

Appendix Q – Downstream Defender Mitigation Indices and Unit Selection

Marianna Dyason

From: Karl Hall <khall@hydro-int.com>
Sent: 13 September 2022 21:34
To: Marianna Dyason
Subject: RE: re Downstream Defender
Attachments: downstream_defender_select_design_data_sheet_b0622-en-gb.pdf

Thanks Marianna

Downstream Defenders are rated in terms of diameter by the treatment flow that is needed, so the contributing area of runoff can be anything really. Where the treatment flow is exceeded during a severe event, then the excess hydraulic flow over the treatment flow would be effectively untreated – this is another very good reason to site Downstream Defenders downstream of flow controls/pumps so that the flow can never exceed the treatment flow and thus we can guarantee full treatment at all times. The attached data sheet shows all of the pipework options into and out of each size of Downstream Defender. For all sizes it is possible to have up to 3 incoming pipes.

Note – there is an omission in the attached data sheet – the Simple Index Approach indices shows the figure for hydrocarbons as 0.5 – this is for the dissolved phase (dissolved) HC's – it should also show an additional figure for HC's in the free (floating) phase of 0.8.

Taking in the same order as you have below:

System 1 - Block B, 5 l/s treatment flow = 1.0m \varnothing Downstream Defender Select (Advanced)
System 2 - Block C = as above.
System 3 - Block D – 12.5 l/s = as above
System 4 - Block A, M, K/L and J3 – 65 l/s = 1.8m \varnothing Downstream Defender Select (Advanced)
System 5 - Boltolph Street – 10 l/s = 1.0m \varnothing Downstream Defender Select (Advanced)
System 6 – Block E – 30 l/s = 1.2m \varnothing Downstream Defender Select (Advanced)
System 7 – Block F – 20 l/s = 1.0m \varnothing Downstream Defender Select (Advanced)
System 8 – Block G and J – 70 l/s = 2.1m \varnothing Downstream Defender Select (Advanced)

The units can be supplied in either concrete or plastic form (I prefer concrete personally because single skin plastic units require additional sitework (in situ concrete pour around the units). We also of course have standard drawings in CAD and PDF versions, and BIM models. There is a significant variable though which you have usefully confirmed, and that's the contributing area – the larger areas will have a greater volume of pollutants and thus will require a more frequent maintenance regime – I would certainly suggest that the units if used are provided with remote monitoring that continually measure the silts and grit capture and pings an alert to the client's maintenance team to go along with a vacuum tanker and empty the unit. I've pasted a clip from my CPD below showing the arrangement.

Could I please ask for a project name and location for purposes of information retrieval at a later time as required.

Hope this is all OK but please let me know what more I can provide if needed.

Thanks again,
Karl

Pollutant retention

It is important to ensure that pollutants in a rainfall event are retained throughout subsequent events. The Downstream Defender® Select offers engineers the option of specifying the retention performance of sediments. The **Vortex** and **Vortex Plus** models provide sediment retention up to twice the treatment flow rate, and the **Advanced Vortex**, with its benching skirt creating a calm sediment storage zone, provides sediment retention up to four times the treatment flow rate.

An option for enhancing the retention of hydrocarbons (oils) by storing them as a solid is available, ensuring no wash out during extremely high flows. This option is only available for the **Advanced Vortex** and **Vortex Plus** models

Fig 4. Downstream Defender® Select with enhanced sediment retention and enhanced hydrocarbon (oil) retention options.



The Simple Index Approach (SIA)

The Simple Index Approach outlined in CIRIA C753 The SuDS Manual is a water quality design method for sites with a low to medium risk pollution hazard level. Sites with a high risk pollution hazard level should consider a more precautionary approach.

The approach assigns pollution hazard indices to the given land use for three pollutant groups, total suspended solids (TSS), metals and hydrocarbons. SuDS components are then selected until their combined pollution mitigation index score is greater than the pollution hazard index for each pollutant group.

Model	Downstream Defender® Select Mitigation Indices ^{(a)(b)}		
	Total Suspended Solids (TSS)	Metals	Hydrocarbons (Oils)
Vortex	0.3	0.2	0.2
Vortex Plus	0.5	0.4	0.5
Advanced Vortex	0.5	0.4	0.5

Notes:

- (a) All mitigation indices supplied by Hydro International Ltd are independently verified and calculated using the methods laid out in the British Water How To Guide: Applying the CIRIA SuDS Manual Simple Index Approach to Proprietary / Manufactured Stormwater Treatment Devices. Performance declarations are available on request or on the British Water website.
- (b) Mitigation Indices quoted for the Downstream Defender® Select are valid when the unit is designed according to the Treatment Flow Rate (see Table 3).

Table 2 - SuDS Mitigation Indices for Downstream Defender® Select

Sizing a Downstream Defender® Select

The Downstream Defender® can be sized for different treatment goals and objectives. For design purposes, the selected model's Treatment Flow Rate should be greater than or equal to the site's Water Quality Flow Rate.

The hydraulic capacity of the selected model should be considered with respect to the peak discharge flow rate from the site.

If there is no treatment objective, just betterment, do not use a treatment flow rate and only compare the hydraulic capacity to the peak discharge flow rate.

Model diameter (m)	Treatment flow rate ^{(a)(b)} (l/s)	Hydraulic capacity ^(c) with recommended pipe size (l/s)	Hydraulic capacity ^(d) with maximum pipe size (l/s)	Maximum catchment area m ²	Maximum headloss at treatment flow rate (mm)
1.0	21	46	70	2800	160
1.2	30	84	107	4000	170
1.5	48	144	170	6400	220
1.8	69	217	278	9200	230
2.1	94	271	355	12500	240
2.4	123	422	529	16400	250
3.0	192	652	787	25600	260

Notes:

- (a) The Treatment Flow Rate is based on an annualised removal efficiency of >50% of all particles up to 1000 microns with a mass-median particle size (D50) of 63 microns and a specific gravity of 2.65. The testing was conducted in line with the British Water Code of Practice.
- (b) Alternative sizing based on different sediment grades available on request.
- (c) Maximum flow rate that can pass through the chamber with a maximum headloss of 500mm. Figures shown are when using the recommended pipe size in Table 5.
- (d) Maximum flow rate that can pass through the chamber with a maximum headloss of 500mm. Figures shown are when using the maximum pipe size in Table 5.

Table 3 - Downstream Defender® Select design information.

Appendix R – Exceedance Routes

IN AN EXCEEDANCE EVENT (A STORM EVENT LARGER THAN THE SURFACE WATER DRAINAGE NETWORK CAN ACCOMMODATE) SURFACE WATERS WILL HEAD TO THE SOUTH-EAST OF THE SITE FOLLOWING PATHS AS MODELLED WITHIN ROYAL HASKINGING DMV FLOOD RISK ASSESSMENT REPORT. THE FLOW PATHS SHOWN ARE IN LINE WITH THE FRA AND PROPOSED LEVELS ACROSS THE SITE.

EXCEEDANCE FLOW PATH
 +4.650
 PROPOSED LEVEL



REV	DATE	BY	DESCRIPTION	CHK	APP
PROJECT STATUS: PLANNING APPLICATION <small>Submit Form 02 Over Design 20.6.19 (19th March) (Case number 1883058)</small>					
<small>Unit 22, The Millings, Sandringham, Norfolk, NR23 8JG Tel: 01328 817177 www.fas.co.uk</small>					
CLIENT	WESTON HOMES				
PROJECT	ANGLIA SQUARE, NORWICH, NORFOLK				
TYPE	SURFACE WATER EXCEEDANCE ROUTES				
SCALE	AS SHOWN	DATE	20.09.2022		
DRAWN BY	NTS	MO			
PROJECT NO.	3831	WORKING TITLE	SK05-A		

Appendix S – Anglian Water Sewer Diversion Information

Louisa Wade

From: Fewell Darren A <dFewell@anglianwater.co.uk>
Sent: 17 May 2017 17:18
To: Louisa Wade
Cc: Doneghan Grace
Subject: Proposed Retail Development - Anglia Square Norwich - Development in Close Proximity to Anglian Water Public Sewer Apparatus

Hi Louisa,

Proposed Retail Development – Anglia Square Norwich – Development in Proximity to Anglian Water Public Sewer Apparatus

Further to our detailed phone discussion this afternoon, regarding your overall scope of development proposed at the above site, I am (as requested) just dropping you a line to briefly clarify the main points of our discussion.

I trust this helps with the planning and early design stages Louisa, but if you need anything else then please come back to us and we will do our best to assist you.

- Any re-development areas falling within 3m of the existing public sewer apparatus, but remaining only '*built near*' the public sewers, and maintaining a similar level of clearance and access to that already enjoyed, would in principle be acceptable to us, subject to your clients satisfying themselves that the new foundation designs for the affected new buildings were specifically designed to avoid transferring loading onto the adjacent public sewer apparatus.
- Any areas falling within 3 metres would simply need to comply with usual Part H4 Building Regulations requirements in respect of 'Building Near' public sewer apparatus, and Anglian Water has published self-approval criteria on our website, but the principles of proceeding as outlined in my guidance above would in principle be satisfactory.
- So the designers for the new foundations would need to site survey the affected public sewers to make sure that when considering the relative invert depth of that affected sewer, and the clearance provided to the building structure, that no loading would be transferred on a 45 degree 'angle of repose' design principle.
- Based on drawing A03-P2-052 rev F 'Ground Floor Retail Plan' , the only area that would appear to require direct *consideration* of formal diversion of our apparatus would be the existing 675mm dia SW public sewer, and the existing 225mm dia Foul public sewer that runs immediately south of unit A1.01 (675mm SWS Section close to SW MH's 0453 through to 0456 approx & 225mm FWS Section close to Foul MH's 0405 through to 0408).
- We discussed the principle of it being diverted clear of the retail units footprint but being designed to fall *centrally* within the remaining pedestrian access/walkway areas so that clearance is maximised on either side of the sewers to the buildings.
- This section of drainage could therefore be considered for diversion clear of the footprint of the new retail units, subject to full planning approval, and the correct application being made to Anglian Water under Section 185 of the Water Industry Act 1991, where upon the design would be considered on its individual design merits at that time, but I can confirm that the principle of us being prepared to consider such a diversion to keep the apparatus clear of the building footprint is established.
- The development around retail unit G1.03 would appear to suggest that it may result in a direct build over of our existing foul and surface water manholes/sewers that currently appear to run clear of the existing retail footprint.
- Anglian Water could consider formally divesting the affected sections of public sewer into your clients own private ownership under a Section 116 divesting notice, but they would need to apply to us as the 'owners' of the affected premises served by that drainage, and formally request it is divested into their own private ownership, and they would also need to demonstrate to us that there were no affected 3rd parties connected to the section of public sewer in question, that would otherwise be adversely affected by any proposal to remove (or make redundant) said affected section of public sewer, and they would need to show that the public sewer and its existing connections were *only serving* their own existing retail premises, and this would be done by detailed site survey of the existing drainage with follow up drainage drawings provided, and provision of a CCTV survey with all existing sewer connections identified to us in terms of what they serve and who owns those connections.
- Once a formal divesting was applied for, and we successfully reached a stage whereby we had approved the proposals, and had issued notice under Section 116, then at that point your clients could physically remove the offending sections of apparatus from the ground in order to allow the new building to be constructed without hindrance.

- The existing foul and surface water sewers shown as passing across your 'residential refuse' and 'retail refuse' areas between the Iceland store and retail unit G1.01, which link back towards Anglia Square, are mapped and recorded as 'private' sewer apparatus and thus are still considered private apparatus accordingly, and Anglian Water would not have any further comment to make regarding any impact the development may have on that section of drainage as the apparatus is not considered to be Anglian Water owned, but any future development, and foundation design arrangements would obviously just need to take any reasonable design allowances and standard construction precautions to prevent risk of damage occurring.

I trust this summarises things but let us know if you need anything else,

Regards
Darren Fewell
Drainage Engineer
Anglian Water Services Ltd

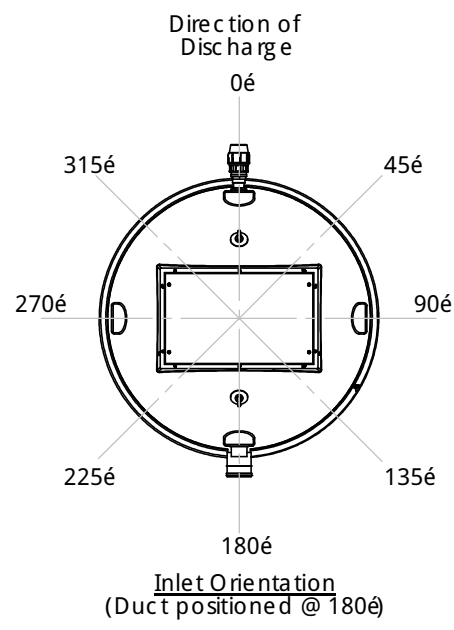
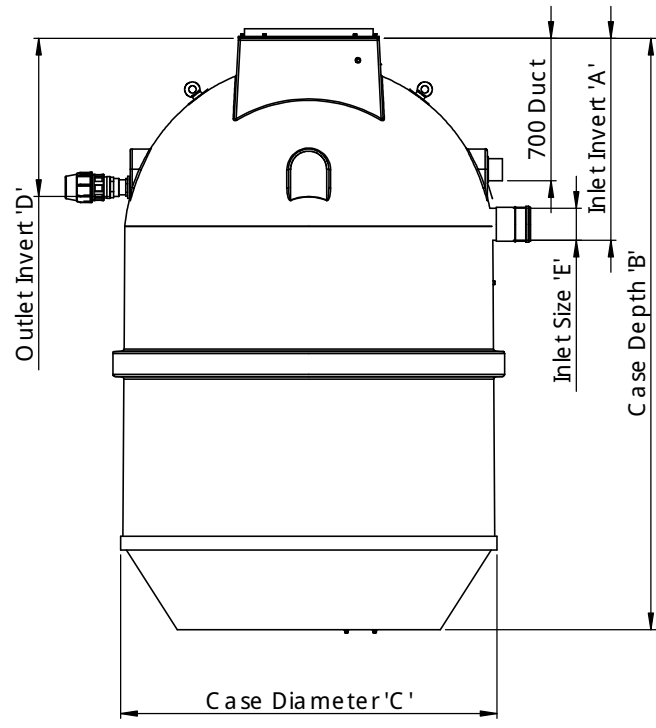
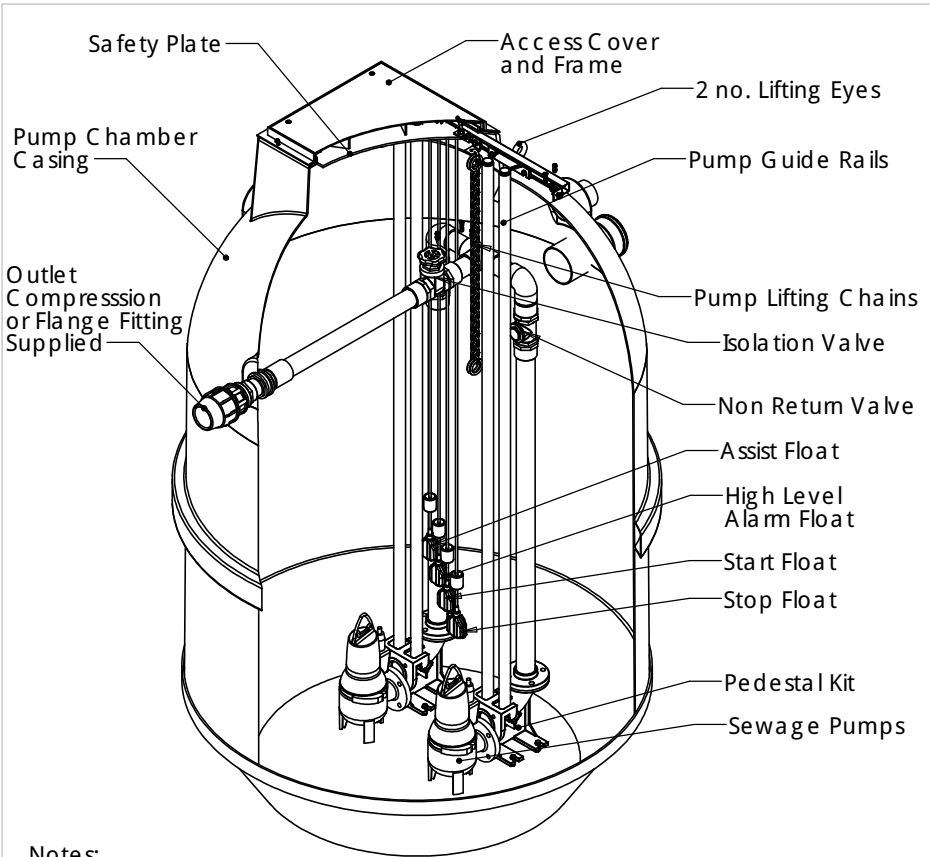
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Appendix T – Standard Surface Water Drainage Details



- Notes:
- ø Pumpwell delivered with pumps & Floats not installed to avoid damage in transit.
 - ø Pumps to be coupled to chains with shackles supplied on lifting chain which is connected to unistrut assembly.
 - ø Read Operating and Installation guidelines before installing.

- Alternate Standard Inverts Available:
- ø 1.8 x 2.5m - 11, 12, 13, 14
 - ø 1.8 x 3.0m - 11, 12, 13, 14, 16, 17, 18, 19
 - ø 1.8 x 3.5m - 11, 12, 13, 14, 16, 17, 18, 19, 21, 22, 23, 24
 - ø 1.8 x 4.0m - 11, 12, 13, 14, 16, 17, 18, 19, 21, 22, 23, 24, 26, 27, 28, 29
 - ø 1.8 x 4.5m - 11, 12, 13, 14, 16, 17, 18, 19, 21, 22, 23, 24, 26, 27, 28, 29, 31, 32, 33, 34
 - ø 2.6 x 3.3m - 11, 12, 13, 14, 16, 17, 18, 19
 - ø 2.6 x 4.0m - 11, 12, 13, 14, 16, 17, 18, 19, 21, 22, 23, 24, 26, 27, 28, 29
 - ø 2.6 x 4.5m - 11, 12, 13, 14, 16, 17, 18, 19, 21, 22, 23, 24, 26, 27, 28, 29, 31, 32, 33, 34

Case Diameter 'C'	Outlet Invert 'D'	Case Depth 'B'								Inlet Invert 'A'				Inlet Size 'E'
		20 (2.0m)	25 (2.5m)	30 (3.0m)	33 (3.3m)	35 (3.5m)	40 (4.0m)	45 (4.5m)	10 (1.0m)	15 (1.5m)	20 (2.0m)	25 (2.5m)	30 (3.0m)	
18 (1.8m)	0.7m	o							o					
			o						o	o				
				o			o		o	o	o			
						o		o	o	o	o	o	o	o
2.6 (2.6m)	0.7m				o			o	o	o				
							o		o	o	o	o	o	

Please check with Kingspan Environmental that this drawing is the latest issue			
Issue	Date	Drawn by	Approved by
03	29/05/18	WMD	
02	24/04/18	WMD	
01	07/09/09	JMcM	

Description: C C 1434 - HLA/Assist float changed position
 C C 1426 - Various Chamber Depths added
 Initial Release

Material: Various
 Finish:
 Weight: 327.01 Kg Kgs

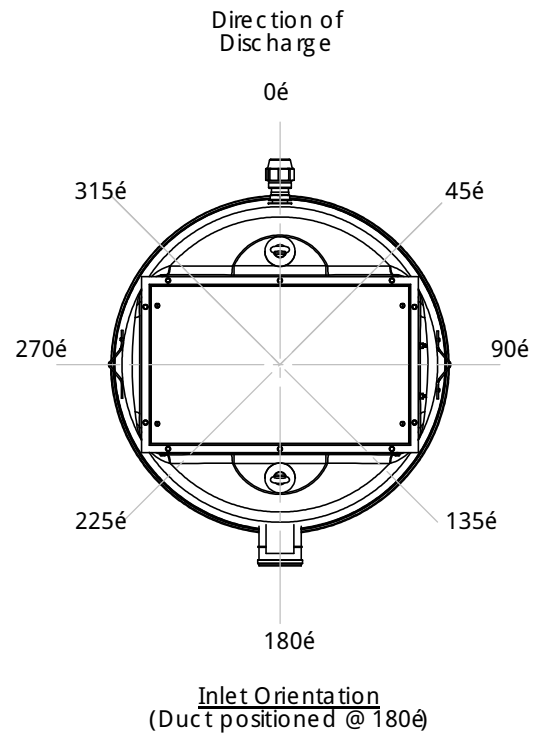
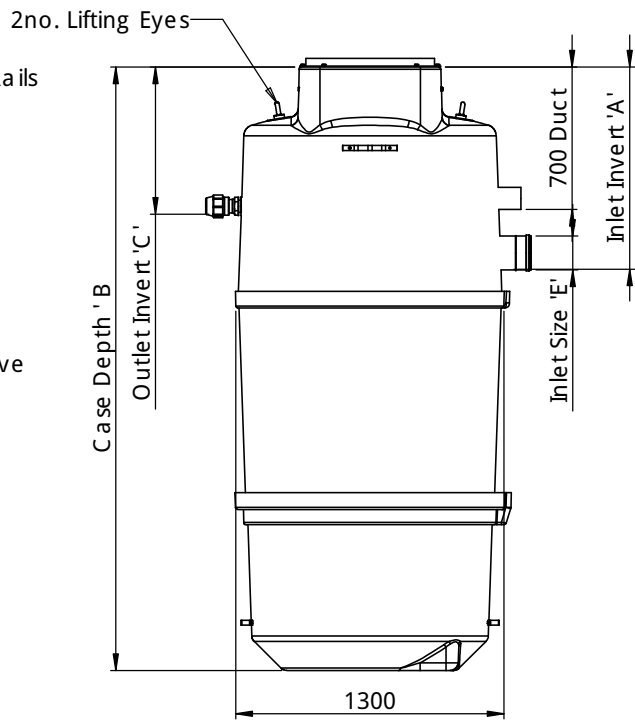
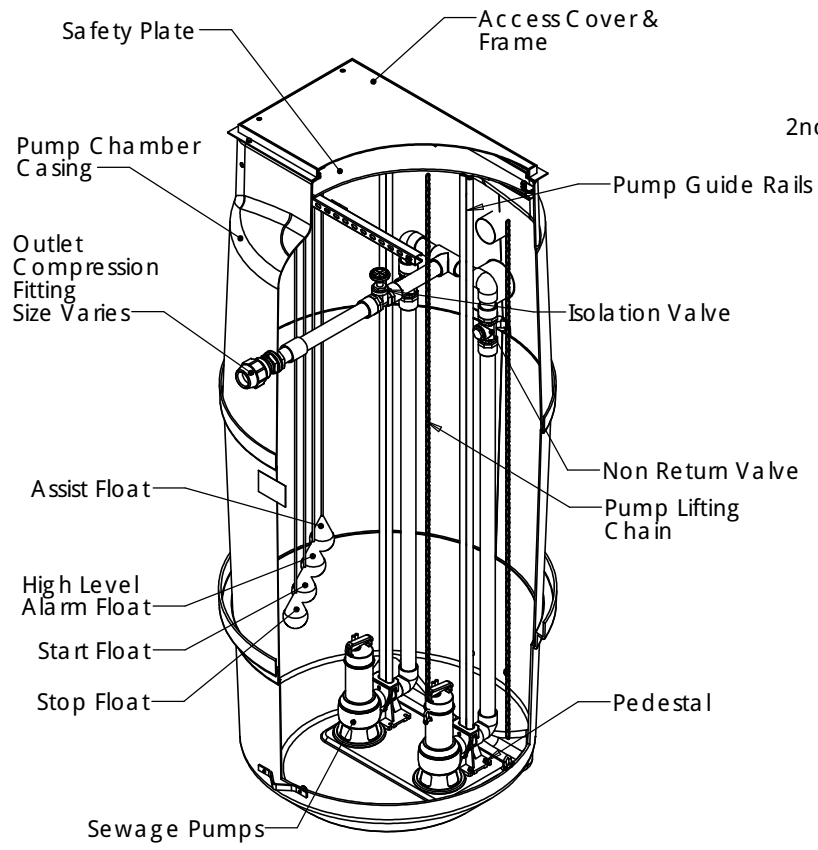
Tolerance:
 Thickness: n/a
 Surface Area:

Drawing: DS1015
 Twin Sewage Pump Chamber Sales Drawing
 Page 1 of 1

All dimensions in mm
 Scale: Not to scale

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REFER TO SHEET 2 FOR DIMENSIONS 'A', 'B', 'C' and 'E'

Notes:

- ø Pumpwell delivered with pumps & Floats not installed to avoid damage in transit.
- ø Pumps to be coupled to chains with shackles supplied on lifting chain which is connected to the unistrut assembly.
- ø Read Operating and Installation guidelines before installing.

Please check with Kingspan Environmental that this drawing is the latest issue			
Issue	Date	Drawn by	Approved by
04	25/05/18	WMD	
03	06/03/18	WMD	
02	07/08/17	WMD	

Material: Various	Tolerance: +/-10 mm
Finish: n/a	Thickness: n/a
Weight: n/a Kgs	Surface Area: n/a

Drawing : DS1054P Page 1 of 2
 ø 1.2m Twin Sewage Pump Chamber

All dimensions in mm Scale: Not to scale

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STANDARD INVERTS

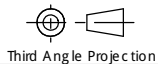
Case Diameter	Outlet Invert 'C'	Case Depth 'B'					Inlet Invert 'A' - Standard					Inlet Size 'E'	
		20 (2.0m)	25 (2.5m)	30 (3.0m)	35 (3.5m)	40 (4.0m)	10 (1.0m)	15 (1.5m)	20 (2.0m)	25 (2.5m)	30 (3.0m)		
12 (1.3m)	0.7m	X					X						110mm
			X				X	X					
				X			X	X	X				160mm
					X		X	X	X	X			
						X	X	X	X	X	X	X	

ALTERNATE STANDARD INVERTS

Case Diameter	Outlet Invert 'C'	Case Depth 'B'					Inlet Invert 'A' - Alternate Standard Inverts																	Inlet Size 'E'						
		20 (2.0m)	25 (2.5m)	30 (3.0m)	35 (3.5m)	40 (4.0m)	09 (0.9m)	11 (1.1m)	12 (1.2m)	13 (1.3m)	14 (1.4m)	16 (1.6m)	17 (1.7m)	18 (1.8m)	19 (1.9m)	21 (2.1m)	22 (2.2m)	23 (2.3m)	24 (2.4m)	26 (2.6m)	27 (2.7m)	28 (2.8m)	29 (2.8m)		31 (2.8m)	32 (2.8m)	33 (2.8m)			
12 (1.3m)	0.7m	X					X	X	X	X																			110mm	
			X				X	X	X	X	X	X	X	X																
				X			X	X	X	X	X	X	X	X	X	X														160mm
					X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X									
						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

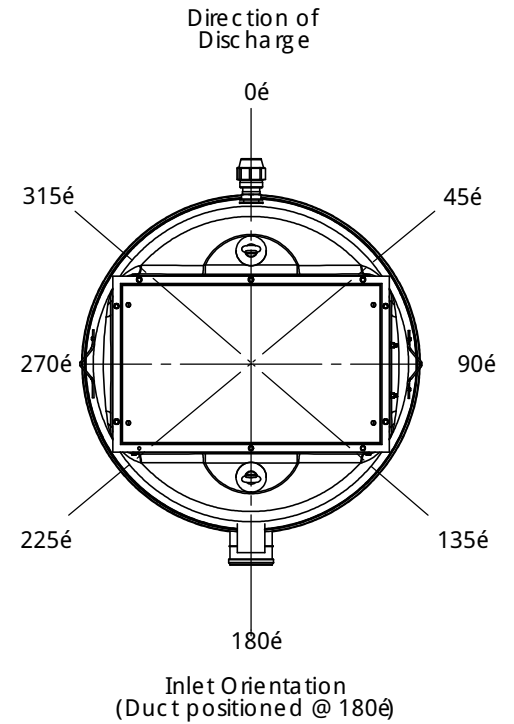
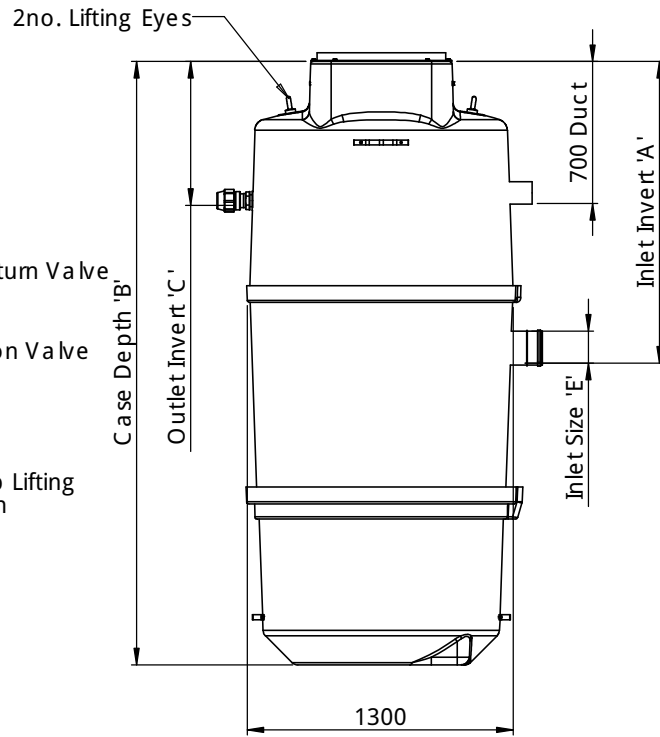
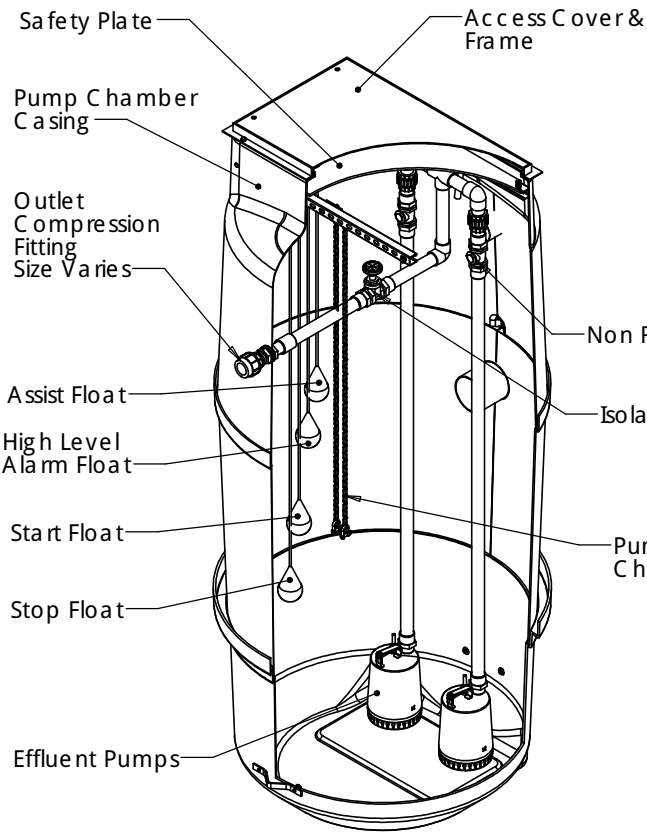
Material :	Tolerance (unless stated) :
Finish :	Thickness :
Weight :	Surface Area : m ²
Modelled By :	

All Dimensions In mm Scale: Do Not Scale



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REFER TO SHEET 2 FOR DIMENSIONS 'A', 'B', 'C' and 'E'

Notes:

- ø Pumpwell delivered with Pumps & Floats not installed to avoid damage in transit.
- ø Pumps to be coupled to chains with shackles supplied on lifting chain which is connected to the unistrut assembly.
- ø Read Operating and installation guidelines before installing.

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

Issue	Date	Drawn by	Approved by	Description
04	25/05/18	WMD		CC 1434 - HLA/Assist float changed position
03	06/03/18	WMD		CC 1421 - Pump Chamber Depths added
02	07/08/17	WMD		CC 1382 - Pump revision

Material: Various
 Finish: n/a
 Weight: n/a Kgs

Tolerance: +/-10 mm
 Thickness: n/a
 Surface Area: n/a

Drawing : DS1056P

ø 1.2m Twin Effluent Pump Chamber

All dimensions in mm

Scale: Not to scale

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STANDARD INVERTS

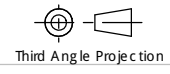
Case Diameter	Outlet Invert 'C'	Case Depth 'B'					Inlet Invert 'A' - Standard					Inlet Size 'E'
		20 (2.0m)	25 (2.5m)	30 (3.0m)	35 (3.5m)	40 (4.0m)	10 (1.0m)	15 (1.5m)	20 (2.0m)	25 (2.5m)	30 (3.0m)	
12 (1.3m)	0.7m	X					X					110mm 160mm
			X				X	X				
				X			X	X	X			
					X		X	X	X	X		
						X	X	X	X	X	X	

ALTERNATE STANDARD INVERTS

Case Diameter	Outlet Invert 'C'	Case Depth 'B'					Inlet Invert 'A' - Alternate Standard Inverts																Inlet Size 'E'																	
		20 (2.0m)	25 (2.5m)	30 (3.0m)	35 (3.5m)	40 (4.0m)	09 (0.9m)	11 (1.1m)	12 (1.2m)	13 (1.3m)	14 (1.4m)	16 (1.6m)	17 (1.7m)	18 (1.8m)	19 (1.9m)	21 (2.1m)	22 (2.2m)	23 (2.3m)	24 (2.4m)	26 (2.6m)	27 (2.7m)	28 (2.8m)		29 (2.8m)	31 (2.8m)	32 (2.8m)	33 (2.8m)													
12 (1.3m)	0.7m	X					X	X	X	X																														110mm 160mm
			X				X	X	X	X	X	X	X	X																										
				X			X	X	X	X	X	X	X	X	X	X	X	X	X																					
					X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		

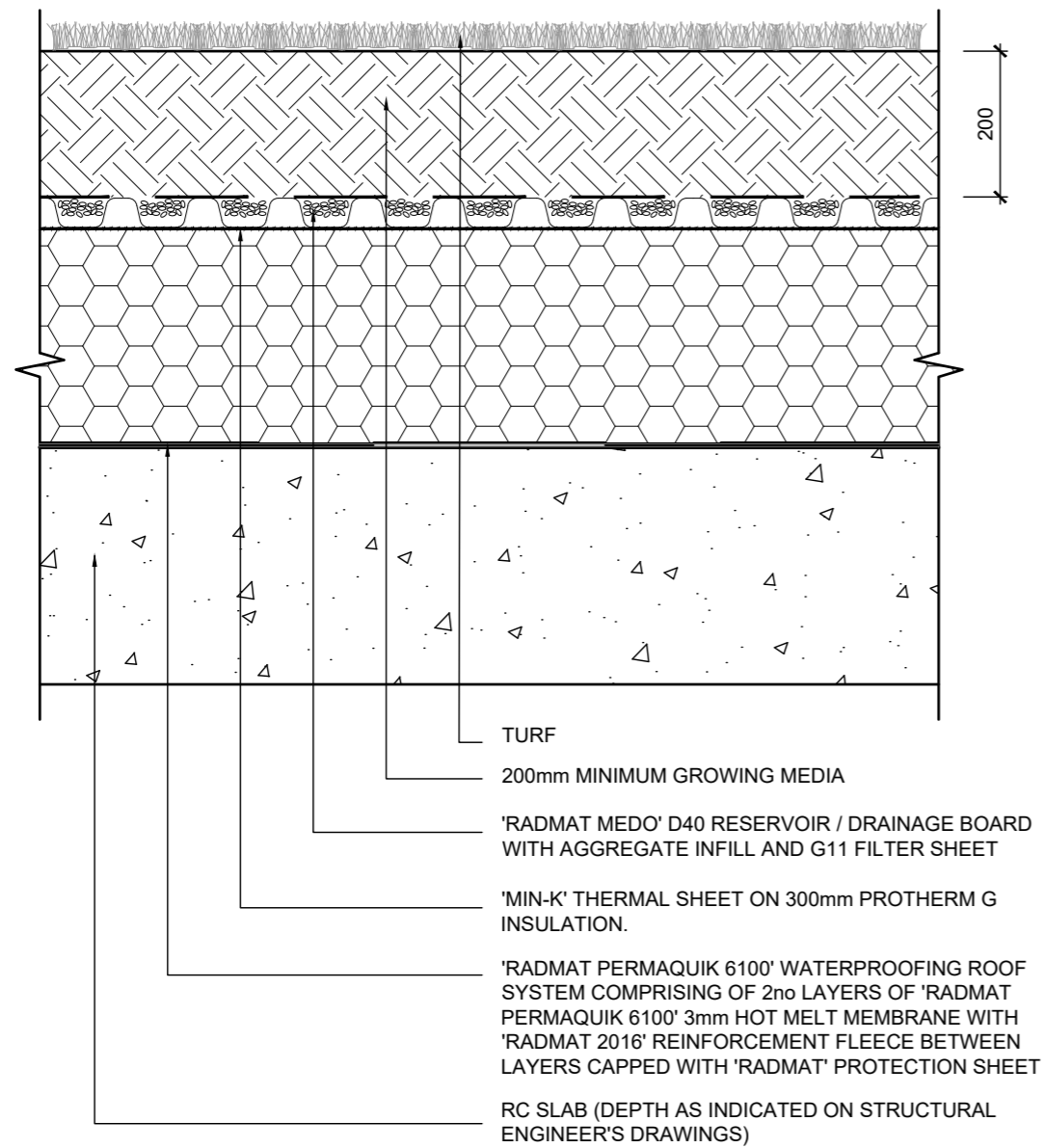
Material :	Tolerance (unless stated) :	Drawing : DS1056P Page 2 of 2
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Weight :	Surface Area : m ²	
Modelled By :		

All Dimensions In mm Scale: Do Not Scale

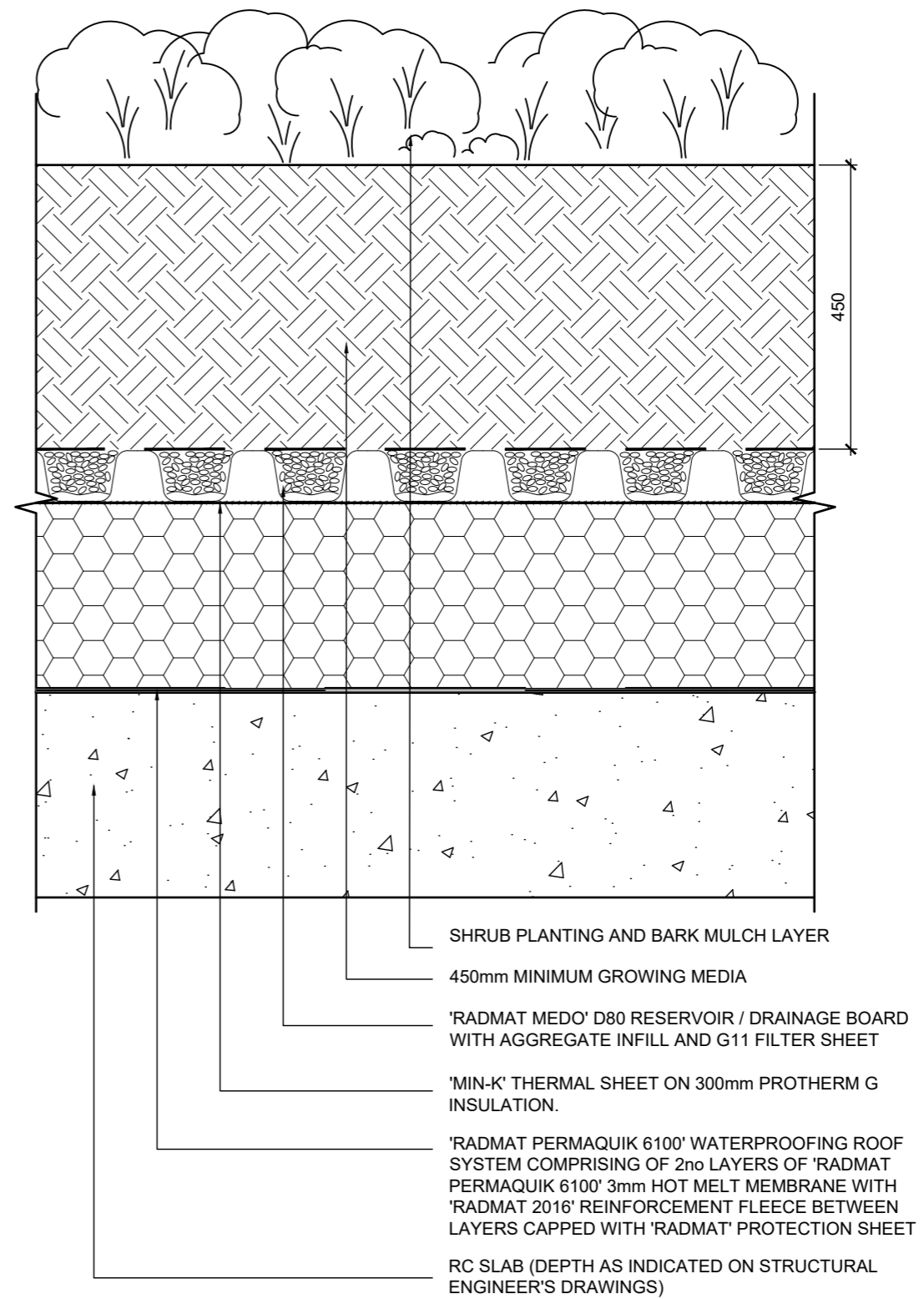


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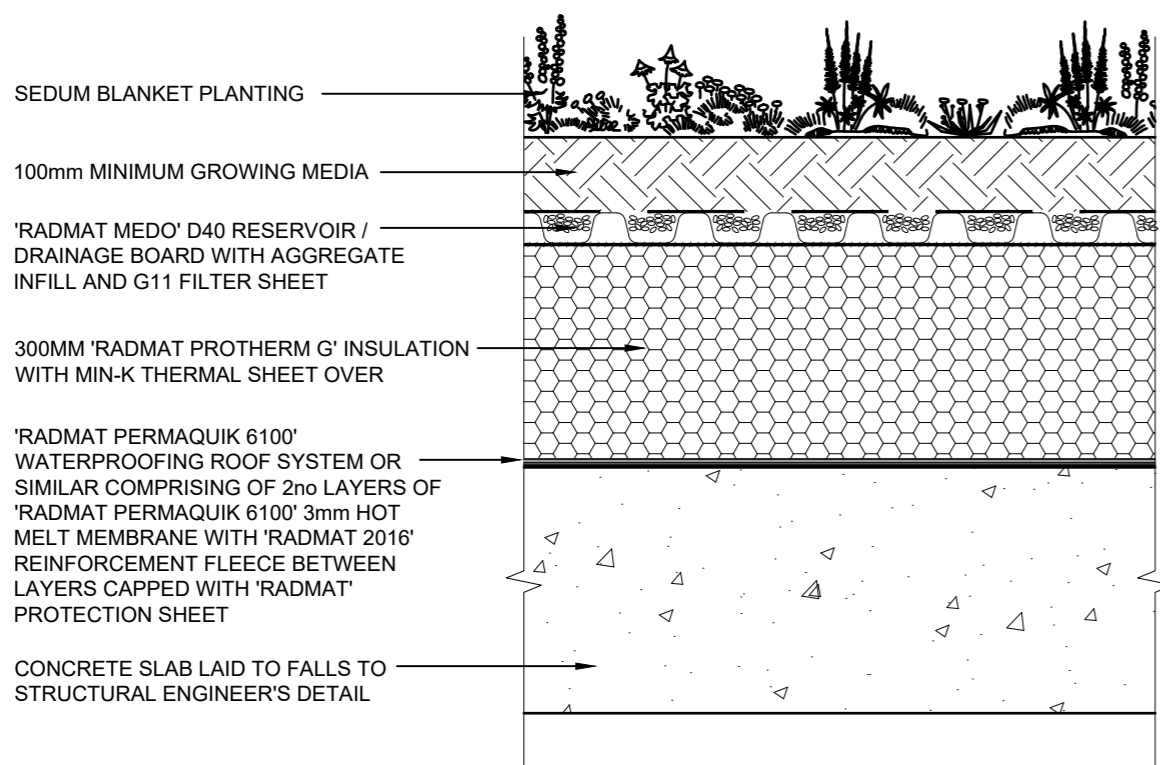




TYPICAL PODIUM GRASS PLANTING DETAIL
SCALE 1:10



TYPICAL PODIUM SHRUB DETAIL
SCALE 1:10



TYPICAL BIODIVERSE GREEN ROOF BUILD UP DETAIL
SCALE 1:10

SEDUM VEGETATION BLANKET XF300

The XF300 Sedum Blanket utilises the vegetation support layer and is installed over a substrate base of around 80mm depth which allows for increased rainwater attenuation capacity, thus reducing the level of rainwater entering the drainage system.

KEY FEATURES

- Delivers instant greening of a roof with sedums and other species all able to flourish in our climate
- Quick and easy to establish
- Cost effective
- Developed to meet FLL guidelines
- Cradle-to-Cradle certification
- Sedum blankets are grown on our farm in the UK and delivered to site within 24 hours of harvesting

The patented carrier of the Xero Flor XF300 Sedum Blanket provides a strong, flexible soil retention layer able to hold both the substrate and vegetation firmly in place against wind and shear loads whilst allowing the roots to grow through and establish into the substrate of the green roof system below.

The sedum vegetation is the same as is used in our Xero Flor XF 301 and will provide dense foliage cover with a lot of colour and interest through the spring and early summer.

The product can be supplied in 10m rolls for crane-assisted installation and is also available in standard 2 x 1m roll sizes.

For further information on the Bauder XF300 Sedum Blanket please see the Bauder Green Roof Vegetation Installation Guide and the Bauder Extensive Green Roof Maintenance Guide, both of which can be found at www.bauder.co.uk.

BAUDER SEDUM BLANKET XF300 INDICATIVE PLANT LIST

Species
<i>Sedum acre</i>
<i>Sedum album</i> - 'bella d' Inverno
<i>Sedum album</i> - coral carpet
<i>Sedum ewersie</i>
<i>Sedum Kamtschaticum</i> - ellacombianum
<i>Sedum Kamtschaticum</i> - weinstephaner gold
<i>Sedum montanum orientale</i>
<i>Sedum pulchellum</i>
<i>Sedum rupestri</i> (reflexum)
<i>Sedum sexangulare</i>
<i>Sedum spurium</i> - mesemlanthemum = Delosferma
<i>Sedum spurium</i> - mesemlanthemum = hallii
<i>Sedum verticillatam</i>



Block A,M,KL

Reference:	PU2645TS
Fluid:	SW
No. of Pumps:	2
Pump Type:	SL1.80.100.22
Impeller Design:	S Tube
Supply Voltage:	3 Phase 400v
Method of Starting:	DOL
Level Controls:	Floats
Control Sequence:	Duty/Assist
Length of Cable:	10 metres
GRP Chamber Diameter:	2600mm
Depth of Chamber:	4500mm
Inlet Depth 1:	3500mm
Inlet Connection 1:	1no. 300mm @ 180° TBC
Pump Outlet:	DN100 Ductile Iron (adaptor to suit 315mm
OD SDR 17 by others)	
Access Size:	900x1500 Pedestrian Duty Cover

Quantity	Description/Model	Price (per unit)
1	PU2645TS Twin Pump Station	£16,900
1	404334 Weather proof kiosk inc beacon	£800

Current Lead time:	60 Working days from receipt of order (subject to daily changes)
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Block E

Reference:	PU2640TS
Fluid:	SW
No. of Pumps:	2
Pump Type:	SL1.80.80.15
Impeller Design:	S-Tube
Supply Voltage:	3 Phase 400v
Method of Starting:	DOL
Level Controls:	Floats
Control Sequence:	Duty/Standby
Length of Cable:	10 metres
GRP Chamber Diameter:	2600mm
Depth of Chamber:	4000mm
Inlet Depth:	2800mm
Inlet Connection:	300mm @ 180° TBC
Pump Outlet:	DN80 Ductile Iron (adaptor to suit 200mm
OD SDR 17 by others)	
Access Size:	900 x 1500 Pedestrian Duty Cover

Quantity	Description/Model	Price (per unit)
1	PU2640TS Twin Pump Station	£15,700
1	404334 Weather proof kiosk inc beacon	£800

Quantity	Item/Description	Price (per unit)
1	Smart Commissioning – Standard commissioning as scope of works, inc supplied and fitted (at point of commissioning) Kingspan Smartserv Pro GSM telemetry alarm for complete peace of mind. Smartserv alerts both Kingspan and designated contacts. Includes 3 years Kingspan monitoring free of charge.*	£649

Current Lead time:	60 Working days from receipt of order (subject to daily changes) per tank
---------------------------	---

Block F

Reference:	PU2645TS
Fluid:	SW
No. of Pumps:	2
Pump Type:	SE1.80.80.15
Impeller Design:	VortexS Tube
Supply Voltage:	3 Phase 400v
Method of Starting:	DOL
Level Controls:	Floats
Control Sequence:	Duty/Standby
Length of Cable:	10 metres
GRP Chamber Diameter:	2600mm
Depth of Chamber:	4500mm
Inlet Depth:	3500mm
Inlet Connection:	300mm @ 180° TBC
Pump Outlet: OD SDR 17 by others)	DN80 Ductile Iron (adaptor to suit 160mm
Access Size:	900x1500 Pedestrian Duty Cover

Quantity	Description/Model	Price (per unit)
1	PU2645TS Twin Pump Station	£15,900
1	404334 Weather proof kiosk inc beacon	£800

Current Lead time:	60 Working days from receipt of order (subject to daily changes)
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Block GJ

Reference:	PU2650TS
Fluid:	SW
No. of Pumps:	2
Pump Type:	SL1.80.100.30
Impeller Design:	S Tube
Supply Voltage:	3 Phase 400v
Method of Starting:	DOL
Level Controls:	Floats

Control Sequence:	Duty/Standby
Length of Cable:	10 metres
GRP Chamber Diameter:	2600mm
Depth of Chamber:	5000mm
Inlet Depth:	4000mm
Inlet Connection:	300mm @ 180° TBC
Pump Outlet:	DN100 Ductile Iron (adaptor to suit 315mm
OD SDR 17 by others)	
Access Size:	900 x 1500 Pedestrian Duty Cover

Quantity	Description/Model	Price (per unit)
1	PU2650TS Twin Pump Station	£17,700
1	404334 Weather proof kiosk inc beacon	£800

Quantity	Item/Description	Price (per unit)
1	Smart Commissioning – Standard commissioning as scope of works, inc supplied and fitted (at point of commissioning) Kingspan Smartserv Pro GSM telemetry alarm for complete peace of mind. Smartserv alerts both Kingspan and designated contacts. Includes 3 years Kingspan monitoring free of charge.*	£649

Current Lead time:	60 Working days from receipt of order (subject to daily changes) per tank
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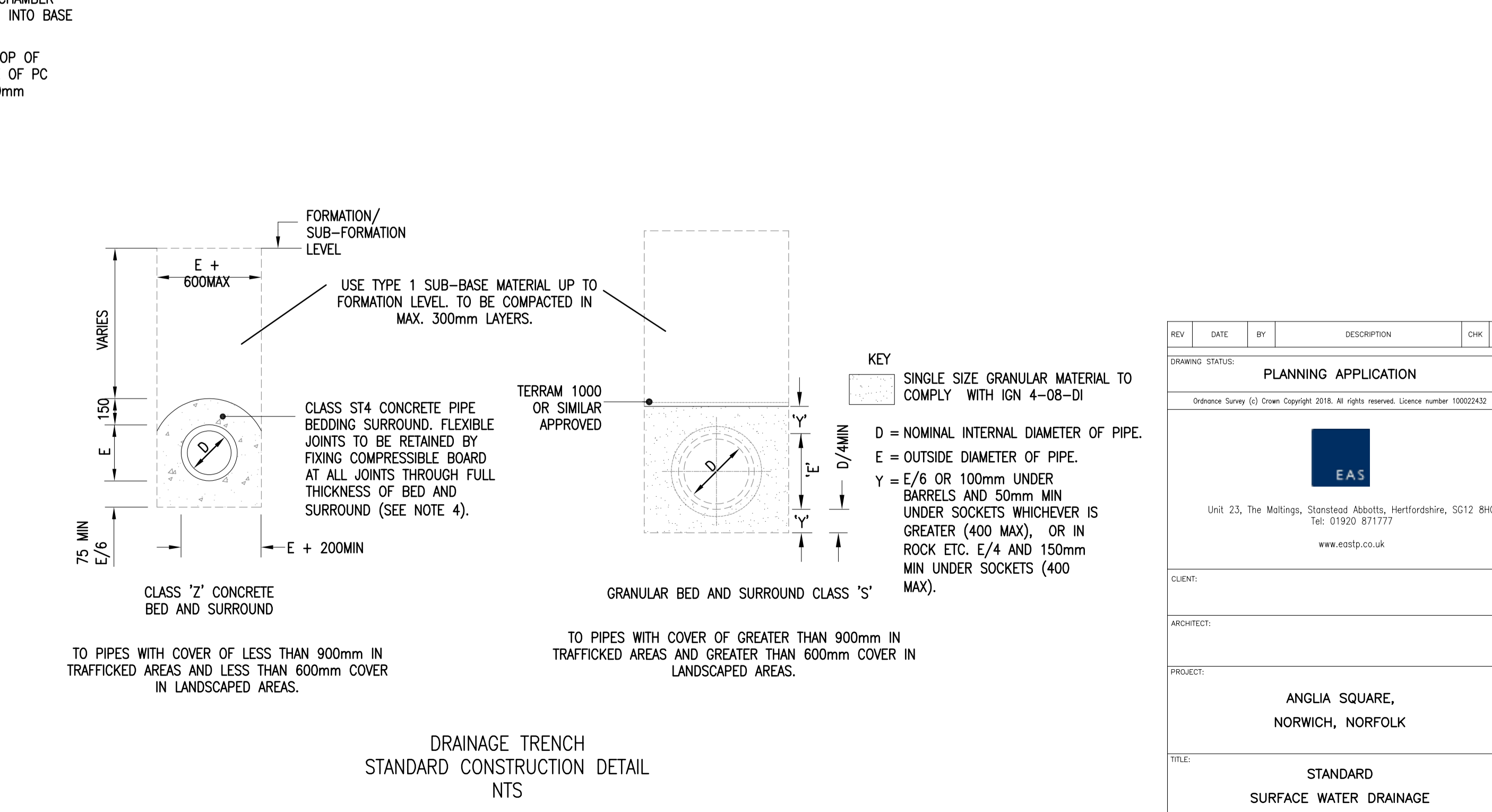
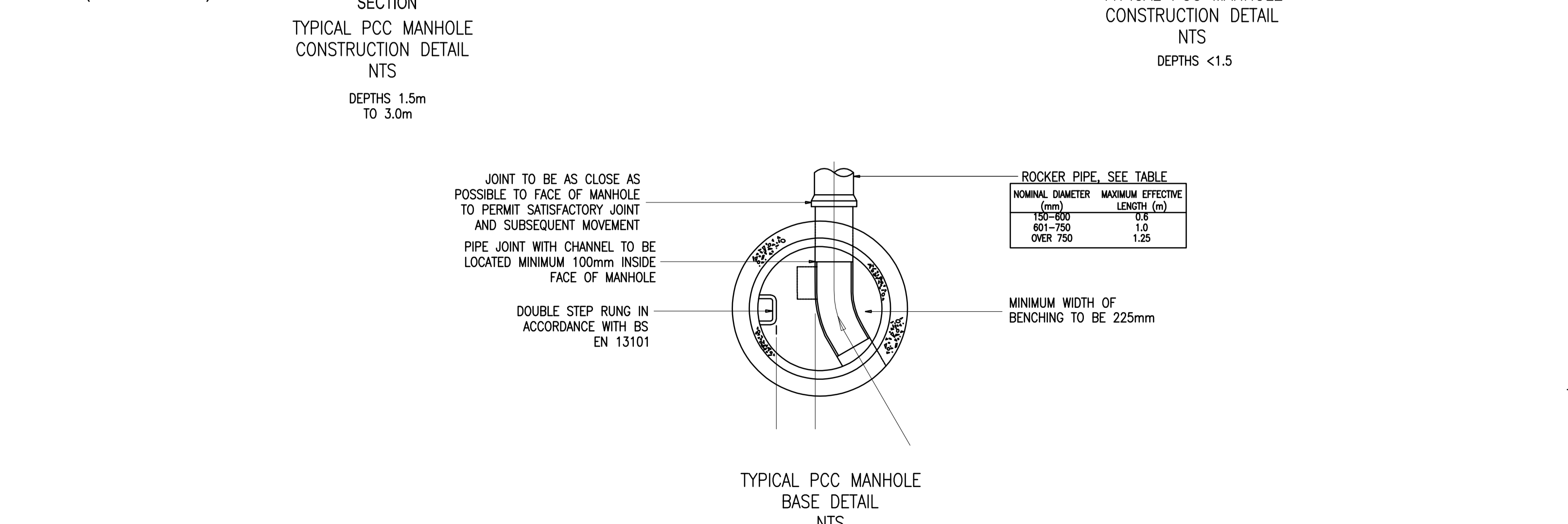
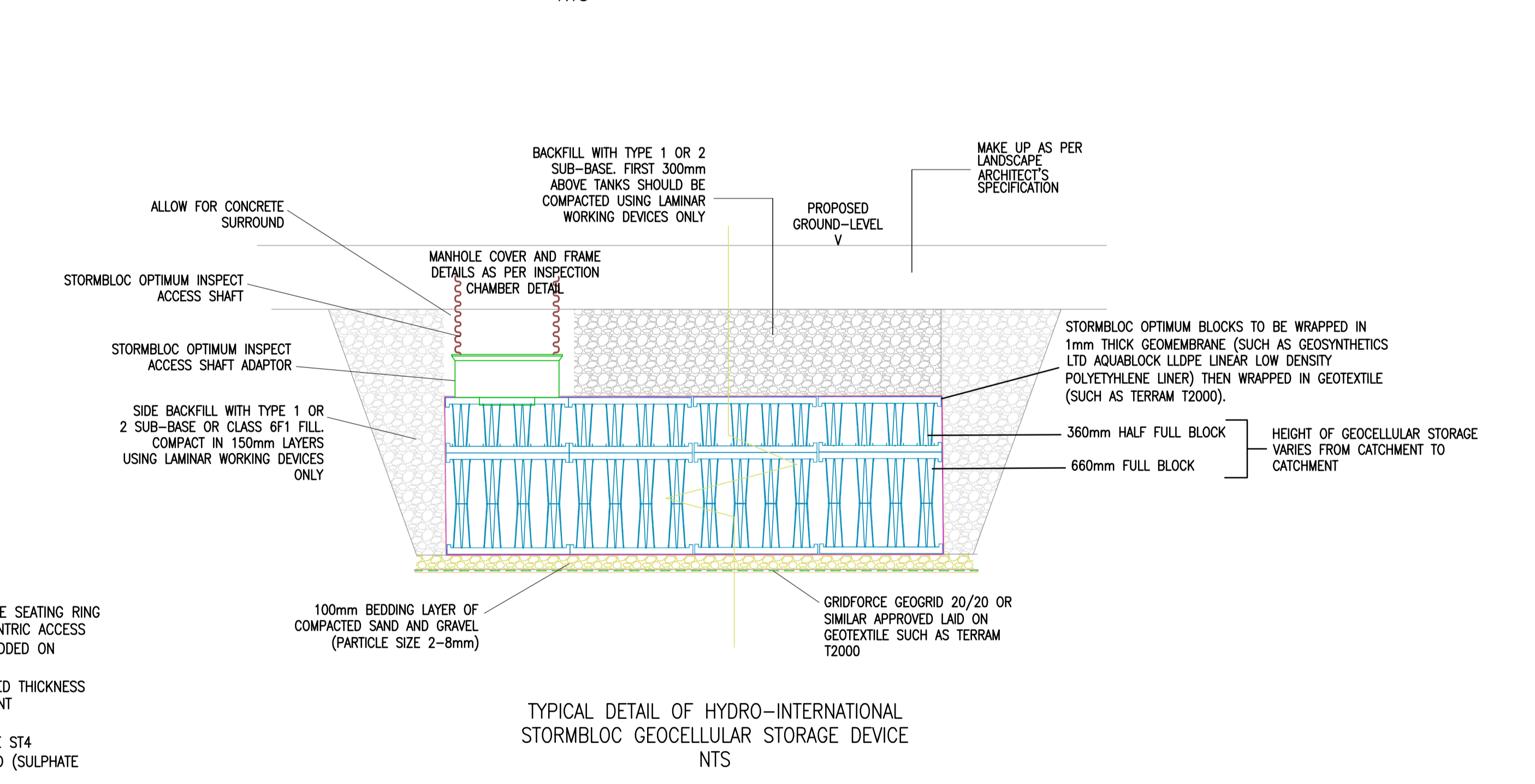
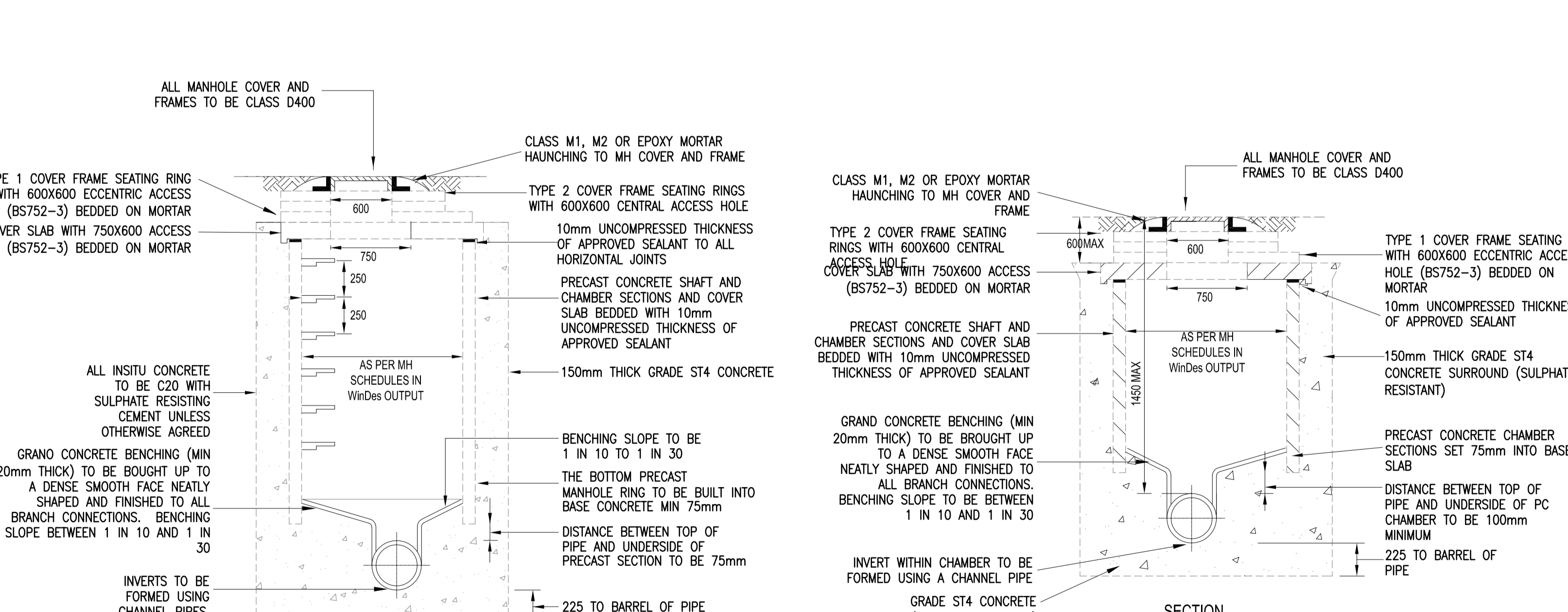
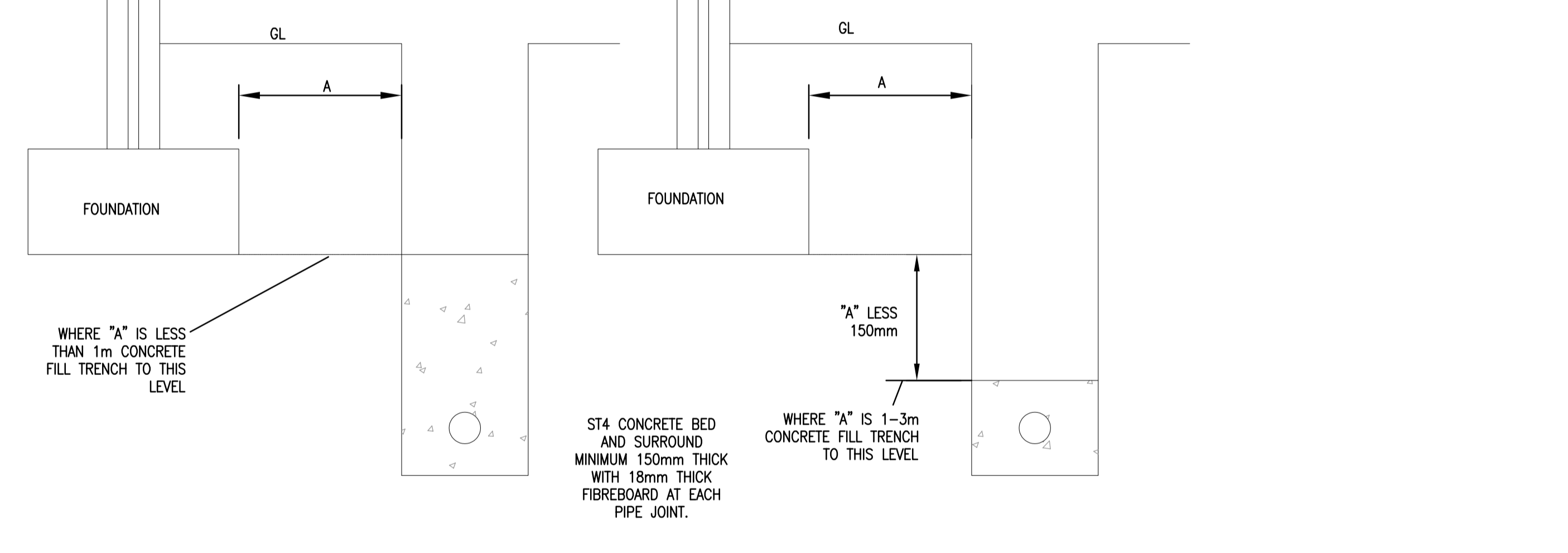
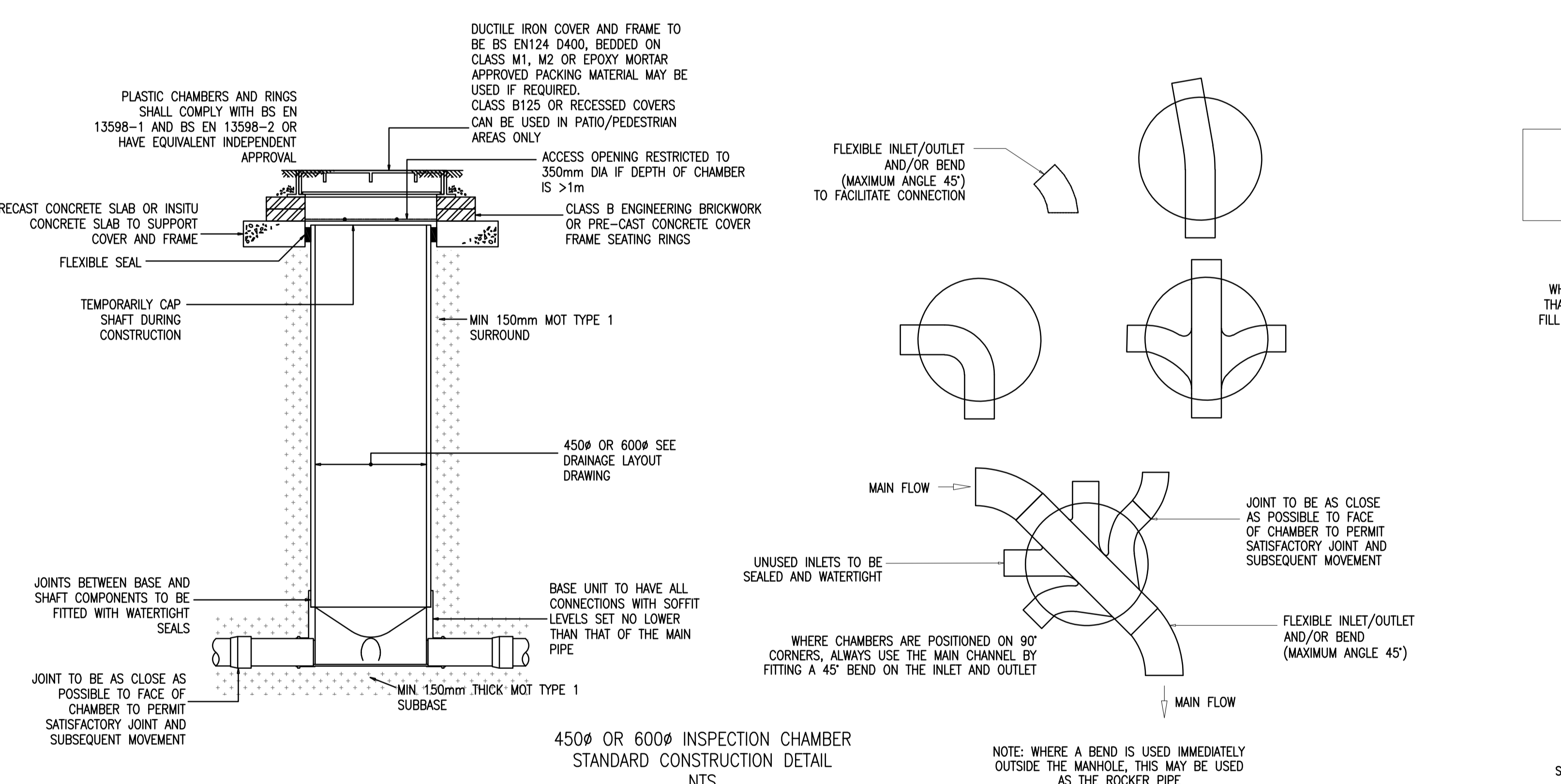
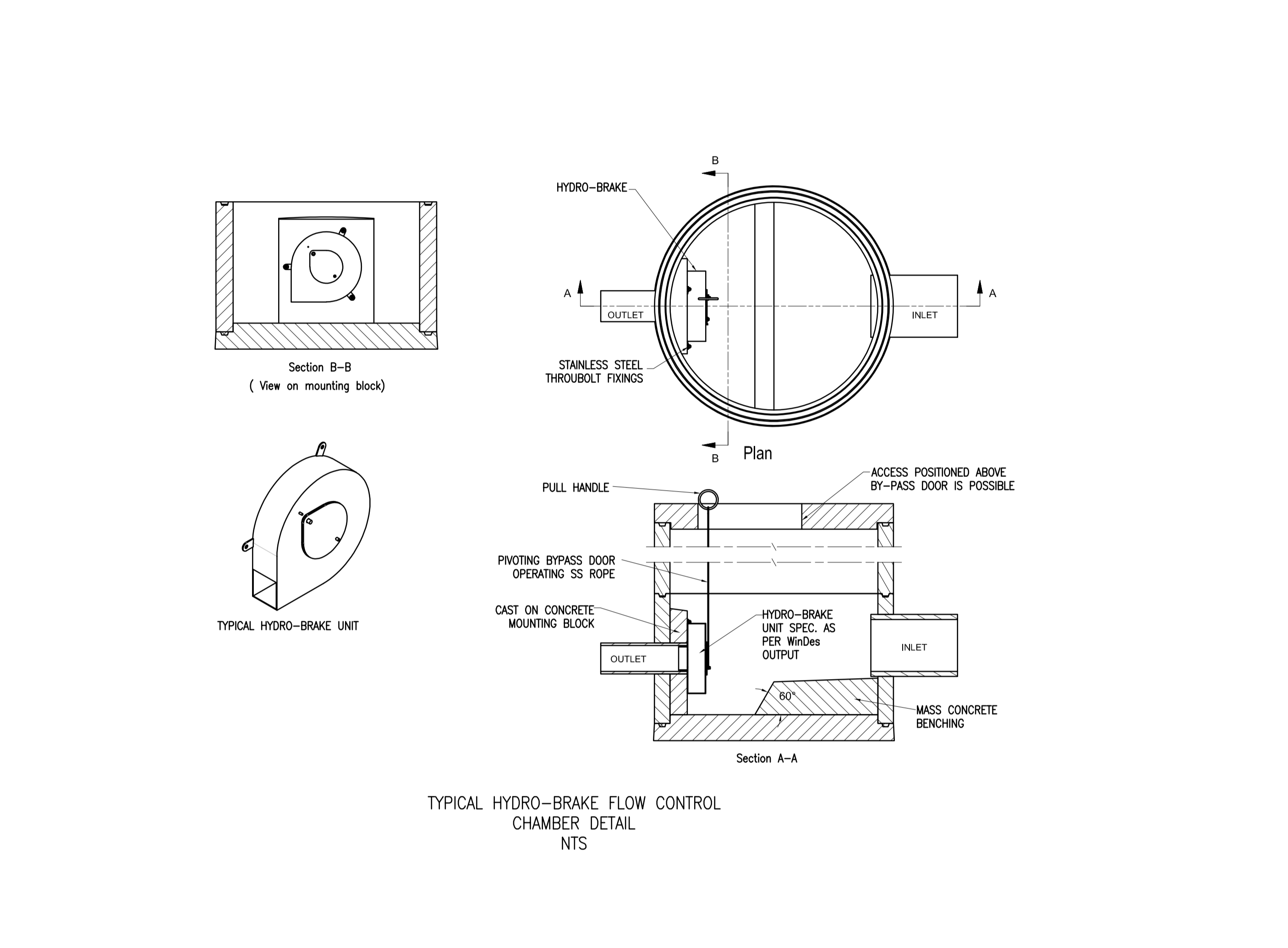
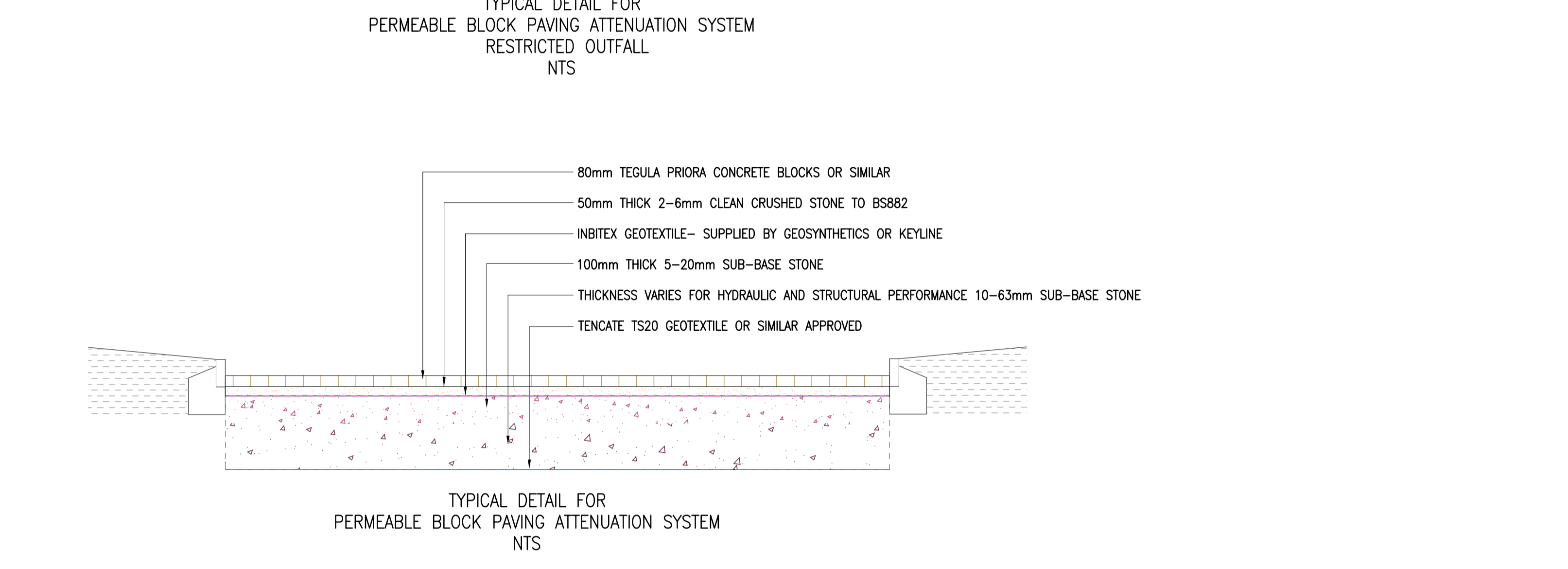
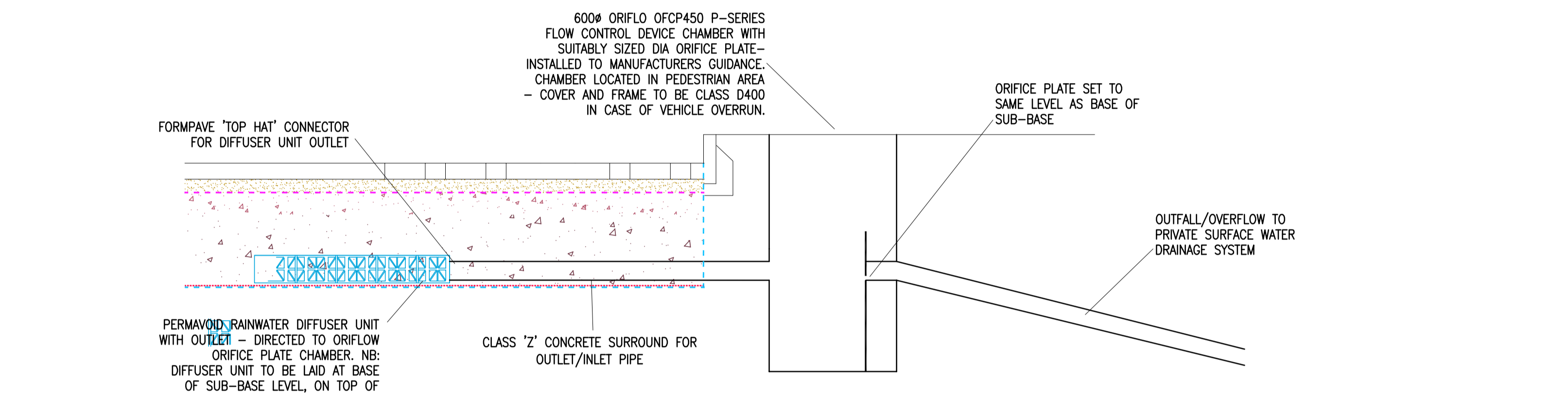
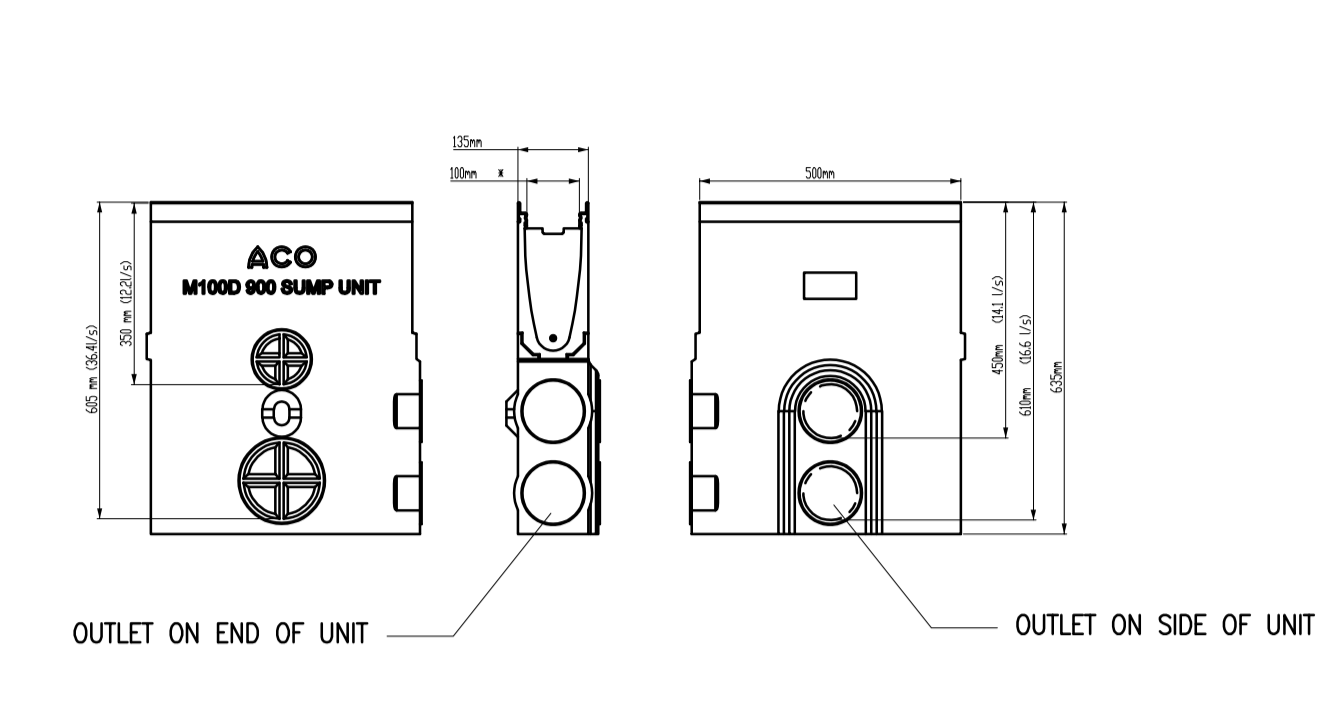
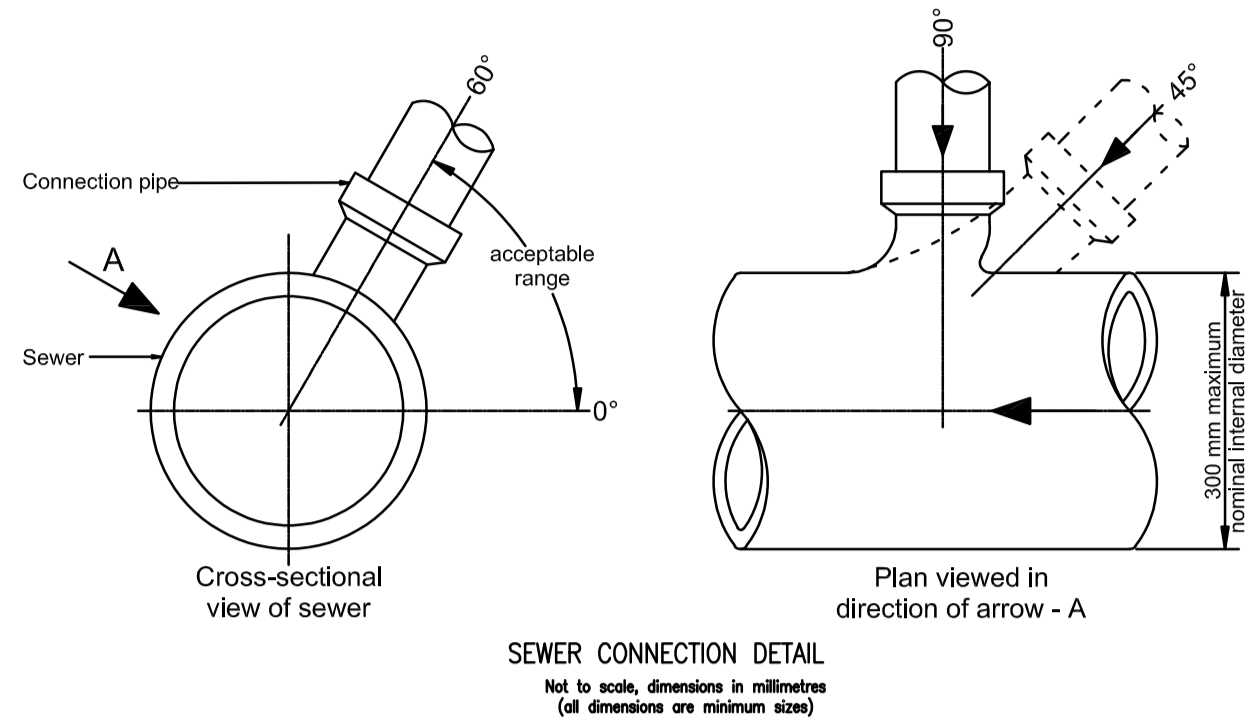
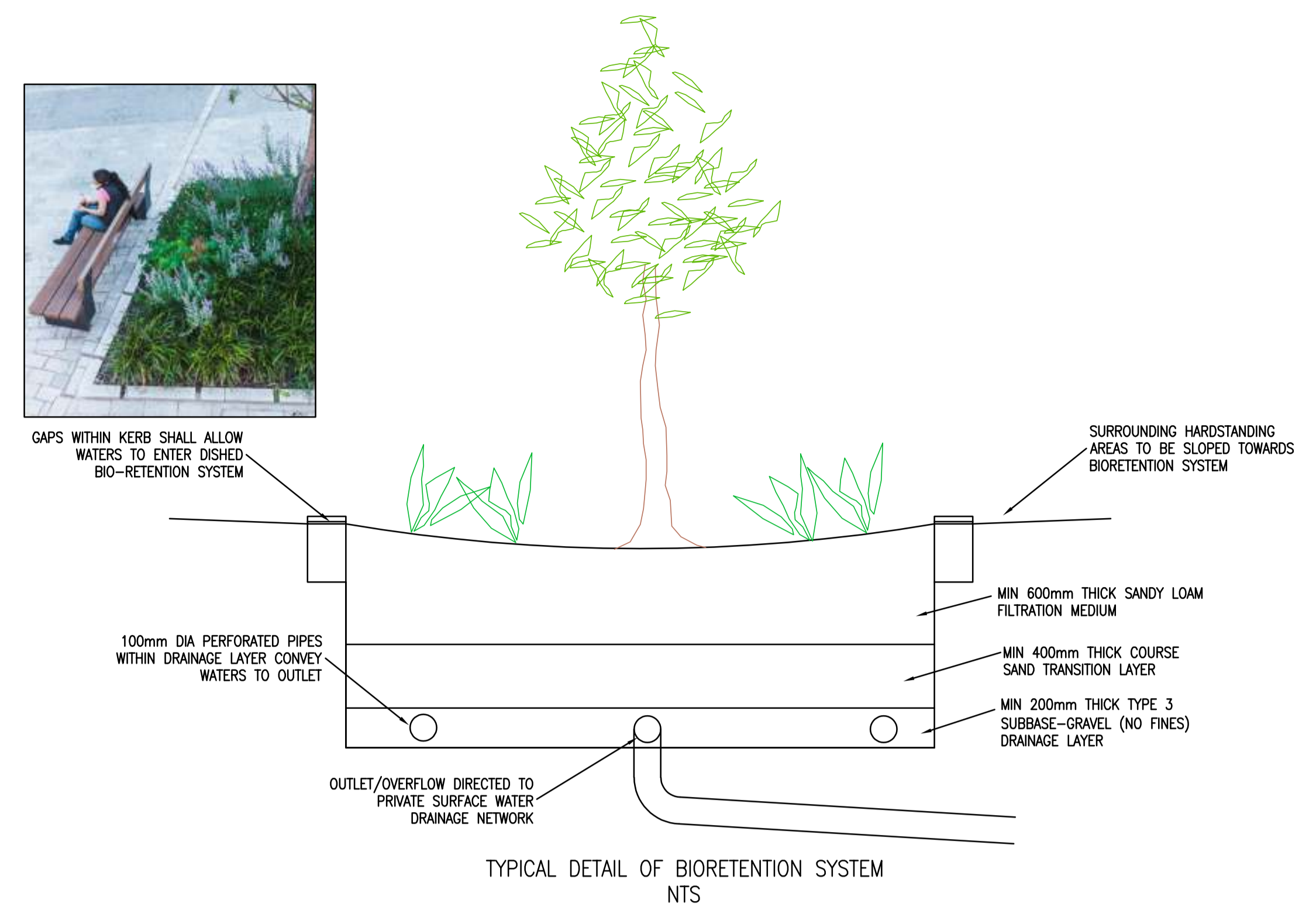
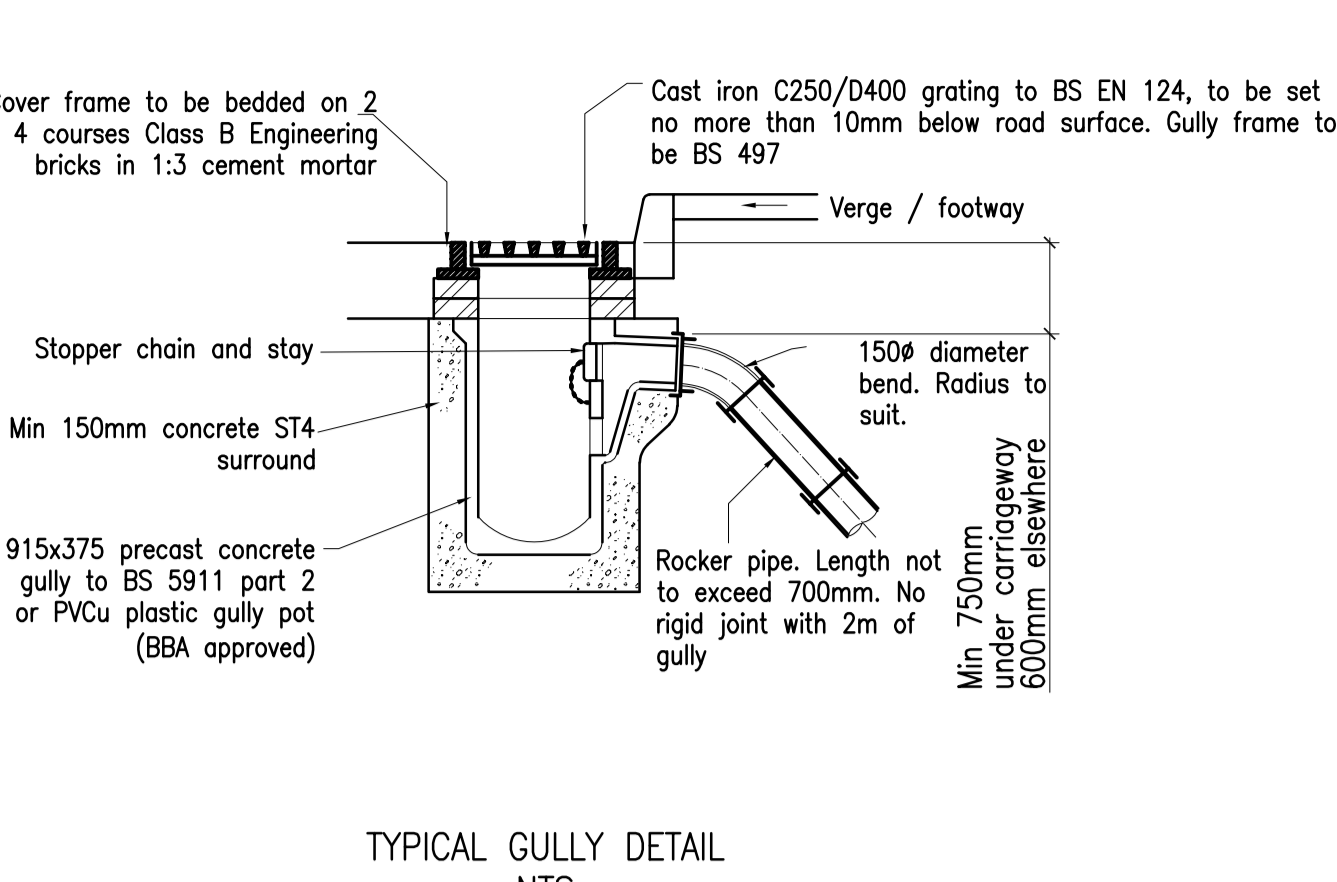
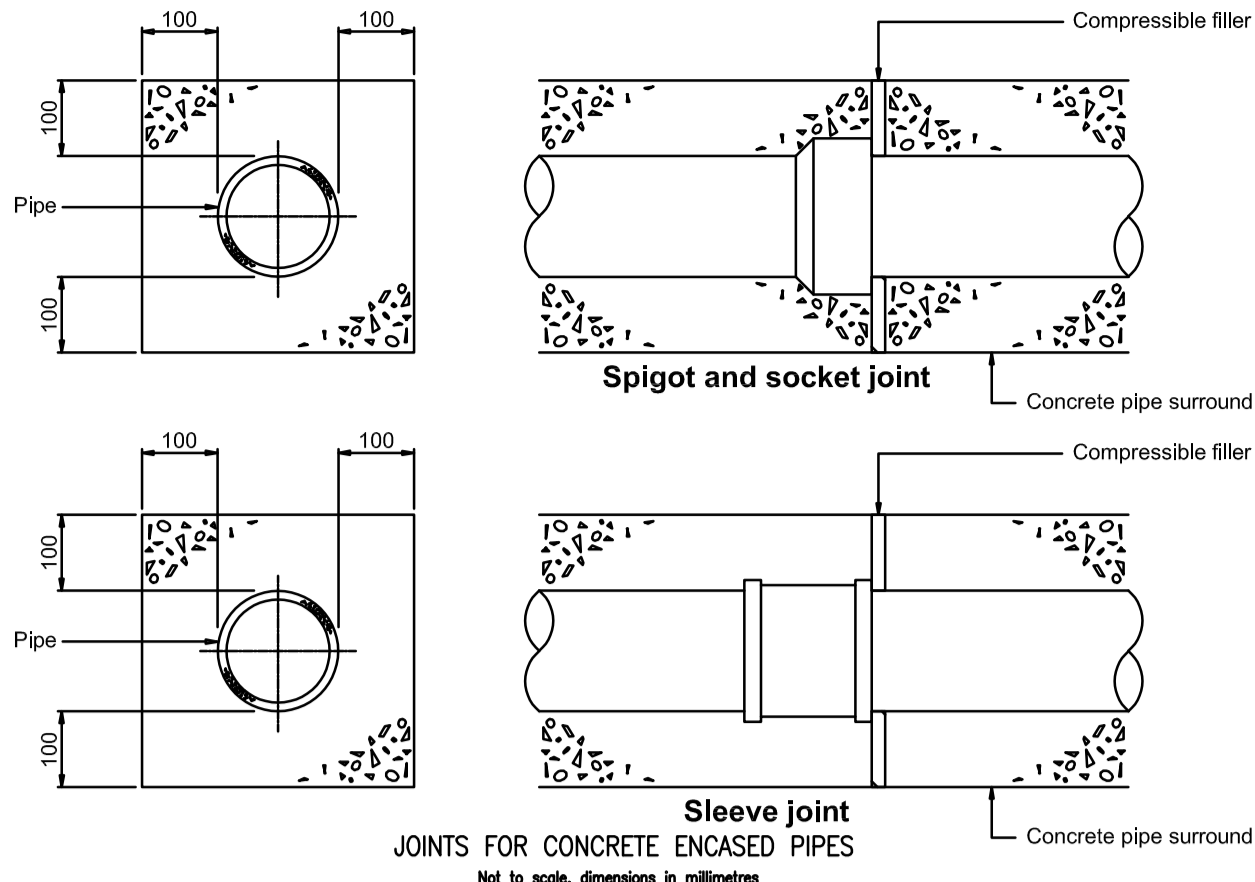
Block H


Reference:	PU1840TS
Material:	SW
No. of Pumps:	2
Pump Type:	SE1.80.80.15
Impeller Design:	Vortex
Supply Voltage:	3 Phase 400v
Method of Starting:	DOL
Level Controls:	Floats
Control Sequence:	Duty/Standby
Length of Cable:	10 metres
GRP Chamber Diameter:	1800mm
Depth of Chamber:	4000mm
Inlet Invert:	2800mm
Inlet Connection:	300mm @ 180° TBC
Pump Outlet:	DN80 Ductile Iron (adaptor
to suit 140mm OD SDR 17 by others)	
Access Cover & Frame:	600x1000 Pedestrian Duty
Only	

Quantity	Description/Model	Price (per unit)
1	PU1840TS	£8,900
1	404334 Weather proof kiosk inc beacon	£800

Quantity	Item/Description	Price (per unit)
1	Smart Commissioning – Standard commissioning as scope of works, inc supplied and fitted (at point of commissioning) Kingspan Smartserv Pro GSM telemetry alarm for complete peace of mind. Smartserv alerts both Kingspan and designated contacts. Includes 3 years Kingspan monitoring free of charge.*	£649

*Kingspan monitoring is for alert only. Service/maintenance packages are available at separate cost on request.



REV	DATE	BY	DESCRIPTION	CHK	APP
			PLANNING APPLICATION		
<small>Drawn: Sanyo J1, Issue: Sanyo J1. All rights reserved. License holder: HERRING</small>					
					
<small>Unit: 23, The Mallings, Stratford-upon-Avon, Warwickshire, CV37 9HQ Tel: 01527 811777 www.eas.co.uk</small>					
CLIENT	ANGLIA SQUARE, NORWICH, NORFOLK				
PROJECT	STANDARD SURFACE WATER DRAINAGE CONSTRUCTION DETAILS				
DRAWN BY	NTS	SECTION/DRAWN	MD	DATE	20.09.2022
PROJECT NO.	3831	DRAWING NO.	SD-001		

Abr.	Species	Height	Girth	Habit/Form	Specification	Container	Density
Ac	Acer campestre	600-650cm	30-35cm	Semi Mature min 2m Clear stem	4x Transplanted	Containerised	Item
Al	Acer freemanii 'Autumn Blaze'	600-650cm	40-45cm	Semi Mature min 2m Clear stem	4x Transplanted	Containerised	Item
Agl	Ainus glutinosa Imperialis	400-450cm		Multi-Stem - Min 3 Breaks	4x Transplanted	Containerised	Item
Agr	Amelanchier x grandiflora	400-450cm		Multi-Stem - Min 3 Breaks	4x Transplanted	Containerised	Item
Al	Amelanchier lamarckii	400-450cm		Multi-Stem - Min 3 Breaks	4x Transplanted	Containerised	Item
Bn	Betula nigra	400-450cm		Multi-Stem - Min 3 Breaks	4x Transplanted	Containerised	Item
BUJ	Betula utilis jacquemontii	400-450cm		Multi-Stem - Min 3 Breaks	4x Transplanted	Containerised	Item
Cb	Carpinus betulus	500-550cm	30-35cm	Semi Mature min 2m Clear stem	4x Transplanted	Containerised	Item
Fs	Fagus sylvatica	500-550cm	30-35cm	Semi Mature min 2m Clear stem	4x Transplanted	Containerised	Item
Gb	Ginkgo biloba	500-550cm	30-35cm	Semi Mature min 2m Clear stem	4x Transplanted	Containerised	Item
Ls	Liquidambar styraciflua	600-650cm	40-45cm	Semi Mature min 2m Clear stem	4x Transplanted	Containerised	Item
Mg	Metasequoia glyptostroboides	600-650cm	40-45cm	Semi Mature min 2.5m Clear stem	4x Transplanted	Containerised	Item
Mk	Magnolia kobus	500-550cm	30-35cm	Semi Mature min 2m Clear stem	4x Transplanted	Containerised	Item
Ph	Platanus x hispanica	600-650cm	40-45cm	Semi Mature min 2m Clear stem	4x Transplanted	Containerised	Item
Ps	Prunus serrula	400-450cm		Multi-Stem - Min 3 Breaks	4x Transplanted	Containerised	Item

- NOTES:
- Do not scale from this drawing.
 - Always work to noted dimensions.
 - All dimensions are in millimetres unless otherwise stated.
 - All setting out, levels and dimensions to be agreed on site.
 - The dimensions of all materials must be checked on site before being laid out.
 - This drawing must be read with the relevant specification clauses and detail drawings.
 - Order of construction and setting out to be agreed on site.

- KEY
- BOUNDARIES**
- HYBRID APPLICATION BOUNDARY
 - LAND OWNED BY CT
 - DETAIL APPLICATION BOUNDARY
- PLANTING AREA - WILDFLOWER TYPE P1**
 Willowow seed mix
 Refer to planting schedule ANG-PLA-XX-XX-SP-L-2000 Planting Schedule for indicative mix
- PLANTING AREA - SWALE PLANTING TYPE P2**
 Rain gardens and other vegetated sustainable drainage elements
 Refer to planting schedule ANG-PLA-XX-XX-SP-L-2000 Planting Schedule for indicative mix
- PLANTING AREA - ST GEORGES ST MIX TYPE P3**
 Flower-rich perennial planting
 Refer to planting schedule ANG-PLA-XX-XX-SP-L-2000 Planting Schedule for indicative mix
- PLANTING AREA - BOTOLPH ST MIX TYPE P4**
 Flower-rich perennial planting
 Refer to planting schedule ANG-PLA-XX-XX-SP-L-2000 Planting Schedule for indicative mix
- PLANTING AREA - RESIDENTIAL YARD MIX TYPE P5**
 Shrub and groundcover planting
 Refer to planting schedule ANG-PLA-XX-XX-SP-L-2000 Planting Schedule for indicative mix
- MIXED NATIVE HEADING TYPE P6**
 Mixed species native heading
 Maintained at 1.2mH
 Refer to planting schedule ANG-PLA-XX-XX-SP-L-2000 Planting Schedule for indicative mix
- PLANTING AREA - GROUNDCOVER MIX**
 Groundcover planting
 Refer to planting schedule ANG-PLA-XX-XX-SP-L-2000 Planting Schedule for indicative mix
- SEM-NATURAL WOODLAND**
 Semi-natural vegetation
 Refer to planting schedule ANG-PLA-XX-XX-SP-L-2000 Planting Schedule for indicative mix
- WETLANDS**
 Plants in Wetland
 Refer to planting schedule ANG-PLA-XX-XX-SP-L-2000 Planting Schedule for indicative mix
- LAWN AREA**
 Species-rich grassland
 Refer to planting schedule ANG-PLA-XX-XX-SP-L-2000 Planting Schedule for indicative mix
- GREEN ROOF**
 Intensive and Extensive biodiversity green roof system
- TREE PLANTING TYPE T1**
 Refer to schedule for specification
- MULTI-STEM TREE PLANTING TYPE T2**
 Refer to schedule for specification
- EXISTING TREE PLANTING TYPE T3**
 To be retained
- EXISTING TREE TO BE REMOVED**

Revision	Date	Description	Drawn	Apprvd.
P05	06.01.23	PLANNING	JV	DF

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 LONDON
 Unit 6 Waterside, 44-48 Wharf Road, London, N1 7UX
 T: 0207 253 5678
 STANDISH
 Standish Gatehouse, Stonehouse, Gloucestershire, GL10 3BZ
 T: 0145 360 7080

Client	Weston Homes		
Project	Anglia Square		
Drg Title	Softworks Site Plan_RevC		
Created on	Created by	Approved by	
01.04.2022	JV	DF	
Scale	Size	Workstage	
1:500	A1	PLANNING	
Drg No.	Suitability	Revision	
ANG-PLA-XX-XX-DR-L-2001	S4	P05	



Appendix U – Construction Phasing Plan

