Report

Project	Co-Op Live
Subject	Verification Report, SuDS
Project no	0048440
Date	5 December 2023

Revision	Description	Issued by	Date
P01	For Information	CE	05.12.23

1 Introduction

The purpose of this Report is to demonstrate compliance with Planning Condition 16 for the Co-Op Live Project, by providing evidence of works installed in accordance with the Buro Happold Engineering Design. The Implementation, Maintenance and Management of the SuDs schemes on this project is covered in the Design Note produced by BHE. (See Appendix 1).

1.1 Relevant Items Installed:

1.1.1 Hydro-brake Flow Control Device

1.1.2 Catchpits/Silt Traps

1.1.3 Gullies

1.1.4 Attenuation Tanks

1.1.5 Permeable Paving

1.1.6 Rainwater harvesting tank

Appendix Documents:

- Appendix 1-BHE Design Note, Implementation, Maintenance and Management Of SuDS:
- Appendix 2-BHE Drainage Design Drawings:
- Appendix 3- BHE Below Ground Drainage Specification
- Appendix 4-Photographic Evidence of Aco Channel Installation to Podium
- Appendix 5-Photographic Evidence of Hydro Brakes installed
- Appendix 6-Photographic Evidence of Catch Pits/Silt Traps Installed
- Appendix 7-Photographic Evidence of Gullies installed
- Appendix 8-Photographic Evidence of Attenuation Tank Installed
- Appendix 9-Certification of completion of Attenuation Tank Installed
- Appendix 10-Photographic Evidence of Permeable Paving Installed
- Appendix 11-Photographic Evidence of Rain Water Harvesting Tank Installed
- Appendix12-Certification of completion of Rain Water Harvesting Tank Installed

DRAFT

Appendix 1-BHE Design Note, Implementation, Maintenance and Management Of SuDS:

BURO HAPPOLD

Design Note

Number	BRA-BHE-XX-ZZ-DN-C-0007
Project	Co-Op Live
Subject	Implementation, Maintenance and Management of SuDS
Project no	0048440
Date	6 July 2022

Revision	Description	Issued by	Date	Approved (signature)
P01	For Information	FD	06.07.22	Allan Hoodless

1 Introduction

The purpose of this Design Note is to provide details of the implementation, maintenance and management of the sustainable drainage scheme on Co-Op Live Arena, Manchester. The proposed drainage is not to be adopted by Manchester City Council or United Utilities and therefore will remail private.

The management and maintenance plan shall be implemented upon first use of the development and thereafter retained and maintained.

The implementation of the proposed maintenance schedule and verification reporting providing photographic evidence of construction should be carried out by a trained member of staff or appropriate contractor on behalf of the Tenant.

1.1 ACO Channels:

Inspections should be frequent and regular, depending on local conditions, but at least annually. Inspections should include gratings; covers including their locking bolts; sumps and sump buckets; exposed concrete surround and adjacent paving. After removal of gratings and/or inspection covers, channels should be flushed with water or high pressure jetting (Do not use boiling water or cleaning agents). All surfaces and joints should be checked and repaired as necessary. Empty all silt buckets and clean out sump/gully and connections. Replace bucket and gratings ensuring they are correctly fitted.

1.2 Hydro-brake Flow Control Device:

It is recommended that the unit be inspected at six monthly intervals. Any extraneous material should be removed from the chamber and hosed down if required.

1.3 Catchpits/Silt Traps:

Catchpit manholes and Silt Traps should be checked every 6 months for the accumulation of debris/silt and cleaned as necessary. Vacuum pumping would be sufficient.

1.4 Gullies:

Gullies should be cleaned a minimum of once per year. Reported blocked gullies may be cleansed reactively after assessment.

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1.5 Attenuation Tanks:

Maintenance of the tanks will be undertaken by an experienced contractor, in cases where geo-cellular units are installed the suppliers will normally offer a maintenance contract for periodic inspections and flushing the system to remove any silt and debris that have been collected. An agreed maintenance programme will be prepared in accordance with the SuDS Manual maintenance guidelines and manufacturers recommendations and supervised by either the development's facilities manager or an appointed property management company. This will be included within the Building Manual for the development on completion.

1.6 Permeable Paving:

The public realm surfaces should be mechanically sprayed and vacuum swept clear of debris at minimum 6 monthly intervals by a typical truck mounted sweeper. At this time inspect all gullies for damage and clean out sumps. This should be increased following particular incidents which may increase debris, e.g. following a flood event or from falling leaves.

A $1m^2$ area of blocks should be removed after 10 years from the opening and then on a 5 yearly cycle to allow for inspection of the underlying stone bedding. This area should not be at a location prone to any visible siltation at the surface, e.g. areas where water may flow and settle prior to passing through the block surfacing.

The stone bedding should be replaced should sufficient siltation have occurred to significantly reduce the void space or prevent infiltration to the permeable sub-base below. This is not anticipated to occur for a period of circa 20 years from installation. Replacement should be achieved by lifting of the blocks and hand removal of the bedding.

The sub-base should be replaced should sufficient siltation have occurred to significantly reduce the void space within the construction.

1.7 Rainwater harvesting tank:

Typically checks to the rainwater harvesting tank and its components would be part of a 6 monthly planned preventative maintenance.

The coarse filter grid would need to be removed and cleaned to remove any debris from the filter grid. Excessive debris within the chamber would need to be removed with a suction vacuum.

The water quality in the tank would be visually inspected from the manhole.

The pumps can be removed via the lifting chains to be visually inspected. They can be tested to ensure working use.

The Aqua Storm Control valve, spindle, actuator arrangement would be visually inspected and tested to ensure working use.

Appendix 2-BHE Drainage Design Drawings:

Name	Title	Revision
BRA-BHE-XX-01-DR-C-0301	SURFACE WATER DRAINAGE PODIUM LEVEL 01 GENERAL ARRANGEMENT	C11
BRA-BHE-XX-01-DR-C-0340	SURFACE WATER DRAINAGE PODIUM LEVEL 01 FORGE LANE BRIDGE A4 AUTHORISED	C02
BRA-BHE-XX-B1-DR-C-0401	GENERAL ARRANGEMENT BASEMENT LEVEL B1 FOUL WATER DRAINAGE	P01
BRA-BHE-XX-XX-DR-C-0212	HIGHWAYS SPORT CITY WAY PUBLIC REALM PROPOSED LEVELS + DRAINAGE	C03
BRA-BHE-XX-XX-DR-C-0232	HIGHWAYS NORTHERN CAR PARK ACCESS PROPOSED LEVELS + DRAINAGE	C01
BRA-BHE-XX-XX-DR-C-0252	HIGHWAYS EMERGENCY ACCESS PROPOSED LEVELS + DRAINAGE	C01
BRA-BHE-XX-XX-DR-C-0264	SECTION 278 EMERGENCY VEHICLE ACCESS PROPOSED CONTOURS AND DRAINAGE	P02
BRA-BHE-XX-XX-DR-C-0275	SECTION 278 NORTHERN CAR PARK ACCESS PROPOSED CONTOURS AND DRAINAGE	P02
BRA-BHE-XX-XX-DR-C-0301	SURFACE WATER DRAINAGE BELOW GROUND GENERAL ARRANGEMENT	C18
BRA-BHE-XX-XX-DR-C-0360	SURFACE WATER DRAINAGE SEWER DIVERSION GENERAL ARRANGEMENT	C01
BRA-BHE-XX-XX-DR-C-0361	SURFACE WATER DRAINAGE SEWER DIVERSION LONG SECTION	C01
BRA-BHE-XX-XX-DR-C-0362	SURFACE WATER DRAINAGE SEWER DIVERSION SOUTHERN CHAMBER PLAN	C01
BRA-BHE-XX-XX-DR-C-0363	SURFACE WATER DRAINAGE SEWER DIVERSION SOUTHERN CHAMBER DETAIL	C01
BRA-BHE-XX-XX-DR-C-0364	SURFACE WATER DRAINAGE SEWER DIVERSION NORTHERN CHAMBER PLAN	P03
BRA-BHE-XX-XX-DR-C-0365	SURFACE WATER DRAINAGE SEWER DIVERSION NORTHERN CHAMBER DETAIL	P04
BRA-BHE-XX-XX-DR-C-0366	SURFACE WATER DRAINAGE SEWER DIVERSION EXISTING UTILITIES	P02
BRA-BHE-XX-XX-DR-C-0367	SURFACE WATER DRAINAGE SEWER DIVERSION TEMPORARY NORTH CHAMBER DETAIL	P01
BRA-BHE-XX-XX-DR-C-0391	SURFACE WATER DRAINAGE BELOW GROUND MANHOLE SCHEDULE	C12
BRA-BHE-XX-XX-DR-C-0401	FOUL WATER DRAINAGE BELOW GROUND GENERAL ARRANGEMENT	C17
BRA-BHE-XX-XX-DR-C-0402	FOUL WATER DRAINAGE FOUL OUTFALL	P02
BRA-BHE-XX-XX-DR-C-0423	FOUL WATER DRAINAGE BELOW GROUND LONG SECTIONS	P05
BRA-BHE-XX-XX-DR-C-0491	FOUL WATER DRAINAGE BELOW GROUND MANHOLE SCHEDULE	C15
BRA-BHE-XX-XX-DR-C-0551	DRAINAGE DETAILS SHEET 1	C01
BRA-BHE-XX-XX-DR-C-0552	DRAINAGE DETAILS SHEET 2	C01
BRA-BHE-XX-XX-DR-C-0553	DRAINAGE DETAILS SHEET 3	C02
BRA-BHE-XX-XX-DR-C-0554	DRAINAGE DETAILS SHEET 4	C05
BRA-BHE-XX-XX-DR-C-0555	DRAINAGE DETAILS SHEET 5	C08
BRA-BHE-XX-XX-DR-C-0556	DRAINAGE DETAILS SHEET 6	C01
BRA-BHE-XX-XX-DR-C-0557	DRAINAGE DETAILS SHEET 7	C01
BRA-BHE-XX-XX-DR-C-0558	DRAINAGE DETAILS SHEET 8	C01
BRA-BHE-XX-XX-DR-C-0559	DRAINAGE DETAILS SHEET 9	C01
BRA-BHE-XX-XX-DR-C-0560	DRAINAGE DETAILS SHEET 10	C01

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Work in Progress (WIP)
S0 - Initial Status
Shared (Non- Contractual)
S1 - Suitable for co-ordination
S2 - Suitable for information
S3 - Suitable for review & comment
S4 - Suitable for stage approval
S5 - Withdrawn
S6 - Suitable for PIM authorisation
S7 - Suitable for AIM authorisation

Published (Contractual)
A1, A2, A3, Etc - Authorised and accepted
B1,B2,B3, Etc, - Partial sign-off (with comments)

Published (AIM Acceptance)
CR - As constructed record document

SAFETY HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING.

CONSTRUCTION.

EXCAVATIONS IN CONTAMINATED GROUND
FINAL CONNECTION TO LIVE SEWER

MAINTENANCE/CLEANING/OPERATION.

HYDRO-BRAKE FLOW CONTROL DEVICE
ATTENUATION TANK
RAINWATER HARVESTING TANK EQUIPMENT

DECOMMISSIONING/DEMOLITION

NO UNUSUAL RISKS

Notes

1. THIS DRAWING REFERENCE FOLLOWING INFORMATION:
   - POPULOUS (ARCHITECT) - LEVEL 01 RECEIVED ON THE 18.01.22
   - CCTV SURVEY FROM SURVEY OPERATIONS REFERENCE 190065 A RECEIVED ON THE 12.09.2019
   - BAM AS-BUILT DRAWING "SCW KERB LINE REV8 - BOLLARD SET OUT" RECEIVED 24.11.2023
2. ALL INTERNAL MANHOLES TO HAVE DOUBLE SEALED COVERS
3. ALL PIPES TO BE Ø150mm UNLESS SHOWN OTHERWISE ON THE DRAWING.
4. FOR GROUND LEVEL SURFACE WATER DRAINAGE REFER TO DRAWING BRA-BHE-XX-XX-DR-C-0301
5. FOR HIGHWAY DRAINAGE REFER TO DRAWING BRA_BHE_XX_XX_DR_C_0310.
6. FOR ABOVE GROUND DRAINAGE REFER TO ME ENGINEERING DRAWINGS.
7. FOR MANHOLE & PIPE SCHEDULE REFER TO DRAWING: BRE_BHE_XX_XX_DR_C_0391.
8. CHANNEL DRAIN OUTLETS TO BE PERFORATED AT PODIUM BUILD-UP DRAINAGE MAT DEPTH TO PROVIDE DRAINAGE FOR MAT. PERFORATIONS TO BE WRAPPED IN GEOTEXTILE.
9. ALL CHANNEL DRAIN, GULLY AND PERMEABLE PAVING OUTLETS TO BE PICKED UP AT HIGH LEVEL WITHIN BUILDING BY MEP ENGINEER. ACCESS COVER TO BE LOCATED ABOVE OUTLET.
10. VERTICAL OUTLET PIPE WITH END CAP REQUIRED AT 5.0m INTERVALS ALONG ACO CHANNEL TO CAPTURE SILT. ACCESS COVER TO BE LOCATED ABOVE OUTLET. REFER TO C-0555 FOR DETAIL.
11. BOLLARD DRAINAGE TO BE Ø100mm PIPEWORK LAID TO 1:100 FALLS.

LEGEND

- LAND OWNERSHIP BOUNDARY
- PROPOSED SURFACE WATER CHANNEL DRAIN ACO MONODRAIN PD100 0.0 CHANNEL WITH OUTLETS
- PROPOSED SURFACE WATER CHANNEL DRAIN ACO MONODRAIN PD150 0.0 CHANNEL WITH OUTLETS
- PROPOSED SURFACE WATER CHANNEL DRAIN ACO MULTIDRAIN M100D 10.00 CHANNEL WITH OUTLETS
- PROPOSED SURFACE WATER PIPE
- G PROPOSED GULLY
- EXISTING SURFACE WATER DRAINAGE
- PD PLANTER OUTLET
- SP PLANTER / FLOOR BOX OUT THROUGH SLAB
- LIVING / GREEN WALL OUTLET
- PROPOSED SCREED LEVEL
- 50mm DIAMETER PIPE (NOT PERFORATED) LAID TO 1 IN 100 FALL
- BAM AS-BUILT PIPEWORK

Rev	Appr/Dm	Date	Description
C11	CR	AH	30.11.23 A4 AUTHORISED AND ACCEPTED
C10	MG	AH	16.10.23 ADDED NON PERFORATED PIPE
C09	FR	AJH	25.08.23 ADDED ACO MONODRAIN PD100
C08	MG	AJH	16.08.23 ADDED ACO MONODRAIN PD100
C07	SG	AJH	28.07.23 A4 AUTHORISED AND ACCEPTED
C06	SG	AJH	24.05.23 A4 AUTHORISED AND ACCEPTED
C05	SG	AJH	12.05.23 A4 AUTHORISED AND ACCEPTED
C04	FD	AJH	14.02.23 A4 AUTHORISED AND ACCEPTED
C03	FD	AJH	14.11.22 A4 AUTHORISED AND ACCEPTED
C02	FD	AJH	22.02.22 A4 AUTHORISED AND ACCEPTED
C01	FD	AJH	08.02.22 A4 AUTHORISED AND ACCEPTED

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Co-op Live

title SURFACE WATER DRAINAGE
PODIUM LEVEL 01
GENERAL ARRANGEMENT

purpose of issue: A4 AUTHORISED & ACCEPTED

scale	drawn	Job no.	Suitability
1:250	JZ		
date	checked		
Nov-19	NJH	0042841	A4

reference: project code originator volume level type role number — rev.
BRA-BHE-XX-01-DR-C-0301 — C11

OUTLET TO BE LOCATED IN A SUITABLE POSITION TO SUIT MEP

3No. 150mm OUTLETS FROM PERMEABLE PAVING FLEXIBILITY TO MOVE THEM

DRAINAGE FROM PODIUM LEVEL TO BE CONNECTED TO BELOW GROUND DRAINAGE AT GROUND FLOOR LEVEL. FOR LAYOUT REFER TO DRAWING BRA-BHE-XX-XX-DR-C-0301. FOR ABOVE GROUND PIPE ROUTING REFER TO MEE DRAWINGS

1000 DIAMETER PERFORATED PIPE WRAPPED IN GEOTEXTILE. OUTFALLS TO 1500 DI PIPE/

ACO M100 10.00 MULTIDRAIN (200mm OVERALL DEPTH) D400 LOAD RATED GRATING

BRIDGE FINISHED LEVELS TO BE ALTERED TO CHANGE THE CROSS FALL AT PROPOSED CHANNEL DRAIN. LOW POINT TO BE ON THE EAST SIDE OF BRIDGE.

CONNECTION TO INTERNAL ABOVE GROUND BUILDING DRAINAGE
USIL: 59.00
EASTING: 386861.192
NORTHING: 398808.032

1500 DUCTILE IRON PIPE LAID AT 1:9 GRADIENT
LENGTH = 13.515m

USIL: 60.450
EASTING: 386864.139
NORTHING: 398794.843

INDICATIVE BRIDGE BEAM POSITION

BREAK IN ACO CHANNEL EITHER SIDE OF MOVEMENT JOINT

DRAINAGE FROM PODIUM LEVEL TO BE CONNECTED TO BELOW GROUND DRAINAGE AT GROUND FLOOR LEVEL. FOR LAYOUT REFER TO DRAWING BRA-BHE-XX-XX-DR-C-0301. FOR ABOVE GROUND PIPE ROUTING REFER TO MEE DRAWINGS

REFER TO POPULOUS DRAWINGS FOR PLANTER WALL DRAINAGE OUTLETS

4No. GULLIES LOCATED WITHIN WASTE MANAGEMENT AREA

REFER TO POPULOUS DRAWINGS FOR PLANTER WALL DRAINAGE OUTLETS

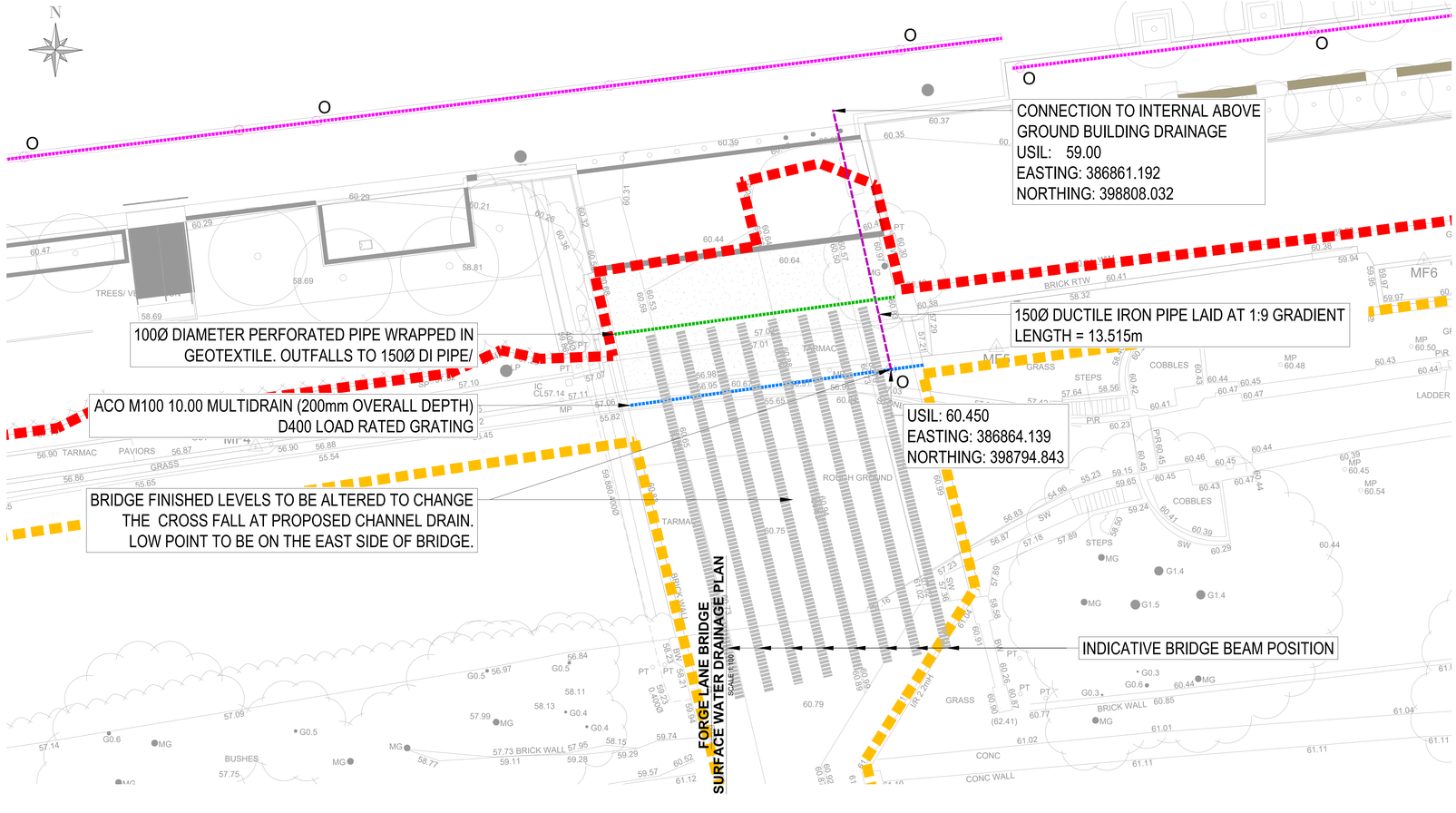
BOLLARD DRAINAGE TO DISCHARGE TO 500mm WIDTH X 500mm LENGTH X 500mm DEPTH SOAKAWAY. SOAKAWAY STONE TO BE PEA GRAVEL WRAPPED IN GEOTEXTILE.

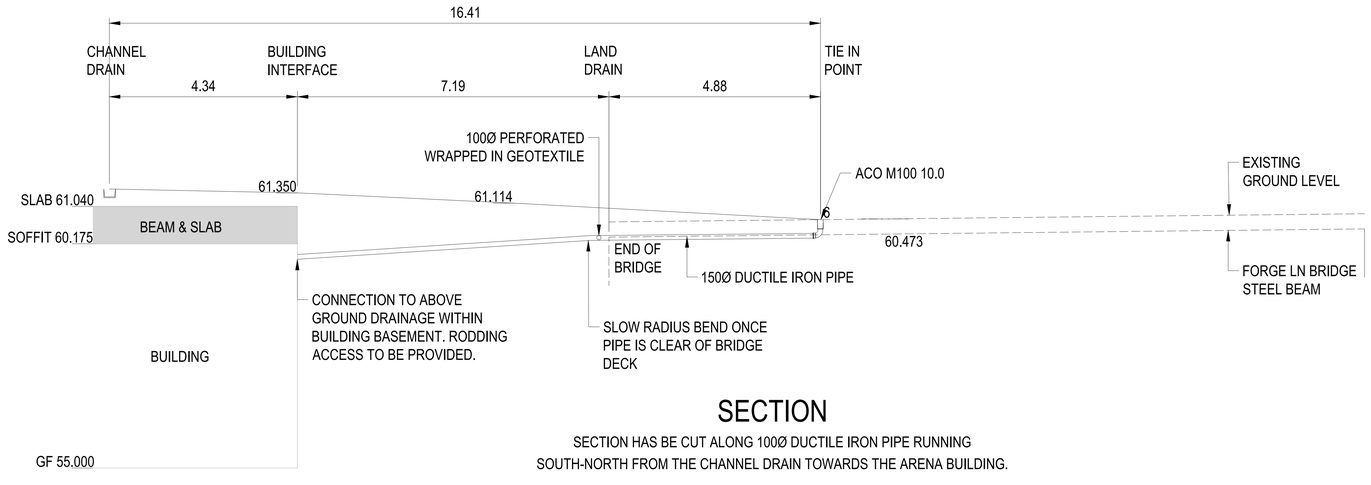
SPRINKLER TANK MANHOLE COVER

SPRINKLER TANK MANHOLE COVER

ATTENUATION TANK

NO UNUSUAL RISKS



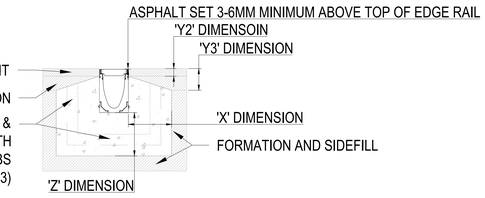


SECTION

SECTION HAS BE CUT ALONG 100Ø DUCTILE IRON PIPE RUNNING SOUTH-NORTH FROM THE CHANNEL DRAIN TOWARDS THE ARENA BUILDING.

Load Class		A15	B125	C250	D400*
Minimum	X	100	150	150	200
Dimensions (mm)	Y	Full Channel Height (Less Y2 where applicable)			
	Z	100	150	150	200
Maximum	Y2	35	35	35	35
Dimensions (mm)	Y3	100	60	60	60

* e.g. parking areas for all types of road vehicle.
Not suitable for carriageway of roads or industrial areas.

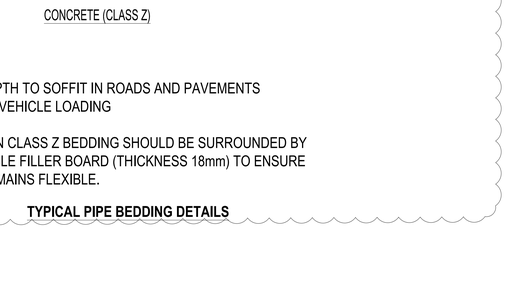


TYPICAL INSTALLATION DETAIL ACO MULTIDRAIN M100D 10.0 ASPHALT PAVEMENT

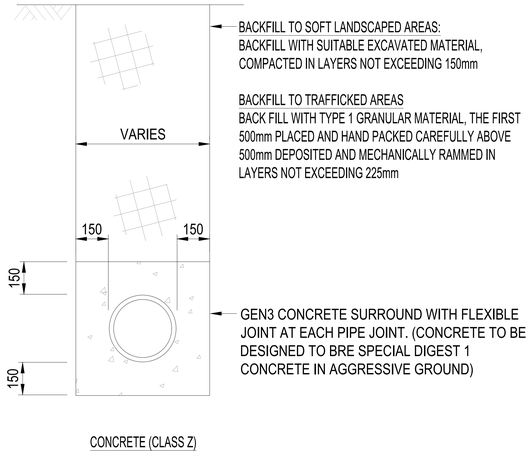
ISOLATION JOINT TO BE INSTALLED NEXT TO ACO CHANNEL
CONCRETE HAUNCHING

Load Class		A15	B125	C250	D400*
Minimum	X	100	150	150	200
Dimensions (mm)	Y	Full Channel Height (Less Y2 where applicable)			
	Z	100	150	150	200
Maximum	Y2	35	35	35	35
Dimensions (mm)	Y3	100	60	60	60

* e.g. parking areas for all types of road vehicle.
Not suitable for carriageway of roads or industrial areas.



TYPICAL INSTALLATION DETAIL ACO MULTIDRAIN SUMP ASPHALT PAVEMENT



<1200mm DEPTH TO SOFFIT IN ROADS AND PAVEMENTS SUBJECT TO VEHICLE LOADING

ALL JOINTS IN CLASS Z BEDDING SHOULD BE SURROUNDED BY COMPRESSIBLE FILLER BOARD (THICKNESS 18mm) TO ENSURE THE PIPE REMAINS FLEXIBLE.

TYPICAL PIPE BEDDING DETAILS

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S7 - Suitable for AIM authorisation

Published (Contractual)
A1, A2, A3, Etc - Authorised and accepted
B1,B2,B3, Etc, - Partial sign-off (with comments)

Published (AIM Acceptance)
CR - As constructed record document

SAFETY HEALTH AND ENVIRONMENTAL INFORMATION

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CONSTRUCTION:

EXCAVATIONS IN CONTAMINATED GROUND
FINAL CONNECTION TO LIVE SEWER

MAINTENANCE/CLEANING/OPERATION:

HYDRO-BRAKE FLOW CONTROL DEVICE
ATTENUATION TANK
RAINWATER HARVESTING TANK EQUIPMENT

DECOMMISSIONING/DEMOLITION

NO UNUSUAL RISKS

Notes

1. THIS DRAWING REFERENCE FOLLOWING INFORMATION:
   - POPULOUS (ARCHITECT) - LEVEL 01 RECEIVED ON THE 18.01.22
   - CCTV SURVEY FROM SURVEY OPERATIONS REFERENCE 19D065 A RECEIVED ON THE 12.09.2019
2. ALL INTERNAL MANHOLES TO HAVE DOUBLE SEALED COVERS
3. ALL PIPES TO BE Ø150mm UNLESS SHOWN OTHERWISE ON THE DRAWING.
4. FOR GROUND LEVEL SURFACE WATER DRAINAGE REFER TO DRAWING BRA-BHE-XX-XX-DR-C-0301
5. FOR HIGHWAY DRAINAGE REFER TO DRAWING BRA_BHE_XX_XX_DR_C_0310.
6. FOR ABOVE GROUND DRAINAGE REFER TO ME ENGINEERING DRAWINGS.
7. FOR MANHOLE & PIPE SCHEDULE REFER TO DRAWING: BRE_BHE_XX_XX_DR_C_0391.
8. CHANNEL DRAIN OUTLETS TO BE PERFORATED AT PODIUM BUILD-UP DRAINAGE MAT DEPTH TO PROVIDE DRAINAGE FOR MAT. PERFORATIONS TO BE WRAPPED IN GEOTEXTILE.

LEGEND

- LAND OWNERSHIP BOUNDARY
- PROPOSED SURFACE WATER CHANNEL DRAIN ACO MONODRAIN PD100 0.0 CHANNEL WITH OUTLETS
- PROPOSED SURFACE WATER CHANNEL DRAIN ACO MONODRAIN PD150 0.0 CHANNEL WITH OUTLETS
- PROPOSED SURFACE WATER CHANNEL DRAIN ACO MULTIDRAIN M100D 10.00 CHANNEL WITH OUTLETS
- PROPOSED SURFACE WATER PIPE
- G PROPOSED GULLY
- EXISTING SURFACE WATER DRAINAGE
- PERFORATED PIPE WRAPPED IN GEOTEXTILE

THRESHOLD CONNECTIONS FROM PODIUM LEVEL TO BE COORDINATED WITH THE MEP ENGINEER, CONTRACTOR TO MAKE ALLOWANCE FOR EXTRA PIPE LENGTHS

C02	FD	AJH	22.04.22	A4 AUTHORISED AND ACCEPTED
C01	FD	AJH	08.02.22	A4 AUTHORISED AND ACCEPTED
P02	TB	NJH	08.09.21	HIGHWAYS AIP
P01	AH	NJH	08.09.20	STAGE 4a DRAFT

Rev	Appr'Dm	Date	Description

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OVG Manchester

title: SURFACE WATER DRAINAGE
PODIUM LEVEL 01
FORGE LANE BRIDGE

purpose of issue: A4 AUTHORISED & ACCEPTED

scale	1:100	drawn	AH	Job no.	Suitability
date	Sep-20	checked	NJH	0042841	A4

reference: BRA-BHE-XX-01-DR-C-0340 — rev: C02

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HEALTH AND SAFETY INFORMATION

IN ADDITION TO THE HAZARDS RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING:

CONSTRUCTION:

EXCAVATIONS IN CONTAMINATED GROUND
FINAL CONNECTION TO LIVE SEWER IS Xm DEEP AND WILL REQUIRE AN EXTERNAL BACKDROP

MAINTENANCE/CLEANING/OPERATION:

HYDRO-BRAKE FLOW CONTROL DEVICE
ATTENUATION TANK

DECOMMISSIONING/DEMOLITION:

N/A

Notes

1. THIS DRAWING REFERENCES FOLLOWING INFORMATION:
   - POPULUS (ARCHITECT) - LEVEL 00 RECEIVED ON THE 30.10.19
   - CCTV SURVEY FROM SURVEY OPERATIONS REFERENCE 190065 A RECEIVED ON THE 12.09.2019
2. ALL INTERNAL MANHOLES TO HAVE DOUBLE SEALED COVERS
3. ALL PIPES TO BE Ø100mm UNLESS SHOWN OTHERWISE ON THE DRAWING.
4. FOR ABOVE GROUND DRAINAGE REFER TO ME ENGINEERING DRAWINGS.
5. FOR DRAINAGE IN THE BASEMENT REFER TO DRAWING BRA-BHE-XX-B1-DR-C-0401.
6. FOR LONG SECTIONS REFER TO DRAWING BRA-BHE-XX-XX-DR-C-0420.
7. FOR MANHOLE & PIPE SCHEDULE REFER TO DRAWING: BRE_BHE_XX_XX_DR_C_0491.
8. PIPE SIZES AND GRADIENTS MAY VARY FOLLOWING RECEIPT OF FINAL FLOW FIGURES FROM ME ENGINEERS.

LEGEND

- SITE BOUNDARY
- PROPOSED FOUL WATER DRAINAGE & MANHOLE
- PROPOSED FOUL WATER RISING MAIN
- EXISTING COMBINED SEWER

FOR GROUND FLOOR LEVEL DRAINAGE REFER TO DRAWING BRA-BHE-XX-XX-DR-C-0401

FWPUMP
CL= 51.000
IL= 50.250
IL= 49.250

FG04
CL= 50.506
IL= 50.394

FG03
CL= 50.506
IL= 50.394

FG02
CL= 50.506
IL= 50.394

FG01
CL= 50.712
IL= 50.600

Rev	Description	Date	Drn	Chkd
P01	STAGE 3 - DRAFT	29.11.2019	JZ	JB

DRAFT STAGE 3

Status of drawing

BUROHAPPOLD ENGINEERING

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Web: www.burohappold.com

Architect: POPULOUS

Project: **OVG MANCHESTER**

Drg Title: GENERAL ARRANGEMENT
BASEMENT LEVEL B1
FOUL WATER DRAINAGE

Scales@A1	1:250	Job No.	0042841
Drawn by	JZ	Date	NOV 2019
Checked by	NJH	Rev	P01
Drawing No.	BRA-BHE-XX-B1-DR-C-0401		

Autodesk Docs://Bra-Bhe/0042841_Bra-Bhe-Xx-Xx-Dr-C-0401.rvt

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S5 - Withdrawn
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CR - As constructed record document

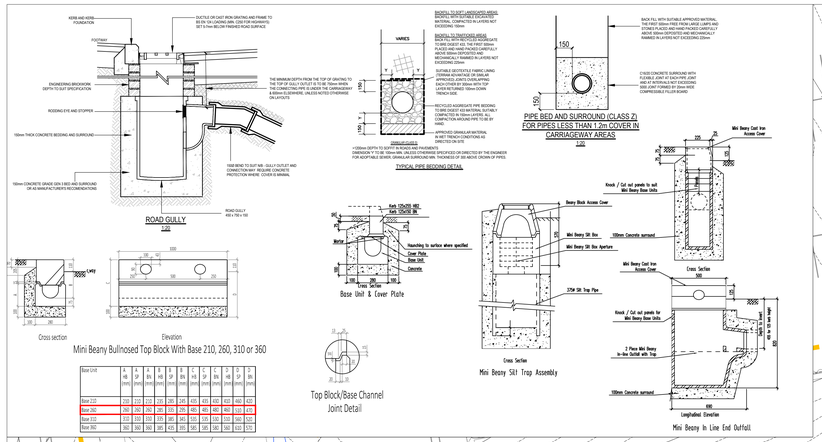
SAFETY HEALTH AND ENVIRONMENTAL INFORMATION

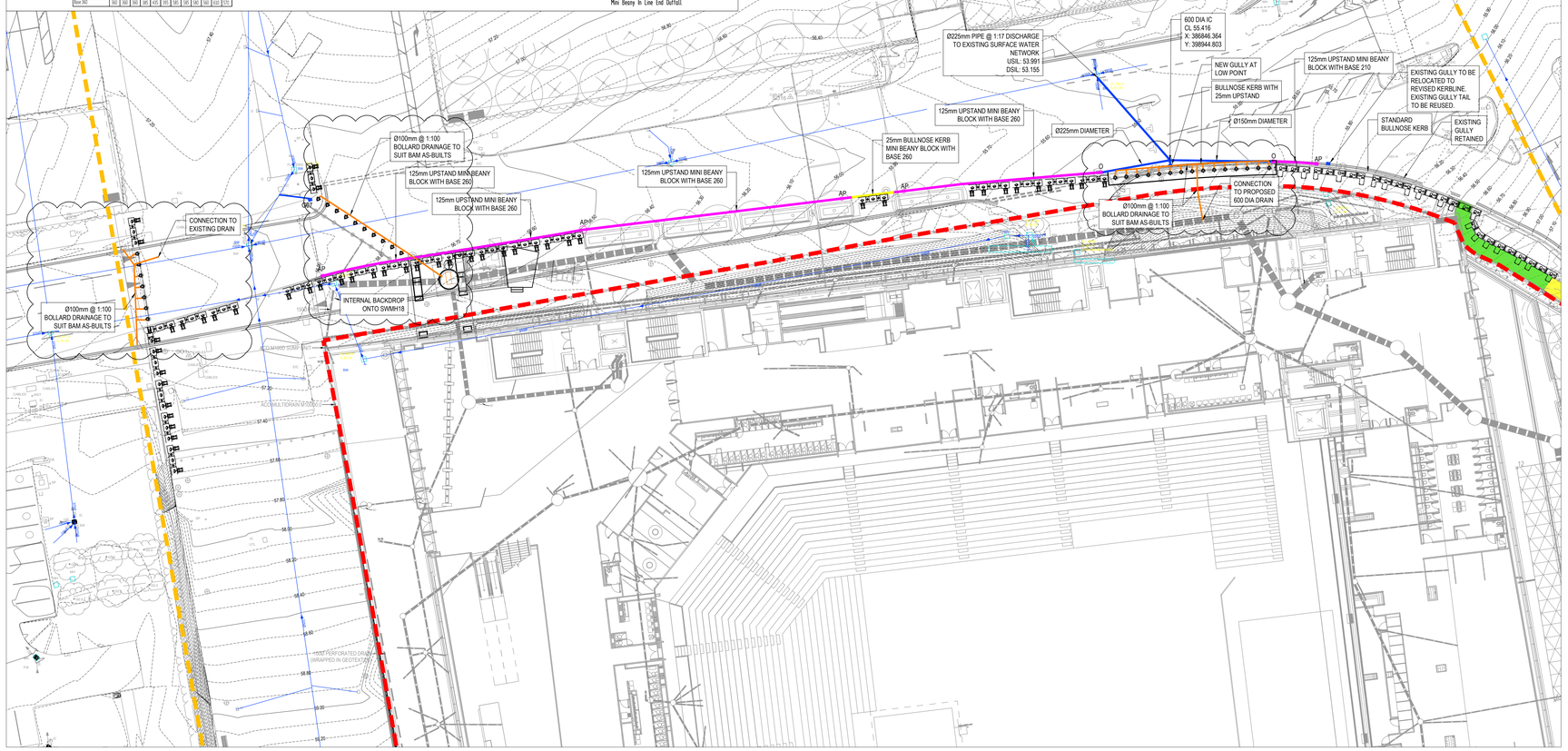
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CONSTRUCTION
- -
- EXISTING BURIED UTILITIES
- EXISTING LIVE HIGHWAY AND CAR PARK

MAINTENANCE/CLEANING/OPERATION
- NO UNUSUAL RISKS

DECOMMISSIONING/DEMOLITION
- NO UNUSUAL RISKS





Notes

1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE STATED
2. DO NOT SCALE FROM THIS DRAWING
3. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH OTHER DISCIPLINE'S DRAWINGS
4. THIS DRAWING REFERENCES THE FOLLOWING INFORMATION:
   - POPULOUS (ARCHITECT) - LEVEL 00 RECEIVED ON THE 02.11.21
   - TOPO SURVEY FROM SURVEY OPERATIONS REFERENCE 190065 A RECEIVED ON THE 12.09.2019
   - BAM AS-BUILT DRAWING "SCW KERB LINE REV8 - BOLLARD SET OUT" RECEIVED 24.11.2023.
5. REFER TO BRA-BHE-XX-XX-DR-C-0301 FOR BELOW GROUND STORM WATER DRAINAGE PROPOSALS
6. ALL GULLY CONNECTOR PIPES TO BE 150mm DIAMETER.
7. BOLLARD DRAINAGE TO BE Ø100mm PIPEWORK LAID TO 1:100 FALLS.

LEGEND

- EXISTING CONTOURS MAJOR (500mm)
- EXISTING CONTOURS MINOR (100mm)
- PLANNING BOUNDARY
- LAND OWNERSHIP BOUNDARY
- 125mm UPSTAND BEANY KERB WITH BASE 260
- 25mm UPSTAND BEANY KERB WITH BASE 260
- PROPOSED BUILDING DRAINAGE
- PROPOSED SPORTS CITY WAY PIPEWORK
- EXISTING STORM DRAINAGE
- GULLY
- OUTLET BOX
- ACCESS POINT (AP)
- 600Ø DRAINAGE INSPECTION CHAMBER
- BAM AS-BUILT PIPEWORK

Rev	Appr/Drn	Date	Description
C03	CR	AJH	30.11.23 A4 AUTHORISED AND ACCEPTED
C02	SG	AJH	13.07.23 A4 AUTHORISED AND ACCEPTED
C01	GM	AJH	22.12.21 A4 AUTHORISED AND ACCEPTED
P06	SBH	TH	03.07.20 STAGE 4a TENDER
P05	SBH	NJH	28.05.20 STAGE 4a DRAFT
P04	SBH	NJH	27.04.20 STAGE 4a DRAFT
P03	SBH	NJH	09.04.20 STAGE 4a DRAFT
P02	SBH	NJH	13.02.20 STAGE 3
P01	SBH	JB	29.11.19 DRAFT STAGE 3

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Co-op Live

title HIGHWAYS
SPORT CITY WAY PUBLIC REALM
PROPOSED LEVELS + DRAINAGE

purpose of issue
A4 AUTHORISED & ACCEPTED

scale	1:250	drawn	SBH	Job no.	Suitability
date	Apr-20	checked	NJH	0042841	A4

reference	project code	originator	volume	level	type	role	number	rev.
BRA-BHE-XX-XX-DR-C-0212								C03

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Published (AIM Acceptance)
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SAFETY HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING.

CONSTRUCTION:
- EXISTING BURIED UTILITIES
- EXISTING LIVE HIGHWAY AND CAR PARK

MAINTENANCE/CLEANING/OPERATION:
- NO UNUSUAL RISKS

DECOMMISSIONING/DEMOLITION:
- NO UNUSUAL RISKS

Notes

1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE STATED
2. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH OTHER RELEVANT ENGINEER AND ARCHITECTS DRAWINGS AND SPECIFICATIONS
3. THIS DRAWING REFERENCES THE FOLLOWING INFORMATION:
   - POPULOUS (ARCHITECT) - LEVEL 00 RECEIVED ON THE 11.03.2020
   - TOPO SURVEY FROM SURVEY OPERATIONS REFERENCE 19D065 A RECEIVED ON THE 12.09.2019

LEGEND

EXISTING CONTOURS
MAJOR (500mm)
MINOR (100mm)

PROPOSED CONTOURS
MAJOR (100mm)
MINOR (20mm)
PROPOSED KERB

MARSHALLS MAX-E CHANNEL DRAIN
PROPOSED DRAINAGE CONNECTION
GULLY
OUTLET BOX

Rev	Appr/Drn	Date	Description
C01	TB NJH	05.02.21	A4 AUTHORISED AND ACCEPTED
P05	SBH TH	03.07.20	STAGE 4a TENDER
P04	SBH NJH	27.04.20	STAGE 4a DRAFT
P03	SBH NJH	09.04.20	STAGE 4a DRAFT
P02	SBH NJH	13.02.20	STAGE 3
P01	SBH JB	29.11.19	DRAFT STAGE 3

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Co-op Live

title HIGHWAYS
NORTHERN CAR PARK ACCESS
PROPOSED LEVELS + DRAINAGE

purpose of issue
A4 AUTHORISED & ACCEPTED

scale	1:250	drawn	SBH	Job no.	Suitability
date	Apr-20	checked	NJH	0042841	A4

	project code	originator	volume	level	type	role	number	rev.
reference	BRA-	BHE-	XX-	XX-	DR-	C-	0232	C01



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CR - As constructed record document

SAFETY HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING

CONSTRUCTION.
N/A

MAINTENANCE/CLEANING/OPERATION.
N/A

DECOMMISSIONING/DEMOLITION
N/A

Notes

LEGEND

- EXISTING CONTOURS
- PROPOSED CONTOURS 100mm (MAJOR)
- PROPOSED CONTOURS 20mm (MINOR)
- ADOPTABLE HIGHWAY BOUNDARY

TO BE READ IN CONJUNCTION WITH CIVILS DRAWINGS:

BRA-BHE-XX-XX-DR-C-0263	GENERAL ARRANGEMENT
BRA-BHE-XX-XX-DR-C-0264	PROPOSED CONTOURS
BRA-BHE-XX-XX-DR-C-0266	CROSS SECTIONS
BRA-BHE-XX-XX-DR-C-0267	SURFACE FINISHES
BRA-BHE-XX-XX-DR-C-0268	TYPICAL CONSTRUCTION DETAILS
BRA-BHE-XX-XX-DR-C-0269	TACTILE PAVING LAYOUTS
BRA-BHE-XX-XX-DR-C-0270	ROAD MARKINGS AND SIGNAGE

Rev	Appr/Drn	Date	Description
C01	TB	NJH	05.02.21 A4 AUTHORISED AND ACCEPTED
P03	SBH	TH	03.07.20 STAGE 4a TENDER
P02	SBH	NJH	27.04.20 STAGE 4a DRAFT
P01	SBH	NJH	09.04.20 STAGE 4a DRAFT

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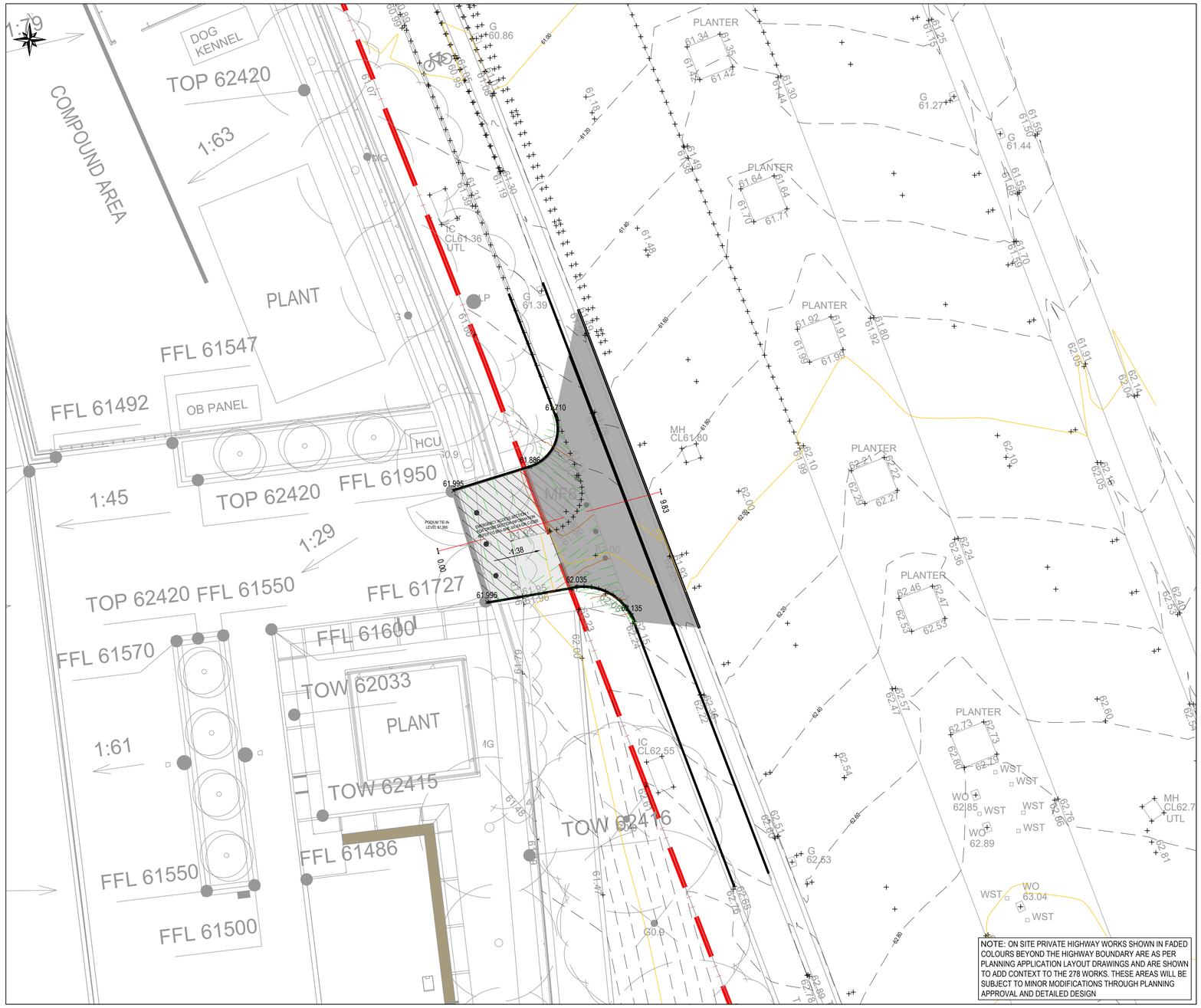
Co-op Live

title HIGHWAYS
EMERGENCY ACCESS
PROPOSED LEVELS + DRAINAGE

purpose of issue
A4 AUTHORISED & ACCEPTED

scale	1:100	drawn	SBH	Job no.	Suitability
date	Apr-20	checked	NJH	0042841	A4

	project code	originator	volume	level	type	role	number	rev.
reference	BRA-BHE-XX-XX-DR-C-0252							C01



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CR - As constructed record document

SAFETY HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING

CONSTRUCTION
N/A

MAINTENANCE/CLEANING/OPERATION
N/A

DECOMMISSIONING/DEMOLITION
N/A

Notes

LEGEND
- EXISTING CONTOURS
- PROPOSED CONTOURS (MAJOR)
- PROPOSED CONTOURS (MINOR)
- ADOPTABLE HIGHWAY BOUNDARY

TO BE READ IN CONJUNCTION WITH CIVILS DRAWINGS:

BRA-BHE-XX-XX-DR-C-0253 GENERAL ARRANGEMENT
BRA-BHE-XX-XX-DR-C-0254 PROPOSED CONTOURS
BRA-BHE-XX-XX-DR-C-0256 CROSS SECTIONS
BRA-BHE-XX-XX-DR-C-0267 SURFACE FINISHES
BRA-BHE-XX-XX-DR-C-0268 TYPICAL CONSTRUCTION DETAILS
BRA-BHE-XX-XX-DR-C-0269 TACTILE PAVING LAYOUTS
BRA-BHE-XX-XX-DR-C-0270 ROAD MARKINGS AND SIGNAGE

Rev	Appr/Drn	Date	Description
P04	RJL	NJH	11.12.20 SECTION 278
P03	SBH	NJH	14.05.20 SECTION 278
P02	SBH	NJH	27.04.20 SECTION 278
P01	SBH	NJH	09.04.20 SECTION 278

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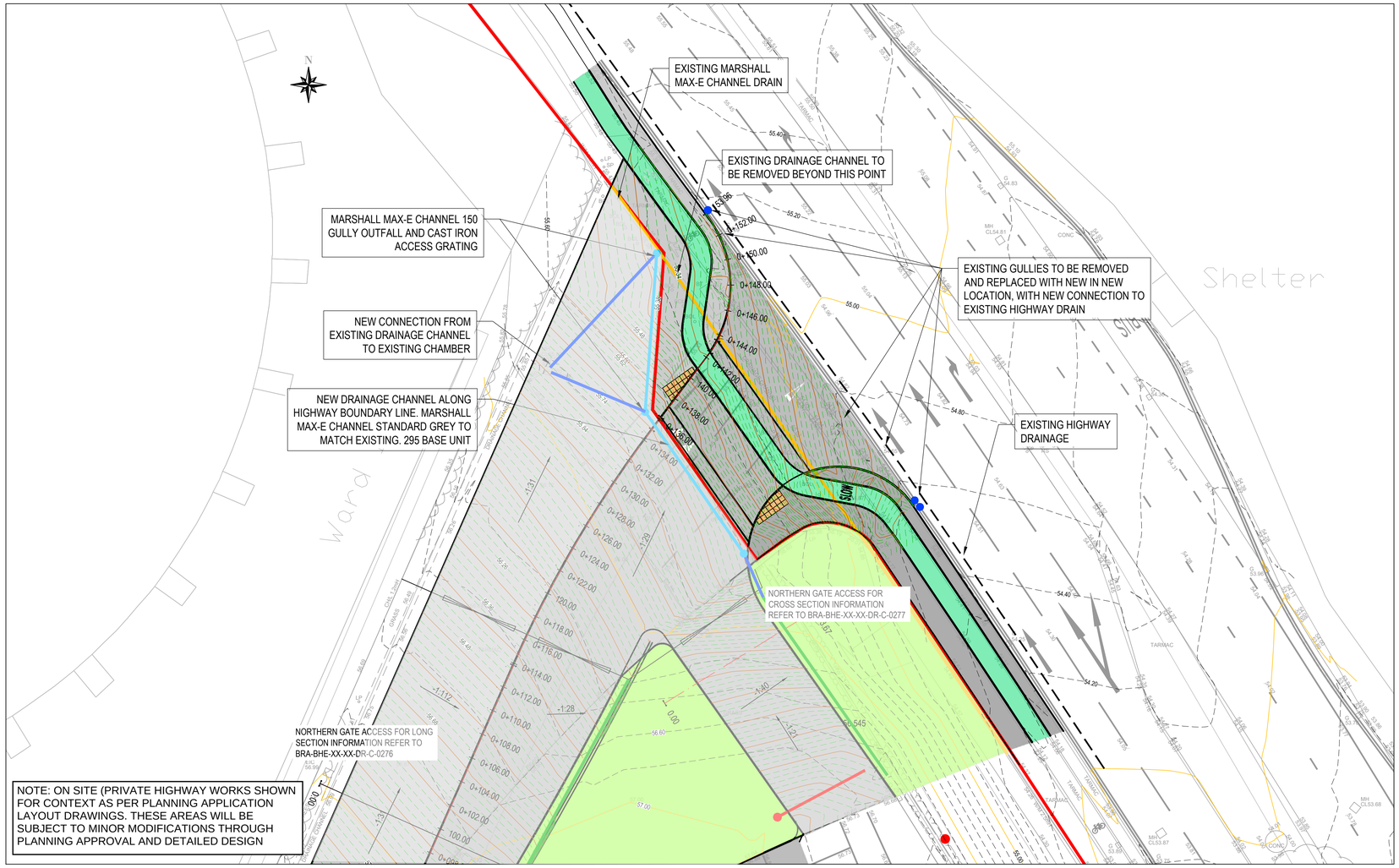
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OVG Manchester

title SECTION 278
EMERGENCY VEHICLE ACCESS
PROPOSED CONTOURS AND DRAINAGE
purpose of issue SECTION 278

scale	1:50	drawn	SBH	Job no.	Suitability
date	Apr-20	checked	NJH	0042841	S3

	project code	originator	volume	level	type	role	number	rev.
reference	BRA-BHE-XX-XX-DR-C-0264							P04



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SAFETY HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING

CONSTRUCTION.

MAINTENANCE/CLEANING/OPERATION.

DECOMMISSIONING/DEMOLITION

Notes

LEGEND

- EXISTING CONTOURS
- PROPOSED CONTOURS (MAJOR)
- PROPOSED CONTOURS (MINOR)
- ADOPTABLE HIGHWAY BOUNDARY

TO BE READ IN CONJUNCTION WITH CIVILS DRAWINGS

BRA-BHE-XX-XX-DR-C-0274 GENERAL ARRANGEMENT
BRA-BHE-XX-XX-DR-C-0275 PROPOSED CONTOURS
BRA-BHE-XX-XX-DR-C-0276 LONG SECTIONS
BRA-BHE-XX-XX-DR-C-0277 CROSS SECTIONS
BRA-BHE-XX-XX-DR-C-0278 SURFACE FINISHES
BRA-BHE-XX-XX-DR-C-0279 TYPICAL CONSTRUCTION DETAILS
BRA-BHE-XX-XX-DR-C-0280 TACTILE PAVING LAYOUTS
BRA-BHE-XX-XX-DR-C-0281 ROAD MARKINGS AND SIGNAGE
BRA-BHE-XX-XX-DR-C-0282 SURFACE WATER DRAINAGE

- DRAINAGE TRENCH
- MARSHALL MAX-E CHANNEL DRAIN
- PROPOSED DRAINAGE CONNECTION
- GULLY
- OUTLET BOX

Rev	Appr/Drn	Date	Description
P03	SBH NJH	14.05.20	SECTION 278
P02	SBH NJH	27.04.20	SECTION 278
P01	SBH NJH	09.04.20	SECTION 278

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OVG Manchester

title SECTION 278
NORTHERN CAR PARK ACCESS
PROPOSED CONTOURS AND DRAINAGE purpose of issue
SECTION 278

scale	1:250	drawn	SBH	Job no.	Suitability
date	Apr-20	checked	NJH	0042841	S3

	project code	originator	volume	level	type	role	number	rev.
reference	BRA-BHE-XX-XX-DR-C-0275							P03

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S4 - Suitable for stage approval
S5 - Withdrawn
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S7 - Suitable for AIM authorisation

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SAFETY HEALTH AND ENVIRONMENTAL INFORMATION
IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING.

CONSTRUCTION.
EXCAVATIONS IN CONTAMINATED GROUND
FINAL CONNECTION TO LIVE SEWER

MAINTENANCE/CLEANING/OPERATION.
HYDRO-BRAKE FLOW CONTROL DEVICE
ATTENUATION TANK
RAINWATER HARVESTING TANK EQUIPMENT

DECOMMISSIONING/DEMOLITION
NO UNUSUAL RISKS

Notes

1. THIS DRAWING REFERENCE FOLLOWING INFORMATION:
   - POPULUS (ARCHITECT) - LEVEL 00 RECEIVED ON THE 02.11.21
   - CCTV SURVEY FROM SURVEY OPERATIONS REFERENCE 190065 A RECEIVED ON THE 12.09.2019
2. ALL INTERNAL MANHOLES TO HAVE DOUBLE SEALED COVERS
3. FOR PODIUM LEVEL SURFACE WATER DRAINAGE REFER TO DRAWING BRA-BHE-XX-01-DR-C-0301
3. ALL PIPES TO BE Ø150mm UNLESS SHOWN OTHERWISE ON THE DRAWING.
4. ALL STACK CONNECTIONS START INVERT LEVELS TO BE SET AT 600 mm BELOW FFL UNLESS SHOWN OTHERWISE ON THE DRAWING.
5. FOR HIGHWAY DRAINAGE REFER TO DRAWING BRA-BHE-XX-XX-DR-C-0310.
6. FOR ABOVE GROUND DRAINAGE REFER TO SES ENGINEERING DRAWINGS.
7. FOR LONG SECTIONS REFER TO DRAWINGS BRA-BHE-XX-XX-DR-C-0320 SERIES.
8. FOR MANHOLE & PIPE SCHEDULE REFER TO DRAWING: BRE-BHE-XX-XX-DR-C-0391.
9. FOR CORES PIPE DIAMETERS AND LEVELS REFER TO BH CORE SKETCHES.

LEGEND
- LAND OWNERSHIP BOUNDARY
- PLANNING APPLICATION BOUNDARY
- PROPOSED SURFACE WATER DRAINAGE & MANHOLE
- PROPOSED SURFACE WATER CHANNEL DRAIN ACO MULTIDRAIN M150D 0.0 CHANNEL BRICKSLOT WITH OUTLETS
- PROPOSED SURFACE WATER ATTENUATION TANK
- EXISTING SURFACE WATER DRAINAGE
- EXISTING GAS MAIN
- INDICATIVE RISING MAIN
- HV AS BUILT

THRESHOLD CONNECTIONS FROM PODIUM LEVEL TO BE COORDINATED WITH THE MEP ENGINEER, CONTRACTOR TO MAKE ALLOWANCE FOR EXTRA PIPE LENGTHS

Rev	Appr/Drn	Date	Description
C18	CR	AJH	13.11.23 A4 AUTHORISED AND ACCEPTED
C17	SG	AJH	27.06.23 A4 AUTHORISED AND ACCEPTED
C16	SG	AJH	12.05.23 A4 AUTHORISED AND ACCEPTED
C15	FD	AJH	30.06.22 A4 AUTHORISED AND ACCEPTED
C14	FD	AJH	23.02.22 A4 AUTHORISED AND ACCEPTED
C13	FD	AJH	24.01.22 A4 AUTHORISED AND ACCEPTED
C12	FD	AJH	06.01.22 A4 AUTHORISED AND ACCEPTED
C11	FD	AJH	15.11.21 A4 AUTHORISED AND ACCEPTED
C10	FD	AJH	05.10.21 A4 AUTHORISED AND ACCEPTED
C09	FD	AJH	30.07.21 A4 AUTHORISED AND ACCEPTED
C08	FD	AJH	02.07.21 A4 AUTHORISED AND ACCEPTED

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Co-op Live

title SURFACE WATER DRAINAGE BELOW GROUND GENERAL ARRANGEMENT

purpose of issue: A4 AUTHORISED & ACCEPTED

scale 1:250	drawn JZ	Job no.	Suitability
date Nov-19	checked NJH	0042841	A4

reference project code originator volume level type role number: BRA-BHE-XX-XX-DR-C-0301 — rev. C18

EXISTING MANHOLE 8901

375mm SEWER TO BE ABANDONED

SPORTCITY WAY

EXISTING MANHOLE 8902
(NODE REF 8900 IN CCTV SURVEY)
CL 55.54
IL 47.37

375mm SEWER TO BE ABANDONED

ALAN TURING WAY

JOE MERCER WAY

EXISTING MANHOLE 8801 TO
BE ABANDONED
CL 59.98
IL 47.73
ALL INCOMING CONNECTIONS
CAPPED OFF.

NORTHERN CHAMBER IN ABEYANCE
DRAWING WILL BE UPDATED TO REFLECT THE AS BUILT
POSITION OF THE NORTHERN CHAMBER FOLLOWING
CONSTRUCTION. THE POSITION SHOWN IS AS DESIGNED

NORTHERN CHAMBER

CLAY SEWER

CAST IRON SEWER

EXISTING 375mm DIAMETER SEWER
TO BE RECLASSIFIED AS A STORM SEWER

SEWER EASEMENT
(8m WIDE)
HATCHED IN YELLOW

EXISTING MANHOLE 8703
RECLASSIFIED AS STORM MANHOLE
CL 60.86
IL 48.36
ALL INCOMING CONNECTIONS
CAPPED OFF.

SOUTHERN CHAMBER

375mm DIAMETER CONCRETE
SEWER
MINIMUM 1:40 GRADIENT

375mm DIAMETER CONCRETE
SEWER
MINIMUM 1:40 GRADIENT

N 398900

N 398800

E 386400

E 386600

E 386800

E 387000

LEGEND

- EXISTING SEWER TO BE ABANDONED (ALIGNMENT FROM CCTV SURVEY)
- EXISTING MANHOLE TO BE ABANDONED (ALIGNMENT FROM CCTV SURVEY)
- EXISTING SEWER (ALIGNMENT FROM CCTV SURVEY)
- EXISTING SEWER (ALIGNMENT FROM LASER SURVEY)
- SITE BOUNDARY
- PROPOSED BUILDING EXTENT
- EASEMENT

NOTES

1. THIS DRAWING IS BASED ON THE FOLLOWING INFORMATION:
   - BELOW GROUND DRAINAGE CCTV SURVEY FROM DRAIN ALERT, RECEIVED 02.04.2020 AND 04.08.2020.
   - EXTERNAL UTILITIES FROM RECORD DRAWINGS, CAD XREF: BRA_BHE_XX_XX_M2_C_0022_EXTERNAL UTILITIES FROM RECORDS.
   - BELOW GROUND UTILITIES SURVEY REF: 0819-SSL-12618FINAL.
   - UNITED UTILITIES ASSET RECORDS DATED 25.11.19
   - TOPOGRAPHICAL SURVEY FROM SURVEY OPERATIONS, REF: 19D065 DATED JUNE 2019.
   - BAM LASER SURVEY, REF: TfGM OUTFALL LAYOUT.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH:
   - BRA-BHE-XX-XX-DR-C-0361 - SEWER DIVERSION LONG SECTION.
   - BRA-BHE-XX-XX-DR-C-0362 - SEWER DIVERSION SOUTHERN CHAMBER PLAN.
   - BRA-BHE-XX-XX-DR-C-0363 - SEWER DIVERSION SOUTHERN CHAMBER DETAIL.
   - BRA-BHE-XX-XX-DR-C-0364 - SEWER DIVERSION NORTHERN CHAMBER PLAN.
   - BRA-BHE-XX-XX-DR-C-0365 - SEWER DIVERSION NORTHERN CHAMBER DETAIL.
   - BRA-BHE-XX-XX-DR-C-0366 - SEWER DIVERSION EXISITNG UTILITY PLAN.
3. PROPOSED DIVERSION DESIGN IS SUBJECT TO UNITED UTILITIES APPROVAL.
4. ALL LEVELS ARE IN METRES AND RELATE TO ORDNANCE DATUM UNLESS STATED OTHERWISE.
5. DO NOT SCALE FROM THIS DRAWING.
3. ALL PIPEWORK IDENTIFIED TO BE ABANDONED SHALL BE GROUTED UP.
4. ALL MANHOLES IDENTIFIED TO BE ABANDONED SHALL BE GROUTED UP TO 1000mm BELOW SITE FORMATION LEVEL. THE EXTENT OF THE MANHOLE STRUCTURE ABOVE GROUTING LEVEL SHALL BE DEMOLISHED AND REMOVED FROM SITE.
5. ALL WORKS ARE TO BE CARRIED OUT IN ACCORDANCE WITH THE FOLLOWING DOCUMENTS, UNLESS SPECIFIED OTHERWISE:
   - UNITED UTILITIES STANDARD DETAILS AND SPECIFICATIONS.
   - SEWERS FOR ADOPTION 7th EDITION.
   - CIVIL ENGINEERING SPECIFICATION FOR THE WATERINDUSTRY (CESWI), 7th EDITION.
8. THE CONTRACTOR IS TO CONFIRM ALL LEVELS AND SETTING OUT PRIOR TO THE COMMENCEMENT OF THE WORKS.
9. THE CONTRACTOR IS TO UNDERTAKE RISK ASSESSMENTS IN LINE WITH CURRENT HEALTH AND SAFTEY PROTOCOLS AND PROCEDURES.

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1) ALL SERVICES ARE INDICATIVE AND SHOULD BE VERIFIED PRIOR TO COMMENCEMENT OF ENABLING WORKS AND ASSUMED TO BE LIVE.
2) THE CONTRACTOR IS TO CONFIRM THE GROUND CONDITIONS.
3) ALLOWANCE FOR OVER PUMPING OF SEWAGE AND GROUNDWATER TO BE MADE
4) DEEP EXCAVATIONS
5) WORKING IN CONFINED SPACES
6) FALLS FROM HEIGHT
7) GROUND CONTAMINATION

MAINTENANCE/CLEANING/OPERATION

1) WORKING IN CONFINED SPACES
2) FALLS FROM HEIGHT

DECOMMISSIONING/DEMOLITION

1) WORKING IN CONFINED SPACES
2) FALLS FROM HEIGHT

Notes

Rev	Appr/Drn	Date	Description
C01	RJL TH	09.07.21	AS CONSTRUCTED RECORD
P06	TH NJH	03.03.21	SITE BOUNDARY UPDATED
P05	TH NJH	09.02.21	UPDATE IN RESPONSE TO UU ALM COMMENTS
P04	TH NJH	19.01.21	UPDATE IN RESPONSE TO SURVEY
P03	TH NJH	30.11.20	UPDATE IN RESPONSE TO UU ALM COMMENTS
P02	TH NJH	13.11.20	UPDATE IN RESPONSE TO UU ALM COMMENTS
P01	TH NJH	27.10.20	STAGE 4

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OVG Manchester

title SURFACE WATER DRAINAGE
SEWER DIVERSION
GENERAL ARRANGEMENT

purpose of issue
AS CONSTRUCTED RECORD

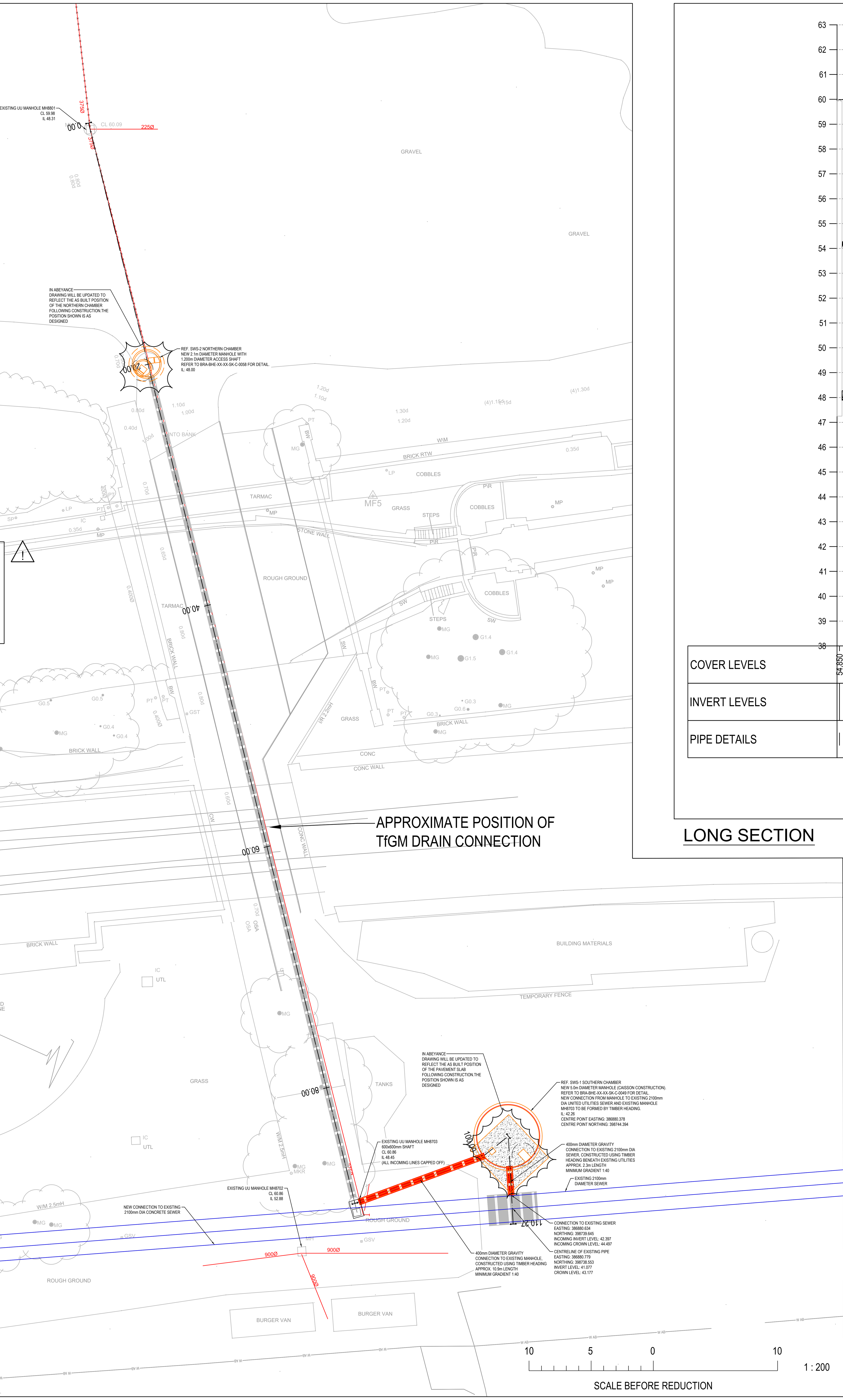
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date	Oct-20	checked	NJH	0042841	CR

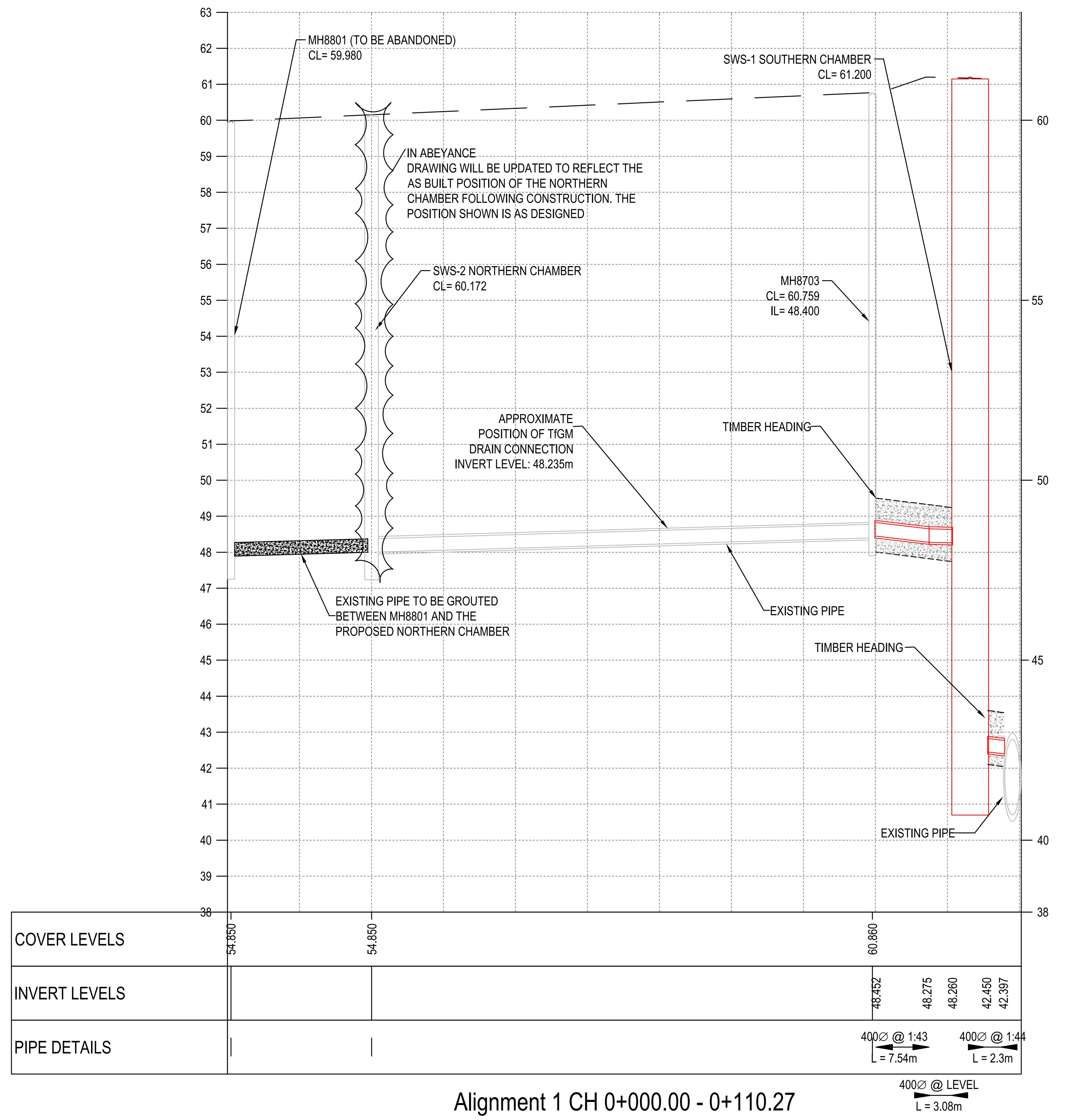
reference	project code	originator	volume	level	type	role	number	rev.
BRA-BHE-XX-XX-DR-C-0360								C01

1) THE CONTRACTOR IS TO SURVEY THE WORKS AREA TO CONFIRM THE LOCATION OF EXISTING BELOW GROUND UTILITIES. REFER TO DRAWING BRA-BHE-XX-XX-DR-C-0366 FOR THE POSITION OF KNOWN UTILITIES.
2) THE CONTRACTOR IS TO CONFIRM THE GROUND CONDITIONS PRIOR TO CONSTRUCTION.
3) THE CONTRACTOR IS TO MAKE AN ALLOWANCE FOR OVER PUMPING OF SEWAGE AND PUMPING OF GROUND WATER (WHERE NECESSARY).

NOTES

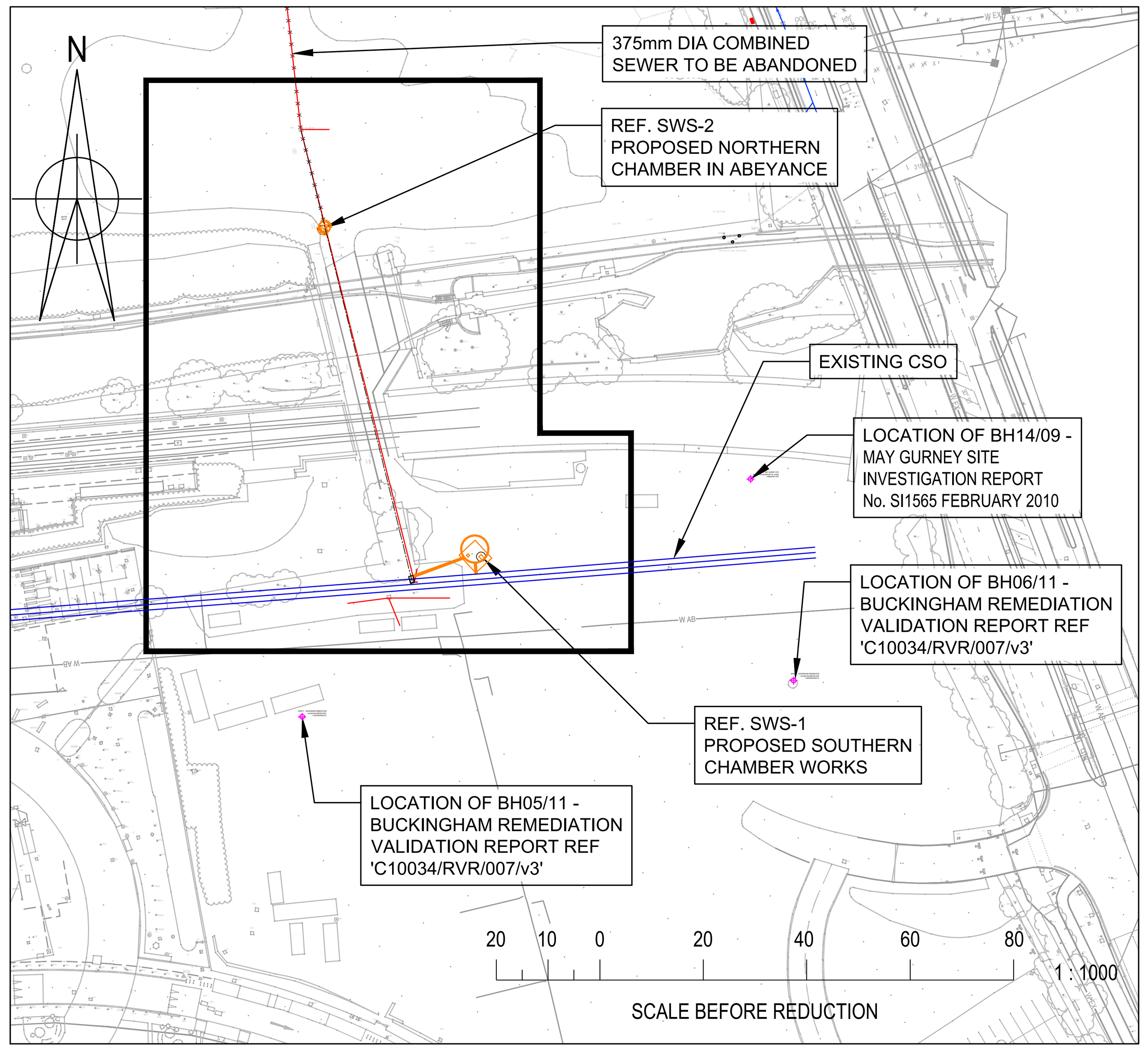
1. THIS DRAWING IS BASED ON THE FOLLOWING INFORMATION:
   - BELOW GROUND DRAINAGE CCTV SURVEY FROM DRAIN ALERT, RECEIVED 02.04.2020 AND 04.08.2020.
   - EXTERNAL UTILITIES FROM RECORD DRAWINGS, CAD XREF: BRA_BHE_XX_XX_M2_C_0022_EXTERNAL UTILITIES FROM RECORDS.
   - BELOW GROUND UTILITIES SURVEY REF: 0819-SSL-12618FINAL.
   - UNITED UTILITIES ASSET RECORDS DATED 25.11.19
   - TOPOGRAPHICAL SURVEY FROM SURVEY OPERATIONS, REF: 19D065 DATED JUNE 2019.
   - BAM LASER SURVEY, REF: TfGM OUTFALL LAYOUT.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH:
   - BRA-BHE-XX-XX-DR-C-0360 - SEWER DIVERSION GENERAL ARRANGEMENT.
   - BRA-BHE-XX-XX-DR-C-0362 - SEWER DIVERSION SOUTHERN CHAMBER PLAN.
   - BRA-BHE-XX-XX-DR-C-0363 - SEWER DIVERSION SOUTHERN CHAMBER DETAIL.
   - BRA-BHE-XX-XX-DR-C-0364 - SEWER DIVERSION NORTHERN CHAMBER PLAN.
   - BRA-BHE-XX-XX-DR-C-0365 - SEWER DIVERSION NORTHERN CHAMBER DETAIL.
   - BRA-BHE-XX-XX-DR-C-0366 - SEWER DIVERSION EXISITNG UTILITY PLAN.
3. PROPOSED DIVERSION DESIGN IS SUBJECT TO UNITED UTILITIES APPROVAL.
4. ALL LEVELS ARE IN METRES AND RELATE TO ORDNANCE DATUM UNLESS STATED OTHERWISE.
5. DO NOT SCALE FROM THIS DRAWING.
3. ALL PIPEWORK IDENTIFIED TO BE ABANDONED SHALL BE GROUTED UP.
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Alignment 1 CH 0+000.00 - 0+110.27
SCALES: H 1:500, V 1:100

LONG SECTION



LOCATION PLAN

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SAFETY HEALTH AND ENVIRONMENTAL INFORMATION

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5) WORKING IN CONFINED SPACES
6) FALLS FROM HEIGHT
7) GROUND CONTAMINATION

MAINTENANCE/CLEANING/OPERATION.
1) WORKING IN CONFINED SPACES
2) FALLS FROM HEIGHT

DECOMMISSIONING/DEMOLITION
1) WORKING IN CONFINED SPACES
2) FALLS FROM HEIGHT

Notes

Rev	Appr/Drn		Date	Description
C01	RJL	TH	09.07.21	AS CONSTRUCTED RECORD
P05	TH	NJH	09.02.21	UPDATE IN RESPONSE TO UU ALM COMMENTS
P04	TH	NJH	19.01.21	UPDATE IN RESPONSE TO SURVEY
P03	TH	NJH	30.11.20	UPDATE IN RESPONSE TO UU ALM COMMENTS
P02	TH	NJH	13.11.20	UPDATE IN RESPONSE TO UU ALM COMMENTS
P01	TH	NJH	27.10.20	STAGE 4

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OVG Manchester

title SURFACE WATER DRAINAGE
SEWER DIVERSION
LONG SECTION

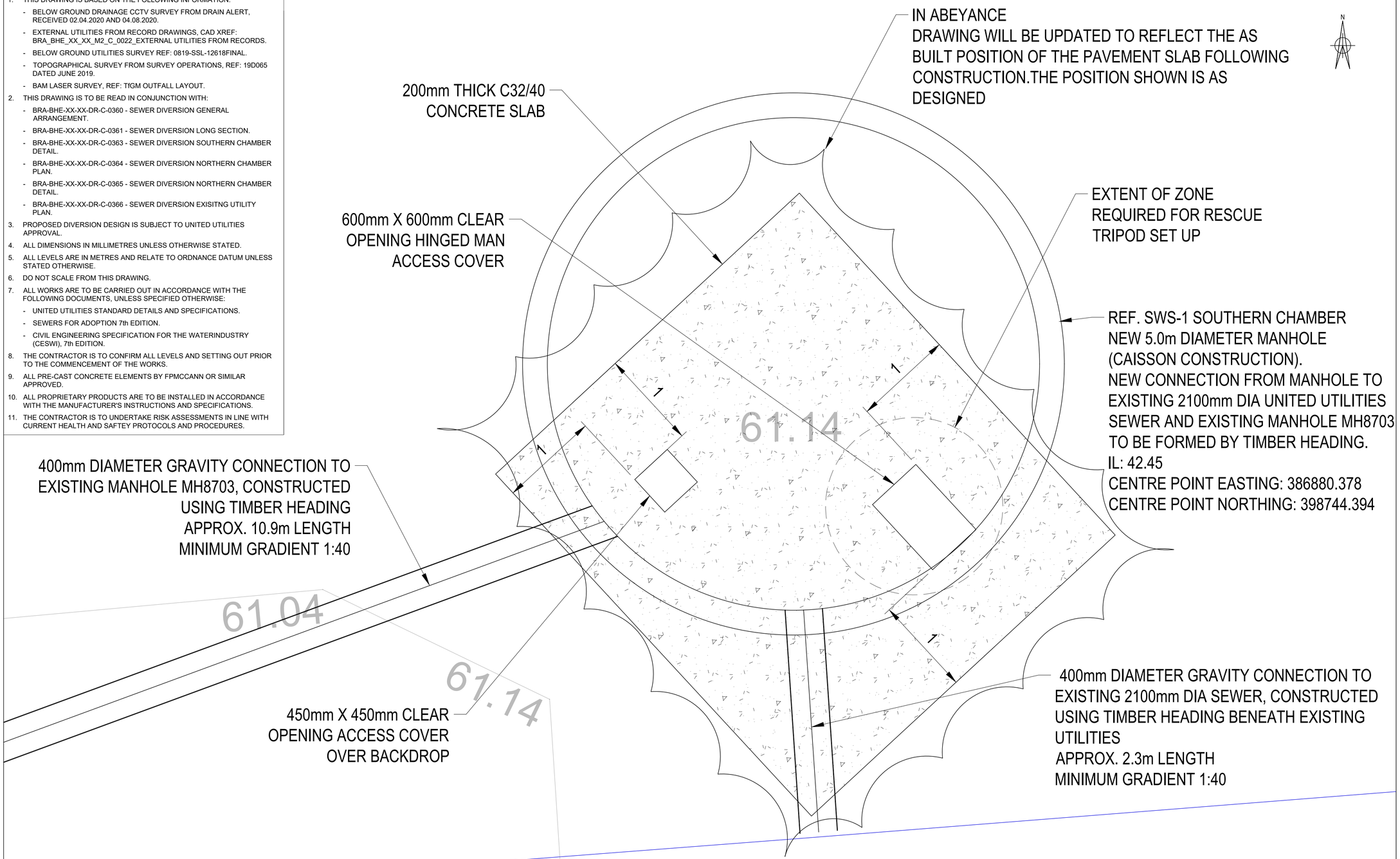
purpose of issue
AS CONSTRUCTED RECORD

scale	1:200	drawn	TH	Job no.		Suitability
date	Oct-20	checked	NJH	0042841		CR

reference project code originator volume level type role number — rev.
BRA-BHE-XX-XX-DR-C-0361 — C01

NOTES

1. THIS DRAWING IS BASED ON THE FOLLOWING INFORMATION:
   - BELOW GROUND DRAINAGE CCTV SURVEY FROM DRAIN ALERT, RECEIVED 02.04.2020 AND 04.08.2020.
   - EXTERNAL UTILITIES FROM RECORD DRAWINGS, CAD XREF: BRA_BHE_XX_XX_M2_C_0022_EXTERNAL UTILITIES FROM RECORDS.
   - BELOW GROUND UTILITIES SURVEY REF: 0819-SSL-12618FINAL.
   - TOPOGRAPHICAL SURVEY FROM SURVEY OPERATIONS, REF: 19D065 DATED JUNE 2019.
   - BAM LASER SURVEY, REF: TfGM OUTFALL LAYOUT.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH:
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   - BRA-BHE-XX-XX-DR-C-0361 - SEWER DIVERSION LONG SECTION.
   - BRA-BHE-XX-XX-DR-C-0363 - SEWER DIVERSION SOUTHERN CHAMBER DETAIL.
   - BRA-BHE-XX-XX-DR-C-0364 - SEWER DIVERSION NORTHERN CHAMBER PLAN.
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3. PROPOSED DIVERSION DESIGN IS SUBJECT TO UNITED UTILITIES APPROVAL.
4. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE STATED.
5. ALL LEVELS ARE IN METRES AND RELATE TO ORDNANCE DATUM UNLESS STATED OTHERWISE.
6. DO NOT SCALE FROM THIS DRAWING.
7. ALL WORKS ARE TO BE CARRIED OUT IN ACCORDANCE WITH THE FOLLOWING DOCUMENTS, UNLESS SPECIFIED OTHERWISE:
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8. THE CONTRACTOR IS TO CONFIRM ALL LEVELS AND SETTING OUT PRIOR TO THE COMMENCEMENT OF THE WORKS.
9. ALL PRE-CAST CONCRETE ELEMENTS BY FPMCCANN OR SIMILAR APPROVED.
10. ALL PROPRIETARY PRODUCTS ARE TO BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS AND SPECIFICATIONS.
11. THE CONTRACTOR IS TO UNDERTAKE RISK ASSESSMENTS IN LINE WITH CURRENT HEALTH AND SAFTEY PROTOCOLS AND PROCEDURES.



1) THE CONTRACTOR IS TO SURVEY THE WORKS AREA TO CONFIRM THE LOCATION OF EXISTING BELOW GROUND UTILITIES. REFER TO DRAWING BRA-BHE-XX-XX-DR-C-0366 FOR THE POSITION OF KNOWN UTILITIES.
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1 0.5 0 1 2 3 4 1 : 50

SCALE BEFORE REDUCTION

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Notes

C01 RJL TH 09.07.21 AS CONSTRUCTED RECORD
P06 TH NJH 06.05.21 UPDATE IN RESPONSE TO COVER SLAB DESIGN
P05 TH NJH 09.02.21 UPDATE IN RESPONSE TO UU ALM COMMENTS
P04 TH NJH 19.01.21 UPDATE IN RESPONSE TO SURVEY
P03 TH NJH 30.11.20 UPDATE IN RESPONSE TO UU ALM COMMENTS
P02 TH NJH 13.11.20 UPDATE IN RESPONSE TO UU ALM COMMENTS
P01 TH NJH 27.10.20 STAGE 4

Rev	Appr/Drn	Date	Description

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OVG Manchester

title SURFACE WATER DRAINAGE
SEWER DIVERSION
SOUTHERN CHAMBER PLAN

purpose of issue: AS CONSTRUCTED RECORD

scale	1:20	drawn	TH	Job no.	Suitability
date	Oct-20	checked	NJH	0042841	CR

reference	project code	originator	volume	level	type	role	number	rev.
	BRA-BHE-XX-XX-DR-C-0362							C01

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Notes

C01 RJL TH 09.07.21 AS CONSTRUCTED RECORD
P07 TH NJH 06.05.21 UPDATE IN RESPONSE TO COVER SLAB DESIGN
P06 TH NJH 12.02.21 CHANNEL ACCESS REVISED
P05 TH NJH 09.02.21 UPDATE IN RESPONSE TO UU ALM COMMENTS
P04 TH NJH 19.01.21 UPDATE IN RESPONSE TO SURVEY
P03 TH NJH 30.11.20 UPDATE IN RESPONSE TO UU ALM COMMENTS
P02 TH NJH 13.11.20 UPDATE IN RESPONSE TO UU ALM COMMENTS
P01 TH NJH 27.10.20 STAGE 4

Rev	Appr/Drn	Date	Description

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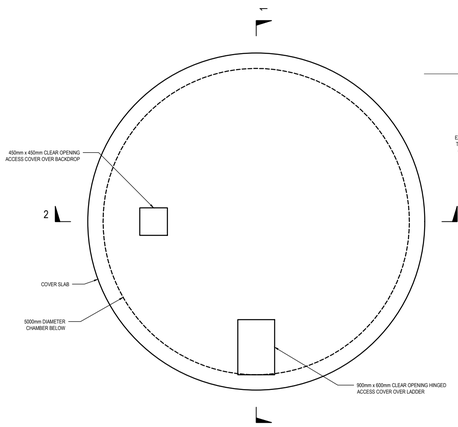
OVG Manchester

title SURFACE WATER DRAINAGE
SEWER DIVERSION
SOUTHERN CHAMBER DETAIL

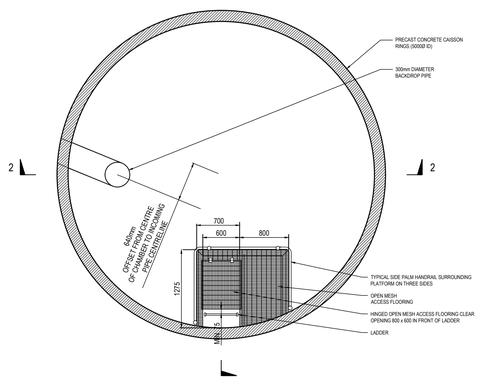
purpose of issue: AS CONSTRUCTED RECORD

scale	1:50	drawn	TH	Job no.	Suitability
date	Oct-20	checked	NJH	0042841	CR

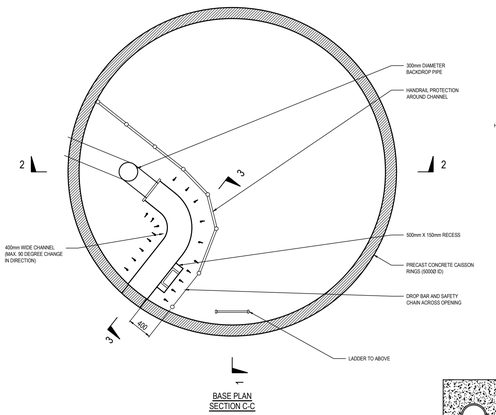
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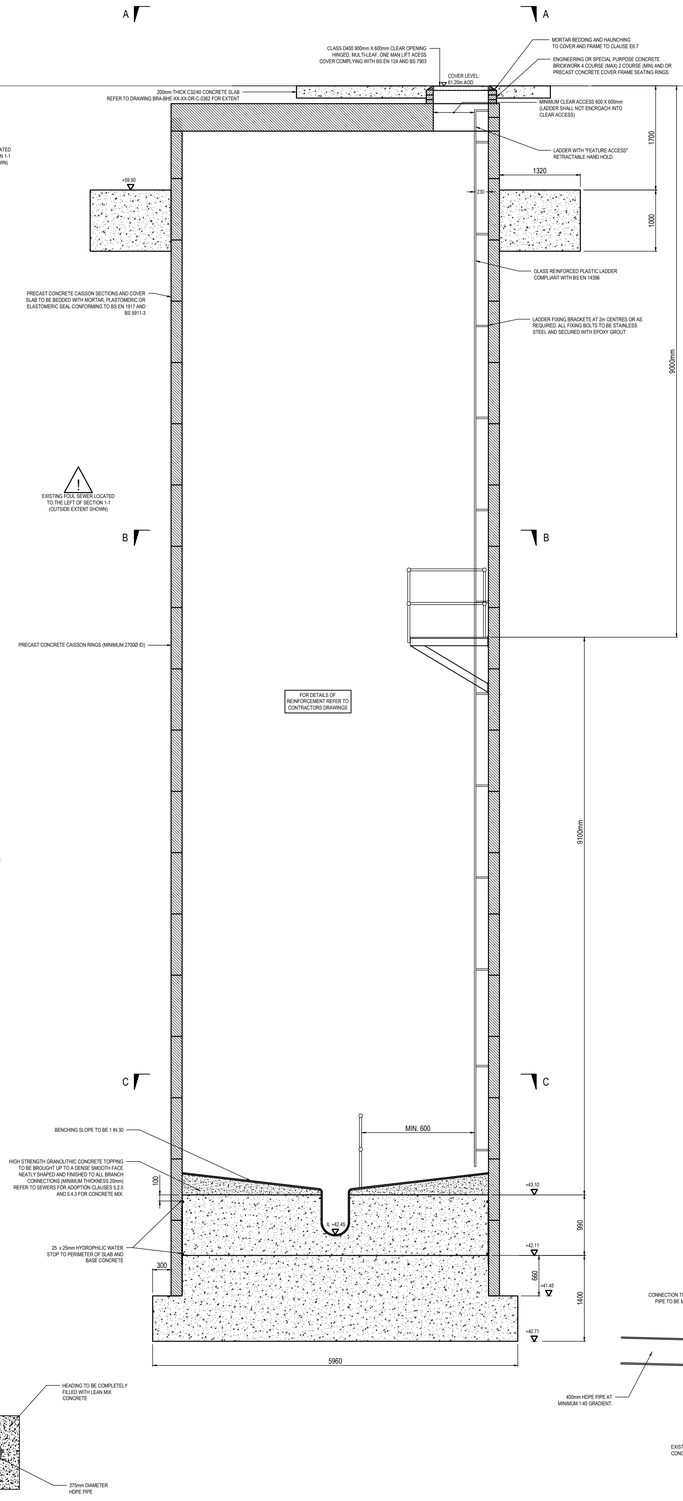
COVER PLAN
SECTION A-A



PLATFORM PLAN
SECTION B-B

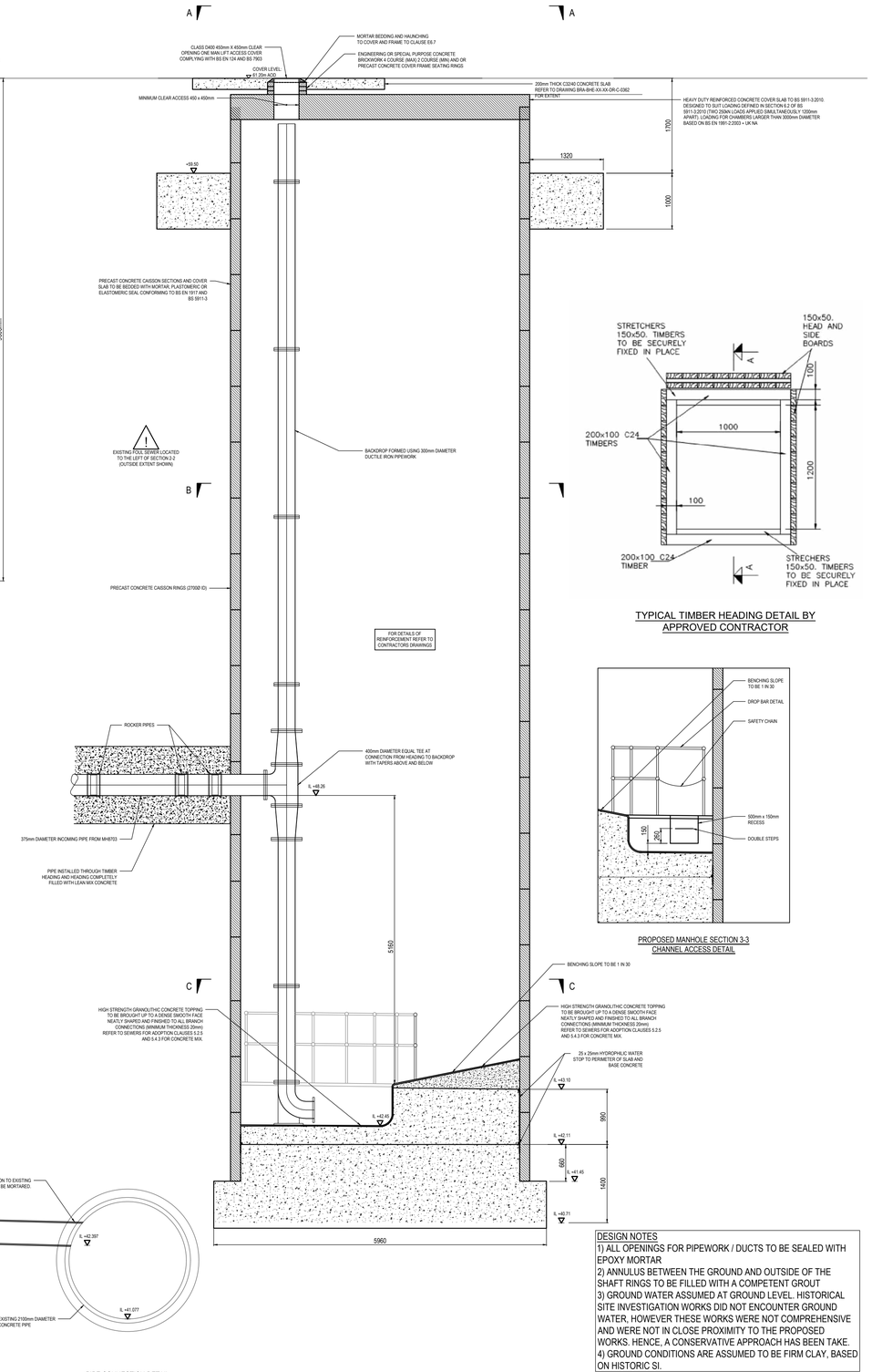


BASE PLAN
SECTION C-C



PIPE SURROUND DETAIL THROUGH
TIMBER HEADING CONSTRUCTION

PROPOSED MANHOLE SECTION 1-1



PROPOSED MANHOLE SECTION 2-2

TYPICAL TIMBER HEADING DETAIL BY
APPROVED CONTRACTOR

PROPOSED MANHOLE SECTION 3-3
CHANNEL ACCESS DETAIL

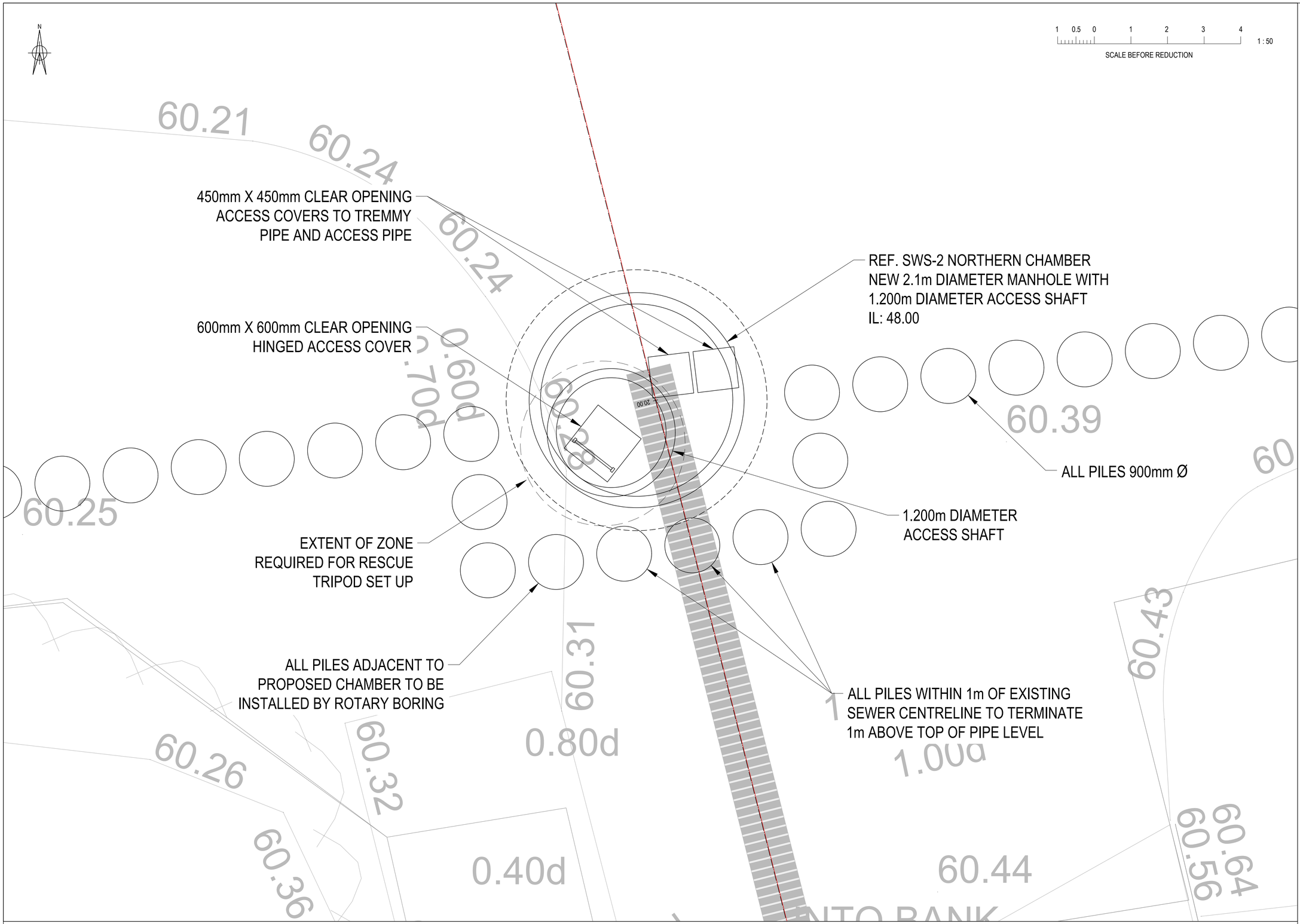
PIPE CONNECTION DETAIL
TO EXISTING SEWER

DESIGN NOTES
1) ALL OPENINGS FOR PIPEWORK / DUCTS TO BE SEALED WITH EPOXY MORTAR
2) ANNULUS BETWEEN THE GROUND AND OUTSIDE OF THE SHAFT RINGS TO BE FILLED WITH A COMPETENT GROUT
3) GROUND WATER ASSUMED AT GROUND LEVEL. HISTORICAL SITE INVESTIGATION WORKS DID NOT ENCOUNTER GROUND WATER, HOWEVER THESE WORKS WERE NOT COMPREHENSIVE AND WERE NOT IN CLOSE PROXIMITY TO THE PROPOSED WORKS. HENCE, A CONSERVATIVE APPROACH HAS BEEN TAKE.
4) GROUND CONDITIONS ARE ASSUMED TO BE FIRM CLAY, BASED ON HISTORIC SI.

1) THE CONTRACTOR IS TO SURVEY THE WORKS AREA TO CONFIRM THE LOCATION OF EXISTING BELOW GROUND UTILITIES. REFER TO DRAWING BRA-BHE-XX-XX-DR-C-0366 FOR THE POSITION OF KNOWN UTILITIES.
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   - BRA-BHE-XX-XX-DR-C-0365 - SEWER DIVERSION NORTHERN CHAMBER DETAIL.
   - BRA-BHE-XX-XX-DR-C-0366 - SEWER DIVERSION EXISITNG UTILITY PLAN.
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6) FALLS FROM HEIGHT
7) GROUND CONTAMINATION

MAINTENANCE/CLEANING/OPERATION.
1) WORKING IN CONFINED SPACES
2) FALLS FROM HEIGHT

DECOMMISSIONING/DEMOLITION
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Notes

P03 TH NJH 30.11.20 UPDATE IN RESPONSE TO UU ALM COMMENTS
P02 TH NJH 13.11.20 UPDATE IN RESPONSE TO UU ALM COMMENTS
P01 TH NJH 27.10.20 STAGE 4

Rev	Appr/Drn	Date	Description

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OVG Manchester

title SURFACE WATER DRAINAGE
SEWER DIVERSION
NORTHERN CHAMBER PLAN

purpose of issue: STAGE 4a

scale	1:20	drawn	TH	Job no.	Suitability
date	Oct-20	checked	NJH	0042841	S4

reference: project code originator volume level type role number — BRA-BHE-XX-XX-DR-C-0364 — rev. P03

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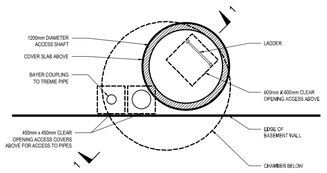
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NOTES

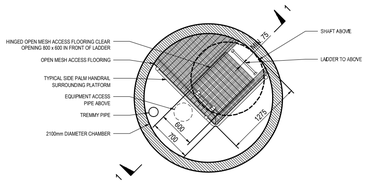
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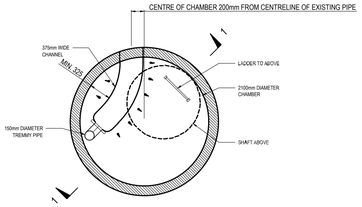
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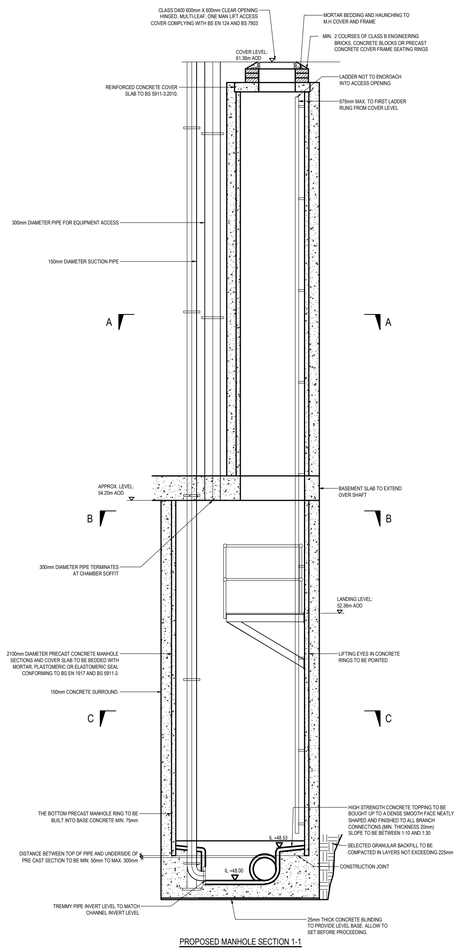
SHAFT PLAN
SECTION A-A



LANDING PLAN
SECTION B-B

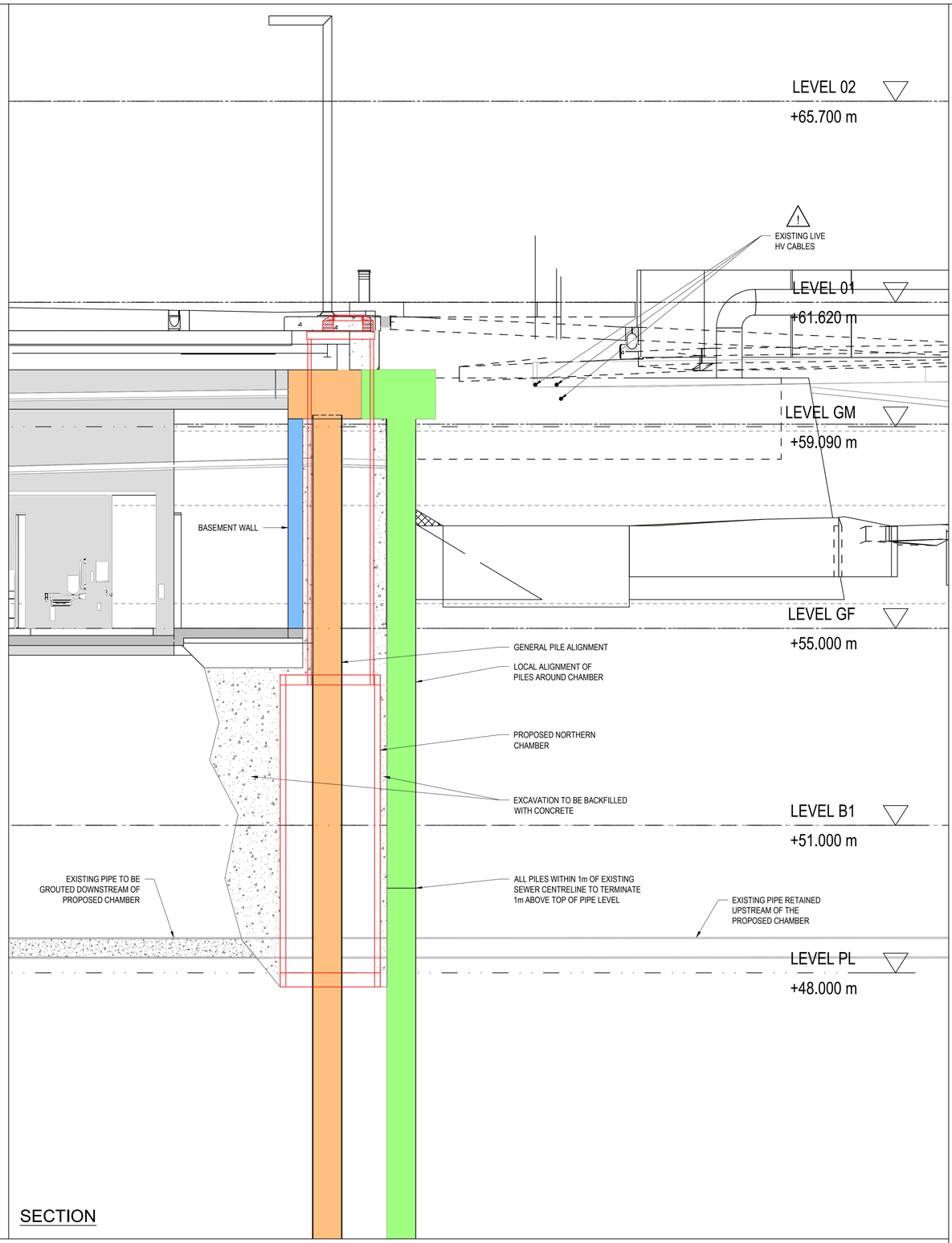


BASE PLAN
SECTION C-C



PROPOSED MANHOLE SECTION 1-1

DETAIL



SECTION

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Notes

P04 TH NJH 12.04.21 MINOR AMENDMENT
P03 TH NJH 30.11.20 UPDATE IN RESPONSE TO UU ALM COMMENTS
P02 TH NJH 13.11.20 UPDATE IN RESPONSE TO UU ALM COMMENTS
P01 TH NJH 27.10.20 STAGE 4

Rev	Appr/Drn	Date	Description

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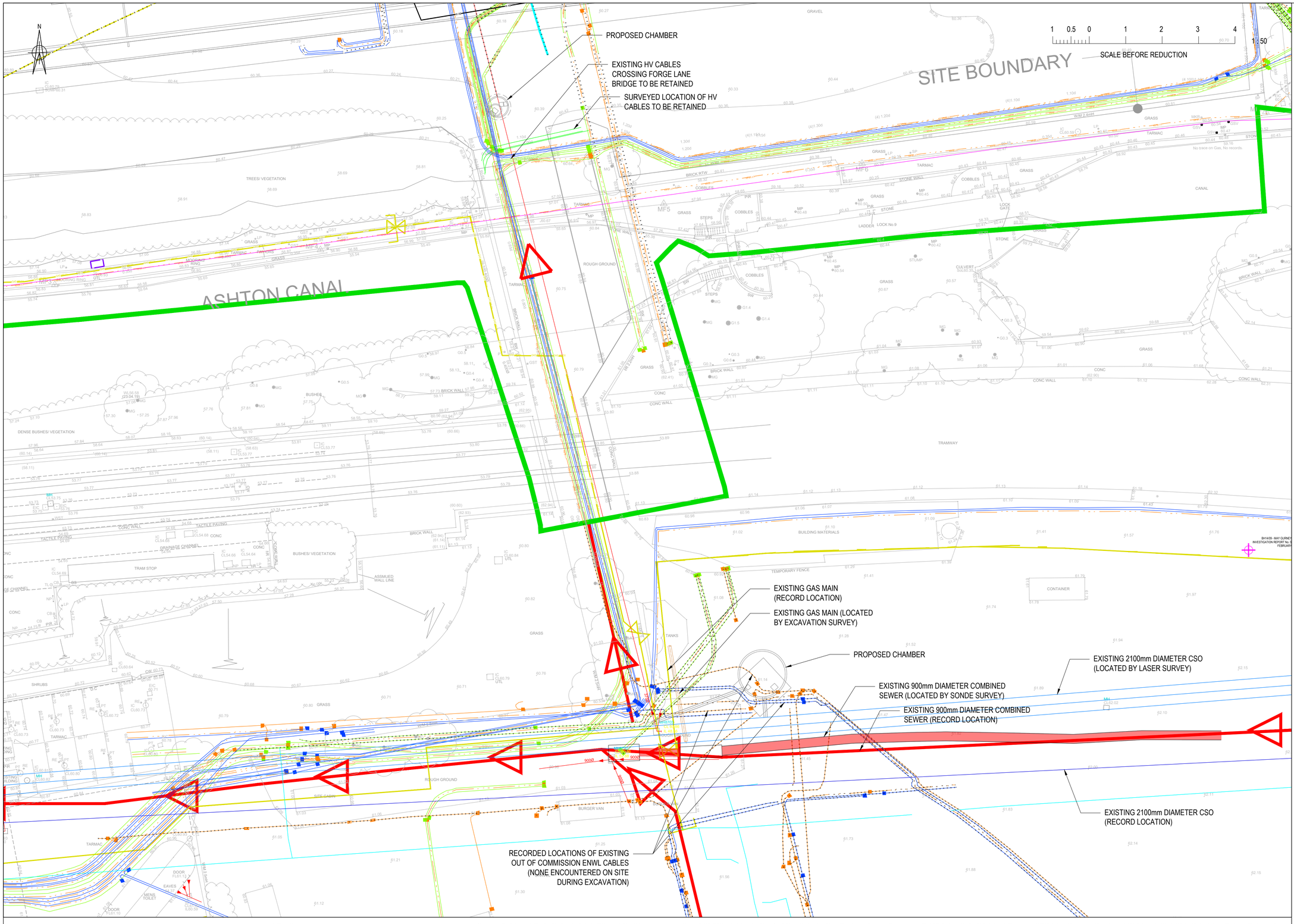
OVG Manchester

title SURFACE WATER DRAINAGE
SEWER DIVERSION
NORTHERN CHAMBER DETAIL

purpose of issue
STAGE 4a

scale	1:50	drawn	TH	Job no.	Suitability
date	Oct-20	checked	NJH	0042841	S4

reference: BRA-BHE-XX-XX-DR-C-0365 — rev. P04



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Notes

P02 TH NJH 09.02.21 UPDATE IN RESPONSE TO UU ALM COMMENTS
P01 TH NJH 22.01.21 STAGE 4

Rev	Appr/Drn	Date	Description

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OVG Manchester

title: SURFACE WATER DRAINAGE SEWER DIVERSION EXISTING UTILITIES

purpose of issue: STAGE 4a

scale	1:200	drawn	TH	Job no.	Suitability
date	Jan-21	checked	NJH	0042841	S4

	project code	originator	volume	level	type	role	number	rev.
reference	BRA-BHE-XX-XX-DR-C-0366							P02

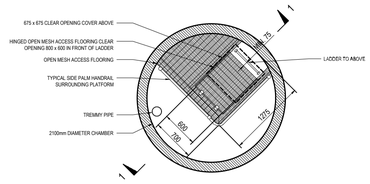
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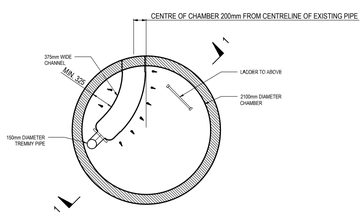
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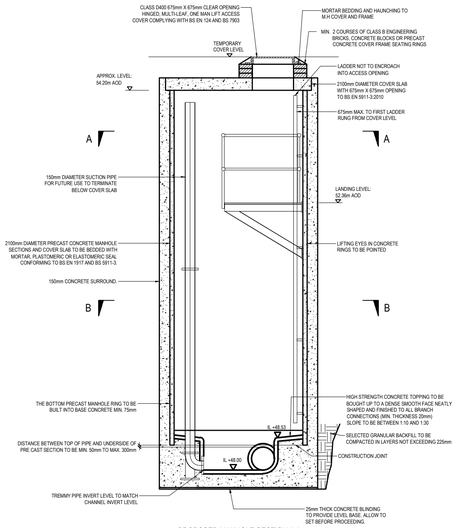
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LANDING PLAN
SECTION A-A



BASE PLAN
SECTION B-B



PROPOSED MANHOLE SECTION 1-1

DETAIL

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SAFETY HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING

CONSTRUCTION
1) ALL SERVICES ARE INDICATIVE AND SHOULD BE VERIFIED PRIOR TO COMMENCEMENT OF ENABLING WORKS AND ASSUMED TO BE LIVE.
2) THE CONTRACTOR IS TO CONFIRM THE GROUND CONDITIONS.
3) ALLOWANCE FOR OVER PUMPING OF SEWAGE AND GROUNDWATER TO BE MADE
4) DEEP EXCAVATIONS
5) WORKING IN CONFINED SPACES
6) FALLS FROM HEIGHT
7) GROUND CONTAMINATION

MAINTENANCE/CLEANING/OPERATION
1) WORKING IN CONFINED SPACES
2) FALLS FROM HEIGHT

DECOMMISSIONING/DEMOLITION
1) WORKING IN CONFINED SPACES
2) FALLS FROM HEIGHT

Notes

P01 TH NJH 12.04.21 STAGE 4

Rev	Appr/Drn	Date	Description

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OVG Manchester

title SURFACE WATER DRAINAGE
SEWER DIVERSION
TEMPORARY NORTH CHAMBER DETAIL

purpose of issue: STAGE 4a

scale	1:50	drawn	TH	Job no.	Suitability
date	Apr-21	checked	NJH	0042841	S4

reference	project code	originator	volume	level	type	role	number	rev.
BRA-BHE-XX-XX-DR-C-0367								P01

MANHOLE SCHEDULE - PROPOSED SW

NAME	EASTING [m]	NORTHING [m]	TYPE	COVER LEVEL [m]	COVER LOADING	COVER TYPE	DEPTH [m]	INCOMING PIPE DIAMETER [mm]	INCOMING PIPE IL [m]	OUTGOPING PIPE NAME	OUTGOING PIPE DIAMETER [mm]	OUTGOING PIPE IL [m]	OUTGOING PIPE LENGTH [m]	OUTGOING PIPE SLOPE	COMMENTS
SWM RW PUMP	386906.904	398872.208	Generic Circular Manhole (1,200 Dia)	55.000	D400	ST	3.500								REFER TO RW HARVESTING TANK DETAILS DRAWINGS 0558 & 0559
SWMH FILTER	386906.049	398855.472	Generic Circular Manhole (600 Dia)	55.000	D400	ST	2.380	300 375	52.660 53.225						REFER TO RW HARVESTING TANK DETAILS DRAWINGS 0558 & 0559
SWMH01	386776.147	398916.181	SfA Manhole Type 2 (1,500 Dia)	56.520	A15	RE	2.610	300 250 250 150	55.170 54.910 54.910 54.910	3.000	375	53.910	19.02	1:42	SIPHONIC MANHOLE. PIPES DIAMETERS AS PER SES AND FULLFLOW DRAWINGS
SWMH02	386757.244	398914.049	SfA Manhole Type 1A (1,500 Dia)	56.800	A15	RE	4.095	375 150	53.455 BD 52.930	3.001	375	52.705	15.54	1:311	
SWMH02B	386750.098	398895.693	SfA Manhole Type 3 Circular (450 Dia)	55.500	A15	RE	2.400	150 150	53.100 53.100	4.001	150	53.100	6.50	1:130	
SWMH02C	386744.615	398900.997	SfA Manhole Type 3 Circular (450 Dia)	57.490	A15	RE	2.290	100	56.700 BD	46	100	55.200	7.41	1:11	
SWMH02D	386751.972	398901.920	SfA Manhole Type 1A (1,200 Dia)	57.490	A15	RE	4.440	150 100	53.050 54.550 BD	4.001B	150	53.050	13.23	1:110	
SWMH03	386755.097	398868.087	SfA Manhole Type 3 Circular (450 Dia)	55.500	A15	RE	1.700	150	53.800	4.000	150	53.800	28.05	1:40	
SWMH04	386760.741	398832.583	SfA Manhole Type 3 Circular (450 Dia)	55.500	A15	RE	1.250	150	54.250	2.001	150	54.250	10.55	1:61	
SWMH05	386763.168	398822.321	SfA Manhole Type 3 Circular (450 Dia)	55.500	A15	RE	1.423	150 150	54.077 54.077	2.002	150	54.077	11.45	1:149	
SWMH06	386773.599	398817.609	SfA Manhole Type 3 Circular (450 Dia)	55.500	A15	RE	1.500	150	54.000	2.003	150	54.000	11.12	1:148	
SWMH07	386774.979	398806.575	SfA Manhole Type 2 (1,200 Dia)	55.500	A15	RE	1.650	150 150 150 150	53.925 53.925 54.460 BD 53.925	2.004	225	53.850	55.44	1:173	
SWMH08	386830.007	398813.305	SfA Manhole Type 2 (1,200 Dia)	55.000	A15	RE	1.470	225 150	53.530 54.105 BD	2.005	225	53.530	76.67	1:150	
SWMH09	386905.965	398823.756	SfA Manhole Type 2 (1,500 Dia)	55.000	A15	RE	2.130	225 100	53.020 53.145	2.006	375	52.870	11.34	1:378	
SWMH10	386917.114	398825.823	SfA Manhole Type 2 (1,500 Dia)	55.000	A15	RE	2.160	375	52.840	2.007	375	52.840	51.10	1:393	
SWMH11	386909.545	398876.357	SfA Manhole Type 2 (1,500 Dia)	55.000	D400	ST	2.290	375 150	52.710 52.935	2.008	375	52.710	5.96	1:400	
SWMH12	386903.668	398875.376	SfA Manhole Type 2 (1,800 Dia)	55.000	D400	ST	2.880	225 375	52.620 52.695	1.005	600	52.470	2.08	1:408	CATCHPIT. 350mm SUMP
SWMH13	386895.465	398909.038	SfA Manhole Type 2 (1,500 Dia)	55.000	D400	ST	2.940	600 150	52.410 53.655 BD	1.006	600	52.410	10.78	1:490	CATCHPIT. 350mm SUMP
SWMH14	386885.106	398912.023	SfA Manhole Type 2 (1,500 Dia)	55.000	D400	ST	2.612	600	52.388	1.007	600	52.388	13.34	1:477	
SWMH15	386875.224	398920.988	SfA Manhole Type 2 (1,500 Dia)	55.000	D400	ST	2.640	600	52.360	1.008	600	52.360	15.05	1:502	
SWMH16	386861.353	398926.826	SfA Manhole Type 2 (1,800 Dia)	55.000	D400	ST	2.670	600 250 300 250	52.330 53.730 53.730 53.330	1.009	600	52.330	12.75	1:510	SIPHONIC MANHOLE. PIPES DIAMETERS AS PER SES AND FULLFLOW DRAWINGS
SWMH17	386854.777	398937.751	SfA Manhole Type 2 (1,500 Dia)	55.269	D400	RE	2.964	600	52.305	1.010	600	52.305	68.97	1:140	
SWMH17A	386786.413	398928.655	SfA Manhole Type 1A (1,500 Dia)	56.291	D400	RE	4.478	600	51.813	1.010A	600	51.813	6.87	1:137	
SWMH17B	386782.147	398934.033	SfA Manhole Type 1A (1,800 Dia)	56.465	D400	RE	4.702	600	51.763	1.010B	600	51.763	27.49	1:139	
SWMH18	386755.045	398929.433	SfA Manhole Type 1A (2,400 Dia)	56.803	D400	RE	5.238	600 375	51.565 52.655 BD	1.011	600	51.565	14.83	1:99	
SWMH19	386792.240	398820.748	SfA Manhole Type 2 (1,500 Dia)	55.500	A15	RE	1.900	250 250 300	54.600 54.600 54.600	1.000	450	53.600	28.15	1:63	SIPHONIC MANHOLE. PIPES DIAMETERS AS PER SES AND FULLFLOW DRAWINGS
SWMH20	386820.181	398824.172	SfA Manhole Type 2 (1,500 Dia)	55.000	A15	RE	1.850	450	53.150	1.001	450	53.150	64.64	1:231	
SWMH21	386884.373	398831.758	SfA Manhole Type 2 (1,500 Dia)	55.000	A15	RE	2.130	450 300 250 250	52.870 54.130 53.730 53.730	1.002	450	52.870	24.60	1:159	SIPHONIC MANHOLE. PIPES DIAMETERS AS PER SES AND FULLFLOW DRAWINGS
SWMH22	386908.666	398835.663	SfA Manhole Type 2 (1,500 Dia)	55.000	A15	RE	2.285	450	52.715	1.003	450	52.715	17.23	1:345	
SWMH23	386906.433	398852.744	SfA Manhole Type 2 (1,500 Dia)	55.000	D400	ST	2.335	450	52.665	1.004 1.004B	300 375	52.665 53.225	2.75 2.75	1:507 Horizontal	Ø300 AND Ø375 OUTGOING PIPES TO RW HARVESTING TANK. REFER TO TANK DETAILS DRAWINGS 0558 & 0559
SWMH24	386858.864	398940.738	SfA Manhole Type 3 Circular (450 Dia)	55.521	D400	RE	2.321	450	52.665		150	53.200	5.06	1:12.8	
SWOUTFALL	386740.220	398929.061	SfA Manhole Type 1A (1,500 Dia)	56.790	D400	ST	5.375	600 150	51.415 52.915 BD						CONNECTION INTO EXISTING MANHOLE

COVER TYPE ABBREVIATIONS
ST - SOLID TOP
RE - RECESSED / INFILLED
BD - BACKDROP
ALL INTERNAL MANHOLES TO BE DOUBLE SEALED

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Suitability Code (as defined in ISO 19650-2:2018)

Work in Progress (WIP)
S0 - Initial Status

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SAFETY HEALTH AND ENVIRONMENTAL INFORMATION

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CONSTRUCTION.

EXCAVATIONS IN CONTAMINATED GROUND
FINAL CONNECTION TO LIVE SEWER

MAINTENANCE/CLEANING/OPERATION.

HYDRO-BRAKE FLOW CONTROL DEVICE
ATTENUATION TANK
RAINWATER HARVESTING TANK EQUIPMENT

DECOMMISSIONING/DEMOLITION

NO UNUSUAL RISKS

Notes

1. PIPE LENGTH IS TAKEN FROM MANHOLE CENTRE TO CENTRE
2. MANHOLE COVER SIZES FOR:
   450mmØ TYPE 3: FRAME CLEAR OPENING OF 450 x 450 mm
   600mm Ø TYPE 3, TYPE 2 AND TYPE 1A: FRAME CLEAR OPENING OF 600 x 600 mm
3. FOR MORE DETAILS ON MANHOLE TYPES AND COVER DIMENSIONS REFER TO:
   BRA_BHE_XX_XX_SP_C_0001 BELOW GROUND DRAINAGE SPECIFICATION,
   BRA_BHE_XX_XX_DR_C_0551,
   BRA_BHE_XX_XX_DR_C_0552 AND
   BRA_BHE_XX_XX_DR_C_0554
5. COVER FINISH TO BE STAINLESS STEEL UNLESS INDICATED OTHERWISE ON THE SCHEDULE COMMENTS COLUMN.

Rev	Appr/Drn	Date	Description
C12	SG AJH	12.05.23	A4 AUTHORISED AND ACCEPTED
C11	FD AJH	06.01.22	A4 AUTHORISED AND ACCEPTED
C10	FD AJH	15.11.21	A4 AUTHORISED AND ACCEPTED
C09	FD AJH	05.10.21	A4 AUTHORISED AND ACCEPTED
C08	FD AJH	30.07.21	A4 AUTHORISED AND ACCEPTED
C07	FD AJH	02.07.21	A4 AUTHORISED AND ACCEPTED
C06	FD AJH	23.06.21	A4 AUTHORISED AND ACCEPTED
C05	FD AJH	03.06.21	A4 AUTHORISED AND ACCEPTED
C04	FD AJH	04.05.21	A4 AUTHORISED AND ACCEPTED
C03	FD NJH	26.03.21	A4 AUTHORISED AND ACCEPTED

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Co-op Live

title SURFACE WATER DRAINAGE BELOW GROUND MANHOLE SCHEDULE

purpose of issue: A4 AUTHORISED & ACCEPTED

scale	drawn	Job no.	Suitability
NTS	JZ		
date: Nov-19	checked: NJH	0042841	A4

reference: BRA-BHE-XX-XX-DR-C-0391 (project code, originator, volume, level, type, role, number)
rev.: C12

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CONSTRUCTION.

EXCAVATIONS IN CONTAMINATED GROUND

MAINTENANCE/CLEANING/OPERATION.

NO UNUSUAL RISKS

DECOMMISSIONING/DEMOLITION

EXISTING COMBINED SEWER THROUGH SITE TO BE ABANDONED. DETAILS OF ABANDONMENT UNDER DISCUSSION WITH UNITED UTILITIES.

Notes

1. THIS DRAWING REFERENCES FOLLOWING INFORMATION:
   - POPULUS (ARCHITECT) - LEVEL 00 RECEIVED ON THE 02.11.21
   - CCTV SURVEY FROM SURVEY OPERATIONS REFERENCE 190069-A RECEIVED ON THE 12.09.2019
2. ALL INTERNAL MANHOLES TO HAVE DOUBLE SEALED COVERS.
3. FOR ABOVE GROUND DRAINAGE REFER TO SES ENGINEERING DRAWINGS.
4. ALL STACK CONNECTIONS TO BE Ø100mm UNLESS SHOWN OTHERWISE ON THE DRAWING.
5. ALL STACK CONNECTIONS START INVERT LEVELS TO BE SET AT 600mm BELOW FFL UNLESS SHOWN OTHERWISE ON THE DRAWING.
6. FOR LONG SECTIONS REFER TO DRAWING BRA-BHE-XX-XX-DR-C-0420.
7. FOR MANHOLE SCHEDULE REFER TO DRAWING: BRE_BHE_XX_XX_DR_C_0491.
8. FOR CORES PIPE DIAMETERS AND LEVELS REFER TO BH CORE SKETCHES.
9. REFER TO POPULOUS DRAWINGS FOR MANHOLE AND DRAINAGE CONNECTION SETTING OUT.
10. CHANNEL DRAIN IN SERVICE YARD TO BE ACO S RANGE S100 S01 OR SIMILAR APPROVED. TO BE INSTALLED TO MANUFACTURER DETAILS.
    GRATINGS:
    - IN FRONT OF THE COMPACTOR ZONE: SOLID COVER DUCTILE IRON - F900. DETAIL SUBJECT OF CONFIRMATION OF COMPACTOR.
    - ELSEWHERE: HEELGUARD HEAVY-DUTY DUCTILE IRON GRATING - F900.
    OUTLETS: 110mm VERTICAL KNOCK-OUT FROM THE BASE OF THE CHANNEL.

LEGEND

- LAND OWNERSHIP BOUNDARY
- PLANNING APPLICATION BOUNDARY
- PROPOSED FOUL WATER DRAINAGE & MANHOLE
- PROPOSED CHANNEL DRAIN
- EXISTING COMBINED SEWER

INFORMATION PROVIDED BY POPULOUS:

- SVP CONNECTION
- FLOOR DRAIN

Rev	Appr/Drn	Date	Description
C17	FD	AJH	13.07.22 A4 AUTHORISED AND ACCEPTED
C16	FD	AJH	30.06.22 A4 AUTHORISED AND ACCEPTED
C15	FD	AJH	08.04.22 A4 AUTHORISED AND ACCEPTED
C14	FD	AJH	05.04.22 A4 AUTHORISED AND ACCEPTED
C13	FD	AJH	09.02.22 A4 AUTHORISED AND ACCEPTED
C12	FD	AJH	31.01.22 A4 AUTHORISED AND ACCEPTED
C11	FD	AJH	24.01.22 A4 AUTHORISED AND ACCEPTED
C10	FD	AJH	06.01.22 A4 AUTHORISED AND ACCEPTED
C09	FD	AJH	13.12.21 A4 AUTHORISED AND ACCEPTED

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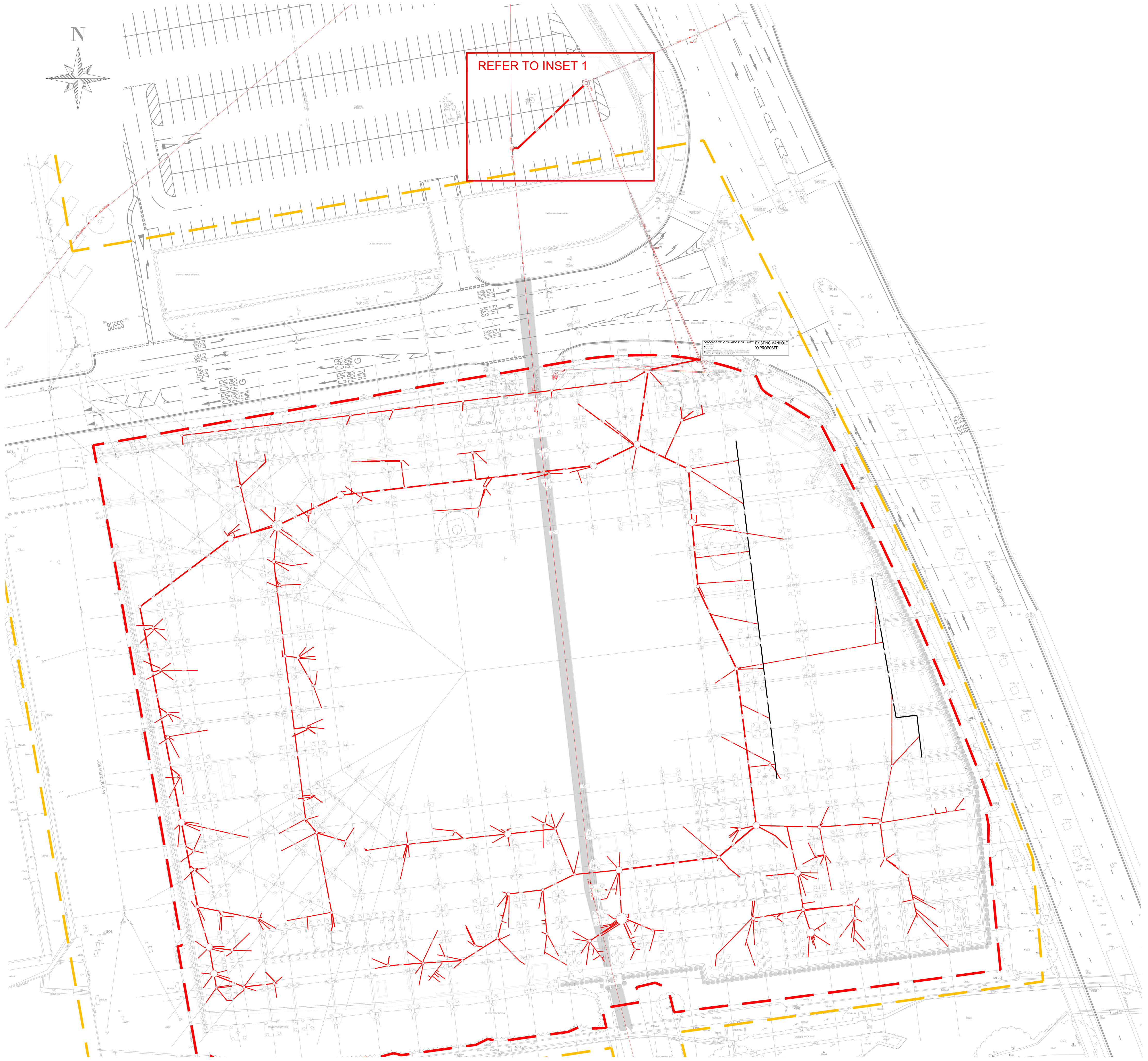
Co-op Live

title: FOUL WATER DRAINAGE BELOW GROUND GENERAL ARRANGEMENT

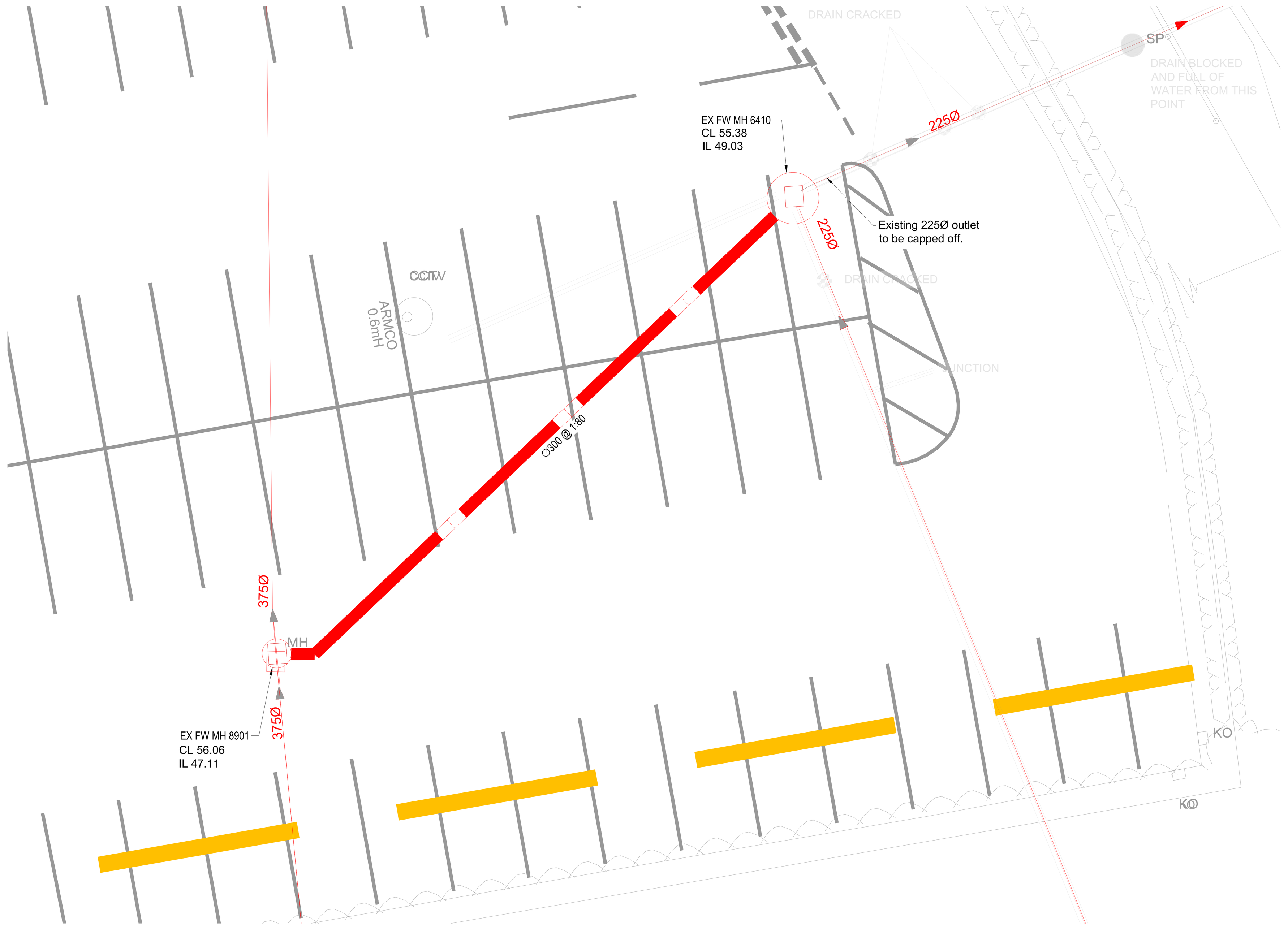
purpose of issue: A4 AUTHORISED & ACCEPTED

scale 1:250	drawn JZ	Job no.	Suitability
date Nov-19	checked NJH	0042841	A4

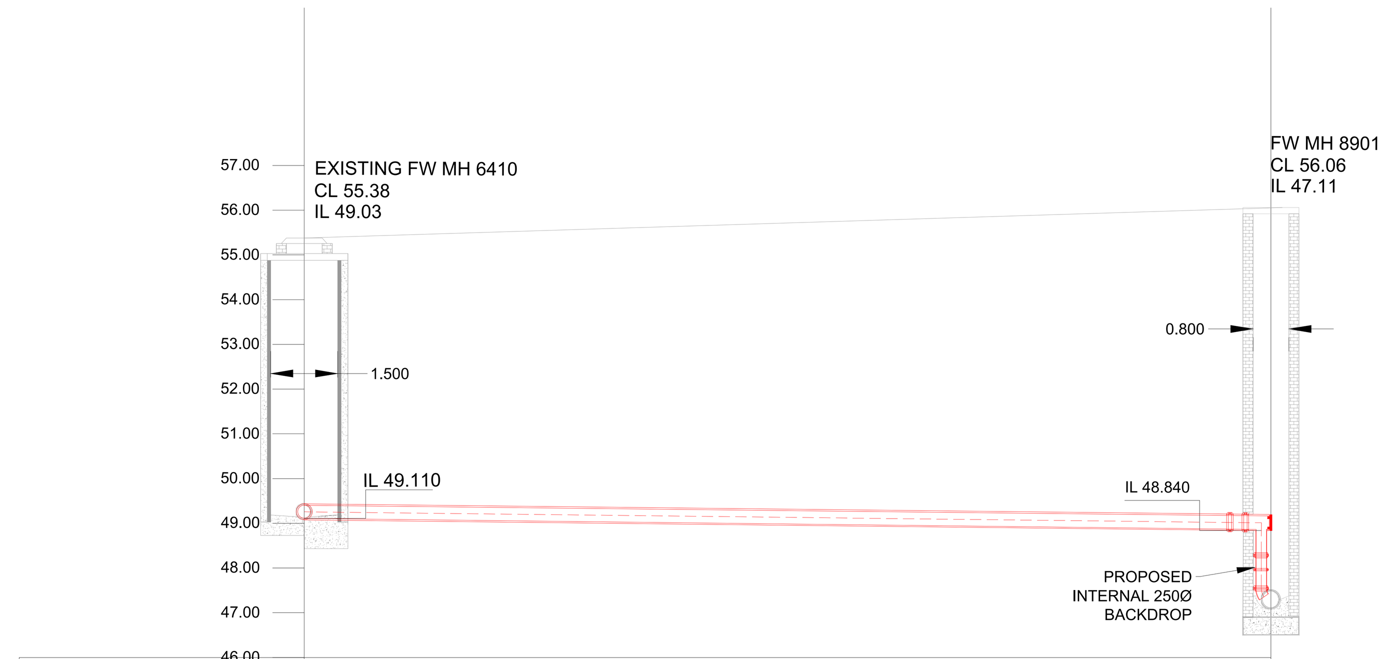
reference: BRA-BHE-XX-XX-DR-C-0401 rev. C17



PLAN VIEW
SCALE 1:500

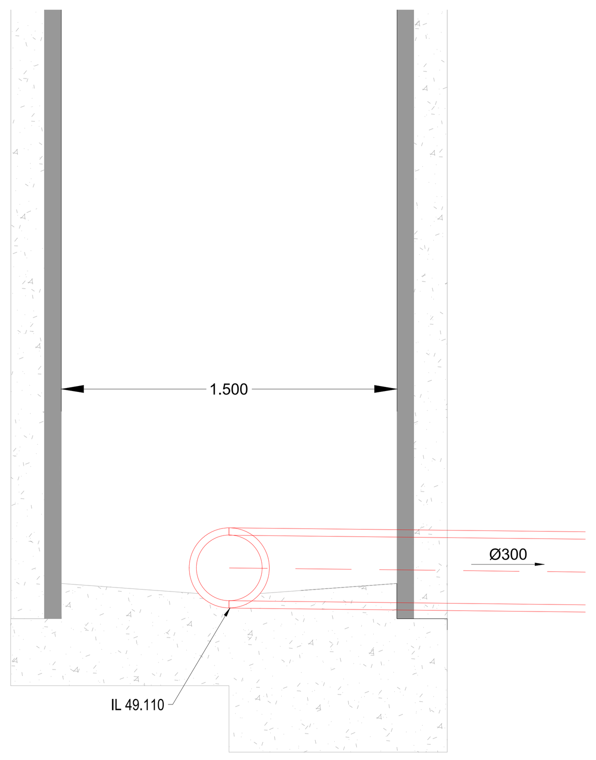


INSET 1
SCALE 1:100

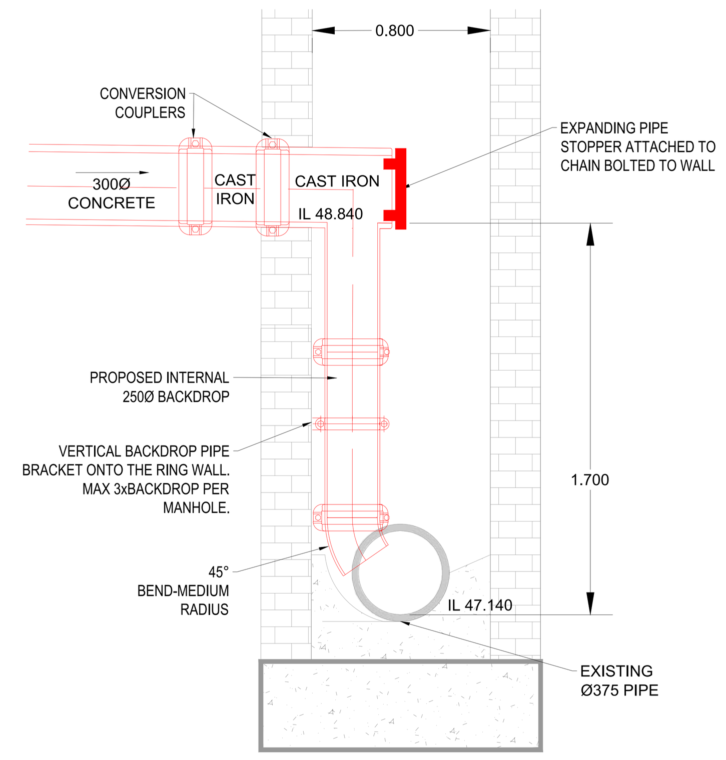


GROUND LEVELS (mAOD) EXISTING	55.380			56.060
PROPOSED LEVELS	55.380			56.060
PROPOSED INVERT LEVELS	49.110			48.840
DEPTH OF COVER TO TOP OF PIPE (m)	6.270			6.220
PIPE DATA	300Ø 1:80 21.62m CONC (CLASS 'S' BEDDING)			
CHAINAGE	0.00	10.00	20.00	21.62

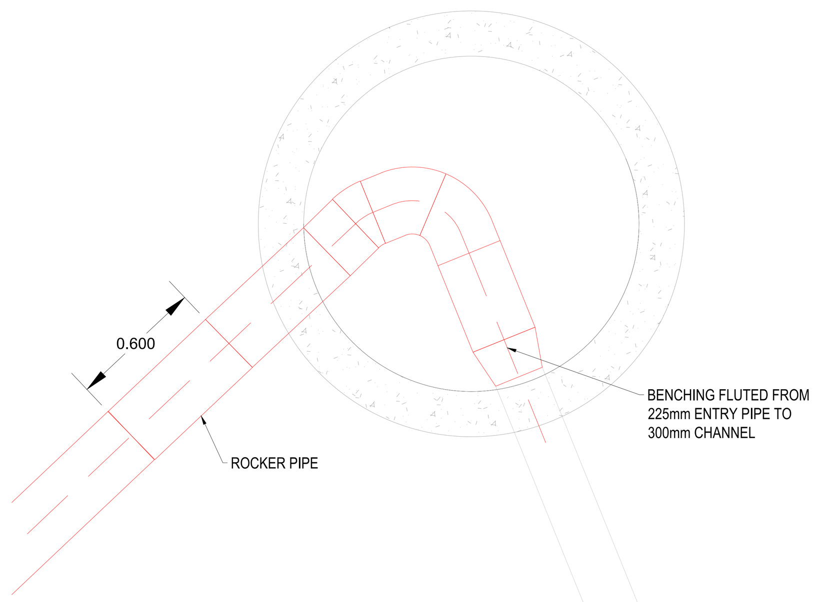
LONGSECTION
PROPOSED STRUCTURE INTERNAL BACKDROP
SCALE 1:100



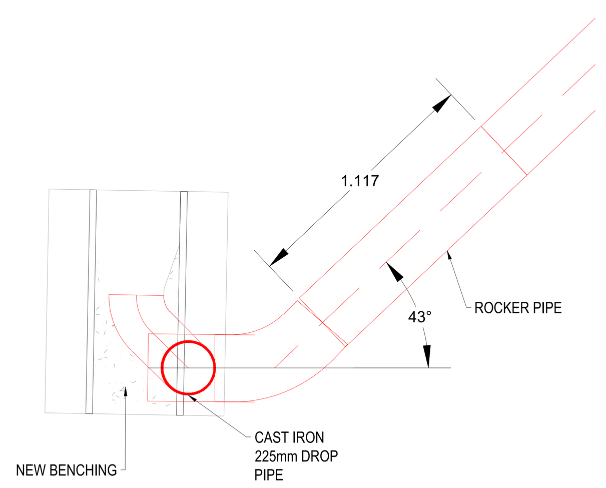
CONNECTION INTO FW MH 6410
SCALE 1:20



CONNECTION INTO FW MH 8901
PROPOSED INTERNAL BACKDROP
SCALE 1:20



CONNECTION INTO FW MH 6410
PLAN VIEW
SCALE 1:20



CONNECTION INTO FW MH 8901
PROPOSED INTERNAL BACKDROP
PLAN VIEW
SCALE 1:20

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EXCAVATIONS IN CONTAMINATED GROUND

MAINTENANCE/CLEANING/OPERATION.
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Notes

1. THIS DRAWING REFERENCES FOLLOWING INFORMATION:
   - POPULUS (ARCHITECT) - LEVEL 00 RECEIVED ON THE 02.11.21
   - CCTV SURVEY FROM SURVEY OPERATIONS REFERENCE 19D065 A RECEIVED ON THE 12.09.2019

LEGEND
- LAND OWNERSHIP BOUNDARY
- PLANNING APPLICATION BOUNDARY
- PROPOSED FOUL WATER DRAINAGE & MANHOLE
- PROPOSED CHANNEL DRAIN
- EXISTING COMBINED SEWER

Rev	Appr/Drn	Date	Description
P02	FD AJH	24.08.22	A4 AUTHORISED AND ACCEPTED
P01	FD AJH	12.08.22	A4 AUTHORISED AND ACCEPTED

OVG INTERNATIONAL

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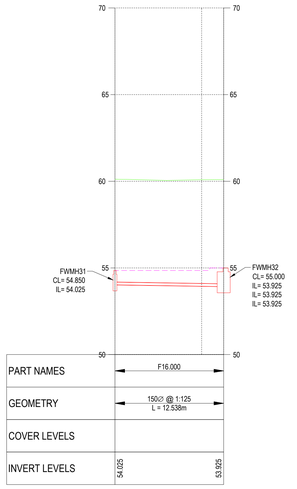
Co-op Live

title FOUL WATER DRAINAGE
FOUL OUTFALL

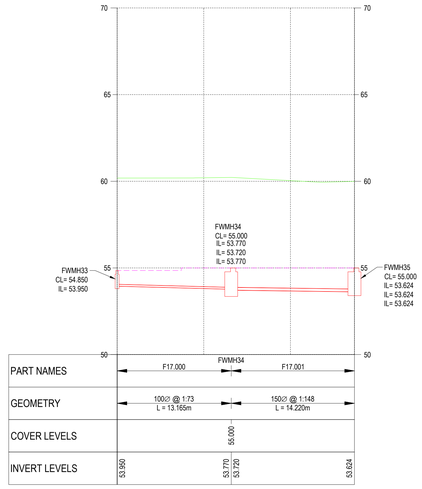
purpose of issue
A4 AUTHORISED & ACCEPTED

scale	AS SHOWN	drawn	FD	Job no.	Suitability
date	Jul-22	checked	AH	0042841	A4

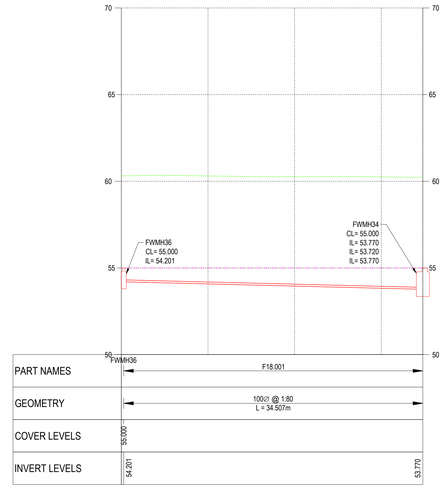
reference project code originator volume level type role number — rev.
BRA-BHE-XX-XX-DR-C-0402 — P02



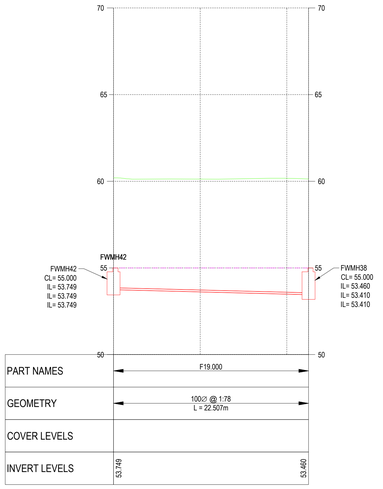
PROPOSED FW 17 CH 0+000.00 - 0+012.54
SCALES: H 1:250, V 1:125



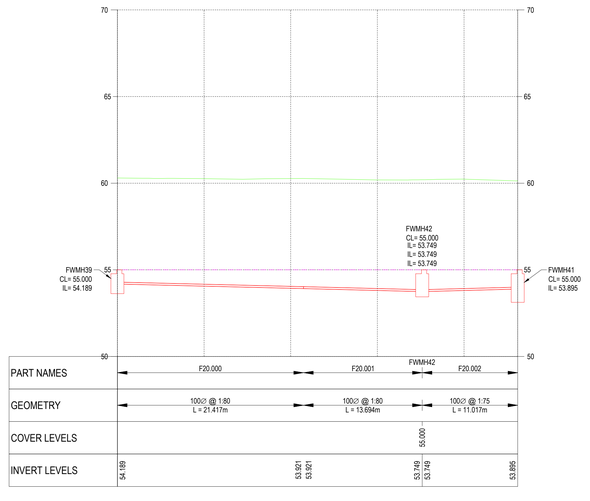
PROPOSED FW 18 CH 0+000.00 - 0+027.39
SCALES: H 1:250, V 1:125



PROPOSED FW 19 CH 0+000.00 - 0+034.79
SCALES: H 1:250, V 1:125



PROPOSED FW 20 CH 0+000.00 - 0+022.51
SCALES: H 1:250, V 1:125



PROPOSED FW 21 CH 0+000.00 - 0+046.19
SCALES: H 1:250, V 1:125

P05

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DO NOT SCALE THIS DRAWING.

HEALTH AND SAFETY INFORMATION

IN ADDITION TO THE HAZARDS RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING:

CONSTRUCTION:

EXCAVATIONS IN CONTAMINATED GROUND
FINAL CONNECTION TO LIVE SEWER IS Xm DEEP AND WILL REQUIRE AN EXTERNAL BACKDROP

MAINTENANCE/CLEANING/OPERATION:

HYDRO-BRAKE FLOW CONTROL DEVICE
ATTENUATION TANK

DECOMMISSIONING/DEMOLITION:

N/A

Notes

1. THIS DRAWING REFERENCE FOLLOWING INFORMATION:
   - POPULUS (ARCHITECT) - LEVEL 01 RECEIVED ON THE 10.03.20
   - TOPO SURVEY FROM SURVEY OPERATIONS REFERENCE 190065 A RECEIVED ON THE 12.09.2019
2. ALL INTERNAL MANHOLES TO HAVE DOUBLE SEALED COVERS
3. ALL PIPES TO BE Ø150mm UNLESS SHOWN OTHERWISE ON THE DRAWING.
4. FOR GROUND LEVEL FOUL WATER DRAINAGE REFER TO DRAWING BRA-BHE-XX-XX-DR-C-0401
4. FOR ABOVE GROUND DRAINAGE REFER TO ME ENGINEERING DRAWINGS.
5. FOR MANHOLE & PIPE SCHEDULE REFER TO DRAWING: BRE_BHE_XX_XX_DR_C_0491.
6. PIPE SIZES AND GRADIENTS MAY VARY FOLLOWING RECEIPT OF FINAL FLOW FIGURES FROM ME ENGINEERS.

LEGEND

PROPOSED FINISHED FLOOR PROFILE

EXISTING GROUND PROFILE

Rev	Description	Date	Drn	Chkd
P05	STAGE 3	03.04.2020	TB	NJH
P04	STAGE 3	20.03.2020	TB	NJH
P03	STAGE 3 - PIPES SIZES CORRECTED	20.02.2020	TB	NJH
P02	STAGE 3	13.02.2020	SBH	NJH
P01	DRAFT STAGE 3	29.11.2019	JZ	JB

STAGE 3

Status of drawing

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Architect: POPULUS

Project: OVG MANCHESTER

Drg Title: FOUL WATER DRAINAGE BELOW GROUND LONG SECTIONS

Scales@A1: AS SHOWN
Drawn by: JZ
Checked by: NJH

Job No.: 0042841
Date: NOV 2019
Rev: P05

Drawing No.: BRA-BHE-XX-XX-DR-C-0423

Plotted: Wed 04 Mar 2020 09:31:44 - Plotted by: Jonathan.Zammit - C:\Users\jonathan.zammit\Desktop\0042841_BRA-BHE-XX-XX-DR-C-0423_P05.rvt

MANHOLE SCHEDULE - PROPOSED FW

NAME	EASTING [m]	NORTHING [m]	TYPE	COVER LEVEL [m]	COVER LOADING	COVER TYPE	DEPTH [m]	INCOMING PIPE DIAMETER [mm]	INCOMING PIPE IL [m]	INCOMING SOFFIT LEVELS	OUTGOING PIPE DIAMETER [mm]	OUTGOING PIPE SOFFIT LEVELS	OUTGOING PIPE IL [m]	OUTGOING PIPE LENGTH [m]	OUTGOING PIPE SLOPE	NOTES
EXISTING MANHOLE	386870.458	398940.096	SfA Manhole Type 1A (1,200 Dia)	55.618	D400	RE	3.778	225	51.840	52.065						
FW.MH.01	386802.790	398809.019	SfA Manhole Type 3 Circular (450 Dia)	55.500	A15	RE	1.250	100 100 150	54.300 54.300 54.250	54.400 54.400 54.400	150	54.400	54.250	7.57	1:38	
FW.MH.02	386810.338	398809.584	SfA Manhole Type 3 Circular (450 Dia)	55.000	A15	RE	0.950	150 100 100 100 100	54.050 54.100 54.100 54.100 54.100	54.200 54.200 54.200 54.200 54.200	150	54.200	54.050	8.48	1:141	
FW.MH.03	386818.800	398810.114	SfA Manhole Type 3 Circular (450 Dia)	55.000	A15	RE	1.010	150 100 100	53.990 54.040 54.040	54.140 54.140 54.140	150	54.140	53.990	9.03	1:139	
FW.MH.05	386826.439	398814.934	SfA Manhole Type 3 Circular (450 Dia)	55.000	A15	RE	1.075	150 100 100 100	53.925 53.975 53.975 53.975	54.075 54.075 54.075 54.075	150	54.075	53.925	9.90	1:141	
FW.MH.06	386828.747	398824.560	SfA Manhole Type 3 Circular (600 Dia)	55.000	A15	RE	1.145	150 100 100 100 100	53.855 53.905 53.905 53.905 53.905	54.005 54.005 54.005 54.005 54.005	150	54.005	53.855	7.53	1:137	
FW.MH.07	386843.065	398828.794	SfA Manhole Type 3 Circular (450 Dia)	55.000	A15	RE	1.300	150 100 150	53.700 53.750 53.700	53.850 53.850 53.850	150	53.850	53.700	9.73	1:45	
FW.MH.08	386852.748	398829.770	SfA Manhole Type 2 (1,200 Dia)	55.000	A15	RE	1.590	150 100 150 100 100 100	53.485 53.535 53.485 53.535 53.535 53.535	53.635 53.635 53.635 53.635 53.635 53.635	225	53.635	53.410	21.80	1:156	
FW.MH.09	386874.361	398832.596	SfA Manhole Type 3 Circular (600 Dia)	55.000	A15	RE	1.730	225 100 150 100	53.270 53.395 53.345 53.395	53.495 53.495 53.495 53.495	225	53.495	53.270	10.60	1:152	
FW.MH.10	386882.472	398839.412	SfA Manhole Type 2 (1,200 Dia)	55.000	A15	RE	1.800	225 150 150 150	53.200 53.275 53.275 53.275	53.425 53.425 53.425 53.425	225	53.425	53.200	34.29	1:149	
FW.MH.11	386878.184	398873.435	SfA Manhole Type 3 Circular (600 Dia)	55.000	D400	RE	2.030	225 100 100 100	52.970 53.095 53.095 53.800 BD	53.195 53.195 53.195 53.900	225	53.195	52.970	19.66	1:164	
FW.MH.12	386869.838	398891.236	SfA Manhole Type 3 Circular (600 Dia)	55.000	D400	ST	2.150	225 100	52.850 52.975	53.075 53.075	225	53.075	52.850	13.96	1:155	
FW.MH.13A	386868.542	398905.135	SfA Manhole Type 2 (1,200 Dia)	55.000	D400	ST	2.240	225 100 150 100	52.760 52.885 52.835 52.885	52.985 52.985 52.985 52.985	225	52.985	52.760	11.60	1:129	
FW.MH.13B	386867.835	398916.711	SfA Manhole Type 2 (1,200 Dia)	55.000	D400	ST	2.330	225 100 100	52.670 52.795 52.795	52.895 52.895 52.895	225	52.895	52.670	12.42	1:17	
FW.MH.14	386856.631	398922.079	SfA Manhole Type 1A (1,200 Dia)	55.000	D400	ST	3.040	225 225 100 150 100	51.960 51.960 52.085 52.035 52.085	52.185 52.185 52.185 52.185 52.185	225	52.185	51.960	16.36	1:204	
FW.MH.15	386859.054	398938.255	SfA Manhole Type 1A (1,200 Dia)	55.365	D400	RE	3.485	225 150 100	51.880 53.380 BD 52.005	52.105 53.530 52.105	225	52.105	51.880	11.55	1:289	
FW.MH.16A	386778.061	398805.168	SfA Manhole Type 3 Circular (450 Dia)	55.500	A15	RE	0.725	100 100 150 100	54.825 54.825 54.775 54.825	54.925 54.925 54.925 54.925	150	54.925	54.775	6.67	1:30	
FW.MH.16B	386771.435	398804.408	SfA Manhole Type 3 Circular (450 Dia)	55.500	A15	RE	0.950	150 100 100 100	54.550 54.600 54.600 54.600	54.700 54.700 54.700 54.700	150	54.700	54.550	7.10	1:13	
FW.MH.16C	386765.480	398804.253	SfA Manhole Type 3 Circular (450 Dia)	55.500	A15	RE	1.473	100 100 100 100	54.077 54.077 54.077 54.077	54.177 54.177 54.177 54.177	150	54.177	54.027	3.08	1:114	
FW.MH.17	386764.948	398807.281	SfA Manhole Type 2 (1,200 Dia)	55.500	A15	RE	1.500	150 150 100 100 100 100	54.000 54.000 54.050 54.050 54.050 54.050	54.150 54.150 54.150 54.150 54.150 54.150	150	54.150	54.000	5.80	1:145	
FW.MH.18	386763.946	398812.994	SfA Manhole Type 2 (1,200 Dia)	55.500	A15	RE	1.540	150 150 100 100 100 100	53.960 53.960 54.010 54.010 54.010 54.010	54.110 54.110 54.110 54.110 54.110 54.110	150	54.110	53.960	9.15	1:141	
FW.MH.19	386761.410	398821.791	SfA Manhole Type 3 Circular (600 Dia)	55.500	A15	RE	1.680	150 150 100 100	53.895 53.895 53.945 53.945	54.045 54.045 54.045 54.045	225	54.045	53.820	18.62	1:219	
FW.MH.20	386748.887	398886.856	SfA Manhole Type 3 Circular (600 Dia)	55.500	A15	RE	2.000	225	53.500	53.725	225	53.725	53.500	24.57	1:197	
FW.MH.21	386768.511	398901.626	SfA Manhole Type 2 (1,200 Dia)	55.500	A15	RE	2.125	225 100 100 100	53.375 53.500 53.500 53.500	53.600 53.600 53.600 53.600	225	53.600	53.375	10.61	1:125	
FW.MH.22A	386778.729	398904.496	SfA Manhole Type 2 (2,100 Dia)	55.500	A15	RE	2.210	225 150 100 100 100 100 100 100 100	53.290 53.365 53.415 53.415 53.415 53.415 53.415 53.415 53.415	53.515 53.515 53.515 53.515 53.515 53.515 53.515 53.515 53.515	225	53.515	53.290	15.18	1:152	
FW.MH.22B	386785.461	398906.927	SfA Manhole Type 3 Circular (450 Dia)	55.500	A15	RE	2.100	100 100 100 100	53.450 53.450 53.450 53.450	53.550 53.550 53.550 53.550	150	53.550	53.400	0.57	1:7	
FW.MH.23	386792.377	398911.073	SfA Manhole Type 2 (1,200 Dia)	55.500	A15	RE	2.310	225 100	53.190 53.315	53.415 53.415	225	53.415	53.190	55.17	1:102	
FW.MH.24	386847.211	398917.473	SfA Manhole Type 2 (1,200 Dia)	55.000	A15	RE	2.350	225 100	52.650 52.775	52.875 52.875	225	52.875	52.650	10.49	1:15	
FW.MH.25	386790.472	398820.533	SfA Manhole Type 3 Circular (450 Dia)	55.500	A15	RE	1.200	150 100 150	54.300 54.350 54.300	54.450 54.450 54.450	150	54.450	54.300	18.14	1:101	
FW.MH.26A	386793.498	398835.989	SfA Manhole Type 3 Circular (450 Dia)	55.500	A15	RE	1.200	100 100	54.350 54.350	54.450 54.450	150	54.450	54.300	7.24	1:38	
FW.MH.27A	386787.196	398837.883	SfA Manhole Type 3 Circular (450 Dia)	55.500	A15	RE	1.375	150 150 100 100	54.125 54.125 54.175 54.175	54.275 54.275 54.275 54.275	150	54.275	54.125	3.13	1:30	
FW.MH.27B	386784.812	398840.813	SfA Manhole Type 3 Circular (450 Dia)	55.500	A15	RE	1.500	150 100 100 100	54.000 54.050 54.050 54.050	54.150 54.150 54.150 54.150	150	54.150	54.000	35.64	1:91	
FW.MH.28	386777.920	398896.690	SfA Manhole Type 3 Circular (600 Dia)	55.500	A15	RE	2.050	150 100 100 100 100	53.450 53.500 53.500 53.500 53.500	53.600 53.600 53.600 53.600 53.600	150	53.600	53.450	7.85	1:92	
FW.MH.29	386806.985	398835.354	SfA Manhole Type 3 Circular (450 Dia)	55.500	A15	RE	1.300	100 100 100 150 100	54.250 54.250 54.250 54.200 54.250	54.350 54.350 54.350 54.350 54.350	150	54.350	54.200	21.75	1:145	
FW.MH.30	386828.623	398837.590	SfA Manhole Type 2 (1,200 Dia)	55.500	A15	RE	1.450	150 100 100 100 100 100	54.050 54.100 54.100 54.600 BD 54.100 54.100	54.200 54.200 54.200 54.700 54.200 54.200	150	54.200	54.050	10.41	1:139	
FW.MH.31	386838.972	398838.718	SfA Manhole Type 3 Circular (450 Dia)	55.000	A15	RE	1.025	150 150 100 100	53.975 53.975 54.025 54.025	54.125 54.125 54.125 54.125	150	54.125	53.975	10.73	1:39	RECESSED COVER WITH BRASS FINISH
FW.MH.32	386846.412	398814.363	SfA Manhole Type 3 Circular (600 Dia)	55.000	A15	RE	0.850	100 100 100 100 100	54.200 54.200 54.200 54.200 54.200	54.300 54.300 54.300 54.300 54.300	150	54.300	54.150	8.42	1:28	
FW.MH.33	386853.292	398819.220	SfA Manhole Type 2 (2,100 Dia)	55.000	A15	RE	1.150	150 150 150 100 100 100 100 100 100 150 100 100	53.850 53.850 53.850 53.900 53.900 53.900 53.900 53.900 53.900 53.850 53.900 53.900	54.000 54.000 54.000 54.000 54.000 54.000 54.000 54.000 54.000 54.000 54.000 54.000	150	54.000	53.850	10.56	1:29	
FW.MH.34	386860.005	398816.740	SfA Manhole Type 3 Circular (450 Dia)	55.000	A15	RE	0.850	100 100	54.200 54.200	54.300 54.300	150	54.300	54.150	7.16	1:24	
FW.MH.35	386856.184	398812.493	SfA Manhole Type 3 Circular (450 Dia)	55.000	A15	RE	0.850	100 100	54.200 54.200	54.300 54.300	150	54.300	54.150	7.32	1:24	
FW.MH.36	386915.317	398828.469	SfA Manhole Type 3 Circular (600 Dia)	55.000	A15	RE	1.100	150	53.900	54.050	150	54.050	53.900	6.28	1:35	
FW.MH.37	386910.313	398832.259	SfA Manhole Type 3 Circular (600 Dia)	55.000	A15	RE	1.280	150 100 100 100	53.720 53.770 53.770 53.770	53.870 53.870 53.870 53.870	150	53.870	53.720	7.80	1:49	
FW.MH.38	386909.331	398839.999	SfA Manhole Type 3 Circular (600 Dia)	55.000	A15	RE	1.440	150 100 100 100	53.560 53.610 53.610 53.610	53.710 53.710 53.710 53.710	150	53.710	53.560	13.20	1:102	
FW.MH.38B	386911.861	398852.349	SfA Manhole Type 3 Circular (450 Dia)	55.000	D400	ST	1.150	100 100	53.850 53.850	53.950 53.950	100	53.950	53.850	12.61	1:52	
FW.MH.39	386896.164	398839.104	SfA Manhole Type 3 Circular (600 Dia)	55.000	A15	RE	1.570	150 100 100 100	53.430 53.480 53.480 53.480	53.580 53.580 53.580 53.580	150	53.580	53.430	13.69	1:88	
FW.MH.40A	386894.289	398816.201	SfA Manhole Type 2 (1,500 Dia)	55.000	A15	RE	1.150	100 100 100 100 100 100 100 100	53.900 53.900 53.900 53.900 53.900 53.900 53.900 53.900	54.000 54.000 54.000 54.000 54.000 54.000 54.000 54.000	150	54.000	53.850	5.22	1:15	
FW.MH.40B	386892.677	398821.166	SfA Manhole Type 3 Circular (600 Dia)	55.000	A15	RE	1.500	150 150 150 100 100	53.500 53.500 53.500 53.550 53.550	53.650 53.650 53.650 53.650 53.650	150	53.650	53.500	8.12	1:125	

MANHOLE SCHEDULE - PROPOSED FW

NAME	EASTING [m]	NORTHING [m]	TYPE	COVER LEVEL [m]	COVER LOADING	COVER TYPE	DEPTH [m]	INCOMING PIPE DIAMETER [mm]	INCOMING PIPE IL [m]	INCOMING SOFFIT LEVELS	OUTGOING PIPE DIAMETER [mm]	OUTGOING PIPE SOFFIT LEVELS	OUTGOING PIPE IL [m]	OUTGOING PIPE LENGTH [m]	OUTGOING PIPE SLOPE	NOTES
FW.MH.41	386891.385	398829.180	SfA Manhole Type 2 (1,200 Dia)	55.000	A15	RE	1.565	150 100 150 100 100 100	53.435 53.485 53.435 53.485 53.485 53.485	53.585 53.585 53.585 53.585 53.585 53.585	150	53.585	53.435	10.38	1:127	
FW.MH.42	386881.822	398819.291	SfA Manhole Type 4 Circular (600 Dia)	55.000	A15	RE	1.050	100 100 150 100 100 100	54.000 54.000 53.950 54.000 54.000 54.000	54.100 54.100 54.100 54.100 54.100 54.100	150	54.100	53.950	11.02	1:24	
FW.MH.43	386903.908	398819.291	SfA Manhole Type 3 Circular (600 Dia)	55.000	A15	RE	1.000	100 100 100 100	54.050 54.050 54.050 54.050	54.150 54.150 54.150 54.150	150	54.150	54.000	2.98	1:40	
FW.MH.44	386903.689	398822.266	SfA Manhole Type 3 Circular (600 Dia)	55.000	A15	RE	1.075	150 100 100	53.925 53.975 53.975	54.075 54.075 54.075	150	54.075	53.925	11.07	1:26	
FW.MH.45	386886.846	398819.445	SfA Manhole Type 4 Circular (450 Dia)	55.000	A15	RE	0.890	100 100	54.160 54.160	54.260 54.260	150	54.260	54.110	1.00	1:2	
FW.MH.46	386897.312	398833.115	SfA Manhole Type 3 Circular (450 Dia)	55.000	A15	RE	0.820	100 100 100 100 100	54.180 54.180 54.180 54.180 54.180	54.280 54.280 54.280 54.280 54.280	100	54.280	54.180	6.10	1:9	
FW.MH.47	386885.409	398852.575	SfA Manhole Type 3 Circular (450 Dia)	55.000	D400	RE	1.180	100 100 100	53.820 53.820 53.820	53.920 53.920 53.920	100	53.920	53.820	4.30	1:7	
FW.MH.48	386866.333	398927.339	SfA Manhole Type 3 Circular (600 Dia)	55.000	D400	RE	1.450	150 150 150	53.550 53.550 54.410 BD	53.700 53.700 54.560	150	53.700	53.550	8.98	1:8	
FW.MH.49	386821.505	398813.366	SfA Manhole Type 3 Circular (450 Dia)	55.000	A15	RE	0.850	100 100 100	54.200 54.200 54.200	54.300 54.300 54.300	150	54.300	54.150	1.62	1:5	
FW.MH.50A	386837.112	398815.960	SfA Manhole Type 3 Circular (450 Dia)	55.000	A15	RE	0.900	100 100 100	54.150 54.150 54.150	54.250 54.250 54.250	150	54.250	54.100	9.54	1:32	
FW.MH.50B	386836.226	398825.462	SfA Manhole Type 3 Circular (450 Dia)	55.000	A15	RE	1.200	150 150 100	53.800 53.800 53.850	53.950 53.950 53.950	150	53.950	53.800	7.61	1:76	
FW.MH.51	386817.152	398838.196	SfA Manhole Type 3 Circular (450 Dia)	55.500	A15	RE	0.820	100 100	54.730 54.730	54.830 54.830	150	54.830	54.680	2.32	1:6	
FW.MH.52	386836.724	398839.822	SfA Manhole Type 3 Circular (450 Dia)	55.000	A15	RE	0.820	100 100 100	54.230 54.230 54.230	54.330 54.330 54.330	150	54.330	54.180	2.50	1:12	
FW.MH.54	386878.843	398838.645	SfA Manhole Type 3 Circular (600 Dia)	55.000	A15	RE	1.630	100 100 100 100 100	53.420 53.420 53.420 53.420 53.420	53.520 53.520 53.520 53.520 53.520	150	53.520	53.370	3.71	1:39	
FW.MH.55	386768.886	398812.385	SfA Manhole Type 3 Circular (450 Dia)	55.500	A15	RE	1.050	100 100 100	54.500 54.500 54.500	54.600 54.600 54.600	150	54.600	54.450	4.98	1:10	
FW.MH.56A	386774.424	398819.180	SfA Manhole Type 3 Circular (450 Dia)	55.500	A15	RE	0.580	100 100 100 100	54.970 54.970 54.970 54.970	55.070 55.070 55.070 55.070	150	55.070	54.920	13.27	1:13	
FW.MH.56B	386766.505	398819.829	SfA Manhole Type 3 Circular (450 Dia)	55.500	A15	RE	0.950	100 100 100	54.600 54.600 54.600	54.700 54.700 54.700	150	54.700	54.550	0.87	1:2	
FW.MH.57	386760.755	398829.853	SfA Manhole Type 3 Circular (450 Dia)	55.500	A15	RE	1.575	100 100 100	53.975 54.500 BD 54.500 BD	54.075 54.600 54.600	150	54.075	53.925	1.15	1:18	
FW.MH.58	386760.499	398833.987	SfA Manhole Type 3 Circular (450 Dia)	55.500	A15	RE	1.490	100 100 100	54.060 54.060 54.060	54.160 54.160 54.160	150	54.160	54.010	1.77	1:10	
FW.MH.59	386757.893	398840.076	SfA Manhole Type 2 (1,200 Dia)	55.500	A15	RE	1.765	225 100 100 100 100 100	53.735 53.860 53.860 53.860 53.860 53.860	53.960 53.960 53.960 53.960 53.960 53.960	225	53.960	53.735	47.64	1:203	
FW.MH.60	386757.737	398850.119	SfA Manhole Type 3 Circular (450 Dia)	55.500	A15	RE	1.620	100 100 100	53.930 53.930 53.930	54.030 54.030 54.030	150	54.030	53.880	2.36	1:12	
FW.MH.61	386755.010	398858.667	SfA Manhole Type 3 Circular (450 Dia)	55.500	A15	RE	1.780	100 100 100 100	53.770 53.770 53.770 53.770	53.870 53.870 53.870 53.870	150	53.870	53.720	0.79	1:10	
FW.MH.62	386754.934	398863.760	SfA Manhole Type 3 Circular (450 Dia)	55.500	A15	RE	1.690	100 100 100 100	53.860 53.860 53.860 53.860	53.960 53.960 53.960 53.960	150	53.960	53.810	1.91	1:10	
FW.MH.63	386753.343	398873.106	SfA Manhole Type 3 Circular (450 Dia)	55.500	A15	RE	1.760	100 100 100 100 100	53.790 53.790 53.790 53.790 53.790	53.890 53.890 53.890 53.890 53.890	150	53.890	53.740	1.71	1:10	
FW.MH.64	386751.744	398882.229	SfA Manhole Type 3 Circular (450 Dia)	55.500	A15	RE	1.805	100 100 100 100 100	53.745 53.745 53.745 53.745 53.745	53.845 53.845 53.845 53.845 53.845	150	53.845	53.695	1.69	1:10	
FW.MH.65	386770.691	398913.037	SfA Manhole Type 3 Circular (450 Dia)	56.520	A15	RE	2.170	150 150 100	54.350 55.700 BD 54.400	54.500 55.850 54.500	150	54.500	54.350	10.25	1:10	
FW.MH.66	386786.100	398846.049	SfA Manhole Type 3 Circular (450 Dia)	55.500	A15	RE	1.250	100 100 100 100	54.300 54.300 54.300 54.300	54.400 54.400 54.400 54.400	150	54.400	54.250	1.90	1:7	
FW.MH.67	386784.978	398860.741	SfA Manhole Type 3 Circular (450 Dia)	55.500	A15	RE	1.345	100 150 100 150	54.205 54.155 54.205 54.155	54.305 54.305 54.305 54.305	150	54.305	54.155	2.62	1:7	
FW.MH.68	386786.459	398869.833	SfA Manhole Type 3 Circular (450 Dia)	55.500	A15	RE	0.870	100 100	54.680 54.680	54.780 54.780	150	54.780	54.630	6.83	1:11	
FW.MH.69	386783.214	398875.847	SfA Manhole Type 3 Circular (600 Dia)	55.500	A15	RE	1.500	150 100 100 100 100 100	54.000 54.050 54.050 54.050 54.050 54.050	54.150 54.150 54.150 54.150 54.150 54.150	150	54.150	54.000	2.88	1:7	
FW.MH.70	386780.350	398876.172	SfA Manhole Type 3 Circular (600 Dia)	55.500	A15	RE	1.890	150 150 150	53.610 53.610 53.610	53.760 53.760 53.760	150	53.760	53.610	20.66	1:129	
FW.MH.71	386779.972	398891.221	SfA Manhole Type 3 Circular (450 Dia)	55.500	A15	RE	1.830	100 100 100 100	53.720 53.720 53.720 53.720	53.820 53.820 53.820 53.820	150	53.820	53.670	1.62	1:10	
FW.MH.72	386797.186	398910.732	SfA Manhole Type 3 Circular (450 Dia)	55.500	A15	RE	2.150	100 150 100	53.400 53.350 53.400	53.500 53.500 53.500	150	53.500	53.350	0.78	1:7	
FW.MH.73	386805.496	398918.427	SfA Manhole Type 3 Circular (450 Dia)	55.500	A15	RE	2.250	100 100 100	53.300 53.300 53.300	53.400 53.400 53.400	150	53.400	53.250	5.62	1:37	
FW.MH.74	386820.991	398920.348	SfA Manhole Type 3 Circular (450 Dia)	55.500	A15	RE	2.300	100 100 100	53.250 53.250 53.250	53.350 53.350 53.350	150	53.350	53.200	5.58	1:25	RECESSED COVER WITH BRASS FINISH
FW.MH.75A	386822.473	398908.350	SfA Manhole Type 3 Circular (450 Dia)	55.000	A15	RE	1.000	100 100	54.050 54.050	54.150 54.150	150	54.150	54.000	4.52	1:6	
FW.MH.75B	386823.730	398912.691	SfA Manhole Type 3 Circular (450 Dia)	55.500	A15	RE	2.200	150 100 100 100	53.300 53.350 53.350 53.350	53.450 53.450 53.450 53.450	150	53.450	53.300	2.52	1:7	RECESSED COVER WITH BRASS FINISH
FW.MH.76	386837.585	398915.722	SfA Manhole Type 3 Circular (450 Dia)	55.350	A15	RE	1.900	100 100 100	53.500 53.500 53.500	53.600 53.600 53.600	150	53.600	53.450	0.78	1:1	
FW.MH.77	386758.022	398924.034	SfA Manhole Type 3 Circular (450 Dia)	56.714	D400	RE	1.414	150 100	55.300 55.350	55.450 55.450	150	55.450	55.300	36.76	1:77	
FW.MH.78	386794.522	398928.376	SfA Manhole Type 3 Circular (450 Dia)	56.181	D400	RE	1.361	150 150	54.820 54.820	54.970 54.970	150	54.970	54.820	9.40	1:78	
FW.MH.79	386803.843	398929.572	SfA Manhole Type 3 Circular (450 Dia)	56.067	D400	RE	1.367	150 100	54.700 54.750	54.850 54.850	150	54.850	54.700	15.25	1:80	
FW.MH.80	386818.971	398931.473	SfA Manhole Type 3 Circular (450 Dia)	55.886	D400	RE	1.376	150 150	54.510 54.510	54.660 54.660	150	54.660	54.510	19.04	1:31	
FW.MH.82	386838.150	398933.797	SfA Manhole Type 3 Circular (450 Dia)	55.202	D400	RE	1.302	150 100	53.900 53.950	54.050 54.050	150	54.050	53.900	17.20	1:115	
FW.MH.83	386854.949	398935.874	SfA Manhole Type 3 Circular (450 Dia)	55.200	D400	RE	1.450	150	53.750	53.900	150	53.900	53.750	4.74	1:13	

COVER TYPE ABBREVIATIONS
ST - SOLID TOP
RE - RECESSED / INFILLED
BD - BACKDROP
ALL INTERNAL MANHOLES TO BE DOUBLE SEALED

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CONSTRUCTION.

EXCAVATIONS IN CONTAMINATED GROUND

MAINTENANCE/CLEANING/OPERATION.

N/A

DECOMMISSIONING/DEMOLITION

EXISTING COMBINED SEWER THROUGH SITE TO BE ABANDONED. DETAILS OF ABANDONMENT UNDER DISCUSSION WITH UNITED UTILITIES.

Notes

1. PIPE LENGTH IS TAKEN FROM MANHOLE CENTRE TO CENTRE
2. MANHOLE COVER SIZES FOR:
   450 mm Ø TYPE 3: FRAME CLEAR OPENING OF 450 x 450 mm
   600 mm Ø TYPE 3, TYPE 2 AND TYPE 1A MANHOLES: FRAME CLEAR OPENING OF 600 x 600 mm
3. FOR MORE DETAILS ON MANHOLES TYPES AND COVER DIMENSIONS REFER TO:
   BRA_BHE_XX_XX_SP_C_0001 BELOW GROUND DRAINAGE SPECIFICATION,
   BRA_BHE_XX_XX_DR_C_0551,
   BRA_BHE_XX_XX_DR_C_0552 AND
   BRA_BHE_XX_XX_DR_C_0554
4. REFER TO POPULOUS DRAWINGS FOR MANHOLE AND DRAINAGE CONNECTION SETTING OUT.
5. COVER FINISH TO BE STAINLESS STEEL UNLESS INDICATED OTHERWISE ON THE SCHEDULE COMMENTS COLUMN.

Rev	Appr/Drn		Date	Description
C15	FD	AJH	13.07.22	A4 AUTHORISED AND ACCEPTED
C14	FD	AJH	30.06.22	A4 AUTHORISED AND ACCEPTED
C13	FD	AJH	16.02.22	A4 AUTHORISED AND ACCEPTED
C12	FD	AJH	31.01.22	A4 AUTHORISED AND ACCEPTED
C11	FD	AJH	24.01.22	A4 AUTHORISED AND ACCEPTED
C10	FD	AJH	06.01.22	A4 AUTHORISED AND ACCEPTED
C09	FD	AJH	13.12.21	A4 AUTHORISED AND ACCEPTED
C08	FD	AJH	26.11.21	A4 AUTHORISED AND ACCEPTED
C07	FD	AJH	15.11.21	A4 AUTHORISED AND ACCEPTED

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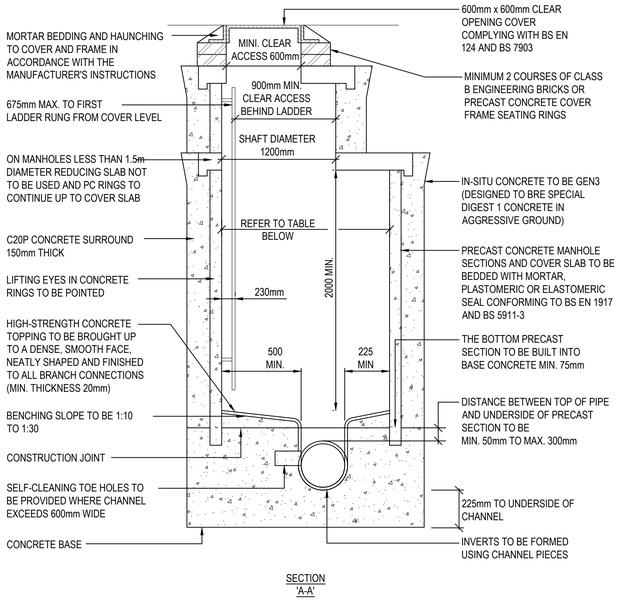
Co-op Live

title FOUL WATER DRAINAGE
BELOW GROUND
MANHOLE SCHEDULE

purpose of issue
A4 AUTHORISED & ACCEPTED

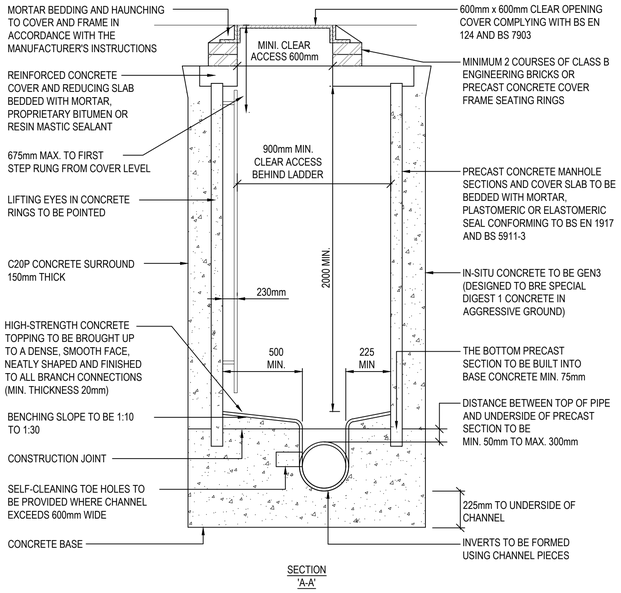
scale NTS | drawn JZ | Job no. | Suitability
date Nov-19 | checked NJH | 0042841 | A4

reference project code originator volume level type role number | rev.
BRA-BHE-XX-XX-DR-C-0491 | C15



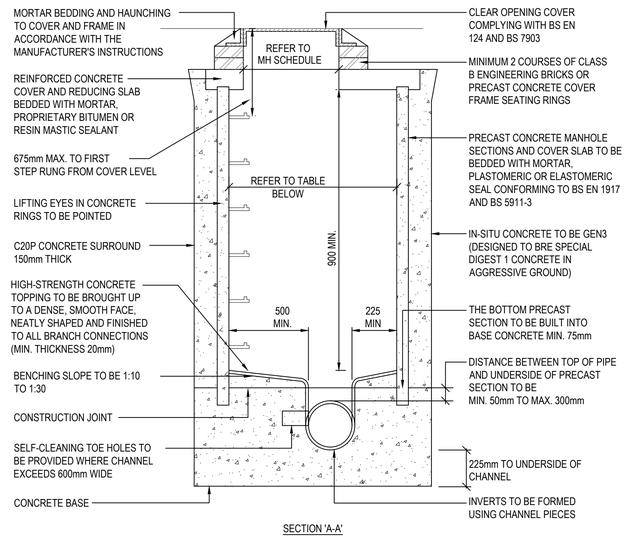
SECTION 'A-A'

Ø OF LARGEST PIPE IN MANHOLE (mm)	INTERNAL DIAMETER OF MANHOLE (mm)
LESS THAN 375	1200
375-700	1500
750-900	1800
>900	LIAISE WITH WATER AUTHORITY



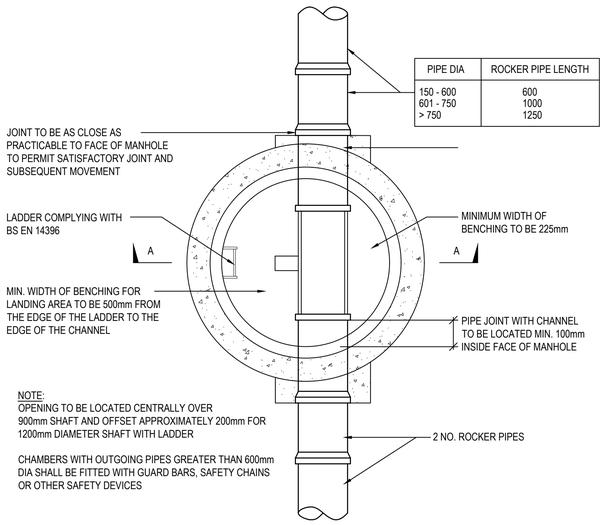
SECTION 'A-A'

Ø OF LARGEST PIPE IN MANHOLE (mm)	INTERNAL DIAMETER OF MANHOLE (mm)
LESS THAN 375	1200
375-700	1500
750-900	1800
>900	LIAISE WITH WATER AUTHORITY



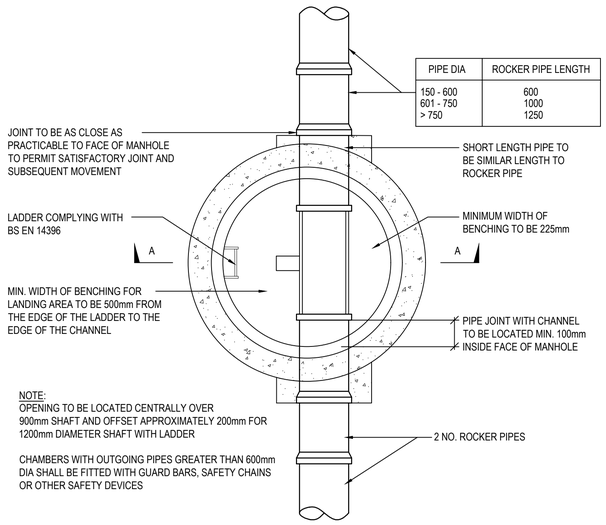
SECTION 'A-A'

Ø OF LARGEST PIPE IN MANHOLE (mm)	INTERNAL DIAMETER OF MANHOLE (mm)
LESS THAN 375	1200
375-700	1500
750-900	1800
>900	LIAISE WITH WATER AUTHORITY



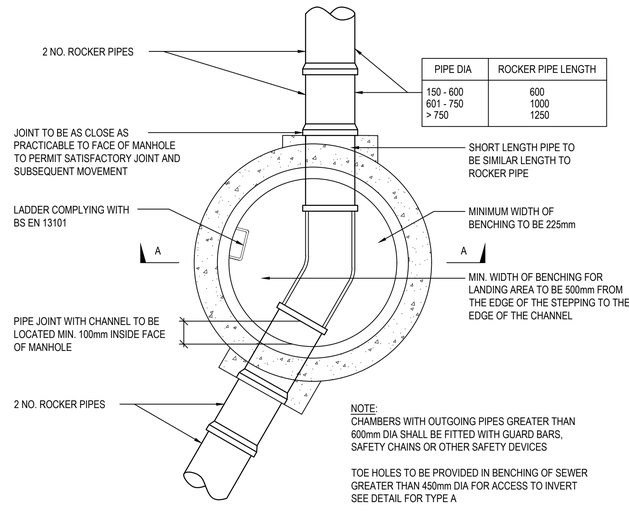
TYPICAL MANHOLE DETAIL - TYPE 1A

DEPTH FROM COVER LEVEL TO SOFFIT OF PIPE 3m TO 6m



TYPICAL MANHOLE DETAIL - TYPE 1B

DEPTH FROM COVER LEVEL TO SOFFIT OF PIPE 3m TO 6m



TYPICAL MANHOLE DETAIL - TYPE 2

MAXIMUM DEPTH FROM COVER LEVEL TO SOFFIT OF PIPE 3m

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CONSTRUCTION.
EXCAVATIONS IN CONTAMINATED GROUND
FINAL CONNECTION TO LIVE SEWER

MAINTENANCE/CLEANING/OPERATION.
HYDRO-BRAKE FLOW CONTROL DEVICE
ATTENUATION TANK
RAINWATER HARVESTING TANK EQUIPMENT

DECOMMISSIONING/DEMOLITION
NO UNUSUAL RISKS

Notes

Rev	Appr/Drn	Date	Description
C01	KH AH	30.07.21	A4 AUTHORISED AND ACCEPTED
P05	SBH TH	03.07.20	STAGE 4a TENDER
P04	SBH NJH	20.03.20	STAGE 3
P03	SBH NJH	13.02.20	STAGE 3
P02	JZ JB	29.11.19	DRAFT STAGE 3
P01	JZ SR	01.11.19	DRAFT STAGE 3

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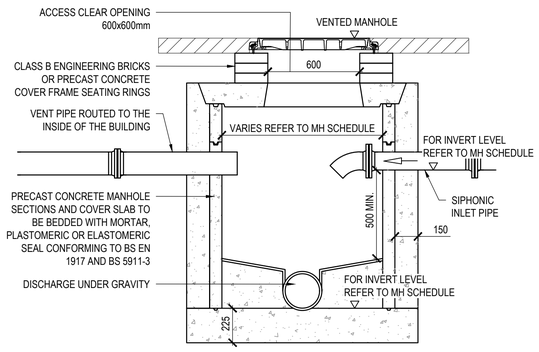
Co-op Live

title DRAINAGE DETAILS SHEET 1

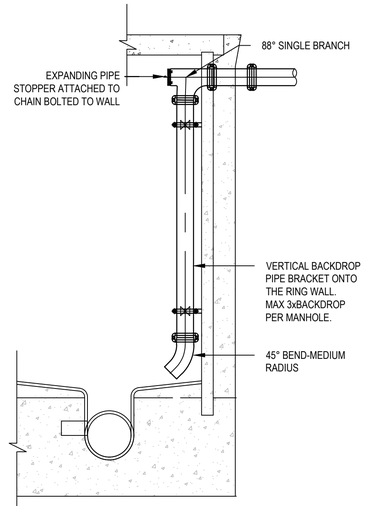
purpose of issue: STAGE 4a

scale 1:20 | drawn JZ | Job no. 0042841 | Suitability A4
date Nov-19 | checked NJH

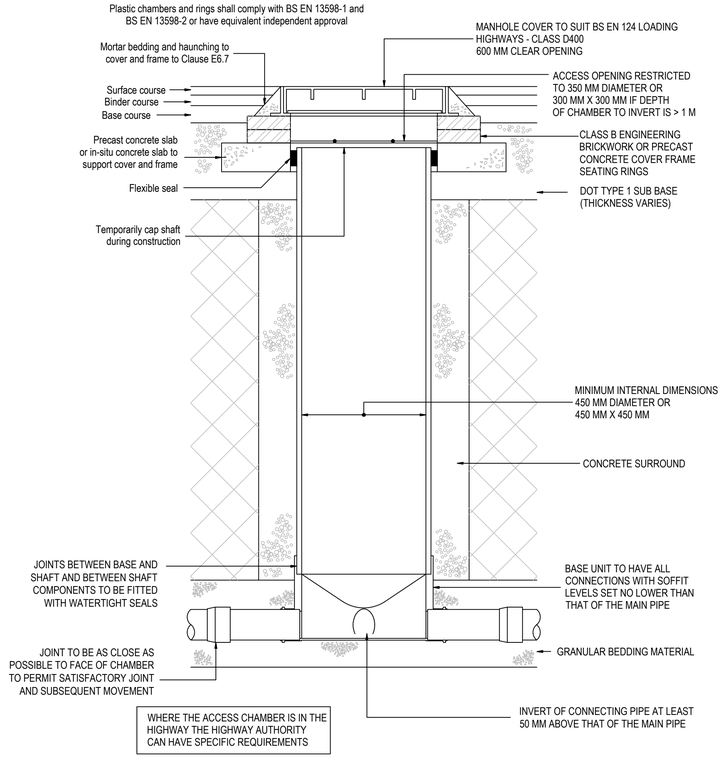
reference: BRA-BHE-XX-XX-DR-C-0551 | rev. C01



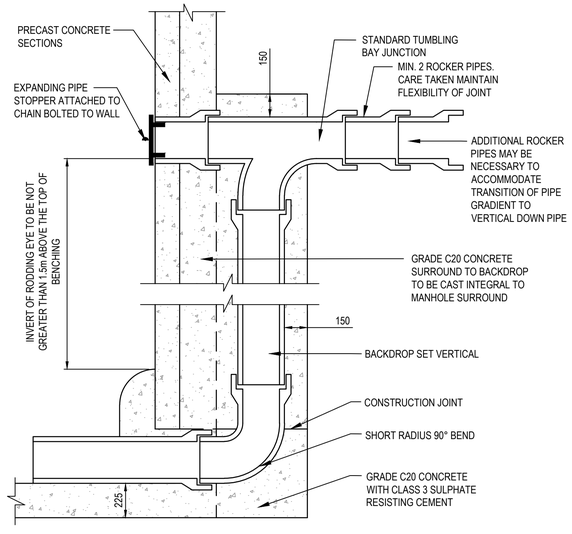
TYPICAL SIPHONIC
BREAK CHAMBER MANHOLE



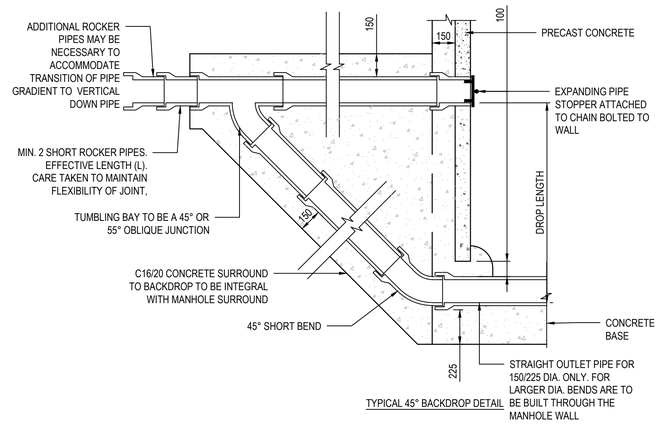
TYPICAL INTERNAL MANHOLE BACKDROP DETAIL.
ONLY FOR USE IN EXISTING CHAMBER



TYPICAL INSPECTION CHAMBER DETAIL - TYPE 3
(FLEXIBLE MATERIAL DETAIL)
MAXIMUM DEPTH FROM COVER LEVEL TO SOFFIT OF PIPE
NON-ENTRY



TYPICAL BACKDROP DETAIL



TYPICAL 45° BACKDROP DETAIL

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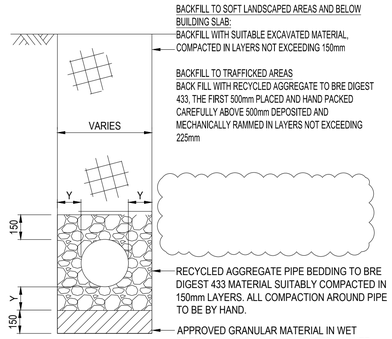
Co-op Live

title DRAINAGE DETAILS
SHEET 2

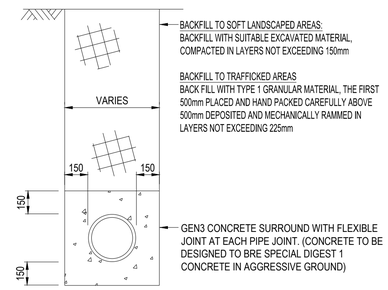
purpose of issue
STAGE 4a

scale 1:20 | drawn JZ | Job no. | Suitability
date Nov-19 | checked NJH | 0042841 | A4

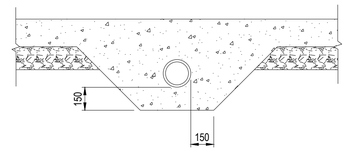
reference | project code | originator | volume | level | type | role | number | rev.
BRA-BHE-XX-XX-DR-C-0552 | C01



GRANULAR
(CLASS S)



CONCRETE (CLASS Z)



PIPE CAST INTO SLAB (CLASS Y)
(FOR PIPES WHERE THE SOFFIT IS LESS THAN 150MM BELOW UNDERSIDE OF SLAB)

>150mm BELOW UNDERSIDE OF BUILDING SLAB OR
>1200mm DEPTH TO SOFFIT IN ROADS AND PAVEMENTS

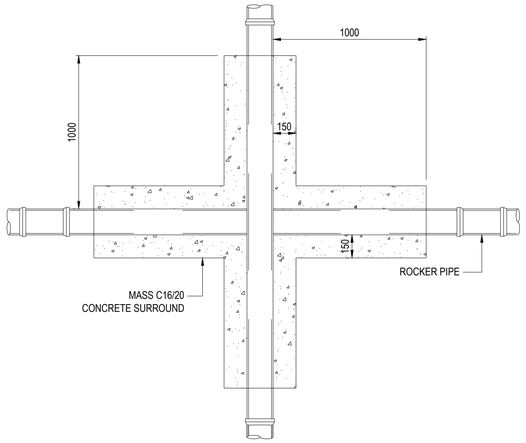
DIMENSION 'Y' TO BE 100mm MIN. UNLESS OTHERWISE SPECIFICED OR DIRECTED BY THE ENGINEER

FOR ADOPTABLE SEWER, GRANULAR SURROUND MIN. THICKNESS OF 300 ABOVE CROWN OF PIPES.

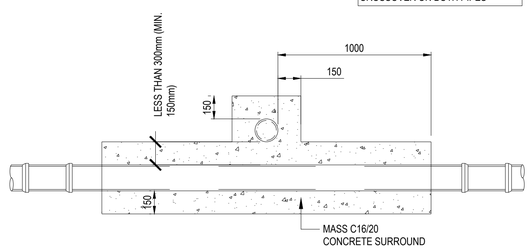
<1200mm DEPTH TO SOFFIT IN ROADS AND PAVEMENTS SUBJECT TO VEHICLE LOADING

ALL JOINTS IN CLASS Z BEDDING SHOULD BE SURROUNDED BY COMPRESSIBLE FILLER BOARD (THICKNESS 18mm) TO ENSURE THE PIPE REMAINS FLEXIBLE.

TYPICAL PIPE BEDDING DETAILS

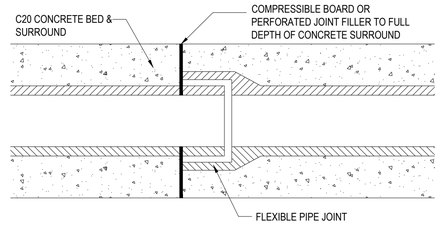


CONCRETE SURROUND TO EXTEND FOR 1.0M EITHER SIDE OF CROSSOVER ON BOTH PIPES

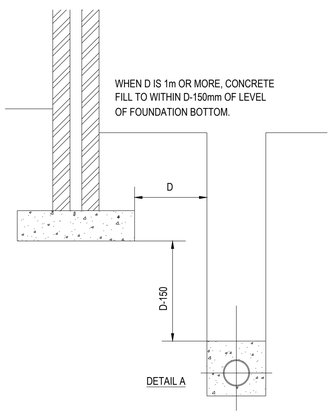


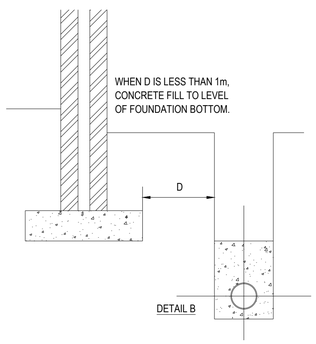
PIPE CROSSOVER DETAIL WHERE PIPE SEPARATION IS BETWEEN 100mm TO 300mm

NOMINAL DIAMETER OF PIPE	THICKNESS OF COMPRESSIBLE FILLER
<450	18
450 TO 1200	36
>1200	54

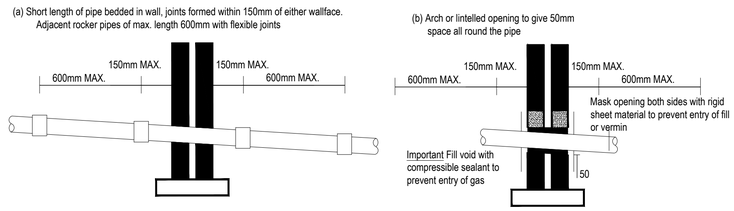


TYPICAL FLEXIBLE PIPE JOINT DETAIL
FOR CONCRETE SURROUND





DRAINS ADJACENT TO STRUCTURAL FOUNDATIONS



PIPES PENETRATING WALLS

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ATTENUATION TANK
RAINWATER HARVESTING TANK EQUIPMENT

DECOMMISSIONING/DEMOLITION
NO UNUSUAL RISKS

Notes

Rev	Appr/Drn	Date	Description
C02	FD AH	31.01.22	A4 AUTHORISED AND ACCEPTED
C01	KH AH	30.07.21	A4 AUTHORISED AND ACCEPTED
P05	SBH TH	03.07.20	STAGE 4a TENDER
P04	SBH NJH	20.03.20	STAGE 3
P03	SBH NJH	13.02.20	STAGE 3
P02	JZ JB	29.11.19	DRAFT STAGE 3
P01	JZ SR	01.11.19	DRAFT STAGE 3

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Web: www.burohappold.com

Co-op Live

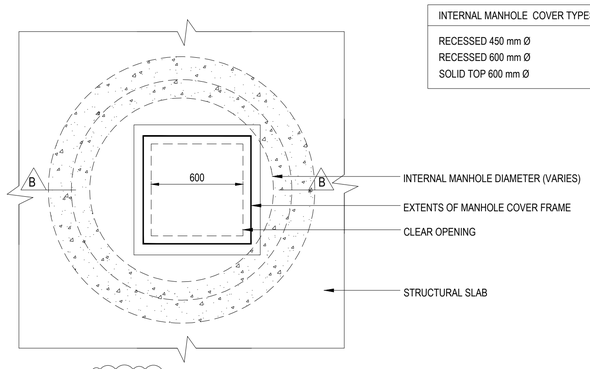
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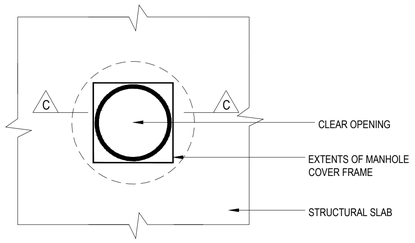
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STAGE 4a

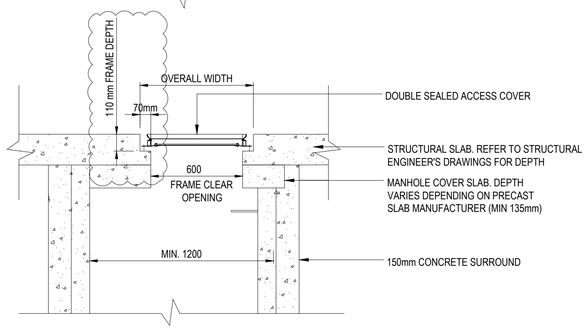
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date	Nov-19	checked	NJH	0042841	A4

reference	project code	originator	volume	level	type	role	number	rev.
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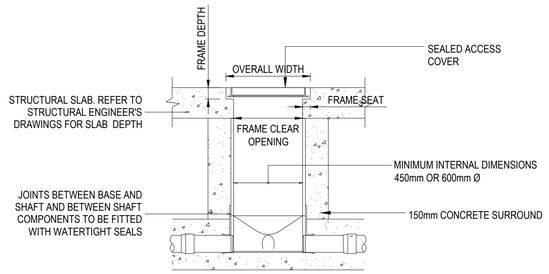
INTERNAL MANHOLE COVER TYPES:	FRAME DEPTH	FRAME SEAT	FRAME CLEAR OPENING	OVERALL WIDTH
RECESSED 450 mm Ø	110 mm	70 mm	450 x 450 mm	450 x 450 mm
RECESSED 600 mm Ø	110 mm	70 mm	600 x 600 mm	600 x 600 mm
SOLID TOP 600 mm Ø	110 mm	135 mm	600 x 600 mm	740 x 740 mm



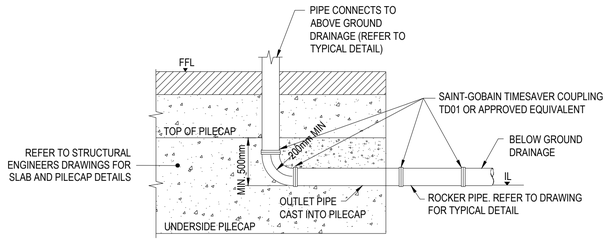




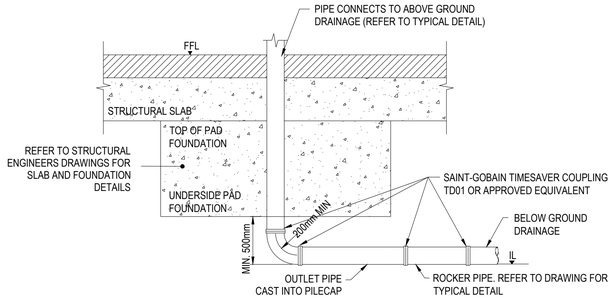
SECTION B - B
TYPICAL INTERNAL MANHOLE COVER DETAIL - TYPE 1 AND TYPE 2
SCALE 1:20



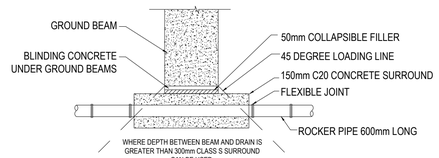
SECTION C - C
TYPICAL INSPECTION CHAMBER DETAIL - TYPE 3 AND TYPE 4
MAX. DEPTH FROM COVER LEVEL TO SOFFIT OF PIPE IN AREAS SUBJECT TO VEHICLE LOADING 3m, NON-ENTRY
SCALE 1:20



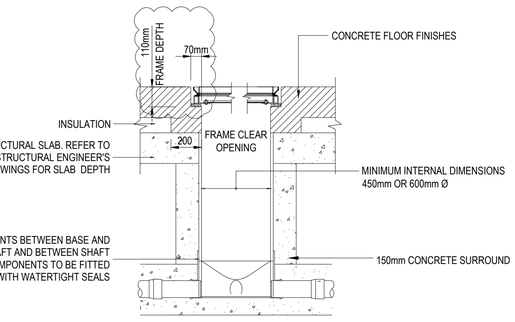
DRAIN POINT THROUGH A PILE CAP
SCALE 1:20



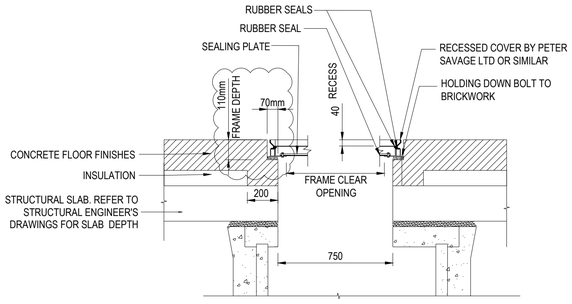
DRAIN POINT THROUGH PAD FOUNDATION
SCALE 1:20



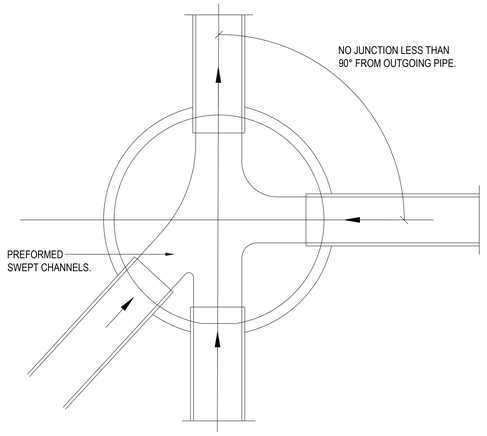
SEWER CAST UNDER GROUND BEAM / RETAINING WALL FOOTING
SCALE 1:20



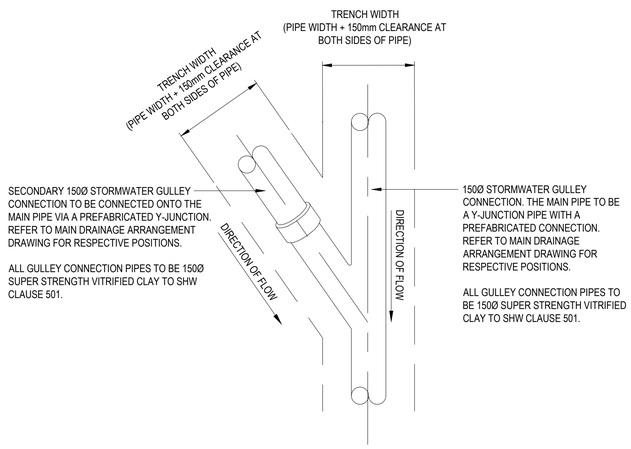
TYPICAL INSPECTION CHAMBER DETAIL -
INSPECTION CHAMBER LOCATED WITHIN 300mm FLOOR FINISHES
SCALE 1:20



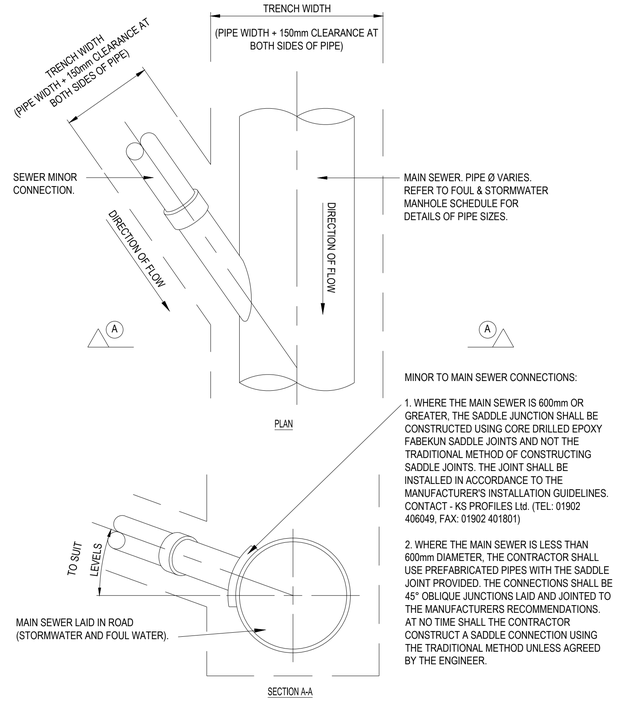
INTERNAL MANHOLE COVER WITH SEALING PLATE
MANHOLE CHAMBER LOCATED WITHIN 300mm FLOOR FINISHES



TYPICAL ARRANGEMENT OF PIPE JUNCTIONS WITHIN MANHOLES



PLAN: Y-JUNCTION CONNECTION DETAIL
(FOR 150Ø TO 150Ø GULLY CONNECTIONS)



MINOR TO MAIN SEWER CONNECTIONS:

1. WHERE THE MAIN SEWER IS 600mm OR GREATER, THE SADDLE JUNCTION SHALL BE CONSTRUCTED USING CORE DRILLED EPOXY FABEKUN SADDLE JOINTS AND NOT THE TRADITIONAL METHOD OF CONSTRUCTING SADDLE JOINTS. THE JOINT SHALL BE INSTALLED IN ACCORDANCE TO THE MANUFACTURER'S INSTALLATION GUIDELINES. CONTACT - KS PROFILES Ltd. (TEL: 01902 406049, FAX: 01902 401801)

2. WHERE THE MAIN SEWER IS LESS THAN 600mm DIAMETER, THE CONTRACTOR SHALL USE PREFABRICATED PIPES WITH THE SADDLE JOINT PROVIDED. THE CONNECTIONS SHALL BE 45° OBLIQUE JUNCTIONS LAID AND JOINTED TO THE MANUFACTURERS RECOMMENDATIONS. AT NO TIME SHALL THE CONTRACTOR CONSTRUCT A SADDLE CONNECTION USING THE TRADITIONAL METHOD UNLESS AGREED BY THE ENGINEER.

SEWER CONNECTION DETAIL FOR MINOR PIPES CONNECTING INTO MAIN SEWER

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DECOMMISSIONING/DEMOLITION
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Co-op Live

title DRAINAGE DETAILS
SHEET 4

purpose of issue
STAGE 4a

scale	1:20	drawn	JZ	Job no.	Suitability
date	Nov-19	checked	NJH	0042841	A4

reference	project code	originator	volume	level	type	role	number	rev.
BRA-BHE-XX-XX-DR-C-0554								C05

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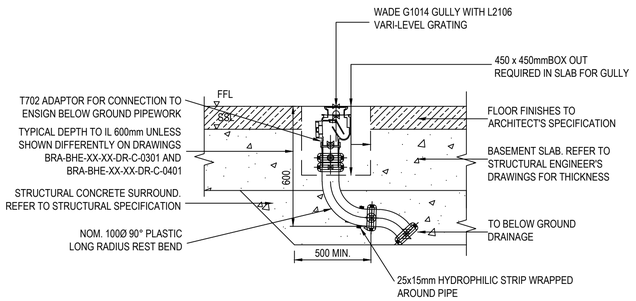
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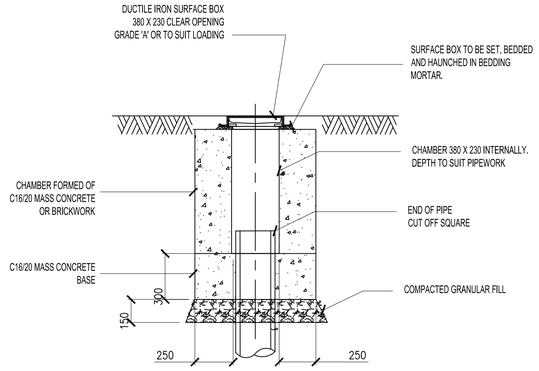
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DECOMMISSIONING/DEMOLITION
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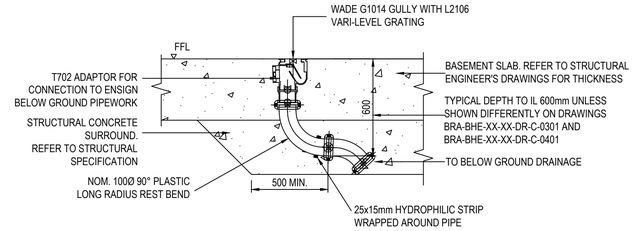
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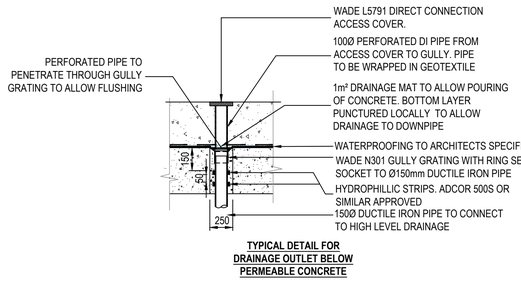
TYPE 1 - TYPICAL INTERNAL TRAPPED FLOOR GULLY DETAIL WITH FLOOR FINISHES



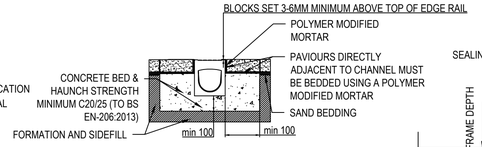
TYPICAL RODDING POINT DETAIL



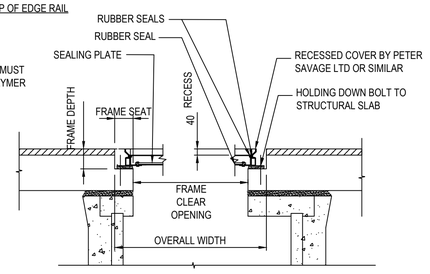
TYPICAL INTERNAL TRAPPED FLOOR GULLY DETAIL FOR AREAS WITH NO FLOOR FINISHES



TYPICAL DETAIL FOR DRAINAGE OUTLET BELOW PERMEABLE CONCRETE



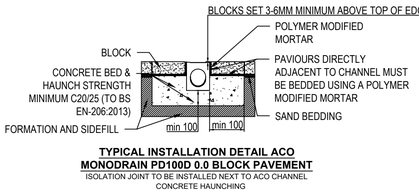
TYPICAL INSTALLATION DETAIL ACO MONODRAIN PD150D 0.0 BLOCK PAVEMENT
ISOLATION JOINT TO BE INSTALLED NEXT TO ACO CHANNEL CONCRETE HAUNCHING



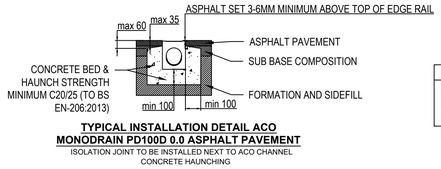
INTERNAL MANHOLE COVER WITH SEALING PLATE

INTERNAL MANHOLE COVER TYPES:	FRAME DEPTH	FRAME SEAT	FRAME CLEAR OPENING	OVERALL WIDTH
RECESSED 450 mm Ø	110 mm	70 mm	450 x 450 mm	450 x 450 mm
RECESSED 600 mm Ø	110 mm	70 mm	600 x 600 mm	600 x 600 mm
SOLID TOP 600 mm Ø	110 mm	135 mm	600 x 600 mm	740 x 740 mm

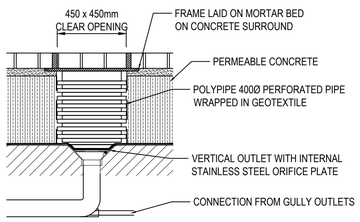
NOTE: RECESSED COVERS TBC BY CAREYS MH SUPPLIER



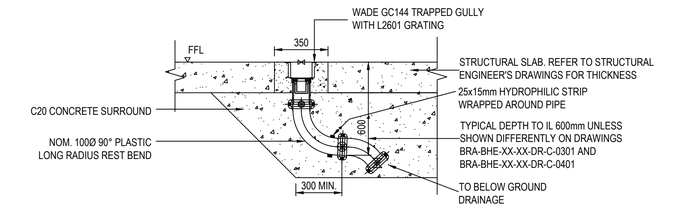
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ISOLATION JOINT TO BE INSTALLED NEXT TO ACO CHANNEL CONCRETE HAUNCHING



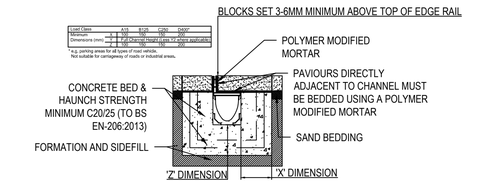
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ISOLATION JOINT TO BE INSTALLED NEXT TO ACO CHANNEL CONCRETE HAUNCHING



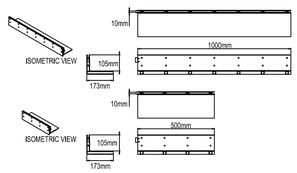
TYPICAL INSPECTION CHAMBER AND VERTICAL OUTLET SYSTEM AT PODIUM LEVEL - FOR DEPTHS >300mm



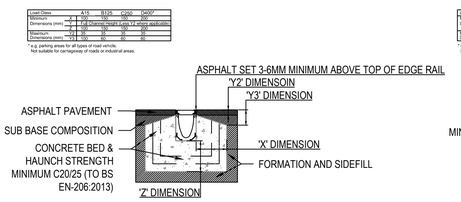
TRAPPED FLOOR GULLY DETAIL FOR WASTE COLLECTION AREA



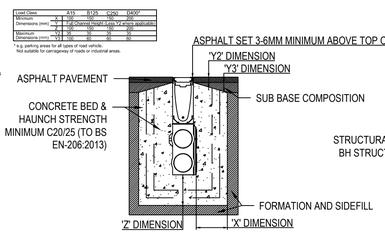
TYPICAL INSTALLATION DETAIL ACO MULTIDRAIN M150D 0.0 BRICKSLOT BLOCK PAVEMENT



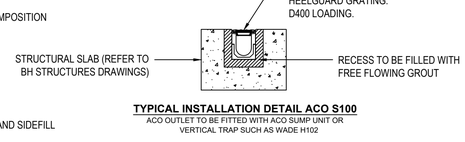
TYPICAL INSTALLATION DETAIL ACO M150D/DS BRICKSLOT STEEL GRATINGS D400



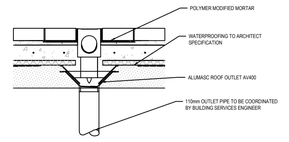
TYPICAL INSTALLATION DETAIL ACO MULTIDRAIN M100D 10.0 ASPHALT PAVEMENT
ISOLATION JOINT TO BE INSTALLED NEXT TO ACO CHANNEL CONCRETE HAUNCHING



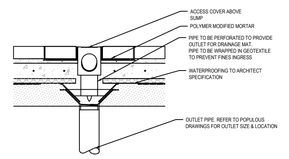
TYPICAL INSTALLATION DETAIL ACO MULTIDRAIN SUMP ASPHALT PAVEMENT



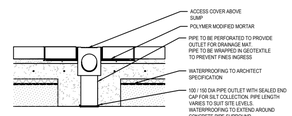
TYPICAL INSTALLATION DETAIL ACO S100
ACO OUTLET TO BE FITTED WITH ACO SUMP UNIT OR VERTICAL TRAP SUCH AS WADE H102



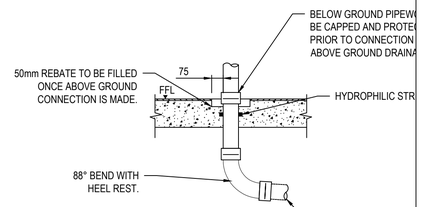
DETAIL FOR ACO MONODRAIN PD100 0.0 CHANNEL DRAIN OUTLET PASSING THROUGH SUSPENDED SLAB
SCALE 1:10



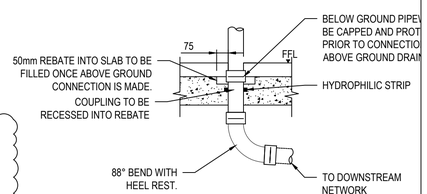
DETAIL FOR ACO MONODRAIN PD100 / 150 0.0 CHANNEL DRAIN OUTLET PASSING THROUGH SUSPENDED SLAB WITH PODIUM DRAINAGE MAT OUTLET
SCALE 1:10



DETAIL FOR ACO MONODRAIN PD100 / 150 0.0 PODIUM CHANNEL SILT COLLECTION
SCALE 1:10



TYPICAL FOUL WATER DRAIN CONNECTION TO BELOW GROUND - NO ARCHITECTURAL FINISH
SCALE 1:20



TYPICAL FOUL WATER DRAIN CONNECTION TO BELOW GROUND - WITH ARCHITECTURAL FINISH
SCALE 1:20

Rev	Appr/Drn	Date	Description
C08	SG AH	28.07.23	A4 AUTHORISED AND ACCEPTED
C07	SG AH	27.06.23	A4 AUTHORISED AND ACCEPTED
C06	SG AH	12.05.23	A4 AUTHORISED AND ACCEPTED
C05	SG AH	24.04.23	A4 AUTHORISED AND ACCEPTED
C04	FD AH	14.02.23	A4 AUTHORISED AND ACCEPTED
C03	FD AH	09.02.22	A4 AUTHORISED AND ACCEPTED
C02	FD AH	16.11.21	A4 AUTHORISED AND ACCEPTED
C01	KH AH	30.07.21	A4 AUTHORISED AND ACCEPTED
P05	SBH TH	03.07.20	STAGE 4a TENDER
P04	SBH NJH	20.03.20	STAGE 3

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Co-op Live

title DRAINAGE DETAILS SHEET 5

purpose of issue: STAGE 4a

scale	1:20	drawn	JZ	Job no.		Suitability
date	Nov-19	checked	NJH	0042841		A4
reference	project code	originator	volume	level	type	role	number	rev.
BRA-BHE-XX-XX-DR-C-0555								C08

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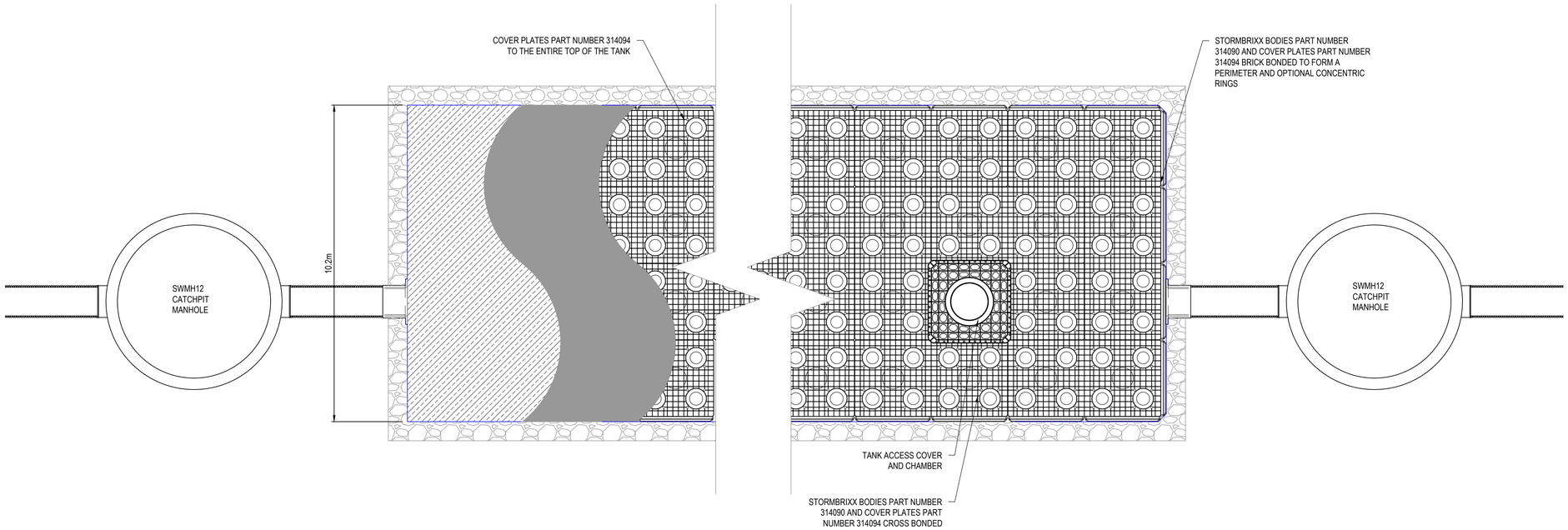
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CONSTRUCTION.
EXCAVATIONS IN CONTAMINATED GROUND
FINAL CONNECTION TO LIVE SEWER

MAINTENANCE/CLEANING/OPERATION.
HYDRO-BRAKE FLOW CONTROL DEVICE
ATTENUATION TANK
RAINWATER HARVESTING TANK EQUIPMENT

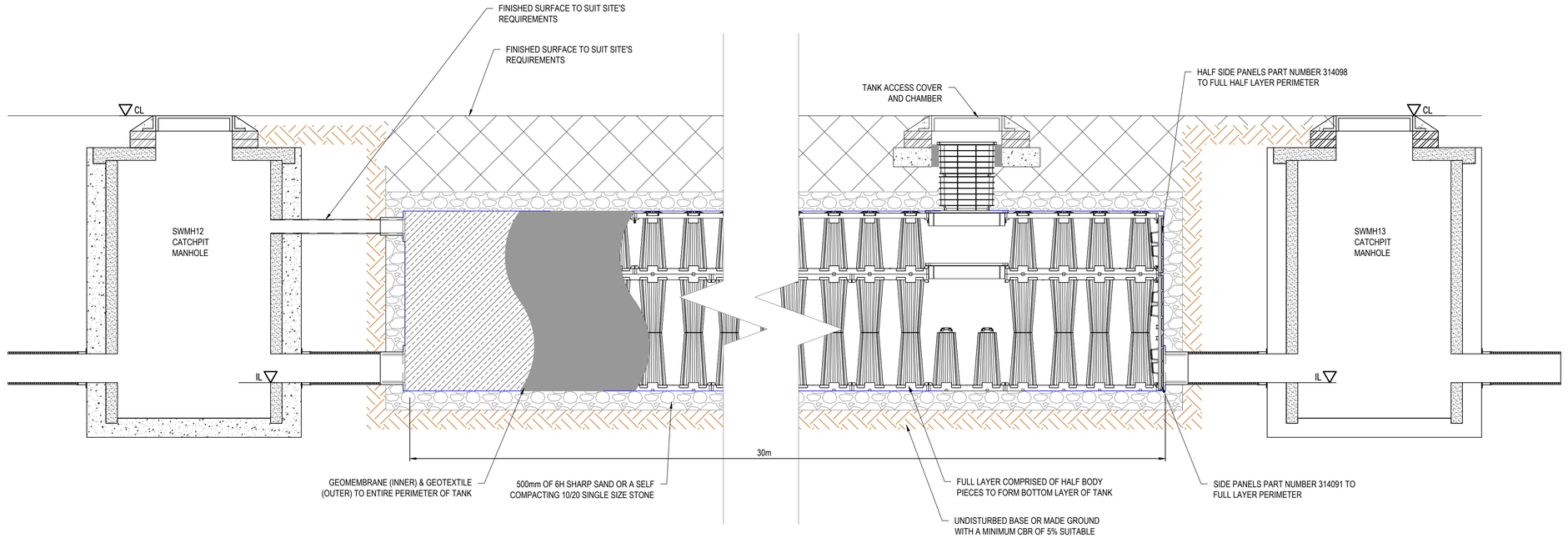
DECOMMISSIONING/DEMOLITION
NO UNUSUAL RISKS

Notes



ACO STORMBRIXX HD ATTENUATION 1.5 LAYER TANK
PLAN
NOT TO SCALE

ATTENUATION TANK TO BE HANDLED AND INSTALLED IN STRICT ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS



ACO STORMBRIXX HD ATTENUATION 1.5 LAYER TANK
ELEVATION
NOT TO SCALE

Rev	Appr/Drn	Date	Description
C01	KH AH	30.07.21	A4 AUTHORISED AND ACCEPTED
P05	SBH TH	03.07.20	STAGE 4a TENDER
P04	SBH NJH	20.03.20	STAGE 3
P03	SBH NJH	13.02.20	STAGE 3
P02	JZ JB	29.11.19	DRAFT STAGE 3
P01	JZ SR	01.11.19	DRAFT STAGE 3

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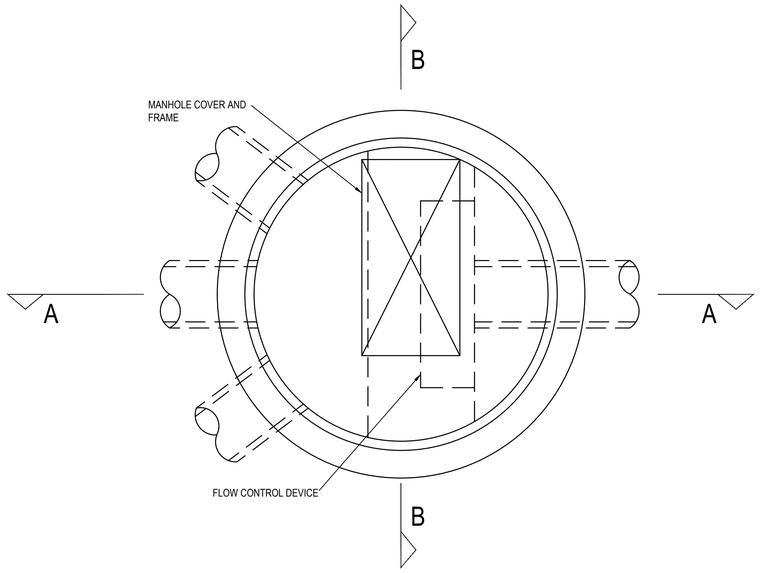
Co-op Live

title DRAINAGE DETAILS
SHEET 6

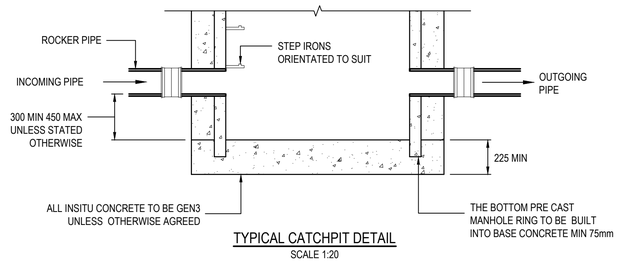
purpose of issue
STAGE 4a

scale	1:20	drawn	JZ	Job no.	Suitability
date	Nov-19	checked	NJH	0042841	A4

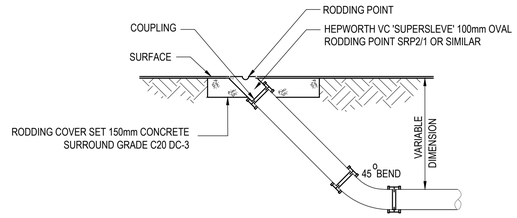
reference	project code	originator	volume	level	type	role	number	rev.
BRA-BHE-XX-XX-DR-C-0556								C01



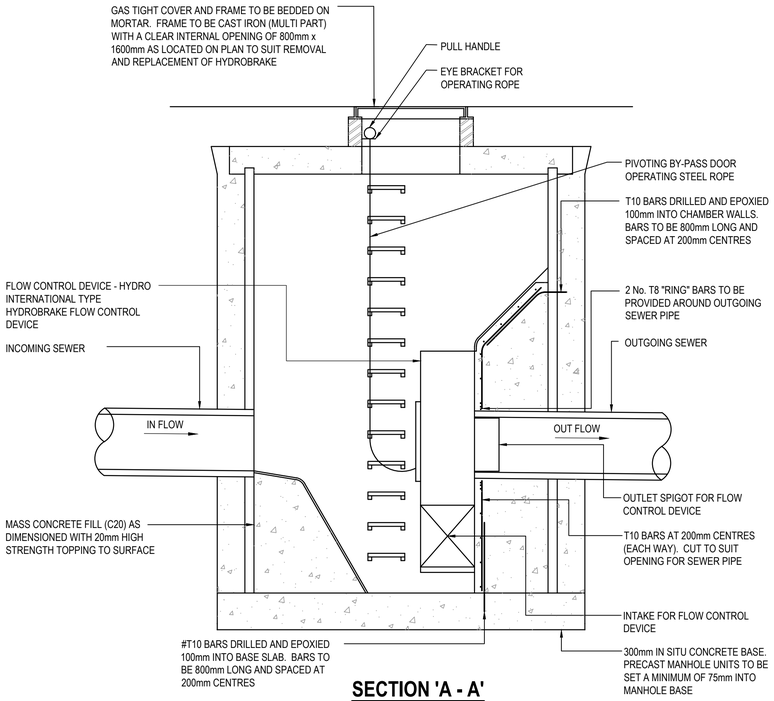
MANHOLE WITH HYDRO BRAKE - PLAN DETAIL
MANHOLE



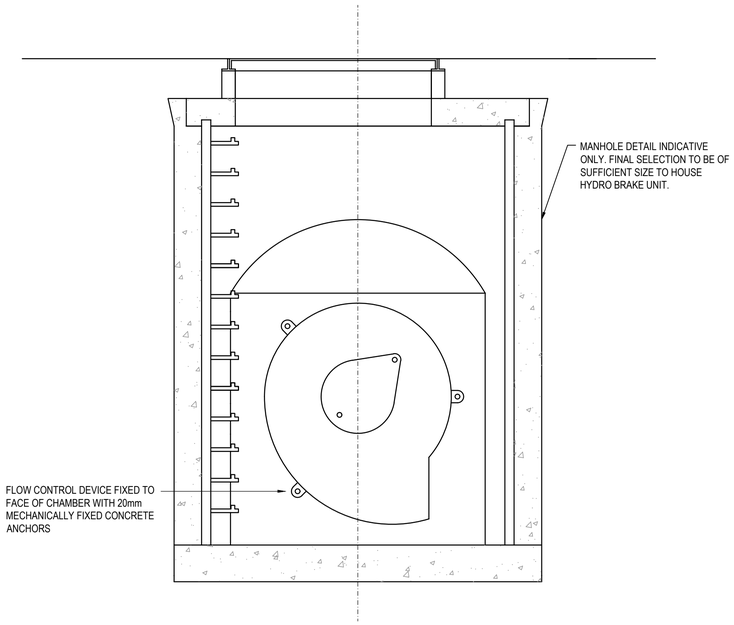
TYPICAL CATCHPIT DETAIL
SCALE 1:20



RODDING EYE IN LANDSCAPE
SCALE 1:20



SECTION 'A - A'



SECTION 'B - B'

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CONSTRUCTION.
EXCAVATIONS IN CONTAMINATED GROUND
FINAL CONNECTION TO LIVE SEWER

MAINTENANCE/CLEANING/OPERATION.
HYDRO-BRAKE FLOW CONTROL DEVICE
ATTENUATION TANK
RAINWATER HARVESTING TANK EQUIPMENT

DECOMMISSIONING/DEMOLITION
NO UNUSUAL RISKS

Notes

C01 KH AH 30.07.21 A4 AUTHORISED AND ACCEPTED
P01 FR AH 03.07.20 STAGE 4a TENDER

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title DRAINAGE DETAILS
SHEET 7

purpose of issue
STAGE 4a

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reference	project code	originator	volume	level	type	role	number	rev.
BRA-BHE-XX-XX-DR-C-0557								C01

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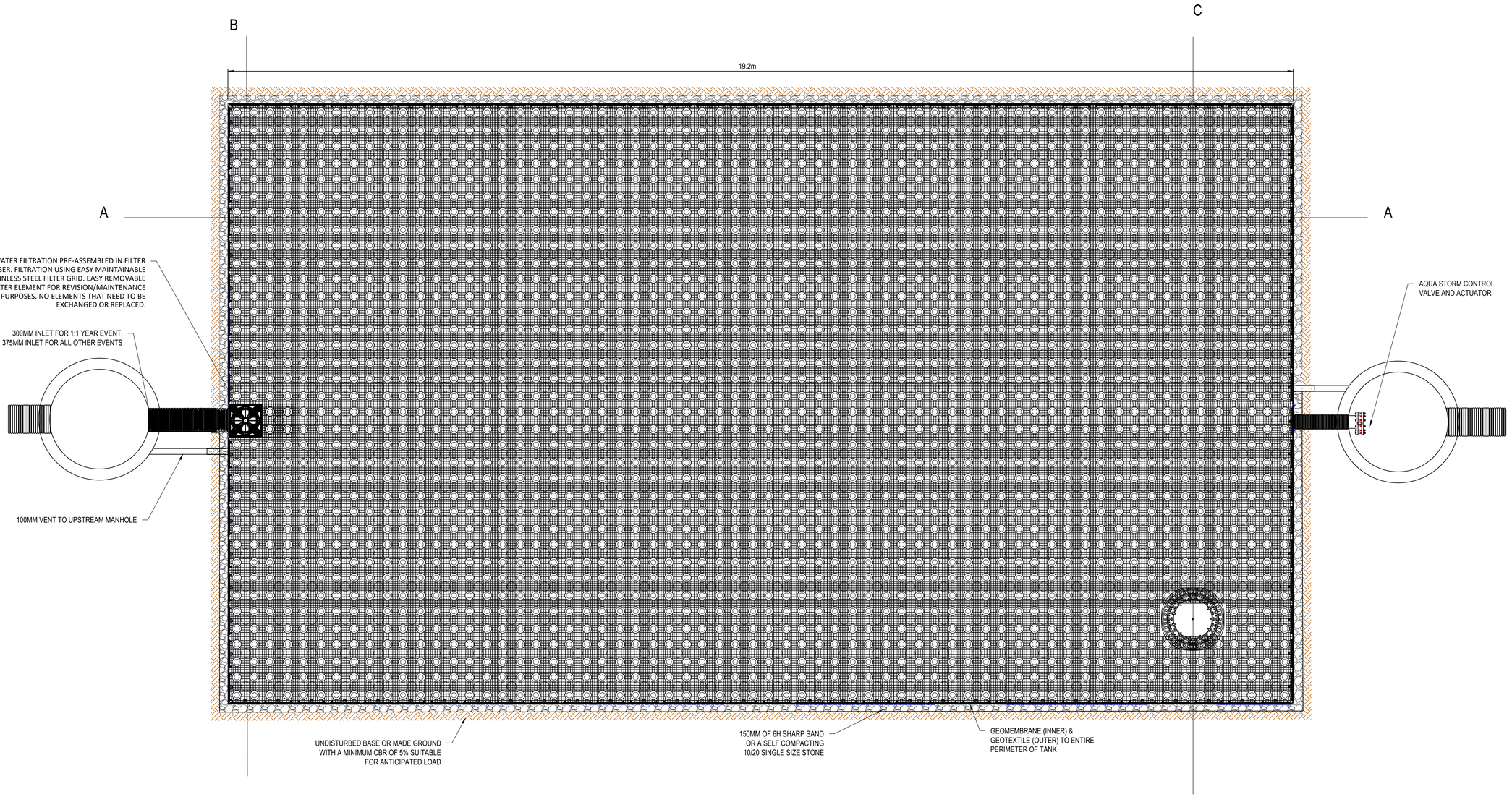
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CONSTRUCTION.
EXCAVATIONS IN CONTAMINATED GROUND
FINAL CONNECTION TO LIVE SEWER

MAINTENANCE/CLEANING/OPERATION.
HYDRO-BRAKE FLOW CONTROL DEVICE
ATTENUATION TANK
RAINWATER HARVESTING TANK EQUIPMENT

DECOMMISSIONING/DEMOLITION
NO UNUSUAL RISKS

Notes



RAINWATER HARVESTING TANK
ACO STORMBRIXX HD ATTENUATION 1.5 LAYER TANK
PLAN
NOT TO SCALE

RAINWATER HARVESTING TANK TO BE HANDLED AND INSTALLED IN STRICT ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS
REFER TO DRAWING 0559 FOR SECTIONS

Rev	Appr/Drn	Date	Description
C01	KH AH	30.07.21	A4 AUTHORISED AND ACCEPTED
P01	FR AH	03.07.20	STAGE 4a TENDER

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title DRAINAGE DETAILS
SHEET 8

purpose of issue
STAGE 4a

scale	1:20	drawn	FR	Job no.	Suitability
date	Jul-20	checked	AH	0042841	A4

reference	project code	originator	volume	level	type	role	number	rev.
BRA-BHE-XX-XX-DR-C-0558								C01

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B1,B2,B3, Etc, - Partial sign-off (with comments)

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CR - As constructed record document

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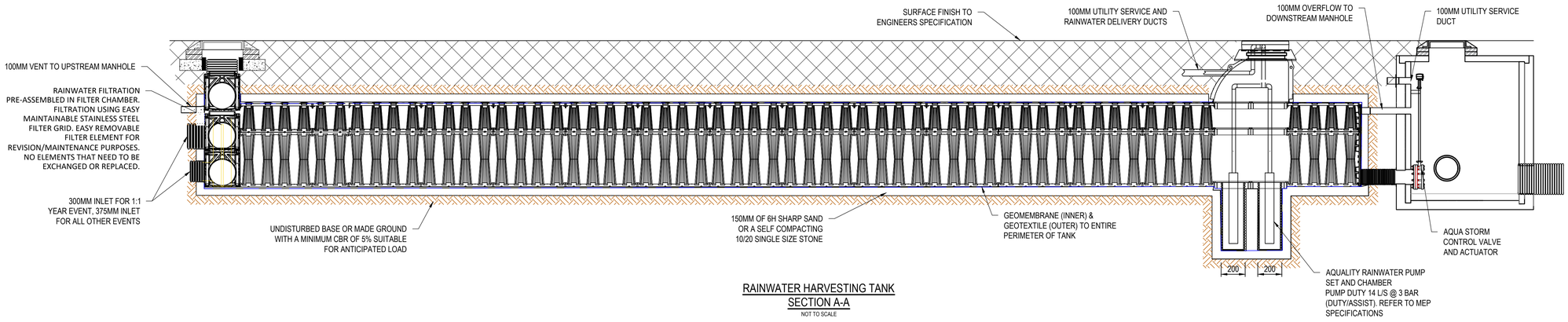
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CONSTRUCTION.
EXCAVATIONS IN CONTAMINATED GROUND
FINAL CONNECTION TO LIVE SEWER

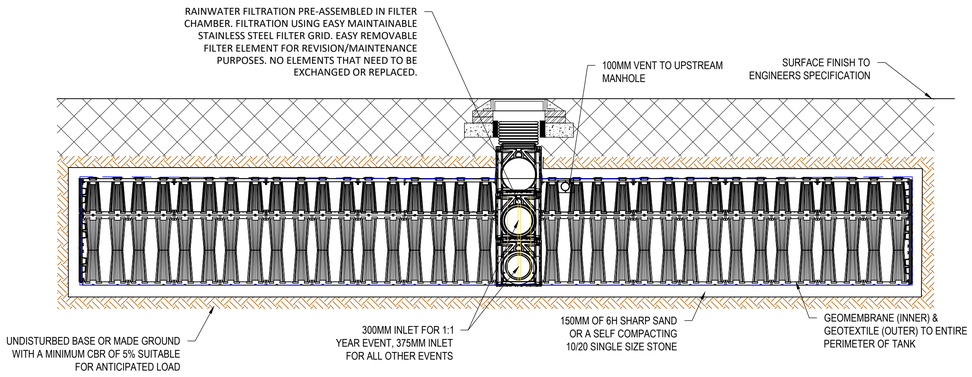
MAINTENANCE/CLEANING/OPERATION.
HYDRO-BRAKE FLOW CONTROL DEVICE
ATTENUATION TANK
RAINWATER HARVESTING TANK EQUIPMENT

DECOMMISSIONING/DEMOLITION
NO UNUSUAL RISKS

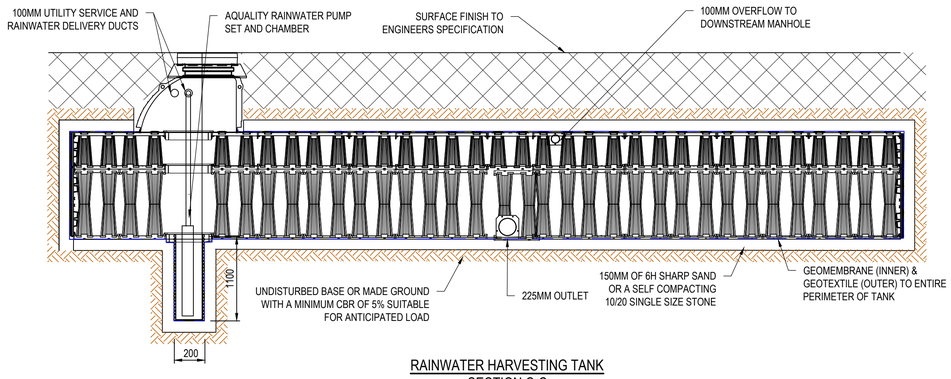
Notes



RAINWATER HARVESTING TANK
SECTION A-A
NOT TO SCALE



RAINWATER HARVESTING TANK
SECTION B-B
NOT TO SCALE



RAINWATER HARVESTING TANK
SECTION C-C
NOT TO SCALE

RAINWATER HARVESTING TANK TO BE HANDLED AND INSTALLED IN STRICT ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS
REFER TO DRAWING 0558 FOR PLAN

C01 KH AH 30.07.21 A4 AUTHORISED AND ACCEPTED
P01 FR AH 03.07.20 STAGE 4a TENDER

Rev	Appr/Drn	Date	Description

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title DRAINAGE DETAILS
SHEET 9

purpose of issue
STAGE 4a

scale	1:20	drawn	FR	Job no.	Suitability
date	Jul-20	checked	AH	0042841	A4

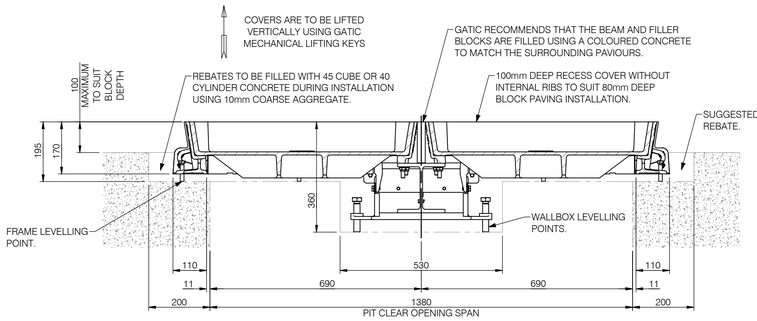
reference	project code	originator	volume	level	type	role	number	rev.
BRA-BHE-XX-XX-DR-C-0559								C01

1300 x 1380mm CLEAR OPENING GATIC 4 PART RECESSED MULTISPAN COVER & FRAME COMPLETE WITH ONE REMOVABLE SUPPORT BEAM - TYPE PAV PRODUCT CODE - PD130/138

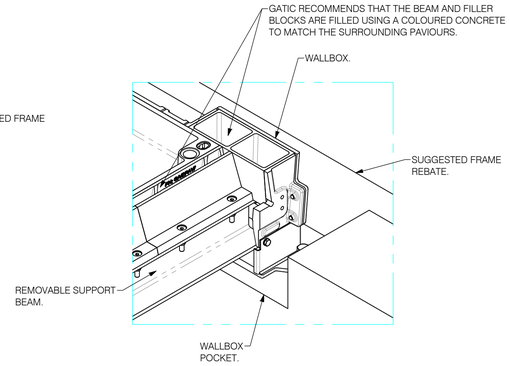
COVER MAKE UP
4 - 600 x 600 PAV NOM. C/O. COVER

COVER WEIGHT

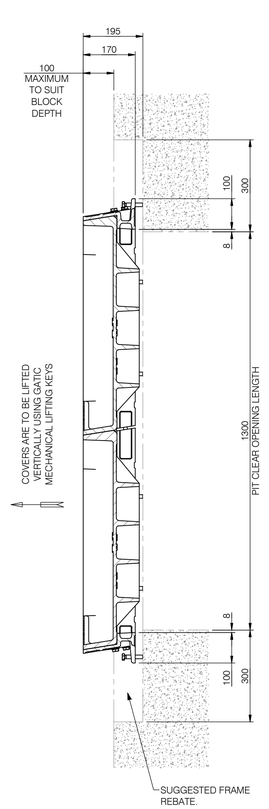
COMPLETE SUPPLIED UNIT WEIGHT - 688 kg
600 x 600 PAV COVER ONLY WEIGHT (UNFILLED) - 101kg
COVER FILLED WEIGHTS DEPENDANT ON INFILL MATERIAL USED.
BEAM ASSEMBLY WEIGHT - 118kg



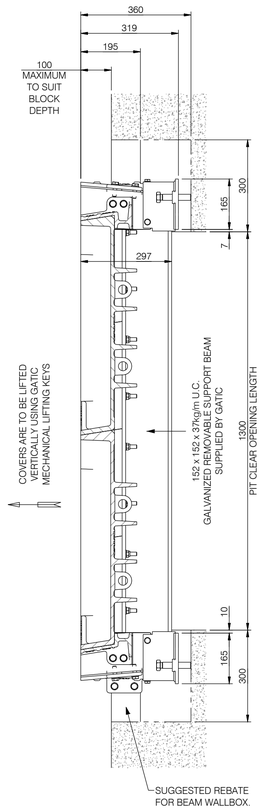
SECTION A - A



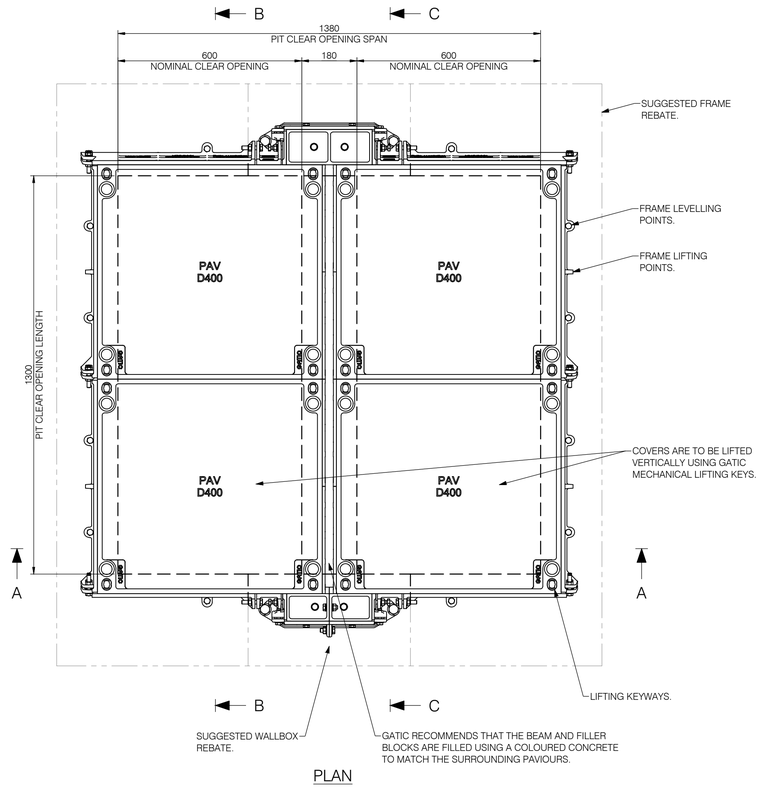
BACK WALLBOX ISOMETRIC VIEW
NOT TO SCALE



SECTION B - B



SECTION C - C



PLAN

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES (mm).
2. MATERIAL:
   COVERS & FRAMES -
   DUCTILE CAST IRON TO 'BS EN 1563' (SPHEROIDAL GRAPHITE) GRADE 600/3.

   REMOVABLE SUPPORT STEEL WORK -
   STRUCTURAL STEEL SECTIONS TO 'BS EN 10365'.
3. FINISH:
   UNITS ARE COATED WITH A BLACK BITUMINOUS SOLUTION THAT ACTS AS A TEMPORARY PROTECTION DURING TRANSIT.

   REMOVABLE SUPPORTING STEEL WORK - GALVANIZED TO 'BS EN ISO 1461'.
4. LOADING:
   'BS EN 124'
   D400 SUITABLE FOR 11.5 TONNE SLOW MOVING PNEUMATIC WHEEL LOAD.
5. COVERS ARE TO BE LIFTED VERTICALLY USING GATIC MECHANICAL LIFTING KEYS.
6. IT IS THE CONTRACTORS RESPONSIBILITY TO REPAIR TRANSIT & HANDLING DAMAGE TO THE GALVANIZED FINISH IN ACCORDANCE WITH 'BS EN ISO 1461'.
7. BEFORE COMMENCING SITE INSTALLATION REFER TO SETTING INSTRUCTIONS SUPPLIED AND GATIC MULTISPAN INSTALLATION TUTORIAL AVAILABLE FROM www.gatic.com/tutorial.

MANHOLE DETAIL FOR PODIUM LEVEL SPRINKLER TANK ACCESS

DETAIL BASED ON GATIC PD130/138. DETAIL TO BE INSTALLED TO GATIC REQUIREMENTS

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ATTENUATION TANK
RAINWATER HARVESTING TANK EQUIPMENT

DECOMMISSIONING/DEMOLITION
NO UNUSUAL RISKS

Notes

Rev	Appr/Drn	Date	Description
C01	FR AH	14.02.23	A4 AUTHORISED AND ACCEPTED

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title DRAINAGE DETAILS
SHEET 10

purpose of issue
STAGE 4a

scale	1:10	drawn	FR	Job no.	Suitability
date	Feb-23	checked	AH	0042841	A4

reference	project code	originator	volume	level	type	role	number	rev.
BRA-BHE-XX-XX-DR-C-0560								C01

Appendix 3- BHE Below Ground Drainage Specification

BUROHAPPOLD ENGINEERING

Co-Op Live

BRA_BHE_XX_XX_SP_C_0001 Below Ground Drainage Specification

0042841

25 August 2023

Revision C03

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Revision	Description	Issued by	Date	Checked
00	Issued for Draft Costing	SR	01.11.19	NH
P01	Stage 3	MJR	20.03.20	NH
P02	Stage 4a	BL	03.07.20	TH
C01	Issue for Construction	FDR	30.07.21	AH
C02	Issue for Construction	FDR	16.11.21	AH
C03	Gully located within podium waste management area	FR	25.08.23	AH

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author	**Francisco Rodriguez**
date	**25.08.23**
approved	**Allan Hoodless**
signature	
date	**25.08.23**

..

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1.1.1 Foul water drainage 4

1.1.2 Storm water drainage 4

1.2 Drawings 4

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2.2 Products 5

2.4 Completion 28

3 Health and Safety **30**

3.1 Confined Space Working 30

3.2 Lifting of Covers 30

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1 Preamble

1.1 Scope

1.1.1 Foul water drainage

Foul drainage is disposed off-site by gravity to an existing manhole in the north east corner of the site. The gravity foul water network is located below the ground floor slab to receive above ground stacks.

1.1.2 Storm water drainage

The existing site drains to highway drainage within Sport City Way.

The arena roof drains by using siphonic drainage to the external network. Discharge from the roof is unrestricted and is conveyed to an attenuation tank below the service yard slab.

Hard landscaped areas of the podium are drained using a combination of channel drains and permeable surfaces. Flows from the podium areas are not restricted and discharged to the below ground system to enable attenuation to the permissible discharge rates.

1.2 Drawings

This specification should be read in conjunction with the Civil Engineering drawings issued by BuroHappold Engineering. Civil Engineering drawings and documentation should also be read in conjunction with all other relevant Architect's and Engineer's drawings and documentation.

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2 R12 Below Ground Drainage Systems

2.1 General

R12/110 BELOW GROUND DRAINAGE SYSTEMS

- Surface water and rainwater drainage sources:
  - New roof area for proposed arena.
  - Runoff from hardlandscaped areas at ground floor and podium level.
- Foul drainage sources:
  - Foul flows from new arena building.
- Pipes, bends and junctions:
  - Clay – flexible joints (see clause R12/336): for diameters 100-300mm in external areas.
  - Cast iron – ductile, flexible or rigid joints, (see clause R12/332): for diameters 100-300mm cast into structures.
  - Concrete – flexible joints (see clause R12/342): for diameters >300mm in external areas and diameters >400mm beneath structures.
  - Plastic – flexible or rigid joints, (see clause R12/344): for diameters 100-300mm in external areas
- Manholes, inspection chambers:
  - Manholes: pre-cast concrete.
  - Inspection chambers: polypropylene

2.2 Products

R12/312 ADAPTORS TO PLASTIC DRAINAGE

- Material and standard: Plastics to BS 4660 and Kitemark certified or to BS EN 1401-1 and Kitemark certified.
- Type: DN 100 to DN 300.
- Manufacturer: Wavin or approved equivalent.
  - Product reference: OsmaDrain

R12/317A COMPOSITE GULLIES - 'S' TRAP GULLIES FOR INTERNAL AREAS WITH OR WITHOUT FLOOR FINISH

- Standards: To BS EN 1253-1, -2, -3, -4, -5
  - Cast iron: To BS 437 and Kitemark certified, or Agrément certified.

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- Material: Cast iron
- Manufacturer: Wade or equivalent approved.
- Product Reference: Wade G1014
- Traps: As supplied
- Raising pieces: -
- Silt Buckets: If available
- Covers:
    - Product Reference: L2106 vary level grate
    - Material: Stainless Steel
    - Size: 150mm x 150mm
    - Loading Grade to BS EN 124: Min A15

R12/317B COMPOSITE GULLIES - BELL TRAP GULLIES FOR BIN STORE

- Standards: To BS EN 1253-1, -2, -3, -4, -5
    - Cast iron: To BS 437 and Kitemark certified, or Agrément certified.
    - Material: Cast iron
    - Manufacturer: Wade or equivalent approved.
    - Product Reference: Wade GC144
    - Traps: Required
    - Raising pieces: If required
    - Silt Buckets: If available
    - Covers:
        - Product Reference: L2601 grate
        - Material: Stainless Steel
        - Size: 150mm x 150mm
        - Loading Grade to BS EN 124: Min C250

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R12/317C COMPOSITE GULLIES – CHUTE GULLY FOR SCW

- Standards: To BS EN 1253-1, -2, -3, -4, -5
    - Cast iron: To BS 437 and Kitemark certified, or Agrément certified.
    - Material: Cast iron
    - Manufacturer: Wrekin or equivalent approved.
    - Product Reference: Gully Chute Connector with 500 x 350mm Gully Grate
    - Covers:
        - Loading Grade to BS EN 124: Min D400

R12/317C DIRECT CONNECTION GRATE

- Standards: To BS EN 1253-1, -2, -3, -4, -5
    - Cast iron: To BS 437 and Kitemark certified, or Agrément certified.
    - Material: Cast iron
    - Manufacturer: Wade or equivalent approved.
    - Traps: Not required
    - Raising pieces: Not required
    - Silt Buckets: Not required
    - Covers:
        - Product Reference: K2193 grate
        - Material: Cast iron
        - Size: 150mm x 150mm
        - Loading Grade to BS EN 124: Min C250

R12/317D PERMEABLE CONCRETE OUTLET GRATE

- Standards: To BS EN 1253-1, -2, -3, -4, -5
    - Cast iron: To BS 437 and Kitemark certified, or Agrément certified.

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- Material: Nickel Bronze
- Manufacturer: Wade or equivalent approved.
- Traps: Not required
- Raising pieces: Not required
- Silt Buckets: Not required
- Covers:
    - Product Reference: N301 grate
    - Material: Nickel bronze
    - Size: 150mm diameter
    - Loading Grade to BS EN 124: Min C250

R12/317E COMPOSITE GULLIES - GULLIES WITHIN PODIUM WASTE MANAGEMENT AREA

- Standards: To BS EN 1253-1, -2, -3, -4, -5
    - Cast iron: To BS 437 and Kitemark certified, or Agrément certified.
    - Material: Cast iron
    - Manufacturer: ACO or equivalent approved.
    - Product Reference: car park gullies Passavant (DN 100)
    - Traps: Required
    - Raising pieces: If required
    - Covers:
        - Size: 200mm x 200mm
        - Load Class: M 125

329 PIPES, BENDS AND JUNCTIONS - SUPPLY

- Pipes and fittings: From same manufacturer for each pipeline.

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R12/332 PIPES, BENDS AND JUNCTIONS - CAST IRON - DUCTILE FOR DIAMETERS BETWEEN 100-300mm CAST INTO STRUCTURES

- Standard: To BS EN 598, Kitemark certified.
- Manufacturer: PAM Saint-Gobain, or similar approved.
- Product reference: Timesaver, or similar approved.
    - Sizes: 100-300mm diameter.
- Additional corrosion protection: zinc coating & acrylic primer.
- Jointing type: Two-piece ductile iron coupling, or push-fit on 100mm and 150mm diameter pipework. Push fit to have nitrile rubber gasket.

R12/336 PIPES, BENDS AND JUNCTIONS – CLAY – FLEXIBLE JOINTS FOR STORM AND FOUL WATER PIPES EXTERNAL TO BUILDING FOOTPRINT

- Material and Standard: Vitrified Clay to BS EN 295-1, Kitemark certified.
- Manufacturer: Hepworth, or similar approved.
    - Product reference: Hepworth SuperSleeve.
- Sizes: 100mm to 300mm diameter.
- Crushing strength (minimum): 40kN/m for up to 150mm; 45kN/m for 225mm and 72kN/m for 300mm diameter pipes.
- Jointing type: Polypropylene sleeve with EPDM sealing rings

R12/342 PIPES, BENDS AND JUNCTIONS - CONCRETE SURFACE WATER

- Standards: To BS 5911-1 and BS EN 1916, with flexible joints.
- Manufacturer: CPM or similar approved.
    - Product reference: Flexible jointed pipes or similar approved.
- Sizes: 300mm and above.
- Shapes: Circular.
- Cement type and content: To BS 5911-1 and BS EN1916.
- Accessories: Rubber ring seal jointing.

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R12/344 PIPES, BENDS AND JUNCTIONS - PLASTICS – STRUCTURED WALL SURFACE WATER FOR ATTENUATION TANK

- Standard: Type B, to BS EN 13476-1 and -3, Kitemark or Agrément certified.
    - Supplementary requirements: Puncture resistance, jetting resistance and longitudinal bending to requirements of WIS 4-35-01, issue 2.
- Material: HDPE.
- Manufacturer: Wavin or similar approved.
    - Product reference: Twinwall perforated and unperforated.
- Recycled content: 100% (minimum) to BS EN ISO 14021.
- Sizes: Refer to drawings and details
- Jointing type: Spigot and socket joints with rubber sealing ring.

357 CONNECTORS – SADDLE (WHERE REQUIRED)

- Standards:
    - Cast iron: To BS 437 and Kitemark certified, or Agrément certified.
    - Clay: To BS EN 295-1 and Kitemark certified, or Agrément certified.
    - Concrete: To BS 5911-6 and Kitemark certified, or Agrément certified.
    - Plastics: To BS 4660 and Kitemark certified, or Agrément certified.
- Material: To suit connecting pipe material
- Manufacturer: As per pipework
    - Product reference: As per pipework
- Sizes: To suit connection

R12/365 PUDDLE FLANGES

- Manufacturer: Ensign or similar approved.
    - Product reference: Ensign EEZI-FIT to suit pipe diameter

R12/379 WARNING MARKER TAPES – FOUL DRAINAGE EXTERNAL TO ARENA

- Type: Heavy gauge polyethylene.

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- Manufacturer: Terram or approved equivalent.
    - Product reference: Utilitape or similar approved.
- Colour: Red.
- Widths: 150mm.
- Message: CAUTION FOUL SEWER BELOW.
- Wire detection aid: Not required.

R12/380* WARNING MARKER TAPES – SURFACE WATER DRAINAGE EXTERNAL TO ARENA BUILDING

- Type: Heavy gauge polyethylene.
- Manufacturer: Terram or approved equivalent.
    - Product reference: Utilitape or similar approved.
- Colour: Blue.
- Widths: 150mm.
- Message: CAUTION STORMWATER DRAIN BELOW.
- Wire detection aid: Not required.

R12/401 INSPECTION CHAMBERS – PLASTICS FOR ACCESS TO PODIUM OUTFALL POINTS

- Standard: To BS 7158 or BS EN 13598-1, or Agrément certified.
- Diameter: 600mm x 600mm.
- Manufacturer: Wavin or approved equivalent.
- Bases:
    - Product reference: Range 450 to suit connections.
- Shaft units:
    - Product reference: Range 450.
- Access covers and frames:
    - Product reference: Refer clause 471.
    - Loading grades to BS EN 124: D400

R12/407 MANHOLES – CONCRETE - INTERNAL

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- Standards:
    - To BS 5911-3 and BS EN 1917 and Kitemark certified; or
    - To BS 5911-4 and BS EN 1917.
- Manufacturer: CPM or approved equivalent.
- Shape: Rectangular and Circular – Refer to Manhole Schedule
- Sizes: Diameter varies. Refer to Manhole Schedule
- Cement type and content: To BS 5911-1 and BS EN 1916.
- Chamber sections:
    - Product reference: Perfect Manhole System.
    - Jointing type: Rubber.
- Cover slabs:
    - Product reference: Sealed Manhole.
    - Thickness: As per manufacturers recommendations.
    - Loading grades to BS EN 124: A15 (Internal only), D400 (Service yard and event floor)
    - Openings: To suit access covers.
- Steps: Required in chambers over 900mm deep.

R12/408 MANHOLES – CONCRETE – EXTERNAL

- Standards:
    - To BS 5911-3 and BS EN 1917 and Kitemark certified; or
    - To BS 5911-4 and BS EN 1917.
- Manufacturer: CPM or approved equivalent.
- Shape: Circular.
- Sizes: Diameter varies.
- Cement type and content: To BS 5911-1 and BS EN 1916.
- Chamber sections:
    - Product reference: Perfect Manhole System.
    - Jointing type: Rubber.

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- Cover slabs:
    - Product reference: Perfect Manhole System.
    - Thickness: As per manufacturers recommendations.
    - Loading grades to BS EN 124: D400
    - Openings: To suit access covers.
- Steps: Required in chambers over 900mm deep.

409 MANHOLES - CONCRETE - ADDITIONAL COMPONENTS FOR DEEP MANHOLES

- Standards:
    - To BS 5911-3 and BS EN 1917 and Kitemark certified; or
    - To BS 5911-4 and BS EN 1917.
- Manufacturer: CPM or similar approved
- Cement type and content: To BS 5911-1 and BS EN 1916.
- Landing slabs: If required
    - Product reference: As per supplier
    - Sizes: To suit manhole diameter
- Reducing slabs:
    - Product reference: As per supplier
    - Sizes: To suit manhole diameter
- Straight backed tapers: Not required
    - Product reference: -
    - Nominal sizes: -
- Shaft sections:
    - Product reference: As per supplier
- Sizes: To suit manhole diameter

412 MANHOLES AND INSPECTION CHAMBERS – PLASTICS

- Standard: To BS 7158, Kitemark certified

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- Manufacturer: Wavin or similar approved
    - Product reference: Universal chamber
- Material: As supplied
- Shape: Circular
- Size: 450mm or as indicated
- Moulded base:
    - Channels and connections: As required
    - Benching: Pre-formed base units
- Formwork for concrete surround: Required
- Steps: Not required

R12/433 MANHOLE CHANNELS AND BRANCHES - CONVENTIONAL

- Material: To match pipework.
- Manufacturer: To match pipework.
    - Product reference: Refer to pipework clause 342.

R12/435 MANHOLE CHANNELS AND BRANCHES - PREFORMED PLASTICS

- Manufacturer: To match pipework.
    - Product reference: Refer to pipework clauses 344 and 346.

R12/437 VORTEX FLOW CONTROL UNIT

- Manufacturer: Hydro International for vortex flow control units
- Unit reference : SHE-0356-9200-2850-9200
- Flow control chamber to be at least 2400mm
- Clear opening to be 1800x600mm
- Supplier to provide installation drawings and specifications to the Contractor for construction.
- Type of flow: Surface water
- Body and fixings: to be stainless steel Grade 304

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Installation: As suppliers' specification and drawings

R12/438 Active Rainwater Harvesting Tank

- Manufacturer: Aquality
- Refer to BHE drawings 0558-0559 for details
- Supplier to provide installation drawings and specifications to the Contractor for construction.
- Installation: As suppliers' specification and drawings

R12/439 MANHOLE STEPS

- Standard: To BS EN 13101.
- Type: Type D Class 1 galvanised iron with plastic encapsulation to approved pattern.
- Manufacturer: As recommended by chamber manufacturer.

R12/444 SEALING FOR CONCRETE MANHOLES – BITUMINOUS STRIPS

- Manufacturer: Denso, or approved equivalent.
    - Product reference: TOK-Strip, or similar approved.

R12/464 MODULAR STORMWATER ATTENUATION UNITS – FOR ATTENUATION TANK

- Manufacturer: ACO Water Management, or approved equivalent.
- Product reference: ACO StormBrixx HD, or similar approved.
- Unit size: 1.2m long x 0.6m wide x 0.6m high.
- Tank capacity / size (minimum): 405 cu.m
- Waterproof membrane: As recommended by supplier
    - Membrane joints: To manufacturers specification / details.
- Geotextile layer: As recommended by supplier

R12/464 MODULAR STORMWATER ATTENUATION UNITS

- Manufacturer: ACO Water Management, or approved equivalent.

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- Product reference: ACO StormBrixx HD, or similar approved.
- Unit size: 1.2m long x 0.6m wide x 0.6m high.
- Tank capacity / size (minimum): 275 cu.m
- Waterproof membrane: As recommended by supplier
    - Membrane joints: To manufacturers specification / details.
- Geotextile layer: As recommended by supplier

468 PRECAST CONCRETE COVER SLABS

- Standard: To BS 5911-3.
- Manufacturer: CPM Group or similar approved
    - Product reference: As supplied
- Size: To suit manhole diameter
- Openings: To suit access covers.

R12/472 ACCESS COVERS AND FRAMES – MANHOLE CHAMBERS – INTERNAL RECESSED

- Standard: To BS EN 124.
- Types: Double sealed.
- Manufacturer: Peter Savage (EJ) or approved equivalent.
    - Product reference: 3900
- Materials: Galvanised steel
- Finishes: Edging to Architects requirements
- Sizes: 450 x 450mm or 600 x 600mm C/O to suit location
- Loading grades to BS EN 124: A15 / AAA
- Edging trims: Refer to Architect's specification.
- Accessories: Lockable.

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R12/472 ACCESS COVERS AND FRAMES – MANHOLE CHAMBERS – INTERNAL SERVICE YARD

- Standard: To BS EN 124.
- Types: Sealing plates for foul water. Vented covers for attenuation tank
- Manufacturer: Peter Savage (EJ) or approved equivalent.
    - Product reference: KD100
- Materials: Ductile iron
- Finishes: As supplied
- Sizes: 600 x 600mm C/O to suit location
- Loading grades to BS EN 124: D400
- Edging trims: -
- Accessories: High security locking, badged SW or FW to suit

R12/473 ACCESS COVERS AND FRAMES – MANHOLE CHAMBERS – EXTERNAL SOLID TOP

- Standard: To BS EN 124.
- Types: Single sealed.
- Manufacturer: Peter Savage (EJ) or approved equivalent.
    - Product reference: KD100.
- Materials: Ductile Iron.
- Finishes: Suitable for trafficable areas. Depth of tray to suit type of finish.
- Sizes: 740 x 740 (clear opening 600 x 600).
- Loading grades to BS EN 124: D400.
- Edging trims: Not required.
- Accessories: High security locking, Badged FW or SW to suit

R12/473B ACCESS COVERS AND FRAMES – MANHOLE CHAMBERS – EXTERNAL RECESSED

- Standard: To BS EN 124.
- Types: Single sealed.
- Manufacturer: Peter Savage (EJ) or approved equivalent.
    - Product reference: PS6000.
- Materials: Steel.

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- Finishes: Suitable for trafficable areas. Depth of tray to suit type of finish.
- Sizes: 740 x 740 (clear opening 600 x 600).
- Loading grades to FACTA D.
- Edging trims: Not required.
- Accessories: High security locking, Badged FW or SW to suit

R12/475 ACCESS LADDERS MANHOLE TYPE 1B

- Standard: To BS 4211.
- Manufacturer: Manhole manufacturer recommendation.
    - Product reference: Mild steel access ladder.
- Finish: Galvanized to BS EN ISO 1461.
- Accessories: None.

R12/483 CONCRETE (GENERAL)

- Inspection chamber surrounds.
- Standard: To BS 8500-2.
- Concrete: C16/20 with sulphate resisting concrete.

R12/487 CONCRETE (ADOPTABLE MANHOLE BENCHINGS AND SURROUNDS)

- Standard:
    - England and Wales, Northern Ireland: To WRc 'Sewers for Adoption'.
- Concrete: In situ.

R12/489 CONCRETE (ADOPTABLE MANHOLE BENCHING TOPPING)

- Standard:
    - England and Wales, Northern Ireland: To WRc 'Sewers for Adoption'.
- Concrete: High strength.

R12/492 GEOTEXTILE MEMBRANES – WHERE REQUIRED

- Manufacturer: Terram or similar approved.

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- Product reference: T1000 or similar approved.

R12/494 GEOTEXTILE MEMBRANES – FOR ATTENUATION TANK

- Manufacturer: As recommended by tank supplier
  - Product reference: As recommended

R12/496 GRANULAR MATERIAL - NATURAL

- Standard: To BS EN 12620.
- Recycled content: 50% minimum to BS EN 14021.
- Size: Dependent on location

2.3 Execution

R12/610 STRIPPING OUT

- Extent of stripping out: TBC
- Exposed ends of existing drainage to be abandoned: Seal with concrete (general).

R12/611 EXISTING DRAINS

- Setting out: Before starting work, check invert levels and positions of existing drains, sewers, inspection chambers and manholes against drawings. Report discrepancies.
- Protection: Protect existing drains to be retained and maintain normal operation if in use.

R12/613 EXCAVATED MATERIAL

- Turf, topsoil, hardcore, etc: Set aside for use in reinstatement.

R12/616 SELECTED FILL FOR BACKFILLING

- Selected fill: As-dug material, free from vegetable matter, rubbish, frozen soil and material retained on a 40 mm sieve.
  - Compaction: By hand in 100 mm layers.

R12/623 LOWER PART OF TRENCH - GENERAL

- Trench up to 300 mm above crown of pipe: Vertical sides, width as small as practicable.

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- Width (minimum): External diameter of pipe plus 300 mm.

R12/625 LOWER PART OF TRENCH - TRANSITION DEPTHTrench widths up to 300 mm above crown of pipe (maximum):

- DN 100 pipelines more than 6.0 m deep: 600 mm.
- DN 150 pipelines more than 5.4 m deep: 700 mm.
- DN 225 pipelines more than 4.0 m deep: 800 mm.
- DN 300 pipelines more than 2.9 m deep: 900 mm.
- DN 750 pipelines more than 2.0 m deep: 1500 mm.

R12/631 TYPE OF SUBSOIL

- General: Where type of subsoil at level of crown of pipe differs from that stated for the type of bedding, surround or support, give notice.

R12/635 FORMATION FOR BEDDINGS

- Timing: Excavate to formation immediately before laying beddings or pipes.
- Mud, rock projections, boulders and hard spots: Remove. Replace with consolidated bedding material.
- Local soft spots: Harden by tamping in bedding material.
- Inspection of excavated formations: Give notice.

R12/641 PIPES AT DIFFERENT LEVELS IN COMMON TRENCH

- Sub trench: Permissible provided soil of step is stable and unlikely to break away.
  - Sub trench not permissible: Trench depth as required for lower pipe. Increase thickness of bedding to upper pipe as necessary.
- Lower pipe: Backfill with compacted granular material to at least halfway up higher pipe.
- Clear horizontal distance between pipes (minimum):
  - Pipes up to DN 700: 350 mm.
  - Pipes exceeding DN 700: 500 mm.

R12/667 CLASS S SURROUND – FOR PIPES GREATER THAN 1200mm DEEP

- Type of subsoil: Made ground overlying clay.

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- Trench width up to 300 mm above crown of pipe (maximum):
    - DN 100 nominal pipe size: 600 mm.
    - DN 150 nominal pipe size: 700 mm.
    - DN 225 nominal pipe size: 800 mm.
    - DN 300 nominal pipe size: 900 mm.
    - DN 750 nominal pipe size: 1500 mm.
- Granular material: Natural.
    - Pipe sizes DN 100 and DN 150: Size 4/10.
    - Pipe sizes DN 225 and DN 300: Size 4/10, 10/20 or 4/20.
    - Pipe sizes DN 375-500: Size 10/20 or 4/20.
    - Pipe sizes DN 600 and above: Size 10/20, 20/40, 4/20 or 4/40.
- Bedding:
    - Material: Granular, compacted over full width of trench.
    - Thickness (minimum): 50 mm for sleeve jointed pipes, 100 mm for socket jointed pipes. Where trench bottom is uneven, increase depth by 100 mm.
- Pipes: Dig slightly into bedding, rest uniformly on barrels and adjust to line and gradient.
- Initial testing before placing surround: Required.
- Surround:
    - Material: Granular.
    - Depth: To 50 mm above crown of pipe.
    - Compaction: By hand in 100 mm layers.
- Backfilling:
    - Material: Protective cushion of selected fill.
    - Depth: 150 mm (250 mm for adoptable sewers) above crown of pipe.
    - Compaction: By hand in 100 mm layers.

R12/678 CLASS Z SURROUND – FOR PIPES LESS THAN 1200mm DEEP BELOW TRAFFICKED AREAS

- Type of subsoil: Made ground overlying clay.

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- Blinding:
    - Material: Concrete (structural).
    - Thickness (minimum): 25 mm.
    - Width: Full width of trench.
    - Allow to set before proceeding.
- Pipes:
    - Temporary support: Folding wedges of compressible board. Prevent flotation.
    - Clearance under pipes (minimum): 100 mm.
    - Adjust pipes to line and gradient.
- Initial testing before placing surround: Required.
- Surround – Pipes below basement slab
    - Material: Concrete – Waterproof Concrete
    - Depth: To 150 mm above crown of pipe.
    - Width: Full width of trench.
    - Refer to Structural Engineer's specification and detailed drawings for exact details
- Surround:
    - Material: Concrete (General)
    - Depth: To 150 mm above crown of pipe.
    - Width: Full width of trench.
- Vertical construction joints:
    - Location: At face of flexible pipe joints.
    - Material: 18 mm thick compressible board pre-cut to profile of pipe.
    - Socketed pipes: Fill gaps between spigots and sockets with resilient material to prevent entry of concrete.

R12/680 CONCRETE SURROUND FOR PIPE RUNS NEAR FOUNDATIONS

- Class Z surround: Provide in locations where bottom of trench is lower than bottom of foundation and as follows (horizontal clear distance between nearest edges of foundations and pipe trenches):
    - Trenches less than 1 m from foundations: Top of concrete surround not lower than bottom of foundation.

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- Trenches more than 1 m from foundations: Top of concrete surround not lower than D mm below bottom of foundation, where D mm is horizontal distance of trench from foundation, less 150 mm.

R12/683 LAYING PIPELINES

- Laying pipes: To true line and regular gradient on even bed for full length of barrel with sockets (if any) facing up the gradient.
- Ingress of debris: Seal exposed ends during construction.
- Timing: Minimize time between laying and testing.

R12/685 JOINTING PIPELINES

- Connections: Durable, effective and free from leakage.
- Junctions, including to differing pipework systems: With adaptors intended for the purpose.
- Cut ends of pipes: Clean and square. Remove burrs and swarf. Chamfer pipe ends before inserting into ring seal sockets.
- Jointing or mating surfaces: Clean and, where necessary, lubricate immediately before assembly.
- Allowance for movement: Provide and maintain appropriate clearance at ends of spigots as fixing and jointing proceeds.
- Jointing material: Do not allow to project into bore of pipes and fittings.

R12/687 CONCRETE SURROUND FOR CROSSOVERS

- Class Z surround: Provide where two pipelines (other than plastics pipes) cross with less than 300 mm separation.
    - Extent, on both pipes: 1 m centred on the crossing point, and beyond as necessary to come within 150 mm of nearest flexible joints.

R12/689 PIPELINES PASSING THROUGH STRUCTURES

- Pipelines that must be cast in or fixed to structures (including manholes, catch pits and inspection chambers): Provide 600 mm long rocker pipes adjacent to the external face of the structure (or both faces where appropriate, e.g. walls to footings), with flexible joints at both ends.
    - Distance to rocker pipe from structure (maximum): 150 mm.
- Provision for movement for pipelines that need not be cast in or fixed to structures (e.g. walls to footings):
    - Rocker pipes as specified above; or
    - Openings in the structures to give 50 mm minimum clearance around the pipeline. Closely fit a rigid sheet to each side of opening to prevent ingress of fill or vermin.

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R12/691 BENDS AT BASE OF SOIL STACKS

- Type: Long radius 90-degree rest bend or two 45-degree bends.
    - Radius to centreline of pipe (minimum): 200mm.
- Height of invert of horizontal drain at base of stack below centreline of lowest branch pipe (minimum): 750mm.
- Bedding: Do not impair flexibility of pipe couplings.
    - Material: Concrete (structural).

R12/693 DIRECT CONNECTION OF GROUND FLOOR WCS TO DRAINS

- Drop from crown of WC trap to invert of drain (maximum): 1.3m.
- Horizontal distance from the drop to a ventilated drain (maximum): 6 m.

R12/695 BACKDROP PIPES OUTSIDE MANHOLE WALLS

- Excavation beneath backdrop pipe: Backfill.
    - Material: Concrete (structural).
- Pipe encasement:
    - Material: Concrete (structural).
    - Thickness (minimum): 150 mm.

R12/699 CONNECTIONS TO SEWERS

- General: Connect new pipework to existing adopted sewers to the requirements of the adopting authority or its agent.

R12/705 INITIAL TESTING OF PIPELINES

- Before testing:
    - Cement mortar jointing: Leave 24 h.
    - Solvent welded pipelines: Leave 1 h.
- Method: Block open ends of pipelines to be tested and pressurise. Air test short lengths to BS EN 1610.

R12/711 TRENCH SUPPORTS

- Removal of trench supports: Sufficient to permit compacted filling of all spaces.

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R12/715 BACKFILLING TO PIPELINES

- Backfilling above top of surround or protective cushion: Material excavated from trench, compacted in layers 300 mm (maximum) thick.
- Heavy compactors: Do not use before there is 600 mm (total) of material over pipes.

R12/718 BACKFILLING OVER CONCRETE

- Minimum times from placing concrete:
    - Backfilling generally: 24 h.
    - Heavy compactors and traffic loads: 72 h.

R12/720 BACKFILLING UNDER ROADS AND PAVINGS

- Backfilling from top of surround or protective cushion up to formation level: Granular sub-base material To Q20/210, laid and compacted in 150 mm layers.

R12/728 LAYING WARNING MARKER TAPES

- Installation: During backfilling, lay continuously over pipelines.
- Depth: 300-400 mm.
    - Pipelines deeper than 2 m: Lay an additional tape 600 mm above the top of the pipeline.

R12/732 TEMPORARY BRIDGES

- Trench bridges: As necessary to prevent construction traffic damaging pipes after backfilling.

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R12/741 INSTALLING INSPECTION CHAMBERS – PLASTICS

- Bedding:
  - Material: Concrete (structural).
  - Thickness (minimum): 150mm.
- Surround:
  - Material: Concrete (structural).
  - Thickness (minimum): 150mm.
- Backfilling: Granular material.
  - Compaction: By hand in 100 mm layers.
- Concrete collar:
  - Material: Concrete (structural).
  - Thickness (minimum): 150mm.
  - Width (minimum): 150mm.
- Seating: Not required.

R12/743 INSTALLING CONCRETE MANHOLES

- Bases:
  - Material: Concrete (structural).
  - Thickness (minimum): 150mm.
- Surround:
  - Material: Not required.
- Backfilling:
  - Material: Not Required

R12/753 FIXING MANHOLE STEPS

- Fixing: As per manufacturers details.
- Positioning: 300 mm vertical centres staggered 300 mm horizontally, with lowest step 300 mm (maximum) above benching and top step 450 mm (maximum) below top of cover.

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R12/755 JOINTING CONCRETE MANHOLE CHAMBER SECTIONS

- Jointing and sealing: Proprietary sealant to manufacturers specifications.
- Inner joint surface: Trim surplus jointing material extruded into chamber and point neatly.

R12/773 INSTALLING ACCESS COVERS AND FRAMES – INSPECTION CHAMBERS

- Seating: Not required.
- Bedding and haunching of frames: Continuously.
    - Material: Polyester access cover bedding mortar.
    - Top of haunching: 30 mm below surrounding surfaces.
- Horizontal positioning of frames:
    - Centred over openings.
    - Square with joints in surrounding paving.
- Vertical positioning of frames:
    - Level; or
    - Marry in with levels of surrounding paving.
- Permissible deviation in level of external covers and frames: +0 to -6 mm.

R12/774 INSTALLING ACCESS COVERS AND FRAMES - MANHOLES

- Seating: Pre-cast concrete rings or Class B engineering bricks.
- Bedding and haunching of frames: Continuously.
    - Material: Polyester access cover bedding mortar.
    - Top of haunching: 30 mm below surrounding surfaces.
- Horizontal positioning of frames:
    - Centred over openings.
    - Square with joints in surrounding paving.
- Vertical positioning of frames:
    - Level; or
    - Marry in with levels of surrounding paving.
- Permissible deviation in level of external covers and frames: +0 to -6 mm.

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R12/776 EXPOSED OPENINGS IN INSPECTION CHAMBERS, ACCESS POINTS, FITTINGS AND EQUIPMENT

- General: Fit purpose made temporary caps. Protect from site traffic.

2.4 Completion

R12/901 REMOVAL OF DEBRIS AND CLEANING

- Preparation: Lift covers to manholes, inspection chambers and access points. Remove mortar droppings, debris and loose wrappings.
    - Timing: Before cleaning, final testing, CCTV inspection, and immediately before handover.
- Cleaning: Thoroughly flush pipelines with water to remove silt and check for blockages. Rod pipelines between access points if there is any indication that they may be obstructed.
- Washings and detritus: Do not discharge into sewers or watercourses.
- Covers: Securely replace after cleaning and testing.

R12/903 TEMPORARY MEASURES

- Water used to stabilize tanks and the like during installation: Drain.

R12/911 TESTING AND INSPECTION

- Dates for testing and inspection: Give notice.
    - Period of notice: 24 hours.

R12/921 FINAL TESTING OF PRIVATE GRAVITY DRAINS AND SEWERS UP TO DN 300

- Before testing:
    - Cement mortar jointing: Leave 24 h.
    - Solvent welded pipelines: Leave 1 h.
- Standard: To Building Regulations.
- Method: Air testing to BS EN 1610.

R12/931 FINAL TESTING OF ADOPTABLE AND LARGE PRIVATE SEWERS

- Standard (sewers up to and including size DN 750):
    - England, Wales and Northern Ireland: To WRc ‘Sewers for adoption’.
- Method: Air testing to BS EN 1610.

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R12/941 WATER TESTING OF MANHOLES AND INSPECTION CHAMBERS

- Timing: Before backfilling.
- Standard:
    - Exfiltration: To BS EN 1610.
    - Method: Testing with water (method W).
    - Infiltration: No identifiable flow of water penetrating the chamber.

R12/971 CCTV INSPECTION OF PRIVATE PIPELINES

- General: Carry out and record internal inspection using CCTV equipment.
    - Locations to be inspected: Foul and surface water drains. The survey is to include all pipework up to the base of rest bends
- Illumination: Of adequate intensity.
- Recording: Provide continuous position recording, still photographs and stopping of the camera at any point.
    - Copy of videotape recording: Submit via email.
    - It is essential the pipe runs are clearly annotated so they can be cross referenced to the drainage plans which should also be annotated to ensure a clear understanding of what has been surveyed and where it can be located within the report and on the recording.

R12/978 LIFTING KEYS

- Lifting keys: Supply suitable keys for each type of access cover.
    - Timing: At completion.

R12/980 INSTRUCTIONS

- Manufacturer's user instructions: Submit where applicable.

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3 Health and Safety

- There are a number of specific Health and Safety concerns related to the operation and maintenance of buried drainage.
- Once the systems are complete and successfully tested, there is expected to be minimal operational input, but when it comes to maintenance (jetting blockages/ item replacement etc.) and follow-on works there are significant Health and Safety issues to be addressed (that the operator needs to take into account). In particular; confined space working; lifting of covers and risk of striking existing services when carrying out follow on works involving excavation.

3.1 Confined Space Working

- Primarily, as the underground services system is made up of both deep and shallow systems, there are numerous purpose-built access chambers that present the possible risk of confined space working (if personnel entry is ever necessary). Similarly, there are the associated risks of heavy gas build-up, foul effluent, flooding etc.
- Included in the list of chambers are the following:
    - Numerous manholes (Foul Water (FW)/ Surface Water (SW)) – (follow-on works and maintenance).
    - Entry to surface water attenuation tanks
- Entry into any access chamber must be carried out by taking consideration of any necessary confined space precautions (appropriate training/ venting/ gas detection/ man retrieval equipment and harnesses/ escape sets etc.). A confined space entry permit system should be introduced, and the works must be carried out by persons fully trained and holding a valid confined space certificate. Before work commences a method statement and risk assessment should be prepared.
- All pumping stations are fitted with guide rails to allow pump sets to be lifted out of the pumping stations and avoid the need of manual entry of any maintenance works.

3.2 Lifting of Covers

- Access to all the above list of chambers will require the lifting of covers which will involve manual handling. In some cases, the lifting of covers involves risks associated with heavy lifting i.e. the appropriate lifting handles and equipment must be used. Before work commences a method statement and risk assessment should be prepared. Security clearance for manhole cover lifting is a building operations consideration.

Follow-on Works Involving Excavation

- Any intended excavation poses the risk of striking existing buried services and it is important to appreciate that there is a wide range of risks associated with the services in the ground.

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- Prior to carrying out any excavation, it will be necessary for the contractor to review and compile ALL the buried drainage and services drawings and satisfy themselves as to what services are present – by hand/ trial excavation, if necessary. Before work commences a method statement and risk assessment should be prepared.

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Appendix 4-Photographic Evidence of Aco Channel Installation to Podium

Appendix 5-Photographic Evidence of Hydro Brakes installed


DONEGAN
15:37 15/JUN/2021


15:37 15/JUN/2021


15:38 15/JUN/2021


15:38 15/JUN/2021


7:48 30/JUN/2021





Appendix 6-Photographic Evidence of Catch Pits/Silt Traps Installed


7:01 24/APR/2023


8:28 8/DEC/2023

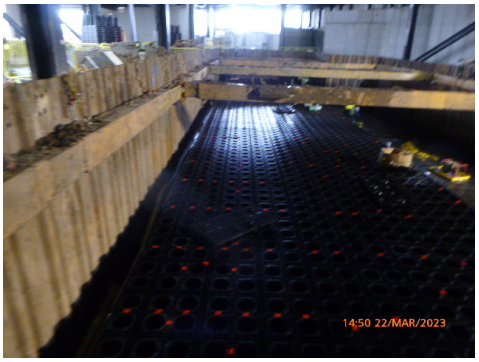

8:31 8/DEC/2023

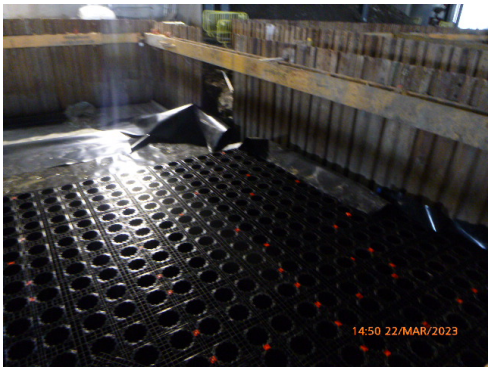
Appendix 7-Photographic Evidence of Gullies installed

Appendix 8-Photographic Evidence of Attenuation Tank Installed


13:49 16/MAR/2023


16:25 21/MAR/2023


14:50 22/MAR/2023


14:50 22/MAR/2023


14:51 22/MAR/2023


9:16 24/MAR/2023


10:58 27/MAR/2023


10:58 27/MAR/2023


8:24 29/MAR/2023

Appendix 9-Certification of completion of Attenuation Tank Installed

GEOSHIELD

PRE-SIGN OFF

CERTIFICATE OF CONFORMITY

PROJECT:	Careys - Coop Live Arena	DATE:	17.3.21
PROJECT CONTACT:	Jonathan Freeburn	REPORT Nr.	02

INSPECTION & VALIDATION DETAILS: * Smoke test + Met gas test carried out to attenuation tank.
* All faults from previous visit were found to be sufficiently remediated by installing patches of LLDPE 1.0mm gas membrane
* All remaining Leaks that were found today were also repaired by the specialist applicators using the same material and process
* Passed & verified in accordance with CIRIA 735

AREA / GRID LINE / PLOT NUMBER SIGNED

1	attenuation tank	4	
2		5	
3		6	

OUTSTANDING REMEDIATIONS

1	
2	

Signed on behalf of Geoshield: Liam White

Signed on behalf of Client:

WHEN REPORT INVOICE HAS BEEN PAID IN FULL THE REPORT WILL BE ISSUED.
ON SETTLEMENT OF FINAL ACCOUNT THE VERIFICATION CERTIFICATE WILL BE ISSUED.

Catalogue Engineering

Sign Off Document - Tank

Project Information			
Project Title / Address	Co-op Live Manchester Way, Mancs	Project No.	1989
		Postcode	M11 3DU
Day/Date Works Commence	16/3/23		
Tank Reference/Name			
Tank Manufacturer	ACO		
Tank Variation	StormBrixx SD		
Tank Dimensions			

Inlet/Outlet/Vent Reference; *(denote diameter, level and location)*

Air tested by Geo Shield Repaired Membrane damage and re-sealed around pump Chamber. Validated and Signed off.

PLAN

ELEVATION

Weld Number/Reference; *(denote where welds have been completed)*

BASE

LID

This document is evidence that the installation of materials listed above have been carried out and tested in and adequate and suitable capacity. I have inspected the installation and confirm it has been completed to a satisfactory level.

On behalf of Catalogue Engineering;

Name A. Pilgrim / Sign [signature] / Date 17/3/23

On behalf of Careys;

Name Jonathan Fu / Sign [signature] / Date 17/3/23

Appendix 10-Photographic Evidence of Permeable Paving Installed

Appendix 11-Photographic Evidence of Rain Water Harvesting Tank Installed


8:41 1/FEB/2023


8:41 1/FEB/2023




12:59 10/FEB/2023

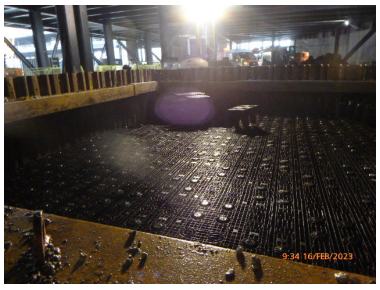

12:59 10/FEB/2023


12:59 10/FEB/2023


16:02 14/FEB/2023


16:02 14/FEB/2023


16:03 14/FEB/2023

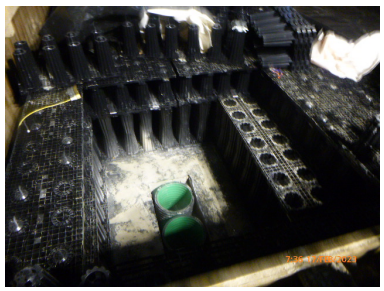

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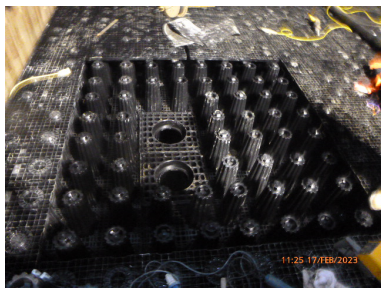

14:54 16/FEB/2023


14:54 16/FEB/2023


14:56 16/FEB/2023


14:56 16/FEB/2023




11:25 17/FEB/2023


10:51 20/FEB/2023






11:03 27/MAR/2023


11:03 27/MAR/2023

Appendix12-Certification of completion of Rain Water Harvesting Tank Installed

Project: Cotterill Drainage
Hermitage Farm, Grove Lane
Sutton Coldfield, B76 9QJ

Observation Work to Complete #8: JOB REF: 158417 / JOB HANDOVER SHEET - Co op Live Stormbrixx Stormwater attenuation Tank Installation

Origin		**Status**	Initiated
Created By	Jess Davies (Cotterill Contractors)	**Date Created**	5 Apr, 2023
Assignee		**Distribution**	Jess Davies (Cotterill Contractors)
Notification Date			
Due Date	3 Apr, 2023	**Private**	Yes

Description

Date 3rd April 2023

PJ Carey (Contractors) Ltd

PJ Carey (Contractors) Ltd (BAM)
Co-op Live
Etihad Campus
Manchester
M11 3FF

Installed tank details:

- Totaling 435.97m3 Gross Volume (422.90m3 Nett Volume).

JOB SPECIFICATION

Crates used: ACO Stormbrixx

300g/m2 protective fleece laid
1mm impermeable attenuation tank wrap used
ACO Stormbrixx Storm Crates dispersed into excavated area in a position ready for connection to drainage.
Assembling of storm crates to create above mentioned storm attenuation tanks.
Complete wrap of Storm Crates with Membrane by heat welding together.
Connections made 600mm twin wall in/out & vent connection)
Site left in a safe condition for drainage connection and backfill to begin.

Linked Drawings

Attachments



PHOTO-2023-04-05-11-54-17.jpg



PHOTO-2023-04-05-11-54-14.jpg



PHOTO-2023-04-05-11-54-16.jpg



PHOTO-2023-04-05-11-54-18.jpg

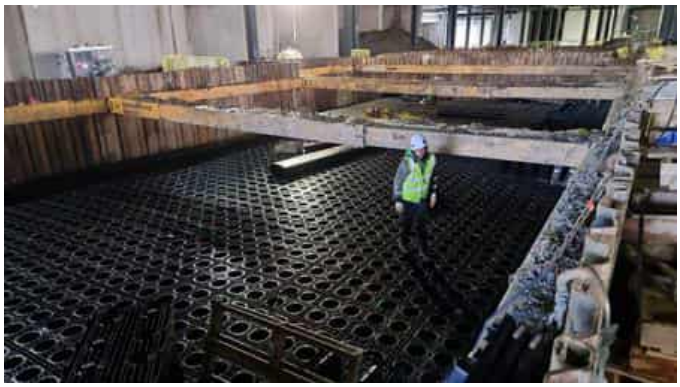


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PHOTO-2023-03-23-11-09-17.jpg



PHOTO-2023-03-23-11-09-16.jpg



PHOTO-2023-03-23-11-09-16 (1).jpg