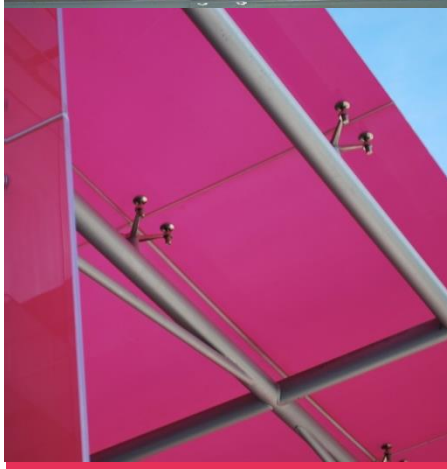








The Castings, Heyrod Street, Manchester

Verification & Drainage Maintenance Strategy

Curtins Ref: CAS-CUR-XX-XX-RP-C-92010

Curtins Project No: 075424

Revision: V03

Issue Date: 29 April 2024

Client Name: Midgard UK

Site Address: The Castings, 2 Heyrod Street, Manchester

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Control Sheet

Rev	Description	Issued by	Checked	Date
V01	First Issue - Draft	CS	CG	22/03/2023
V02	Verification and Maintenance for Planning Condition 13.	CG	CG	19/02/2024
V03	Updated to include final installed drainage	CG	CG	29/04/2024

This report has been prepared for the sole benefit, use, and information for the client. The liability of Curtins with respect to the information contained in the report will not extend to any third party.

Author	*Signature*	*Date*
Charlie Smith MEng (Hons) GMICE Civil Engineer		29 April 2024

Reviewed	*Signature*	*Date*
Chloé Grimsley BSc (Hons) Principal Engineer		29 April 2024

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Appendices

Appendix A

CAS-CUR-XX-GF-DR-C-83-0500 Drainage Layout

CAS-CUR-XX-GF-DR-C-83-0505 Building Drainage Layout

CAS-CUR-XX-GF-DR-C-83-0501 MH Schedule

CAS-CUR-XX-GF-DR-C-83-0510 Drainage Notes

CAS-CUR-XX-GF-DR-C-83-0521-Drainage Details Sheet 1

CAS-CUR-XX-GF-DR-C-83-0522-Drainage Details Sheet 2

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CAS-CUR-XX-GF-DR-C-03-0700 External Works General Arrangement

CAS-CUR-XX-GF-DR-C-03-0701 External Works Details

Appendix B

Surface Water Drainage Calculations 1-year, 30-year, 100-Year +40%cc

Appendix C

United Utilities Approval – Reference EC5658

Appendix D

Hydro-Brake Manufacturers Information

Polystorm Manufacturers Information

Appendix E

Solutek Attenuation Tank Formation Inspection Certificate

1.0 Introduction

1.1 Project Background

1.1.1 Curtins have been appointed by Midgard to provide a Verification and Drainage Maintenance Strategy for the proposed below ground drainage design for The Castings site at Heyrod Street, Manchester. The British National Grid co-ordinates for the site is approximately Easting 385252, Northing 398026.

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 Existing Drainage

2.1.1 All existing drainage on site has been confirmed as redundant and removed. A private manhole located on site located along the southern boundary was investigated in January 2022 and confirmed as full of debris, the manhole was redundant, all pipework was grubbed up and capped off.

2.2 General

2.2.1 The drainage network on site is a private drainage network.

2.2.2 The drainage network is a separate foul and surface water system within the development, with a single combined outfall into the existing combined public sewer network in Heyrod Street.

2.3 Foul Drainage

2.3.1 The current peak foul flow rate has been estimated at **22 l/s** based on the Discharge Units.

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

2.4 Surface Water Drainage

2.4.1 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.

2.4.2 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.

2.4.3 Assessment was completed at preliminary design stage to confirm the most viable method of discharge was connection to the combined public sewer at a restricted rate.

2.4.4 The on-site surface water network is based on a pipe system serving the building with a flow restriction and a pipe system serving the external private areas with a flow restriction. Both pipe systems connect to the combined outfall connection into Heyrod Street.

2.4.5 The existing drainage network on site was estimated to discharge 57.83 l/s in the 1 in 100-year return period, therefore proposed flows used the design are restricted to **28.91 l/s.**

2.4.6 Longacre Street is currently an adopted highway and is to remain adopted post development. Due to this reason, the surface water run-off catchment in this area has been excluded from the calculations and any flow restrictions. Longacre Street is estimated to discharge **11.06** l/s post development.

2.4.7 The building footprint has been restricted to 50% of existing flows minus the unrestricted flows from Longacre Street at a maximum of **8.9 l/s.** The restriction is achieved by a hydro-brake flow control located in manhole FCC1.

2.4.8 The external areas are proposed to discharge 50% of existing flows at **8.91 l/s.** The restriction is achieved by a hydro-brake flow control located in manhole FCC2.

2.4.9 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.

2.4.10 The building network connects o a below ground cellular attenuation tank located below the car park at ground floor. The attenuation tank provides approximately 63m³ of storage.

2.4.11 The external areas are drained via a permeable construction build up. The permeable construction includes a minimum 150mm layer of course graded aggregate with 30% voids which provides up to 30m³ of storage.

2.4.12 The building at ground floor level proposes a car park with approximately 20 number of parking spaces. Due to the very low risk of spillages being conveyed to the surface water system, due to the car park being internal and covered, it is anticipated that a petrol interceptor or similar is not required. Any spillages within the carpark should be treated locally and disposed of correctly in accordance with the proposals set out in the maintenance strategy section. Spillages should not be washed down into the drainage system.

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

2.4.14 Surface Water Drainage Calculations are enclosed in *Appendix B.*

2.5 Approvals

2.5.1 The connection to the public sewer in Heyrod Street has been approved under a Section 106 Agreement referenced EC5658. The correspondence is enclosed in *Appendix C.*

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
- Permeable Paving
- Flow Control Chambers
- Tree Pits

3.1.3 Photographs for the flow control chambers to be supplemented into the report once access can be made to the chambers prior to completion.

3.1.4 A CCTV Survey has also been provided along with As built record information for each chamber.

3.2 Photographic Information

Attenuation Tank

3.2.1 The attenuation tank is a Polypipe Polystorm PSM1A product. Manufacturers information is enclosed in *Appendix D*.

3.2.2 The ground formation for the attenuation Tank was inspected by Solutek on 10th March 2022 and inspection certificate is enclosed in *Appendix E.*

3.2.3 Tank Installation was inspected on 16th March 2022, photographs are shown in Figure 1 – 3.

Figure 1 – Attenuation Tank Installation



Figure 2 – Attenuation Tank Installation



Figure 3 – Attenuation Tank Installation



Permeable Paving

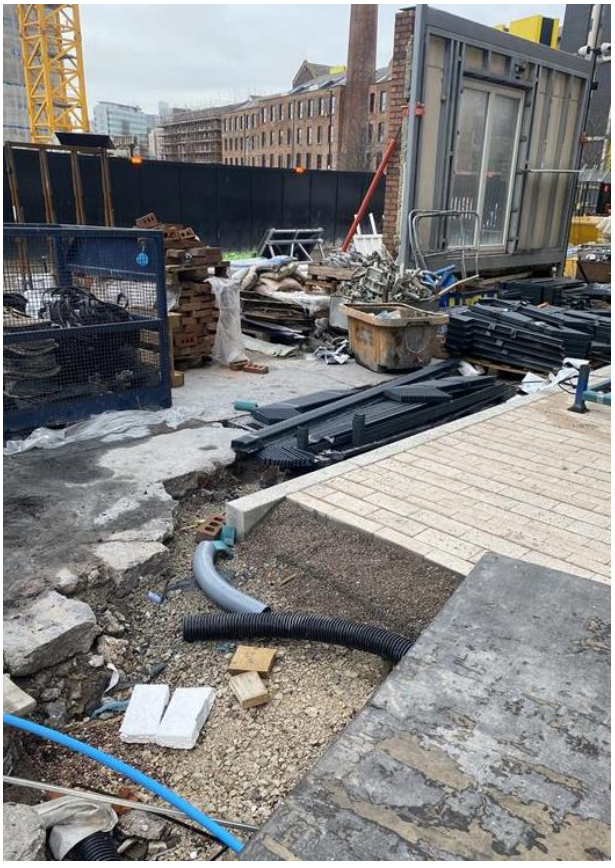
3.2.4 Permeable Paving Installation was inspected on 1st February 2024, photographs are shown in Figure 4 – 8.

Figure 4 – Permeable Paving Installation



Southern Elevation - Formation prior to membrane installation.

Figure 5 – Permeable Paving Installation



Western elevation demonstrating full construction completed.

Figure 6 – Permeable Paving Installation



Western elevation demonstrating rodding access to perforated pipe within sub-base material.

Figure 7 – Permeable Paving Installation



Western elevation demonstrating permeable laying course material.

Figure 8 – Permeable Paving Installation



Southern elevation demonstrating permeable sub-base material prior to laying.

Flow Control Chambers

3.2.5 The Flow Control Chambers FCC1 and FCC2 have been installed in April 2024, photographs are shown in Figures 9-10.

Figure 9 – Flow Control Installation



Figure 10 – Flow Control Installation



Tree Pits

3.2.6 The tree pits have been installed in April 2024; photographs are shown in Figures 11-12.

Figure 11 – Tree Pit Installation



Figure 12 – Tree Pit Installation



Figure 13 – Tree Pit Installation





3.3 CCTV Survey and As Built information

3.3.1 A CCTV Survey was completed on the installed drainage network in August 2022.

3.3.2 The survey confirms at this time the drainage network was in general good condition. There were minor defects recorded on three lines (Run 3, 11 and 27) theses have been recommended to be repaired prior to handover and a final CCTV Survey completed.

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:

- CAS-CUR-XX-GF-DR-C-83-0500 Drainage Layout
- CAS-CUR-XX-GF-DR-C-83-0505 Building Drainage Layout
- CAS-CUR-XX-GF-DR-C-83-0501 MH Schedule
- CAS-CUR-XX-GF-DR-C-83-0510 Drainage Notes
- CAS-CUR-XX-GF-DR-C-83-0521-Drainage Details Sheet 1
- CAS-CUR-XX-GF-DR-C-83-0522-Drainage Details Sheet 2
- CAS-CUR-XX-GF-DR-C-83-0523-Drainage Details Sheet 3
- CAS-CUR-XX-GF-DR-C-83-0524-Drainage Details Sheet 4
- CAS-CUR-XX-GF-DR-C-03-0700 External Works General Arrangement
- CAS-CUR-XX-GF-DR-C-03-0701 External Works Details

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:

Native,
Bruntwood Works,
111 Piccadilly,
Manchester
M1 2HY

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 - Hydrobrake
- Permeable Paving

4.4 Inspection, Manhole and Catchpit Chambers

4.4.1 The locations of the chambers are indicated on Curtins drainage drawing CAS-CUR-XX-GF-DR-C-83-0500.

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 CAS-CUR-XX-GF-DR-C-83-0500.

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 CAS-CUR-XX-GF-DR-C-83-0500.

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 CAS-CUR-XX-GF-DR-C-83-0500.

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 - Hydrobrake

4.8.1 The locations of the Flow Control Chambers are indicated on Curtin's drainage drawings CAS-CUR-XX-GF-DR-C-83-0500.

4.8.2 The flow control units are intended for flood control and flow restriction.

4.8.3 The flow controls are specified as Hydro-brake or similar approved and are proprietary products; 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 CAS-CUR-XX-GF-DR-C-83-0500.

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).

4.10 Washdown Gullies

4.10.1 The locations of the wash down gullies are indicated on Curtin's drainage drawing CAS-CUR-XX-GF-DR-C-83-0500.

4.10.2 Washdown gullies to be regularly maintained and filled with water to prevent traps from drying out.

4.10.3 Gullies installed have removable covers to allow cleaning and clearing of debris and silt. The appropriate barriers and signage should be installed during any opening of gullies to warn pedestrians.

4.11 Spill Management in Car Park

4.11.1 Spillages i.e. petrol, oil from vehicles should not be washed to the foul gullies as this connects direct to the public sewer. Petrol/oil leaks etc should be isolated at the source and locally cleaned/disposed of.

4.11.2 The building manager or person responsible for maintenance of the building should regular inspect the car park for such spillages. As the car park is laid flat, there is very low risk of spillages running/draining direct to the gullies.

4.11.3 Gullies are required for general cleaning of the car park for wash down purposes, rainwater, snow/ice, etc that cars bring in, once thawed for somewhere to drain to. The car park is flat therefore this type of water would most likely air dry before reaching the gullies however can be washed/brushed to the gullies if excessive.

Appendix A

CAS-CUR-XX-GF-DR-C-83-0500 Drainage Layout

CAS-CUR-XX-GF-DR-C-83-0505 Building Drainage Layout

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CAS-CUR-XX-GF-DR-C-83-0524-Drainage Details Sheet 4

CAS-CUR-XX-GF-DR-C-03-0700 External Works General Arrangement

CAS-CUR-XX-GF-DR-C-03-0701 External Works Details

RESIDUAL HAZARD REGISTER

HAZARDS THAT SHOULD BE OBVIOUS TO A COMPETENT CONTRACTOR HAVE NOT BEEN INDICATED ON THIS DRAWING.
SHOULD ANY ADDITIONAL HAZARDS BE IDENTIFIED, THE CONTRACTOR SHOULD NOTIFY ALL RELEVANT PROJECT TEAM MEMBERS.

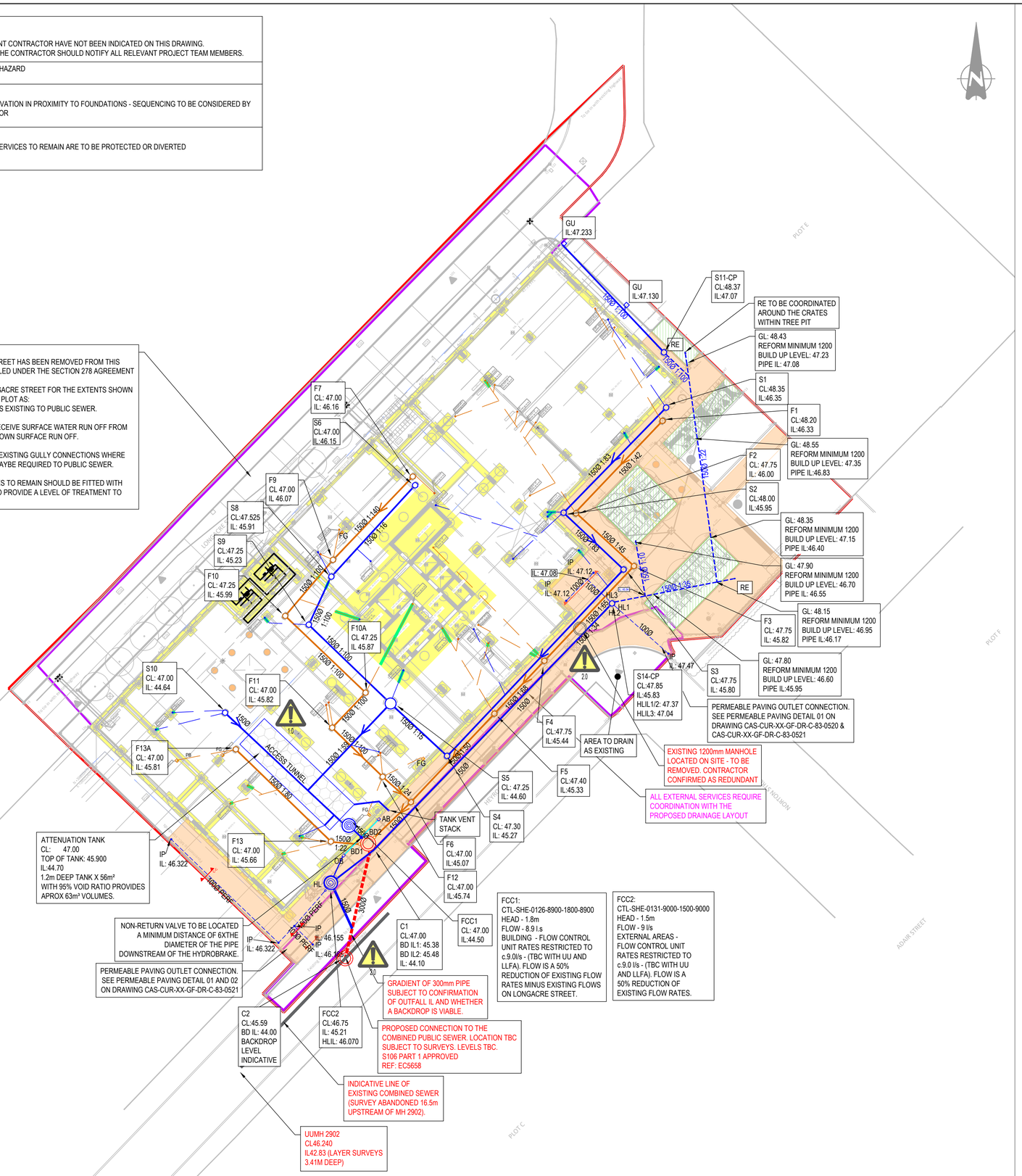
HAZARD REF No.	ITEM (FEATURE, ELEMENT OR ACTIVITY)	RESIDUAL HAZARD
1.0	ATTENUATION TANK	DEEP EXCAVATION IN PROXIMITY TO FOUNDATIONS - SEQUENCING TO BE CONSIDERED BY CONTRACTOR
2.0	SERVICES	EXISTING SERVICES TO REMAIN ARE TO BE PROTECTED OR DIVERTED

LONGACRE STREET
ALL DRAINAGE TO LONGACRE STREET HAS BEEN REMOVED FROM THIS DRAWING AND SHOULD BE DETAILED UNDER THE SECTION 278 AGREEMENT DRAWINGS.
DRAINAGE PRINCIPLES FOR LONGACRE STREET FOR THE EXTENTS SHOWN HAVE BEEN AGREED UNDER THIS PLOT AS:
ROAD AND FOOTWAY TO DRAIN AS EXISTING TO PUBLIC SEWER.

PROPOSED RAIN GARDENS TO RECEIVE SURFACE WATER RUN OFF FROM HIGHWAY TO TREAT AND SLOW DOWN SURFACE RUN OFF.

PROPOSED GULLIES TO UTILISE EXISTING GULLY CONNECTIONS WHERE POSSIBLE. NEW CONNECTIONS MAYBE REQUIRED TO PUBLIC SEWER.

PROPOSED AND EXISTING GULLIES TO REMAIN SHOULD BE FITTED WITH SMART SPONGE TECHNOLOGY TO PROVIDE A LEVEL OF TREATMENT TO SURFACE RUN OFF.



KEY:

- SITE BOUNDARY (TAKEN FROM 0799-RFM-XX-00-M2-L-0006)
- EXISTING HIGHWAY ADOPTION BOUNDARY PROPOSAL REQUIRE FURTHER COORDINATION AND S278 AGREEMENT WITH MANCHESTER CITY COUNCIL HIGHWAYS
- PROPOSED EXTENT OF S278
- EXISTING COMBINED PUBLIC SEWER INDICATIVE LOCATION TBC
- PROPOSED PRIVATE COMBINED DRAIN
- PROPOSED PRIVATE FOUL DRAIN
- PROPOSED PRIVATE SURFACE DRAIN
- PROPOSED ATTENUATION SYSTEM (TYPE TO BE CONFIRMED)
- PROPOSED FLOW CONTROL CHAMBER
- PROPOSED PRIVATE FOUL MANHOLE OR PPIC (REFER TO SCHEDULE) — F1
- PROPOSED PRIVATE SURFACE MANHOLE OR PPIC (REFER TO SCHEDULE) — S1
- PERMEABLE PAVING OUTLET PIPE WITH VERTICAL INSPECTION PIPE IL BASED ON PIPE WITHIN STONE LAYER. — IP
- OUTLET FROM TREE BIO-RETENTION OUTLET IL BASED ON DEPTHS TAKEN FROM LANDSCAPE ARCHITECT SECTIONS — OU
- PROPOSED AREA OF PERMEABLE PAVING. REFER TO EXTERNAL WORKS LAYOUT AND DETAILS FOR CONSTRUCTION.
- PROPOSED ROAD GULLY — PG
- PROPOSED INTERNAL FLOOR GULLY — FG
- PROPOSED BIORETENTION TREE PIT SYSTEM/PERMEABLE RESIN BOUND CONSTRUCTION.REFER TO LANDSCAPE ARCHITECTS DETAILS FOR BUILD UP/ SPECIFICATION.
- PROPOSED RWP AND CONNECTION
- PROPOSED FOUL POPUP AND CONNECTION
- PROPOSED FACADE DRAIN & ACCESS/OUTLET BOX (ASSUMED GATIC 150mm) — AB — OB
- PROPOSED RWP/SVP TO BE CAST INTO THE FOUNDATIONS
- SERVICES BASED ON CAS-ABE-X0-XX-DR-V-01-0001 DRAWING. REQUIRES COORDINATION AROUND PROPOSED DRAINAGE AND PERMEABLE PAVING CONSTRUCTION

DESIGN PHILOSOPHY

SURFACE WATER DESIGN
AREA 1 - BUILDING FOOTPRINT IS TO BE RESTRICTED TO 50% OF EXISTING FLOWS MINUS EXISTING FLOWS FROM LONGACRE STREET.

AREA 2 - EXTERNAL AREAS WITHIN THE PLANNING BOUNDARY TO BE RESTRICTED TO 50% OF EXISTING FLOWS.

AREA 3 - LONGACRE STREET (ADOPTED HIGHWAY), UNRESTRICTED FLOW.

AREA 1:
THE DESIGN PROVIDES CAPACITY UP TO THE 100 YEAR 40% CLIMATE CHANGE EVENT.
SW FLOW RATE: 20 L/S (BASED ON MANCHESTER CITY COUNCILS GUIDANCE OF 50% REDUCTION OF EXISTING BROWNFIELD FLOWS). EXISTING FLOWS ON LONGACRE STREET (11.06l/s) HAVE BEEN OFFSET FROM AREA 1. TOTAL PROPOSED DISCHARGE RATE 8.9l/s (20l/s - 11.06l/s).
OUTFALL: TO COMBINED PUBLIC SEWER ON HEYROD ST SUBJECT TO A SECTION 106 AGREEMENT
POLLUTION TREATMENT: INTERNAL CAR PARK DRAINAGE IS DISCHARGED TO FOUL GULLIES FOR WASHDOWN. ANY SPILLS TO BE CONTAINED AND DISPOSED OF APPROPRIATELY.

AREA 2:
THE DESIGN PROVIDES CAPACITY UP TO THE 100 YEAR 40% CLIMATE CHANGE EVENT.
SW FLOW RATE: 8.91 L/S (BASED ON MANCHESTER CITY COUNCILS GUIDANCE OF 50% REDUCTION OF EXISTING BROWNFIELD FLOWS)
POLLUTION TREATMENT & SUSTAINABLE DRAINAGE: PERMEABLE PAVING, BIORETENTION TREE PIT SYSTEM.

AREA 3:
LONGACRE STREET (ADOPTED HIGHWAY), UNRESTRICTED FLOW CALCULATED AT 11.06l/s USING WALLINGFORD'S MODIFIED RATIONAL METHOD WITH AN AVERAGE RAINFALL INTENSITY OF 36mm/hr.

FOUL WATER DESIGN
FW PEAK FLOW RATE: 22.1l/s BASED ON TOTAL DISCHARGE UNITS AT OUTFALL PIPE BASED ON M&E DRAWING CAS-ABE-XX-GF-DR-M-52-00001/CALCS DATED 14.10.21.

OUTFALL: CW SEWER ON HEYROD ST (TO BE AGREED WITH UU AND SUBJECT TO A SECTION 106 AGREEMENT).

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.

GENERAL NOTES:

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2. DO NOT SCALE THIS DRAWING. ANY AMBIGUITIES, OMISSIONS AND ERRORS ON DRAWINGS SHALL BE BROUGHT TO THE ENGINEERS ATTENTION IMMEDIATELY. ALL DIMENSIONS MUST BE CHECKED / VERIFIED ON SITE.
3. ALL DIMENSIONS ARE IN METRES AND LEVELS IN METRES ABOVE ORDNANCE DATUM UNLESS OTHERWISE NOTED.
4. REFER TO NOTES DRAWING: CAS-CUR-XX-GF-DR-C-83-0501.
5. FOR DETAILED DRAINAGE UNDER THE BUILDING, REFER TO BUILDING DRAINAGE LAYOUT CAS-CUR-XX-GF-DR-C-83-0505.

DRAWING BASED ON:

- AXIS GROUND DRAINAGE POPUP DRAWING REF CAS-AXIS-BU1-L00-DR-A-33-0100-P06
- TOPOGRAPHICAL SURVEY BY SURVEY SYSTEMS LTD, DRAWING REFERENCE SSL:7016C:200:1:2, DATED SEPTEMBER 2018.
- LANDSCAPE ARCHITECT, LEVEL 00 GA, DRAWING REF, CAS-RFM-XX-GF-DR-L-19-0003-C10
- FOUNDATIONS LAYOUT, CURTINS, DRAWING REF STRUCTURALPLAN-FOUNDATIONGENERAL ARRANGEMENT CO-ORDS, RECEIVED 13.12.21.
- EXTERNAL SERVICES LAYOUT CAS-ABE-X0-XX-DR-V-01-0001 RECEIVED 03.03.22 REQUIRES COORDINATION AROUND DRAINAGE AND PERMEABLE CONSTRUCTION

Rev:	Description:	Date:	By:	Chkd:
C11	FINAL CONSTRUCTION	19.02.24	CG	CG
C10	CONSTRUCTION ISSUE UPDATE	27.10.23	CS	CG
C09	S5, S8, S9, F10 & F10A CL's UPDATED	21.08.23	CG	CG
C08	CONSTRUCTION ISSUE UPDATE	07.07.23	CS	CG
C07	CONSTRUCTION ISSUE UPDATE	19.05.23	CS	CG
C06	CONSTRUCTION ISSUE UPDATE	10.08.22	CS	CG
C05	CONSTRUCTION ISSUE UPDATE	29.04.22	CS	CG
C04	CONSTRUCTION ISSUE UPDATE	11.03.22	CS	CG
C03	CONSTRUCTION ISSUE UPDATE	02.02.22	CS	CG
C02	CONSTRUCTION ISSUE UPDATE	19.01.22	CS	CG
C01	CONSTRUCTION ISSUE	17.12.21	CS	CG
P09	STAGE 4 ISSUE - DRAWING RENUMBERED	24.11.21	CS	CG
P08	PERMEABLE PAVING NOTE UPDATE	15.10.21	CD	CD
P07	UPDATED FOR PLANNING	20.09.21	CS	CD
P06	MINOR UPDATES	04.11.20	CD	CD
P05	STAGE 3 DRAFT ISSUE	28.09.20	AH	CD
P04	UPDATED TO INCLUDE LATEST LANDSCAPE LAYOUT	25.06.20	CD	CD
P03	UPDATED STRATEGY AND PLANNING BOUNDARY	05/06/20	CD	CD
P02	DRAINAGE EXTENDED TO PLANNING BOUNDARY	16/04/20	CD	CD
P01	DRAFT ISSUE	01/04/20	AH	CD

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Status: CONSTRUCTION RECORD

Project: HEYROD STREET

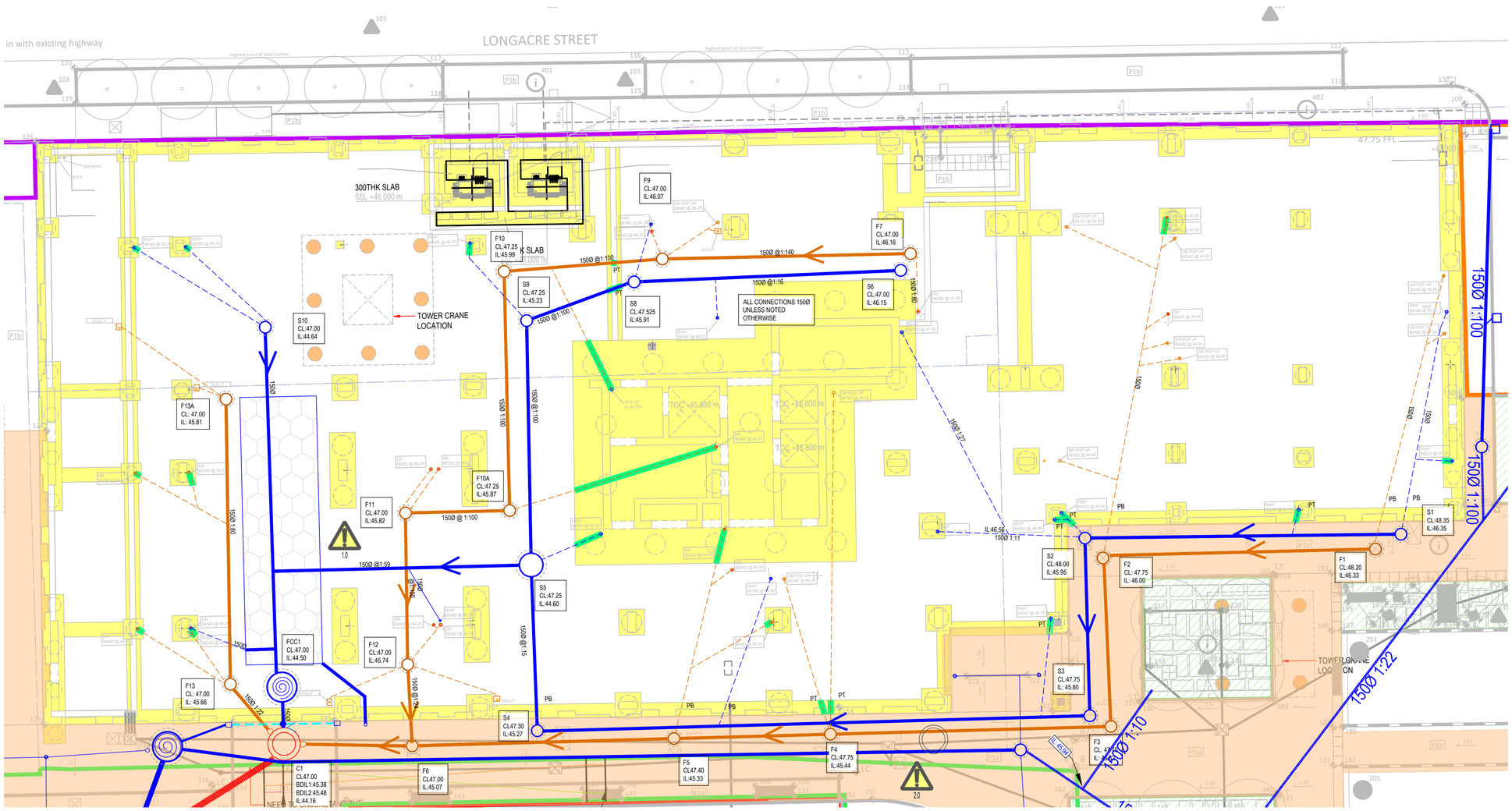
Drg Title: DRAINAGE LAYOUT

Size:	Date:	Drawn By:	Designed By:	Checked By:
A1	01/04/20	AH	AH	CD

Scale: 1:250

Project No:	Originator:	Volume:	Level:	Type:	Role:	Category / Number:	Rev:
CAS	- CUR -	XX -	GF -	DR -	C -	83-0500 -	C11

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4. REFER TO NOTES DRAWING: CAS-CUR-XX-GF-DR-C-83-0501.
5. FOR SITE DRAINAGE LAYOUT, REFER TO BUILDING DRAINAGE LAYOUT CAS-CUR-XX-GF-DR-C-83-0500.

DRAWING BASED ON:

- AXIS GROUND DRAINAGE POPUP DRAWING REF CAS-AXIS-BU1-L00-DR-A-33-0100-P06
- TOPOGRAPHICAL SURVEY BY SURVEY SYSTEMS LTD, DRAWING REFERENCE SSL:7016C:200:1:2, DATED SEPTEMBER 2018.
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- EXTERNAL SERVICES LAYOUT CAS-ABE-X0-XX-DR-V-01-0001 RECEIVED 03.03.22 REQUIRES COORDINATION AROUND DRAINAGE AND PERMEABLE CONSTRUCTION

Rev:	Description:	Date:	By:	Chkd:
C11	FINAL CONSTRUCTION	19.02.24	CG	CG
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C05	CONSTRUCTION ISSUE UPDATE	29.04.22	CS	CG
C04	CONSTRUCTION ISSUE UPDATE	11.03.22	CS	CG
C03	CONSTRUCTION ISSUE UPDATE	02.02.22	CS	CG
C02	CONSTRUCTION ISSUE UPDATE	19.01.22	CS	CG
C01	CONSTRUCTION ISSUE	17.12.21	CS	CG

RESIDUAL HAZARD REGISTER

HAZARDS THAT SHOULD BE OBVIOUS TO A COMPETENT CONTRACTOR HAVE NOT BEEN INDICATED ON THIS DRAWING.
SHOULD ANY ADDITIONAL HAZARDS BE IDENTIFIED, THE CONTRACTOR SHOULD NOTIFY ALL RELEVANT PROJECT TEAM MEMBERS.

HAZARD REF No.	ITEM (FEATURE, ELEMENT OR ACTIVITY)	RESIDUAL HAZARD
1.0	ATTENUATION TANK	DEEP EXCAVATION IN PROXIMITY TO FOUNDATIONS - SEQUENCING TO BE CONSIDERED BY CONTRACTOR
2.0	SERVICES	EXISTING SERVICES TO REMAIN ARE TO BE PROTECTED OR DIVERTED

DESIGN PHILOSOPHY

SURFACE WATER DESIGN
AREA 1 - BUILDING FOOTPRINT IS TO BE RESTRICTED TO 50% OF EXISTING FLOWS MINUS EXISTING FLOWS FROM LONGACRE STREET.

AREA 2 - EXTERNAL AREAS WITHIN THE PLANNING BOUNDARY TO BE RESTRICTED TO 50% OF EXISTING FLOWS.

AREA 3 - LONGACRE STREET (ADOPTED HIGHWAY), UNRESTRICTED FLOW.

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THE DESIGN PROVIDES CAPACITY UP TO THE 100 YEAR 40% CLIMATE CHANGE EVENT.
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OUTFALL: TO COMBINED PUBLIC SEWER ON HEYROD ST SUBJECT TO A SECTION 106 AGREEMENT
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LONGACRE STREET (ADOPTED HIGHWAY), UNRESTRICTED FLOW CALCULATED AT 11.06l/s USING WALLINGFORD'S MODIFIED RATIONAL METHOD WITH AN AVERAGE RAINFALL INTENSITY OF 36mm/hr.

FOUL WATER DESIGN
FW PEAK FLOW RATE: 22.1l/s BASED ON TOTAL DISCHARGE UNITS AT OUTFALL PIPE BASED ON M&E DRAWING CAS-ABE-XX-GF-DR-M-52-00001/CALCS DATED 14.10.21.

OUTFALL: CW SEWER ON HEYROD ST (TO BE AGREED WITH UU AND SUBJECT TO A SECTION 106 AGREEMENT).

KEY:

- SITE BOUNDARY (TAKEN FROM 0799-RFM-XX-00-M2-L-0006)
- EXISTING INDICATIVE HIGHWAY BOUNDARY - EXTENT OF S278 WORKS TBC
- PROPOSED HIGHWAY BOUNDARY (TBC)
- EXISTING HIGHWAY BOUNDARY PROPOSED TO BE STOPPED UP. WORKS PRIOR TO STOPPING UP REQUIRES AGREEMENT UNDER S278 WORKS
- EXISTING COMBINED PUBLIC SEWER INDICATIVE LOCATION TBC
- PROPOSED PRIVATE COMBINED DRAIN
- PROPOSED PRIVATE FOUL DRAIN
- PROPOSED PRIVATE SURFACE DRAIN
- PROPOSED ATTENUATION SYSTEM (TYPE TO BE CONFIRMED)
- PROPOSED FLOW CONTROL CHAMBER
- PROPOSED PRIVATE FOUL MANHOLE OR PPIC (REFER TO SCHEDULE) — F1
- PROPOSED PRIVATE SURFACE MANHOLE OR PPIC (REFER TO SCHEDULE) — S1
- PERMEABLE PAVING OUTLET PIPE WITH VERTICAL INSPECTION PIPE IL BASED ON PIPE WITHIN STONE LAYER. — IP
- OUTLET FROM TREE BIO-RETENTION OUTLET IL BASED ON DEPTHS TAKEN FROM LANDSCAPE ARCHITECT SECTIONS — OU
- PROPOSED AREA OF PERMEABLE PAVING. REFER TO EXTERNAL WORKS LAYOUT AND DETAILS FOR CONSTRUCTION.
- PROPOSED ROAD GULLY — PG
- PROPOSED INTERNAL FLOOR GULLY — FG
- PROPOSED BIORETENTION TREE PIT SYSTEM/PERMEABLE RESIN BOUND CONSTRUCTION.REFER TO LANDSCAPE ARCHITECTS DETAILS FOR BUILD UP/ SPECIFICATION.
- PROPOSED RWP AND CONNECTION
- PROPOSED FOUL POPUP AND CONNECTION
- PROPOSED FACADE DRAIN & ACCESS/OUTLET BOX (ASSUMED GATIC 150mm) — AB — OB
- PROPOSED RWP/SVP TO BE CAST INTO THE FOUNDATIONS
- SERVICES BASED ON CAS-ABE-X0-XX-DR-V-01-0001 DRAWING. REQUIRES COORDINATION AROUND PROPOSED DRAINAGE AND PERMEABLE PAVING CONSTRUCTION

CONSTRUCTION RECORD - FINAL CONSTRUCTION

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Status: CONSTRUCTION RECORD

Project: HEYROD STREET

Drg Title: BUILDING DRAINAGE LAYOUT

Size:	Date:	Drawn By:	Designed By:	Checked By:
A1	17/12/21	CS	CS	CG

Scale: 1:250

Project No:	Originator:	Volume:	Level:	Type:	Role:	Category / Number:	Rev:
CAS	CUR	XX	GF	DR	C	83-0505	C11

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Manhole schedule															
MH REF	CL (mAOD)	IL (mAOD)	X Co-ordinate	Y Co-ordinate	DEPTH TO SOFFIT (m)	DS PIPE DIA (mm)	MH DIA (mm)	MH TYPE	COVER SIZE (mm)	COVER CLASS	COVER TYPE	RECESSED	RESTRICTED ACCESS	BACK DROP	COMMENTS
S1	48.350	46.350	385296.5789	398058.4252	1.850	150	450	PPIC	600x600	D400	SINGLE SEALED	TBC BY LA	Y	N	350mm RESTRICTED ACCESS
S2	48.000	45.950	385285.037	398046.594	1.900	150	450	PPIC	600x600	D400	SINGLE SEALED	TBC BY LA	Y	N	350mm RESTRICTED ACCESS
S3	47.750	45.800	385291.788	398040.203	1.800	150	450	PPIC	600x600	D400	SINGLE SEALED	TBC BY LA	Y	N	350mm RESTRICTED ACCESS
S4	47.300	45.270	385271.910	398019.215	1.880	150	600	PPIC	600x600	D400	SINGLE SEALED	TBC BY LA	Y	N	
S5 - CP	47.250	44.600	385265.548	398025.119	2.500	150	1200	TYPE B	600x600	B125	DOUBLE SEALED	TBC BY ARCH	N	N	INTERNAL CHAMBER
S6	47.000	46.150	385268.318	398049.683	0.700	150	600	PPIC	600x600	B125	DOUBLE SEALED	TBC BY ARCH	Y	N	INTERNAL CHAMBER
S7	OMITTED														
S8	47.525	45.910	385258.884	398039.399	1.465	150	600	PPIC	600x600	B125	DOUBLE SEALED	TBC BY ARCH	Y	N	INTERNAL CHAMBER
S9	47.250	45.230	385256.343	398033.991	1.870	150	600	PPIC	600x600	B125	DOUBLE SEALED	TBC BY ARCH	Y	N	INTERNAL CHAMBER
S10-CP	47.000	44.640	385246.920	398024.079	2.210	150	600	PPIC	600x600	D400	DOUBLE SEALED	TBC BY ARCH	Y	N	INTERNAL CHAMBER 350mm RESTRICTED ACCESS
S11-CP	48.370	47.070	385296.336	398064.641	1.150	150	450	PPIC	450X450	B125	SINGLE SEALED	TBC BY LA	N	N	
S12-CP	OMITTED														
S13-CP	OMITTED														
S14-CP	47.840	45.830	385290.490	398036.381	1.860	150	600	PPIC	600x600	D400	SINGLE SEALED	TBC BY LA	Y	N	350mm RESTRICTED ACCESS CATCHPIT CHAMBER - SUMP INVERT LEVEL 300mm BELOW IL
FCC1	47.000	44.500	385260.852	398011.381	2.350	150	1500	TYPE B	600x600	D400	DOUBLE SEALED	TBC BY ARCH	N	N	FLOW CONROL CHAMBER - SIZE OF CHAMBER TO BE CONFIRMED WITH HYDRO-INERNATIONAL
FCC2	46.750	45.210	385258.819	398004.946	1.390	150	1500	TYPE C	1200x675	D400	SINGLE SEALED	TBC BY LA	N	N	FLOW CONROL CHAMBER - SIZE OF CHAMBER TO BE CONFIRMED WITH HYDRO-INERNATIONAL
F1	48.200	46.330	385296.184	398056.934	1.720	150	450	PPIC	450x450	D400	SINGLE SEALED	TBC BY LA	Y	N	350mm RESTRICTED ACCESS
F2	47.750	46.000	385286.436	398046.526	1.600	150	450	PPIC	450x450	D400	SINGLE SEALED	TBC BY LA	Y	N	350mm RESTRICTED ACCESS
F3	47.750	45.820	385292.964	398040.588	1.780	150	450	PPIC	450x450	D400	SINGLE SEALED	TBC BY LA	Y	N	350mm RESTRICTED ACCESS
F4	47.750	45.440	385282.880	398029.927	2.160	150	450	PPIC	450x450	D400	SINGLE SEALED	TBC BY LA	Y	N	350mm RESTRICTED ACCESS
F5	47.400	45.330	385277.251	398023.976	1.920	150	450	PPIC	450x450	D400	SINGLE SEALED	TBC BY LA	Y	N	350mm RESTRICTED ACCESS
F6	47.000	45.070	385267.841	398014.029	1.780	150	450	PPIC	450x450	D400	SINGLE SEALED	TBC BY LA	Y	N	350mm RESTRICTED ACCESS
F7	47.000	46.110	385268.059	398050.670	0.740	150	450	PPIC	450x450	B125	DOUBLE SEALED	TBC BY ARCH	N	N	INTERNAL CHAMBER
F8	OMITTED														
F9	47.000	45.940	385259.075	398041.292	0.910	150	450	PPIC	450x450	B125	DOUBLE SEALED	TBC BY ARCH	Y	N	INTERNAL CHAMBER 350mm RESTRICTED ACCESS
F10	47.250	45.880	385253.690	398034.979	1.220	150	450	PPIC	450x450	B125	DOUBLE SEALED	TBC BY ARCH	Y	N	INTERNAL CHAMBER 350mm RESTRICTED ACCESS
F10A	47.250	45.700	385262.739	398026.338	1.400	150	450	PPIC	450x450	B125	DOUBLE SEALED	TBC BY ARCH	Y	N	INTERNAL CHAMBER 350mm RESTRICTED ACCESS
F11	47.000	45.530	385258.977	398022.398	1.320	150	450	PPIC	450x450	D400	DOUBLE SEALED	TBC BY ARCH	Y	N	INTERNAL CHAMBER 350mm RESTRICTED ACCESS
F12	47.000	45.350	385264.665	398016.875	1.500	150	450	PPIC	450x450	D400	DOUBLE SEALED	TBC BY ARCH	Y	N	INTERNAL CHAMBER 350mm RESTRICTED ACCESS
F13A	47.000	45.810	385248.127	398019.969	1.040	150	450	PPIC	450x450	D400	DOUBLE SEALED	TBC BY ARCH	N	N	INTERNAL CHAMBER
F13	47.000	45.660	385258.835	398009.583	1.190	150	450	PPIC	450x450	D400	DOUBLE SEALED	TBC BY ARCH	Y	N	INTERNAL CHAMBER 350mm RESTRICTED ACCESS
C1	47.000	44.100	385263.028	398009.360	2.600	300	1200	TYPE B	600 x 600	D400	SINGLE SEALED	TBC BY LA	N	BDIL1: TBC BDIL2: TBC	COMBINED OUTFALL - NON-RETURN VALVE ON SW INLET TO CHAMBER
C2	46.750	TBC	385260.460 TBC	397996.449 TBC	TBC	420X700	1500	TYPE B	600 x 600	D400	SINGLE SEALED	NO	N	BDIL: 44.00 TBC	IL AND EXACT LOCATION TO BE CONFIRMED

ALL CO-ORDINATES ARE BASED ON MANHOLE CENTRE - PIPES MAY NEED TO BE OFFSET TO PROVIDE REQUIRED BENCHING

CONSTRUCTION RECORD - FINAL CONSTRUCTION

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3. ALL DIMENSIONS ARE IN METRES AND LEVELS IN METRES ABOVE ORDNANCE DATUM UNLESS OTHERWISE NOTED.
4. DESIGN BASED ON TOPOGRAPHICAL SURVEY INFORMATION, ARCHITECTS PROPOSED BUILDING LAYOUT AND LANDSCAPED ARCHITECTS SITE LAYOUT AVAILABLE AT THE TIME OF THE DESIGN.
5. COVER LEVELS, GULLY POSITIONS, AND BUILDINGS LOCATION ARE APPROXIMATE AND SHALL BE CONFIRMED BY ARCHITECT/ LANDSCAPE ARCHITECT. CONTRACTOR TO ALLOW FOR ADJUSTMENT TO SUIT AGREED POSITIONS AND FINISHED LEVELS, AND CONFIRM ALL COVER LEVELS ON SITE.
6. ALL GULLY AND CHANNEL DRAIN OUTLETS AND TERMINATION POINTS TO BE TRAPPED AND RODDABLE. INTERNAL GULLIES AND CHANNEL DRAINS TO BE SPECIFIED BY OTHERS.
7. THE CHAMBER SIZE OF MANHOLES WITH MORE THAN ONE CONNECTION MAY NEED TO BE INCREASED TO ACCOMMODATE THE CONNECTIONS AND BENDS.
8. ALL MANHOLE COVERS IN BLOCK/SLAB AND EXTERNAL PAVING AREAS TO HAVE RECESSED COVERS OF THE APPROPRIATE GRADE TO ACCEPT ARCHITECT'S PAVING PROPOSAL.
9. MANHOLE AND INSPECTION CHAMBER COVERS TO BE CO-ORDINATED WITH THE LANDSCAPE ARCHTECTS PAVING LAYOUT WHERE POSSIBLE. ACCESS LCOATIONS ON MANHOLES NEED TO BE POSITIONED TO SUIT THE LANDING AREA AT THE MANHOLE BASE AND ASSOCIATED STEP POSITIONS.
10. ALL INTERNAL COVERS TO HAVE MECHANICALLY JOINTED CORNERS AND DOUBLE SEALED WITH RECESSED TRAY TO ALLOW FOR FINISHES.
11. UNLESS NOTED OTHERWISE IN THE MANHOLE SCHEDULE, ALL MANHOLE, GULLY AND CHANNEL COVERS (IRONWORK) SHOULD BE THE FOLLOWING SPECIFICATION:
    - B125 LOAD CLASS IN PEDESTRIAN AREAS
    - D400 LOAD CLASS IN VEHICULAR AREAS.

Rev:	Description:	Date:	By:	Chkd:
C09	FINAL CONSTRUCTION	19.02.24	CG	CG
C08	MANHOLE S1A ADDED	27.10.23	CS	CG
C07	S5, S8, S9, F10 & F10A CL's UPDATED	21.08.23	CG	CG
C06	CONSTRUCTION ISSUE UPDATE	07.07.23	CS	CG
C05	CONSTRUCTION ISSUE UPDATE	29.04.22	CS	CG
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C01	CONSTRUCTION ISSUE	17.12.21	CS	CG
P02	STAGE 4 ISSUE - DRAWING RENUMBERED	24.11.21	CS	CG
P01	STAGE 3 DRAFT ISSUE	28.09.20	AH	CD

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Status: CONSTRUCTION RECORD

Project: HEYROD STREET

Drg Title: MANHOLE SCHEDULE

Size:	Date:	Drawn By:	Designed By:	Checked By:
A1	28/09/20	AH	AH	CD
Scale: NTS				

Project No:	Originator:	Volume:	Level:	Type:	Role:	Category / Number:	Rev:
CAS	- CUR -	XX -	GF -	DR -	C -	83-501	- C09

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GENERAL NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.

2. WHERE EXISTING DRAINAGE IS BEING USED, ALLOWANCES SHOULD BE MADE TO REMEDIATE THIS DRAINAGE IN LINE WITH AVAILABLE CCTV SURVEY INFORMATION. IF NO SURVEY IS AVAILABLE, IT IS ADVISED TO OBTAIN ONE PRIOR TO COMMENCEMENT OF WORKS.

3. ALL EXISTING SERVICES TO BE LOCATED PRIOR TO COMMENCEMENT OF ANY DRAINAGE WORKS, AND WHERE NECESSARY PROTECTION OR DIVERSIONS TO BE UNDERTAKEN TO AVOID CONFLICT WITH THE PROPOSED WORK.

4. ALL EXISTING SEWERS, CONNECTIONS, PIPE SIZES AND INVERT LEVELS TO BE CONFIRMED BY CONTRACTOR PRIOR TO COMMENCEMENT OF WORKS TO ENSURE CONNECTIVITY. ANY VARIANCE FROM THE INFORMATION SHOWN SHOULD BE REPORTED TO THE ENGINEER FOR REVIEW.

5. ALL ADOPTABLE DRAINAGE WORKS INCLUDING WORKS TO EXISTING PUBLIC SEWERS TO BE UNDERTAKEN IN ACCORDANCE WITH "SEWERS FOR ADOPTION 7th EDITION" AND "CIVIL ENGINEERING SPECIFICATION FOR THE WATER INDUSTRY 7th EDITION" AND CONSTRUCTED TO THE RELEVANT STATUTORY UNDERTAKERS DETAILS.

6. ALL PRIVATE DRAINAGE WORKS TO BE IN ACCORDANCE WITH CURTINS DRAINAGE SPECIFICATION, "CIVIL ENGINEERING SPECIFICATION FOR THE WATER INDUSTRY 7th EDITION", BS EN 752 2017 'DRAIN AND SEWER SYSTEMS OUTSIDE BUILDINGS' AND THE BUILDING REGULATIONS APPROVED 'DOCUMENT H'.

7. DO NOT SCALE THIS DRAWING. ANY AMBIGUITIES, OMISSIONS AND ERRORS ON DRAWINGS SHALL BE BROUGHT TO THE ENGINEERS ATTENTION IMMEDIATELY. ALL DIMENSIONS MUST BE CHECKED / VERIFIED ON SITE.

8. DESIGN BASED ON TOPOGRAPHICAL SURVEY AND CCTV SURVEY INFORMATION AVAILABLE AT THE TIME OF THE DESIGN.

9. OUTFALL CONNECTION(S) SUBJECT TO AGREEMENT WITH THE APPROVING AUTHORITY.

10. ALL DIMENSIONS ARE IN METRES AND LEVELS IN METRES ABOVE ORDNANCE DATUM UNLESS OTHERWISE NOTED.

11. COVER LEVELS, GULLY POSITIONS, AND BUILDINGS LOCATION ARE APPROXIMATE AND SHALL BE CONFIRMED BY ARCHITECT/ LANDSCAPE ARCHITECT. CONTRACTOR TO ALLOW FOR ADJUSTMENT TO SUIT AGREED POSITIONS AND FINISHED LEVELS, AND CONFIRM ALL COVER LEVELS ON SITE.

12. ALL INTERNAL DRAINAGE CONNECTIONS ARE PROVIDED TO THE PENETRATION POSITIONS SHOWN ON ARCHITECT AND M&E DRAWINGS. REFER TO DIMENSIONED LOCATIONS AND DIAMETERS ON ARCHITECT'S GROUND FLOOR SETTING-OUT PLANS.

13. ALL UNDERGROUND FOUL DRAINAGE SHOULD BE SUITABLY VENTED AT OR NEAR TO THE HEAD OF RUNS.

14. ALL ACCESS FITTINGS, STACKS, RWP'S AND GULLIES TO BE RODDABLE. ALL TO HAVE LOW LEVEL RODDING ACCESS PLATES UNLESS AN ALTERNATIVE MEANS OF ACCESS IS AGREED. ACCESS POINT TO BE ABOVE ANY GROUND FLOOR CONNECTED APPLIANCE SPILL LEVEL.

15. LARGE ACCESS FITTING REQUIRED ABOVE GROUND WHERE GREATER THAN 12M UP TO 22M TO A JUNCTION. SMALL ACCESS FITTING REQUIRED UP TO 12M TO A JUNCTION.

16. ALL GULLY AND CHANNEL DRAIN OUTLETS AND TERMINATION POINTS TO BE TRAPPED AND RODDABLE. INTERNAL GULLIES AND CHANNEL DRAINS TO BE SPECIFIED BY OTHERS.

17. WHERE NO WC'S ARE CONNECTED UPSTREAM, UNDERSLAB FW DRAINAGE TO BE LAID AT 1:40 MIN. AFTER THE CONNECTION OF AT LEAST 1NO WC, A MIN. FALL OF 1:80 APPLIES.

18. ALL CONNECTIONS FROM POP-UPS TO BE LAID AT A CONSTANT GRADIENT TO JUNCTION/ INSPECTION CHAMBER/ MANHOLE UNLESS NOTED OTHERWISE. ANY ISSUES RELATING TO CLASHES WITH FOUNDATIONS ARE TO BE FORWARDED TO THE ENGINEER, ALLOWING SUFFICIENT TIME FOR AN ALTERNATIVE SOLUTION TO BE PROPOSED.

19. INVERT LEVELS AT MANHOLES/ INSPECTION CHAMBERS TO BE USED TO SET OUT PIPEWORK. PIPE GRADIENTS ARE SHOWN INDICATIVELY ONLY.

20. ALL PIPE DIAMETERS GIVEN ARE NOMINAL INTERNAL PIPE DIAMETERS.

21. ALL SEWERS, UNLESS AGREED OTHERWISE STATED, SHALL BE:
- 100mm to 300mm DIA TO BE VITRIFIED CLAY.
- 375mm DIA AND GREATER TO BE CLASS 120 CONCRETE PIPES.

22. AS AN ALTERNATIVE THE CONTRACTOR MAY USE AN APPROVED UNPLASTICISED POLYVINYL CHLORIDE (PVCU) WITH APPROVAL FROM THE ENGINEER.

23. SEWER PIPES TO BE LAID IN MAXIMUM 3 METRE LENGTHS UNLESS THERE IS A SPECIFIC OPERATIONAL NEED TO LAY LONGER LENGTHS.

24. THE FIRST PIPE OUT OF MANHOLES TO BE AS SHORT AS PRACTICABLE SO AS TO PROVIDE A FLEXIBLE JOINT AS CLOSE AS POSSIBLE TO THE OUTSIDE FACE OF THE CONCRETE SURROUND AND CONNECTED TO A LENGTH OF ROCKER PIPE.

25. ALL NEW CONNECTIONS INTO EXISTING MANHOLES (OR INTO EXISTING SEWERS) TO BE 'SOFFITS LEVEL' UNLESS OTHERWISE NOTED.

26. ALL ADOPTABLE DRAINAGE PIPES WILL REQUIRE A MINIMUM OF 1200mm COVER, IN ACCORDANCE WITH SEWERAGE UNDERTAKERS REQUIREMENTS. WHERE THIS IS NOT ACHIEVED, IT WILL BE NECESSARY TO AGREE THE BED AND SURROUND DETAIL.

27. ALL PRIVATE DRAINAGE PIPES WITH A COVER OF LESS THAN 600mm IN NON-TRAFFICKED AREAS AND LESS THAN 1200mm IN TRAFFICKED AREAS TO BE BEDDED AND SURROUNDED IN CONCRETE (CLASS Z). COMPRESSIBLE MATERIAL SHALL BE PROVIDED AT EVERY PIPE JOINT. WHERE COVER EXCEEDS THIS DEPTH, PIPES ARE TYPICALLY BEDDED AND SURROUNDED IN CLASS S. REFER TO PIPE EMBEDMENT DETAILS DRAWING FOR SPECIFIC TYPES.

28. WHERE DRAINAGE PIPES ARE LESS THAN 300mm BELOW THE UNDERSIDE OF THE GROUND FLOOR SLAB, CONCRETE ENCASEMENT IS REQUIRED (CLASS Z). COMPRESSIBLE JOINTS ARE TO BE PROVIDED AT EVERY PIPE JOINT WITHIN THE CONCRETE.

29. WHERE PIPES ARE MORE THAN 300mm BELOW THE UNDERSIDE OF THE SLAB, CLASS S BEDDING IS ACCEPTABLE.

30. WHERE FOUL SEWERS RUN ABOVE SURFACE SEWERS, CONCRETE PROTECTION MAY BE REQUIRED AT CROSSOVERS TO PREVENT ANY POTENTIAL CONTAMINATION.

31. ALL CONNECTIONS PASSING THROUGH BASES OR EDGE BEAMS TO BE IN SEALED SLEEVES. ALTERNATIVELY CONNECTIONS MAY BE CAST-IN WITH FLEXIBLE JOINTS NOT GREATER THAN 150MM FROM FACE OF CONCRETE.

32. THE CHAMBER SIZE OF MANHOLES WITH MORE THAN ONE CONNECTION MAY NEED TO BE INCREASED TO ACCOMMODATE THE CONNECTIONS AND BENDS.

33. ALL MANHOLE COVERS IN BLOCK/SLAB AND EXTERNAL PAVING AREAS TO HAVE RECESSED COVERS OF THE APPROPRIATE GRADE TO ACCEPT ARCHITECT'S PAVING PROPOSAL.

34. ALL INTERNAL COVERS TO HAVE MECHANICALLY JOINTED CORNERS AND DOUBLE SEALED WITH RECESSED TRAY TO ALLOW FOR FINISHES.

35. UNLESS NOTED OTHERWISE IN THE MANHOLE SCHEDULE, ALL MANHOLE, GULLY AND CHANNEL COVERS (IRONWORK) SHOULD BE THE FOLLOWING SPECIFICATION:
- B125 LOAD CLASS IN PEDESTRIAN AREAS
- D400 LOAD CLASS IN VEHICULAR AREAS.

36. ALL PROPRIETARY PRODUCTS TO BE INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURERS REQUIREMENTS, INSTRUCTIONS AND RECOMMENDATIONS.

37. THE DESIGN IS BASED ON A GRAVITY RAINWATER SYSTEM. WHERE A SIPHONIC SYSTEM IS PROPOSED ADDITIONAL NOTES REQUIRED AND DESIGN ADJUSTED TO SUIT.

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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3. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.

4. FOR THE DRAINAGE LAYOUT REFER TO DRAWING: CAS-CUR-XX-GF-DR-C-83-0510.

Rev:	Description:	Date:	By:	Chkd:
C02	FINAL CONSTRUCTION	19.02.24	CG	CG
C01	CONSTRUCTION ISSUE	17.12.21	CS	CG
P02	STAGE 4 ISSUE- DRAWING RENUMBERED	24.11.21	CS	CG
P01	STAGE 3 DRAFT ISSUE	28.09.20	AH	CD

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Status:

CONSTRUCTION RECORD

Project:

HEYROD STREET

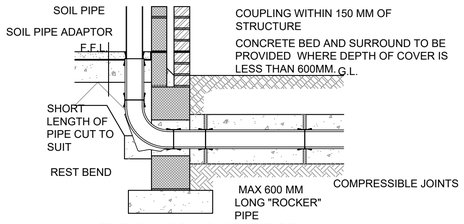
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DRAINAGE NOTES

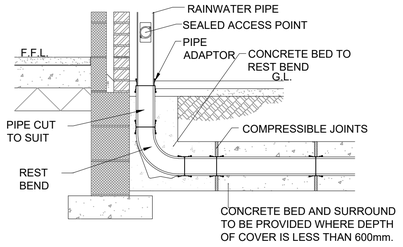
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A1	28/09/20	AH	AH	CD
Scale: NTS				

Project No:	Originator:	Volume:	Level:	Type:	Role:	Category / Number:	Rev:
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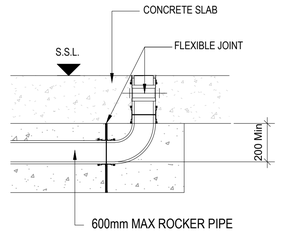
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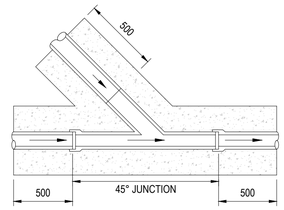
TYPICAL SOIL & VENT PIPE / STUB STACK / W.C. CONNECTION DETAIL



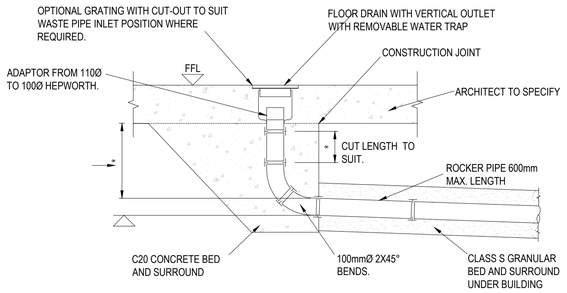
RWP CONNECTION DETAIL
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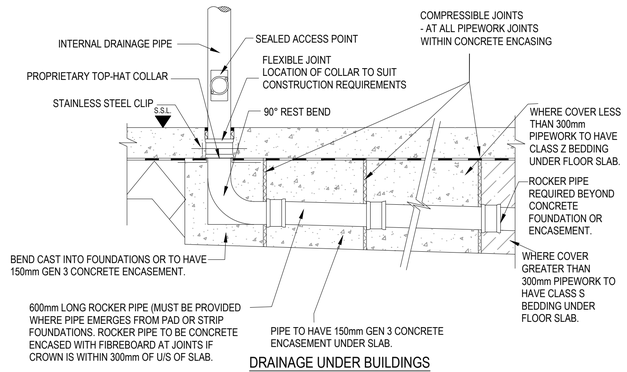
TYPICAL SECTION THROUGH SLAB
(100mmØ downpipe)



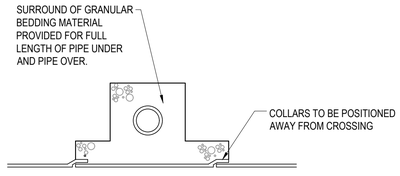
TYPICAL SADDLE CONNECTION



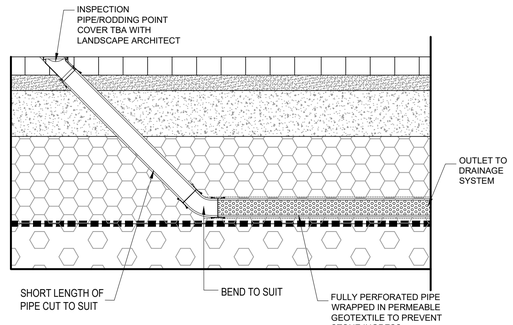
INTERNAL FLOOR DRAIN



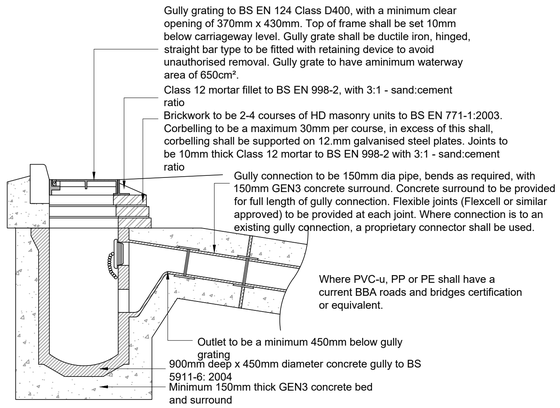
DRAINAGE UNDER BUILDINGS



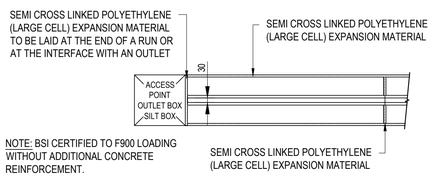
PIPE CROSSINGS DETAIL
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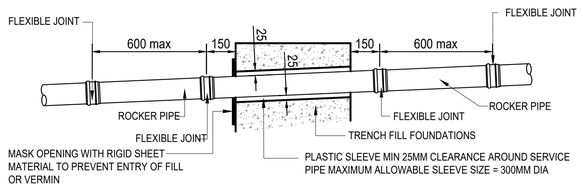
INSPECTION/RODDING POINT DETAIL
(NTS)



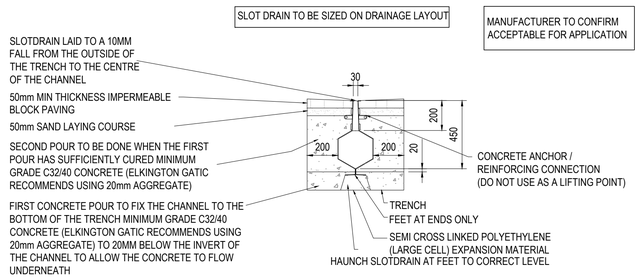
ROAD GULLY(G) DETAIL - TYPE 1
(SCALE 1:20)



GATIC PLAN DETAIL

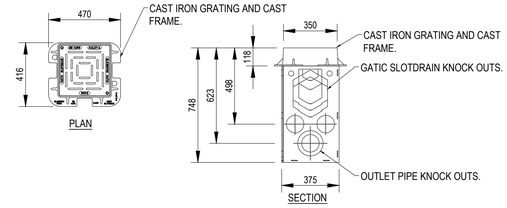


PIPES PASSING THROUGH GROUND BEAM

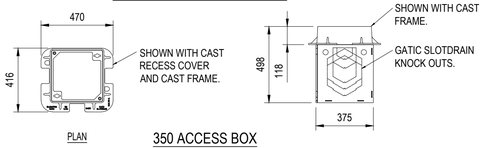


GATIC SLOTDRAIN PAVESLOT TREADSAFE PAVED BLOCK INSTALLATION

ARCHITECT TO CONFIRM IF RECESSED COVERS ARE REQUIRED IN PAVED AREAS.



GATIC SLOTDRAIN 350mm OUTLET UNIT SECTION AND PLAN DETAILS



350 ACCESS BOX SECTION AND PLAN DETAILS

CONSTRUCTION RECORD - FINAL CONSTRUCTION

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4. FOR FULL DRAINAGE NOTES REFER TO CAS-CUR-XX-GF-83-0500.

Rev:	Description:	Date:	By:	Chkd:
C02	FINAL CONSTRUCTION	19.02.24	CG	CG
C01	CONSTRUCTION ISSUE	17.12.21	CS	CG
P02	STAGE 4 ISSUE - DRAWING RENUMBERED	23.11.21	CS	CG
P01	STAGE 3 DRAFT ISSUE	28.09.20	AH	CD

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Status: CONSTRUCTION RECORD

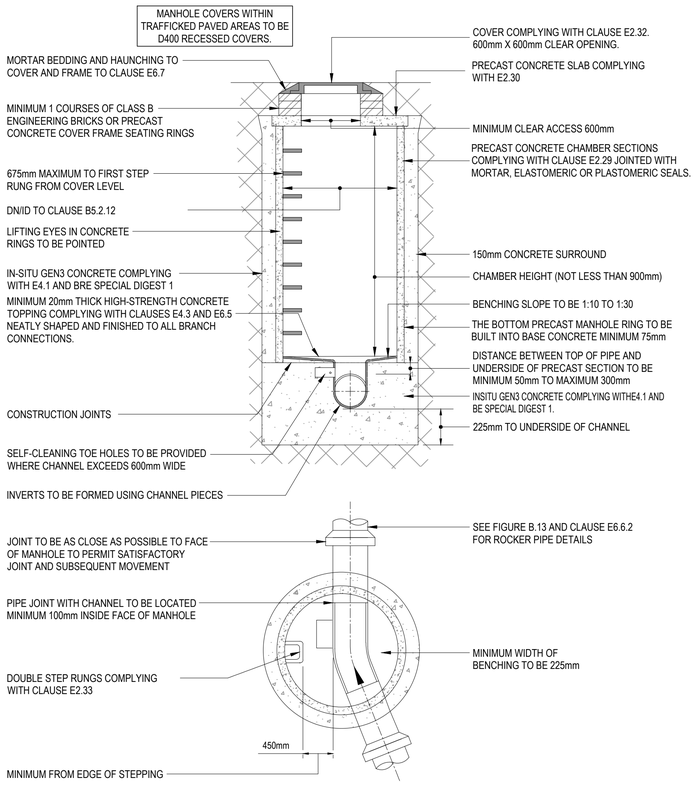
Project: HEYROD STREET

Drg Title: DRAINAGE DETAILS SHEET 1 OF 4

Size:	Date:	Drawn By:	Designed By:	Checked By:
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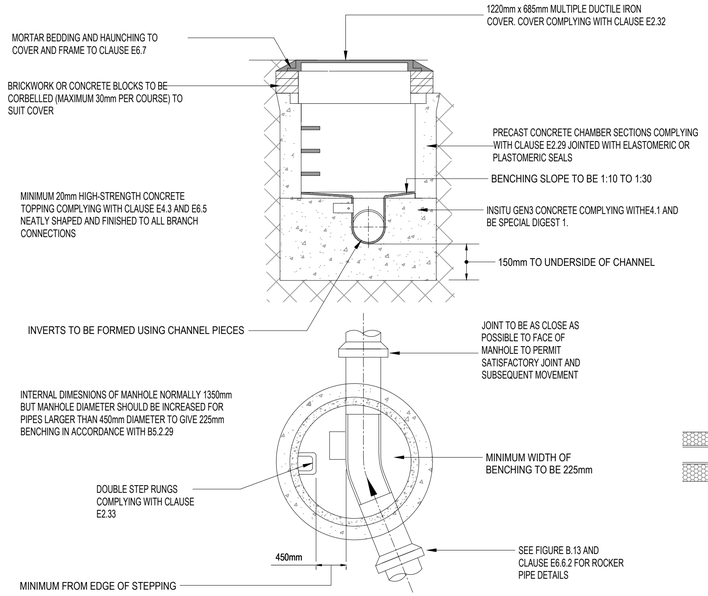
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CAS	- CUR -	XX -	GF -	DR -	C -	83-0520 -	C02

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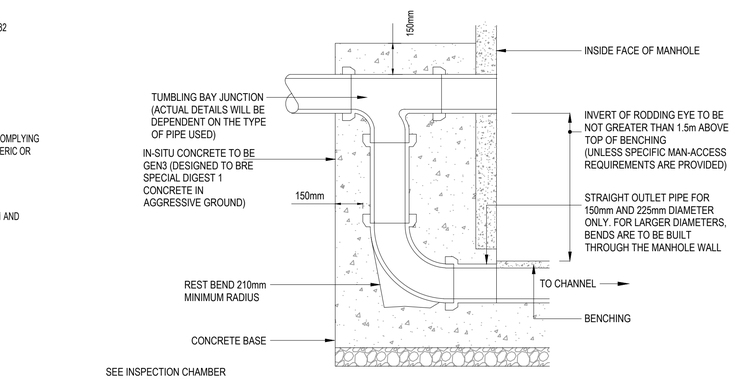


TYPICAL MANHOLE DETAIL - TYPE B
DEPTH FROM COVER LEVEL TO SOFFIT OF PIPE 1.5m TO 3m
ALTERNATIVE RIGID MATERIAL CONSTRUCTION WITH CONCRETE SURROUND

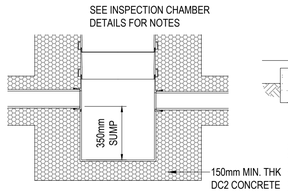
TYPICAL MANHOLE DETAIL - TYPE A
DEPTH FROM COVER LEVEL TO SOFFIT LESS THAN 1.5m
MAXIMUM PIPE SIZE 450mm DIAMETER
RIGID MATERIAL CONSTRUCTION



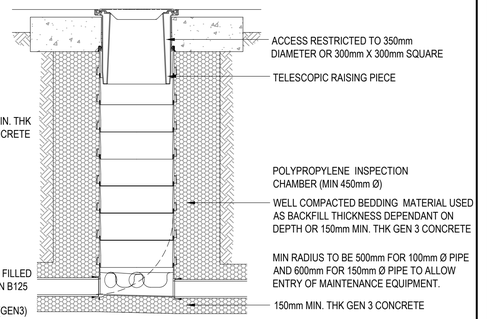
MANHOLE COVERS WITHIN TRAFFICKED PAVED AREAS TO BE D400 RECESSED COVERS.



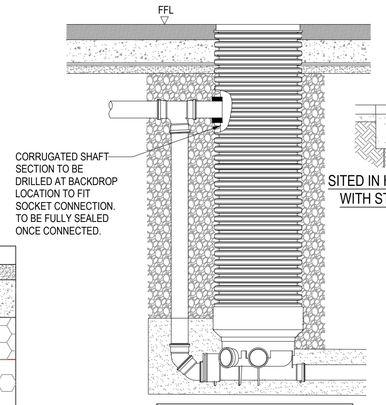
EXTERNAL VERTICAL BACKDROP



PPIC CATCHPIT BASE DETAIL

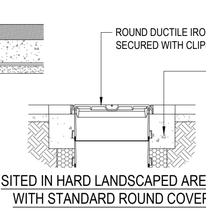


DEEP INSPECTION CHAMBER
DEPTHS BETWEEN 1.2m AND 3.0m

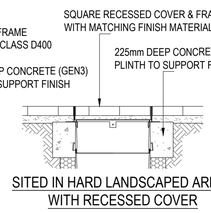


FOR GENERAL CHAMBER NOTES REFER TO TYPICAL INSPECTION CHAMBER DETAIL

TYPICAL INSPECTION CHAMBER BACKDROP DETAIL

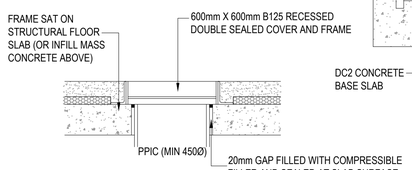


SITED IN HARD LANDSCAPED AREAS WITH STANDARD ROUND COVER

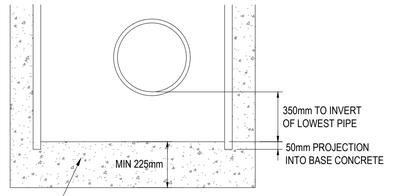


SITED IN HARD LANDSCAPED AREAS WITH RECESSED COVER

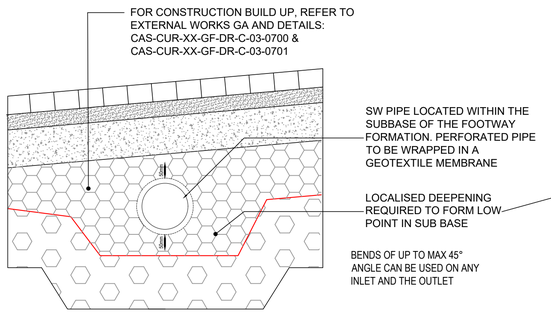
TYPICAL INSPECTION CHAMBER COVER DETAILS



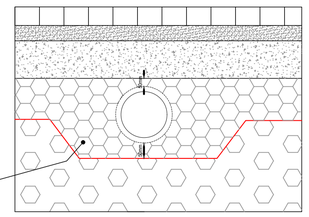
INTERNAL COVER DETAIL



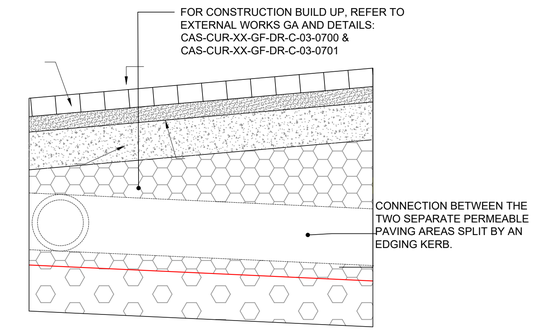
CATCH PIT DETAIL



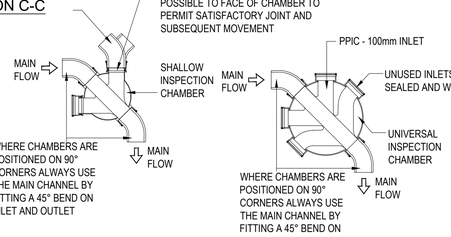
01 - PERFORATED PIPE DETAIL WITHIN PERMEABLE FOOTWAY SUBBASE
SECTION A-A

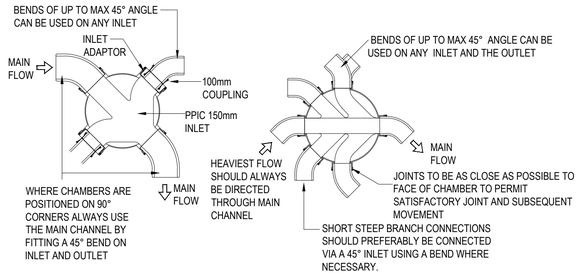


03 - PERFORATED PIPE DETAIL WITHIN PERMEABLE FOOTWAY SUBBASE
SECTION C-C

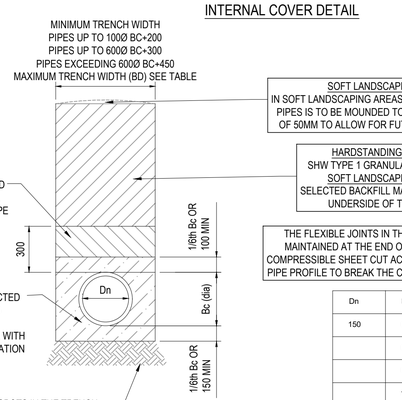


02 - PERFORATED PIPE DETAIL WITHIN PERMEABLE FOOTWAY SUBBASE
SECTION B-B





INSPECTION CHAMBER BASE DETAILS



CLASS S - 360° GRANULAR SURROUND PIPE BEDDING DETAIL

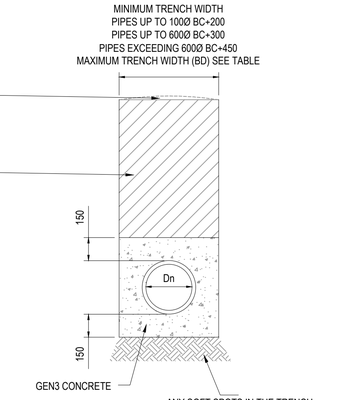
SOFT LANDSCAPE AREAS
IN SOFT LANDSCAPING AREAS TRENCH FILL ABOVE PIPES IS TO BE MOUNDED TO A MAXIMUM DEPTH OF 50MM TO ALLOW FOR FUTURE SETTLEMENT.

HARDSTANDING AREAS
SHW TYPE 1 GRANULAR MATERIAL
SOFT LANDSCAPE AREAS
SELECTED BACKFILL MATERIAL UP TO UNDERSIDE OF TOP-SOIL

THE FLEXIBLE JOINTS IN THE PIPES SHALL BE MAINTAINED AT THE END OF EACH PIPE WITH COMPRESSIBLE SHEET CUT ACCURATELY TO FIT THE PIPE PROFILE TO BREAK THE CONCRETE SURROUND

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

MAXIMUM TRENCH WIDTH



CLASS Z - CONCRETE BED AND SURROUND PIPE BEDDING DETAIL
COVER < 900mm IN VEHICULAR LOADING AND OPEN FIELD.
COVER <600mm ELSEWHERE EXCEPT UNDER BUILDINGS.

GENERAL NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
2. DO NOT SCALE THIS DRAWING. ANY AMBIGUITIES, OMISSIONS AND ERRORS ON DRAWINGS SHALL BE BROUGHT TO THE ENGINEERS ATTENTION IMMEDIATELY. ALL DIMENSIONS MUST BE CHECKED / VERIFIED ON SITE.
3. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
4. FOR GENERAL NOTES REFER TO DRAWING 92510.

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.

Rev:	Description:	Date:	By:	Chkd:
C05	FINAL CONSTRUCTION	19.02.24	CG	CG
C04	CONSTRUCTION ISSUE UPDATE	27.10.23	CS	CG
C03	CONSTRUCTION ISSUE UPDATE	02.02.21	CS	CG
C02	CONSTRUCTION ISSUE UPDATE	19.01.22	CS	CG
C01	CONSTRUCTION ISSUE	17.12.21	CS	CG
P02	STAGE 4 ISSUE - DRAWING RENUMBERED	23.11.21	CS	CG
P01	STAGE 3 DRAFT ISSUE	28.09.20	AH	CD

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Status: CONSTRUCTION RECORD

Project: HEYROD STREET

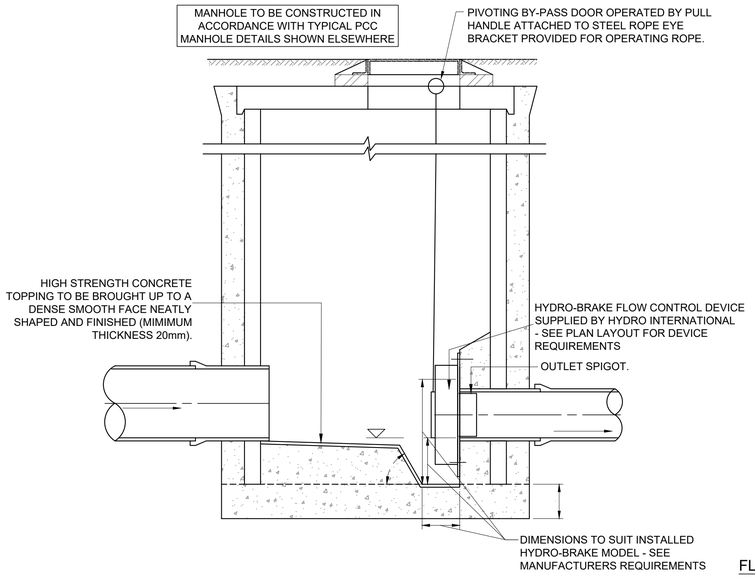
Drg Title: DRAINAGE DETAIL SHEET 2 OF 4

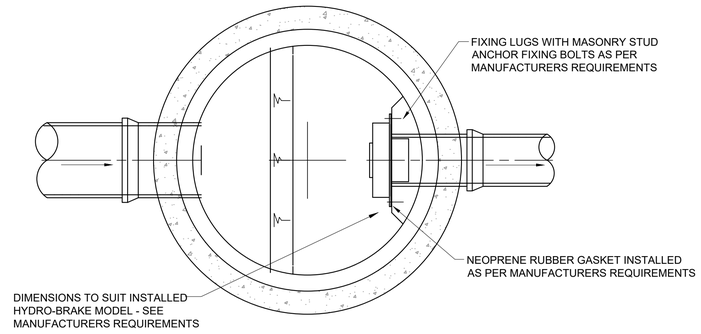
Size:	Date:	Drawn By:	Designed By:	Checked By:
A1	28/09/20	AH	AH	CD
Scale: NTS				

Project No: | Originator: | Volume: | Level: | Type: | Role: | Category / Number: | Rev:

CAS - CUR - XX - GF - DR - C - 83-0521 - C05

\\ma-fs-1P\projects\075001 - 076000\75424 - 2 Heyrod Street\04-Production\4A-Models-Drawings\CA\92521.





FLOW CONTROL MANHOLE
(HYDRO-BRAKE)

GENERAL NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
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3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
4. REFER TO DRAINAGE LAYOUT CAS-CUR-XX-GF-DR-C-83-0500 FOR THE LOCATION OF THE ATTENUATION TANK.
5. FLOW CONTROL TO BE INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURERS REQUIREMENTS, INSTRUCTIONS AND RECOMMENDATIONS.
6. WHERE ALTERNATIVE FLOW CONTROL DEVICE IS PREFERRED, IT WILL BE SUBJECT TO REDESIGN TO CONFIRM WHETHER THE SYSTEM HAS CAPACITY.
7. SURFACE WATER DRAINAGE CONNECTION SUBJECT TO S106 AGREEMENT WITH UNITED UTILITIES.
8. FOR FULL DRAINAGE NOTES REFER TO CAS-CUR-XX-GF-DR-C-83-0501.

Technical Specification

Control Point	Head (m)	Flow (l/s)
Primary Design	1.800	8.900
Flush-Flo™	0.529	8.887
Kick-Flo®	1.089	7.031
Mean Flow		7.793

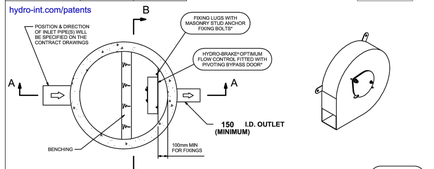
Hydro-Brake® Optimum Flow Control including:

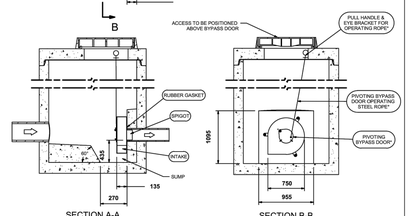
- 3 mm grade 304L stainless steel
- Integral stainless steel pivoting by-pass door allowing clear line of sight through to outlet, c/w stainless steel operating rope
- Bead blasted finish to maximise corrosion resistance
- Stainless steel fixings
- Rubber gasket to seal outlet

BBA APPROVAL INSPECTION TESTING CERTIFICATION CERTIFICATE No. 08/4598

WRc Approved PT/329/0412

hydro-int.com/patents





IMPORTANT: LIMIT OF HYDRO INTERNATIONAL SUPPLY
THE DEVICE WILL BE HANDED TO SUIT SITE CONDITIONS
FOR SITE SPECIFIC DETAILS AND MINIMUM CHAMBER SIZE REFER TO HYDRO INTERNATIONAL
ALL CIVIL AND INSTALLATION WORK BY OTHERS
* WHERE SUPPLIED
HYDRO-BRAKE® FLOW CONTROL & HYDRO-BRAKE® OPTIMUM FLOW CONTROL ARE REGISTERED TRADEMARKS FOR FLOW CONTROLS DESIGNED AND MANUFACTURED EXCLUSIVELY BY HYDRO INTERNATIONAL

THIS DESIGN LAYOUT IS FOR ILLUSTRATIVE PURPOSES ONLY. NOT TO SCALE.

DESIGN ADVICE !	The head/flow characteristics of this SHE-0126-8900-1800-8900 Hydro-Brake® Optimum Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve. **The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.**
DATE	11/23/2021 8:42 AM
SITE	Heyrod St
DESIGNER	Charlie Smith
REF	FCC1

Hydro International

SHE-0126-8900-1800-8900

Hydro-Brake® Optimum

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charlie.smith@curtins.com

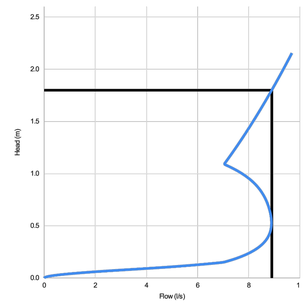
Technical Specification

Control Point	Head (m)	Flow (l/s)
Primary Design	1.800	8.900
Flush-Flo	0.529	8.887
Kick-Flo®	1.089	7.031
Mean Flow		7.793

BBA APPROVAL INSPECTION TESTING CERTIFICATION CERTIFICATE No. 08/4598

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Head (m)	Flow (l/s)
0.000	0.000
0.062	2.105
0.124	5.840
0.186	7.486
0.248	8.083
0.310	8.465
0.372	8.698
0.434	8.827
0.497	8.881
0.559	8.882
0.621	8.844
0.683	8.776
0.745	8.678
0.807	8.544
0.869	8.363
0.931	8.116
0.993	7.784
1.055	7.344
1.117	7.114
1.179	7.296
1.241	7.473
1.303	7.646
1.366	7.814
1.428	7.978
1.490	8.139
1.552	8.296
1.614	8.451
1.676	8.602
1.738	8.750
1.800	8.896

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Site	Heyrod St
DESIGNER	Charlie Smith
Ref	FCC1

Hydro International

SHE-0126-8900-1800-8900

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Technical Specification

Control Point	Head (m)	Flow (l/s)
Primary Design	1.500	9.000
Flush-Flo™	0.440	8.994
Kick-Flo®	0.927	7.182
Mean Flow		7.853

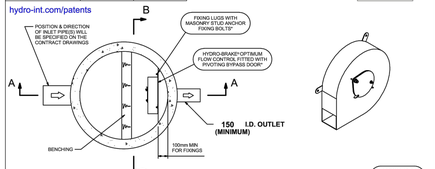
Hydro-Brake® Optimum Flow Control including:

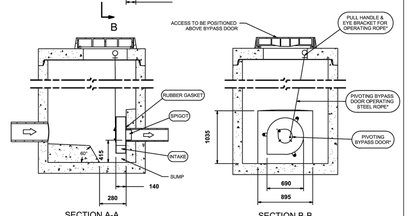
- 3 mm grade 304L stainless steel
- Integral stainless steel pivoting by-pass door allowing clear line of sight through to outlet, c/w stainless steel operating rope
- Bead blasted finish to maximise corrosion resistance
- Stainless steel fixings
- Rubber gasket to seal outlet

BBA APPROVAL INSPECTION TESTING CERTIFICATION CERTIFICATE No. 08/4598

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DESIGN ADVICE !	The head/flow characteristics of this SHE-0131-9000-1500-9000 Hydro-Brake® Optimum Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve. **The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.**
DATE	11/23/2021 8:44 AM
SITE	Heyrod St
DESIGNER	Charlie Smith
REF	FCC2

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SHE-0131-9000-1500-9000

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charlie.smith@curtins.com

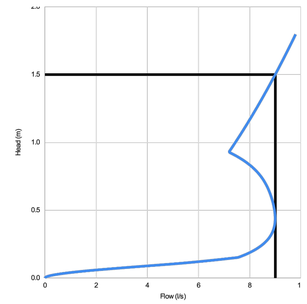
Technical Specification

Control Point	Head (m)	Flow (l/s)
Primary Design	1.500	9.000
Flush-Flo	0.440	8.994
Kick-Flo®	0.927	7.182
Mean Flow		7.853

BBA APPROVAL INSPECTION TESTING CERTIFICATION CERTIFICATE No. 08/4598

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Head (m)	Flow (l/s)
0.000	0.000
0.052	1.563
0.103	4.960
0.155	7.593
0.207	8.192
0.259	8.575
0.310	8.808
0.362	8.936
0.414	8.988
0.466	8.989
0.517	8.952
0.569	8.888
0.621	8.800
0.672	8.684
0.724	8.530
0.776	8.322
0.828	8.039
0.879	7.658
0.931	7.202
0.983	7.380
1.034	7.559
1.086	7.733
1.138	7.903
1.190	8.069
1.241	8.231
1.293	8.390
1.345	8.546
1.397	8.699
1.448	8.849
1.500	8.996

DESIGN ADVICE !	The head/flow characteristics of this SHE-0131-9000-1500-9000 Hydro-Brake Optimum® Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve. **The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.**
DATE	23/11/2021 08:44
Site	Heyrod St
DESIGNER	Charlie Smith
Ref	FCC2

Hydro International

SHE-0131-9000-1500-9000

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Rev:	Description:	Date:	By:	Chkd:
C02	FINAL CONSTRUCTION	19.02.24	CG	CG
C01	CONSTRUCTION ISSUE	17.12.21	CS	CG
P03	STAGE 4 ISSUE - DRAWING RENUMBERED	25.11.21	CS	CG
P02	UPDATED FOR PLANNING	20.09.21	CS	CD
P01	STAGE 3 DRAFT ISSUE	28.09.20	AH	CD

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Status: CONSTRUCTION RECORD

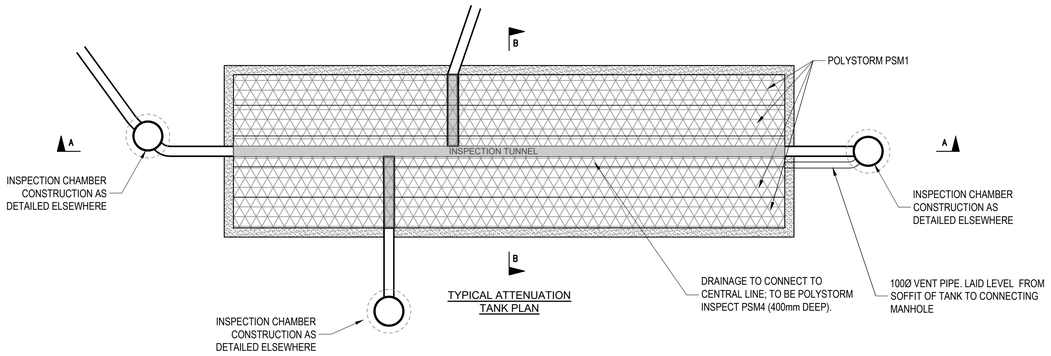
Project: HEYROD STREET

Drg Title: DRAINAGE DETAILS SHEET 3 OF 4

Size:	Date:	Drawn By:	Designed By:	Checked By:
A1	28/09/20	AH	AH	CD
Scale: NTS				

Project No:	Originator:	Volume:	Level:	Type:	Role:	Category / Number:	Rev:
CAS	- CUR -	XX -	GF -	DR -	C -	83-0522 -	C02

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TYPICAL ATTENUATION TANK PLAN

CURRENT ATTENUATION DESIGN ASSUMPTIONS

TANK IS LOCATED IN AN AREA SUBJECT UNDER THE BUILDING SUBJECT TO LIGHT VEHICLE LOADING.

THE MANUFACTURER WILL NEED TO CONFIRM THAT THE TANK HAS SUFFICIENT STRENGTH FOR THIS LOCATION IN ACCORDANCE WITH CIRIA C680.

INVERT LEVEL APPROX. 44.700m AOD.
BASE OF TANK TO BE LAID AT 1:150 FALL MINIMUM.

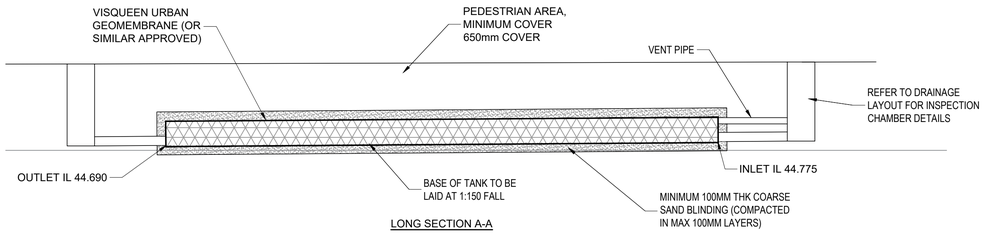
DIMENSIONS OF TOTAL UNIT ARE 14m X 4m.
TOTAL DEPTH OF TANK IS 1200mm.
ATTENUATION VOLUME IS 63m³ (95% VOID RATIO)

TANK TO BE WRAPPED IN IMPERMEABLE MEMBRANE AND THE MEMBRANE SHOULD BE LAPPED BY A MINIMUM OF 300mm.

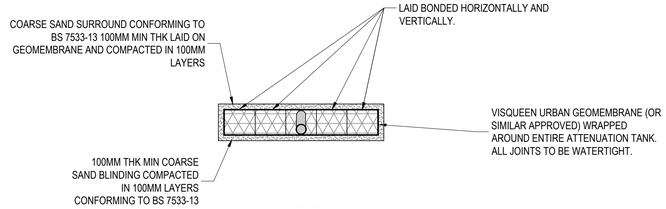
TANK TO BE BED AND SURROUND IN MINIMUM OF 100mm LAYER OF COMPACTED COARSE SAND OR CLASS 6H SELECTED GRANULAR MATERIAL. REQUIREMENT FOR CONCRETE SURROUND OR PROTECTION TO BE CONFIRMED WITH THE MANUFACTURER.

REQUIREMENTS SHOULD BE IN LINE WITH SELECTED MANUFACTURERS GUIDANCE.

REFER TO DRAINAGE LAYOUT CAS-CUR-XX-GF-DR-C-83-0500 FOR TANK & INLET/OUTLET LOCATIONS.



LONG SECTION A-A



CROSS SECTION B-B

CONSTRUCTION RECORD - FINAL CONSTRUCTION

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3. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
4. REFER TO DRAINAGE LAYOUT CAS-CUR-XX-GF-83-0500 FOR THE LOCATION OF THE ATTENUATION TANK.
5. ATTENUATION TANK TO BE INSTALLED STRICTLY IN ACCORDANCE WITH THE MANUFACTURER'S REQUIREMENTS.
6. WHERE AN ALTERNATIVE ATTENUATION TANK DEVICE IS PREFERRED, IT WILL BE SUBJECT TO REDESIGN TO CONFIRM WHETHER THE SYSTEM HAS CAPACITY.
7. THE DESIGN OF THE TANK SHOULD BE PROVIDED BY THE MANUFACTURER OR SUPPLIER TO ENSURE THE TANK IS SUFFICIENT FOR THE SITE SPECIFIC CRITERIA.
8. THE TANK DESIGN SHOULD INCORPORATE:
   - CRATES SUBJECT TO REGULAR HEAVY VEHICLE LOADING,
   - SUITABLE MAINTENANCE ACCESS; AND
   - VENTING TO PREVENT TRAPPED AIR POCKETS.
9. THE STRENGTH OF THE TANK SHOULD COMPLY WITH CIRIA C680 STRUCTURAL DESIGN OF MODULAR GEOCELLULAR DRAINAGE TANKS.
10. ACCESS FOR MAINTENANCE SHOULD BE IN ACCORDANCE WITH CIRIA GUIDANCE.
11. VENTING TO THE TANK SHOULD BE CONFIRMED BY THE TANK MANUFACTURER. VENTING SHOULD BE LOCATED WITHIN LANDSCAPED AREAS, OR ROUTED BACK TO THE NEAREST MANHOLE ABOVE THE DESIGN WATER LEVEL.
12. CONSTRUCTION AND INSTALLATION OF THE TANK SHOULD BE STRICTLY IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION REQUIREMENTS.
13. THE CURRENT DESIGN OF THE TANK IS BASED ON USE OF POLYPIPE MODULES, TO ALLOW AN ASSUMPTION OF UNIT SIZES WITHIN THE OVERALL DESIGN. HOWEVER, WHERE AN ALTERNATIVE SYSTEM IS PROPOSED, THE DIMENSIONS OF THE UNITS WILL NEED TO BE CHECKED WITHIN THE DESIGN AND MAY RESULT IN A REDESIGN.
14. THE CONTRACTOR SHALL PROHIBIT THE MOVEMENT OF CONSTRUCTION PLANT ACROSS THE STORAGE TANK AND WHERE NECESSARY PROVIDE ADDITIONAL SUPPORT AND PROTECTION TO THE STRUCTURE. PARTICULARLY POST CONSTRUCTION. TEMPORARY FENCING CAN BE USED TO PROHIBIT TRADE STOCKS, PILLING MATERIALS, HEAVY PLANTS ETC.
15. FOR FULL DRAINAGE NOTES REFER TO CAS-CUR-XX-GF-83-0501.

Rev:	Description:	Date:	By:	Chkd:
C02	FINAL CONSTRUCTION	19.02.24	CG	CG
C01	CONSTRUCTION ISSUE	17.12.21	CS	CG
P02	STAGE 4 ISSUE - DRAWING RENUMBERED	23.11.21	CS	CG
P01	FIRST ISSUE	20.09.21	CS	CD

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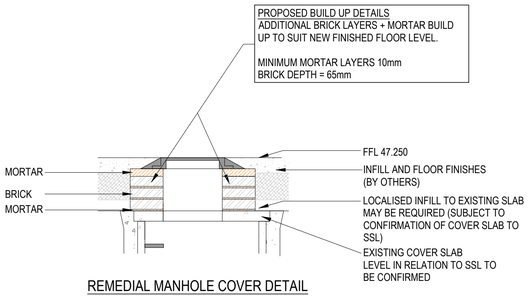
Project: HEYROD STREET

Drg Title: DRAINAGE DETAILS
SHEET 4 OF 4

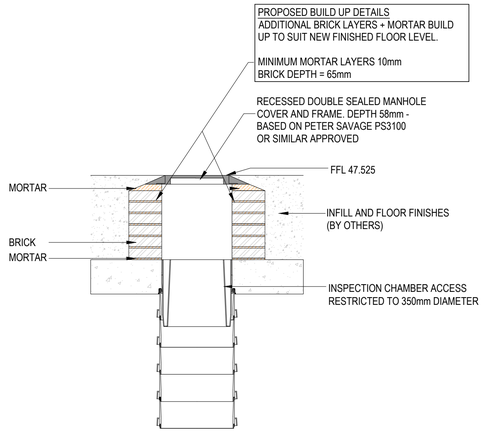
Size:	Date:	Drawn By:	Designed By:	Checked By:
A1	28/09/20	AH	AH	CD
Scale: NTS				

Project No:	Originator:	Volume:	Level:	Type:	Role:	Category / Number:	Rev:
CAS	- CUR -	XX -	GF -	DR -	C -	83-0523 -	C02

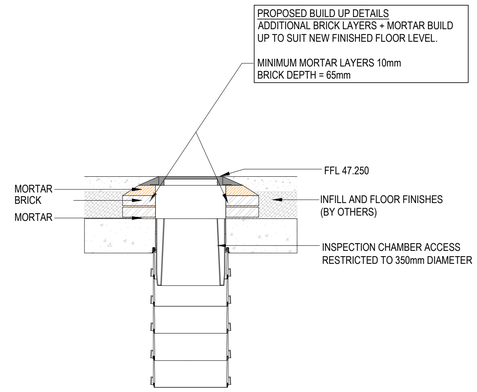
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REMEDIAL MANHOLE COVER DETAIL
(MANHOLE S5)



REMEDIAL MANHOLE COVER DETAIL
(MANHOLE S8)



REMEDIAL MANHOLE COVER DETAIL
(MANHOLES S9, F10 & F10A)

CONSTRUCTION RECORD - FINAL CONSTRUCTION

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3. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
4. FOR GENERAL NOTES REFER TO DRAWING 92510.

Rev:	Description:	Date:	By:	Chkd:
C02	FINAL CONSTRUCTION	19.02.24	CG	CG
C01	CONSTRUCTION ISSUE	21.08.23	CG	CG

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Status:
CONSTRUCTION RECORD

Project:
HEYROD STREET

Drg Title:
MANHOLE COVER REMEDIAL DETAILS

Size:	Date:	Drawn By:	Designed By:	Checked By:
A1	21/08/23	CG	CG	CG
Scale: NTS				

Project No:	Originator:	Volume:	Level:	Type:	Role:	Category / Number:	Rev:
CAS	- CUR	- XX	- GF	- DR	- C	- 83-0524	- C02

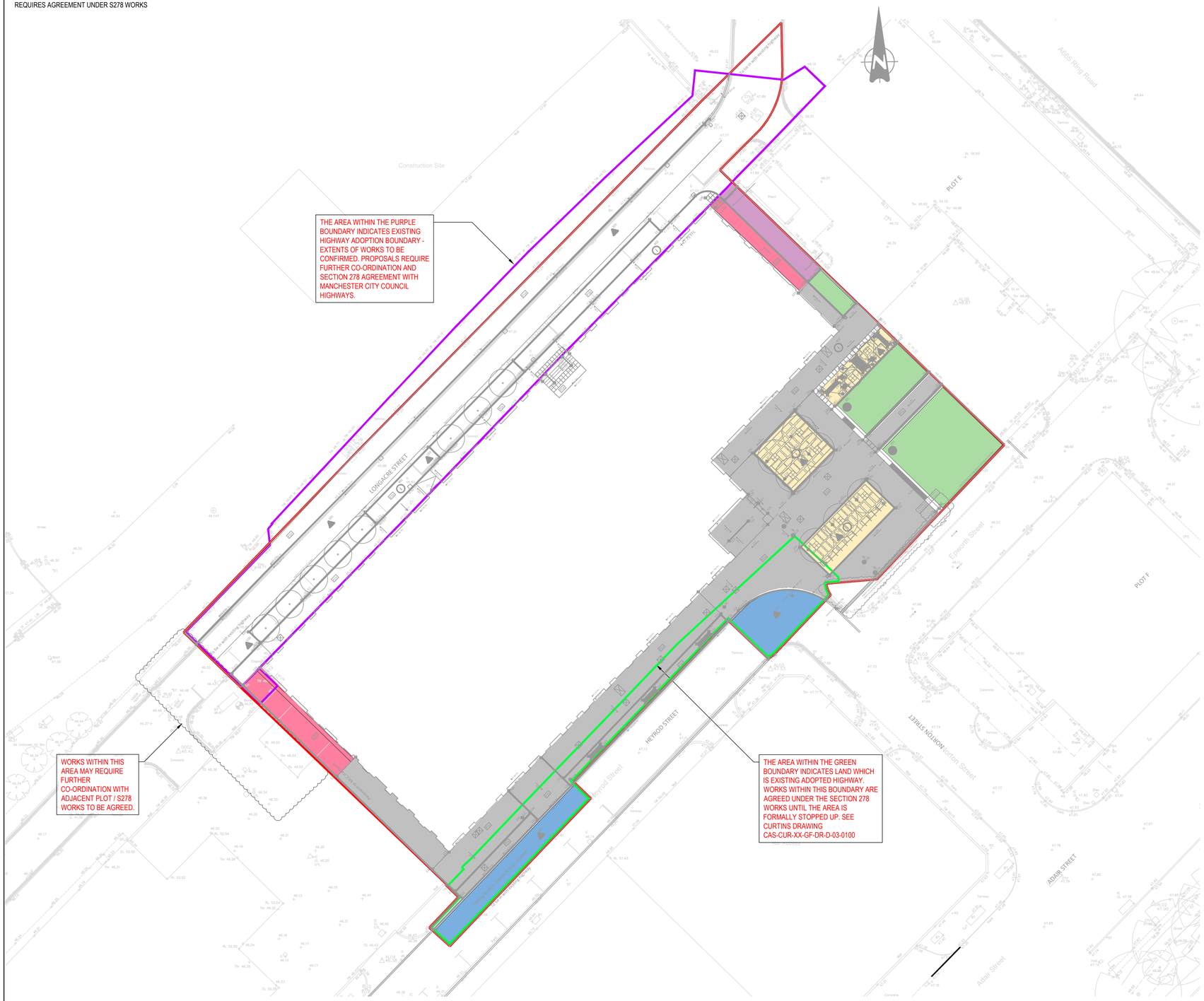
\\ms-fs-1\Projects\075001 - 076000\075424 - 2 Heyrod Street\04-Production\4A-Models-Drawings\CIC\ADR\

KEY:

SITE BOUNDARY
(TAKEN FROM 0799-RFM-XX-00-M2-L-0006 working drawing (dated 18.11.21)

INDICATES EXISTING HIGHWAY ADOPTION BOUNDARY. PROPOSALS REQUIRE FURTHER CO-ORDINATION AND SECTION 278 AGREEMENT WITH MANCHESTER CITY COUNCIL HIGHWAYS.

INDICATES EXISTING HIGHWAY BOUNDARY PROPOSED TO BE STOPPED UP. WORKS PRIOR TO STOPPING UP REQUIRES AGREEMENT UNDER S278 WORKS



DRAWINGS USED AS A BASE TO FORM THIS DRAWING ARE AS FOLLOWS:

TOPOGRAPHICAL SURVEY
SURVEY SYSTEMS - SSL:7016C:200:2:2

LANDSCAPE ARCHITECT
RE-FORM LANDSCAPE ARCHITECTURE
CAS-RFM-XX-GF-DR-L-19-0003-C10

KEY:

REFER TO DRAWING CAS-CUR-XX-GF-03-0701 FOR EXTERNAL WORKS DETAILS

P01 - IMPERMEABLE ASPHALT (POTENTIAL HEAVY VEHICLE LOADING)
BASED ON MCC TYPICAL REQUIREMENTS - IN CASE OF FUTURE ADOPTION

P02 - IMPERMEABLE ASPHALT (POTENTIAL HEAVY VEHICLE LOADING)
WHERE REQUIRED - TO TIE INTO EXISTING ADOPTED ROAD CONSTRUCTION.

P03 - IMPERMEABLE CONCRETE BLOCK PAVING FOOTWAY CONSTRUCTION
(PEDESTRIAN AND OCCASIONAL LIGHT VEHICLE LOADING)
BASED ON MCC TYPICAL REQUIREMENTS - IN CASE OF FUTURE ADOPTION

P04 - PERMEABLE CONCRETE BLOCK PAVING FOOTWAY CONSTRUCTION
(PEDESTRIAN AND LIGHT VEHICLE LOADING OCCASIONAL HEAVY VEHICLE)

P05 -RESIN BOUND FOOTWAY CONSTRUCTION
(PEDESTRIAN LOADING)
SPECIFICATION TO BE CO-ORDINATED WITH TREE PIT SPECIFICATION AND SURFACE WATER FLOW PATHS

SOFT LANDSCAPING AREA (PEDESTRIAN
SPECIFICATION BY LANDSCAPE ARCHITECT

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.

GENERAL NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
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3. ALL WORKS AND MATERIALS TO BE IN ACCORDANCE WITH CURRENT BRITISH STANDARDS AND BUILDING REGULATIONS.
4. THE LANDSCAPE ARCHITECT'S DRAWING HAS BEEN USED AS A BASE FOR THIS PLAN. PLEASE REFER TO THE LATEST LANDSCAPING LAYOUT.
5. REFER TO LANDSCAPE ARCHITECTS SPECIFICATION FOR SURFACE FINISHES.
6. KERBING REQUIREMENTS/DETAIL TO BE CONFIRMED BY LANDSCAPE ARCHITECT.
7. REFER TO LANDSCAPE ARCHITECTS SPECIFICATION FOR JOINTING MATERIAL. CONSIDERATION REQUIRED OF COMPATIBILITY OF JOINTING AND BEDDING MATERIAL AND WHETHER SUB-SURFACE DRAINAGE IS REQUIRED.
8. WHERE PERMEABLE FINISHES AND/OR PERMEABLE BEDDING IS SPECIFIED, CONSIDERATION IS REQUIRED TO CONFIRM WHETHER SUB-SURFACE DRAINAGE IS REQUIRED.
9. ALL SUB-BASES AND CAPPING LAYERS TO BE GRADED AND COMPACTED IN ACCORDANCE WITH THE SPECIFICATION FOR HIGHWAY WORKS (SFHW)
10. ALL PAVEMENT CONSTRUCTIONS ARE BASED ON AN ASSUMED CBR VALUE OF 5%. TO BE CONFIRMED BY INSITU TESTING AT FORMATION.
11. IT IS RECOMMENDED THAT CBR TESTS ARE CARRIED OUT TO CONFIRM AND SUB-BASE ADJUSTED IN ACCORDANCE WITH THE CAPPING AND SUB-BASE THICKNESS TABLE.
12. MEASURED CBR VALUE TO BE AT FORMATION LEVEL AND TO BE A 'SOAKED' CONDITION.
13. ANY VARIATIONS IN GROUND CONDITIONS SHOULD BE NOTIFIED TO THE ENGINEER PRIOR TO CONSTRUCTION.
14. THE CONSTRUCTION DEPTHS GIVEN ARE THE MINIMUM REQUIRED (COMPACTED).
15. THE CONSTRUCTION DEPTHS GIVEN ASSUME FORMATION IS NON-FROST SUSCEPTIBLE.
16. EXTENT OF HIGHWAY BOUNDARY TO BE CONFIRMED PRIOR TO COMMENCEMENT OF WORKS.
17. IN AREAS WHERE LEVELS ARE TO BE RAISED, ACCEPTABLE FILL MATERIAL IS TO BE USED TO THE UNDERSIDE OF THE PROPOSED CONSTRUCTION MAKE UP.
18. NO REGULATING OR FILL MATERIAL HAS BEEN INCLUDED IN CONSTRUCTION BUILD UP. CONTRACTOR TO INCLUDE FOR REGULATING/FILL MATERIAL IN THEIR RATES.
19. IN AREAS WHERE LEVELS ARE TO BE LOWERED, EXISTING CONSTRUCTION IS TO BE REMOVED (FULL DEPTH).
20. LAYING COURSE TO BE NATURALLY OCCURRING SAND OR MORTAR IN ACCORDANCE WITH BS7533 REQUIREMENTS.
21. CBM1 TO BE TO BS7533 REQUIREMENTS.
22. TYPE 1 SUB-BASE IN ACCORDANCE WITH SFHW.
23. CAPPING MATERIAL TO BE 6F1, 6F2 OR 6F5 MATERIAL IN ACCORDANCE TH SFHW 600 SERIES.
24. FIRE TENDER ROUTE TO BE CONFIRMED.
25. MAINTENANCE VEHICLE ROUTE TO BE CONFIRMED.

Rev:	Description:	Date:	By:	Chkd:
C04	CONSTRUCTION RECORD	19.02.24	CG	CG
C03	CONSTRUCTION ISSUE UPDATE	27.10.23	CS	CG
C02	CONSTRUCTION ISSUE UPDATE	19.05.23	CS	CG
C01	CONSTRUCTION ISSUE	17.12.21	CS	CG
P04	STAGE 4 ISSUE - DRAWING RENUMBERED	24.11.21	CS	CG
P03	P04 BUILD UP UPDATED	15.10.20	CD	CD
P02	DRAFT STAGE 3 ISSUE	28.09.20	AH	CD
P01	DRAFT ISSUE	17.04.20	CD	CD

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Status:
CONSTRUCTION RECORD

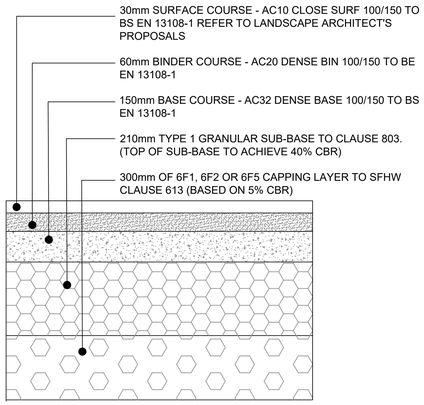
Project:
HEYROD STREET

Drg Title:
EXTERNAL WORKS LAYOUT

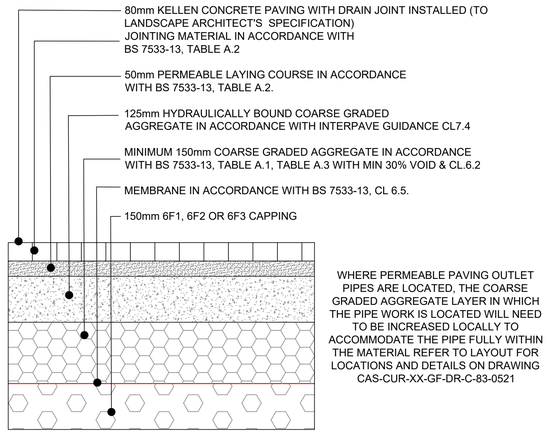
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Scale: 1:250				

Project No:	Originator:	Volume:	Level:	Type:	Role:	Category / Number:	Rev:
CAS	- CUR	- XX	- GF	- DR	- C	- 03-0700	- C04

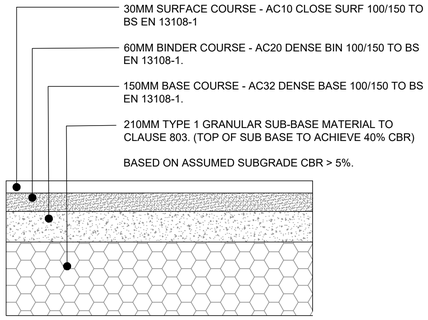
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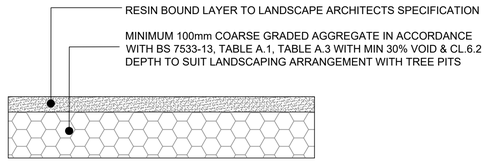
P01 IMPERMABLE ASPHALT ROAD CONSTRUCTION
REGULAR HEAVY VEHICLES
ASSUMED 5% CBR
TO REMAIN PRIVATE



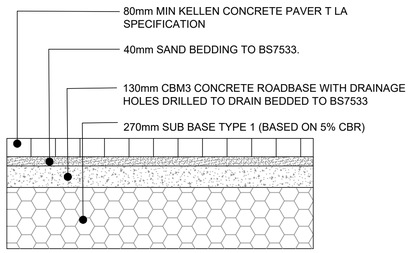
P04 - PERMEABLE CONCRETE BLOCK FOOTWAY CONSTRUCTION - SYSTEM C - PEDESTRIAN 0.015msa (1 LARGE VEHICLE PER WEEK) - DESIGNED IN ACCORDANCE WITH BS 7533-13.
ASSUMED 5% CBR



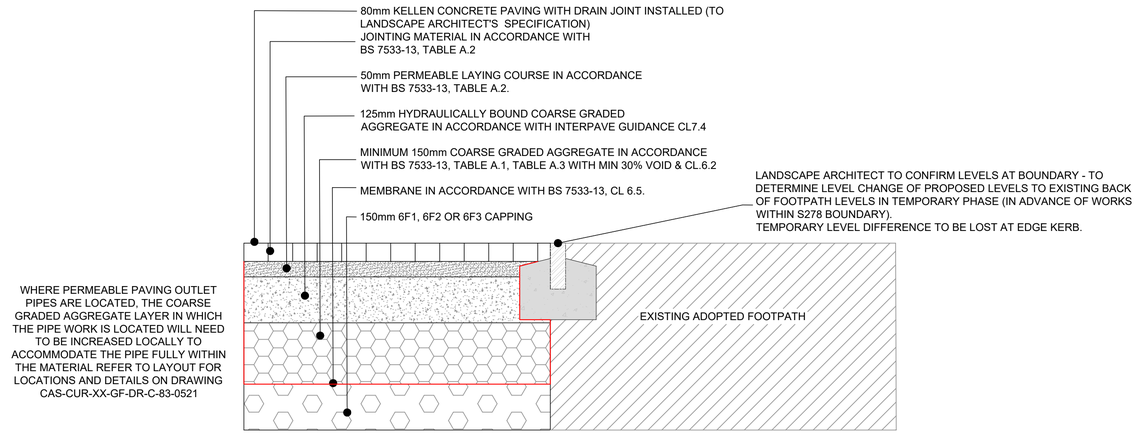
P02 IMPERMABLE ASPHALT ROAD CONSTRUCTION
REGULAR HEAVY VEHICLES
ASSUMED 5% CBR
SUBJECT TO CONFIRMATION OF EXISTING ROAD CONSTRUCTION



P05 - RESIN BOUND FOOTWAY CONSTRUCTION (PEDESTRIAN LOADING)
SPECIFICATION TO BE CO-ORDINATED WITH TREE PIT SPECIFICATION AND SURFACE WATER FLOW PATHS



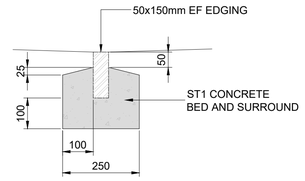
P03 CONCRETE BLOCK FOOTWAY CONSTRUCTION
FOOTWAY AND OCCASIONAL LIGHT VEHICLES
SUBJECT TO CONFIRMATION IF BEING ADOPTED UNDER S38 AGREEMENT AND IF REQUIRED, CO-ORDINATION WITH S278 WORKS



P04 (TEMP) - PERMEABLE CONCRETE BLOCK FOOTWAY CONSTRUCTION - SYSTEM C - PEDESTRIAN 0.015msa (1 LARGE VEHICLE PER WEEK) - DESIGNED IN ACCORDANCE WITH BS 7533-13.
ASSUMED 5% CBR

TO TIE-IN TO EXISTING FOOTPATH CONSTRUCTION IN TEMPORARY SCENARIO

EDGING KERB AND SIDE MEMBRANE TO BE REMOVED WHEN FOOTPATH WORKS ARE TO BE COMPLETED - SUBJECT TO S278 DESIGN



EK - FLAT TOP EDGING

CONSTRUCTION RECORD - FINAL CONSTRUCTION

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Rev:	Description:	Date:	By:	Chkd:
C04	FINAL CONSTRUCTION	19.02.24	CG	CG
C03	P04 UPDATED TO SUIT S278 REQUIREMENTS, P02 SURFACE FINISH UPDATE	19.05.23	CS	CG
C02	UPDATED TO INCLUDE PHASED SOLUTION	12.08.22	CS	CG
C01	CONSTRUCTION ISSUE	17.12.21	CS	CG
P01	STAGE 4 ISSUE - DRAWING RENUMBERED	24.11.21	CS	CG

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Status: CONSTRUCTION RECORD

Project: HEYROD STREET

Drg Title: EXTERNAL WORKS DETAILS

Size:	Date:	Drawn By:	Designed By:	Checked By:
A1	24/11/21	CD	CD	CD
Scale: 1:250				

Project No:	Originator:	Volume:	Level:	Type:	Role:	Category / Number:	Rev:
CAS	- CUR -	XX -	GF -	DR -	C -	03-0701 -	C04

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Appendix B

Surface Water Drainage Calculations 1-year, 30-year, 100-Year +40%cc

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	1	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	18.000	Minimum Backdrop Height (m)	0.200
Ratio-R	0.359	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	5.00	Enforce best practice design rules	x

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
1	0.025	5.00	48.350	450	385296.341	398058.635	1.950
2	0.009	5.00	48.000	450	385285.037	398046.594	1.800
3	0.004	5.00	47.750	450	385292.195	398039.802	1.670
4			47.300	600	385271.089	398018.303	1.650
5	0.055	5.00	47.400	1200	385264.705	398024.228	2.470
7	0.016	5.00	47.700	600	385268.925	398052.594	1.380
8	0.009	5.00	47.000	600	385257.822	398040.394	0.980
9	0.009	5.00	47.200	600	385260.074	398038.307	1.950
9A	0.012	5.00	47.200	600	385255.442	398033.457	2.135
10	0.024	5.00	47.000	1200	385241.440	398029.100	2.220
TANK			47.000	1200	385256.778	398015.926	2.300
FCC 1	0.024	5.00	47.000	1200	385261.128	398011.672	2.320
C1			47.000	1200	385263.731	398008.452	2.840
OUT 1			46.180		385261.720	397995.129	3.025
11	0.013	5.00	47.800	600	385289.068	398073.907	1.350
12			48.850	600	385309.844	398054.341	2.590
13	0.029	5.00	47.820	600	385293.272	398037.165	1.720
14	0.023	5.00	47.700	600	385286.741	398030.518	1.660
FCC 2	0.024	5.00	46.750	1200	385260.607	398003.568	1.540
OUT 2			46.750	1200	385261.763	397994.948	1.750

Links (Input)

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	1	2	16.583	0.600	46.400	46.200	0.200	82.9	150	5.25	45.7
1.001	2	3	9.926	0.600	46.200	46.080	0.120	82.7	150	5.40	45.1
1.002	3	4	27.898	0.600	46.080	45.650	0.430	64.9	150	5.77	44.0
1.003	4	5	11.071	0.600	45.650	44.930	0.720	15.4	150	5.84	43.4
1.004	5	TANK	11.477	0.600	44.930	44.700	0.230	49.9	150	5.98	42.8
2.000	7	8	17.703	0.600	46.320	46.020	0.300	59.0	150	5.22	45.6
2.001	8	9	4.628	0.600	46.020	45.960	0.060	77.1	150	5.29	45.4
2.002	9	9A	14.674	0.600	45.250	45.065	0.185	79.3	150	5.51	44.7
2.003	9A	5	11.215	0.600	45.065	44.930	0.135	83.1	150	5.68	44.0
3.000	10	TANK	12.646	0.600	44.780	44.700	0.080	158.1	150	5.26	44.0
1.006	TANK	FCC 1	8.540	0.600	44.700	44.680	0.020	427.0	225	6.20	42.0
1.007	FCC 1	C1	9.224	0.600	44.680	44.235	0.445	20.7	225	6.26	41.6
1.008	C1	OUT 1	13.474	0.600	44.160	43.155	1.005	13.4	300	6.31	41.5
4.000	11	12	28.539	0.600	46.450	46.260	0.190	150.0	150	5.58	44.6
4.001	12	13	23.867	0.600	46.260	46.100	0.160	149.2	150	6.07	43.0
4.002	13	14	9.319	0.600	46.100	46.040	0.060	155.3	150	6.26	42.3
4.003	14	FCC 2	37.540	0.600	46.040	45.210	0.830	45.2	150	6.68	41.1
4.004	FCC 2	OUT 2	8.697	0.600	45.210	45.000	0.210	41.4	150	6.77	40.8

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
1	385296.341	398058.635	48.350	1.950	450	0	1.000	46.400	150
2	385285.037	398046.594	48.000	1.800	450	1 0	1.000 1.001	46.200 46.200	150 150
3	385292.195	398039.802	47.750	1.670	450	1 0	1.001 1.002	46.080 46.080	150 150
4	385271.089	398018.303	47.300	1.650	600	1 0	1.002 1.003	45.650 45.650	150 150
5	385264.705	398024.228	47.400	2.470	1200	1 2 0	2.003 1.003 1.004	44.930 44.930 44.930	150 150 150

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Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)
7	385268.925	398052.594	47.700	1.380	600	0	2.000	46.320	150
8	385257.822	398040.394	47.000	0.980	600	1	2.000	46.020	150
						0	2.001	46.020	150
9	385260.074	398038.307	47.200	1.950	600	1	2.001	45.960	150
						0	2.002	45.250	150
9A	385255.442	398033.457	47.200	2.135	600	1	2.002	45.065	150
						0	2.003	45.065	150
10	385241.440	398029.100	47.000	2.220	1200	0	3.000	44.780	150
TANK	385256.778	398015.926	47.000	2.300	1200	1	3.000	44.700	150
						2	1.004	44.700	150
						0	1.006	44.700	225
FCC 1	385261.128	398011.672	47.000	2.320	1200	1	1.006	44.680	225
						0	1.007	44.680	225
C1	385263.731	398008.452	47.000	2.840	1200	1	1.007	44.235	225
						0	1.008	44.160	300
OUT 1	385261.720	397995.129	46.180	3.025		1	1.008	43.155	300
11	385289.068	398073.907	47.800	1.350	600	0	4.000	46.450	150
12	385309.844	398054.341	48.850	2.590	600	1	4.000	46.260	150
						0	4.001	46.260	150
13	385293.272	398037.165	47.820	1.720	600	1	4.001	46.100	150
						0	4.002	46.100	150
14	385286.741	398030.518	47.700	1.660	600	1	4.002	46.040	150
						0	4.003	46.040	150
FCC 2	385260.607	398003.568	46.750	1.540	1200	1	4.003	45.210	150
						0	4.004	45.210	150
OUT 2	385261.763	397994.948	46.750	1.750	1200	1	4.004	45.000	150

Simulation Settings

Rainfall Methodology	FSR	Summer CV	0.750	Drain Down Time (mins)	240
FSR Region	England and Wales	Winter CV	0.840	Additional Storage (m³/ha)	20.0
M5-60 (mm)	18.000	Analysis Speed	Normal	Check Discharge Rate(s)	x
Ratio-R	0.359	Skip Steady State	x	Check Discharge Volume	x

Storm Durations

15	30	60	120	180	240	360	480	600	720	960	1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1	0	0	0	100	40	0	0
30	0	0	0				

Node OUT 1 Surcharged Outfall

Overrides Design Area	x	Depression Storage Area (m²)	0	Evapo-transpiration (mm/day)	0
Overrides Design Additional Inflow	x	Depression Storage Depth (mm)	0		

Applies to 30yr, 100yr+40% CC 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440 minute storms

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Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)	Time (mins)	Depth (m)
0	1.200	180	1.200	360	1.200	540	1.200	720	1.200	900	1.200	1080	1.200	1260	1.200	1440	1.200
60	1.200	240	1.200	420	1.200	600	1.200	780	1.200	960	1.200	1140	1.200	1320	1.200		
120	1.200	300	1.200	480	1.200	660	1.200	840	1.200	1020	1.200	1200	1.200	1380	1.200		

Node FCC 1 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	x	Sump Available	✓
Invert Level (m)	44.680	Product Number	CTL-SHE-0126-8900-1800-8900
Design Depth (m)	1.800	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	8.9	Min Node Diameter (mm)	1200

Node FCC 2 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	45.210	Product Number	CTL-SHE-0131-9000-1500-9000
Design Depth (m)	1.500	Min Outlet Diameter (m)	0.150
Design Flow (l/s)	9.0	Min Node Diameter (mm)	1200

Node TANK Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	44.700
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	55

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	56.0	0.0	1.000	56.0	0.0	1.001	0.0	0.0

Node 13 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Width (m)	11.500	Depth (m)	0.100
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	47.370	Length (m)	25.000	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)	0	Slope (1:X)	150.0		

Node 14 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Width (m)	9.500	Depth (m)	0.100
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	47.250	Length (m)	23.000	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)	0	Slope (1:X)	150.0		

Node FCC 2 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Width (m)	6.000	Depth (m)	0.100
Side Inf Coefficient (m/hr)	0.00000	Invert Level (m)	46.300	Length (m)	37.000	Inf Depth (m)	
Safety Factor	2.0	Time to half empty (mins)	23	Slope (1:X)	150.0		

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Results for 1 year Critical Storm Duration. Lowest mass balance: 99.31%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	46.440	0.040	3.0	0.0164	0.0000	OK
15 minute winter	2	10	46.248	0.048	4.1	0.0124	0.0000	OK
15 minute winter	3	11	46.130	0.050	4.5	0.0103	0.0000	OK
15 minute winter	4	11	45.682	0.032	4.5	0.0091	0.0000	OK
15 minute winter	5	10	45.028	0.098	16.3	0.1548	0.0000	OK
15 minute winter	7	10	46.349	0.029	2.0	0.0152	0.0000	OK
15 minute winter	8	10	46.061	0.041	3.0	0.0193	0.0000	OK
15 minute winter	9	10	45.296	0.046	4.0	0.0172	0.0000	OK
15 minute winter	9A	11	45.119	0.054	5.4	0.0214	0.0000	OK
60 minute winter	10	43	44.851	0.071	1.6	0.0951	0.0000	OK
60 minute winter	TANK	43	44.850	0.150	10.7	8.1751	0.0000	OK
60 minute winter	FCC 1	43	44.849	0.169	6.2	0.2257	0.0000	OK
60 minute winter	C1	43	44.190	0.030	6.2	0.0342	0.0000	OK
60 minute winter	OUT 1	43	43.185	0.030	6.2	0.0000	0.0000	OK
15 minute winter	11	10	46.484	0.034	1.6	0.0161	0.0000	OK
15 minute winter	12	11	46.293	0.033	1.6	0.0092	0.0000	OK
15 minute winter	13	11	46.163	0.063	4.8	0.0391	0.0000	OK
15 minute winter	14	11	46.094	0.054	7.4	0.0305	0.0000	OK
15 minute winter	FCC 2	12	45.467	0.256	10.3	0.3701	0.0000	SURCHARGED
15 minute summer	OUT 2	1	45.000	0.000	8.4	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	1.000	2	3.0	0.697	0.152	0.0709	
15 minute winter	2	1.001	3	4.0	0.812	0.205	0.0491	
15 minute winter	3	1.002	4	4.5	1.168	0.205	0.1093	
15 minute winter	4	1.003	5	4.5	0.668	0.099	0.0823	
15 minute winter	5	1.004	TANK	16.6	1.784	0.657	0.1346	
15 minute winter	7	2.000	8	1.9	0.614	0.084	0.0566	
15 minute winter	8	2.001	9	2.9	0.783	0.145	0.0174	
15 minute winter	9	2.002	9A	4.0	0.781	0.201	0.0753	
15 minute winter	9A	2.003	5	5.5	0.615	0.280	0.1000	
15 minute winter	10	3.000	TANK	2.9	0.749	0.208	0.1362	
60 minute winter	TANK	1.006	FCC 1	5.6	0.195	0.223	0.2569	
60 minute winter	FCC 1	1.007	C1	6.2	1.509	0.054	0.0379	
60 minute winter	C1	1.008	OUT 1	6.2	1.711	0.020	0.0489	17.6
15 minute winter	11	4.000	12	1.6	0.555	0.107	0.0820	
15 minute winter	12	4.001	13	1.5	0.319	0.104	0.1175	
15 minute winter	13	4.002	14	4.8	0.757	0.341	0.0596	
15 minute winter	14	4.003	FCC 2	7.5	0.541	0.282	0.4387	
15 minute winter	FCC 2	Hydro-Brake®	OUT 2	8.6				5.0

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Results for 30 year Critical Storm Duration. Lowest mass balance: 99.31%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	10	46.465	0.065	7.5	0.0271	0.0000	OK
15 minute winter	2	10	46.282	0.082	10.1	0.0211	0.0000	OK
15 minute winter	3	11	46.162	0.082	11.1	0.0170	0.0000	OK
15 minute winter	4	11	45.701	0.051	11.1	0.0143	0.0000	OK
15 minute winter	5	12	45.465	0.535	36.4	0.8438	0.0000	SURCHARGED
15 minute winter	7	10	46.366	0.046	4.8	0.0237	0.0000	OK
15 minute winter	8	10	46.089	0.069	7.4	0.0323	0.0000	OK
15 minute winter	9	12	45.560	0.310	10.0	0.1163	0.0000	SURCHARGED
15 minute winter	9A	12	45.521	0.456	12.2	0.1801	0.0000	SURCHARGED
60 minute winter	10	47	45.126	0.346	3.8	0.4666	0.0000	SURCHARGED
60 minute winter	TANK	47	45.126	0.426	23.2	23.1395	0.0000	SURCHARGED
60 minute winter	FCC 1	47	45.123	0.443	8.9	0.5927	0.0000	SURCHARGED
15 minute summer	C1	10	44.366	0.206	8.3	0.2328	0.0000	OK
15 minute summer	OUT 1	1	44.355	1.200	9.7	0.0000	0.0000	OK
15 minute winter	11	13	46.528	0.078	3.9	0.0369	0.0000	OK
15 minute winter	12	14	46.525	0.265	10.2	0.0749	0.0000	SURCHARGED
15 minute winter	13	13	46.517	0.417	12.3	0.2584	0.0000	SURCHARGED
15 minute winter	14	13	46.501	0.461	16.6	0.2584	0.0000	SURCHARGED
15 minute winter	FCC 2	16	46.387	1.177	21.3	3.0896	0.0000	SURCHARGED
15 minute summer	OUT 2	1	45.000	0.000	9.0	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	1.000	2	7.4	0.864	0.379	0.1422	
15 minute winter	2	1.001	3	9.9	1.012	0.508	0.0973	
15 minute winter	3	1.002	4	11.1	1.476	0.502	0.2104	
15 minute winter	4	1.003	5	11.2	0.823	0.244	0.1263	
15 minute winter	5	1.004	TANK	33.7	1.913	1.335	0.2021	
15 minute winter	7	2.000	8	4.7	0.761	0.205	0.1109	
15 minute winter	8	2.001	9	7.3	0.984	0.360	0.0343	
15 minute winter	9	2.002	9A	8.8	0.889	0.440	0.2583	
15 minute winter	9A	2.003	5	11.2	0.636	0.574	0.1974	
15 minute summer	10	3.000	TANK	6.7	0.794	0.478	0.2226	
30 minute winter	TANK	1.006	FCC 1	8.5	0.213	0.340	0.3396	
60 minute winter	FCC 1	1.007	C1	8.8	0.845	0.076	0.1234	
15 minute summer	C1	1.008	OUT 1	9.7	0.148	0.032	0.8216	22.3
15 minute winter	11	4.000	12	3.8	0.702	0.265	0.3827	
15 minute winter	12	4.001	13	-6.4	-0.400	-0.441	0.4202	
15 minute summer	13	4.002	14	10.9	0.889	0.766	0.1641	
15 minute summer	14	4.003	FCC 2	15.0	0.968	0.564	0.6609	
15 minute summer	FCC 2	Hydro-Brake®	OUT 2	9.0				11.2

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Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 99.31%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	1	13	46.589	0.189	13.5	0.0783	0.0000	SURCHARGED
15 minute winter	2	13	46.545	0.345	18.3	0.0893	0.0000	SURCHARGED
15 minute winter	3	13	46.488	0.408	19.9	0.0844	0.0000	SURCHARGED
15 minute winter	4	13	46.304	0.654	17.6	0.1852	0.0000	SURCHARGED
15 minute winter	5	12	46.230	1.300	53.6	2.0482	0.0000	SURCHARGED
15 minute winter	7	13	46.443	0.123	8.6	0.0631	0.0000	OK
15 minute winter	8	13	46.428	0.408	13.4	0.1900	0.0000	SURCHARGED
15 minute winter	9	13	46.410	1.160	16.5	0.4352	0.0000	SURCHARGED
15 minute winter	9A	12	46.335	1.270	18.2	0.5015	0.0000	SURCHARGED
60 minute winter	10	59	45.638	0.858	7.0	1.1555	0.0000	SURCHARGED
60 minute winter	TANK	59	45.637	0.937	40.6	50.9303	0.0000	SURCHARGED
60 minute winter	FCC 1	59	45.635	0.955	9.8	1.2776	0.0000	SURCHARGED
30 minute winter	C1	11	44.364	0.204	8.9	0.2310	0.0000	OK
15 minute summer	OUT 1	1	44.355	1.200	10.9	0.0000	0.0000	OK
15 minute winter	11	13	47.229	0.779	7.0	0.3699	0.0000	SURCHARGED
15 minute winter	12	13	47.209	0.949	15.3	0.2684	0.0000	SURCHARGED
15 minute winter	13	13	47.186	1.086	16.3	0.6732	0.0000	SURCHARGED
15 minute winter	14	13	47.107	1.067	22.9	0.5976	0.0000	SURCHARGED
30 minute winter	FCC 2	29	46.543	1.333	29.5	12.6968	0.0000	FLOOD RISK
15 minute summer	OUT 2	1	45.000	0.000	9.0	0.0000	0.0000	OK

Link Event (Outflow)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	1	1.000	2	13.4	0.951	0.687	0.2919	
15 minute winter	2	1.001	3	17.7	1.131	0.904	0.1747	
15 minute summer	3	1.002	4	18.5	1.520	0.838	0.4911	
15 minute summer	4	1.003	5	15.6	0.934	0.342	0.1949	
15 minute winter	5	1.004	TANK	49.2	2.796	1.951	0.2021	
15 minute winter	7	2.000	8	8.5	0.858	0.368	0.2922	
15 minute summer	8	2.001	9	12.6	1.115	0.621	0.0815	
15 minute winter	9	2.002	9A	12.3	0.861	0.618	0.2583	
15 minute winter	9A	2.003	5	16.3	0.926	0.836	0.1974	
15 minute winter	10	3.000	TANK	11.3	0.930	0.802	0.2226	
15 minute summer	TANK	1.006	FCC 1	8.7	-0.242	0.351	0.3396	
120 minute summer	FCC 1	1.007	C1	8.9	0.807	0.077	0.1237	
15 minute summer	C1	1.008	OUT 1	10.9	0.168	0.036	0.8030	40.8
15 minute summer	11	4.000	12	6.3	0.762	0.437	0.5024	
15 minute winter	12	4.001	13	-9.0	-0.513	-0.623	0.4202	
15 minute winter	13	4.002	14	14.0	0.895	0.985	0.1641	
15 minute winter	14	4.003	FCC 2	21.6	1.229	0.816	0.6609	
120 minute winter	FCC 2	Hydro-Brake®	OUT 2	9.0				47.1

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Appendix C

United Utilities Approval – Reference EC5658

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

	EC5658
Applicant details	
Applicant name	**Chloe Grimsley**
Applicant address *(including postcode)*	**curtins Consulting (on behalf of JRL)** **17-19 Whitworth Street West** **Manchester** **M1 5WG**
Applicant email	**Chloe.grimsley@curtins.com and Peter Carroll <peter.carroll@midgard.ltd.uk>**
Site details: The site / property which is proposed for connection to the public sewer	
	The Castings, Heyrod Street, Manchester, M1 2WW

APPROVED

Your application for connection to the public sewer has been approved, to be made via a new connection:

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	**New manhole**					
Sewer connection type	Foul	☐	Surface water	☐	Combined	☒

This approval is valid for 12 months from the date below.
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.

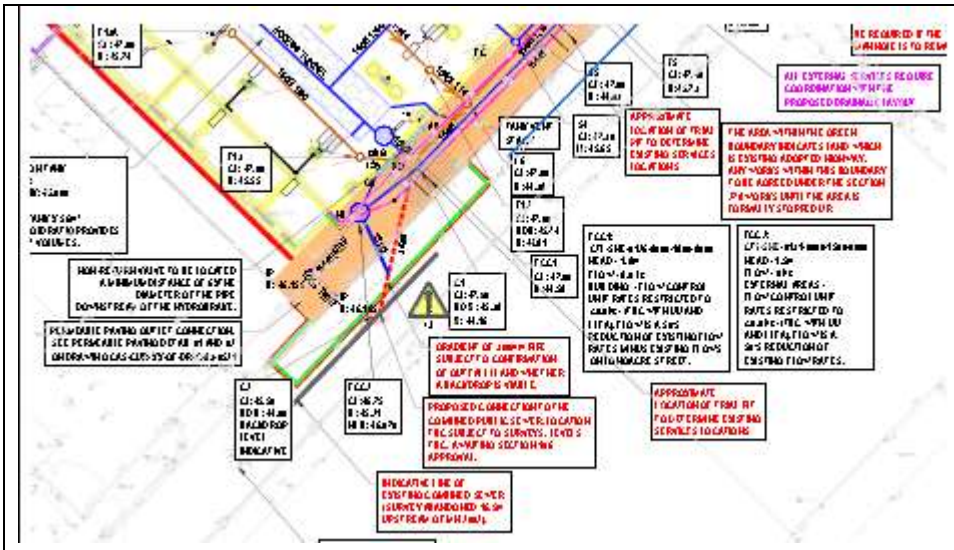
Comments

Approval for the 300mm combined connection to the existing 420x700mm combined sewer in Heyrod Street via a new manhole attenuation indicated with a flow control restricted to 8.9l/s

The new manhole must be constructed in line with United Utilities standard details with the appropriate openings, ring size, benching/pipe configuration, channels and landing. Please ensure a plan of your proposals is submitted with your contractors Part 2 application

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.

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.



Development Support Technician	**Lynne Berry**
Contact number	**07881 034558**
Date	**02/02/2022**

United Utilities Water Ltd
Developer Services & Metering
Second Floor, Grasmere House,
Lingley Mere Business Park,
Warrington
WA5 3LP

Telephone: 0345 072 6067
Wastewaterdeveloperservices@uuplc.co.uk

Your Reference	EC5658
Our Reference	4200046007
Date	02/02/2022

Dear Sir/Madam,

Location:	The Castings Heyrod Street Manchester M1 2WW

Section 106 Water Industry Act 1991

I refer to your recent application to make a connection to the public sewerage system for the purpose of draining the above property. '**Application to connect to a public sewer'** (**Part 1**) has been approved and you may now appoint your contractor to carry out this work.

If it is your intention to make a connection direct to the public sewer then your contractor must complete the **Request for permission to work on the public sewer (Part 2)** of the application for approval prior to commencing the works. Please click on the link for further guidance and information.

***Please note:** It is important that your contractor/ground workers meet the requirements set out in the guidance on our website.

http://www.unitedutilities.com/connecting-public-sewer.aspx

**If the connection is to a lateral or drain only, you will need the approval of the Local Authority Building Inspector following which you may then proceed with this work.

If this connection connects a property to the public sewer for the first time, you need to tell us

0345 672 2888 (for customers who don't have a water meter)

0345 672 2999 (for customers with a water meter)

***Please Note: -** This approval is valid for 12 months from the date of this letter.

Should you require further information please call 0345 072 6067.

Yours faithfully,

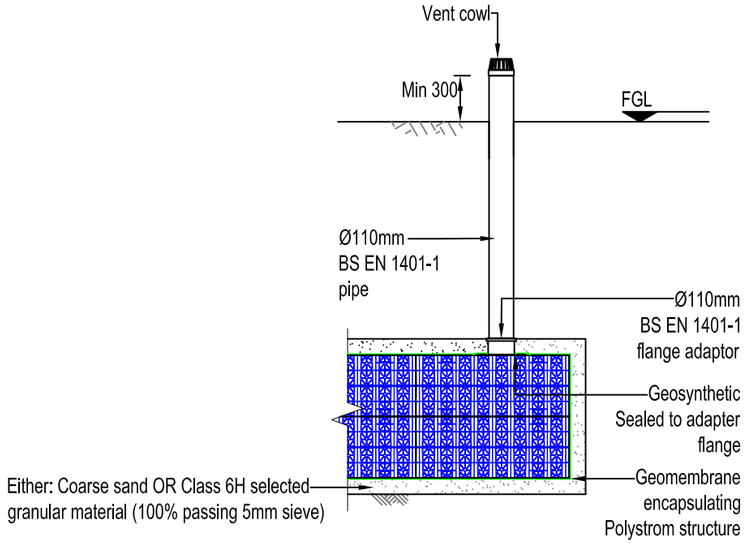
Louise Dack.

For Developer Services and Metering

Appendix D

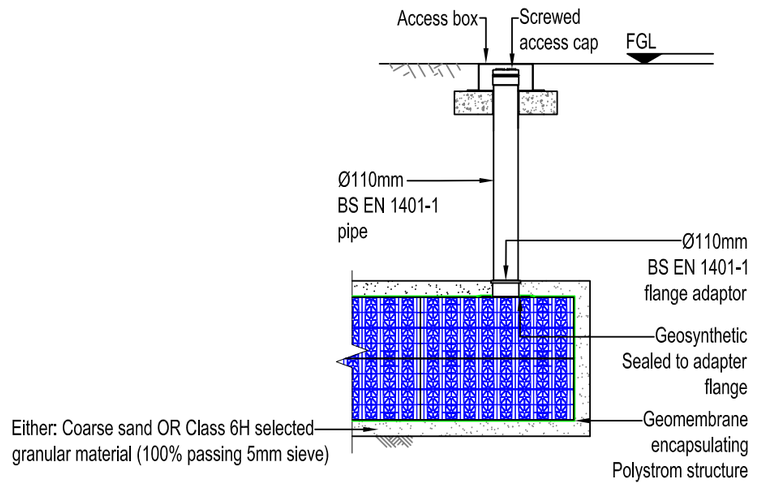
Hydro-Brake Manufacturers Information

Polystorm Manufacturers Information



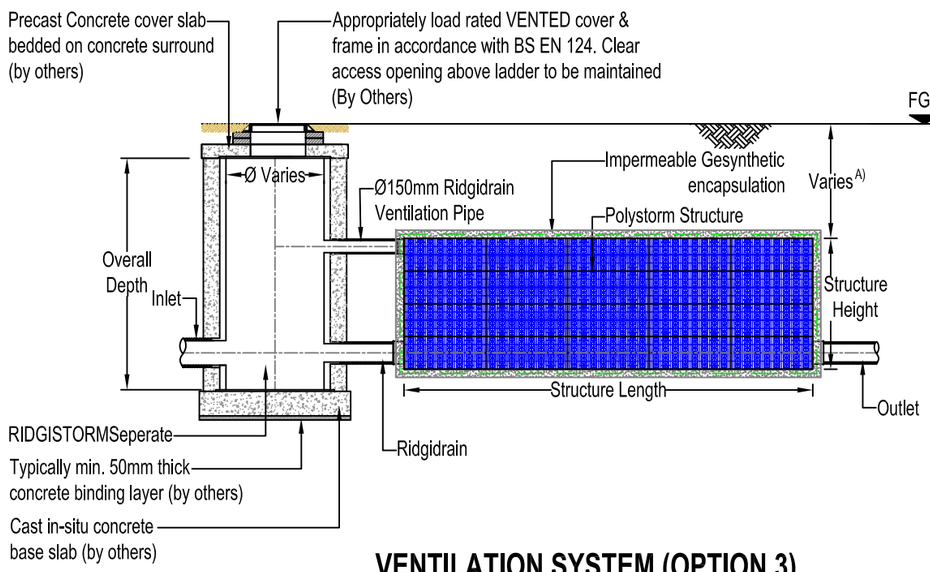
VENTILATION SYSTEM (OPTION 1)

Scale (1:40)



VENTILATION SYSTEM (OPTION 2)

Scale (1:40)



VENTILATION SYSTEM (OPTION 3)

Scale (1:75)

NOTE A

For information on tank cover depths, please contact the Technical Team:- 01509 61500

NOTES

1. All dimensions in millimetres, unless otherwise stated.
2. All dimensions are nominal and may vary within manufacturing or construction tolerances.
3. All site temporary and enabling works by others.
4. Polypipe products to be installed in accordance with Polypipe civils recommendations (refer to Polypipe technical guidance for further information), giving due consideration to the requirements of the organisation who will be taking ultimate owner ship of the installation.
5. This drawing is intended for guidance only. Confirmation of the information contained within this document should be sought from the consulting engineers before final design or construction activities commence.

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Polypipe Civils & Green Urbanisation
North Road, Loughborough, Leicestershire, LE11 1LE
Tel: 01509 615100
Fax: 01509 615215
www.polypipe.com/civils

PROJECT	POLYSTORM STANDARD DETAILS
TITLE	POLYSTORM VENTILATION DETAIL
STATUS	FOR INFORMATION
DATE	11/12/18
DRAWN BY	KT
ORIGINAL SIZE	A3
SCALE	AS SHOWN
DRAWING No.	PSM_SD_PSM_002
REV.	A

Preliminary Polystorm Performance Assessment

72857 - The Castings - Apartments - Heyrod Street, Manchester

1.0 Proposal Brief

The following section details the assumed parameters on which our proposed product offering has been based. Please refer to CIRIA Report C680 (2008; RP782) & BBA Certificate No 06/4297 for further details on typical product testing procedures and the calculation methodology proposed.

1.1 Proposed Polystorm Geocellular Unit

The Polystorm unit(s) proposed, along with the relevant unit characteristic parameters which may be used for design purposes, are given below:

Polystorm unit	- Description - Product Code	Polystorm-R PSM1A
Ultimate compressive strength [kN/m²]	- Vertical, $X_{k;VC}$ - Lateral, $X_{k;LC}$	610 63.0
Short term deflection [kN/m² per mm]	- Vertical, $X_{k;VD}$ - Lateral, $X_{k;LD}$	60 4.4
Creep equation co-efficient, x [mm] *[x ln (design life; hrs)]*	- Vertical, $X_{k;VCr}$ - Lateral, $X_{k;LCr}$	0.2798 1.0192
Allowable deflection [mm]	- Vertical, $\delta_{k;V}$ - Lateral, $\delta_{k;L}$	9.0 14.0
Allowable creep deformation [mm]	- Vertical, $\varepsilon_{k;V}$ - Lateral, $\varepsilon_{k;L}$	9.0 18.0

1.2 Recommended Material and Partial Factor of Safety

Factor of safety	ULS	SLS
Material, $f_{m;*}$	2.75	1.5

(Polypipe recommended factor; based on the minimum values proposed in CIRIA C680; Clause 4.6)

Partial factor of safety	ULS	SLS
Variable loads, γ_Q	1.6	1.0
Permanent loads, γ_G	1.4	1.0
Lateral earth pressure, γ_e	1.35	1.0
Hydrostatic, γ_u	1.35	1.0

(Based on CIRIA C680, Clause 4.6)

1.3 Proposed Installation

Idealised details of the proposed Polystorm installation are summarised below (refer to figure 1).

Depths

Depth to structure invert, H	2.300 m
Polystorm structure depth, h_1	1.200 m
Design depth, z *(= H - 0.2m)*	2.100 m
Cover depth, h_c *(= H - h_1)*	1.100 m

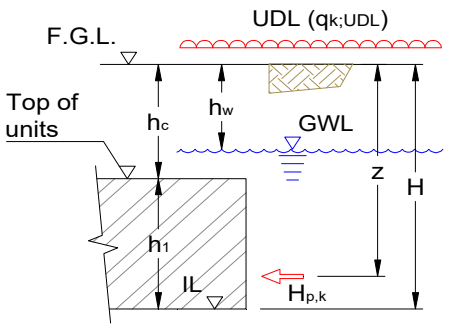


Figure 1) Idealised illustration of installation

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Assumed ground conditions

This has been assumed and will need to be checked.

Native soil

Shearing resistance, Ø	28°	
Density, γ_k	20.0 kN/m³	*[Assumed]*

Active earth pressure co-efficient, Ka 0.361
(= [1 - Sin Ø] / [1 + Sin Ø])

Ground water

Depth below FGL, h_w	N/A
Density, γ_w	N/A

1.4 Assumed Transient (Live) Loads

For illustrative purposes, vehicle loading assumed

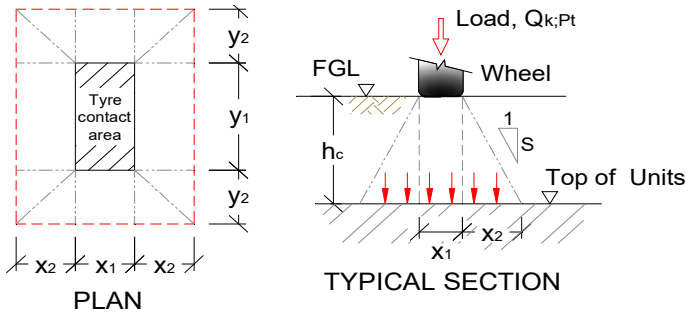


Figure 2) Concentrated load parameters

Loading classification	Car parking; unrestricted height	*[CIRIA C680; Table 4.2]*
DIN 1072 classification	6/6	*[CIRIA C680; Table 4.2]*
Max Gross vehicle weight	< 6,000 Kg	*[CIRIA C680; Table 4.2]*
Uniformly distributed load, $q_{k;UDL}$	5.0 kN/m²	*[CIRIA C680; Table 4.2]*
Concentrated wheel load, $Q_{k;Pt}$	20.0 kN	*[CIRIA C680; Table 4.2]*
Dynamic load factor, Φ	1.0	*[Assumed]*
Contact area - Length, y_1	0.200 m	*[CIRIA C680; Table 4.2]*
- Width, x_1	0.200 m	*[CIRIA C680; Table 4.2]*
Load distribution, S	1 in 2.0	*[Assumed]*
Additional load spread, x_2 & y_2	0.550 m	

(= h_c / S)

Unfactored

Imposed load, $q_{k;Pt}$ **11.8 kN/m²** [> Uniformly distributed load]

(= [$Q_{k;pt}$. Φ] / [(x_1 + 2x_2) x (y_1 + 2y_2)])

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Preliminary Polystorm Performance Assessment

72857 - The Castings - Apartments - Heyrod Street, Manchester

2.0 Assumed Imposed Loading

The following section illustrates how Polypipe would typically expect imposed loads on a proposed Polystorm structure to be derived; in accordance with the guidance given in CIRIA C680 (2008; RP782)

2.1 Vertical Loads Imposed on Upper Structure Face

The following section estimates the vertical imposed load at the Polystorm structure soffit.

Unfactored

Pressure derived from concentrated load gave worst case transient parameter, refer to Section 1.4

Live load, $q_{k;*}$ **11.8 kN/m²** *[* - Pt; refer to Section 1.4]*

Dead load, G_k **22.0 kN/m²**

(= [h_c x γ_k])

Factored

ULS, $V_{d;ULS}$ **49.7 kN/m²** [< 221.8 kN/m² Therefore OK]

(= [$q_{k;*}$]$\gamma_{Q;\,ULS}$ + [G_k]$\gamma_{G;\,ULS}$) *(= $X_{k;VC}$ / $f_{m;ULS}$; Refer to Section 1.0)*

Degree of utilization, Λ_{STR} **22%**

SLS, $V_{d;SLS,\,\delta}$ **11.8 kN/m²**

(= [$q_{k;Pt}$]$\gamma_{Q;\,SLS}$)

SLS, $V_{d;SLS,\,\varepsilon}$ **22.0 kN/m²**

(= [G_k]$\gamma_{G;\,SLS}$)

2.2 Lateral Load Imposed at Depth z

The following section estimates the lateral pressure imposed on the proposed Polystorm structure, at design depth z (worst case imposed load assumed to occur at the centre of the unit, due to additional support provided by the unit's external faces)

Unfactored

Live load, $q_{k;UDL}$ **5.0 kN/m²**

Dead load, W_{Gk} **42.0 kN/m²**

Hydrostatic load, U_k **N/A**

Where $h_w \leq z$

(W_{Gk} = [h_w x γ_k] + [(z - h_w) . (γ_k - γ_w)])

(U_k = [z - h_w] x γ_w)

Where $h_w > z$

(W_{Gk} = z x γ_k)

Lateral pressure, $H_{p;k}$ **17.0 kN/m²**

(= Ka [q_k + W_{Gk}] + U_k)

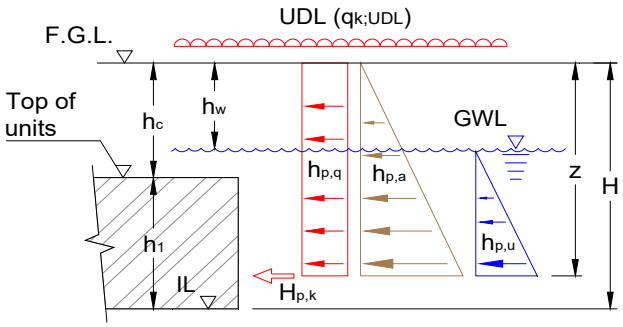


Figure 3) Idealised illustration of lateral pressure(s)

Factored

ULS, $H_{d;ULS}$ **22.9 kN/m²** [< 22.9 kN/m² Therefore OK]

(= Ka [q_k + W_{Gk}]$\gamma_{e;\,ULS}$ + [U_k]$\gamma_{U;\,ULS}$) *(= $X_{k;LC}$ / $f_{m;ULS}$; Refer to Section 1.0)*

SLS, $H_{d;SLS}$ **17.0 kN/m²**

(= Ka [q_k + W_{Gk}]$\gamma_{e;\,SLS}$ + [U_k]$\gamma_{U;\,SLS}$)

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3.0 Serviceability Limit State Checks (Deflection & Creep)

The serviceability of the proposed Polystorm structure (Section 1.3) may be assessed by predicting possible unit deflection (short term) and creep (long term)

3.1 Vertical Deflection Due to Expected Traffic Loading

The overseeing engineer should be consulted to ensure that the deformation predicted below, would not compromise the structural integrity of any proposed surface pavement. Where excessive deflections are predicted, protective measures may be introduced.

Design strength; $X_{d;VD}$	**40.0 kN/m² per mm**		
(= $X_{k;VD}$ / $f_{m;SLS}$; refer to Section 1.0)			
SLS, $V_{d;SLS,\delta}$	**11.8 kN/m²**		
Deflection, δ_V	**0.30 mm**	[< 1.0 mm	Typically OK]
(= $V_{d;SLS}$ / $X_{d;VD}$)			

3.2 Vertical Creep

Derived creep equation is only valid if expected imposed load(s) do not exceed the creep test load

Creep test load, $X_{d;v,cr}$	**162.0 kN/m²**		
SLS, $V_{d;SLS,\varepsilon}$	**22.0 kN/m²**	[< 162.0 kN/m²	Therefore OK]
Degree of utilization, Λ_{STR}	**14%**		
Creep data limit, t	**60 years**	*[Unit has a durability life in excess of 60yrs]*	
Estimated unit creep, $\varepsilon_{h,c}$	**3.7 mm**	[< 9.0 mm	Therefore OK]
(= 0.2798 ln [design life, t]); t in hours		*[Refer to Section 1.1; based on test load]*	
Degree of utilization, Λ_{STR}	**41%**		

3.3 Lateral Deflection

Design strength; $X_{d;LD}$	**2.9 kN/m² per mm**		
(= $X_{k;LD}$ / $f_{m;SLS}$; refer to Section 1.0)			
SLS, $H_{d;SLS}$	**17.0 kN/m²**		
Deflection, δ_L	**5.78 mm**	[< 14.0 mm	Therefore OK]
(= $H_{d;SLS}$ / $X_{d;LD}$)		*[Refer to Section 1.1; based on test load]*	
Degree of utilization, Λ_{STR}	**41%**		

3.4 Lateral Creep

Derived creep equation is only valid if expected imposed load(s) do not exceed the creep test load

Test load, $X_{d;v,cr}$	**30.9 kN/m²**		
SLS, $H_{d;SLS}$	**17.0 kN/m²**	[< 30.9 kN/m²	Therefore OK]
Degree of utilization, Λ_{STR}	**55%**		
Creep data limit, t	**60 years**	*[Unit has a durability life in excess of 60yrs]*	
Estimated unit creep, $\varepsilon_{h,c}$	**13.4 mm**	[< 18.0 mm	Therefore OK]
(= 1.0192 ln [design life, t]); t in hours		*[Refer to Section 1.1; based on test load]*	
Degree of utilization, Λ_{STR}	**75%**		

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Technical Specification

Control Point	Head (m)	Flow (l/s)
Primary Design	1.800	8.900
Flush-Flo™	0.529	8.887
Kick-Flo®	1.089	7.031
Mean Flow		7.793

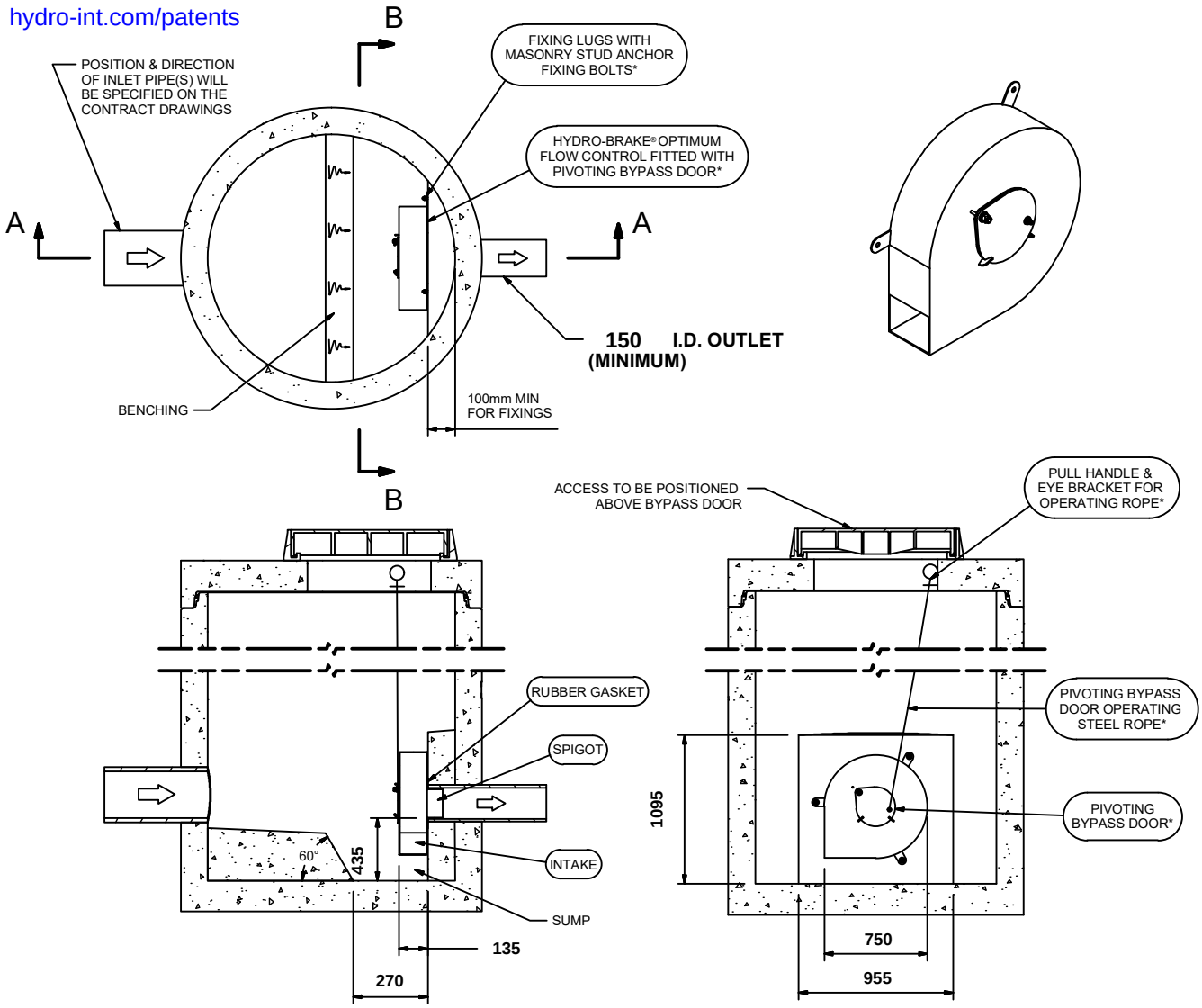
Hydro-Brake® Optimum Flow Control including:

- 3 mm grade 304L stainless steel
- Integral stainless steel pivoting by-pass door allowing clear line of sight through to outlet, c/w stainless steel operating rope
- Beed blasted finish to maximise corrosion resistance
- Stainless steel fixings
- Rubber gasket to seal outlet

BBA APPROVAL INSPECTION TESTING CERTIFICATION CERTIFICATE 08/4596

WRc Approved PT/329/0412

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SECTION A-A

SECTION B-B

IMPORTANT: ⬭ LIMIT OF HYDRO INTERNATIONAL SUPPLY
THE DEVICE WILL BE HANDED TO SUIT SITE CONDITIONS
FOR SITE SPECIFIC DETAILS AND MINIMUM CHAMBER SIZE REFER TO HYDRO INTERNATIONAL
ALL CIVIL AND INSTALLATION WORK BY OTHERS
* WHERE SUPPLIED
HYDRO-BRAKE® FLOW CONTROL & HYDRO-BRAKE® OPTIMUM FLOW CONTROL ARE REGISTERED TRADEMARKS FOR FLOW CONTROLS DESIGNED AND MANUFACTURED EXCLUSIVELY BY HYDRO INTERNATIONAL

THIS DESIGN LAYOUT IS FOR ILLUSTRATIVE PURPOSES ONLY. NOT TO SCALE.

DESIGN ADVICE

The head/flow characteristics of this SHE-0126-8900-1800-8900 Hydro-Brake® Optimum Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.
The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.

Hydro International®

DATE	11/23/2021 8:42 AM
SITE	Heyrod St
DESIGNER	Charlie Smith
REF	FCC1

SHE-0126-8900-1800-8900
Hydro-Brake® Optimum

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charlie.smith@curtins.com

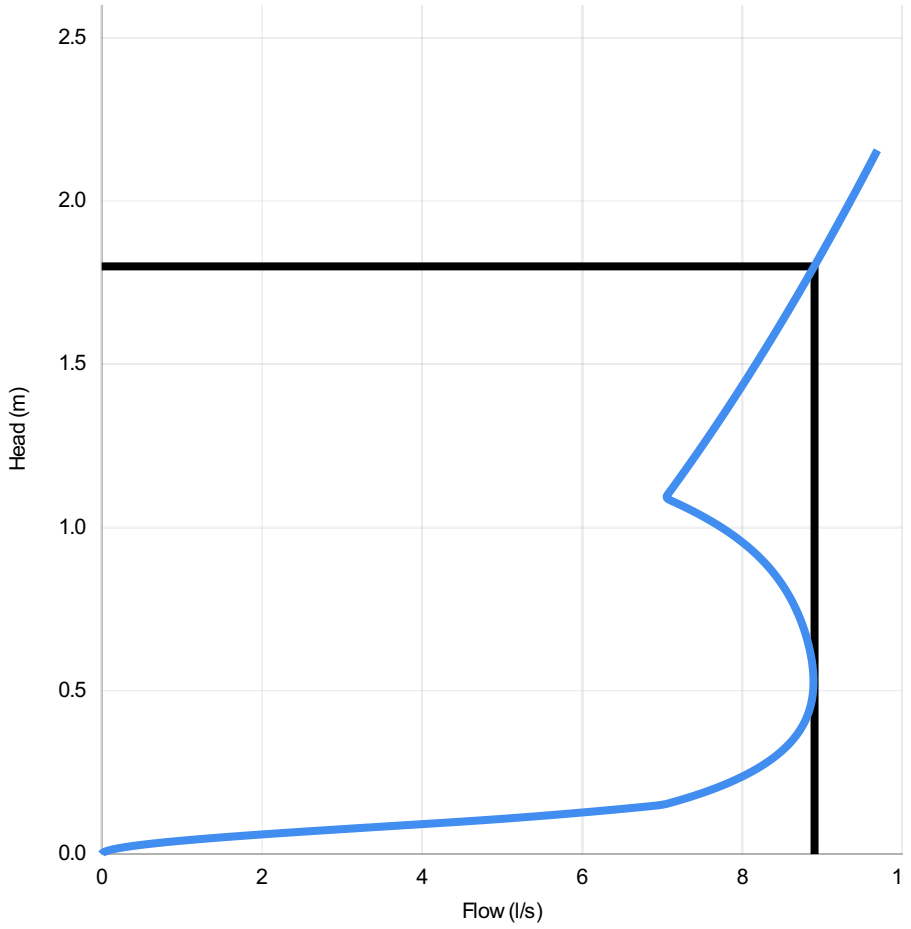
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Flush-Flo	0.529	8.887
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Mean Flow		7.793

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Head (m)	Flow (l/s)
0.000	0.000
0.062	2.105
0.124	5.840
0.186	7.486
0.248	8.083
0.310	8.465
0.372	8.698
0.434	8.827
0.497	8.881
0.559	8.882
0.621	8.844
0.683	8.776
0.745	8.678
0.807	8.544
0.869	8.363
0.931	8.116
0.993	7.784
1.055	7.344
1.117	7.114
1.179	7.296
1.241	7.473
1.303	7.646
1.366	7.814
1.428	7.978
1.490	8.139
1.552	8.296
1.614	8.451
1.676	8.602
1.738	8.750
1.800	8.896

DESIGN ADVICE

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Hydro International®

DATE	23/11/2021 08:42
Site	Heyrod St
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SHE-0126-8900-1800-8900

Hydro-Brake Optimum®

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Technical Specification

Control Point	Head (m)	Flow (l/s)
Primary Design	1.500	9.000
Flush-Flo™	0.440	8.994
Kick-Flo®	0.927	7.182
Mean Flow		7.853

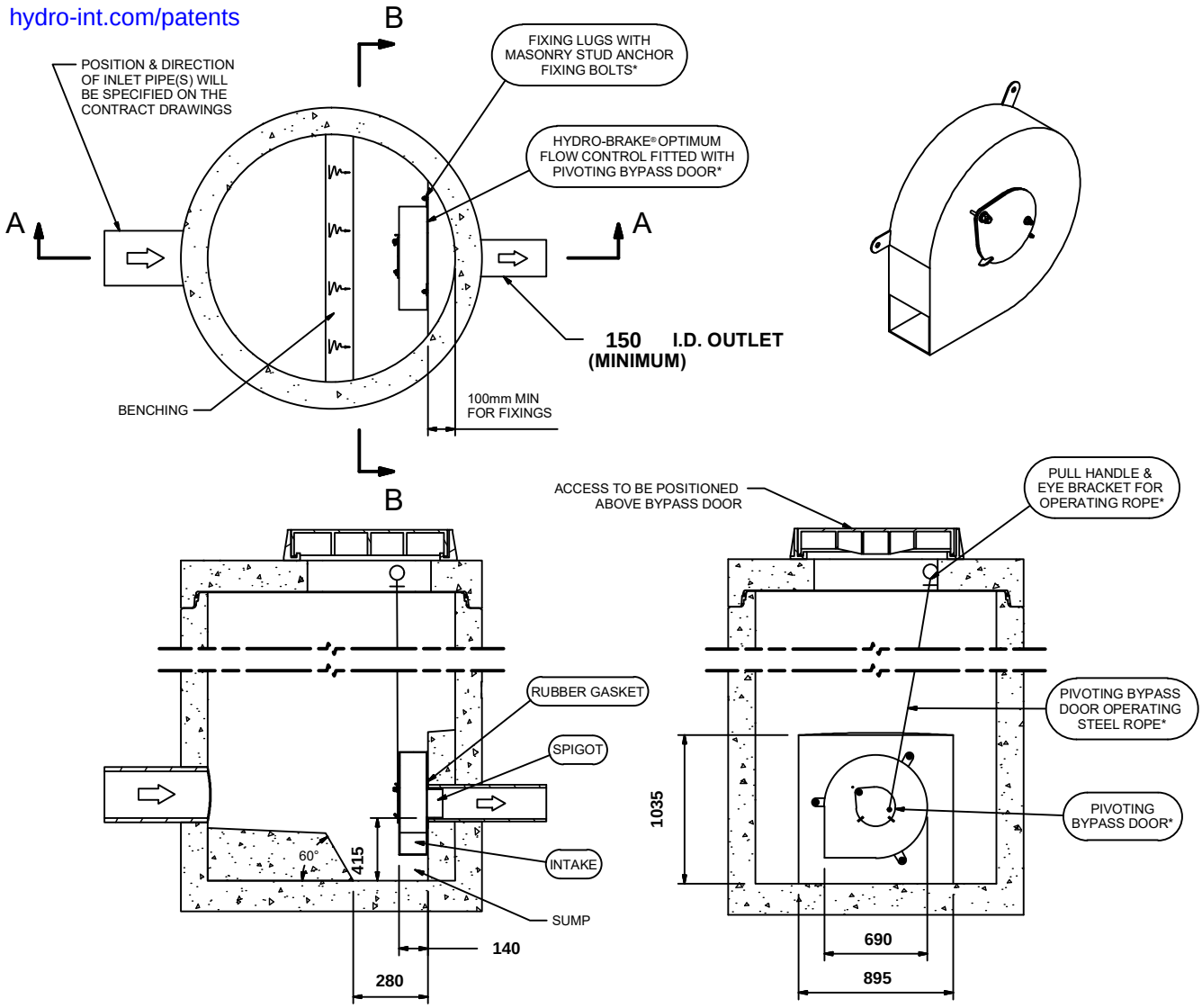
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SECTION A-A

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DESIGN ADVICE

The head/flow characteristics of this SHE-0131-9000-1500-9000 Hydro-Brake® Optimum Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.
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Hydro International®

DATE	11/23/2021 8:44 AM
SITE	Heyrod St
DESIGNER	Charlie Smith
REF	FCC2

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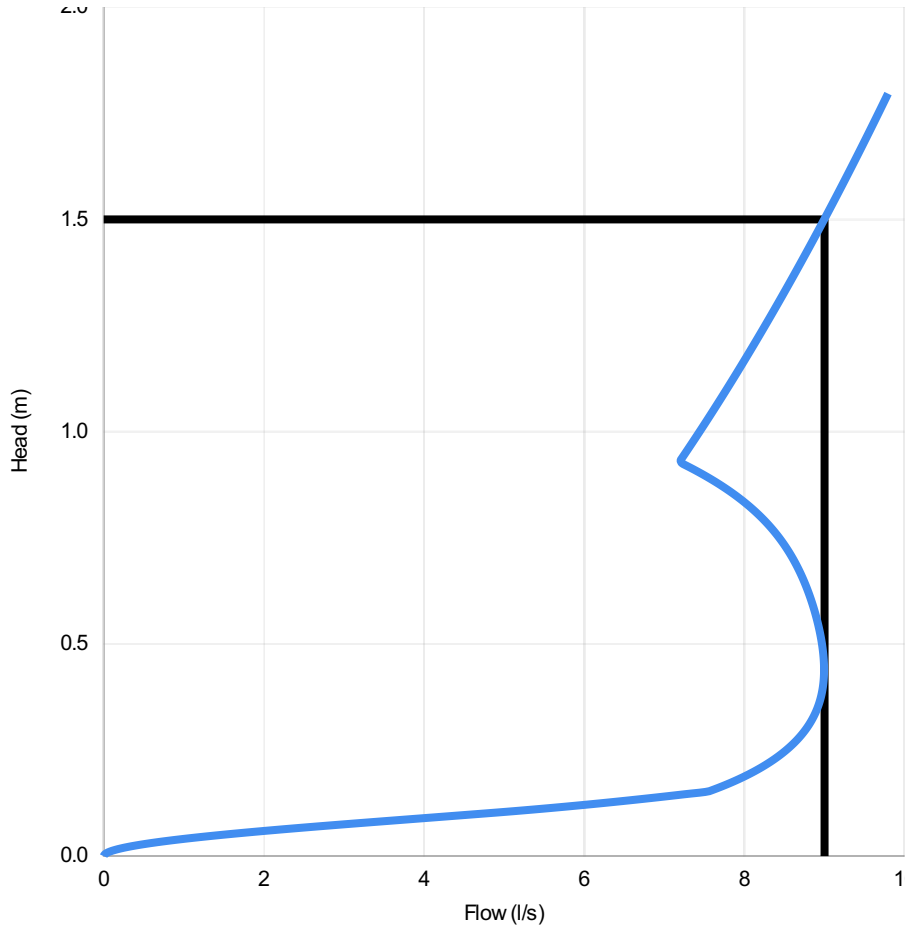
Technical Specification

Control Point	Head (m)	Flow (l/s)
Primary Design	1.500	9.000
Flush-Flo	0.440	8.994
Kick-Flo®	0.927	7.182
Mean Flow		7.853

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CERTIFICATE No 08/4596

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Head (m)	Flow (l/s)
0.000	0.000
0.052	1.563
0.103	4.960
0.155	7.593
0.207	8.192
0.259	8.575
0.310	8.808
0.362	8.936
0.414	8.988
0.466	8.989
0.517	8.952
0.569	8.888
0.621	8.800
0.672	8.684
0.724	8.530
0.776	8.322
0.828	8.039
0.879	7.658
0.931	7.202
0.983	7.380
1.034	7.559
1.086	7.733
1.138	7.903
1.190	8.069
1.241	8.231
1.293	8.390
1.345	8.546
1.397	8.699
1.448	8.849
1.500	8.996

DESIGN ADVICE

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SHE-0131-9000-1500-9000

Hydro-Brake Optimum®

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Appendix E

Solutek Attenuation Tank Formation Inspection Certificate

SOLUTEK
ENVIRONMENTAL LTD

ACCEPTANCE OF WORKING AREA

SQA-01

Contract No: 18083	**Client:** J Reddington	**Project:** The Castings, Manchester
Date:	**Engineer:**	**Material:** Polystorm & Tuflex

Acceptance of Working Area

I the undersigned, a duly appointed representative of Solutek, have visually observed the sub grade surface in the location of

and found it to be an acceptable surface on which to carry out the installation.

I the undersigned, a duly appointed representative of the Client hereby handover the above noted area to Solutek. We certify that the area is ready and checked to be at the correct formation level and condition for the installation to proceed.

(This observation is on the surface of the sub grade only, and therefore Solutek can take no responsibility for any subterranean conditions, the sub grade formation, level or its conformance to the projects specifications.)

Excavation

I the undersigned, a duly appointed representative of the Client are fully aware the tank size we are instructed to install is:

This tank will be installed 14 M length x 4 M width.

Excavation/Tank size additional information:

Solutek Representative	
Name (Signature)	
Name (Print)	Mark Sutcliffe
Date	10/3/22

Clients Representative	
Name (Signature)	
Name (Print)	A. FARRAR
Date	10/3/22

Form No	Date Iss.	Issue No.
SFR - 043	Jun-19	2

QSL ISO 9001 Quality Management Certification

SOLUTEK
ENVIRONMENTAL LTD

NON DESTRUCTIVE TEST FORM

SQA-02

Contract No: 18083	**Client:** J Reddington	**Project:** The Castings, Manchester
Date:	**Engineer:**	**Material:** Polystorm & Tuflex

Date / Time	Seam No:	Photos Taken	AIR TEST				Pass/Fail	Solutek Representative	Clients Representative
			Pressure (Bar)		Time				
			Start	End	Start	End			

Form No	Date Iss.	Issue No.
SFR - 040	Jun-19	2

REPAIR RECORD

SQA-03

Repair No:	Date	Photos Taken	Repair size (mm xmm)	Test Date	Pass/Fail	Clients Representative	Comments

Form No	Date Iss.	Issue No.
SFR - 042	Jun-19	2

QSL ISO 9001 Quality Management Certification

SOLUTEK
ENVIRONMENTAL LTD

LOCATION INSPECTION REPORT/ HANDBACK AREA TO CLIENT

SQA-04

Contract No: 18083	**Client:** J Reddington	**Project:** The Castings, Manchester
Date:	**Engineer:**	**Material:** Polystorm & Tuflex

Location .

		Clients representatives initials
1. Visual inspection of geomembrane	✓	
2. Visual inspection of geomembrane joints	✓	
3. Visual inspection of geotextile	✓	
4. Completion of non-destructive testing	X	
5. Number of small patch repairs	Quantity 9 X	
6. Number of tank connections	Quantity 5 ✓	

11. Details of any other items / works i.e. sealing to manholes, lift pits, etc

Pipe Flange Sizes:

9 160 mm
1 110mm

*Delete above items where appropriate

Handback of Area to Client

SQA-05

I the duly appointed representative of the Client hereby take receipt of the completed installed area from Solutek, having inspected the works and confirmed it as being . free from faults and installed as per the project requirements

Clients Representative

Name (Signature) [signature] Name (Print) A. FARRAR Date 10/3/22

Form No	Date Iss.	Issue No.
SFR - 044	Nov-11	1

QSL ISO 9001 Quality Management Certification

Our Locations

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