

The Heights School

Drainage & SuDS Strategy

Curtins Ref: THPS-CUR-00-XX-RP-C-0002

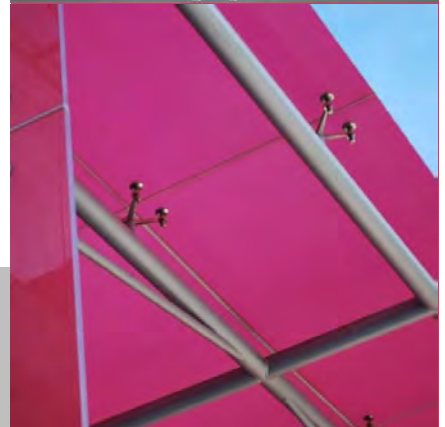
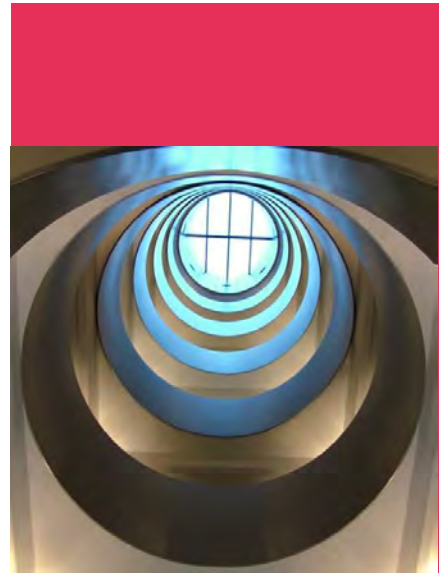
Revision: P01

Issue Date: 20 July 2020

Client Name: Kier Construction

Client Address: Building 1410 Arlington Business Park
Theale
Reading
RG7 4SA

Site Address: Mapledurham Playing Fields
Reading
RG4 7LH



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Rev	Description	Issued by	Checked	Date
P01	Planning Issue	MCS	TL	20/07/20

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1.0 Introduction

1.1 Project Overview

Curtins Consulting have produced a Drainage Strategy report so that Reading Council may approve the changes to the drainage at the proposed Heights School, Reading. The project proposals will see the construction of a new school building with associated hardstanding and landscaping.

This Drainage Strategy report has been written for the purpose of formally amending Condition 20 of planning permission 171023. The original condition states that the below ground drainage strategy should be installed as per the approved details set out in the document “The Heights Free School, Caversham: Surface Water Management Plan” by Campbell Reith Consulting (ref: N1 12243-200317-SWMP-D2 – 20th March 2017).

Following further geotechnical investigations on the site, it was found that the geology on the site was not favourable to the original strategy and therefore a new strategy was required. This was due to solution features within the chalk leading to the requirement of a 20m offset from any proposed or existing building for a traditional or geo-cellular soakaway.

The proposed architectural drawings are shown in **Appendix A**.

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 derivation from the intent contained in this document, prior approval shall be obtained from the relevant authority in advance of commencing such works.

1.2 Site Location

The site is located in the Caversham Heights area of Reading, off Woodcote Road. The approximate postcode of the proposed site is RG4 7LB, with grid reference SU 69820 75843.

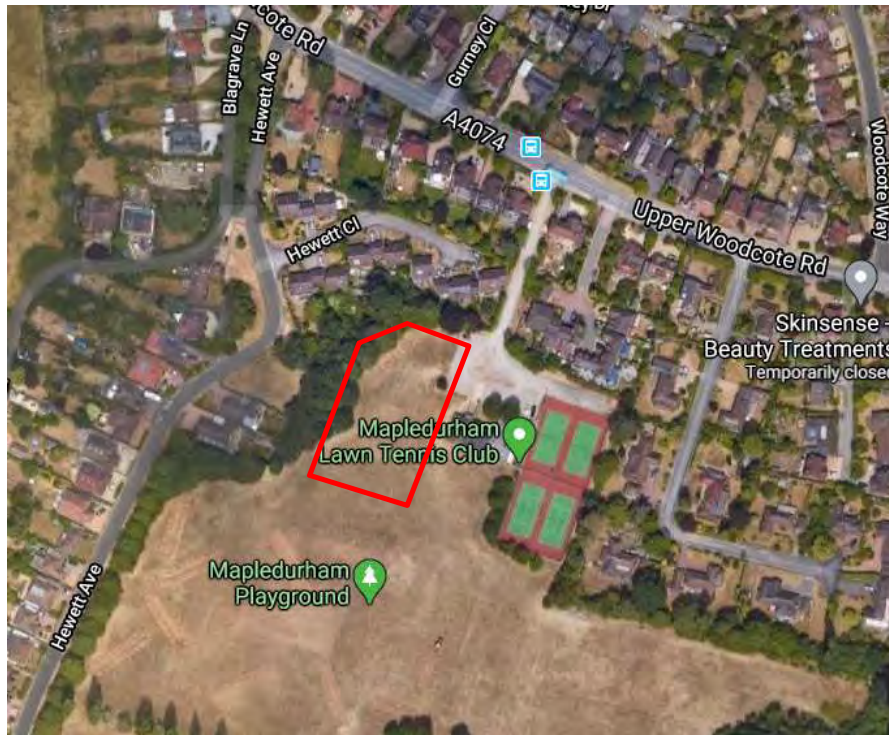


Figure 1-1: Site Location

1.3 Site Description

The site is currently part of the Mapledurham Playing Fields and is covered by grass. The site generally falls from north-west to south-east. The highest point is approximately 72.17mAOD in the north west corner, with the lowest point being 70.31mAOD in the south east corner.

The topographical survey is shown in **Appendix B**.

1.4 Site Geology

The proposed development is underlain by fine silt and gravel of the Boyn Hill Gravel Member to a depth of approximately 5m, then very low-density Chalk of the White Chalk Subgroup. Ground investigations have identified there to be solution features within the chalk across the site and as a result, injection grouting is required to remediate the ground beneath the school.

Following the assessment of the chalk beneath the site, it was recommended by the project Geotechnical Engineer that a 20m offset was maintained from the school, or any existing building, for any traditional infiltration device, in order to prevent further solution features opening up during the design life of the building. This advice was not compatible with the previously approved strategy given the general reliance on soakaways, and therefore an amendment to the condition is required.

2.0 Proposed Drainage Strategy

2.1 General

The proposed Drainage Strategy General Arrangement drawing is shown in **Appendix C**.

The proposed below ground drainage strategy for the Heights School, Reading is to discharge surface water run-off via two soakaway systems on site.

The first system that will serve the school building, Multi Use Games Area (MUGA) and hardstanding (not proposed for use by vehicles), will discharge through three deep bore soakaways. Each soakaway is proposed to be 26m deep and have an internal diameter of 0.2m. On-site testing has been carried out for these soakaways and the results are contained in **Appendix D**.

The second system is a traditional geo-cellular soakaway located 20m away from the proposed school building which serves the car park and other trafficked areas within the site boundary. The test results for this soakaway is also contained in **Appendix D**. A by-pass separator is proposed as part of this system to ensure that hydrocarbons do not enter the ground.

Attenuation is provided for both systems to account for exceedance storm events. A 900mm deep layer of Type 3 material is proposed beneath the MUGA and external areas to the south of the school providing 429.3m³ of storage for the system servicing the school building and non-trafficked hardstanding. Infiltration of this volume is prevented by the use of an impermeable membrane within 20m of the structure.

Attenuation for the car park is provided by the geo-cellular soakaway, providing 76m³ of storage.

2.2 Surface Water

In line with the Drainage Hierarchy, surface water run off from a site should endeavour to be controlled as close to the source as possible. Discharge from site should be via one of the methods detailed in **Table 1**, in descending priority;

Table 1: Discharge Opportunities

London Sustainable Drainage Hierarchy	Site Specific Application
Store rainwater for later use	This drainage strategy has been designed to be the closest achievable strategy to the originally approved Campbell Reith strategy, that takes into account the now known ground conditions. Rainwater harvesting has therefore not been included.
Use infiltration techniques, such as porous surfaces in non-clay areas	Two systems are proposed on the site, both infiltrating run-off to ground. The car park drainage system is to use a geo-cellular soakaway, with the remainder of the school discharging through deep bore soakaways. A bypass separator has been included in the car park system to manage hydrocarbons
Attenuate rainwater in ponds or open water features for gradual release	Due to spatial constraints across the site, it is not possible to include open water features on this development. The use of above ground storage features also poses a health and safety risk to future students.
Attenuate rainwater by storing in tanks or sealed water features for gradual release	It is proposed for both systems to attenuate excess surface water in below ground sealed storage features for gradual release. The car park system will utilise a geo-cellular tank, whereas the remainder of the school will utilise a Type 3 900mm deep storage structure.
Discharge rainwater direct to a water course	This is not required as surface water is proposed to be discharged to ground.
Discharge rainwater to a surface water sewer/drain	This is not required as surface water is proposed to be discharged to ground.
Discharge rainwater to a combined sewer	This is not required as surface water is proposed to be discharged to ground.

2.2.1 Proposed Site Discharge

The proposed surface water strategy is split into two distinct systems. System A will serve the car park and trafficked areas of the site, whilst system B will serve the school building, non-trafficked hard standing, MUGA and recreational space to the south of the building.

1.1.1.1 System A

System A has been designed to manage the proposed car parking and areas at elevated risk of contamination. The system will discharge via a geo-cellular soakaway installed to the rear of the car park beneath the proposed parking bays. The location of the soakaway can be seen on the Drainage General Arrangement drawing contained in **Appendix C**. A Class 1 bypass separator has been included prior to the soakaway so that hydrocarbons are removed before the flows enter the soakaway. The by-pass separator has been designed in line with the governments “Pollution prevention for businesses” guidance. This strategy has been agreed in principal with the LLFA and the response in included in Appendix

The proposed system has been designed using MicroDrainage network and the results are shown in **Appendix E**. Infiltration testing carried out around the proposed soakaway location has been used to determine the infiltration rate of the ground. The infiltration testing used is shown in **Appendix D** and also as an input to the MicroDrainage model. The expected rate is $4.14 \times 10^{-6} \text{m/s}$ and the location relative to the soakaway is shown below.



Figure 2-1: Trial Pit Location

The location of the trial pit is due to the construction route into the site and the location of the site cabins. The trial pit depth was 2.5m and the geology at test level was the same as the tank base.

The proposed tank is an SDS GeoLight400. This specific tank has been chosen as it utilises a distribution pipe that is wrapped in a geotextile with a granular surround. The distribution pipe is

accessible at both ends via either a manhole or a rodding eye. This mean that silt is unable to enter the tank and jetting of the distribution pipe is possible. SDS have therefore advised that both the base and side of the tank are available for infiltration throughout the whole design life of the tank.

1.1.1.2 System B

System B has been designed to manage the school building, pedestrian and recreation areas, where the risk of contamination is very low. The system will discharge via three 26m deep, 200mm diameter boreholes located to the south of the school. The location of the soakaways can be seen on the Drainage General Arrangement drawing contained in **Appendix C**.

The proposed system has been designed using MicroDrainage network and the results are shown in **Appendix E**. Infiltration testing carried out around the proposed soakaway location has been used to determine the infiltration rate of the ground. The infiltration test results used is shown in **Appendix D** and also as an input to the MicroDrainage model. The location plan showing the test and proposed locations is also contained in **Appendix D**. Only three of the initially proposed 5 boreholes were tested, these were BH3, BH4 and BH5. The infiltration rates for each of the three tested boreholes are also given below.

Hole No	Test No	Hole Depth m	Soakage Rate for Each Test	Soakage Rate for Each Hole		Water Level at Finish of Test	Remarks
			litre/m ² /min	litre/m ² /min	m/sec		
BH3	No 1	26.00	2.95	2.95	4.92E-5	Nearly empty pit.	Depth to top of permeable soils was 12m.
BH4	No 1	26.00	0.425	0.425	7.08E-6	Nearly empty pit.	Depth to top of permeable soils was 12m.
BH5	No 1	26.00	0.863	0.863	1.44E-5	Nearly empty pit.	Depth to top of permeable soils was 12m.

Figure 2-2: Deep Bore Soakaway Infiltration Rates

The proposed strategy has been discussed in principal with the Environment Agency and their response is contained in **Appendix F**.

It is noted that the Environment Agency would not accept flows from the car park to the deep bore soakaways. This has been resolved by introducing System A that discharges via a Class 1 by-pass separator to ground. This strategy has been approved in principal by the LLFA and the response in contained in **Appendix G**.

2.2.2 Attenuation

1.1.1.3 System A

Attenuation is provided in system A as a part of the soakaway structure. The proposed soakaway has been sized so that it provides attenuation for events up to and including the 1 in 100 year +40% CC event. This has been modelled and tested in MicroDrainage to ensure that no flooding occurs. The results are available in **Appendix E**. The proposed storage volume is 76.6m³ based on a 95% porosity.

From the MicroDrainage results it can be seen that the tank is less than 50% full during the 1 in 30 year event. The tank therefore has adequate capacity to take two consecutive 1 in 30 year events. There is also no flooding during the 1 in 100 year event +40% CC.

1.1.1.4 System B

Attenuation is provided in system B by a 900mm deep Type 3 granular material sealed storage tank. The proposed tank has an area of 1590m² giving a total working storage volume of 429.3m³, based on a 30% porosity.

From the MicroDrainage results it can be seen that the tank is less than 50% full during the 1 in 30 year event. The tank therefore has adequate capacity to take two consecutive 1 in 30 year events. There is also no flooding during the 1 in 100 year event +40% CC.

The arrangement and details of both proposed tanks are contained in **Appendix C**.

2.2.3 Sustainable Drainage Systems

Developments should utilise sustainable drainage systems (SuDS) unless there are practical reasons for not doing so. As mentioned previously, the design should aim to reduce run-off rates and ensure that run-off is managed as close to its source as possible as per the drainage hierarchy (see **Table 1**).

Where possible SuDS have been included in the scheme, however due to spatial constraints there has been limited opportunity to include them. The main focus of the design intent was a sustainable disposal method which has been achieved for both the car park drainage and the remainder of the school. Permeable surfaces and by-pass separators will manage any pollution whilst allowing above ground space to be utilised as amenity space for the school.

2.2.4 Water Quality

To allow for the disposal of water via a deep bore soakaway, the EA requires that it is at a very low risk of contamination. Following the receipt of the proposals by the EA, comments were given regarding the removal of the car parking area from the deep bore soakaway system. This change was incorporated into the design to gain the EA's approval. The response letter from the EA giving an approval in principal is contained in **Appendix F**.

The car parking area is proposed to be drained using a traditional drainage system, consisting of a network of gullies and channels. The proposed gullies will include traps that along with the open channels offer a level of treatment to the water. The proposed flows also pass through a class 1 by-pass interceptor prior to discharge via the geo-cellular soakaway. This approach has been discussed with the LLFA and approved in principal. The response is contained in **Appendix G**.

2.3 Foul Water

The proposed foul system is to be managed in line with the original Campbell Reith proposal issued as part of the original planning submission. Therefore, it is not discussed at length here.

Foul water is drained using a separate system that discharges to a below ground pumping station with associated 24-hour storage, before being discharged via a rising main to the Thames Water public foul sewer beneath Woodcote Road. This has been approved by Thames Water

The proposed foul network is shown on the Drainage General Arrangement contained in **Appendix C**.

3.0 General Maintenance

It is assumed that all drainage within the site will be maintained as a private network. A suitable maintenance strategy will be included within handover documentation by the contractor once final details and suppliers have been chosen for the individual drainage elements. This strategy should be adopted to ensure the drainage network is cleaned regularly and the routine maintenance and cleansing regime should be documented.

An Operation and Maintenance Manual has been written by Curtins and should be referenced for general maintenance, THPS-CUR-C2-00-SP-C-0002 this can be found in **Appendix H**.

4.0 Conclusions and Recommendations

This report is intended to provide further details on the design of the drainage systems for the proposed Heights Primary School and to act as additional information in support of the planning application. The conclusions to be drawn from this report are as follows:

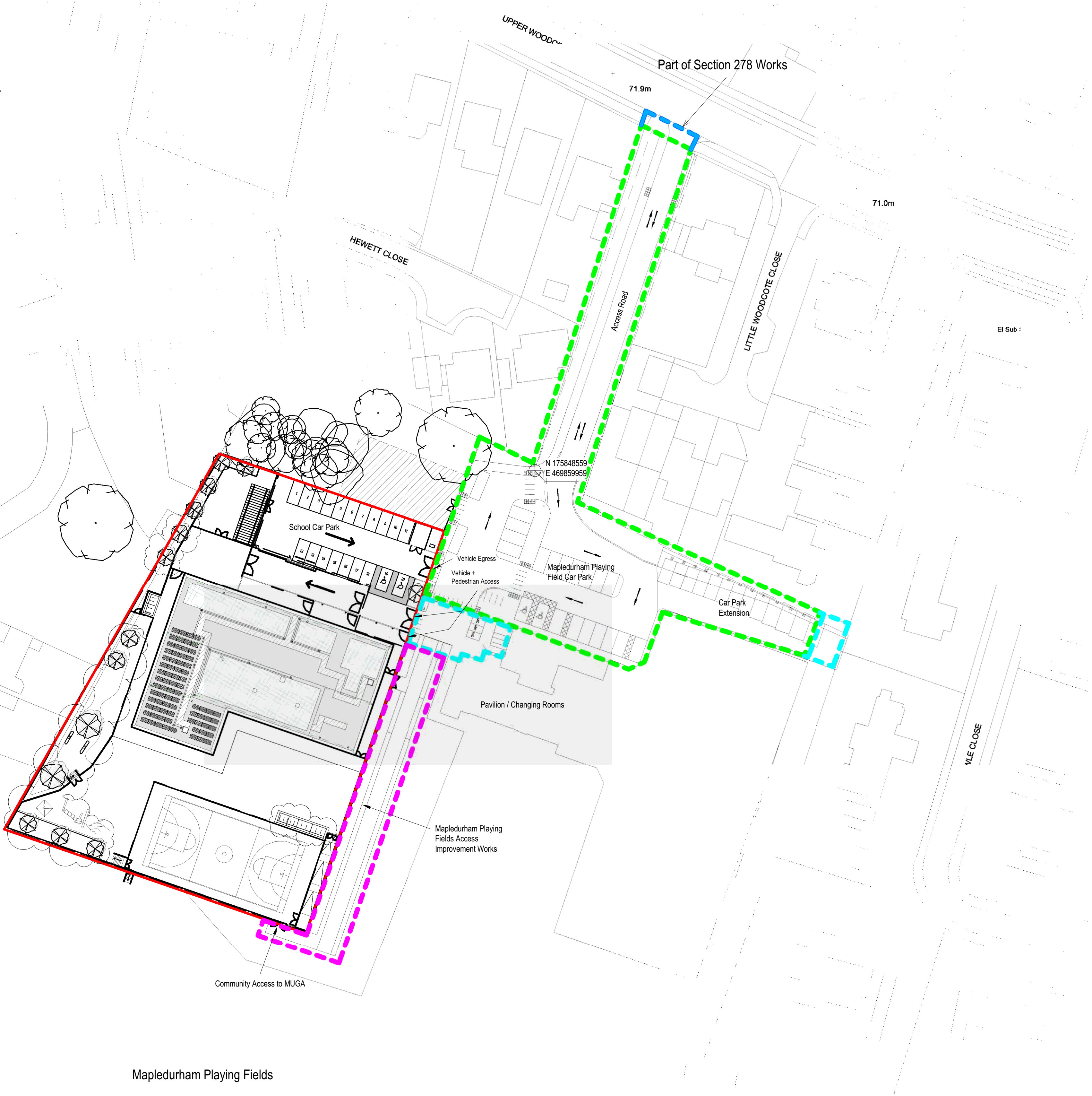
- The proposed school is located in an area of low-density chalk with solution features present in it. This has required injection grouting to be carried out in the ground to stabilise it and has led to the requirement to change the drainage strategy from traditional soakaways to a combination of deep bore and traditional soakaways.
- The proposed drainage strategy uses two distinct systems to manage the surface water on site. Both systems dispose of water to ground. The northern system that serves the car park discharges via a geo-cellular soakaway. The southern system serving the school discharges via a deep bore soakaway. The proposed geo-cellular soakaway has an offset of 20m from the existing neighbouring buildings and the proposed school building.
- Below ground attenuation is provided for both systems for rainfall events up to and including the 1 in 100 year event +40% CC. The northern system uses a geo-cellular sealed tank whilst the southern system uses a Type 3 filled sealed tank.
- Above traditional water treatment provided by trapped gullies and channels, a type 1 bypass separator has been included on the northern system to ensure that hydrocarbons from the car park do not enter the ground. This has been designed in line with the government's "Pollution Prevention for Business" guidance.
- The proposed scheme has been approved in principle by the Environment Agency and the Lead Local Flood Authority.
- Testing has been carried out for all infiltration devices and these results have been included in the model for the site wide surface water network.
- Foul water is proposed to be managed using a separate system that is drained via gravity to the car park, where it is pumped to a demarcation chamber at the entrance near Woodcote Road, before discharging via gravity to the existing Thames Water sewer beneath Woodcote Road.

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Appendix A – Proposed Site Plans

Notes:



Key

- School Site
- Section 106 Works
- Section 278 Works
- Mapledurham Playing Fields Access Improvement Works
- Car Park Improvement Works

Amendments

13	Stage 5 Issue, general amendments	04/02/2020	JE
12	Section 106 update, Current landscape GA showing	17/07/2019	JE
11	Section 106 update	08/07/2019	JE
10	Issued for Construction	21/06/2019	JE
9	Revisions as clouded	13/06/2019	JE
8	Trees removed, see rev clouds	07/05/2019	JE
7	Car park updates in accordance with RBC comments, see rev clouds	30/04/2019	PS
6	Car park updates in accordance with RBC comments	12/04/2019	PS
5	Section 106 Update	15/03/2019	PS

No.	Description	Date	Issued by
13	Stage 5 Issue, general amendments	04/02/2020	JE

Use figured dimensions only. All levels and dimensions to be checked on site. This drawing is to be read in conjunction with all other relevant drawings and specifications.
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Project Name:
The Heights Primary School

Dwg Reference:
Site Plan

Drawn: JE Checked: PS

Scale: 1 : 500 @ A1 Project Issue Date: November 2018

Project:	Originator:	Volume:	Level:	Type:	Role:	Number:
FS0280	NOV	V1	ZZ	DR	A	01000

Status:	Suitability Description:	Orig Paper Size:
S3	Suitable for Review and Comment	A1
Revision:	Revision Description:	Novium Job No:
C-13	Stage 5	Z0279



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north

- All dimensions in millimetres unless otherwise indicated. All levels in metres relative to Ordnance Datum and are positive (AOD) unless otherwise indicated.
- Figure dimensions only to be taken from this drawing, do not scale. Dimensions to be checked on site.
- For civil and structural matters including existing and proposed services, sub-base construction and site structures (including retaining walls over 900mm height) refer to information by others.
- The original version of this drawing was produced in colour - monochrome copies should not be relied upon to accurately reflect all drawing elements.
- This drawing has been prepared for information and tender purposes only and should not be used for construction.

KEY

Site boundary

Secure line

Existing tree to be retained and protected in accordance with BS 5837:2012 - refer to arboricultural report.

Proposed Hard Surfaces

Vehicular bitmac

Pedestrian bitmac

Brushed concrete base

Artificial grass

MUGA

Bark mulch path

Proposed Soft Surfaces

Tree

Shrub & groundcover planting

Proposed enclosure

Weldmesh 2m ht. boundary or secure line

Internal fence - 1.2m ht. metal bowtop railing

MUGA fence (total ht. 3m)

Timber 'hit & miss' fence to refuse store (1.8m)

Timber picket fence (1.2m) with matching gates

Retaining wall - pre-cast 'L' profiled concrete wall

Guarding - 1.2m ht. metal bowtop railing as fall protection

Site Furniture

Door hoops (to architects specification)

Cycle Shelter - Broxap 'Wardale' (BXMW/WAR)

Scooter rack - Broxap (BXMW/SCO) single sided 10 scooter capacity

Bollard

Wheel stop - rubber, bolt down surface mounted.

C0017.07.19PSRBRevised GF; raised kerbs added to early years play

C00208.07.19DPDRMinor comments and status update

C00119.06.19EBRBStage 5 issue

P1315.05.19PSRBStage 4 issue - wheel stops & bollards to sliding gate

P1225.04.19PSRBStage 4 issue

P1123.04.19PSRBSubstation omitted

P1017.04.19PSRBStage 4 issue; substation location moved; additional gate to SE corner; timber legacy play equipment to SW corner; ramp length revised; indicative location of gas kiosk; replacement tree to car park; maintenance access gate position revised; Revisions - cycle shelters spec, size & positions; gate positions; canopy to Early Years; Additions - Door hoops

P0801.02.19PSRB

P0821.01.19PSRB

P0708.01.19PSRB

P0607.01.19PSRB

P0514.12.18PSRB

P0412.12.18PSRB

P0306.12.18PSRB

P0229.11.18PSRB

P0122.11.18PSRB

rev. date by chn notes

KIER

projectThe Heights Primary School

titleGeneral Arrangement

statusConstruction

scale @ A11:200

dwg noFS0280-TFC-V2-00-DR-L-1001

references-

terrafirma

LANDSCAPE ARCHITECTS

Site B, Ideal House, Bedford Road, Tel. +44 (0)1793 242 640

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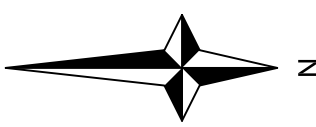
Appendix B – Topographical Survey

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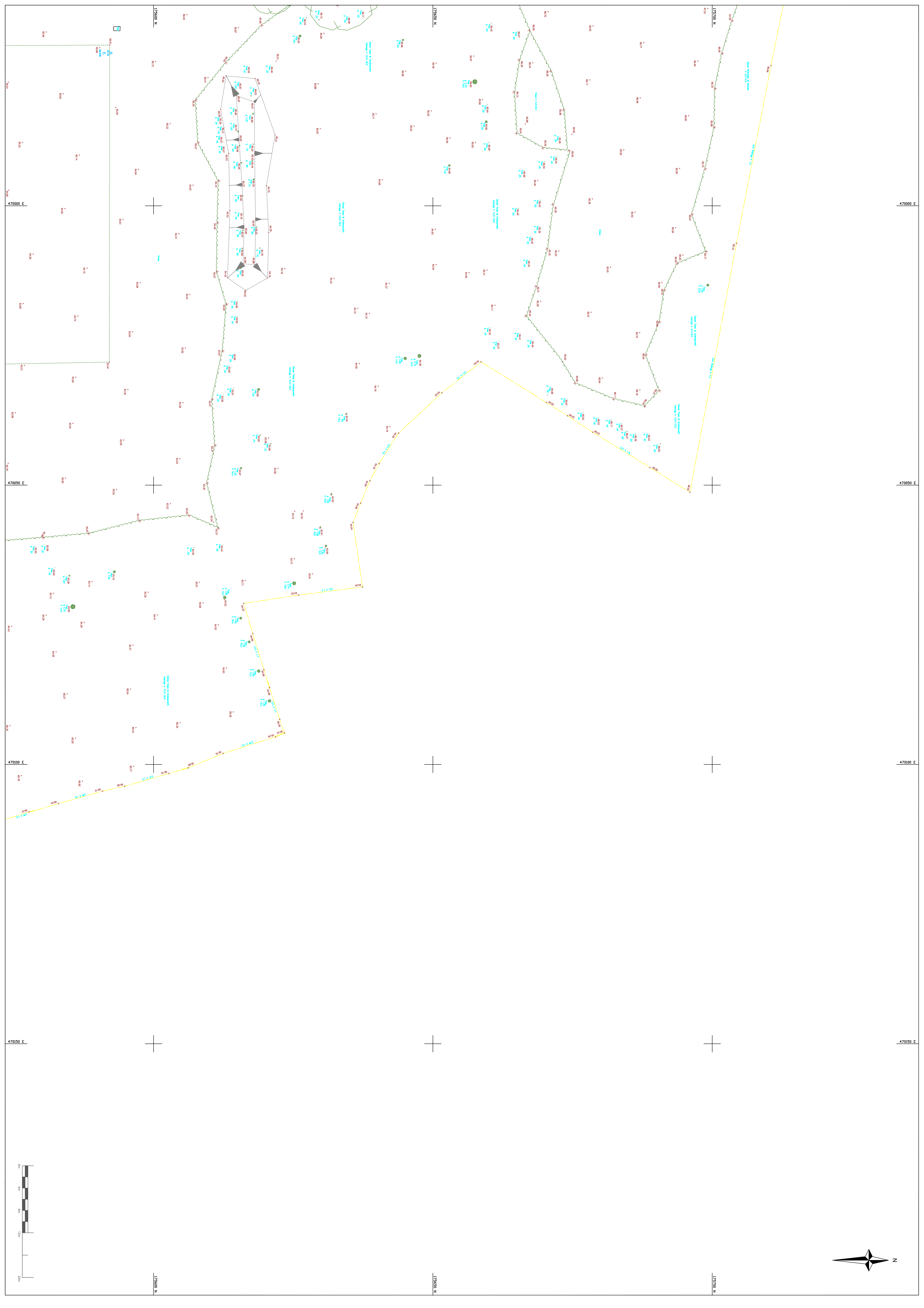
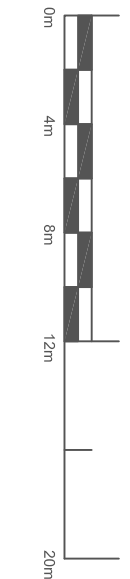
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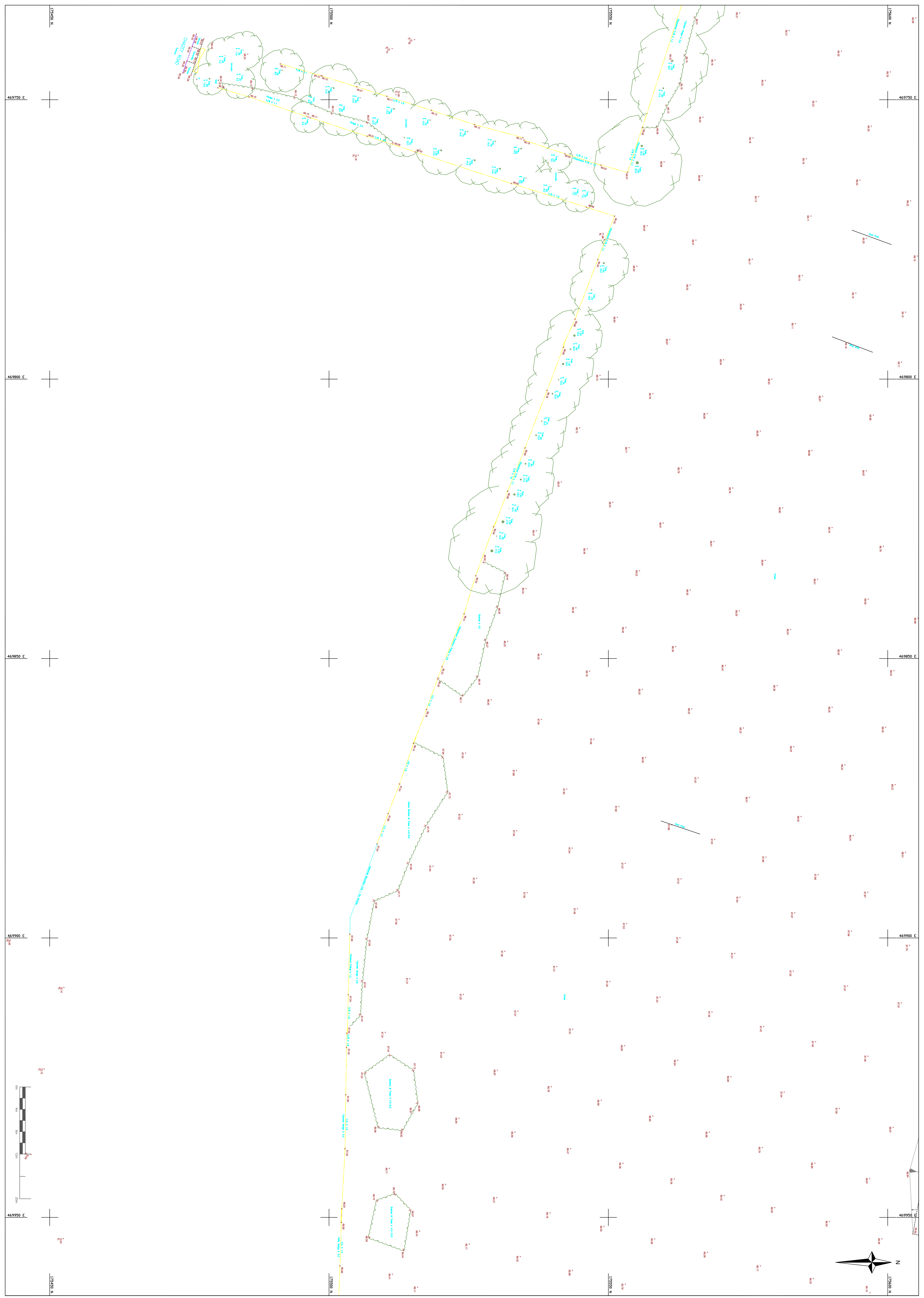
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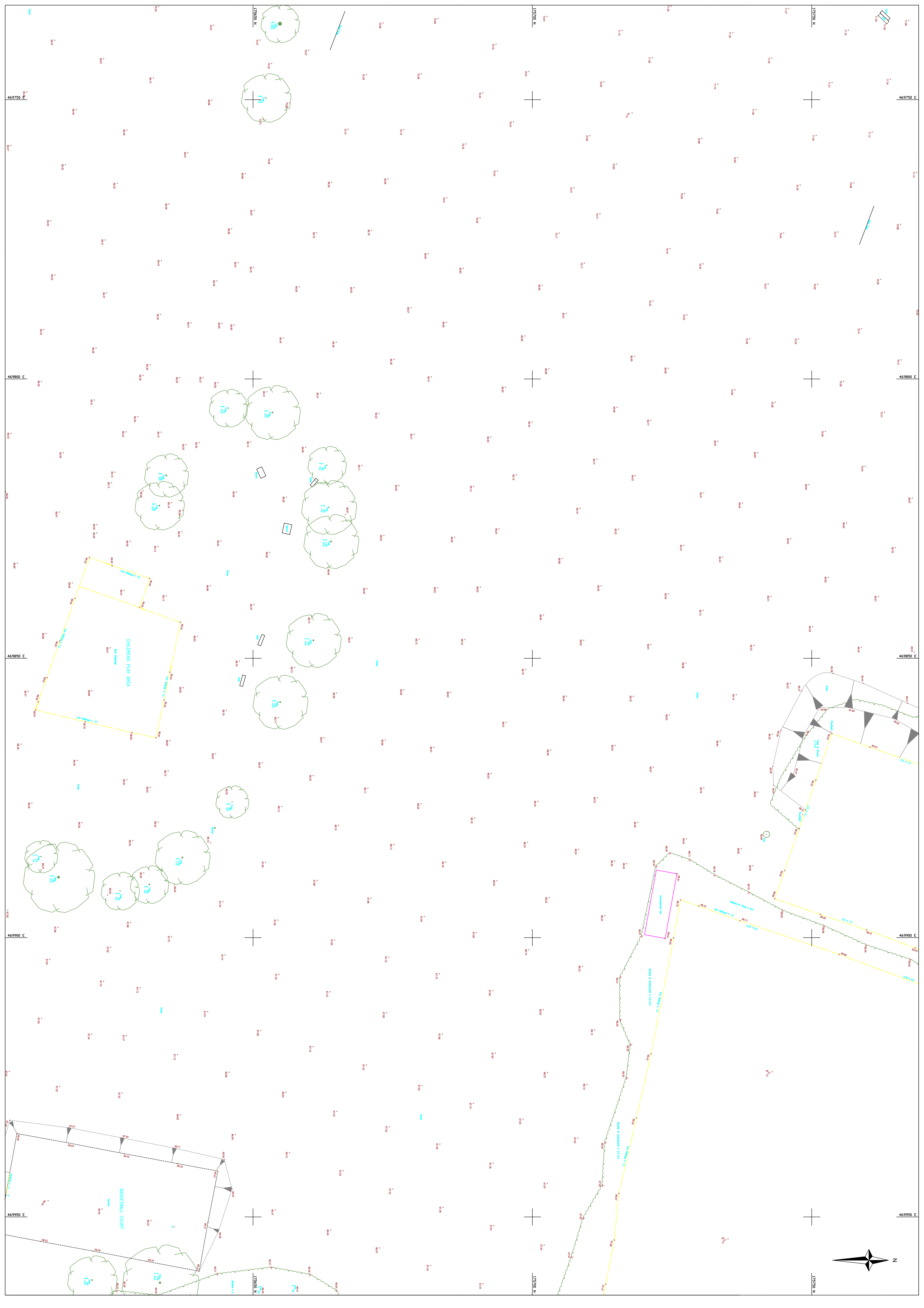
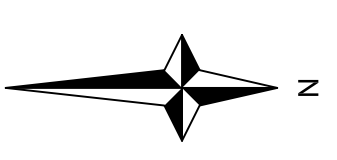
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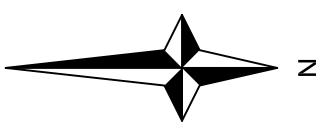
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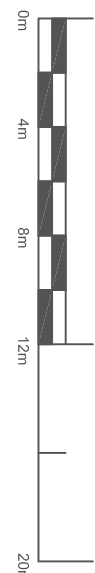
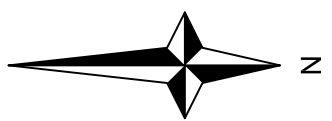










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175660 N

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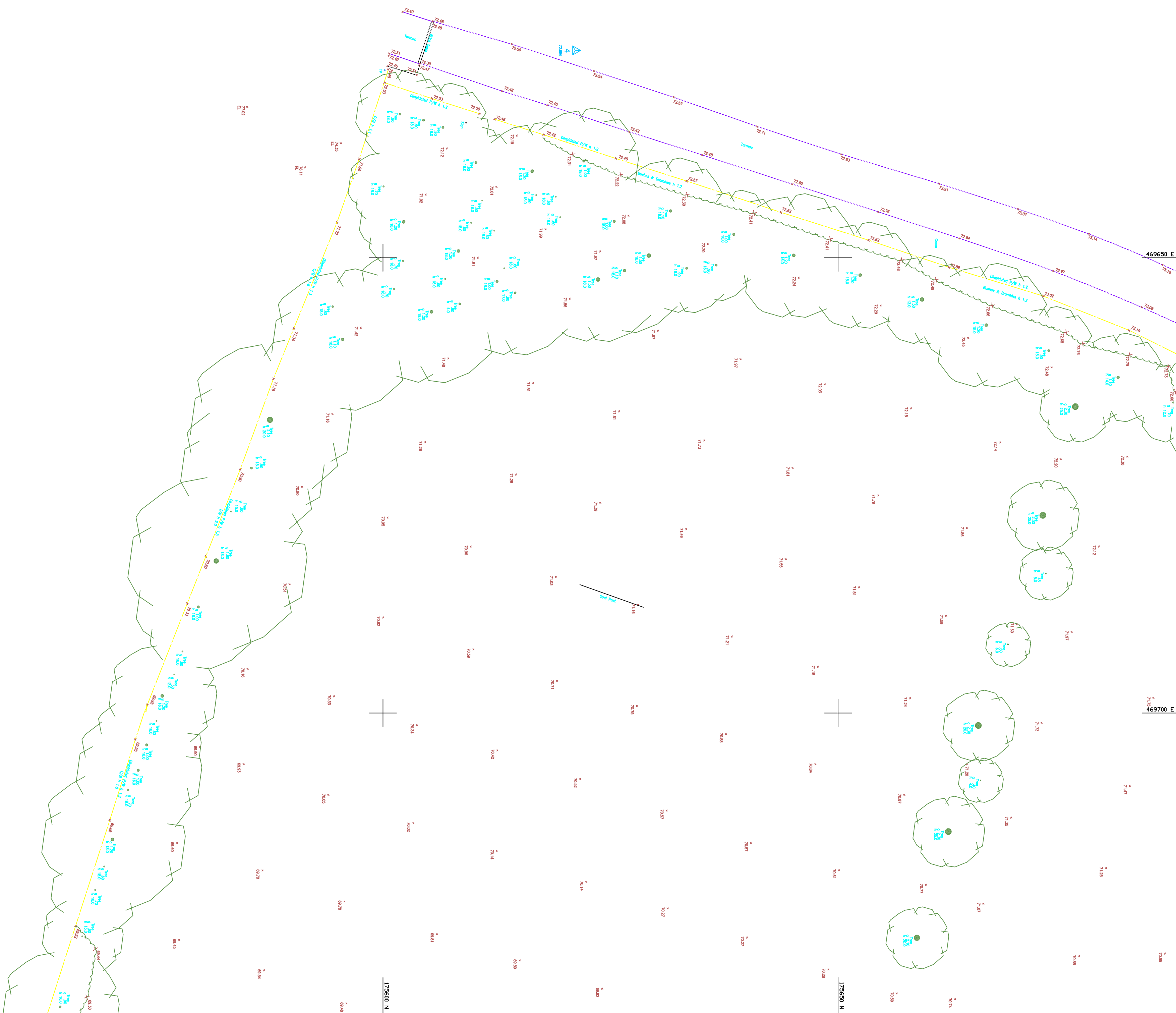
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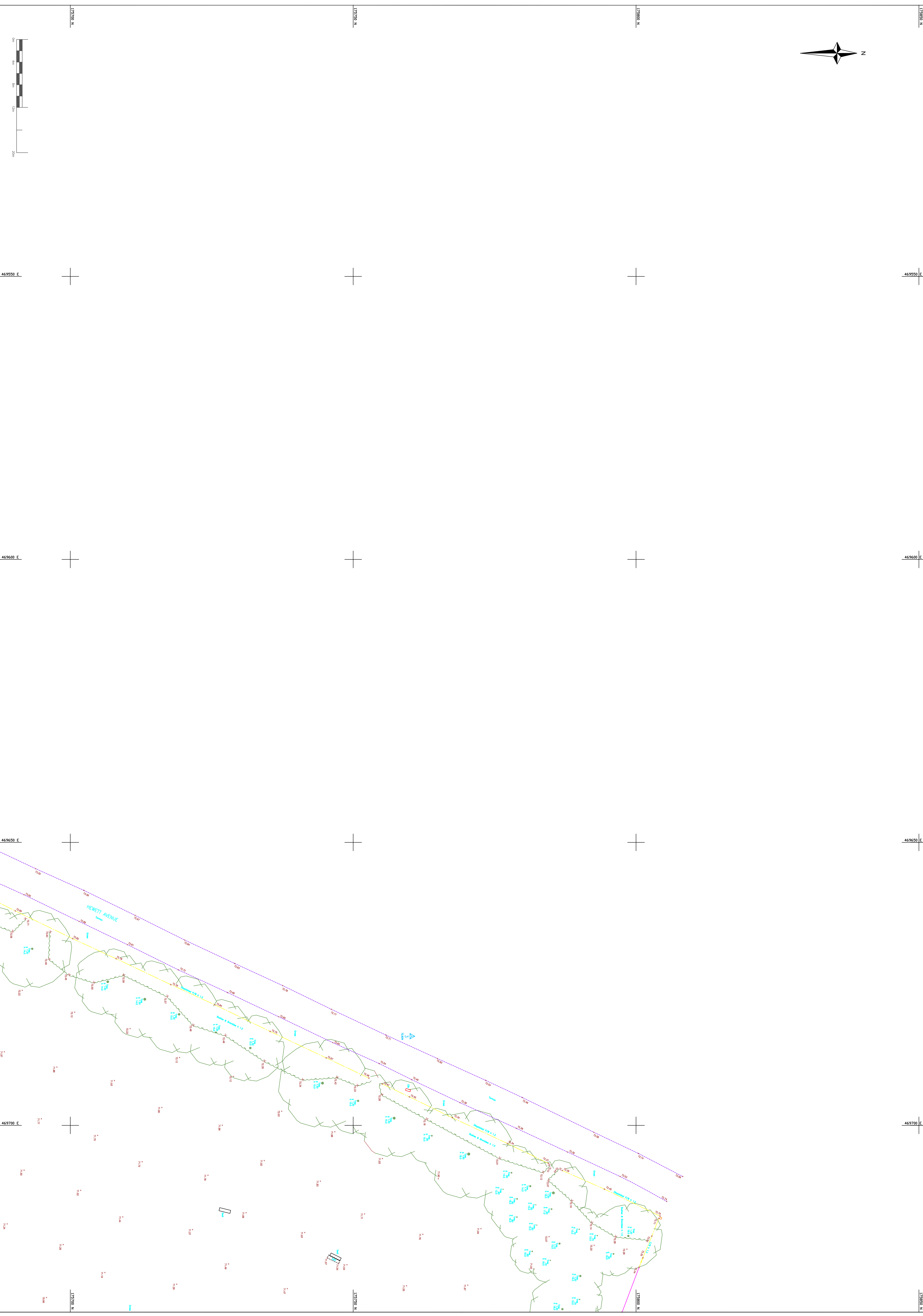
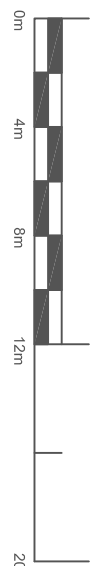
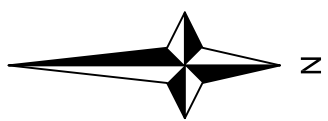
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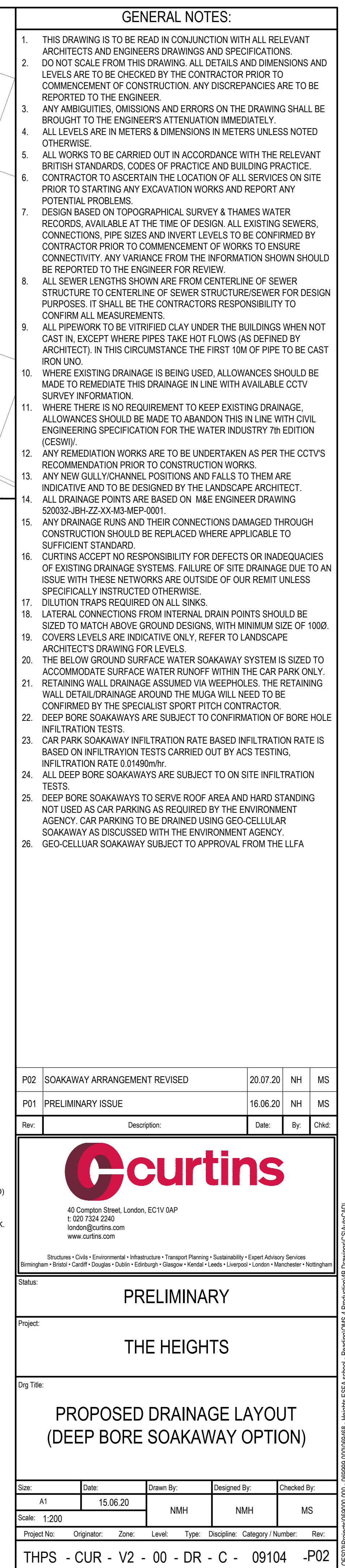
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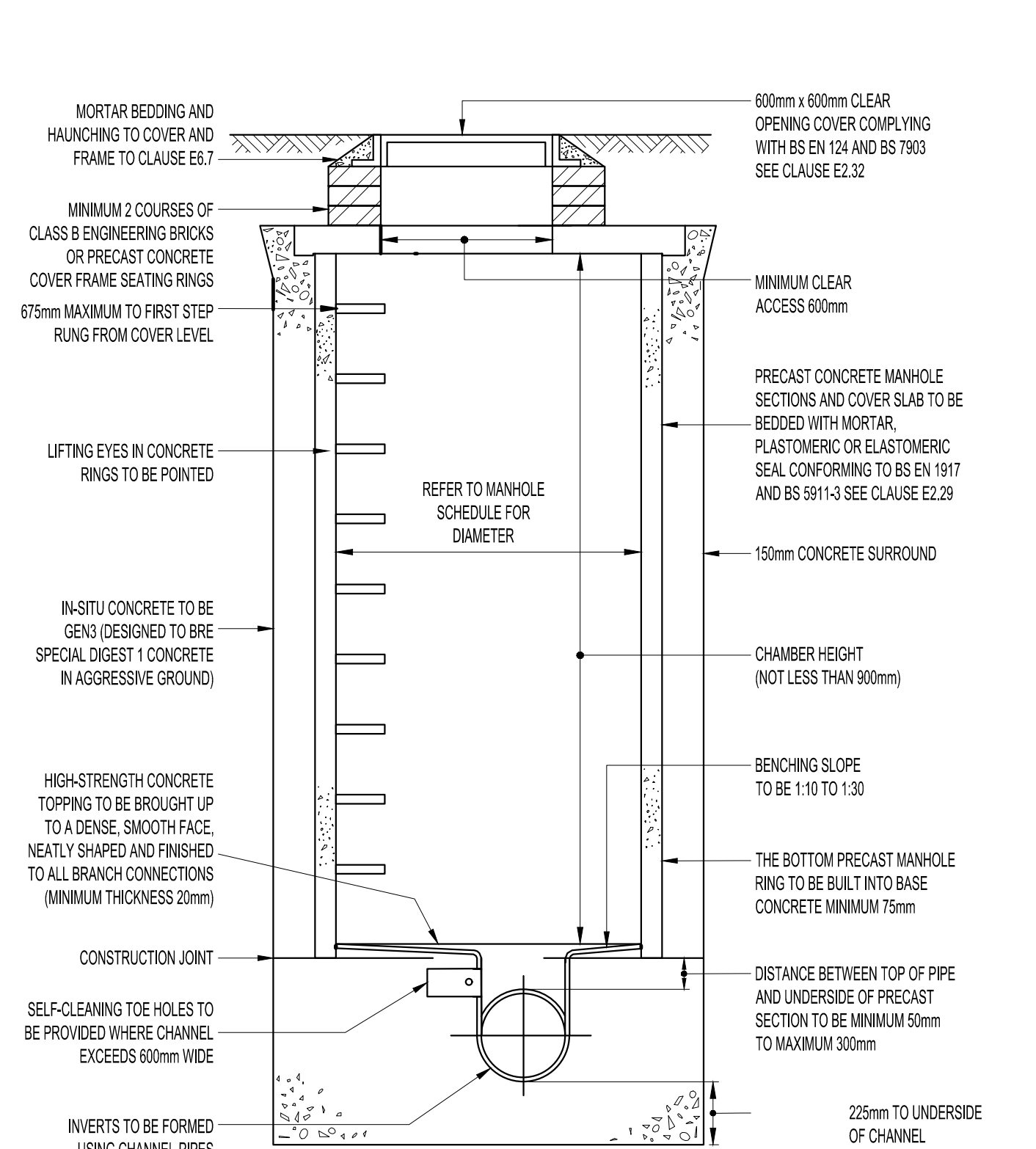


Appendix C – Proposed Drainage Drawings



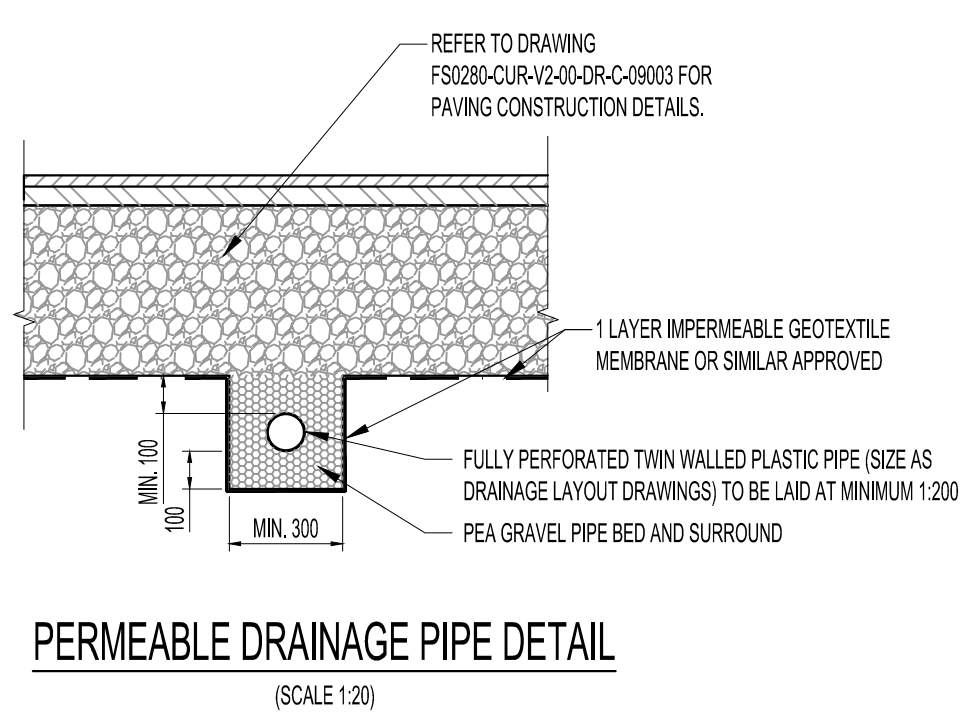
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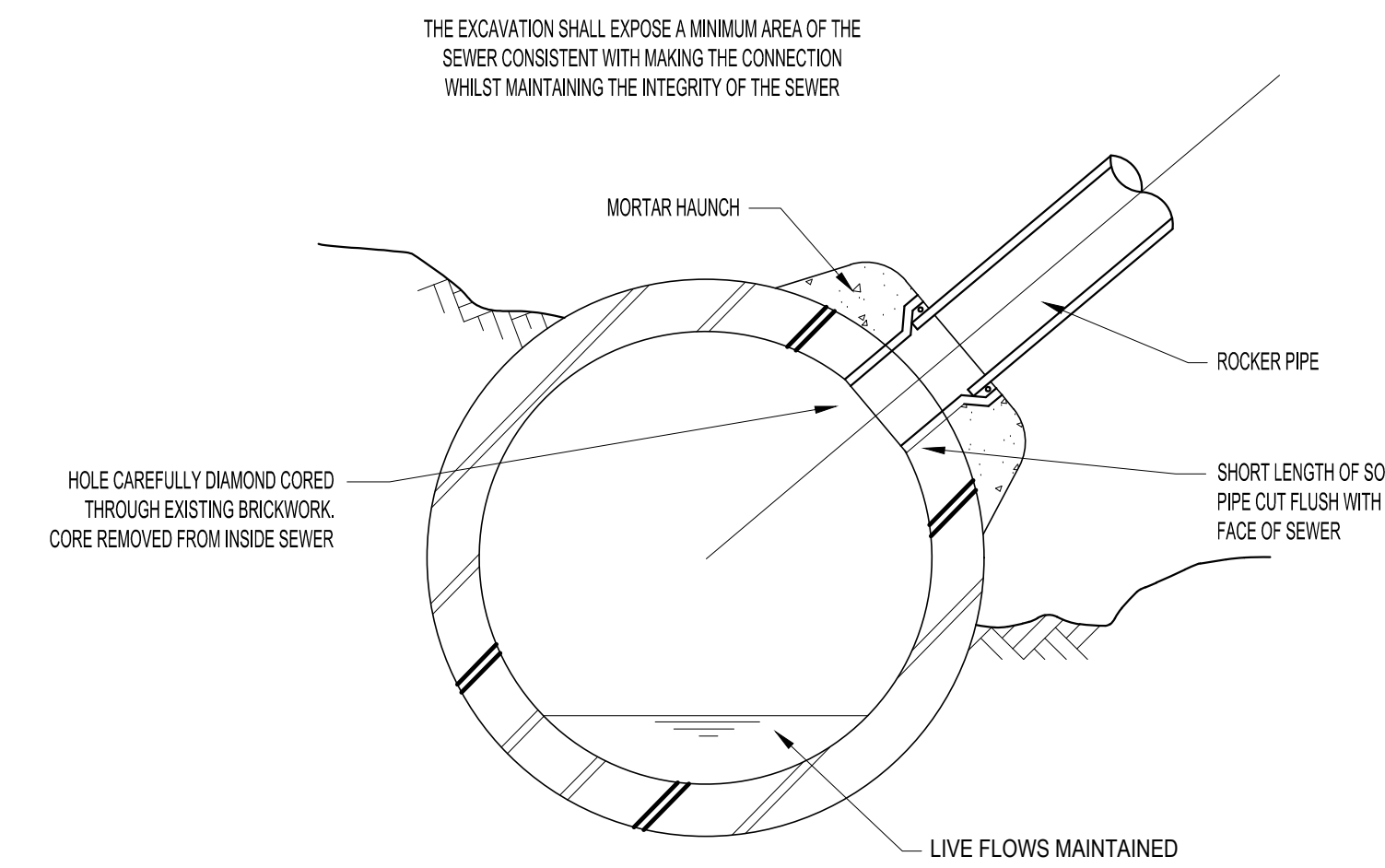
TYPICAL MANHOLE DETAIL - TYPE 2

MAXIMUM DEPTH FROM COVER LEVEL TO SOFFIT OF PIPE 3.0 M



PERMEABLE DRAINAGE PIPE DETAIL

(Scale 1:20)

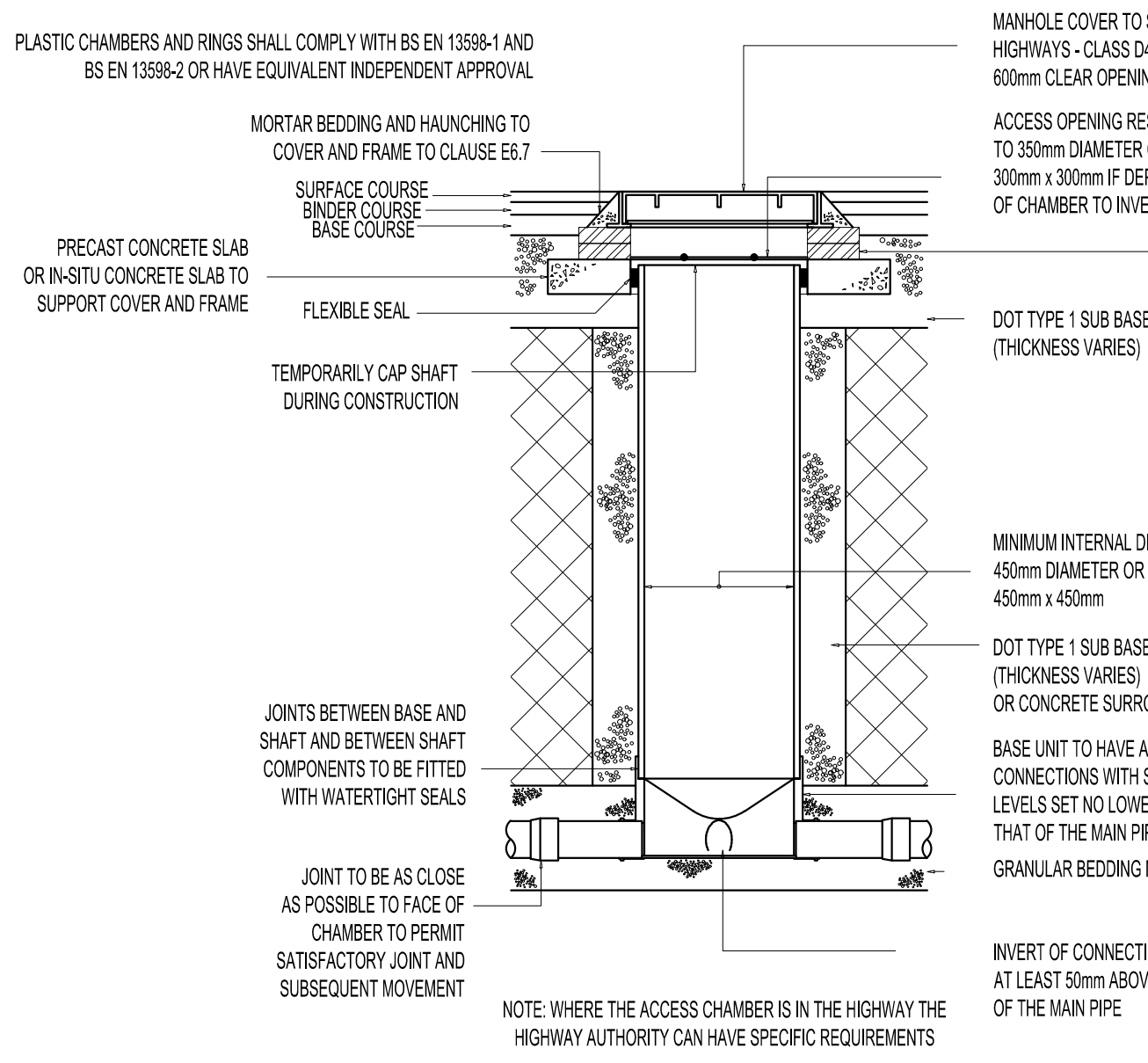


SADLE CONNECTION TO BRICK SEWER

CLASS	DIMENSION 'X' (mm)	CONCRETE GRADE (N/mm ²)
A15	100	25
B125	125	25
C50	150	25
D400	200	30
E600	200	30
F900	200	35

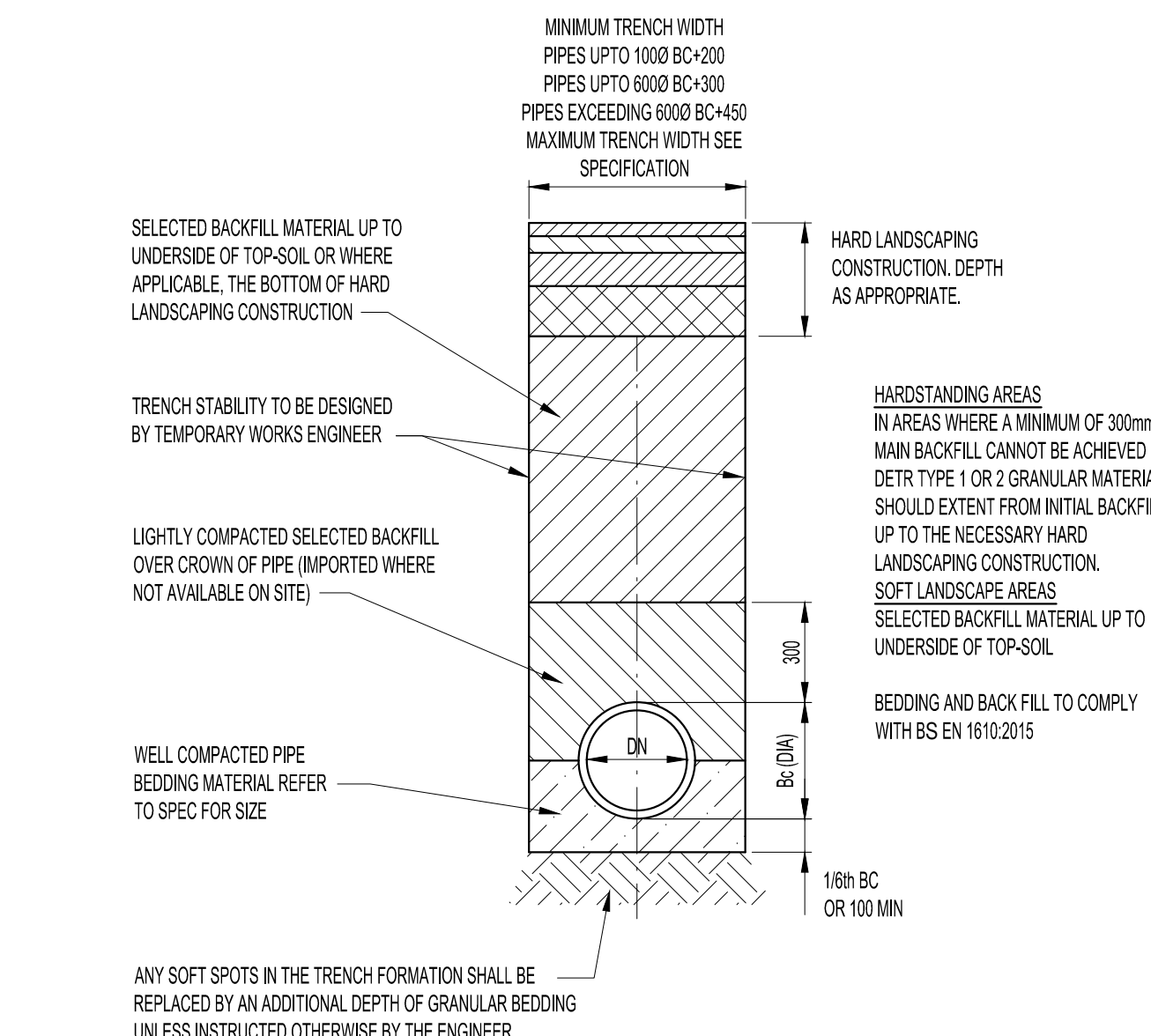
ACI 308.3S NO. 10.0.0 OR SIMILAR APPROVED CHANNEL DRAIN TO BE USED

TYPICAL CHANNEL DRAIN DETAIL

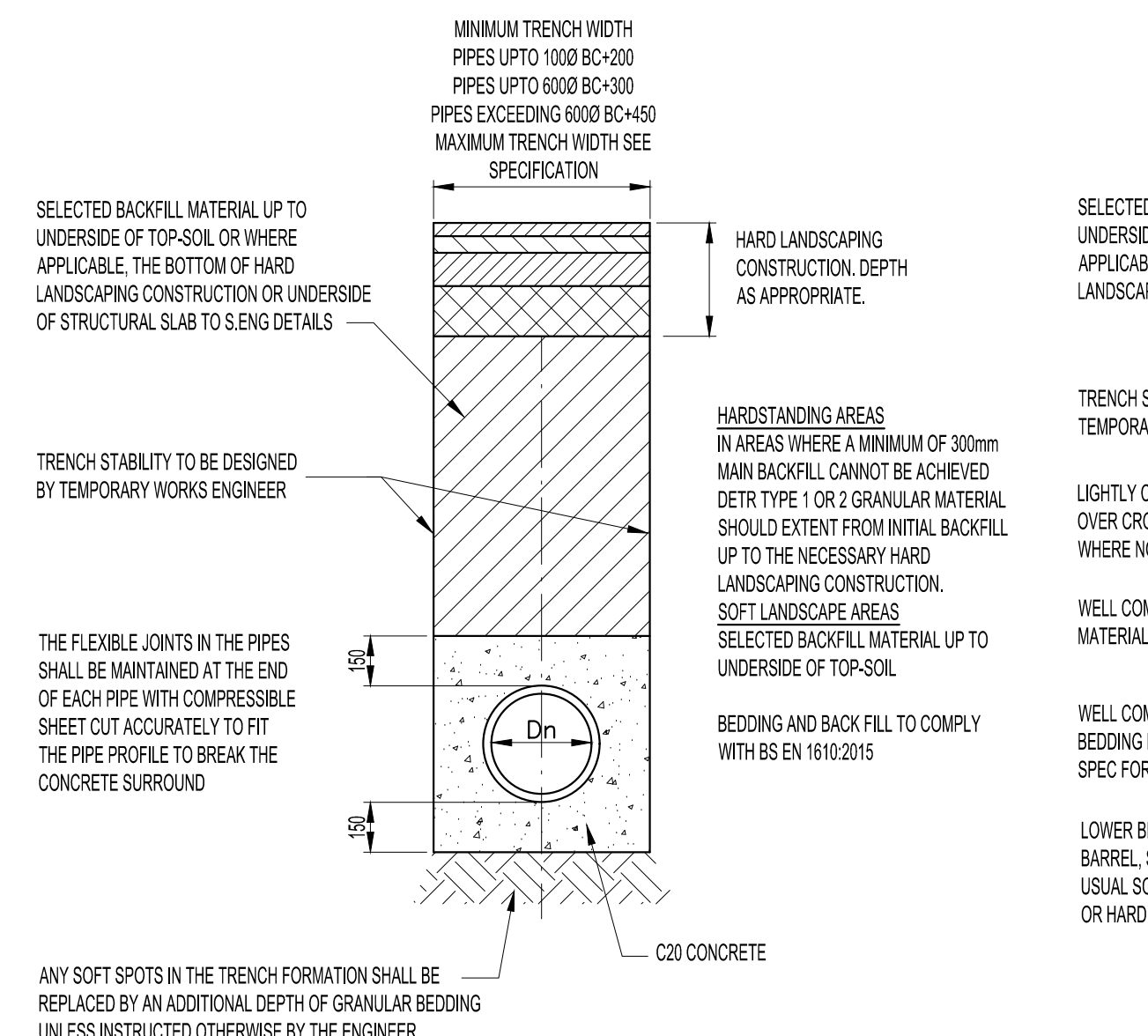


TYPICAL INSPECTION CHAMBER DETAIL - TYPE 3

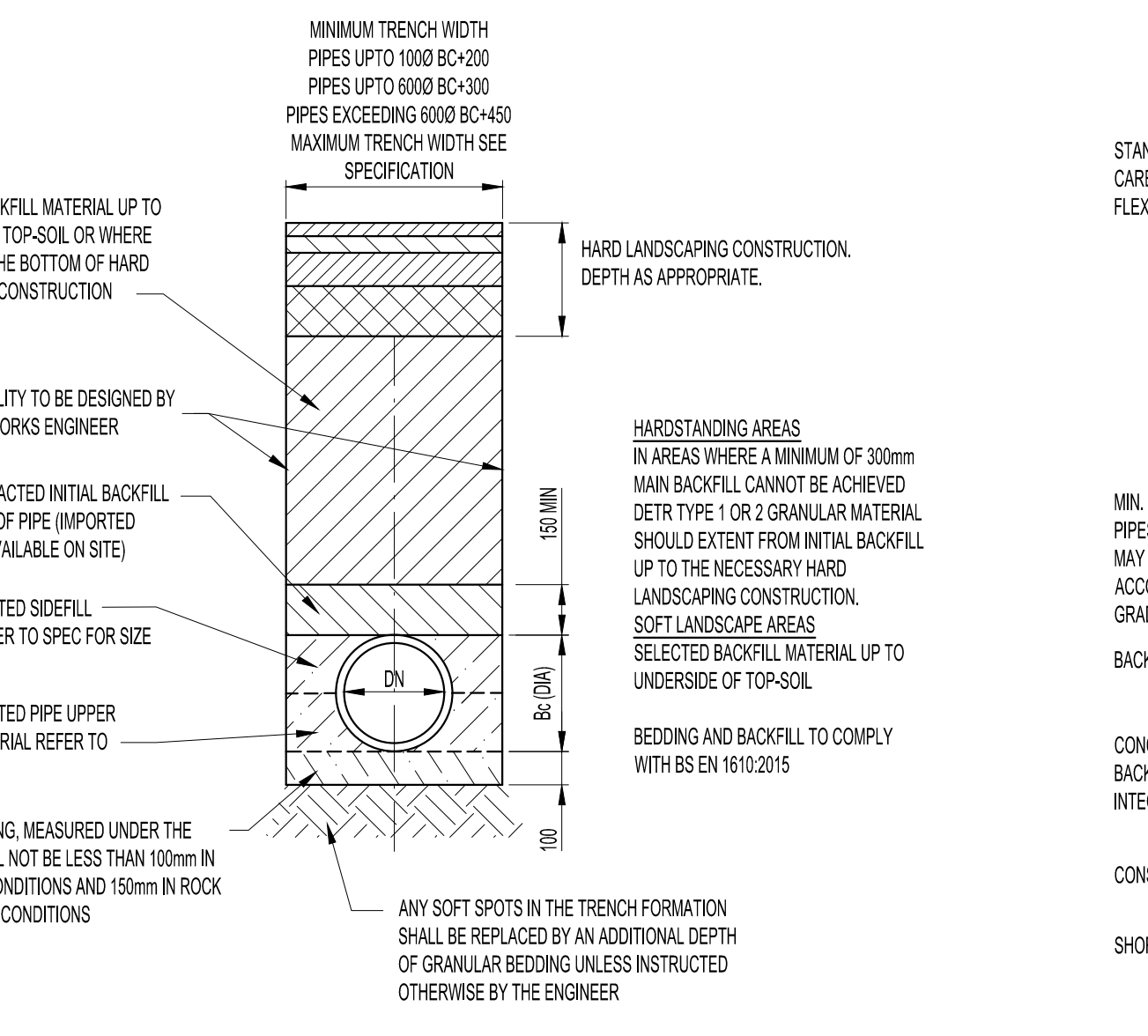
(FLEXIBLE MATERIAL DETAIL)
MAXIMUM DEPTH FROM COVER LEVEL TO SOFFIT OF PIPE IN AREAS SUBJECT TO VEHICLE LOADING 3 M, NON-ENTRY



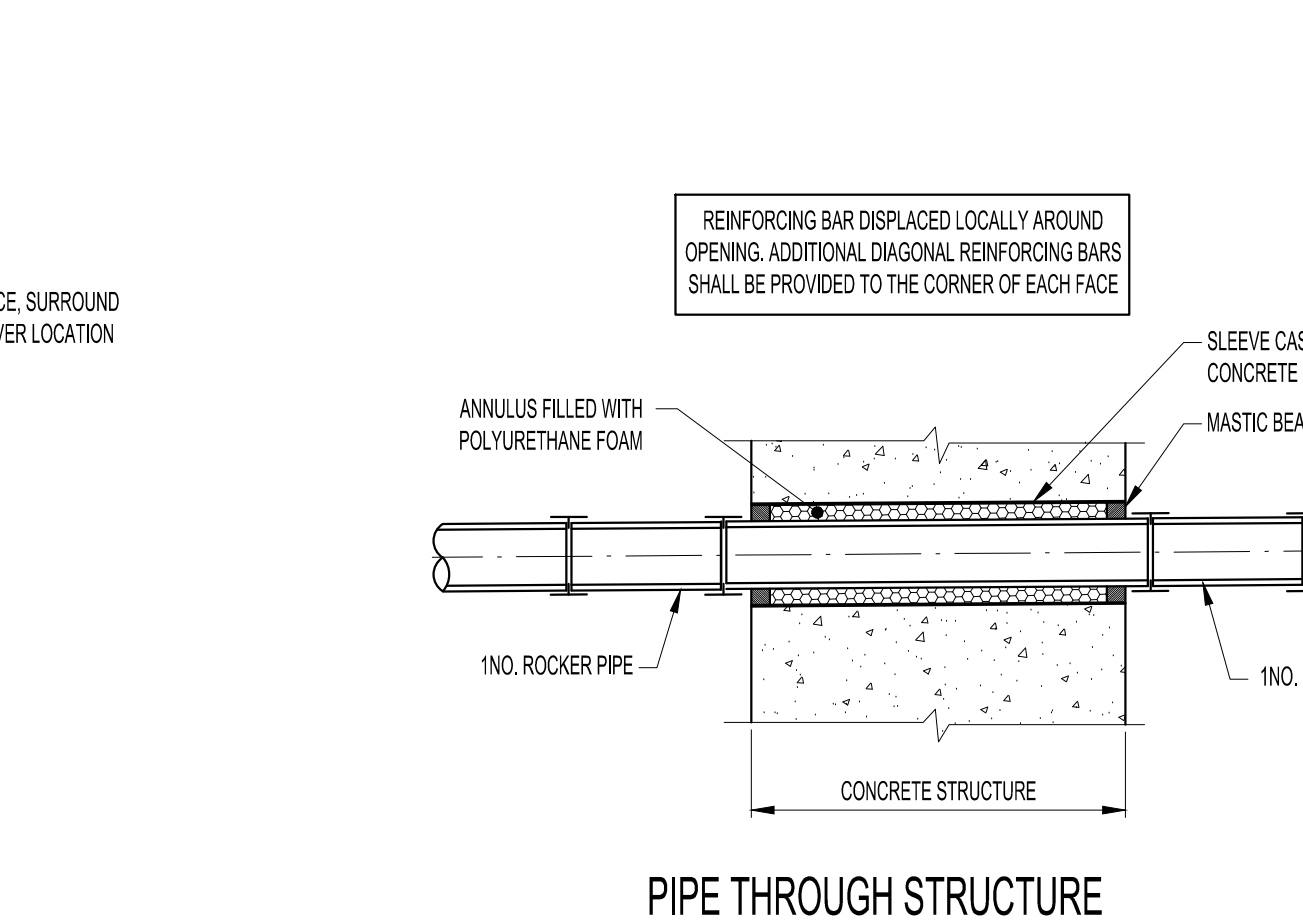
CLASS B
180° GRANULAR BED PIPE BEDDING DETAIL



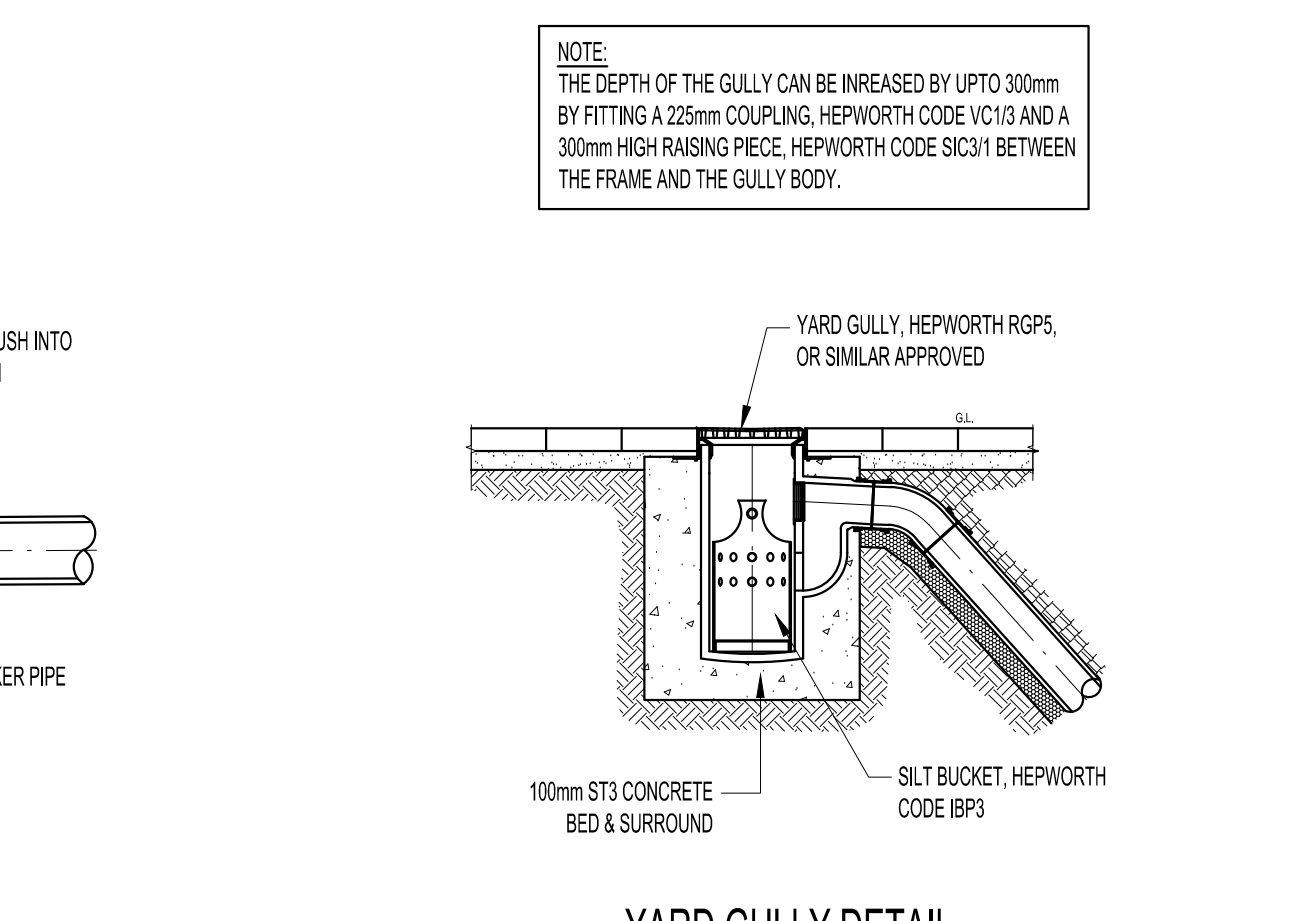
CLASS Z
CONCRETE BED AND SURROUND PIPE BEDDING DETAIL



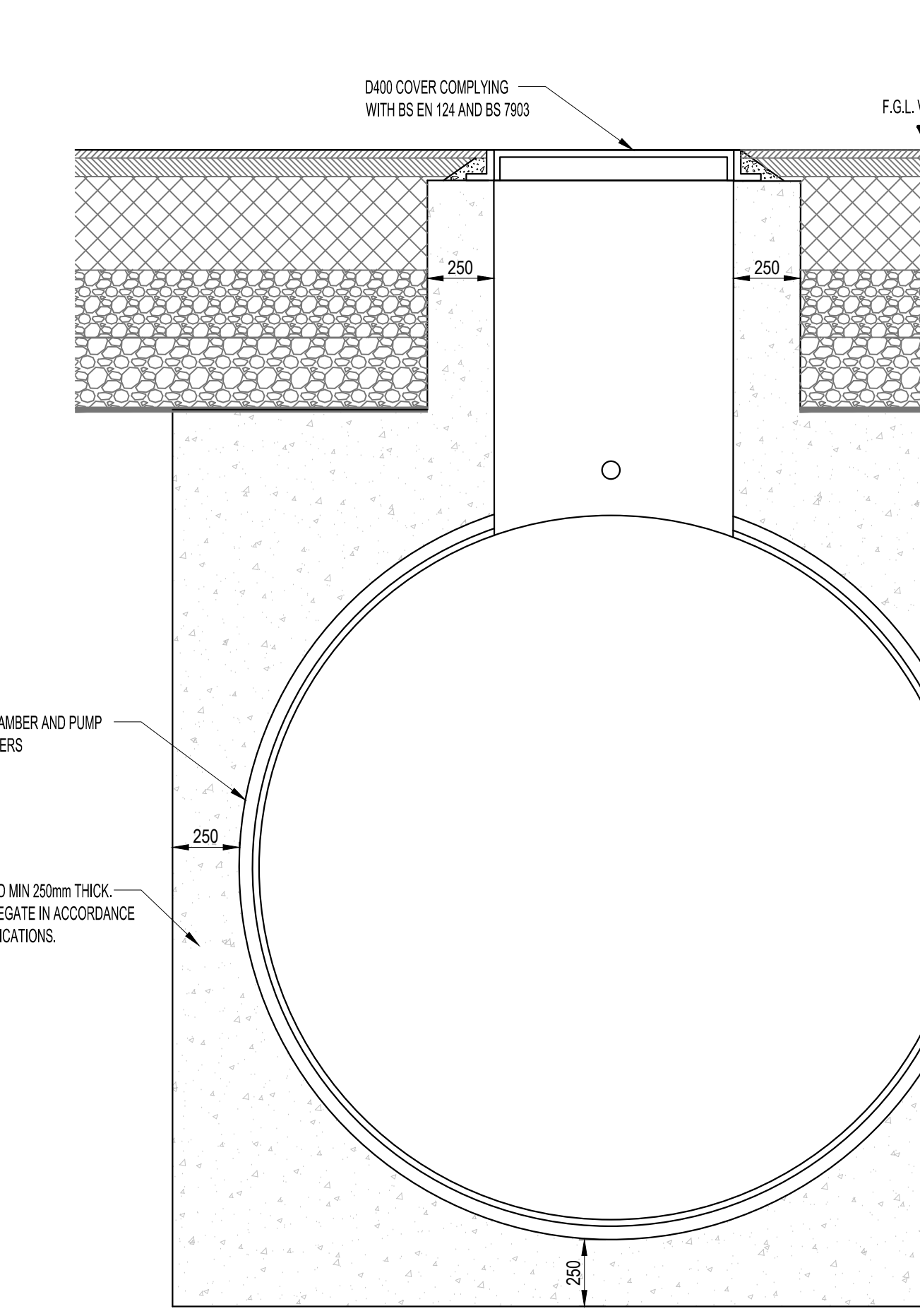
CLASS S
360° GRANULAR SURROUND PIPE BEDDING DETAIL



PIPE THROUGH STRUCTURE

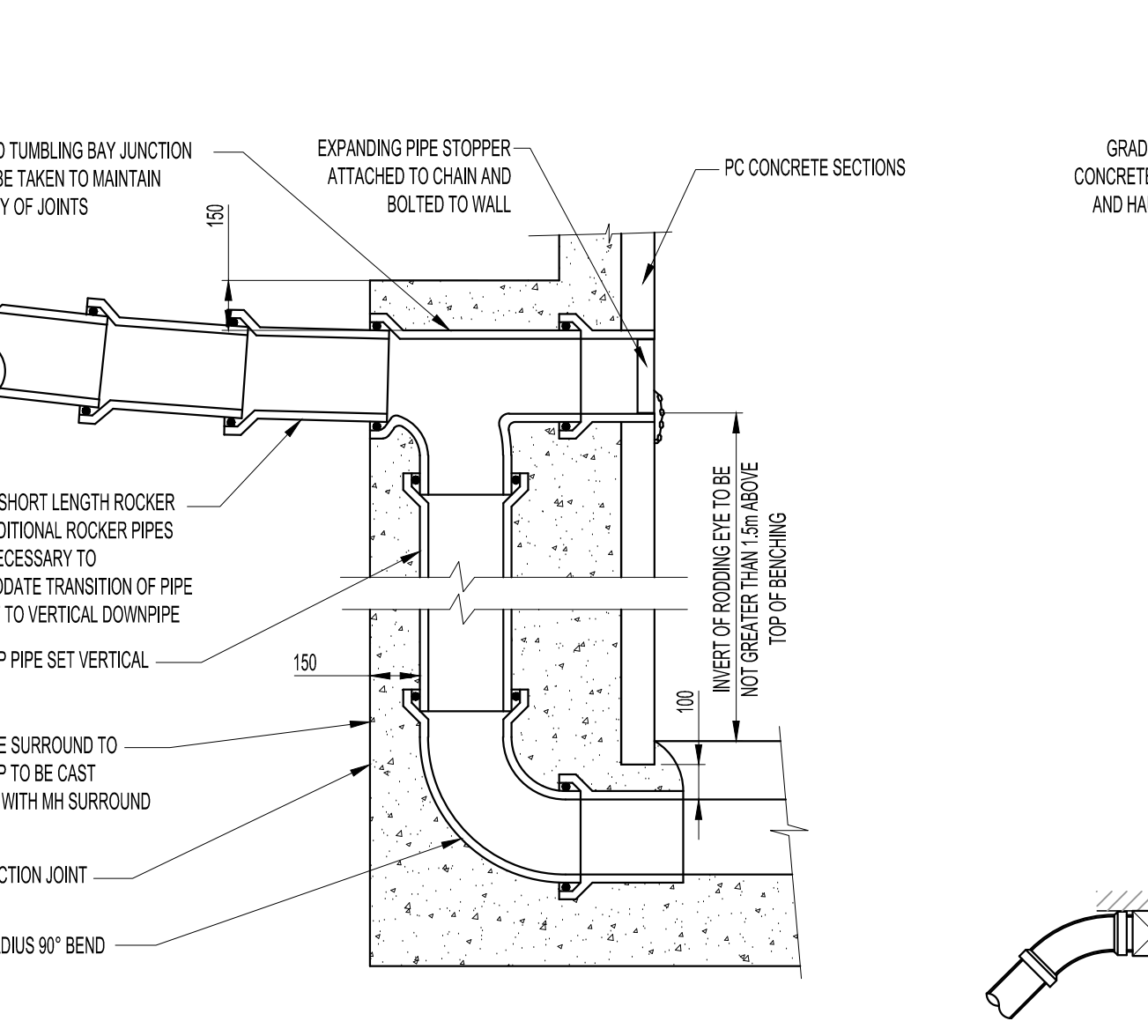


YARD GULLY DETAIL



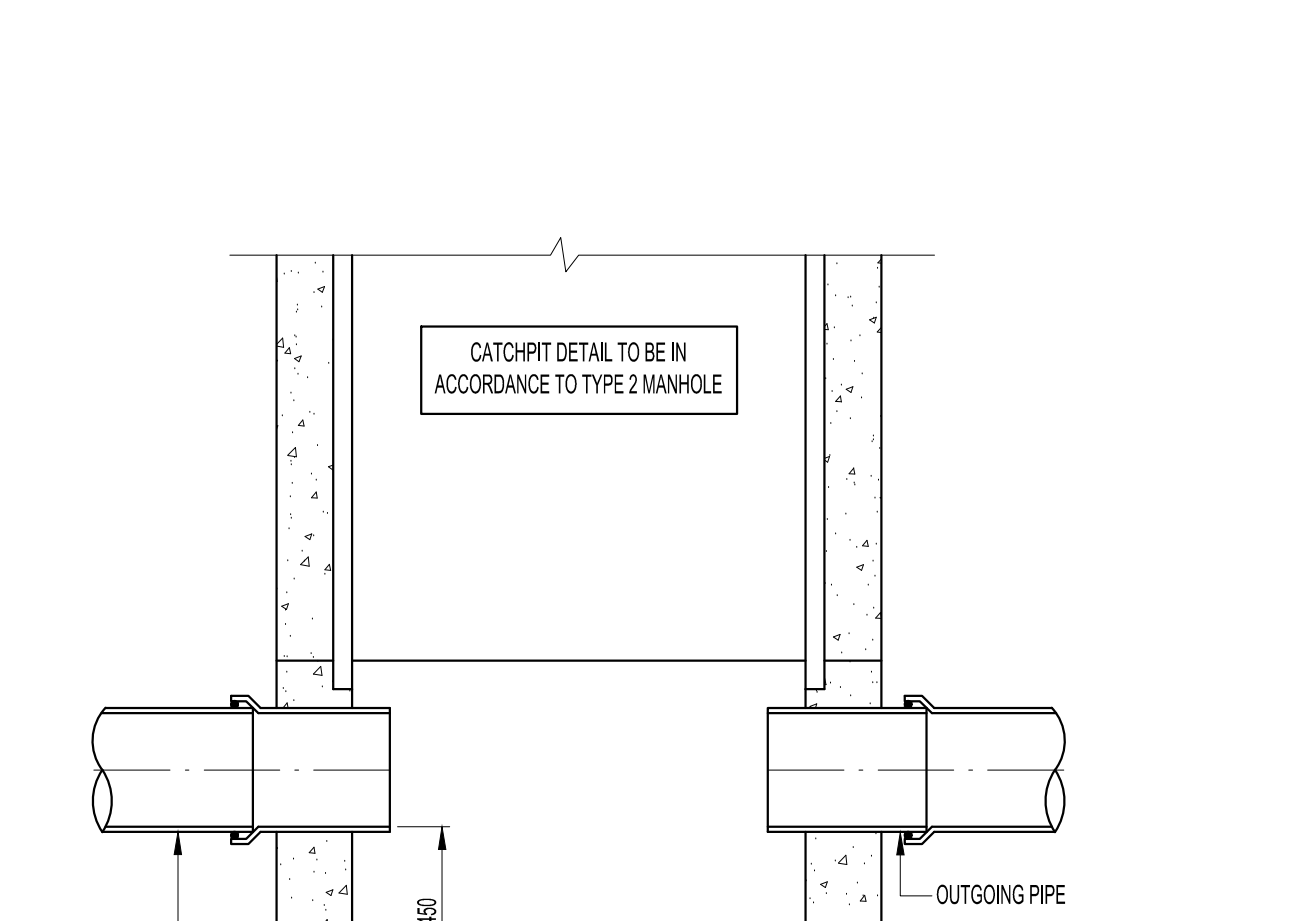
HORIZONTAL PUMP CHAMBER DETAIL
(HARGRESTER PISTON-11 OR SIMILAR APPROVED)

(Scale 1:20)

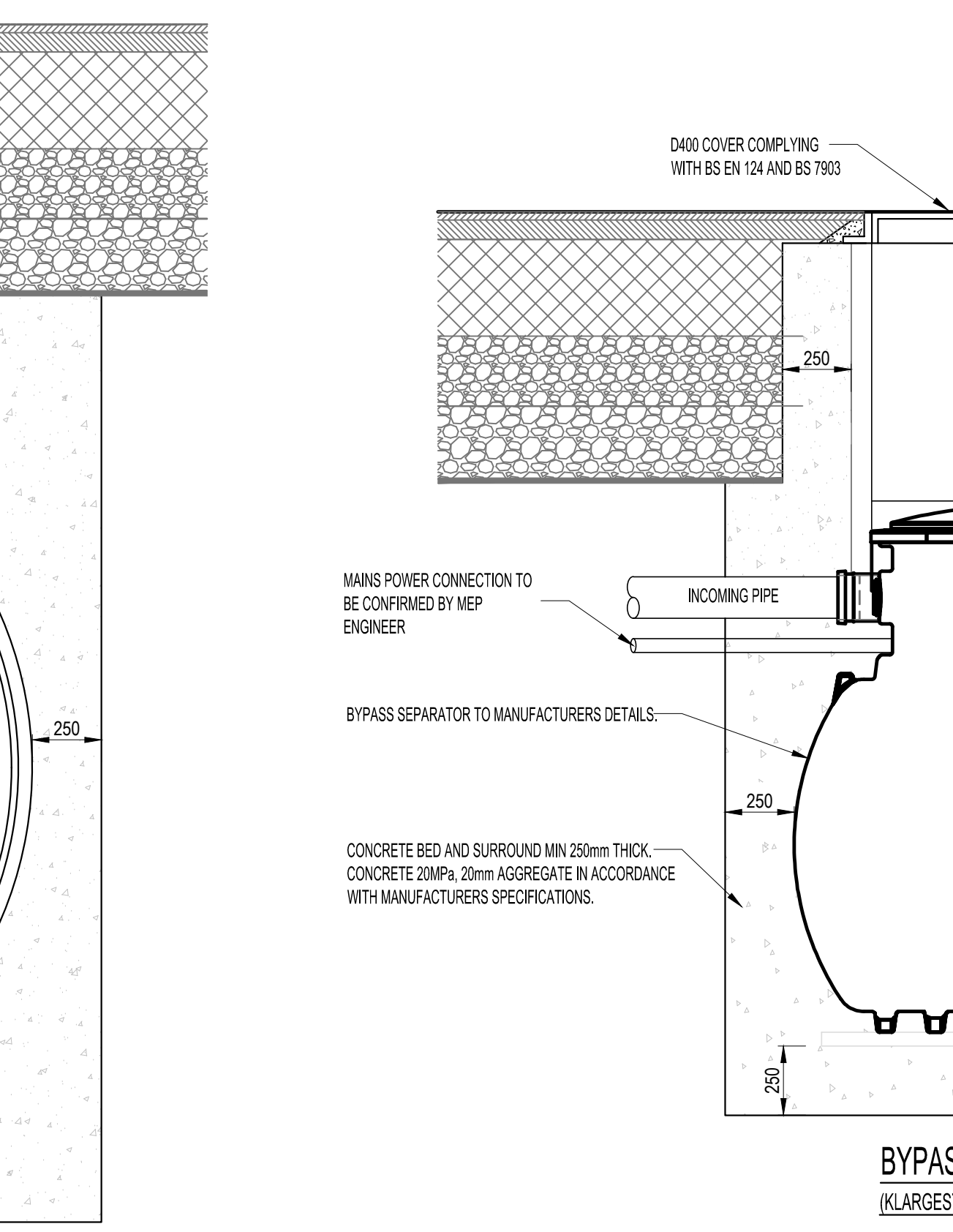


VERTICAL BACKDROP DETAIL

(Scale 1:20)

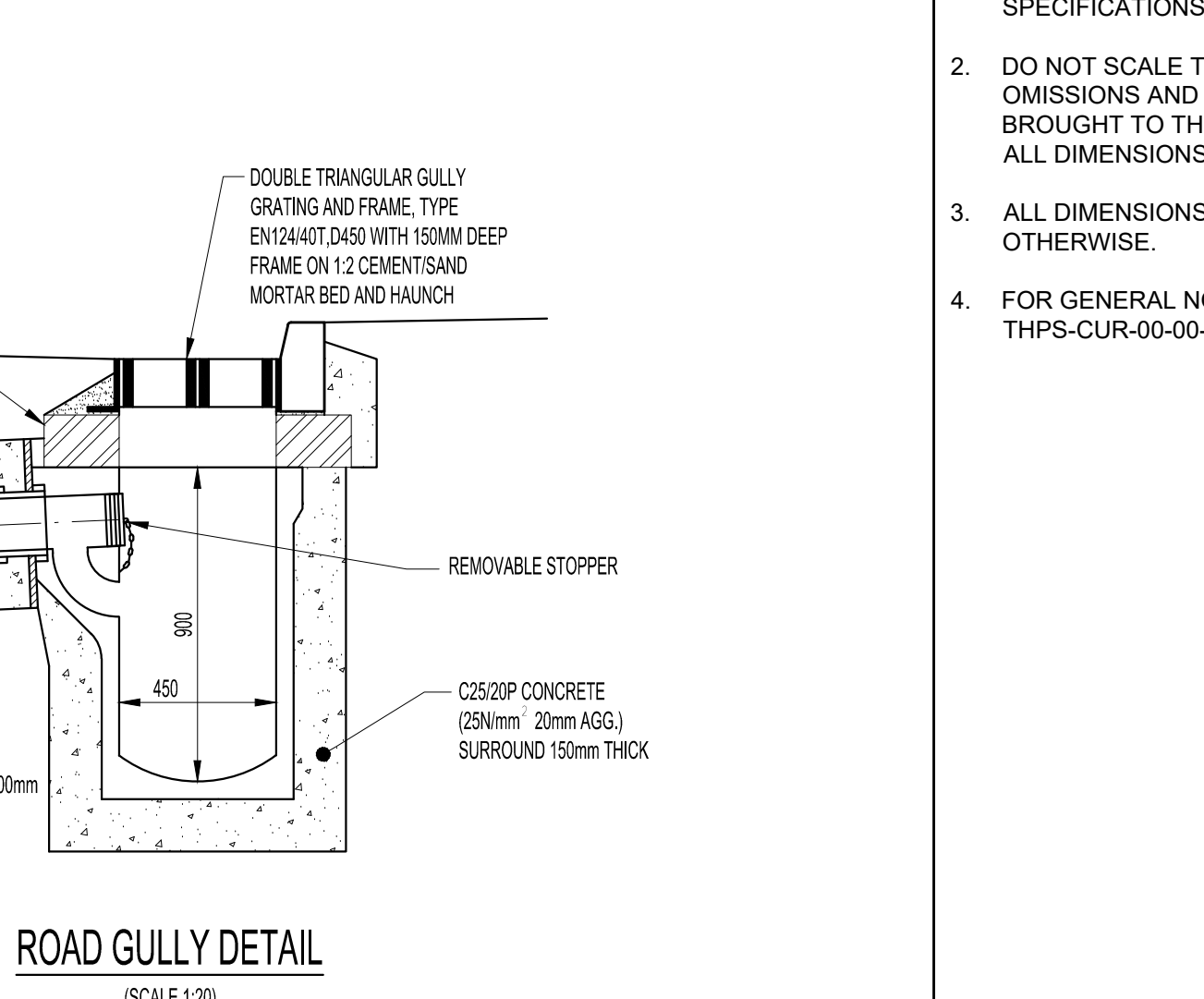


CATCHPIT MANHOLE DETAIL



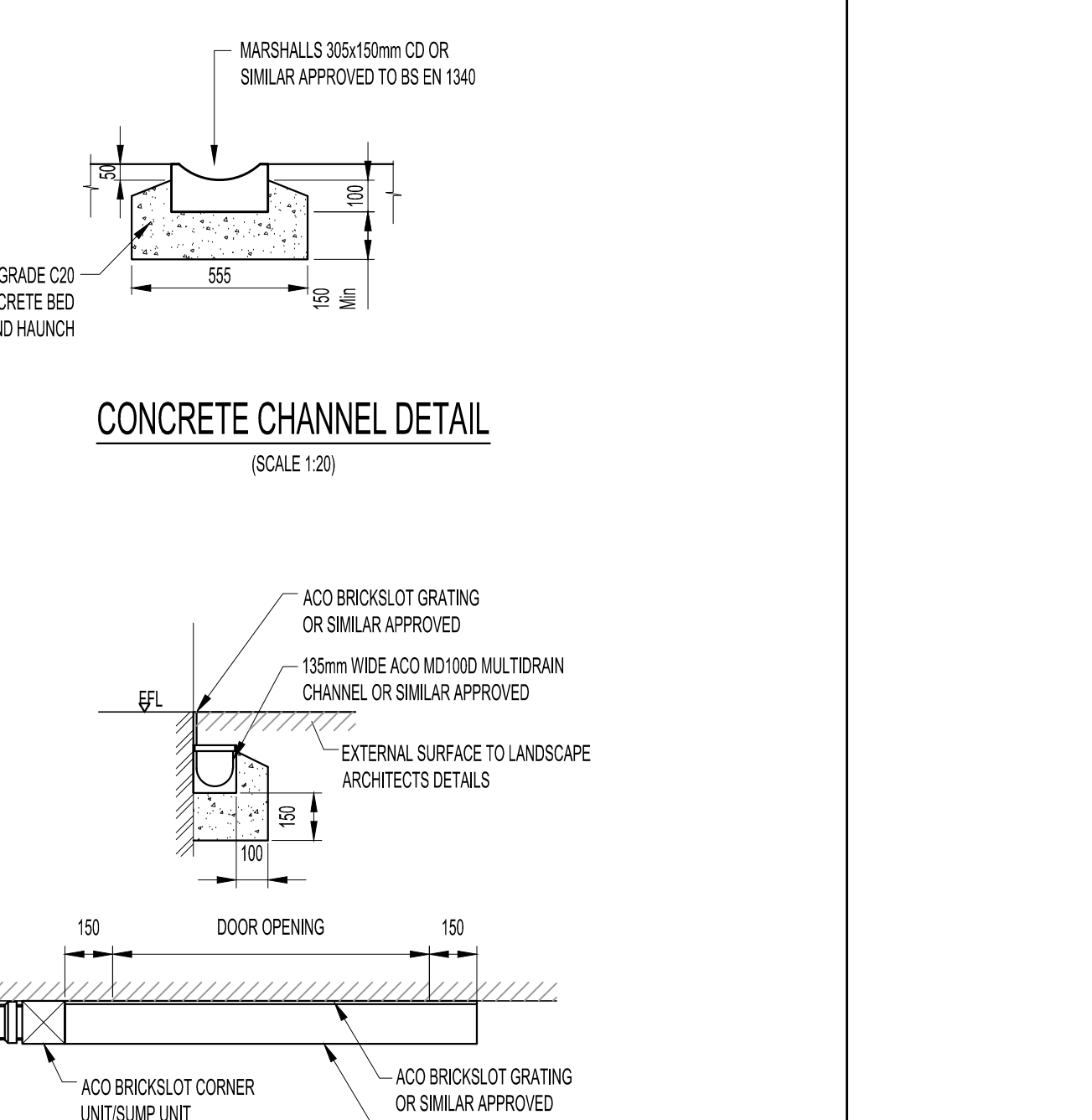
BYPASS SEPARATOR DETAIL
(HARGRESTER NSF4020 OR SIMILAR APPROVED)

(Scale 1:20)



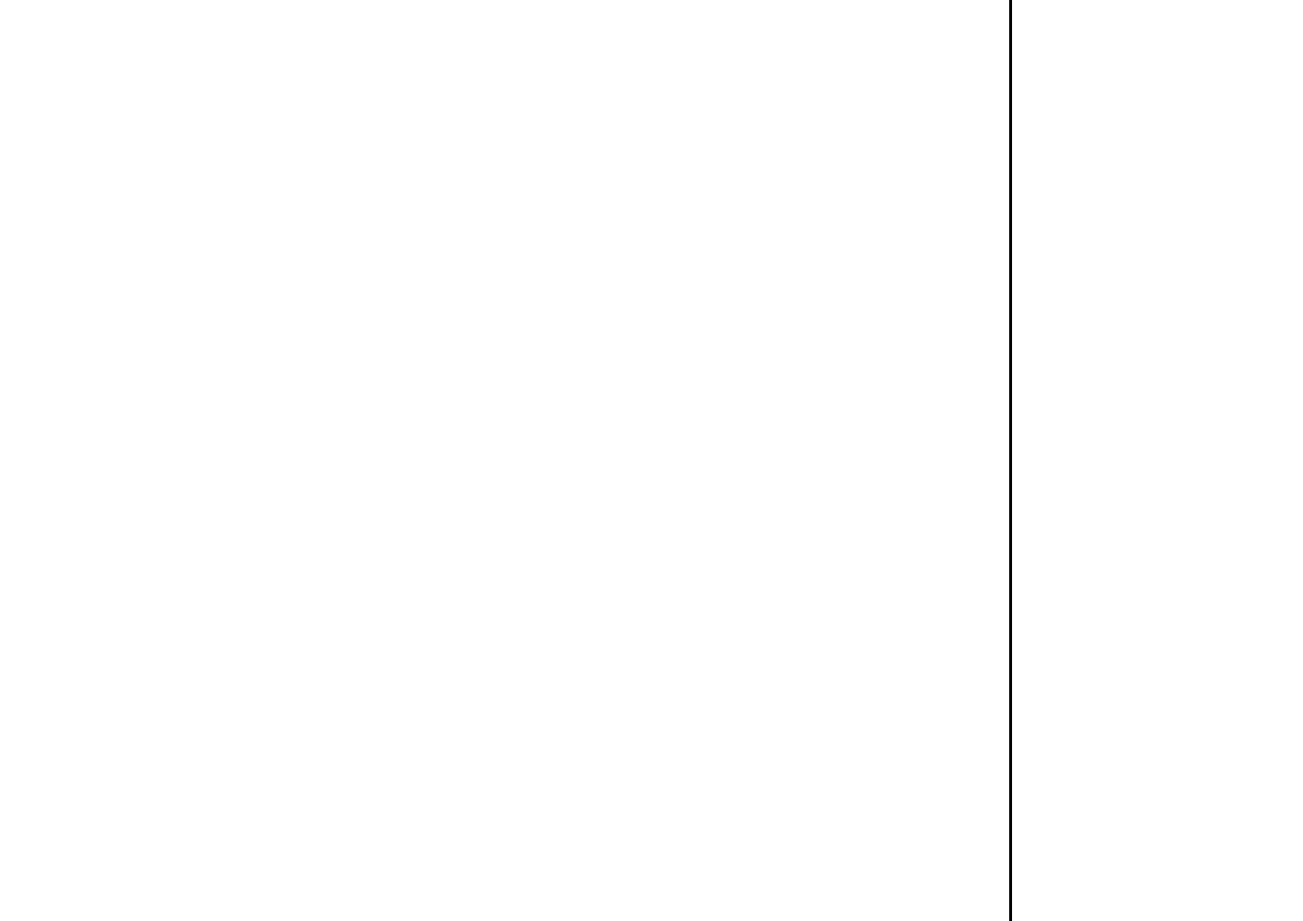
ROAD GULLY DETAIL

(Scale 1:20)



CONCRETE CHANNEL DETAIL

(Scale 1:20)



THRESHOLD SLOT DRAIN DETAIL

C02	BYPASS SEPARATOR DETAIL FOUL PUMP STATION DETAIL REVISED ADDED	20.07.20	NMH	MS
C01	CONSTRUCTION ISSUE	19.03.20	NMH	SH
P03	DETAILS UPDATED IN LINE WITH REVISED DRAINAGE STRATEGY	12.03.20	NMH	TL
P02	STAGE 4 ISSUE	26.04.19	AM	RU
P01	PRELIMINARY ISSUE	28.01.19	NMH	RU
Rev	Description	Date	By	Chk

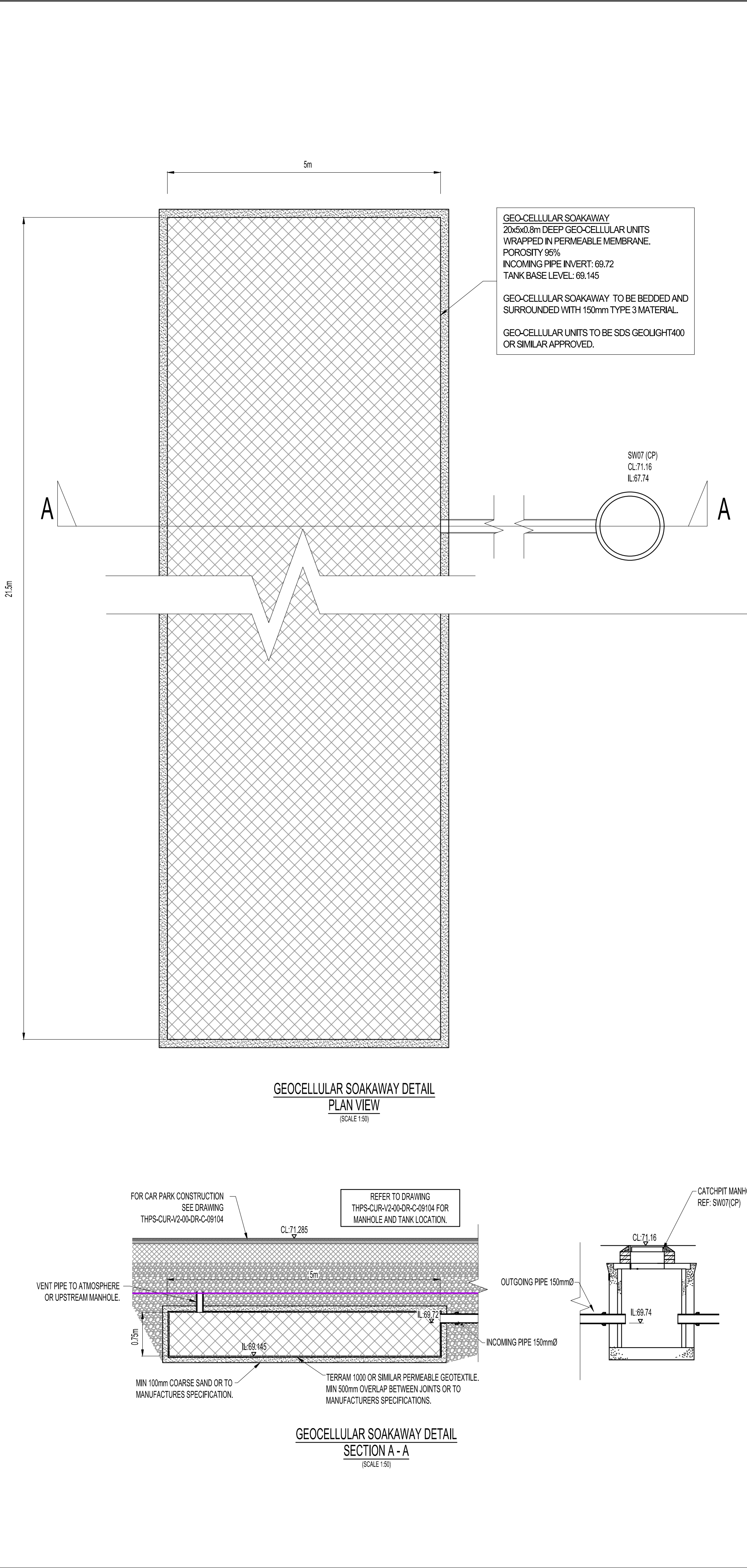
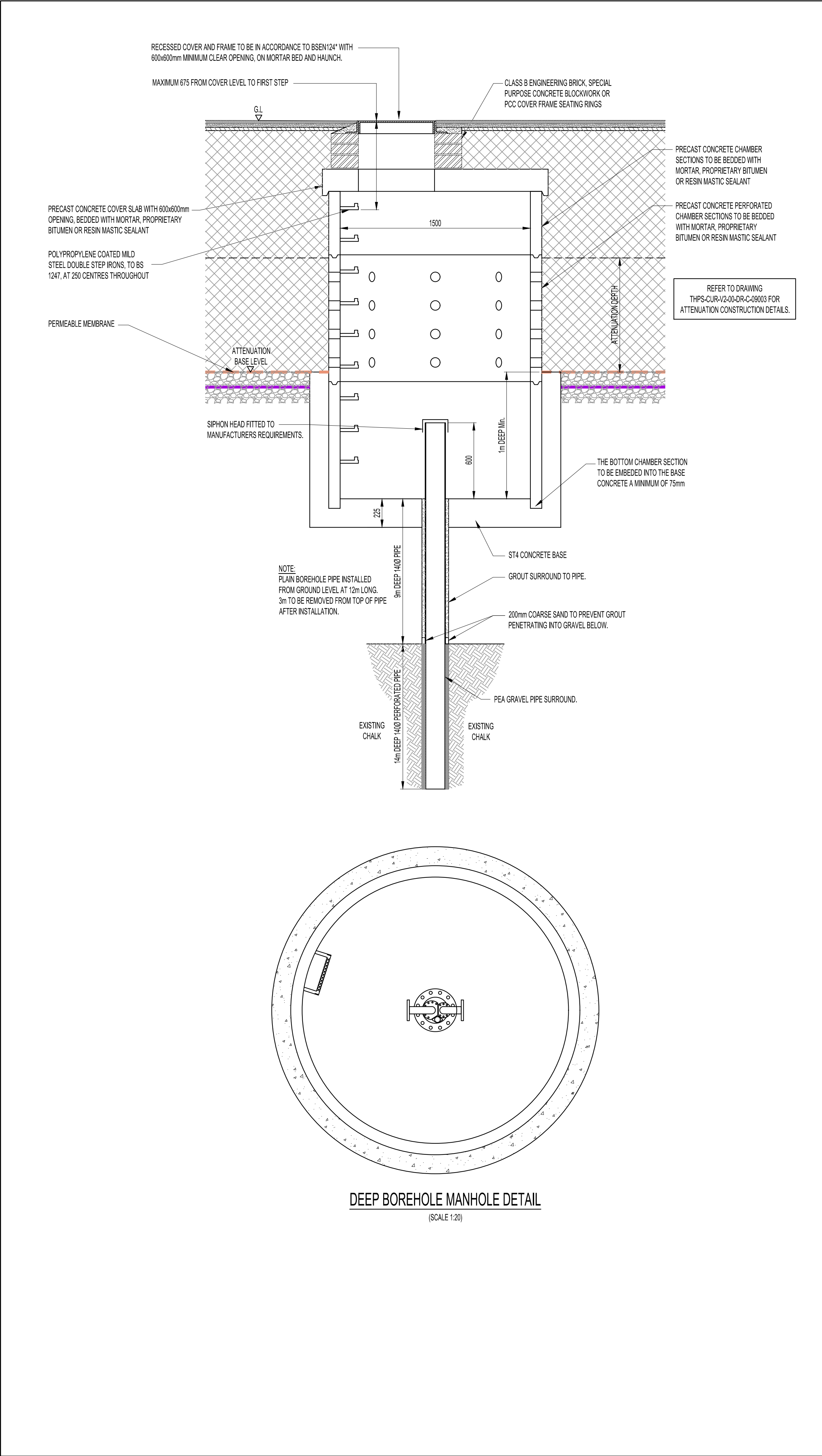


CONSTRUCTION

THE HEIGHTS

TYPICAL DRAINAGE DETAILS

Size	Date	Drawn By	Designed By	Checked By
A0	21.12.18	NMH	NMH	RU
Scale:	NTS			
Project No:	Originator	Zone	Level	Type
THPS - CUR - V2 - 00 - DR - C - 09002				



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 MILLIMETRES UNLESS NOTED OTHERWISE.			

\\0FS03P0606000000-00950100006469 - Heights ESFA school - Reading\0154 Production\04 Drawings\CS\AutoCAD

Manhole Schedule							
MANHOLE REFERENCE	CHAMBER SIZE	COVER DUTY	COVER LEVEL (m AOD)	OUTLET INVERT LEVEL (m AOD)	EASTING (mm)	NORTHING (mm)	
FW01	PPIC 450 Min.	B125	CL:70.95	IL:69.80	469824.583	175792.213	
FW02	PPIC 450 Min.	B125	CL:70.95	IL:69.70	469825.653	175796.415	
FW03	PPIC 450 Min.	B125	CL:70.95	IL:69.66	469826.782	175797.906	
FW04	PPIC 450 Min.	B125	CL:70.95	IL:69.64	469827.243	175799.188	
FW05	PPIC 450 Min.	B125	CL:70.95	IL:70.00	469827.940	175802.899	
FW06	PPIC 450 Min.	B125	CL:70.95	IL:69.54	469832.201	175813.552	
FW07	PPIC 450 Min.	B125	CL:70.95	IL:69.34	469817.188	175819.840	
FW09	DIA 1200	B125	CL:70.95	IL:69.16	469812.894	175821.662	
FW10	DIA 1200	B125	CL:70.95	IL:69.06	469807.586	175823.473	
FW11	PPIC 450 Min.	B125	CL:70.95	IL:69.82	469777.318	175801.848	
FW12	PPIC 450 Min.	B125	CL:70.95	IL:69.49	469781.614	175814.292	
FW12A	PPIC 450 Min.	B125	CL:70.95	IL:69.40	469782.790	175817.696	
FW13	DIA 1200	D400	CL:70.95	IL:69.29	469787.236	175830.121	
FW14	DIA 1200	B125	CL:70.95	IL:69.11	469802.358	175825.213	
FW14A	PPIC 450 Min.	D400	CL:70.95	IL:69.14	469795.657	175826.633	
SA 01	DIA 1500	RECESSED C250	CL:70.85	IL:67.975	469769.952	175783.845	
SA 02	DIA 1500	RECESSED C250	CL:70.85	IL:67.975	469775.182	175781.693	
SA 03	DIA 1500	RECESSED C250	CL:70.85	IL:67.975	469767.476	175778.263	
SW01 (CP)	DIA 1200	B125	CL:70.95	IL:69.08	469773.964	175794.551	SUMP LEVEL:68.63
SW02	DIA 1050	B125	CL:70.93	IL:69.62	469832.333	175814.761	
SW03(CP)	DIA 1050	B125	CL:70.85	IL:69.22	469820.323	175778.777	SUMP LEVEL:68.77
SW04	PPIC 600 Min.	B125	CL:70.95	IL:69.86	469798.183	175796.972	
SW05 (CP)	DIA 1200	B125	CL:70.95	IL:69.08	469794.841	175787.321	SUMP LEVEL:68.63
SW06 (CP)	DIA 1200	D400	CL:71.01	IL:69.79	469821.890	175824.562	SUMP LEVEL:69.34
SW07	DIA 1200	D400	CL:71.16	IL:69.74	469825.070	175833.700	
RE 1	-	D400	CL:71.01	IL:69.90	469802.277	175831.537	RODDING EYE
RE 2	-	D400	CL:70.92	IL:69.90	469793.615	175829.465	RODDING EYE
RE 3	-	B125	CL:70.92	IL:70.10	469782.477	175819.269	RODDING EYE
RE 4	-	B125	CL:70.95	IL:70.10	469815.818	175790.815	RODDING EYE

DRAIN POINT SCHEDULE		
DRAIN POINT	EASTING (mm)	NORTHING (mm)
DP1	469795.738	175822.521
DP2	469805.459	175818.684
DP3	469803.186	175816.155
DP4	469804.807	175815.267
DP5	469806.339	175815.062
DP6	469819.227	175808.506
DP7	469786.940	175819.371
DP8	469794.014	175814.879
DP9	469796.228	175811.252
DP10	469799.695	175810.175
DP11	469803.408	175808.715
DP12	469807.902	175807.145
DP13	469813.553	175805.186
DP14	469817.063	175804.310
DP15	469818.881	175803.680
DP16	469819.071	175803.288
DP17	469820.468	175800.576
DP18	469788.314	175809.976
DP19	469817.334	175799.052
DP20	469820.745	175797.870
DP21	469824.808	175797.254
DP22	469785.039	175795.919
DP23	469795.355	175796.753
DP24	469818.734	175795.518
TD1	469824.836	175799.517
TD2	469825.157	175799.406
FG1	469815.628	175794.612
FG2	469818.807	175793.512
R1	469788.745	175799.660



THE PROPOSED SURFACE WATER OUTFALL IS IN ABEYANCE AND NOT FOR CONSTRUCTION.
DISCHARGE OF SURFACE WATER IS SUBJECT TO PLANNING APPROVAL
FINALISED DRAWING SHOWING THE SURFACE WATER OUTFALL WILL BE
ISSUED ONCE PLANNING APPROVAL IS GIVEN.

GENERAL NOTES:

- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS AND SPECIFICATIONS.
- DO NOT SCALE FROM THIS DRAWING. ALL DETAILS AND DIMENSIONS AND LEVELS ARE TO BE CHECKED BY THE CONTRACTOR PRIOR TO COMMENCEMENT OF CONSTRUCTION. ANY DISCREPANCIES ARE TO BE REPORTED TO THE ENGINEER.
- ANY AMBIGUITIES, OMISSIONS AND ERRORS ON THE DRAWING SHALL BE BROUGHT TO THE ENGINEER'S ATTENUATION IMMEDIATELY.
- ALL LEVELS ARE IN METERS & DIMENSIONS IN METERS UNLESS NOTED OTHERWISE.
- ALL DRAINAGE POINTS ARE BASED ON M&E ENGINEER DRAWING 520032-JBH-ZZ-XX-M3-MEP-0001. ALL SETTING OUT OF RWP'S SVP'S AND SS ARE BASED ON LOCATION PROPOSED BY M&E ENGINEERS.M&E ENGINEER AND ARCHITECT TO CONFIRM THE ACCURACY OF THE SETTING OUT PROVIDED. CURTINS TAKE NO RESPONSIBILITY FOR INACCURACIES OR DISCREPANCIES IN THE SETTING OUT OF INFORMATION PROVIDED/DESIGNED BY OTHERS. ALL QUERIES OR COMMENTS ON THESE POINTS SHOULD BE RAISED WITH THE RELEVANT CONSULTANT.
SURFACE WATER OUTFALL ARRANGEMENT SUBJECT TO APPROVAL FROM THAMES WATER AND THE LLFA

P01	PRELIMINARY ISSUE	20.07.20	NH	MS
Rev:	Description:	Date:	By:	Chkd:



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Status: PRELIMINARY

Project: THE HEIGHTS

Drg Title: MANHOLE SCHEDULE
(DEEP BORE SOAKAWAY OPTION)

Size:	Date:	Drawn By:	Designed By:	Checked By:			
A2	20.07.2020	NMH	NMH	MS			
Scale: 1:200							
Project No:	Originator:	Zone:	Level:	Type:	Discipline:	Category / Number:	Rev:
THPS - CUR - V2 - 00 - DR - C - 09106 -P01							

Appendix D – Soakaway Test Results

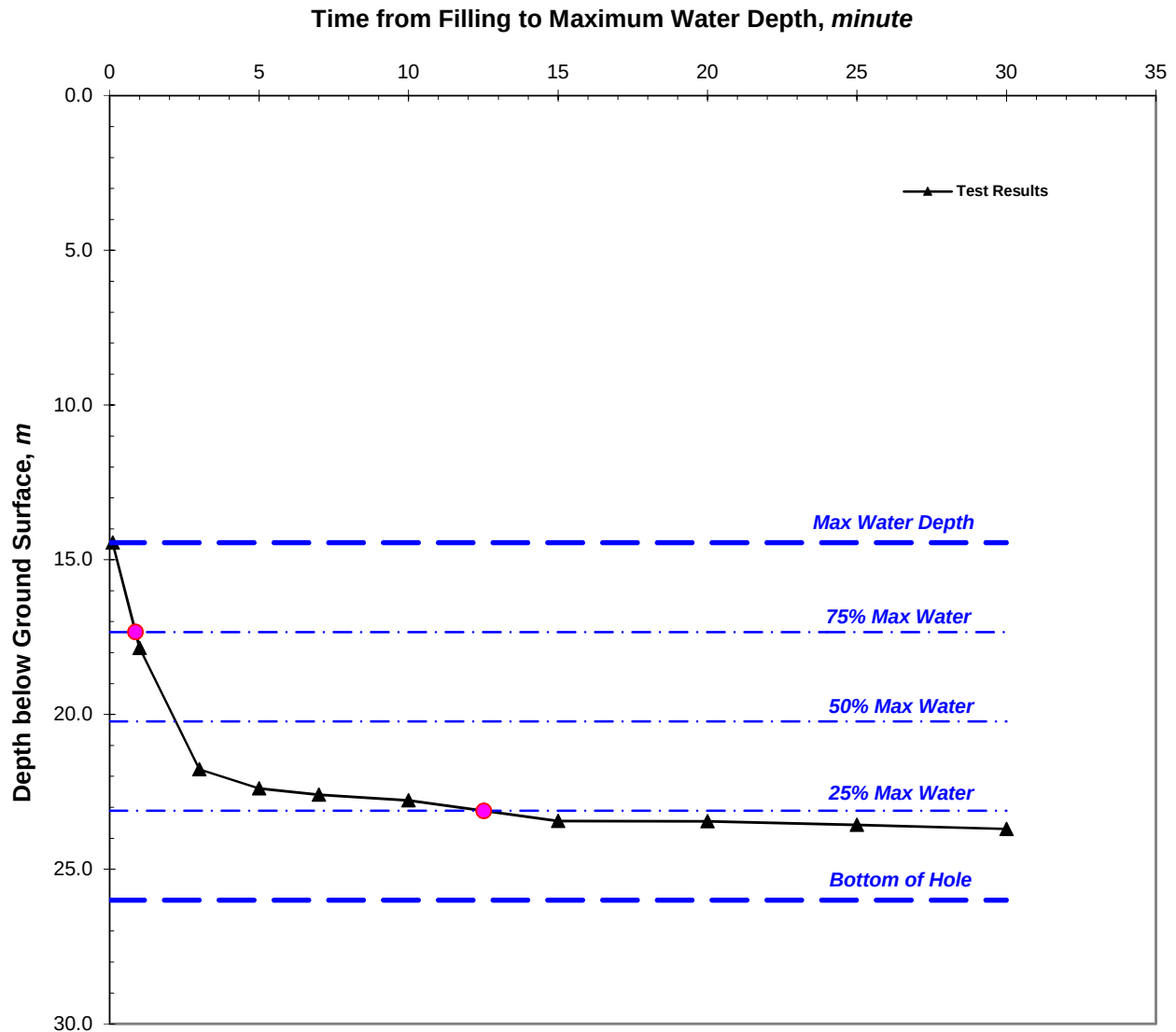
Summary Sheet

Results of Preliminary Falling-Head Soakage Tests

Site : Heights Primary School, Mapledurham Playing Field					Job No : JT0324		
Client : Kier Regional Building Southern					O S Reference : SU 69775 75753		
Tested By : SS				Engineer: RJ		Test Date : 13/Jul/2020	
Hole No	Test No	Hole Depth <i>m</i>	Soakage Rate for Each Test <i>litre/m²/min</i>	Soakage Rate for Each Hole <i>litre/m²/min m/sec</i>		Water Level at Finish of Test	Remarks
BH3	No 1	26.00	2.95	2.95	4.92E-5	Nearly empty pit.	Depth to top of permeable soils was 12m.
BH4	No 1	26.00	0.425	0.425	7.08E-6	Nearly empty pit.	Depth to top of permeable soils was 12m.
BH5	No 1	26.00	0.863	0.863	1.44E-5	Nearly empty pit.	Depth to top of permeable soils was 12m.
Mean Value of All Calculated Soakage Rates :				1.41 <i>litre/m²/min</i>	2.36E-5 <i>m/sec</i>		

Preliminary Falling-Head Soakage Test

Test Hole No: BH3
Test No: Test No 1 (Initial)



Diameter of Borehole, m	0.200	Depth to Water at Start of Test, m	14.450
Depth to End of Borehole Casing, m		Max Water Dropdown during Test, m	9.250
Depth to Borehole Base, m	26.000	Total Soakage Test Time, min	30.0
Depth to Top of Permeable Soils, m	12.000	Mean Internal Discharge Area, m ²	3.660
Depth to Groundwater Surface, m		Discharge Rate, litre/min	10.803
Depth to Top of Granular Fill, m	11.000	Soakage Rate, litre/m ² /min	2.95
Voids Assumed within Borehole, %	69%	BRE Soil Infiltration Rate, m/sec	4.92E-05

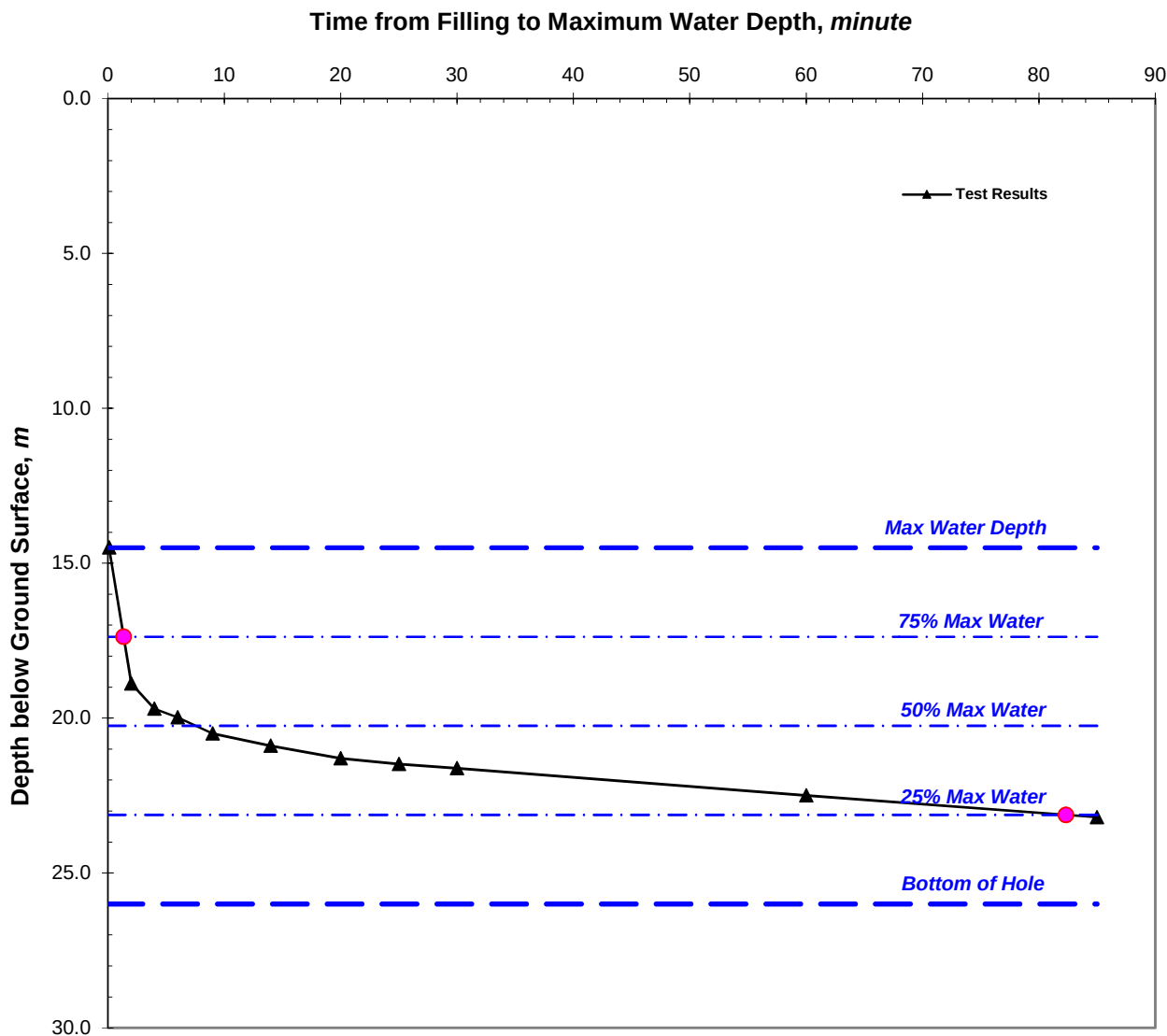
Comments:

Pit was nearly emptied at finish of test.

Client: Kier Regional Building Southern	Job No: JT0324	Test Date: 30/Jan/2019
Site: Heights Primary School, Mapledurham Play	Tested By: SS	Engineer: RJ
		Fig. S1

Preliminary Falling-Head Soakage Test

Test Hole No: BH4
Test No: Test No 1 (Initial)



Diameter of Borehole, m	0.200	Depth to Water at Start of Test, m	14.500
Depth to End of Borehole Casing, m		Max Water Dropdown during Test, m	8.700
Depth to Borehole Base, m	26.000	Total Soakage Test Time, min	85.0
Depth to Top of Permeable Soils, m	12.000	Mean Internal Discharge Area, m ²	3.644
Depth to Groundwater Surface, m		Discharge Rate, litre/min	1.548
Depth to Top of Granular Fill, m	11.000	Soakage Rate, litre/m ² /min	0.425
Voids Assumed within Borehole, %	69%	BRE Soil Infiltration Rate, m/sec	7.08E-06

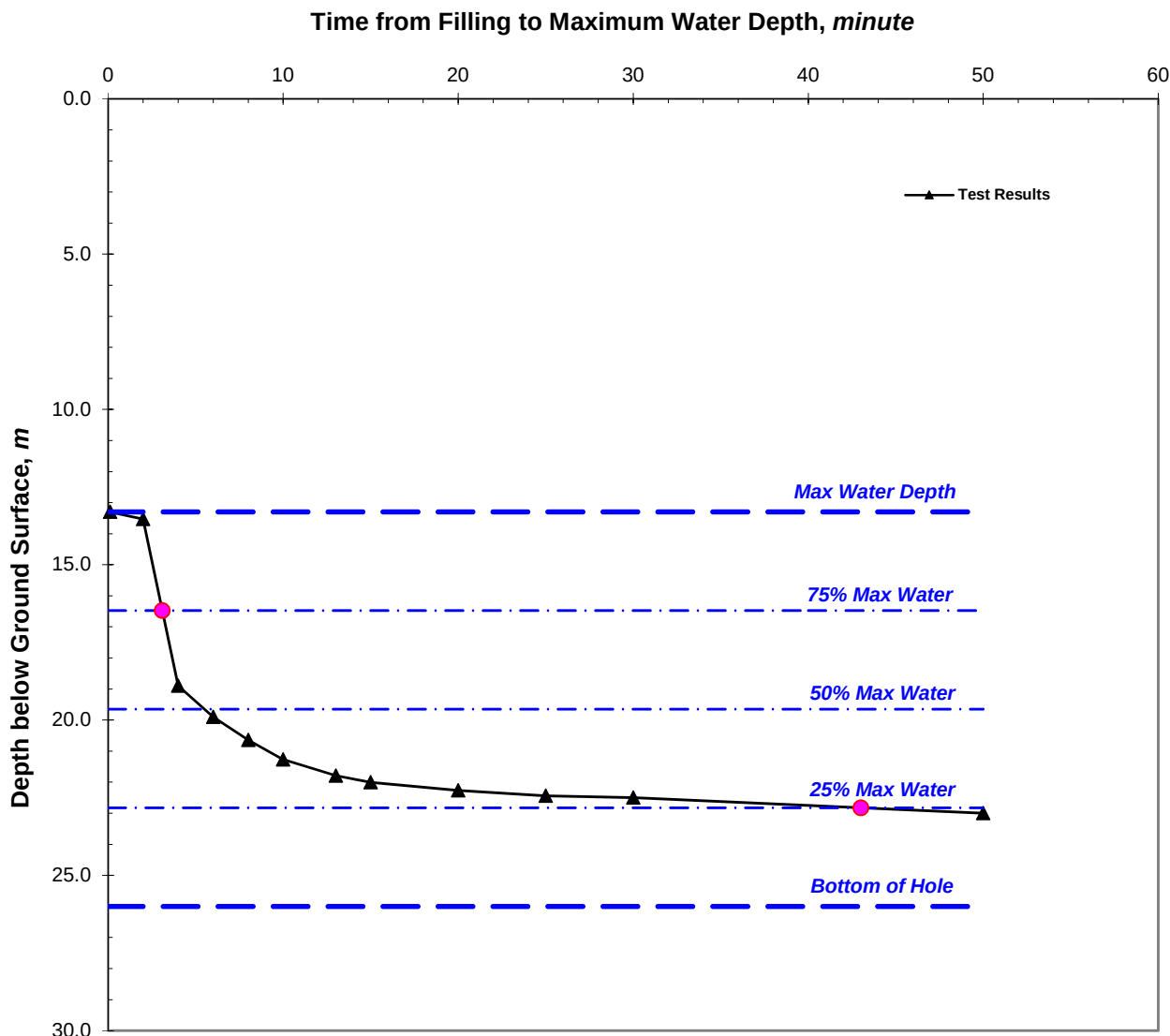
Comments:

Pit was nearly emptied at finish of test.

Client: Kier Regional Building Southern	Job No: JT0324	Test Date: 13/Jul/2020
Site: Heights Primary School, Mapledurham Play	Tested By: SS	Engineer: RJ
		Fig. S2

Preliminary Falling-Head Soakage Test

Test Hole No: BH5
Test No: Test No 1 (Initial)



Diameter of Borehole, m	0.200	Depth to Water at Start of Test, m	13.300
Depth to End of Borehole Casing, m		Max Water Dropdown during Test, m	9.700
Depth to Borehole Base, m	26.000	Total Soakage Test Time, min	50.0
Depth to Top of Permeable Soils, m	12.000	Mean Internal Discharge Area, m ²	4.021
Depth to Groundwater Surface, m		Discharge Rate, litre/min	3.470
Depth to Top of Granular Fill, m	11.000	Soakage Rate, litre/m ² /min	0.863
Voids Assumed within Borehole, %	69%	BRE Soil Infiltration Rate, m/sec	1.44E-05

Comments:

Pit was nearly emptied at finish of test.

Client: Kier Regional Building Southern	Job No: JT0324	Test Date: 13/Jul/2020
Site: Heights Primary School, Mapledurham Play	Tested By: SS	Engineer: RJ
		Fig. S3

Constant rate and Variable head tests								
Client	Kier Regional Building Southern				Project Eng.	RJ	Project No.:	JT0324
Project Name	Heights Primary School, Mapledurham Playing Fields, Reading, RG4 7LH				Tested By	SS	Checked By	RJ
Borehole details								
BH No.	BH	BH depth	26	BH Diameter	0.2	Hole Vol above SWL		
Notes: Post installation test. 2200 litres (2m3 - flow-meter reading) discharged into borehole in 11m.								
Installation: GL-12m Plain 140mm diameter pvc liner. Bentonite: 3m -11m, sand: 11m-12m								
12m-26m slotted 140mm diameter pvc liner. 10mm diameter gravel: 12m - 26m								
Test Data								
Date of Test	Times		Volumes of water in litres			Soakage Rate l/min	Level water in Borehole m	Corrected Soakage Rate l/min
	Clock	Time from start	In bowser	In Hole	Used (diff)			
13/07/2020		0.1		363.0			14.45	
		1		256.1			17.85	
		3		132.9			21.77	
		5		113.5			22.39	
		7		107.2			22.59	
		10		101.2			22.78	
		15		80.5			23.44	
		20		80.1			23.45	
		25		76.4			23.57	
		30		72.3			23.7	
Soakage rate based on Volume of water discharge from bowser (ignore falling head)								
	Volume of water discharged from bowser:			2200	litres			
		Time discharged		11	minutes			
Volume of water in borehole at start of falling head test				363	litres			
Volume of water soaked away in 11 minutes				1837	litres			
		soakage rate		167	litres/min			
				2.8	litres/sec			

Constant rate and Variable head tests								
Client	Kier Regional Building Southern				Project Eng.	RJ	Project No.:	JT0324
Project Name	Heights Primary School, Mapledurham Playing Fields, Reading, RG4 7LH				Tested By	SS	Checked By	RJ
Borehole details								
BH No.	BH4	BH depth	26	BH Diameter	0.2	Hole Vol above SWL		
Notes: Post installation test. 2200 litres (2m3 - flow-meter reading) discharged into borehole in 12m.								
Installation: GL-12m Plain 140mm diameter pvc liner. Bentonite: 3m -11m, sand: 11m-12m								
12m-26m slotted 140mm diameter pvc liner. 10mm diameter gravel: 12m - 26m								
Test Data								
Date of Test	Times		Volumes of water in litres			Soakage Rate l/min	Level water in Borehole m	Corrected Soakage Rate l/min
	Clock	Time from start	In bowser	In Hole	Used (diff)			
13/07/2020		0.1		361.4			14.5	
		2		223.5			18.89	
		4		198.0			19.7	
		6		189.2			19.98	
		9		172.9			20.5	
		14		160.3			20.9	
		20		147.7			21.3	
		25		142.1			21.48	
		30		137.7			21.62	
		60		110.0			22.5	
		85		88.0			23.2	
	Soakage rate based on Volume of water discharge from bowser (ignore falling head)							
		Volume of water discharged from bowser:			2200	litres		
			Time discharged		12	minutes		
	Volume of water in borehole at start of falling head test				361.4	litres		
	Volume of water soaked away in 12 minutes				1838.6	litres		
			soakage rate		153.2	litres/min		
					2.6	litres/sec		

Constant rate and Variable head tests								
Client	Kier Regional Building Southern				Project Eng.	RJ	Project No.:	JT0324
Project Name	Heights Primary School, Mapledurham Playing Fields, Reading, RG4 7LH				Tested By	SS	Checked By	RJ
Borehole details								
BH No.	BH5	BH depth	26	BH Diameter	0.2	Hole Vol above SWL		
Notes: Post installation test. 2200 litres (2m3 - flow-meter reading) discharged into borehole in 10m.								
Installation: GL-12m Plain 140mm diameter pvc liner. Bentonite: 3m -11m, sand: 11m-12m								
12m-26m slotted 140mm diameter pvc liner. 10mm diameter gravel: 12m - 26m								
Test Data								
Date of Test	Times		Volumes of water in litres			Soakage Rate l/min	Level water in Borehole m	Corrected Soakage Rate l/min
	Clock	Time from start	In bowser	In Hole	Used (diff)			
13/07/2020		0.1		399.1			13.3	
		2		391.9			13.53	
		4		223.1			18.9	
		6		191.7			19.9	
		8		168.5			20.64	
		10		148.7			21.27	
		13		132.3			21.79	
		15		125.4			22.01	
		20		117.2			22.27	
		25		111.9			22.44	
		30		110.0			22.5	
		50		94.3			23	
Soakage rate based on Volume of water discharge from bowser (ignore falling head)								
		Volume of water discharged from bowser:			2200	litres		
		Time discharged			10	minutes		
		Volume of water in borehole at start of falling head test			399.1	litres		
		Volume of water soaked away in 10 minutes			1800.9	litres		
			soakage rate		180.1	litres/min		
					3.00	litres/sec		

SOIL INFILTRATION RATE

In accordance with BRE Digest 365 "Soakaway Design"

Job Reference : 19-51346

Client : Kier Construction Ltd

Client Reference : TP201

Site : Heights School

Test Number : 1

Location : Mapledurham Playing Fields, Reading

Date Tested :

13/03/19 - 14/12/19

Technician :

LF

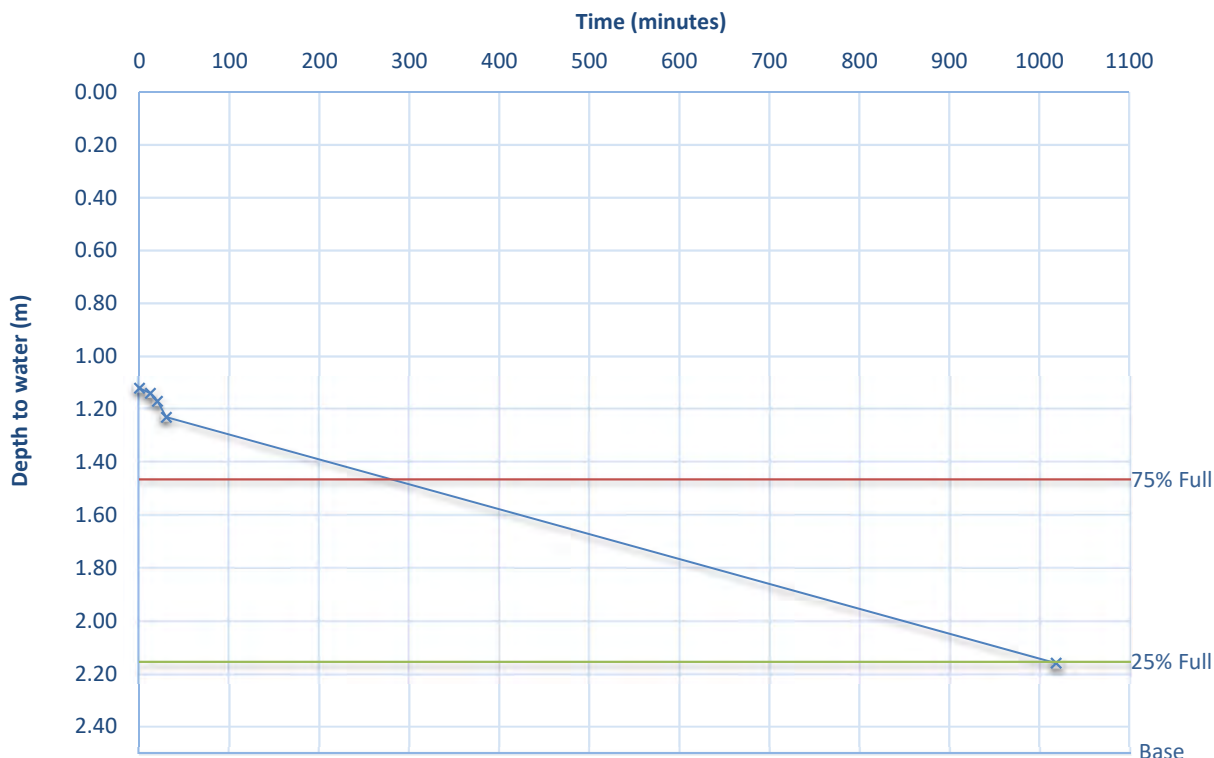
Weather :

Sunny/Cloudy

Parameters	
Length	2.10 m
Breadth	0.65 m
Depth	2.50 m
Water Level	1.12 m
Max Eff. Depth	1.38 m
v_{p75-25}	0.94 m ³
a_{p50}	5.16 m ²
t_{p75-25}	44040 s
p75%	1.47 m
p25%	2.16 m

[illegible]

Time to drain	Minutes	Seconds
75%	285	17100
25%	1019	61140

**Remarks:**

Base of trial pit recorded to be 2.29mbgl at time of last reading.

Soil Infiltration Rate = 4.14E-06 ms⁻¹

Approved by: B Graham *Senior Geo-Environmental Engineer*

Brent Crab

Date : 21/03/2019

SOIL INFILTRATION RATE

In accordance with BRE Digest 365 "Soakaway Design"

Job Reference : 19-51346

Client : Kier Construction Ltd

Client Reference : TP201

Site : Heights School

Test Number : 2

Location : Mapledurham Playing Fields, Reading

Date Tested :

14/12/2019

Technician :

LF

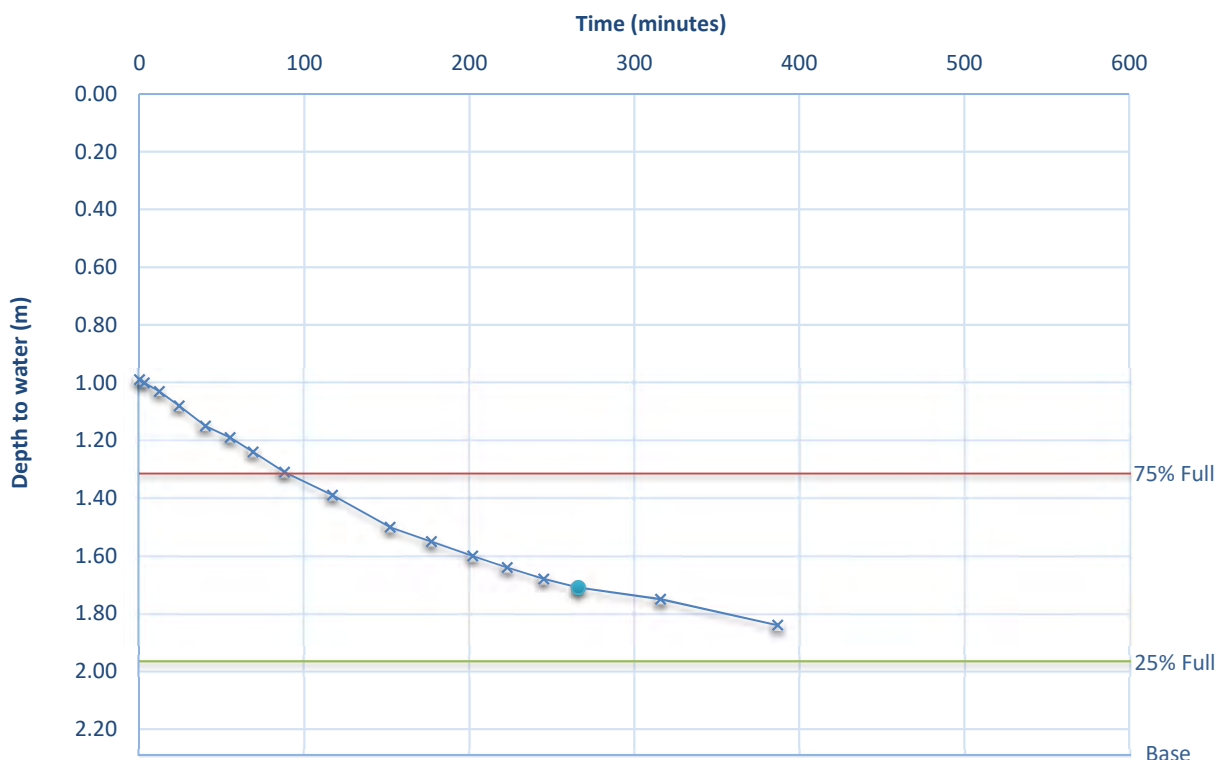
Weather :

Sunny/Cloudy

Parameters	
Length	2.10 m
Breadth	0.65 m
Depth	2.29 m
Water Level	0.99 m
Max Eff. Depth	1.30 m
V_{p75-25}	0.89 m ³
a_{p50}	4.94 m ²
t_{p75-25}	N/A s
p75%	1.32 m
p25%	1.97 m

Time Elapsed		Depth to Water (m)
Minutes	Seconds	
0	0	0.99
3	180	1.00
12	720	1.03
24	1440	1.08
40	2400	1.15
55	3300	1.19
69	4140	1.24
88	5280	1.31
117	7020	1.39
152	9120	1.50
177	10620	1.55
202	12120	1.60
223	13380	1.64
245	14700	1.68
266	15960	1.71
316	18960	1.75
387	23220	1.84

Time to drain	Minutes	Seconds
75%		
25%		



Remarks:

Unable to complete test due to time constraints.

Soil Infiltration Rate = N/A

Approved by: B Graham Senior Geo-Environmental Engineer

Brent Graham

Date : 21/03/2019

Appendix E – MicroDrainage Results

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Designed by Michael.Smith

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PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S3.001	12.915	0.105	123.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.005	5.657	0.001	5657.0	0.055	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.006	4.517	0.001	4517.0	0.036	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.007	4.517	0.001	4517.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S4.000	20.816	0.110	189.2	0.033	4.00	0.0	0.600	o	150	Pipe/Conduit	
S4.001	9.675	0.050	193.5	0.046	0.00	0.0	0.600	o	150	Pipe/Conduit	
S4.002	4.164	0.595	7.0	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S4.003	3.644	0.063	57.8	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	
S4.004	3.644	0.063	57.8	0.000	0.00	0.0	0.600	o	150	Pipe/Conduit	

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	E I.Area (ha)	E Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S3.001	50.00	4.35	69.080	0.033	0.0	0.0	0.0	1.18	46.8	4.5
S1.005	50.00	6.76	68.975	0.341	0.0	0.0	0.0	0.16	6.6«	46.2
S1.006	50.00	7.09	69.675	0.377	0.0	0.0	0.0	0.22	15.9«	51.1
S1.007	50.00	7.63	80.000	0.377	0.0	0.0	0.0	0.14	2.5«	51.1
S4.000	50.00	4.48	69.900	0.033	0.0	0.0	0.0	0.73	12.8	4.5
S4.001	50.00	4.70	69.790	0.079	0.0	0.0	0.0	0.72	12.7	10.7
S4.002	50.00	4.72	69.740	0.079	0.0	0.0	0.0	3.83	67.7	10.7
S4.003	50.00	4.77	69.145	0.079	0.0	0.0	0.0	1.33	23.4	10.7
S4.004	50.00	4.81	80.000	0.079	0.0	0.0	0.0	1.33	23.4	10.7

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Date 20/07/2020 14:23
File Deep Bore Soakaway - 3 ...
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Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam., L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backsight (mm)
SRE1	70.950	1.050	Open Manhole	1200	S1.000	69.900	300				
SSW02	70.950	1.330	Open Manhole	1200	S1.001	69.620	300	S1.000	69.620	300	
SSW03	70.850	1.630	Open Manhole	1200	S1.002	69.220	300	S1.001	69.430	300	
SRE2	70.950	0.850	Open Manhole	1200	S2.000	70.100	150				
SSW04	70.950	1.090	Open Manhole	1200	S2.001	69.860	150	S2.000	69.860	150	
SSW05	70.950	1.870	Open Manhole	1200	S1.003	69.080	225	S1.002	69.085	300	
								S2.001	69.340	150	
SBH5	70.850	1.875	Open Manhole	1500	S1.004	68.975	225	S1.003	68.975	225	
SRE3	70.950	0.850	Open Manhole	1200	S3.000	70.100	225				
SSW01	70.950	1.870	Open Manhole	1200	S3.001	69.080	225	S3.000	69.080	225	
SBH4	70.850	2.069	Open Manhole	1500	S1.005	68.975	225	S1.004	68.781	225	
								S3.001	68.975	225	
SBH3	70.850	1.876	Open Manhole	1500	S1.006	69.675	300	S1.005	68.974	225	
SDummy 1	90.000	20.326	Open Manhole	1200	S1.007	80.000	150	S1.006	69.674	300	
S	90.000	10.001	Open Manhole	0		OUTFALL		S1.007	79.999	150	
SRE4	70.950	1.050	Open Manhole	1200	S4.000	69.900	150				
SSW06	70.950	1.160	Open Manhole	1200	S4.001	69.790	150	S4.000	69.790	150	
SSW07	70.950	1.210	Open Manhole	1200	S4.002	69.740	150	S4.001	69.740	150	
SSoakaway	70.950	1.805	Open Manhole	1200	S4.003	69.145	150	S4.002	69.145	150	
SDummy 2	90.000	20.918	Open Manhole	1200	S4.004	80.000	150	S4.003	69.082	150	
S	90.000	10.063	Open Manhole	0		OUTFALL		S4.004	79.937	150	

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
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S1.007	S	90.000	79.999	80.000	0	0
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Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall C. Level Name (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
------------------------	------------------------------	-----------------	------------------------	-------------	-----------

S4.004	\$	90.000	79.937	80.000	0	0
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. . .		
Date 20/07/2020 14:23	Designed by Michael.Smith	
File Deep Bore Soakaway - 3 ...	Checked by	
Innovyze	Network 2018.1.1	
<u>Simulation Criteria for Storm</u> Volumetric Runoff Coeff 0.750 Additional Flow - % of Total Flow 0.000 Areal Reduction Factor 1.000 MADD Factor * 10m³/ha Storage 2.000 Hot Start (mins) 0 Inlet Coefficient 0.800 Hot Start Level (mm) 0 Flow per Person per Day (l/per/day) 0.000 Manhole Headloss Coeff (Global) 0.500 Run Time (mins) 60 Foul Sewage per hectare (l/s) 0.000 Output Interval (mins) 1 Number of Input Hydrographs 0 Number of Storage Structures 5 Number of Online Controls 0 Number of Time/Area Diagrams 0 Number of Offline Controls 0 Number of Real Time Controls 0 <u>Synthetic Rainfall Details</u> Rainfall Model FSR Profile Type Summer Return Period (years) 100 Cv (Summer) 0.750 Region England and Wales Cv (Winter) 0.840 M5-60 (mm) 19.600 Storm Duration (mins) 30 Ratio R 0.400		
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Innovyze	Network 2018.1.1																																																											
Storage Structures for Storm Cellular Storage Manhole: SSW05, DS/PN: S1.003 Invert Level (m) 68.975 Safety Factor 2.0 Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.30 Infiltration Coefficient Side (m/hr) 0.00000 <table><tr><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th><th>Depth (m)</th><th>Area (m²)</th><th>Inf. Area (m²)</th></tr><tr><td>0.000</td><td>1600.0</td><td>0.0</td><td>0.901</td><td>0.0</td><td>0.0</td></tr><tr><td>0.900</td><td>1600.0</td><td>0.0</td><td></td><td></td><td></td></tr></table> Deep Bore Soakaway Manhole: SBH5, DS/PN: S1.004 Chamber Invert Level (m) 41.975 Infiltration Coefficient Base (m/hr) 0.05184 Chamber Diameter/Length (m) 1.500 Safety Factor 2.0 Borehole Diameter (m) 0.200 Borehole Depth (m) 26.000 <table><tr><th>Side</th><th>Side</th><th>Side</th><th>Side</th></tr><tr><th>Depth Infil.</th><th>Depth Infil.</th><th>Depth Infil.</th><th>Depth Infil.</th></tr><tr><th>(m) Coef.</th><th>(m) Coef.</th><th>(m) Coef.</th><th>(m) Coef.</th></tr><tr><th>(m/hr)</th><th>(m/hr)</th><th>(m/hr)</th><th>(m/hr)</th></tr><tr><td>0.000 0.05184</td><td>14.000 0.05184</td><td>14.001 0.00000</td><td>26.000 0.00000</td></tr></table> Deep Bore Soakaway Manhole: SBH4, DS/PN: S1.005 Chamber Invert Level (m) 41.975 Infiltration Coefficient Base (m/hr) 0.02549 Chamber Diameter/Length (m) 1.500 Safety Factor 2.0 Borehole Diameter (m) 0.200 Borehole Depth (m) 26.000 <table><tr><th>Side</th><th>Side</th><th>Side</th><th>Side</th></tr><tr><th>Depth Infil.</th><th>Depth Infil.</th><th>Depth Infil.</th><th>Depth Infil.</th></tr><tr><th>(m) Coef.</th><th>(m) Coef.</th><th>(m) Coef.</th><th>(m) Coef.</th></tr><tr><th>(m/hr)</th><th>(m/hr)</th><th>(m/hr)</th><th>(m/hr)</th></tr><tr><td>0.000 0.02549</td><td>14.000 0.02549</td><td>14.001 0.00000</td><td>26.000 0.00000</td></tr></table> Deep Bore Soakaway Manhole: SBH3, DS/PN: S1.006 Chamber Invert Level (m) 41.975 Infiltration Coefficient Base (m/hr) 0.17712 Chamber Diameter/Length (m) 1.500 Safety Factor 2.0 Borehole Diameter (m) 0.200 Borehole Depth (m) 26.000			Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)	0.000	1600.0	0.0	0.901	0.0	0.0	0.900	1600.0	0.0				Side	Side	Side	Side	Depth Infil.	Depth Infil.	Depth Infil.	Depth Infil.	(m) Coef.	(m) Coef.	(m) Coef.	(m) Coef.	(m/hr)	(m/hr)	(m/hr)	(m/hr)	0.000 0.05184	14.000 0.05184	14.001 0.00000	26.000 0.00000	Side	Side	Side	Side	Depth Infil.	Depth Infil.	Depth Infil.	Depth Infil.	(m) Coef.	(m) Coef.	(m) Coef.	(m) Coef.	(m/hr)	(m/hr)	(m/hr)	(m/hr)	0.000 0.02549	14.000 0.02549	14.001 0.00000	26.000 0.00000
Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)																																																							
0.000	1600.0	0.0	0.901	0.0	0.0																																																							
0.900	1600.0	0.0																																																										
Side	Side	Side	Side																																																									
Depth Infil.	Depth Infil.	Depth Infil.	Depth Infil.																																																									
(m) Coef.	(m) Coef.	(m) Coef.	(m) Coef.																																																									
(m/hr)	(m/hr)	(m/hr)	(m/hr)																																																									
0.000 0.05184	14.000 0.05184	14.001 0.00000	26.000 0.00000																																																									
Side	Side	Side	Side																																																									
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Depth	Side	Depth	Side	Depth	Side	Depth	Side
(m)	Infil.	(m)	Infil.	(m)	Infil.	(m)	Infil.
	Coef.		Coef.		Coef.		Coef.
	(m/hr)		(m/hr)		(m/hr)		(m/hr)
0.000	0.17712	14.000	0.17712	14.001	0.00000	26.000	0.00000

Invert Level (m)	69.145	Safety Factor	2.0
Infiltration Coefficient Base (m/hr)	0.01490	Porosity	0.95
Infiltration Coefficient Side (m/hr)	0.01490		

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	107.5	107.5	0.751	0.0	147.2
0.750	107.5	147.2			

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PN	US/MH Name	Water	Surcharged	Flooded	Pipe		Status	Level Exceeded
		Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)		
S1.000	SRE1	70.031	-0.169	0.000	0.39		33.5	OK
S1.001	SSW02	69.782	-0.138	0.000	0.56		40.8	OK
S1.002	SSW03	69.408	-0.112	0.000	0.70		49.6	OK
S2.000	SRE2	70.178	-0.072	0.000	0.53		10.0	OK
S2.001	SSW04	69.937	-0.073	0.000	0.52		18.6	OK
S1.003	SSW05	69.216	-0.089	0.000	0.06		1.8	OK
S1.004	SBH5	69.216	0.016	0.000	0.04		2.4	SURCHARGED
S3.000	SRE3	70.152	-0.173	0.000	0.12		11.8	OK
S3.001	SSW01	69.216	-0.089	0.000	0.01		0.5	OK
S1.005	SBH4	69.216	0.016	0.000	0.15		3.4	SURCHARGED
S1.006	SBH3	69.216	-0.759	0.000	0.00		0.0	OK
S1.007	SDummy 1	69.674	-10.476	0.000	0.00		0.0	OK
S4.000	SRE4	70.234	0.184	0.000	0.88		10.7	SURCHARGED
S4.001	SSW06	70.148	0.208	0.000	2.26		25.4	SURCHARGED
S4.002	SSW07	69.818	-0.072	0.000	0.53		25.5	OK
S4.003	SSoakaway	69.414	0.119	0.000	0.00		0.1	SURCHARGED
S4.004	SDummy 2	69.414	-10.736	0.000	0.00		0.0	OK

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Designed by Michael.Smith

Checked by

Network 2018.1.1

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

		Water	Surcharged	Flooded			Pipe		
	US/MH	Level	Depth	Volume	Flow /	Overflow	Flow		Level
PN	Name	(m)	(m)	(m³)	Cap.	(l/s)	(l/s)	Status	Exceeded
S1.000	SRE1	70.090	-0.110	0.000	0.71		60.8		OK
S1.001	SSW02	69.868	-0.052	0.000	0.99		71.9		OK
S1.002	SSW03	69.576	0.056	0.000	1.22		86.2	SURCHARGED	
S2.000	SRE2	70.217	-0.033	0.000	0.96		18.1		OK
S2.001	SSW04	69.975	-0.035	0.000	0.94		33.7		OK
S1.003	SSW05	69.528	0.223	0.000	0.08		2.3	SURCHARGED	
S1.004	SBH5	69.529	0.329	0.000	0.06		3.6	SURCHARGED	
S3.000	SRE3	70.172	-0.153	0.000	0.22		21.5		OK
S3.001	SSW01	69.528	0.223	0.000	0.02		0.9	SURCHARGED	
S1.005	SBH4	69.528	0.328	0.000	0.25		5.8	SURCHARGED	
S1.006	SBH3	69.528	-0.447	0.000	0.00		0.0		OK
S1.007	SDummy 1	69.674	-10.476	0.000	0.00		0.0		OK
S4.000	SRE4	70.854	0.804	0.000	1.49		18.1	FLOOD RISK	
S4.001	SSW06	70.613	0.673	0.000	3.79		42.8	SURCHARGED	
S4.002	SSW07	69.850	-0.040	0.000	0.88		42.6		OK
S4.003	SSoakaway	69.690	0.395	0.000	0.00		0.1	SURCHARGED	
S4.004	SDummy 2	69.690	-10.460	0.000	0.00		0.0		OK

Appendix F – Environment Agency Response

Mr. David Hammond
Curtin's
40 (Unit 5) Compton Street
London
EC1V 0BD

Our ref: WA/2020/127950/01-L01
Agreement No. ENVPAC/1/THM/00403
Your ref: 171023
Date: 05 June 2020

Dear Mr. Hammond

Advice regarding discharge of Condition 20 of 171023, erection of 2FE primary school (350 pupils) with associated landscaping, multi-use games area (MUGA), car and cycle parking, and servicing.

Mapledurham Playing Fields, Upper Woodcote Road, Caversham, Reading

Thank you for accepting our offer to provide detailed planning advice. We have reviewed the following documents:

- Surface Water Management Plan, by Campbell Reith, dated March 2017
- Deep bore soakaway investigation, test borehole layout, Drw No. FS0280 CUR V2 00 DR C 09102 P01, dated 6/5/2020.
- Email entitled Heights School Methodology and Scope, from David Drummond, dated 22 May 2020

We are providing this advice under Agreement No. ENVPAC/1/THM/00403. Please note we have taken 1.75 hours to review and provide our advice on these documents. You will be invoiced accordingly.

Please note that we are only providing you with our advice on the matters as outlined in our offer as requested.

Summary

In summary, we see no problems with your methodology or location of test bore holes for infiltration testing.

Environment Agency Advice

We have reviewed the submitted documents with the understanding that you are proposing to alter the drainage strategy with the possible use of a deep borehole soakaway. We have the following comments to make.

Cont/d..

We have reviewed the methodology for the drilling and infiltration testing emailed by David Hammond and the test borehole locations. We have no problems with the methodology or location of the test bore holes for infiltration testing.

We would also like to make comment on the changes to the drainage strategy. According to the previous Surface Water Management plan for the site (March 2017), the site drainage is split into two parts. The roof drainage, the soft informal and social areas draining to soakaway. As this is a small primary school we can assume these areas will be draining clean water. The second part, namely the car park and MUGA areas were proposed to drain via porous surfaces.

Provided there is no change to this drainage philosophy, i.e. clean water to the soakaway (deep borehole now proposed) and road runoff (potentially contaminated with hydrocarbons) to porous surface SuDS, there should be no issues with the proposed changes to the management of rainfall run-off from the site from a groundwater quality perspective.

Clean water, as can be seen from our position statements G9 & G12 in 'The Environment Agency's Approach to Groundwater Protection' <https://www.gov.uk/government/publications/groundwater-protection-position-statements>, has no specific requirements for deep infiltration systems.

However, we would not accept water from the car park going to the deep borehole soakaway. A suitable SuDS system would need to be implemented for the management of this potentially contaminated water. The use of porous surfaces is not covered in the referenced Ciria guidance. For information, the top 1-2m of soil in a surface soakaway provides excellent chemical attenuation due to the bacteria present. Deep bore soakaways do not provide this.

Discharging contaminated water to a deep bore soakaway would require a permit from the Environment Agency. As there is an alternative available through porous paving SuDS it is unlikely that a permit would be granted.

Also, you should not assume that a permit will automatically be forthcoming once planning permission has been granted. If you expect you will need a permit we advise you to consult with our permitting team at the earliest opportunity by emailing enquiries@environment-agency.gov.uk.

Next Steps

We recommend that you consult as again for advice on your revised water management strategy document once it is near completion.

We also suggest that you contact your LPA to find out if you will need to submit a 'Variation of Condition' application. This new drainage strategy may not satisfy the original condition 20.

Final comments

Once again, thank you for contacting us with your enquiry. Our comments are based on our available records and the information as submitted to us.

I hope the above advice is helpful. If there is any further work you anticipate needing our detailed advice on in relation to this project, please let me know so it can be incorporated into this charging agreement.

Disclaimer

Please note that the views expressed in this report by the Environment Agency, is a response to a pre-application enquiry only and does not represent our final view in relation to any future consultations made in relation to this site. We reserve the right to change our position in relation to any such application. You should seek your own expert advice in relation to technical matters relevant to any conditions before submission.

Please quote our reference number in any future correspondence. If you have any queries please feel free to contact me.

Yours sincerely

Kirsty Macpherson
Planning Specialist

Direct dial 02030256243

Email Planning_THM@environment-agency.gov.uk

Appendix G – LLFA Response

Michael Smith

From: Shean, Sam <Sam.Shean@reading.gov.uk>
Sent: 06 July 2020 12:29
To: Nigel Hickman
Cc: Michael Smith; George Ramsay; Stirling Higley
Subject: RE: Heights School Drainage requirements

OFFICIAL

Hi Nigel

Yes, accepted in principle, Darren Cook of Development Control will approve / provide technical approval the detailed designs once received.

SAM SHEAN

Streetcare Services Manager
Environmental & Commercial Services | Economic Growth & Neighbourhoods Directorate
Reading Borough Council 2-4 Darwin Close, Reading, RG2 0TB
0118 937 2138 (72138) (sam.shean@reading.gov.uk)

Environmental & Commercial Services: www.reading.gov.uk/commercialservices
; commercialservices@reading.gov.uk

[Website](#) | [Facebook](#) | [Twitter](#) | [YouTube](#)



From: Nigel Hickman <Nigel.Hickman@curtins.com>
Sent: 06 July 2020 10:19
To: Shean, Sam <Sam.Shean@reading.gov.uk>
Cc: Michael Smith <Michael.Smith@curtins.com>; George Ramsay <George.Ramsay@curtins.com>; Stirling Higley <Stirling.Higley@curtins.com>
Subject: FW: Heights School Drainage requirements

This is an EXTERNAL EMAIL. STOP. THINK before you CLICK links or OPEN attachments.

Sam,

I recently spoke to you about the below project regarding the discharge of surface water from the site. I believe you have been in contact with my colleague Michael Smith already on this issue

We are currently looking to discharge the surface water into a deep bore soakaways at the rear of the site. After discussions with the EA they are happy for us to discharge the clean water (Roof and playgrounds etc) to the deep bore soakaways. The car park however will have to be discharged separately to avoid contaminating the water table (As advised by the EA) We are currently proposing to put the car park run off to discharge to a regular soakaway (Again as approved by the EA) and the run off will pass through a bypass separator.

We need confirmation from Reading Council on the treatment method of the car park water entering the geo-cellular soakaway meets your approval.

Various works on this site are progressing and we would like a final resolution to this issue as soon as possible so that we can continue construction.

If you wish to discuss this further please contact me on the above email address or my mobile number 07710 621 505

Many Thanks

Nigel Hickman Senior Technician

Curtins

T. 020 7324 2240 | nigel.hickman@curtins.com

From: Nigel Hickman

Sent: 29 April 2020 14:28

To: sam.shean@reading.gov.uk

Cc: Michael Smith <Michael.Smith@curtins.com>; Stirling Higley <Stirling.Higley@curtins.com>; David Hammond <David.Hammond@curtins.com>

Subject: FW: Heights School Drainage requirements

Good Afternoon Sam,

I hope that you are doing well.

Curtins are currently working on the design of the below ground drainage for the proposed Heights school at Upper Woodcote Road Caversham, Reading (application number 171023).

The initial proposals for the scheme were based on 'The Heights Free School, Caversham: surface water management plan' by Campbell Reith Consulting, doc. ref. 12243- 200317-SWMP-D2, dated 20 March 2017', as stated in Condition 20 of the decision notice. This included the foul water being pumped to the local Thames Water sewer which was approved by Thames Water through a capacity check and all surface water was to be discharge to ground at the rear of the building.

Following extensive ground investigations which resulted in the discovery of various solution features within the chalk, the original proposal to infiltrate into the ground was seen as unfeasible. This was for two reasons;

- CIRIA guidance states that where these features are present in underlying chalk, any infiltrating device should be located a minimum of 20m from any structure, to ensure the stability of the structure is not undermined. This left only a ~2m wide strip along the southern boundary of the site. Hydraulic analysis with pre-grouting infiltration rates did not conclude this to be adequate. Furthermore, any future development on the site to the south would potentially be located less than 20m from this soakaway.
- In order to stabilise the ground, grout is required to be injected into the ground. The aim of this is to fill open voids and minimise movement. Any injection grouting would be detrimental to the infiltration rates and initial assessments indicated that the system would not operate and pose a flood risk.

For the reasons stated above, the below ground drainage strategy has now been amended accordingly. Please see the attached WIP plans showing the intended amendments. The surface water is proposed to be pumped into the local Thames water Foul Sewer (225 Dia) along the Upper Woodcote Lane which along with the foul discharge from site. Please provide comments on the attached plans.



Thames Water have been contacted regarding the amended proposals and have provided the attached response.

Regarding the drainage hierarchy mentioned in Thames Water's letter, since there are no watercourses located near the site and infiltration has been proved no suitable discharge to a sewer is seen to be the last remaining option.

Thames water has expressed the opinion that surface water discharge is made via the surface water manhole at the junction of St Peters Ave which is 0.2 miles from the site entrance (see below). For reasons apparent by the screenshot below, this is not seen as feasible. Construction of the private rising main would be required to;

- Cross third party land
- Close 4 junctions and a minimum of 9 private driveways
- Negotiate existing services along Woodcote Road and in the junctions of St Peter's Avenue, Upper Woodcote Road, Knowle Close, Little Woodcote Close
- Interface with incoming and outgoing connections from 1 sub station on the south of Woodcoate Road
- Disruption to local bus route and traffic flows



Therefore, the proposed connection is seen as unfeasible and require the alternative Thames Water proposal put forward in their report as surface water discharging into the foul sewer at 2l/s for Surface water and 3.5l/s for foul.

We are currently under pressure from the various bodies involved for a response to this so a swift response would be greatly appreciated.

We look forward to your response

Kind Regards

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Appendix H – Operations and Maintenance Manual

The Heights School

Surface Water Drainage Operations and Maintenance Manual

Curtins Ref: THPS-CUR-C2-00-SP-C-0002

Revision: P01

Issue Date: 20 July 2020

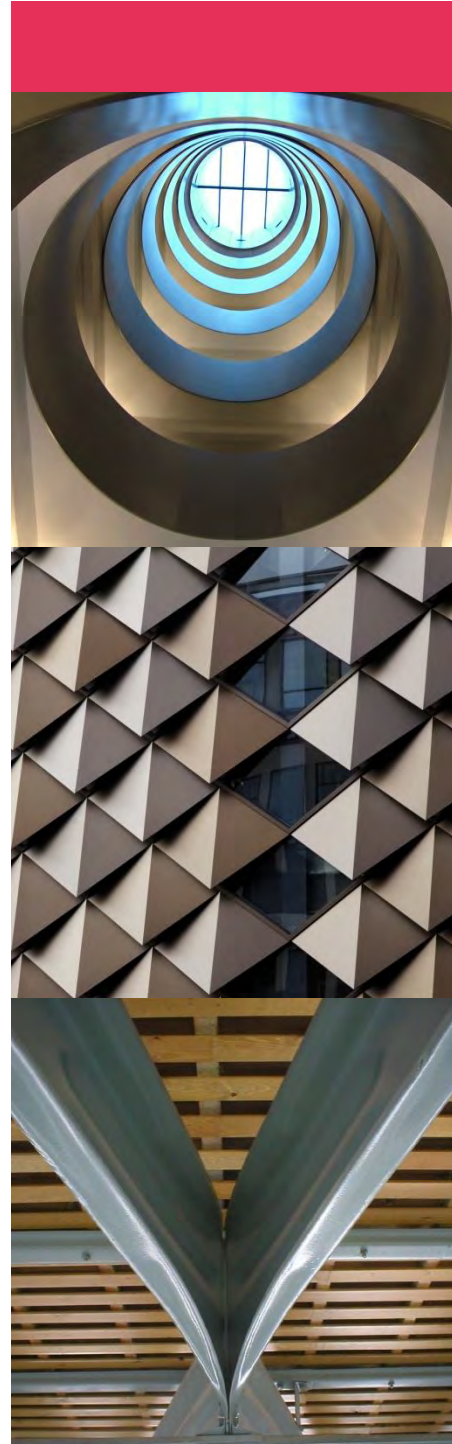
Client Name: Kier Construction

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Rev	Description	Issued by	Checked	Date
P01	Planning Issue	NMH	MS	20/07/2020

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Author	Signature	Date
Nigel Hickman Civil Engineer		20/07/20

Reviewed	Signature	Date
Michael Smith MEng (Hons) Principal Civil Engineer		20/07/20



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1.0 Introduction

1.1 Project Background

Curtins Consulting Limited has been appointed by Kier to prepare a Surface Water Drainage Operations and Maintenance Manual as part of the Flood Risk Assessment for the proposed Height School.

This report is based on currently best practice guidance.

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 derivation from the intent contained in this document, prior approval shall be obtained from the relevant authority in advance of commencing such works.

In accordance with the FRA the surface water network has/will be designed to accommodate the 1 in 100 year event plus an allowance of 40% for climate change. As the flows are being attenuated on site 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 below.

1.2 Scope of O&M Manual

This manual is intended to give an overview of the operation and maintenance for the range of SuDS features included with the drainage strategy and in relation to typical details only. Where proprietary products are specified the manufacturer's instructions and recommendations should be followed in priority to this document unless specifically noted otherwise due to project constraints.

The recommended operations and frequencies are typical only and should be more frequent initially to ensure that there are no unforeseen issues with the operation and then adjusted to suit the site requirements.

2.0 Attenuation Tank (Ge-cellular Units)

2.1 Location and Description

The attenuation tank is located to the front of the building in the car park, as shown on drainage strategy drawing THPS-CUR-V2-00-DR-C-09104.

The tank has been in accordance with CIRIA C697.

A typical arrangement is shown on drawing THPS-CUR-V2-00-DR-C-09105.

Geo-cellular units are proprietary products and therefore manufacturer's recommendations should also be taken into consideration. Additionally, different manufacturers may have different connection types and arrangements which will need to be taken in to consideration.

2.2 Operation

The attenuation tank is intended to be the surface water storage feature to attenuate the discharge from the site up to and including the 1 in 100 year plus 40% climate change event. As such during rainfall events the basin will fill to a maximum level of 69.895 mAOD. The tank is intended to be empty between rainfall events.

Access for maintenance has been provided through manholes and rodding eyes.

2.3 Inspection and Maintenance Regime

Regular inspection and maintenance are important for the effective operation of attenuation tanks as designed. As the feature is buried a regularly inspection regime is very important to ensure the correction functionality of the surface water drainage network. Maintenance responsibility for an attenuation tank and its surrounding area should be placed with Heights School Maintenance team.

Sediment\material removal should be undertaken in consultation with the local planning authority and Environment Agency to confirm appropriate protocols, especially where run-off is taken from potentially contaminated areas such as car parks/service yards.

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

	Inspect ventilation cowl (if present)	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
	Where rainfall infiltrates into blocks from above, check surface of filter for blockage by silt, algae or other matter. Remove and replace surface infiltration medium as necessary.	Monthly (and after large storms)
	Remove sediment from pre-treatment structures	Annually (or as required after heavy rainfall events)
Remedial actions	Repair/rehabilitation of inlets, outlet, overflows and vents.	As required.

3.0 Permeable Pavements

3.1 Location and Description

The permeable pavements are located to the rear of the school building, as shown on drainage strategy drawing THPS-CUR-V2-00-DR-C-09104.

The permeable pavements have/will be designed in accordance with CIRIA C697 and BS7533-13.

A typical arrangement is shown on drawing THPS-CUR-V2-00-DR-C-09003.

Permeable pavements contain proprietary products and as such where used the manufacture's recommendations should be followed.

3.2 Operation

The permeable pavements are intended to be water quality and attenuation storage features. These features are intended to be dry except during rainfall events.

The surface has been designed to be porous or to contain gaps where rain can flow through the upper construction layers into the voided stone which makes up the subbase.

Access for maintenance is provided through the perforated distribution pipes and attached manholes.

3.3 Inspection and Maintenance Regime

Regular inspection and maintenance are important for the effective operation of the pervious pavement. Maintenance responsibility for the pavement and its surrounding area should be placed with Heights School Maintenance team.

Sediment/material removal should be undertaken in consultation with the local planning authority and Environment Agency to confirm appropriate protocols, as run-off is taken from potentially contaminated areas such as car parks/service yards.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required)	Initial inspection.	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth. If required take remedial action.	3-monthly, 48 hours after large storms.
	Inspect silt accumulation rates and establish appropriate brushing frequencies. Silt can also be	Annually.

	caused by adjacent landscaping areas which should be reprofiled to provide a flat area or berm adjacent to the paving.	
	Monitor inspection chambers.	Annually.
Regular maintenance\inspection	Brushing and vacuuming.	Three times/year at end of winter, mid-summer, after autumn leaf fall, or as required based on site-specific observations of clogging or manufacturers' recommendations.
Occasional maintenance	Stabilise and mow contributing and adjacent areas.	As required and as per landscape architect's specification.
	Removal of weed.	As required.
Remedial actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving.	As required.
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users.	As required.
	Rehabilitation of surface and upper sub-structure. This could include replacement of the jointing and bedding material. The upper geotextiles layer may also need replacing if clogged and Terram 1000 has a life span of 25 years.	As required (if infiltration performance is reduced as a result of significant clogging).

4.0 Pipes (Including Oversized)

4.1 Location and Description

Pipes are the main conveyance across the site with the network as shown on drainage strategy drawing THPS-CUR-V2-00-DR-C-09104.

A typical detail for pipe bedding and detailing are shown on drawing:

THPS-CUR-V2-00-DR-C-09002.

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.

4.2 Operation

Pipes are intended to be the main conveyance across the development and where oversized they form the attenuation volume required by the limitation of the discharge rate. They are intended to be dry except for during rainfall events. These have been designed to be self-cleansing where possible for smaller diameter pipes, and for larger diameters the risk is reduced due to the overall pipe size.

Access for maintenance is provided through access chambers, manholes, rodding plates and rodding eyes.

4.3 Inspection and Maintenance Regime

Regular inspection and maintenance is important to identify areas which may have been obstructed/clogged and may not be draining correctly thus exposing the development to a greater level of flood risk. Maintenance responsibility for the pipes should be placed with Heights School Maintenance team.

Sediment/material removal should be undertaken in consultation with the local planning authority and Environment Agency to confirm appropriate protocols, as run-off is taken from potentially contaminated areas such as car parks/service yards.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required)	Initial inspection should be provided as post construction CCTV survey.	N/A
	Inspect for evidence of poor operation via water level in chambers. If required take remedial action.	3-monthly, 48 hours after large storms.

Occasional maintenance	Check and remove large vegetation growth near pipe runs.	6 monthly
Remedial actions	Rod through poorly performing runs as initial remediation.	As required.
	If continued poor performance jet and CCTV survey poorly performing runs.	As required.
	Seek advice as to remediation techniques suitable for the type of performance issue and location.	As required If above does not improve performance.

5.0 Deep Bore Soakaways

5.1 Location and Description

The location of the proposed deep bore soakaways are shown on THPS-CUR-V2-00-DR-C-09104.

A typical detail for pipe bedding and detailing are shown on drawing THPS-CUR-V2-00-DR-C-09501.

5.2 Operation

Deep bore soakaways are intended to be used for the disposal of surface water to ground. They consist of a vertical perforated pipe surrounded by pea gravel that allows water to infiltrate to the surrounding ground. The perforations are only present at the level where infiltration is permitted, this is illustrated on drawing THPS-CUR-V2-00-DR-C-09501.

Access for maintenance is provided through the manholes that house the siphon head for each borehole.

5.3 Inspection and Maintenance Regime

Regular inspection and maintenance are important to identify if any have been obstructed/clogged and may not be draining correctly thus exposing the development to a greater level of flood risk. Maintenance responsibility for the boreholes should be placed with Heights School Maintenance team.

Sediment/material removal should be undertaken in consultation with the local planning authority and Environment Agency to confirm appropriate protocols, as run-off is taken from potentially contaminated areas such as car parks/service yards.

Maintenance Schedule	Required Action	Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required)	Inspect for evidence of poor operation via water level in chambers. If required take remedial action.	3-monthly, 48 hours after large storms.
Occasional maintenance	Check and remove large vegetation growth in siphon head chamber	6 monthly
Remedial actions	Seek advice from specialist company	As required.

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