

Hough End Sports Village, Manchester

Verification & Drainage Maintenance Strategy

Curtins Ref: HEV-CUR-XX-XX-RE-C-92010

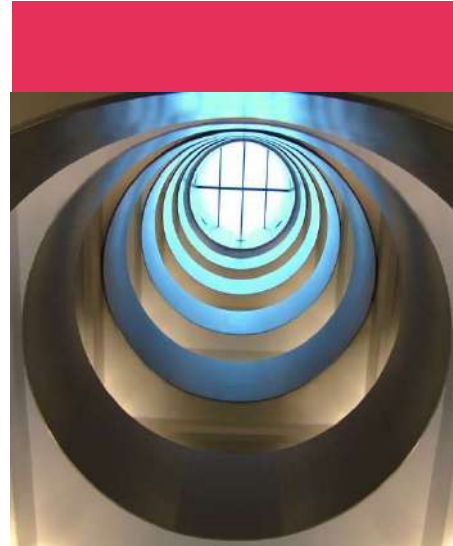
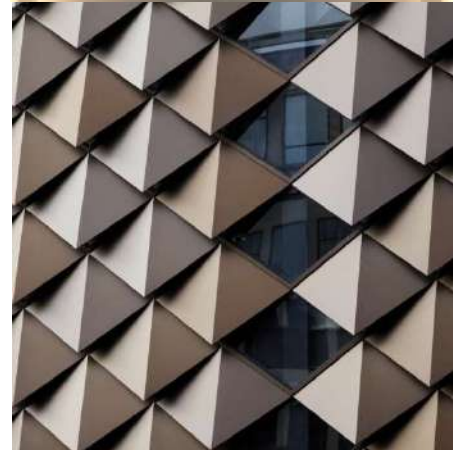
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Client Name: ISG Ltd

Site Address: Hough End Sports Village, Manchester



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Control Sheet

Rev	Description	Issued by	Checked	Date
V01	Issued for Planning Condition Discharge	CS	CG	08/05/2024

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Appendix C

Aco QBrake Manufacturers Information

SDS Geolight Manufacturers Information

1.0 Introduction

1.1 Project Background

- 1.1.1 Curtins have been appointed by ISG Ltd to provide a Verification and Drainage Maintenance Strategy for the proposed below ground drainage design at the Hough End Sports Village, Princess Road, Manchester.

1.2 Scope of the Verification and Maintenance Strategy

- 1.2.1 This report demonstrates the below ground drainage which has been installed for the development site and provides product information to inform future maintenance requirements.
- 1.2.2 This manual is intended to give an overview of the operation and maintenance for the drainage features included with the drainage strategy and in relation to typical details only. Where proprietary products are specified the manufacturer's instructions and recommendations should be followed in priority to this document unless specifically noted otherwise due to project constraints.
- 1.2.3 The recommended operations and frequencies are typical only and should be more frequent initially to ensure that there are no unforeseen issues with the operation and then adjusted to suit the site requirements.

2.0 Drainage Strategy

2.1 General

- 2.1.1 The drainage network on site is a private drainage network.
- 2.1.2 The drainage network is a separate foul and surface water system within the development, with a new foul outfall connecting to the combined public sewer in Princess Road and a new surface water outfall connecting to the Red Lion Brook.

2.2 Foul Drainage

- 2.2.1 The current peak foul flow rate has been estimated at **14 l/s** based on the Discharge Units.
- 2.2.2 The Final Construction Drainage Drawings are enclosed in *Appendix A*.

2.3 Surface Water Drainage

- 2.3.1 Any new development site drainage should be designed in accordance with current best practice to provide adequate capacity not to flood for the critical 1 in 30-year storm event and flood water generated for up to the critical 1 in 100-year plus climate change storm event shall be constrained within the areas on site so not to cause damage to buildings, essential services or adjoining developments and services.
- 2.3.2 Based on the nature of the development, a lifespan in excess of up to 60 years is anticipated. Therefore, the potential climate change allowance for 2070-2115 ranges between 20% for the central allowance and 40% for the upper end allowance. As such, an allowance of 40% for climate change on peak rainfall intensity has been included in the design.
- 2.3.3 Assessment was completed at preliminary design stage to confirm the most viable method of discharge was connection to the Red Lion Brook at a restricted rate. The restriction is achieved by a hydro-brake flow control located in manhole S13.
- 2.3.4 The proposed network on site requires attenuation to provide capacity to accommodate the volumes generated during the 1 in 100 year +40% design event whilst maintaining the maximum flow restrictions.
- 2.3.5 The network connects to a below ground cellular attenuation tank located below the car park at ground floor. The attenuation tank provides approximately 106m³ of storage.
- 2.3.6 The new car parking bays are to be drained via a permeable construction build up with excess flow draining to a central below ground swale. The permeable construction and swale include a minimum 150mm layer of course graded aggregate with 30% voids.
- 2.3.7 Due to the very low risk of oil being conveyed to the surface water system, due to the car park being drained via permeable paving, a petrol interceptor or similar is not required.

2.3.8 The Final Construction Drainage Drawings are enclosed in *Appendix A*.

2.4 Approvals

2.4.1 The connection to the public sewer in Princess Road has been approved under a Section 106 Agreement referenced 02503948. The correspondence is enclosed in *Appendix B*.

3.0 Verification

3.1 Introduction

3.1.1 The Verification section has been developed with reference to the drainage design details and philosophy provided in section 2 of this report. Manchester City Council requirements are to verify the installation of the Drainage and SuDS to confirm by Photographic record that this has been installed.

3.1.2 The following elements have been recorded:

- Attenuation Tank
- Flow Control
- Permeable Paving
- Swale

3.2 Photographic Information

Attenuation Tank

3.2.1 The attenuation tank is a SDS Geolight product. Manufacturers information is enclosed in *Appendix C*.

3.2.2 Tank Installation photograph is shown in Figure 1.

Figure 1 – Attenuation Tank Installation



Flow Control

3.2.3 Permeable Paving Installation photograph is shown in Figure 2.

Figure 2 – Flow Control Installation



Permeable Paving

3.2.4 Permeable Paving Installation photographs are shown in Figure 3.

Figure 3 – Permeable Paving Installation



Swale

3.2.5 Swale Installation photographs are shown in Figures 4 – 5.

Figure 4 – Swale Installation



Figure 5 – Swale Installation



4.0 Maintenance Recommendations

4.1 General Maintenance

- 4.1.1 The maintenance strategy should be adopted to ensure the drainage network is cleaned regularly and the routine maintenance and cleansing regime should be documented.
- 4.1.2 A copy of the final construction drainage layout should be provided in the final Operations and Maintenance Manual along with this report.
- 4.1.3 Reference should be made to the following drawings:
- HEV-CUR-XX-XX-DR-C-92500 – Drainage Layout Sheet 1
 - HEV-CUR-XX-XX-DR-C-92501 – Drainage Layout Sheet 2
 - HEV-CUR-XX-XX-DR-C-92502 – Building Drainage Layout
 - HEV-CUR-XX-XX-DR-C-92503 – Manhole Schedule
 - HEV-CUR-XX-XX-DR-C-92520 – Drainage Details Sheet 1
 - HEV-CUR-XX-XX-DR-C-92521 – Drainage Details Sheet 1
 - HEV-CUR-XX-XX-DR-C-92522 – Drainage Details Sheet 1
 - HEV-CUR-XX-XX-DR-C-92523 – Drainage Details Sheet 1
 - HEV-CUR-XX-XX-DR-C-94700 – External Works General Arrangement
- 4.1.4 The maintenance scheduling should begin from the completion date.
- 4.1.5 It is recommended that the drainage system is inspected as a minimum twice a year, with the system also being inspected after any major storm event.
- 4.1.6 Significant sediment deposition is likely in areas used for storage, so a post clean-up operation may be required including the removal of litter, vegetation, sewerage debris and larger objects.
- 4.1.7 Long-term management practices include monthly sweeping of external paved areas. The sweeping program will remove sand and contaminants directly from paved surfaces before they become mobilised during storm events and transported to the drainage system.
- 4.1.8 During the winter months, drainage features such as gullies and channels should be cleared of ice, snow, debris or litter.
- 4.1.9 Sediment/Material removal should be undertaken in consultation with the environmental regulator to confirm appropriate protocols where applicable.

4.2 Responsibilities

- 4.2.1 Maintenance of the private drainage network within the development Ownership Boundary will be the responsibility of the Building Operator:
- 4.2.2 Maintenance of the drainage network outside of the development Ownership Boundary will be the responsibility of Manchester City Council and United Utilities.

4.3 Components

- 4.3.1 The following components have been included within the drainage design for the proposed development:
 - Inspection, Manhole and Catchpit Chambers
 - Pipes
 - Drainage Channels and Gullies
 - Cellular Storage/Attenuation
 - Flow Control - QBrake
 - Permeable Paving

4.4 Inspection, Manhole and Catchpit Chambers

- 4.4.1 The locations of the chambers are indicated on Curtins drainage drawing HEV-CUR-XX-XX-DR-C-92500.
- 4.4.2 Access points have been located at the head of each run, at a change in direction and at a change of pipe size in accordance with Building Regulations Part H.
- 4.4.3 The appropriate barriers and signage should be installed during any opening of manholes to warn site users/pedestrians.
- 4.4.4 When accessing chambers, the latest Health and Safety legislation should be adhered to.
- 4.4.5 The appropriate health and safety equipment must be used when accessing manholes. Confined space certificates must be held by any personnel entering a manhole and the appropriate permits should be obtained from the Facilities Maintenance Manager prior to any access.
- 4.4.6 Sediment\material removal should be undertaken in consultation with the environmental regulator to confirm appropriate protocols; especially where run-off is taken from potentially contaminated areas.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required)	Initial inspection should be provided as post construction CCTV survey.	N/A
	Inspect for evidence of poor operation via water level in chambers. If required take remedial action.	3-monthly, 48 hours after large storms.
Occasional maintenance	Check and remove large vegetation growth near pipe runs.	6 monthly
Remedial actions	Rod through poorly performing runs as initial remediation.	As required.
	If continued poor performance jet and CCTV survey poorly performing runs.	As required.
	Seek advice as to remediation techniques suitable for the type of performance issue and location.	As required If above does not improve performance.

4.5 Pipes

- 4.5.1 The locations of the pipes are indicated on Curtins drainage drawing HEV-CUR-XX-XX-DR-C-92500.
- 4.5.2 Pipes are proprietary products, and the materials can vary across the site and as such where used the manufacture's recommendations should be followed. Regardless of the product used the pipes are fully compliant with the Curtins drainage specification.
- 4.5.3 Pipes are intended to be the main conveyance across the development and where oversized they form the attenuation volume required by the limitation of the discharge rate. They are intended to be dry except for during rainfall events. These have been designed to be self-cleansing where possible for smaller diameter pipes, and for larger diameters the risk is reduced due to the overall pipe size.
- 4.5.4 Access for maintenance is provided through access chambers and manholes.
- 4.5.5 Regular inspection and maintenance is important to identify areas which may have been obstructed/clogged and may not be drainage correctly thus exposing the development to a greater level of flood risk.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required)	Initial inspection should be provided as post construction CCTV survey.	N/A
	Inspect for evidence of poor operation via water level in chambers. If required, take remedial action.	3-monthly, 48 hours after large storms.
Occasional maintenance	Check and remove large vegetation growth near pipe runs.	6 monthly
Remedial actions	Rod through poorly performing runs as initial remediation.	As required.
	If continued poor performance jet and CCTV survey poorly performing runs.	As required.
	Seek advice as to remediation techniques suitable for the type of performance issue and location.	As required If above does not improve performance.

4.6 Drainage Channels and Gullies

- 4.6.1 The locations of the drainage channels and gullies are indicated on Curtins drainage drawing HEV-CUR-XX-XX-DR-C-92500.
- 4.6.2 Channels and gullies should be inspected and cleaned in accordance with the manufacturer's details.
- 4.6.3 Channels and gullies installed have removable covers to allow cleaning and clearing of debris and silt.
- 4.6.4 Channel units can be cleaned through the use of a high-pressure hose; this can be fed into the channel system through access units strategically placed along the channel run. The throat section of channel units should be kept clear at all times to ensure uninterrupted flow of surface water into the drainage channel and any debris within the throat should be removed.
- 4.6.5 The appropriate barriers and signage should be installed during any opening of gullies/channel outlet boxes to warn site users/pedestrians.

- 4.6.6 Locking bolts should be replaced and sufficiently tightened, taking care that the bolt heads do not stand above the top surface of the cover or grate. If covers are allowed to move within their frame, this may cause damage to the frame or seating.
- 4.6.7 Sediment\material removal should be undertaken in consultation with the environmental regulator to confirm appropriate protocols; especially where run-off is taken from potentially contaminated areas such as the car park drainage.

4.7 Cellular Storage

- 4.7.1 The location of the attenuation tank is indicated on Curtin's drainage drawing HEV-CUR-XX-XX-DR-C-92500.
- 4.7.2 The attenuation tank is currently specified as geocellular units and are intended for storage of surface water run-off from the site up to and including the 1 in 100 year plus 40% climate change event to reduce the rate of run-off into the downstream network and to minimise flood risk.
- 4.7.3 The geocellular units are proprietary products and therefore manufacturer's recommendations should also be taken into consideration.
- 4.7.4 Access for maintenance has been provided by an access shaft located on the tank and from the manhole chambers downstream of the tank.
- 4.7.5 Geocellular units are proprietary products and therefore manufacturer's recommendations should also be taken into consideration. Additionally, different manufacturers may have different connection types and arrangements which will need to be taken into consideration.
- 4.7.6 Manufacturers information is enclosed in *Appendix C*.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required)	Inspect inlets, outlets and overflows for blockages, and clear if required. If faults persist jetting and CCTV survey may be required.	Monthly and after large storms.
	Check penstocks and other mechanical devices (if present).	Half yearly.
Regular maintenance\inspection	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then six monthly

	Debris removal from catchment surface (where may cause risks to performance)	Monthly
	Where rainfall infiltrates into blocks from above, check surface of filter for blockage by silt, algae or other matter. Remove and replace surface infiltration medium as necessary.	Monthly (and after large storms)
	Remove sediment from pre-treatment structures	Annually (or as required after heavy rainfall events)
Remedial actions	Repair/rehabilitation of inlets, outlet, overflows and vents.	As required.

4.8 Flow Control Units – Aco QBrake

- 4.8.1 The locations of the Flow Control Chambers are indicated on Curtin's drainage drawings HEV-CUR-XX-XX-DR-C-92500.
- 4.8.2 The flow control units are intended for flood control and flow restriction.
- 4.8.3 The flow control has been installed as an Aco QBrake product and is a proprietary product; therefore, manufacturer's recommendations should also be taken into consideration.
- 4.8.4 Access for maintenance has been provided by locating within manhole chambers.
- 4.8.5 Manufacturers information is enclosed in *Appendix C*.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required).	Inspect inlets for blockages, and clear if required. If faults persist jetting and CCTV survey may be required.	Monthly and after large storms.

Regular maintenance\ inspection	Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months, then six monthly.
	Debris removal from catchment surface (where may cause risks to performance).	Monthly
	Remove sediment from pre-treatment structures and flow control chambers.	Annually (or as required after heavy rainfall events)
Remedial Actions	Repair/rehabilitation of inlets.	As required.

4.9 Permeable Pavements

- 4.9.1 The locations of the permeable pavements are indicated on Curtin's drainage drawing HEV-CUR-XX-XX-DR-C-92500.
- 4.9.2 Permeable pavements contain proprietary products and as such, where used, the manufacturer's recommendations should be followed.
- 4.9.3 The permeable pavements are intended to be water quality and attenuation storage features. These features are intended to be dry except during rainfall events.
- 4.9.4 The surface has been designed to contain gaps where rain can flow through the upper construction layers into the voided stone which makes up the subbase. Where these features are intended to be used as infiltration devices or soakaways any capping also needs to be permeable to permit the flows to the formation. In this instance, all permeable paved areas are fully sealed to permit no infiltration and outlet pipes are provided.
- 4.9.5 Access for maintenance is provided via the surface or via the inspection points which are positioned in various areas across the length of the permeable paved area.
- 4.9.6 Regular inspection and maintenance is important for the effective operation of the permeable pavement.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required).	Initial Inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth. If required, take remedial action. Inspect silt accumulation rates and establish appropriate brushing frequencies. Silt can also be caused by adjacent landscaping areas which should be reprofiled to provide a flat area or berm adjacent to the paving.	3-monthly, 48 hours after large storms.
Regular maintenance\ inspection	Brushing and Vacuuming	Three times/year at end of winter, mid-summer, after autumn leaf fall, or as required based on site specific observations of clogging or manufacturers' recommendations.
Occasional maintenance	Stabilise and mow contributing and adjacent areas.	As required and as per landscape architect's specification.
	Removal of weeds	As required.
Remedial Action	Remediate any landscaping which, through vegetation maintenance or soil slip, has	As required.

	been raised to within 50 mm of the level of the paving.	
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users.	As required.
	Rehabilitation of surface and upper sub-structure. This could include replacement of the jointing and bedding material. The upper geotextiles layer may also need replacing if clogged and generally have a life span of 25 years.	As required (if infiltration performance is reduced as a result of significant clogging).

Appendix A

HEV-CUR-XX-XX-DR-C-92500 – Drainage Layout Sheet 1

HEV-CUR-XX-XX-DR-C-92501 – Drainage Layout Sheet 2

HEV-CUR-XX-XX-DR-C-92502 – Building Drainage Layout

HEV-CUR-XX-XX-DR-C-92503 – Manhole Schedule

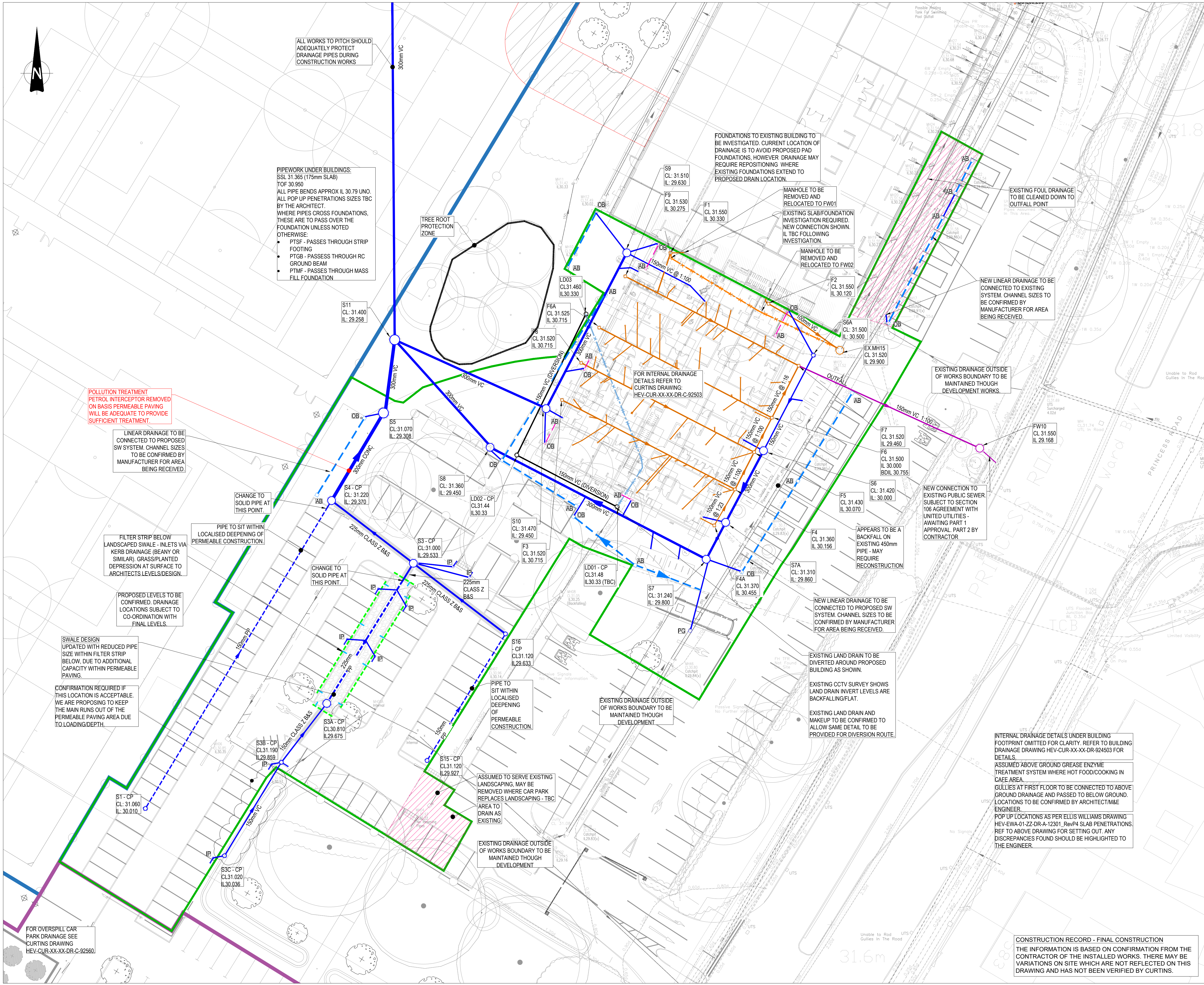
HEV-CUR-XX-XX-DR-C-92520 – Drainage Details Sheet 1

HEV-CUR-XX-XX-DR-C-92521 – Drainage Details Sheet 1

HEV-CUR-XX-XX-DR-C-92522 – Drainage Details Sheet 1

HEV-CUR-XX-XX-DR-C-92523 – Drainage Details Sheet 1

HEV-CUR-XX-XX-DR-C-94700 – External Works General Arrangement



GENERAL NOTES:

- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
- STRATEGY BASED ON NO AVAILABLE TOPOGRAPHICAL SURVEY AND CCTV SURVEY INFORMATION AVAILABLE AT THE TIME OF DESIGN AND SHOULD BE REASSESSED UPON RECEIPT.
- REFER TO THE CURTINS CCTV DRAINAGE SURVEY REVIEW DRAWINGS 92011 & 92012 FOR INFORMATION ON FURTHER WORK REQUIRED AN ALLOWANCES TO BE MADE FOR EXISTING DRAINAGE
- REFER TO CURTINS NOTES DRAWING 92502 FOR DRAINAGE. NOTES.
DRAWING IS BASED ON:
 - ARCHITECT LAYOUT - HEV-EWA-02-XX-DR-L-79001_RevP13
 - POP UPS - HEV-EWA-01-ZZ-DR-A-12301_RevP4
 - TOPOGRAPHICAL SURVEY REF: U21-4667 February 2020.
 - DRAINAGE CCTV SURVEY REF: U21-4667 March 2021.
 - FOUNDATION LAYOUT - 076170-CUR-01-ZZ-M3-S-00001 - Structural Plan - 26.07.22
 - ISG AS BUILT COMMENTS, RECEIVED MARCH 2024; HEV-CUR-XX-XX-DR-C-94700 (Markup)

- KEY
- APPROXIMATE EXTENT OF WORKS FOR BUILDING EXTENSION AND CAR PARK EXTENSION. TO BE CONFIRMED.
 - PROPOSED FOUL DRAINAGE
 - PROPOSED SURFACE WATER DRAINAGE
 - PROPOSED FLOW CONTROL CHAMBER
 - PROPOSED ACO Q-MAX SLOT DRAIN. ACCESS BOX TO HIGH END, OUTLET BOX TO LOW END. OUTLET PIPE TO MATCH CHANNEL SIZE. TBC BY MANUFACTURER. REFER TO ACO DESIGN DES019950v1 FOR CHANNEL SIZES
 - PROPOSED THRESHOLD DRAINAGE FACADE SLOT. ACCESS BOX TO HIGH END, OUTLET BOX TO LOW END. SHALLOW OUTLET BOX TO BE USED. OUTLET PIPE TO MATCH CHANNEL SIZE. TBC BY MANUFACTURER.
 - PROPOSED KERB DRAIN (BEANY OR SIMILAR). OUTLET PIPE TO FILTER DRAIN.
 - SURFACE WATER FULLY PERFORATED PIPE.
 - INDICATIVE PIPE ROUTE FROM PITCH DRAINAGE. BY OTHERS.
 - PROPOSED SURFACE WATER GULLY
 - PROPOSED FOUL WATER GULLY
 - PROPOSED SHOWER GULLY
 - BACK DROP
 - PROPOSED UNDERGROUND ATTENUATION STORAGE
 - EXISTING LAND DRAIN TO BE REMOVED
 - DIVERTED LAND DRAIN.
 - EXISTING FOUL DRAIN TO BE REMOVED
 - IMPERMEABLE AREA TO DRAIN AS EXISTING
 - FOUNDATIONS
 - 150mm VERTICAL INSPECTION POINT WITH 150mm VC OUTLET PIPE AND 150mm WRAPPED PERFORATED INLET PIPE. REFER TO DETAILS.
 - PERMEABLE TARMAC AREA, BAYS ONLY. SUBBASE LAID TO FALL TOWARDS THE PERFORATED PIPE / INSPECTION POINT POSITIONS. REFER TO DETAILS.
 - STONE TRENCH WITH GRASSED DEPRESSION / SWALE AT SURFACE. REFER TO DETAILS.
 - INDICATIVE GSPH EXCLUSION ZONE

C05	FLOW CONTROL DEVICE AND CHANNEL DRAINAGE UPDATED TO SUIT AS INSTALLED FEATURES	30/04/24	CS	CG
C04	FINAL CONSTRUCTION	08/04/24	JC	CG
C03	CONSTRUCTION UPDATE	26/10/23	CS	CG
C02	CONSTRUCTION ISSUE UPDATE	28/03/23	CS	CG
Rev:	Description:	Date:	By:	Chkd:

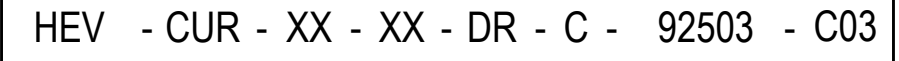
Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG
0161 236 2394
manchester@curtins.com
www.curtins.com

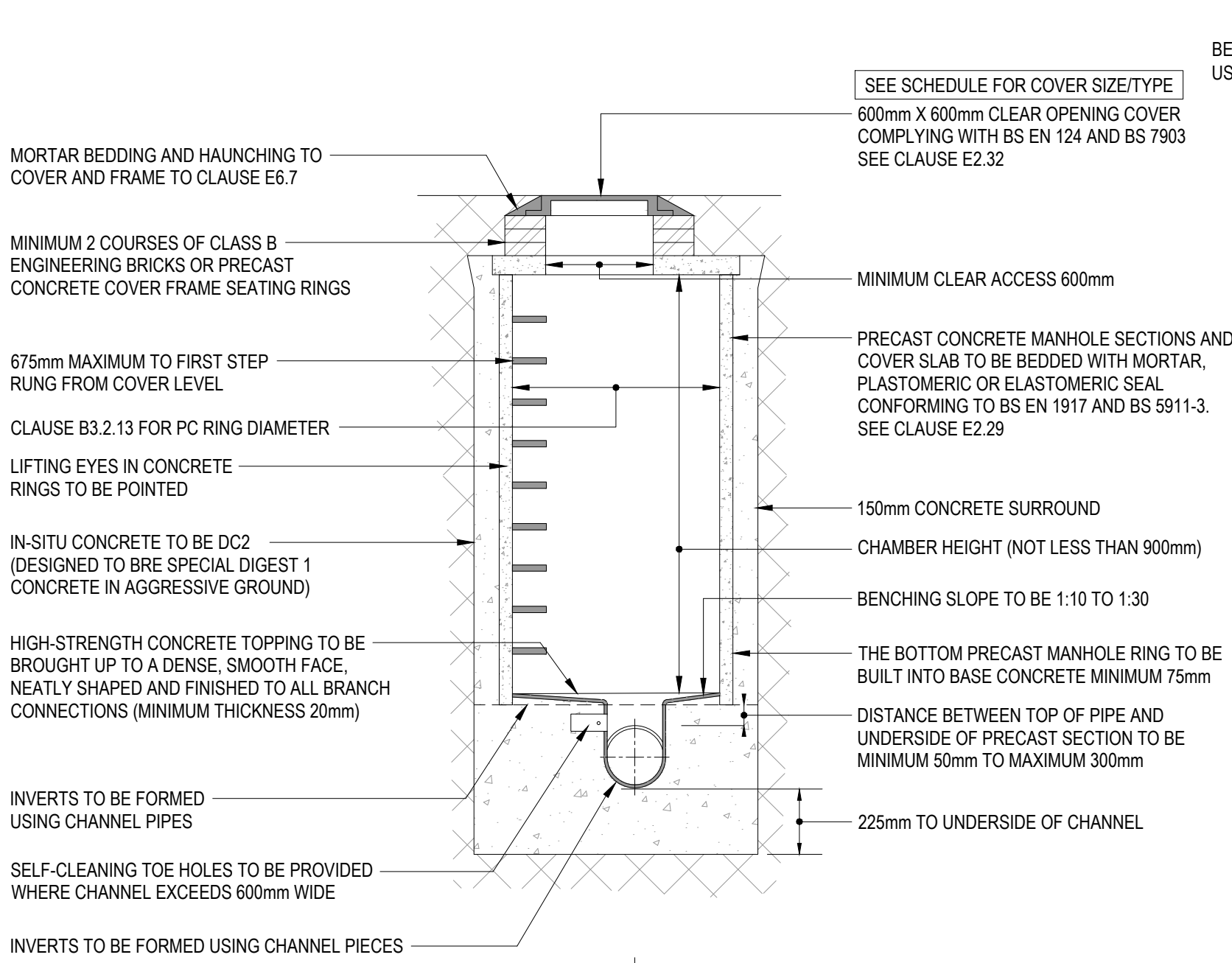
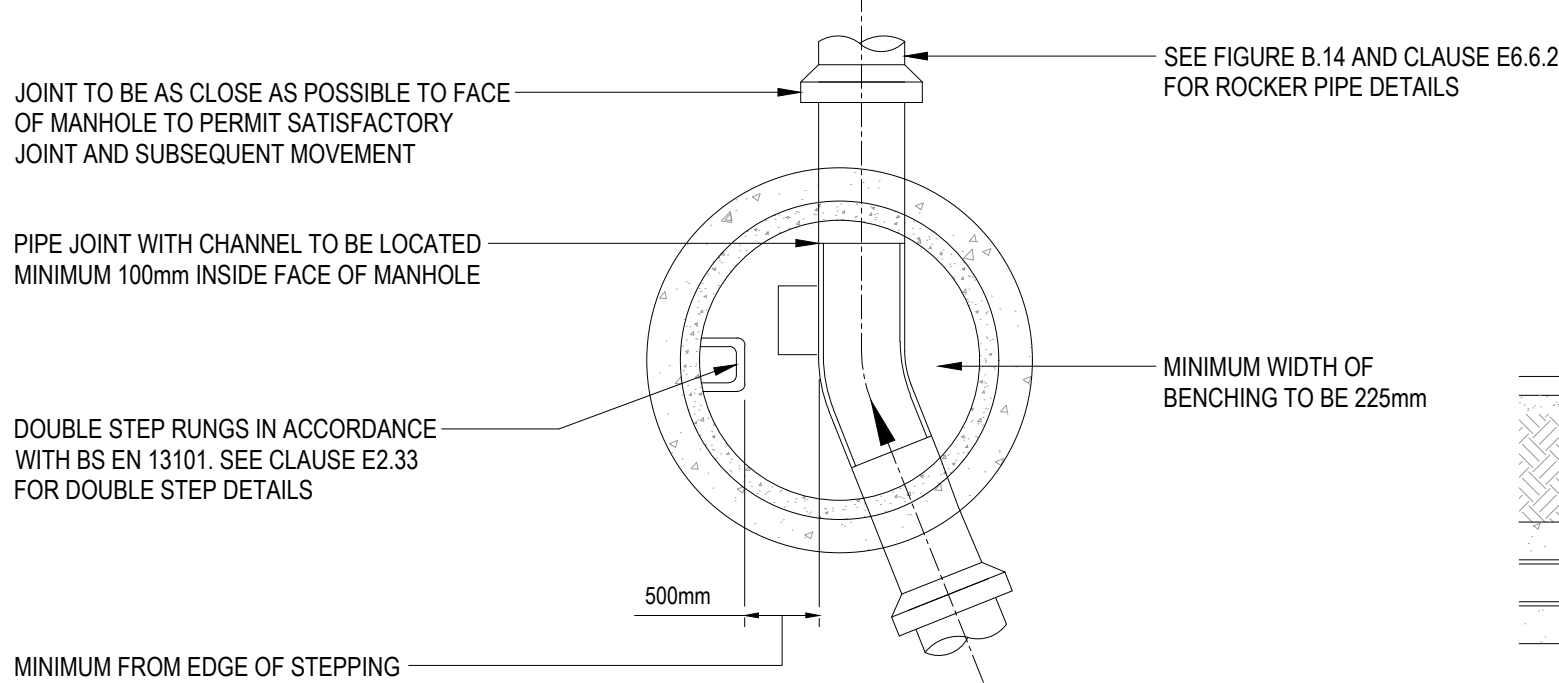
Civils & Structures • Transport Planning • Environmental • Infrastructure • Geotechnical • Conservation & Heritage • Principal Designer
Birmingham • Bristol • Cambridge • Cardiff • Douglas • Dublin • Edinburgh • Glasgow • Kentish • Leeds • Liverpool • London • Manchester • Nottingham

CONSTRUCTION RECORD				
Project: HOUGH END SPORTS VILLAGE				
Orig Title: PROPOSED DRAINAGE LAYOUT SHEET 1 OF 2				
Size:	Date:	Drawn By:	Designed By:	Checked By:
A1	12/01/21	CG	CG	CG
Scale: 1:250				
Project No:	Originator:	Volume:	Level:	Type:
				Role: Category/Number: Rev:
HEV - CUR - XX - XX - DR - C - 92500 - C05				

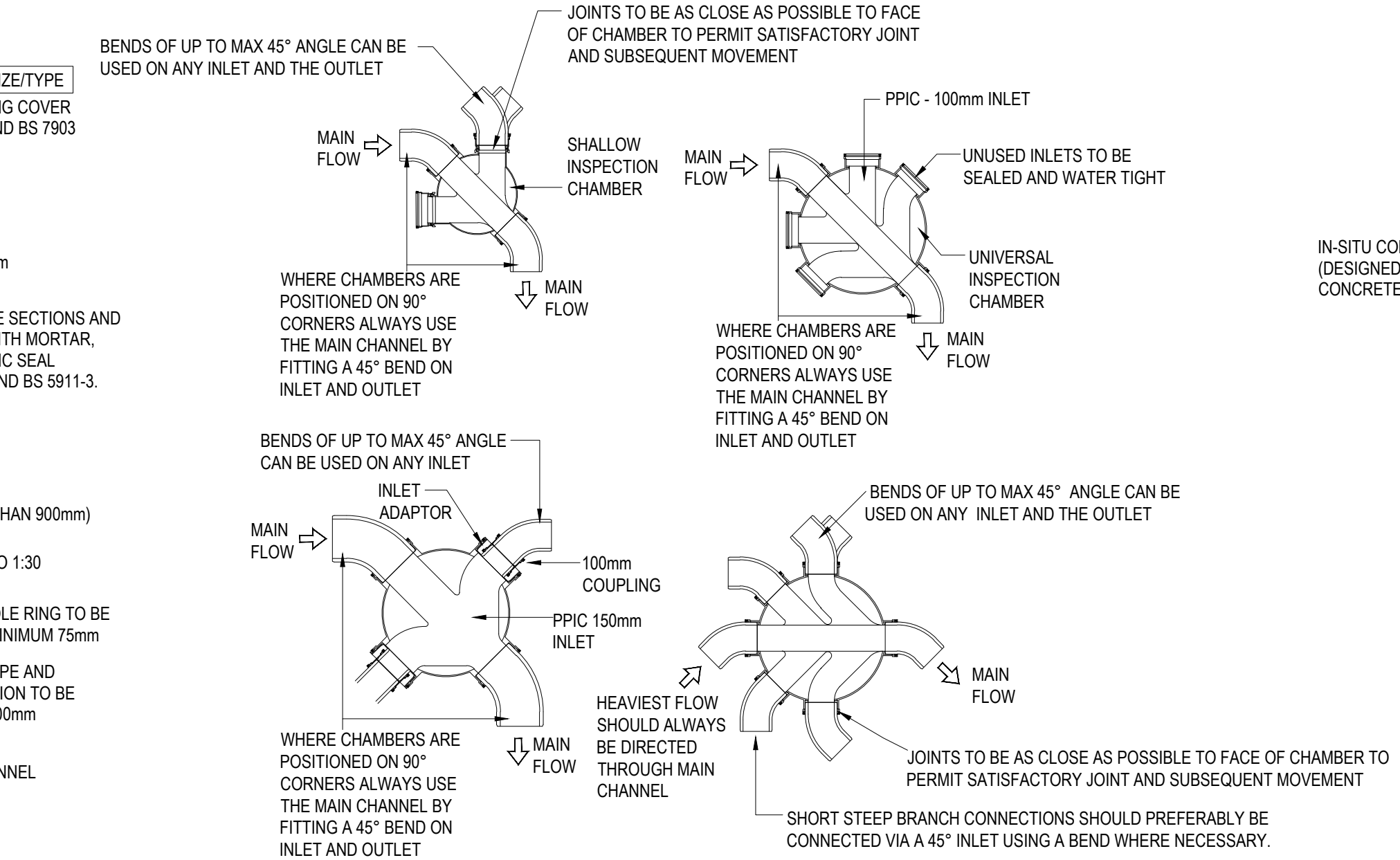
CONSTRUCTION RECORD - FINAL CONSTRUCTION
THE INFORMATION IS BASED ON CONFIRMATION FROM THE CONTRACTOR OF THE INSTALLED WORKS. THERE MAY BE VARIATIONS ON SITE WHICH ARE NOT REFLECTED ON THIS DRAWING AND HAS NOT BEEN VERIFIED BY CURTINS.

[illegible]

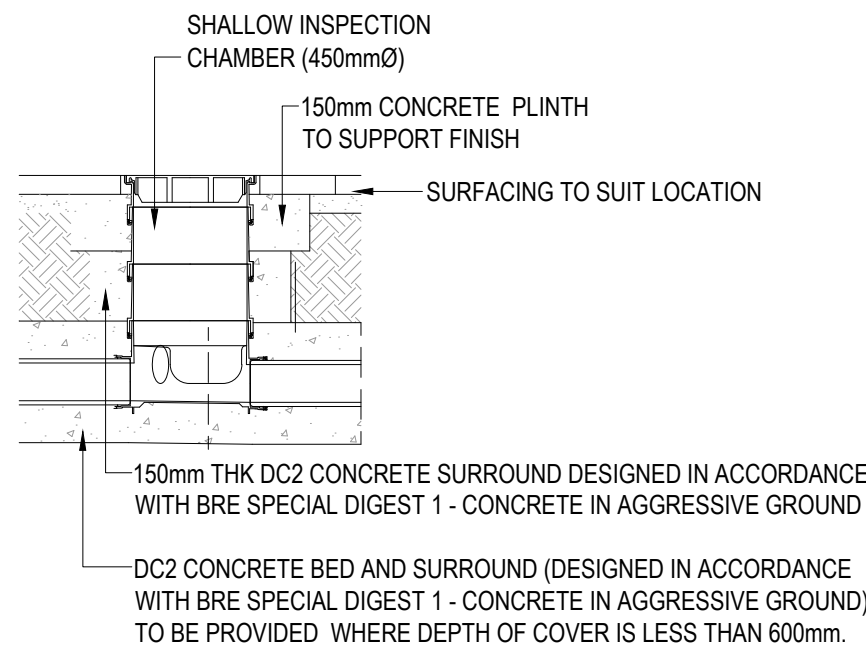




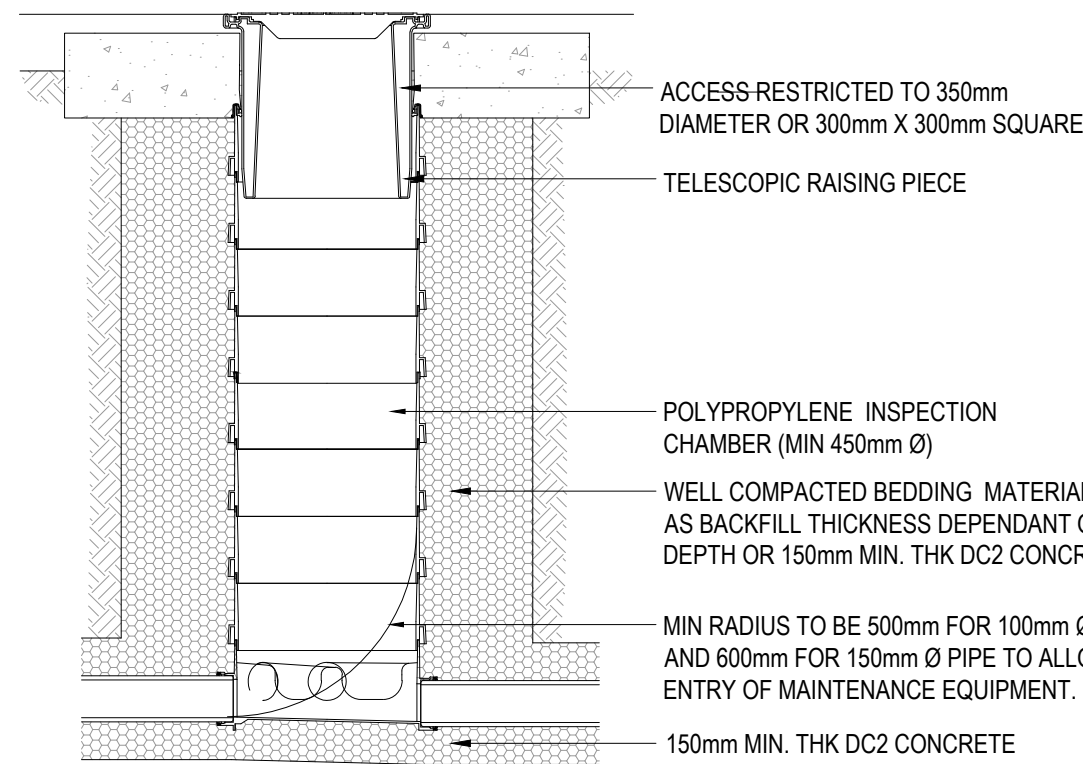
Typical Manhole Detail - Type 2
(Maximum depth from cover to soffit of pipe 3.0 m)



Inspection Chamber Base Details

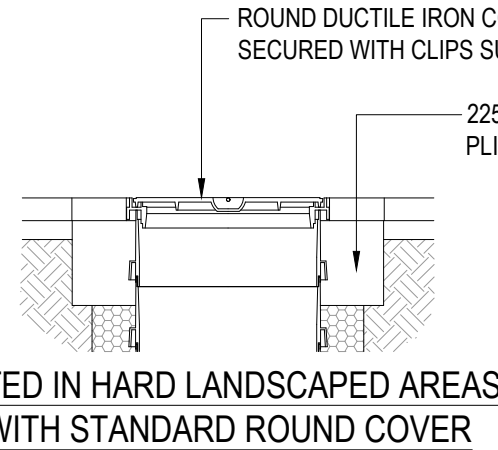
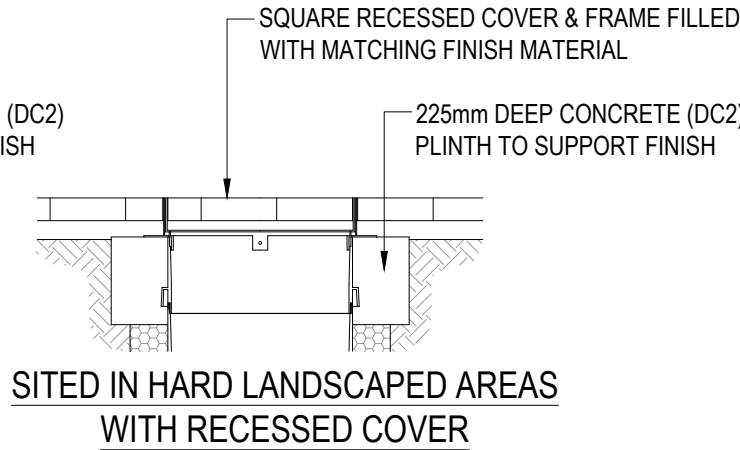


Shallow Inspection Chamber
Max Depth 0.6m

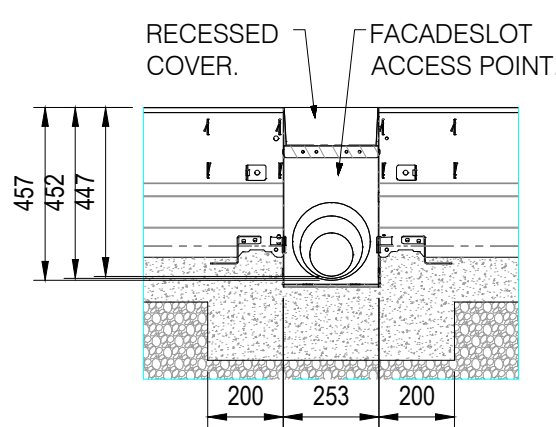


Deep Inspection Chamber
Depths between 1.2m and 3.0m

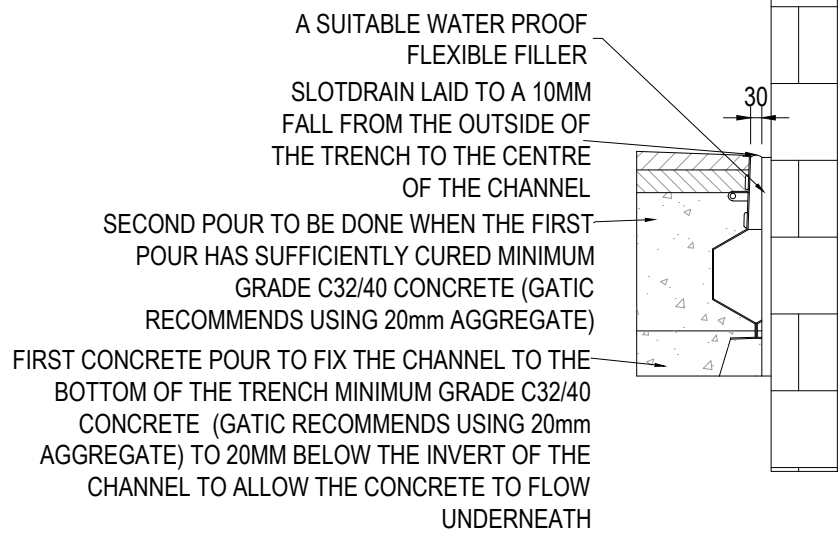
Typical Inspection Chamber Details - PPIC



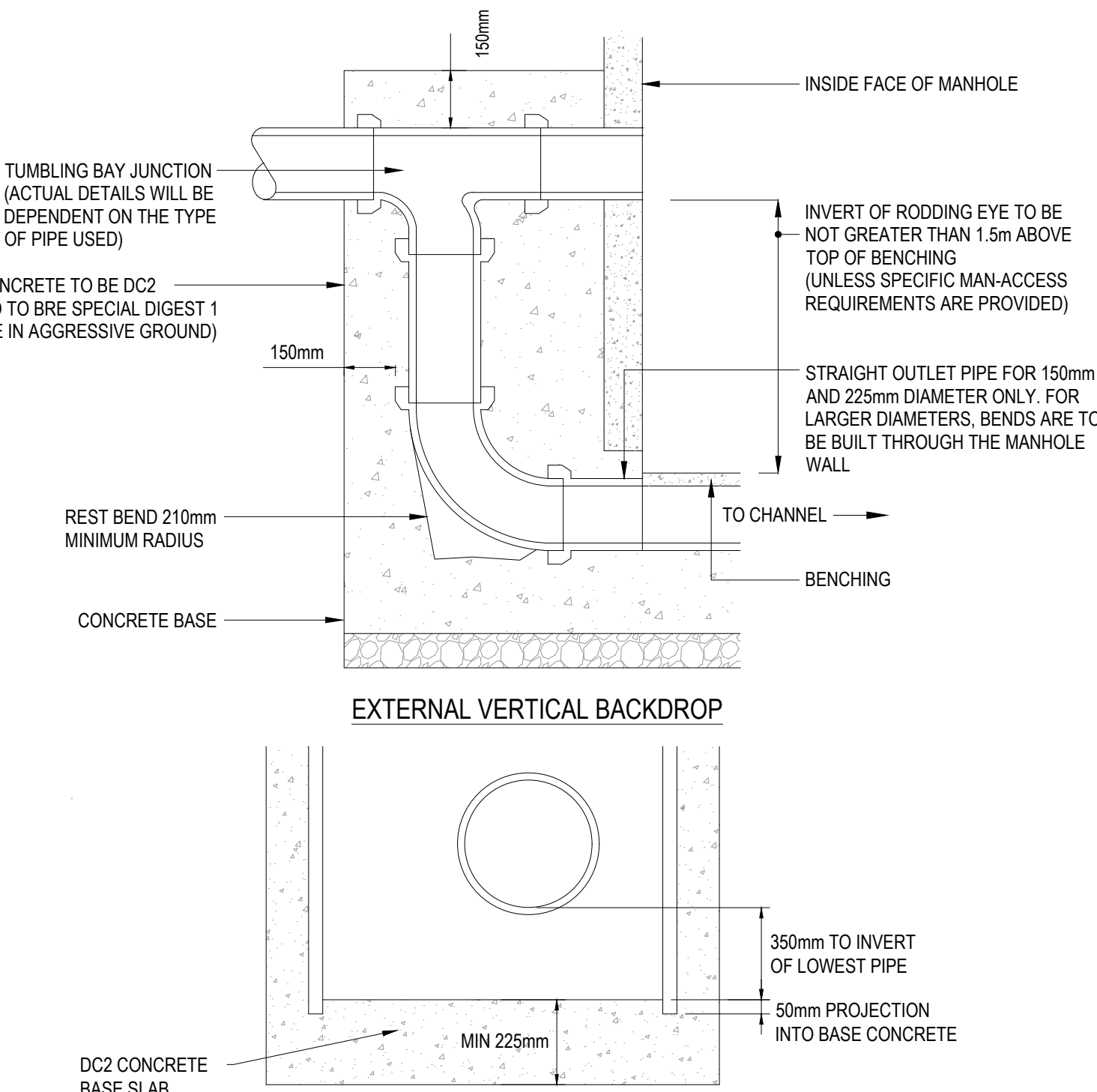
Typical Inspection Chamber Cover Details



Reduced Invert Facade
Outlet Box Details (GATIC
Drawing Reference 5007)

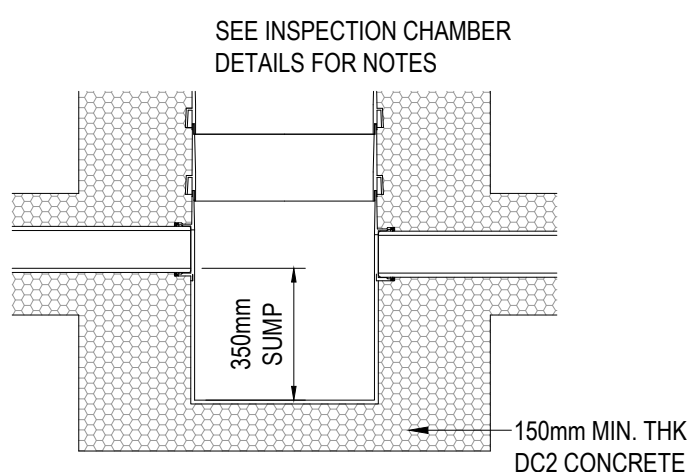


Facade Slot Details
GATIC Drawing Reference 4776



External Vertical Backdrop

Catch Pit Detail



PPIC Catchpit Base
Detail

For channel details to external areas
refer to ACO QMAX DESIGN DES019950v1

GENERAL NOTES:

- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
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- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
- SULPHATE RESISTANT CEMENT DC2 AND PRECAST CONCRETE PRODUCTS MUST BE USED WHERE SULPHATE FOUND, OR WHERE NO SULPHATES THEN C20- GEN 3

CONSTRUCTION RECORD - FINAL CONSTRUCTION
THE INFORMATION IS BASED ON CONFIRMATION FROM THE CONTRACTOR OF THE INSTALLED WORKS. THERE MAY BE VARIATIONS ON SITE WHICH ARE NOT REFLECTED ON THIS DRAWING AND HAS NOT BEEN VERIFIED BY CURTINS.

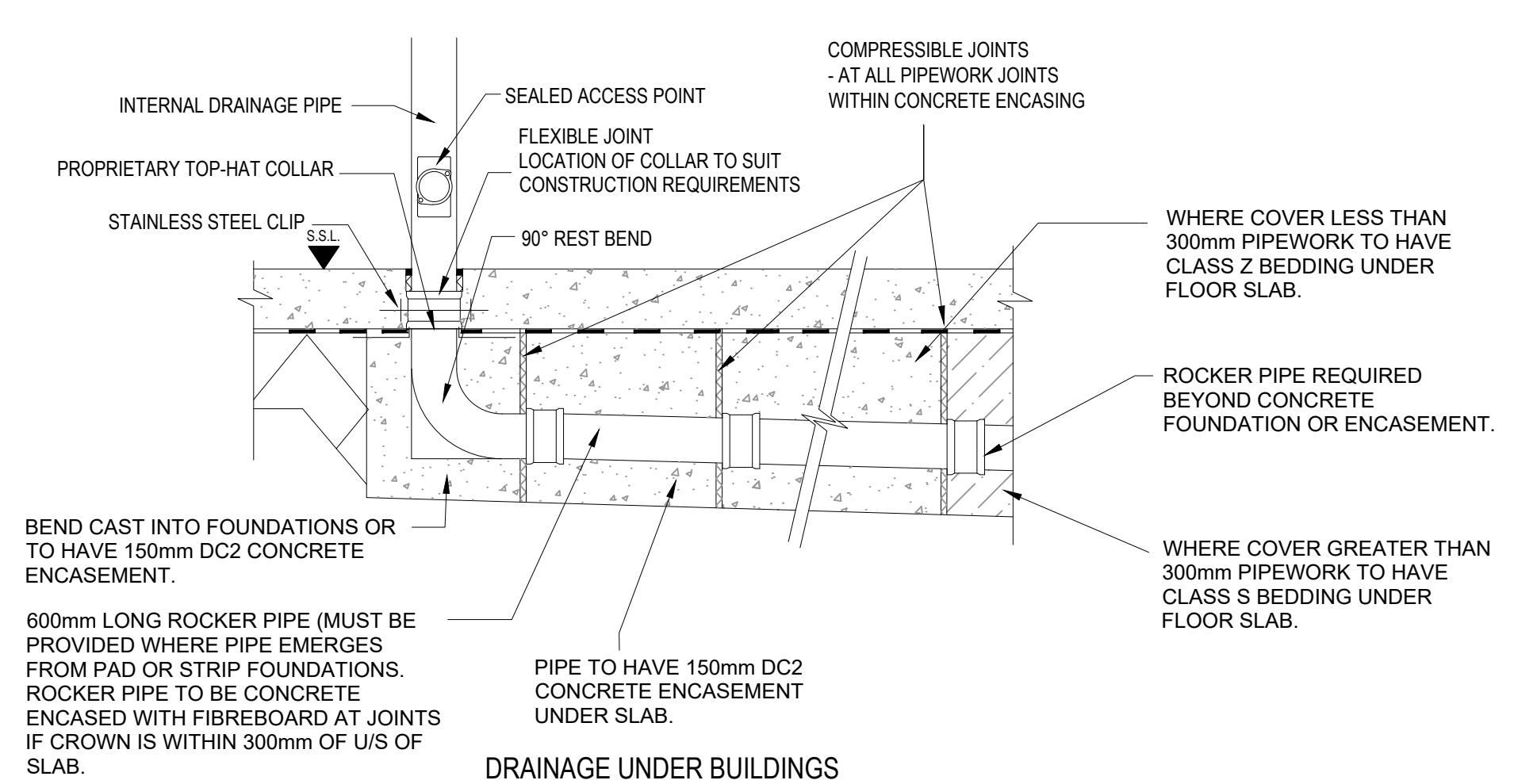
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C03	FINAL CONSTRUCTION	08.04.24	JC	CG
C02	CONSTRUCTION ISSUE UPDATE	26.10.23	CS	CG
C01	ISSUED FOR CONSTRUCTION	05.08.22	CS	CG
P03	UPDATED TO INCORPORATE TEAMS SCOMMENTS	30.06.21	CS	CD
P02	STAGE 4	14.06.21	CD	CG
P01	STAGE 3 ISSUE	16.04.21	CD	CG
Rev:	Description:	Date:	By:	Chkd:



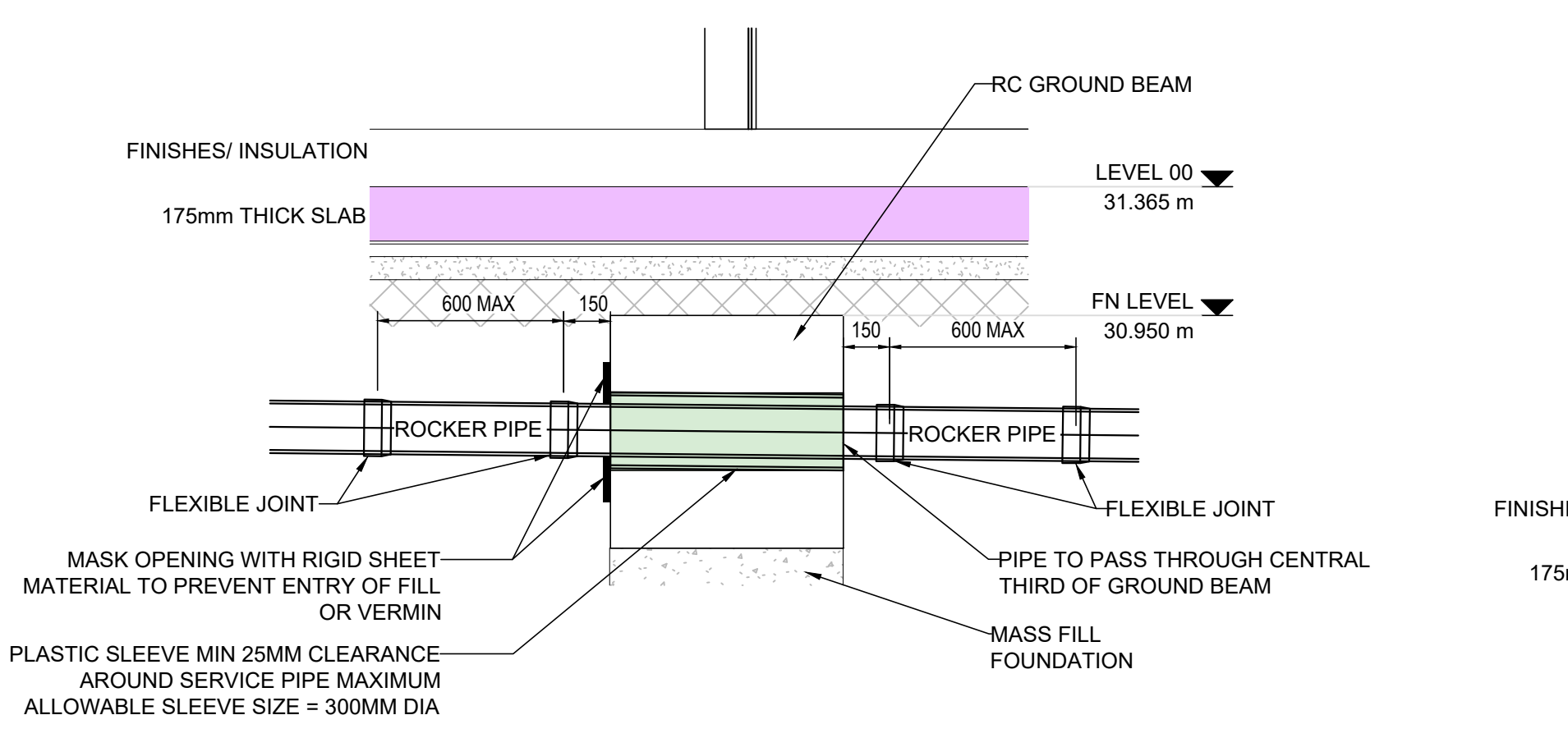
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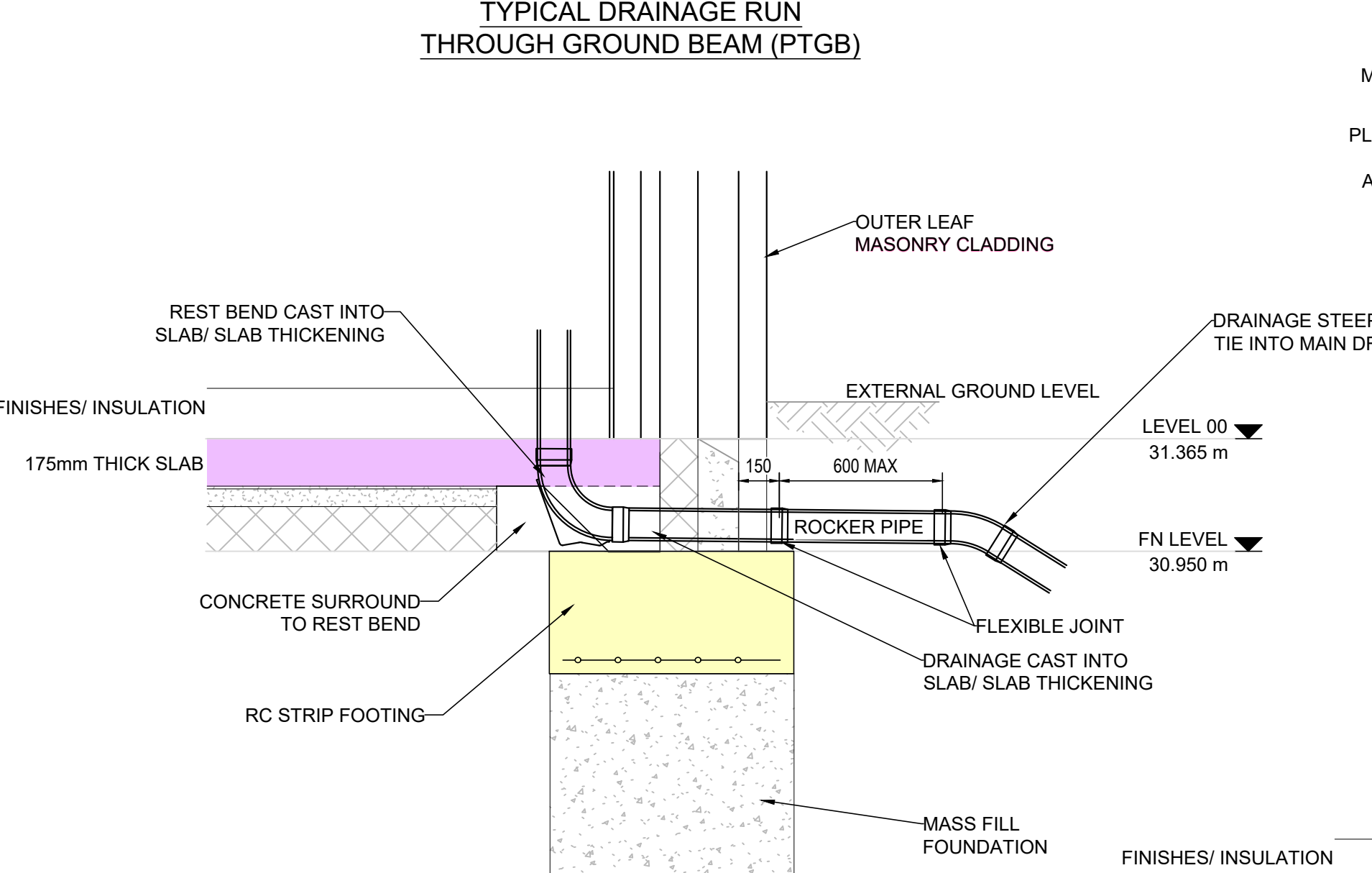
Status:	CONSTRUCTION RECORD			
Project:	HOUGH END SPORTS VILLAGE			
Orig Title:	DRAINAGE DETAILS SHEET 1			
Size:	Date:	Drawn By:	Designed By:	Checked By:
A1	16.04.21	CD	CG	CG
Scale:	1:20			
Project No:	Originator:	Zone:	Level:	Type: Discipline: Category / Number: Rev:
HEV	- CUR	- XX	- XX	- DR - C - 92520 -C04



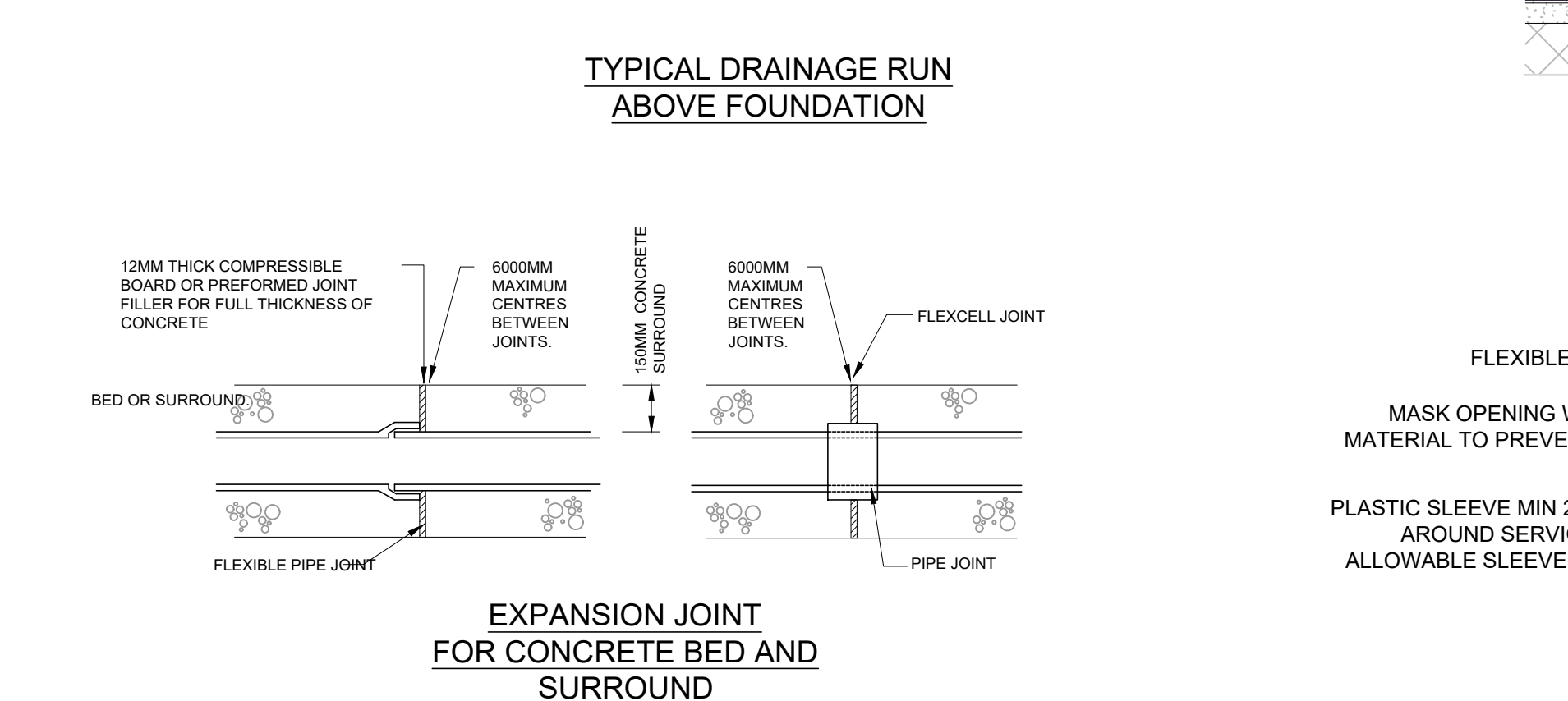
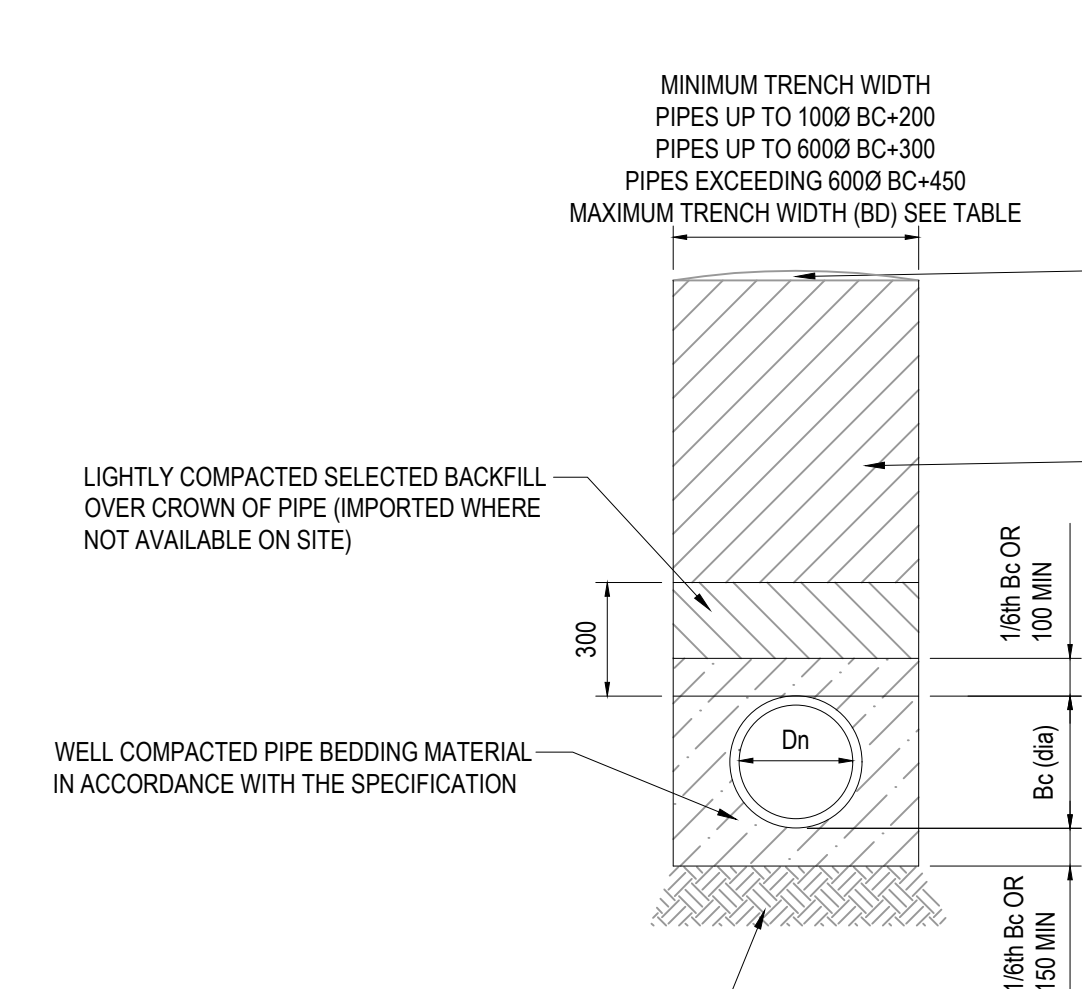
DRAINAGE UNDER BUILDINGS



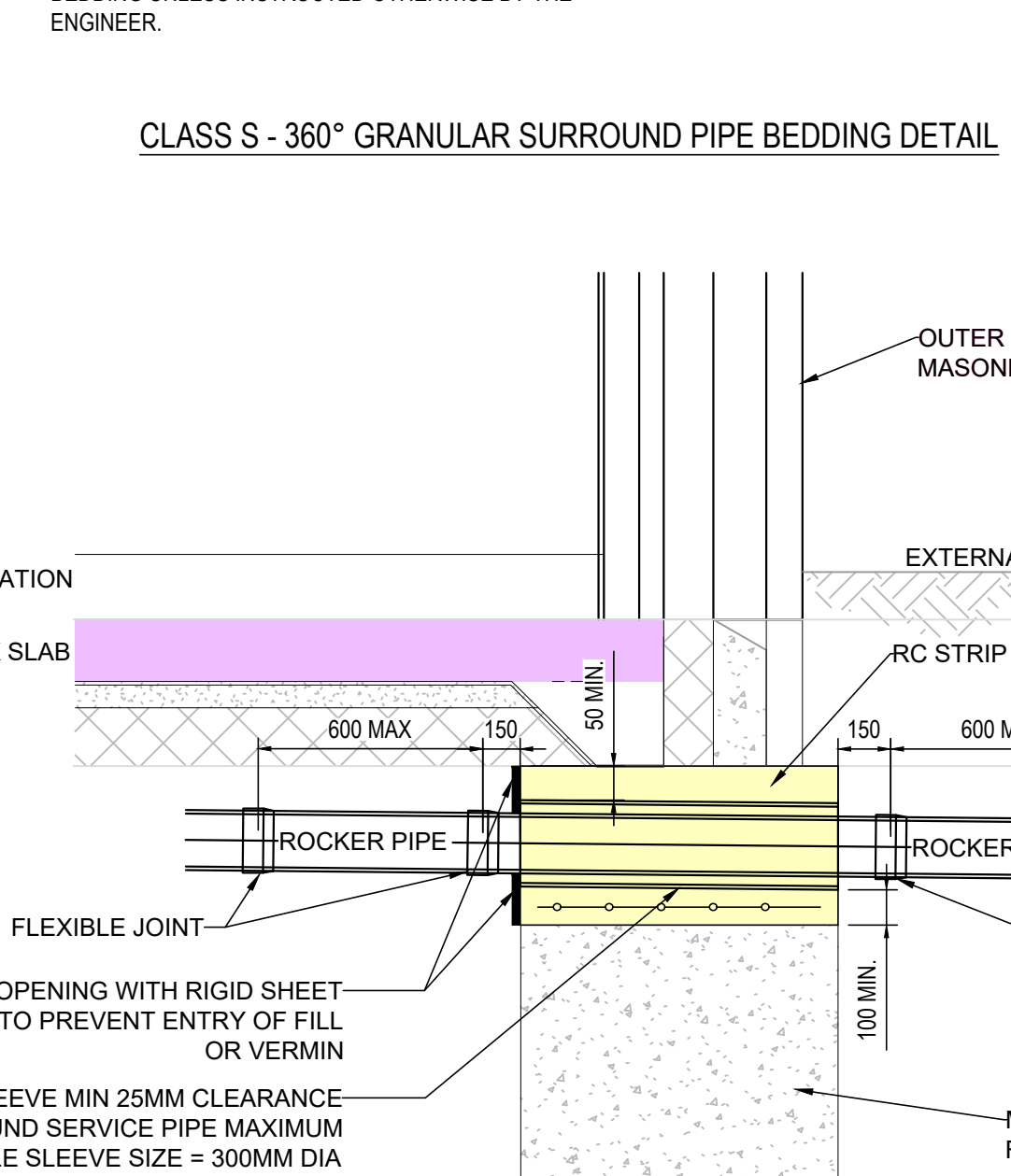
TYPICAL DRAINAGE RUN THROUGH GROUND BEAM (PTGB)



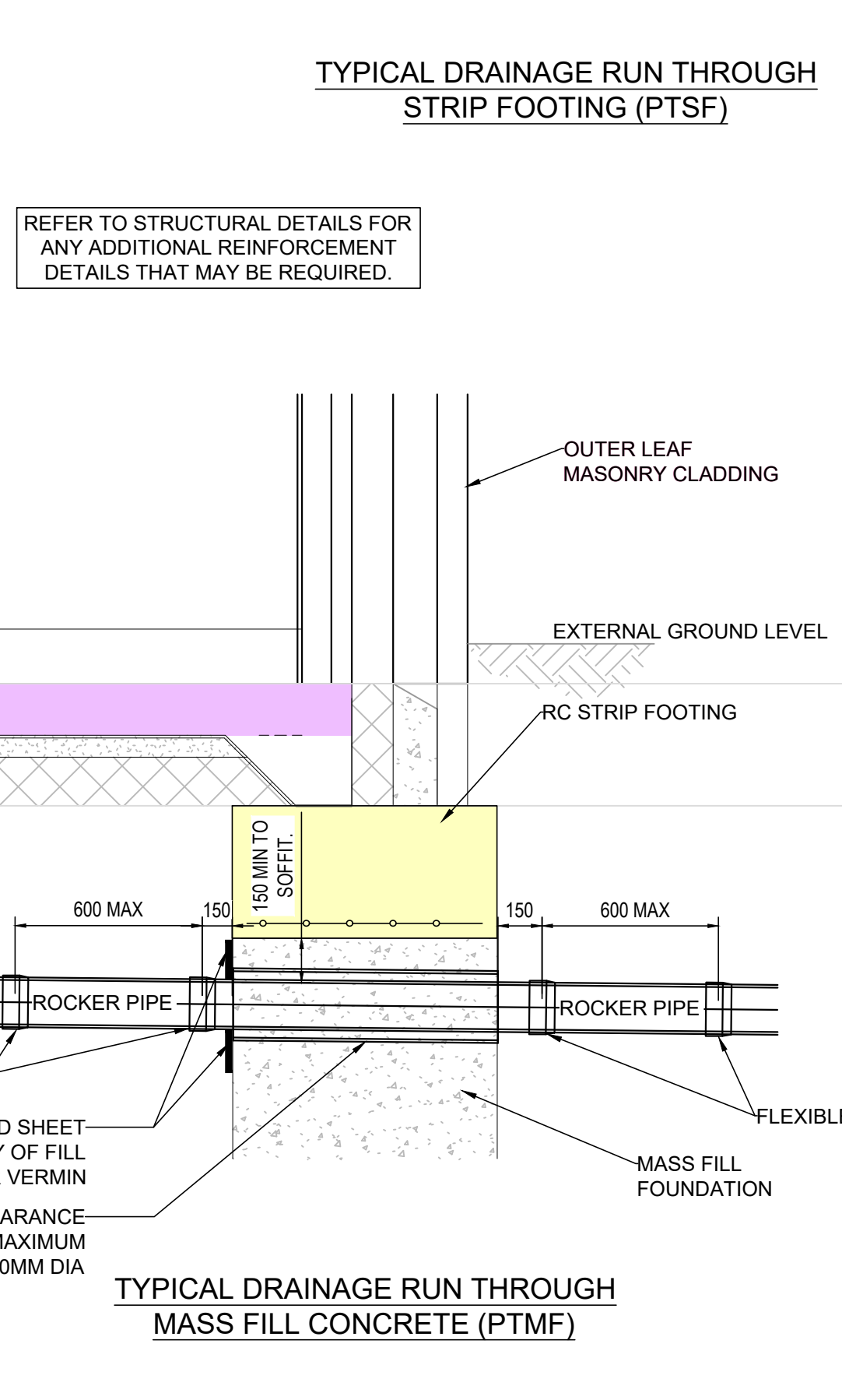
TYPICAL DRAINAGE RUN ABOVE FOUNDATION



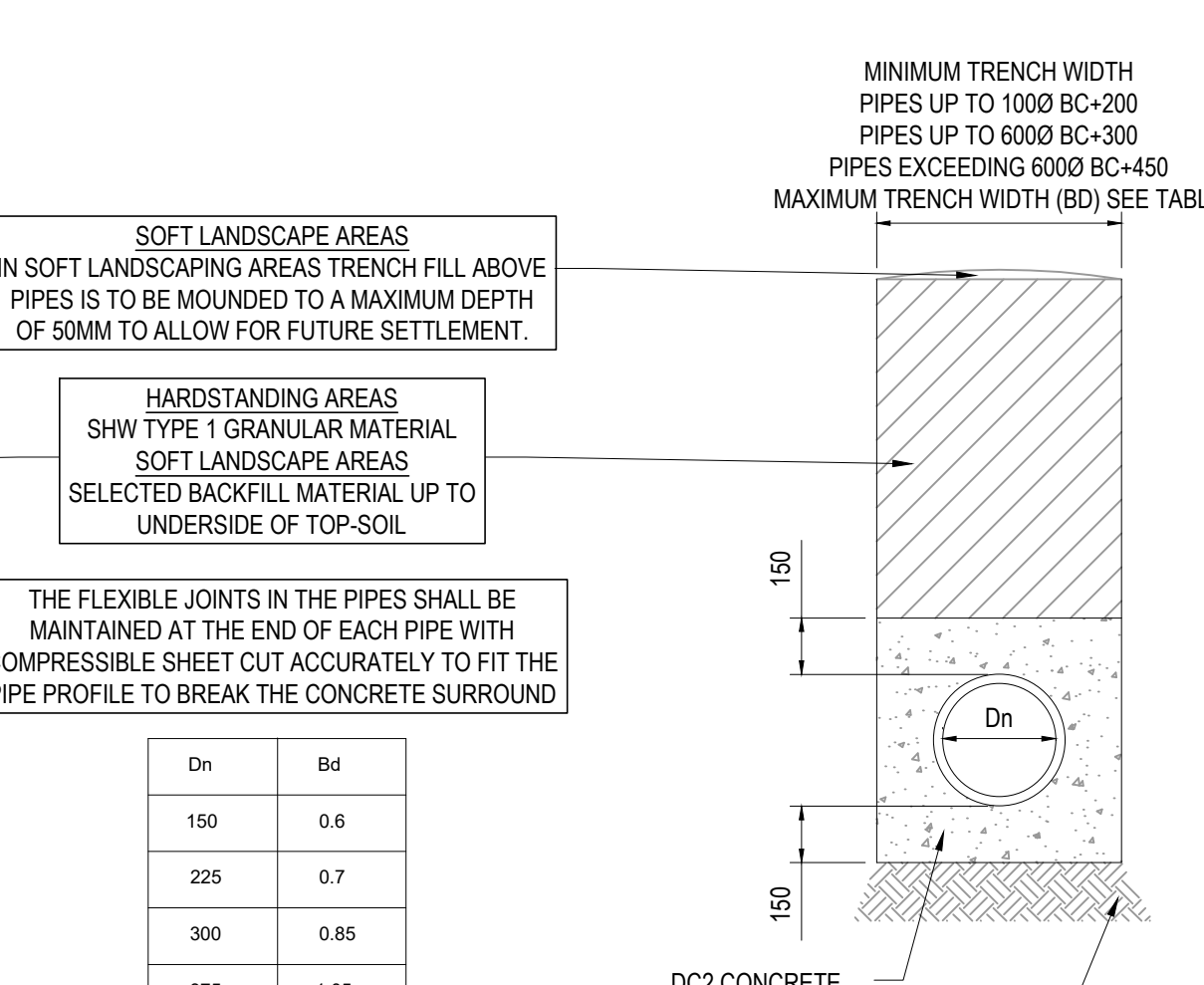
CLASS S - 360° GRANULAR SURROUND PIPE BEDDING DETAIL



TYPICAL DRAINAGE RUN THROUGH STRIP FOOTING (PTSF)



TYPICAL DRAINAGE RUN THROUGH MASS FILL CONCRETE (PTMF)

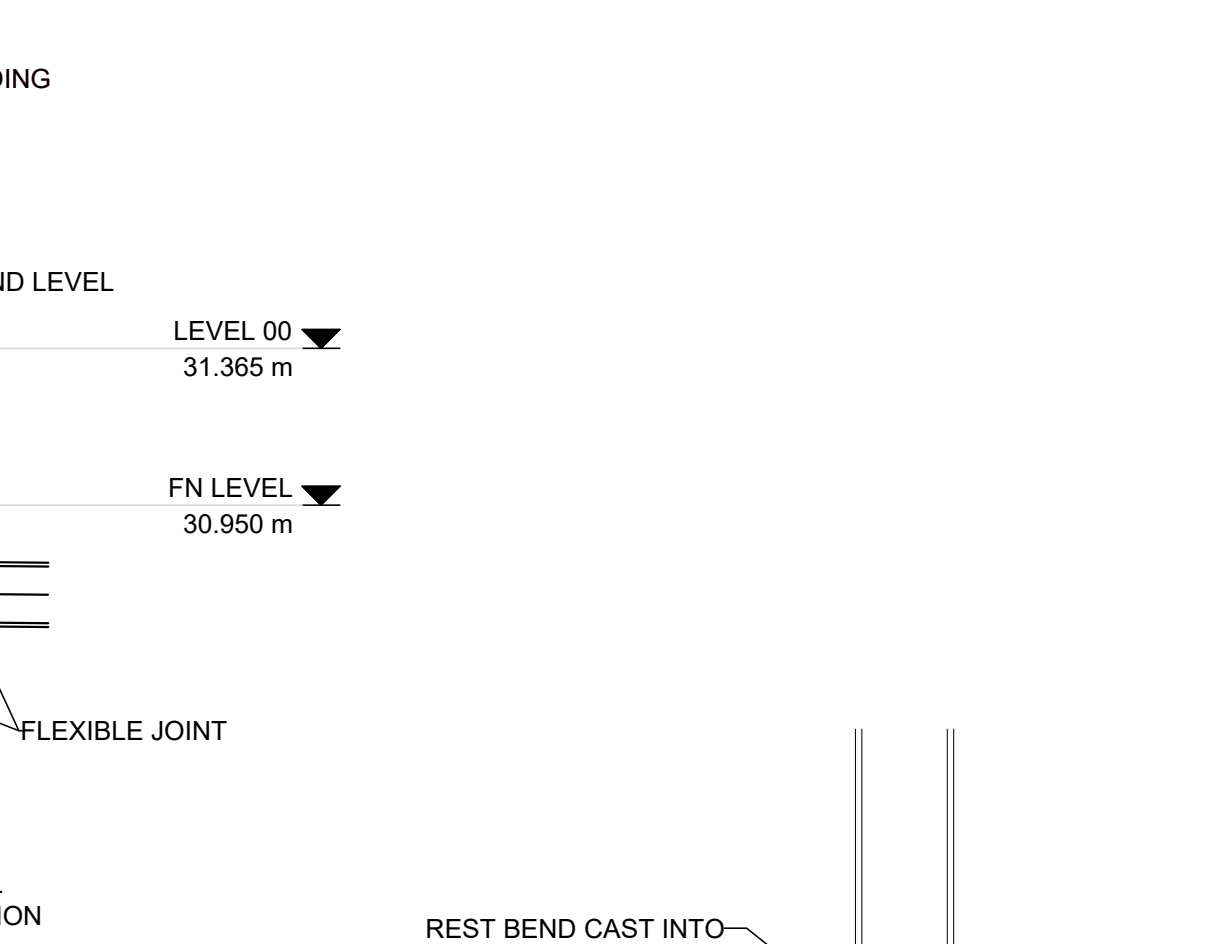


CLASS Z - CONCRETE BED AND (SURROUND PIPE BEDDING DETAIL)

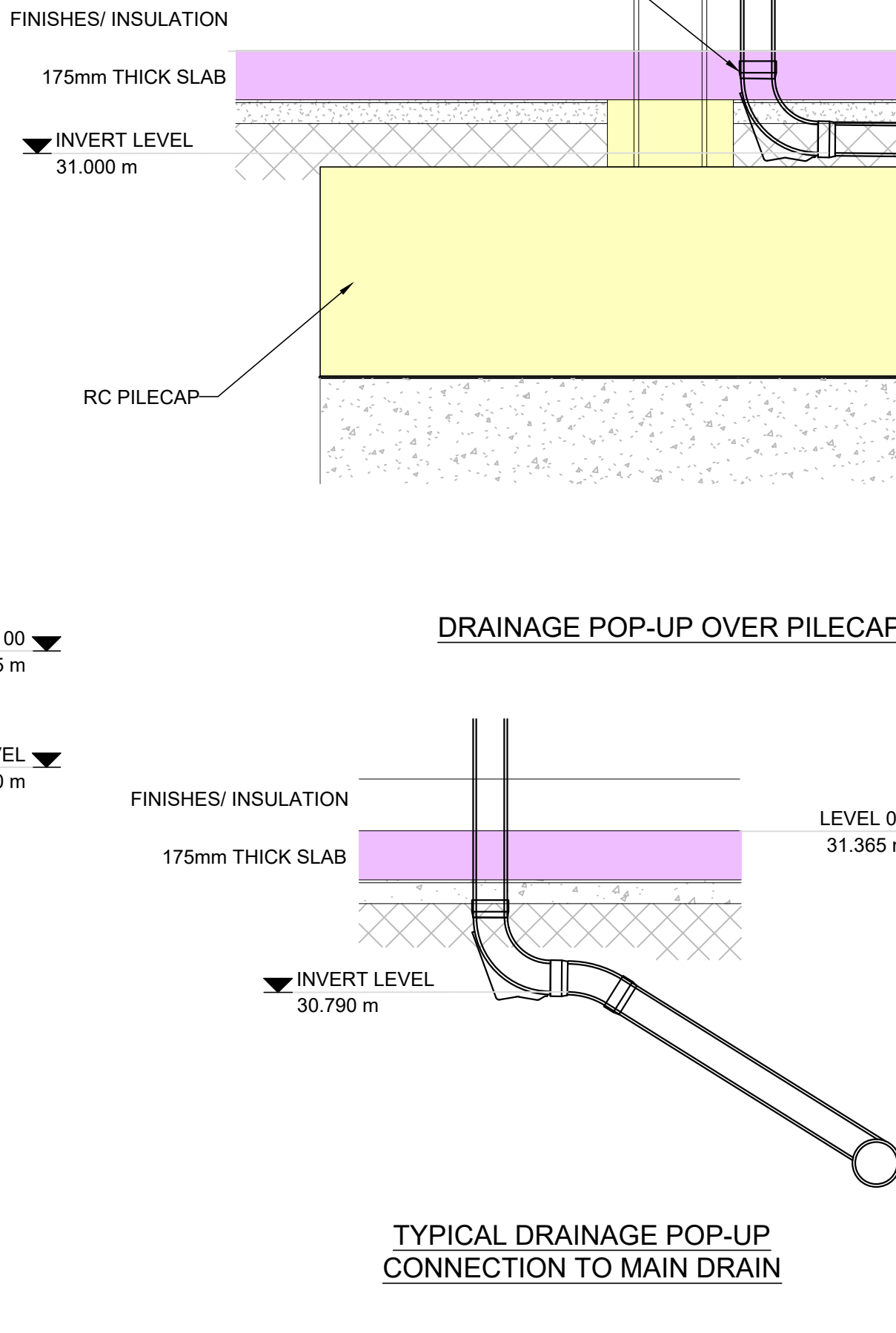
MAXIMUM TRENCH WIDTH

Dn	Bd
150	0.6
225	0.7
300	0.85
375	1.05
450	1.15
525	1.25
600	1.35
675	1.45
750	1.50

MAXIMUM TRENCH WIDTH

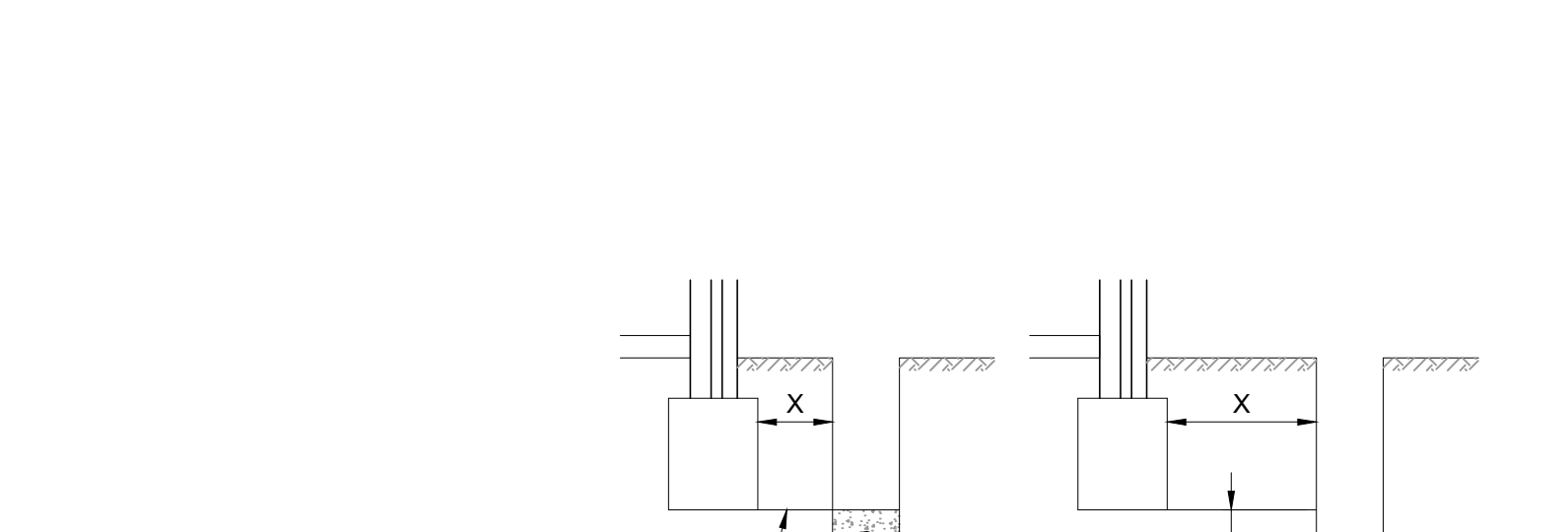


TYPICAL DRAINAGE POP-UP OVER PILECAP

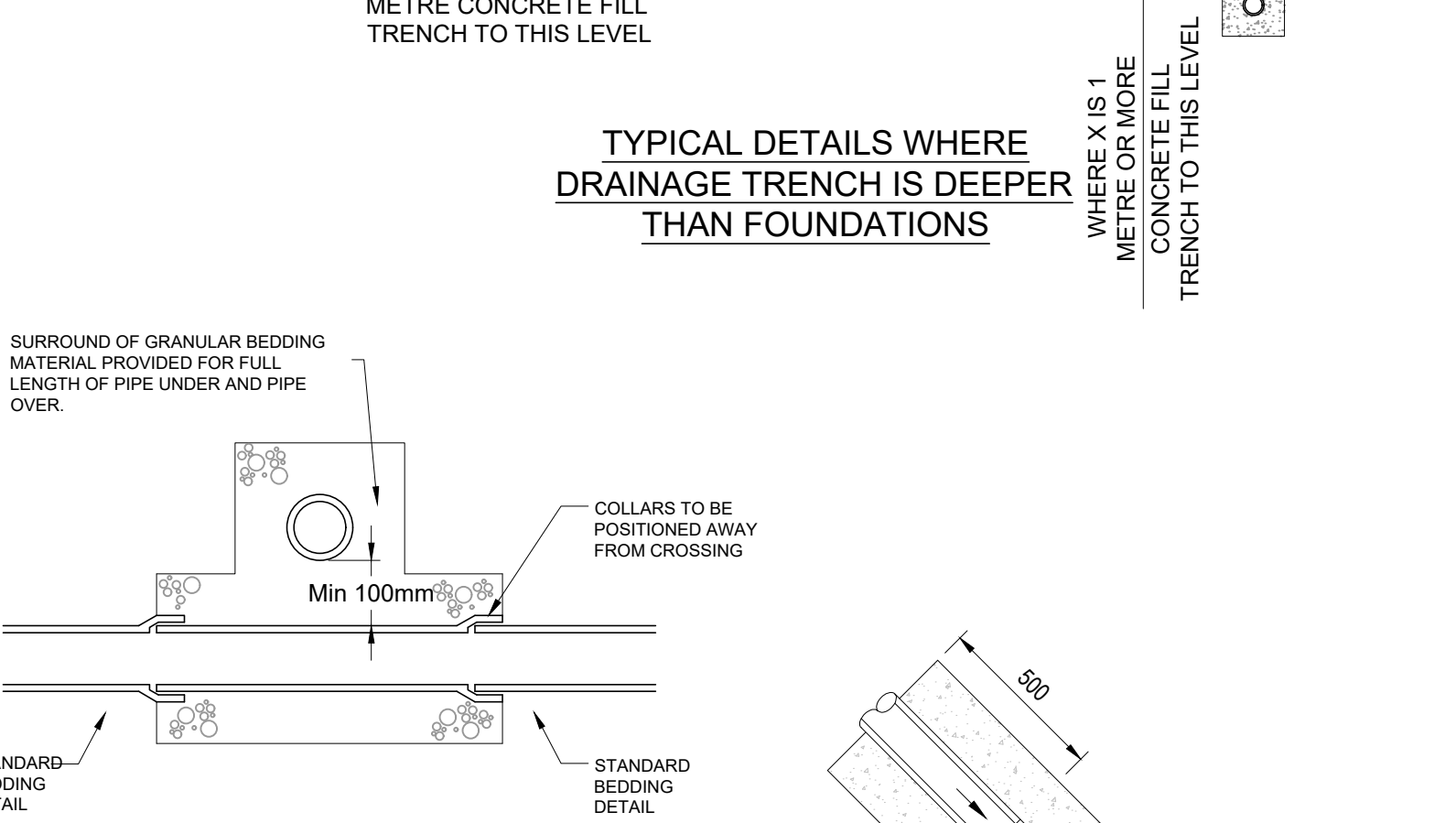


TYPICAL DRAINAGE POP-UP CONNECTION TO MAIN DRAIN

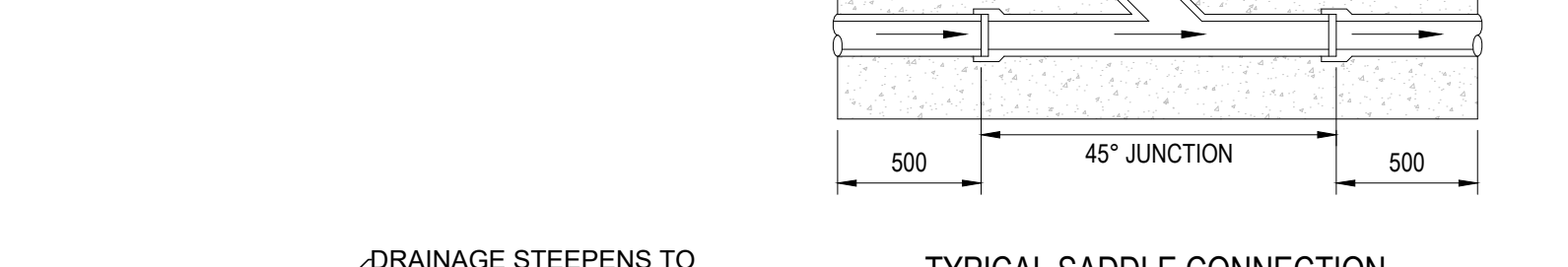
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TYPICAL DETAILS WHERE DRAINAGE TRENCH IS DEEPER THAN FOUNDATIONS



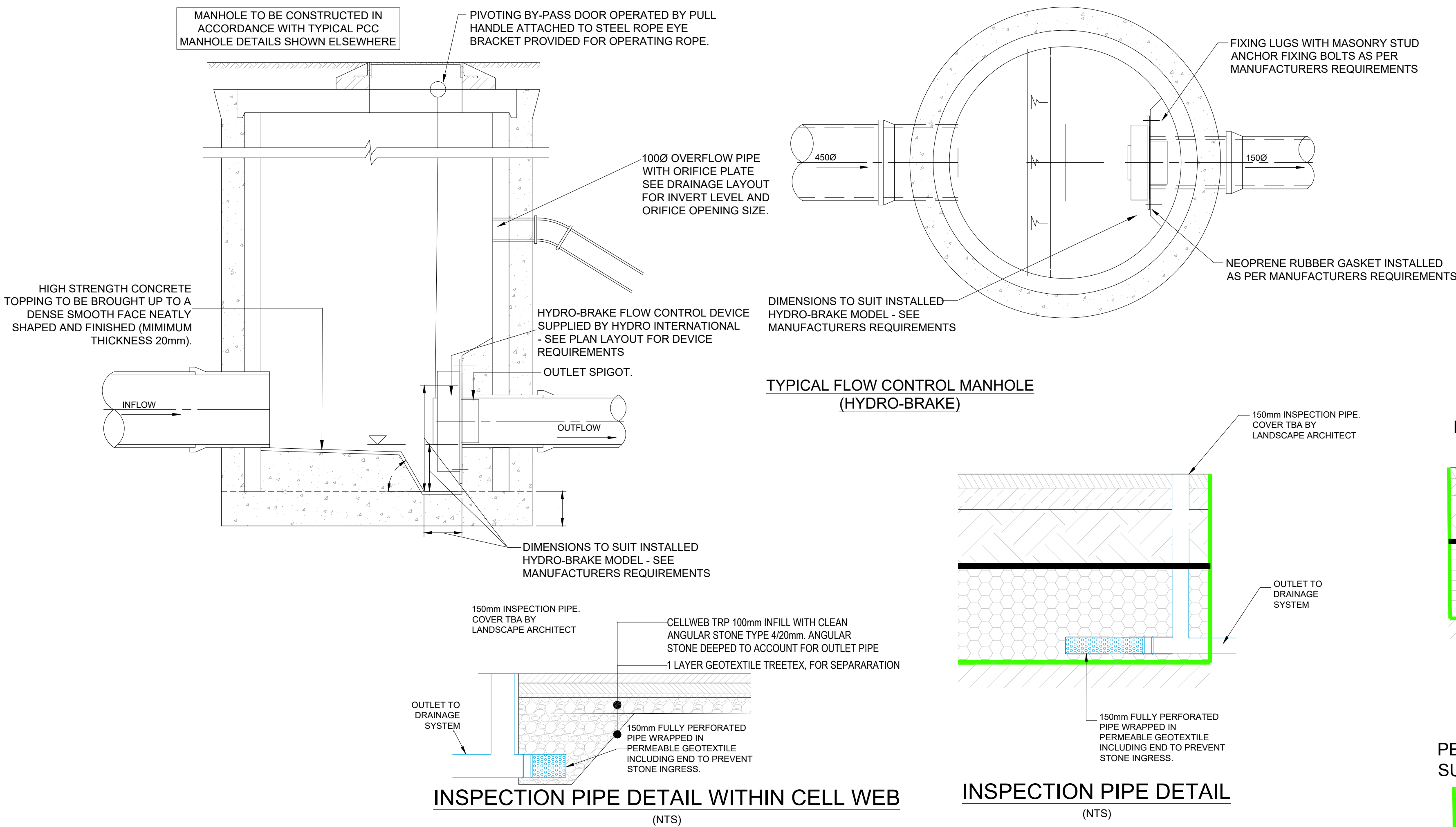
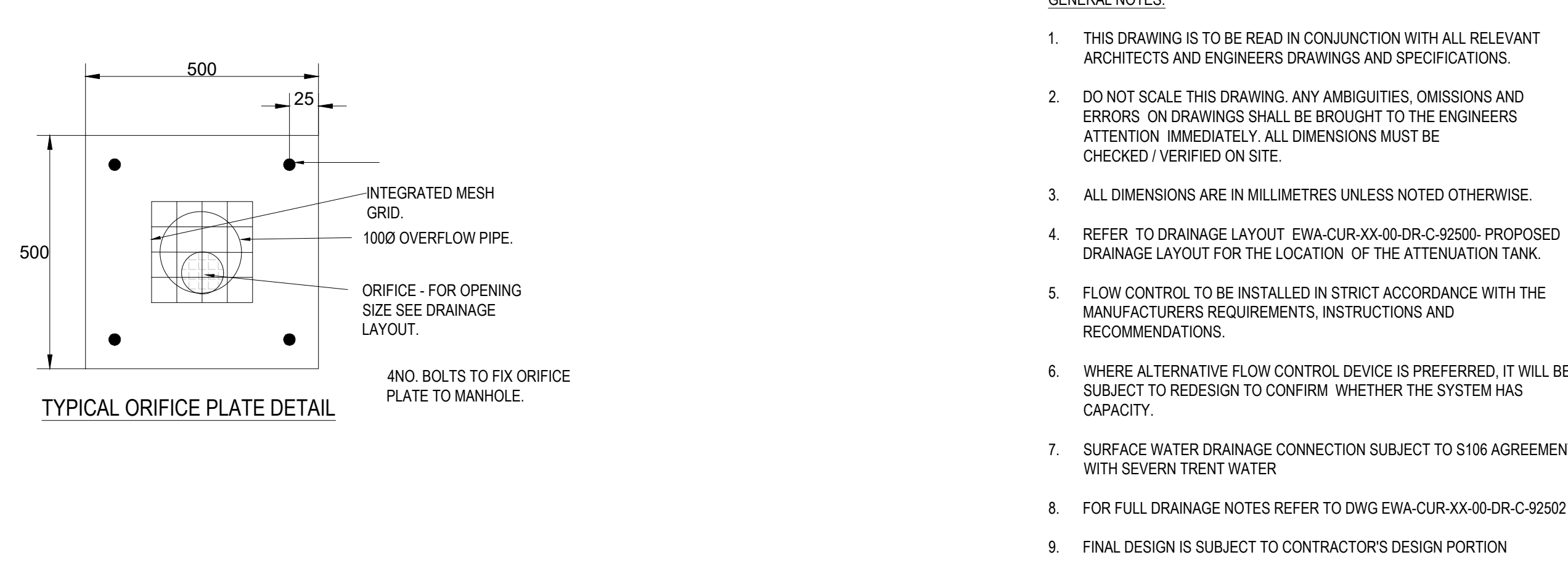
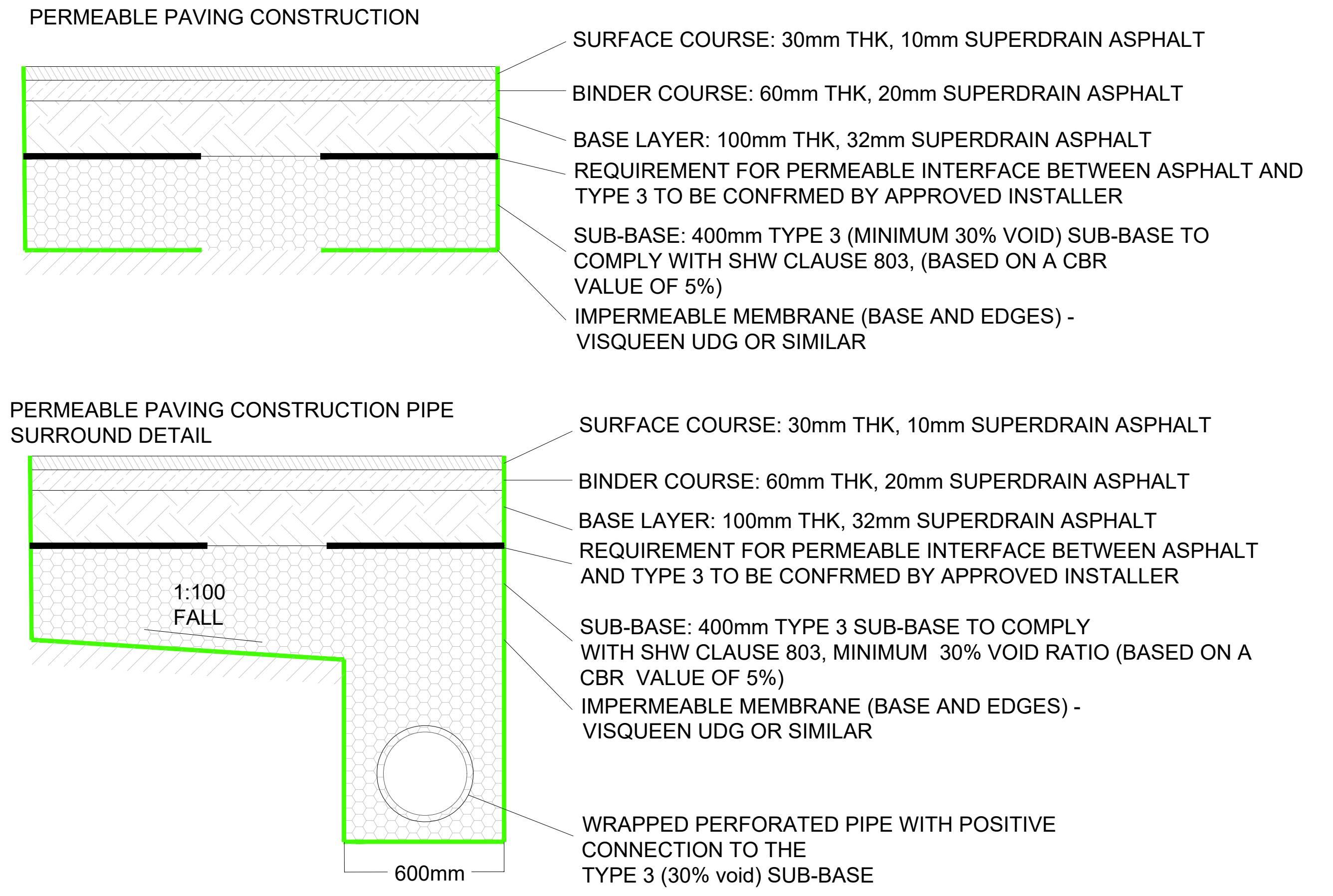
PIPE CROSSINGS DETAIL



TYPICAL SADDLE CONNECTION

CONSTRUCTION RECORD - FINAL CONSTRUCTION
THE INFORMATION IS BASED ON CONFIRMATION FROM THE CONTRACTOR OF THE INSTALLED WORKS. THERE MAY BE VARIATIONS ON SITE WHICH ARE NOT REFLECTED ON THIS DRAWING AND HAS NOT BEEN VERIFIED BY CURTINS.

C02	FINAL CONSTRUCTION	08/04/24	JC	CG
C01	ISSUED FOR CONSTRUCTION	05.08.22	CS	CG
P03	PIPE DETAILS AT FOUNDATIONS UPDATED	29.04.22	ATL	CG
P02	STAGE 4	14.06.21	CD	CG
P01	STAGE 3 ISSUE	16.04.21	CD	CG
Rev:	Description:	Date:	By:	Chkd:
<div><div><div>C</div><div>curtins</div></div><div>Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG 0161 236 2394 manchester@curtins.com www.curtins.com</div><div>Civils & Structures • Transport Planning • Environmental • Infrastructure • Geotechnical • Conservation & Heritage • Principal Designer Birmingham • Bristol • Cambridge • Cardiff • Douglas • Dublin • Edinburgh • Glasgow • Kentville • Leeds • Liverpool • London • Manchester • Nottingham</div></div>				
Status: CONSTRUCTION RECORD				
Project: HOUGH END SPORTS VILLAGE				
Orig Title: DRAINAGE DETAILS SHEET 2				
Size:	Date:	Drawn By:	Designed By:	Checked By:
A1	16.04.21	CD	CG	CG
Scale:	1:20			
Project No:	Originator:	Zone:	Level:	Type: Discipline: Category / Number: Rev:
HEV	- CUR	- XX	- XX	- DR - C - 92521 -C02



ACO Q-Brake Dimensions

Model: QB400

Plan View

Front View

Side View

Flow Control Dimensions

Key	Description	Size [mm]
B	Orifice diameter	94
C	Outlet Spigot OD	145
G	Overall width	565
H	Overall height	407

Chamber/Pipework Dimensions

Key	Description	Min [mm]	Design [mm]
D	Outlet pipe DN	150	150
E	Sump depth	352	
F	Chamber diameter	1050	1500

* Design dimensions shown are as selected by the designer.

Disclaimer: This design only applies to ACO Q-Brake and ACO Q-Plate products and no other parties' products. It is the responsibility of the designer ('user') to verify that the design parameters have been entered correctly and that relevant industry standards and guidelines have been taken into consideration. ACO Q-Brake and Q-Plate are intended to be used with surface water only.

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ACO QuAD-VFC

Q-Brake Design and Performance Report

Project Details

Project : QUO207096
Chamber Number : 1
Chamber Name : New Chamber

Reference

Design Reference : 00003134
Created by : Jack Prior
Date Produced : 23-04-2024

Design

Description	Size [m]	Description	Rate [l/s]	Description	Model
Design Head	1.400	Design Flow Rate	5.000	Design Style	Curved Back

Head [m]

Flowrate [l/s]

Head [m]	Flow [l/s]
0.000	0.000
0.024	1.498
0.048	2.119
0.072	2.595
0.096	2.997
0.120	3.351
0.144	3.670
0.168	3.964
0.192	4.238
0.215	4.495
0.241	4.725
0.300	4.953
0.357	4.997
0.412	4.897
0.463	4.690
0.509	4.413
0.549	4.104
0.581	3.802
0.606	3.543
0.620	3.367
0.634	3.334
0.727	3.568
0.819	3.788
0.912	3.996
1.004	4.194
1.096	4.383
1.189	4.564
1.281	4.738
1.374	4.906
1.466	5.068
1.531	5.179

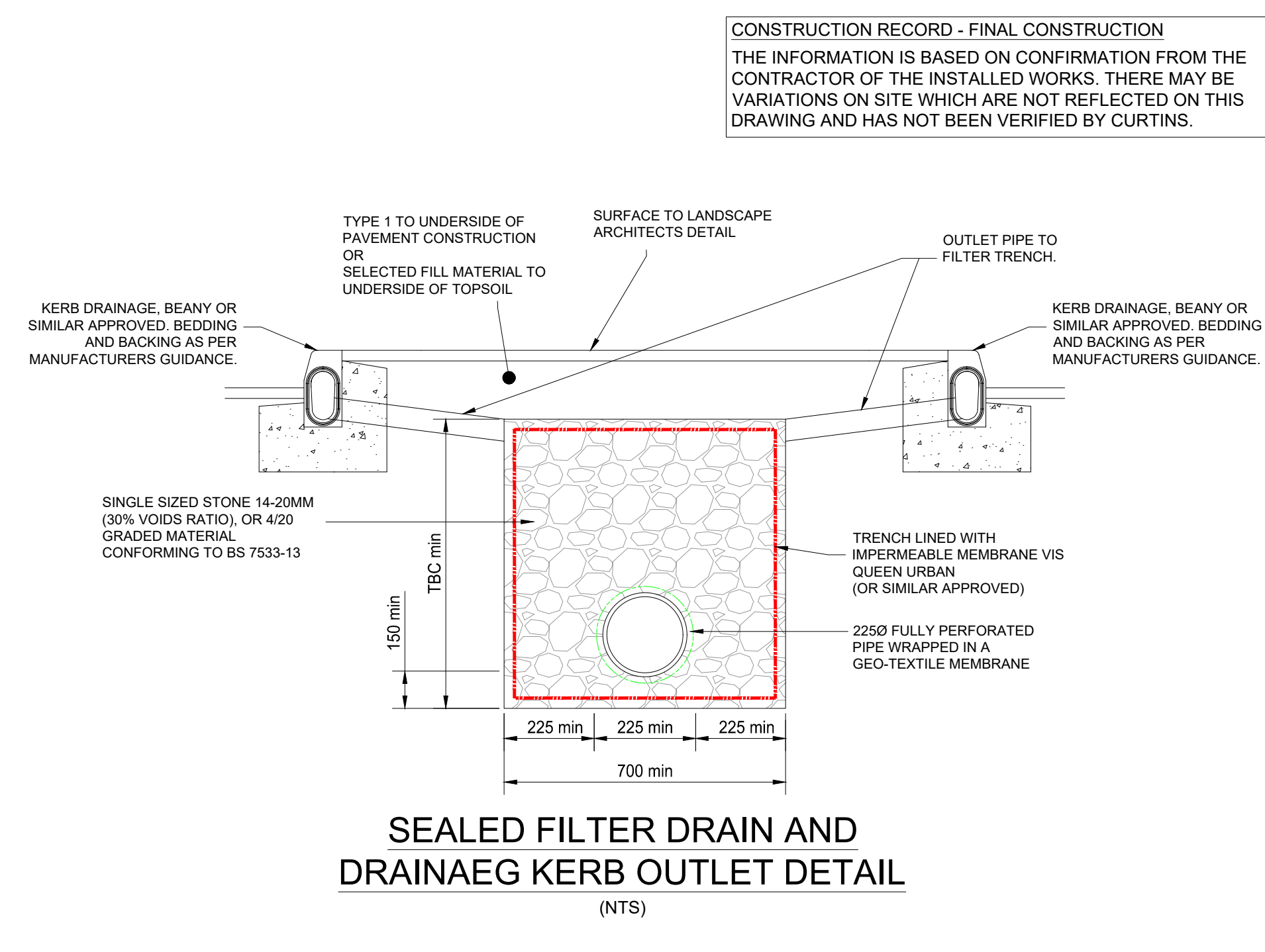
Specification

Description	Height [m]	Rate [l/s]	Description	Size [mm]
Flush Flow	0.263	4.83	Minimum Outlet Pipe Diameter	150
Reattachment	0.625	3.31	Minimum Sump Depth	352
			Minimum Chamber Diameter	1050

Disclaimer: This design only applies to ACO Q-Brake and ACO Q-Plate products and no other parties' products. It is the responsibility of the designer ('user') to verify that the design parameters have been entered correctly and that relevant industry standards and guidelines have been taken into consideration. ACO Q-Brake and Q-Plate are intended to be used with surface water only.

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- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
- REFER TO DRAINAGE LAYOUT EWA-CUR-XX-00-DR-C-92500- PROPOSED DRAINAGE LAYOUT FOR THE LOCATION OF THE ATTENUATION TANK.
- FLOW CONTROL TO BE INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURERS REQUIREMENTS, INSTRUCTIONS AND RECOMMENDATIONS.
- WHERE ALTERNATIVE FLOW CONTROL DEVICE IS PREFERRED, IT WILL BE SUBJECT TO REDESIGN TO CONFIRM WHETHER THE SYSTEM HAS CAPACITY.
- SURFACE WATER DRAINAGE CONNECTION SUBJECT TO S106 AGREEMENT WITH SEVERN TRENT WATER
- FOR FULL DRAINAGE NOTES REFER TO DWG EWA-CUR-XX-00-DR-C-92502
- FINAL DESIGN IS SUBJECT TO CONTRACTOR'S DESIGN PORTION

C04	UPDATED TO SUIT AS INSTALLED FLOW CONTROL DEVICE	30/04/24	CS	CG
C03	FINAL CONSTRUCTION	08/04/24	JC	CG
C02	UPDATED CONSTRUCTION ISSUE	26.10.23	CS	CG
C01	ISSUED FOR CONSTRUCTION	05.08.22	CS	CG
P05	STAGE 4 UPDATE	30.06.22	CS	CG

Rev: Description: Date: By: Chkd:

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Status: CONSTRUCTION RECORD

Project: HOUGH END SPORTS VILLAGE

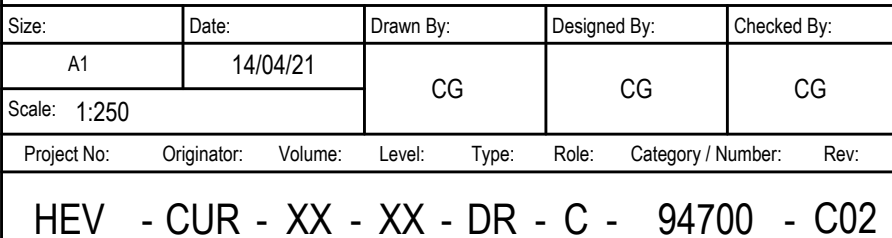
Dig Title: DRAINAGE DETAILS SHEET 3

Size:	Date:	Drawn By:	Designed By:	Checked By:
A1	16.04.21	CD	CG	CG

Scale: 1:20

Project No: Originator: Zone: Level: Type: Discipline: Category / Number: Rev:

HEV - CUR - XX - XX - DR - C - 92522 -C04



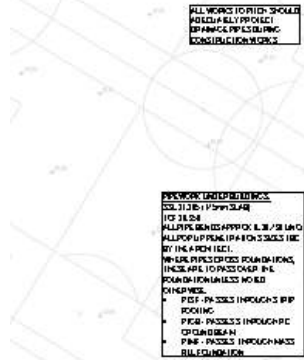
Appendix B

United Utilities Approval – Reference 02503948

S106 Part 1 'Application to connect to a public sewer' Approval Notice



		02503948				
Applicant details						
Applicant name	Charlie Smith					
Applicant address (including postcode)	Curtins Consulting Ltd Merchant Exchange, 17-19 Whitworth Street West, Manchester, M1 5WG					
Applicant email	charlie.smith@curtins.com					
Site details: The site / property which is proposed for connection to the public sewer						
	Hough End Sports Village, Princess Street, Manchester, M20 1HD					
<h2>APPROVED</h2> <p>Your application for connection to the public sewer has been approved, to be made via a new connection:</p>						
To a private drain	☐	You may appoint your contractor and advise your appointed building control body (who should inspect the work). United Utilities should be advised when this work is complete.				
Direct to the public sewer	☒	Further action required You may now appoint an appropriately qualified contractor. Your appointed contractor is responsible for obtaining authorisation to work on a public sewer. (The S106 Part 2 application form ' Request for permission to work on a public sewer ' is available on our website; unitedutilities.com).				
Mode of connection approved	Junction					
Sewer connection type	Foul	☒	Surface water	☐	Combined	☐
<p>This approval is valid for 12 months from the date below.</p> <p>This approval does not grant access to third party land, permission should be sought if required between applicant and land owner If the new connection renders access unsafe or is otherwise detrimental to the manhole or sewer, a new/upgraded manhole will be requested.</p>						
Comments						
<p>Approval for the 150mm foul only connection to the existing 450mm combined sewer in Princess Road via a junction as per your drainage plan below referenced HEV-CUR-XX-XX-DR-C-92500-P10 (as indicated on your drainage plan a junction connection with an off line manhole due to existing services)</p> <p>Surface water to a Watercourse</p> <p>The preformed junction should be a 'Y' type laid in the direction of flow. 'T' type junctions are not acceptable. Please see details included in the Sewer Connection Pack.</p> <p>For low-lying sites, (where the ground level of the site or the level of a basement is below the ground level at the point where the drainage connects to the public sewer), care should be taken to ensure that the property is not at increased risk of flooding. If these circumstances exist it could affect the detailed design of your site and result in the need to incorporate appropriate mitigating measures in your drainage scheme.</p> <p>Please note, if you are proposing to connect to an existing, unchartered drain or sewer then it is the developers responsibility to confirm that it communicates with the Public Sewer Connections may be made to private lateral drains or to existing neighbouring drain. A part 1 approval does not give permission to access third party land. The applicant must seek permission from the relevant land owner.</p>						



Development Support Technician
Contact number
Date

Appendix C

Aco QBrake Manufacturers Information

SDS Geolight Manufacturers Information

Q-Brake Design and Performance Report

Project Details

Project : QUO207096

Chamber Number : 1

Chamber Name : New Chamber

Reference

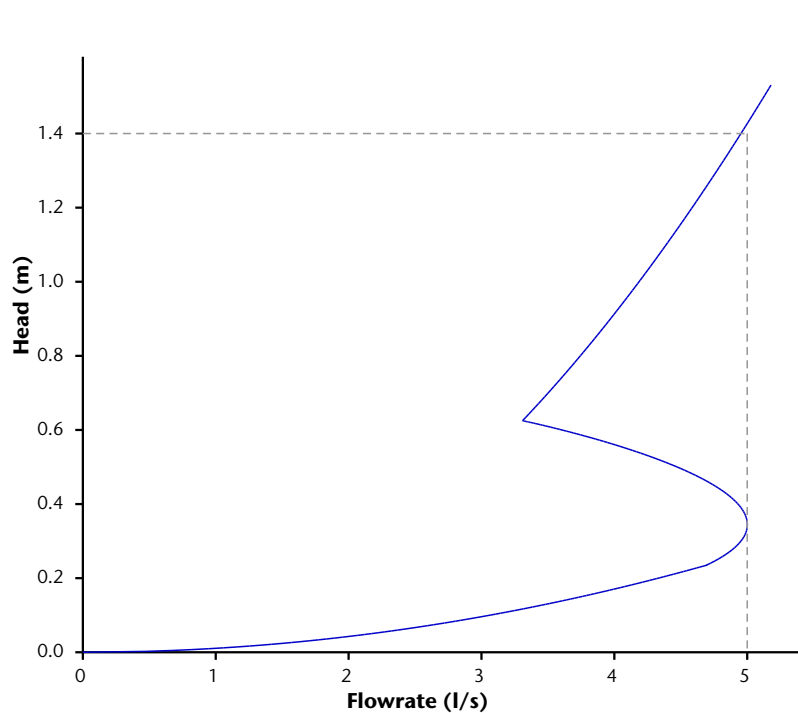
Design Reference : 00003134

Created by : Jack Prior

Date Produced : 23-04-2024

Design

Description	Size [m]	Description	Rate [l/s]	Description	Model
Design Head	1.400	Design Flow Rate	5.000	Design Style	Curved Back



Head [m] Flow [l/s]

0.000	0.000
0.024	1.498
0.048	2.119
0.072	2.595
0.096	2.997
0.120	3.351
0.144	3.670
0.168	3.964
0.192	4.238
0.215	4.495
0.241	4.725
0.300	4.953
0.357	4.997
0.412	4.897
0.463	4.690
0.509	4.413
0.549	4.104
0.581	3.802
0.606	3.543
0.620	3.367
0.634	3.334
0.727	3.568
0.819	3.788
0.912	3.996
1.004	4.194
1.096	4.383
1.189	4.564
1.281	4.738
1.374	4.906
1.466	5.068
1.531	5.179

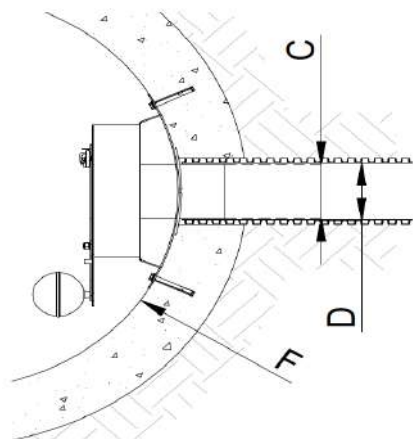
Specification

Description	Height [m]	Rate [l/s]	Description	Size [mm]
Flush Flow	0.263	4.83	Minimum Outlet Pipe Diameter	150
Reattachment	0.625	3.31	Minimum Sump Depth	352
			Minimum Chamber Diameter	1050

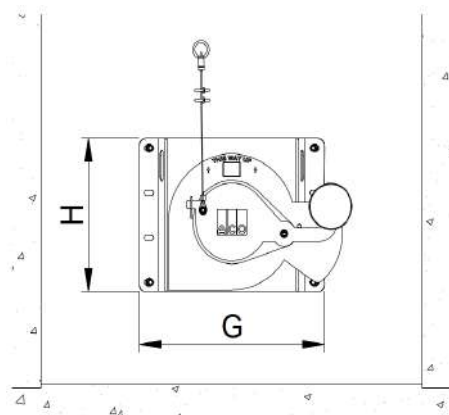
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ACO Q-Brake Dimensions

Model: QB400



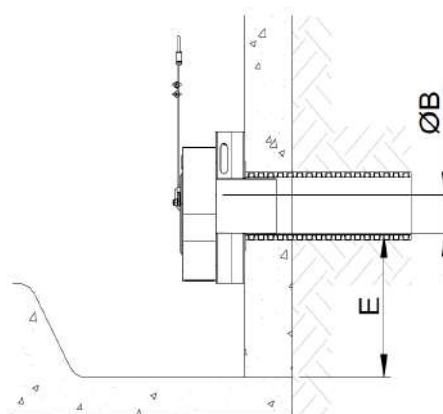
Plan View



Front View

Flow Control Dimensions

Key	Description	Size [mm]
B	Orifice diameter	94
C	Outlet Spigot OD	145
G	Overall width	565
H	Overall height	407



Side View

Chamber/Pipework Dimensions

Key	Description	Min [mm]	Design [mm]
D	Outlet pipe DN	150	150
E	Sump depth	352	
F	Chamber diameter	1050	1500

* Design dimensions shown are as selected by the designer.

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SDS GEOLight®

Stormwater Management System

Product Profile

SDS GEOLight® is an ultra lightweight honeycombed modular structure made from recycled PVC. The ready to install units are preformed to provide an underground stormwater storage facility, for the application of stormwater attenuation or infiltration.

The high void rate (>95%), high compressive strength (to 1000KN/m²) and low resistance to water flow makes

SDS GEOLight® an ideal material for cost efficient and maintainable underground water storage during storm conditions.

SDS GEOLight® Benefits

- High compressive strength – can be located under all roads, car parks and amenity area surfaces.
- Reduced excavation costs – the very high void rate (95%) minimises the required volume of earthworks.
- Speed of installation – 1000m³ reservoir, completed in one week.
- Light and easy to handle.
- Excellent hydraulic characteristics.
- The honeycomb structure is highly permeable, offering low resistance to water flow.
- SDS GEOLight®'s unique lateral and vertical filling arrangement requires a minimum amount of pipework and stone.
- Depth of tank invert reduced by using patented lateral supply.
- Simplified distribution pipe network, easy maintenance – dispensing with costly and complicated pipework configurations.
- Modular format offers design flexibility to overcome topographical constraints and architectural requirements.
- Greatly reduces the risk of flooding when used as stormwater storage.
- Can also be used for water recycling and combining with irrigation systems.
- Can virtually eliminate pollution when used in combination with specialist separation and filtration technology such as SDS Aqua-Swirl™ and SDS Aqua-Filter™.
- Design service available, including calculations.



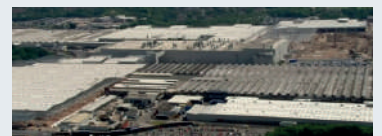
APPLICATIONS



RETAIL



INFRASTRUCTURE



INDUSTRIAL



RESIDENTIAL



COMMERCIAL



PUBLIC SECTOR



Material

Colour

Standard length of a block

Standard width of a block

Standard height of a block*

Void Ratio

Compressive Strength



SDS GEOLight® 400

SDS GEOLight® 600

SDS GEOLight® 800

APPLICATIONS

Stormwater Management

Attenuation / Infiltration

Bacterial filter-bed for biological treatment

Hydrocarbon Separation

Filtration and Separation Units

SPECIFICATIONS

Recycled Rigid PVC

Dark grey to black

2000 mm

2000 mm

2000 mm

500 mm

500 mm

500 mm

750 mm

750 mm

750 mm

*Other block sizes available on request

> 95%

> 95%

> 95%

420 kN/m²

610 kN/m²

800 kN/m²

ADVANTAGES

Highly cost effective

Reduced excavation costs

High void capacity

Good UV resistance

Good hydrocarbon resistance

GEO DS/1021

Our Locations

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