

05/05/2023

FAO: Eithne Fitzgerald

RE: Oldham Road

Your REF: Planning Permission (Ref. 125686/FO/2019)

In relation to planning condition 11, please see responses to your individual items in blue:

1. Verification reporting providing photographic evidence of construction.
[Please see appended, within Appendix A.](#)
2. Management and maintenance plan for the lifetime of the development which shall include the arrangements adoption by any public body or statutory undertaker, or any other arrangements to secure the operation of the sustainable drainage scheme throughout its lifetime.
[To confirm, none of the drainage is to be adopted and will be managed by the operator.](#)
[In relation to all other items, please see appended, within Appendix B.](#)
3. Timescale for implementation.
[The attenuation tank is the only form of sustainable drainage, which as of installation, has been continuously in use.](#)
4. The implementation of the management and maintenance plan shall be implemented in accordance with the timescales agreed and retained for as long as the development remains in use.
[Please see the below contact details from the lead operative for the Oldham Rd scheme:](#)
[Jake Matthews MRICS CIWFM](#)
[Head of Residential FM](#)
[E: jake.matthews@native-residential.com](mailto:jake.matthews@native-residential.com)
[M: +44 7976 509 686](tel:+447976509686)

With respect to the above, we believe the above sufficiently addresses planning condition 11.

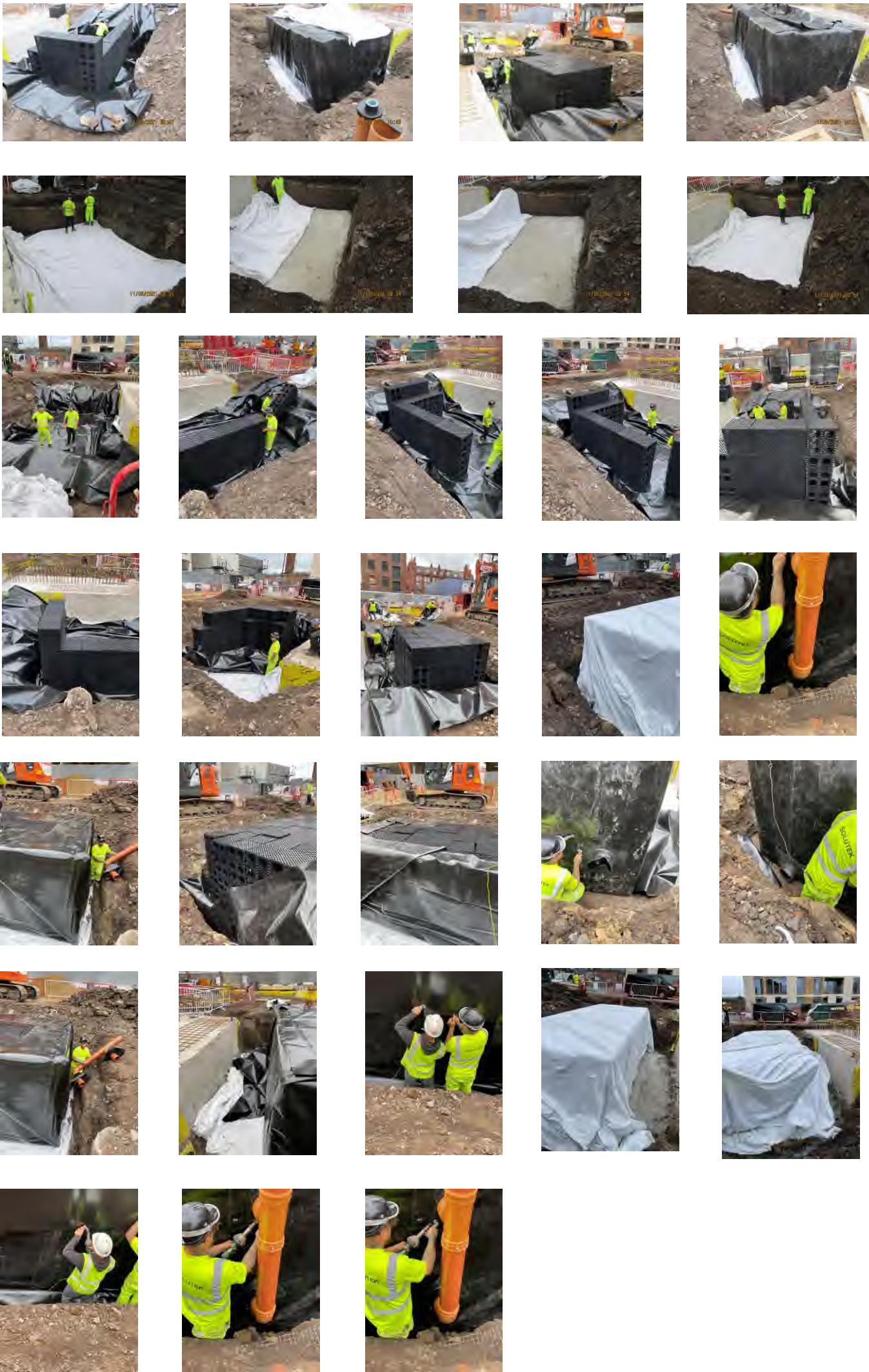
Yours Sincerely,

Vladimir Windle



APPENDIX A

Installation of Attenuation Tank



LOCATION INSPECTION REPORT/ HANDBACK AREA TO CLIENT
SQA-04

Contract No: 17526	Client: Midwest	Project: Oldham Road, Manchester
Date: 11/09/21	Engineer:	Material: Pluvial & Tuflex

Location _____

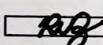
1. Visual inspection of geomembrane
2. Visual inspection of geomembrane joints
3. Visual inspection of geotextile
4. Completion of non-destructive testing
5. Number of small patch repairs
6. Number of tank connections

	✓
	✓
	✓
	✓
Quantity	X
Quantity	3

Clients representatives initials

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

*Delete above items where appropriate

Handback of Area to Client	SQA-05
I the duly appointed representative of the Client hereby take receipt of the completed installed area from Solutek, having inspected the works and confirmed it as being free from faults and installed as per the project requirements	
Clients Representative	
Name (Signature) 	Name (Print) <u>Richard van Zyl</u>
Date <u>11/09/21</u>	

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





ACCEPTANCE OF WORKING AREA

SQA-01

Contract No: 17526

Client: Midwest

Project: Oldham Road, Manchester

Date: 11/09/21

Engineer:

Material: Pluvial & Tuflex

Acceptance of Working Area

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

EXCAVATION
AREA

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

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

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

Excavation

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

This tank will be installed 5.5 length x 2.5 width.

Excavation/Tank size additional information:

2.5m HEIGHT = 29.56^{^3}

Solutek Representative

Name (Signature)

Name (Print)

Date

Clients Representative

Name (Signature)

Name (Print)

Date

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





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APPENDIX B



Modular Geo-Void Systems

Total Water Management

Maintenance & Access



 ALDERBURGH

Contents

Maintenance Pages 2 to 5

Maintenance

Introduction

The purpose of maintenance regimes and preventative design measures is to ensure the sustainability of the hydraulic operation of the installation. The typical stated life of geocellular installations is 50 years.

Geocellular units invariably comprise plastic elements, sometimes referred to as 'crates' usually arranged in a stacking or interlocking configuration. The types of units available are diverse; however, many units have a complex internal structure of columns, end plates, cover plates and bracing. The units typically have an initial void ratio of 95% and allow water to be stored and flow virtually unimpeded between adjacent units. However, this complex internal structure, which provides the strength, contributes to the low weight and the relatively low cost of the units, also makes them difficult to access internally for inspection and maintenance once constructed and backfilled.

The units in attenuation applications are generally enclosed in a water tight sealed membrane, protective fleece geotextile and buried to varying depths and so direct visual inspection of the units is not possible in nearly all cases.

Therefore maintenance strategies are required that protect the geocellular units and reduce the rate of performance loss over the life of the installation, along with an allowance that some storage volume loss will inevitably occur. This is the approach adopted by most suppliers.

Damage to geocellular units

The performance of the geocellular units and therefore the installation could be severely affected by damage to the units.

Care will be required in the storage,

installation, back-filling and protection pre commissioning of the geocellular units. Damaged units should be discarded and replaced before installation.

Unit handling

The units must be stored appropriately and undamaged prior to use as sharp edges for instance could pierce the membrane from within once backfilled. In addition damaged units are likely to affect the structural performance of the tank.

Root damage and vegetation

Many units are placed within landscaping areas. In these cases care will have to be taken to ensure large trees do not exist nearby and large specimen trees are not planted as part of a vegetation scheme within a defined exclusion zone created around the installation. This distance could vary depending on the species and size of the vegetation being considered. However, a reasonable guide is that tree roots will extend as far as the mature height of the tree and therefore for a small/medium tree, such as Hawthorn, Rowan (Mountain Ash) or Ornamental Cherry a distance of 6 to 7 metres would be appropriate. For larger trees such as Oak over 20 m distance would be recommended. Specific guidance can be found in the NHBC standards Chapter 4 Foundations section 4.2 'Building Near Trees' concerning trees in proximity of building works. It should also be borne in mind that trees and their root systems will actively seek out water sources, typically leaking drains, and therefore infiltration systems or poorly sealed attenuation tanks could see root penetration over time if large trees are situated nearby. Positioning of installations should not be under the canopy of mature trees as there is a risk of damage to both the units via the roots and by destabilising or affecting the health of the tree.

Membrane damage

The geocellular units are wrapped in a relatively vulnerable membrane and the effective operation of the installation depends on this being watertight. For attenuation and storage installations, damage to the membrane will compromise the effectiveness of the whole installation. A leaking membrane will overtime likely lead to wash out of the surrounding backfill, which could further damage the units by concentrating load, allowing external wash through of materials into the tank and lead to subsidence due to loss of material at the surface, damaging pavements above.

The installation of the membrane is a specialist operation with the seams welded and tested during construction. Once covered and buried to varying depths repairs are difficult to detect, locate and access for repair.

Installation precautions often call for the first 150 to 400mm of backfill to be either non-compacted or with hand driven 'light' equipment only. A protective geotechnical 'fleece' layer is also provided around the membrane and a sand blinding layer beneath the installation to distribute loadings and ensure that there is no large or sharp debris present which could perforate the membrane.

There is no practical remedial maintenance that can be undertaken for the membrane and once installed; it is designed to last the life of the installation.

Damage in construction or operation

Due to the modular nature of the units and the way installations are formed, there is generally little that can be done in the form of straightforward repairs. If there is a structural local failure then this is likely to propagate through the installation and if flotation occurs during construction the units are likely to become distorted resulting in the removal and reassembly of the whole installation. The units are also vulnerable to damage post commission from installation of new unrelated services above or future construction activities. Warning tape / mesh a minimum 300mm above the units shall be provided below the covering pavement / surface material to prevent excavation on top of the units and above ground clear permanent signs should be placed to warn of the location and depth to the units.

Construction records and the recommended maintenance regime should be passed on to the client, usually contained within the CDM Health and Safety Manual.

Siltation

To enable the units to perform well during their operation and design life, siltation has to be considered as the primary maintenance issue. The hydraulic performance of the units will be affected and the capacity will gradually be reduced when materials are washed into or settle out of the water being stored and discharged through the unit. Once material has collected in the geocellular units it is usually difficult to remove due to the internal structure of the units.

In operation the volume of silt or suspended solids carried within the runoff or water carried into the units is dependent on the type and area being drained. However, a key consideration and time period of high risk is during the construction period. During this phase of works, either from the installation directly or from general construction activities within the development, surface water will be highly loaded with silt and other debris. Precautions and measures will have to be undertaken to prevent surface water entering the installation during the construction period. This can be done by sealing the pipework to isolate the geocellular units until they are ready to commission.

Guidance exists; see Table 6.1 below and from manufactures for the percentage loss of capacity for an installation due to siltation that can be allowed for in design. The guidance indicates a percentage loss of capacity during a 50 year design life period of between 2 to 8.5%. However, it is understood that manufacturers and designers conservatively allow up to 10% loss for siltation due to material that cannot be removed in the hydraulic design considerations. Table 6.1 displays the silt loading levels for various categories of runoff surfaces.

Silt loading levels and potential loss of storage

Location:	Worse case silt load (TSS):* (kg/ha/yr)	Max. potential loss of storage after 50 years:
Highways	723	7%
Commercial	840	8.5%
Low Density Residential	340	3%
High Density Residential	755	8%
Car Parks	762	8%
Roofs	216	2%

*CIWEM give typical silt loadings (in terms of Total Suspended Solids). The information is included in the following reference - D'Arcy B J, Ellis J B, Ferrier R C, Jenkins A and Dils R (2000). Diffuse pollution impacts, the environmental and economic impacts of diffuse pollution in the UK. CIWEM.

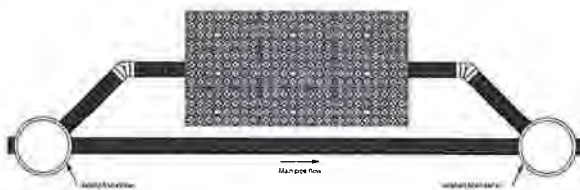
The general approach for siltation control is in the provision of external maintainable elements that prevent some materials entering the installation. An alternative approach is for low flow channels or sediment forebays to be provided. These can be regularly cleaned and maintained, thereby affording some protection to the main geocellular units/installation and slowing the rate, but not preventing, siltation. While these devices are generally effective they are subject to washout during storm events and very fine suspended solids will pass through. The sediment forebay is used in infiltration systems and allows an easily accessible section of the installation to be provided near to the inlet. Regular inspections of the forebay should be made and it should be cleaned as necessary.

In attenuation or storage installations a sediment tunnel is often specified and provided. This will allow the water to fill the tank efficiently and perform during use but also act as both the 'low flow' path and sediment trap where sediments are likely to build up. The tunnels are designed to be easily accessible and can be flushed through to clean.



Plan of geocellular installations showing a sediment tunnel and sediment forebay.

For both types of system, inspections are likely to be once a month initially after commissioning reducing to every three months and also after the first 'flood' event to assess the rate of siltation. Figure 6.1 above shows a plan view of the layout for both types of system.



Plan of geocellular installations showing an offline solution.

Installations should be provided with means of isolation via valves and it is recommended that offline bypass pipes are provided to allow low

flows to avoid the tank altogether, see Figure 6.2 above. Typically inspection chambers are provided at the inlet and outlet of the tank system. These will be easily accessible and may provide the means of undertaking survey work (CCTV) and also as the primary means of regular maintenance silt removal etc. Figure 6.3 below gives a diagrammatic view of a typical tank layout with fore and aft inspection chambers. The design of the catchpits can often include separators and silt traps to retain as much of the suspended materials as possible and assist in the maintenance.



Typical geocellular tank layout with inspection chambers/sediment catch pits details.

Inspection

The inspection of the units once installed and back filled is difficult to achieve for the entirety of the geocellular structure. In practice the internal structure can make it very difficult to undertake a CCTV survey, as the camera will snag and likely be lost. It is possible to undertake survey of the central pipework or manifold but this will leave the majority of the installation un-inspected. Nevertheless, these inspections can indicate the level of siltation, water levels and possibly unit damage present. To reach the geocellular units proprietary product specific units are often provided by the manufactures for inspection chambers etc. Should standard inspection chambers be used above units then consideration of the detailing will have to be made so that when loaded from above by vehicular movements etc. the load is not transmitted directly to the units resulting in damage. It should be noted that some geocellular units have an 'open' internal structure with little in the way of internal elements and these may be possible to CCTV survey and also jet out silt that may have built up. However, even if jetting is feasible large volumes of water will be required and the process can be expensive. The recommended frequency and type of inspection for geocellular tanks is given below in Table 6.2 below which is based on Table 13.2 from CIRIA C697 'The Suds Manual', but with the addition of the pre-commission survey.

Recommended maintenance schedule

Maintenance schedule	Required Action	Recommended Frequency
At Commission	Inspect all areas to ensure free from construction debris and silt	Once at Commission
Regular maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial actions.	Monthly for 3 months then 6 monthly
	Debris removal from catchment surface (where may cause risk to performance)	Monthly
	Where rainfall infiltrates into blocks from above, check surface filter for blockage by silt, algae or other matter. Remove and replace surface infiltration medium as necessary.	Monthly (and after large storms)
	Remove sediment from pre treatment structures	Annually or as required
Remedial actions	Repair / rehabilitation of inlets, outlet, overflows and vents.	As required
Monitoring	Inspect / check all inlets, outlet, overflows and vents to ensure in good condition and operating as required.	Annually and after large storms

Maintenance strategies

In order to protect geocellular installations from damage, siltation and reduce onerous maintenance and inspection, systems are designed to protect the tanks from direct damage and intercept suspended solids. Recommended design measures and good practise to include in the specification for the installation are given below:

- Tanks are recommended to be designed to be “off-line” but “on-line” tanks incorporating a low flow bypass pipeline usually minimum 150mm in diameter is usually acceptable.
- Silt traps, hydrodynamic separators or similar should be installed “upstream” of the tank inlets.
- Allowance should be made for siltation and a percentage loss of capacity agreed over the design life of the installation.
- Where direct connections are to be made a temporary geotextile is recommended to be placed over/ around the units inlet pipes to prevent silt ingress during construction. This is removed prior to final commissioning.
- Isolation / Penstock control units should be provided to isolate the installation for maintenance and to prevent / control contaminated flows.
- Geocellular installation pipework / manifolds shall be CCTV accessible for inspection.
- No large shrubs to be planted over the geocellular installation plus or within 3m in all directions and 6m from small/medium specimen tree planting. Large trees such as Oaks should not be planted within 20m of the installation.
- Geocellular installation should not be constructed beneath the existing or the predicted full mature canopy of trees.
- A specialist contractor must be used for the sealing of the membrane which should be by automatic heat welding unit. Use of taped seams even on soakaway installations is not recommended.
- Warning tapes or a grid should be provided 300mm above the installation to visually indicate that there is a buried structure.
- Permanent above ground signage detailing location and depth should be provided.
- A pre agreed maintenance and inspection regime should be in place at handover to the client.

PLUVIAL CUBE HEAVY DUTY MODULE – DATA SHEET

Pluvial Cube Module Dimensions* (mm)	Module Configuration	Units per m ³	Module Volume (m ³)	Storage Volume (m ³)
500 (L) x 500 (W) x 550 (D)	Single	7.27	0.1375	0.132
500 (L) x 500 (W) x 1075 (D)	Double	3.72	0.2688	0.258
500 (L) x 500 (W) x 1600 (D)	Triple	2.5	0.4	0.384

* Bespoke modules with different configuration available



Single Module



Double Module



Triple Module

Product Data	Heavy Duty Pluvial Cube Module
Application	Stormwater Management
Average Weight (kg) – single module	8
Compressive Strength* (kN/m ²)	400
Lateral Strength* (kN/m ²)	225
Creep Rupture Strength (kN/m ²)	317
Creep Rupture Lateral Strength (kN/m ²)	201
Long Term Creep Testing** (kN/m ²)	200
Void Ratio (%)	96
Surface Void Ratio (%)	Greater than 90
Minimum Backfill Cover Landscaped areas# (mm)	450
Material	Polypropylene
Chemical resistance	Good
Bacterial Resistance	Good
UV Resistance	Good

Note: Other Modules with Compressive Strength more than 1500 kN/m² available

* Modules tested using UKAS calibrated test machine, range 0 – 60 Tons, UDL, loading rate 0.2 kN/m²

** Modules tested for long term creep testing for 90, 180 and 208 days / 5000 hours = 50 years design life.

Any cover less than 450 mm and for Min. backfill cover for trafficked areas – contact ESS design department

Maximum depth to invert based on soil type dense sand and gravel for different soil type–contact ESS design department

Note: All Alderburgh products are manufactured to the highest quality, being subjected to rigid quality control. However the company cannot control conditions of application and use of its products, thus any warranty, written or implied, is given in good faith for materials only. Alderburgh Ltd will not accept any responsibility for damage or injury arising from storage handling, misapplication or misuse of its products. All transactions are subject to our standard condition of sales, copies of which are available on request. Product design and specification are subject to change without further notice

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Fax: 01706 376785
Email: sales@alderburgh.com



DRAINAGE NOTES

- THE CONTRACTOR SHALL ALLOW FOR THE PROTECTION, TEMPORARY AND PERMANENT SUPPORT AND DIVERSION WORKS AS NECESSARY, TO ALL EXISTING SERVICES TO THE SATISFACTION OF THE PUBLIC UTILITIES.
- THE CONTRACTOR SHALL ALLOW FOR DEALING WITH SURFACE WATER RUN-OFF INTO EXCAVATIONS AND FROM GROUNDWATER BY MEANS OF SUMPS, PUMPING AND DE-WATERING AS APPROPRIATE, IN ORDER TO KEEP THE EXCAVATION AS REASONABLY DRY AS POSSIBLE DURING THE CONSTRUCTION OF THE WORKS.
- ALL PRIVATE DRAINAGE WITHIN THE SITE IS TO COMPLY WITH THE REQUIREMENTS OF BSEN752 AND BUILDING REGULATIONS PART H. WHERE APPROPRIATE, ALL ADOPTED DRAINAGE SHALL BE DESIGN AND CONSTRUCTED IN ACCORDANCE WITH SEWERS FOR ADOPTION 8th EDITION AND THE ADOPTING AUTHORITIES STANDARD REQUIREMENTS.
- ALL PRIVATE DRAINAGE PIPES TO BE LAID IN TRENCHES BEDDED CLASS 'B' ON SINGLE SIZED AGGREGATE AND BACKFILLED WITH APPROVED SELECTED FILL (40mm DOWN) REUSED FROM EXCAVATED MATERIAL. UNDER BUILDINGS AND WHERE COVER TO INVERT IS LESS THAN 1200mm UNDER TRAFFICKED AREAS PIPES TO BE CAST IN CONCRETE (CLASS Z BEDDING), CLASS 'S' BED AND SURROUND MAY BE REQUIRED FOR SEWERS TO BE ADOPTED. REFER TO SPECIFIC DRAWINGS FOR FURTHER INFORMATION.
- SELECTED BACKFILL MATERIAL SHALL CONSIST OF UNIFORM EXCAVATED MATERIAL, FREE FROM STONES LARGER THAN 40mm, CLAY LUMPS LARGER THAN 75mm, TREE ROOTS, CONTAMINATED MATERIAL. SELECTED BACKFILL MATERIAL IS TO BE PLACED IN LAYERS NOT EXCEEDING 150mm THICKNESS. THE MATERIAL SHALL BE COMPACTED TO ACHIEVE NOT LESS THAN 95% OF THE MAXIMUM DRY DENSITY AS DETERMINED IN LABORATORY
- CONCRETE PROTECTION TO PIPEWORK IS TO BE PROVIDED AS FOLLOWS:
 - ALL PIPEWORK WITHIN PEDESTRIAN/SOFT AREAS WITH LESS THAN 600mm COVER.
 - ALL PIPEWORK SUBJECT TO VEHICULAR OVERRUN WITH LESS THAN 1.2m COVER.
- ALL PIPEWORK WITHIN MANHOLES ARE TO BE LAID SOFFIT TO SOFFIT (U.N.O). ALL CHAMBER INVERT LEVELS ARE FOR THE OUTGOING PIPE LEVELS. BACKDROP PIPEWORK SHALL BE CONNECTED AT SOFFIT TO SOFFIT WITH THE RODDING ACCESS LEVEL SPECIFIED.
- ALL DRAINS TO BE LAID ACCURATELY TO LINE AND LEVEL IN STRICT ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS.
- ANY GRADIENTS OF DRAINS INDICATED ARE INDICATIVE ONLY AND THE CONTRACTOR SHALL INSTALL THE DRAINS TO THE SPECIFIED LEVELS SHOWN FOR EACH MANHOLE (U.N.O). CATCHPIT INVERT LEVELS ARE FOR THE OUTGOING PIPE WITH THE SUMP LEVEL SPECIFIED SEPARATELY.
- CO-ORDINATE SETTING OUT INFORMATION FOR MANHOLES IS TO THE INTERSECTION THE DRAINS AND NOT THE CENTRE OF THE MANHOLE.
- COVER LEVELS OF THE MANHOLES ARE PROVISIONAL AND SUBJECT TO ADJUSTMENT ON SITE TO SUIT THE FINISHED GROUND LEVELS. ALL EXTERNAL WORKS CONSTRUCTION AREAS

TO BE AS LOCATED BY THE ARCHITECT.

- MANHOLE COVERS AND FRAMES ARE TO BE IN ACCORDANCE WITH BSEN124 AND THE FOLLOWING:
 - VEHICULAR AREAS: CLASS D400 (E600 IN VULNERABLE SERVICE YARD LOCATIONS), DOUBLE TRIANGULAR, 150mm DEEP DUCTILE IRON COVER AND FRAME WITH THREE POINT COVER SEATING, BADGED FW OR SW FOR FOUL OR SURFACE WATER DRAINAGE.
 - PEDESTRIAN AREAS: CLASS B125, 100mm DEEP, BADGED FW OR SW FOR FOUL OR SURFACE WATER DRAINAGE.
- POSITIONS AND SIZES OF ABOVE GROUND FOUL AND SURFACE WATER DRAINAGE CONNECTIONS ARE TO BE CONFIRMED PRIOR TO CONSTRUCTION WITH THE ARCHITECT & M&E ENGINEER.
- GULLY GRATINGS AND STEEL CHANNEL COVERS ARE TO BE IN ACCORDANCE WITH BSEN124 AS FOLLOWS:
 - AREAS SUBJECT TO VEHICULAR OVERRUN: CLASS D400 MINIMUM.
 - AREAS NOT SUBJECT TO REGULAR VEHICLE OVERRUN (ADJACENT TO KERBS ETC): CLASS C250.
 - GULLY GRATES ADJACENT TO KERBS SHALL BE HINGED ON THE SIDE OF THE TRAFFIC DIRECTION (LEFT HAND SIDE).
- ALL BRICKWORK IN CONNECTION WITH DRAINAGE IS TO BE SOLID CLASS B ENGINEERING BRICK TO BS3921.
- ALL PRECAST CONCRETE PIPES, CHAMBER PRODUCTS AND ROAD GULLIES SHALL BE TO BS5911 AND BE KITEMARKED.
- ALL DRAINAGE INSITU CONCRETE SHALL BE GEN3 (U.N.O).
- ALL INSITU AND CONCRETE PRODUCTS SHALL COMPLY WITH THE REQUIREMENTS FOR SULPHATE EXPOSURE IN ACCORDANCE WITH BRE SPECIAL DIGEST 1, CONCRETE IN AGGRESSIVE GROUND (2001) PART 1: TABLE 2.

- UPON COMPLETION OF THE WORKS THE CONTRACTOR SHALL CLEAN ALL DRAINAGE BY JETTING, REMOVING ALL DEBRIS FROM SITE. NO DEBRIS SHALL BE PERMITTED TO ENTER THE EXISTING DRAINAGE SYSTEM.
- CONSTRUCTION JOINTS IN CONCRETE SURROUND MUST NOT BE WITHIN 150MM OF CHAMBER/SHAFT RING JOINTS.
- ROCKER PIPES TO BE SURROUNDED WITH CONCRETE LOCATED 150mm MINIMUM 200mm MAXIMUM FROM THE FIRST FLEXIBLE JOINT TO THE MANHOLE WALL.
- SOFT SPOTS IN THE TRENCH FORMATION SHALL BE REMOVED AND REPLACED WITH GRANULAR BEDDING UNLESS INSTRUCTED OTHERWISE.
- LATERAL CONNECTIONS IN BETWEEN MANHOLE RUNS SHALL BE FORMED BY USING PURPOSE MADE JUNCTION FITTINGS. BEND FITTINGS SHALL BE PROVIDED WHERE APPROPRIATE TO DIRECT THE FLOW INTO MAIN RUNS.
- IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO LIAISE WITH BUILDING CONTROL FOR APPROVALS, INTERIM INSPECTION, SNAGGING AND FINAL INSPECTIONS OF THEIR WORK.
- THE CONTRACTOR SHALL CONFIRM THE LOCATION OF ALL EXISTING STATUTORY UNDERTAKERS APPARATUS AND SERVICE CONNECTIONS ADJACENT TO AND CROSSING THE WORKS BY TRIAL PITS PRIOR TO COMMENCING MACHINE DIG.
- AT THE CONCLUSION OF THE WORKS THE CONTRACTOR SHALL PROVIDE A MARKED UP DRAWING TO RECORD ANY AS BUILT VARIATIONS NOT SHOWN ON THE DRAWINGS.
- THE DRAINAGE SYSTEM IS NOT DESIGNED TO ACCEPT UNTREATED EFFLUENT FROM A COMMERCIAL KITCHEN

CONTAINING GREASE AND OILS. REMOVAL OF GREASE AND OIL SHOULD BE MADE AT SOURCE USING A FLOOR MOUNTED ABOVE GROUND GREASE REMOVAL SYSTEM. IT IS RECOMMENDED THAT A MECHANICAL GREASE REMOVAL SYSTEM BE EMPLOYED FOR THIS PURPOSE NOT A PASSIVE SYSTEM.

28.PIPEWORK TO BE OF THE FOLLOWING MANUFACTURER: 100 / 150 / 225MM DIAMETER HEPWORTH SUPERSLEEVE VITRIFIED CLAY PIPES (40kN/mm CRUSHING STRENGTH), 300mm + TO BE CONCRETE CLASS M. ALTERNATIVELY 'POLYSEWER' UPVC DRAINAGE SYSTEM BY POLYPIPE WHEN INSTALLED IN LINE WITH THE MANUFACTURERS RECOMMENDATIONS. FILTER DRAINAGE TO BE PERFORATED HDPE.

29.ALL RWP, WPC & GULLY CONNECTIONS TO BE 100mm DIA UNO & ARE RODDABLE AT LOCATIONS ABOVE GROUND LEVEL.

30.ALL INSPECTION CHAMBERS WITH A DEPTH GREATER THAN 1.2m TO HAVE A 350mm DIAMETER REDUCING PLATE LOCATED BENEATH COVER AND FRAME TO PREVENT ACCESS.

GENERAL NOTES

- DRAWINGS ARE TO BE READ IN CONJUNCTION WITH ALL RELEVANT SPECIFICATIONS, ENGINEERS, ARCHITECTS & SERVICES DRAWINGS, INCLUDING APPROVED BUILDERS WORK DRAWINGS. CONTRACTOR TO NOTIFY ENGINEER OF DISCREPANCIES BETWEEN STRUCTURAL DRAWINGS AND SPECIFICATIONS OR OTHER DRAWINGS.
- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
- DO NOT SCALE FROM THIS DRAWING. WORK TO DIMENSIONS OR CO-ORDINATES PROVIDED. ALL LEVELS ARE IN METRES AND ALL DIMENSIONS ARE IN MILLIMETRES, UNLESS OTHERWISE NOTED. ANY AMBIGUITIES, OMISSIONS AND ERRORS ON DRAWINGS, SHALL BE BROUGHT TO THE ENGINEERS ATTENTION IMMEDIATELY.

DRAINAGE KEY

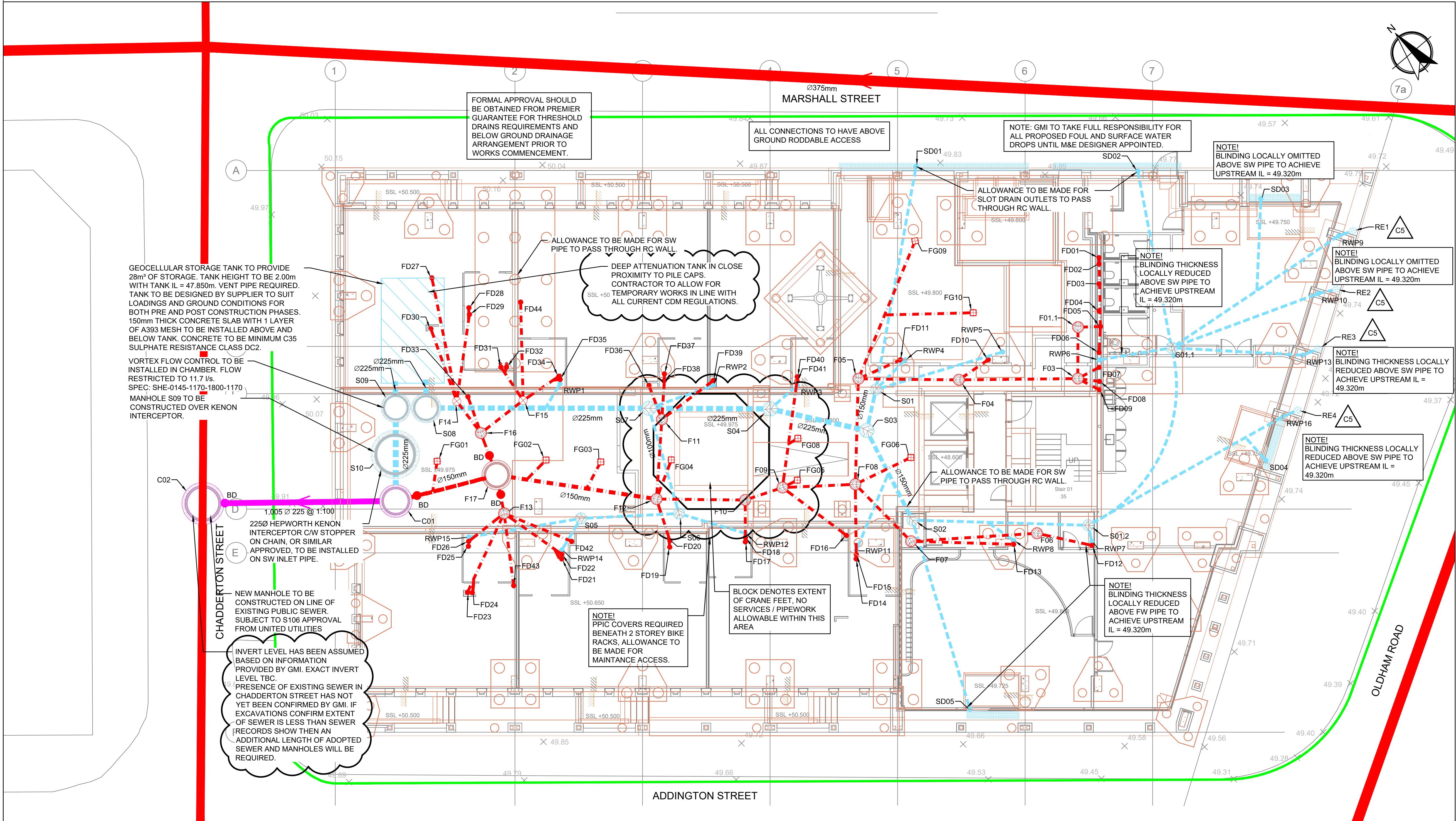
- EXISTING CW DRAIN
- EXISTING CW MANHOLE
- PROPOSED CW DRAIN
- PROPOSED CW MANHOLE
- PROPOSED FW DRAIN
- PROPOSED FW MANHOLE
- PROPOSED SW DRAIN
- PROPOSED SW MANHOLE
- SITE BOUNDARY

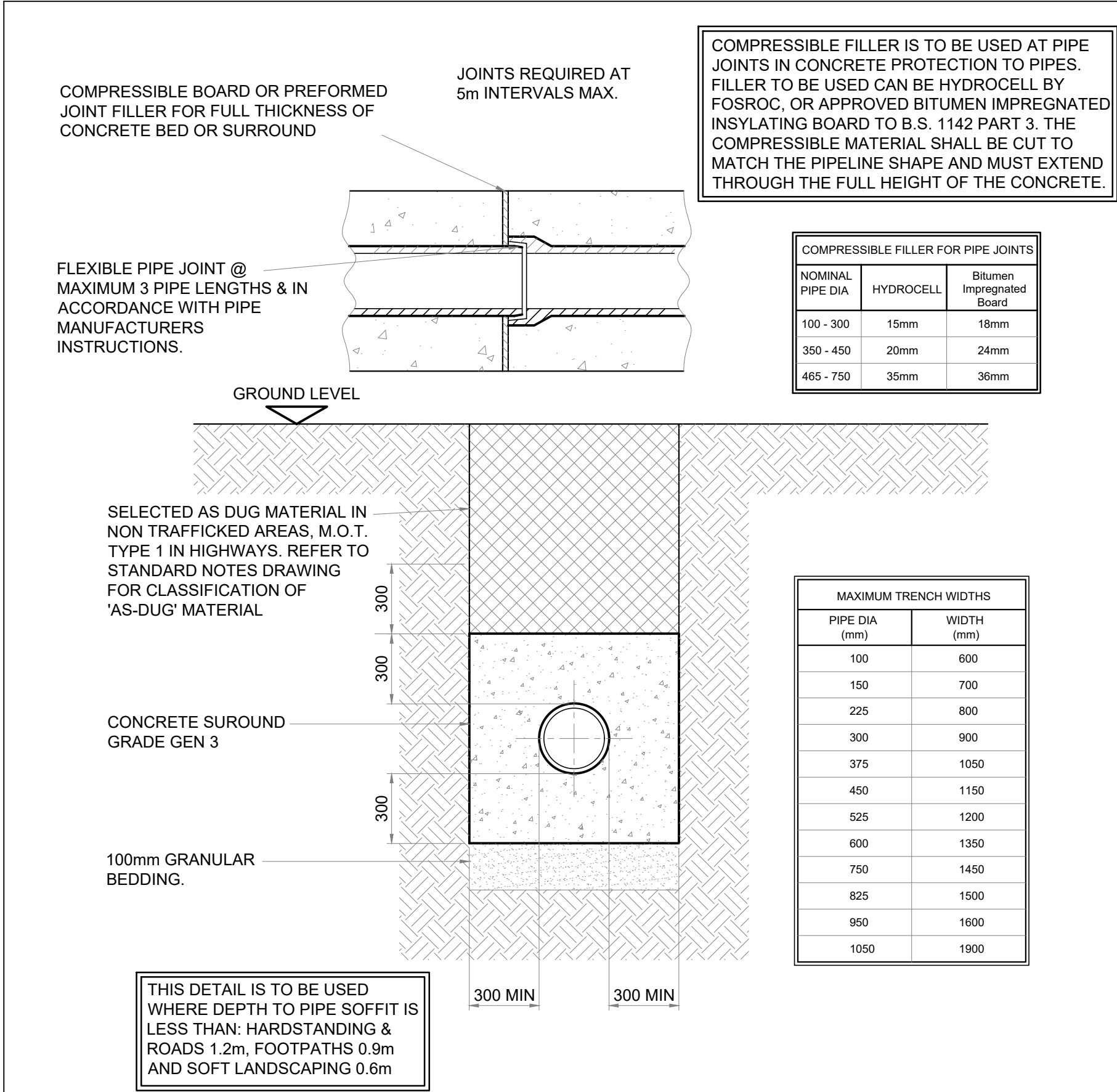
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C4	01.10.21	AS	EJD	ADDITIONAL DROPS ADDED
C3	21.09.21	AS	EJD	OUTFALL UPDATED
C2	02.08.21	AS	EJD	UPDATED TO SUIT LAYOUT
C1	12.05.21	AS	PG	ISSUED FOR CONSTRUCTION
No	DATE	DRAWN	REV'D	AMENDMENT

STATUS	PURPOSE OF ISSUE
A	CONSTRUCTION

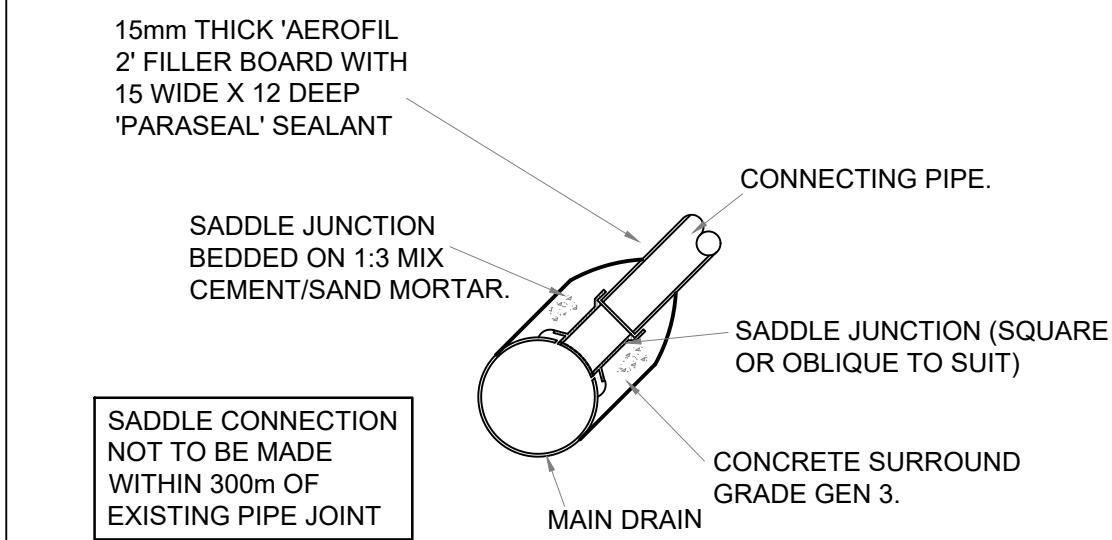
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CLIENT	GMI CONSTRUCTION		
PROJECT	OLDHAM ROAD, NEW CROSS,MANCHESTER		
DRAFTER	AS	ENGINEER	ED
TITLE	DRAINAGE GA		
SCALE	SHEET	DRAWING No	REV
1:100	A1	D464-RDG-00-ZZ-DR-C-0101	C5



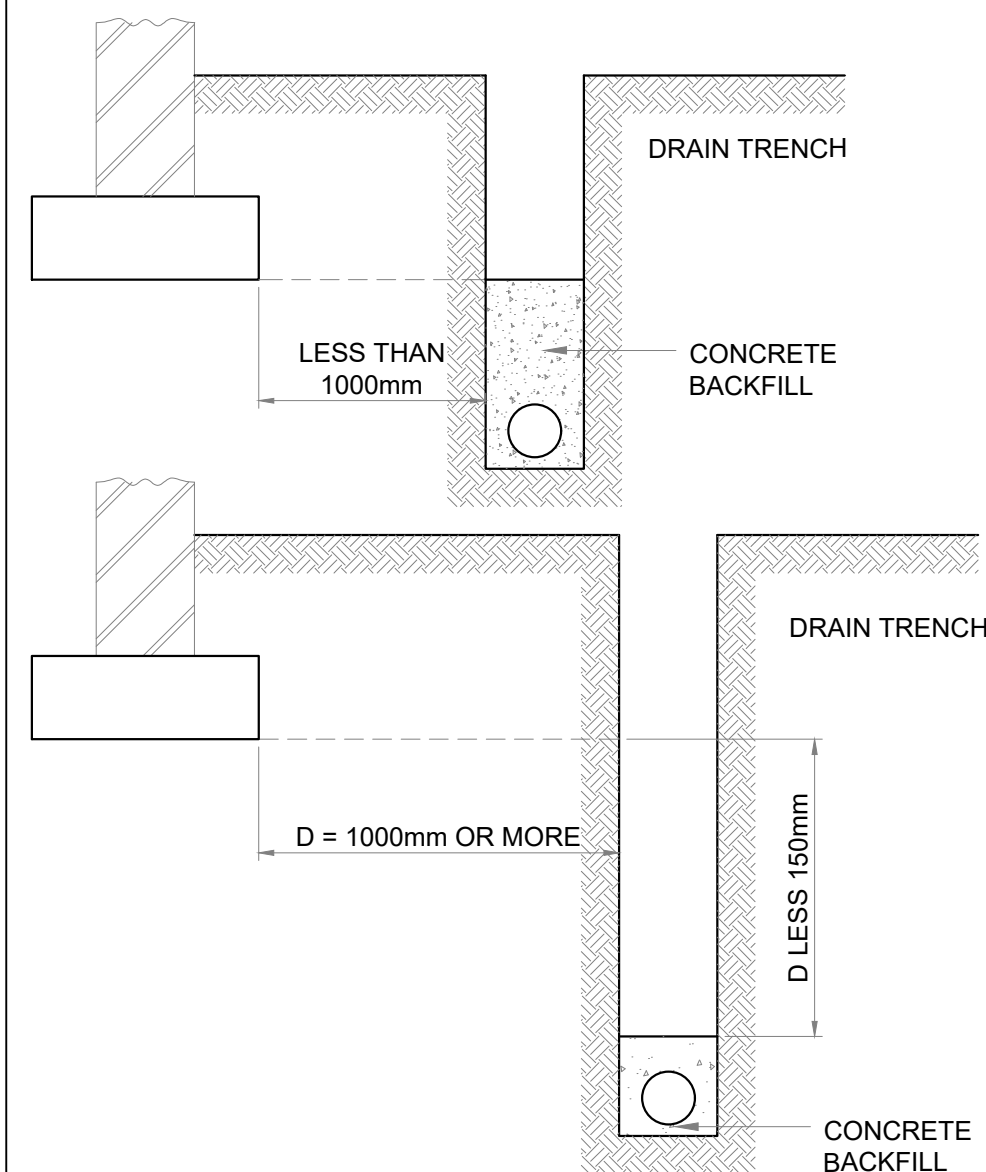


CLASS 'Z' PIPE BEDDING



SADDLE CONNECTION DETAIL

(DIAMETER OF MAIN DRAIN TO BE A MINIMUM OF DOUBLE THE SIZE OF THE CONNECTING PIPE. IN ALL OTHER CASES A PRE-FORMED JUNCTION IS TO BE USED.)



PIPE RUNS ADJACENT TO BUILDING

NOTES

- CONCRETE TO BE GRADE GEN 3
- JOINTS TO BE PROVIDED IN CONCRETE SURROUND AT NOT GREATER THAN 5.0m CENTRES. BUILDING REGULATIONS PART H1 PARA A11
- WHERE THE TRENCH IS WITHIN 1m OF THE BUILDING THE TRENCH SHALL BE FILLED WITH CONCRETE UP TO THE LOWEST LEVEL OF THE FOUNDATIONS. WHERE THE TRENCH IS FURTHER THAN 1000mm FROM THE BUILDING, THE TRENCH SHALL BE FILLED WITH CONCRETE UP TO A LEVEL, BELOW THE LOWEST LEVEL OF THE FOUNDATION, EQUAL TO THE DISTANCE FROM THE BUILDING LESS 150mm.

BS EN 1610:1997 Annex B Table B.15 Coarse Aggregate - Pipe Bedding						
Sieve Size (mm)	Percentage by mass passing BS sieves for nominal sizes			Single-sized Aggregate (mm)		
	Graded Aggregate (mm)	40 to 5	20 to 5	14 to 5	40	20
50.0	100	-----	-----	-----	100	-----
37.5	90 - 100	100	-----	-----	85 - 100	100
20.0	35 - 70	90 - 100	100	0 - 25	85 - 100	100
14.0	-----	-----	90 - 100	-----	85 - 100	100
10.0	10 - 40	30 - 60	50 - 85	0 - 5	0 - 25	0 - 50
5.0	0 - 5	0 - 10	0 - 10	-----	0 - 5	0 - 10
2.36	-----	-----	-----	-----	0 - 5	-----

RIGID PIPES BEDDING GRADING

BASED ON BS EN 1610 : 1997 TABLE B.15
FOR RIGID PIPES THE BEDDING SHOULD BE SINGLE SIZE MATERIAL OR GRADED MATERIAL FROM 5MM UP TO A MAX SIZE OF 10MM FOR 100MM PIPES; 14MM FOR 150MM PIPES; 20MM FOR 225MM TO 600MM PIPES; 40MM FOR OVER 675MM PIPES

SELECTED AS DUG MATERIAL IN NON TRAFFICKED AREAS, M.O.T. TYPE 1 IN HIGHWAYS.

SELECTED AS DUG MATERIAL. REFER TO STANDARD NOTES DRAWING FOR CLASSIFICATION OF 'AS DUG' MATERIAL

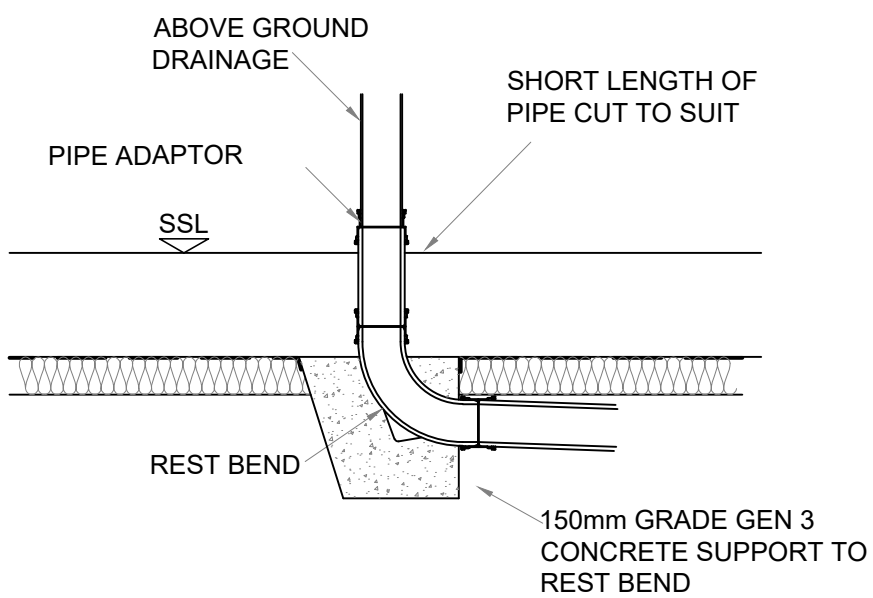
FOR GRANULAR BEDDING REFER TO TABLE

Y VALUE (BELOW PIPE):
HARD SPOTS/IRREGULAR TRENCH BOTTOM BC/4 (200mm MIN)
EVEN TRENCH BOTTOM BC/6 (100mm MIN)

BC = OUTSIDE DIAMETER

PIPE BEDDING CLASS B

BEDDING FACTOR 1.9



TYPICAL DETAIL OF CONNECTION OF INTERNAL DRAINAGE TO BELOW GROUND DRAINAGE

BACKFILL OPTIONS ABOVE THE MODULAR UNIT FOR FIRST 100mm :

- MIN 100mm THICK SELECTED EXCAVATED MATERIAL IF SEEN SUITABLE BY THE SITE ENGINEER.
- 100 mm THICK COARSE SAND OR CLASS 6H SELECTED GRANULAR MATERIAL.
- BACKERBOARD HD (IS A PREMOULDED BOARD FOR USE AS PROTECTION AGAINST BACKFILL)

BACKFILL MATERIAL WITHIN 300mm OF THE TANK TO BE FREE FROM PARTICLES EXCEEDING 40mm IN DIAMETER, IN ACCORDANCE WITH CLASS 8 MATERIAL TO SERIES 600, VOLUME 1, MCHW. BACKFILLING TO BE CARRIED OUT IN ACCORDANCE WITH THE MANUFACTURER'S GUIDANCE.

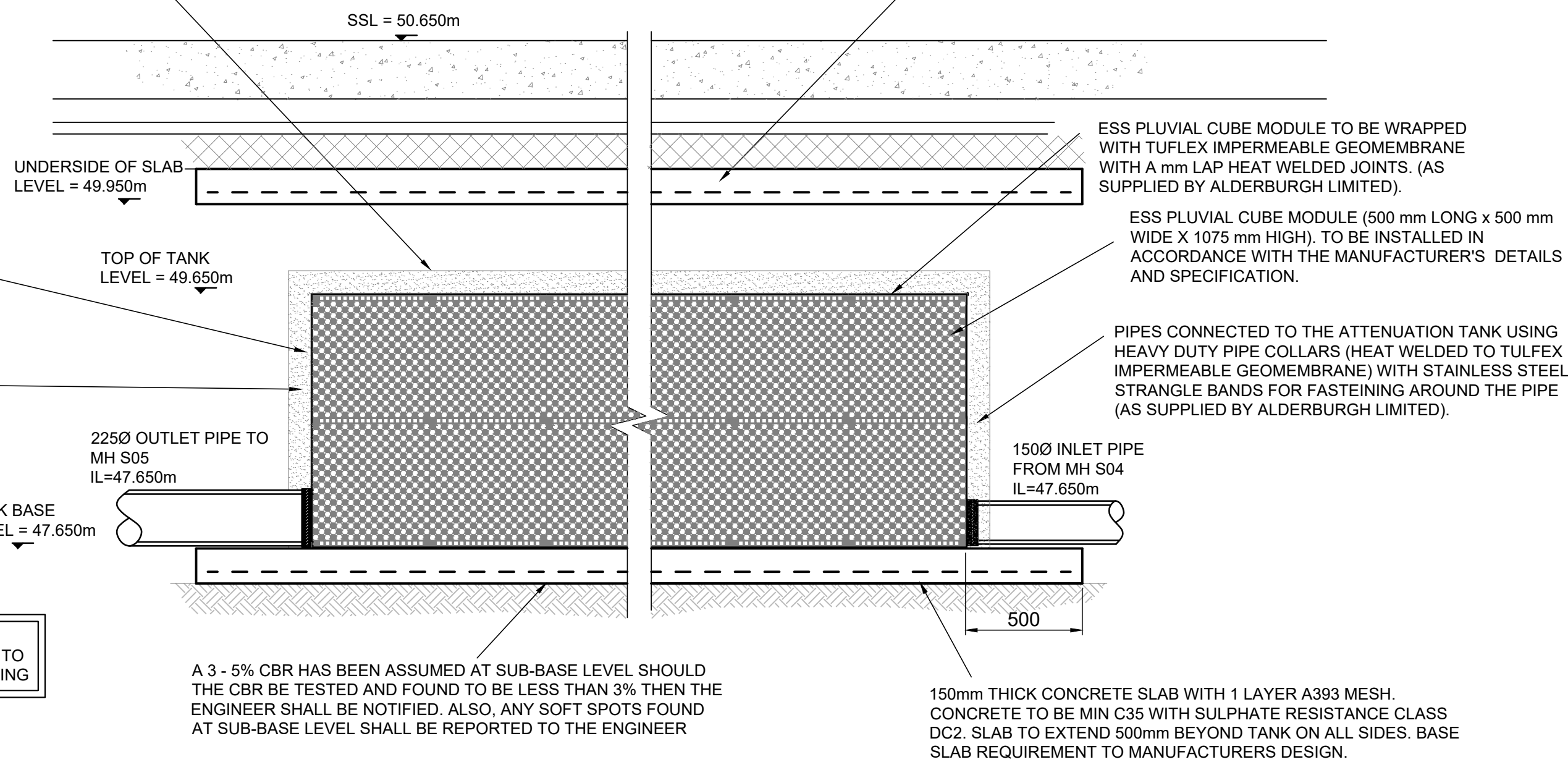
TO PROTECT THE WATERPROOF TUFLEX GEOMEMBRANE DURING BACKFILLING OPERATION, OVERLAY THE TOP AND SIDES WITH GEOTEX 300 PP NEEDLE PUNCHED NON-WOVEN PROTECTION GEOTEXTILE WITH A LAPPED JOINTS (AS SUPPLIED BY ALDERBURGH LIMITED).

WHERE SURCHARGING IN THE TEMPORARY CASE IS LIKELY TO OCCUR TEMPORARY WORKS DESIGNER MAY OPT TO SUBSTITUTE BACKFILL MATERIAL FOR 300mm THK ST1 LEAN MIX CONCRETE.

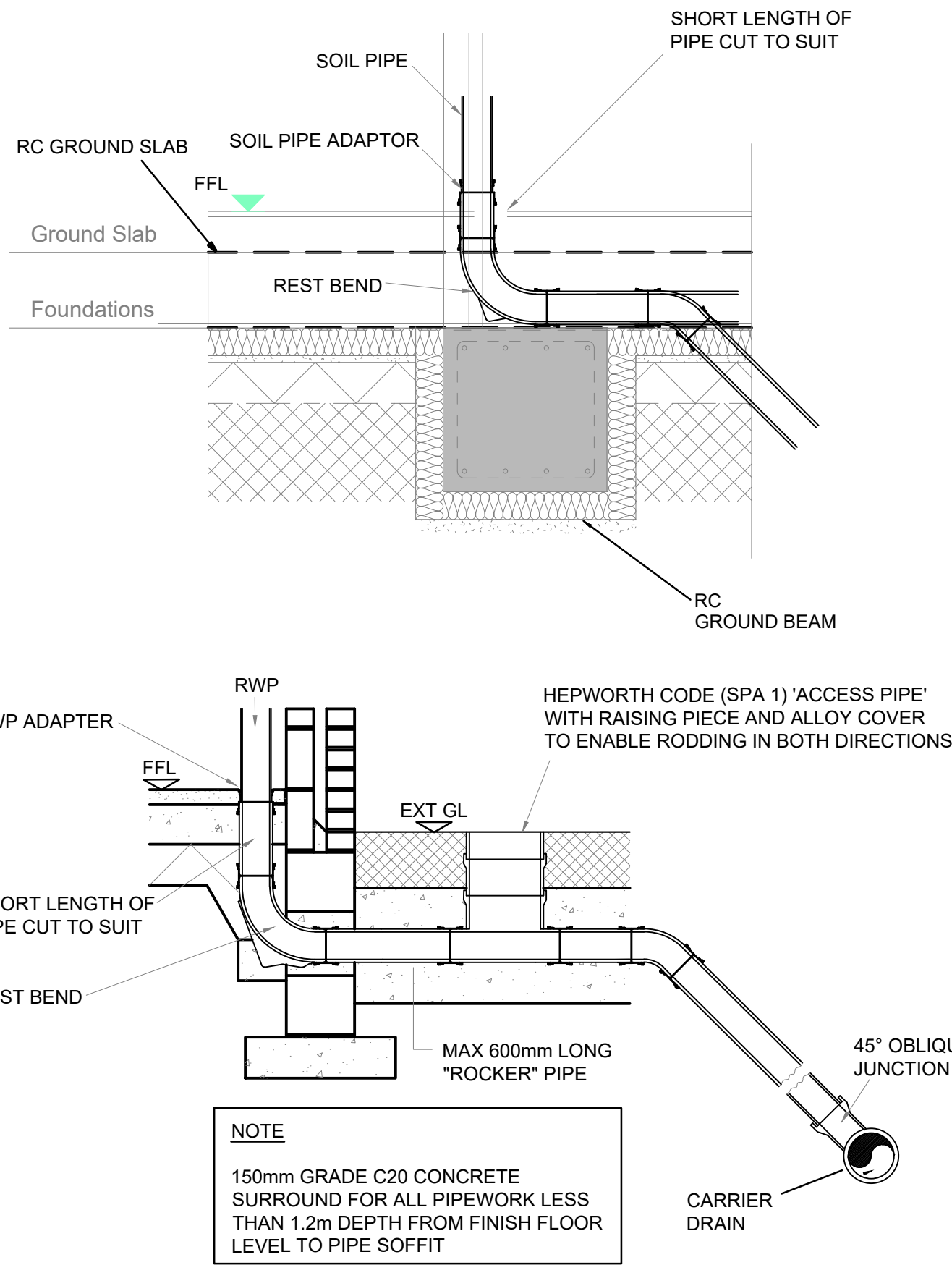
OTHERWISE BACKFILL OPTIONS AROUND THE SIDES OF MODULAR UNIT MAY BE:

- 100mm THICK SELECTED EXCAVATED MATERIAL IF SEEN SUITABLE BY THE SITE ENGINEER.
- BACKERBOARD HD (IS A PREMOULDED BOARD FOR USE AS PROTECTION AGAINST BACKFILL)

INLET/OUTLET PIPES MUST BE SUPPORTED WITH CONCRETE TO PROTECT IT DURING BACKFILLING



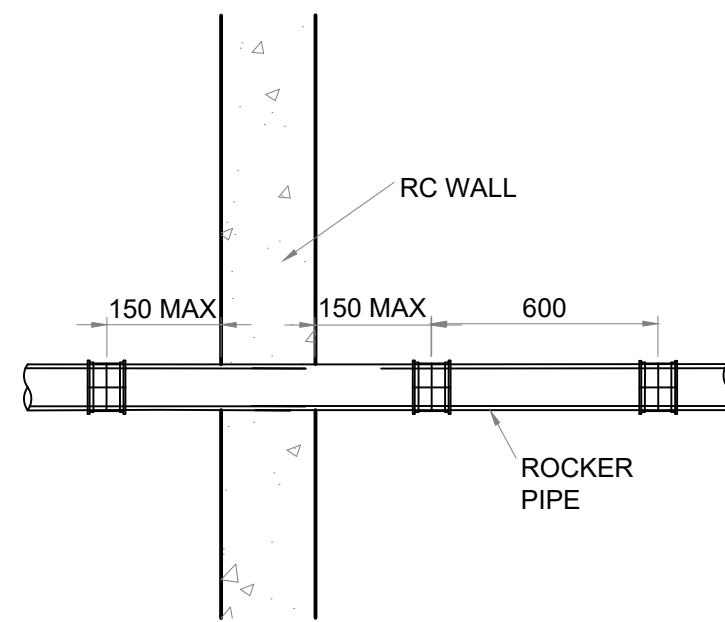
TYPICAL DETAILS OF ATTENUATION TANK BASED ON ALDERBURGH PLUVIAL CUBE MODULE UNITS



RWP CONNECTION DETAIL

TYPICAL RC WALL PENETRATION DETAIL

1:20



GENERAL NOTES

1. DRAWINGS ARE TO BE READ IN CONJUNCTION WITH ALL RELEVANT SPECIFICATIONS, ENGINEERS, ARCHITECTS & SERVICES DRAWINGS, INCLUDING APPROVED BUILDERS WORK DRAWINGS. CONTRACTOR TO NOTIFY ENGINEER OF DISCREPANCIES BETWEEN STRUCTURAL DRAWINGS AND SPECIFICATIONS OR OTHER DRAWINGS.

2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.

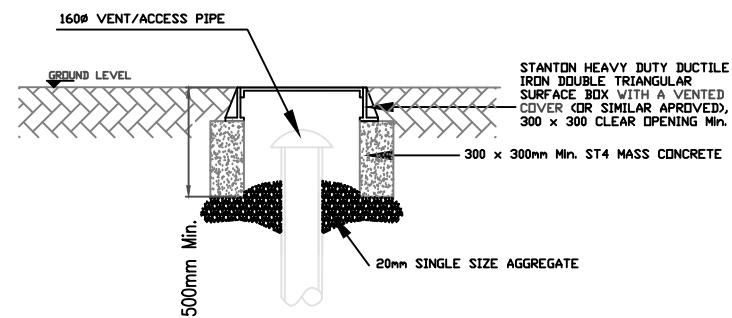
3. DO NOT SCALE FROM THIS DRAWING. WORK TO DIMENSIONS OR CO-ORDINATES PROVIDED. ALL LEVELS ARE IN METRES AND ALL DIMENSIONS ARE IN MILLIMETRES, UNLESS OTHERWISE NOTED. ANY AMBIGUITIES, OMISSIONS AND ERRORS ON DRAWINGS, SHALL BE BROUGHT TO THE ENGINEERS ATTENTION IMMEDIATELY.

C2	02.08.21	AS	ED	WALL PENETRATION DETAIL ADDED	
C1	12.05.21	AS	ED	ISSUED FOR CONSTRUCTION	
No	DATE	DRAWN	REV'D ENG.	AMENDMENT	

STATUS	PURPOSE OF ISSUE
A	CONSTRUCTION

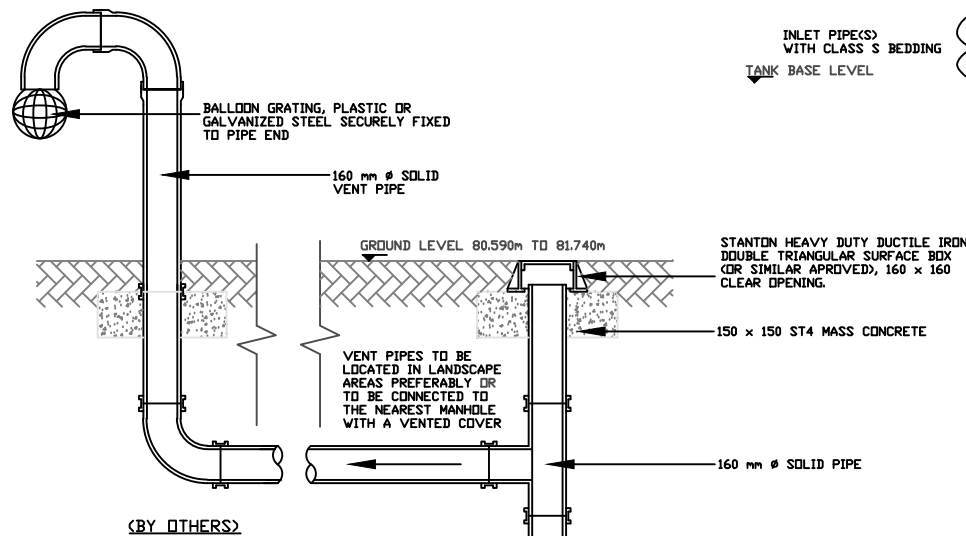
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CLIENT GMI CONSTRUCTION			
PROJECT NEW CROSS - OLDHAM ROAD			
DRAFTER AS		ENGINEER PG	
TITLE DRAINAGE DETAILS SHEET 2		PROJECT REFERENCE:	
SCALE NTS	SHEET A1	DRAWING No D464-RDG-00-ZR-DD-C-0103	REV C2



VENT BOX DETAIL
BY OTHERS
(OPTIONAL)

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, PILING MATERIALS, HEAVY PLANTS ETC.,



TYPICAL 160mm VENT/ACCESS PIPE CONNECTION

BACKFILL SUGGESTIONS OPTIONS AROUND THE SIDES OF PLUVIAL CUBE MODULAR UNIT:

- SELECTED EXCAVATED MATERIAL IF SEEN SUITABLE BY THE SITE ENGINEER.
- BACKERBOARD HD (IS A PREMOULDED BOARD FOR USE AS PROTECTION AGAINST BACKFILL)

TO PROTECT THE WATERPROOF TUFLEX GEDMEMBRANE DURING BACKFILLING OPERATION, OVERLAY THE TOP AND SIDES WITH GEOTEX 300 PP NEEDLE PUNCHED NON-WOVEN PROTECTION GEOTEXTILE WITH A LAPPED JOINTS

ESS PLUVIAL CUBE MODULE TO BE WRAPPED WITH TUFLEX AN IMPERMEABLE GEDMEMBRANE WITH A LAP HEAT WELDED JOINTS. (AS SUPPLIED BY ALDERBURGH LIMITED).

INLET PIPE(S) WITH CLASS S BEDDING
TANK BASE LEVEL

INLET PIPE INVERT LEVEL

INLET PIPE(S) WITH CLASS S BEDDING
TANK BASE LEVEL

INLET PIPE INVERT LEVEL

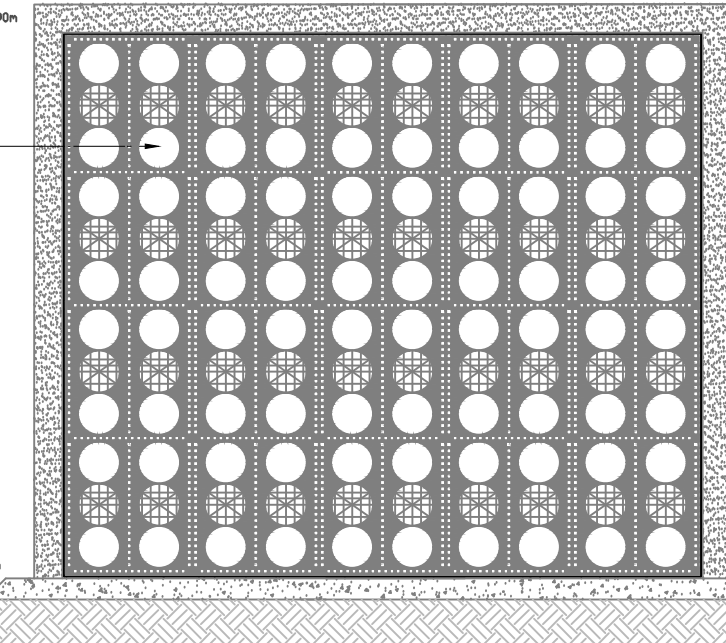
VENT/ACCESS DETAILS OPTIONS TO SUIT SITE AND ENGINEER REQUIREMENTS

INLET/OUTLET PIPES MUST BE SUPPORTED WITH CONCRETE TO PROTECT IT DURING BACKFILLING

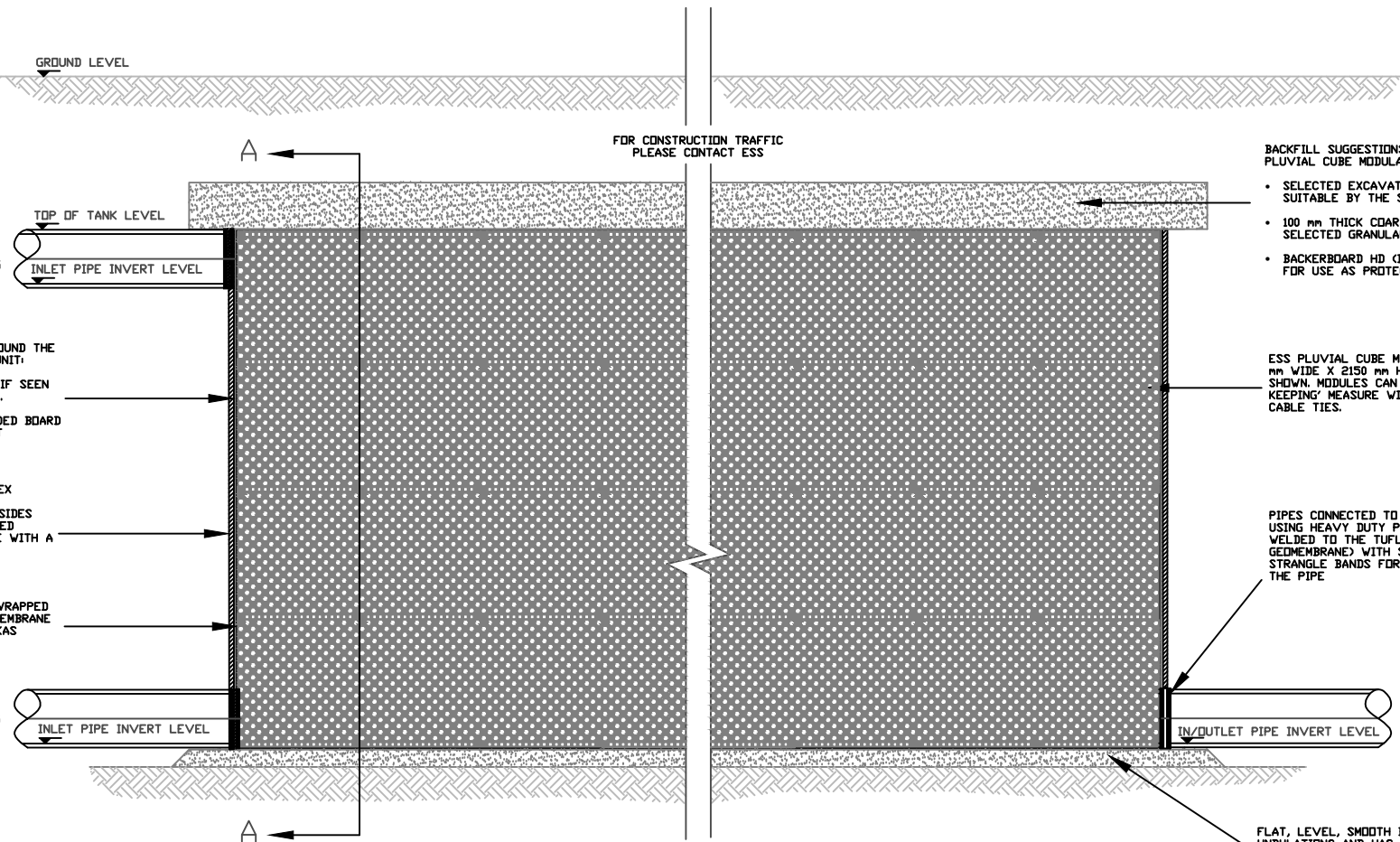
TOP OF TANK LEVEL 78.990m

ESS PLUVIAL CUBE MODULE TO BE WRAPPED WITH TUFLEX IMPERMEABLE GEDMEMBRANE WITH A LAP HEAT WELDED JOINTS. (AS SUPPLIED BY ALDERBURGH LIMITED).

TANK BASE LEVEL 76.840m



TYPICAL DETAILS OF ATTENUATION TANK USING PLUVIAL CUBE MODULE UNITS
SECTION A-A



TYPICAL INLET PIPE CONNECTION

TYPICAL IN/OUTLET PIPE CONNECTION

TYPICAL DETAILS OF ATTENUATION TANK USING PLUVIAL CUBE MODULE UNITS

A 3 - 5% CBR HAS BEEN ASSUMED AT SUB-BASE LEVEL SHOULD THE CBR BE TESTED AND FOUND TO BE LESS THAN 3% THEN THE ENGINEER SHALL BE NOTIFIED. ALSO, ANY SDFT SPOTS FOUND AT SUB-BASE LEVEL SHALL BE REPORTED TO THE ENGINEER

BACKFILL SUGGESTIONS OPTIONS ABOVE THE PLUVIAL CUBE MODULAR UNIT:

- SELECTED EXCAVATED MATERIAL IF SEEN SUITABLE BY THE SITE ENGINEER.
- 100 mm THICK COARSE SAND OR CLASS 6H SELECTED GRANULAR MATERIAL.
- BACKERBOARD HD (IS A PREMOULDED BOARD FOR USE AS PROTECTION AGAINST BACKFILL)

ESS PLUVIAL CUBE MODULE (500 mm LONG x 500 mm WIDE x 2150 mm HIGH) ARRANGEMENTS AS SHOWN. MODULES CAN BE SECURED AS A 'HOUSE KEEPING' MEASURE WITH PLASTIC PROPRIETY CABLE TIES.

PIPES CONNECTED TO THE ATTENUATION TANK USING HEAVY DUTY PIPE COLLARS (HEAT WELDED TO THE TUFLEX AN IMPERMEABLE GEDMEMBRANE) WITH STAINLESS STEEL STRANGLE BANDS FOR FASTENING AROUND THE PIPE

IN/OUTLET PIPE(S) DIA VARIES WITH CLASS S BEDDING

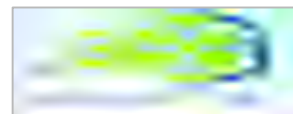
IN/OUTLET PIPE INVERT LEVEL

FLAT, LEVEL, SMOOTH BASE WITH NO UNDULATIONS AND HAS 3-5% CBR

Notes :-

1. ALL STORAGE TANK DRAINAGE WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE SPECIFICATIONS, METHOD STATEMENTS AND RECOMMENDATIONS OF ENVIRONMENTAL SUSTAINABLE SOLUTIONS (ESS) LIMITED, LITTLEBOROUGH.
2. THE LOCATION, SIZE AND DEPTH OF ALL EXISTING DRAINS / SEWERS AND SERVICES SHALL BE ESTABLISHED BY THE CONTRACTOR PRIOR TO THE COMMENCEMENT OF WORKS ON SITE. ANY DISCREPANCIES FROM THE INFORMATION INDICATED IN THESE DRAWINGS SHALL IMMEDIATELY BE BROUGHT TO THE ATTENTION OF THE ENGINEER.
3. THE CONTRACTOR SHALL ALLOW FOR THE PROTECTION, TEMPORARY AND PERMANENT SUPPORT AND DIVERSION WORKS AS NECESSARY, TO ALL EXISTING SERVICES TO THE SATISFACTION OF THE PUBLIC UTILITIES.
4. THE CONTRACTOR SHALL ALLOW FOR DEALING WITH SURFACE WATER RUN-OFF INTO EXCAVATIONS AND FROM GROUNDWATER BY MEANS OF PUMPS, PUMPING AND DE-WATERING AS APPROPRIATE, IN ORDER TO KEEP THE EXCAVATION AS REASONABLY DRY AS POSSIBLE DURING THE CONSTRUCTION OF THE WORKS.
5. ALL LEVELS AND DIMENSIONS SHALL BE VERIFIED ON SITE PRIOR TO THE COMMENCEMENT OF ANY WORKS. ANY DISCREPANCIES SHALL IMMEDIATELY BE BROUGHT TO THE ATTENTION OF THE ENGINEER.
6. THE CONTRACTOR SHALL TAKE ALL NECESSARY SAFETY PRECAUTIONS IN LINE WITH CURRENT LEGISLATION WHEN WORKING IN / NEAR CONFINED SPACES, DEEP EXCAVATIONS AND MACHINERY.
7. THE CONTRACTOR SHALL TAKE ALL NECESSARY SAFETY TO PROTECT PEDESTRIANS AND VEHICLES FROM THE WORKING AREAS.
8. TO PROTECT THE ESS PLUVIAL CUBE MODULAR ATTENUATION OR SDAKAWAY / STORAGE TANK FROM CONSTRUCTION SITE DEBRIS, THE CONTRACTOR SHALL ENSURE THAT STOPPERS ARE SECURELY PLACED IN ALL CONNECTIONS IMMEDIATELY UPSTREAM OF THE TANK UNITS. ONLY TO BE REMOVED ONCE THE FINAL CLEANING OF THE ROADS / DRAINAGE HAS BEEN COMPLETED.
9. UPON COMPLETION OF THE WORKS THE CONTRACTOR SHALL CLEAN ALL DRAINAGE BY JETTING, REMOVING ALL DEBRIS FROM SITE, NO DEBRIS SHALL BE PERMITTED TO ENTER THE TANK STORAGE SYSTEM.
10. NUMBER OF VENT UNITS DEPENDS ON THE SIZE OF THE TANK (REFER VENT DRAWING)
11. REFER SEQUENCE OF WORK DOCUMENT FOR DETAILED INSTALLATION METHODOLOGY (CONTACT ENVIRONMENTAL SUSTAINABLE SOLUTIONS (ESS) LIMITED)

Notes :- All the Dimensions by Millimeters



ENVIRONMENTAL SUSTAINABLE SOLUTIONS
(ESS) LIMITED
SOLUTION HOUSE
DANE STREET
ROCHDALE
OL11 4EZ
TEL: 01706 374416
FAX 01706 376785
EMAIL: TECHNICAL@Y-ESS.COM

PROJECT

OLDHAM ROAD, NEW CROSS,
MANCHESTER
ATTENUATION TANK - DETAILS

TITLE

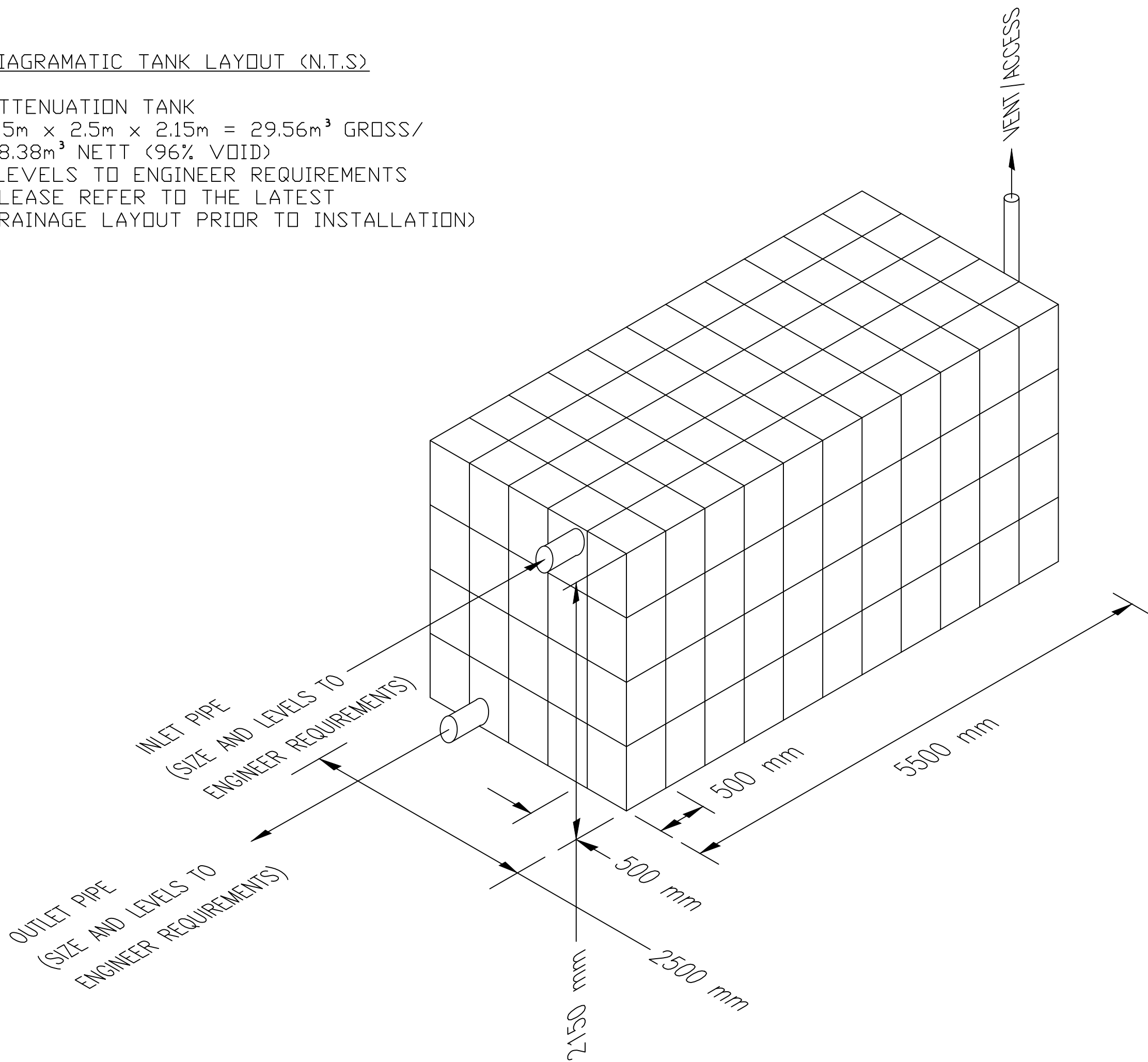
ATTENUATION TANK
DETAILS USING PLUVIAL CUBE
MODULE WITH STONE TRENCH
AND PIPE

Scale	Drawn	Checked
N.T.S.	MI	AY
Date	Drawing No.	Revision
01/07/2021	PCST - 4.0	R0

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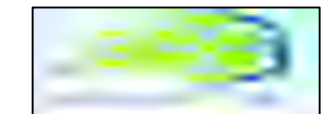
DIAGRAMATIC TANK LAYOUT (N.T.S)

ATTENUATION TANK
5.5m x 2.5m x 2.15m = 29.56m³ GROSS/
28.38m³ NETT (96% VOID)
(LEVELS TO ENGINEER REQUIREMENTS
PLEASE REFER TO THE LATEST
DRAINAGE LAYOUT PRIOR TO INSTALLATION)



- Notes :-
1. ALL STORAGE TANK DRAINAGE WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE SPECIFICATIONS, METHOD STATEMENTS AND RECOMMENDATIONS OF ENVIRONMENTAL SUSTAINABLE SOLUTIONS (ESS) LIMITED, LITTLEBOROUGH.
 2. THE LOCATION, SIZE AND DEPTH OF ALL EXISTING DRAINS / SEWERS AND SERVICES SHALL BE ESTABLISHED BY THE CONTRACTOR PRIOR TO THE COMMENCEMENT OF WORKS ON SITE. ANY DISCREPANCIES FROM THE INFORMATION INDICATED ON THESE DRAWINGS SHALL IMMEDIATELY BE BROUGHT TO THE ATTENTION OF THE ENGINEER.
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 9. UPON COMPLETION OF THE WORKS THE CONTRACTOR SHALL CLEAN ALL DRAINAGE BY JETTING, REMOVING ALL DEBRIS FROM SITE, NO DEBRIS SHALL BE PERMITTED TO ENTER THE TANK STORAGE SYSTEM.
 10. NUMBER OF VENT UNITS DEPENDS ON THE SIZE OF THE TANK (REFER VENT DRAWING)
 11. REFER SEQUENCE OF WORK DOCUMENT FOR DETAILED INSTALLATION METHODOLOGY (CONTACT ENVIRONMENTAL SUSTAINABLE SOLUTIONS (ESS) LIMITED)

Notes :- All the Dimensions by Millimeters



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PROJECT

OLDHAM ROAD, NEW CROSS,
MANCHESTER

ATTENUATION TANK - LAYOUT

TITLE

ATTENUATION TANK
DETAILS USING PLUVIAL CUBE
MODULE WITH STONE TRENCH
AND PIPE

Scale	Drawn	Checked
N.T.S.	MI	AY
Date	Drawing No.	Revision
01/07/2021	PCST - 4.1	R0



Modular Geo-Void Systems

Total Water Management

Pluvial Cube

Total Linear Access
Precipitation Collection System

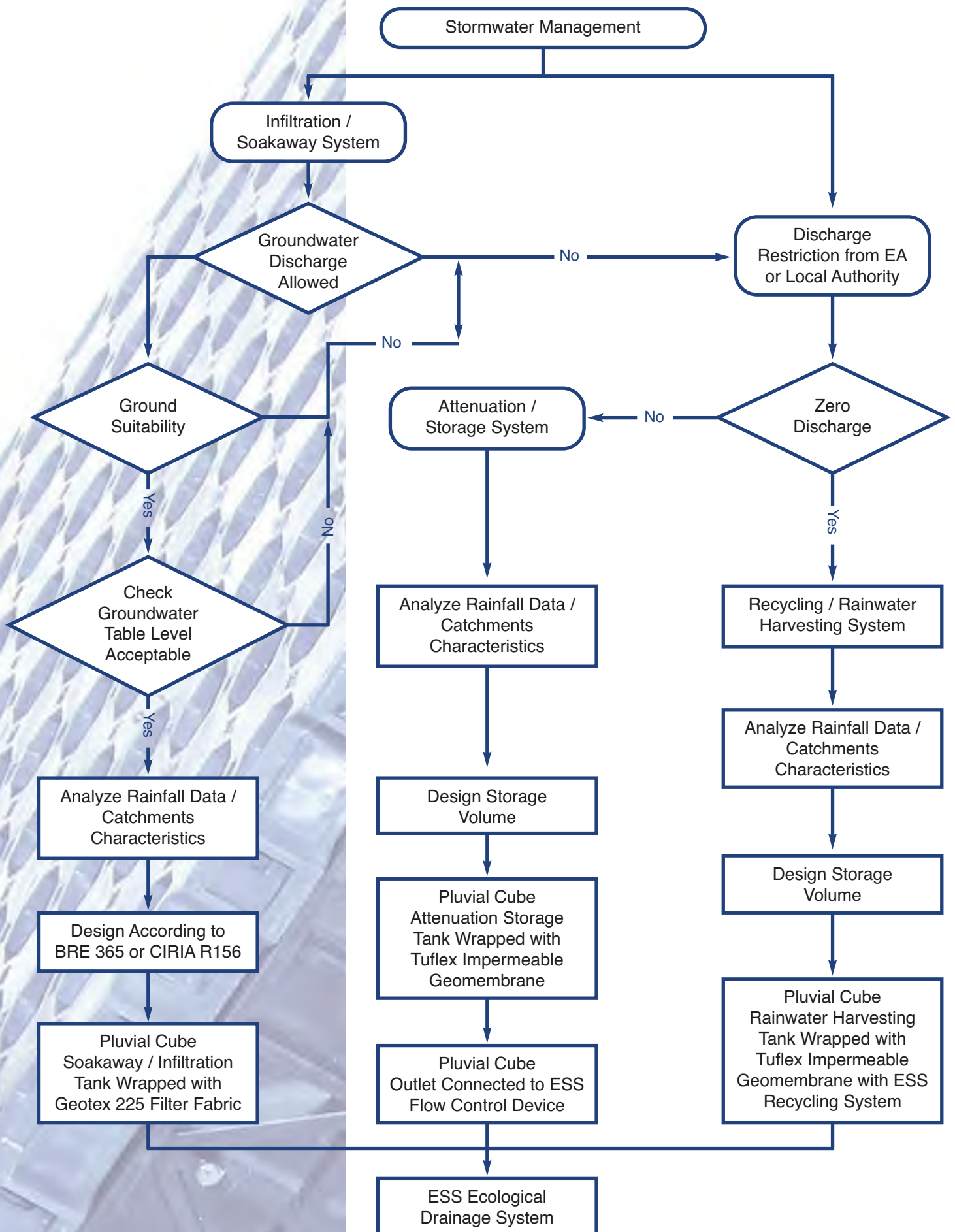


Unique Low Flow
Channel System



ENVIRONMENTAL SUSTAINABLE SOLUTIONS LTD

Flow Chart



Modular Geo-Cell Tank System

Infiltration, Detention and Re-use made easy...

Total Stormwater Management

E.S.S. Geo-Cell Modular Tank systems use surface and sub-surface infiltration techniques, resulting in clean water that can be re-used or allowed to re-enter the natural water system. E.S.S. Geo-Cell Modular Systems offer a highly efficient option for Stormwater Management in any kind of soils.

Water Quality

E.S.S. Geo-Cell Modular Tank Systems excel when there is a requirement to achieve a high water quality, particularly in the effective removal of nutrients and gross pollutants. In addition to the obvious environmental benefits, the sub-surface location of the tank system provides more usable space and an enhanced aesthetic setting compared to above ground concrete or plastic tanks.

The Modular Advantage

E.S.S. Geo-Cell Modular Tank System performance supersedes outdated aggregate trenches. The E.S.S. System provides a void space of over 90% compared to less than 20% in typical aggregate trenches. Consequently, the E.S.S. System offers a smaller footprint to achieve the same storage capacity as an aggregate trench. This saves time and money in installation and civil works costs. The lightweight design of E.S.S. Modular Tank Modules also make installation quicker, safer and cheaper. No sediment build up occurs in the E.S.S. System, unlike the clogging that is characteristic of aggregate based approaches.

System Components

Pluvial Cube Geo-Cell Tank Modules

EcoSand biologically engineered soils

E.S.S. Filtration Unit

Geotex Filtration Fabric

Tuflex Waterproofing Membrane

Geotex Protection Fleece

Ventilation Units

Preformed Pipe Connection Covers

Aquabrake Flow Control Devices and Chambers

Refer to separate data sheets

Benefits...

Complete Linear Access

Quick

Reduce site access delays

Lightweight

No cranes required

Strong

Designed for car loadings

Modular

Easily create any shape

Economical

Cheaper than concrete

Maintenance Free Tank

All debris and sediment is pre-filtered

Determinate Volume

One cubic metre of Pluvial Cube modules contain 950 litres of water

Cost Effective

Reduces excavation and disposal by two thirds compared with conventional soak wells

High Infiltration

90% void surface area

Structurally Designed

Supports shear loadings

Unique Low Flow Channels

Ensuring complete removal of any silts

Permeable Paving

Single Module



Size: 50cms x 50cms x 55cms
Units / m³: 0.1375m³
7.27 per m³

Double Module



Size: 50cms x 50cms x 107.5cms
Units / m³: 0.269m³
3.72 per m³

Triple Module



Size: 50cms x 50cms x 160cms
Units / m³: 0.40m³
2.50 per m³

Clear Linear Access Through Open Subterranean Channels

Water sensitive Urban Channels

The Channel Systems are based on permeable sub-surface waterways that restore water quality and recharge the natural environment. The sub-surface E.S.S. Channel System provides a unique way of working with nature to solve the enormous problems currently associated with open concrete channels and swales.

Traditional Concrete Channels

Open concrete channels and swales are currently one of the main methods of transporting large quantities of Stormwater for discharge into streams, rivers and oceans. Open channels are used widely in the urban landscape even though they are considered unsafe. Channels are also a breeding ground for vermin and vector that endangers human health. In addition to the health and safety problem, large concrete channels take up vast areas of land and have a negative impact on the amenity of the area.

Pluvial Cube Module Dimensions* (mm)	Module Configuration	Units per m ³	Module Volume (m ³)
500 (L) x 500 (W) x 550 (D)	Single	7.27	0.1375
500 (L) x 500 (W) x 1075 (D)	Double	3.72	0.2688
500 (L) x 500 (W) x 1600 (D)	Triple	2.5	0.4

Product Data	Pluvial Cube Module	Heavy Duty Pluvial Cube Module
Application	Stormwater Management	Stormwater Management
Average Weight (kg) - single module	7	8
Compressive Strength* (kN/m ²)	320	400
lateral Strength* (kN/m ²)	200	225
Long Term Creep Testing** (kN/m ²)	200	200
Void Ratio (%)	96	96
Surface Void Ratio (%)	Greater than 90	Greater than 90
Minimum Backfill Cover# (mm)	450	450
Maximum depth to invert (mm)	7000	7500
Material	Propylene	Propylene
Chemical Resistance	Good	Good
Bacterial Resistance	Good	Good
UV Resistance	Good	Good

Note: Other Modules with Compressive Strength more than 1500 kN/m² available

* Modules tested using UKAS calibrated test machine, range 0 – 60 Tons, UDL, loading rate 0.2 kN/m²

** Modules tested for long term creep testing for 90, 180 and 208 days / 5000 hours = 50 years design life.

Any cover less than 450 mm and for Min. backfill cover for trafficked areas – contact ESS design department

Maximum depth to invert based on soil type dense sand and gravel for different soil type–contact ESS design department

E.S.S. Channel System

E.S.S. Channels

With the E.S.S. Channel System being a sub-surface system, these problems with open concrete channels are rectified. The permeable channel system can be designed to follow the inherent contours of the landform and emulate the flow of natural waterways. The curvilinear channel design creates vertical flow, turbulence and reduces the overall flow of velocity while increasing the self cleansing capacity of the channel bed to create healthy aerobic conditions. The clear access channels allow for continual and future maintenance

Road Edge Infiltration Area.



Environmental Benefits

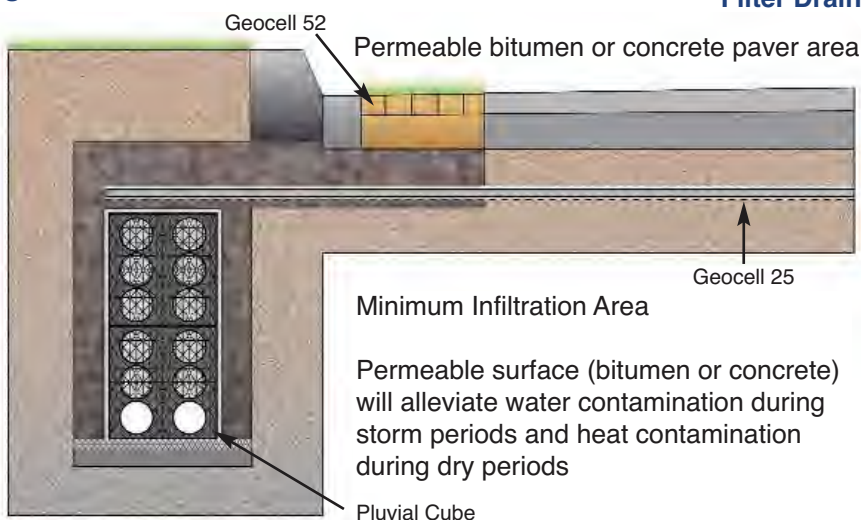
By replacing open concrete channels or swales with E.S.S. Channel Systems, cities can now benefit from increased environmental amenities, greater recreational space and healthier conditions by using the vast tracts of land once given over to rapid flowing concrete channels.



Car Park Infiltration Area.

High Traffic Areas

Filter Drain



Low Flow Channel System

Self Cleaning at High Flow Velocity



Top View
Showing Clear Channel

Provides Total Linear Access



2 Clear Channels
500mm x 210mm per 0.5mt width

Controls Silt at Low Flow Velocity



4 x160mm Pipe
Access Point

The above channels can be multi-connected using preformed connectors to larger inlet / outlet pipes



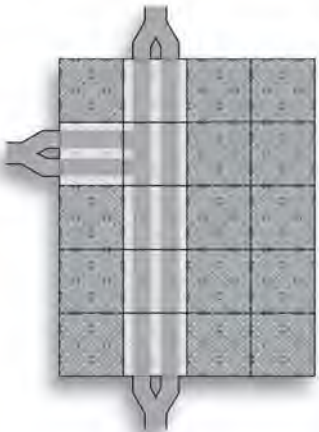
225 or 300mm
Internal Dia Channel



225 Low Flow Channel
(if required)



300mm Dia Low Flow Channel
(if required)



Typical Installation
Tank Format



Typical Installation Channel Format
4 Clear Access Channels x 210mm

Linear Access Channel.

With slotted low flow silt control channel installed



Top view showing low flow maintenance channel.

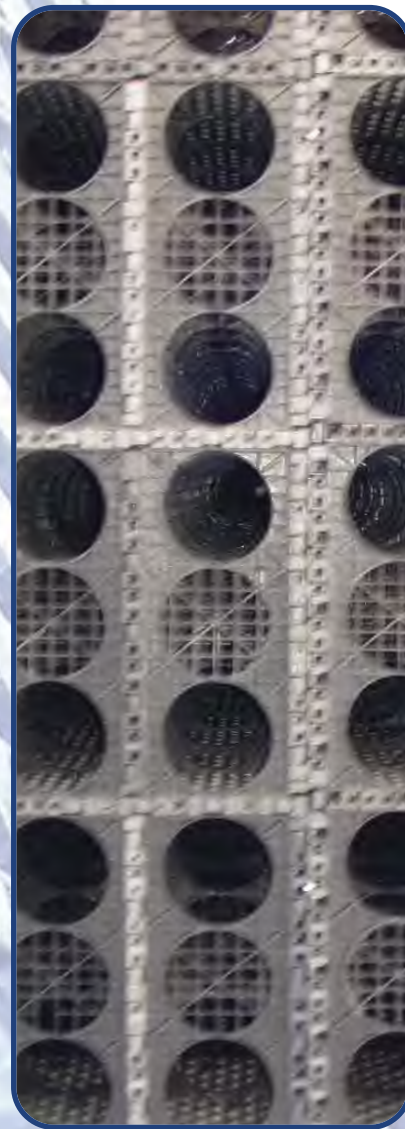


Self cleaning channels.



Connection to low flow maintenance channel at invert level.

Attenuation Tank Highlighting
Number and Position of Access
Points.



E.S.S. Systems Permeable Paving

Cover Materials

Cover materials are an essential part of the infiltration process. E.S.S. **EcoSand** Biologically Engineered sand is designed to provide maximum permeability through optimum physical, chemical and biological characteristics. To retain infiltration performance it is essential to choose the appropriate cover material and constantly maintain pH levels between 6 and 7.5.



Type 1 - Road run off



Type 2 - Road run off



Type 3



Type 4



Type 5 - Compactable



Type 1 - Road run off

The filter sand is engineered to installation and E.A. requirements. Depending on site contaminants expected.

Trafficable Landscape - Compaction Prevention:

If a trafficable, soft landscape surface is required (i.e. grass or gravel car parks, road verges etc.), it is recommended to use **E.S.S. GeoCell 52** grass reinforcement structure. The addition of product will allow long-term permeability of the cover soil.

Loading	Minimum Cover
Pedestrian	300mm
Occasional traffic	500mm

Infiltration Tank



Attenuation Tank.



2mts deep tank with 3mts cover

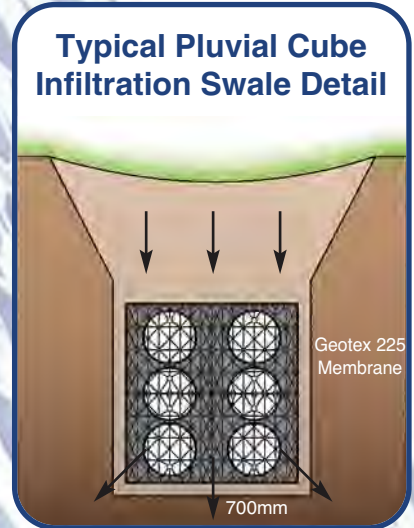
Infiltration Swales & Underground Channels

Subsurface Road Channels / Swales

Pluvial Cube Tanking System provides an efficient way of managing road stormwater runoff. It allows high infiltration areas, preventing road accidents, water ponding, and mosquito infestation. Provides new accessible space.

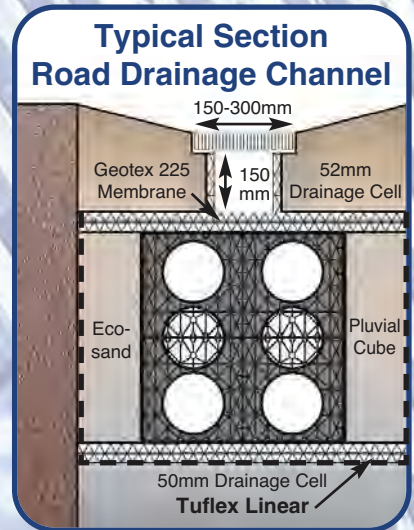
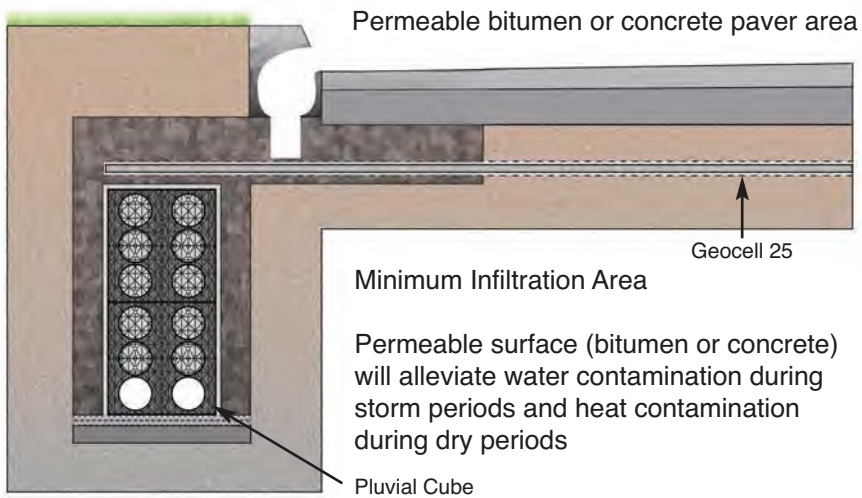


Attenuation Tank under Park and Ride Scheme showing versatility of modular system.



High Traffic Areas

Filter Drain



Tank 2mts deep with access channels.

Installation Procedures

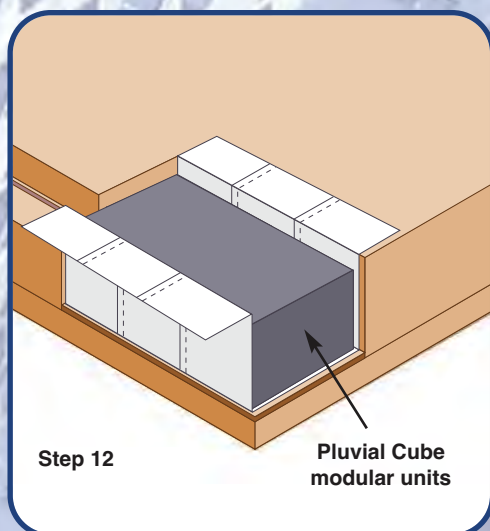
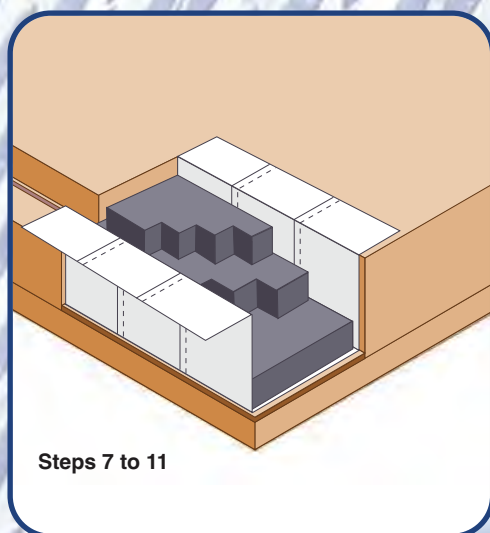
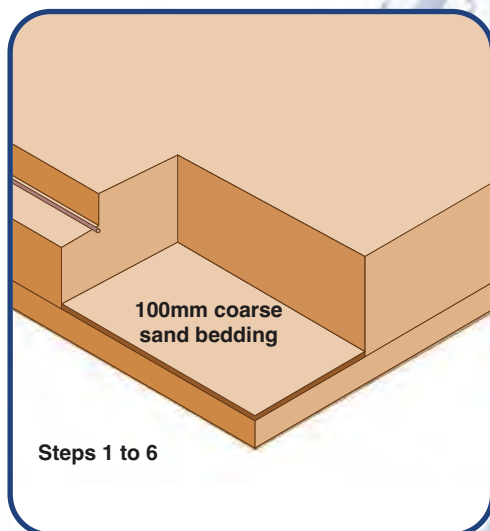
Infiltration Tanks

Installation Steps

1. Excavate the pipe trench and lay the inlet pipe to the required fall and install silt traps in appropriate locations in the pipe run.
2. Excavate the hole or trench to the required dimensions to modular units, and any external inspection chamber(s) and / or silt trap(s).
3. Ensure that the base plan dimensions of the hole allows sufficient working space for the site operatives to manoeuvre the units and geotextile into position.
4. Ensure that the base of the excavation is flat and level, batter back the sides of the excavation to a safe angle, and ensure that the safe access is provided for the site operatives.
5. Remove any soft spots from the excavation and replace with compacted granular material.
6. **a) For Soakaway**, lay 100mm coarse sand bedding to the base of the excavation and level.
b) For Attenuation, lay 100mm (minimum) compact solid level base (site concrete preferably).
7. **a) For Soakaway**, lay the geotextile, Geotex 225ff, over the base and up the sides of the excavation with minimum 200mm overlap joints between strips.
b) For Attenuation, repeat procedure with Tuflex Geo Membrane.
8. Ensure there is a minimum 200mm over-run of geo-textile at the end of the modular unit.
9. Inspect geotextile for damage.
Tuflex for Attenuation, ensuring integrity of all welded laps.
10. Assemble the module tanks to required dimensions.

The illustrations show the correct relationships, orientation, and sequence of connection of each panel to form a basic full module tank (500 x 500 x depth).

11. Assemble the Pluvial Cube Modules in orientation as per drawing.
L x W x D.



Installation Procedures

12. To receive the inlet pipe (and outlet/ inspection pipe if required). Insert tank connector and, using geotextile, form a wrap around apron of the tank connector spigot and secure using tape or jubilee clip. Ensure a minimum 50mm of spigot remains exposed.
For Attenuation tanks, all inlets and outlets are sealed with welded preformed pipe flanges.

13. **a) For Soakaway**, Continue with the geotextile encapsulation of the Pluvial Cube tank.
b) For Attenuation, use Tuflex Geo Membranes.

14. Fold the corners of the geotextile over-run at each end of the infiltration tank as shown, wetting all corners. The same method applies for Tuflex Geo Membranes ensuring all corners are wetted and folded (not cut).

15. **a) For Soakaway**, Complete the encapsulation by wrapping the geotextile horizontally around the tank and tape into position.
b) For Attenuation, use Tuflex Geo Membranes.

16. Connect inlet / outlet / vent pipe and inspection chambers using appropriate adaptors.

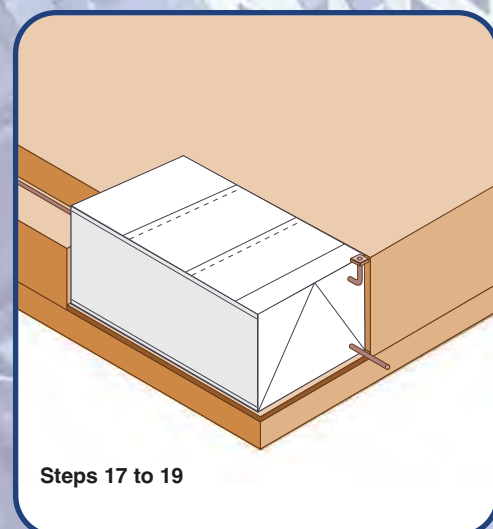
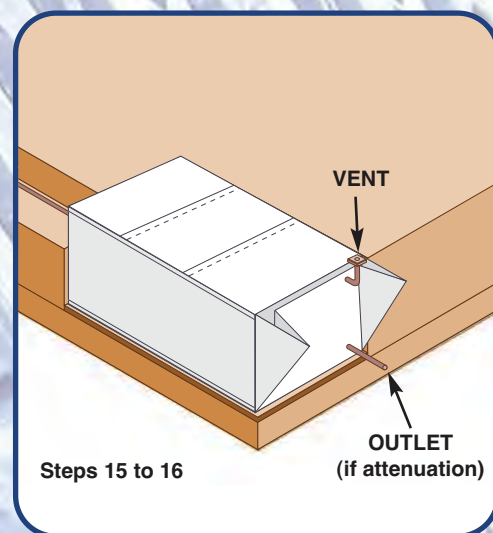
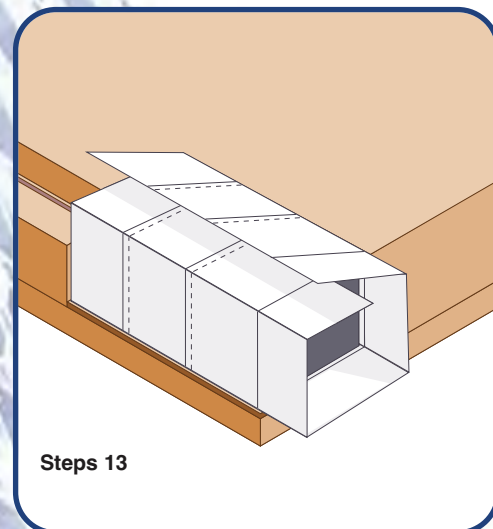
17. Backfill around excavation using type 1 or 2 sub base or selected granular material, and compact in layers of not less than 150mm. The first 500mm of any installation should be compacted by hand.

18. Use a coarse sand protection layer over the top of the Pluvial Cube tanks and geotextile and the back fill to the required depth using Type 1 or 2 sub base material. If the area is to be trafficked. Where the area is to be landscaped then as-dug material may be used provided sharp or large solid matter is removed.

19. The area should then be compacted using suitable compaction equipment in accordance with specification for highway Works.

20. **For Attenuation tank**, steps 7-16 are also followed to encapsulate the Tuflex Geo Membranes lined tanks with Geotex 300 protection membrane prior to backfill.

N.B. Please refer to full sequence of works data for more detailed instructions.



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To find out more about these systems and products please contact us



Pluvial Cube

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Date 12th January 2021

Our Reference: Emma Robinson

To Whom It May Concern

Polypipe Group plc & Subsidiary Companies - Verification of Insurance

We act as insurance brokers to Polypipe Group plc and Subsidiary Companies and confirm that we have arranged insurance on its behalf as detailed below:

Employers' Liability

Insurer: Zurich Insurance PLC / Chubb European Group SE
Policy Number: GA964889, 7121353, 7121352 / UKCAND30069
Period of Insurance: 1st January 2021 to 31st December 2021
Limit of Indemnity: £50,000,000 any one Occurrence

Public/Products Liability

Insurer: Zurich Insurance PLC / Chubb European Group SE
Policy Number: GA964889, 7121353, 7121352 / UKCAND30069
Period of Insurance: 1st January 2021 to 31st December 2021
Limit of Indemnity: Public Liability £50,000,000 any one Occurrence
Products Liability £50,000,000 any one Occurrence and in the aggregate for the Period of Insurance.

Professional Indemnity

Insurer: Generali Global Corporate & Commercial / Dual Corporate Risks Limited / International General Insurance Co. (UK) Ltd / Canopus
Policy Number: GBNBK2000769 / To be confirmed
Period of Insurance: 1st January 2021 to 31st December 2021
Limit of Indemnity: £10,000,000 Annual Aggregate costs and expenses inclusive

The Employers' Liability and Public Liability sections of cover provide for an Indemnity to Principal.

Cover is subject to the full terms, conditions limitations and exclusions and cancellation provisions of the relevant policy wording and may also be subject to warranties.

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