



1950

Project 6, MGS

Manchester

Drainage Strategy

1950-MGS-DP2-A180-RP-XX-9005

Rev P02

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Project 6, Manchester Grammar School

For

Manchester Grammar School and OMI Architects

June 2023

Ref : 1950-MGS-DP2-A180-RP-XX-9005

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B.Eng C.Eng MICE

Report approved by Darren Paine

B.Eng C.Eng MICE



Rev	Date	By	Comment
P01	06-06-2023	DEP	First Issue
P02	04-04-2024	DEP	Updated with Stage 4 Design

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Project 6 – Drainage Strategy

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1. Introduction

This report outlines the SuDS Surface Water Management Strategy for the reconfigured drainage to the Sixth Form Pavilion at Manchester Grammar School,

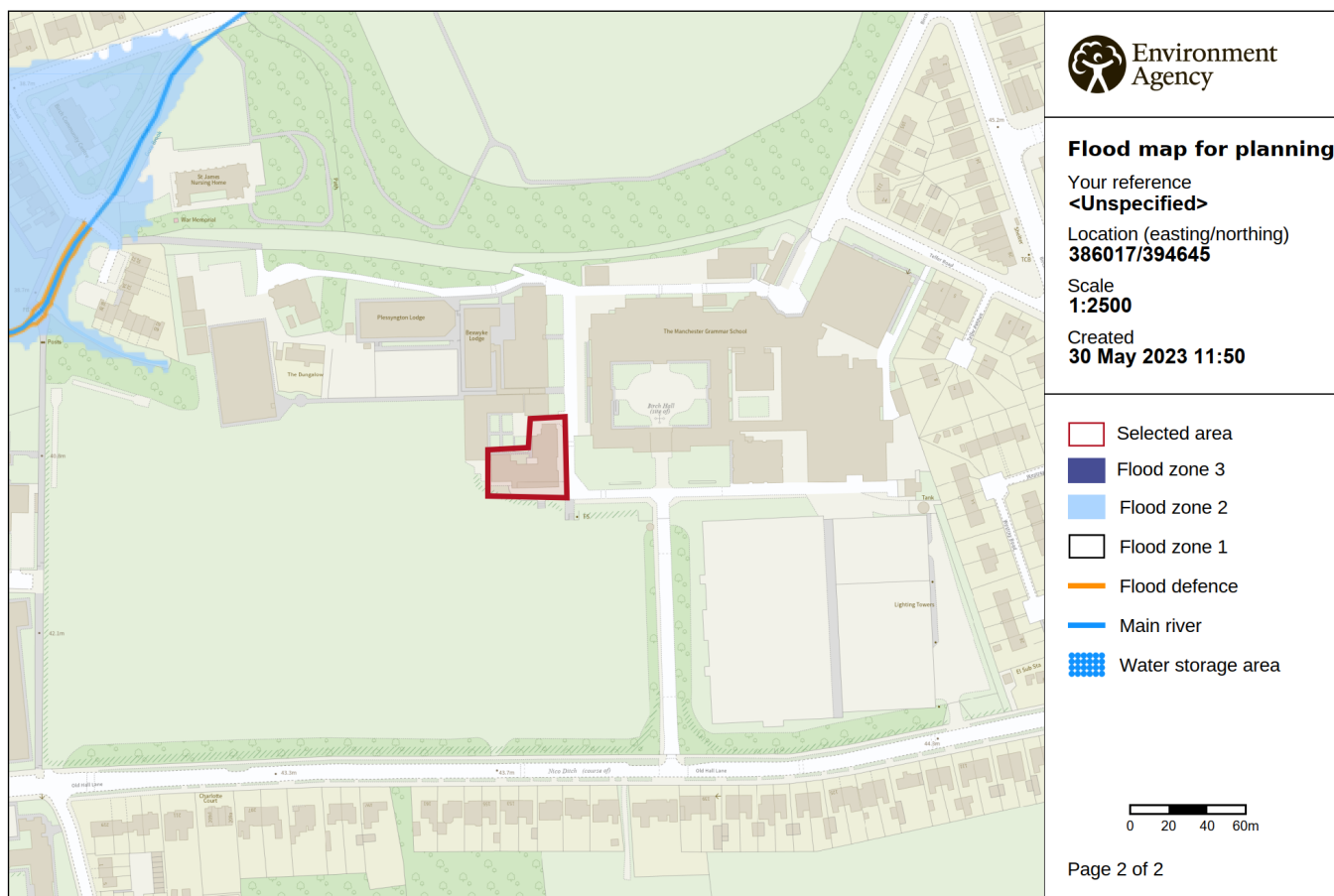
The existing surface water regime consists of:

- Infiltration to soft landscaping areas
- Gullies connected to the combined sewer for hard surfaced areas
- Rainwater from roofs connected to the combined sewer that forms part of the site wide drainage.

The proposed surface water system looks to reduce the current flow to the combined sewer utilising the following:

- Infiltration to soft landscaping areas
- Rainwater from new roofs connected to the combined sewer, utilising a storm water attenuation tank.

The site currently does not sit in an active flood zone.



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Figure 1 - Extract from EA Flood Map

2. Drainage Hierarchy

The National Planning Practice Guidance sets out The Hierarchy of Drainage to promote the use of Sustainable Drainage Systems, by aligning modern drainage systems with natural water processes. The aim of the Hierarchy of Drainage is to drain surface water run-off as sustainable, as reasonably practicable.

The increase in infrastructure and the use of traditional drainage networks (pipes and culverts) are resulting in downstream flooding and a deterioration in water quality of controlled waters, due to foul sewer overflow. Therefore, sustainable drainage systems aim to alleviate these problems by storing or re-using surface water at the source. This decreases the flow rates to watercourses and improves water quality.

2.1. The Hierarchy of Drainage

As stated in the National Planning Practice Guidance, the aim should be to discharge surface water run-off as high up the drainage hierarchy, as reasonably practicable:

- into the ground (infiltration).
- to a surface water body.
- to a surface water sewer, highway drain, or another drainage system.
- to a combined sewer.

2.1.1. Infiltration

A site investigation has been conducted and the results show that the underlying strata is mainly clay.

LK GROUP				LK CONSULT LTD		Site	Number
Broke out Tarmacadam with follow on window sample to 4.305mbgl				Eton Business Park, Eton Hill Road, Radcliffe, M26 2ZS Tel: 0161 763 7200 web: www.thelkgroup.com		Manchester Grammar School	BH1
Excavation Method		Dimensions		Ground Level (mOD)		Client	Job Number
		Location (Observed measurements)		Dates		The Manchester Grammar School	LKC 23 1086
				14/04/2023		Engineer	Sheet
						LKC	1/1
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend
0.10-0.30	D				(0.10)	MADE GROUND: TARMACADAM	
0.10-0.30	ES PID: 0.3ppm				(0.20)	MADE GROUND: Light brown sandy silty GRAVEL with rare coal fragments and clinker. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded comprising sandstone.	
0.30-1.10	D				0.30		
0.30-1.10	ES PID: 0.2ppm				(0.80)	MADE GROUND: Dark brown to black slightly gravelly sandy silty CLAY with occasional brick and coal fragments, rare clinker and ceramic. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded comprising sandstone.	
1.20-1.65	SPT N=12		2,2/2,3,3,4		1.10	Firm to very stiff consistency very high strength light brown slightly gravelly sandy silty CLAY with rare coal fragments. Sand is fine to coarse. Gravel is fine to coarse, sub-angular to sub-rounded comprising sandstone.	
1.20-1.50	ES PID: 0.3ppm		172, 147, 147, 147, 147/Av. 152.00			Clay becomes stiff very high strength at 1.50mbgl.	
1.50-2.00	D						
1.50	PP 152kPa						
2.00-2.45	SPT N=15		2,2/3,4,4,4				
2.50-3.00	D		196, 221, 196, 196, 221/Av. 206.00		(2.50)	Clay becomes very stiff very high strength at 2.50mbgl.	
2.50	PP 206kPa						
3.00-3.45	SPT N=32		6,6/6,7,8,11				

Figure 2 - Borehole Log Extract

The clay layer precludes the use of soak away systems on the site.

2.1.2. Surface Water Body

The nearest surface water body is 250m away on the other side of school buildings and private land and is excluded due to cost and practicality.



Figure 3 - Distance to Water Course

2.1.3. Connection to Surface Water Sewer.

There are no surface water sewers adjacent to the site.

2.1.4. Connection to a combined sewer

The existing drainage to the pavilion is part of a site wide drainage system that includes other buildings on the school site.

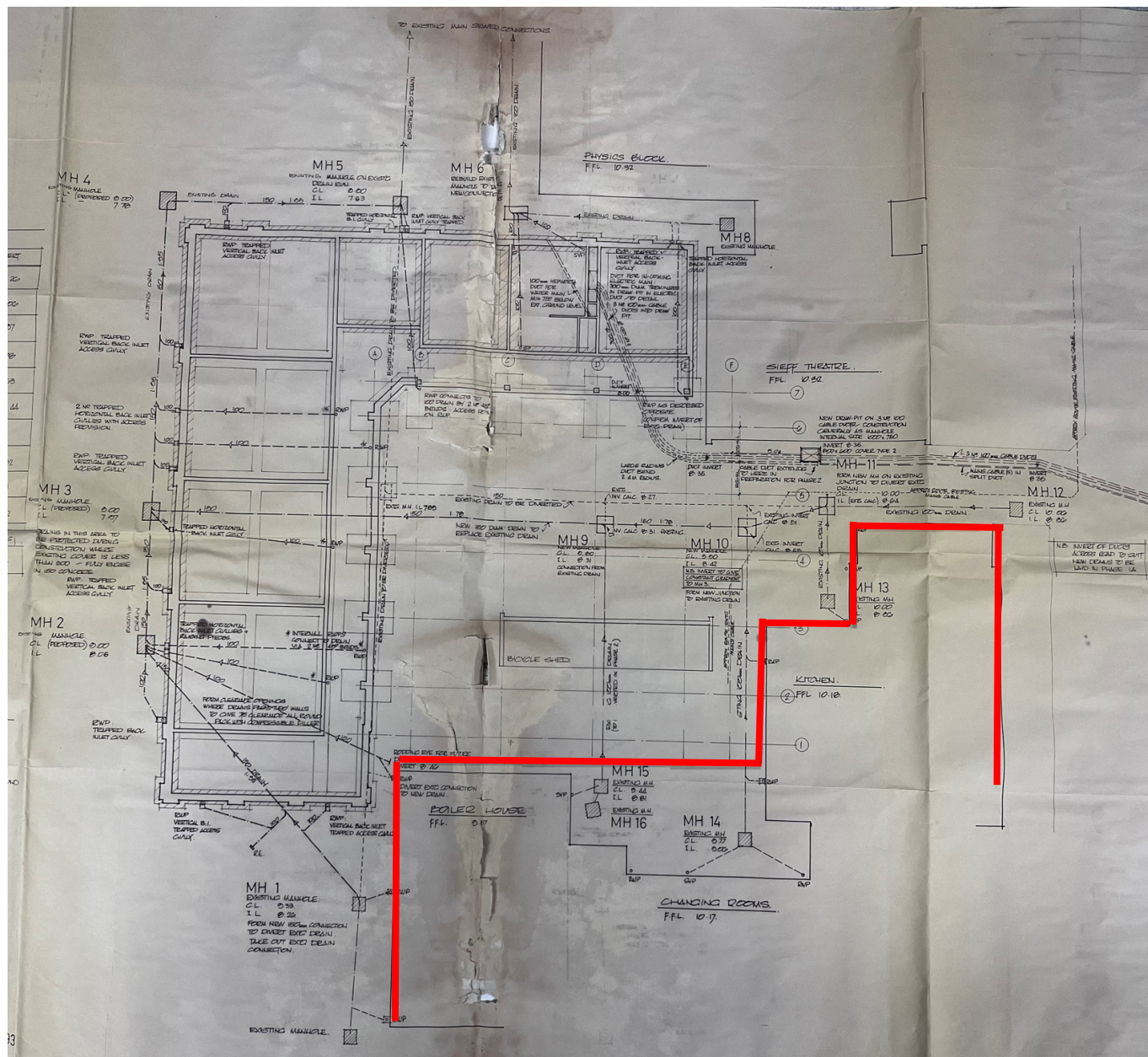


Figure 4 - Existing Drainage Plan - Existing Pavilion highlighted in Red.

2.2. Surface Water Proposal

Following the drainage hierarchy, the proposed surface water drainage is to be connected into the existing surface water system via two attenuation tanks that will provide storage to restrict the discharge flow to 5l/s. Refer to Appendix A for attenuation tank design.

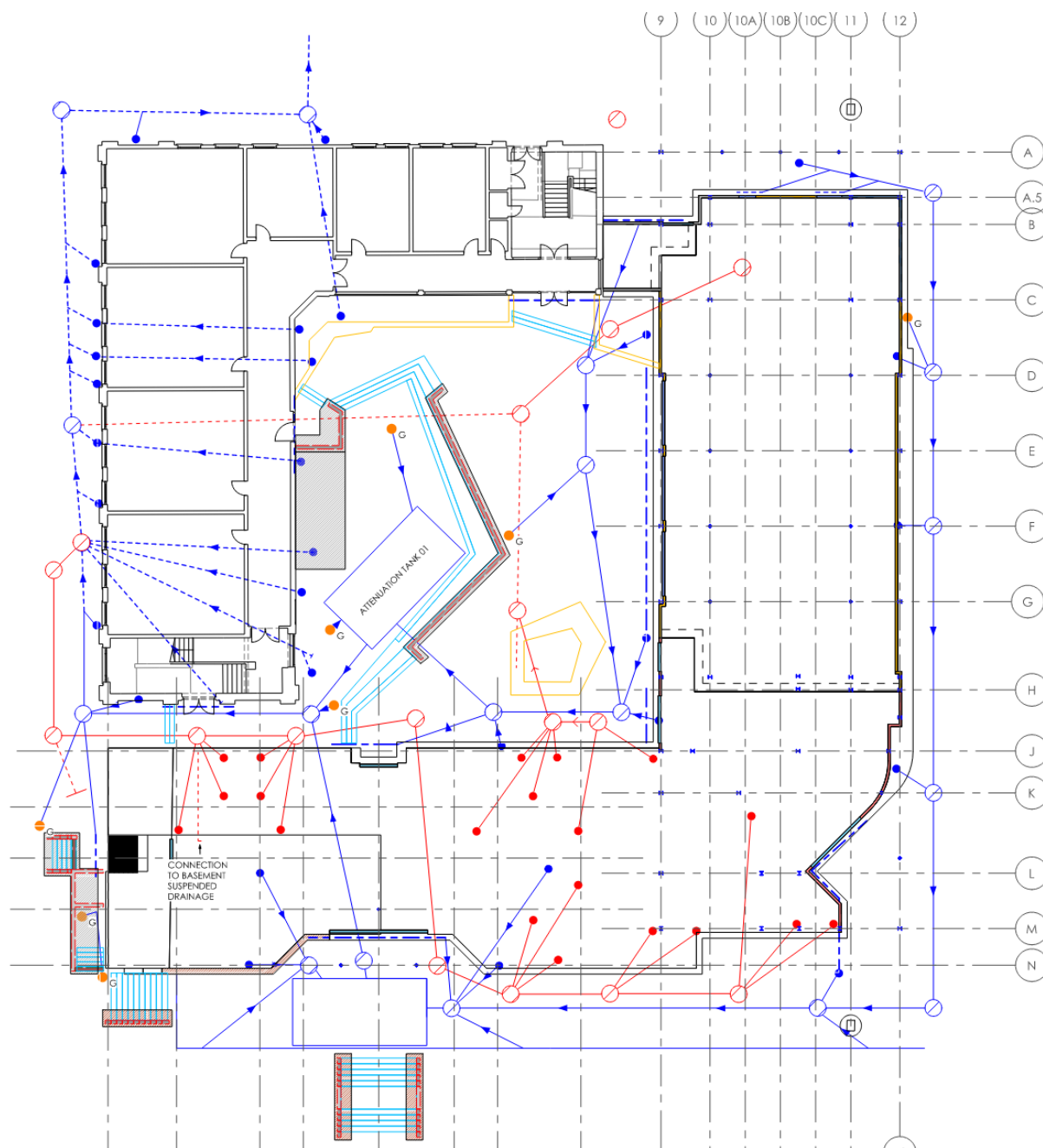


Figure 5 - Proposed Drainage Layout

The storage volume for each tank is 24m³ with an outflow limit of 2.5l/s for each tank. The total storage is 48m³ with a combined outflow of 5l/s.

3. Appendix A – Attenuation Tank Design

Drainage Details

Area	943m ²	Allowable Discharge	2.5 ltr/sec
Catchment Type	Roof + Hardstanding	Climate Change	40%
Area Reduction Factor	0.9	Effective Area	1188.18m ²
Soil Type	Silty sandy clay	Factor of Safety	1

Rainfall Data

R Value	0.33	Storm Return Period	1 in 30 years
M5-60	18	County	Greater Manchester

Time	Z1 Value	y mm	Z2 Value	p mm	Inflow	Outflow	Storage Volume
5min	0.35	6.3	1.43	9.01	10.7	0.75	9.95
10min	0.5	9	1.46	13.14	15.61	1.5	14.11
15min	0.61	10.98	1.47	16.14	19.18	2.25	16.93
30min	0.78	14.04	1.47	20.64	24.52	4.5	20.02
1hr	1	18	1.51	27.18	32.29	9	23.29
2hr	1.22	21.96	1.52	33.38	39.66	18	21.66
4hr	1.56	28.08	1.51	42.4	50.38	36	14.38
6hr	1.72	30.96	1.49	46.13	54.81	54	0.81
10hr	2	36	1.49	53.64	63.73	90	-26.27
24hr	2.6	46.8	1.45	67.86	80.63	216	-135.37
48hr	3.25	58.5	1.41	82.49	98.01	432	-333.99

Critical storm duration (hrs)	1hr
Required Storage Height	23.29m
Volume from Dimensions	24.32m ³

4. Appendix B – Drainage Drawings

NOTES:

DO NOT SCALE FROM THIS DRAWING

ALL DIMENSIONS ARE IN MILLIMETRES U.N.O.

ALL HEIGHTS ARE IN METRES ABOVE ORDNANCE DATUM U.N.O.

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KEY



SURFACE MANHOLE

DOWNPIPE



PROPOSED SURFACE DRAINPIPE.
ALL PIPEWORK TO BE 100mm
DIAMETER HEPWORTH CLAY (OR
SIMILAR) AT MINIMUM FALL OF
1:100



EXISTING SURFACE
DRAINPIPE



SURFACE MANHOLE

SVP



PROPOSED FOUL DRAINPIPE.
ALL PIPES TO BE 150mm
DIAMETER CLAYWARE AT A
MINIMUM FALL OF 1:80



EXISTING SURFACE
DRAIN PIPE

LEVEL 00 ISSUED - DRAINAGE

1 : 150

Drawing No.: 1950-MGS-DP2-G100-PL-XX-0051

Rev: T02

Client: MANCHESTER GRAMMAR SCHOOL

Project: PROJECT 6 - PAVILION

Title: PROPOSED DRAINAGE

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Scale of A1: As indicated
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Checked by: DEP
Date: 12/03/24

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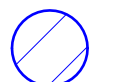
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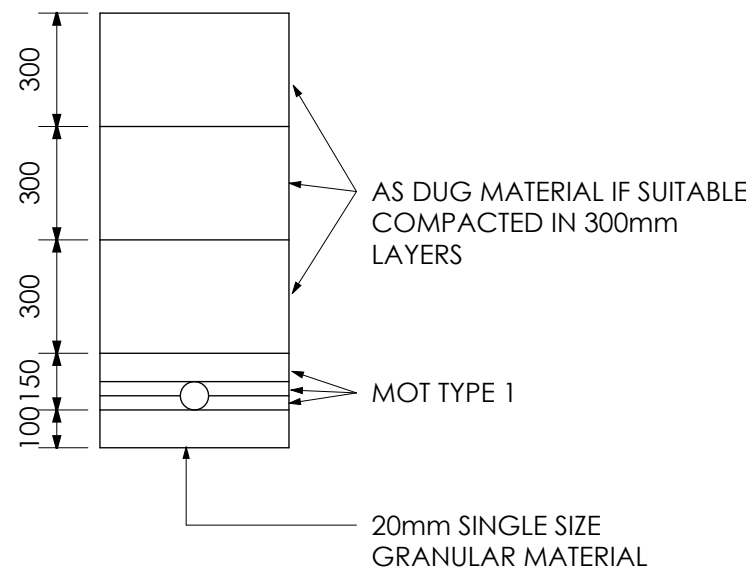
-  SURFACE MANHOLE
-  DOWNPIPE
-  PROPOSED SURFACE DRAINPIPE. ALL PIPEWORK TO BE 100mm diameter HEPWORTH CLAY (OR SIMILAR) AT MINIMUM FALL OF 1:100
-  EXISTING SURFACE DRAINPIPE

ATTENUATION TANKS BY WAVIN AQUACELL OR SIMILAR APPROVED.

EACH TANK IS TO BE FORMED FROM 128 AQUACELL UNITS (256 TOTAL)
MINIMUM DIMENSION OF TANK = 4m X 8m X 0.8m
MINIMUM COVER = 0.45m

Manhole Ref	Cover Level	Invert Level	Manhole Type	Cover Type	Notes
SWMH 01	43.260	42.660	PPIC	A15	Invert for attenuation tank = 41.7
SWMH 02	43.080	42.553	PPIC	A15	
SWMH 03	43.000	42.461	PPIC	A15	
SWMH 04	42.900	42.301	PPIC	A15	
SWMH 05	42.890	42.171	PPIC	A15	
SWMH 06	43.025	42.101	PPIC	A15	
SWMH 07	42.900	41.881	PPIC	A15	
SWMH 08	42.900	41.700	PPIC	A15	
SWMH 09	42.900	42.300	PPIC	A15	
SWMH 13	43.100	42.500	PPIC	A15	Invert Level for attenuation tank = 41.3
SWMH 14	43.100	42.440	PPIC	A15	
SWMH 15	43.100	42.315	PPIC	A15	
SWMH 16	43.100	42.245	PPIC	A15	
SWMH 10	42.440	41.250	PPIC	A15	Invert Level for attenuation tank = 41.3
SWMH 11	41.950	41.175	PPIC	A15	
Existing connection	41.900	41.050			

SWMH 10 IS THE FLOW CONTROL CHAMBER AND IS TO BE LIMITED TO 5l/s



-  DENOTES: DRAINAGE CHANNEL TO CONNECT INTO ADJACENT RWP LOCATIONS
-  DENOTES: GULLY SEE LANDSCAPE PLAN

BACKFILL DETAIL

Scale 1 : 20

Drawing No.: 1950-MGS-DP2-G100-PL-XX-0052

Rev: T02

Client: MANCHESTER GRAMMAR SCHOOL

Project: PROJECT 6 - PAVILION

Title: SURFACE WATER DRAINAGE

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KEY



SURFACE MANHOLE

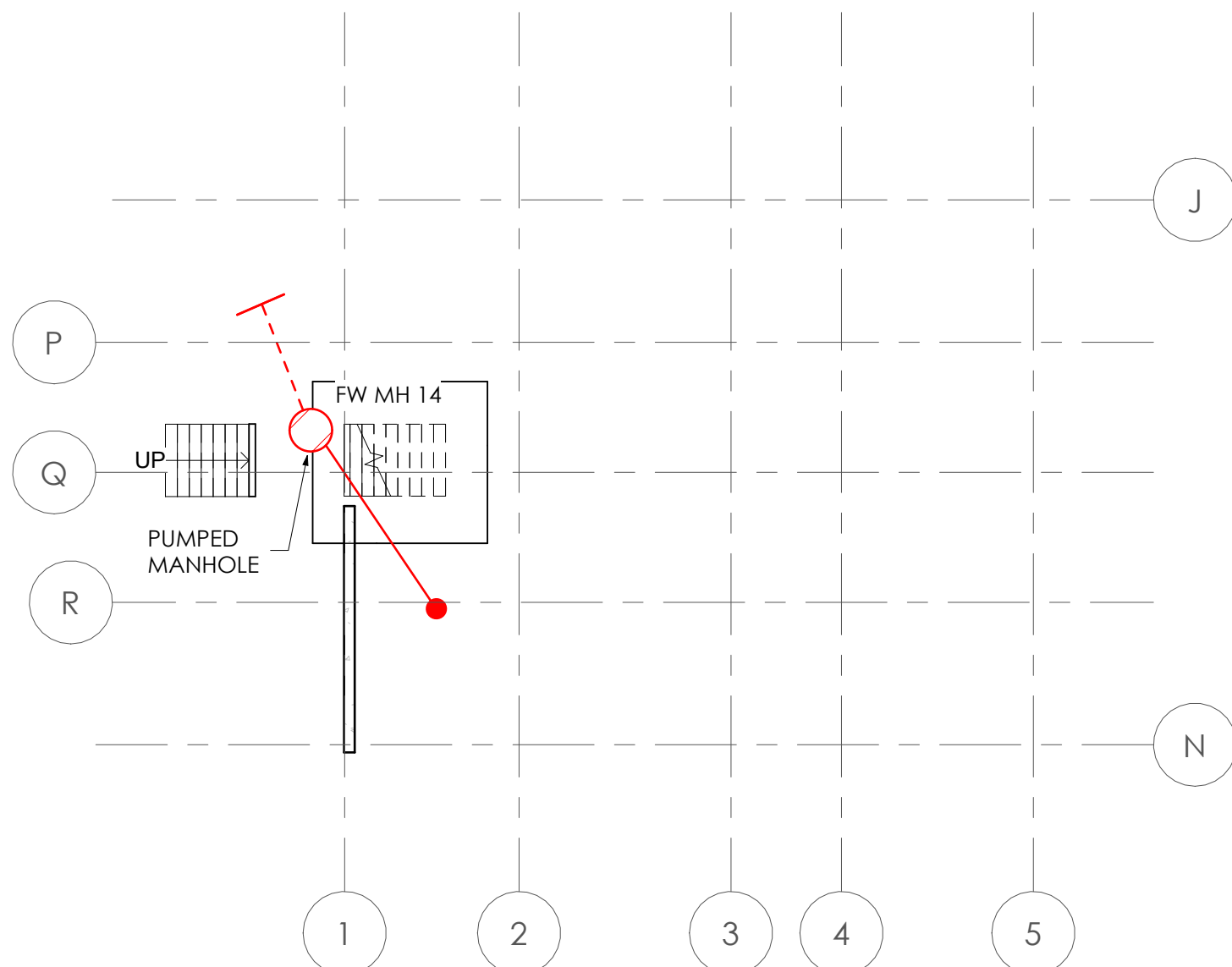


SVP

PROPOSED FOUL DRAINPIPE.
ALL PIPES TO BE 150mm
DIAMETER CLAYWARE AT A
MINIMUM FALL OF 1:80

EXISTING SURFACE
DRAINPIPE

Manhole Ref	Cover Level	Invert Level	Manhole Type	Cover Type	Notes
FWMH 01	43.100	42.500	PPIC	A15	New Manhole on Existing
Existing Manhole	43.080	41.300	PPIC	A15	
FWMH 02	43.100	42.500	PPIC	A15	
FWMH 03	43.100	42.466	PPIC	A15	
FWMH 04	43.100	41.800	PPIC	A15	
FWMH 05	42.900	42.300	PPIC	A15	
FWMH 06	42.900	42.204	PPIC	A15	
FWMH 07	42.900	42.129	PPIC	A15	
FWMH 08	42.900	42.054	PPIC	A15	
FWMH 09	43.100	41.879	PPIC	A16	
FWMH 10	42.440	41.789	PPIC	A17	
FWMH 11	42.360	41.714	PPIC	A18	
FWMH 12	41.950	41.298	PPIC	A19	
FWMH 13	41.950	41.175	PPIC	A20	
Existing connection	41.900	41.050			



FOUL DRAINAGE B1

1 : 150

Drawing No.: 1950-MGS-DP2-G100-PL-XX-0053

Rev: T02

Client: MANCHESTER GRAMMAR SCHOOL

Project: PROJECT 6 - PAVILION

Title: FOUL WATER DRAINAGE

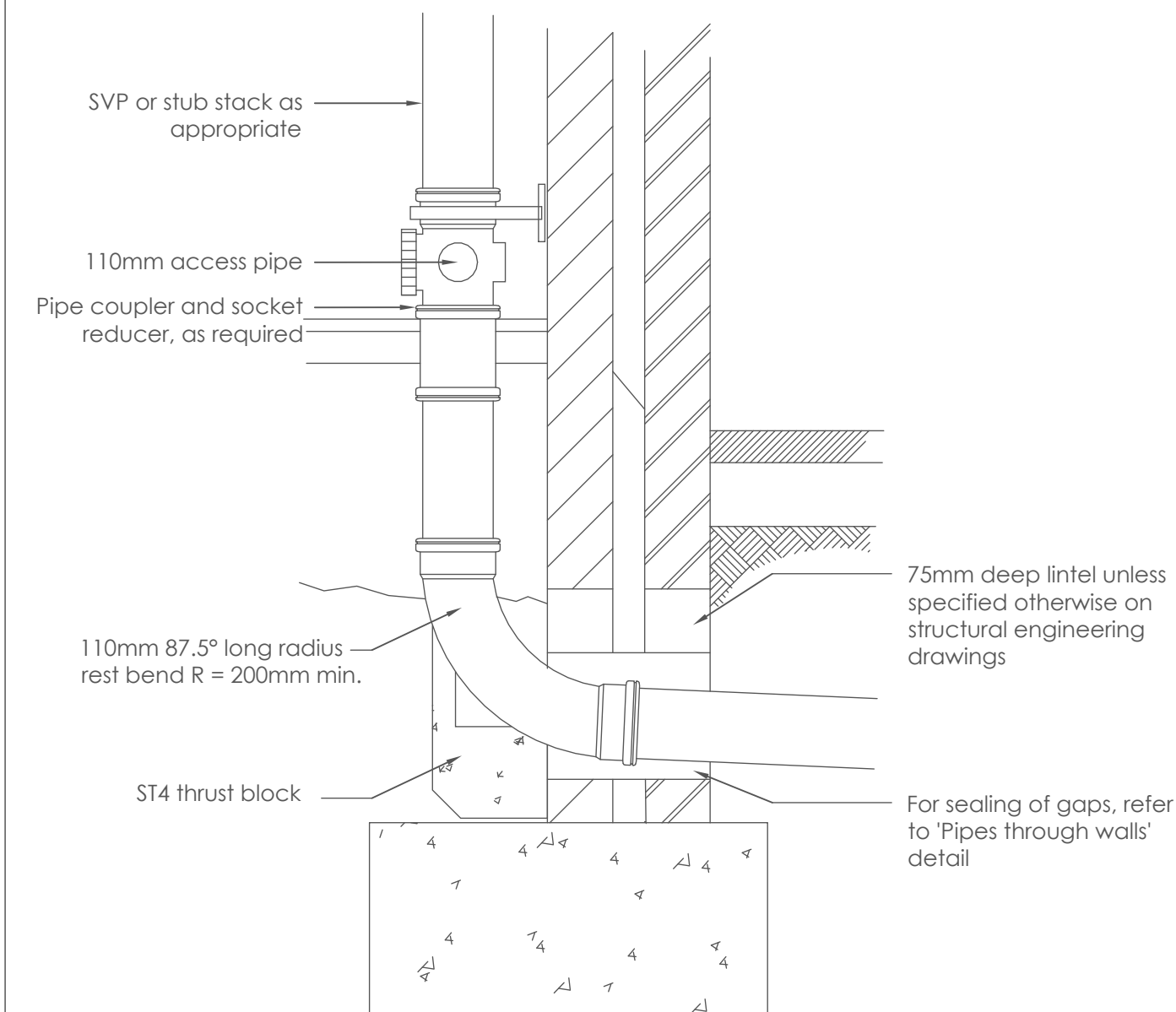
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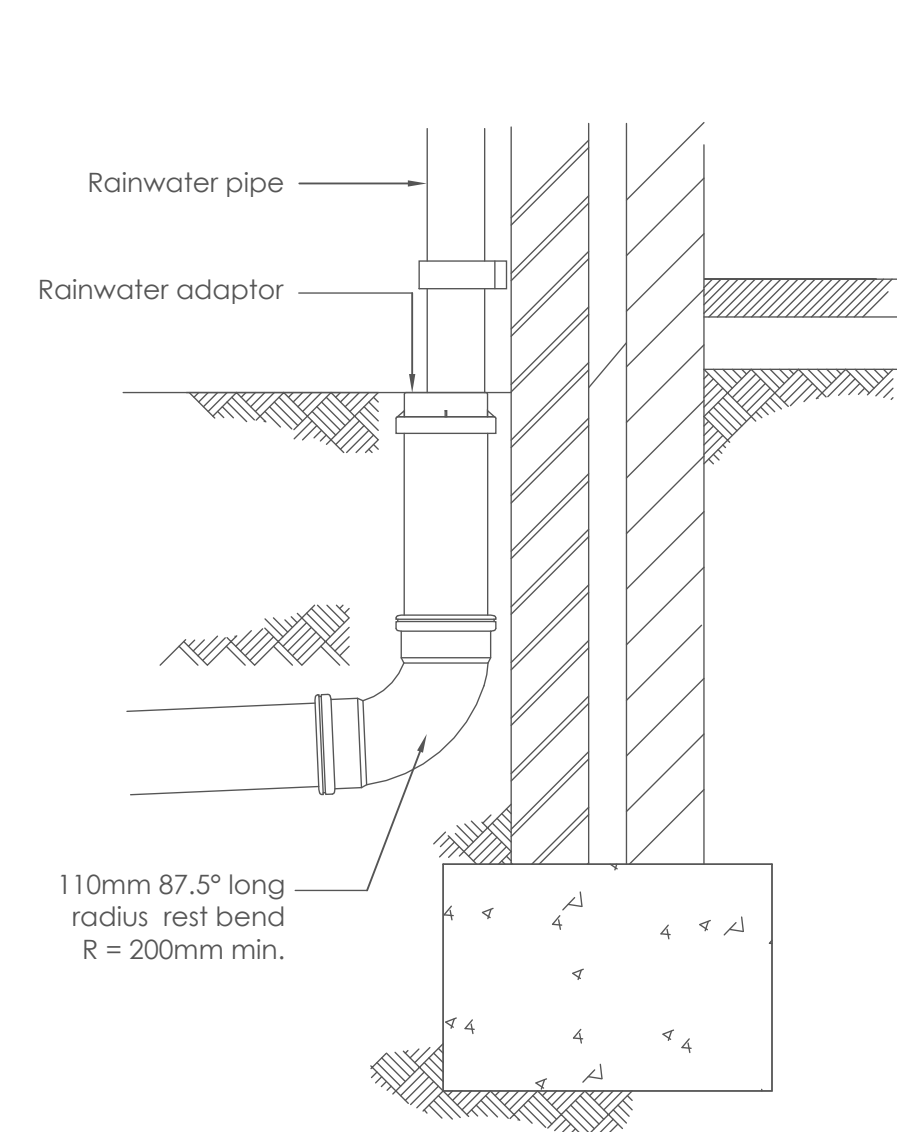
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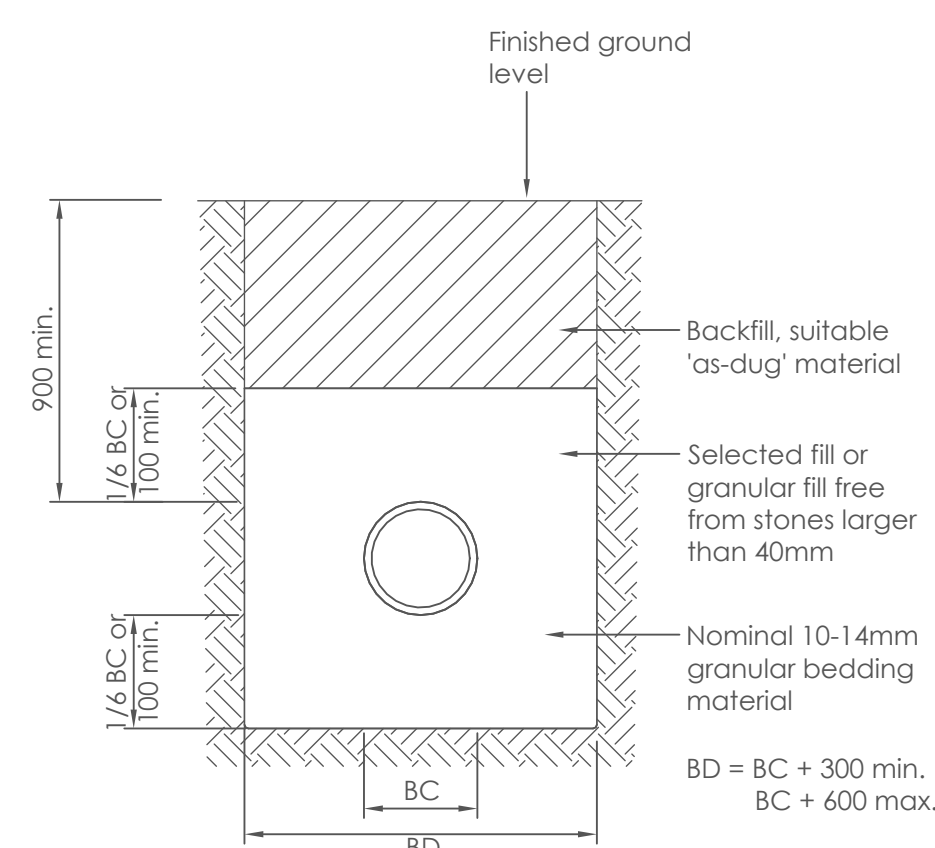
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Internal SVP/Stub Stack
Connection Through External
Wall to Drain
Scale 1:10



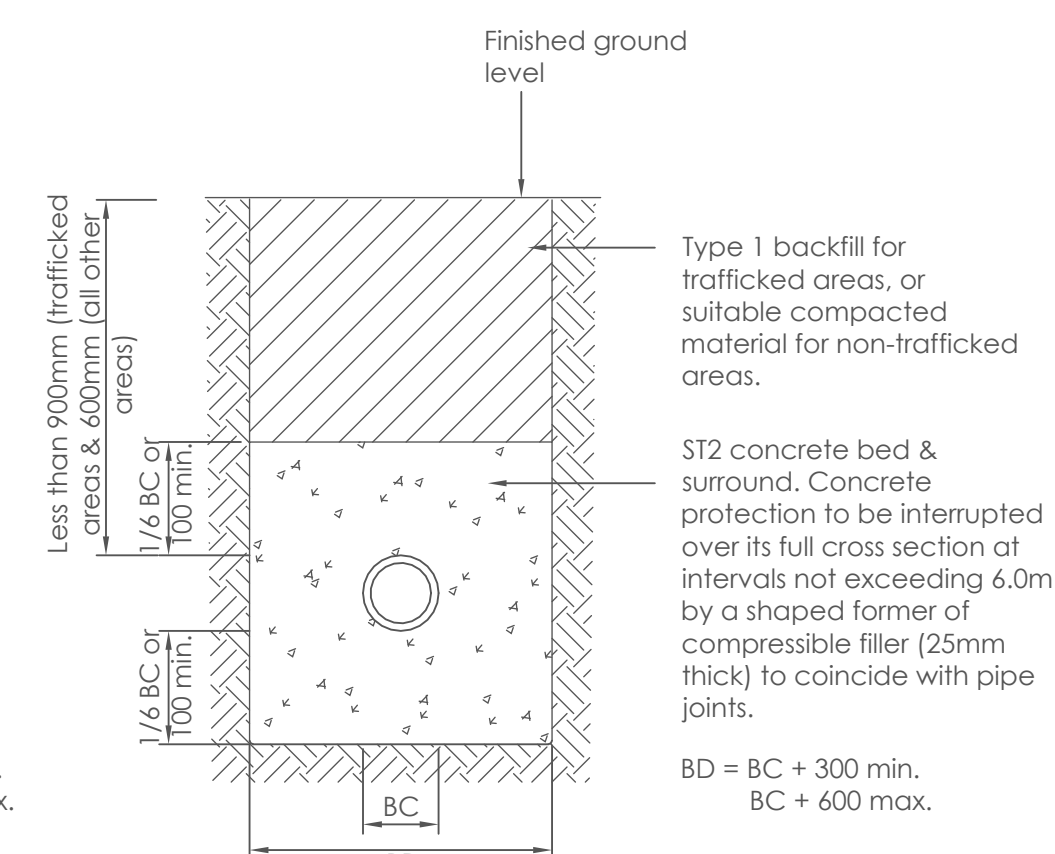
External RWP to Drain
Scale 1:10



Typical Trench Detail
Scale 1:10

NOTE: To be used where cover depth:

- >0.6m fields & gardens
- >0.9m lightly trafficked areas e.g. light roads & drives



Shallow Trench Detail
Scale 1:10

NOTE: To be used where cover depth:

- <0.6m fields & gardens
- <0.9m lightly trafficked areas e.g. light roads & drives

NOTES:

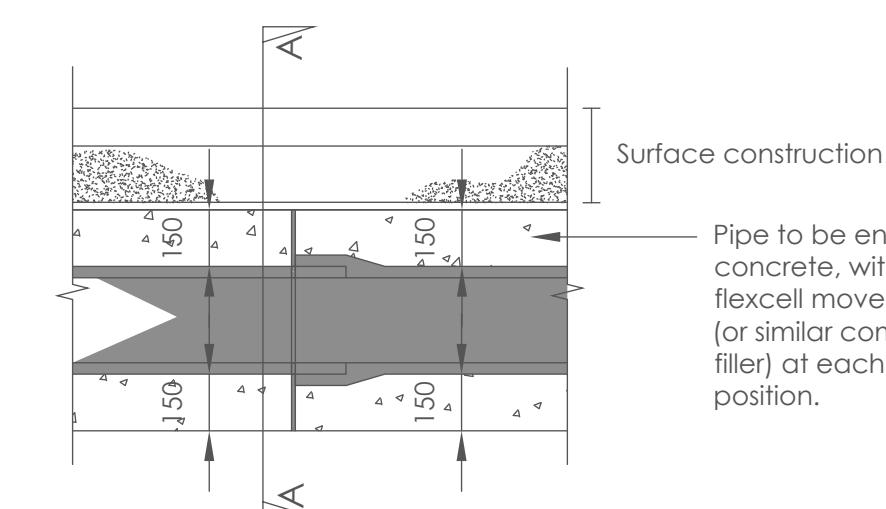
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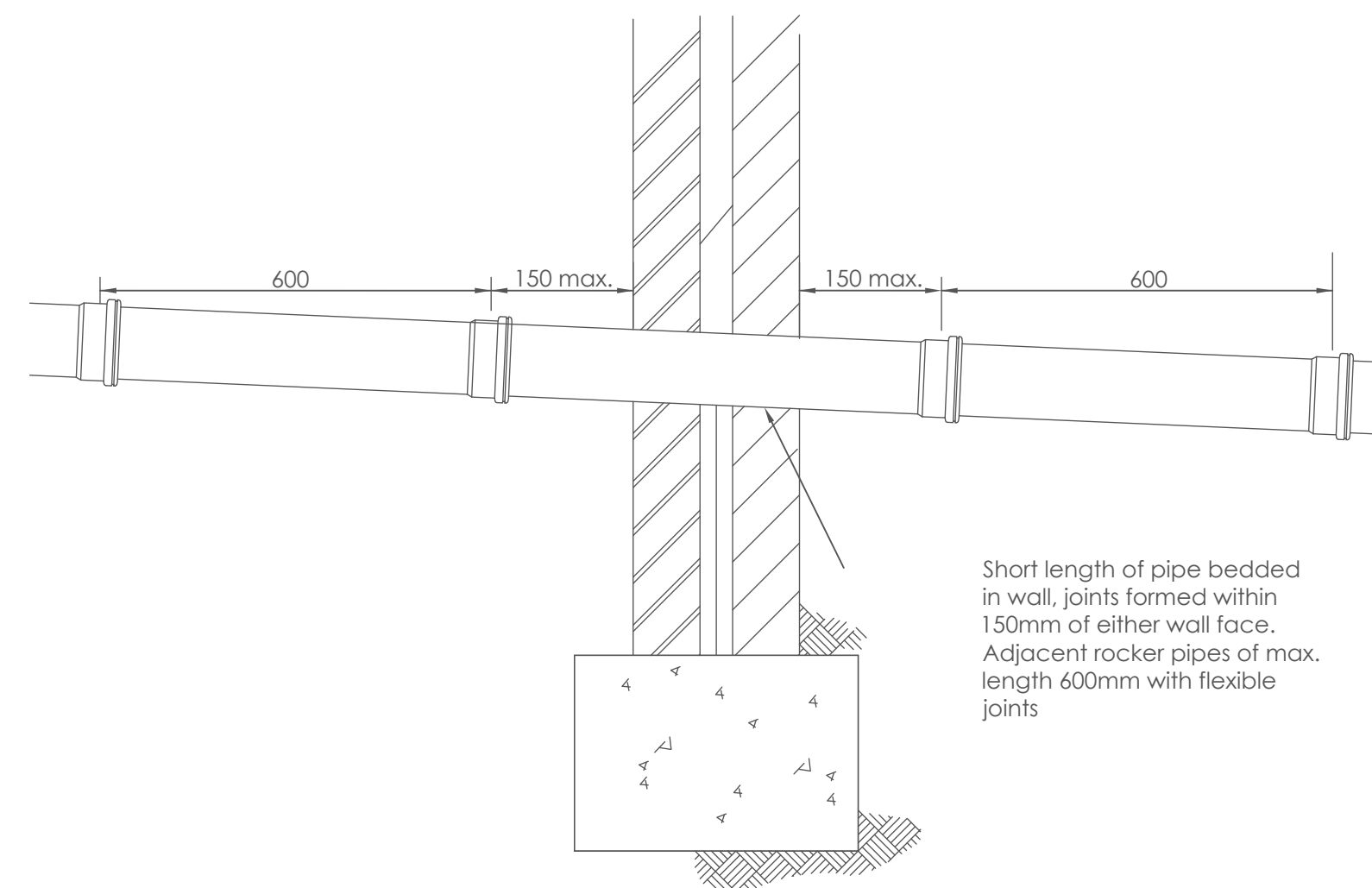
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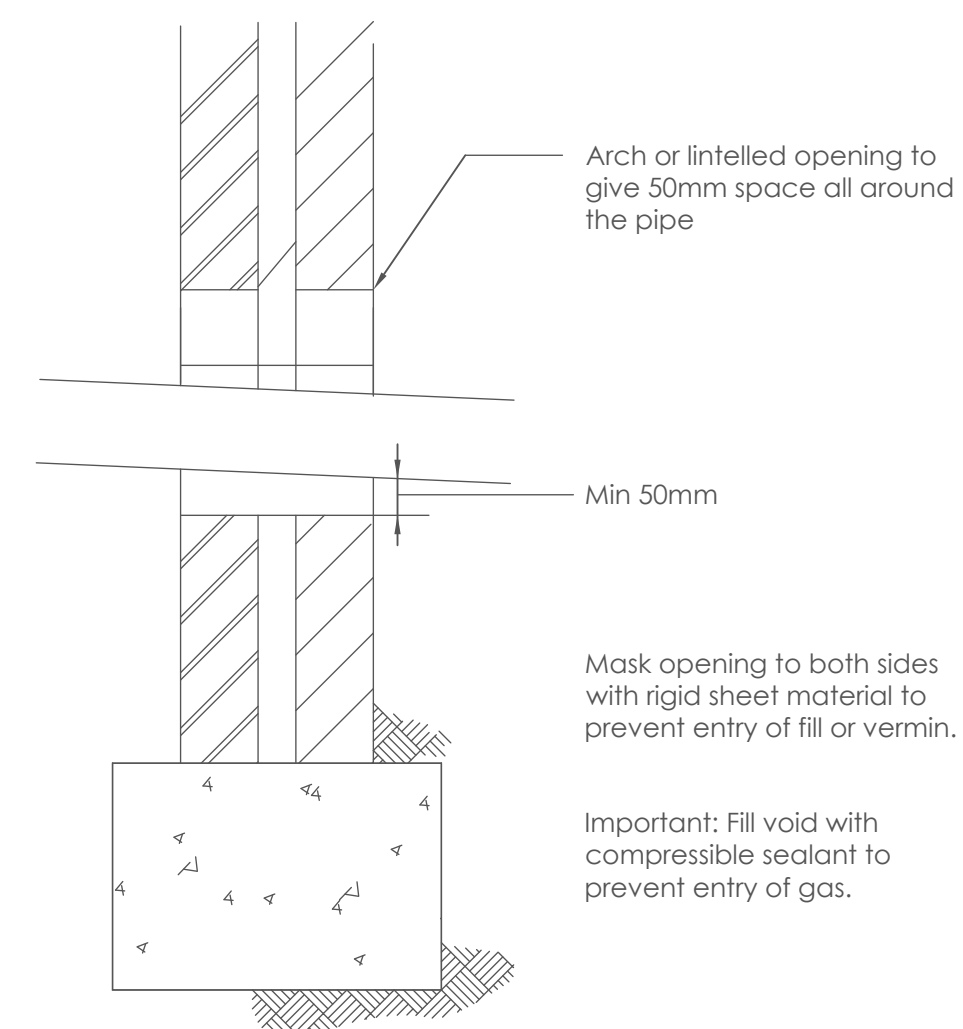
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Joints for Concrete
Encased Pipes
Scale 1:10

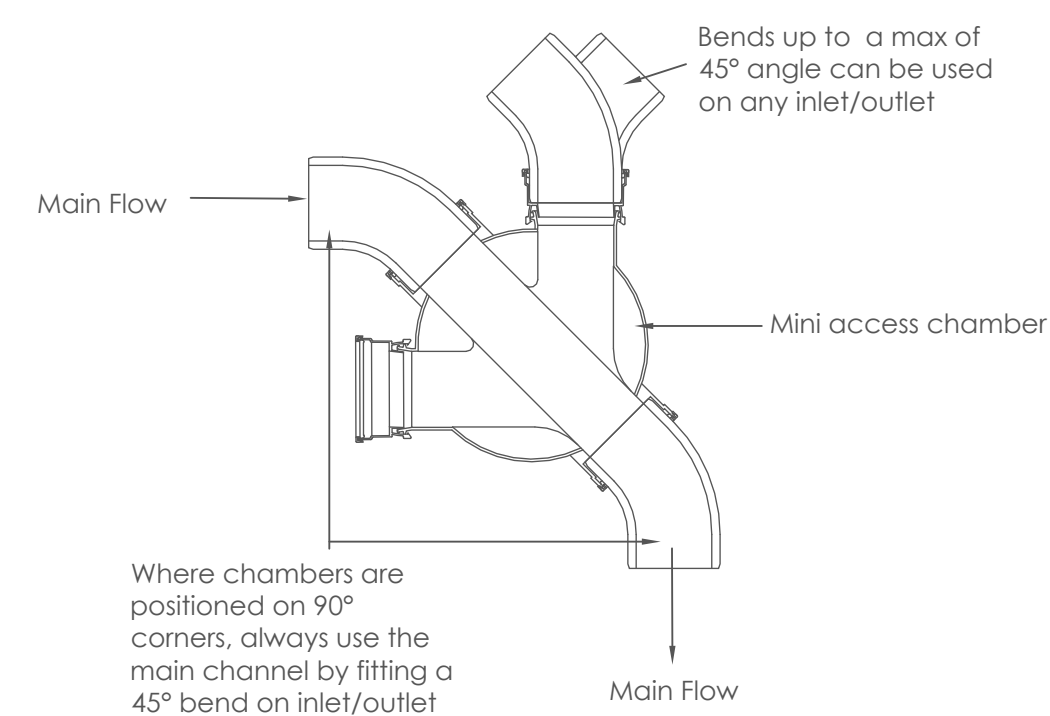
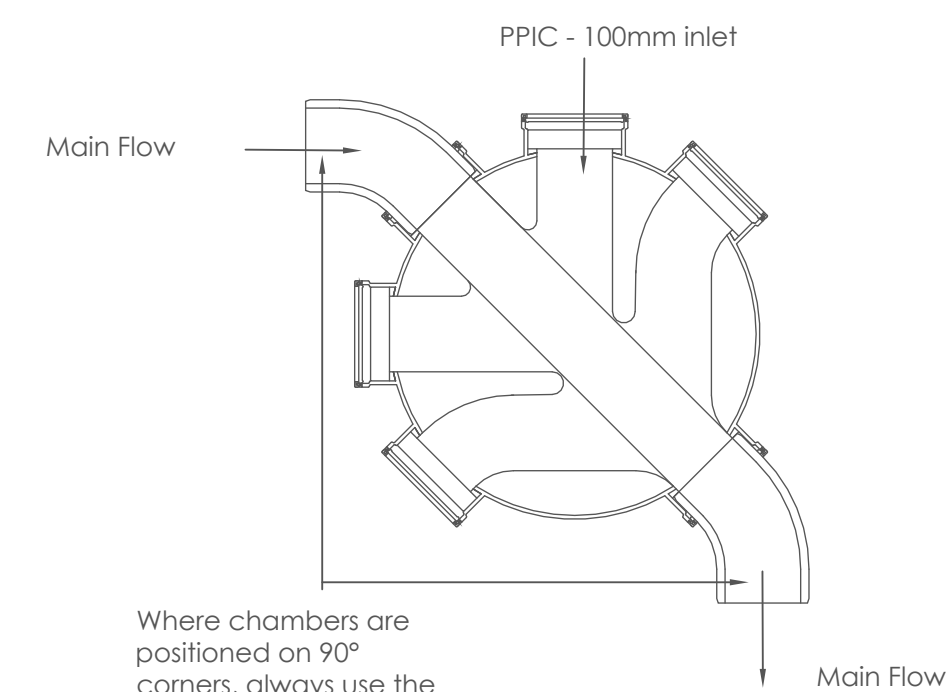
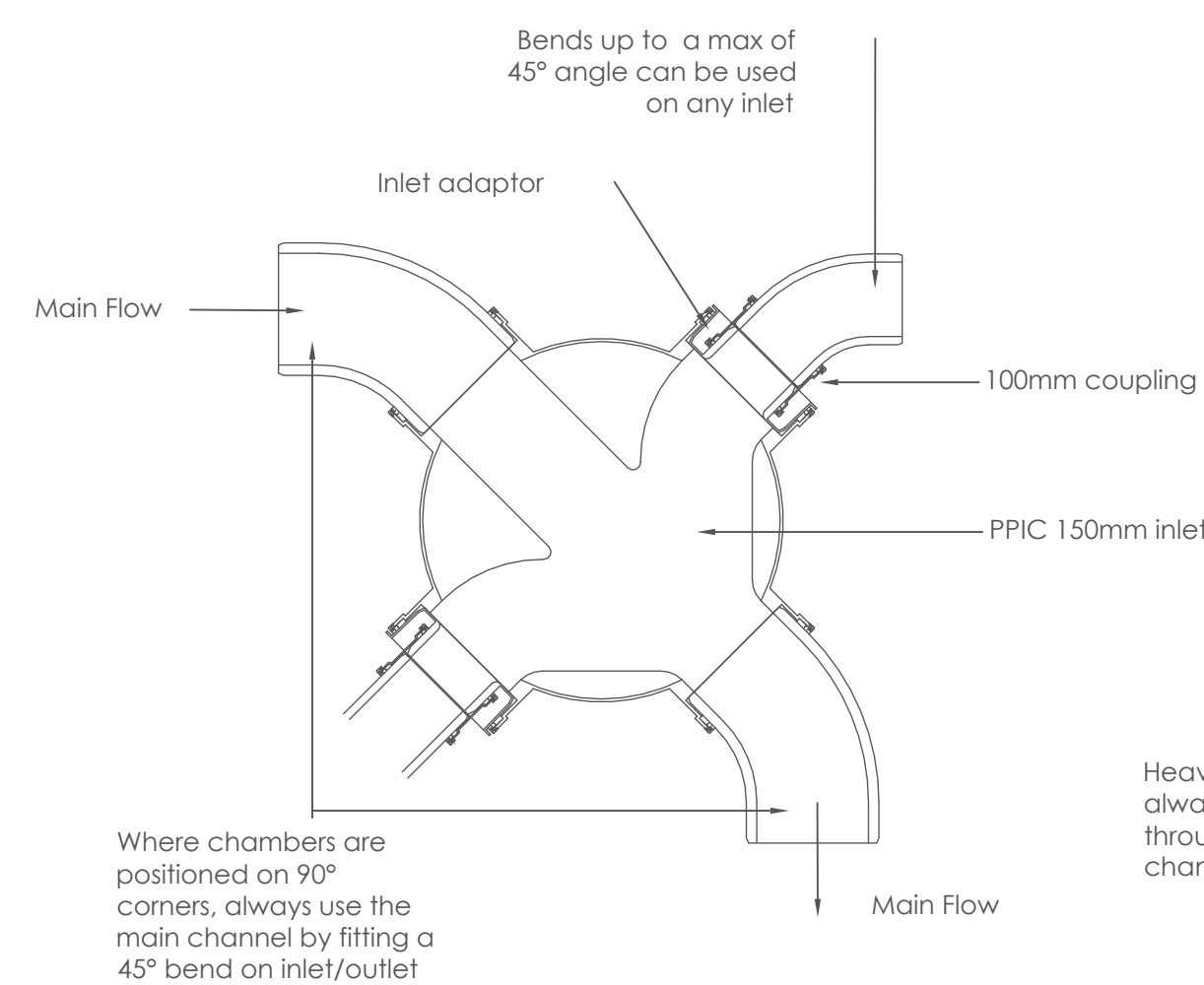
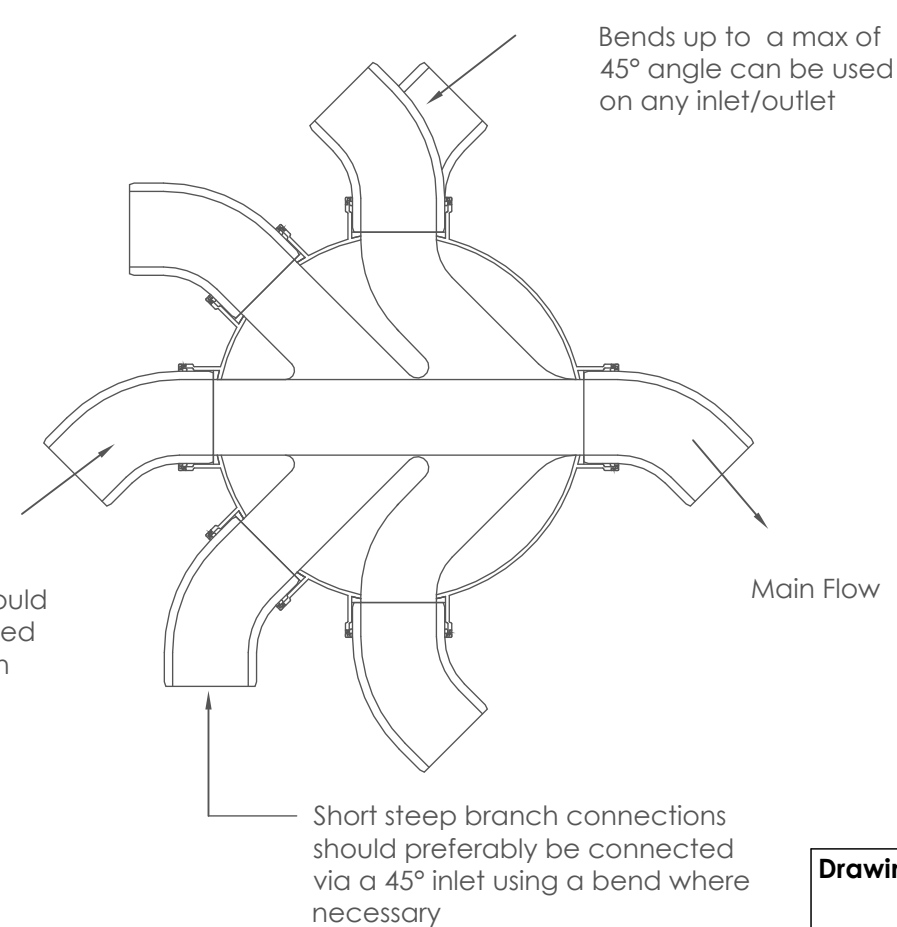


Pipes Through Walls (a)
Scale 1:10

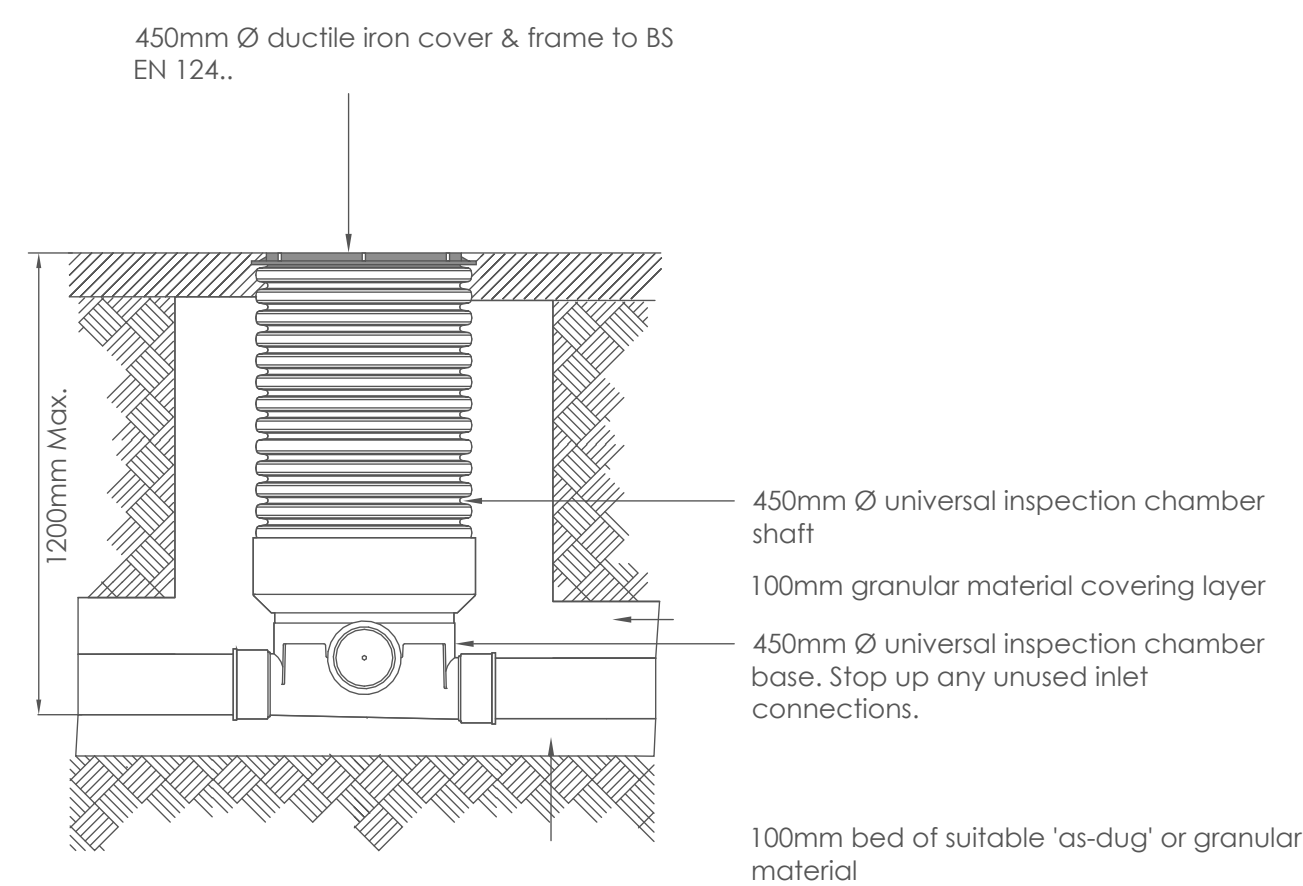


Pipes Through Walls (b)

Scale 1:10



Mini Access Chamber & PPIC Installation Details Scale 1:10



Typical Polypropylene Inspection Chamber
Max. 1.2m Deep
Scale 1:20

(for use in soft areas, driveways and parking bays only)

T01	Issued for Tender	QK/DEP	29-02-2022
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Drawing No.: 1950-MGS-DP2-G100-PL-XX-0054				Rev: T01	
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Project: PROJECT 6 - PAVILION				A DESIMONE Company contact@dpquared.net	
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