

Our Reference: 2020 – EG10

Flood Risk and Drainage Solutions Ltd
144 New Lane
Oswaldtwistle
Lancashire
BB5 3QW
Tel: 07961477330
Email: info@floodrisk-drainage.co.uk



Date: 05/02/20

Drainage Impact Assessment to Support the Proposed Drive Thru Coffee Shop at ASDA Larchwood Avenue, Havant, Hampshire

Introduction

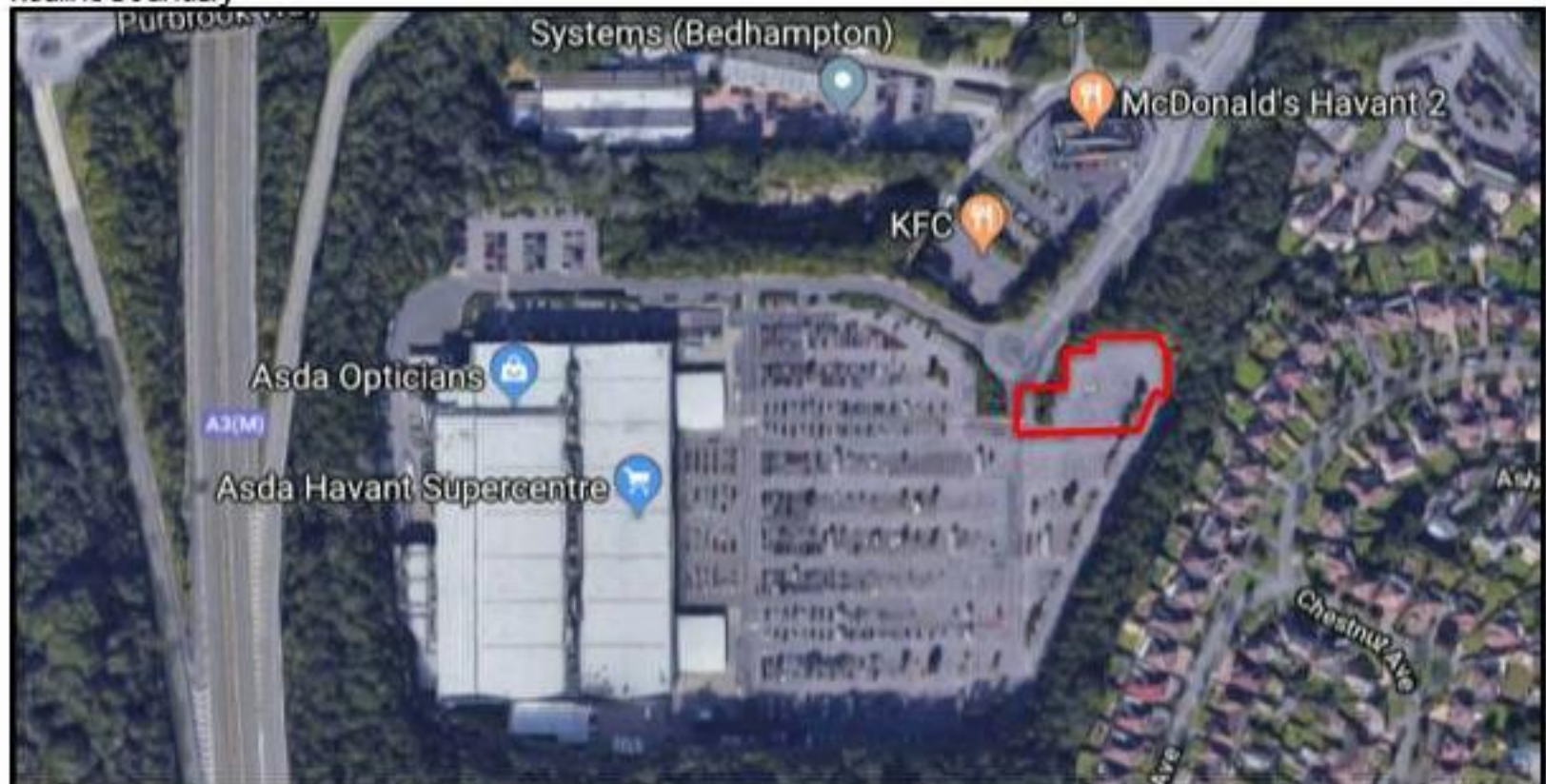
Flood Risk and Drainage Solutions Ltd have been commissioned by Euro Garages Ltd to provide a Detailed Drainage Design for the development of a drive-through coffee shop, located on part of the existing car parking area serving the ASDA site on Larchwood Avenue in Havant, Hampshire.

Existing Site

At present the site comprises of car parking area associated with the ASDA Supermarket to the west of the application site

- Total redline boundary = 0.250Ha
- Total developable area (excluding the existing access) = 0.200Ha

Redline Boundary



Development Proposals

Development proposals comprise of the erection of a drive through coffee shop and associated car parking provisions.

Post development the impermeable area of the site will reduce from 95% i.e. 0.237Ha to approximately 70% 0.174Ha of the total site area.

Development Proposals



Existing Drainage

A CCTV Survey was unavailable at the time of writing, however it is understood that the existing car parking area is currently positively drained via a network of linier drainage channels which ultimately pass through a bypass separator, before discharging into the Southern Water Public Sewer Network.

Southern Water Sewer Records show that the nearest public surface water sewer is a 675mm diameter SW surface water sewer located within the access road to the site, adjacent to the McDonald's Restaurant, approximately 100m north east of the application site.

The nearest foul sewer is a 150mm diameter SW foul sewer located within the McDonalds car parking area approximately 70m north east of the application site.

Engineering judgment suggests that the ASDA site is served by foul infrastructure which is expected to flow in an easterly direction along the access road into the ASDA site, to the north of the application site.

Hierarchy of Surface Water Disposal

The hierarchy for disposal of surface water from new developments is outlined within the Building Regulations Approved Document H and specifies the following methods in order of preference:

- Infiltration via soakaway or other suitable infiltration device
- Discharge to watercourse
- Discharge to public surface water sewer

- Discharge to public combined sewer

Infiltration

Borehole logs taken from the BGS online service on the application site show that the underlying ground comprises of clay down to 5m BGL, which is not considered suitable for the use of infiltration techniques.

Furthermore, Soilscape maps identify that the proposed development site is located on ground which is considered to be slowly permeable seasonally wet acid loamy and clayey soils.

*See attachments for Desktop Ground Conditions.

Taking the above into consideration disposal of surface water via infiltration methods is not considered to be suitable

Watercourse

There are no watercourses within a suitable distance of the application site in which surface water resulting from the development could be disposed.

Sewer

At present the existing car parking area drains into a positive drainage network, directing flow to a private surface water sewer which is part of the larger drainage network serving the ASDA site.

As such it is proposed that surface water resulting from the application site should be directed into the existing surface water drainage network serving the site, upstream of any bypass interceptors.

Existing Runoff Rates

Brownfield runoff rates have been calculated for the proposed developable area, which accounts for 0.200Ha.

- Brownfield runoff rate = 28l/s

Restricted Discharge Rates

Surface water flows from the proposed development have been restricted to no more than 70% of the existing runoff rate, with the inclusion of 20% climate change to account for increased rainfall intensity over the lifetime of the development.

- Proposed discharge rate 70% of existing = 19.6l/s

Proposed Surface Water Drainage Strategy

Surface water flows from the application site are to be collected via rainwater down pipes and a network of aco channels, before being connected into the private surface water network serving the ASDA site.

Flows from the site have been restricted to no more than 19.6l/s by means of a vortex flow control device for all return periods up to and including the 100 year + 20% climate change event, flows in excess of this are to be attenuated within a geo-cellular storage tank located within car parking spaces.

Offline Geo-cellular Attenuation Tank Details

- Area = 46.75m²
- Depth of crates = 0.5m
- CL = 33.340 (min)
- IL = 32.340
- Crates to be suitable for HGV trafficked area

Pollution Control

- ASDA sites are already served by bypass interceptors which provide pollution control for the existing car parking areas.

Vortex Flow Control

- Design Head = 0.700m
- Discharge = 19.6l/s
- Chamber = 1200mm Dia

Proposed Surface Water Discharge Rates

The proposed surface water drainage strategy has been modelled using FLOW Software for the 1 year + 20% climate change event, 30 year + 20% climate change event and 100 year + 20% climate change event, the results are tabulated below for reference.

Proposed Discharge Rates

Return Period	Discharge Rate (l/s)	Comment
1 Year + 20% Climate Change	13.0	OK
30 Year + 20% Climate Change	19.0	Surcharged
100 Year + 20% Climate Change	19.6	Surcharged

Exceedance Route

Modelling normal conditions during the 100 year + 20% climate change event shows that the proposed drainage network has sufficient capacity to accommodate flows below ground level with no flooding.

Management/Maintenance

Following development, the drainage network serving the site will remain private, upon request from the LPA the developer is to provide evidence of the funding mechanism for the management and maintenance of the drainage system.

Typical maintenance requirements for attenuation tanks are provided below:

TABLE 21.3 Operation and maintenance requirements for attenuation storage tanks			
	Maintenance schedule	Required action	Typical frequency
	Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then annually
		Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
		For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae or other matter; remove and replace surface infiltration medium as necessary.	Annually
		Remove sediment from pre-treatment structures and/or internal forebays	Annually, or as required
	Remedial actions	Repair/rehabilitate inlets, outlet, overflows and vents	As required
	Monitoring	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually
		Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required

Foul Flows

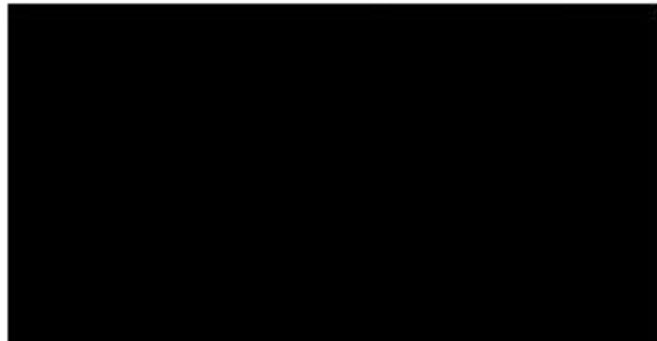
Foul flows from the proposed development are to be connected to the private foul drainage system serving the ASDA site which is anticipated to be located to the west of the site.

Attachments

- Desktop Ground Conditions
- Southern Water Sewer Records
- Proposed Drainage Layout Drawing and Manhole Schedule
- Typical Drainage Details Drawing
- Modelled Surface Water Network Simulation Report (Normal Conditions)

We trust that the above is acceptable and look forward to hearing from you in due course; however, should you have any queries, please do not hesitate to contact me.

Yours Sincerely,



Chris Vose

Flood Risk and Drainage Solutions Ltd

Desktop Ground Conditions



Legend

Search

Soil information

Soilscape 18:
Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils

Texture:
Loamy and clayey

Coverage:
England: 19.9% Wales: 2.4%
England & Wales: 17.5%

Selected area:
76.0km²

Drainage:
Impeded drainage

Fertility:
Moderate

Habitats:
Seasonally wet pastures and woodlands

Landcover:
Grassland and arable some woodland

Carbon:
Low

Drinking to:

GROUND EXPLORATIONS LTD.

BOREHOLE NO. 8

Contract Name **Proposed PIMCO Hypermarket**

Report No. **8011/MCB/IAB**

Client **Bowden, Sillett & Ptnrs.,**

Site Address

Address **62, Carter Lane,**

Littlepark,

City of London,

Havant,

EC4V 5EA.

Hampshire.

Standing Water Level **4.0 m**

Method of Boring **Clay cutter**

Water Struck **None**

Diameter **150 mm**

Ground Level **27.0 m A.O.D. (Approx)**

Start **30.3.79** Finish **30.3.79**

Perforated Casing

Remarks **Standing water level measured 2 hours after completion of drilling**

JARS m		CORES m		BULK m	
1791 0.1		1793 1.0		1797 3.0	
1792 0.5		1795 2.5		1800 4.5	
1794 1.5		1798 4.0			
1796 3.0					
1799 4.5					
Water					

Description	Thickness	Depth
	<u>m</u>	<u>m</u>
TOPSOIL (soft brown silty clay with humus and roots)	0.1	0.1
Firm/stiff brown fissured silty/sandy CLAY with roots	0.9	1.0
Stiff brown/blue mottled fissured silty/sandy CLAY with some black pebbles	3.0	4.0
Stiff blue fissured silty/sandy CLAY	1.0	5.0
TOTALS	5.0	5.0

Notes 1. Descriptions are in accordance with B.S. Code of Practice C.P. 2001

Clients are requested to compare with samples submitted.

2. Core samples are nominally 102mm diameter and 460mm long.

Depths shown are to top of sample

Southern Water Sewer Records

SEWER RECORDS PAGE 1 OF 2

107796

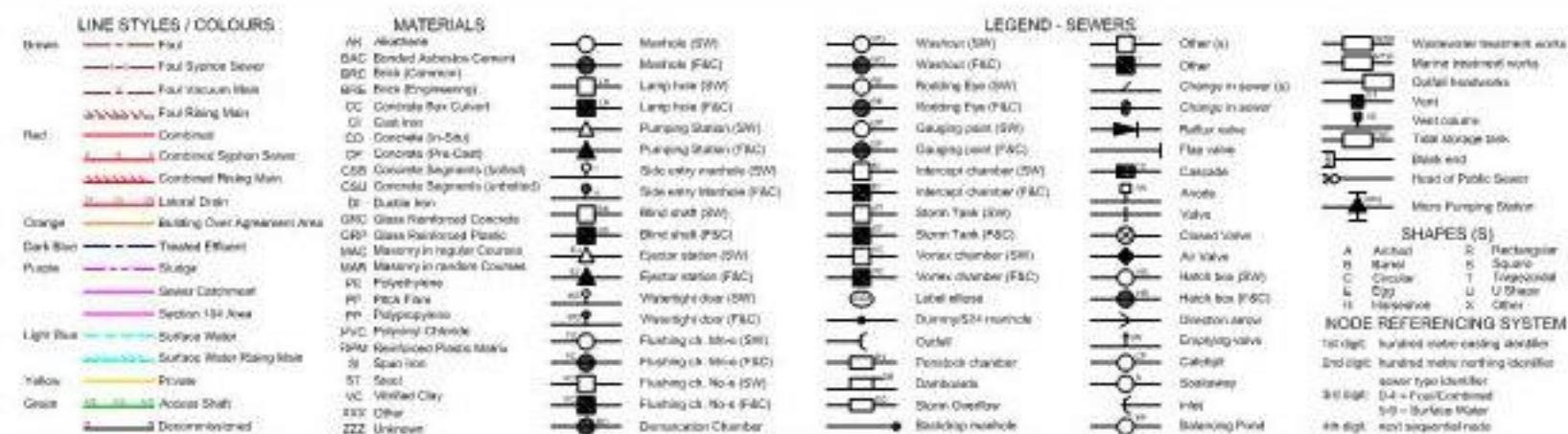


107218

O.S. REF. SU6907NE Title: 348942_Asda, Larchwood Avenue,	Drawn by: rohandas Scale: 1:2500 Date: 21/08/2019	The positions of pipes shown on this plan are believed to be correct, but Southern Water Services Ltd accept no responsibility in the event of inaccuracy. The actual positions should be determined on site. WARNING: BAC pipes are constructed of Bonded Asbestos Cement WARNING: Unknown (UNK) materials may include Bonded Asbestos Cement Based upon Ordnance Survey Digital Data with the permission of the controller of H.M.S.O. Crown Copyright Reserved Licence No. WU 298530.	469042 469988 N 
---	--	---	---

SEWER RECORDS PAGE 2 OF 2

Node						Node						Node						Node					
	Cover	Invert	Size	Material	Shape		Cover	Invert	Size	Material	Shape		Cover	Invert	Size	Material	Shape		Cover	Invert	Size	Material	Shape
6201X			UNK	UNK	CIRC	8402X	29.79	27.51	150	VC	CIRC												
6202X	30.88		225	VC	CIRC	8403X	28.67	27.32	150	VC	CIRC												
6203X			UNK	UNK	CIRC	8404X	28.83	26.46	225	VC	CIRC												
6204X	31.53		225	VC	CIRC	8405X	29.95	27.92	150	VC	CIRC												
6250X	33.45		225	VC	CIRC	8451X	28.52	25.91	225	VC	CIRC												
6251X			225	VC	CIRC	8452X	28.54	27.44	150	VC	CIRC												
6301X			UNK	UNK	CIRC	8453X	29.53	27.86	150	VC	CIRC												
6302X			UNK	UNK	CIRC	8454X	31.71	29.74	150	VC	CIRC												
6303X			UNK	UNK	CIRC	8501X	25.96	22.41	225	VC	CIRC												
6501X	26.8	23.47	150	VC	CIRC	8502X	24.52	22.74	225	VC	CIRC												
6502X	27.08	22.82	225	VC	CIRC	8504X			150	VC	CIRC												
6550X	27.15	22.96	675	CP	CIRC	8551X	25.09	23.24	225	VC	CIRC												
7201X	29.16	26.12	225	VC	CIRC	8552X	26.47	24.23	225	VC	CIRC												
7250X	28.85	26.76	225	VC	CIRC	8553X	21.02	20.29	225	CP	CIRC												
7301X	31.47	30.49	150	VC	CIRC	8603X			150	VC	CIRC												
7302X	30.18	29.26	150	VC	CIRC	860DX			150	VC	CIRC												
7350X	31.47	29.77	225	VC	CIRC	8650X	21.49	19.84	375	CP	CIRC												
7351X	30.04	27.95	225	VC	CIRC	8651X	19.48	18.21	750	CP	CIRC												
7402X	31.87	29.66	150	VC	CIRC	8652X	21.43	18.66	600	CP	CIRC												
7403X	32.53	30.64	150	VC	CIRC	8653X	21.26	18.6	525	CP	CIRC												
7404X	34.51	31.81	150	VC	CIRC	8654X	20.51	18.4	600	CP	CIRC												
7405X			UNK	UNK	CIRC	8655X	20.8	19.99	225	CP	CIRC												
7406X			UNK	UNK	CIRC	8701X	20.02	17.42	225	VC	CIRC												
740DX			UNK	UNK	CIRC	8702X	19.25	17.12	225	VC	CIRC												
741DX			UNK	UNK	CIRC	8703X	20.01	18.87	225	VC	CIRC												
742DX			UNK	UNK	CIRC	8704X	19.2	17.72	225	VC	CIRC												
7450X			UNK	UNK	CIRC	8750X	23.18	20.86	375	CP	CIRC												
7451X	32.08	29.37	225	VC	CIRC	8751X	22.05	19.79	225	VC	CIRC												
7452X	35.26	32.46	225	VC	CIRC	8752X	19.79	18.2	225	VC	CIRC												
7453X	29.58	26.98	225	VC	CIRC	8753X	19.51	17.44	225	VC	CIRC												
7501X	27.09	24.98	150	VC	CIRC	8754X	19.56	17.93	225	VC	CIRC												
7502X	24.85	23.34	225	VC	CIRC	9201X	22.84	21.02	150	VC	CIRC												
7503X	24.66	23.03	225	VC	CIRC	9251X	23.7	22.1	150	VC	CIRC												
7550X	26.88	24.4	225	VC	CIRC	9301X	24.27	22.79	150	VC	CIRC												
7551X	22.96		450	CP	CIRC	9302X	25.42	23.95	150	VC	CIRC												
7552X	23.01		450	CP	CIRC	9304X			150	UNK	CIRC												
7553X	24.41		300	UNK	CIRC	933DX			150	UNK	CIRC												
7601X	25	22.61	225	VC	CIRC	9351X	24.33	22.74	150	VC	CIRC												
7650X	25.39	20.9	675	CP	CIRC	9352X	25.42	24.05	150	VC	CIRC												
7651X	22.9	20.41	450	CP	CIRC	9401X	26.97	25.1	225	VC	CIRC												
7651Y	22.9		450	CP	CIRC	9451X	27.34	24.95	225	VC	CIRC												
7652X	22.73	20.14	450	CP	CIRC	9501X			225	VC	CIRC												
7653X	22.02	20.35	225	VC	CIRC	9502X	25.6	21.66	225	VC	CIRC												
7654X	21.95	20.91	150	VC	CIRC	9503X	21.77	19.99	225	VC	CIRC												
7655X	21.72	19.14	525	CP	CIRC	9550X	21.31	20.61	225	CP	CIRC												
7656X	22.19	19.47	525	CP	CIRC	9551X	22.04	21.09	225	VC	CIRC												
7701X	24.7	21.49	225	VC	CIRC	9552X	22.3	21.39	225	VC	CIRC												
7702X	23.02	20.7	225	VC	CIRC	9553X	24.57	23.04	150	VC	CIRC												
7750X	25.62	23.47	375	CP	CIRC	9554X	22.62	21.24	225	VC	CIRC												
7751X	24.72	20.23	675	CP	CIRC	9650X	17.84		750	CP	CIRC												
7752X	23.75	21.13	375	CP	CIRC	9701X	18.32	16.34	225	VC	CIRC												
7753X	23.74	22.25	225	CP	CIRC	9702X	18.94	16.6	225	VC	CIRC												
7753Y	23.74	22.21	225	CP	CIRC	9703X	18.49	16.17	225	VC	CIRC												
7754X	23.29	19.12	675	CP	CIRC	9704X	17.76	15.83	225	VC	CIRC												
8201X	24.57	23.36	225	VC	CIRC	9705X	18.98	18.03	225	VC	CIRC												
8202X	24.13	22.79	225	VC	CIRC	9705Y	18.98	18.03	225	VC	CIRC												
8203X	25.15	23.71	225	VC	CIRC	9706X	18.88	16.94	225	VC	CIRC												
8205X			UNK	UNK	CIRC	9707X	18.88	16.88	225	VC	CIRC												
8250X	25.23	24.19	225	VC	CIRC	9750X	18.7	17.67	225	VC	CIRC												
8251X	24.2	22.79	225	VC	CIRC	9751X	18.54	16.68	225	VC	CIRC												
8252X	25.72	24.64	225	VC	CIRC	9752X	18.99	18.09	225	VC	CIRC												
8301X	27.18	25.88	150	VC	CIRC																		
8302X	25.73	24.7	150	VC	CIRC																		
8350X	27	25.83	225	VC	CIRC																		
8401X	31.65	29.42	150	VC	CIRC																		



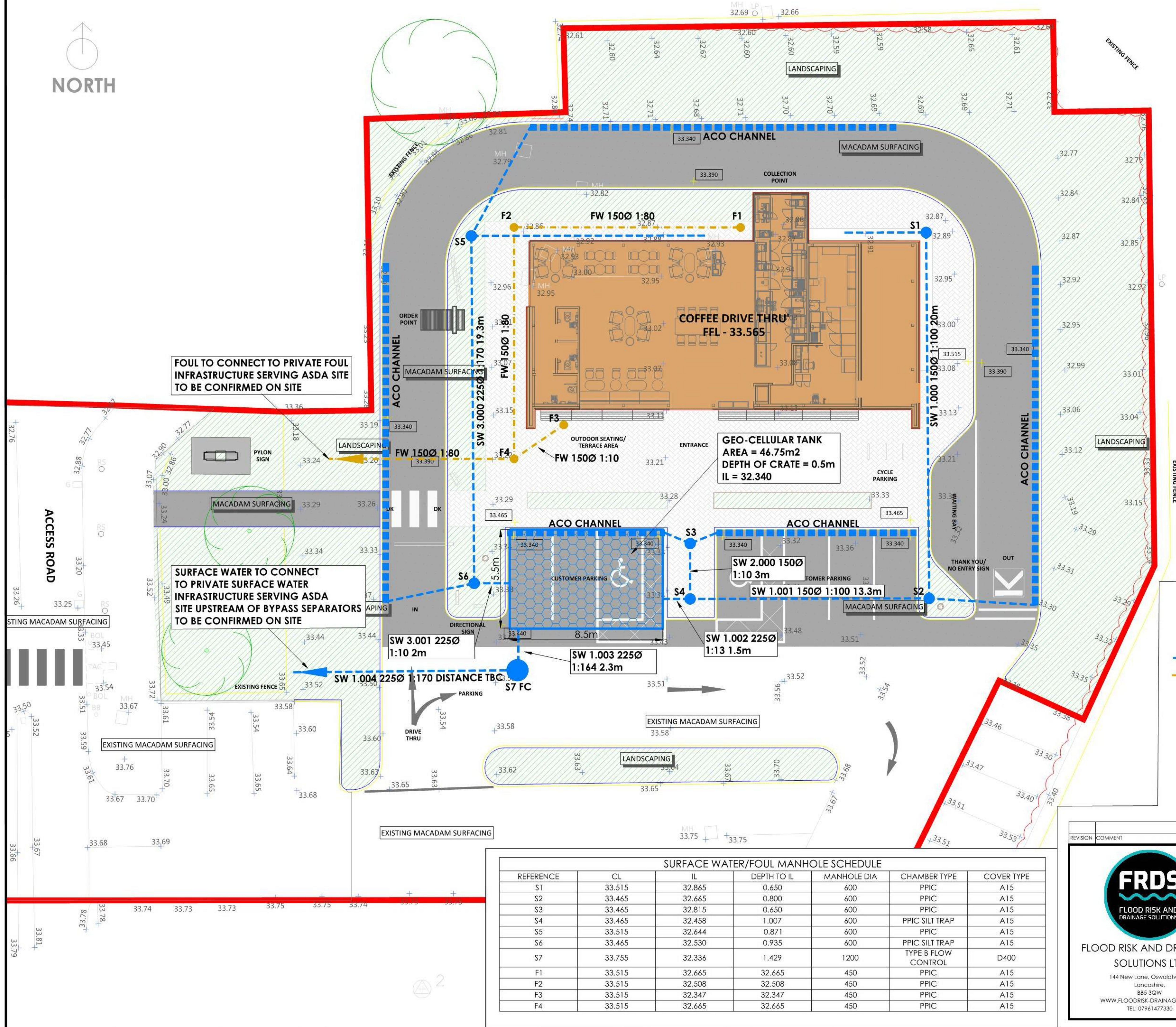
Drawn by: rohandas

Title: 348942 Asda, Larchwood Avenue,

Date: 21/08/2019



Proposed Drainage Layout Drawing and Manhole Schedule



GENERAL NOTES:

1. COPYRIGHT IN THIS DOCUMENT BELONGS TO FRDS LTD & ALL RIGHTS IN IT ARE RESERVED BY THE OWNER.
2. NO PART OF THIS DRAWING MAY BE COPIED, TRANSFERRED, OR MADE AVAILABLE TO USERS OTHER THAN THE ORIGINAL RECIPIENT, INCLUDING ELECTRONICALLY, WITHOUT PRIOR PERMISSION FROM FRDS LTD.
3. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS & ENGINEERS DRAWINGS & SPECIFICATIONS.
4. ALL DIMENSIONS ARE SHOWN IN MILLIMETRES UNLESS OTHERWISE STATED.
5. NO DIMENSIONS TO BE SCALED FROM THIS DRAWING.
6. THE LOCATION AND LEVELS OF EXISTING DRAINAGE PIPES AND CULVERTS MUST BE CHECKED ON-SITE PRIOR TO CONSTRUCTION.
7. PROPOSED FINISHED LEVELS HAVE ONLY BEEN ASSUMED AND SHOULD BE FINALISED BY A CIVIL ENGINEER.
8. POSITION OF RAINWATER DOWN PIPES TO BE CONFIRMED BY THE ARCHITECT.
9. FLOATATION CALCULATIONS OF ANY ATTENUATION STRUCTURES SHOULD BE PROVIDED BY A CIVIL ENGINEER OR MANUFACTURE.

SURFACE WATER ATTENUATION

GEO-CELLULAR SHALLOW ATTENUATION
AREA = 46.8m²
DEPTH OF CRATE = 0.5m
IL = 32,340
COVER = 0.500m
CRATES TO BE SUITABLE FOR TRAFFICKED AREAS

BY PASS INTERCEPTOR

CONNECTION TO ASDA INFRASTRUCTURE WHICH
ALREADY PASSES THROUGH A BYPASS SEPARATOR

FLOW CONTROL DETAILS

VORTEX FLOW CONTROL
DESIGN DEPTH = 0.700m
DISCHARGE RATE = 19.6L/S
CHAMBER = 1200Ø

CHAMBER DETAILS TO BE SPECIFIED BY MANUFACTURE

PROPOSED DISCHARGE RATES

1 IN 1 YEAR + 20% CLIMATE CHANGE EVENT = 13.0L/S
1 IN 30 YEAR + 20% CLIMATE CHANGE EVENT = 19.3L/S
1 IN 100 YEAR + 20% CLIMATE CHANGE EVENT= 19.6L/S

KEY

90.150

SW 1.000

FW 1.000

S1

F1

ACO

ATTENUATION TANK

PROPOSED LEVELS

PROPOSED SURFACE WATER DRAIN

PROPOSED FOUL DRAIN

PROPOSED SURFACE WATER MANHOLE

PROPOSED FOUL MANHOLE

PROPOSED SURFACE WATER ACO CHANNEL

ATTENUATION TANK

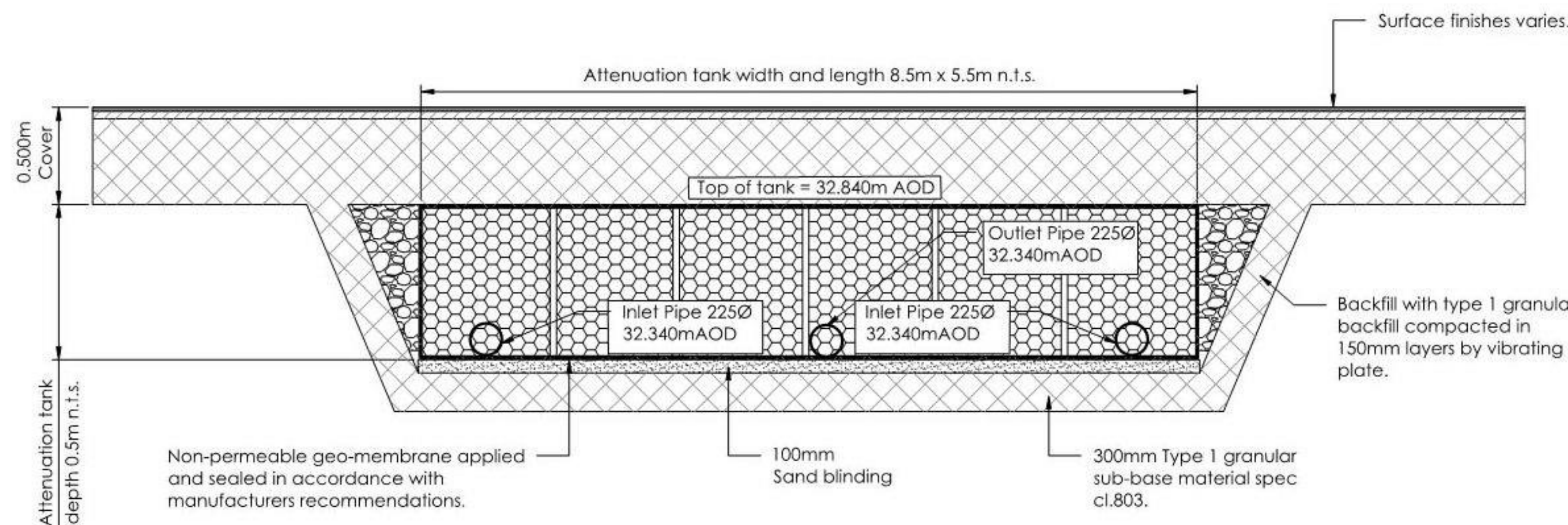
SURFACE WATER/FOUL MANHOLE SCHEDULE						
REFERENCE	CL	IL	DEPTH TO IL	MANHOLE DIA	CHAMBER TYPE	COVER TYPE
S1	33.515	32.865	0.650	600	PPIC	A15
S2	33.465	32.665	0.800	600	PPIC	A15
S3	33.465	32.815	0.650	600	PPIC	A15
S4	33.465	32.458	1.007	600	PPIC SILT TRAP	A15
S5	33.515	32.644	0.871	600	PPIC	A15
S6	33.465	32.530	0.935	600	PPIC SILT TRAP	A15
S7	33.755	32.336	1.429	1200	TYPE B FLOW CONTROL	D400
F1	33.515	32.665	32.665	450	PPIC	A15
F2	33.515	32.508	32.508	450	PPIC	A15
F3	33.515	32.347	32.347	450	PPIC	A15
F4	33.515	32.665	32.665	450	PPIC	A15

REVISION	COMMENT

FLOOD RISK AND DRAINAGE SOLUTIONS LTD
144 New Lane, Oswaldtwistle,
Lancashire,
BB5 3QW
[WWW.FLODRISK-DRAINAGE.CO.UK](#)
TEL: 07961477330

CLIENT:	EURO GARAGES	DATE: 05/02/2020	BY:
		STATUS:	
PROJECT:	DRIVE THROUGH COFFIE SHOP ASDA HAVANT	DRAWN BY: CV	
		SCALE: 1:100	
DRAWING TITLE:	PROPOSED SURFACE WATER/FOUL LAYOUT & MANHOLE SCHEDULE	SIZE: A1	
DRAWING REFERENCE:	2020-EG10-01	REVISION:	

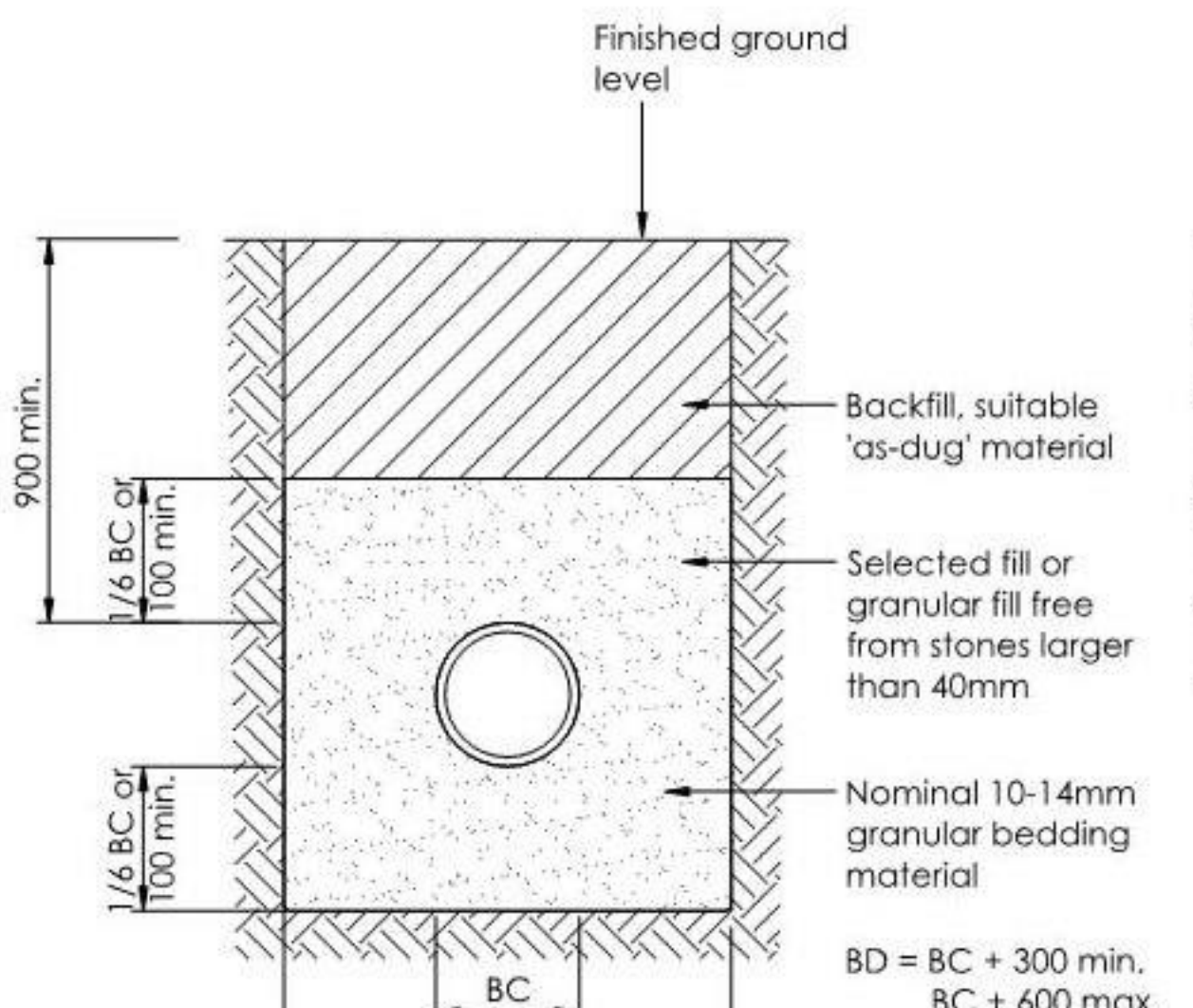
Typical Drainage Details



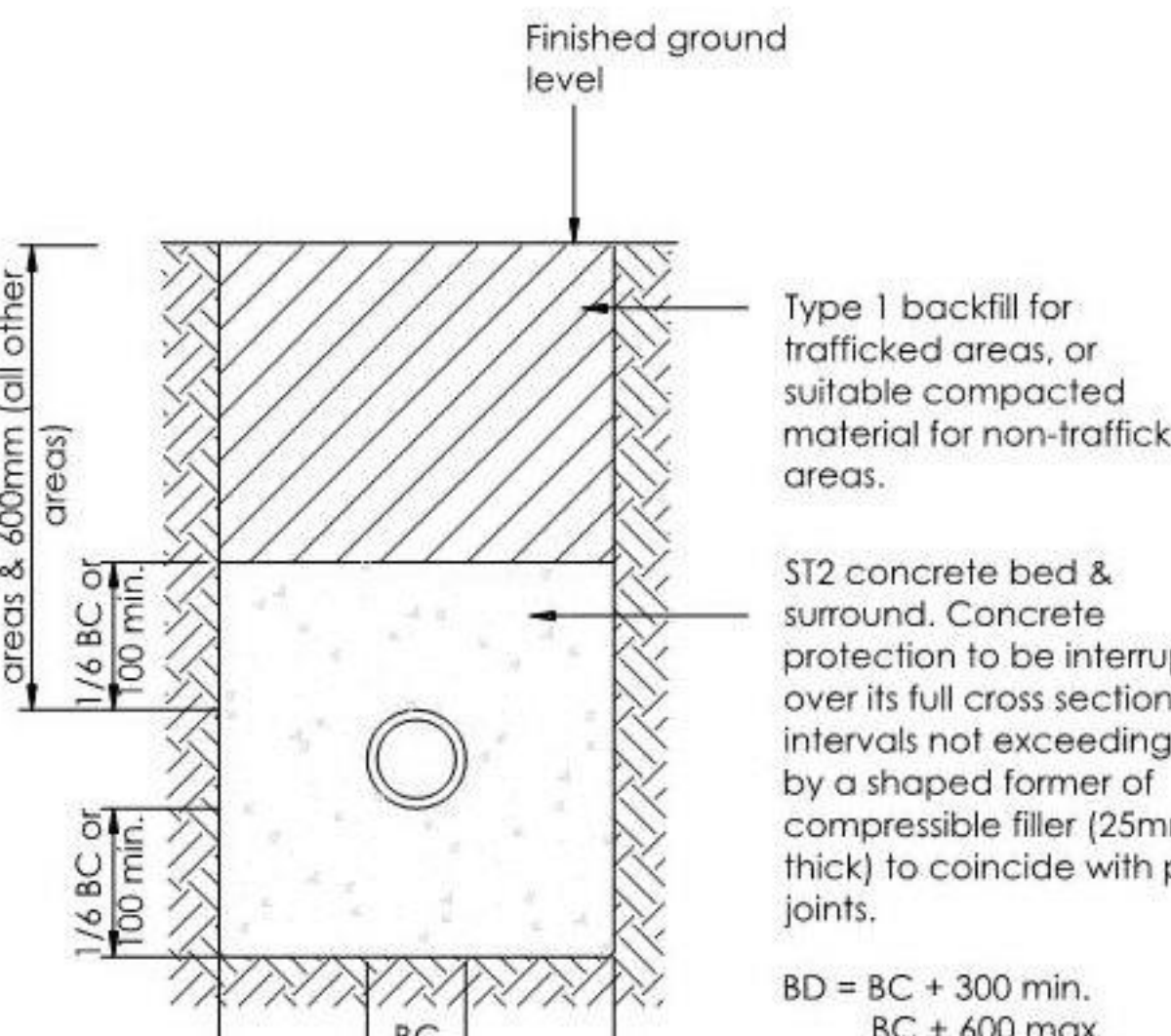
Indicative Section Through Attenuation Tank Not to Scale

Installation Method:

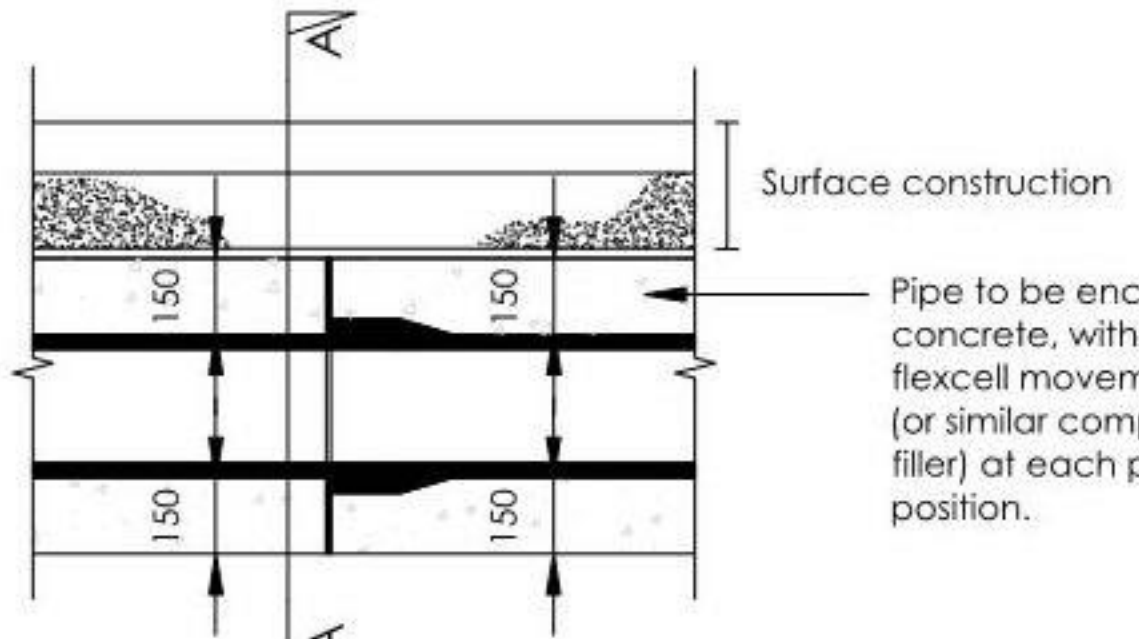
- Specialist supplier to prepare and submit appropriate layouts, schedules and details to enable fully compliant installation of geo-cellular units
- Excavate
- Install sub-base
- Install impermeable geomembrane (in accordance with manufacturers recommendations)
- Install crate units + connections (in accordance with manufacturers recommendations)
- Install inspection chambers as required
- Install crate end plates
- Cover sides & top with geotextile membrane (note: care taken not to rip, tear or puncture membrane)
- Seal membrane
- Lateral backfilling
- Cover & backfill



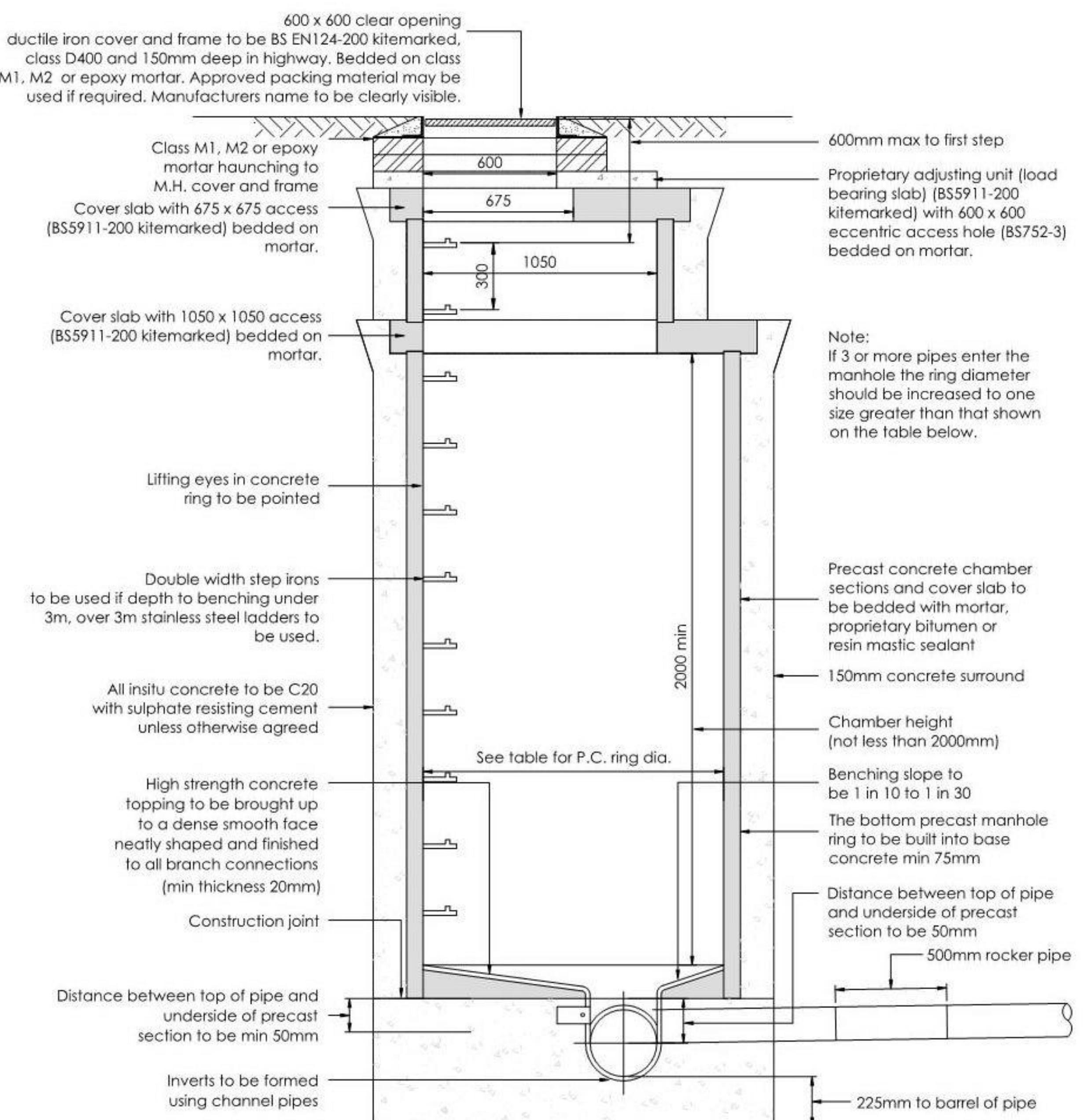
Typical Trench Detail Scale 1:10



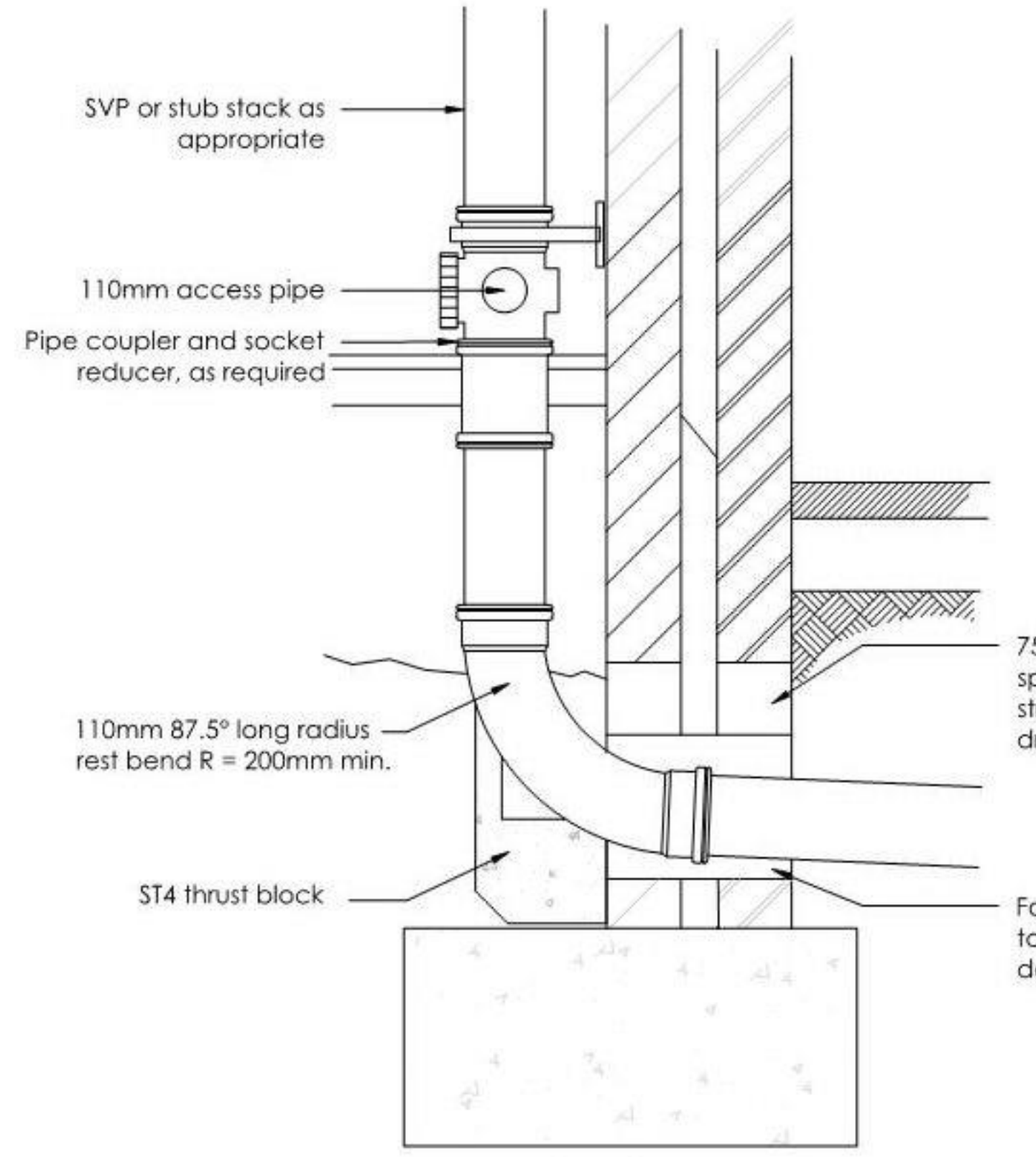
Shallow Trench Detail Scale 1:10



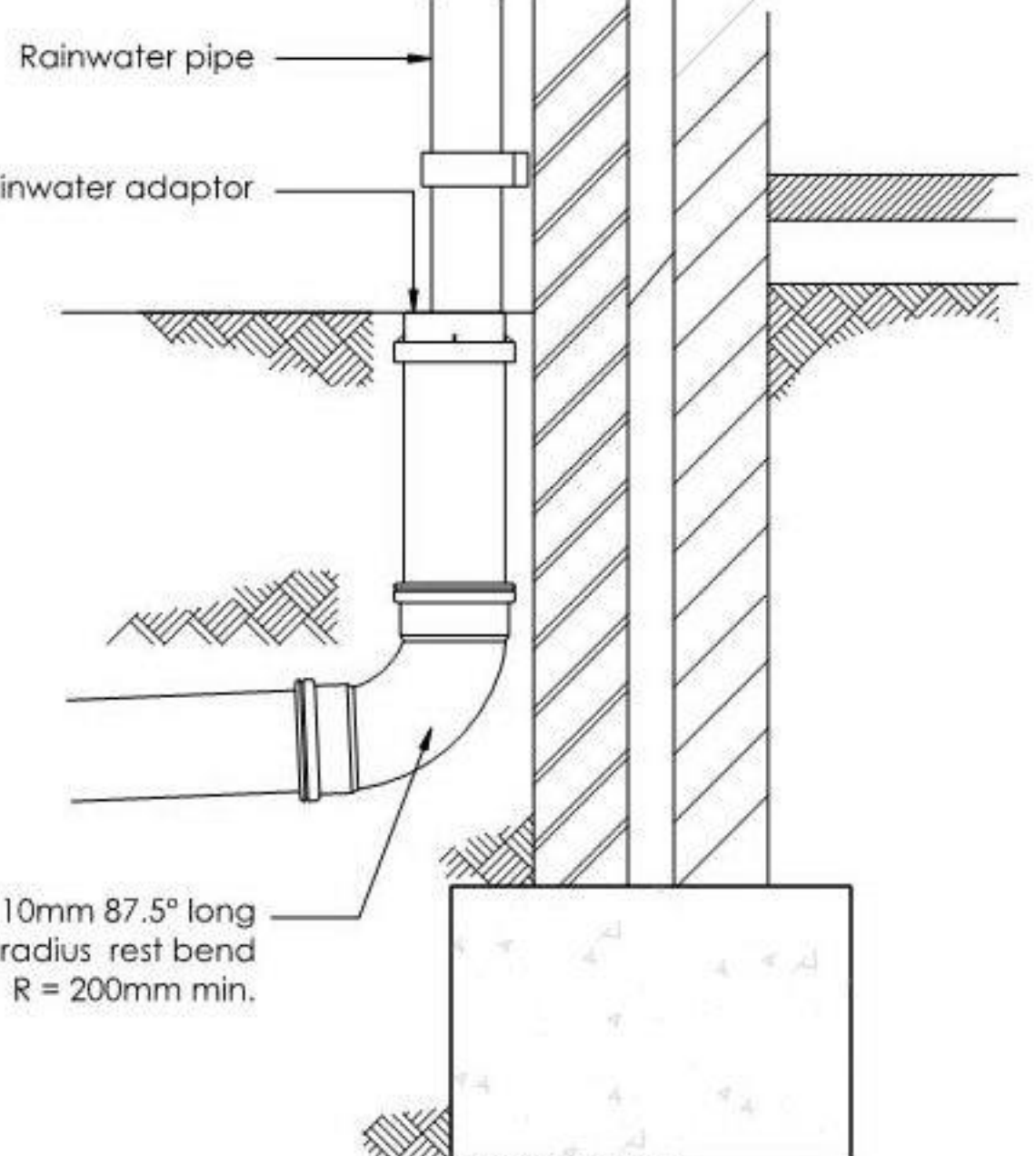
Joints for Concrete Encased Pipes Scale 1:10



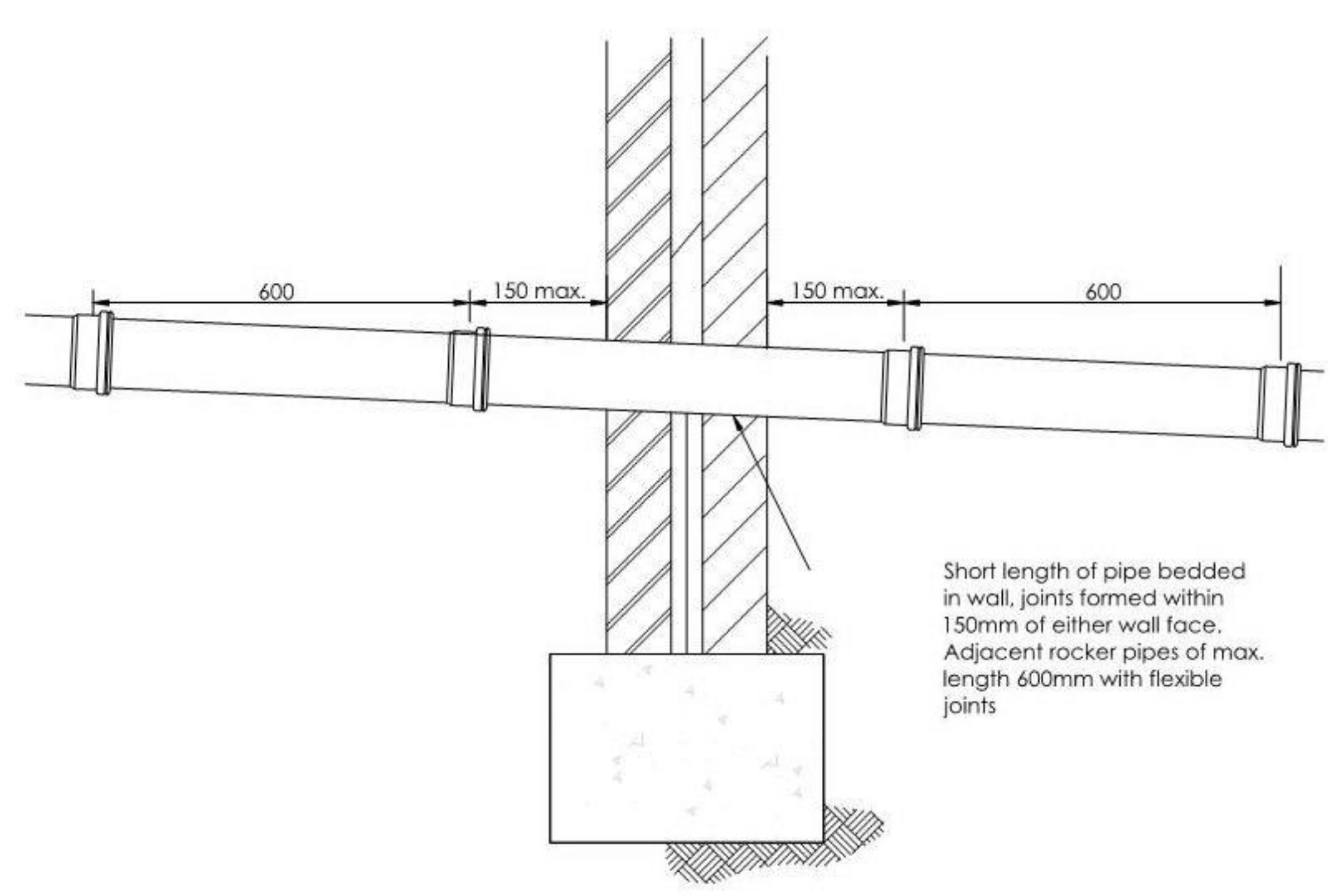
Typical Manhole Detail - Type A Scale 1:20



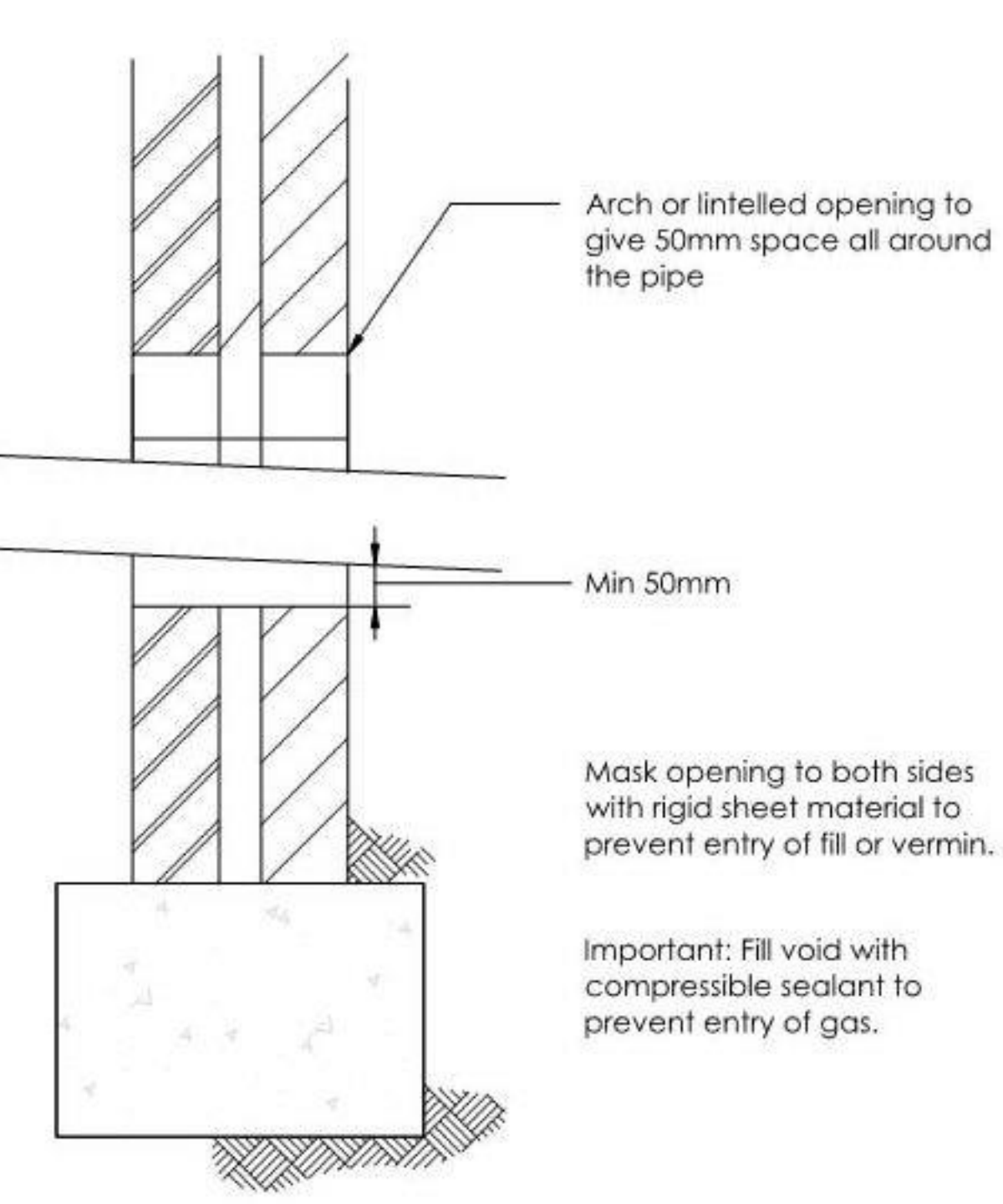
Internal SVP/Stub Stack Connection Through External Wall to Drain Scale 1:10



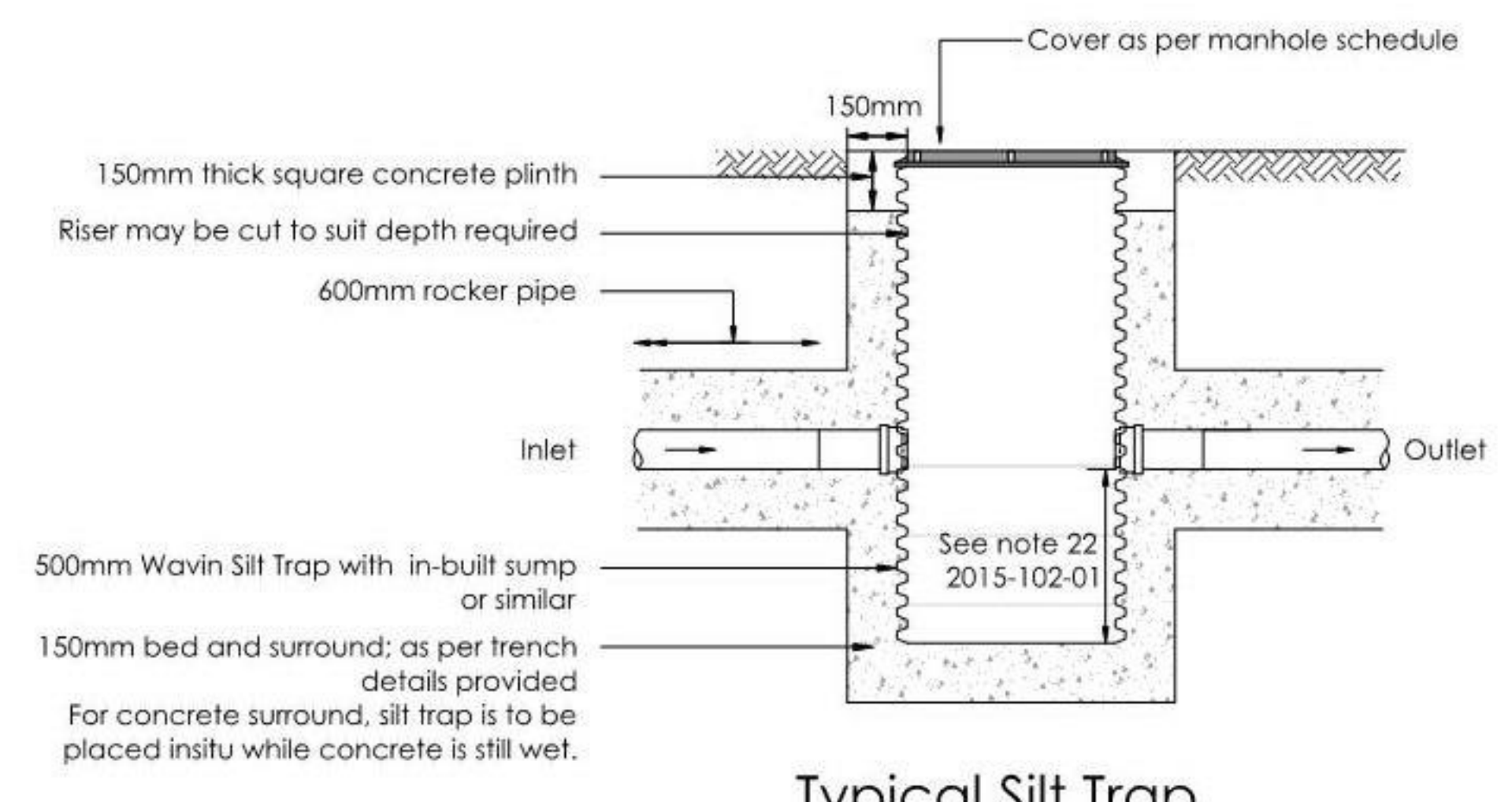
External RWP to Drain Scale 1:10



Pipes Through Walls (a) Scale 1:10



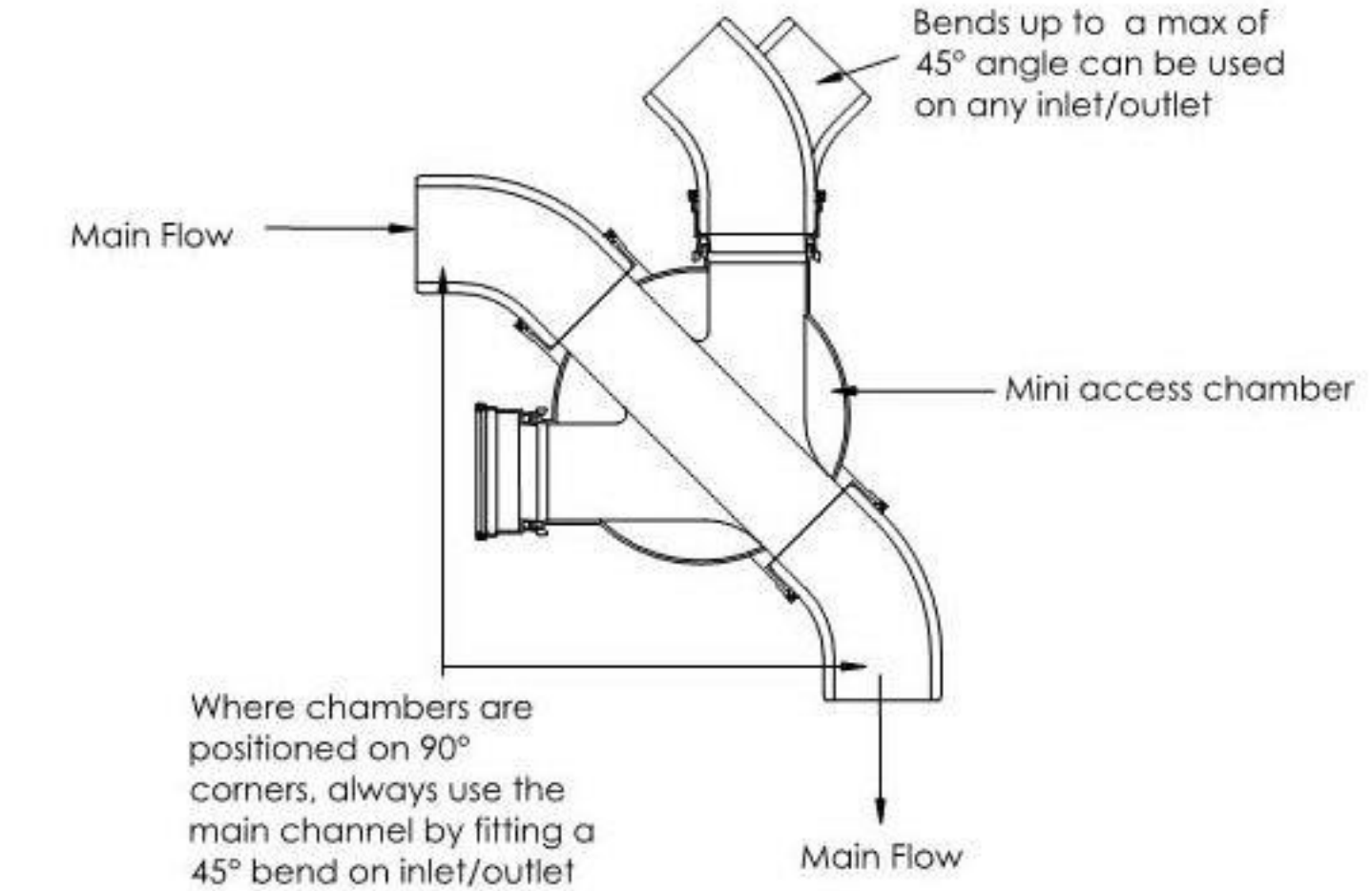
Pipes Through Walls (b) Scale 1:10



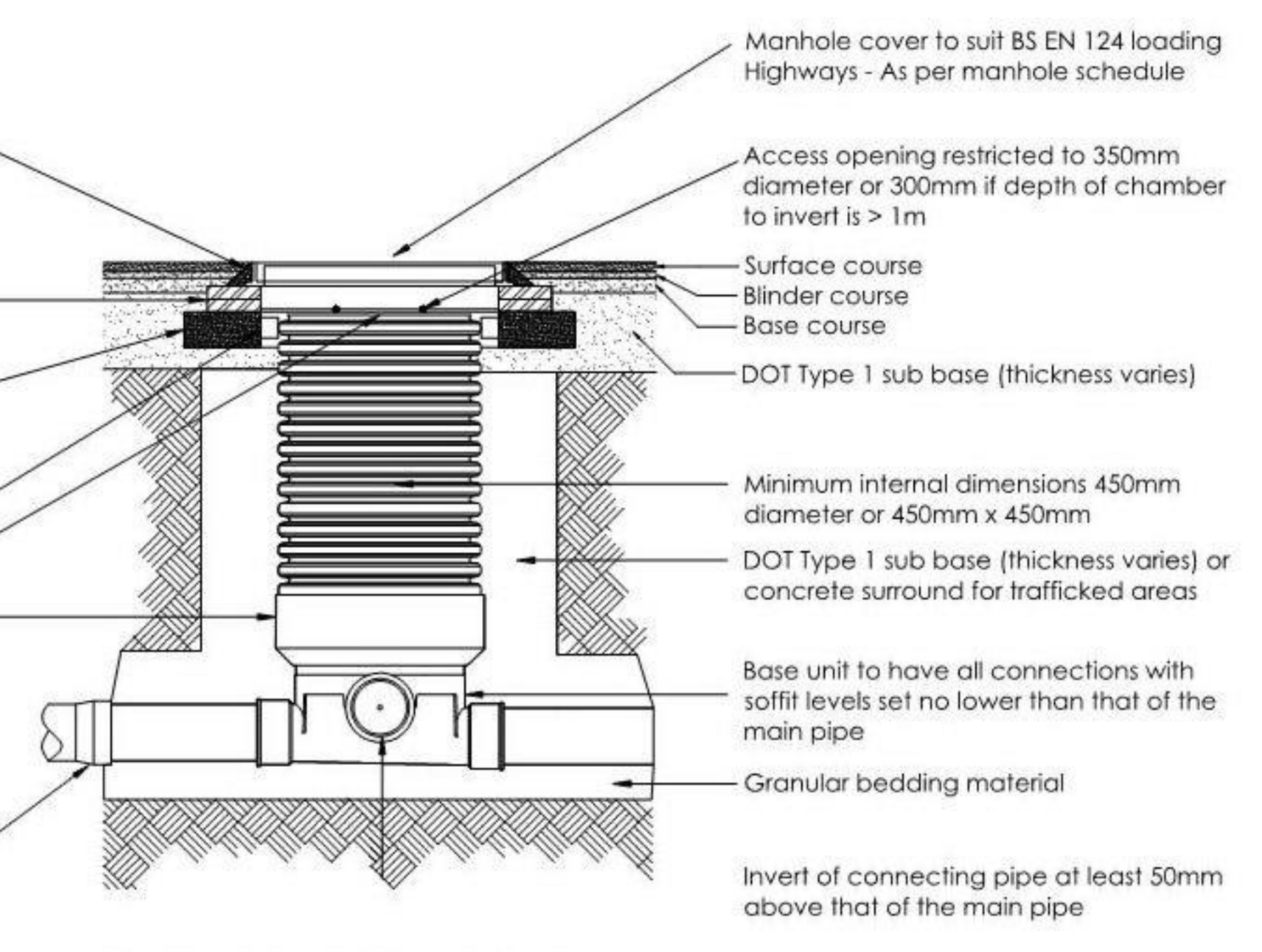
Typical Silt Trap Scale 1:20



Type S ACO Channel Car Park Scale 1:20



Mini Access Chamber & PPIC Installation Details Scale 1:10



Typical Inspection Chamber Max. 3m Deep Non Entry Scale 1:20

Extract from Table A2 WIS 4-08-02

Processed granular bedding & siltfill materials for flexible pipes

Pipe nominal bore (mm) (see note D)	Nominal Maximum particle size (mm)	Materials specified in British Standards (see note A)
100	10	10mm nominal single size
Over 100 to 150	15	10 or 14mm nominal single size or 14mm to 5mm graded
Over 150 to 300	20	10-14mm or 20mm nominal single size or 14-5mm graded or 20-5mm graded
Over 300 to 500	20	14 or 20mm nominal single size or 14-5mm graded or 20-5mm graded
Over 500	40	14 or 20mm or 40mm nominal single size or 14-5mm graded or 20-5mm graded or 40-5mm graded

- Notes:
- Processed granular materials to include aggregates and air cooled blast furnace slag to BS EN 12620:220 + A1:2008 and lightweight aggregates to BS EN 13101:2002.
 -
 - For the purpose of this table, PE pipe of 630mm OD can be regarded as having nominal bores of over 550mm, irrespective of wall thickness.
 - Nominal bore is used in preference to DN because of the different nominal size classifications for flexible pipes.

Minimum Recommended Trench Widths for Structured Wall Pipes in Poor Ground Conditions.

Native soil modulus between 3 & 4 MPA
Typical soil Classifications: Very loose gravel, loose sand, medium dense clayey silty sand, firm clay

Nominal pipe diameter (mm)	150	225	300	375	450	525	600	750	900
Minimum trench width (mm)*	450	525	600	750	900	1050	1200	1500	1800

* A vertical trench face has been assumed to allow a modulus of 7MPa to be achieved for the pipe bedding and siltfill material.

Other assumed values:
Depth of cover = 6m (max)
Traffic loading = main road
Pipe stiffness = S48

Note: Where the native soil modulus is below 3MPa or the depth of cover exceeds 6m, guidance should be sought from the pipe manufacturer regarding structural design and installation details.

GENERAL NOTES:

- COPYRIGHT IN THIS DOCUMENT BELONGS TO FRDS LTD & ALL RIGHTS IN IT ARE RESERVED BY THE OWNER.
- NO PART OF THIS DRAWING MAY BE COPIED, TRANSFERRED, OR MADE AVAILABLE TO USERS OTHER THAN THE ORIGINAL RECIPIENT, INCLUDING ELECTRONICALLY, WITHOUT PRIOR PERMISSION FROM FRDS LTD.
- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS & ENGINEERS DRAWINGS & SPECIFICATIONS.
- ALL DIMENSIONS ARE SHOWN IN MILLIMETRES UNLESS OTHERWISE STATED.
- NO DIMENSIONS TO BE SCALED FROM THIS DRAWING.
- THE LOCATION AND LEVELS OF EXISTING DRAINAGE PIPES AND CULVERTS MUST BE CHECKED ON-SITE PRIOR TO CONSTRUCTION.
- PROPOSED FINISHED LEVELS HAVE ONLY BEEN ASSUMED AND SHOULD BE FINALISED BY A CIVIL ENGINEER.
- POSITION OF RAINWATER DOWN PIPES TO BE CONFIRMED BY THE ARCHITECT.
- FLOATATION CALCULATIONS OF ANY ATTENUATION STRUCTURES SHOULD BE PROVIDED BY A CIVIL ENGINEER OR MANUFACTURE.

SURFACE WATER ATTENUATION

GEO-CELLULAR SHALLOW ATTENUATION
AREA = 46.8m²
DEPTH OF CRATE = 0.5m
IL = 32.340
COVER = 0.500m
CRATES TO BE SUITABLE FOR TRAFFICKED AREAS

BY PASS INTERCEPTOR

CONNECTION TO ASDA INFRASTRUCTURE WHICH ALREADY PASSES THROUGH A BYPASS SEPARATOR

FLOW CONTROL DETAILS

VORTEX FLOW CONTROL
DESIGN DEPTH = 0.700m
DISCHARGE RATE = 19.6L/S
CHAMBER = 1200Q

CHAMBER DETAILS TO BE SPECIFIED BY MANUFACTURE

PROPOSED DISCHARGE RATES

1 IN 1 YEAR + 20% CLIMATE CHANGE EVENT = 13.0L/S
1 IN 30 YEAR + 20% CLIMATE CHANGE EVENT = 19.3L/S
1 IN 100 YEAR + 20% CLIMATE CHANGE EVENT = 19.6L/S

REVISION	COMMENT	CLIENT	DATE	BY
		EURO GARAGES	05/02/2020	
		PROJECT: DRIVE THROUGH COFFEE SHOP ASDA HAVANT	DRAWN BY: CV	
		DRAWING TITLE: TYPICAL DRAINAGE DETAILS	SCALE: AS SHOWN	
		DRAWING REFERENCE: 2020-EG10-02	SIZE: A0	
			REVISION:	



FLOOD RISK AND DRAINAGE SOLUTIONS LTD
144 New Lane, Oswaldtwistle, Lancashire, B83 9JW
WWW.FLOODRISK-AND DRAINAGE.CO.UK
TEL: 07961 47330

Modelled Surface Water Network Simulation Report (Normal Conditions)

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	1	Maximum Rainfall (mm/hr)	150.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	20.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.400	Preferred Cover Depth (m)	0.500
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	4.00	Enforce best practice design rules	x

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	20.000	100.0	150	Circular	33.515	32.865	0.500	33.465	32.665	0.650
1.001	13.300	100.8	150	Circular	33.465	32.665	0.650	33.465	32.533	0.782
2.000	3.000	10.6	150	Circular	33.465	32.815	0.500	33.465	32.533	0.782
1.002	1.500	12.7	225	Circular	33.465	32.458	0.782	33.340	32.340	0.775
3.000	19.300	169.3	225	Circular	33.515	32.644	0.646	33.465	32.530	0.710
3.001	2.000	10.5	225	Circular	33.465	32.530	0.710	33.340	32.340	0.775
1.003	2.300	164.3	225	Circular	33.340	32.340	0.775	33.755	32.326	1.204
1.004	5.000	172.4	225	Circular	33.755	32.326	1.204	33.630	32.297	1.108

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	S1	600	Manhole	Adoptable	S2	600	Manhole	Adoptable
1.001	S2	600	Manhole	Adoptable	S4	600	Manhole	Adoptable
2.000	S3	600	Manhole	Adoptable	S4	600	Manhole	Adoptable
1.002	S4	600	Manhole	Adoptable	TANK	600	Manhole	Adoptable
3.000	S5	600	Manhole	Adoptable	S6	600	Manhole	Adoptable
3.001	S6	600	Manhole	Adoptable	TANK	600	Manhole	Adoptable
1.003	TANK	600	Manhole	Adoptable	S7	1200	Manhole	Adoptable
1.004	S7	1200	Manhole	Adoptable	S8	1200	Manhole	Adoptable

Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S1	33.515	0.650	600				
				0	1.000	32.865	150
S2	33.465	0.800	600		1	1.000	32.665
				0	1.001	32.665	150
S3	33.465	0.650	600				
				0	2.000	32.815	150
S4	33.465	1.007	600		1	2.000	32.533
				2	1.001	32.533	150
				0	1.002	32.458	225

Manhole Schedule

Node	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
S5	33.515	0.871	600		0	3.000	32.644 225
S6	33.465	0.935	600		1	3.000	32.530 225
TANK	33.340	1.000	600		0	3.001	32.530 225
					1	3.001	32.340 225
					2	1.002	32.340 225
					0	1.003	32.340 225
S7	33.755	1.429	1200		1	1.003	32.326 225
					0	1.004	32.326 225
S8	33.630	1.333	1200		1	1.004	32.297 225

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	20.000	Drain Down Time (mins)	240
Ratio-R	0.400	Additional Storage (m ³ /ha)	20.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	20	0	0
30	20	0	0
100	20	0	0

Node S7 Online ACO Q-Brake Control

Flap Valve	x	Design Depth (m)	0.700	Min Node Diameter (mm)	1200
Replaces Downstream Link	✓	Design Flow (l/s)	19.6	Orifice Diameter (mm)	0.190
Invert Level (m)	32.326	Min Outlet Diameter (m)	0.220		

Node TANK Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	32.340
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	14

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	46.8	0.0	0.500	46.8	0.0	0.501	0.0	0.0

Results for 1 year +20% CC Critical Storm Duration. Lowest mass balance: 99.88%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	10	32.893	0.028	1.4	0.0150	0.0000	OK
15 minute winter	S2	10	32.714	0.049	3.9	0.0311	0.0000	OK
15 minute summer	S3	10	32.875	0.060	13.6	0.1577	0.0000	OK
15 minute winter	S4	10	32.526	0.068	17.4	0.0193	0.0000	OK
15 minute winter	S5	10	32.697	0.053	4.3	0.0445	0.0000	OK
15 minute winter	S6	10	32.559	0.029	5.9	0.0140	0.0000	OK
15 minute winter	TANK	13	32.452	0.112	23.3	5.0264	0.0000	OK
15 minute winter	S7	13	32.434	0.108	13.0	0.1221	0.0000	OK
15 minute summer	S8	1	32.297	0.000	12.3	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S1	1.000	S2	1.4	0.387	0.079	0.0733	
15 minute winter	S2	1.001	S4	3.8	0.786	0.217	0.0651	
15 minute winter	S3	2.000	S4	13.6	2.295	0.248	0.0178	
15 minute winter	S4	1.002	TANK	17.4	1.929	0.119	0.0206	
15 minute winter	S5	3.000	S6	4.3	0.862	0.108	0.0985	
15 minute winter	S6	3.001	TANK	5.9	1.492	0.037	0.0219	
15 minute winter	TANK	1.003	S7	13.0	1.171	0.321	0.0444	
15 minute winter	S7	ACO Q-Brake	S8	13.0				10.0

Results for 30 year +20% CC Critical Storm Duration. Lowest mass balance: 99.88%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	10	32.910	0.045	3.5	0.0238	0.0000	OK
15 minute winter	S2	10	32.748	0.083	9.6	0.0526	0.0000	OK
15 minute winter	S3	10	32.928	0.113	33.4	0.2970	0.0000	OK
30 minute winter	S4	23	32.650	0.192	32.1	0.0543	0.0000	OK
15 minute winter	S5	10	32.728	0.084	10.5	0.0698	0.0000	OK
15 minute winter	S6	14	32.662	0.132	14.5	0.0627	0.0000	OK
30 minute winter	TANK	23	32.647	0.307	51.8	13.7474	0.0000	SURCHARGED
30 minute winter	S7	23	32.638	0.312	19.9	0.3526	0.0000	SURCHARGED
15 minute summer	S8	1	32.297	0.000	19.1	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S1	1.000	S2	3.5	0.490	0.197	0.1445	
15 minute winter	S2	1.001	S4	9.5	0.990	0.540	0.1357	
15 minute winter	S3	2.000	S4	33.4	2.711	0.608	0.0368	
15 minute winter	S4	1.002	TANK	42.9	2.090	0.293	0.0567	
15 minute winter	S5	3.000	S6	10.5	1.118	0.264	0.3026	
30 minute winter	S6	3.001	TANK	26.0	1.549	0.161	0.0592	
30 minute winter	TANK	1.003	S7	19.9	1.216	0.493	0.0915	
30 minute winter	S7	ACO Q-Brake	S8	19.3				32.5

Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 99.88%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	10	32.917	0.052	4.6	0.0275	0.0000	OK
30 minute winter	S2	23	32.787	0.122	9.4	0.0772	0.0000	OK
15 minute summer	S3	10	33.006	0.191	43.3	0.5002	0.0000	SURCHARGED
30 minute winter	S4	23	32.782	0.324	42.4	0.0916	0.0000	SURCHARGED
30 minute winter	S5	24	32.777	0.133	10.4	0.1108	0.0000	OK
30 minute winter	S6	24	32.777	0.247	21.8	0.1175	0.0000	SURCHARGED
30 minute winter	TANK	24	32.777	0.437	53.3	19.5460	0.0000	SURCHARGED
30 minute winter	S7	24	32.767	0.441	20.1	0.4991	0.0000	SURCHARGED
15 minute summer	S8	1	32.297	0.000	19.6	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	S1	1.000	S2	4.6	0.516	0.259	0.1790	
15 minute winter	S2	1.001	S4	12.9	0.993	0.730	0.2084	
15 minute summer	S3	2.000	S4	42.5	2.700	0.775	0.0528	
15 minute summer	S4	1.002	TANK	53.4	2.114	0.364	0.0597	
15 minute winter	S5	3.000	S6	14.0	1.187	0.351	0.5763	
30 minute summer	S6	3.001	TANK	28.3	1.577	0.175	0.0781	
30 minute summer	TANK	1.003	S7	20.8	1.167	0.513	0.0915	
15 minute winter	S7	ACO Q-Brake	S8	19.6				32.3