COWSHED

Operation & Maintenance Manual for SuDS Assets

Elmridge Lane, Preston, PR3 2NY

CSH-BML-XX-XX-RP-C-0502

Tuesday, 25th July 2023

BarnsleyMarshall

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Contents Amendment Record

This report has been issued and amended as follows:

Revision	Description	Issued by	Checked by	Date
P01	First Issue for Planning Approval	K. Dean	A. Mavhunga	2023-07-25

Barnsley Marshall Limited have prepared this report in accordance with the instructions of their client, FI Construction Limited, for their sole and specific use. Any other persons who use any information contained herein do so at their own risk.

Contents

Appendices

1. Introduction

1.1 Project Background

Barnsley Marshall Ltd was appointed by FI Construction Limited to provide a SuDS Drainage Strategy Layout for the proposed construction of a cowshed at Elmridge Lane, Preston, PR3 2NY.

This report provides recommended maintenance regimes for SuDS assets proposed as part of the surface water drainage for the development based on government and local authority guidance with regard to maintenance.

The report is based on currently available and preliminary discussions.

Proposals contained or forming part of this report represent the design intent and may be subject to alteration or adjustment in completing the detailed design for this project. Where such adjustments are undertaken as part of the detailed design and are deemed a material deviation from the intent contained in this document, prior approval shall be obtained from the relevant authority in advance of commencing such works.

Where the proposed works to which this report refers are undertaken more than twelve months following the issue of this report, Barnsley Marshall shall reserve the right to re-validate the findings and conclusions by undertaking appropriate further investigations at no cost to Barnsley Marshall.

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. 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 maintenance regimes and frequencies are typical only and should be more frequent initially to ensure that there are no unforeseen issues with the operation of the proposed asset, and thereafter adjusted to suit the site requirements.

2. Flow Control Units

2.1 Location and Description

The location and details of the flow control unit is indicated on the SuDS Drainage Strategy Layout drawings and construction details, refer to ***Appendix A***. The flow control device is specified as Hydro-brake or similar approved and is a proprietary product; therefore, the manufacturer's recommendations should also be taken into consideration.

2.2 Operation

The Hydro-brake is intended to be the main Surface Water Control Device from the site, limiting the outflow from the development to a maximum of 3.0 l/s for all storm events up to and including the 100-year + 40% CC storm event. When storms exceed the 100-year + 40% CC storm event, the flow control chamber will allow additional outflow from the site via the overflow pipe, and the Hydro-brake will be discharging greater than 3.0 l/s. The flow control chamber and Hydro-brake should be inspected every time after such an excessive storm.

2.3 Inspection and Maintenance Regime

Regular inspection and maintenance are important for the effective operation of the flow control unit.

Being part of private drainage, whole life cycle maintenance of the Hydro-brake chamber shall be the responsibility of FI Construction Limited. The responsible officer is John Lohan whose details are as below:

- jlohan@fi-construction.com
- *Canal Mill, Botany Brow, Chorley, Lancashire, PR6 9AF*

Table 2.1 gives the recommended maintenance regime for the asset.

Table 2.1: Recommended Maintenance Regime for Flow Control Chamber and Hydro-brake

Maintenance Schedule	Required Action		Frequency
Monitoring (to be undertaken more regularly within the first year of operation and adjusted as required)	Inspect inlets for blockages, and clear if required. If faults persist jetting and CCTV survey may be required.		Monthly and after large storms.
Regular maintenance/inspection	Inspect and identify any areas that are not operating correctly. If required, take remedial action.		Six-monthly
	Remove sediment and debris from flow control chambers.		Annually (or as required after heavy rainfall events).
Remedial actions	Repair/rehabilitation of inlets.		As required.

3. Storage Pond and Swales

3.1 Location and Description

The proposed storage pond and swale are shown on the Drainage Strategy Layout drawing in ***Appendix A***. The grass seeding, flowers, shrubs, and plants within the pond area will be recommended by a Landscape Architect.

3.2 Operation

Run-off from each rain event is retained and treated in the pond. The retention time promotes pollutant removal through sedimentation and the opportunity for biological uptake mechanisms to reduce nutrient concentrations. This helps prevent pollutants from entering groundwater

3.3 Inspection and Maintenance Regime

Regular inspection and maintenance are important for the effective operation of the storage pond.

Being part of private drainage, whole life cycle maintenance of the Storage Pond and Swale shall be the responsibility of FI Construction Limited. The responsible officer is John Lohan whose details are as below:

- jlohan@fi-construction.com
- *Canal Mill, Botany Brow, Chorley, Lancashire, PR6 9AF*

Table 3.1 gives the recommended maintenance regime for the asset.

Table 3.1: Recommended Maintenance Regime for Storage Pond and Swales

Regular Maintenance	
Monthly	• Litter and debris removal • Mulching (where required) • Inspect/check all inlets, outlets, surface and overflow (where required) to ensure that they are in good condition, free from blockages and operating as designed. • Take action where required.
Six Monthly	• Remove nuisance and invasive vegetation
Annually	• Pruning and trimming of trees • Inspect and document the presence of wildlife • Check for poor vegetation growth due to lack of sunlight or dropping of leaf litter, and cut back adjacent vegetation where required
As Required	• Repair erosion or other damage by re-mulching or re-seeding • Re-seed areas of poor vegetation growth. Alter plant types to better suit conditions, if required • Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface (typically every 60-month period) • Remove build-up of sediment, reinstate design levels (typically every 60-month period) • Remove and dispose of oils or petrol residues using safe standard practices
Remedial Actions: Significant storms may cause significant damage to SuDS. As such, a number of actions may be required following such events.	
Following all significant storm events	• Inspect and carry out essential recovery works to return the feature to full working order.

4. Filter Drains

5.1 Location and Description

The location of the Filter Drains is indicated on the SuDS Drainage Strategy Layout drawing in ***Appendix A***. The proposed filter drains will have SHW Type B filter material (20-40mm stone) and be topped with 150mm top soil and lawn seeding to provide a pleasant aesthetic finish.

5.2 Operation

The proposed Filter Drains will allow Stormwater run-off to soakaway into a porous pipe at the bottom of the trench. The trench is filled with stone filter material. This stone fill collects particles and helps prevent pollutants from entering groundwater.

5.3 Inspection and Maintenance Regime

Regular inspection and maintenance are important for the effective operation of the Filter Drains.

Being part of private drainage, whole life cycle maintenance of Filter Drains shall be the responsibility of FI Construction Limited. The responsible officer is John Lohan whose details are as below:

- jlohan@fi-construction.com
- *Canal Mill, Botany Brow, Chorley, Lancashire, PR6 9AF*

Table 5.1 gives the recommended maintenance regime for the asset.

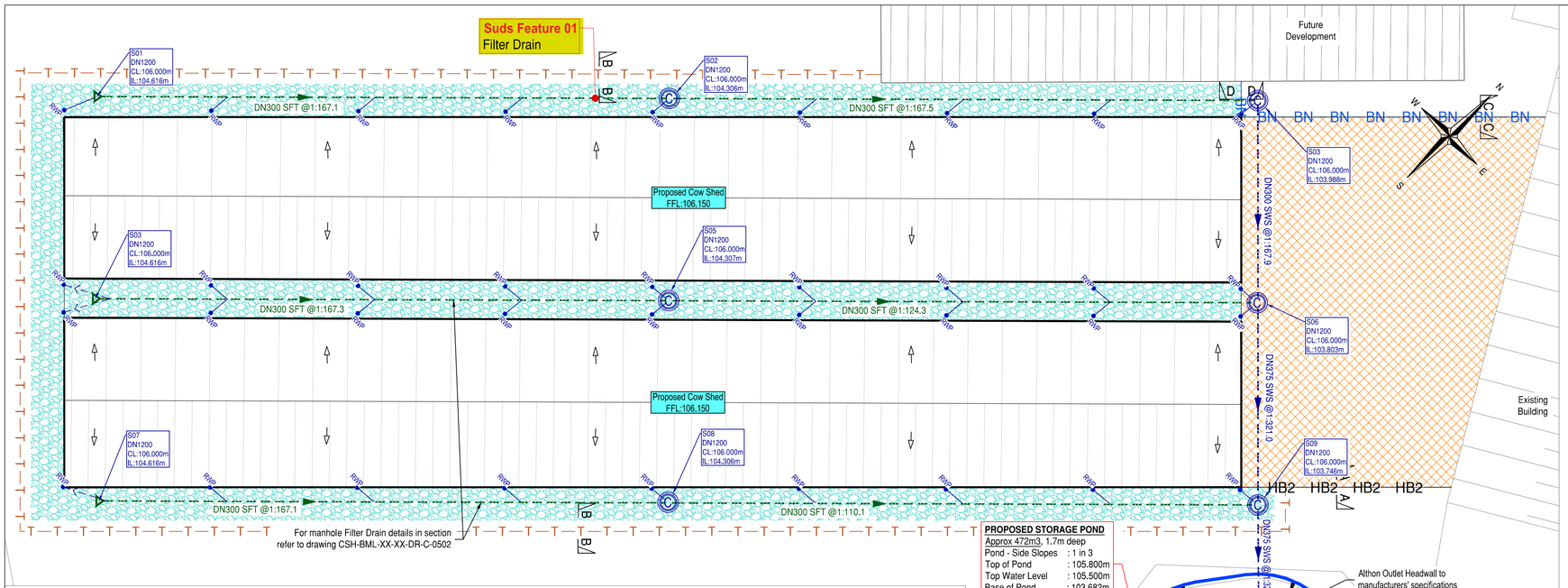
Table 5.1: Recommended Maintenance Regime for Filter Drains

Regular Maintenance	
Monthly	• Litter and debris removal • Mow grasses (where required to promote lateral runoff inflow) and remove resultant clippings (during growing season only) • Remove nuisance and invasive vegetation (for 12 months following installation) • Inspect/check all inlets, outlets, surface and overflows (where required) to ensure that they are in good condition, free from blockages and operating as designed. Take action where required
Six Monthly	• Not applicable
Annually	• Not applicable
Annually	• Remove nuisance and invasive vegetation • Inspect and document the presence of wildlife
As Required	• Repair erosion or other damage by re-turfing, reseeding or replacing filter material • Re-level uneven surfaces and reinstate design levels (typically every 60-month period) • Remove and replace top 300 – 500mm of gravel, clean and replace where required (typically every 60-month period) • Remove and dispose of oils or petrol residues using safe standard practices
Remedial Actions: Significant storms may cause significant damage to SuDS. As such, a number of actions may be required following such events	
Following all significant storm events	• Inspect and carry out essential recovery works to return the feature to full working order

APPENDICES

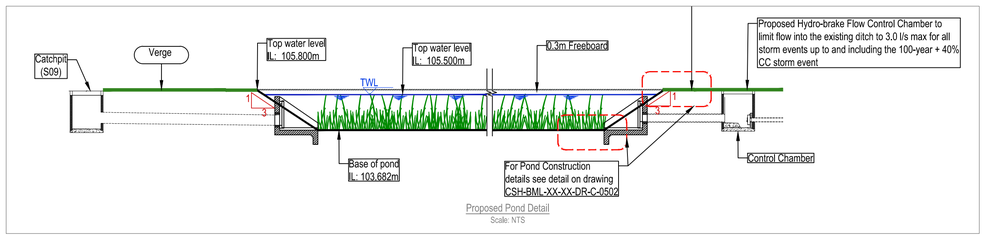
Appendix A

SuDS Drainage Proposals



PROPOSED STORAGE POND
Approx 472m3, 1.7m deep

Pond - Side Slopes	: 1 in 3
Top of Pond	: 105.800m
Top Water Level	: 105.500m
Base of Pond	: 103.682m



Greenfield Runoff Rates

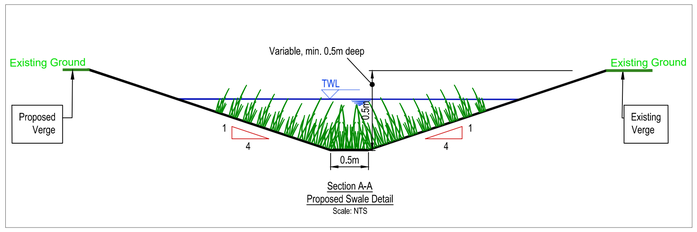
ICP SUDS Mean Annual Flood

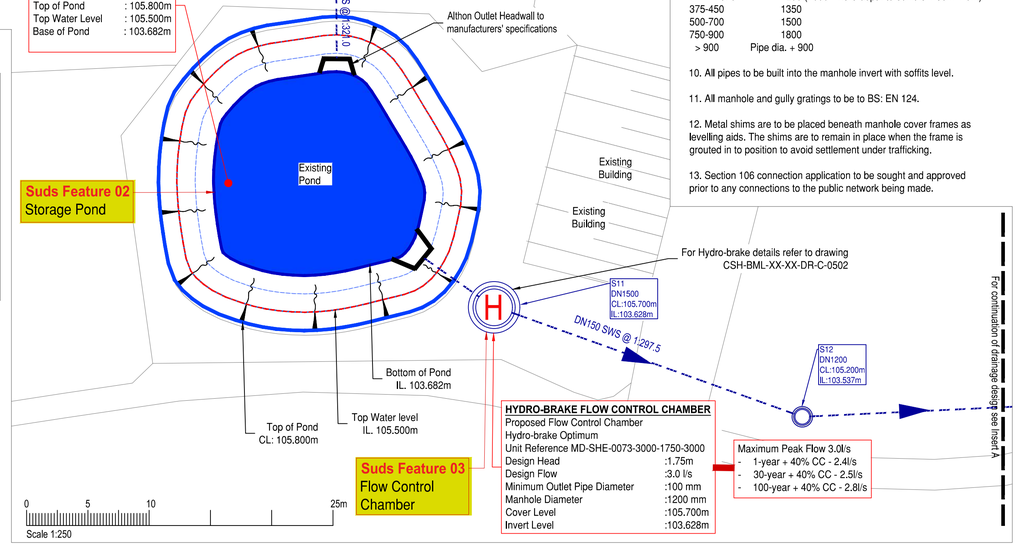
Input

Return Period (years)	100	Soil	0.450
Area (ha)	0.604	Urban	0.000
SAAR (mm)	981	Region Number	Region 10

Results l/s

QBAR Rural	3.9
QBAR Urban	3.9
Q100 years	8.2
Q1 year	3.4
Q30 years	6.7
Q100 years	8.2



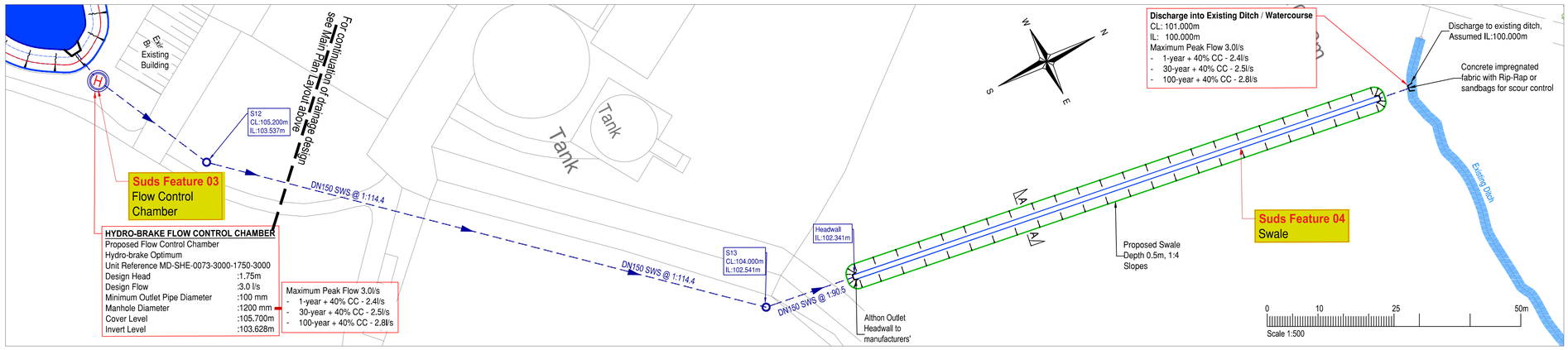


HYDRO-BRAKE FLOW CONTROL CHAMBER

Proposed Flow Control Chamber	
Hydro-brake Optimum	
Unit Reference MD-SHE-0073-3000-1750-3000	
Design Head	:1.75m
Design Flow	:3.0 l/s
Minimum Outlet Pipe Diameter	:100 mm
Manhole Diameter	:1200 mm
Cover Level	:105.700m
Invert Level	:103.628m

Maximum Peak Flow 3.0l/s
- 1-year + 40% CC - 2.4l/s
- 30-year + 40% CC - 2.5l/s
- 100-year + 40% CC - 2.8l/s

Plan
Scale 1:250



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Maximum Peak Flow 3.0l/s
- 1-year + 40% CC - 2.4l/s
- 30-year + 40% CC - 2.5l/s
- 100-year + 40% CC - 2.8l/s

Insert A
Scale 1:500

Drainage Notes:

1. The existing services shown on this drawing are not necessarily complete nor is their location with regard to position and depth precise. It is the Contractor's responsibility to liaise with all relevant services companies to ensure that all services are accurately located and adequately protected during construction.

2. Pipes up to and including 300mm diameter shall be vitrified clay to BS EN 295 with either sleeved or spigot and socket flexible joints, and shall satisfy the minimum crushing strengths stated below:
100Ø - 28 kN/m² 225Ø - 28 kN/m²
150Ø - 28 kN/m² 300Ø - 36 kN/m²

Alternatively a PVC system (complying with appropriate standards and drainage authority requirements) may be used when agreed with the engineer and installed in strict accordance with manufacturers recommendations.

3. Pipes of 375mm diameter and above shall be precast concrete class M with flexible joints to BS 5911 Part 100.

4. All pipes to be 100Ø (unless noted otherwise) & laid to a minimum fall of 1:80 (unless noted otherwise). All pipes are to be laid in accordance with the Manufacturer's recommendations and sitework instructions.

5. Invert levels at connections to existing drainage to be confirmed by the Contractor to the Engineer prior to commencing drainage construction.

6. All new rainwater down pipes are to discharge into roddable connections.

7. Manhole cover grades are to be as follows:

Grade	Proposed Use
A15	Landscaping
B125	Pedestrian only Areas
C250	Car Parking Areas
D400	Highway

8. Precast concrete chamber sections and cover slabs to be to BS: 5911.

9. Chamber sizes:

Main pipe dia (mm)	Chamber dia (mm)
< 375	1200 (1050 where depth to soffit is 1.35m-1.5m)
375-450	1350
500-700	1500
750-900	1800
> 900	Pipe dia. + 900

10. All pipes to be built into the manhole invert with soffits level.

11. All manhole and gully gratings to be to BS: EN 124.

12. Metal shims are to be placed beneath manhole cover frames as levelling aids. The shims are to remain in place when the frame is grouted in to position to avoid settlement under trafficking.

13. Section 106 connection application to be sought and approved prior to any connections to the public network being made.

Safety, Health & Environmental Information:
In addition to the hazards and risks normally associated with the types of work detailed on this drawing, please note the significant hazards identified by symbols below,

INDICATES A RESIDUAL RISK AS A WARNING

INDICATES A RESIDUAL RISK FOR INFORMATION

and described below:

Construction/Maintenance/Cleaning/Demolition
Refer to Drawing:

General Notes:

1. Do not scale from this drawing.

2. All dimensions are in millimetres (mm), all levels in metres (m) unless noted otherwise.

3. Discrepancies or omissions are to be reported to the Engineer prior to work commencing.

4. Materials and workmanship are to comply in all respects with current British Standard Specifications, Codes of Practice, and Building Regulations Approved Documents.

5. The copyright of this drawing is vested in the Engineer and must not be copied or reproduced without written consent.

6. The Contractor is to check and verify all building and site dimensions, levels and sewer invert levels at connection points before work commences.

7. This drawing is to be read in conjunction with all relevant specifications and drawings issued by the Engineer, Architect and other Specialists.

Drainage Key:

DNXXX SWS @ 1:XXX	Proposed Stormwater
DNXXX SFT @ 1:XXX	Proposed Filter Drain
C SXX	Proposed Stormwater Manhole
C SXX	Proposed Ridgistorm Separate Catchpit
H SXX	Proposed Stormwater Hydro-brake
	DN150 Gully / RWP Connector
RWP	Proposed Rain Water Pipe
	Proposed Rodding Eye
FFL:XX.XXX	Proposed Finish Floor Level

Rev	By / Chk'd	Date	Description
P02	DH/AM	21/07/23	Preliminary Issue
P01	RA/GM	05/04/23	For Discussion

PRELIMINARY DRAWING
This drawing is not to be used for construction

Client
FI REAL ESTATE MANAGEMENT

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Tel: 01905 330550
Email: design@barnsleymarshall.co.uk
Web: www.barnsleymarshall.co.uk

Project
Cow Shed
Elmridge Lane, Preston,
PR3 2NY

Drawing
Proposed Surface Water Drainage Layout

By/Chk'd RA/GM Date 05/04/2023

Drawing No. CSH-BML-XX-XX-DR-C-0500
Revision P02
BML Job No. 1000-05
Status -
Drawing Scale at A1: As Shown
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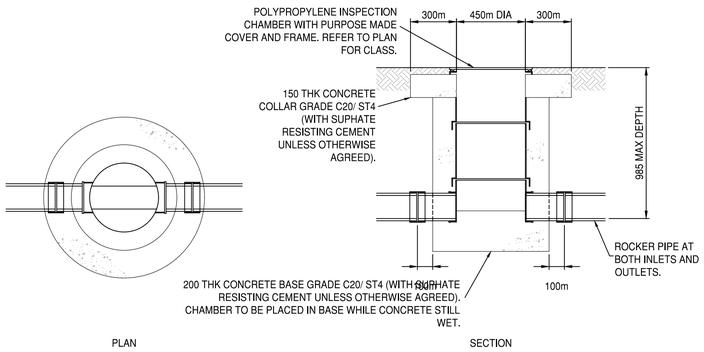
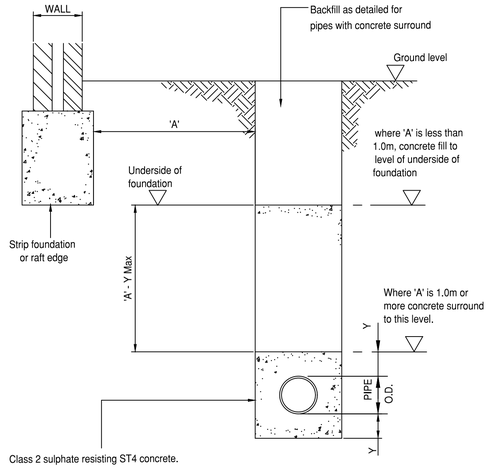


Polypropylene Manhole

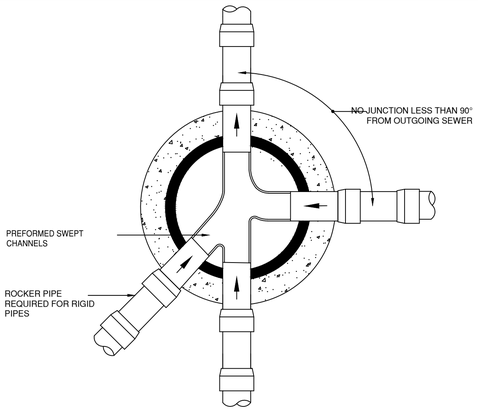
Scale 1:20

DEPTH FROM GROUND LEVEL TO INVERT OF PIPE UP TO 985mm



Pipe Runs Near Buildings

Scale 1:20



SECTIONAL PLAN

RIGID PIPES BUILT INTO MANHOLE SHOULD HAVE A FLEXIBLE JOINT AS CLOSE AS FEASIBLE TO THE EXTERNAL FACE OF THE STRUCTURE AND THE LENGTH OF THE NEXT ROCKER PIPE SHOULD BE AS SHOWN.

NOMINAL DIAMETER (mm)	MAXIMUM EFFECTIVE LENGTH (m)
150 - 600	0.6
601 - 750	1.00
OVER 750	1.25

ALL PIPES ENTERING THE BOTTOM OF THE MANHOLE TO HAVE SOFFITS LEVEL.

Typical Arrangement of Pipe Junctions within Manholes

Scale n.t.s.

Safety, Health & Environmental Information:

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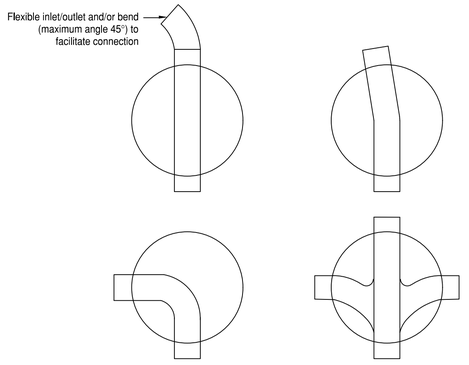
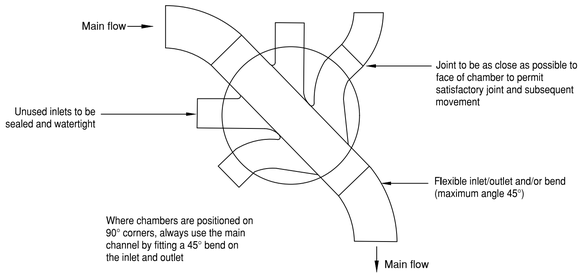
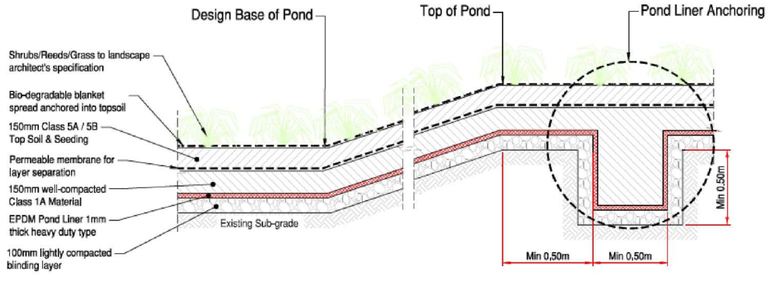
8. For drainage plans refer to drawing:
   - RCF-BML-ERD-ZZ-DR-C-0550 Combined Drainage Layout





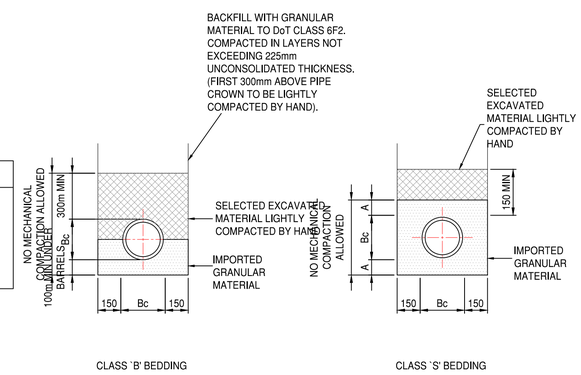
Note: Where a bend is used immediately outside the manhole, this may be used as the rocker pipe



Pond/Swale Construction Build Up (to be confirmed by Landscape Architects)

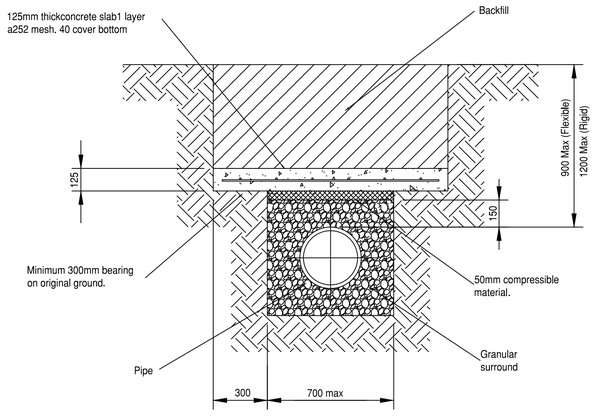
NTS

DIMENSION `A'
MACHINE DUG UNIFORM SOILS 100mm OR 1/6 Bc WHICHEVER IS GREATER (UNDER BARRELS)
ROCK OR MIXED SOILS 200mm OR 1/4 Bc WHICHEVER IS GREATER (UNDER BARRELS)



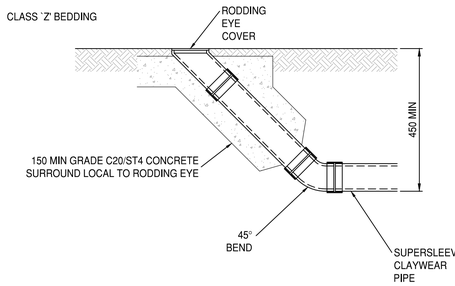
Typical Sewer Bedding Details

Scale 1:20



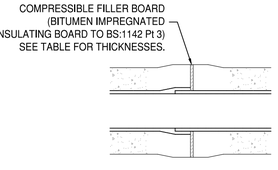
Protection for Pipes Laid at Shallow Depths

Scale 1:20



Rodding Eye Detail

NOMINAL BORE OF PIPE (mm)	THICKNESS OF COMPRESSIBLE FILLER (mm)
LESS THAN 450	18
450 - 1200	36
EXCEEDING 1200	54



Typical Pipe Joint Detail (Bedding Class Z)

Scale 1:20

Rev	By	Chk'd	Date	Description
P02	DH	AM	21/07/23	Details Updated
P01	RA	GM	13/04/23	Preliminary

PRELIMINARY DRAWING
This drawing is not to be used for construction

Client

FI REAL ESTATE MANAGEMENT

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1 Birch Court
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WR3 8SG
Tel: 01905 330550
Email: design@barnsleymarshall.co.uk

BarnsleyMarshall

Project

Cow Shed
Elmridge Lane, Preston,
PR3 2NY

Drawing

Drainage Details
Sheet 1 of 2

Drawn by		Date	
Checked by	RA/GM	Date	05/04/2023

Drawing No. CSH-BML-XX-XX-DR-C-0501

Revision P02

BML Job No. 1000-05

Drawing Scale at A1: NTS

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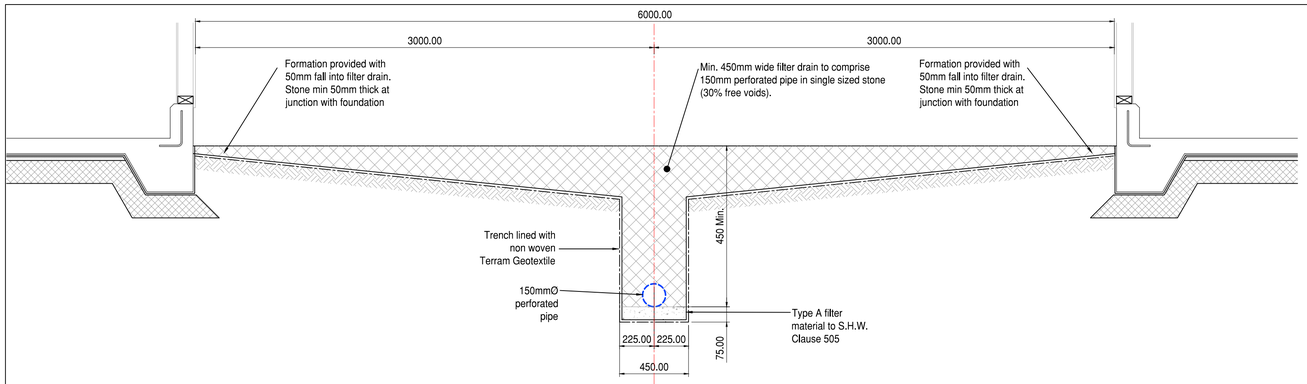
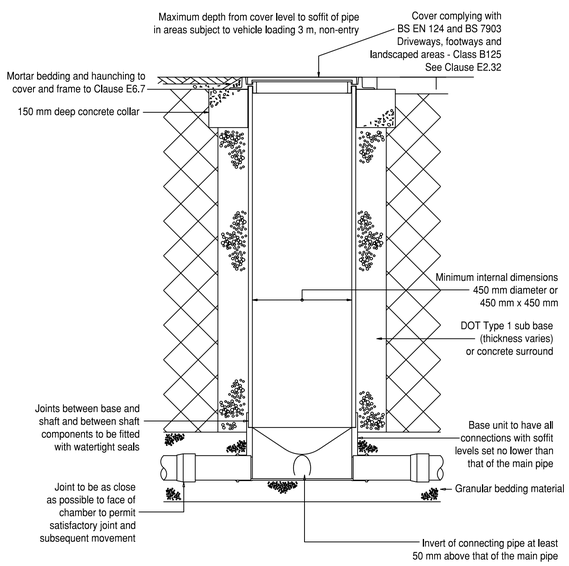


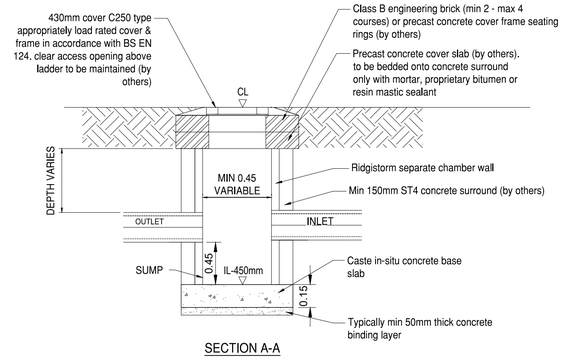
Typical Section Thro' Filter Drain (Section A-A)

Scale 1:20

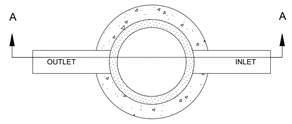


Typical Inspection Chamber Detail (Flecible Material Detail)

NTS



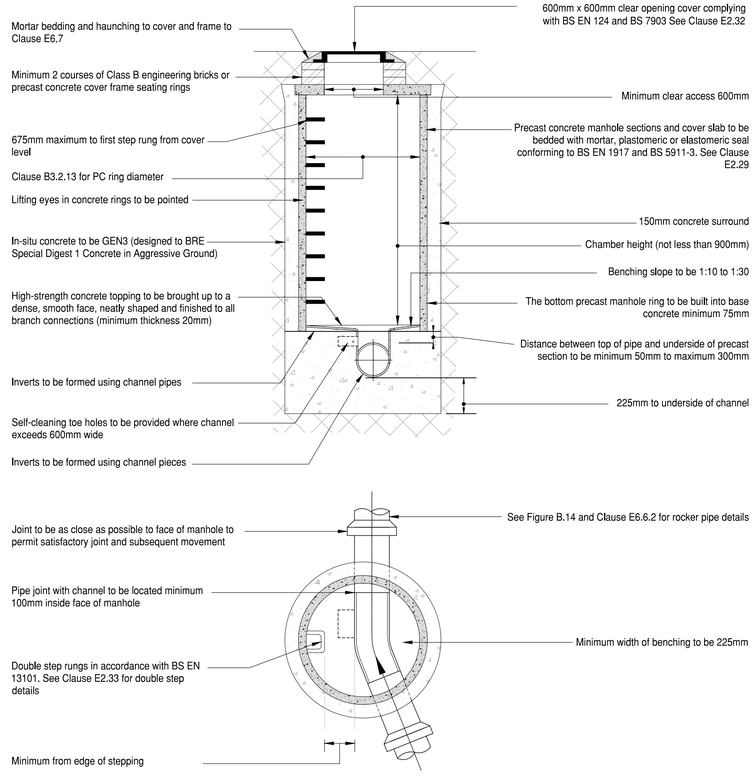
SECTION A-A



PLAN

Rigistorm Separate Catchpit

NTS



Typical Manhole Detail (Max depth from cover to soffit of pipe 3.0m)

Scale 1:20

Safety, Health & Environmental Information:

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Refer to Drawing:

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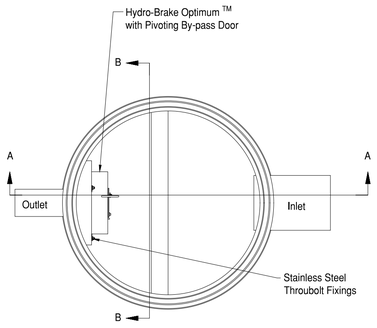
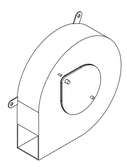
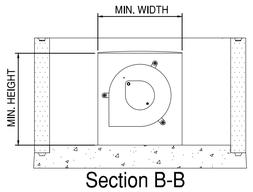
8.For drainage plans refer to drawing:
- RCF-BML-ERD-ZZ-DR-C-0550 Combined Drainage Layout



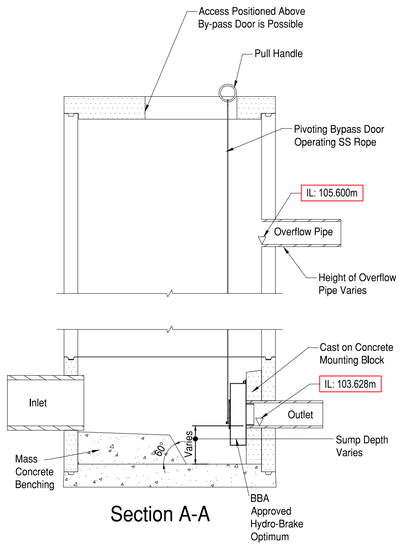
Plan





Section B-B
(View on Mounting Block)

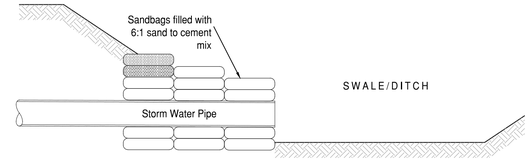
Note - A Pre-formed Hydro-Brake® Chamber base is Available from Hydro International with Hydro-Brake Optimum TM Pre-fitted



Section A-A

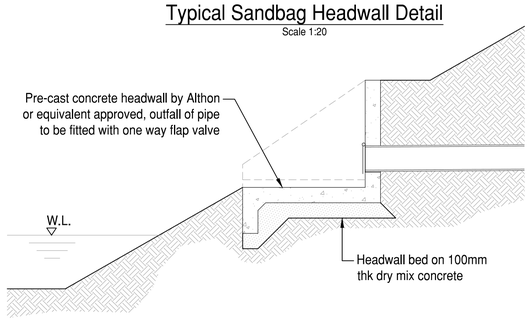
Typical Hydrobrake Chamber Detail With Overflow Pipe

Scale 1:20



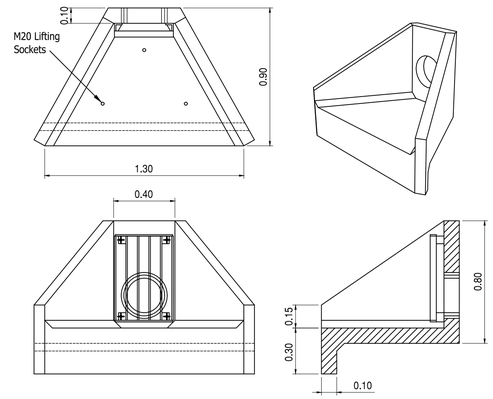
Typical Sandbag Headwall Detail

Scale 1:20



Typical Concrete Headwall Detail

Scale 1:20



Headwall Outlet - Athlon H3C Headwall (Up to DN300)

Scale 1:20

PRELIMINARY DRAWING
This drawing is not to be used for construction

Rev	By	Chk'd	Date	Description
P02	DH	AM	2/07/23	Details Updated
P01	RA	GM	13/04/23	Preliminary

Client

FI REAL ESTATE MANAGEMENT

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BarnsleyMarshall

Project

Cow Shed
Elmridge Lane, Preston,
PR3 2NY

Drawing

Drainage Details
Sheet 2 of 2

Drawn by — Date

Checked by RA/GM — Date 05/04/2023

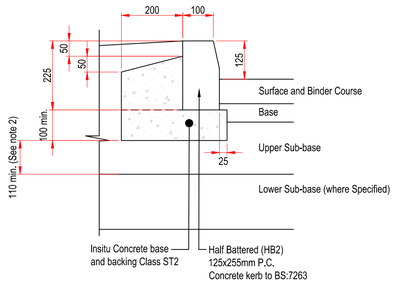
Drawing No. CSH-BML-XX-XX-DR-C-0502

Revision P02

BML Job No. 1000-05

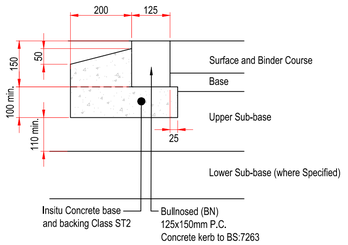
Drawing Scale at A1: NTS

CAD Filename:



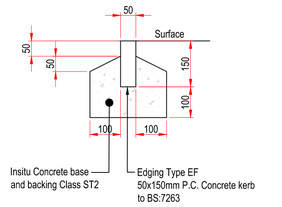
Full height HB2 Kerb & Base Detail

Scale 1:10



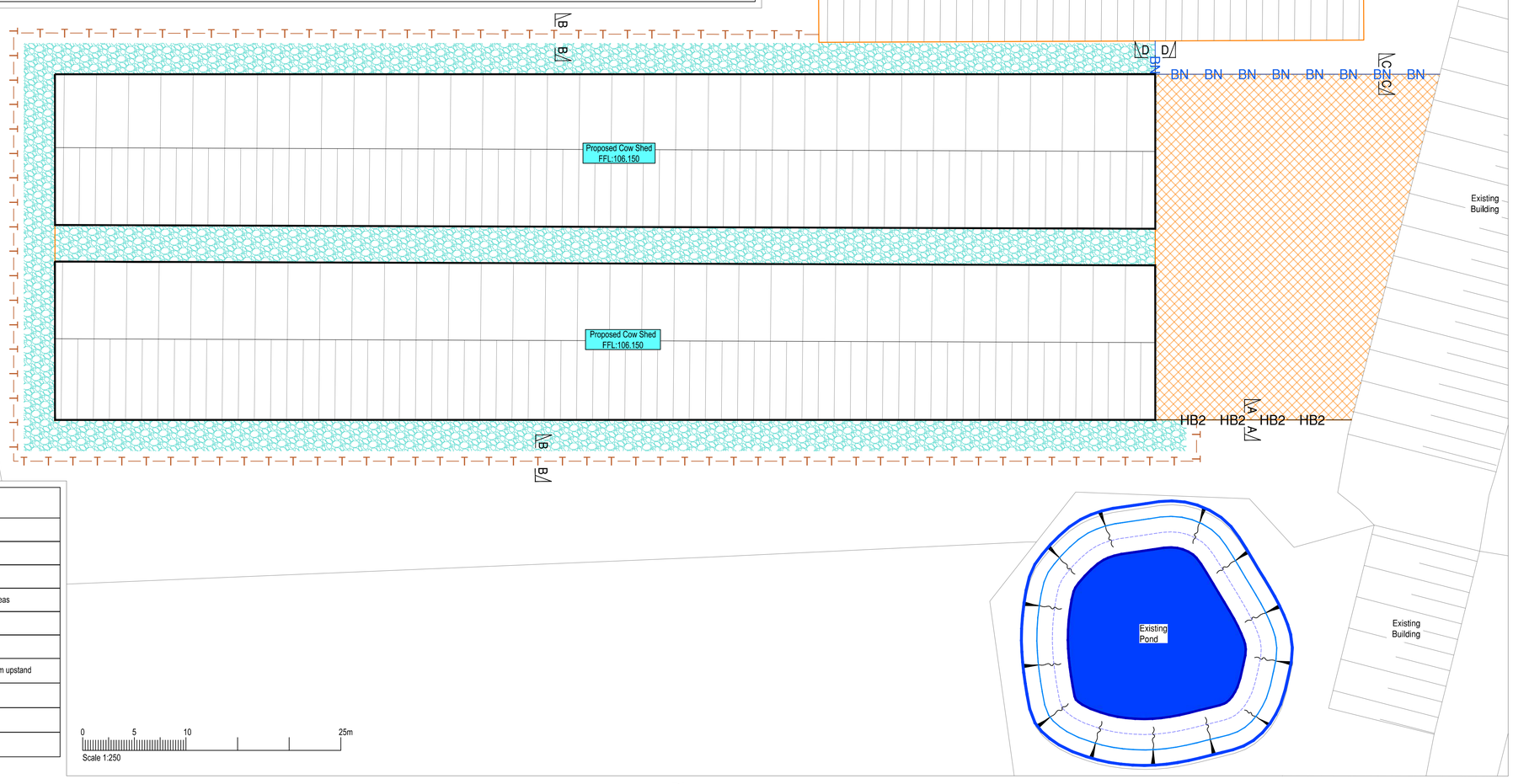
Dropped BN Kerb (0mm upstand) & Base Detail

Scale 1:10



Edging EF Kerb & Base Detail

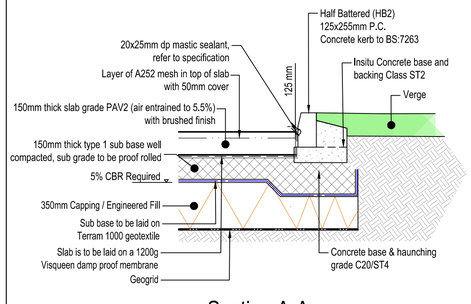
Scale 1:10



Plan

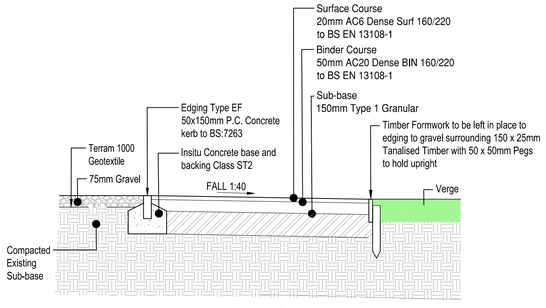
Scale 1:250

Key:	
	Existing Building
	Proposed Concrete Slab
	Proposed Footpath
	Existing and Proposed Green Areas
	Proposed Building
	Proposed Gravel Surround
—HB2—	Proposed HB2 kerbs with 125mm upstand
—BN—BN—	Proposed BN kerbs
—EF—EF—	Proposed EF Kerbs
-T—T—T—	Proposed Timber Edging



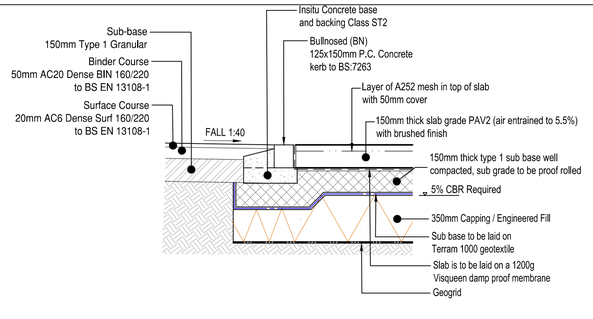
Section A-A
Verge & Concrete Slab

Scale 1:20



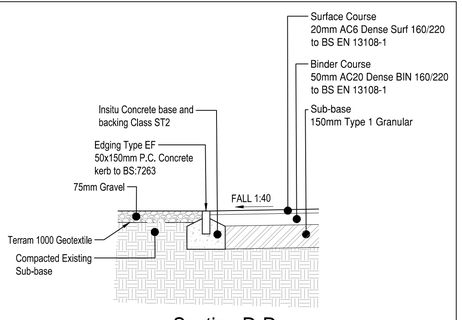
Section B-B
Gravel Surround, Footway & Verge

Scale 1:20



Section C-C
Footway & Concrete Slab

Scale 1:20



Section D-D
Gravel Surround, Footway & Verge

Scale 1:20

Safety, Health & Environmental Information:

In addition to the hazards and risks normally associated with the types of work detailed on this drawing, please note the significant hazards identified by symbols below,

INDICATES A RESIDUAL RISK AS A WARNING

INDICATES A RESIDUAL RISK FOR INFORMATION

and described below:

Construction/Maintenance/Cleaning/Demolition

Refer to Drawing:

General Notes:

1. Do not scale from this drawing.
2. All dimensions are in millimetres (mm), all levels in metres (m) unless noted otherwise.
3. Discrepancies or omissions are to be reported to the Engineer prior to work commencing.
4. Materials and workmanship are to comply in all respects with current British Standard Specifications, Codes of Practice, and Building Regulations Approved Documents.
5. The copyright of this drawing is vested in the Engineer and must not be copied or reproduced without written consent.
6. The Contractor is to check and verify all building and site dimensions, levels and sewer invert levels at connection points before work commences.
7. This drawing is to be read in conjunction with all relevant specifications and drawings issued by the Engineer, Architect and other Specialists.

Notes:

1. The contractor is to check all information provided prior to commencing works, and seek clarification from the engineer in respect to any ambiguities found.
2. Contractor to check insitu CBR at time of construction and adjust pavement foundation as per Table 3. Assumed Site CBR 3% <= CBR < 5%
3. Contractor to check that the existing subgrade is not frost-susceptible. If found to be frost-susceptible, contractor to ensure all material within 450mm depth from the pavement surface is non frost-susceptible by adding a capping layer below the sub-base.

Table 3: Class 2 Pavement Foundation Options

In-situ CBR	Type 1 sub base to DfT SHW Clause 803
7% - 20%	100
5% - 7%	150
3% - 5%	250
2% - 3%	325
< 2%	Consult Engineer for Advice

Rev	By / Chk'd	Date	Description
P01	DH/AM	2/07/2023	Preliminary Issue

PRELIMINARY DRAWING
This drawing is not to be used for construction

Client

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Project

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Drawing

External Works

By/Chk'd RA/GM Date 05/04/2023

Drawing No. CSH-BML-XX-XX-DR-C-0700

Revision P01

BML Job No. 1000-05

Status -

Drawing Scale at A1: As Shown

CAD Filename: Y:\Projects\1000-05 Cow Shed\Information - Working\DWG\CSH-BML-XX-XX-DR-C-0702 P01 - External Works.dwg