

Technical Note - 170188-MNP-ZZ-ZZ-RP-C-0001

Project:	KS DC Manchester	Job No:	223169
Subject:	Drainage conditions	Revision:	P01
Prepared by:	Andrew G Dushyanthan	Date:	11 th June 2024

This technical note has been prepared to provide a response with supporting documentation in relation to drainage condition 8 stated in the planning permission letter from Manchester City Council (Planning reference: 137424/FO/2023) for the proposed redevelopment at Simon House, Brownley Road, Manchester, M22 5RA.

Condition 8 - Non statutory Technical Standards

'No development hereby permitted shall be occupied until surface water drainage works have been implemented in accordance with Non-Statutory Technical Standards for Sustainable Drainage Systems (March 2015) or any subsequent replacements national standards and details that have been submitted to and approved in writing by the Local Planning Authority.'

Response:

- The sections below refer to the performance requirements stated in National Standard: DEFRA -Sustainable Drainage Systems: Non-Statutory technical standards for sustainable drainage systems (March 2015).

Standard/ Reference		Site Location
National Standards/ S1	Where the drainage system discharges to a surface water body that can accommodate uncontrolled surface water discharges without any impact on flood risk from that surface water body (e.g. the sea or a large estuary) the peak flow control standards (S2 and S3 below) and volume control technical standards (S4 and S6 below) need not apply.	Not applicable. It should be noted that there are no such surface water bodies within vicinity of the site and therefore standards S2, S3, S4 and S6 will always apply.
National Standards/ S2	For greenfield developments, the peak runoff rate from the development to any highway drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event should never exceed the peak greenfield runoff rate for the same event.	Not applicable. Not a greenfield development.
National Standards/ S3	For developments which were previously developed, the peak runoff rate from the development to any drain, sewer or surface water body for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event must be as close as reasonably practicable to the greenfield runoff rate	Compliant. The site is proposed drain to: - public sewer via flow control device at a discharge rate of 2.07l/s

Technical Note

	from the development for the same rainfall event, but should never exceed the rate of discharge from the development prior to redevelopment for that event	This is less than the calculated greenfield runoff rate of 4.42l/s (refer to FRA). Therefore, there is no increase in the rate of discharge from the existing condition
National Standards/ S4	Where reasonably practicable, for greenfield development, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6 hour rainfall event should never exceed the greenfield runoff volume for the same event.	Not applicable. Not a greenfield development.
National Standards/ S5	Where reasonably practicable, for developments which have been previously developed, the runoff volume from the development to any highway drain, sewer or surface water body in the 1 in 100 year, 6 hour rainfall event must be constrained to a value as close as is reasonably practicable to the greenfield runoff volume for the same event, but should never exceed the runoff volume from the development site prior to that development.	Compliant. The site is proposed drain to: - Existing discharge volume for 1in100 year, 6hour storm is 156.2m3, with the proposed volume at 56.2m3. - There is no increase in hardstanding area. - Cellular storage tank to accommodate runoff volume with proposed flow control.
National Standards/ S6	Where it is not reasonably practicable to constrain the volume of runoff to any drain, sewer or surface water body in accordance with S4 or S5 above, the runoff volume must be discharged at a rate that does not adversely affect flood risk	Compliant Surface Water to be discharged at a rate of 2.07l/s.
National Standards/ S7	The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur on any part of the site for a 1 in 30 year rainfall event	Compliant. MicroDrainage results show no flooding in the 1 in 30 year event.
National Standards/ S8	The drainage system must be designed so that, unless an area is designated to hold and/or convey water as part of the design, flooding does not occur during a 1 in 100 year rainfall event in any part of: a building (including a basement); or in any utility plant susceptible to water (e.g. pumping station or electricity substation) within the development	Compliant. MicroDrainage results show no flooding in the 1 in 100 year event +40% climate change, with flooding of less 1m3 at +45% climate change.
National Standards/ S9	The design of the site must ensure that, so far as is reasonably practicable, flows resulting from rainfall in excess of a 1 in 100 year rainfall event are managed in exceedance routes that minimise the risks to people and property.	Compliant. Majority of site area consists of building. Any overland flows will be contained within the site away from the building in extreme rainfall events.

Technical Note

Condition 8 - Informative

‘A finalized drainage layout showing all components, outfalls, levels and connectivity.’

Response:

- Refer to attached drainage strategy layout showing all proposed manholes, pipes, outfall connection and SuDS features.

‘Maximized integration of green SuDS components (utilizing infiltration or attenuation) if practicable.’

Response:

- Drainage strategy utilizes use of below ground attenuation tanks and french drains as per the details set out in the approved Flood Risk Assessment and Sustainable Drainage Strategy (SuDS) Report by Lyons O’Neill Structural Engineers. Also refer to attached drainage layout.

‘Details of surface water attenuation that offers a reduction in surface water runoff rate in line with the Manchester Trafford and Salford Strategic Flood Risk Assessment, i.e. at least a 50% reduction in runoff rate compared to the existing rates with the aim of reducing to the Greenfield runoff rates, as the site is located within Conurbation Core Critical Drainage Area.’

Response:

- The proposed surface water discharge rate of 2.07l/s is a significant reduction to the existing rates, as well as lower than the greenfield runoff rate of 4.42l/s. Refer to Table 7 of the Flood Risk Assessment for the betterment comparison.

‘An existing and proposed impermeable areas drawing to accompany all discharge rate calculations.’

Response:

- As stated in the FRA and SuDS report, the total application site has an area of 7572m². The proposed developed area is equivalent to 3480m², where there is no change in impermeable areas. All areas will be positively drained and hence discharged out of site.

‘Runoff volume in the 1 in 100 year, 6 hours rainfall shall be constrained to a value as close as is reasonable practicable to the greenfield runoff volume for the same event, but never to exceed the runoff volume from the development site prior to redevelopment.’

Response:

- Refer to attached Microdrainage calculations. Existing discharge volume for 1in100 year, 6hour storm is 156.2m³, with the proposed volume at 56.2m³.
- Proposed drainage network has been modelled for all storm events at 1 in 100 year storm event plus climate change, with proposed discharge below greenfield rates.

‘Evidence that the drainage system has been designed (unless an area is designated to hold and/or convey water as part of the design) so that flooding does not occur during a 1 in 100 year rainfall event with allowance for 45% climate change.’

Technical Note

Response:

- Refer to attached Microdrainage calculations. Proposed drainage network will cater for all storm events up to 1 in 100-year storm event, plus 40% climate change with no flooding. For 1 in 100 year storm event plus 45% climate change, minimal flooding of less than 1m³ is expected, which will be contained within the car park area with local ponding.

‘Assessment of overland flow routes for extreme events. Overland flow routes need to be designed to convey the flood water in a safe manner in the event of a blockage or exceedance of the proposed drainage system capacity including inlet structures. A layout with overland flow routes needs to be presented with appreciation of these overland flow routes with regards to the properties on site and adjacent properties off site.’

Response:

- Refer to attached overland flows drawings. Majority of site area consists of building and hence minimal overland flow will exist. Any overland flows will be contained within the site away from the building in extreme rainfall events.

‘Progression through the drainage hierarchy shall be evidence based and supported by site investigation. Results of ground investigation carried out under Building Research Establishment Digest 365. Site investigations should be undertaken in locations and at proposed depths of the proposed infiltration devices. Proposal of the attenuation that is achieving half emptying time within 24 hours. If no ground investigations are possible or infiltration is not feasible on site, evidence of alternative surface water disposal routes (as follows) is required.’

Response:

- With reference to GEA’s ground investigation report from the 15th August 2023, the site is underlain by superficial Glacial Till overlying the Bollin Mudstone Member. Boreholes have recorded topsoil to 0.5m depth beneath which was sandy silty clay. Below the clay is recorded laminated sandstone, siltstone and ‘greasy’ clays to the maximum depth of 16.4m. The nature of the geology suggests that soakage via infiltration will be very limited. This is confirmed within the report on section 6.5, where soakage testing measured very low soakage rates. Therefore, any infiltration techniques will be negligible.

‘Where surface water is connected to the public sewer, agreement in principle from United Utilities is required that there is adequate spare capacity in the existing system taking future development requirements into account. An email of acceptance of proposed flows and/or new connection will suffice.’

Response:

- Due to the proposed rates providing significant betterment to the existing rates, it is anticipated that capacity within the public sewers will be sufficient. An S106 application is currently in progress with the local water authority.

‘For sites where proposed development would cause pollution risk to surface water, evidence of pollution control measures (preferably through SuDS) is required.’

Response:

- Majority of the site area is the building roof area, with very low risk of oil pollution or contamination anticipated from these areas, and only roof water being discharged.
- No petrol interceptors are required due to the number of car parking not exceeding more than 50 spaces or 800m² in area.

Technical Note

‘Hydraulic calculation of the proposed drainage system.’

Response:

- Refer to attached Microdrainage calculations. Proposed drainage network has been modelled for all storm events at 1 in 100 year storm event plus climate change, with proposed discharge rates limited to 2.07l/s.

‘Construction details of flow control and SuDS elements.’

Response:

- Refer to attached drainage details sheets showing details of all proposed manholes, pipes, and SuDS features.

Encl.

Microdrainage Calculations
Drainage Strategy
Drainage Details
Overland Flows

Mason Navarro Pledge		Page 1
Bancroft Court Hitchin Hertfordshire, SG5 1LH	KS DC Manchester Existing Flow Rates 100year 6hour storm	
Date 01/06/2024	Designed by AGD	
File Existing Rates.MDX	Checked by	
Innovyze	Network 2020.1.3	

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	100	PIMP (%)	100
M5-60 (mm)	18.000	Add Flow / Climate Change (%)	0
Ratio R	0.359	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Time Area Diagram for Storm

Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.273	4-8	0.077

Total Area Contributing (ha) = 0.350

Total Pipe Volume (m³) = 0.497

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Mason Navarro Pledge		Page 2
Bancroft Court Hitchin Hertfordshire, SG5 1LH	KS DC Manchester Existing Flow Rates 100year 6hour storm	
Date 01/06/2024	Designed by AGD	
File Existing Rates.MDX	Checked by	
Innovyze	Network 2020.1.3	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coefficient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	0	Number of Storage Structures	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.359
Region	England and Wales	Cv (Summer)	0.750
M5-60 (mm)	18.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0	DVD Status	OFF
Analysis Timestep	Fine	Inertia Status	OFF
DTS Status	ON		

Profile(s)	Summer and Winter
Duration(s) (mins)	360
Return Period(s) (years)	100
Climate Change (%)	0

		Water Surcharged				
PN	US/MH Name	Event	US/CL (m)	Level (m)	Depth (m)	Flow / Overflow Cap. (l/s)
1.000	1	360 minute 100 year Summer I+0%	100.000	99.188	-0.137	0.33
1.001	2	360 minute 100 year Summer I+0%	100.000	98.901	-0.074	0.78

		Pipe			
PN	US/MH Name	Maximum Vol (m³)	Discharge Vol (m³)	Flow (l/s)	Status
1.000	1	0.094	156.404	27.5	OK
1.001	2	0.202	156.155	27.4	OK

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Bancroft Court

Hitchin

Hertfordshire, SG5 1LH

Date 01/06/2024

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KS DC Manchester

Proposed Flow Rates

100year 6hour storm

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Page 1



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Network 2020.1.3

Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000

Hot Start (mins) 0

Hot Start Level (mm) 0

Manhole Headloss Coeff (Global) 0.500

Foul Sewage per hectare (l/s) 0.000

Additional Flow - % of Total Flow 0.000

MADD Factor * 10m³/ha Storage 2.000

Inlet Coefficient 0.800

Flow per Person per Day (l/per/day) 0.000

Number of Input Hydrographs 0

Number of Offline Controls 0

Number of Time/Area Diagrams 0

Number of Online Controls 1

Number of Storage Structures 1

Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR

Region England and Wales Cv (Summer) 0.750

M5-60 (mm) 18.000

Cv (Winter) 0.840

Ratio R 0.358

Margin for Flood Risk Warning (mm) 300.0

Analysis Timestep 2.5 Second Increment (Extended)

DTS Status OFF

DVD Status ON

Inertia Status ON

Profile(s) Summer and Winter

Duration(s) (mins) 360

Return Period(s) (years) 100

Climate Change (%) 45

				Water Surcharged			
PN	US/MH Name	Event	US/CL (m)	Level (m)	Depth (m)	Flow / Cap.	Overflow (l/s)
S1.000	SSW01	360 minute 100 year Winter I+45%	60.850	59.483	-0.088	0.22	
S1.001	SSW02	360 minute 100 year Winter I+45%	60.850	59.481	0.416	0.28	
S2.000	SSW03	360 minute 100 year Winter I+45%	60.850	59.481	0.039	0.19	
S1.002	SSW04	360 minute 100 year Winter I+45%	60.850	59.479	0.693	0.19	
S3.000	SJUNC	360 minute 100 year Winter I+45%	60.850	59.351	0.776	0.04	
S1.003	SSW05	360 minute 100 year Winter I+45%	60.850	59.479	1.029	0.10	

Pipe

US/MH Maximum Discharge Flow

PN Name Vol (m³) Vol (m³) (l/s) Status

S1.000 SSW01 0.037 77.708 9.1 OK

S1.001 SSW02 3.006 107.770 12.7 SURCHARGED

S2.000 SSW03 0.073 77.696 9.1 SURCHARGED

S1.002 SSW04 5.298 180.943 20.7 SURCHARGED

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Mason Navarro Pledge				Page 2																															
Bancroft Court Hitchin Hertfordshire, SG5 1LH		KS DC Manchester Proposed Flow Rates 100year 6hour storm																																	
Date 01/06/2024		Designed by AGD																																	
File NETWORK.MDX		Checked by																																	
Innovyze		Network 2020.1.3																																	
<u>Summary of Critical Results by Maximum Level (Rank 1) for Storm</u>																																			
<table><tr><td></td><td></td><td></td><td></td><td>Pipe</td><td></td></tr><tr><td></td><td>US/MH</td><td>Maximum</td><td>Discharge</td><td>Flow</td><td></td></tr><tr><td>PN</td><td>Name</td><td>Vol (m³)</td><td>Vol (m³)</td><td>(l/s)</td><td>Status</td></tr><tr><td>S3.000</td><td>SJUNC</td><td>213.995</td><td>-187.698</td><td>1.3</td><td>SURCHARGED*</td></tr><tr><td>S1.003</td><td>SSW05</td><td>1.833</td><td>56.197</td><td>1.5</td><td>SURCHARGED</td></tr></table>										Pipe			US/MH	Maximum	Discharge	Flow		PN	Name	Vol (m³)	Vol (m³)	(l/s)	Status	S3.000	SJUNC	213.995	-187.698	1.3	SURCHARGED*	S1.003	SSW05	1.833	56.197	1.5	SURCHARGED
				Pipe																															
	US/MH	Maximum	Discharge	Flow																															
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S3.000	SJUNC	213.995	-187.698	1.3	SURCHARGED*																														
S1.003	SSW05	1.833	56.197	1.5	SURCHARGED																														
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Mason Navarro Pledge		Page 1								
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Innovyze	Network 2020.1.3									
Time Area Diagram for Storm <table><thead><tr><th>Time (mins)</th><th>Area (ha)</th><th>Time (mins)</th><th>Area (ha)</th></tr></thead><tbody><tr><td>0-4</td><td>0.199</td><td>4-8</td><td>0.149</td></tr></tbody></table> Total Area Contributing (ha) = 0.348 Total Pipe Volume (m³) = 8.371			Time (mins)	Area (ha)	Time (mins)	Area (ha)	0-4	0.199	4-8	0.149
Time (mins)	Area (ha)	Time (mins)	Area (ha)							
0-4	0.199	4-8	0.149							
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Micro
Drainage



Micro
Drainage

Mason Navarro Pledge		Page 4
Bancroft Court Hitchin Hertfordshire, SG5 1LH	KS DC Manchester Network Results	
Date 01/06/2024 File NETWORK.MDX	Designed by AGD Checked by	
Innovyze	Network 2020.1.3	

Online Controls for Storm

Hydro-Brake® Optimum Manhole: SSW05, DS/PN: S1.003, Volume (m³): 3.4

Unit Reference	MD-SHE-0055-2100-2500-2100
Design Head (m)	2.500
Design Flow (l/s)	2.1
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	55
Invert Level (m)	58.300
Minimum Outlet Pipe Diameter (mm)	75
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.500	2.1	Kick-Flo®	0.494	1.0
Flush-Flo™	0.240	1.2	Mean Flow over Head Range	-	1.5

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.1	1.200	1.5	3.000	2.3	7.000	3.4
0.200	1.2	1.400	1.6	3.500	2.5	7.500	3.5
0.300	1.2	1.600	1.7	4.000	2.6	8.000	3.6
0.400	1.2	1.800	1.8	4.500	2.8	8.500	3.7
0.500	1.0	2.000	1.9	5.000	2.9	9.000	3.8
0.600	1.1	2.200	2.0	5.500	3.0	9.500	3.9
0.800	1.3	2.400	2.1	6.000	3.1		
1.000	1.4	2.600	2.1	6.500	3.3		

Mason Navarro Pledge		Page 5
Bancroft Court Hitchin Hertfordshire, SG5 1LH	KS DC Manchester Network Results	
Date 01/06/2024 File NETWORK.MDX	Designed by AGD Checked by	
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Storage Structures for Storm

Cellular Storage Manhole: SJUNC, DS/PN: S3.000

Invert Level (m) 58.350 Safety Factor 2.0
 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
 Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	224.0	200.0	1.001	0.0	256.6
1.000	224.0	256.6			

Mason Navarro Pledge				Page 6							
Bancroft Court Hitchin Hertfordshire, SG5 1LH				KS DC Manchester Network Results							
Date 01/06/2024 File NETWORK.MDX				Designed by AGD Checked by							
Innovyze				Network 2020.1.3							
1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm											
Simulation Criteria											
Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000											
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000											
Hot Start Level (mm) 0 Inlet Coefficient 0.800											
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000											
Foul Sewage per hectare (l/s) 0.000											
Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0											
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0											
Synthetic Rainfall Details											
Rainfall Model FSR Ratio R 0.358											
Region England and Wales Cv (Summer) 0.750											
M5-60 (mm) 18.000 Cv (Winter) 0.840											
Margin for Flood Risk Warning (mm) 300.0											
Analysis Timestep 2.5 Second Increment (Extended)											
DTS Status OFF											
DVD Status ON											
Inertia Status ON											
Profile(s) Summer and Winter											
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080											
Return Period(s) (years) 1, 30, 100											
Climate Change (%) 0, 0, 40											
Water											
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Level (m)		
S1.000	SSW01	15 Winter	1	+0%	100/15	Summer			59.432		
S1.001	SSW02	15 Winter	1	+0%	30/15	Summer			58.936		
S2.000	SSW03	15 Winter	1	+0%	100/15	Summer			59.297		
S1.002	SSW04	15 Winter	1	+0%	30/15	Summer			58.651		
S3.000	SJUNC	360 Winter	1	+0%	30/30	Summer			58.519		
S1.003	SSW05	15 Winter	1	+0%	1/15	Summer			58.636		
Surcharged Flooded											
PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level Exceeded		
S1.000	SSW01	-0.139	0.000	0.29			12.1	OK			
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Mason Navarro Pledge		Page 7
Bancroft Court Hitchin Hertfordshire, SG5 1LH	KS DC Manchester Network Results	
Date 01/06/2024 File NETWORK.MDX	Designed by AGD Checked by	
Innovyze	Network 2020.1.3	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for
Storm

PN	US/MH Name	Surcharged Flooded		Flow / Overflow		Half Drain Pipe		Status	Level Exceeded
		Depth (m)	Volume (m ³)	Cap.	(l/s)	Time (mins)	Flow (l/s)		
S1.001	SSW02	-0.129	0.000	0.37			16.9	OK	
S2.000	SSW03	-0.145	0.000	0.26			12.3	OK	
S1.002	SSW04	-0.135	0.000	0.27			29.4	OK	
S3.000	SJUNC	-0.056	0.000	0.04		275	1.2	OK*	
S1.003	SSW05	0.186	0.000	0.08			1.2	SURCHARGED	

Mason Navarro Pledge				Page 8																																																																																	
Bancroft Court Hitchin Hertfordshire, SG5 1LH		KS DC Manchester Network Results																																																																																			
Date 01/06/2024 File NETWORK.MDX		Designed by AGD Checked by																																																																																			
Innovyze		Network 2020.1.3																																																																																			
30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm Simulation Criteria Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000 Hot Start Level (mm) 0 Inlet Coefficient 0.800 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000 Foul Sewage per hectare (l/s) 0.000 Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0 Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0 Synthetic Rainfall Details Rainfall Model FSR Ratio R 0.358 Region England and Wales Cv (Summer) 0.750 M5-60 (mm) 18.000 Cv (Winter) 0.840 Margin for Flood Risk Warning (mm) 300.0 Analysis Timestep 2.5 Second Increment (Extended) DTS Status OFF DVD Status ON Inertia Status ON Profile(s) Summer and Winter Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080 Return Period(s) (years) 1, 30, 100 Climate Change (%) 0, 0, 40 WARNING: Half Drain Time has not been calculated as the structure is too full.																																																																																					
<table><tr><th></th><th>US/MH</th><th></th><th>Return</th><th>Climate</th><th>First (X)</th><th>First (Y)</th><th>First (Z)</th><th>Overflow</th><th>Water</th></tr><tr><th>PN</th><th>Name</th><th>Storm</th><th>Period</th><th>Change</th><th>Surcharge</th><th>Flood</th><th>Overflow</th><th>Act.</th><th>Level</th></tr><tr><td>S1.000</td><td>SSW01</td><td>15 Winter</td><td>30</td><td>+0%</td><td>100/15 Summer</td><td></td><td></td><td></td><td>59.495</td></tr><tr><td>S1.001</td><td>SSW02</td><td>15 Winter</td><td>30</td><td>+0%</td><td>30/15 Summer</td><td></td><td></td><td></td><td>59.223</td></tr><tr><td>S2.000</td><td>SSW03</td><td>15 Winter</td><td>30</td><td>+0%</td><td>100/15 Summer</td><td></td><td></td><td></td><td>59.353</td></tr><tr><td>S1.002</td><td>SSW04</td><td>15 Winter</td><td>30</td><td>+0%</td><td>30/15 Summer</td><td></td><td></td><td></td><td>59.045</td></tr><tr><td>S3.000</td><td>SJUNC</td><td>600 Winter</td><td>30</td><td>+0%</td><td>30/30 Summer</td><td></td><td></td><td></td><td>58.866</td></tr><tr><td>S1.003</td><td>SSW05</td><td>15 Winter</td><td>30</td><td>+0%</td><td>1/15 Summer</td><td></td><td></td><td></td><td>58.903</td></tr></table>						US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Water	PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	Level	S1.000	SSW01	15 Winter	30	+0%	100/15 Summer				59.495	S1.001	SSW02	15 Winter	30	+0%	30/15 Summer				59.223	S2.000	SSW03	15 Winter	30	+0%	100/15 Summer				59.353	S1.002	SSW04	15 Winter	30	+0%	30/15 Summer				59.045	S3.000	SJUNC	600 Winter	30	+0%	30/30 Summer				58.866	S1.003	SSW05	15 Winter	30	+0%	1/15 Summer				58.903	
	US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Water																																																																												
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	Level																																																																												
S1.000	SSW01	15 Winter	30	+0%	100/15 Summer				59.495																																																																												
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Mason Navarro Pledge		Page 9
Bancroft Court Hitchin Hertfordshire, SG5 1LH	KS DC Manchester Network Results	
Date 01/06/2024 File NETWORK.MDX	Designed by AGD Checked by	
Innovyze	Network 2020.1.3	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

PN	US/MH Name	Surcharged		Flooded		Half Drain		Pipe	Status	Level Exceeded
		Depth (m)	Volume (m ³)	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Flow		
S1.000	SSW01	-0.076	0.000	0.71			29.6			OK
S1.001	SSW02	0.158	0.000	0.79			36.1		SURCHARGED	
S2.000	SSW03	-0.089	0.000	0.64			30.1			OK
S1.002	SSW04	0.259	0.000	0.59			63.6		SURCHARGED	
S3.000	SJUNC	0.291	0.000	0.04			1.1		SURCHARGED*	
S1.003	SSW05	0.453	0.000	0.08			1.2		SURCHARGED	

Mason Navarro Pledge

Page 10

Bancroft Court
Hitchin
Hertfordshire, SG5 1LH

Date 01/06/2024
File NETWORK.MDX

KS DC Manchester
Network Results

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Checked by

Micro Drainage

Innovyze

Network 2020.1.3

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

Simulation Criteria

Areal Reduction Factor 1.000

Hot Start (mins) 0

Hot Start Level (mm) 0

Manhole Headloss Coeff (Global) 0.500

Foul Sewage per hectare (l/s) 0.000

Additional Flow - % of Total Flow 0.000

MADD Factor * 10m³/ha Storage 2.000

Inlet Coefficient 0.800

Flow per Person per Day (l/per/day) 0.000

Number of Input Hydrographs 0

Number of Offline Controls 0

Number of Time/Area Diagrams 0

Number of Online Controls 1

Number of Storage Structures 1

Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR

Region England and Wales Cv (Summer) 0.750

M5-60 (mm) 18.000

Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0

Analysis Timestep 2.5 Second Increment (Extended)

DTS Status OFF

DVD Status ON

Inertia Status ON

Profile(s) Summer and Winter

Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080

Return Period(s) (years) 1, 30, 100

Climate Change (%) 0, 0, 40

WARNING: Half Drain Time has not been calculated as the structure is too full.

	US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Water
PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	Level
									(m)
S1.000	SSW01	15 Winter	100	+40%	100/15 Summer				60.841
S1.001	SSW02	15 Winter	100	+40%	30/15 Summer				60.263
S2.000	SSW03	15 Winter	100	+40%	100/15 Summer				60.398
S1.002	SSW04	960 Winter	100	+40%	30/15 Summer				60.230
S3.000	SJUNC	600 Winter	100	+40%	30/30 Summer				59.351
S1.003	SSW05	960 Winter	100	+40%	1/15 Summer				60.230

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Bancroft Court Hitchin Hertfordshire, SG5 1LH	KS DC Manchester Network Results	
Date 01/06/2024 File NETWORK.MDX	Designed by AGD Checked by	
Innovyze	Network 2020.1.3	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

PN	US/MH Name	Surcharged		Flooded		Half Drain		Pipe	Status	Level Exceeded
		Depth (m)	Volume (m ³)	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Flow		
S1.000	SSW01	1.270	0.000	1.04			43.0		FLOOD RISK	
S1.001	SSW02	1.198	0.000	1.32			59.9		SURCHARGED	
S2.000	SSW03	0.956	0.000	0.97			45.8		SURCHARGED	
S1.002	SSW04	1.444	0.000	0.09			9.5		SURCHARGED	
S3.000	SJUNC	0.776	0.000	0.04			1.3		SURCHARGED*	
S1.003	SSW05	1.780	0.000	0.13			1.9		SURCHARGED	

Mason Navarro Pledge			Page 1					
Bancroft Court Hitchin Hertfordshire, SG5 1LH		KS DC Manchester Network Results						
Date 01/06/2024		Designed by AGD						
File NETWORK.MDX		Checked by						
Innovyze		Network 2020.1.3						
<u>100 year Return Period Summary of Critical Results by Maximum Level (Rank 1)</u> <u>for Storm</u>								
<u>Simulation Criteria</u>								
Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000								
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000								
Hot Start Level (mm) 0 Inlet Coefficient 0.800								
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000								
Foul Sewage per hectare (l/s) 0.000								
Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0								
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0								
<u>Synthetic Rainfall Details</u>								
Rainfall Model FSR Ratio R 0.358								
Region England and Wales Cv (Summer) 0.750								
M5-60 (mm) 18.000 Cv (Winter) 0.840								
Margin for Flood Risk Warning (mm) 300.0								
Analysis Timestep 2.5 Second Increment (Extended)								
DTS Status OFF								
DVD Status ON								
Inertia Status ON								
Profile(s) Summer and Winter								
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320, 5760, 7200, 8640, 10080								
Return Period(s) (years) 100								
Climate Change (%) 45								
WARNING: Half Drain Time has not been calculated as the structure is too full.								

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Bancroft Court Hitchin Hertfordshire, SG5 1LH	KS DC Manchester Network Results	
Date 01/06/2024 File NETWORK.MDX	Designed by AGD Checked by	
Innovyze	Network 2020.1.3	

100 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

PN	US/MH Name	Water	Surcharged	Flooded	Half Drain		Pipe	Status	Level Exceeded
		Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Time (mins)		
S1.000	SSW01	60.851	1.280	0.544	1.06		43.8	FLOOD	3
S1.001	SSW02	60.850	1.785	0.017	0.16		7.4	FLOOD	1
S2.000	SSW03	60.850	1.408	0.088	0.11		5.4	FLOOD	2
S1.002	SSW04	60.849	2.063	0.000	0.11		12.2	FLOOD RISK	
S3.000	SJUNC	59.351	0.776	0.000	0.04		1.3	SURCHARGED*	
S1.003	SSW05	60.848	2.398	0.000	0.14		2.1	FLOOD RISK	

SURFACE WATER MANHOLE SCHEDULE										
REF	EASTINGS (M)	NORTHINGS (M)	APPROX.CL(M)	INVERT(M)	DEPTH (MM)	TYPE	SIZE	COVER TYPE	COVER SIZE	SPECIAL REQUIREMENTS
SW01	382940.342	386868.552	60.850	59.346	1504	Type D	600	B125	300 X 300	
SW02	382866.429	386886.041	60.850	58.840	2310	Type D	600	B125	300 X 300	Catchpit manhole.
SW03	382947.813	386900.365	60.850	59.217	1633	Type D	600	B125	300 X 300	
SW04	382873.999	386918.016	60.850	58.486	2364	Type B	1200	D400	600 X 600	
SW05	382875.653	386924.999	60.850	58.300	2850	Type B	1200	D400	600 X 600	Catchpit manhole. Flow control manhole
CW01	382326.188	386658.402	61.130	58.000	3130	Type B	1200	D400	600 X 600	

FOUL WATER MANHOLE SCHEDULE										
REF	EASTINGS (M)	NORTHINGS (M)	APPROX.CL(M)	INVERT(M)	DEPTH (MM)	TYPE	SIZE	COVER TYPE	COVER SIZE	SPECIAL REQUIREMENTS
FW01	382907.164	386877.523	60.850	60.350	500	Type D	450	B125	430 X 430	
FW02	382874.946	386885.105	60.850	59.473	1377	Type D	450	B125	300 X 300	
FW03	382865.431	386887.345	60.850	59.350	1500	Type D	450	B125	300 X 300	
FW04	382886.004	386914.179	61.400	60.350	1050	Type D	450	D400	430 X 430	
FW05	382882.057	386915.111	60.850	60.253	597	Type D	450	D400	430 X 430	
FW06	382872.538	386917.365	60.850	58.965	1885	Type D	450	D400	300 X 300	Backdrop IL: 60.131
FW07	382874.371	386925.140	60.530	58.865	1665	Type D	450	D400	300 X 300	
CW01	382326.188	386658.402	61.130	58.000	3130	N/A	N/A	N/A	N/A	

General Drainage Specification

- All private drains shall be constructed and commissioned in accordance with the relevant sections of the Building Regulations Approved Documents and relevant British Standards.
- All rainwater pipes to be 150Ø. All other pipework to be 100Ø minimum unless noted otherwise.
- Private surface water drains shall be laid at a minimum gradient of 1 in 100 or to the gradients and invert levels shown.
- Private foul water drains shall be laid at a minimum gradient of 1 in 80 or to the gradients and invert levels shown
- Foul pipework connections to first access point shall be laid at a minimum gradient of 1 in 40 or to the levels shown.
- All connections to be made soffit to soffit unless noted otherwise.
- Pipe bedding to be Class 'B' bedding for rigid pipes and Class 'T' bedding for flexible pipes (100 mm granular bed and surround).
- Where cover to soffit of pipe is less than 600 mm in private areas, the following shall apply:-
 - Vitrified clay pipes - provide a 100 mm min. thick concrete bed and surround (instead of class 'B' & 'T' bedding) and a 13 mm thick compressible filler at each joint.
 - uPVC pipes - provide a concrete bridging (in addition to class 'B' or 'T' bedding) in accordance with appendix A15, Building Regulations part 'H'.
- All concrete indicated in the construction of drainage infrastructure (pipe bedding, bridging, manholes etc) shall be standardised prescribed concrete ST2 and is to conform to BS EN 206-1 and BS 8500-2. The maximum aggregate size shall be 20mm.
- Foundations adjacent to pipe runs or manholes are to have their formation level set above the invert level no higher than the equivalent of the horizontal distance between the pipe/excavation trench and the foundation, minus 500mm.
- Excavations for manholes, pipe runs etc located within a 45 degree load distribution splay from any adjoining existing foundations, are to be adequately supported for the duration of the works and pipe runs protected as note 8 above.
- Where excavations for pipe runs are parallel and in close proximity to each other and/or other service trenches, The Contractor shall ensure that adequate safety measures, including temporary shoring, are provided in line with current health & safety legislation and good practice. Particular attention is to be paid to adjacent trenches of differing invert levels.
- All existing drainage found on site during the works shall be investigated, its operational status confirmed and the following applied:-
 - Inoperative drainage shall be cut back and pipe runs filled with concrete grout.
 - 'Live' drainage shall be advised to the engineer.

General

- This drawing is to be read in conjunction with all Architect's, Engineer's and Services Engineer's drawings and specifications.
- Do not scale from any of the Civils drawings. All dimensions to be verified on site and any discrepancies should be highlighted.
- All materials to comply with the relevant British Standard.

Legend

Surface Water	Description
	New surface water drain
	New surface water manhole (Size indicated on Manhole Schedule)
	New modular storage tank
	New rain water down pipe
	New yard gully
	Filter Strip/French Drain
	Linear Drainage Channel
Foul	Description
	New foul water drain
	Backdrop
	New shallow foul inspection chamber (typ. 450mmØ) upto 1200mm deep
	New soil and vent pipe
	New foul gully
Combined	Description
	Existing combined sewer
	Existing combined sewer manhole
	New combined sewer manhole (Size indicated on Manhole Schedule)
General	Description
	Site Boundary

- Setting out of internal foul drainage points by others.
- Potential that existing services may require diverting to accommodate the proposed building.
- These drawings are based on TTSP drawings 3447-TSP-ZZ-02-DR-A-20-002 and 3447-TSP-ZZ-XX-DR-A-00-002
- CCTV drainage survey to be undertaken to confirm details of existing drainage.
- Cover depth for attenuation tank based on existing topographical levels.
- Contractor to confirm setting out of tank in line with the requirements of the below ground drainage shown on plan.

C02	Revised as clouded Background survey updated	15.04.24	RJ
C01	Construction Issue	27.03.24	RJ
P03	Stage 4 Issue	26.01.24	RJ
P02	Revised Stage 3 Issue	23.08.23	RJ
P01	Stage 3 Issue	31.07.23	RJ
REV	COMMENTS	DATE	CHK
STATUS			

CONSTRUCTION

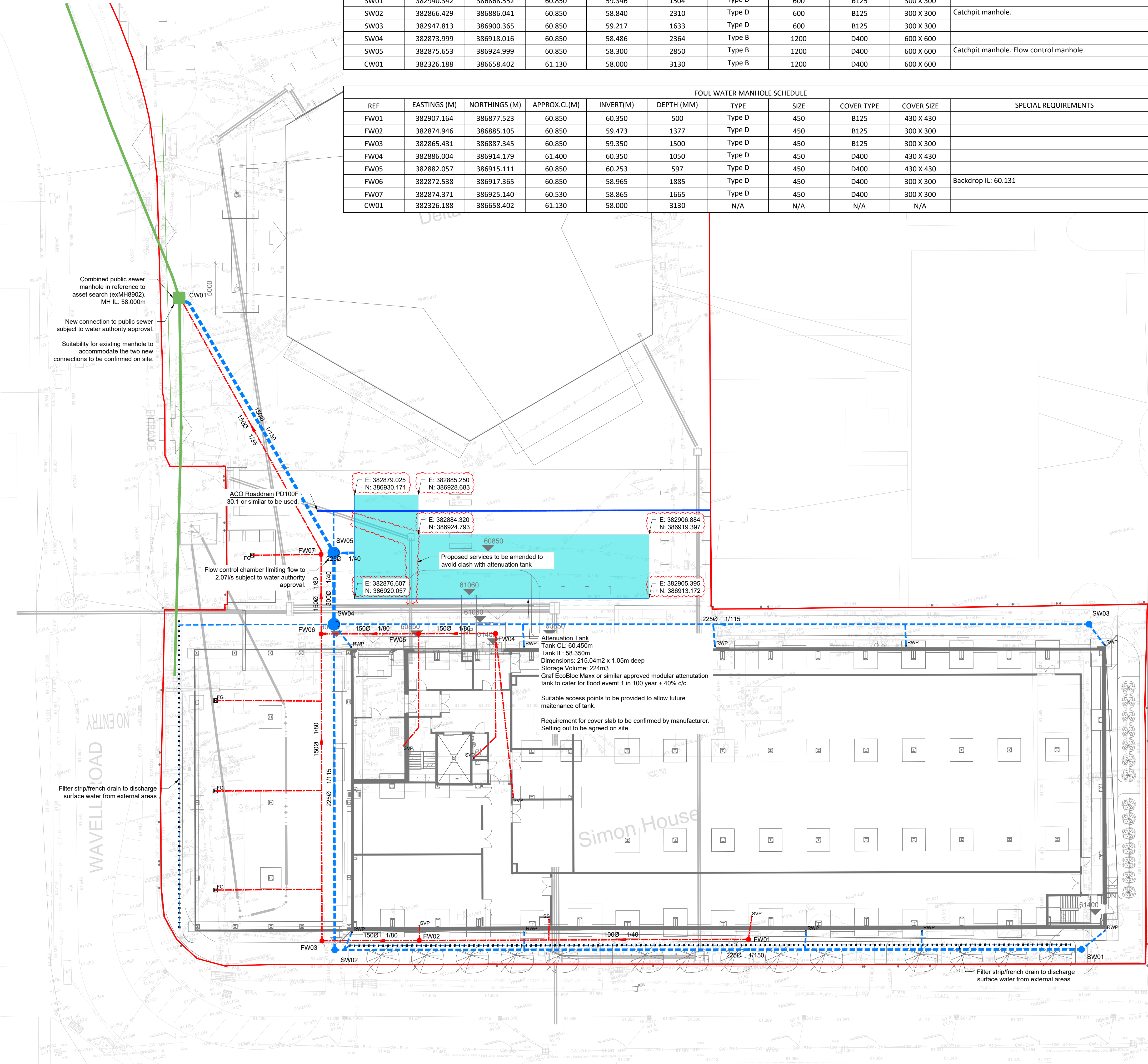
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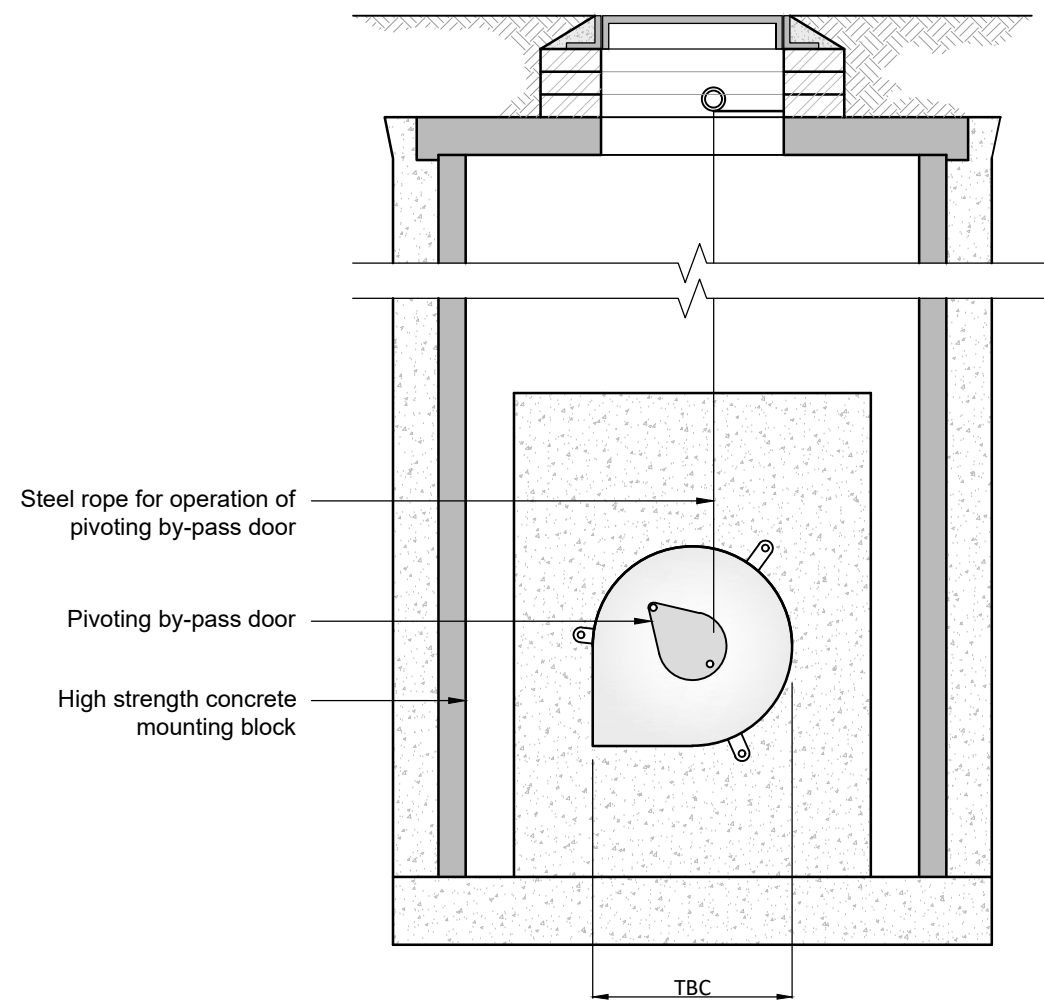
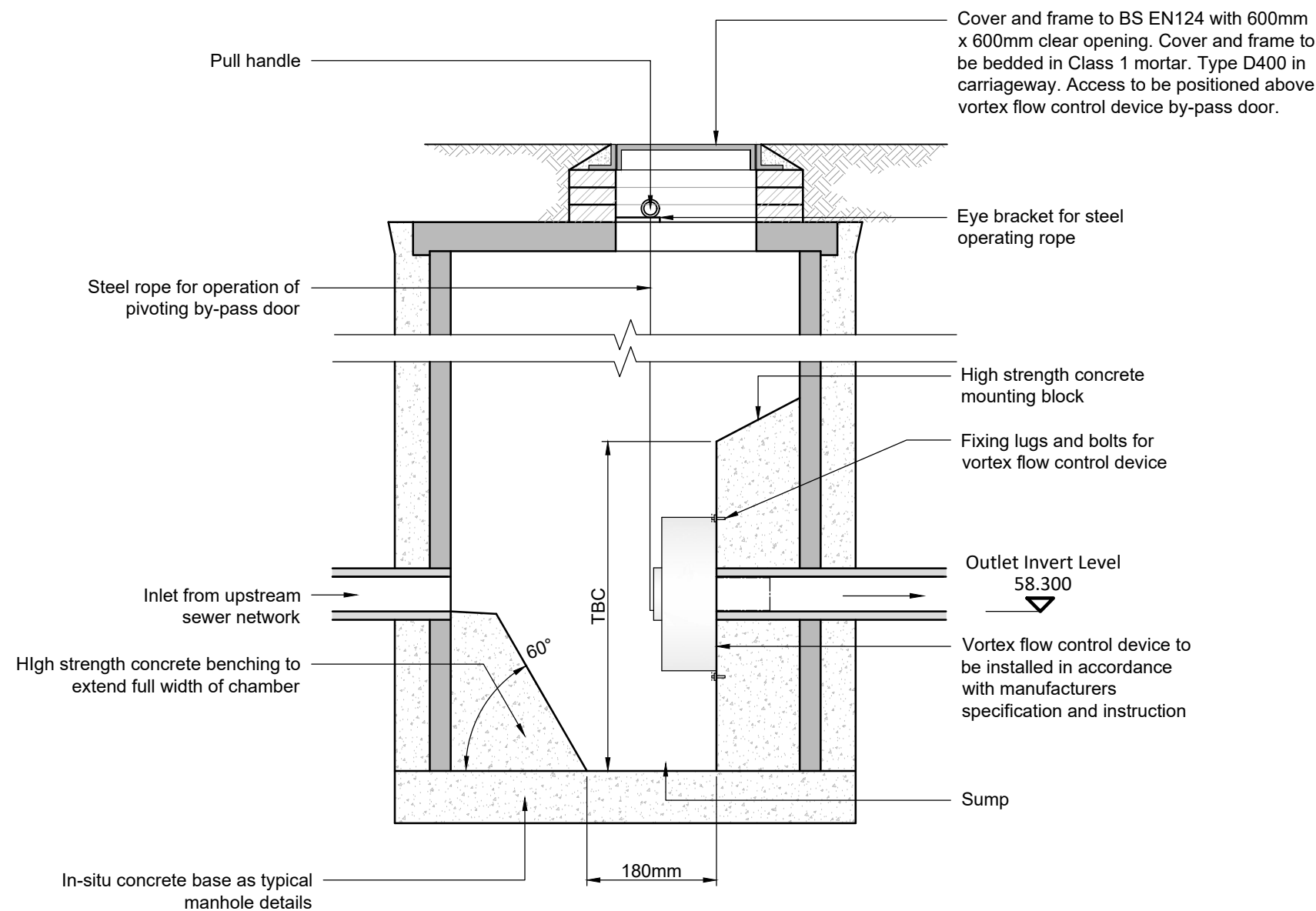
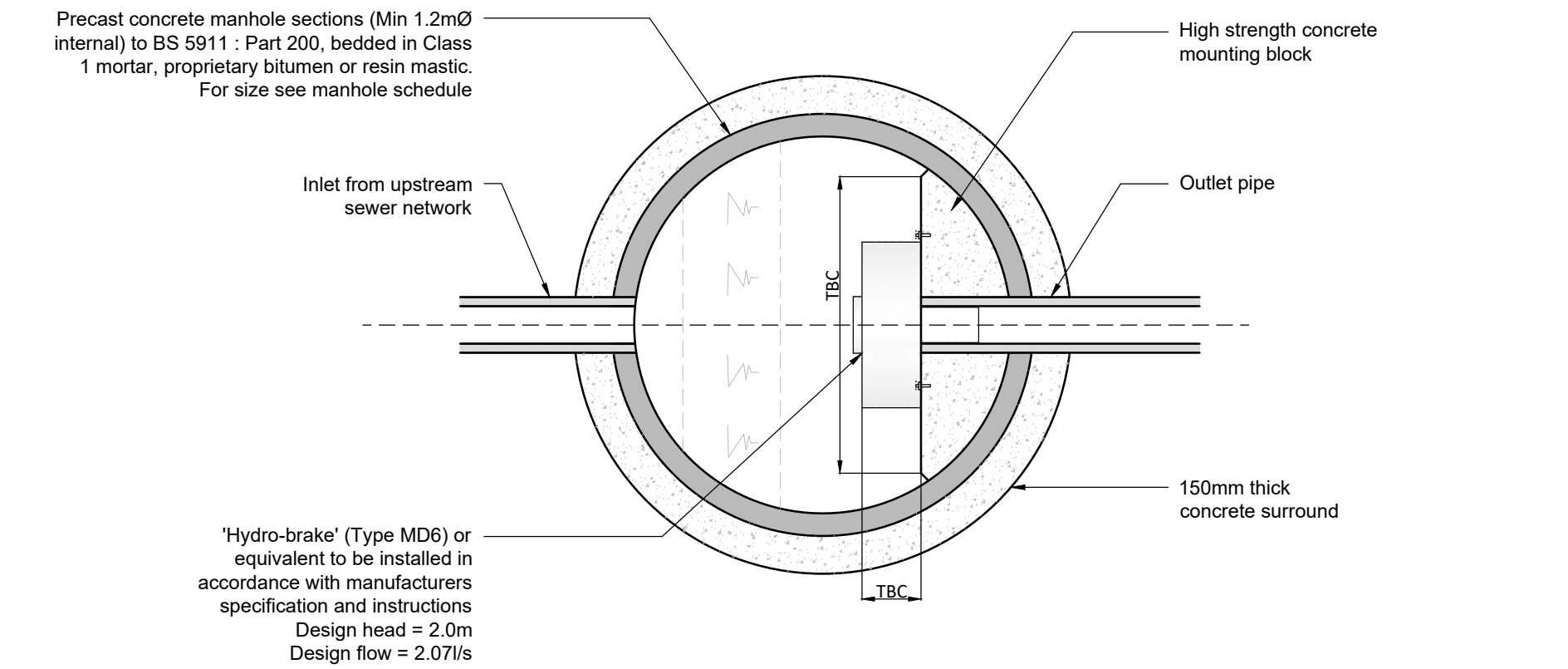
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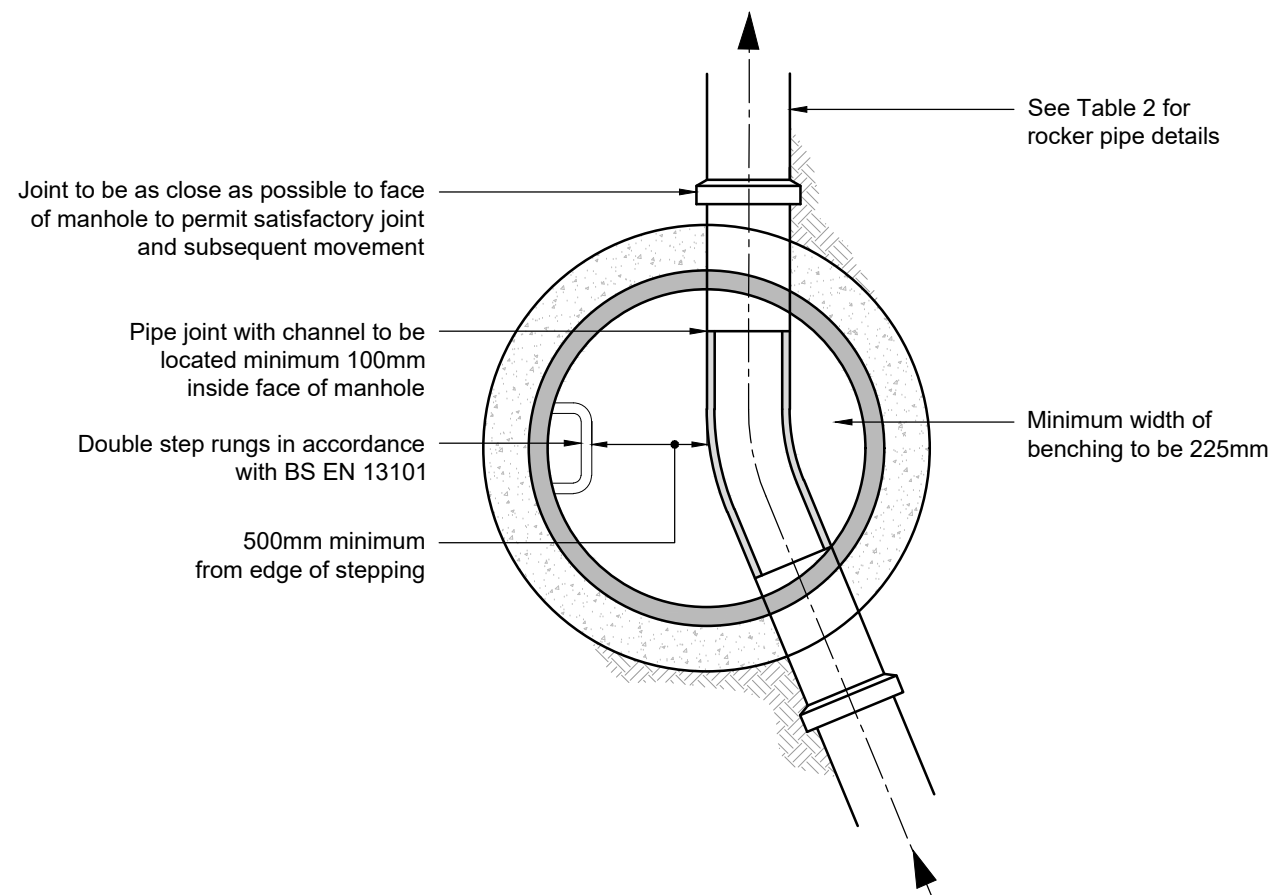
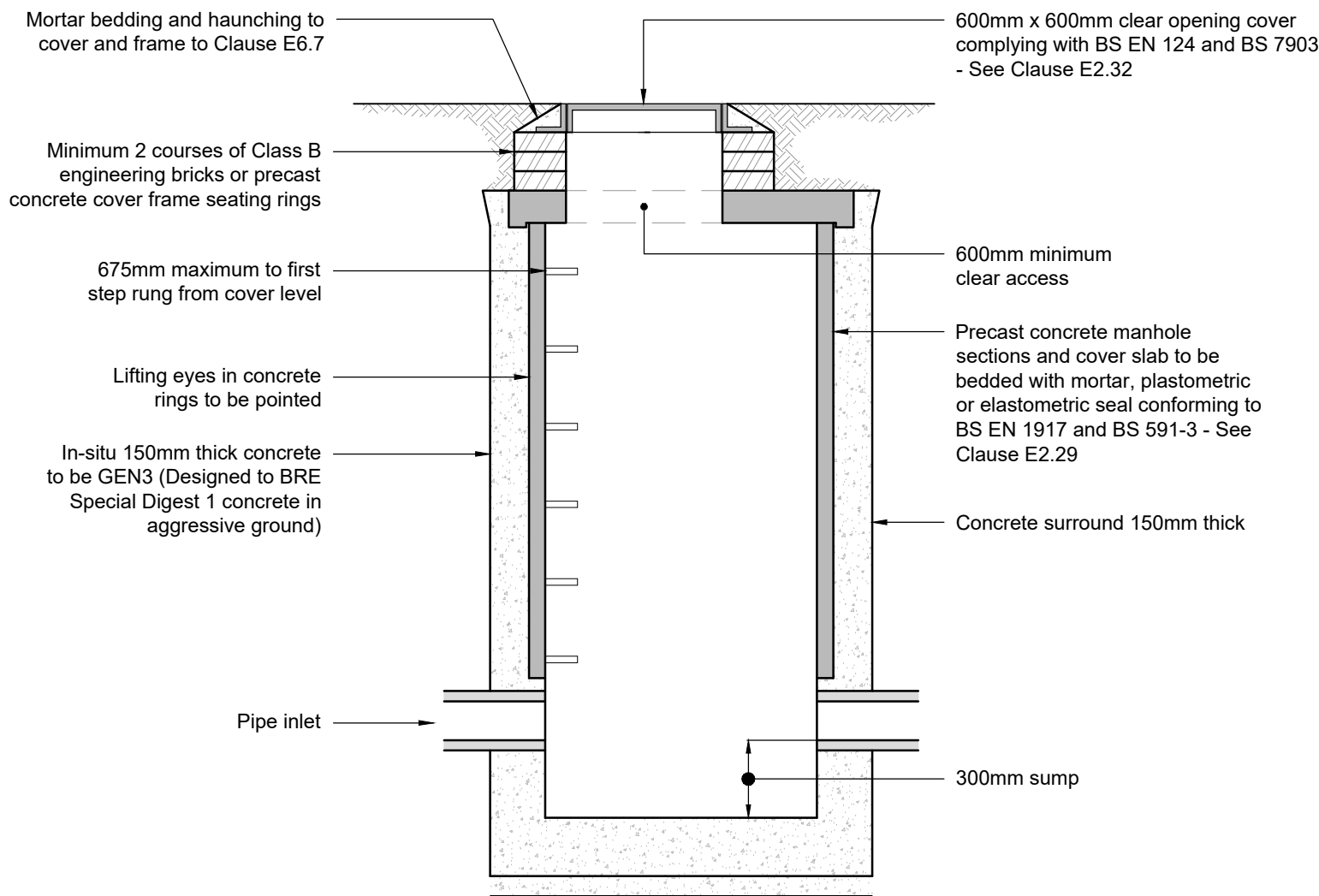
DRAWING TITLE
Drainage General Arrangement

SCALE @ A1	DRAWN BY	DATE
1:200	AGD	August 2023
MNP No.	STATUS CODE	REV
223169	S4	C02
Ref No: 170188-MNP-ZZ-XX-DR-C-01800		

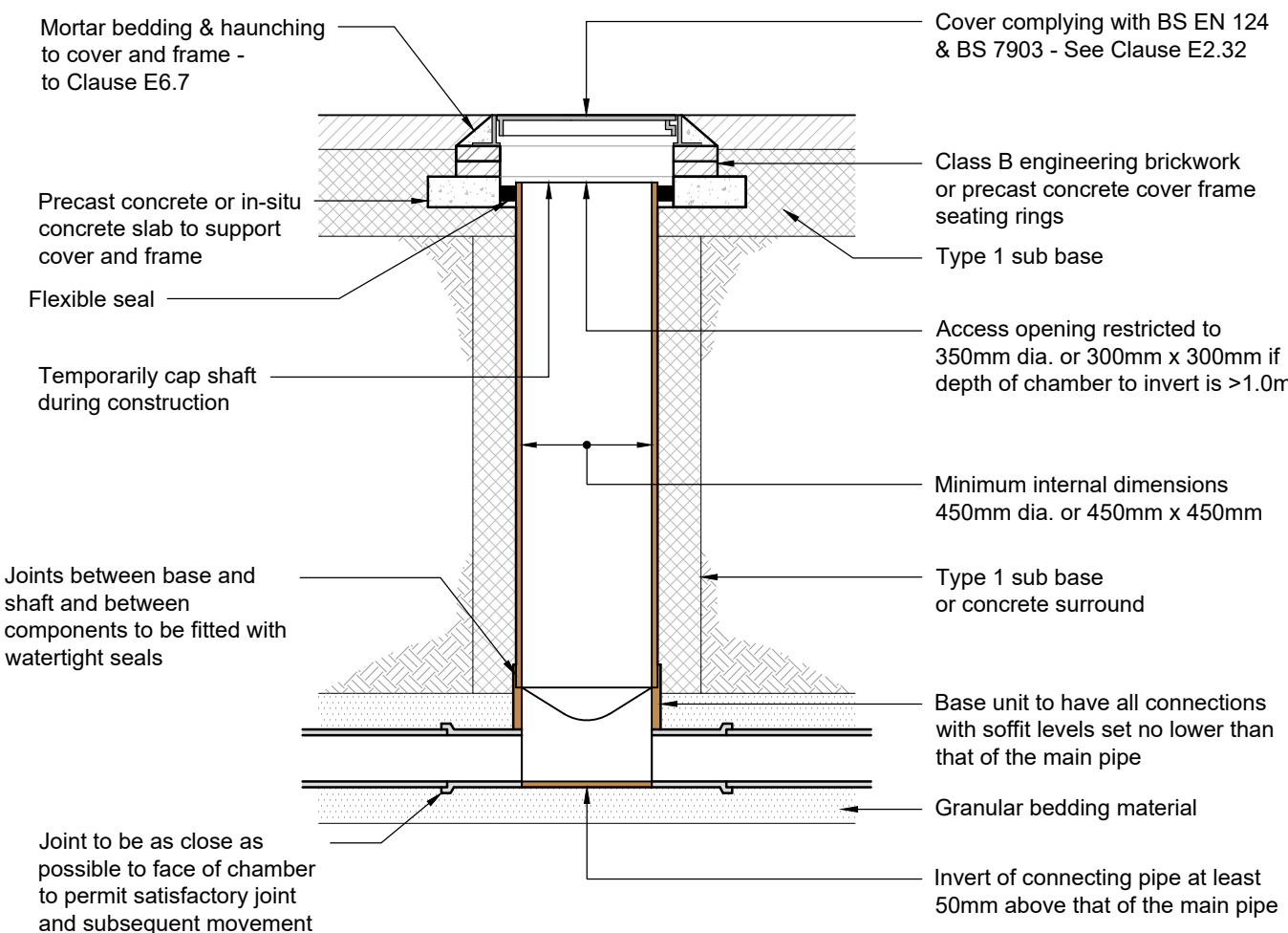




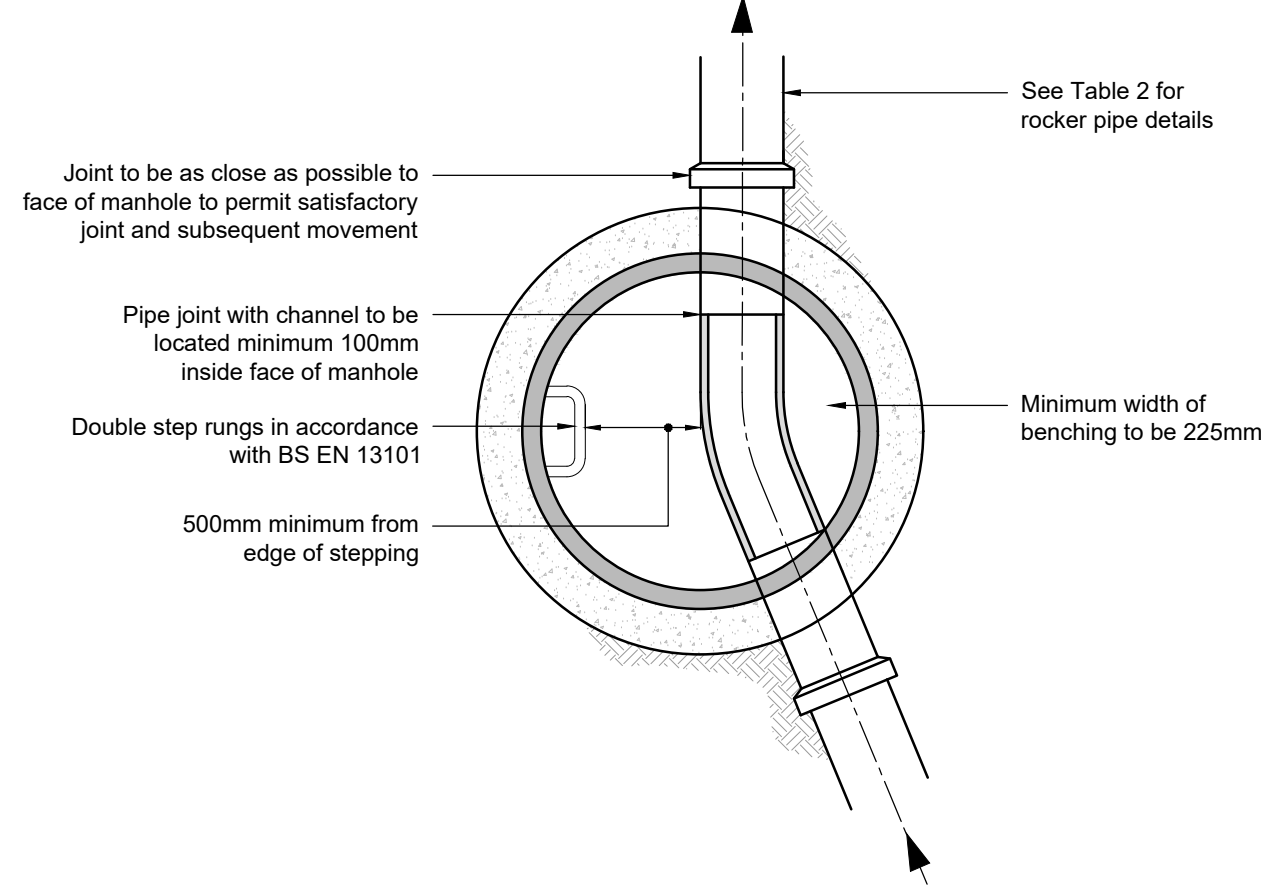
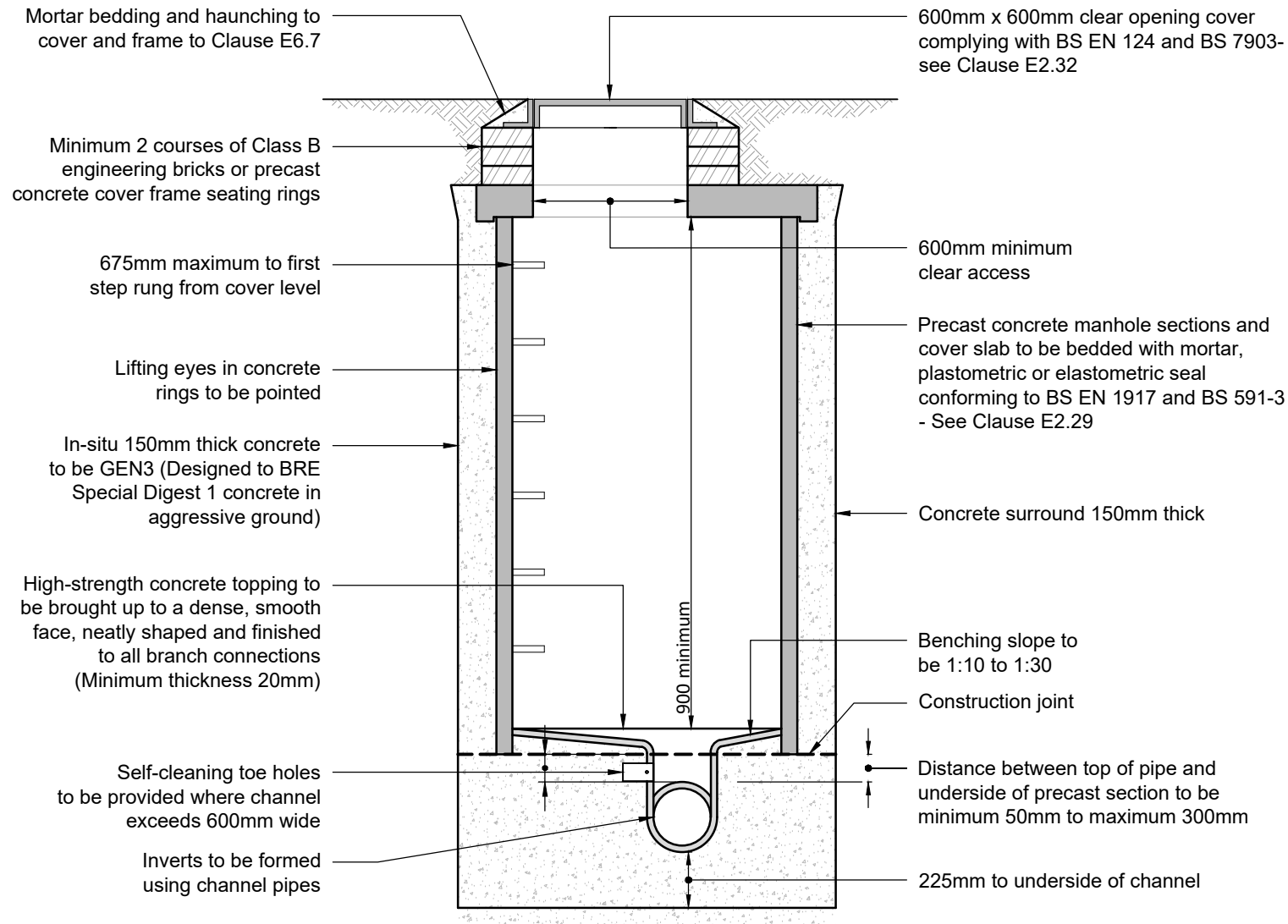
Typical Flow Control Manhole
Hydro-brake or Similar approved
(Scale 1:25)



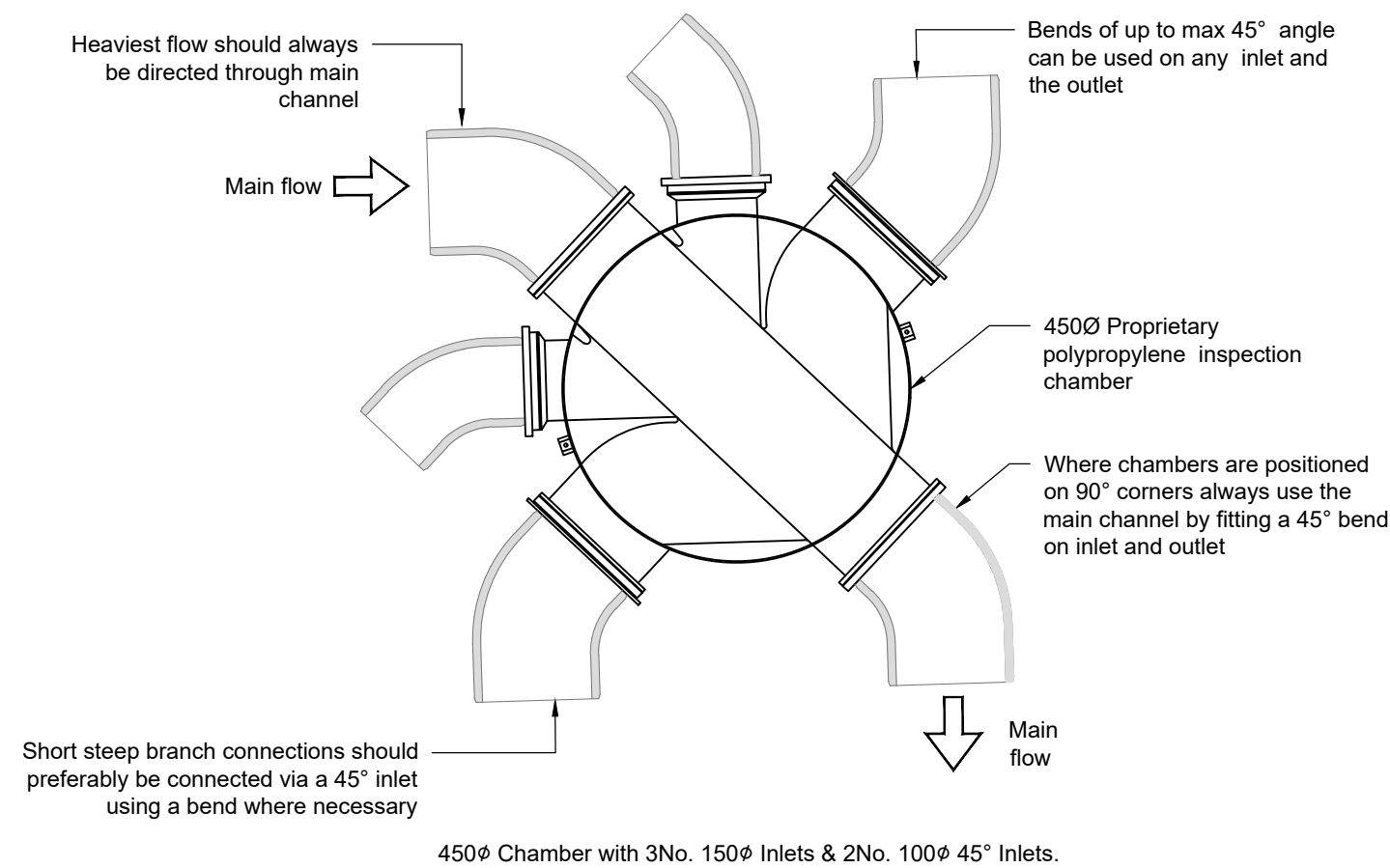
Typical Manhole Detail - Type B with Sump
Max depth from cover level to soffit of pipe 3.0m
(Scale 1:25)



Typical Inspection Chamber Detail - Type D
Max depth from cover level to soffit of pipe in areas subject to vehicle loading 3.0m, non-entry
(Scale 1:25)



Typical Manhole Detail - Type B
Max depth from cover level to soffit of pipe 3.0m
(Scale 1:25)



Polypropylene Inspection Chamber Typical Pipework Arrangements
(Scale 1:10)

General

1.1 This drawing is to be read in conjunction with all Architect's, Engineer's and Services Engineer's drawings and specifications.

1.2 Do not scale from any of the structural drawings. All dimensions to be verified on site and any discrepancies should be highlighted.

1.3 The contractor is responsible for the stability of the building and adjoining structures during construction and shall design, install, adapt and maintain all necessary propping and temporary works. A method statement for the temporary works must be submitted to the contractor administrator for comment before work begins.

1.4 All materials to comply with the relevant British Standard.

Rocker Pipe Length	
Nominal diameter of pipe (mm)	Maximum effective length (m)
150 TO 600	0.6
675 TO 750	1.0
OVER 750	1.25

Manhole Cover Type	
Location of manhole	Cover class
Landscape areas	A15
Footpaths and driveways	B125
Car parks	C250
Highway (Inc areas with HGV access)	D400

Compressible Filler and Packing for Pipelines	
Nominal diameter of pipe (mm)	Thickness of compressible filler (mm)
Less than 450	18
450 to 1200	36
Exceeding 1200	54

C03	Construction Issue	17.05.24	RJ
C02	Construction Issue	30.04.24	RJ
C01	Construction Issue	05.03.24	RJ
P02	Stage 4 Issue	26.01.24	RJ
P01	Stage 3 Issue	31.07.23	RJ

REV	COMMENTS	DATE	CHK
STATUS			

CONSTRUCTION

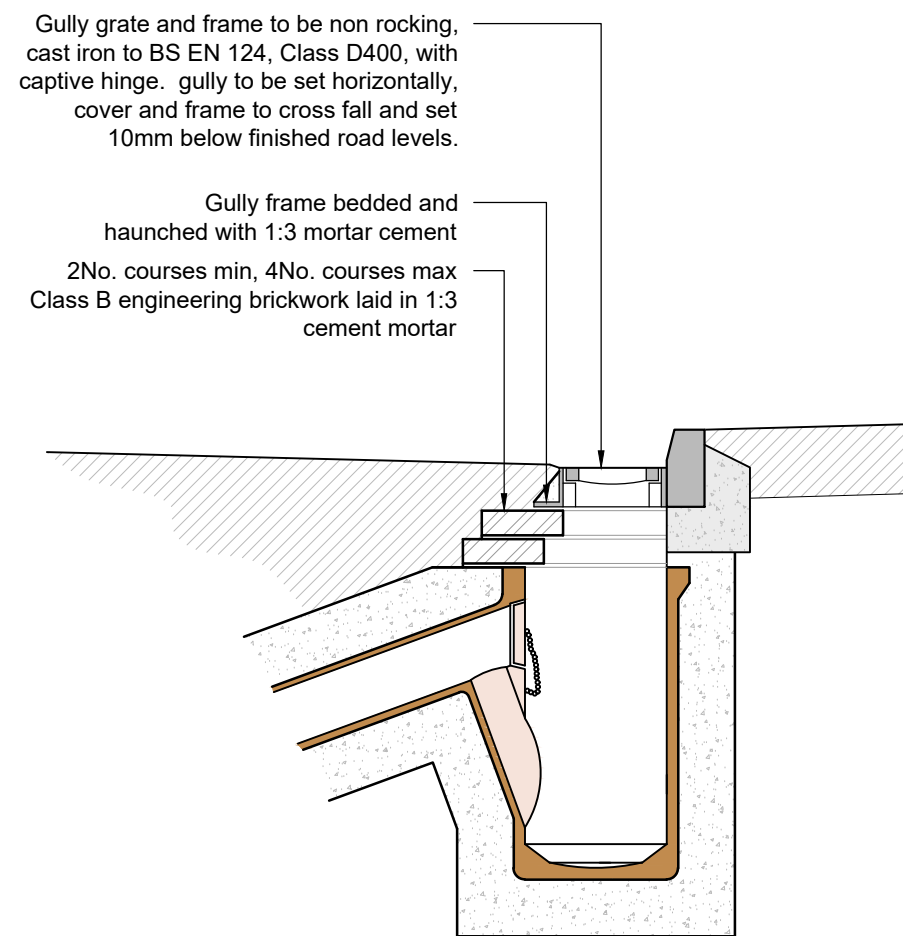
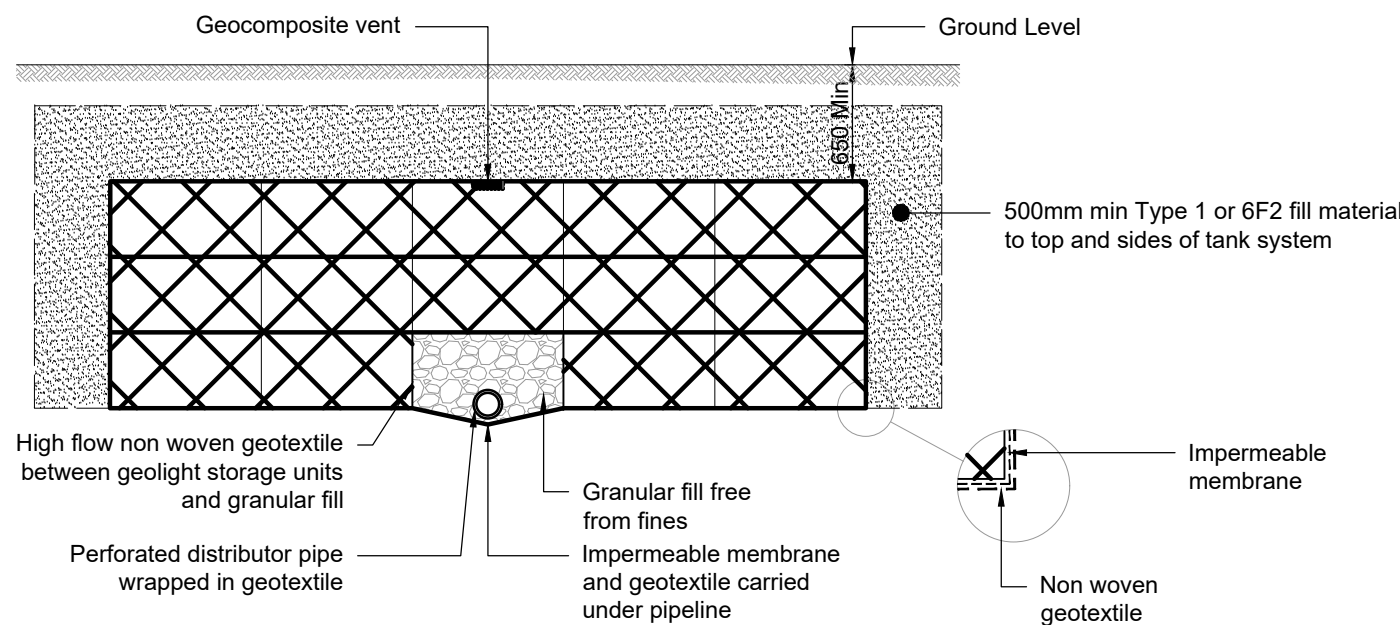
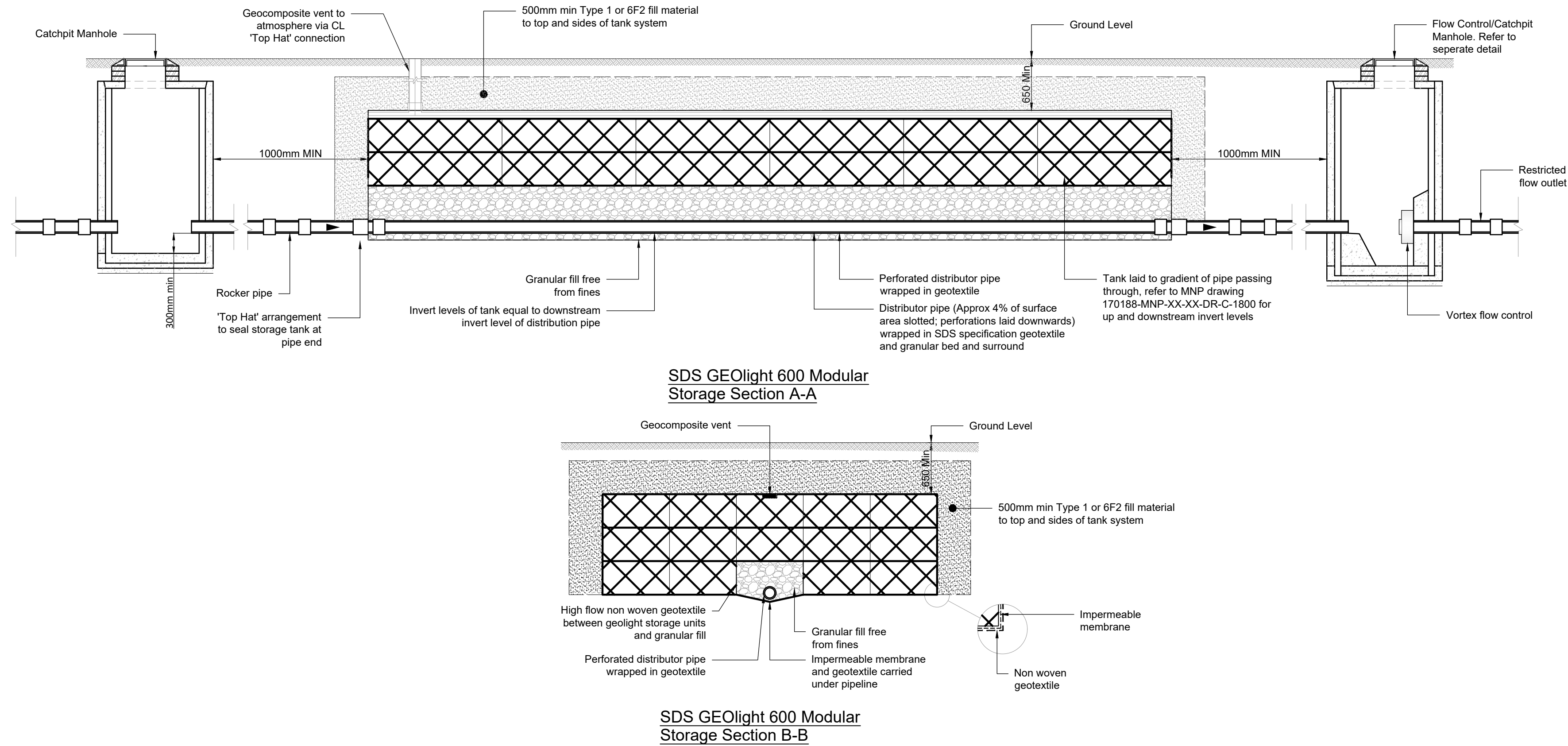
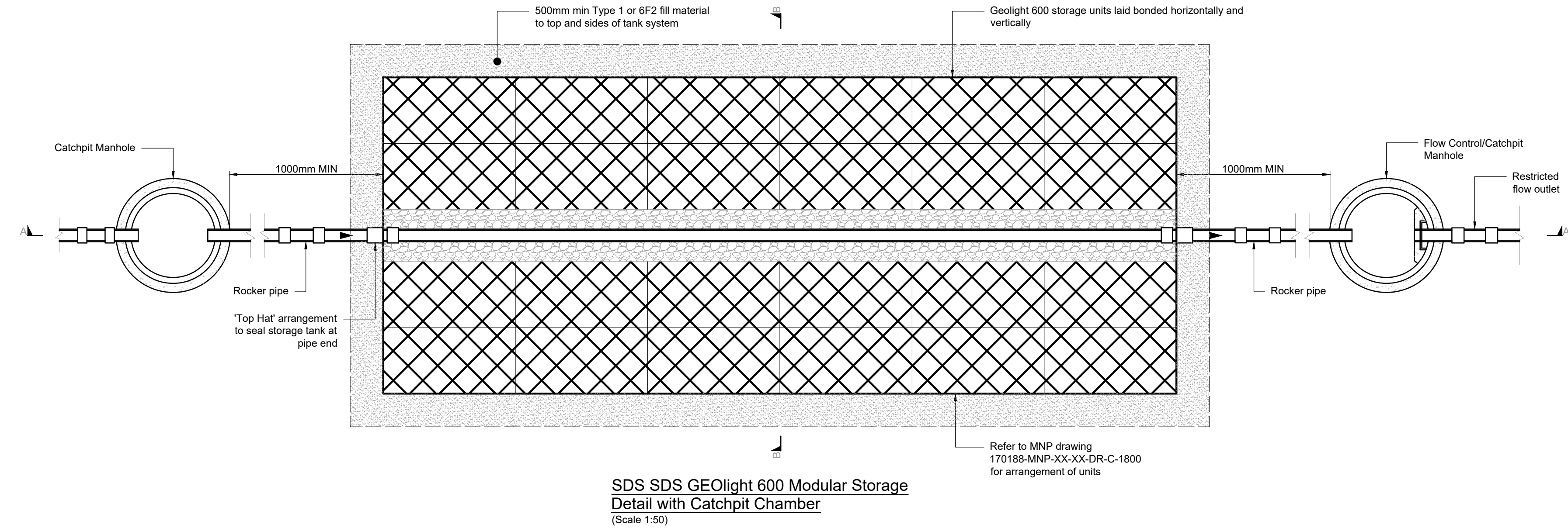
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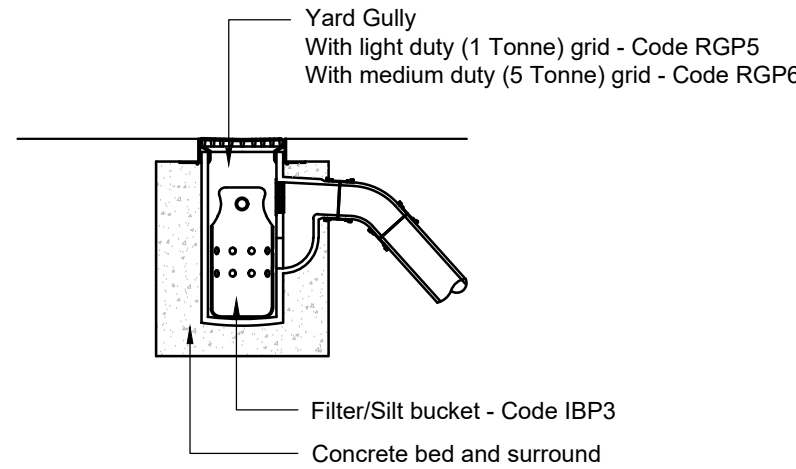
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DRAWING TITLE
Site Wide Typical Drainage Details Sheet 1

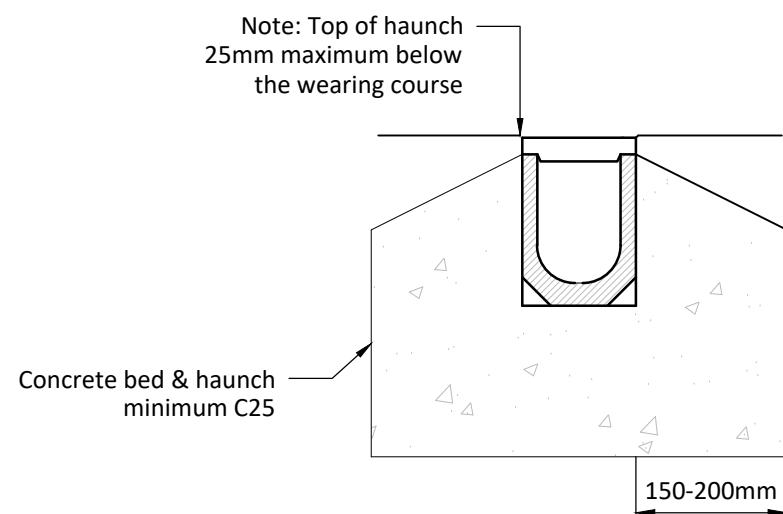
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MNP No.	STATUS CODE	REV
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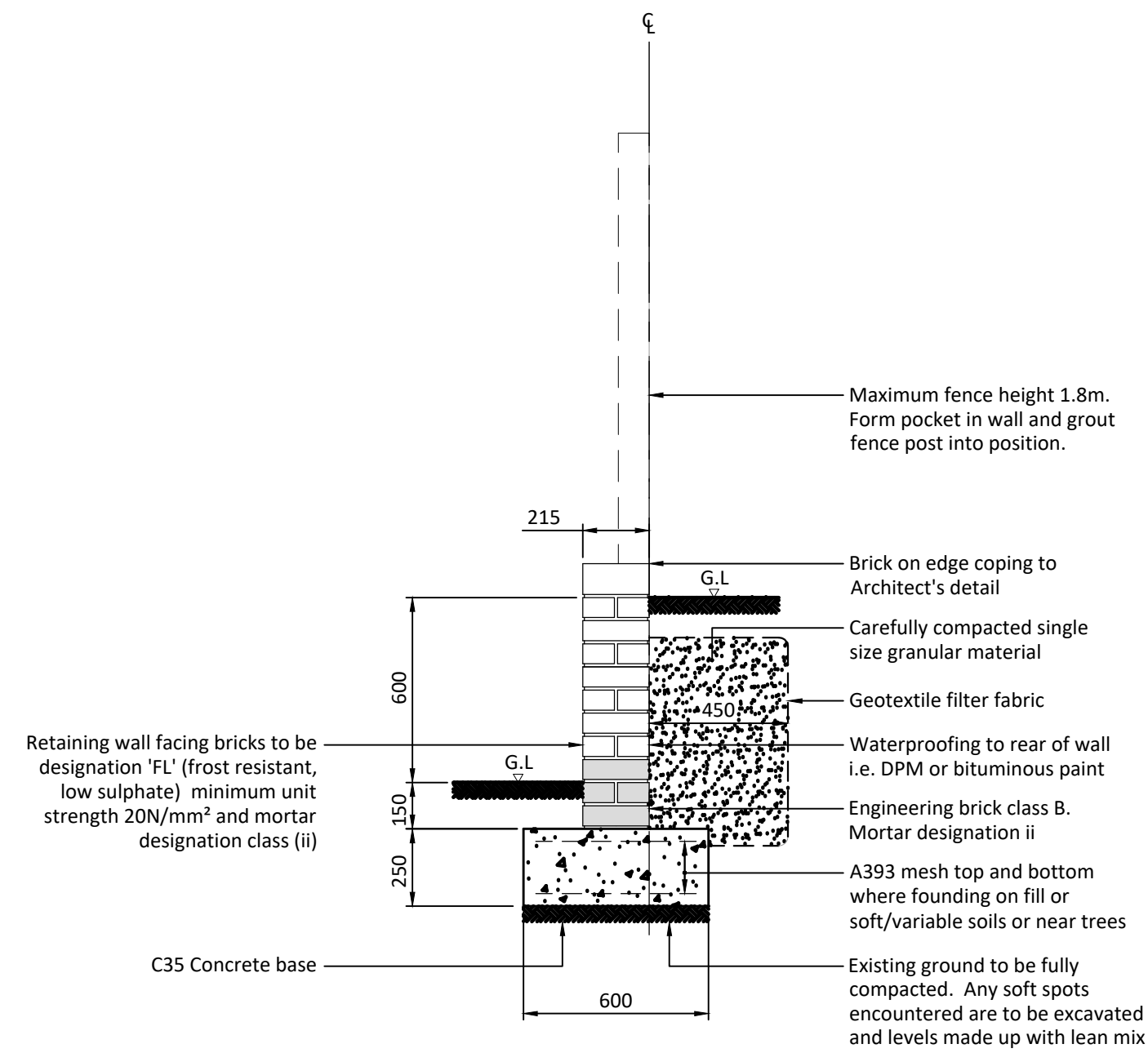
Gully Detail
450mm x 900mm for Road Gully, 375mm x 750mm for Car Park Gully
(Scale 1:25)



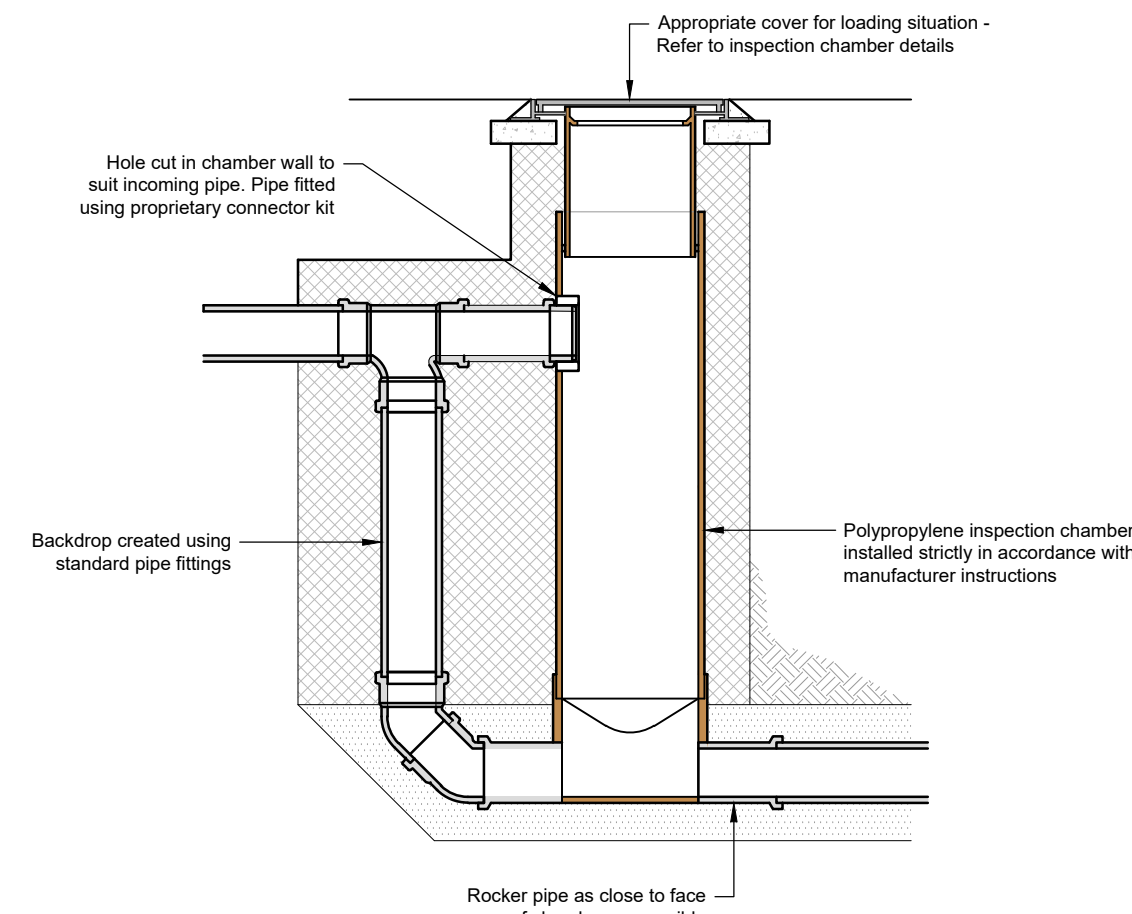
Trapped Yard Gully
(Scale 1:25)



ACO Drain Detail
(Scale 1:10)



600 Masonry Retaining Wall
(No Fence)



Typical Inspection Chamber Backdrop Detail
(Scale 1:25)

General

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C01	Construction Issue	05.03.24	RJ
P02	Stage 4 Issue	26.01.24	RJ
P01	Stage 3 Issue	31.07.23	RJ
REV	COMMENTS	DATE	CHK
STATUS			

CONSTRUCTION

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Consulting Civil and Structural Engineers

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CLIENT

TTSP

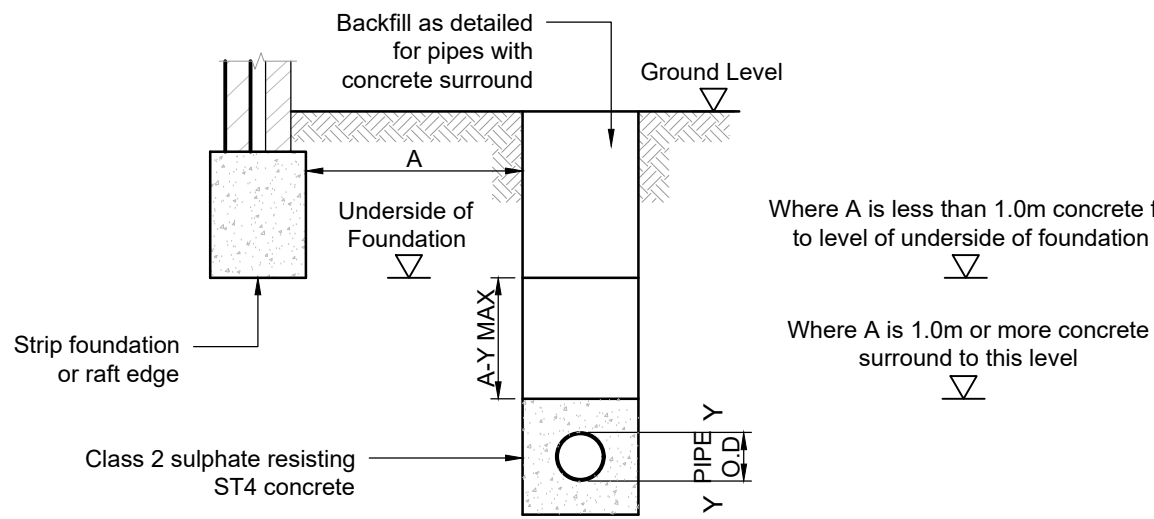
PROJECT

KS DC Manchester

DRAWING TITLE

Site Wide Typical Drainage Details
Sheet 2

SCALE (B/A1)	DRAWN BY	DATE
1:25	AGD	July 2023
MNP No.	STATUS CODE	REV
223169	S4	C01
Ref No.	170188-MNP-ZZ-XX-DR-C-2801	

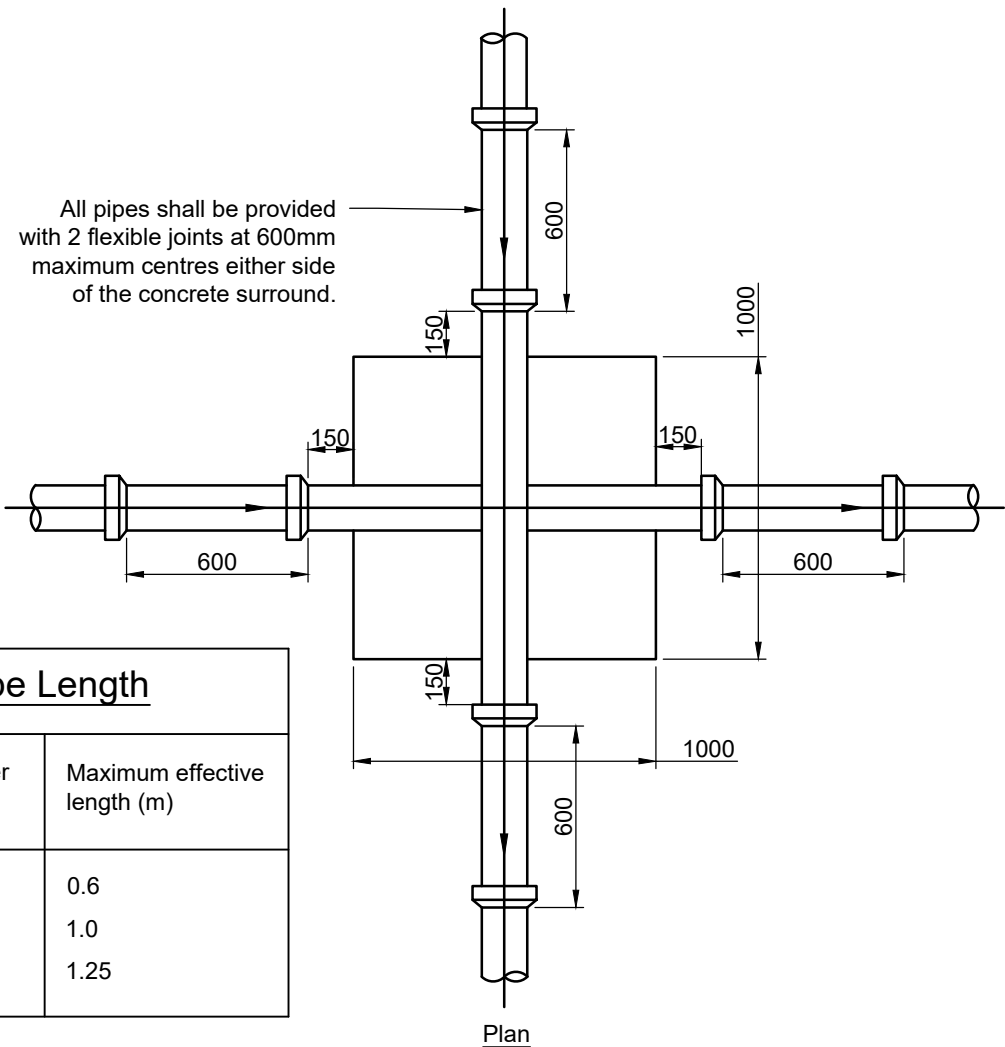


Pipe Runs Near Buildings
(Scale 1:25)

PIPE Ø (mm)	Y minimum		MAXIMUM TRENCH WIDTH	L
	Y1 min	Y2 min		
150	100	200	750	18
225	100	200	825	18
300	100	200	925	18
375	100	200	1090	18
450	150	200	1175	36
525	150	250	1270	36
600	150	250	1370	36
675	150	250	1420	36
750	225	300	1500	36
825	225	300	1585	36

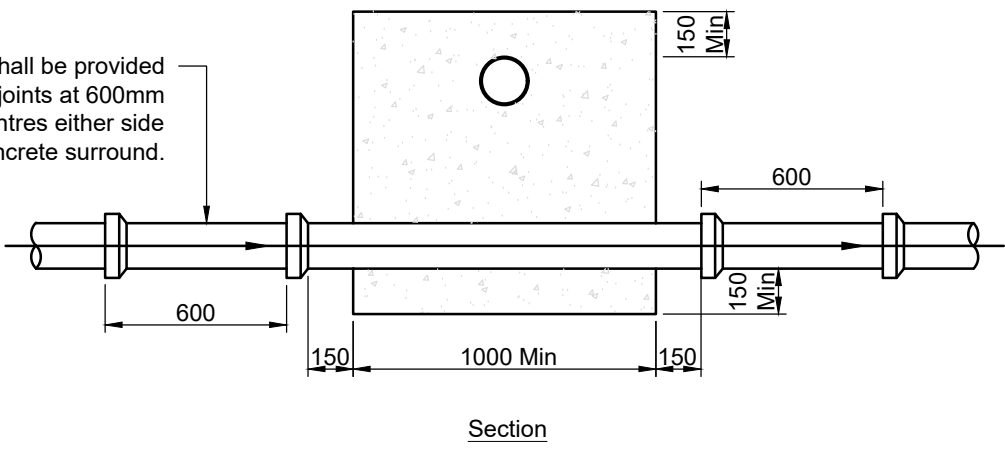
Dimensions for Pipe Bedding

Flexible joints shall be provided in concrete, by inserting compressible board at intervals not exceeding 5000mm precut to diameter, height and width equal to the concrete cross section. Refer to dimensions for pipe bedding tables for thickness of filler. For values of y refer to dimensions for pipe bedding tables



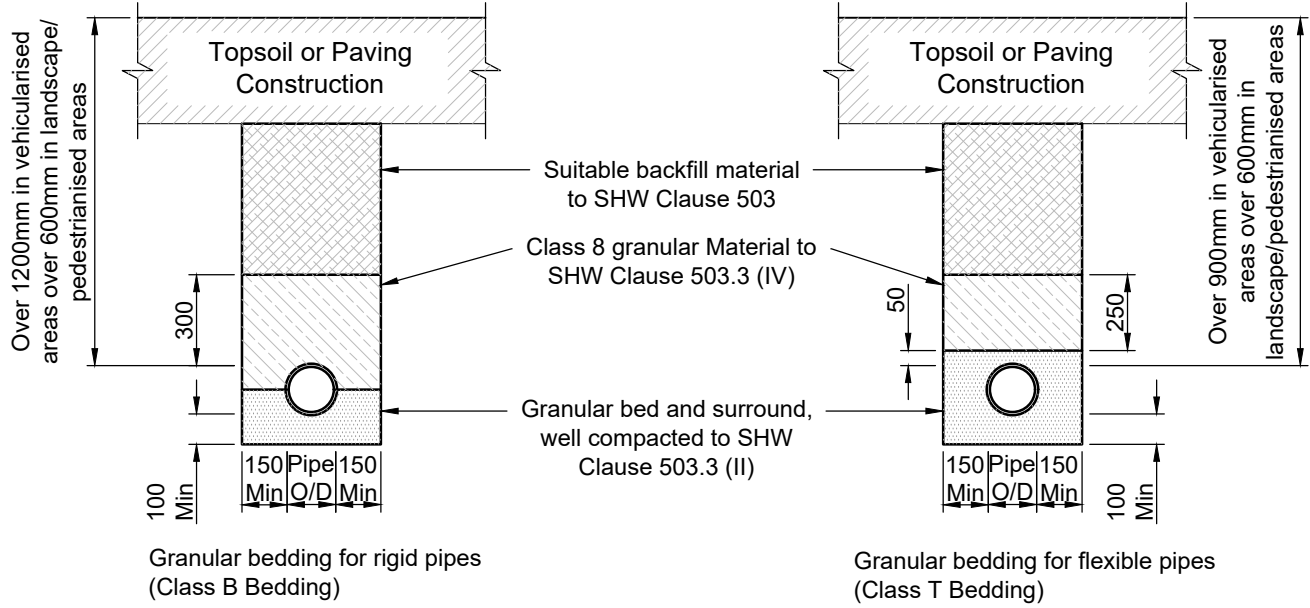
Rocker Pipe Length	
Nominal diameter of pipe (mm)	Maximum effective length (m)
150 TO 600	0.6
675 TO 750	1.0
OVER 750	1.25

All pipes shall be provided with 2 flexible joints at 600mm maximum centres either side of the concrete surround.



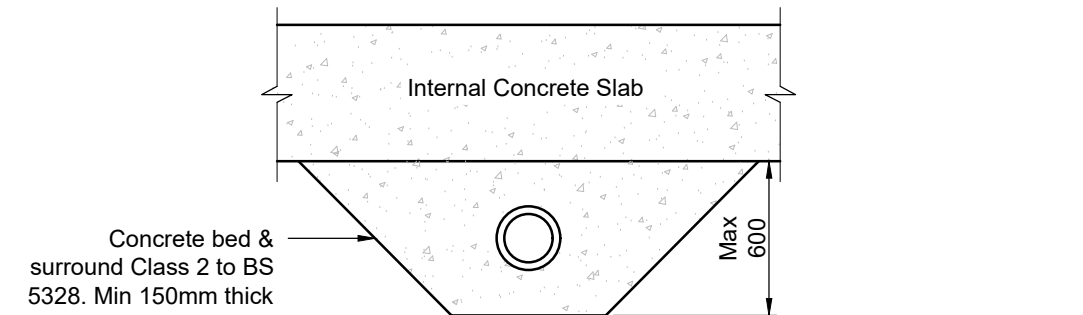
Concrete surround shall be provided where the distance between the soffit of the lower drain and the barrel of the highest drain is less than 300mm

Pipe to Pipe Crossover
(Scale 1:25)

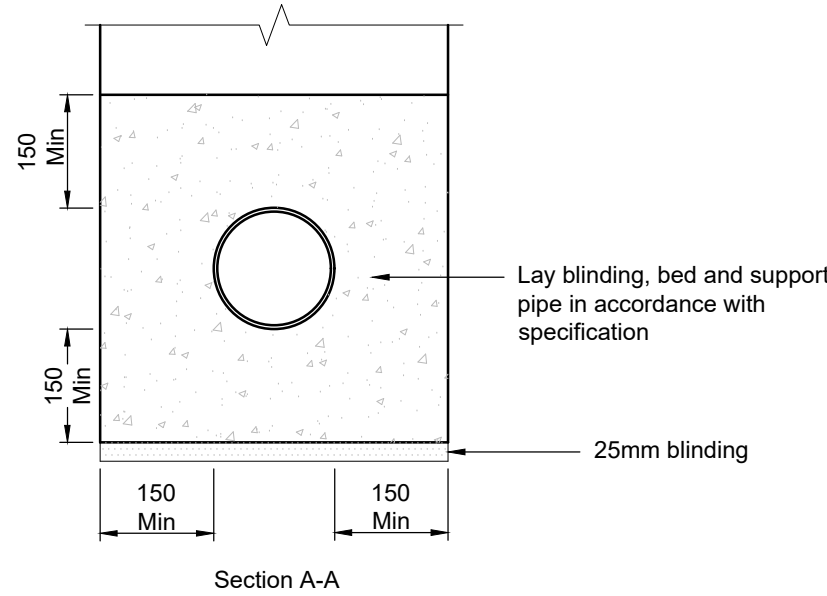
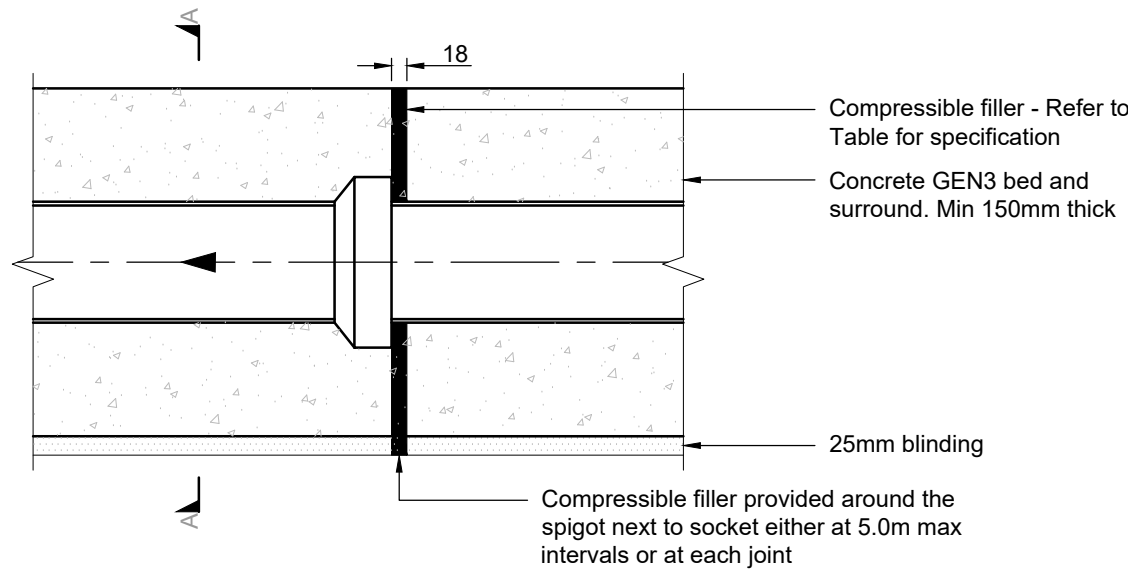


Bedding beneath and at the sides of the pipe to be well compacted the first 300mm fill above the crown of the pipe is to be lightly tamped by hand. Mechanical compaction may be used only above this level, geotextiles may be used where directed or approved by the engineer to contain bedding material in certain soils e.g. running sand in very wet conditions, where directed or approved by the engineer a temporary land drain may be laid within the granular bed.

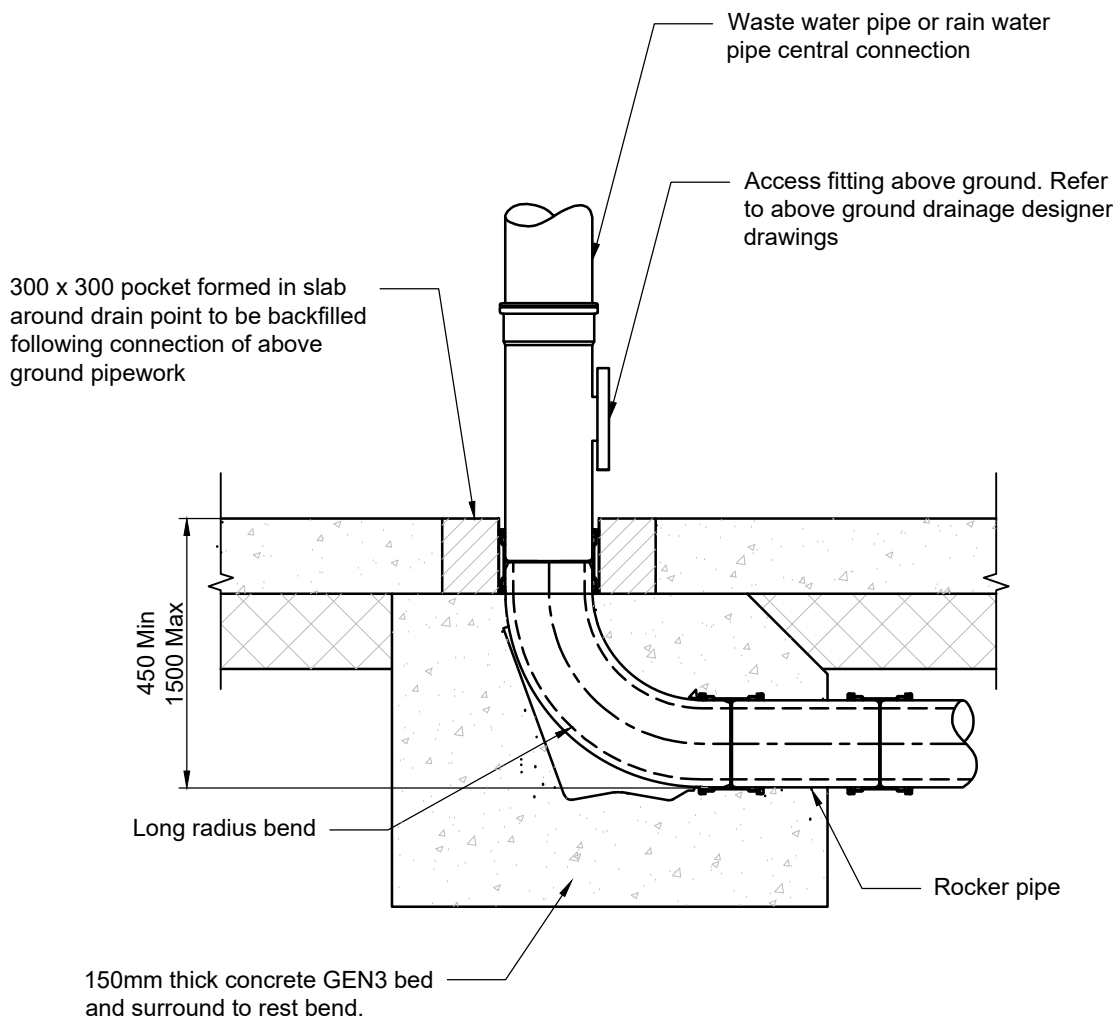
Pipe Bedding Details
(Scale 1:25)



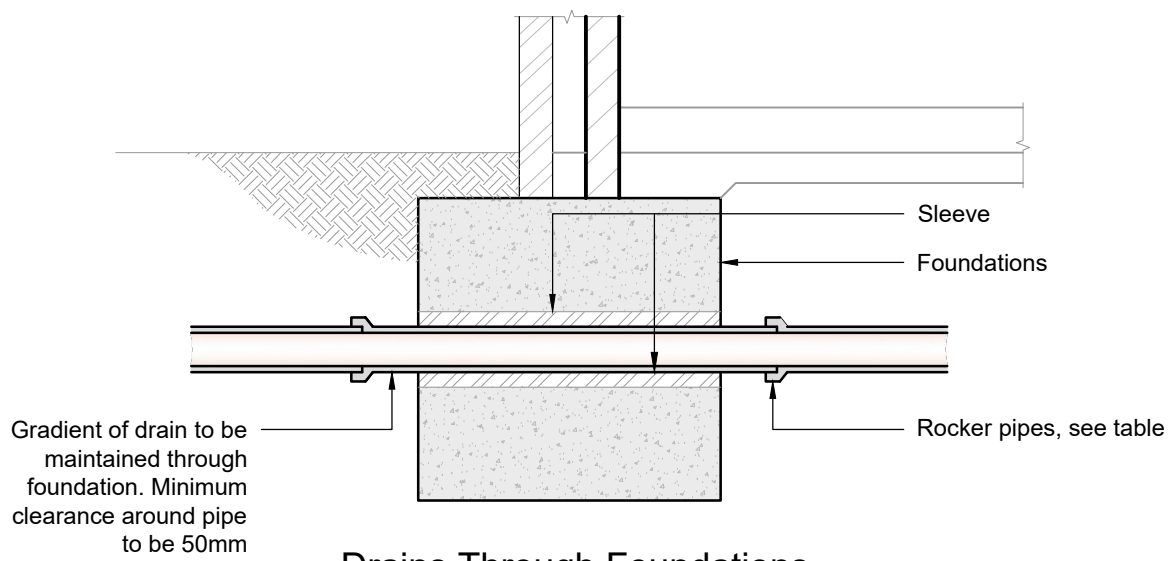
Pipe Bedding Under Slab
(Scale 1:25)



Pipe Bedding Class Z
(Scale 1:10)



Below Ground Pipe Connection Detail
(Scale 1:10)

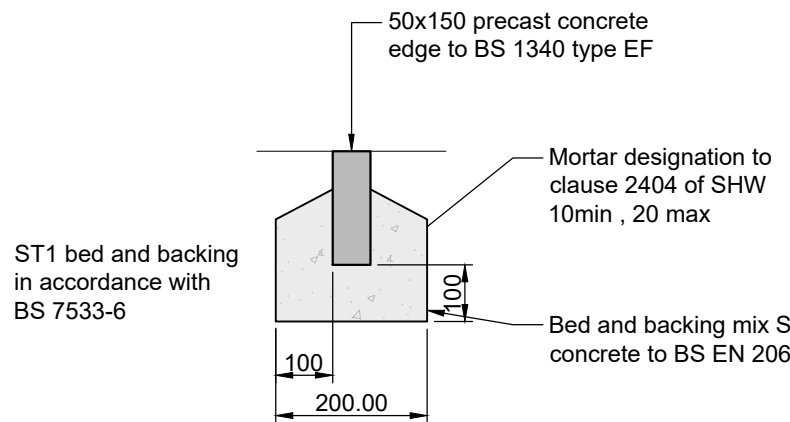


Drains Through Foundations
(Scale 1:25)

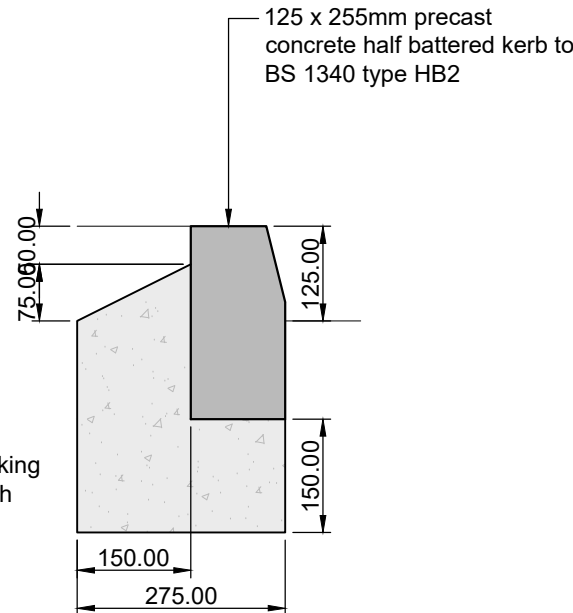
Rocker Pipe Length (mm)	Pipe Diameter (mm)
600	150 - 600
1000	675 - 750
1250	> 750

Drain sleeve/duct to be located wholly within the middle third of the foundation depth. Engineer is to be advised if this is not possible. In normal soil conditions the sleeve/duct is to give a 50mm clearance all round the outside of the drain pipe (this may be achieved by lightly packing the space with compressible filler material) maximum sleeve size to be 300mm without reference to the Engineer.

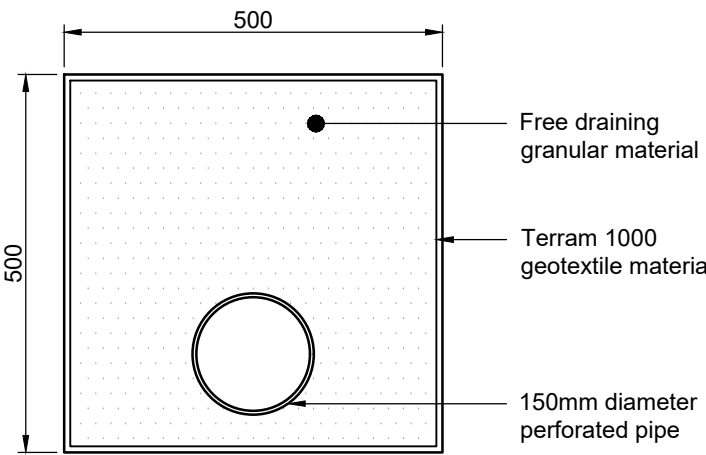
Sleeve/duct is to give a 50mm clearance all round the outside of the drain pipe (this may be achieved by lightly packing the space with compressible filler material) maximum sleeve size to be 300mm without reference to the Engineer.



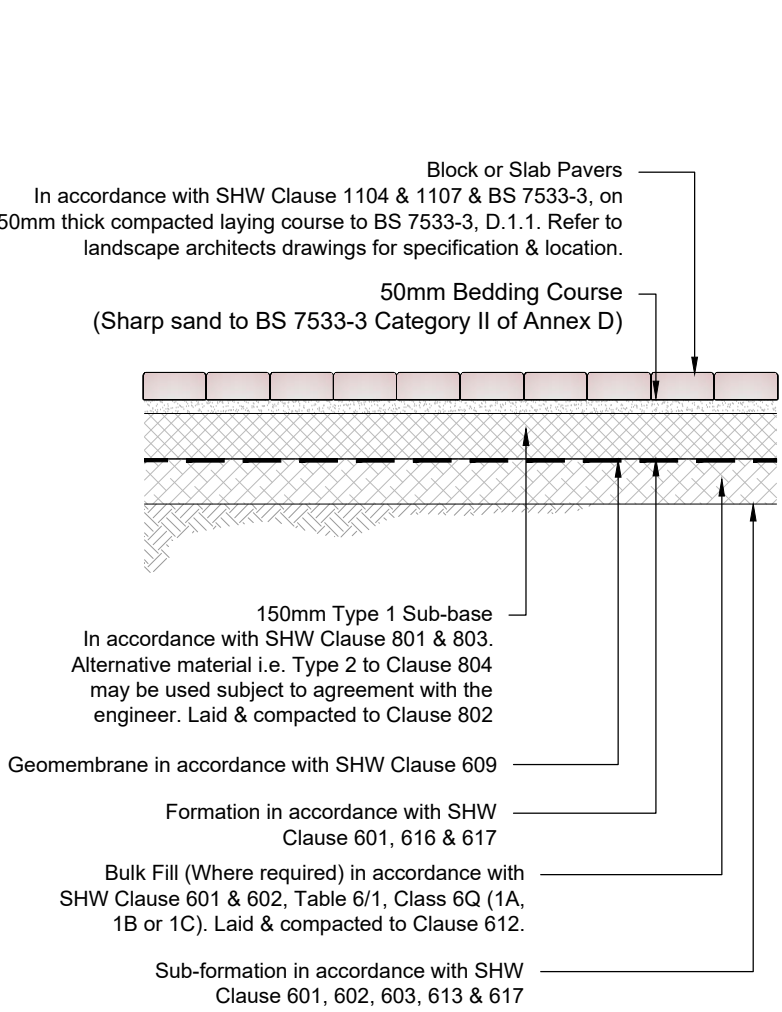
Kerb Detail - EF
(Scale 1:10)



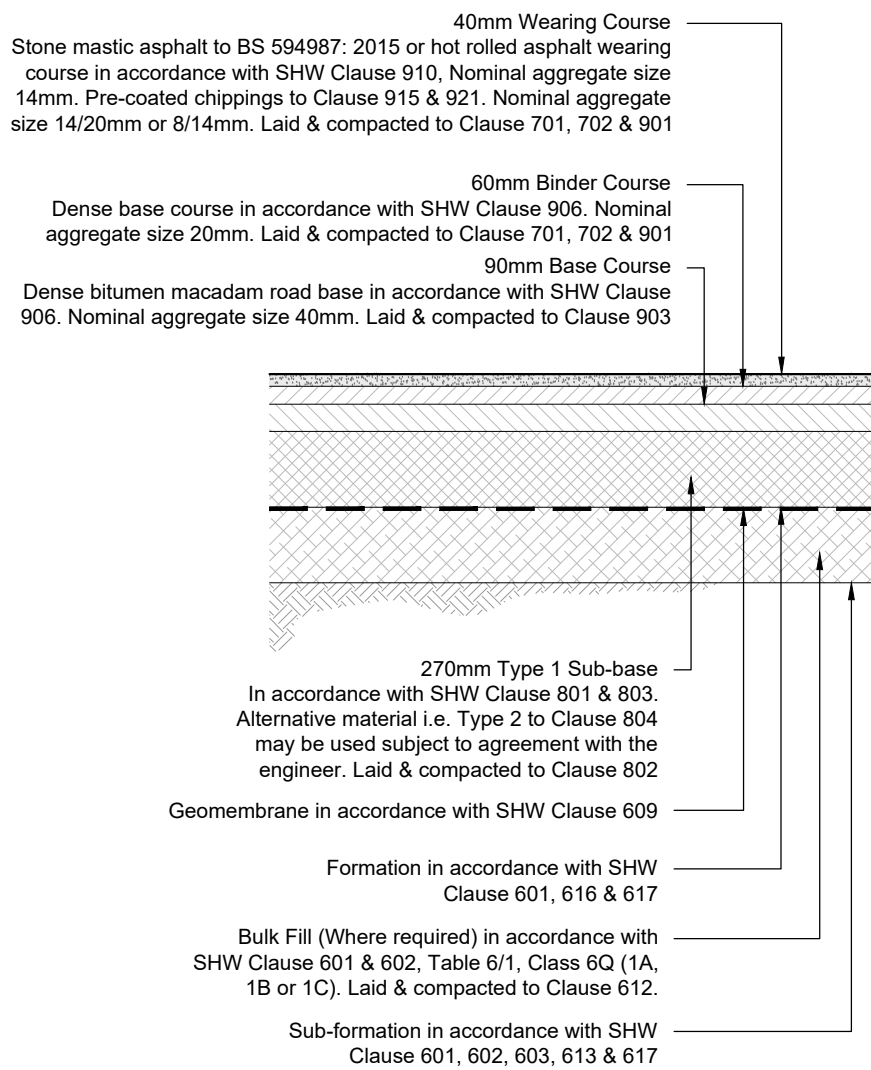
Kerb Detail - HB2
(Scale 1:10)



French Drain Detail
(Scale 1:10)



Pedestrian Block Paving
(Scale 1:25)



Heavy Duty Vehicular Road
(Scale 1:25)

Pavement Thickness			
CBR%	Sub-base (mm)	Sub-base + Capping (mm)	MPa
2.5	420	250 + 420	32
3	370	230 + 370	36
4	310	220 + 320	43
5	270	200 + 250	49
7	250	170 + 230	61
10	220	150 + 200	77
12	215	150 + 180	86
15	200	150 + 150	100

Note
This Table is based on CD 225 - Design for new pavement foundations (Formerly IAN 73/06 Revision 1 (2009) HD 25/94) Revision 1 (2020)

Note
Details shown on this drawing are based on a minimum subgrade CBR Value of 5%

Note
Capping to be adjusted to suit CBR Values. See Table above, if in doubt contact the Engineer.

General
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PROJECT	KS DC Manchester
DRAWING TITLE	Site Wide Typical Drainage Details Sheet 3

SCALE @ A1	DRAWN BY	DATE
1:25	AGD	July 2023
MNP No.	STATUS CODE	REV
223169	S4	C01
Ref No.	170188-MNP-ZZ-XX-DR-C-2802	

