

Kincardine Court, Manchester

Drainage & SuDs Strategy

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Client Name: Unite Group PLC

Site Address: Kincardine Court, Kincardine Road, Manchester, M13 9JA



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1.0 Introduction

1.1 Project Background

- 1.1.1 Curtins was appointed by Unite Group PLC to provide a Drainage & SuDs Strategy for a proposed development located at Kincardine Court, Kincardine Road, Manchester, M13 9JA.
- 1.1.2 The proposed development encompasses a full planning application for the erection of a part 4, part 5, part 6 storey extension comprising 92 student apartments (use class sui generis), with associated communal space, cycle parking, recycling and refuse bin storage and associated plant on land at Kincardine Court, Kincardine Road Manchester.
- 1.1.3 The development has been approved for planning, subject to Planning Conditions. (Planning Reference 124472/FO/2019)
- 1.1.4 This report is intended to satisfy the requirements of Planning Condition 5. The details of the planning conditions are available in Table 1.

Table 2: Planning Condition Details

Ref	Condition	Type
4	Surface Water Drainage Strategy Notwithstanding the detailed flood risk and drainage strategy prepared (ref. 072071-CUR-00-XX-RE-92001-V03) stamped as received by the City Council, as Local Planning Authority, on the 7 August 2019, (a) the development shall not commence until a scheme for the drainage of surface water for the development has been submitted for approval in writing by the City Council as the Local Planning Authority. This shall include: • maximise use of green SuDs in design. • details of surface water attenuation that offers a reduction in surface water runoff to 5 l/s. • Evidence that the drainage system has been designed (unless an area is designated to hold and/or convey water as part of the design) so that flooding does not occur during a 1 in 100-year rainfall event with allowance for climate change in any part of a building. • Assessment of overland flow routes for extreme events that is diverted away from buildings (including basements). • Overland flow routes need to be designed to convey the flood water in a safe manner in the event of a blockage or exceedance of the proposed drainage system capacity including inlet structures. The flood water should be routed away from the buildings and towards the less vulnerable areas i.e., open spaces, car parks and roads. A layout with overland flow routes needs to be presented with the appreciation of these overland flow routes with regards to the properties on site and adjacent properties off site. • Hydraulic calculation of the proposed drainage system. • Construction details of flow control and SuDs elements. (b) The development shall then be constructed in accordance with the approved details, within an agreed timescale. Reason - To promote sustainable development, secure proper drainage and to manage the risk of flooding and pollution pursuant to policies SP1, EN14 and DM1 of the Manchester Core Strategy (2012).	Pre-Start

- 1.1.5 Planning Condition 9 also refers to a Pre-occupation Planning Condition. An update to this report will be required at this stage to discharge this condition.
- 1.1.6 Proposals contained or forming part of this report represent the design intent and may be subject to alteration or adjustment in completing the detailed design for this project. Where such adjustments are undertaken as part of the detailed design and are deemed a material deviation from the intent contained in this document, prior approval shall be obtained from the relevant authority in advance of commencing such works.
- 1.1.7 The Flood Risk Assessment referenced 072071-CUR-00-XX-RP-C-92002 Rev V03 should be referred to for details in relation to Flood Risk, Flooding and Flood Compensation.

1.2 Proposed Development

- 1.2.1 The development is expected to comprise of an extension to the existing student accommodation made up of the following:
- 92 Student Bedrooms/ Studios
 - Shared kitchen facilities
 - Common room & study room
 - Bin store
 - Associated Plant and servicing areas.
- External Areas Including:
- An amended courtyard area
 - New hardstanding adjacent to the proposed building
 - Cycle store with 35 cycle spaces
 - Extension of existing masonry wall forming security line
 - Replacement of external gates to car park
 - Proposed brick water tank room
 - Reconfiguration of car parking spaces and provision of removable bollards.
- 1.2.2 The Proposed Site Layout and Floor Plans are enclosed in *Appendix A*.

2.0 Existing Drainage

2.1 Existing Watercourses and Other Waterbodies

- 2.1.1 No above ground watercourses have been identified within the proposed site or immediately adjacent to the site.
- 2.1.2 The River Medlock is located approximately 540m to the North of the site. The River Medlock is classified as a main river at this location.
- 2.1.3 The Rochdale Canal is located approximately 950m to the North West of the site.
- 2.1.4 The (culverted) Corn Brook which is an ordinary watercourse is situated approximately 220m to the Southeast of the site.

2.2 Existing Drainage

- 2.2.1 The public sewer records have been obtained for the development site, and are enclosed in *Appendix B*.
- 2.2.2 A CCTV drainage survey was undertaken in February 2021, and a further survey undertaken in June 2020.
- 2.2.3 A review of the public sewer records and indicate that the following public sewers are located within the site boundary:
 - A 375mm diameter combined sewer which runs along to the South-Eastern boundary of the site. This sewer flows from North-East to South-West and upsizes to a 450mm diameter sewer at Manhole Ref. 8901. The existing site drainage connects to the sewer at this manhole. The sewer runs to manhole Ref. 8902 in the Southwest corner of the site, before exiting the site.
 - A 225mm diameter combined sewer located within the existing carpark of the site. This sewer flows Southeast from Manhole Ref 8906 towards the 375mm diameter combined sewer at Manhole Ref 9901. Manholes 8906 & 9901 cannot be seen at the surface and are assumed to be buried. This branch has been identified via a gully connection to the main line. On-site works are required to locate these manholes
- 2.2.4 The public sewer records also indicate that the following public sewers are located within the vicinity of the site:
 - A 150mm diameter combined sewer located to the North of the site in between the site boundary and the surrounding residential dwellings. This sewer flows from South West to North East.

- A 525mm diameter combined sewer located to the West of the site; on the other side of Kincardine Road, parallel to the highway. This sewer flows from South-West to North-East and upsizes to a 600mm diameter sewer further downstream.
- A 225mm and a 450mm diameter combined sewer flow from South-East to North-West and connects to the 375/450mm diameter combined sewer located just within the South-East site boundary.
- A foul water inspection chamber is shown to be located just outside the Northern boundary of the site. This is referenced on the United Utilities plans as public; however, United Utilities have confirmed that this is a private inspection chamber.
- A foul water inspection chamber is shown to be located in the centre of the site, adjacent to the existing building. This is referenced on the United Utilities plans as public; however, United Utilities have confirmed that this is a private inspection chamber.

2.2.5 There are further public sewers identified on the public sewer records within the wider vicinity of the site, but these are not considered relevant to the scheme.

2.2.6 The CCTV surveys identified a series of drains within the site, serving the existing building and external areas. The on-site drainage is a combined system, and, as noted in 2.2.3, connects to the sewer at manhole ref. 8901. The existing drainage varies from 100-225mm diameter.

2.2.7 The majority of the existing drainage is to be retained as existing. Some drains serving external areas will be abandoned/ removed as the drainage to these areas are to be reconfigured.

2.2.8 There are some sections of drainage that will require diverting, as they will clash with the proposed foundation layout.

2.2.9 Drains to be removed/ diverted are shown on drawing 072071-CUR-XX-00-DR-C-90001, which is available in Appendix E.

3.0 Drainage Strategy

3.1 Proposed Foul Water Drainage

- 3.1.1 A separate foul and surface water system is proposed.
- 3.1.2 The peak flow rate for the development has been calculated based on the Discharge Unit method for calculating domestic foul discharge. The total peak flow from the site is estimated at approximately 11.4 l/s based on 92 bedrooms plus communal areas. These calculations have estimated the number and type of appliances, and the final peak foul flow rates should be confirmed by the M&E Designer.
- 3.1.3 A pre-development enquiry has been submitted to United Utilities, they have responded, and confirmed that the foul flows can be discharged to the public sewer network at an unrestricted rate.
- 3.1.4 The foul drainage has been split into two networks.
- 3.1.5 Foul Network A is located to the North of the proposed building and connects to the existing drainage at existing manhole 3A. This manhole is identified as a buried manhole, and it is intended to rebuild this manhole as part of the works. The estimated total flow in this network is 6.1 l/s.
- 3.1.6 Network A will be subject to an indirect Section 106 Agreement with United Utilities.
- 3.1.7 Foul Network B is located to the East of the proposed building and connects to the proposed manhole CW1. From this manhole it is proposed to connect to the existing 375mm diameter sewer within the site. The estimated total flow in this network is 5.3 l/s.
- 3.1.8 Network B will be subject to direct Section 106 Agreement with United Utilities. (Combined connection with the Surface Water proposals.
- 3.1.9 A copy of the United Utilities correspondence is included in *Appendix B*
- 3.1.10 The proposed drainage strategy is enclosed in *Appendix E*.

3.2 Proposed Surface Water Drainage

- 3.2.1 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.
- 3.2.2 In following the standard hierarchy of drainage solutions, consideration should firstly be given to the discharge of surface water runoff by sustainable methods such as infiltration.

Infiltration

- 3.2.3 The Site Investigation indicates that the superficial deposits on the site consist of Glacial Till (sandy). The bedrock is made up of the Triassic Chester Formation (Sandstone).
- 3.2.4 The BGS GeoReport specifies that it is likely that the groundwater table is likely to be between 3-5m below the existing ground level on the site. The Site Investigation did not encounter any groundwater as part of the on-site investigations or groundwater monitoring.
- 3.2.5 The Site Investigations shows the presence of made ground to maximum depth of 1.90m.
- 3.2.6 The BGS GeoReport confirms that infiltration may be compatible on site and are unlikely to cause ground stability problems.
- 3.2.7 The site is not located within a Groundwater Source Protection Zone.
- 3.2.8 Infiltration devices, in accordance with Building Regulations, are not permitted within 5m of a structure. Also, these devices are not generally permitted within 5m of the public highway. The layout of the site dictates that any structure would need to be located within the car park area to the east of the site.
- 3.2.9 There is an existing Public Combined Sewer within the car park. It is not suitable to have infiltration features within the easement of the public sewer.
- 3.2.10 Given the constraints created by the location of the building, Public Sewer and Public Highway, it is considered that to discharge via infiltration is not feasible.

Watercourse

- 3.2.11 The Corn Brook and River Medlock are the nearest watercourses to the site and are located approximately 220m to the South-East and 560m to the North of the site respectively. To drain to either of these watercourses would not be feasible due to the distance from the site and the potential requirement to cross third party land.

Surface Water Sewer

- 3.2.12 There are no dedicated surface water public sewers in the vicinity of the site. Therefore, the connection to a surface water sewer is not a viable option.

Combined Water sewer

- 3.2.13 There are various existing combined public sewers within, and in the vicinity of the site. It is assumed that the existing site discharges to the existing combined sewer network at various locations. It is therefore assumed that discharge to the public sewer network will be a viable option, with existing connections being utilised where possible.
- 3.2.14 Table 5 summarises the options for surface water disposal.

Table 5: Surface Water Disposal

Surface Water Disposal	Potential	Description
Infiltration	X	Due to the constraints created by the site layout, Public Sewer & Public Highway, discharge via infiltration is considered unviable.
Watercourse	X	Th nearest watercourse is the River Medlock, 560m from the site. To discharge at this location will be unviable.
Surface Water Public Sewer	X	There are no dedicated surface water public sewers in the vicinity of the site. Therefore, this is assumed to be unviable.
Combined Public Sewer	✓	It is assumed that discharge to the combined public sewer system will be a viable solution and existing outfalls are to be utilised where suitable.

3.2.15 It is proposed to connect he to the combined public sewer within the site.

3.2.16 As the current site has previously been developed, brownfield run-off rates were used to calculate the proposed discharge restrictions.

3.2.17 The development area taken into account for drainage calculations is 0.10 Ha. This covers the area of the building extension, and the central courtyard. Surveys indicate that the existing car park is served by a single gully, and a large proportion of the area will flow to the Public Highway, this area has been discounted as part of the existing drainage flows.

3.2.18 The Brownfield flow rates are estimated as follows:

- 1 year = 10.4 l/s,
- 30 year = 28.6 l/s
- 100 year = 35.9 l/s

3.2.19 The existing drainage modelling results are enclosed in *Appendix D*.

3.2.20 Proposed discharge rates are required to be reduced by up to 50% of existing discharge. Therefore, proposed flow rates are assumed to discharge at a maximum of:

- 5.4 l/s for the 1 in 1-year event,
- 14.3 l/s for the 1 in 30-year event and
- 17.9 l/s for the 1 in 100-year event + 20% climate change.

- 3.2.21 A pre-development enquiry has been submitted to United Utilities, and they have responded, indicating that the maximum discharge from the site that United Utilities will accept is 5 l/s.
- 3.2.22 A copy of the United Utilities correspondence is included in *Appendix B*.
- 3.2.23 The drainage strategy has therefore been designed to reduce the discharge from the site to a maximum of 5 l/s for all storm events.
- 3.2.24 The existing car park falls mean that any flooding that occurs in the 100-year return period, with 40% climate change, will flow off the site and onto the public highway. Therefore, the system has been designed to not flood during the 100-year event, with 40% climate change allowance.
- 3.2.25 The existing drainage modelling results are enclosed in *Appendix F*.
- 3.2.26 The estimated volumes of attenuation required is 63m³, based on attenuating the 1 in 100-Year Storm Event with 40% climate change allowance, and assuming an impermeable site area of approximately 0.10 Ha. The attenuation storage will be provided by an underground cellular attenuation tank within the car park area.
- 3.2.27 The proposed drainage modelling results are enclosed in *Appendix E*.
- 3.2.28 Surface water run-off from impermeable areas at risk of contamination should receive water quality treatment. Roof drainage is considered very low hazard and residential car parks low risk, in terms of contamination. Residential Figure 7 illustrates the pollution hazard indices for different land use classifications from The CIRIA SuDS Manual C753 (2015).

Figure 7: Pollution Hazard indices for land use classification (Table 26.2 the CIRIA SuDS manual 2015)

Land use	Pollution hazard level	Total suspended solids (TSS)	Metals	Hydro-carbons
Residential roofs	Very low	0.2	0.2	0.05
Other roofs (typically commercial/ industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (eg cul de sacs, homezones and general access roads) and non-residential car parking with infrequent change (eg schools, offices) ie < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (eg hospitals, retail), all roads except low traffic roads and trunk roads/motorways ¹	Medium	0.7	0.6	0.7
Sites with heavy pollution (eg haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways ¹	High	0.8 ²	0.8 ²	0.9 ²

3.2.29 Figure 8 illustrates the SuDS Component mitigation indices from The CIRIA SuDS Manual C753 (2015).

Figure 8: Indicative SuDS mitigation indices (Table 26.3 the CIRIA SuDS manual 2015)

TABLE 26.3 Indicative SuDS mitigation indices for discharges to surface waters				
Type of SuDS component	Mitigation indices¹			
	TSS	Metals	Hydrocarbons	
Filter strip	0.4	0.4	0.5	
Filter drain	0.4 ²	0.4	0.4	
Swale	0.5	0.6	0.6	
Bioretention system	0.8	0.8	0.8	
Permeable pavement	0.7	0.6	0.7	
Detention basin	0.5	0.5	0.6	
Pond ⁴	0.7 ³	0.7	0.5	
Wetland	0.8 ³	0.8	0.8	
Proprietary treatment systems ^{5,6}	These must demonstrate that they can address each of the contaminant types to acceptable levels for frequent events up to approximately the 1 in 1 year return period event, for inflow concentrations relevant to the contributing drainage area.			

Notes

- 1 SuDS components only deliver these indices if they follow design guidance with respect to hydraulics and treatment set out in the relevant technical component chapters.
- 2 Filter drains can remove coarse sediments, but their use for this purpose will have significant implications with respect to maintenance requirements, and this should be taken into account in the design and Maintenance Plan.
- 3 Ponds and wetlands can remove coarse sediments, but their use for this purpose will have significant implications with respect to the maintenance requirements and amenity value of the system. Sediment should normally be removed upstream, unless they are specifically designed to retain sediment in a separate part of the component, where it cannot easily migrate to the main body of water.
- 4 Where a wetland is not specifically designed to provide significantly enhanced treatment, it should be considered as having the same mitigation indices as a pond.
- 5 See **Chapter 14** for approaches to demonstrate product performance. A British Water/Environment Agency assessment code of practice is currently under development that will allow manufacturers to complete an agreed test protocol for systems intended to treat contaminated surface water runoff. Full details can be found at: <http://tinyurl.com/qf7yuj7>
- 6 SEPA only considers proprietary treatment systems as appropriate in exceptional circumstances where other types of SuDS component are not practicable. Proprietary treatment systems may also be considered appropriate for existing sites that are causing pollution where there is a requirement to retrofit treatment. SEPA (2014) also provides a flowchart with a summary of checks on suitability of a proprietary system.

- 3.2.30 The selection of treatment should ensure that the SuDS mitigation component index (Figure 8) exceeds the pollution hazard index (Figure 7). Where two stages of treatment are required, the second stage of treatment should account for reduced performance due to lower inflows; therefore 0.5 (mitigation index) should be used.
- 3.2.31 The final external work proposals have not been finalised. However, the only amendments to the existing surfacing will be within the courtyard area. Therefore, it is considered that there is limited scope to introduce surface SuDS features to provide water quality treatment.
- 3.2.32 The proposals are roof drainage, pedestrian areas, and a small car park area. Therefore, the site is considered a low pollution risk. The current proposals are to install a Filter Chamber product by Naylor, or similar approved, upstream of the connection to the public combined sewer.
- 3.2.33 The surface water will be subject to direct Section 106 Agreement with United Utilities. (Combined connection with Foul Network B).
- 3.2.34 The proposed drainage strategy plan is enclosed in *Appendix E*.

3.2.35 The final design of the drainage networks shall be in accordance with the legislation set by the Environment Agency, Manchester City Council and United Utilities.

4.0 Maintenance

- 4.1.1 This section 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. 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.
- 4.1.2 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.
- 4.1.3 The surface water network has been designed to accommodate the 1 in 100-year storm rainfall event plus an allowance for climate change particular to the requirements of the site. It may be that the exceedance flows above the 1 in 30-year storm rainfall event are stored within the site partially above ground, on non-habitable external landscaping, parking or other space. As the flows are generally being attenuated on site and within SuDS features there will be a period of time after storm events where the network is still partially or fully surcharged and is draining down. Where this surcharging is still present after 48hrs appropriate action should be taken as noted in this section.

4.2 Components

- 4.2.1 The following components have been included within the drainage design for the proposed development:
- Inspection, Manhole and Catchpit Chambers
 - Pipes
 - Drainage Channels and Gullies
 - Attenuation Tank
 - Flow Control Unit
 - Filter Chamber
- 4.2.2 The maintenance strategy should be adopted to ensure the drainage network is cleaned regularly and the routine maintenance and cleansing regime should be documented.
- 4.2.3 Maintenance of the drainage network will be the responsibility of an on-site facilities management team.
- 4.2.4 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.
- 4.2.5 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.

- 4.2.6 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.
- 4.2.7 During the winter months, drainage features such as gullies and channels should be cleared of ice, snow, debris or litter
- 4.2.8 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 filter drains and the upstream/downstream chambers.

4.3 Inspection, Manhole and Catchpit Chambers

- 4.3.1 The locations of the Inspection Chambers, Manholes are indicated on Curtins drainage drawing 072071-CUR-00-XX-RE-92002.
- 4.3.2 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.
- 4.3.3 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 Maintenance Manager prior to any access.

4.4 Pipes

- 4.4.1 The locations of the drainage pipes are indicated on Curtins drainage drawing 072071-CUR-00-XX-RE-92002.
- 4.4.2 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 will be fully compliant with the Curtins drainage specification.
- 4.4.3 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-cleaning where possible for smaller diameter pipes, and for larger diameters the risk is reduced due to the overall pipe size.
- 4.4.4 Access for maintenance is provided through access chambers and manholes.
- 4.4.5 Regular inspection and maintenance are 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
Regular maintenance\ inspection	Inspect for evidence of poor operation via water level in chambers. If required, take remedial action.	3-monthly, 48 hours after large storms.
	Check and remove large vegetation growth near pipe runs.	Monthly or as required
Remedial Action	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 Drainage Channels and Gullies

- 4.5.1 The locations of the drainage channels and gullies are indicated on Curtins drainage drawing 072071-CUR-00-XX-RE-92002.
- 4.5.2 Channels and gullies should be inspected and cleaned in accordance with the manufacturer's details. 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.

- 4.5.3 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.
- 4.5.4 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 channels.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required).	Initial Inspection including channel outlet boxes.	Half yearly and after large storms.
Regular maintenance\ inspection	Litter and debris removal	Monthly or as required.
	Check and remove large vegetation growth near channel runs.	Monthly or as required
	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.
Remedial Action	Inspect access/outlet boxes and rod through poorly performing channels and outlets as initial remediation.	As required.

4.6 Attenuation Tanks

- 4.6.1 The locations of the attenuation tanks are indicated on Curtin's drainage drawing 072071-CUR-00-XX-RE-92002.
- 4.6.2 The attenuation tanks are currently specified as geocellular units, which are wrapped in a geotextile blanket and are intended for storage of surface water run-off from the site up to and including the 1 in 100-year plus 30% climate change event to reduce the rate of run-off into the downstream network and to minimise flood risk.
- 4.6.3 The geocellular units and geotextile are proprietary products and therefore manufacturer's recommendations should also be taken into consideration.
- 4.6.4 The geocellular units proposed are Polystorm PSM1 & PSM4 units by Polypipe.
- 4.6.5 Access for maintenance has been provided by an access shaft located on the tank and from the manhole chambers downstream of the tank.
- 4.6.6 Regular inspection and maintenance are important for the effective operation of attenuation tanks as designed. As the feature is buried, a regular inspection regime is very important to ensure the correction functionality of the surface water drainage network.

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.
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.	Annually (or as required after heavy rainfall events)
Remedial Actions	Repair/rehabilitation of inlets, outlets and overflows.	As required.

4.7 Flow Control Units

- 4.7.1 The locations of the smart filter are indicated on Curtin's drainage drawing 072071-CUR-00-XX-RE-92002.
- 4.7.2 The flow control units are intended for flood control and flow restriction.
- 4.7.3 The flow controls are specified as Hydro-brake and are proprietary products; therefore, manufacturer's recommendations should also be taken into consideration.
- 4.7.4 The product reference for the flow control unit in manhole SW7 is Hydro-brake Optimum MD-SHE-0095-5000-1750-5000.
- 4.7.5 Access for maintenance has been provided by locating within manhole chambers.

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.

4.8 Filter Chamber

- 4.8.1 The locations of the filter chamber are indicated on Curtin's drainage drawing 072071-CUR-00-XX-RE-92002.
- 4.8.2 The smart filters are intended for a second or third stage treatment for water quality.
- 4.8.3 The Smart Filters are specified as Naylor Smart Filter and are proprietary products and therefore manufacturer's recommendations should also be taken into consideration.
- 4.8.4 The product number for the smart filter chambers is SF03.1A Naylor Smart Filter Chamber.
- 4.8.5 Access for maintenance has been provided by locating within manhole chambers.
- 4.8.6 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 such as the chamber containing smart filters.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required).	Inspect inlets and outlets 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 filter chambers.	Annually (or as required after heavy rainfall events)
Remedial Actions	Repair/rehabilitation of inlets/outlets.	As required.

Appendix A

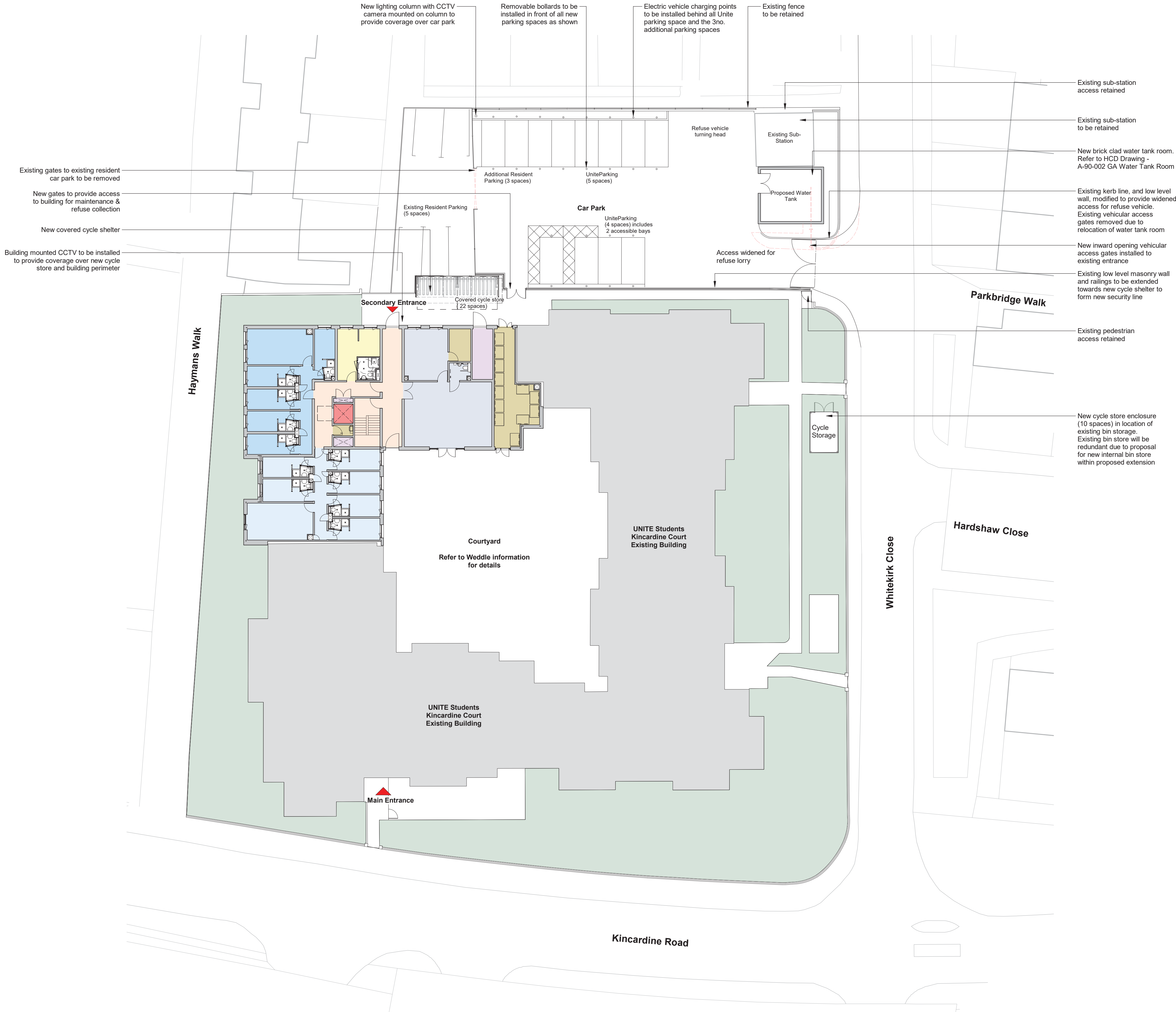
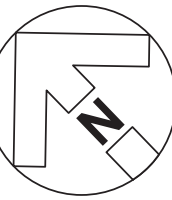
Proposed Site Layout

Proposed Floor Plans

NOTES

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NOTIFY ANY DISCREPANCIES TO THE ARCHITECT.
FOR STRUCTURAL INFORMATION, REFER TO
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FOR M&E INFORMATION, REFER TO M&E ENGINEER'S
AND SUB-CONTRACTORS' DRAWINGS.
FOR HEALTH & SAFETY INFORMATION, REFER TO
HEALTH & SAFETY RISK ASSESSMENTS.

0 m 5 10 15 20
1:200



REVISION: P01 BY: NH CHECKED: APS DATE: 01/07/2021
First issue.

SUITABILITY
S3 | FOR REVIEW & COMMENT
CLIENT



PROJECT
**Kincardine Court
Manchester**
TITLE
GA Site Plan

Hadfield Cawkwell Davidson
Broomgrove Lodge, 13 Broomgrove Rd, Sheffield, S10 2LZ T 0114 266 8181 www.hcd.co.uk

HCD PROJECT NO 2017-044	SCALE 1 : 200 @ A1	REV. P01
PROJECT NO 17044	ORGANISATION HCD	VOLUME A0
LEVEL 00	TYPE DR	SCALE NUMBER A-90-001

C:\temp\17044-HCD-A0-ZZ-M0-A-20-001_Building_YV519_naira.howard.rvt | © HCD



NOTES

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0 m 2 4 6 8 10

1:100

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OS Survey Plan: Ordnance Survey Information: Crown Copyright, Licence Number 100022432.

Delva Patman Redler: Topographical Survey. Drawing Number: 18607-T - Additional Area, dated: Feb 2019.

SEP Ltd: Topographical & Utility Surveys. Drawing Number: S20262-T - Topo Survey, dated: Feb 2020. Drawing Number: S20262-U - Utility Survey, dated: Feb 2020.

Weddle Landscape Design: Landscape Masterplan. Drawing numbers TBC

THERMAL PERFORMANCE

Minimum U-values for the building will be in accordance with building regulation requirements at time of construction and in accordance with the overall energy assessment. See Watermans Energy Statement, Rev A, dated: 14/06/2019.

ACOUSTIC PERFORMANCE

The minimum acoustic performance spec for the building will be in accordance with building regulation and those stated in the acoustic assessment to suit UNITE requirements. RBA Acoustic Report: 226.RP01.EBF.1, dated 13/06/2019.

STRUCTURE

Lightweight Steel Frame (LSF) structural design subject to input from subcontractor with full design responsibility.

REVISION P01 BY NH CHECKED JRP/APS DATE 09/06/2021

First issue.

SUBMITTANCE

S3 | FOR REVIEW & COMMENT

CLIENT



PROJECT

Kincardine Court Manchester

TITLE

Proposed Level 00 GA Plan

Hadfield Cawkwell Davidson

Broomgrove Lodge, 13 Broomgrove Rd, Sheffield, S10 2LZ T 0114 266 8181 www.hcd.co.uk

HCD PROJECT NO 2017-044	SCALE 1 : 100 @ A1	REV. P01
PROJECT NO 17044	ORIGINATOR HCD	VOLUME A0
LEVEL 00	TYPE DR	ROLE - NUMBER A-04-000

C:\temp\17044-HCD-A0-Z2-M3-A-20-001_Building_W519_andy.sawth@hcd.co.uk.rvt | © HCD



Key

- Cluster Flats
- Standard Studio Flats
- Accessible/Adaptable Studio
- Cleaners Store/Store
- Common Area
- Lift
- Plant/Riser/AOV

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FOR HEALTH & SAFETY INFORMATION, REFER TO
HEALTH & SAFETY RISK ASSESSMENTS.

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1:100



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Delva Patman Redler: Topographical Survey.
Drawing Number: 18607-T - Additional Area, dated: Feb 2019.

SEP Ltd: Topographical & Utility Surveys.
Drawing Number: S20262-T - Topo Survey, dated: Feb 2020.
Drawing Number: S20262-U - Utility Survey, dated: Feb 2020.

Weddle Landscape Design: Landscape Masterplan.
Drawing numbers TBC

THERMAL PERFORMANCE

Minimum U-values for the building will be in accordance with building regulation requirements at time of construction and in accordance with the overall energy assessment. See Watermans Energy Statement, Rev A, dated: 14/06/2019.

ACOUSTIC PERFORMANCE

The minimum acoustic performance spec for the building will be in accordance with building regulation and those stated in the acoustic assessment to suit UNITE requirements. RBA Acoustic Report: 226.RP01.EBF.1, dated 13/06/2019.

STRUCTURE

Lightweight Steel Frame (LSF) structural design subject to input from subcontractor with full design responsibility.

REVISION P01 BY NH CHECKED JRP/APS DATE 09/06/2021
First issue.

SUBMITTAL
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CLIENT



PROJECT

Kincardine Court
Manchester

TITLE

Proposed Level 01 GA Plan

Hadfield Cawkwell Davidson

Broomgrove Lodge, 13 Broomgrove Rd, Sheffield, S10 2LZ T 0114 266 8181 www.hcd.co.uk

HCD PROJECT NO. 2017-044 SCALE 1: 100 @ A1 REV. P01

PROJECT NO. 17044 ORIGINATOR HCD VOLUME A0 LEVEL 01 TYPE DR ROLE - NUMBER A-04-001

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Key

- Cluster Flats
- Standard Studio Flats
- Accessible/Adaptable Studio
- Cleaners Store/Store
- Common Area
- Lift
- Plant/Riser/AOV

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Crown Copyright, Licence Number 100022432.

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Drawing Number: 18607-T - Additional Area, dated: Feb 2019.

SEP Ltd: Topographical & Utility Surveys.
Drawing Number: S20262-T - Topo Survey, dated: Feb 2020.
Drawing Number: S20262-U - Utility Survey, dated: Feb 2020.

Weddle Landscape Design: Landscape Masterplan.
Drawing numbers TBC

THERMAL PERFORMANCE
Minimum U-values for the building will be in accordance with building regulation requirements at time of construction and in accordance with the overall energy assessment. See Watermans Energy Statement, Rev A, dated: 14/06/2019.

ACOUSTIC PERFORMANCE
The minimum acoustic performance spec for the building will be in accordance with building regulation and those stated in the acoustic assessment to suit UNITE requirements. RBA Acoustic Report: 226.RP01.EBF.1, dated 13/06/2019.

STRUCTURE
Lightweight Steel Frame (LSF) structural design subject to input from subcontractor with full design responsibility.

REVISION P01 BY NH CHECKED JRP/APS DATE 09/06/2021
First issue.

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UNITE STUDENTS & Bowmer & Kirkland

PROJECT
Kincardine Court
Manchester
TITLE

Proposed Level 02 GA Plan

Hadfield Cawkwell Davidson
Broomgrove Lodge, 13 Broomgrove Rd, Sheffield, S10 2LZ T 0114 266 8181 www.hcd.co.uk
HCD PROJECT NO. 2017-044 SCALE 1:100 @ A1 REV. P01
PROJECT NO. 17044 ORIGINATOR HCD VOLUME A0 LEVEL 02 TYPE DR ROLE - NUMBER A-04-002
C:\temp\17044-HCD-A0-02-M3-A-05-001_Building_W519_andy.swh\hcd.co.uk.rvt | © HCD



Key

- Cluster Flats
- Standard Studio Flats
- Accessible/Adaptable Studio
- Cleaners Store/Store
- Common Area
- Lift
- Plant/Riser/AOV

NOTES

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FOR M&E INFORMATION, REFER TO M&E ENGINEER'S
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FOR HEALTH & SAFETY INFORMATION, REFER TO
HEALTH & SAFETY RISK ASSESSMENTS.

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OS Survey Plan: Ordnance Survey Information:
Crown Copyright, Licence Number 100022432.

Delva Patman Redler: Topographical Survey.
Drawing Number: 18607-T - Additional Area, dated: Feb 2019.

SEP Ltd: Topographical & Utility Surveys.
Drawing Number: S20262-T - Topo Survey, dated: Feb 2020.
Drawing Number: S20262-U - Utility Survey, dated: Feb 2020.

Weddle Landscape Design: Landscape Masterplan.
Drawing numbers TBC

THERMAL PERFORMANCE

Minimum U-values for the building will be in accordance with building regulation requirements at time of construction and in accordance with the overall energy assessment. See Watermans Energy Statement, Rev A, dated: 14/06/2019.

ACOUSTIC PERFORMANCE

The minimum acoustic performance spec for the building will be in accordance with building regulation and those stated in the acoustic assessment to suit UNITE requirements. RBA Acoustic Report: 226.RP01.EBF.1, dated 13/06/2019.

STRUCTURE

Lightweight Steel Frame (LSF) structural design subject to input from subcontractor with full design responsibility.

REVISION P01 BY NH CHECKED JRP/APS DATE: 09/06/2021
First issue.

SUBMITTAL
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CLIENT



PROJECT

Kincardine Court
Manchester

TITLE

Proposed Level 03 GA Plan

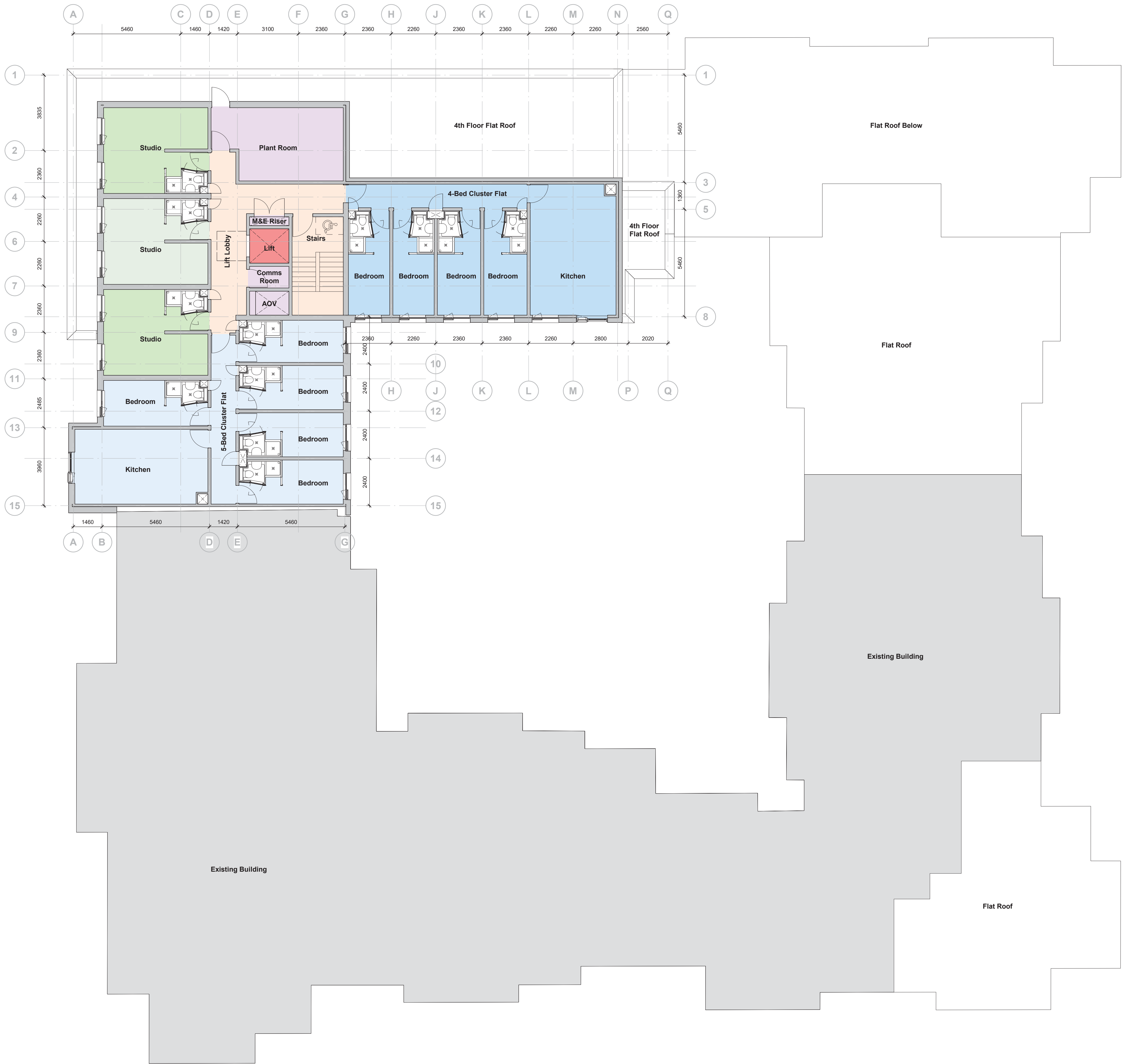
Hadfield Cawkwell Davidson

Broomgrove Lodge, 13 Broomgrove Rd, Sheffield, S10 2LZ T 0114 266 8181 www.hcd.co.uk

HCD PROJECT NO. 2017-044 SCALE 1: 100 @ A1 REV. P01

PROJECT NO. 17044 ORIGINATOR HCD VOLUME A0 LEVEL 03 TYPE DR ROLE - NUMBER A-04-003

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Key

- Cluster Flats
- Standard Studio Flats
- Accessible/Adaptable Studio
- Cleaners Store/Store
- Common Area
- Lift
- Plant/Riser/AOV

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Drawing Number: 18607-T - Additional Area, dated: Feb 2019.

SEP Ltd: Topographical & Utility Surveys.
Drawing Number: S20262-T - Topo Survey, dated: Feb 2020.
Drawing Number: S20262-U - Utility Survey, dated: Feb 2020.

Weddle Landscape Design: Landscape Masterplan.
Drawing numbers TBC

THERMAL PERFORMANCE

Minimum U-values for the building will be in accordance with building regulation requirements at time of construction and in accordance with the overall energy assessment. See Watermans Energy Statement, Rev A, dated: 14/06/2019.

ACOUSTIC PERFORMANCE

The minimum acoustic performance spec for the building will be in accordance with building regulation and those stated in the acoustic assessment to suit UNITE requirements. RBA Acoustic Report: 226.RP01.EBF.1, dated 13/06/2019.

STRUCTURE

Lightweight Steel Frame (LSF) structural design subject to input from subcontractor with full design responsibility.

REVISION P01 BY NH CHECKED JRP/APS DATE 09/06/2021
First issue.

SUBMITTAL
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PROJECT

Kincardine Court
Manchester

TITLE

Proposed Level 04 GA Plan

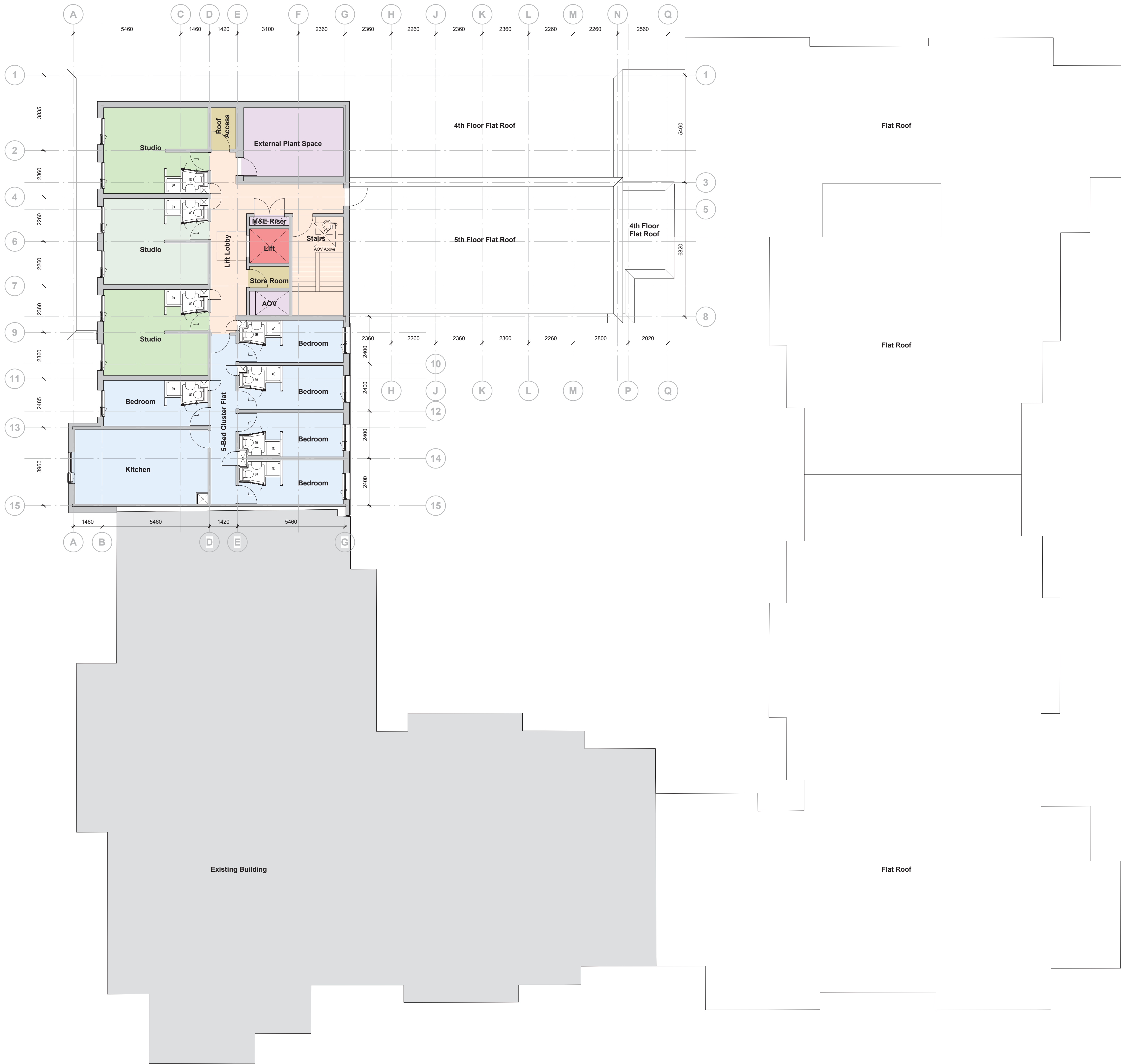
Hadfield Cawkwell Davidson

Broomgrove Lodge, 13 Broomgrove Rd, Sheffield, S10 2LZ T 0114 266 8181 www.hcd.co.uk

HCD PROJECT NO. 2017-044 SCALE 1:100 @ A1 REV. P01

PROJECT NO. 17044 ORIGINATOR HCD VOLUME A0 04 TYPE DR ROLE - NUMBER A-04-004

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Key

- Cluster Flats
- Standard Studio Flats
- Accessible/Adaptable Studio
- Cleaners Store/Store
- Common Area
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- Plant/Riser/AOV

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1:100



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OS Survey Plan: Ordnance Survey Information:
Crown Copyright, Licence Number 100022432.

Delva Patman Redler: Topographical Survey.
Drawing Number: 18607-T - Additional Area, dated: Feb 2019.

SEP Ltd: Topographical & Utility Surveys.
Drawing Number: S20262-T - Topo Survey, dated: Feb 2020.
Drawing Number: S20262-U - Utility Survey, dated: Feb 2020.

Weddle Landscape Design: Landscape Masterplan.
Drawing numbers TBC

THERMAL PERFORMANCE
Minimum U-values for the building will be in accordance with building regulation requirements at time of construction and in accordance with the overall energy assessment. See Watermans Energy Statement, Rev A, dated: 14/06/2019.

ACOUSTIC PERFORMANCE
The minimum acoustic performance spec for the building will be in accordance with building regulation and those stated in the acoustic assessment to suit UNITE requirements. RBA Acoustic Report: 226.RP01.EBF.1, dated 13/06/2019.

STRUCTURE
Lightweight Steel Frame (LSF) structural design subject to input from subcontractor with full design responsibility.

REVISION P01 BY NH CHECKED JRP/APS DATE 09/06/2021
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SUITABILITY
S3 | FOR REVIEW & COMMENT
CLIENT



PROJECT
Kincardine Court Manchester
TITLE

Proposed Level 05 GA Plan

Hadfield Cawkwell Davidson
Broomgrove Lodge, 13 Broomgrove Rd, Sheffield, S10 2LZ T 0114 266 8181 www.hcd.co.uk

HCD PROJECT NO 2017-044	SCALE 1 : 100 @ A1	REV. P01
PROJECT NO 17044	ORIGINATOR HCD	VOLUME A0
LEVEL 05	TYPE DR	ROLE - NUMBER A-04-005

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Delva Patman Redler: Topographical Survey.
Drawing Number: 18607-T - Additional Area, dated: Feb 2019.

SEP Ltd: Topographical & Utility Surveys.
Drawing Number: S20262-T - Topo Survey, dated: Feb 2020.
Drawing Number: S20262-U - Utility Survey, dated: Feb 2020.

Weddle Landscape Design: Landscape Masterplan.
Drawing numbers TBC

THERMAL PERFORMANCE

Minimum U-values for the building will be in accordance with building regulation requirements at time of construction and in accordance with the overall energy assessment. See Watermans Energy Statement, Rev A, dated: 14/06/2019.

ACOUSTIC PERFORMANCE

The minimum acoustic performance spec for the building will be in accordance with building regulation and those stated in the acoustic assessment to suit UNITE requirements.
RBA Acoustic Report: 226.RP01.EBF.1, dated 13/06/2019.

STRUCTURE

Lightweight Steel Frame (LSF) structural design subject to input from subcontractor with full design responsibility.

REVISION: P01 BY: NH CHECKED: JRP/APS DATE: 09/06/2021

First issue.

S3 | FOR REVIEW & COMMENT

JENT



PROJECT _____

**Kincardine Court
Manchester**

TITLE

Proposed Level 06 GA Plan

Hadfield Cawkwell Davidson

roomgrove Lodge, 13 Broomgrove Rd, Sheffield, S10 2LZ T 0114 266 8181 www.hcd.co.uk

HCD PROJECT NO. 2017-044	SCALE 1 : 100 @ A1	REV. P01
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PROJECT NO.	ORIGINATOR	VOLUME	LEVEL	TYPE	ROLE + NUMBER
17044	HCD	A0	06	DR	A-04-006

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Appendix B

United Utilities Public Sewer Records *ref: UUPS-ORD-89235*

Correspondence from United Utilities

Curtins Consulting Ltd

**51-55
Tithebarn Street,
Liverpool,
L2 2SB**

FAO:

How to contact us:

**United Utilities Water Limited
Property Searches
Haweswater House
Lingley Mere Business Park
Great Sankey
Warrington
WA5 3LP**

Telephone: 0370 7510101

E-mail: propertysearches@uuplc.co.uk

**Your Ref: Kincardine Court
Our Ref: UUPS-ORD-89235
Date: 08/03/2019**

Dear Sirs

Location: Kincardine Court 20 Kincardine Road, Manchester, M13 9JA

I acknowledge with thanks your request dated 07/03/2019 for information on the location of our services.

Please find enclosed plans showing the approximate position of United Utilities' apparatus known to be in the vicinity of this site.

The enclosed plans are being provided to you subject to the United Utilities terms and conditions for both the wastewater and water distribution plans which are shown attached.

If you are planning works anywhere in the North West, please read United Utilities' access statement before you start work to check how it will affect our network. <http://www.unitedutilities.com/work-near-asset.aspx>.

I trust the above meets with your requirements and look forward to hearing from you should you need anything further.

If you have any queries regarding this matter please [contact us](#).

Yours Faithfully,



Karen McCormack
Property Searches Manager

TERMS AND CONDITIONS - WASTEWATER AND WATER DISTRIBUTION PLANS

These provisions apply to the public sewerage, water distribution and telemetry systems (including sewers which are the subject of an agreement under Section 104 of the Water Industry Act 1991 and mains installed in accordance with the agreement for the self construction of water mains) (UUWL apparatus) of United Utilities Water Limited "(UUWL)".

TERMS AND CONDITIONS:

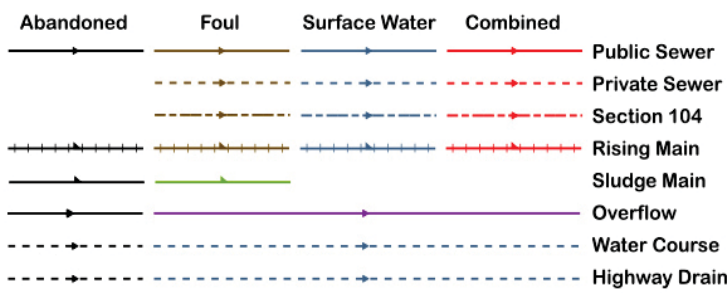
- This Map and any information supplied with it is issued subject to the provisions contained below, to the exclusion of all others and no party relies upon any representation, warranty, collateral contract or other assurance of any person (whether party to this agreement or not) that is not set out in this agreement or the documents referred to in it.
- This Map and any information supplied with it is provided for general guidance only and no representation, undertaking or warranty as to its accuracy, completeness or being up to date is given or implied.
- In particular, the position and depth of any UUWL apparatus shown on the Map are approximate only. UUWL strongly recommends that a comprehensive survey is undertaken in addition to reviewing this Map to determine and ensure the precise location of any UUWL apparatus. The exact location, positions and depths should be obtained by excavation trial holes.
- The location and position of private drains, private sewers and service pipes to properties are not normally shown on this Map but their presence must be anticipated and accounted for and you are strongly advised to carry out your own further enquiries and investigations in order to locate the same.
- The position and depth of UUWL apparatus is subject to change and therefore this Map is issued subject to any removal or change in location of the same. The onus is entirely upon you to confirm whether any changes to the Map have been made subsequent to issue and prior to any works being carried out.
- This Map and any information shown on it or provided with it must not be relied upon in the event of any development, construction or other works (including but not limited to any excavations) in the vicinity of UUWL apparatus or for the purpose of determining the suitability of a point of connection to the sewerage or other distribution systems.
- No person or legal entity, including any company shall be relieved from any liability howsoever and whensoever arising for any damage caused to UUWL apparatus by reason of the actual position and/or depths of UUWL apparatus being different from those shown on the Map and any information supplied with it.
- If any provision contained herein is or becomes legally invalid or unenforceable, it will be taken to be severed from the remaining provisions which shall be unaffected and continue in full force and affect.
- This agreement shall be governed by English law and all parties submit to the exclusive jurisdiction of the English courts, save that nothing will prevent UUWL from bringing proceedings in any other competent jurisdiction, whether concurrently or otherwise.

The position of the underground apparatus shown on this plan is approximate only and is given in accordance with the best information currently available. United Utilities Water will not accept liability for any loss or damage caused by the actual position being different from those shown.

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Revo	Center	Color	Func	Invert	Size	Size	Style	Mail	Length	Grad
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8700	39.26	CO			0	670	BR	78.2431		
8710	39.26	CO			0	670	BR	78.2431		
8720	39.26	CO			0	670	BR	78.2431		
8802	38.82	SD			35.55	600	BR	89.6945		
8902	38.82	SD			35.55	600	BR	89.6945		
9002	38.82	SD			35.55	600	BR	89.6945		
9102	38.82	SD			35.55	600	BR	89.6945		
9202	38.82	SD			35.55	600	BR	89.6945		
9302	38.82	SD			35.55	600	BR	89.6945		
9402	38.82	SD			35.55	600	BR	89.6945		
9502	38.82	SD			35.55	600	BR	89.6945		
9602	38.82	SD			35.55	600	BR	89.6945		
9702	38.82	SD			35.55	600	BR	89.6945		
9802	38.82	SD			35.55	600	BR	89.6945		
9902	38.82	SD			35.55	600	BR	89.6945		
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11802	38.82	SD			35.55	600	BR	89.6945		
11902	38.82	SD			35.55	600	BR	89.6945		
12002	38.82	SD			35.55	600	BR	89.6945		
12102	38.82	SD			35.55	600	BR	89.6945		
12202	38.82	SD			35.55	600	BR	89.6945		
12302	38.82	SD			35.55	600	BR	89.6945		
12402	38.82	SD			35.55	600	BR	89.6945		
12502	38.82	SD			35.55	600	BR	89.6945		
12602	38.82	SD			35.55	600	BR	89.6945		
12702	38.82	SD			35.55	600	BR	89.6945		
12802	38.82	SD			35.55	600	BR	89.6945		
12902	38.82	SD			35.55	600	BR	89.6945		
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13202	38.82	SD			35.55	600	BR	89.6945		
13302	38.82	SD			35.55	600	BR	89.6945		
13402	38.82	SD			35.55	600	BR	89.6945		
13502	38.82	SD			35.55	600	BR	89.6945		
13602	38.82	SD			35.55	600	BR	89.6945		
13702	38.82	SD			35.55	600	BR	89.6945		
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13902	38.82	SD			35.55	600	BR	89.6945		
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14402	38.82	SD			35.55	600	BR	89.6945		
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14702	38.82	SD			35.55	600	BR	89.6945		
14802	38.82	SD			35.55	600	BR	89.6945		
14902	38.82	SD			35.55	600	BR	89.6945		
15002	38.82	SD			35.55	600	BR	89.6945		
15102	38.82	SD			35.55	600	BR	89.6945		
15202	38.82	SD			35.55	600	BR	89.6945		
15302	38.82	SD			35.55	600	BR	89.6945		
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15602	38.82	SD			35.55	600	BR	89.6945		
15702	38.82	SD			35.55	600	BR	89.6945		
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16602	38.82	SD			35.55	600	BR	89.6945		
16702	38.82	SD			35.55	600	BR	89.6945		
16802	38.82	SD			35.55	600	BR	89.6945		
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17102	38.82	SD			35.55	600	BR	89.6945		
17202	38.82	SD			35.55	600	BR	89.6945		
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17502	38.82	SD			35.55	600	BR	89.6945		
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17702	38.82	SD			35.55	600	BR	89.6945		
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17902	38.82	SD			35.55	600	BR	89.6945		
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18702	38.82	SD			35.55	600	BR	89.6945		
18802	38.82	SD			35.55	600	BR	89.6945		
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23102	38.82	SD			35.55	600	BR	89.6945		
23202	38.82	SD			35.55	600	BR	89.6945		
23302	38.82	SD			35.55	600	BR	89.6945		
23402	38.82	SD			35.55					

LEGEND



All point assets follow the standard colour convention:

red	- combined	blue	- surface water
brown	- foul	purple	- overflow

- | | |
|------------------|--------------------------|
| Manhole | Side Entry Manhole |
| Head of System | Outfall |
| Extent of Survey | Screen Chamber |
| Rodding Eye | Inspection Chamber |
| Inlet | Bifurcation Chamber |
| Discharge Point | Lamp Hole |
| Vortex | T Junction / Saddle |
| Penstock | Catchpit |
| Washout Chamber | Valve Chamber |
| Valve | Vent Column |
| Air Valve | Vortex Chamber |
| Non Return Valve | Penstock Chamber |
| Soakaway | Network Storage Tank |
| Gully | Sewer Overflow |
| Cascade | Ww Treatment Works |
| Flow Meter | Ww Pumping Station |
| Hatch Box | Septic Tank |
| Oil Interceptor | Control Kiosk |
| Summit | |
| Drop Shaft | Change of Characteristic |
| Orifice Plate | |

MANHOLE FUNCTION

- | | |
|----|---------------|
| FO | Foul |
| SW | Surface Water |
| CO | Combined |
| Ov | Overflow |

SEWER SHAPE

- | | | |
|-------------|----|-------------|
| Circular | TR | Trapezoidal |
| Egg | AR | Arch |
| Oval | BA | Barrel |
| Flat Top | HO | HorseShoe |
| Rectangular | UN | Unspecified |
| Square | | |

SEWER MATERIAL

- Asbestos Cement
- Brick
- Polyethylene
- Reinforced Plastic Matrix
- Concrete
- Concrete Segment Bolted
- Concrete Segment Unbolted
- Concrete Box Culverted
- Plastic / Steel Composite
- Glass Reinforced Plastic
- Ductile Iron
- Polyvinyl Chloride
- Cast Iron
- Spun Iron
- Steel
- Vitrified Clay
- Polypropylene
- Pitch Fibre
- Masonry, Coursed
- Masonry, Random
- Unspecified

Address or Site Reference:

Kincardine Court 20 Kincardine Road,
Manchester,

Scale: 1:1250 **Date:** 08/03/2019

Sheet: 1 of 1

Printed by: Property Searches

SEWER RECORDS



Andy Losty

From: Dodd, Matthew <Matthew.Dodd@uuplc.co.uk>
Sent: 10 April 2019 11:30
To: Andy Losty
Cc: Wastewater Developer Services
Subject: RE: Kincardine Court, Manchester. Pre-Development Enquiry 4200025247 Due date 12/04/2019

Follow Up Flag: Follow up
Flag Status: Completed

Good Morning

We have carried out an assessment of your application which is based on the information provided; this pre development advice will be valid for 12 months

Foul

Foul will be allowed to drain to the public combined sewer network at an unrestricted rate.

Surface Water

Surface water from this site must drain to soak away or some other form of infiltration system but if ground conditions confirm that this is not a viable solution all surface water can drain to the combined sewer network at a maximum pass forward flow of 5 l/s.

Connection Application

Although we may discuss and agree discharge points & rates in principle, please be aware that you will have to apply for a formal sewer connection. This is so that we can assess the method of construction, Health & Safety requirements and to ultimately inspect the connection when it is made. Details of the application process and the form itself can be obtained from our website by following the link below

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

Please be aware that on site drainage must be designed in accordance with Building Regulations, National Planning Policy, and local flood authority guidelines, we would recommend that you speak and make suitable agreements with the relevant statutory bodies.

Please note, if you intend to put forward your wastewater assets for adoption by United Utilities, the proposed detail design will be subject to a technical appraisal by an Adoption Engineer as we need to be sure that the proposals meets the requirements of Sewers for adoption and United Utilities Asset Standards. The proposed design should give consideration to long term operability and give United Utilities a cost effective proposal for the life of the assets. Therefore, further to this enquiry should you wish to progress a Section 104 agreement, we strongly recommend that no construction commences until the detailed drainage design, submitted as part of the Section 104 agreement, has been assessed and accepted in writing by United Utilities. Any works carried out prior to the technical assessment being approved is done entirely at the developers own risk and could be subject to change.

Regards

Matthew Dodd
Assistant Developer Engineer
Developer Services and Planning

If you have received a great service today why not tell us?
Visit: unitedutilities.com/wow

From: Andy Losty [<mailto:Andy.Losty@curtins.com>]
Sent: 31 March 2019 08:01
To: Wastewater Developer Services <WastewaterDeveloperServices@uuplc.co.uk>
Subject: Kincardine Court, Manchester. Pre-Development Enquiry

Dear Sirs

Please find attached a Pre-Development Application for an extension at the Unite Students Kincardine Court site in Manchester.

Also attached are:

- Site Location Plan
- Proposed Site Plan

The proposed discharge from the site is subject to a 50% reduction from the pre-development flows, in line with Manchester City Council's planning requirements.

The existing site drainage details are not known. However, a simplified model has been used to estimate existing surface water flows.

The existing flows have been estimated at:

- 1-year 7.8 l/s
- 30-year 20.4 l/s
- 100-year 24.7 l/s

Therefore, the proposed reduced discharge rates are:

- 1-year 3.9 l/s
- 30-year 10.2 l/s
- 100-year 12.4 l/s

I look forward to hearing from you. If you need any further information, please do not hesitate to contact me.

Regards

Andy Losty
Project Engineer
T. 0161 236 2394
andy.losty@curtins.com

Merchant Exchange
17-19 Whitworth Street West
Manchester M1 5WG



EMGateway3.uuplc.co.uk made the following annotations

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Appendix C

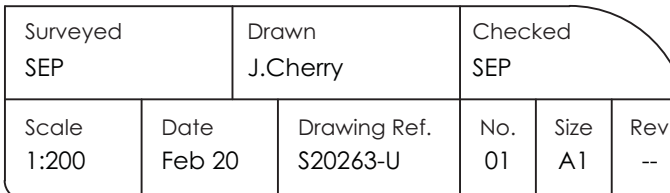
Topographical Survey

CCTV Survey Plan

diligence (Ref. HSG47).



Lines annotated as GPR indicate a series of consistent subsurface anomalies located using the Ground Penetrating Radar and should be considered as Quality Level B2. The nature of these anomalies could not be determined by non-invasive means. GPR lines that were identifiable as a service are shown as their respective service.



Appendix D

Existing Drainage Calculation Results

Storm

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

Number of Online Controls 0 Number of Storage Structures 0 Number of Real Time Controls 0

Rainfall Model	FSR	Ratio R	0.359
Region	England and Wales	Cv (Summer)	1.000
M5-60 (mm)	18.000	Cv (Winter)	1.000

```
Analysis Timestep   Fine Inertia Status OFF
      DTS Status      ON
```

Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 0

Water									
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Level (m)
EX1.000	EX8	30 Summer	1	+0%	1/15 Summer				37.680
EX1.001	EX7	30 Summer	1	+0%	1/15 Summer				37.663
EX1.002	EX14	1440 Winter	1	+0%	100/15 Summer				37.684
EX1.003	EX15	30 Summer	1	+0%	100/15 Summer				37.600

PN	US/MH Name	Surcharged Flooded			Pipe	Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow / Overflow Cap. (l/s)	Flow (l/s)		
EX1.000	EX8	0.055	0.000	0.23	10.6	SURCHARGED	
EX1.001	EX7	0.168	0.000	0.21	10.6	SURCHARGED	
EX1.002	EX14	-0.099	0.000	0.04	1.7	OK	
EX1.003	EX15	-0.133	0.000	0.35	10.4	OK	

Curtins Consulting Ltd						Page 2																																																													
																																																																			
Date 04/07/2021 14:12						Designed by losty_a																																																													
File Proposed Drainage 21.07....						Checked by																																																													
Innovyze						Network 2019.1																																																													
30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm																																																																			
Simulation Criteria Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000 Hot Start Level (mm) 0 Inlet Coefficient 0.800 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000 Foul Sewage per hectare (l/s) 0.000																																																																			
Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0 Number of Online Controls 0 Number of Storage Structures 0 Number of Real Time Controls 0																																																																			
Synthetic Rainfall Details Rainfall Model FSR Ratio R 0.359 Region England and Wales Cv (Summer) 1.000 M5-60 (mm) 18.000 Cv (Winter) 1.000 Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF Analysis Timestep Fine Inertia Status OFF DTS Status ON																																																																			
Profile(s) Summer and Winter Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440 Return Period(s) (years) 1, 30, 100 Climate Change (%) 0, 0, 0																																																																			
<table><tr><th></th><th>US/MH</th><th></th><th>Return</th><th>Climate</th><th>First (X)</th><th>First (Y)</th><th>First (Z)</th><th>Overflow</th><th>Water</th></tr><tr><th>PN</th><th>Name</th><th>Storm</th><th>Period</th><th>Change</th><th>Surcharge</th><th>Flood</th><th>Overflow</th><th>Act.</th><th>Level</th></tr><tr><td>EX1.000</td><td>EX8</td><td>15 Summer</td><td>30</td><td>+0%</td><td>1/15 Summer</td><td></td><td></td><td></td><td>37.851</td></tr><tr><td>EX1.001</td><td>EX7</td><td>15 Summer</td><td>30</td><td>+0%</td><td>1/15 Summer</td><td></td><td></td><td></td><td>37.801</td></tr><tr><td>EX1.002</td><td>EX14</td><td>15 Summer</td><td>30</td><td>+0%</td><td>100/15 Summer</td><td></td><td></td><td></td><td>37.717</td></tr><tr><td>EX1.003</td><td>EX15</td><td>15 Summer</td><td>30</td><td>+0%</td><td>100/15 Summer</td><td></td><td></td><td></td><td>37.683</td></tr></table>									US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Water	PN	Name	Storm	Period	Change	Surcharge	Flood	Overflow	Act.	Level	EX1.000	EX8	15 Summer	30	+0%	1/15 Summer				37.851	EX1.001	EX7	15 Summer	30	+0%	1/15 Summer				37.801	EX1.002	EX14	15 Summer	30	+0%	100/15 Summer				37.717	EX1.003	EX15	15 Summer	30	+0%	100/15 Summer				37.683
	US/MH		Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Water																																																										
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EX1.003	EX15	15 Summer	30	+0%	100/15 Summer				37.683																																																										
<table><tr><th></th><th>US/MH</th><th>Depth</th><th>Volume</th><th>Flow /</th><th>Overflow</th><th>Pipe</th><th></th><th>Level</th></tr><tr><th>PN</th><th>Name</th><th>(m)</th><th>(m³)</th><th>Cap.</th><th>(l/s)</th><th>Flow</th><th>Status</th><th>Exceeded</th></tr><tr><td>EX1.000</td><td>EX8</td><td>0.226</td><td>0.000</td><td>0.62</td><td></td><td>28.8</td><td>SURCHARGED</td><td></td></tr><tr><td>EX1.001</td><td>EX7</td><td>0.306</td><td>0.000</td><td>0.58</td><td></td><td>28.7</td><td>SURCHARGED</td><td></td></tr><tr><td>EX1.002</td><td>EX14</td><td>-0.066</td><td>0.000</td><td>0.74</td><td></td><td>28.4</td><td>OK</td><td></td></tr><tr><td>EX1.003</td><td>EX15</td><td>-0.050</td><td>0.000</td><td>0.96</td><td></td><td>28.6</td><td>OK</td><td></td></tr></table>									US/MH	Depth	Volume	Flow /	Overflow	Pipe		Level	PN	Name	(m)	(m³)	Cap.	(l/s)	Flow	Status	Exceeded	EX1.000	EX8	0.226	0.000	0.62		28.8	SURCHARGED		EX1.001	EX7	0.306	0.000	0.58		28.7	SURCHARGED		EX1.002	EX14	-0.066	0.000	0.74		28.4	OK		EX1.003	EX15	-0.050	0.000	0.96		28.6	OK							
	US/MH	Depth	Volume	Flow /	Overflow	Pipe		Level																																																											
PN	Name	(m)	(m³)	Cap.	(l/s)	Flow	Status	Exceeded																																																											
EX1.000	EX8	0.226	0.000	0.62		28.8	SURCHARGED																																																												
EX1.001	EX7	0.306	0.000	0.58		28.7	SURCHARGED																																																												
EX1.002	EX14	-0.066	0.000	0.74		28.4	OK																																																												
EX1.003	EX15	-0.050	0.000	0.96		28.6	OK																																																												
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Date 04/07/2021 14:12

File Proposed Drainage 21.07....

Designed by losty_a

Checked by

Micro

Drainage

Innovyze

Network 2019.1

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

for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000

Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000

Hot Start Level (mm) 0 Inlet Coefficient 0.800

Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000

Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0

Number of Online Controls 0 Number of Storage Structures 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.359

Region England and Wales Cv (Summer) 1.000

M5-60 (mm) 18.000 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0 DVD Status OFF

Analysis Timestep Fine Inertia Status OFF

DTS Status ON

Profile(s) Summer and Winter

Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440

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

Climate Change (%) 0, 0, 0

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
EX1.000	EX8	15 Summer	100	+0%	1/15 Summer				38.025
EX1.001	EX7	15 Summer	100	+0%	1/15 Summer				37.943
EX1.002	EX14	15 Summer	100	+0%	100/15 Summer				37.808
EX1.003	EX15	15 Summer	100	+0%	100/15 Summer				37.742

PN	US/MH Name	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
EX1.000	EX8	0.400	0.000	0.79		36.4	SURCHARGED	
EX1.001	EX7	0.448	0.000	0.72		35.5	SURCHARGED	
EX1.002	EX14	0.025	0.000	0.93		35.7	SURCHARGED	
EX1.003	EX15	0.009	0.000	1.20		35.9	SURCHARGED	

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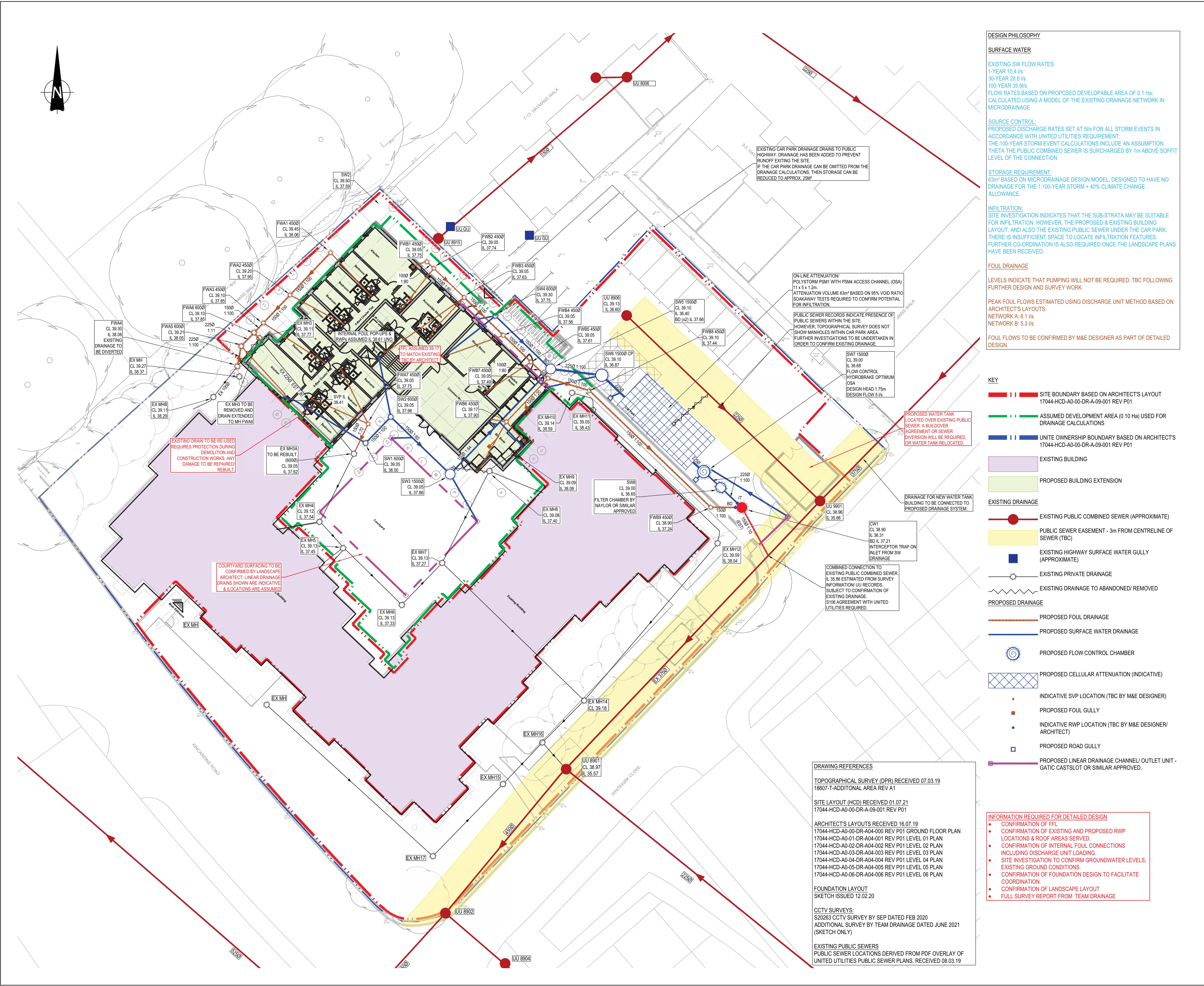
Appendix E

Proposed Drainage Strategy

Overland Flood Plan

Drainage Details

Proposed Drainage Calculations Results



DESIGN PHILOSOPHY

SURFACE WATER

EXISTING SW FLOW RATES:
1-YEAR 10.4 l/s
30-YEAR 28.6 l/s
100-YEAR 35.9 l/s
FLOW RATES BASED ON PROPOSED DEVELOPABLE AREA OF 0.1 Ha;
CALCULATED USING A MODEL OF THE EXISTING DRAINAGE NETWORK IN MICRODRAINAGE

SOURCE CONTROL:
PROPOSED DISCHARGE RATES SET AT 5 l/s FOR ALL STORM EVENTS IN ACCORDANCE WITH UNITED UTILITIES REQUIREMENT:
THE 100-YEAR STORM EVENT CALCULATIONS INCLUDE AN ASSUMPTION THETA THE PUBLIC COMBINED SEWER IS SURCHARGED BY 1m ABOVE SOFFIT LEVEL OF THE CONNECTION.

STORAGE REQUIREMENT:
63m³ BASED ON MICRODRAINAGE DESIGN MODEL, DESIGNED TO HAVE NO DRAINAGE FOR THE 1:100-YEAR STORM + 40% CLIMATE CHANGE ALLOWANCE.

INFILTRATION:
SITE INVESTIGATION INDICATES THAT THE SUB-STRATA MAY BE SUITABLE FOR INFILTRATION. HOWEVER, THE PROPOSED EXISTING BUILDING LAYOUT, AND ALSO THE EXISTING PUBLIC SEWER UNDER THE CAR PARK, THERE IS INSUFFICIENT SPACE TO LOCATE INFILTRATION FEATURES. FURTHER CO-ORDINATION IS ALSO REQUIRED ONCE THE LANDSCAPE PLANS HAVE BEEN RECEIVED.

FOUL DRAINAGE

LEVELS INDICATE THAT PUMPING WILL NOT BE REQUIRED. TBC FOLLOWING FURTHER DESIGN AND SURVEY WORK.

PEAK FOUL FLOWS ESTIMATED USING DISCHARGE UNIT METHOD BASED ON ARCHITECT'S LAYOUTS:
NETWORK A: 6.1 l/s
NETWORK B: 5.3 l/s

FOUL FLOWS TO BE CONFIRMED BY M&E DESIGNER AS PART OF DETAILED DESIGN.

- KEY**
- SITE BOUNDARY BASED ON ARCHITECT'S LAYOUT 17044-HCD-A0-00-DR-A-09-001 REV P01
 - ASSUMED DEVELOPMENT AREA (0.10 Ha) USED FOR DRAINAGE CALCULATIONS
 - UNITE OWNERSHIP BOUNDARY BASED ON ARCHITECT'S 17044-HCD-A0-00-DR-A-09-001 REV P01
 - EXISTING BUILDING
 - PROPOSED BUILDING EXTENSION
 - EXISTING DRAINAGE**
 - EXISTING PUBLIC COMBINED SEWER (APPROXIMATE)
 - PUBLIC SEWER EASEMENT - 3m FROM CENTRELINE OF SEWER (TBC)
 - EXISTING HIGHWAY SURFACE WATER GULLY (APPROXIMATE)
 - EXISTING PRIVATE DRAINAGE
 - EXISTING DRAINAGE TO ABANDONED/ REMOVED
 - PROPOSED DRAINAGE**
 - PROPOSED FOUL DRAINAGE
 - PROPOSED SURFACE WATER DRAINAGE
 - PROPOSED FLOW CONTROL CHAMBER
 - PROPOSED CELLULAR ATTENUATION (INDICATIVE)
 - INDICATIVE SVP LOCATION (TBC BY M&E DESIGNER)
 - PROPOSED FOUL GULLY
 - INDICATIVE RWP LOCATION (TBC BY M&E DESIGNER/ ARCHITECT)
 - PROPOSED ROAD GULLY
 - PROPOSED LINEAR DRAINAGE CHANNEL/ OUTLET UNIT - GATIC CASTSLOT OR SIMILAR APPROVED.

DRAWING REFERENCES

TOPOGRAPHICAL SURVEY (DPR) RECEIVED 07.03.19
18607-T-ADDITIONAL AREA REV A1

SITE LAYOUT (HCD) RECEIVED 01.07.21
17044-HCD-A0-00-DR-A-09-001 REV P01

ARCHITECT'S LAYOUTS RECEIVED 16.07.19
17044-HCD-A0-00-DR-A04-000 REV P01 GROUND FLOOR PLAN
17044-HCD-A0-01-DR-A04-001 REV P01 LEVEL 01 PLAN
17044-HCD-A0-02-DR-A04-002 REV P01 LEVEL 02 PLAN
17044-HCD-A0-03-DR-A04-003 REV P01 LEVEL 03 PLAN
17044-HCD-A0-04-DR-A04-004 REV P01 LEVEL 04 PLAN
17044-HCD-A0-05-DR-A04-005 REV P01 LEVEL 05 PLAN
17044-HCD-A0-06-DR-A04-006 REV P01 LEVEL 06 PLAN

FOUNDATION LAYOUT
SKETCH ISSUED 12.02.20

CCTV SURVEYS:
S20263 CCTV SURVEY BY SEP DATED FEB 2020
ADDITIONAL SURVEY BY TEAM DRAINAGE DATED JUNE 2021 (SKETCH ONLY)

EXISTING PUBLIC SEWERS
PUBLIC SEWER LOCATIONS DERIVED FROM PDF OVERLAY OF UNITED UTILITIES PUBLIC SEWER PLANS. RECEIVED 08.03.19

- INFORMATION REQUIRED FOR DETAILED DESIGN**
- CONFIRMATION OF FFL
 - CONFIRMATION OF EXISTING AND PROPOSED RWP LOCATIONS & ROOF AREAS SERVED.
 - CONFIRMATION OF INTERNAL FOUL CONNECTIONS INCLUDING DISCHARGE UNIT LOADING.
 - SITE INVESTIGATION TO CONFIRM GROUNDWATER LEVELS, EXISTING GROUND CONDITIONS.
 - CONFIRMATION OF FOUNDATION DESIGN TO FACILITATE COORDINATION.
 - CONFIRMATION OF LANDSCAPE LAYOUT
 - FULL SURVEY REPORT FROM TEAM DRAINAGE

GENERAL NOTES:

- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
- DESIGN BASED ON TOPOGRAPHICAL SURVEY AND CCTV SURVEY INFORMATION AVAILABLE AT THE TIME OF DESIGN.
- 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.
- 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.
- ALL DIMENSIONS ARE IN METRES AND LEVELS IN METRES ABOVE ORDANCE DATUM UNLESS OTHERWISE NOTED.
- 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.
- 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.
- ALL RAINWATER AND FOUL POP UPS LOCATIONS AND SIZES INDICATIVE ONLY AND TO BE CONFIRMED BY THE ARCHITECT AND M&E ENGINEER.
- COVER LEVELS, GULLY POSITIONS, AND BUILDINGS LOCATION ARE APPROXIMATE AND SHALL BE CONFIRMED BY ARCHITECT/ LANDSCAPE ARCHITECT.
- ALL PIPE DIAMETERS GIVEN ARE NOMINAL INTERNAL PIPE DIAMETERS. THESE ARE TO BE CONFIRMED ONCE A DETAILED CAPACITY CHECK HAS BEEN UNDERTAKEN AT A LATER DESIGN STAGE.
- OUTFALL CONNECTION(S) SUBJECT TO AGREEMENT WITH THE APPROVING AUTHORITY.

P07	ISSUED FOR DISCHARGE OF CONDITION	05/07/21	ATL	ATL
P06	STAGE 2 ISSUE	21/02/20	ATL	CD
P04	REVISED IN LINE WITH CLIENT'S COMMENT	01/07/19	ATL	ATL
P03	REVISED IN LINE WITH UPDATED ARCHITECT'S PLAN	22/05/19	ATL	CG
P02	UPDATED FOR DETAILED DRAINAGE STRATEGY	18/04/19	ATL	CG
P01	PRELIMINARY ISSUE	05/04/19	ATL	CG
Rev:	Description:	Date:	By:	Chkd:



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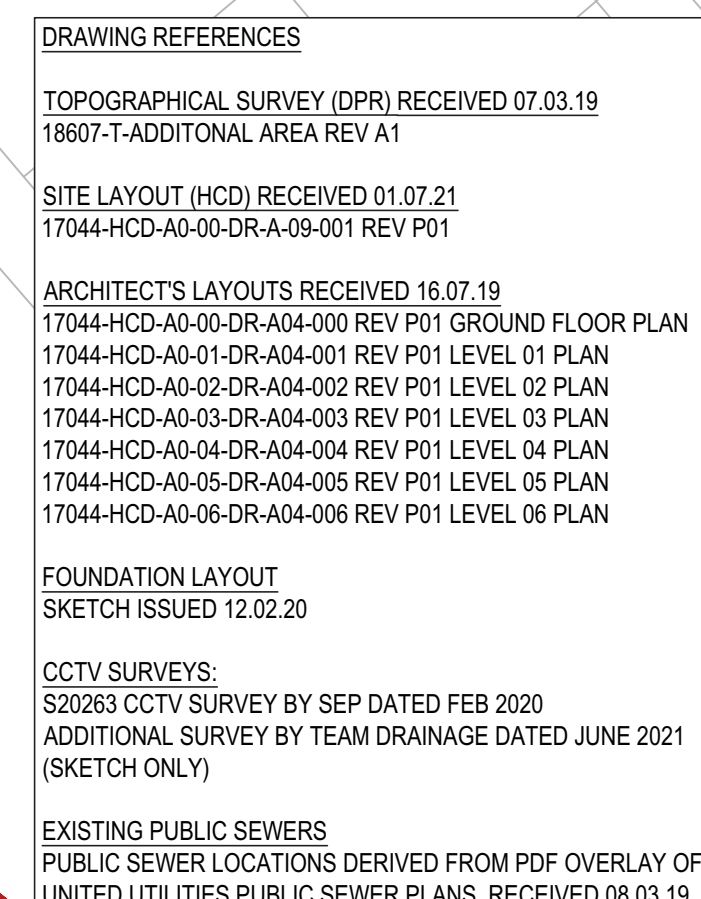
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APPROVAL

Project: KINCARDINE COURT

Proposed Drainage Strategy

Size:	Date:	Drawn By:	Designed By:	Checked By:
A1	05/04/19	ATL	ATL	CG
Scale:	1:200			
Project No:	Originator:	Volume:	Level:	Type:
072071 - CUR - 00 - XX - DR - C -				



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|------|-----------------------------------|----------|-----|-------|
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| Rev: | Description: | Date: | By: | Chkd: |
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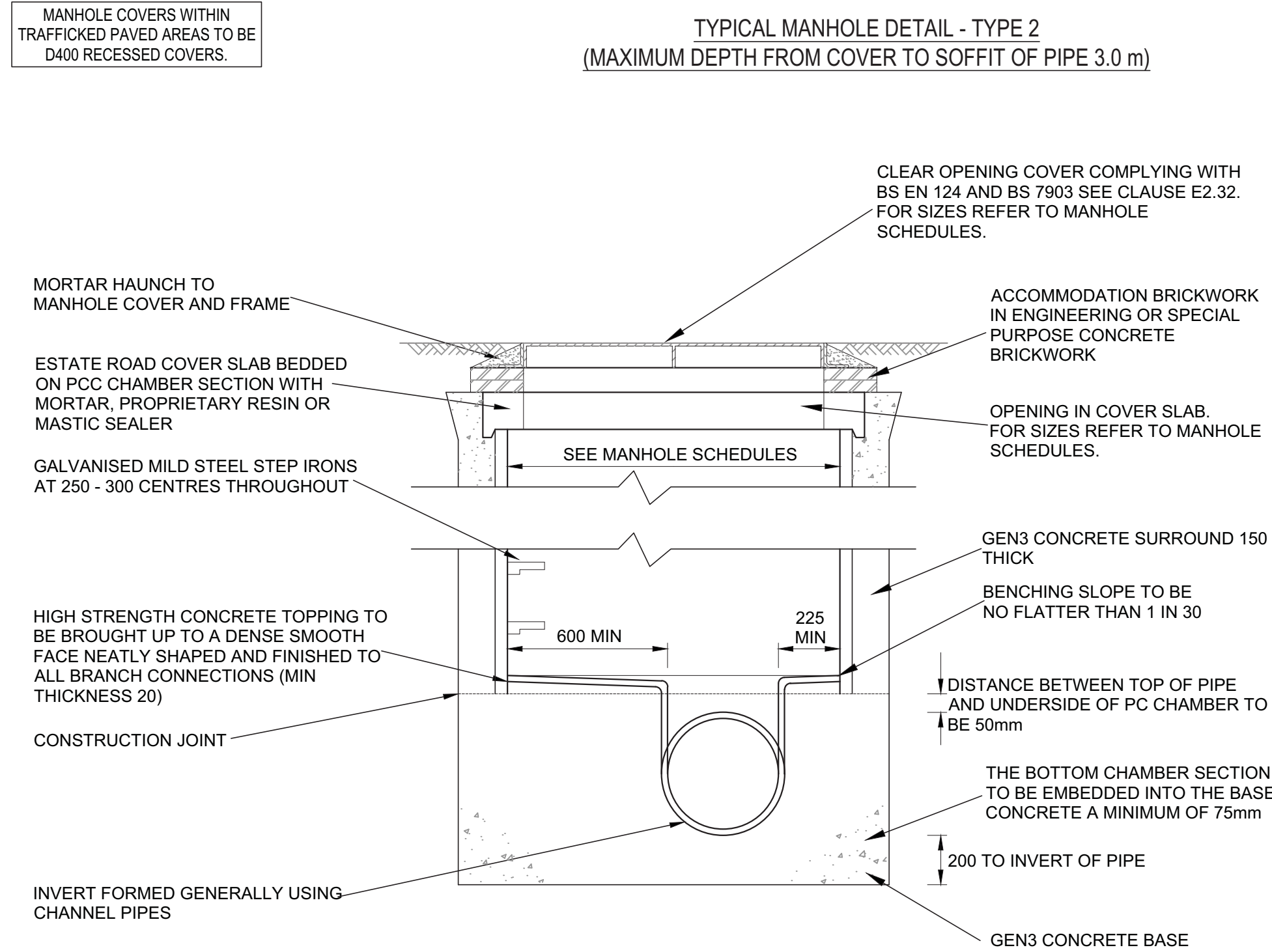
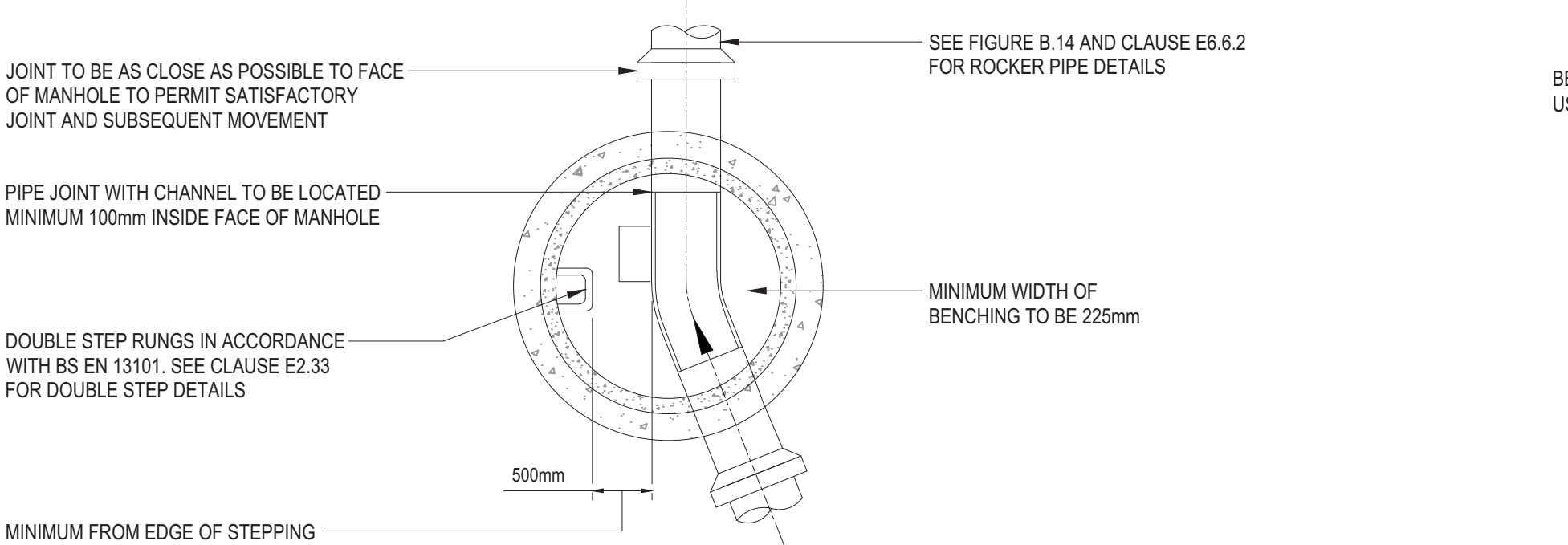
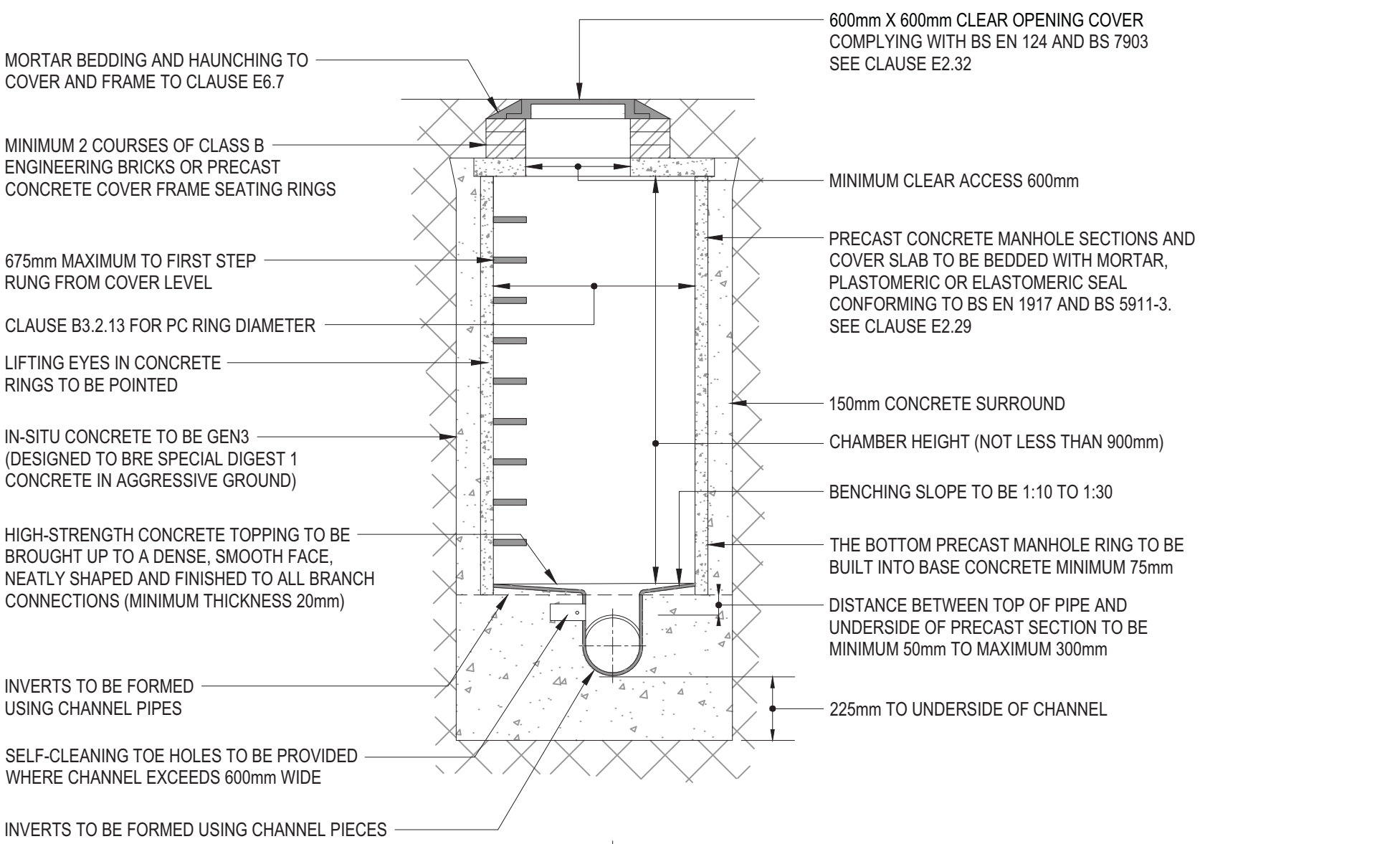


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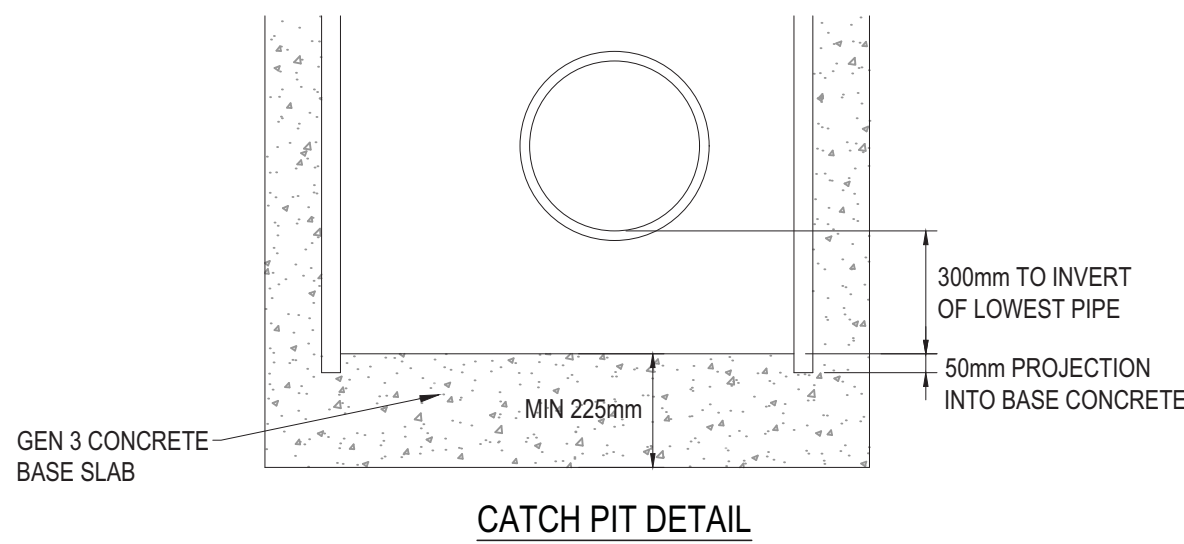
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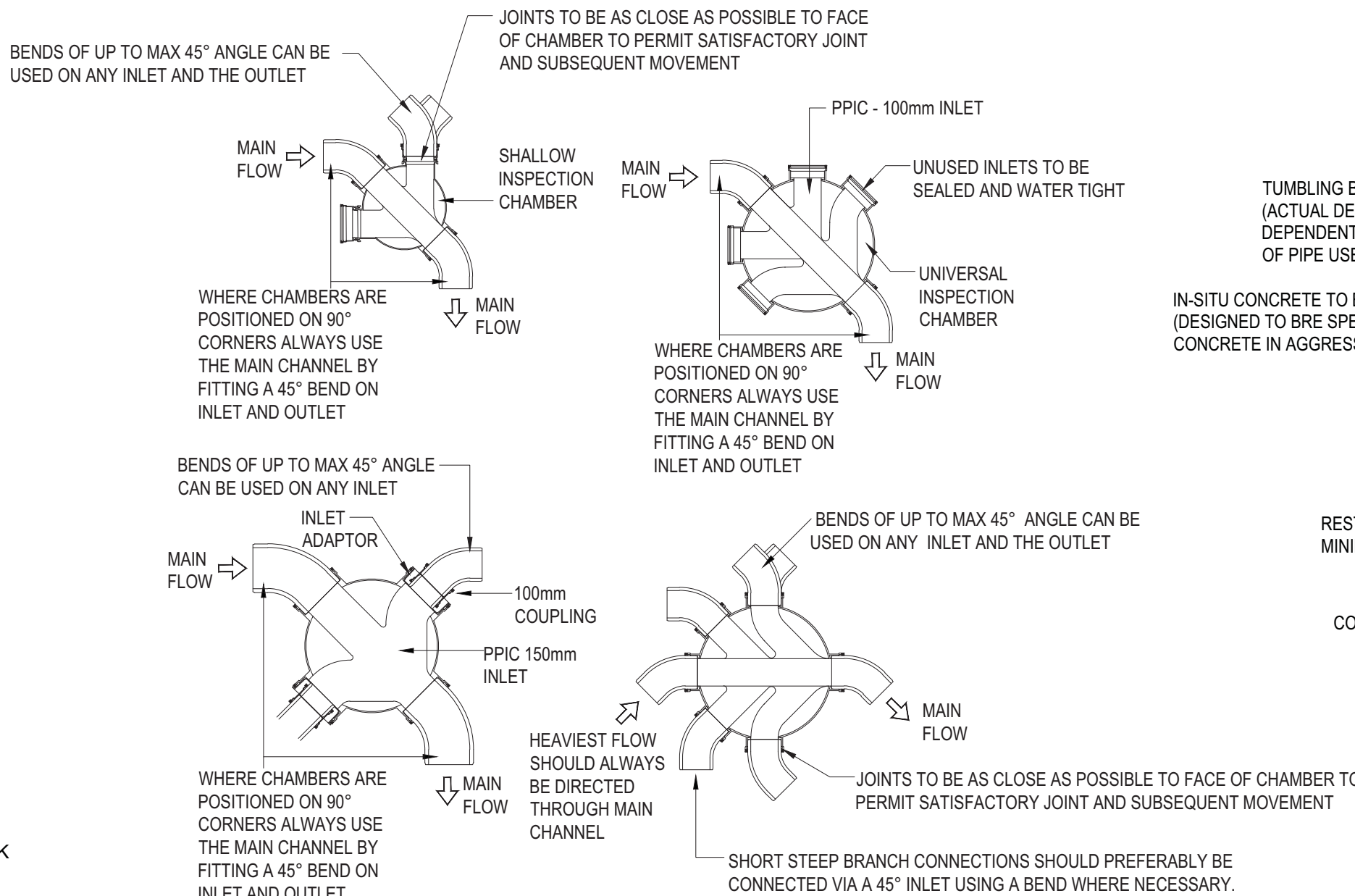
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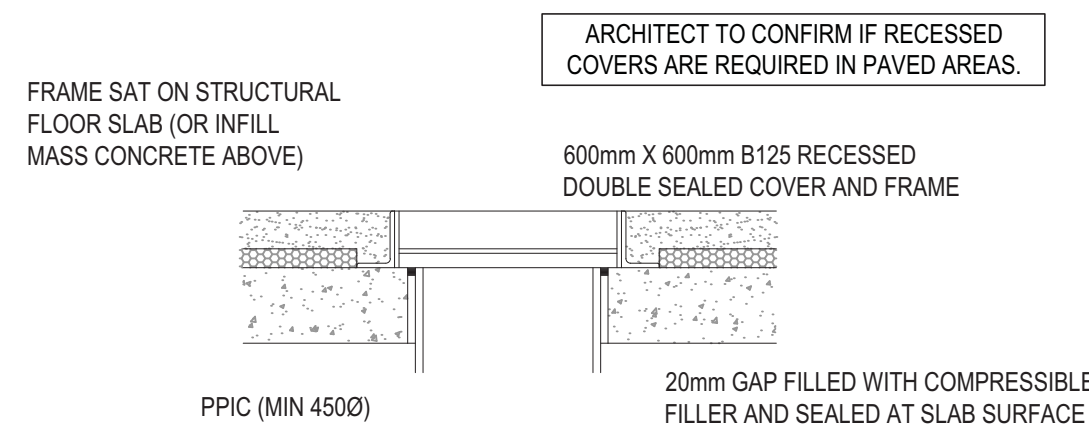
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DEPTH TO SOFFIT 1000 - 1350



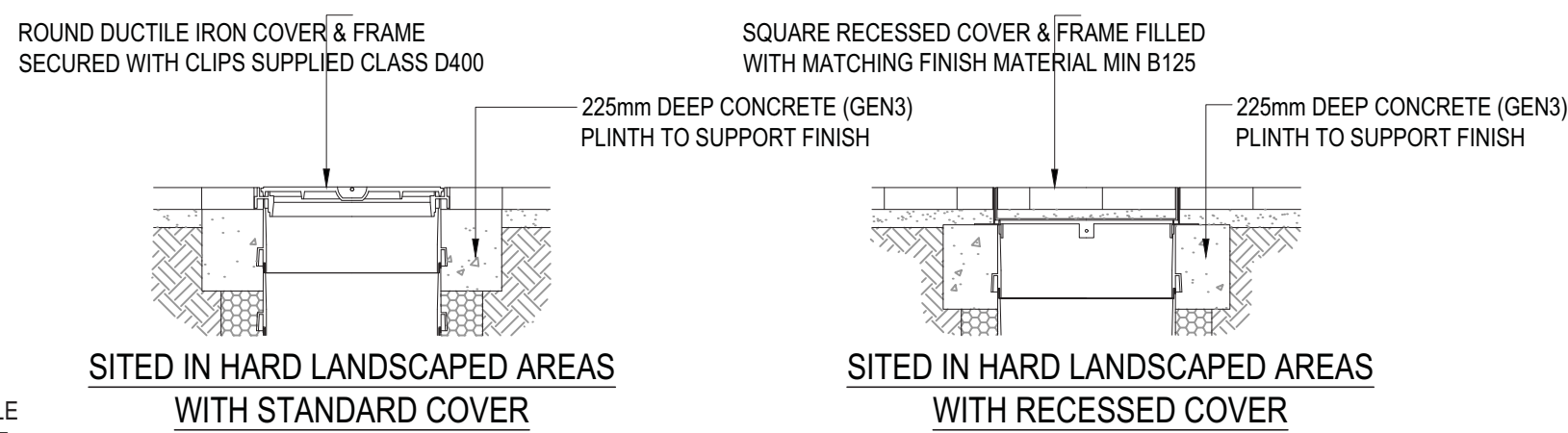
CATCH PIT DETAIL



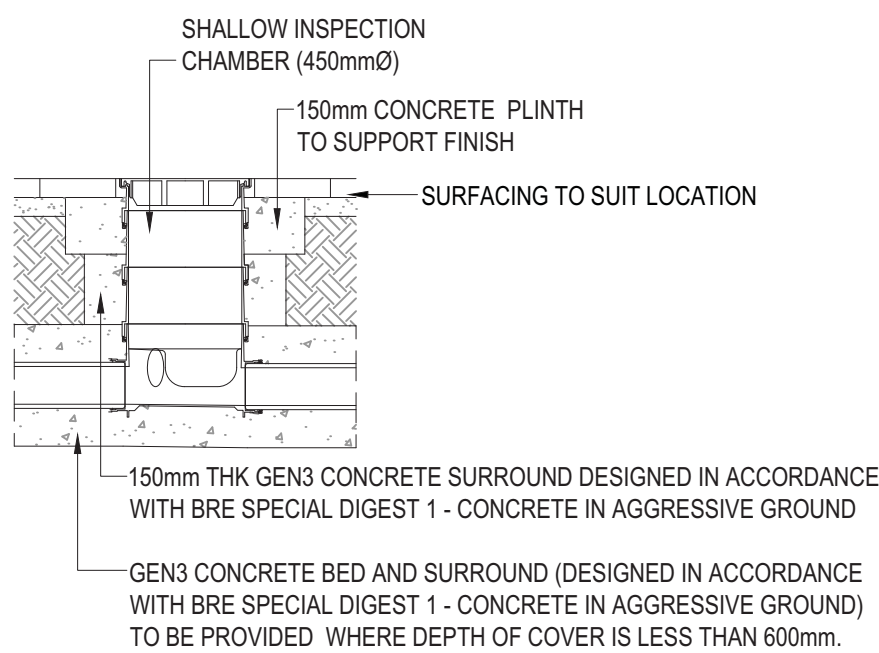
INSPECTION CHAMBER BASE DETAILS



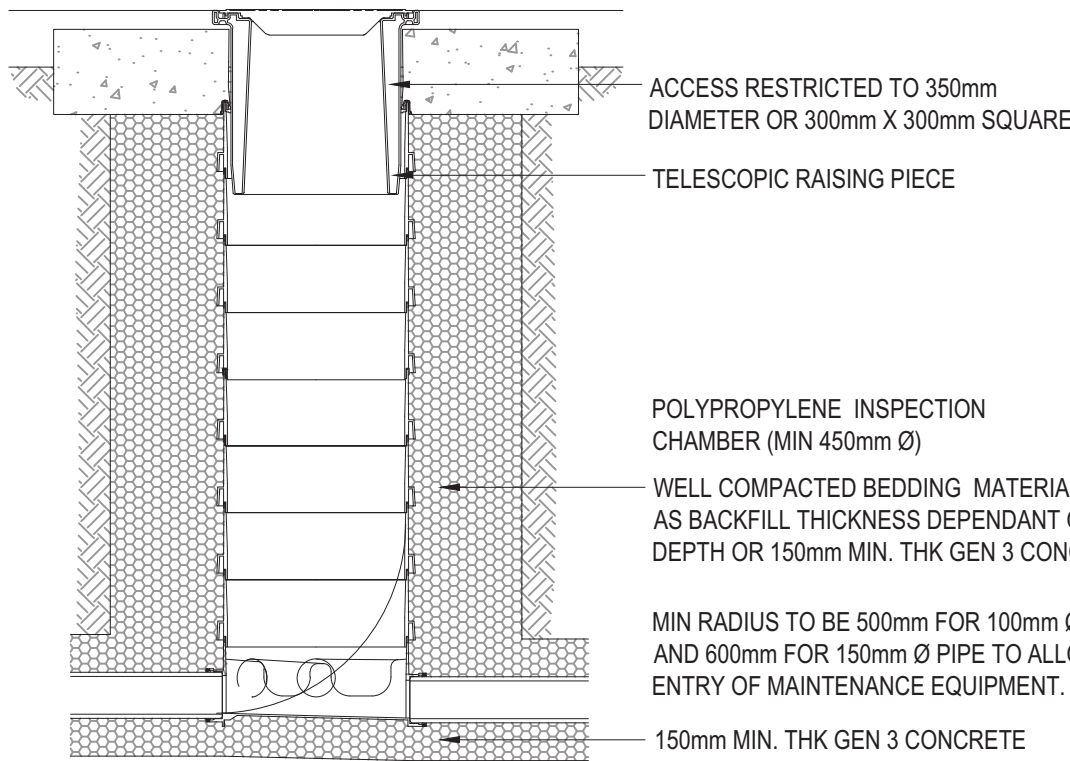
INTERNAL COVER DETAIL



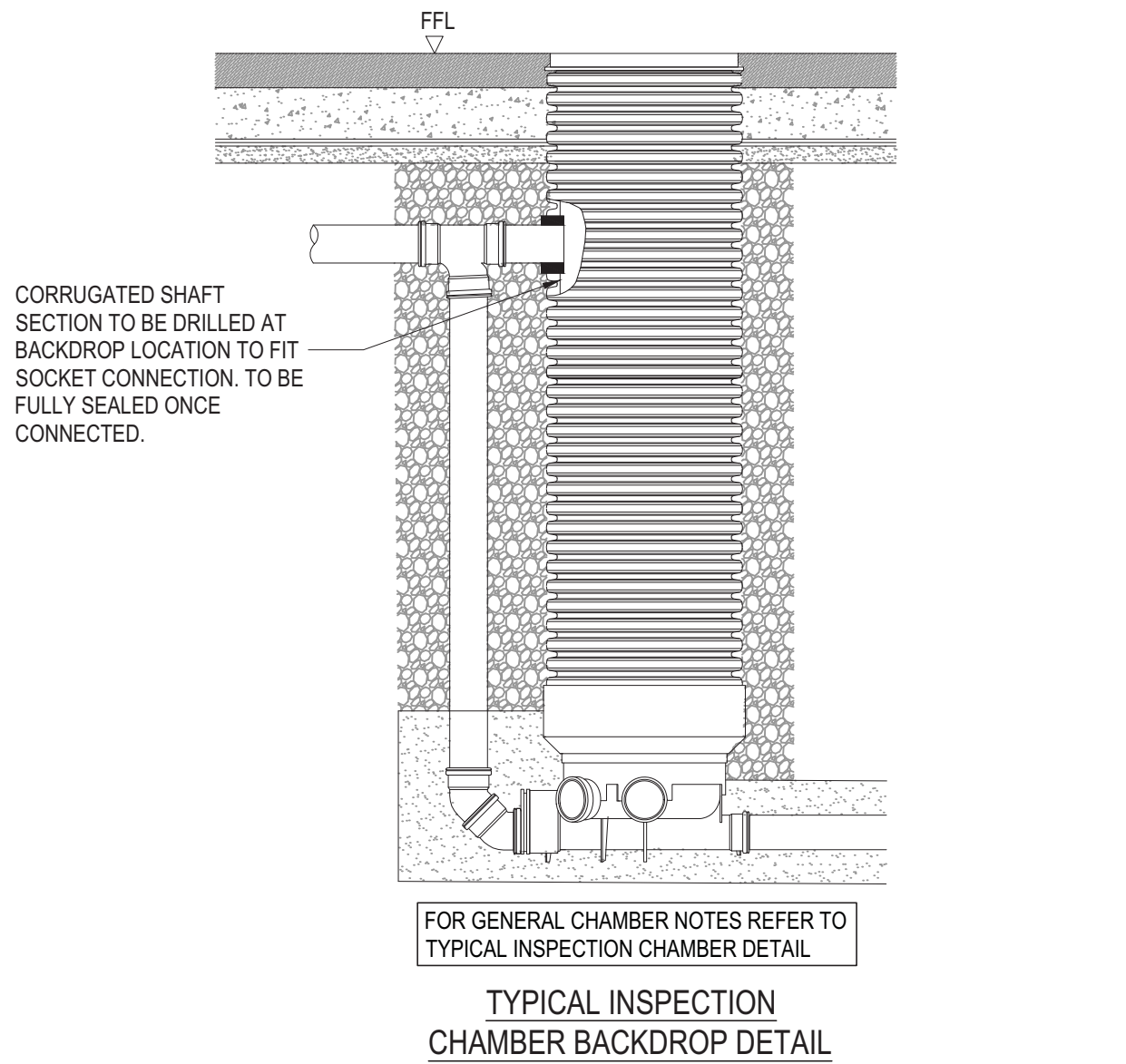
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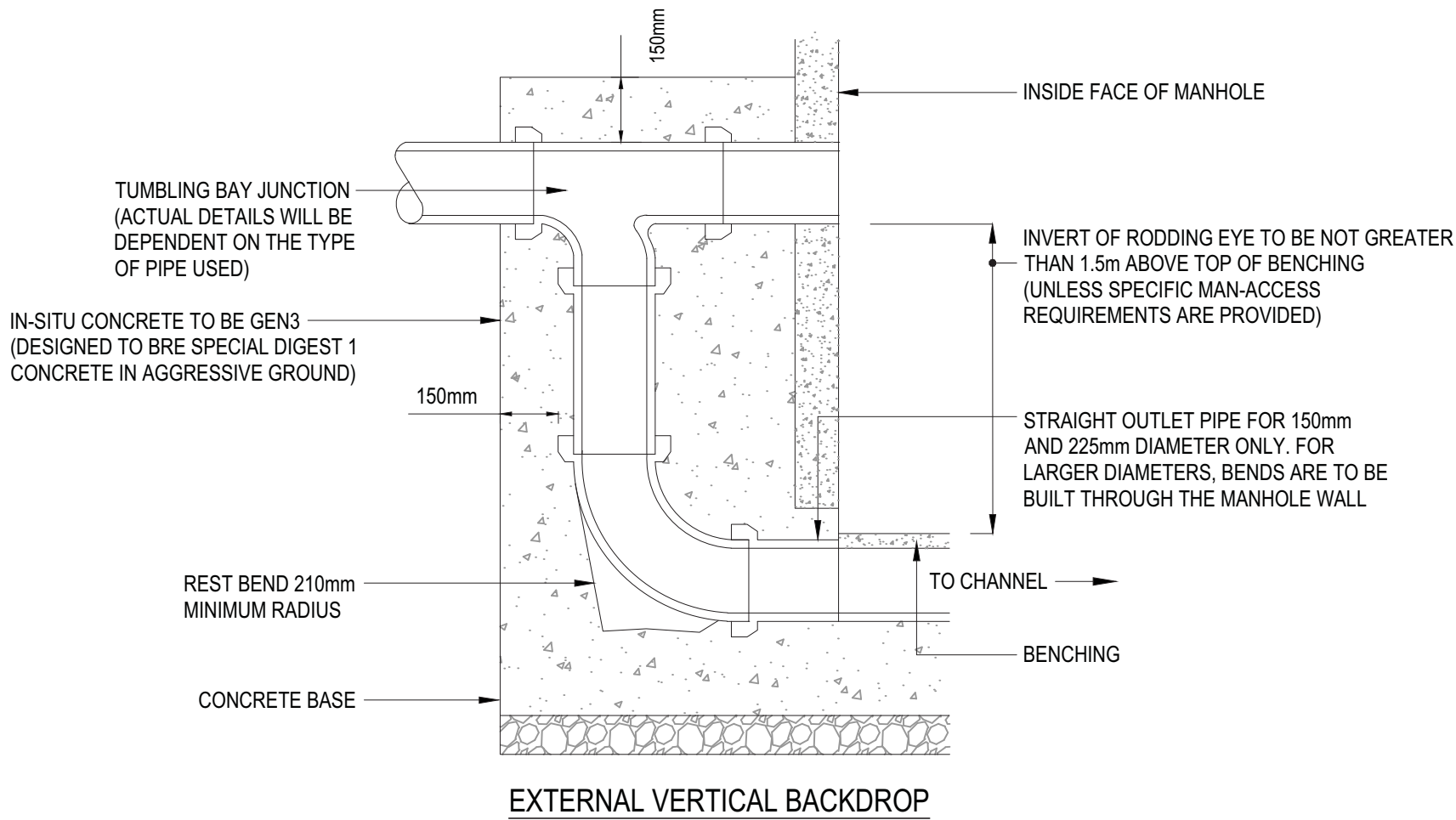
SHALLOW INSPECTION CHAMBER
MAX DEPTH 0.6m



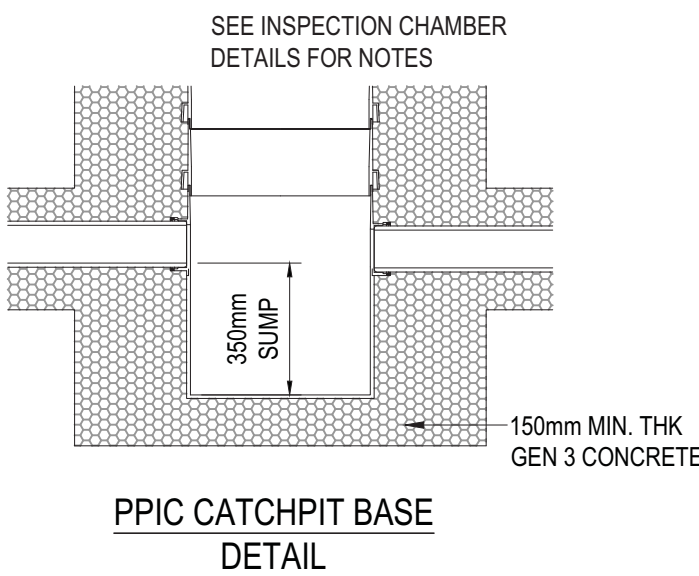
DEEP INSPECTION CHAMBER
DEPTHS BETWEEN 1.2m AND 3.0m



TYPICAL INSPECTION
CHAMBER BACKDROP DETAIL



EXTERNAL VERTICAL BACKDROP



PPIC CATCHPIT BASE
DETAIL

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P02	ISSUED FOR DISCHARGE OF CONDITION	05.07.21	ATL	ATL
P01	STAGE 2 ISSUE	21.02.20	ATL	CD
Rev:	Description:	Date:	By:	Chkd:



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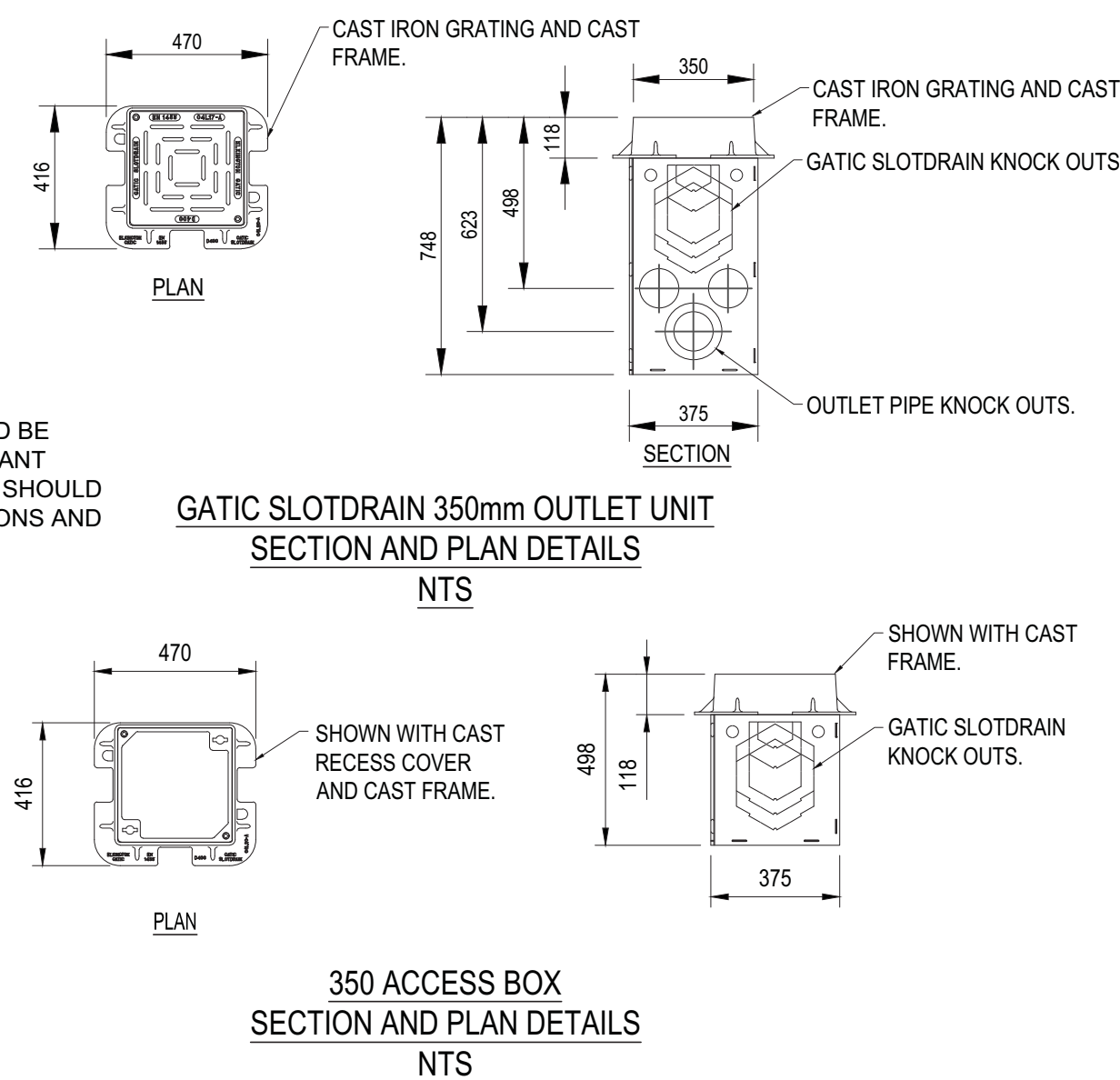
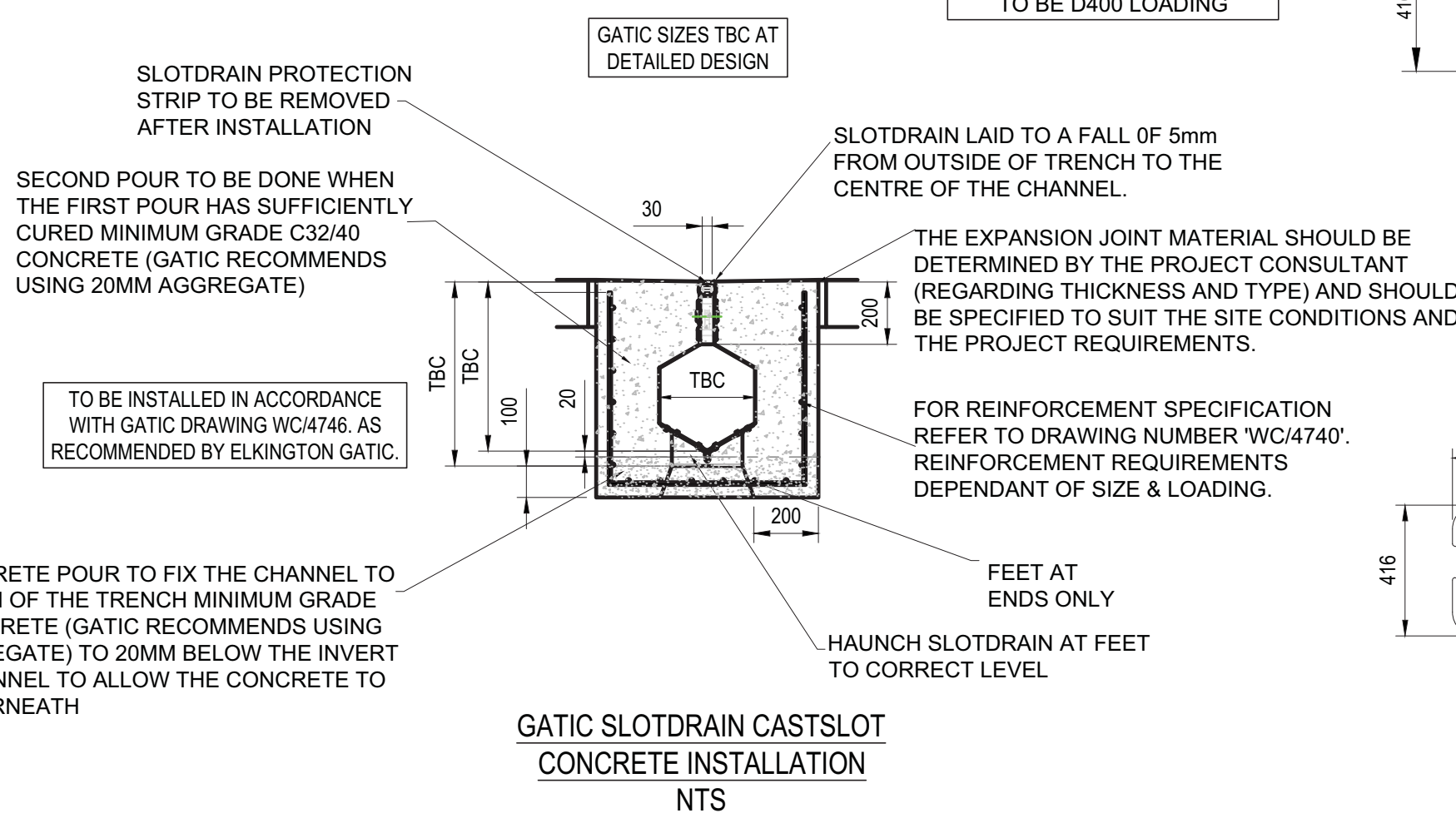
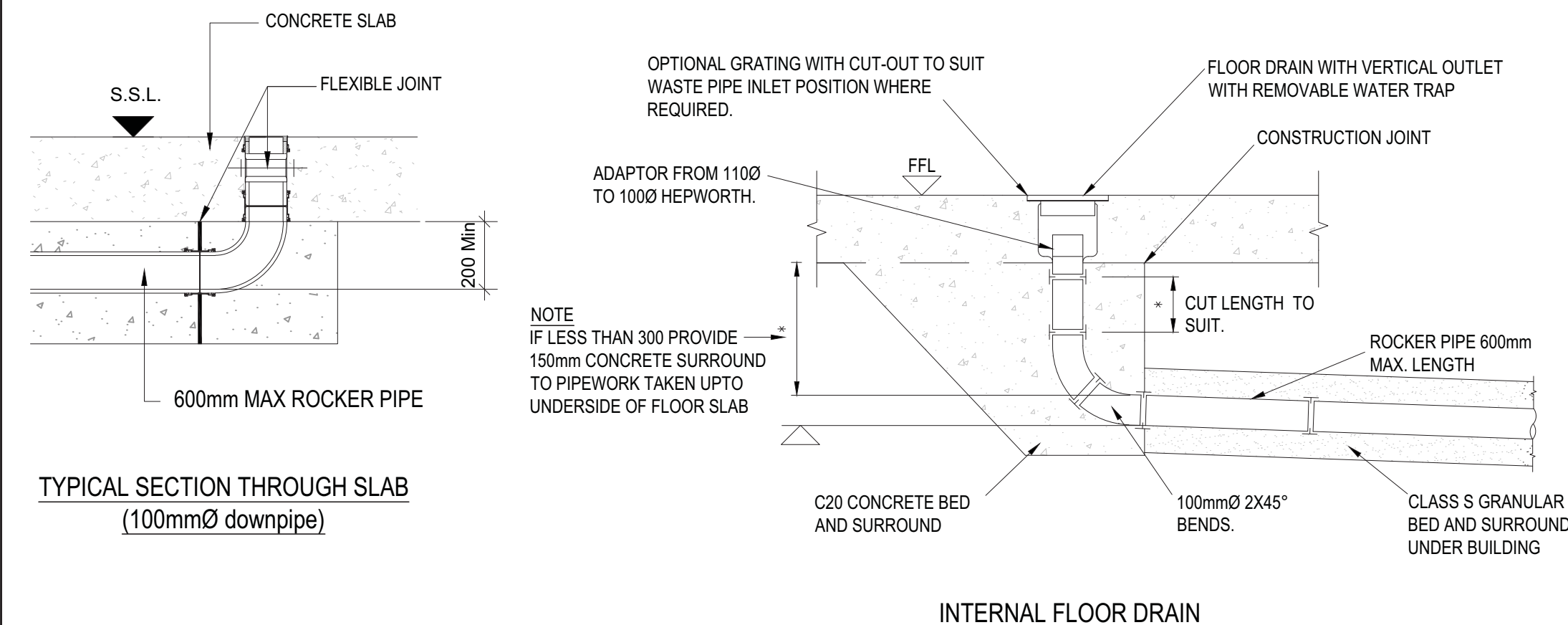
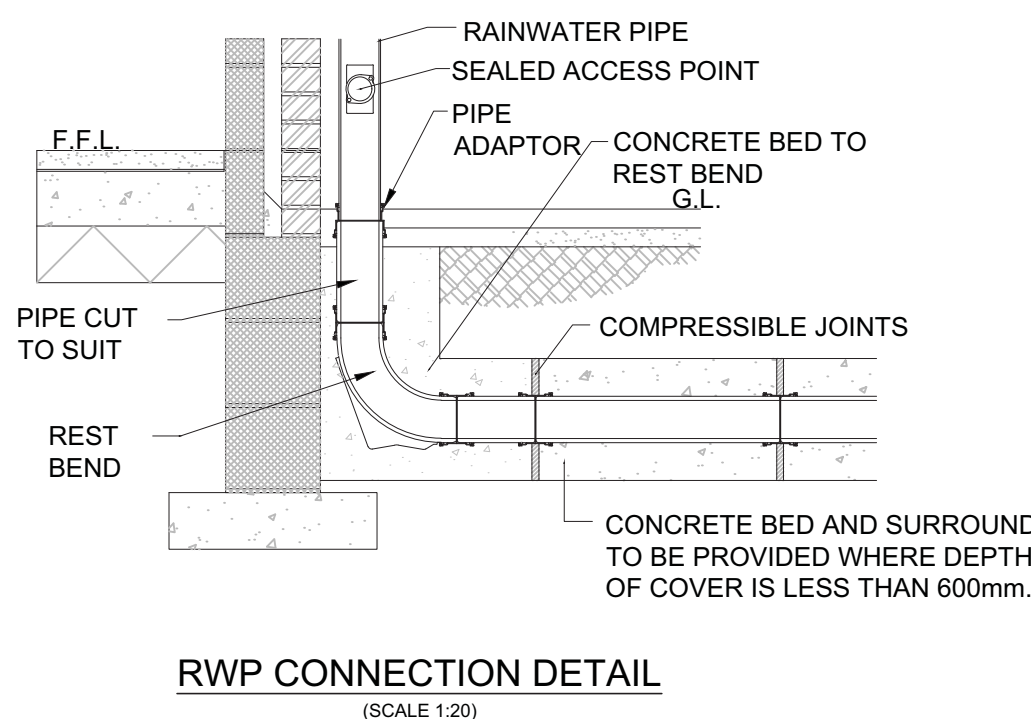
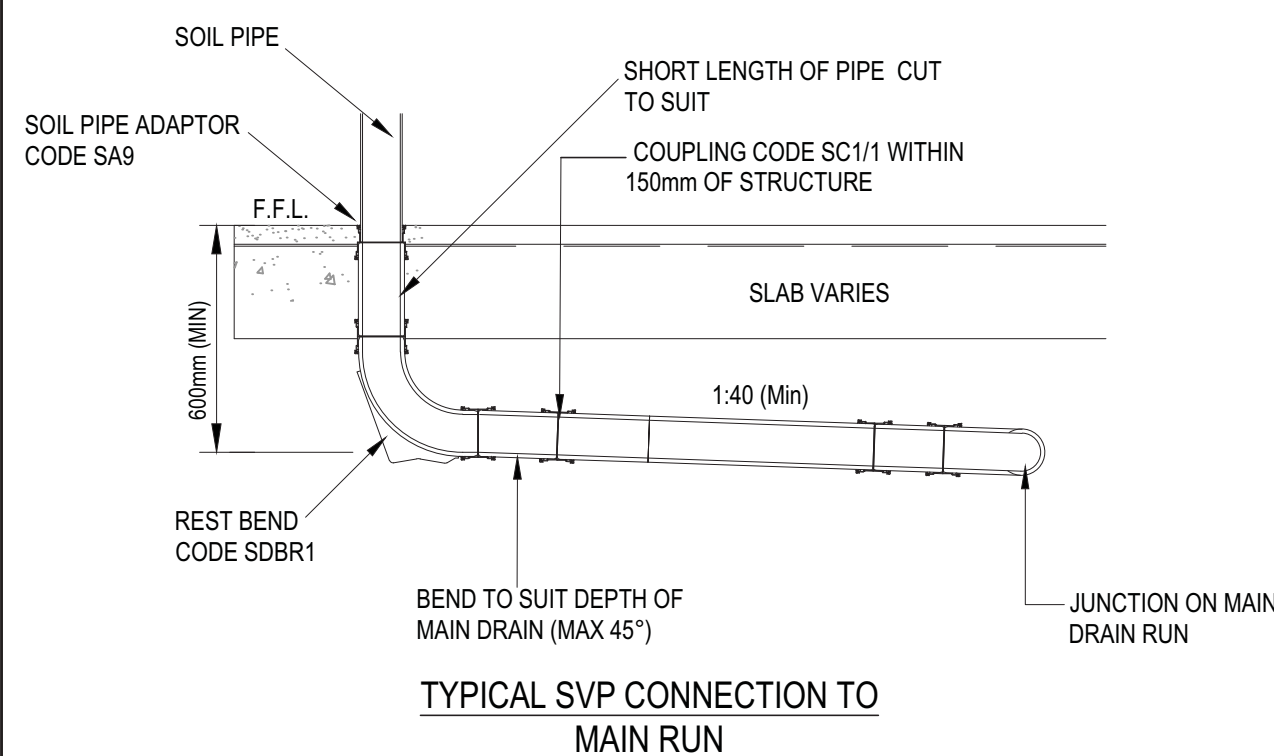
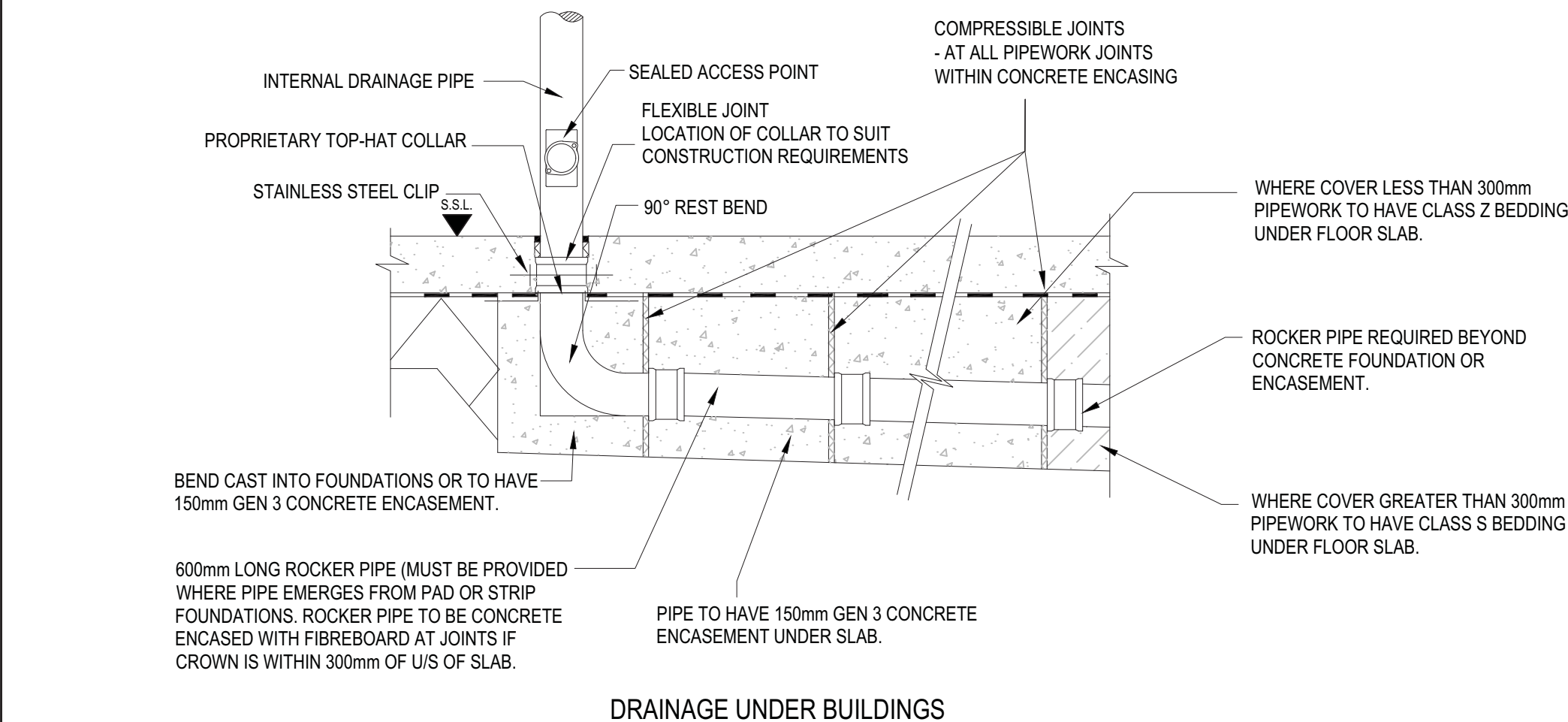
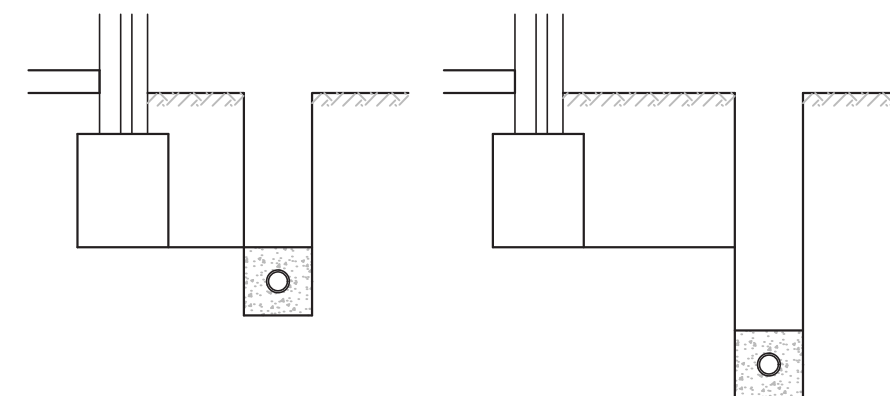
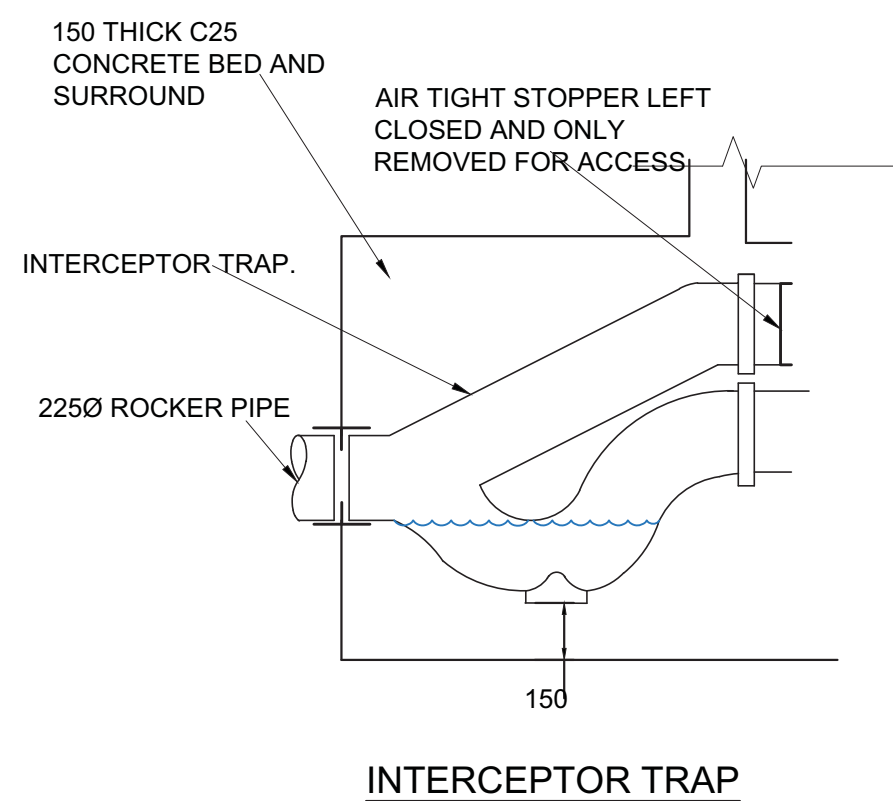
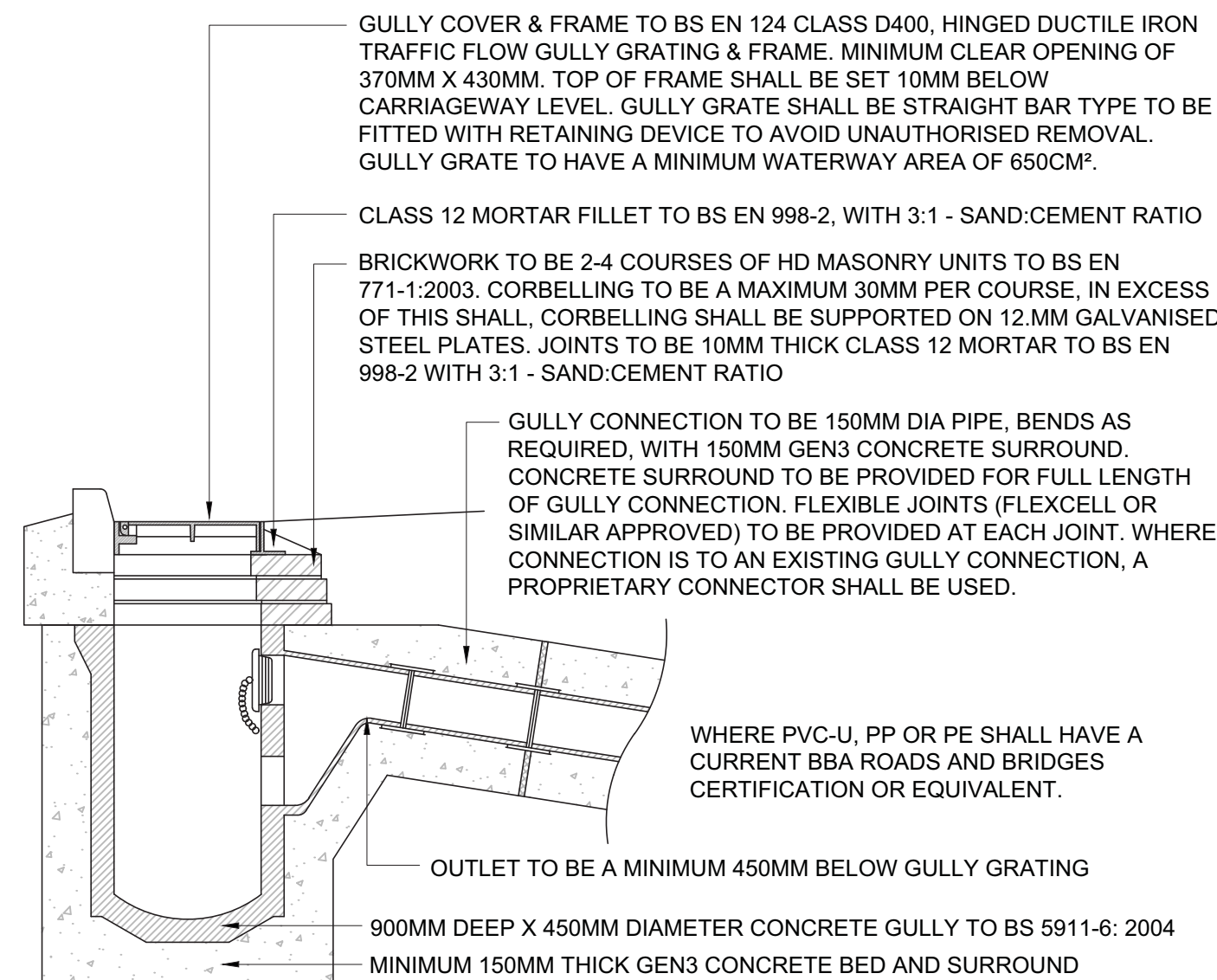
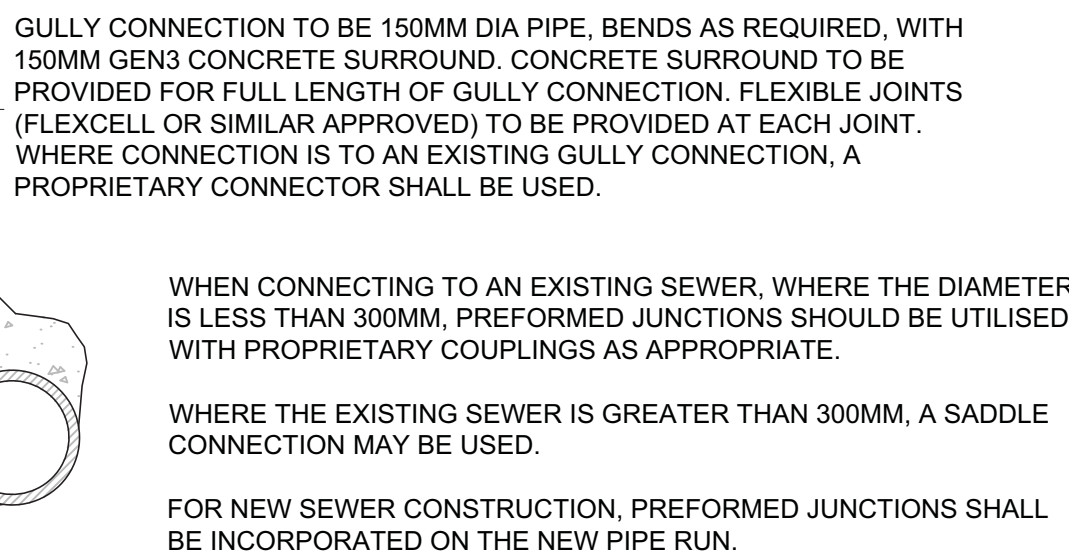
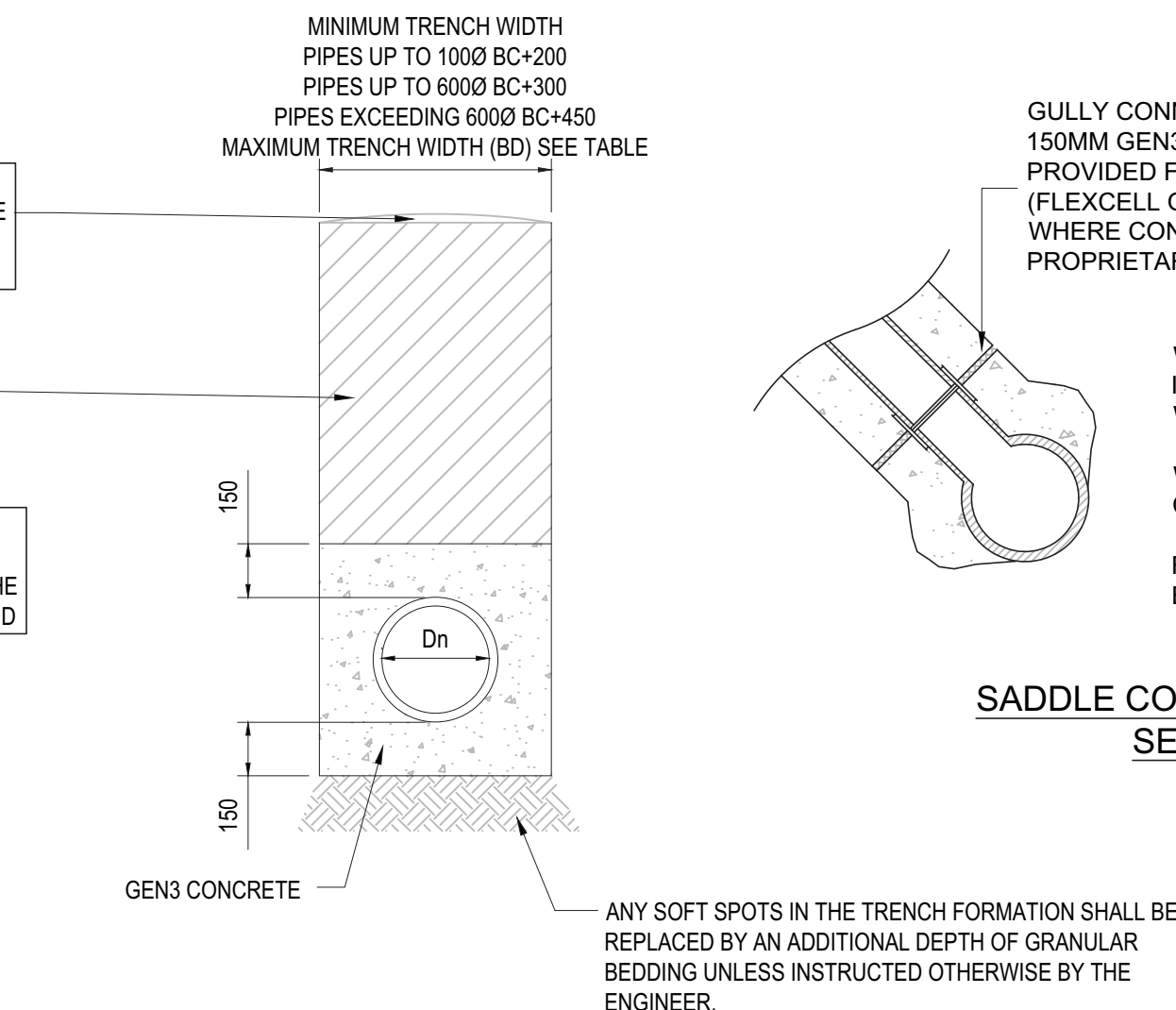
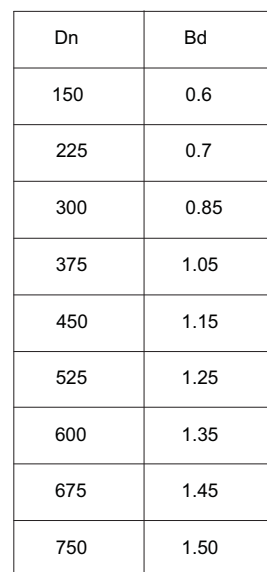
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APPROVAL

KINCARDINE COURT

TYPICAL DRAINAGE DETAILS
SHEET 1

Size:	Date:	Drawn By:	Designed By:	Checked By:
A1	21.02.20	ATL	ATL	CD
Scale:	NTS			
Project No:	Originator:	Zone:	Level:	Type:
072071 - CUR - ZZ - ZZ - DR - D -	92520	-P02		



- | GENERAL NOTES: | |
|----------------|--|
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| 3. | ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE. |
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P02	ISSUED FOR DISCHARGE OF CONDITION	05.07.21	ATL	ATL
P01	STAGE 2 ISSUE	21.02.20	ATL	CD
Rev:	Description:	Date:	By:	Chkd:

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Status: APPROVAL						
Project: KINCARDINE COURT						
Drg Title: TYPICAL DRAINAGE DETAILS SHEET 2						
Size:		Date:	Drawn By:		Designed By:	Checked By:
A1		21.02.20	ATL		ATL	CD
Scale: NTS						
Project No:		Originator:	Zone:	Level:	Type:	Discipline: Category / Number: Rev:
072071		- CUR	- ZZ	- ZZ	- DR	- D - 92521 -P02

CURRENT DESIGN ASSUMPTIONS

DESIGN BASED POLYSTORM (PSM1) UNIT 1000x500x400(D) WITH POLYSTORM INSPECT (PSM4) 1000x500x400(D), BASED ON APPROXIMATE MINIMUM BURIAL DEPTH OF 2.3m.

TANK IS LOCATED IN AN AREA SUBJECT TO OCCASIONAL HEAVY VEHICLE LOADING. DETAILED STRUCTURAL CALCULATIONS REQUIRED TO PROVE TANK HAS SUFFICIENT STRENGTH.

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

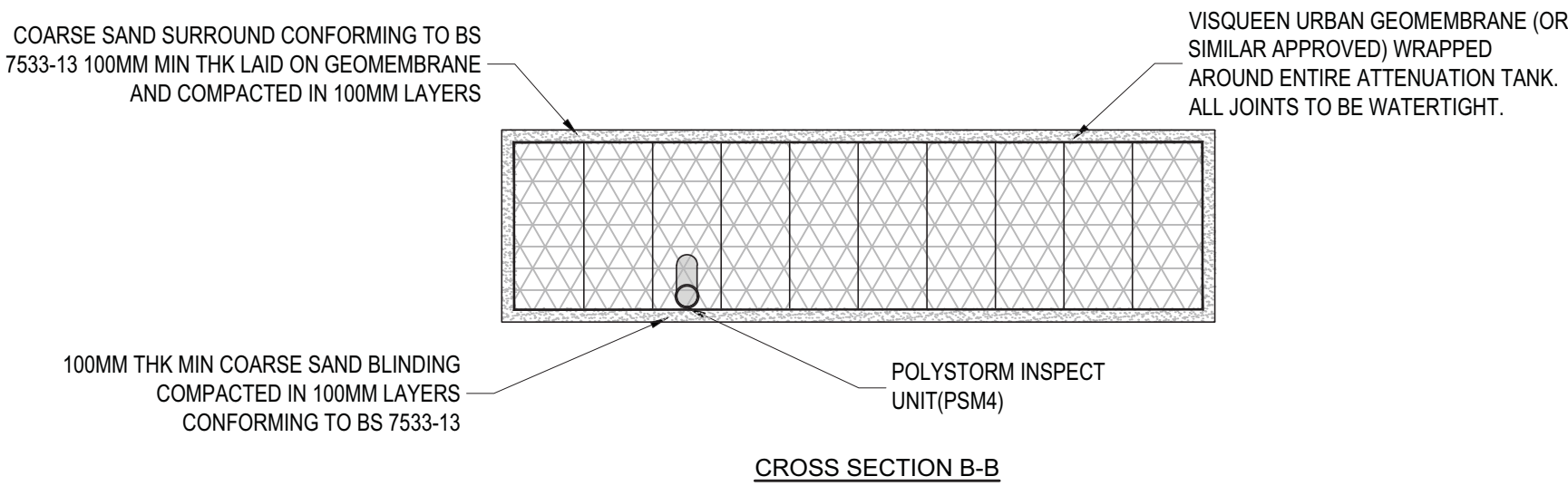
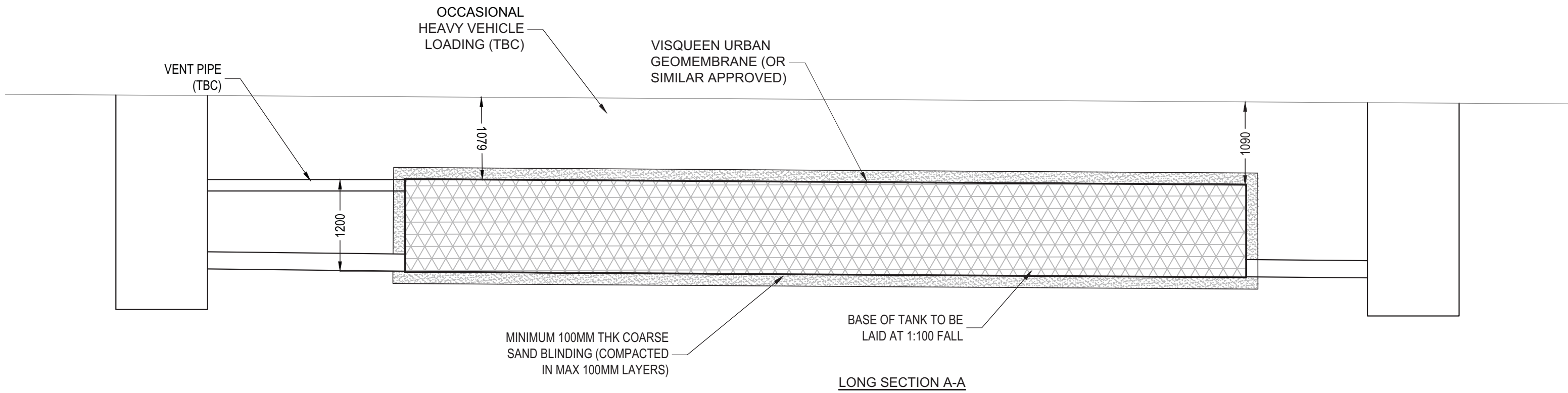
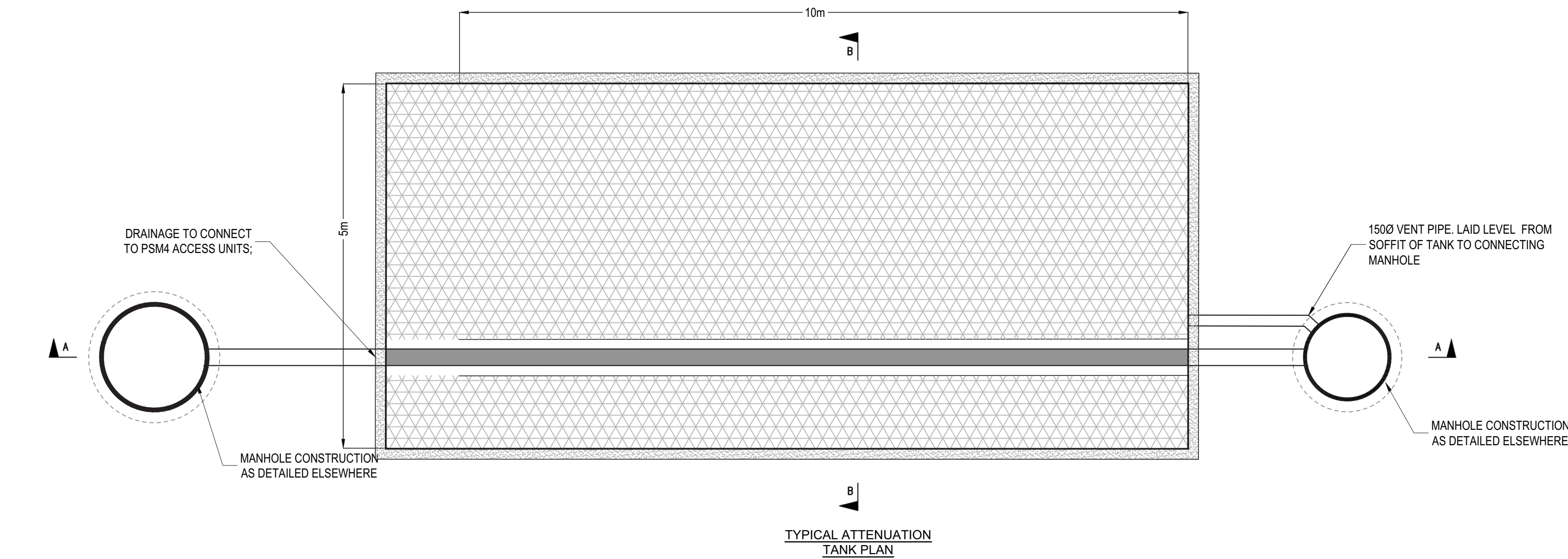
MINIMUM GROUND LEVEL IS APPROX. 39.00, BASED ON EXISTING CAR PARK LEVELS (MIN 1.0m APPROX COVER).

INVERT LEVEL OF INLET PIPE 36.90
INVERT LEVEL OF OUTLET PIPE 36.79
BASE OF TANK TO BE LAID AT 1:100 FALL.

DIMENSIONS OF TOTAL UNIT ARE AS SHOWN.
PLAN AREA OF TANK IS 55m²
TOTAL DEPTH OF TANK IS 1200mm.
ATTENUATION VOLUME, BASED ON 95% VOID RATIO IS 63m³

IMPERMEABLE MEMBRANE, BED AND SURROUND TO BE CONFIRMED WITH THE MANUFACTURER.

REFER TO DRAINAGE LAYOUT 072071-CUR-00-00-DR-C-90001 FOR TANK & INLET/OUTLET LOCATIONS.



GENERAL NOTES:

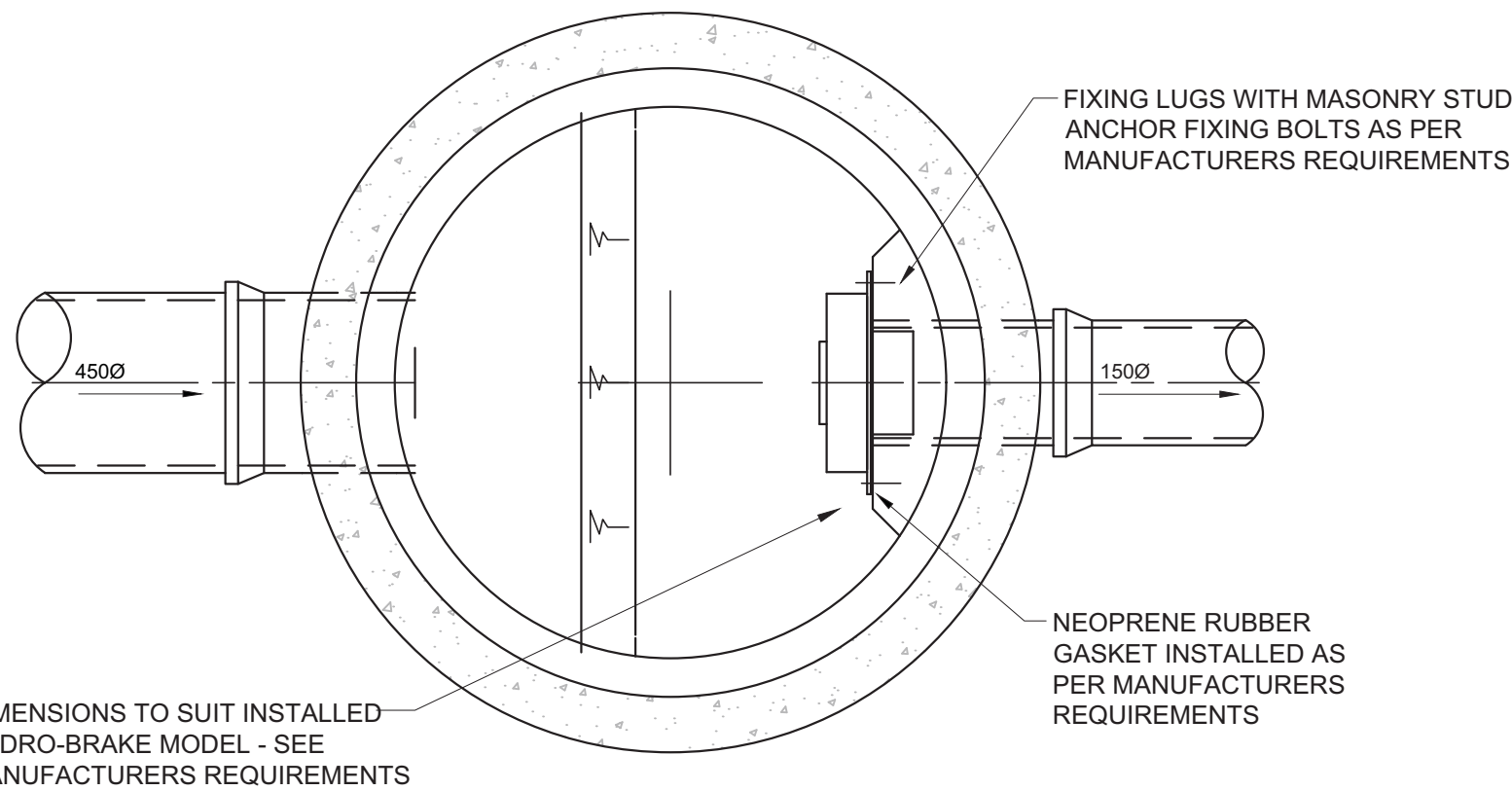
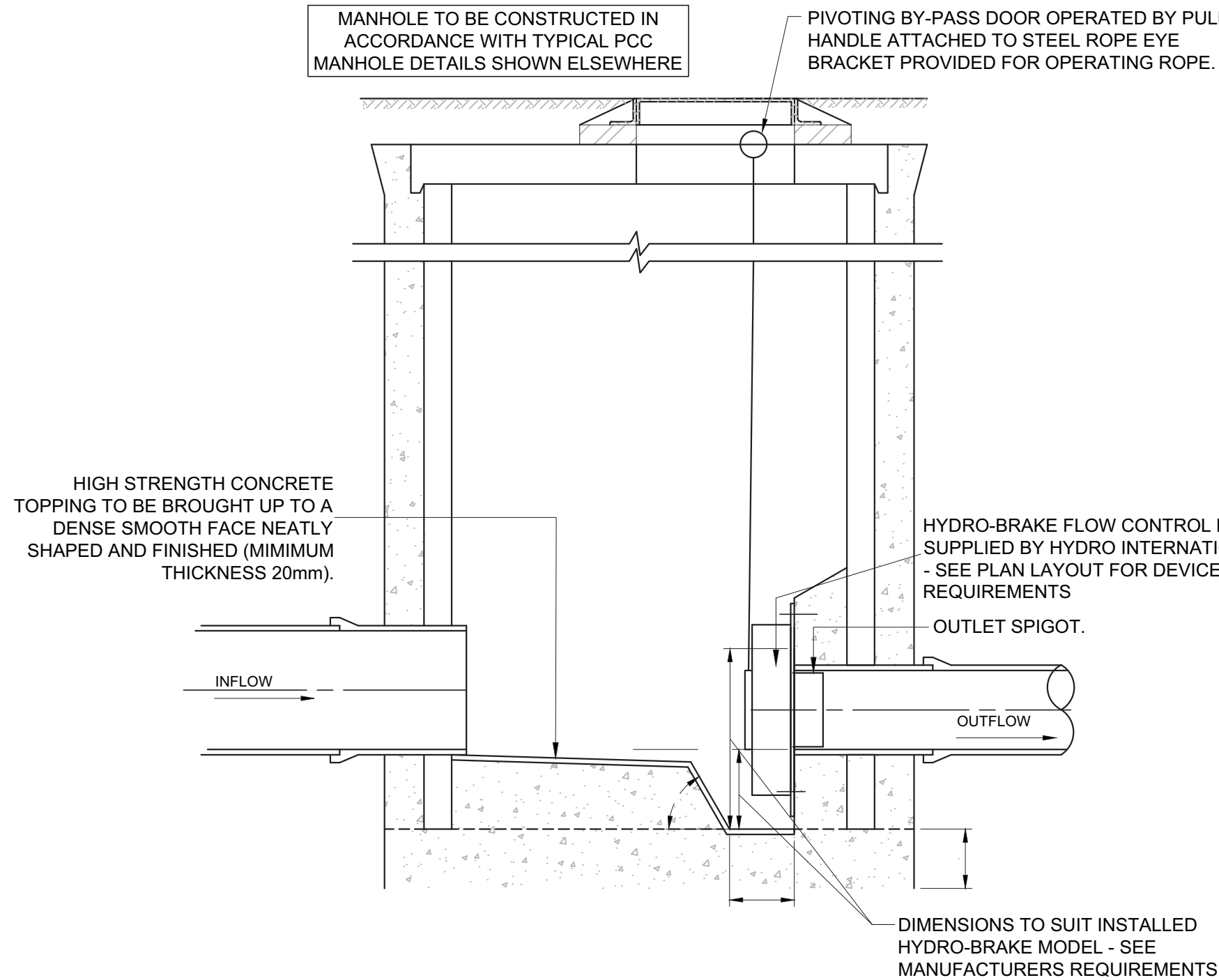
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 - ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
 - REFER TO DRAINAGE LAYOUT 072071-CUR-XX-00-DR-C-90001 FOR THE LOCATION OF THE ATTENUATION TANK.
 - ATTENUATION TANK TO BE INSTALLED STRICTLY IN ACCORDANCE WITH THE MANUFACTURER'S REQUIREMENTS.
 - WHERE AN ALTERNATIVE ATTENUATION TANK DEVICE IS PREFERRED, IT WILL BE SUBJECT TO REDESIGN TO CONFIRM WHETHER THE SYSTEM HAS CAPACITY.
 - THE DESIGN OF THE TANK SHOULD BE PROVIDED BY THE MANUFACTURER OR SUPPLIER TO ENSURE THE TANK IS SUFFICIENT FOR THE SITE SPECIFIC CRITERIA.
 - THE TANK DESIGN SHOULD INCORPORATE:
 - CRATES SUBJECT TO REGULAR HEAVY VEHICLE LOADING,
 - SUITABLE MAINTENANCE ACCESS; AND
 - VENTING TO PREVENT TRAPPED AIR POCKETS.
 - THE STRENGTH OF THE TANK SHOULD COMPLY WITH CIRIA C680 STRUCTURAL DESIGN OF MODULAR GEOCELLULAR DRAINAGE TANKS.
 - ACCESS FOR MAINTENANCE SHOULD BE IN ACCORDANCE WITH CIRIA GUIDANCE.
 - 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.
 - CONSTRUCTION AND INSTALLATION OF THE TANK SHOULD BE STRICTLY IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION REQUIREMENTS.
 - THE CURRENT DESIGN OF THE TANK IS BASED ON USE OF ESS PLUVIAL CUBE 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.
 - 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.
 - FOR FULL DRAINAGE NOTES REFER TO DWG072071-CUR-XX-00-DR-C-90001

P02	ISSUED FOR DISCHARGE OF CONDITION	05.07.21	ATL	ATL
P01	STAGE 2 ISSUE	21.02.20	ATL	CD
Rev:	Description:	Date:	By:	Chkd:

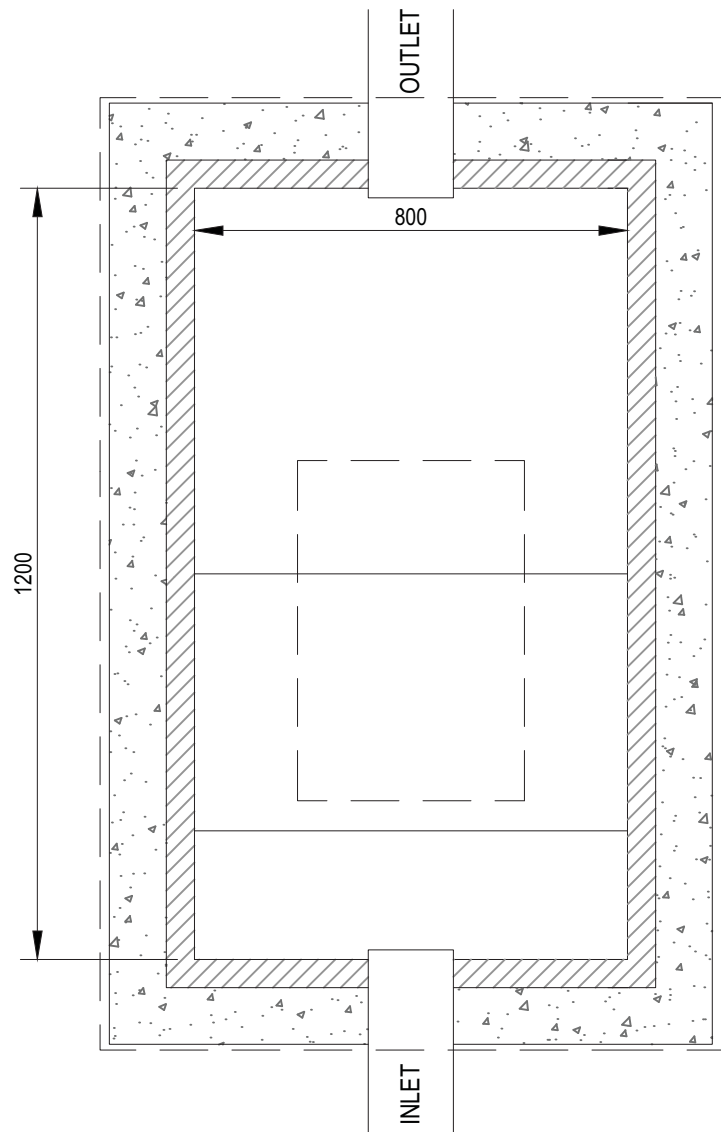
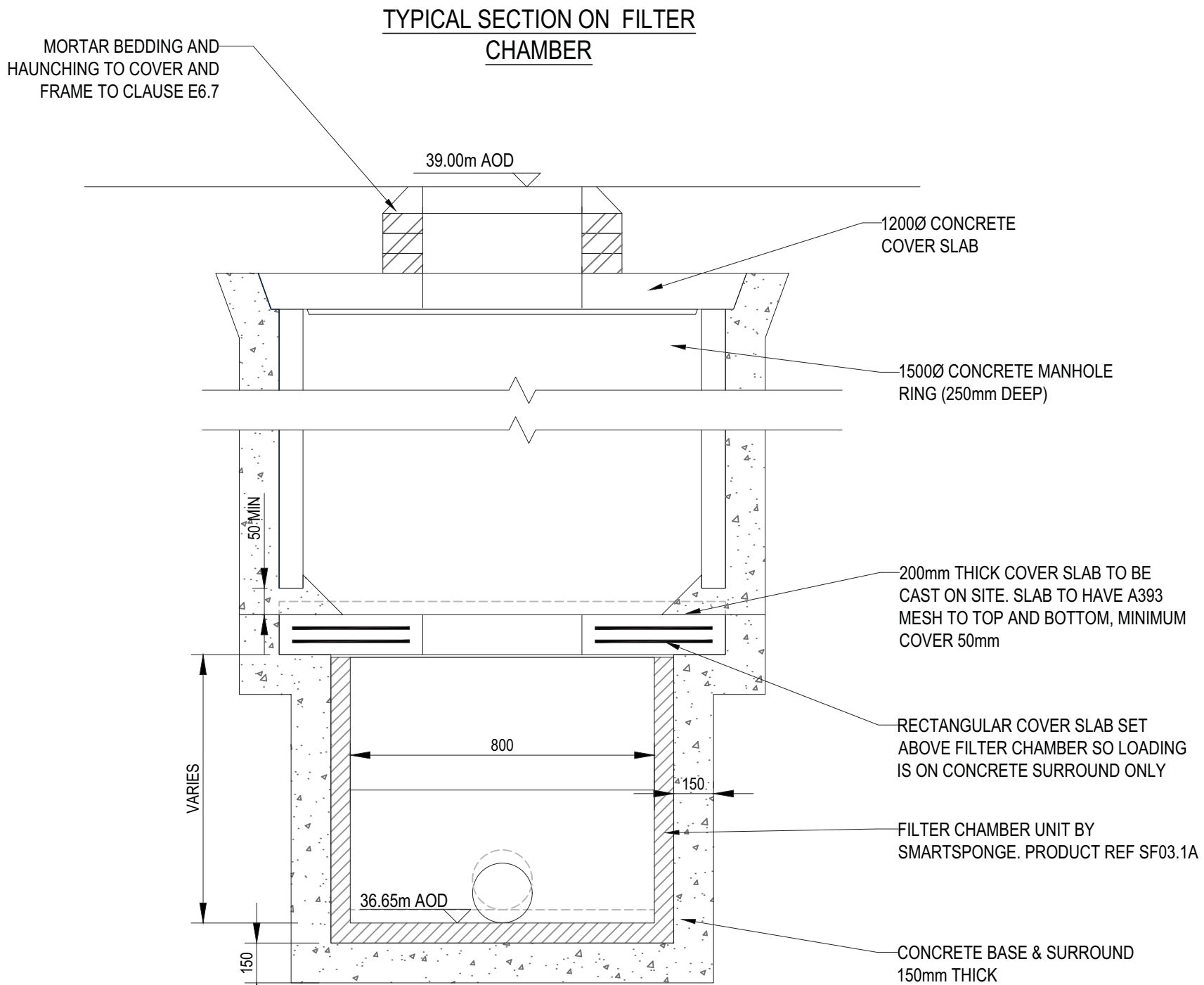
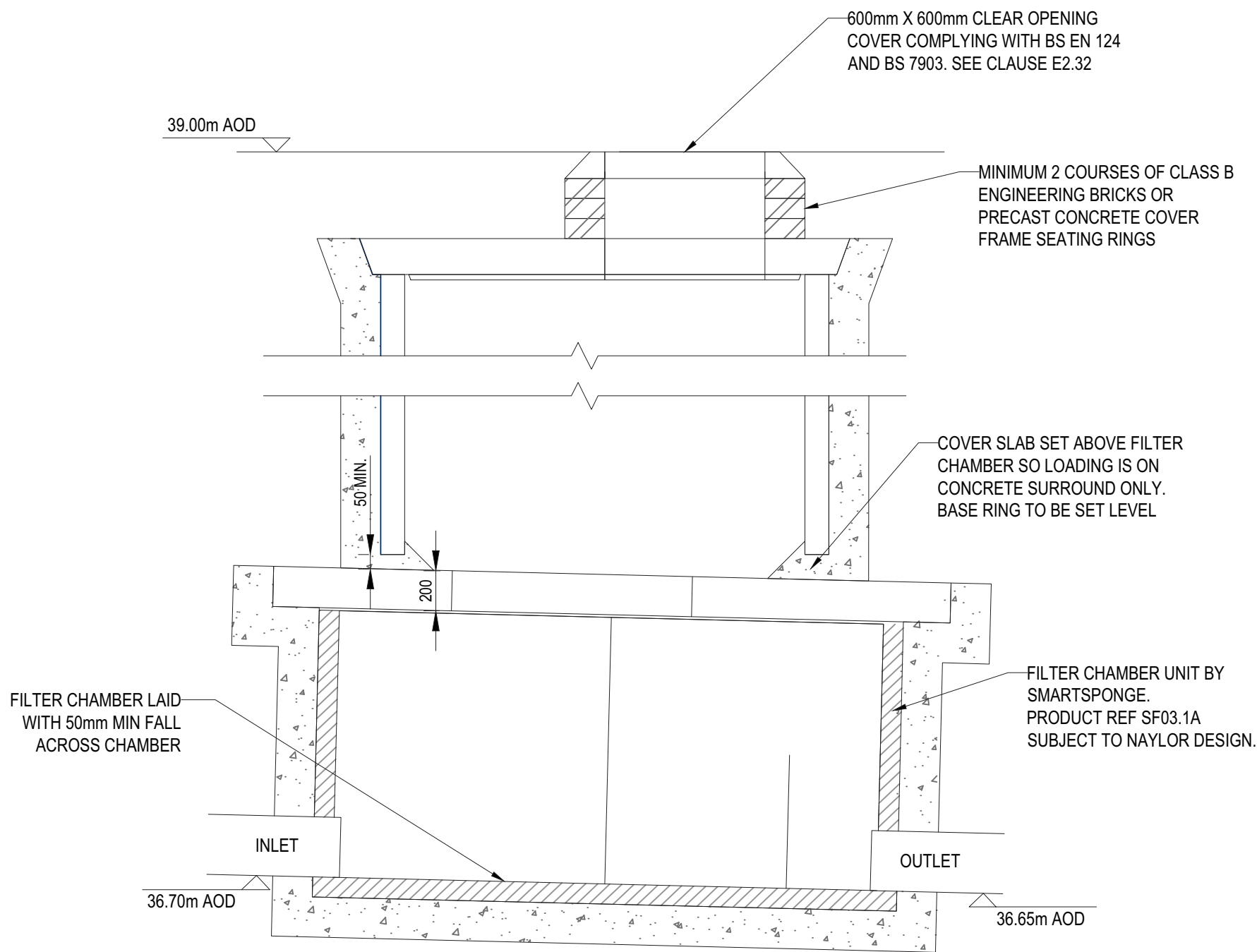
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Status: APPROVAL				
Project: KINCARDINE COURT				
Orig Title: TYPICAL DRAINAGE DETAILS SHEET 3				
Size: A1	Date: 21.02.20	Drawn By: ATL	Designed By: ATL	Checked By: CD
Scale: NTS				
Project No: 072071 - CUR - ZZ - ZZ - DR - D -	Originator: 92522	Zone: -P02	Level: -P02	Type: -P02



FLOW CONTROL MANHOLE (HYDRO-BRAKE) SW7



PLAN ON FILTER CHAMBER

GENERAL NOTES:

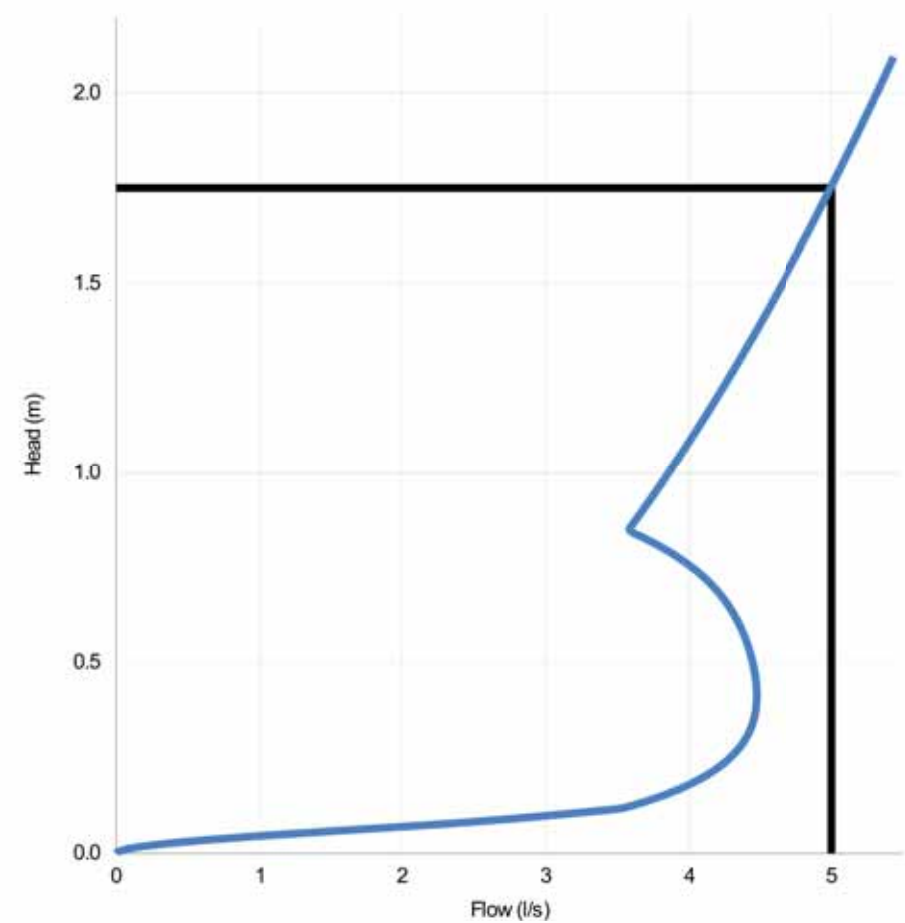
1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
2. DO NOT SCALE THIS DRAWING. ANY AMBIGUITIES, OMISSIONS AND ERRORS ON DRAWINGS SHALL BE BROUGHT TO THE ENGINEERS ATTENTION IMMEDIATELY. ALL DIMENSIONS MUST BE CHECKED / VERIFIED ON SITE.
3. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
9. FOR FULL DRAINAGE NOTES REFER TO DWG 072071-CUR-XX-00-DR-C-90001

Technical Specification

Control Point	Head (m)	Flow (l/s)
Primary Design	1.750	5.000
Flush-Flo	0.415	4.467
Kick-Flo®	0.847	3.570
Mean Flow		4.100



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Head (m)	Flow (l/s)
0.000	0.000
0.060	1.577
0.121	3.550
0.181	3.995
0.241	4.251
0.302	4.390
0.362	4.453
0.422	4.467
0.483	4.449
0.543	4.407
0.603	4.342
0.664	4.245
0.724	4.101
0.784	3.889
0.845	3.589
0.905	3.681
0.966	3.792
1.026	3.900
1.086	4.004
1.147	4.105
1.207	4.203
1.267	4.299
1.328	4.393
1.388	4.484
1.448	4.573
1.509	4.661
1.569	4.747
1.629	4.831
1.690	4.913
1.750	4.994

DESIGN ADVICE

The head/flow characteristics of this SHE-0095-5000-1750-5000 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	04/07/2021 19:01
Site	Kincardine Court
DESIGNER	Andrew Losty
Ref	072071



SHE-0095-5000-1750-5000
Hydro-Brake Optimum®

© 2018 Hydro International Ltd. Shearwater House, Clevedon Hill Estate, Victoria Road, Clevedon, BS21 7RD. Tel: 01275 876371 Fax: 01275 876379 Web: www.hydro-int.com Email: design@hydro-int.com

Technical Specification

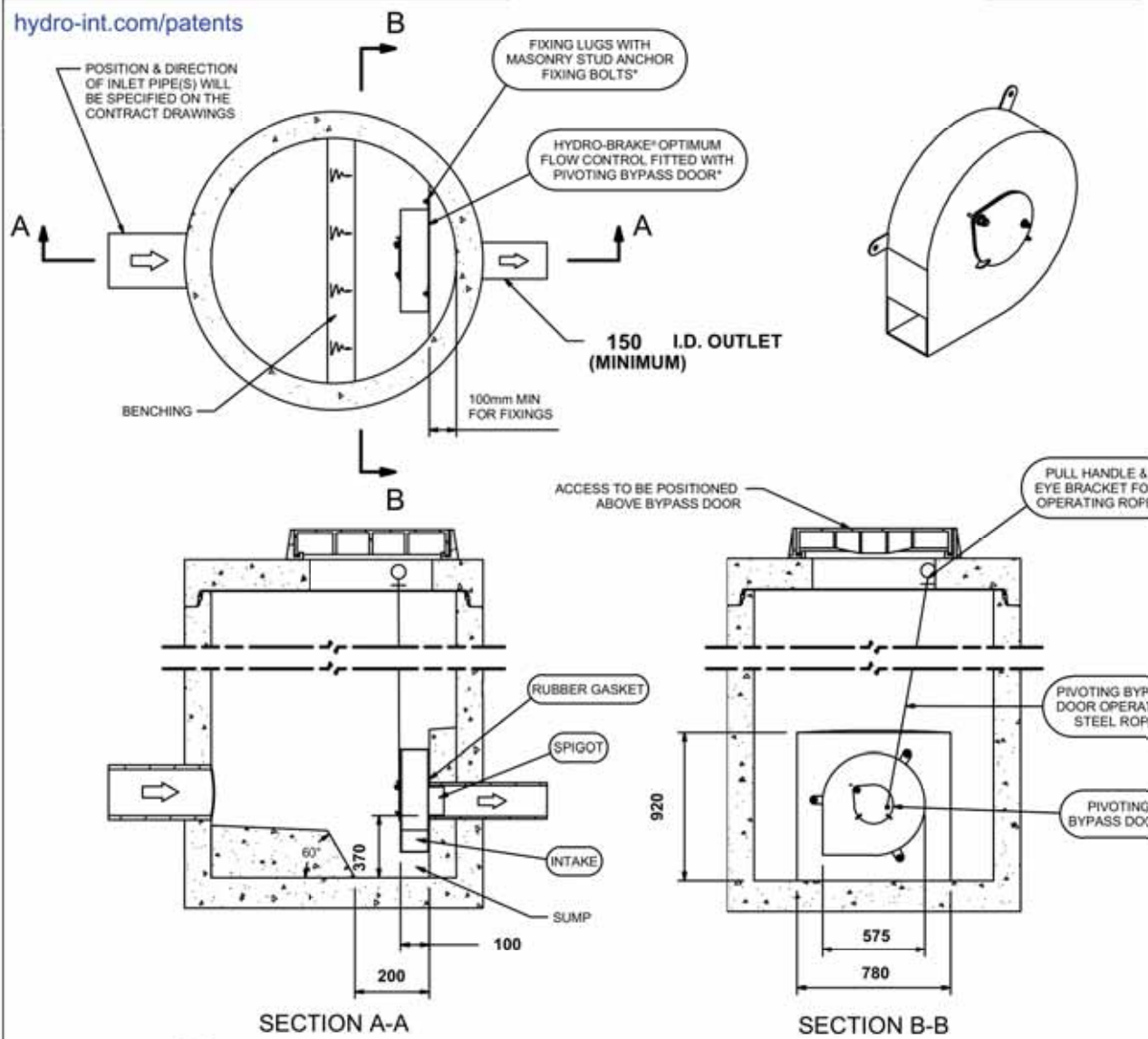
Control Point	Head (m)	Flow (l/s)
Primary Design	1.750	5.000
Flush-Flo™	0.415	4.467
Kick-Flo®	0.847	3.570
Mean Flow		4.100

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



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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-0095-5000-1750-5000 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	7/4/2021 7:01 PM
SITE	Kincardine Court
DESIGNER	Andrew Losty
REF	072071

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SHE-0095-5000-1750-5000
Hydro-Brake® Optimum

P01	ISSUED FOR DISCHARGE OF CONDITION	05.07.21	ATL	ATL
Rev:	Description:	Date:	By:	Chkd:



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Status:

APPROVAL

Project:

KINCARDINE COURT

Orig Title:

TYPICAL DRAINAGE DETAILS
SHEET 4

Size:	Date:	Drawn By:	Designed By:	Checked By:
A1	05.07.21	ATL	ATL	ATL
Scale:	NTS			
Project No:	Originator:	Zone:	Level:	Type: Discipline: Category / Number: Rev:

072071 - CUR - ZZ - ZZ - DR - D - 92522 -P02

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Date 04/07/2021 23:03
File Proposed Drainage 21.07....

Designed by losty_a
Checked by



Innovyze

Network 2019.1

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

PN	US/MH	Surcharged	Flooded	Flow / Cap.	Overflow (l/s)	Pipe	Status	Level Exceeded
	Name	Depth (m)	Volume (m³)			Flow (l/s)		
1.000	S1	-0.119	0.000	0.10		1.2		OK
1.001	S2	-0.097	0.000	0.27		4.2		OK
1.002	S3	-0.079	0.000	0.45		8.1		OK
2.000	S4	-0.099	0.000	0.25		4.0		OK
1.003	S5	0.152	0.000	0.04		1.2	SURCHARGED	
1.004	S6	0.212	0.000	0.03		1.4	SURCHARGED	
1.005	S7	0.373	0.000	0.15		4.5	SURCHARGED	
1.006	S8	0.362	0.000	0.46		13.7	SURCHARGED	
1.007	S9	0.395	0.000	0.23		25.5	SURCHARGED	

Simulation Criteria

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	1	Number of Storage Structures	1	Number of Real Time Controls	0

Rainfall Model	FSR	Ratio R	0.361
Region	England and Wales	Cv (Summer)	1.000
M5-60 (mm)	18.000	Cv (Winter)	1.000

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

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

PN	US/MH	Surcharged	Flooded	Flow / Cap.	Overflow (l/s)	Pipe	Status	Level Exceeded
	Name	Depth (m)	Volume (m³)			Flow (l/s)		
1.000	S1	0.078	0.000	0.27		3.5	SURCHARGED	
1.001	S2	0.114	0.000	0.77		12.1	SURCHARGED	
1.002	S3	0.154	0.000	1.30		23.5	SURCHARGED	
2.000	S4	-0.064	0.000	0.62		9.8	OK	
1.003	S5	0.371	0.000	0.17		5.9	SURCHARGED	
1.004	S6	0.429	0.000	0.15		6.8	SURCHARGED	
1.005	S7	0.586	0.000	0.14		4.2	SURCHARGED	
1.006	S8	0.366	0.000	0.14		4.2	SURCHARGED	
1.007	S9	0.398	0.000	0.04		4.2	SURCHARGED	

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Network 2019.1for Storm

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m ³ /ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coeffiecient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

M5-60 (mm)	18.000 Cv (Winter)	1.000
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Inertia Status ON

Climate Change (%)	0	0	40
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									Water
	US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow
PN	Name	Storm	Period	Change		Surcharge	Flood	Overflow	Act.
1.000	S1	15 Summer	100	+40%		30/15 Summer			
1.001	S2	15 Summer	100	+40%		30/15 Summer			
1.002	S3	360 Summer	100	+40%		30/15 Summer			
2.000	S4	360 Summer	100	+40%		100/15 Summer			
1.003	S5	360 Summer	100	+40%		1/240 Summer			
1.004	S6	360 Summer	100	+40%		1/120 Summer			
1.005	S7	360 Summer	100	+40%		1/30 Summer			
1.006	S8	360 Summer	100	+40%		1/30 Summer			
1.007	S9	360 Summer	100	+40%		1/30 Summer			

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Network 2019.1

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

PN	US/MH	Surcharged	Flooded	Flow / Cap.	Overflow (l/s)	Pipe	Status	Level Exceeded
	Name	Depth (m)	Volume (m³)			Flow (l/s)		
1.000	S1	0.840	0.000	0.54		6.9	FLOOD RISK	
1.001	S2	0.874	0.000	1.30		20.5	FLOOD RISK	
1.002	S3	0.837	0.000	0.51		9.2	FLOOD RISK	
2.000	S4	0.944	0.000	0.25		3.9	SURCHARGED	
1.003	S5	1.717	0.000	0.38		13.2	FLOOD RISK	
1.004	S6	1.774	0.000	0.33		15.1	FLOOD RISK	
1.005	S7	1.931	0.000	0.16		4.8	FLOOD RISK	
1.006	S8	0.367	0.000	0.16		4.8	SURCHARGED	
1.007	S9	0.399	0.000	0.04		4.8	SURCHARGED	

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