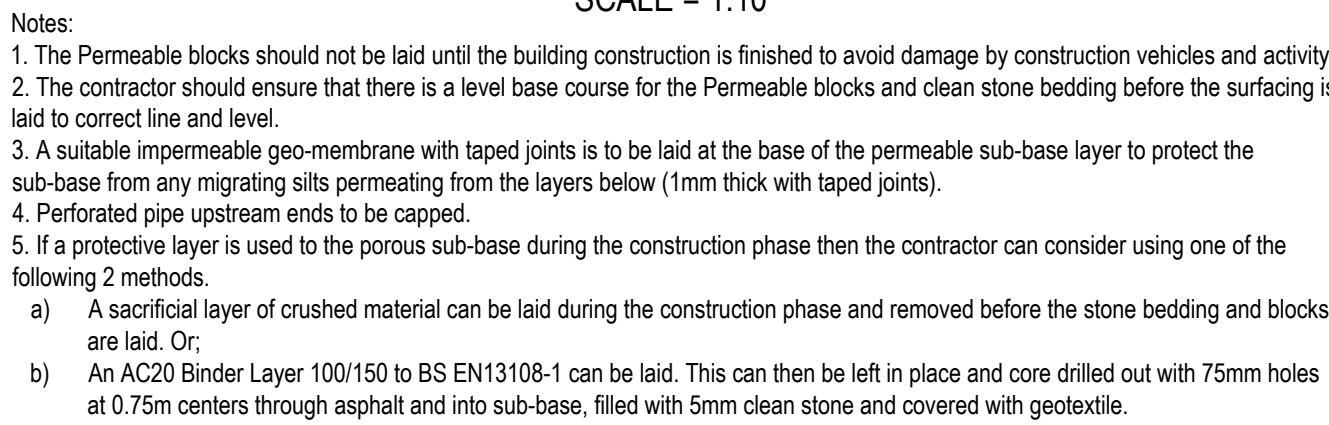
18. All surface water drainage to be min 100mm dia, laid at a gradient no slacker than 1/80. And all foul water drainage to be min 100mm dia. unless stated otherwise.

20. The contractor is to ensure that when preformed polypropylene manhole bases are used that they are orientated such that the main flow is through the main channel of the base. this should be achieved by incorporating long radius bends outside of the manhole.

21. The contractors attention is drawn to the need to ensure that any trenches excavated through previously compacted filled areas, in particular under the building footprint and immediately around the outside, are re-compacted to ensure localised differential settlement does not occur.

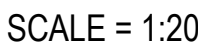
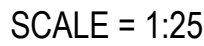
23. Porous paving surface finish 'to the architects spec'. Any alteration to the extents of the porous paving may have an adverse affect upon the Surface water drainage design and must therefore be discussed with the engineer.

24. For bespoke attenuation tank detail, please refer to Tubosider detail EN21_20881_Tub17547 and accompanying design information. Tubosider tank to be installed to manufacturers instructions.



Note:

1. Tail to have a minimum 150mm ST4 Concrete Surround for the first 750mm below Road level.
2. The smart gully adaptor is to be installed in accordance with the manufacturers recommendations.



Notes:

1. This drawing is to be read in conjunction with all relevant architects, engineers and specialist sub-contractors drawings and the specification.
2. All setting out to be in accordance with the schedules, any discrepancies between the engineers and the architects drawings to be referred to the architect before proceeding. Dimensions must not be scaled.
3. All private drainage is to be in accordance with BS EN 752-1-2-3-4, BS EN 1295-1, BS EN 1610 and all relevant sections of approved document H of the building regulations (2015 Edition).
4. Where drainage pipework is to be flexibly jointed extra strength vitrified clay it should be to BS EN 295-1, Hepworth 'Supersleve' or equivalent.
5. Where drainage pipework is plastic i.e. PVC-U it shall be to BS EN 1401-1 Osmo or equivalent. Private pipework to be type SN4 and all adoptable pipework to be type SN8.
6. Where drainage pipework is cast iron it shall be to BS EN 877 and for ductile iron it shall be to BS EN 598.
7. All concrete pipework, shall be to BS EN 1916 and BS 5911-1. Manholes and fittings shall be to BS 5911 parts 3 and 4 and BS EN 1917.
8. All materials for adoptable drainage are to be Kitemarked as appropriate.
9. Where drains pass through foundations or connect to manholes, flexible pipe joints are to be provided within 150mm of the face of the structure and within a further 600mm to form a rocker pipe.
10. Where pipes pass through screen walls, footings or retaining walls, lintels are to be provided.
11. Where pipelines pass within 1.0m of buildings or walls the foundations are to be taken down below the bottom of the trench. Where pipelines are more than 1.0m away from foundations the trench shall be backfilled with concrete up to a point that meets a 45° angle line taken from the bottom corner of the nearest foundation.

12. Where depth to invert does not exceed 600mm and the pipe size does not exceed 100mm diameter, 300mm dia. polypropylene access chambers may be used. Elsewhere, proprietary polypropylene or precast concrete manholes are to be used.

13. Where connections are to be made to existing manholes / sewers, invert levels, pipe sizes and orientation should be checked prior to the commencement of the works and any variance reported to the engineer immediately. Where connections are to be made on or off site the contractor is to check the line and level of any services / mains, to ensure that no clashes exist prior to works commencing.

14. Where pipelines cross, each is to be surrounded with grade ST4 mass concrete for a distance not less than 1.0m centred on the crossing point. Length of surround to be extended as necessary to within 150mm of the next nearest flexible joints.

15. For private drainage, concrete protection is to be provided where the effective cover to the crown of the pipe(s) is less than 1.2m in trafficked areas and 0.6m in soft landscaped or pedestrianised areas.

16. The contractor is to ensure that protective measures are taken to ensure that drainage pipework and fittings are not damaged by site traffic prior to oversite filling operations being completed around buildings.

17. The top run of each private foul drainage network is to be laid to falls no slacker than 1:40, the lead of each run is to be vented to atmosphere in accordance with approved document H.

18. All surface water drainage to be min 100mm dia, laid at a gradient no slacker than 1:80. And all foul water drainage to be min 100mm dia, unless stated otherwise.

19. The contractor is to ensure that all pipework connections are arranged to direct flows down or into the main channel in the direction of the main flow. Where necessary 3/4 bends are to be used on oblique connections inside the manhole benching where sufficient room exists or the pipelines on oblique connections are arranged outside the chamber to be able to divert flows down the main channel. Connections brought in perpendicular to the main channel are not acceptable. Where possible the main channel flow shall be from any connections with WC's to ensure a flush through the main channel is achieved.

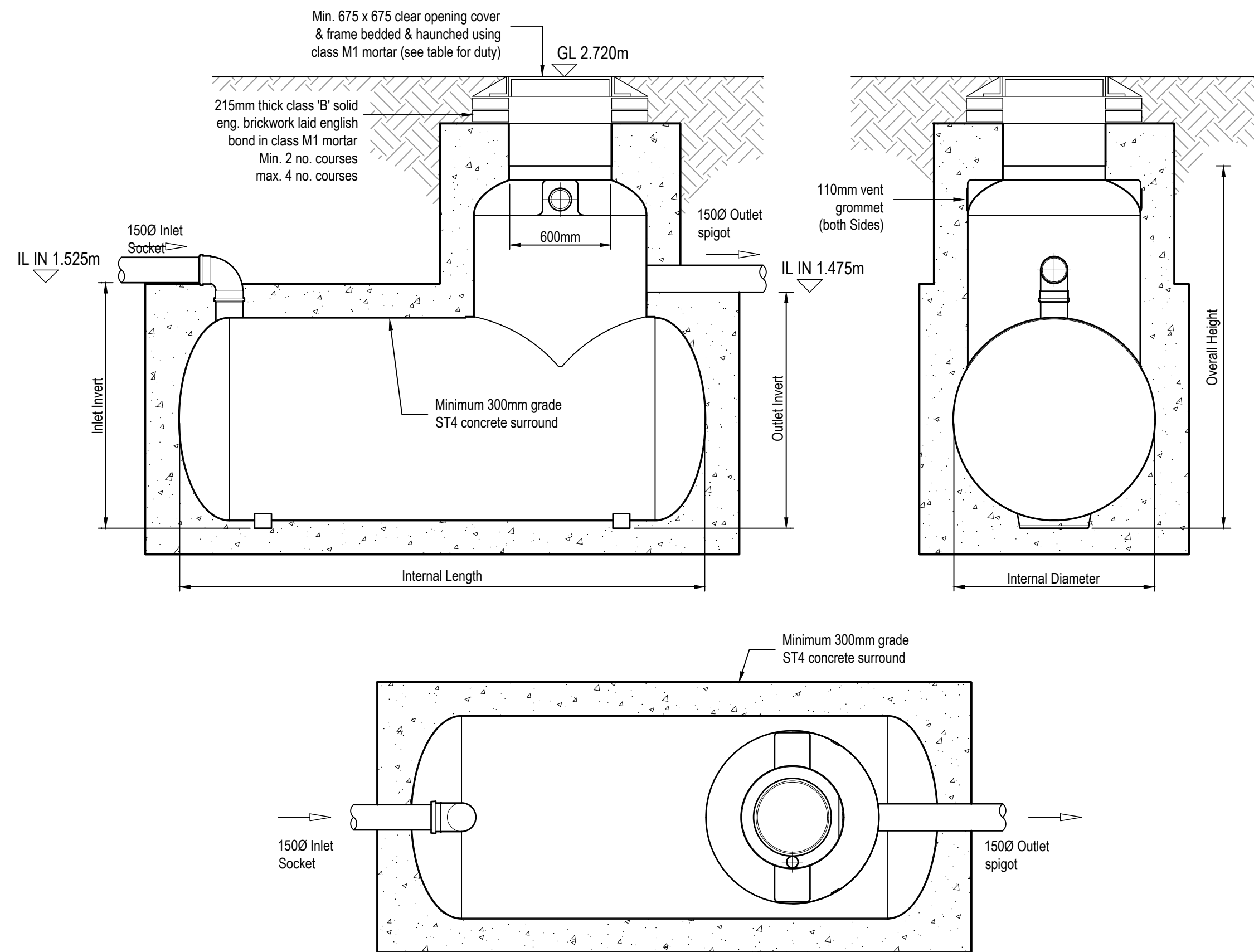
20. The contractor is to ensure that when preformed polypropylene manhole bases are used that they are orientated such that the main flow is through the main channel of the base, this should be achieved by incorporating long radius bends outside of the manhole.

21. The contractors attention is drawn to the need to ensure that any trenches excavated through previously compacted filled areas, in particular under the building footprint and immediately around the outside, are re-compacted to ensure localised differential settlement does not occur.

22. Where new connections are to be made into existing manholes or sewers, all invert levels, pipe orientation and sizes should be checked on-site prior to the commencement of the works, with any variance reported to the engineer once identified. Where new connections are to be made either on or off-site, the contractor is to check the line and level of any existing services / mains, to ensure that no clashes exist prior to the works commencing.

23. Porous paving surface finish 'to the architects spec'. Any alteration to the extents of the porous paving may have an adverse affect upon the Surface water drainage design and must therefore be discussed with the engineer.

24. For bespoke attenuation tank detail, please refer to Tubosider detail EN21_20881_Tub17547 and accompanying design information. Tubosider tank to be installed to manufacturers instructions.

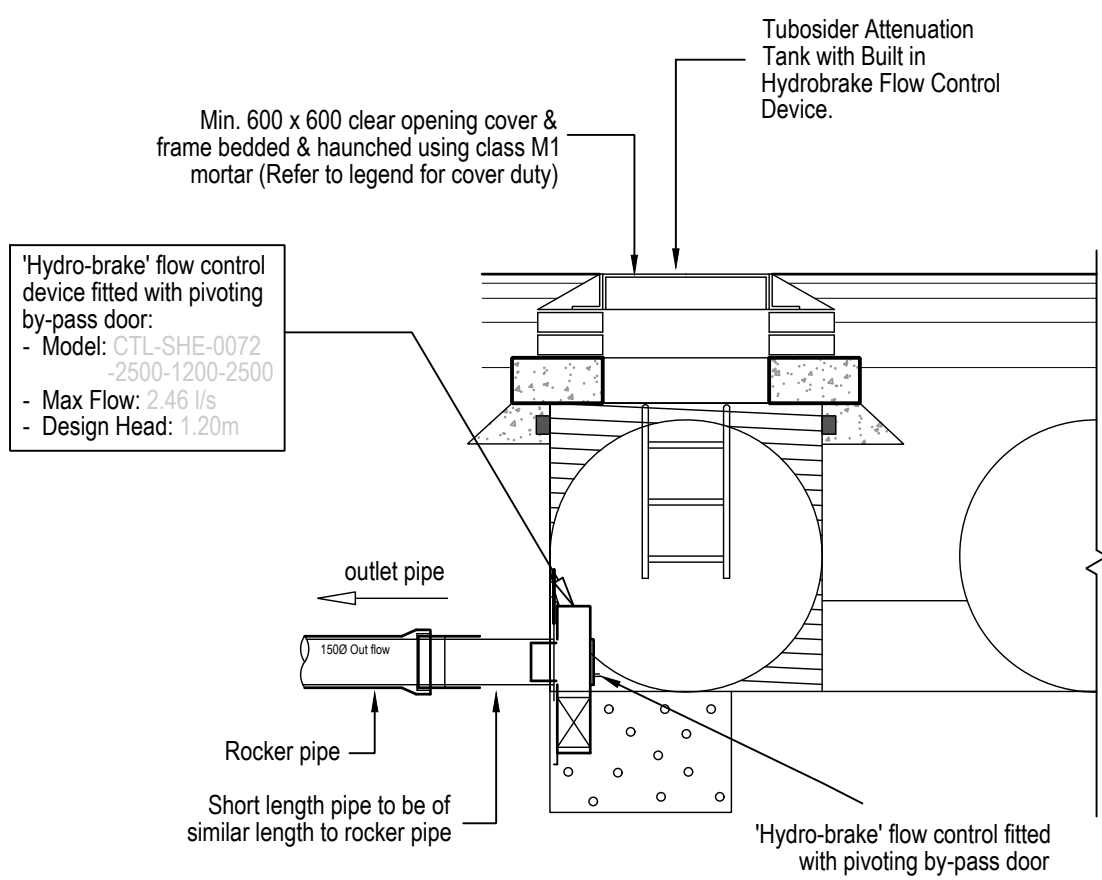


Klargester SKU: 604553 19,000L Washdown
Separator Construction Detail

SCALE = 1:25

Notes:

1. It is important to recognise that separators require regular maintenance. The period between maintenance operations can vary depending on the location and use of the separator, therefore routine inspections shall be undertaken at least every six months and a log maintained of inspection date, depth of oil, depth of silt and any cleaning that is undertaken.
2. Access to the separator should be kept clear and not used for storage.



Hydrobrake Manhole in Tubosider Tank
Construction Detail

SCALE = 1:25

E	03.01.23	Hydrobrake in tank added.
D	06.10.22	Silt trap and hydrobrake in tank added. Levels added to Separ.
C	15.03.22	Note 3 amended
B	04.03.22	Pumping Chamber Detail Removed.
A	31.01.22	Construction Issue
Rev.	Date	Description



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Client
RICHMOND MOTOR GROUP

Project Title
Saltbox

Drawing Title
Construction Details

Sheet 4 of 5

Drawing Status
Construction

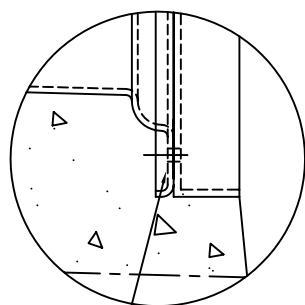
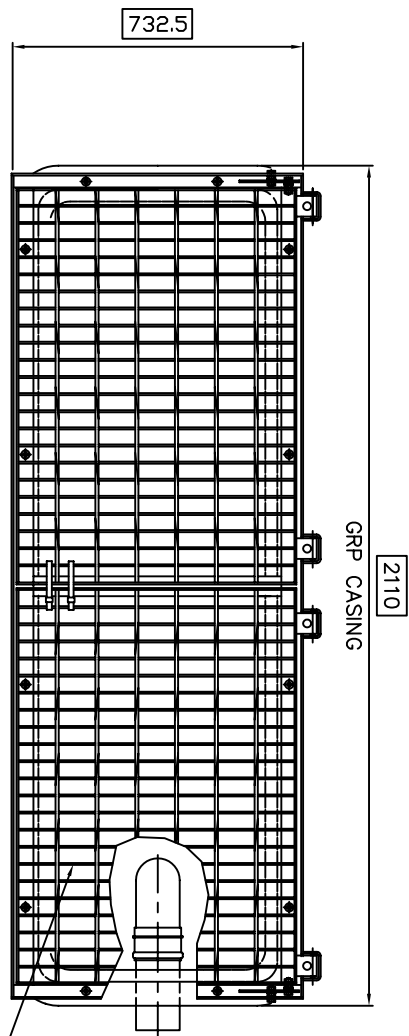
Originator No.	Rev By	CHK By	Scale
114378	DB	PW	1:125 @A1

PROJECT / ORIGINATOR / ZONE / LEVEL / TYPE / ROLE / NO.

114378-CAL-XX-XX-DR-D-0503

Revision

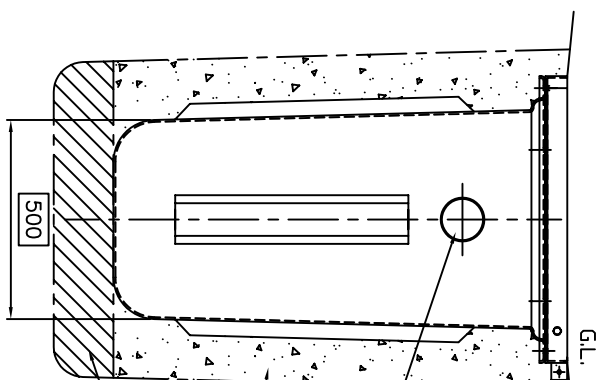
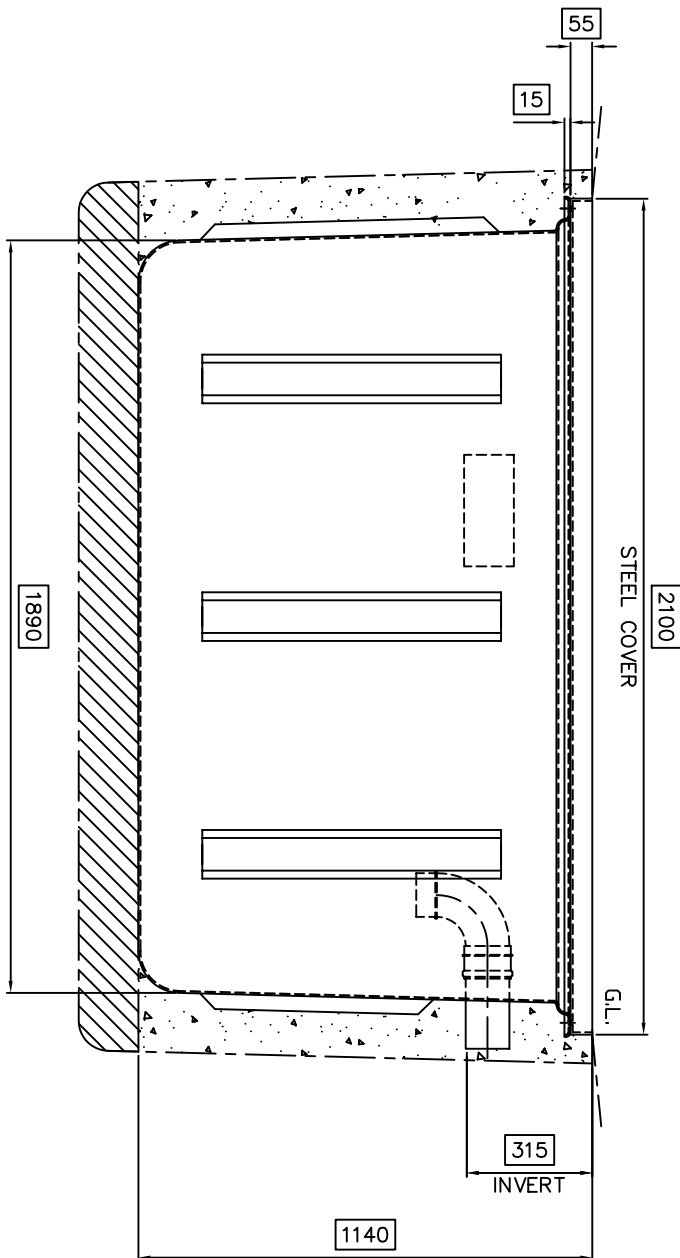
E



SCRAP VIEW

IMPORTANT TO TRANSFER ANY COVER LOADS THROUGH TO BACKFILL i.e. CONCRETE TO BE FREE OF ANY VOIDS UNDER G.R.P. TOP FLANGE.

SURROUNDING FLOOR SLAB SHOULD HAVE AN ADEQUATE FALL TO ALLOW WASTE WATER TO RUN INTO SILT TRAP



CONCRETE BACKFILL BY CLIENT TO SUIT SITE CONDITIONS

CONCRETE BASE SLAB CAST BY CLIENT TO SUIT SITE CONDITIONS.

NOTES:-

- 1.) GALVANISED MESH COVERS.
DESIGNED TO FACTA 'B' LOADING - 5 TONNE SMWL.
- 2.) TOTAL VOLUME = 1150 Litres.
- 3.) TOTAL UNIT WEIGHT = 240kgs (EMPTY).

ALL DIMENSIONS ARE IN MILLIMETRES - DO NOT SCALE

TITLE

CAR WASH
SILT TRAP
CST1H (c/w COVER)
CUSTOMER DRAWINGS



ISSUE	DATE	DRAWN	MODIFICATION
3	02.06.10	T.K.	CC856
2	30.10.09	P.T.C	CC774
1	10.12.08	J.C	INITIAL ISSUE

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SCALE 1:10
D.S. REF. A2
DRAWING No. DS0714P
ISSUE 1

C Proprietary Product Manufacturer Maintenance Requirements

001372

**NSBP003 – NSBP006 Class 1 & 2 Bypass Separator
Installation & Operation Guidelines**



Kingspan Environmental Service Contact Numbers:

GB: 0844 846 0500

NI: 028 3025 4077

IRL: 048 3025 4077

Enclosed Documents

DS0993P	NSBP003 – NSBP006 Class 1 & 2 Bypass Separator
DS1013P	NSBP003 - NSBP006 Installation Drawing
NSBEXT1zz	NSBP Neck Extension Assembly

Issue	Description	Date
04	CC1091	September 2012

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1 Introduction

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

1.2 Handling & Storage

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

1.3 Site Planning

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

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

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

2 Installation

2.1 Installation - General

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

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

- 2.1.8 Pea Shingle - 6 mm to 10 mm rounded pea shingle, offering low point loading characteristics is considered to be the most suitable material for back filling in dry ground installation. (PEASHINGLE ONLY TO BE USED IN DRY SITE CONDITIONS).

2.2 Separator Installation

2.2.1 DRY GROUND CONDITIONS

- 2.2.2 Excavate the site, allowing for a minimum clearance on all sides and base of the unit of 200mm and level the base.
- 2.2.3 Ensure that the hole is kept dry. Should any rain or surface water collect in the hole, this should be pumped out.
- 2.2.4 A base of at least 200mm of lean mix concrete should be provided.
- 2.2.5 Lower the tank in the hole using a rope sling through the lifting points provided on the tank. Under no circumstances should the sling be attached to the inlet pipe or the outlet pipe.
- 2.2.6 Position the inlet pipe in line with the incoming drain. Note that the inlet and the outlet pipes are clearly embossed on the tank. The unique profile of the base will help to level the tank, but make sure the tank is in the truly upright position in order to maintain the 25mm head difference between the inlet and outlet pipes.
- 2.2.7 After any concrete in the base has taken up its initial set (usually after one day), ballast the tank by putting approximately 0.5m depth of water into it.
- 2.2.8 Backfill the space around the tank with pea gravel or similar material (PEASHINGLE ONLY TO BE USED IN DRY SITE CONDITIONS). The backfill should be free from organic material, large stones, brick or sharp objects. Backfilling should be carried out in layers, making sure that voids are not left under and around the sides of the tank and that there are no localized stress concentrations. It is most important that the installer progressively fills the tank with water to the level above the backfill in order to stabilize pressures on the tank.
- 2.2.9 Remove any temporary covers and connect up the tank inlet and outlet pipe to your own pipework. Do not use reducers.
- 2.2.10 Backfilling can now proceed up to ground level in 300mm stages ensuring tank is ballasted in all chambers as you go.
- 2.2.11 A galvanized lockable manhole cover (600x600mm) and frame is to be fitted to suit specific site loadings, THE TANK MUST NOT BE LOAD BEARING. The top of the manhole should not be sat

below the local ground level. If necessary a further neck extension should be added to the tank to bring the cover up to ground level (see section 6).

2.2.12 Venting can be provided through the cover or a Tee piece arrangement on the outlet/inlet.

2.2.13 **WET GROUND CONDITIONS**

2.2.14 Excavate a hole to appropriate depth allowing at least 300mm for lean mix concrete and hard-core base. Allow for tank width plus at least 400mm with additional allowance for any necessary shuttering.

2.2.15 De-water the excavation using suitable pumping equipment. Ensure that the pump discharge does not saturate the ground in the immediate vicinity. In wet ground conditions the installer should ensure that the base is adequate to support the weight of the tank and its contents. If the base of the excavation is unstable, i.e. running sand or similar, excavate an additional 250-300mm below concrete levels and fill up with compacted hard-core. Place a sheet of polythene over the hard-core and up the sides of the excavation before putting in the concrete cradle.

2.2.16 Lay a bed of concrete (minimum 150mm thick) on top of the polythene at the base of the excavation. De-watering is to continue until you are satisfied that the concrete has cured.

2.2.17 Lower the tank onto the concrete bed, ensuring that the inlet and outlet are in the correct position. Ensure the tank is upright and then ballast it with water to a maximum of 500mm deep.

2.2.18 Haunch up the concrete bed at least 450mm all round the base, ensuring that all voids in the concrete are eliminated and at least 150mm of concrete is left below the tank base.

2.2.19 Backfill to the invert depth with concrete. Ensure that the water level inside the tank is maintained no more than 250-300mm above concrete backfill level. It is most important that the installer progressively fills the tank with water to a level above the backfill in order to stabilise pressure on the tank.

2.2.20 Backfill evenly all round the tank, consolidating in layers. The backfilling should start before the base has hardened and be a single continuous operation so that the tank has a full concrete jacket without joins.

2.2.21 DO NOT use vibrating pokers to consolidate concrete. DO NOT discharge concrete directly on to the tank. Ensure that the concrete is not too wet and that is tamped in around the tank.

2.2.22 Align and connect pipework.

2.2.23 Build up a shell of concrete around the neck of the tank to 150-200mm thickness before completing the backfill with a suitable material. Care must be taken to avoid distortion of the neck whilst concreting this area.

2.2.24 Fit cover and frame. Apply surface finish e.g. turf

2.2.25 Do not empty tank until the concrete backfill has cured. Tanks may be left filled with water.

2.3 **Pipework Connections**

2.3.1 In all cases, ensure that the outlet pipework level is maintained for correct operation. (Unless specified on the order, the fall across the unit will be as per the customer drawings).

2.3.2 Small units are generally fitted with **PVCu spigots** to both the outlet and the inlet.

2.3.3 Connect using the same size PVCu socket or a suitable reducer.

2.3.4 Larger units are generally fitted with **Our GRP** manufactured sockets.

2.3.5 The connecting pipework should be pushed into the socket. Ensure that the seal is secure and watertight before backfilling the pipe.

2.3.6 Alternatively, proprietary **flex seal couplings** can be obtained to fit over the outside of the site pipework and the outside of the GRP socket. When using this connection method, please be aware that the outside GRP laminate is not perfectly regular and that you may need to use a sealant on the outside diameter of the GRP. Take care not to over tighten the coupling when connecting to the GRP and ensure that the seal is secure before backfilling the pipe. Drawing 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.

2.4 Oil Level Alarm Neck Fitting

- 2.4.1 We will fit a tube to receive the oil alarm probe. This provides protection and ensures that the probe is positioned at the correct level to sense oil build up.
- 2.4.2 See alarm supplier information and ensure that the probe is placed within the tube and can be accessed from ground level.
- 2.4.3 Continue backfilling with concrete over the tank body to the required level. Build up a shell of concrete, minimum 225mm thick, around the access shaft(s). When using pea shingle continue to back fill up to required level. Temporarily strut the access shaft to avoid distortion. Temporarily strut the access shaft to avoid distortion.
- 2.4.4 Where we supply an extension shaft to meet a deeper invert requirement, a coalescer extension tube will be required. When fitting, ensure that the tube is extended to just below the surface so that the coalescer can easily be removed. Remove the coalescer from the unit before adding the extension tube. When refitting, ensure that the coalescer is correctly inserted and fully pushed into the base fitting. This is important and you must ensure that the coalescer is correctly located before putting the unit in to operation. Reattach the bracket to the extended neck so it lines up with the hole in the coalescer. Class 2 units NSBP do not require a coalescer extension.
- 2.4.5 It is advisable to seal the joints on the extension shafts (particularly on sites with high ground water) with proprietary sealant or by GRP lamination. Temporarily strut the extension neck(s) to avoid distortion during back filling. Where more than one neck section is required to suit a deep invert, consider back-filling section by section. If the extension neck is too long, it can be trimmed using a fine-toothed saw. The original fixing hole bolting the coalescer to the neck should be sealed.
- 2.4.6 Ensure that the vent socket if cut out, is replaced elsewhere. The maximum recommended inlet invert is 2000mm (using 500mm long extension sections). If you are installing a unit deeper than this then you must make your own arrangements for removing and replacing the coalescer. Consideration must be given to the depth of lift involved.
- 2.4.7 Continue back-filling, ensuring minimum 225mm concrete thickness around the access shaft/ extension neck and alarm access tube (as applicable). When using pea shingle back fill as required.
- 2.4.8 Mains powered Alarm Systems. See alarm suppliers installation instructions. Lay 82mm diameter PVCu underground ducting between the alarm panel location and the alarm probe position. The ducting should be 500mm below ground level and fitted with a drawstring for later cable insertion. Any changes of direction should be by long radius bend. If necessary, drill a suitable hole in the access shaft adjacent to the alarm probe terminal box, to accept the ducting and seal.
- 2.4.9 In traffic areas a suitable top slab must be constructed. The top slab should bear on a suitable foundation to prevent superimposed loads being transmitted to the unit and access shafts. Loads applied to covers and frames must bear on the top slab, not the access shaft.
- 2.4.10 The unit should be filled with clean water up to the invert level of the outlet pipe. Ensure the unit identification is placed/ marked inside the neck for future information. The unit is now ready for use.

2.5 Alarm Installation

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

Unit	Recommended Minimum Oil Storage volumes in litres	Actual Oil Storage volume in litres	Max. (100%)Depth of floating oil (Static)
NSBP003	45 litres	107	210mm
NSBP004	60 litres	107	210mm
NSBP006	90 litres	107	210mm

3 Operation

- 3.1.1 The unit is sized on treating a defined area and rainfall (5 mm/hour) EN.858 Part 1 and using the factor provided in the Environment agency guidelines PPG3. (0.0018 = 6.5mm/hr) The unit will treat the entire flow i.e. NSBP003 will treat a flow of 3 litres per second. If the flow is greater than this then the excess flow will bypass the main treatment chamber. A NSBP003 unit will work in bypass mode over 3 and up to 30 litres per second. Flows in excess of this will back up on to the site. During a storm, the rain falls and flushes any surface debris, silt or oil into the tank. This first flush, up to the maximum rated flow is fully treated. As the severity of the storm increases, so does the rate of flow increase. The liquid entering the separator after the first flush tends to be cleaner and so, in lower risk applications, is allowed to bypass the oil separation chamber for directly discharge.
- 3.1.2 The bypass unit has three chambers. The entire flow up to the units listed flow rating is fully treated and passes through all chambers. (E.g. NSBP003 treats 3 litres per second.)
- 3.1.3 Flows in excess of this rating will bypass the separation chamber and the liquid passes untreated to the outlet chamber.
- 3.1.4 The first chamber will accumulate silt and grit. The maximum volume that can be retained is the rating x 100 e.g. a NSBP003 is capable of holding 300 litres of silt.
- 3.1.5 The second / separating chamber is sized to separate oil at the rated flow rate and to accumulate the required oil storage volume. A NSBP003 maximum oil storage volume is 45 litres. An oil probe should be positioned to detect the accumulation of oil when there is no or low flow conditions. The probe should be positioned so that the alarm operates at 90% of the rated oil storage volume.
- 3.1.6 In bypass flow conditions, the flow moves directly from the inlet to the outlet chamber avoiding the separating chamber.
- 3.1.7 Separators can be purchased either as Class 2, or as Class 1. Class 1 Bypass Separators are fitted with a removable coalescer which also includes media to further improve the discharge quality. The coalescer media requires maintenance.
- 3.1.8 Bypass Class 1 & Class 2 Separators are not effective for the removal of soluble or emulsified pollutants such as oil/detergent mixes found in vehicle wash effluents. With permission such discharges should be drained to the foul sewer. Consult our technical department for Separation equipment to meet these applications.

4 Maintenance

4.1 Waste Removal and Servicing

- 4.1.1 Separated light liquid **must** be removed from separator when the oil capacity has been reached.
- 4.1.2 An oil level alarm system is available for purchase which gives warning when the separated light liquid/water interface level reaches 90% of the maximum recommended oil storage volume.

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

4.2 Waste Removal Procedure – Oil & Silt

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

4.3 Checking the Coalescer Assembly

- 4.3.1 Coalescers, where fitted, may be cleaned periodically to maintain efficiency. Coalescers should be checked following a major incident and replaced if necessary. Please contact us if you wish to purchase the coalescer media.
- 4.3.2 Identify the type and size of separator (shown on labels inside the access neck).
- 4.3.3 Assemblies weighing less than 25 Kg may be removed by hand. Heavier assemblies should be lifted by mechanical means. Any lifting device employed must be capable of lifting:
 - 4.3.3.a In excess of the maximum assembly weight.
 - 4.3.3.b The assembly completely out of the access shaft.
 - 4.3.3.c Giving a smooth and controlled lift.
 - 4.3.3.d Swinging the assembly to one side clear of the access shaft.

Unit	Dry Weight (Kg)	Wet Weight (Kg)	Silted Weight (Kg)	Replacement Media Part No.
NSBP003	5.7 kg	≈50 kg	≈60 kg	402715
NSBP004	5.7 kg	≈50 kg	≈60 kg	402715
NSBP006	5.7 kg	≈50 kg	≈60 kg	402715

4.3.4 Ensure that the area around the access shaft is clear and that there is space to place the assembly once removed. If space is not available it will be necessary to support the assembly over the access shaft. e.g. by scaffold poles and platform.

4.3.5 Only remove the access cover when necessary to remove the assembly. Do not leave the access shaft uncovered and unattended.

4.4 Removing the coalescer assembly.

4.4.1 Undo and remove the bracket which secures the coalescer to the access shaft.

4.4.2 Lift the assembly with a smooth and steady motion. Coalescers will become lighter as water drains from the exposed media. Allow the water to drain completely. Assemblies blocked with fine silt may be very heavy.

4.4.3 Fully extract the assembly and set it down adjacent to the access shaft.

4.5 Cleaning the coalescer assembly/ Media Replacement.

4.5.1 Hose down the assembly using clean water at normal pressure. If the media is heavily contaminated with oil and silt, it may not be possible to clean it effectively by hosing. Do not allow untreated cleaning water to pass out of the unit. Continue hosing until the water runs clear.

4.5.2 To replace the media, undo the banding. Slide media off the core tube and slide new media on. Ensure all the apertures on the core tube are covered by the media. Re-secure or replace banding. Consider replacing media and banding every two years.

4.6 Replacing the coalescer assembly.

4.6.1 Position it over the access shaft.

4.6.2 Lower the assembly steadily into the access shaft ensuring that the end locates within the sump at the bottom of the tank. Re-secure the bracket.

4.6.3 Replace the access cover.

5 Connection of Extension Neck

(Option in 1800L Tanks only)

5.1.1 See the accompanying illustration.

5.1.2 Remove existing lid by unscrewing 8 screws and lifting off lid.

5.1.3 Apply mastic around flange of tank that joins to extension neck.

5.1.4 Place extension neck onto flange of the tank and screw down using 8 fixings.

5.1.5 Please refer to drawing NSBEXT1zz

5.1.6 Apply mastic to top face of extension piece that is joining to cover.

5.1.7 Place lid on top of extension neck and screw down using 8 fixings.

5.1.8 Backfill in 200mm stages with concrete (wet site) or peashingle (dry site), bracing neck during each stage until you reach the cover level.

5.1.9 For traffic area loading ensures you refer to tank installation section.

6 Emergencies

- 6.1.1 At sites where there is a high risk of spillage, spill kits containing drain seals, absorbent materials, disposal containers and other appropriate equipment should be held. In the event of a spillage on site, the material should be contained, (if a spill kit is not available, sand or soil may be used) and the Environment Agency notified immediately using the appropriate emergency hotline number listed in the Agency Guideline PPG3. Year 2012 - **0800 80 70 60**

HEALTH & SAFETY

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

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

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

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

Electrical work should be carried out by a qualified electrician.

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

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

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

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

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

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

OIL ALARM SYSTEMS

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

MAINTENANCE

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

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

SEPARATOR MAINTENANCE LOG



Site address/location
.....
Separator location
.....
Type of separator
Nominal Flow
Total capacity

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

012582
Washdown & Silt Separator
Installation & Operation Guidelines



Kingspan Environmental Service Contact Numbers:

GB: 0844 846 0500

NI: 028 3025 4077

IRL: 048 3025 4077

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.

Issue	Description	Date
02	CC1090	September 2012

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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, any information or advice given by employees or agents of Kingspan regarding the design of an installation must be verified by a qualified specialist (e.g. Civil engineering consultant).

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 cannot 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 Environmental accepts 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 and the unit orientated onto its side with even support. 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. 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..
- 3.5. Uncontaminated run off such as roof water should be excluded from separators. (EA Guidelines PPG3.)
- 3.6. 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.
- 3.7. The separator must be installed at a level which will allow connection to the incoming drain and a free discharge at the system outlet. The water table must be below the discharge outlet.
- 3.8. Do not install the unit deeper than necessary, ensure that you purchase extension shafts. The minimum invert depth of the unit is shown on the customer drawing.
- 3.9. 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.
- 3.10. There must be at least 1 metre of clear, level ground all around the access covers to allow for routine maintenance.
- 3.11. It is essential that a mains water supply is accessible for routine cleansing and refilling after removal of waste material and liquid.

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 the unit is uniformly supported so that point loads through the unit are avoided.

4.7. Concrete Specification is a *general* specification. It 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	270 - 280 Kg/M ³
	C20	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 which allows for the burial depth of the unit plus concrete base slab and haunch.
- 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 the unit, then lower the unit onto the haunch using suitable webbing slings and lifting equipment.
- 5.4. **Pour no more than 300 mm depth of clean water into the unit, avoiding shock loads. For units with more than one chamber, add water to each chamber simultaneously. DO NOT OVERFILL, the unit is not designed to hold water whilst unsupported.**
- 5.5. **Place concrete backfill to approximately 250mm depth under and to the sides of the tank ensuring good compaction to remove voids. DO NOT use vibrating pokers. Continue adding concrete backfill, simultaneously keeping the internal water level no more than 200 mm above the backfill level at all times, until the backfill is just below the underside of the outlet drain, giving sufficient room to connect the inlet and outlet pipework.**
- 5.6. 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. A drawing can be provided to show 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.

- 5.7. 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.
- 5.8. It is advisable to seal the joints on the extension shafts (particularly on sites with high ground water) with proprietary sealant or by GRP lamination. Temporarily strut the extension neck(s) to avoid distortion during back filling. Where more than one neck section is required to suit a deep invert, consider back-filling section by section. If the extension neck is too long, it can be trimmed using a fine-toothed saw.
- 5.9. Ensure that the vent socket if cut out, is replaced elsewhere. The maximum recommended inlet invert is 2000mm (using 500mm long extension sections).
- 5.10. Continue back-filling, ensuring minimum 225mm concrete thickness around the access shaft/ extension neck and alarm access tube (as applicable).
- 5.11. 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.
- 5.12. 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.

Unit	Total Capacity (Litres)	Max. Recommended Silt Volume
W1/012	1200	600
W1/020	2000	1000
W1/030	3000	1500
W1/040	4000	2000
W1/060	6000	3000
W1/080	8000	4000
W1/100	10000	5000
W1/120	12000	6000
W1/150	15000	7500
W1/190	19000	9500

The units above all include a single chamber, (W1) but on request, we may be able to provide with 2 or 3 chambers. If you require larger units, these are also available. Please contact us to discuss your specific application

Invert depths (E) can be supplied in additional increments of 500mm from the minimum stated above. Please indicate the inlet drain invert required when specifying units. Maximum 2.0 m.

6.0 Operation

As contaminated water passes through the separation chamber, it is retained long enough to allow settleable solids to sink to the bottom of the unit. Our design uses a maximum of 6 minutes retention time, at the flow rate given. The separator water is able to discharge safely without the risk of pollution to the municipal plant.

The nature of the silt varies depending on either the ground or surface receiving the flow. These aspects should be considered when selecting the size of the unit in relation to the flow being treated. .

7.0 Maintenance

Waste Removal and Servicing

7.1 Separators should be inspected at least every six months or more frequently if experience dictates. A log should be maintained detailing any silt removal or cleaning carried out. A specimen maintenance log is included in the appendices.

7.2 Every site is different, in respect to the amount and type of silt generated by the drain design and installation. Frequently, the construction programme itself generates large and perhaps unusual quantities of silt and grit. We do recommend that following the initial installation, an inspection of the separator contents be made to check that building rubble has not entered the unit. Further inspections at 3 and 6 months should be made so as to be able to assess the volumes of silt accumulated. The inspection and emptying programme can then be defined following the first 6 months site experience. We recommend leaving a maximum interval between inspections of 6 months.

Waste Removal Procedure –Silt

7.3 Remove the access cover and lower the desludging hose in to the separation chamber.

7.4 Lower the desludging hose to the base of the tank and withdraw any grit or sludge that may be present. Do not remove more water than is necessary. Ensure that you access and clean both compartments.

8.0 Emergencies

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**

9.0 Warranty

Taken from 'Kingspan's Terms & Conditions of Sale'

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

This warranty is conditional upon:

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

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

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

For any further advice, please contact us.

Our service provider: Kingspan Environmental Services: 0844 846 0500

SEPARATOR MAINTENANCE LOG



Site address/location

Separator location

Type of separator

Nominal Flow

Total capacity

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



Maintenance

The Tubosider product itself requires no maintenance. Tubosider products have a minimum design life of 60 years, the design life can be extended to suit individual project requirements.

The Tubosider product has been specifically design with manhole access points with ladders, to gain entry to the system and it is the system that will require inspection.

The frequency of inspection will vary from project to project. We would recommend that the first inspection is carried out 12 months after the product has been installed. Over a period of time all attenuation tanks will have a very gradual build up of silt, the level of build up needs to be monitored and from this information the frequency of inspection can be decide.

A gully sucker can be used to remove any silt build up or this can be done manually.

The tank inspection needs to be carried out by someone who has successfully completed a confined space training course.

Hydro International plc

Shearwater House
Clevedon Hall Estate
Victoria Road
Clevedon
Somerset BS21 7RD

Tel: 01275 878371 (General enquiries)
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Fax: 01275 874979
e-mail: enquiries@hydro-int.com
website: www.hydro-int.com



Agrément Certificate
08/4596
Product Sheet 1

HYDRO INTERNATIONAL HYDRO-BRAKE FLOW CONTROLS

S-RANGE HYDRO-BRAKE OPTIMUM FLOW CONTROLS

This Agrément Certificate Product Sheet⁽¹⁾ relates to S-Range Hydro-Brake Optimum Flow Controls⁽²⁾ a range of units to control discharge outlet flow in surface/storm water management systems.

(1) Hereinafter known as 'Certificate'.

(2) Hydro-Brake, Hydro-Brake Optimum, Flush-Flo and Kick-Flo are trademarks of Hydro International plc.

CERTIFICATION INCLUDES:

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

KEY FACTORS ASSESSED

Flow characteristics — the performance characteristics of the flow controls have been assessed (see section 6).

Strength — the ability of the flow controls to withstand characteristic loads has been assessed (see section 8).

Durability — under normal service conditions, the flow controls will have a life expectancy in excess of the structure in which it is installed (see section 10).



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

On behalf of the British Board of Agrément

Date of Second issue: 20 July 2012

Originally certificated on 18 October 2008

B Chamberlain

Brian Chamberlain

Head of Approvals — Engineering

G Cooper

Greg Cooper

Chief Executive

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

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

British Board of Agrément
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©2012

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website: www.bbacerts.co.uk

Regulations

In the opinion of the BBA, S-Range Hydro-Brake Optimum Flow Controls, if installed, used and maintained in accordance with the provisions of this Certificate, will meet or contribute to meeting the relevant requirements of the following Building Regulations (the presence of a UK map indicates that the subject is related to the Building Regulations in the region or regions of the UK depicted):



The Building Regulations 2010 (England and Wales)

Requirement:	H3(3)	Rainwater drainage
Comment:		The units can be used in a construction to meet this Requirement. See section 6 of this Certificate.
Requirement:	Regulation 7	Materials and workmanship
Comment:		The units are acceptable. See section 10 and the <i>Installation</i> part of this Certificate.



The Building (Scotland) Regulations 2004 (as amended)

Regulation:	8(1)(2)	Fitness and durability of materials and workmanship
Comment:		The units are acceptable. See sections 9 and 10 and the <i>Installation</i> part of this Certificate.
Regulation:	9	Building standards — construction
Standard:	3.6(a)	Surface water drainage
Comment:		The units can be used in a construction to satisfy this Standard, with reference to clauses 3.6.1 ⁽¹⁾⁽²⁾ to 3.6.5 ⁽¹⁾⁽²⁾ . See section 6 of this Certificate.
Standard:	7.1(a)(b)	Statement of sustainability
Comment:		The units can contribute to meeting the relevant requirements of Regulation 9, Standards 1 to 6 and therefore will contribute to a construction meeting a bronze level of sustainability as defined in this Standard.
Regulation:	12	Building standards — conversions
Comment:		All comments given for these systems under Regulation 9, also apply to this Regulation, with reference to clause 0.12.1 ⁽¹⁾⁽²⁾ and Schedule 6 ⁽¹⁾⁽²⁾ . (1) Technical Handbook (Domestic). (2) Technical Handbook (Non-Domestic).



The Building Regulations (Northern Ireland) 2000 (as amended)

Regulation:	B2	Fitness of materials and workmanship
Comment:		The units are acceptable. See section 10 and the <i>Installation</i> part of this Certificate.
Regulation:	B3(2)	Suitability of certain materials
Comment:		The units are acceptable. See section 9 of this Certificate.
Regulation:	N5	Rain-water drainage
Comment:		The units can be used in a construction to satisfy this Regulation. See section 6 of this Certificate.

Construction (Design and Management) Regulations 2007

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

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

See section: 3 *Delivery and site handling* (3.3) and 11 *Installation* of this Certificate.

Additional Information

NHBC Standards 2011

In the opinion of the BBA, the use of S Range Hydro-Brake Optimum Flow Controls, in relation to this Certificate, is not subject to the requirements of these Standards.

Technical Specification

1 Description

1.1 S-Range Hydro-Brake Optimum Flow Controls are vortex flow controls manufactured from 3 mm, 5 mm or 8 mm thick grade 304 stainless steel. Alternative material thicknesses and grades are available depending on the application (outside the scope of this Certificate. For more information, the Certificate holder should be contacted).

1.2 Each unit is designed and manufactured to meet specific hydraulic requirements (see section 7). The configuration of the inlet, volute and outlet is varied to achieve the required discharge control characteristics. The units may be fitted with a fixed inlet or an adjustable inlet gate to allow for post-installation adjustment of the discharge flow rate by up to 20% (see Figure 1).

Figure 1 Fixed and adjustable inlet arrangements



1.3 The units are available in a range of sizes to give design flow rates from $0.7 \text{ l}\cdot\text{s}^{-1}$ to $250 \text{ l}\cdot\text{s}^{-1}$, suitable for use in surface/stormwater management applications. A summary of technical information is given in Table 1.

Table 1 Summary of technical information

Characteristic (units)	Typical range of values
Design flow rate ($\text{l}\cdot\text{s}^{-1}$)	0.7 to 250
Design head (m)	0.4 to 4
Maximum lateral dimension (mm)	
Lug mounted units	180 to 2000
Backplate mounted units	Dependent on discharge pipe size
Push-fit units	180 to 2000
Mass (kg) excluding packaging	
Lug mounted units	6 to 680
Backplate mounted units	Dependent on discharge pipe size
Push-fit units	6 to 680

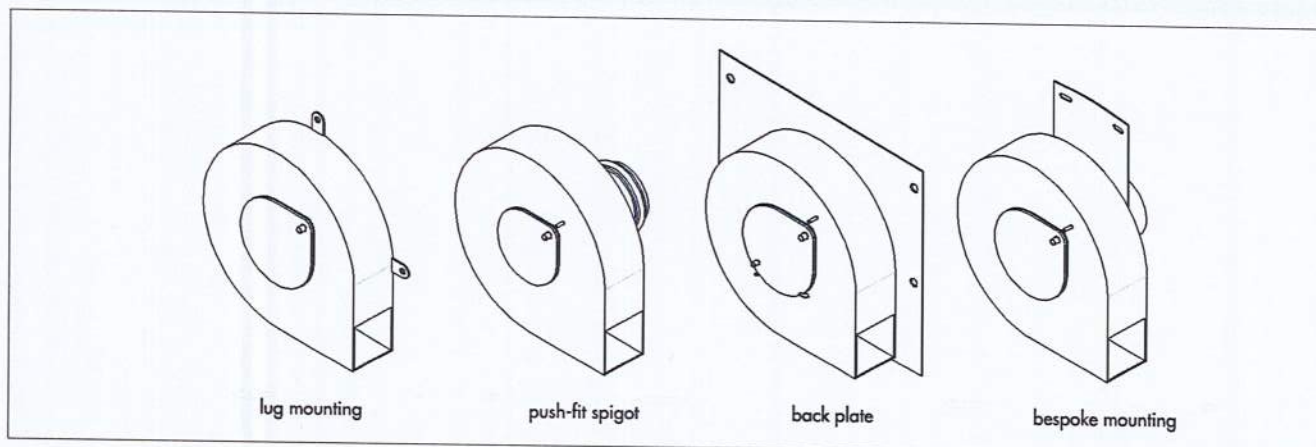
1.4 Each unit is supplied fully assembled including:

- an S-Range Hydro-Brake Optimum Flow Control with integral bypass door on the front face of the unit, pipe location spigot and mounting face gasket or push-fit sealing rings
- wire rope to allow remote operation of the pivoting bypass door (7 mm diameter rope consisting of seven stainless steel strands each of 3 mm diameter) and stainless steel wire rope attachment brackets
- mounting anchor bolts (A4 316 stainless steel). The performance and suitability of the mounting bolts is outside the scope of this Certificate; the Certificate holder should be contacted for advice on the most appropriate fixings for individual projects.

1.5 The flow controls are available with various types of mounting arrangement (see Figure 2):

- lug mounting — lugs are provided at points around the perimeter of the flow control mounting face. This is appropriate for the majority of applications where the outlet diameter of the installation structure is approximately 0.5 times the flow control body diameter or less
- push-fit spigot — a push-fit spigot with rubber sealing rings is provided. A single lug may also be provided on the outside perimeter of the mounting face to prevent rotation of the flow control in service. Precise specification of the outlet pipe is essential for push-fit mounting, in order to ensure a watertight seal
- backplate mounting — a rectangular mounting plate is provided to allow fixing to the outlet of the installation structure where lug mounting is not appropriate. If a flat surface is not available, the mounting plate may also be provided curved to the same radius as the chamber in which it is to be fitted.

Figure 2 Standard mounting arrangements



1.6 The units may be supplied for installation in purpose built or existing structural housings on site. These must have adequate strength to resist the loads imposed by the unit. The design of these structures is outside the scope of the Certificate but the performance and durability of the flow control will be unaffected, provided it is installed in accordance with the recommendations of this Certificate.

1.7 The units may also be supplied ready-fitted to purpose-built reinforced concrete or plastic manhole chambers ready for installation into the ground. The performance of these chambers is outside of the scope of this Certificate.

2 Manufacture

2.1 S-Range Hydro-Brake Optimum Flow Controls are manufactured from stainless steel sheet which is cut, rolled and welded to the required dimensions.

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

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

2.3 The management system of Hydro International plc has been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2008 by Lloyd's Register Quality Assurance Limited (Certificate LRQ 0961366).

3 Delivery and site handling

3.1 S-Range Hydro-Brake Optimum Flow Controls are supplied in polyethylene and plywood packaging for small units and on a pallet for large units. They should be handled and stored appropriately to avoid being dropped or receiving impacts, eg from construction plant.

3.2 Each unit is stamped with the Certificate holder's unique project reference number and carries a label bearing the Certificate holder's contact information and advice on orientation. The packaging also bears details of the package weight and client details.

3.3 Care should be taken handling the units and when lowering into position for installation. Where appropriate, larger units should be lifted via the fitted lugs using mechanical lifting/lowering equipment.

Assessment and Technical Investigations

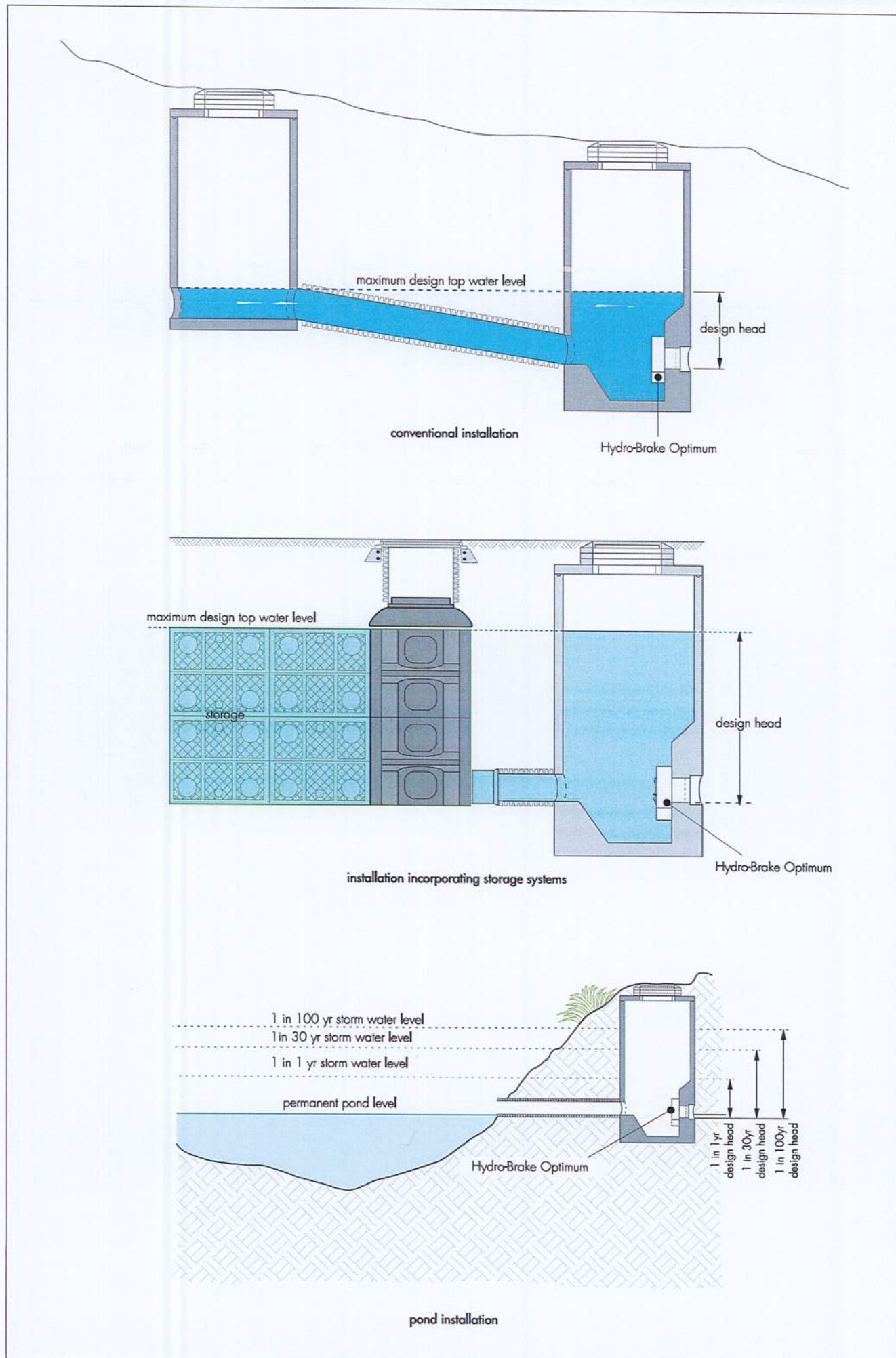
The following is a summary of the assessment and technical investigations carried out on S-Range Hydro-Brake Optimum Flow Controls.

Design Considerations

4 General

4.1 S-Range Hydro-Brake Optimum Flow Controls are intended to restrict the outlet flow from a surface/storm water management system by increasing back pressure, achieved by inducing a vortex flow pattern in the water passing through the device. In these applications, the units are often used in conjunction with storage facilities, including geocellular storage systems, concrete tanks, oversized pipes and ponds. The performance of these items is outside the scope of this Certificate. Guidance on design of sustainable drainage systems is given in Planning Policy Statement 25 *Development and Flood Risk* and CIRIA C697 *The SUDS Manual*. Typical installation details are shown in Figure 3.

Figure 3 Typical applications and design head



4.2 The units are self-activating; they do not have moving parts and do not require external power.

4.3 As a matter of good design practice, measures should be taken to remove silt sediment and debris from the surface water at an early stage to prevent problems further downstream.

4.4 It is recommended to maintain a minimum clear opening of 75 mm in a surface water drainage system. In some cases, it may be necessary to use a flow control with a smaller minimum opening. In which case, the installation of screens or debris removal systems upstream of the device is recommended.

5 Practicability of installation

The product is designed to be installed by a competent contractor, experienced with this type of product.

6 Flow characteristics

6.1 Due to the 'S'-shaped head-flow characteristic, the units are able to pass greater volume flow rates at lower heads, whilst still limiting the flow at the duty/design point to an acceptable level. A typical head versus flow characteristic for the units is given in Figures 4, 5 and 6.

6.2 The units have a hydraulic characteristic, comprising three distinct stages corresponding to different phases of operation (see Figures 4, 5 and 6):

- pre-initiation phase — at low heads, the flow control provides similar performance to an orifice plate with equivalent size to its outlet⁽¹⁾. Flow rate accuracy of $\pm 5\%$ of the ultimate duty/design flow is typically achievable in this region
- vortex initiation phase — as the head increases, vortex motion will start to develop inside the unit, starting to restrict the flow⁽¹⁾. Flow rate accuracy of -5% of flow to $+5\%$ of phase peak is typically achievable in this region
- post-initiation/design phase — following vortex initiation, the flow control characteristic stabilises, providing hydraulic performance equivalent to a substantially smaller orifice plate than the unit's outlet. The units can be specified to give a duty/design point in any part of this region, though in most practical cases, specification will be at flow rates above the initiation phase peak (corresponding to the Flush-Flo point). Flow rate accuracy of $\pm 5\%$ of flow is typically achievable in this region.

As the water level subsides and water in the device drains, the energy within the flow reduces and the vortex collapses. Air is drawn into the volute and the unit returns to operating in a similar manner to an orifice of the same cross sectional area. This drains the system quickly so that the upstream network is ready for the next event.

(1) Although a flow control would not usually be selected with the duty/design point in this region, this part of the characteristic will have implications to overall drainage system operation.

Figure 4 Pre-initiation phase

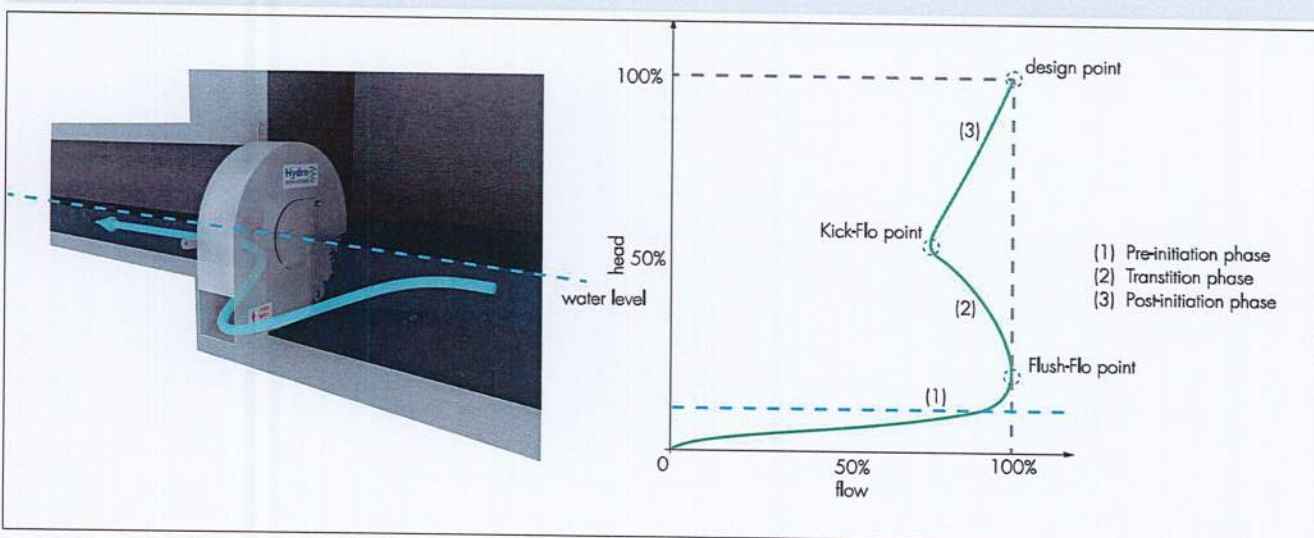


Figure 5 Vortex initiation phase

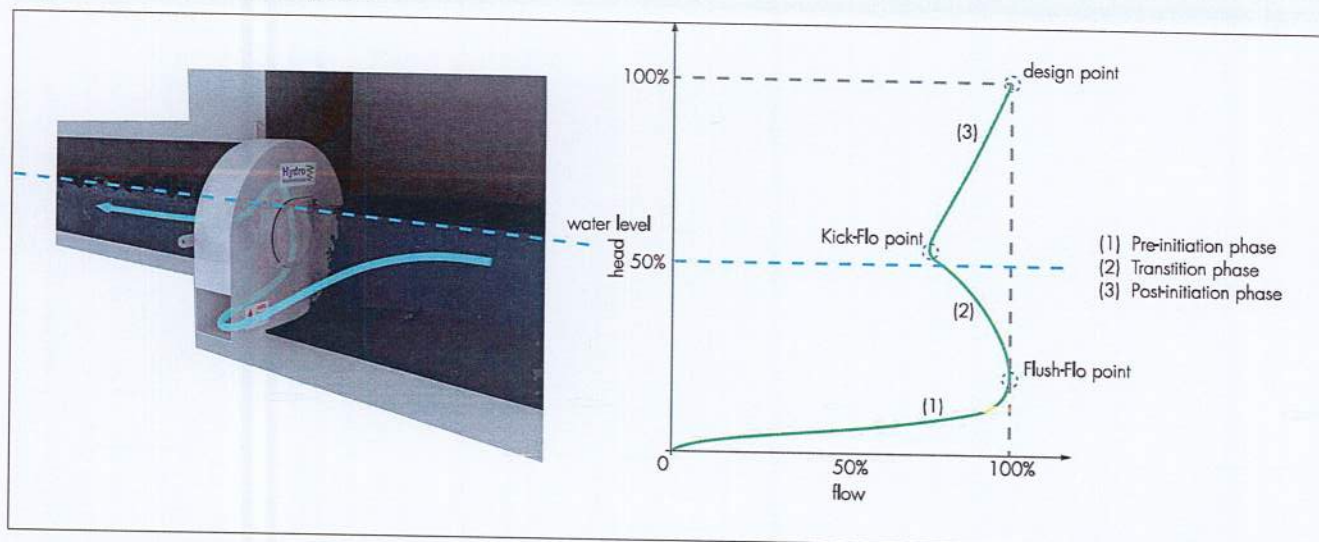
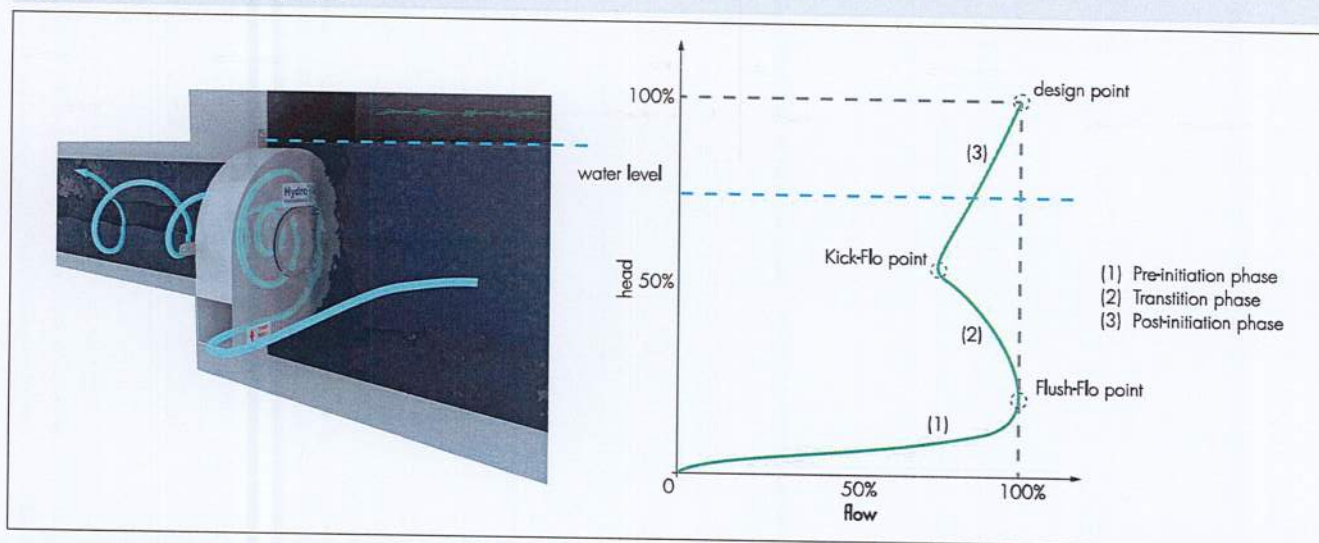


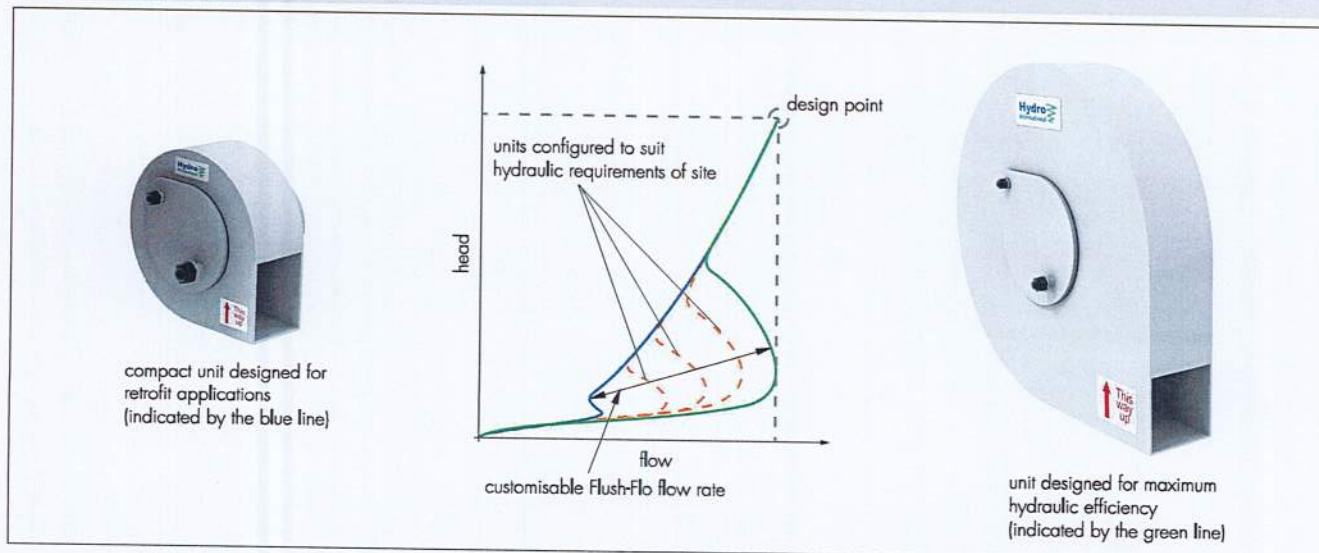
Figure 6 Post initiation phase



6.3 S-Range Hydro-Brake Optimum Flow Controls allows the inlet, volute and outlet to be individually configured to suit the application, enabling the system to be designed to provide the appropriate hydraulic performance or to suit constant discharge, multi-stage discharge or risk-based network designs (see Figure 7). Individual configuration of the inlet, volute and outlet also allows the system designer to adjust the physical dimensions of the unit in order to:

- maximise the internal clearances
- comply with minimum outlet guidelines
- retrofit to existing infrastructure.

Figure 7 Application based design



6.4 The units are specified and supplied to meet individual application requirements. The Certificate holder should be contacted directly for advice on correct selection. The following information should be provided:

- operating head — depth from the unit's outlet invert to the design water level(s) (see Figure 3)
- flow — required discharge at the given head(s)
- manhole details or control chamber proposals, including outlet size
- information on any 'special' conditions, for example if the unit is expected to be subject to downstream surcharging or possible siphoning effects.

6.5 In most cases the downstream drainage system will be designed to allow the unit a free discharge. However, this is not always possible and in certain cases it will be necessary to design the flow control to surcharge conditions. Surcharging of the flow control will affect the hydraulic performance and advice should be sought from the Certificate holder. Installations where the outlet is surcharged are outside the scope of this Certificate.

6.6 Where a drainage system has been designed and hydraulically modelled based on the use of a S-Range Hydro-Brake Optimum Flow Control, it is essential to ensure that the same flow control, or a flow control that has been confirmed to provide an equivalent hydraulic performance across the whole design head range, is used in the final installation.

7 Hydraulic design

7.1 The units are typically used to control flows across a site or to limit the rate of discharge from a site. Where used to limit the rate of discharge from a site, the allowable discharge rate to an appropriate outfall will generally be set by the Environment Agency, the Scottish Environmental Protection Agency, local Planning Authorities or the Sewer Undertaker.

7.2 The allowable discharge rate will often be calculated in respect of the greenfield equivalent run-off rate for the undeveloped site. Advice on calculating the greenfield equivalent run-off rate can be found in the *Interim Code of Practice for Sustainable Drainage Systems*. Where a site is being redeveloped, the allowable discharge rate may be determined based on the discharge rate prior to the redevelopment. The design head acting on the upstream side of the Hydro-Brake Optimum flow control will generally be determined by the maximum design top water level within the storage volume. The design head is illustrated in Figure 3.

8 Strength

8.1 The units are manufactured from stainless steel of a sufficient strength and thickness to ensure that the product remains fit for purpose throughout its design life.

8.2 Under normal operation, the units will deflect by no more than the thickness of the material used for manufacture. This ensures that the volume of the unit available for water flow is not compromised during operation and therefore the hydraulic operation of the unit is not adversely affected by deformation of the unit.

9 Maintenance

 9.1 Access should be allowed for clearing debris from the chamber housing the flow control. In the event that the inlet to the unit becomes blocked, the pivoting bypass door may be operated by pulling the wire rope attached upwards to drain down the chamber and provide access for maintenance. The pivoting bypass door must be returned to the closed position following drain down of the chamber and clearance of the blockage.

9.2 Regular inspections should be carried out to ensure that debris that may obstruct the inlet to the flow control is not present in the chamber. The frequency of inspection will depend on the location of the unit but must be at least once per year.

9.3 The units can be jetted from downstream, in accordance with standard sewer jetting procedures without affecting the hydraulic performance of the system.

10 Durability

 The units are made from materials that will not be adversely affected by contaminants likely to be found in surface water. In the opinion of the BBA, the units will have a design life in excess of the design life of typical structures in which they might be installed.

Installation

11 General

11.1 S-Range Hydro-Brake Optimum Flow Controls must be installed in accordance with the Certificate holder's instructions. In many cases the installation will be in a confined space and all appropriate measures must be taken to ensure the safety of operatives working in such areas.

11.2 Dimensioned drawings for each installation are provided by the Certificate holder. It is important that the flow control chamber is constructed to the drawing. Other than where a curved backplate is supplied, this should incorporate a flat mounting surface on the inside face of the chamber wall at the outlet pipe. It should also be ensured that the sump floor level is sufficiently below the invert of the outlet pipe and sufficiently disposed to accommodate the unit.

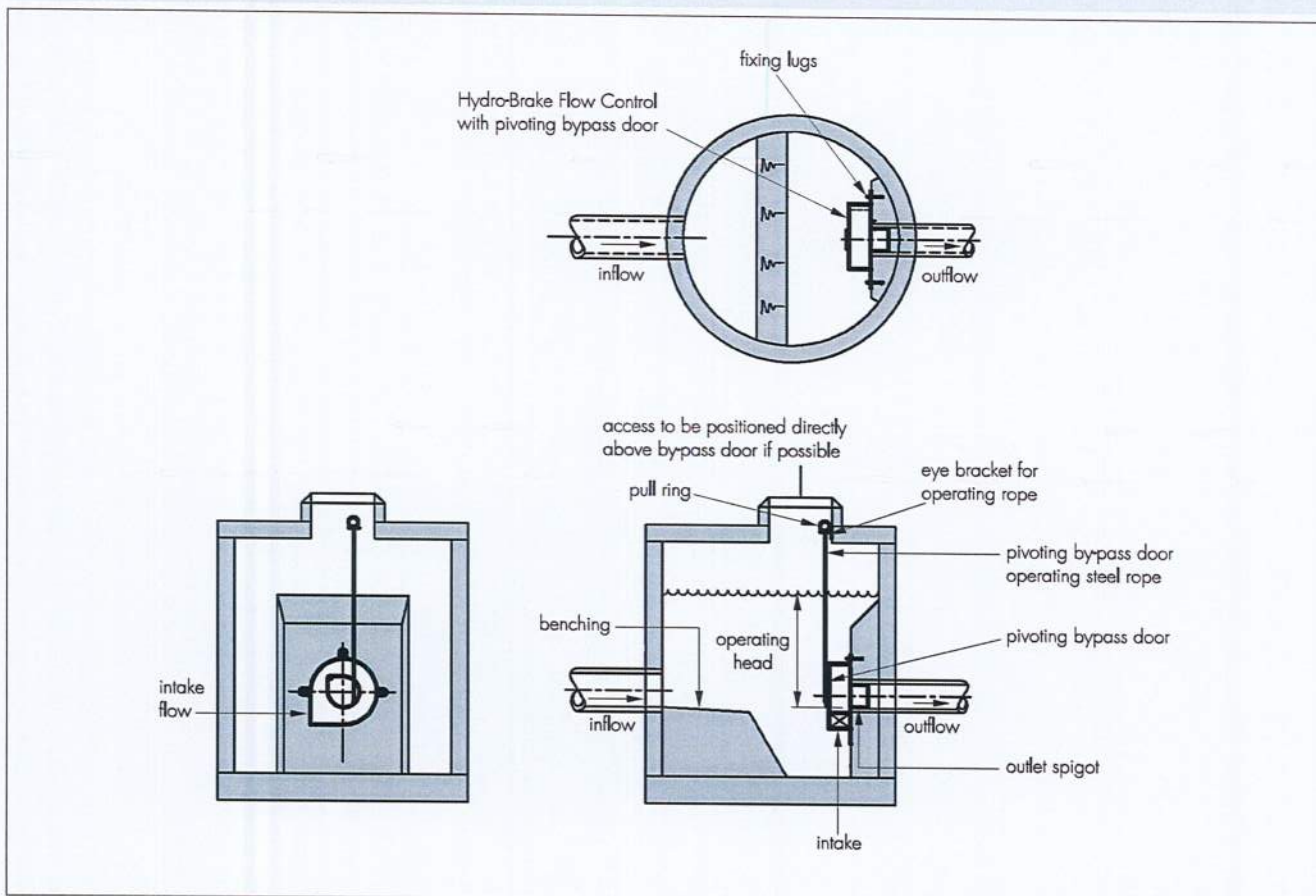
11.3 The benching/standing area should be formed as indicated on the installation drawing.

11.4 Where an adjustable inlet gate is provided, the factory set position must not be adjusted without prior consultation with the Certificate holder.

12 Procedure

12.1 The unit should be offered up to the chamber outlet wall until the spigot projects into the outlet pipe with its invert seated to the outlet pipe invert and with the unit in the correct orientation (see Figure 8).

Figure 8 Typical installation details



12.2 With the unit in position, the position of the required number of bolt holes is marked and drilled through the fixing lugs or plate mount (depending on specification).

12.3 Ensuring that the supplied rubber gasket is suitably positioned over the outlet spigot of the flow control, the fixings should be inserted and tightened until moderate compression of the gasket is achieved.

12.4 The supplied eye brackets on the pivoting bypass door operating rope should be fixed to the soffit of the roof slab using masonry bolts to achieve a direct vertical line of pull from over the chamber access cover to the pivoting bypass door. It should be arranged that the rope is taut when held in the upper eye bracket. Where it is not possible to attain a direct vertical line of pull, additional eye brackets can be used to account for the change of direction.

12.5 The rope stop should be positioned to ensure that, when the pivoting bypass door is open, the rope stop can be clipped to the uppermost bracket. Once positioned, the stop attachment grub screws should be tightened.

Technical Investigations

13 Tests

Tests were carried out to determine:

- dimensional accuracy of the units.
- the hydraulic performance of the units.

14 Investigations

14.1 The manufacturing process was examined, including the methods adopted for quality control, and details were obtained of the quality and composition of the materials used.

14.2 A site visit was made to assess the practicability and ease of installation.

14.3 An assessment of computational fluid dynamic (CFD) modelling used to predict the hydraulic performance of the units was made.

14.4 An assessment of the Certificate holder's predicted characteristics was made against the results of hydraulic performance tests.

14.5 An assessment of the structural adequacy of the units under loads that they are expected to resist was made.

14.6 An evaluation of existing data was made to assess durability.

Bibliography

BS EN ISO 9001 : 2008 Management systems — Quality

Conditions of Certification

15 Conditions

15.1 This Certificate:

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

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

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

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

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

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

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

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