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PHASE 1 A, OLDLANDS FARM, BOGNOR REGIS UNDERGROUND DRAINAGE SPECIFICATION



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UNDERGROUND DRAINAGE SPECIFICATION

Revision **PO1**
Date **08/ 07/ 2019**
Made by **Brett White**
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Approved by **Mark Dewson**
Description **Underground Drainage Specification**

Ref 1620003993-I-SP-01A-201

Ramboll
Carlton House
Ringwood Road
Woodlands
Southampton
SO40 7HT



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Revision History

Rev	Date	Purpose/Status	Document Ref.	Comments
PO1	08/07/19	PRELIMINARY	1620003993-I-SP-01A-201	FOR COMMENT

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1. R12 BELOW GROUND DRAINAGE SYSTEMS

To be read with Preliminaries/General Conditions.

2. GENERAL

110 BELOW GROUND DRAINAGE SYSTEMS

- Surface water and rainwater drainage sources:
 - Road gullies, Linear channels,
 - External rainwater pipes as section R10
- Foul drainage sources:
 - Sanitary Appliances- as section N13
 - Floor channels- as section R11
 - Discharge Stack and branch pipes as section R11
- Pipes, bends and junctions: see clauses 332-346
 - Grey Cast Iron to BS EN877- flexible joint (internal)
 - Clay to BS EN 295-1 - flexible joint (external)
- Accessories:
 - For Cast Iron see clauses 352-379
 - Access points
 - Rodding points
 - For Clay see clauses 352-379
 - Access points
 - Rodding points
 - For Plastic see clauses 352-379
 - Access points
 - Rodding points
- Manholes, inspection chambers, traps, and separators: see clauses 401- 421
 - Inspection chambers:
 - Pre-case Concrete
 - Plastic
 - Manholes and inspection chambers:
 - Concrete
 - Brickwork
- Accessories: see clauses 433-448
 - : Manhole channels and branches- conventional
 - : Manhole steps
- Disposal:
 - Foul water to public foul sewer
 - Surface water to public surface water sewer
- Accessories - general: see clauses 471-498

3. SYSTEM PERFORMANCE

211 DESIGN – BELOW DRAINAGE SYSTEMS

- Design: Complete the design of the below ground drainage system in accordance with BS EN 752, BS EN 1295-1 and BS EN 1610.
 - Ground conditions:
 - 0.5-1.10m deep Clayey Gravelly Sands
 - 1.10-4.00m deep Clayey Sands
 - Ground water table at 0.5m AOD
 - Proposals: Submit drawings, technical information, calculations and manufacturers' literature.

4. PRODUCTS

- 311 CONNECTORS – WASTE PIPES to CAST IRON (Internal building locations within Ground Bearing slabs)
- Material and standard: Cast Iron to BS EN877 and Kitemark certified.
 - Type: DN32-DN50 Waste pipes to DN100 CAST IRON.
 - Manufacturer: Saint Gobain Pipelines.
 - Product reference: Ensign
- 311A CONNECTORS –SOIL STACKS to CAST IRON DRAINAGE
- Material and standard: Cast Iron to BS EN877 and Kitemark certified.
 - Type: DN100-DN150
 - Manufacturer: Saint Gobain Pipelines.
 - Product reference: Ensign
- 311B CONNECTORS –RWPs to CAST IRON DRAINAGE
- Material and standard: Cast Iron to BS EN877 and Kitemark certified.
 - Type: DN100-DN150
 - Manufacturer: Saint Gobain Pipelines.
 - Product reference: Ensign
- 311C CONNECTORS –RWPs to CLAY
- Material and standard: Vitrified clay to BS EN 295-1, Kitemark certified.
 - Type: DN100-DN150
 - Manufacturer: Hepworth
 - Product reference: Superseal
- 311D CONNECTORS –RAINWATER PIPES to PLASTIC DRAINAGE
- Material and standard: Plastic to BS 4660 and Kitemark certified
 - Type: DN100-DN150
 - Manufacturer: Polypipe
 - Product reference: Rigidrain
- 311E CONNECTORS –LINEAR CHANNEL to PLASTIC DRAINAGE
- Material and standard: Plastic to BS 4660 and Kitemark certified
 - Type: DN100-DN150
 - Manufacturer: Polypipe
 - Product reference: Rigidrain
- 315 ONE PIECE GULLIES AND COVERS – TRAFFICKED AREAS
- Standards:
 - Clay: To BS EN 295-1 and Kitemark certified, or Agrément certified.
 - Material: Clay.
 - Manufacturer: Hepworth.
 - Product reference: RG1, RG3.
 - Outlet sizes: DN100, DN150.
 - Covers:
 - Product reference: IDG8, IDG7.
 - Type: Hinged grating
 - Material: Cast iron.
 - Sizes: 360 x 310; 400 x 450.
 - Loading grades to BS EN 124: B125; D400.
 - Silt buckets: Plastic.
 - Product reference: IBP3.

315A LINEAR CHANNEL AND OUTLET UNIT

- Standards:
- Concrete: To BS 5911-6 and Kitemark certified, or Agrément certified.
- Plastics: To BS 4660 and Kitemark certified, or Agrément certified.
- Manufacturer: ACO Water Management: Civils & Infrastructure, Div of ACO Technologies plc



- Address: ACO Business Park, Hitchin Road, Shefford, Bedfordshire SG17 5TE.
- Product reference: Brickslot M100D
- Channel:
- Type of fall: Constant invert
- Joints: Drain union.
- Size: 160 mm diameter.
- Accessories: Sump Outlet unit 23410 (with silt bucket)
- Gratings:
- Load class: D400

329 PIPES, BENDS AND JUNCTIONS – SUPPLY

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

334 PIPES, BENDS AND JUNCTIONS – CAST IRON

- Material and standard: Cast Iron to BS EN877, Kitemark certified.
- Manufacturer: Saint Gobain Pipelines.
- Product reference: Ensign
- Sizes: 300 - 450.
- Jointing type: two-piece ductile iron coupling- ED001

336 PIPES, BENDS AND JUNCTIONS - CLAY - FLEXIBLE JOINTS FOUL WATER (SMALL DIAMETER)

- Material and standard: Vitrified clay to BS EN 295-1, Kitemark certified.
- Manufacturer: Hepworth.
- Product reference: Superseal.
- Sizes: 100 - 300.
- Crushing strength (minimum): 72kN/m².
- Jointing type: Socket & spigot joints with sealing ring.

348 PIPES, BENDS AND JUNCTIONS - POLYPROPYLENE

- Material and standard: plastic to BS 4660, Kitemark certified.
- Manufacturer: Polypipe.
- Product reference: Rigidrain
- Sizes: 300 - 450.
- Jointing type: To Manufacturers Specification

357 CONNECTORS – SADDLE

- Standards: Cast Iron to BS EN877, Kitemark certified.
- Material: Cast Iron
- Manufacturer: Saint Gobain Pipelines.
- Product reference: Ensign
- Sizes: DN100 – DN150

357A CONNECTORS - SADDLE

- Standards:
- Clay: To BS EN 295-1 and Kitemark certified, or Agrément certified.
- Material: Clay.
- Manufacturer: Hepworth.
- Product reference: SJS2/; HJ3/.
- Sizes: DN100 – DN300

359 FLEXIBLE COUPLINGS (Cast Iron)

- Standard: Cast Iron to BS EN877, Kitemark certified
- Manufacturer: Saint Gobain
- Product reference: Ensign

359A FLEXIBLE COUPLINGS

- Standard: To BS EN 295-4 or WIS 04-41-01 and Kitemark certified, or Agrément certified.
- Manufacturer: Hepworth
- Product reference: Hepsure

365 PUDDLE FLANGES ((Internal building locations within Ground Bearing slabs)

- Manufacturer: Saint Gobain
- Product reference: Ensign

365A PUDDLE FLANGES

- Manufacturer: Hepworth
- Product reference: Supersleeve

401 INSPECTION CHAMBERS - PLASTICS

- Standard: To BS 7158 or BS EN 13598-1, or Agrément certified.
- Diameter: 300; 475mm.
- Manufacturer: Hepworth.
- Bases:
 - Product reference: SDC5; SPIC6/.
- Shaft units:
 - Product reference: SDC4; SPIC4.
- Access covers and frames:
 - Not required.

407 MANHOLES AND INSPECTION CHAMBERS - CONCRETE

- Standards:
 - To BS 5911-3 and BS EN 1917 and Kitemark certified; or
 - To BS 5911-4 and BS EN 1917.
- Manufacturer: Milton Precast.
- Shape: Circular.
- Sizes: 1200mm; 1800mm
- Cement type and content: To BS 5911-1 & BS EN 1916.
- Chamber sections:
 - Product reference: Milton Precast Manhole rings and rectangular section.
 - Jointing type: Tongue and groove joint sealed with Miljoint butyl resin sealant.
- Cover slabs:
 - Product reference: Milton Precast Cover Slabs.
 - Thickness: 125; 150mm.
 - Loading grades to BS EN 124: B125-D400.
 - Openings: To suit access covers.
- Steps: Required in chambers over 900mm.

407A BRICK MANHOLES/INSPECTION CHAMBERS

- Bases: 150 mm up to 2m deep 225mm above, thick plain concrete, mix as specified under Generally.
- Brickwork: Type F10/225mm thick up to 3m deep, 343mm thick over 3m with frogs facing upwards. (Class B engineering brickwork to BS 3921 in English bond).
- Steps: Double, Class 1, to BS EN 13101.
Bed in joints to all chambers over 900 mm deep at 300 mm vertical centres staggered 300 mm horizontally, with lowest step not more than 300 mm above benching and top step not more than 450 mm below top of cover.
- Channels, branches and benching: Vitrified clay half round channel with $\frac{3}{4}$ section bends with high strength concrete benching with 20mm wearing screed trowelled smooth.

- Cover slabs: Generally, 150mm thick, 250mm thick with reinforcement in road ways. Slabs may be precast or in-situ concrete at Contractors discretion. If precast, bed solid in 1:3 cement: sand mortar to brickwork.
Openings to suit required access covers.
Concrete mix as specified under Generally.
Reinforcement: Steel fabric to BS 4483-A393 mesh, Proprietary units to be proof loaded to 112kN as per BS 5911 part 200.
Access covers and seating: refer to manhole schedule and clause 810,811 or 820 Orientation specified by the Architect/Landscape Architect.

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: Milton Precast
- Cement type and content: BS 5911-1 & BS EN 1916.
- Landing slabs:
 - Product reference: to manufacturer's specification
 - Sizes: to manufacturer's specification.
- Reducing slabs:
 - Product reference: to manufacturer's specification
 - Sizes: to manufacturer's specification
- Straight backed tapers:
 - Product reference: to manufacturer's specification
 - Nominal sizes: to manufacturer's specification
- Shaft sections:
 - Product reference: to manufacturer's specification
 - Sizes: to manufacturer's specification

421 PETROL INTERCEPTOR UNIT(S):

- Manufacturer and reference:
 - Inlet pipe: as per 1620003993-RAM-0500-01A-DR-CR-00001
 - Outlet pipe: as per 1620003993-RAM-0500-01A-DR-CR-00001
- Standards: To Environment Agency PPG 3 and BS EN 858-1, with oil alarm
- In situ concrete base: 150 mm thick plain concrete, mix as specified under Generally.
- Concrete surround: Fill tank with water then encase tank and access shafts with mass concrete to fully support tank and not less than 150 mm thick, mix as specified under Generally.
- Access covers and seating: Class D400 as clause 811
Alarm: SOL3000 Interceptor Alarm by Eurogauge (Standalone unit) as per manufacturer's instructions, M&E consultant to advise on duct routes and control panel placement.

439 MANHOLE STEPS TO MANHOLES OVER 1M DEEP

- Standard: To BS EN 13101.
- Manufacturer: Contractor's choice
- Product reference: Contractor's choice
- Material: Galvanised Steel.

444 SEALING FOR CONCRETE MANHOLES - BITUMINOUS STRIPS

- Manufacturer: Winn & Coales (Denso) Ltd - UK
- Product reference: Tokstip

471 ACCESS COVERS AND FRAMES

- Standard: To BS EN 124.
- Types: Grey iron or ductile iron to BS EN 124
- Manufacturer: Saint Gobain – PAM
- Product reference: PAM Highways
- Materials: Cast Iron
- Sizes: as per manhole schedule

- Loading grades to BS EN 124: A15-D400 (refer to manhole schedule)

471A STEEL ACCESS COVERS AND SEATING:

- Application: For External areas requiring recessed covers
- Covers: Steel to BS EN 124, where applicable.
Manufacturer: Steelway Brickhouse- Bripave Range.
Type(s): External Recessed Top, Single seal, D400 or FACTA Class D (where subject to vehicular loading) and B125 or FACTA B (where subject to pedestrian loading only), to suit paviors to be confirmed by Landscape Architect
- Internal: Top, Double seal, B125 or FACTA B, to suit finishes to be confirmed by Architect
- Note: covers to have either screw down fixings to frame or security locking system

473 ACCESS COVERS AND FRAMES - PRECAST CONCRETE SEATINGS

- Standards: To BS 5911-3 and BS EN 1917 and Kitemark certified.
- Manufacturer: Milton Precast
- Product reference: to manufacturer's specification
- Opening sizes: To suit access covers.

475 ACCESS LADDERS

- Standard: To BS 4211.
- Manufacturer: Contractor's choice
- Finish: Galvanized to BS EN ISO 1461.

483 CONCRETE (GENERAL)

- Standard: To BS 8500-2.
- Concrete: FND2 (subject to Detailed Ground investigation results)

487 CONCRETE (ADOPTABLE MANHOLE BENCHINGS AND SURROUNDS)

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

489 CONCRETE (ADOPTABLE MANHOLE BENCHING TOPPING)

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

492 GEOTEXTILE MEMBRANES - FILTER

- Manufacturer: Terram Ltd
- Product reference: Terram T1000

494 GEOTEXTILE MEMBRANES - IMPERVIOUS

- Manufacturer: Charcon
- Product reference: Geo-membrane

5. FABRICATION

510 VERMIN GRATINGS FOR OUTFALLS AND OUTLET HEADWALLS

- Construction: Mild steel frame extending 75 mm beyond pipe opening all around, with 25 mm maximum opening steel mesh grille. Top hinged on built-in fish-tail straps and with bottom pin lock.
- Finish: Galvanized to BS EN ISO 1461 after fabrication.
- Submit: Shop drawings.
 - Timing: Before manufacture.

6. EXECUTION

610 STRIPPING OUT

- Extent of stripping out: existing drainage unless noted otherwise on proposed drainage drawing to be retained
- Exposed ends of existing drainage to be abandoned: Seal with concrete (general).

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.

613 EXCAVATED MATERIAL

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

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.

623 LOWER PART OF TRENCH - GENERAL

- Trench up to 300 mm above crown of pipe: Vertical sides, width as small as practicable.
- Width (minimum): External diameter of pipe plus 300 mm.

625 LOWER PART OF TRENCH - TRANSITION DEPTH

- Trench 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.

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.

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.

641 PIPES AT DIFFERENT LEVELS IN COMMON TRENCH

- Subtrench: Permissible provided soil of step is stable and unlikely to break away.
- Subtrench 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 half way up higher pipe.
- Clear horizontal distance between pipes (minimum):
 - Pipes up to DN 700: 350 mm.
 - Pipes exceeding DN 700: 500 mm.

667 CLASS S SURROUND

- Type of subsoil: refer to Ground investigation
- 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.
- Granular material: _____ .
 - 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.

676 CLASS Y SURROUND

- Type of subsoil: refer to Ground investigation
- Timing: Excavate trench after hardcore has been laid and compacted.
- Blinding:
 - Material: Concrete (general).
 - 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, cast integrally with slab:
 - Material: Concrete of same mix as slab.
 - Width (minimum): External diameter of pipe plus 200 mm.
- Extent of surround: To within 150 mm of nearest flexible joint.

678 CLASS Z SURROUND

- Type of subsoil: refer to Ground investigation
- Blinding:
 - Material: Concrete (general).
 - 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:
 - Material: Concrete as clause 483

- 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.

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.
 - 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.

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.

685 JOINTING PIPELINES

- Connections: Durable, effective and free from leakage.
- Junctions, including to differing pipe work 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.

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.

689 PIPELINES PASSING THROUGH STRUCTURES

- Pipelines that must be cast in or fixed to structures (including manholes, catchpits 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.

691 BENDS AT BASE OF SOIL STACKS

- Type:
 - 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 (general).
- 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.
- 695 BACKDROP PIPES OUTSIDE MANHOLE WALLS
- Excavation beneath backdrop pipe: Backfill.
 - Material: concrete (General)
 - Pipe encasement:
 - Material: Concrete (general)
 - Thickness (minimum): 150 mm.
- 697 INSTALLING FLEXIBLE COUPLINGS
- Ends of pipes to be joined: Cut cleanly and square.
 - Outer surfaces of pipes to be joined: Clean and smooth. Where necessary, e.g. on concrete or iron pipes, smooth out mould lines and/ or apply a cement grout over the sealing area.
 - Clamping bands: Tighten carefully to make gastight and watertight seals.
- 699 CONNECTIONS TO SEWERS
- General: Connect new pipework to existing adopted sewers to the requirements of the adopting authority or its agent.
- 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.
- 711 TRENCH SUPPORTS
- Removal of trench supports: Sufficient to permit compacted filling of all spaces.
- 713 INSTALLING ROOT BARRIERS
- Root barrier installation: Full depth of excavation. Fit closely to trench wall nearest the tree.
- 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.
- 718 BACKFILLING OVER CONCRETE
- Minimum times from placing concrete:
 - Backfilling generally: 24 h.
 - Heavy compactors and traffic loads: 72 h.
- 720 BACKFILLING UNDER ROADS AND PAVINGS
- Backfilling from top of surround or protective cushion up to formation level: Granular sub-base material, laid and compacted in 150 mm layers.
- 722 PUBLIC ROADS AND PAVINGS - E&W, SCOT
- Excavating and backfilling of trenches: To Department for Transport 'Specification for the reinstatement of openings in highways'.
- 726 FOAMED CONCRETE BACKFILL
- Preparation: Seal off openings in, and ends of, abandoned pipelines and ducts. Seal off cavities in or next to the excavation which are not to be filled.
 - Backfilling: To British Cement Association 'Foamed concrete - specification for use in the reinstatement of openings in highways'.

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.

732 TEMPORARY BRIDGES

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

734 INSTALLING ACCESS POINTS AND GULLIES

- Bedding:
 - Material: Concrete (General).
 - Thickness (minimum): 150mm.
- Surround:
 - Material: Concrete (General).
 - Thickness (minimum): 150mm.
 - Height: full height
- Setting out relative to adjacent construction features: Square and tightly jointed.
- Permissible deviation in level of external covers and gratings: + 0 to -6 mm.
- Raising pieces (clay and concrete units): Joint with 1:3 cement:sand mortar.
- Exposed openings: Fit purpose made temporary caps. Protect from traffic.

736 INSTALLING RODDING POINTS

- Bedding and surround:
 - Material: Concrete (general).
 - Thickness (minimum): 150mm.
- Permissible deviation in level of external covers and gratings: + 0 to -6 mm.

741 INSTALLING INSPECTION CHAMBERS - PLASTICS

- Bedding:
 - Material: Concrete (General).
 - Thickness (minimum): 100mm.
- Surround:
 - Material: Concrete (General).
 - Thickness (minimum): 150mm.
- Concrete collar:
 - Material: Concrete (General).
 - Thickness (minimum): 225mm.
 - Width (minimum): 225mm.

743 INSTALLING CONCRETE MANHOLES

- refer to drawing S278/38/13 of West Sussex County Council Standard drawings

753 FIXING MANHOLE STEPS

- Fixing: Bed in joints.
- 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.

755 JOINTING CONCRETE MANHOLE CHAMBER SECTIONS

- Jointing and sealing: bituminous strips.
- Inner joint surface: Trim surplus jointing material extruded into chamber and point neatly.

757 LAYING CONVENTIONAL CHANNELS, BRANCHES AND BENCHING

- Main channel: Bed solid in 1:3 cement:sand mortar.
- Branches: Connect to channel, preferably at half pipe level, so that discharge flows smoothly in direction of main flow.
- Branches greater than nominal size 150 mm: Connect the branch soffit level with the main drain soffit.
- Connecting angles more than 45° to direction of flow: Use three-quarter section channel bends.
- Benching:
 - Material: Concrete (general).
 - Profile: Rise vertically from top of main channel to a level not lower than soffit of outlet pipe, then slope upwards at 10% to walls.
 - Topping:
 - Material: Concrete (High Strength)
 - Application: Before benching concrete has set, and with dense smooth uniform finish.

759 LAYING PREFORMED PLASTICS CHANNELS, BRANCHES AND BENCHING

- Main channel: Bed solid in 1:3 cement:sand mortar.
- Branches: Connect to channel, preferably at half pipe level, so that discharge flows smoothly in direction of main flow.
- Connecting angles more than 45° to direction of flow: Use three-quarter section channel bends.
- Bedding: 1:3 cement:sand mortar. Use clips or ensure adequate mechanical key.
- Benching:
 - Material: Concrete (general).
 - Profile: Rise vertically from top of main channel to a level not lower than soffit of outlet pipe, then slope upwards at 10% to walls.
 - Topping:
 - Material: Concrete (High Strength)
 - Application: Before benching concrete has set, and with dense smooth uniform finish.

761 LAYING SEALED ACCESS FITTINGS, BRANCHES AND BENCHING

- Unused branches: Fit caps.
- Bedding: 1:3 cement:sand mortar.
- Benching:
 - Material: Concrete (general).
 - Profile: 10% fall from manhole walls to component rim.
 - Application: Before benching concrete has set, and with dense smooth uniform finish.

771 INSTALLING OUTFALLS

- Pipe outflow invert (minimum): Seasonal peak level or 150 mm above normal water level, whichever is the higher.
- Pipe surround and backfill to the last 2 m run of drain: Excavated subsoil, rammed home.

773 INSTALLING ACCESS COVERS AND FRAMES

- Seating: brickwork.
- Bedding and haunching of frames: Continuously.
 - Material: 1:3 cement sand 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.

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

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

784 HYDROBRAKE UNITS

- Manufacturer and reference: HYDRO INTERNATIONAL HYDROBRAKE
Contact Details:
Clevedon Hall Estate,
Victoria Road, Clevedon,
BS21 7RD

Flow Restricted to levels as shown on drainage plan (drawing 1620003993-RAM-0500-01A-DR-CR-00001)

Installation drawing reference(s): As per manufacturer's installation drawings.

7. COMPLETION**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 if specified, 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.

903 TEMPORARY MEASURES

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

911 TESTING AND INSPECTION

- Dates for testing and inspection: Give notice.
- Period of notice: 3 working days.

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

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'.
 - Scotland: To WRc 'Sewers for Scotland'.
- Method: air testing

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.

951 TESTING OF ANCILLARY COMPONENTS

- Standard: To BS EN 1610.
- Tests: Exfiltration: To BS EN 1610.
- Method: air tests

971 CCTV INSPECTION OF PRIVATE PIPELINES

- General: Carry out and record internal inspection using CCTV equipment.
- Locations to be inspected: entire underground network
- Illumination: Of adequate intensity.
- Recording: Provide continuous position recording, still photographs and stopping of the camera at any point.
- Copy of videotape recording: Submit.

976 CCTV INSPECTION OF ADOPTABLE PIPELINES

- General: Permit the Adopting Authority or its agent to carry out and record internal CCTV inspection of pipelines and associated manholes after completion.
- Locations to be inspected: all adoptable network.
- Pipelines under highways: Complete construction, except for laying of wearing course, before inspection.

978 LIFTING KEYS

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

TEST RECORD SHEETS

8. DRAINAGE TESTING RECORD SHEET

Test Sheet No ___ of ___

Project Title

Job or project No:

Date:

File Ref.:

Test Sheet Prepared By:

Circulation:

Purpose of Test :

Interim -

☐

Final -

☐

System Tested (tick as applicable) :

Foul Drainage -

☐

Surface Water Drainage -

☐

Combined Drainage -

☐

Cavity Drainage -

☐

Land Drainage -

☐

Other (State)

Type of test undertaken : Water - ☐ Air - ☐ Other (State)

Section of system being tested : (Description i.e. between manholes)

.....

(Or attach part copy highlighted drawing to define pipeline or system being tested)

Test results : Pass - ☐ Fail - ☐

Upon failure of testing state corrective measures undertaken:

.....

Observation comments noted during testing:

.....

Contractor's representative – (Print name)

(Sign)

CA's representative (if in attendance)

(Sign)

Building Control / District Surveyor (if in attendance)

(Sign)