

UXBRIDGE COLLEGE ~ INSTITUTE OF TECHNOLOGY

PARK ROAD

UXBRIDGE

UB8 1NQ

Structural Specification

“PRELIMINARY”

R12 ~ Below ground drainage systems

DATE: JULY 2019

CAPITA

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R12 – Below ground drainage systems

R12 - Below Ground Drainage Systems

Revision History

Rev	Date	Purpose/Status	Document Ref.
	24.07.2019	Stage 3, Preliminary	

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To be read with Preliminaries/ General conditions.

GENERAL

110 BELOW GROUND DRAINAGE SYSTEMS BASEMENT AND EXTERNAL DRAINAGE

- Surface water and rainwater drainage sources: See drawing 097204-CAP-TB-00-DR-C-5000.

- Foul drainage sources: See drawing 097204-CAP-TB-00-DR-C-5000.

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Pipes, bends and junctions:

Plastics - structured wall, Clay – flexible joints & Concrete – flexible joints

-Accessories:

-Access points;

-Connectors - saddle;

-Flexible couplings;

-Puddle flanges

-Sealed access fittings

-Warning Tapes

-Refer to drawings 097204-CAP-TB-00-DR-C-5001 and 5002 for further information.

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Manholes, inspection chambers, traps, rodding points, separators, – plastics

Manholes - concrete - additional components for deep manholes.

-Accessories:

-Manhole channels and branches - conventional;

-Manhole channels and branches - preformed plastics;

-Vortex flow control units;

-Orifice plates;

-Sealing for concrete manholes - proprietary sealant.

-Refer to drawings 097204-CAP-TB-00-DR-C-5001 and 5002 for further information.

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Disposal:

-To outfalls;

-To sewers

-Refer to drawings 097204-CAP-TB-00-DR-C-5000 for further information.

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Accessories – general:

-Access covers and frames ;

-Access covers and frames - precast concrete seatings;

-Concrete (general);

-Concrete (structural);

-Concrete (adoptable manhole benchings and surrounds);

-Concrete (adoptable manhole benching topping);

-Granular material; and

-Granular sub-base material.

SYSTEM PERFORMANCE**211 DESIGN – BELOW GROUND DRAINAGE SYSTEMS**

- Design: Complete the design of the below ground drainage system in accordance with BS EN 752-2008, BS EN 1295-1 and BS EN 1610.
- Ground conditions: Refer to Capita Geo-Environmental Investigation and Assessment SS017378-PE-09-287-R dated December 2009.
- Performance criteria: See BS 752: 2008, BS EN 12056-2: 2000, Building Regulations Approved Document H and NHBC Standards Part 5.3,
- Proposals: Submit drawings, technical information, calculations and manufacturers' literature.

PRODUCTS**311 ADAPTORS TO CLAY DRAINAGE**

- Material and standard: clay to BS EN 295-1 and Kitemark certified.
- Type: DN 100 discharge stacks to DN 100 clay, DN 32 wastepipe to DN 100 clay, DN 68 rainwater pipe to DN 100 clay.
- Manufacturer: Contractor's choice.
- Product reference: Contractor's choice.

311 ADAPTORS TO PLASTICS DRAINAGE

- Material and standard: Plastics to BS 4660 and Kitemark certified or BS EN 1401-1 (& kite-marked)
- Type: DN 100 discharge stacks to DN 110 plastics, DN 32 wastepipe to DN 110 plastics, DN 68 rainwater pipe to DN 110 plastics.
- Manufacturer: Contractor's choice.
- Product reference: Contractor's choice.

317 COMPOSITE GULLIES - PAVED AREAS AND WASH DOWN

- Standards:
 - General: to BS EN 1253-1, -2, -3
 - Cast iron: To BS 437 and Kitemark certified, or Agrément certified.
 - Clay: To BS EN 295-1 and Kitemark certified, or Agrément certified.
 - Plastics: To BS 4660 and Kitemark certified, or Agrément certified.
 - Polypropylene: To BS EN 1852-1.
- Material: Cast iron, clay, polypropylene
- Manufacturer: Contractor's choice.
- Traps:
 - Product reference: Contractor's choice.
- Raising pieces:
 - Product reference: Contractor's choice.
- Heights: As required.
- Hoppers:
 - Product reference: Contractor's choice.
- Covers:
 - Product reference: Contractor's choice.
- Type: Bolted grating, captive hinge, non-rock.
- Material: Ductile cast iron.
- Sizes: 400 x 400 mm, 425 x 425 mm
- Loading grades to BS EN 124: D400 (trafficked areas). A15 – Pedestrian only areas, B125 – Lightly Trafficked areas.

R12 – Below ground drainage systems

- Silt buckets: Plastics.
- Product reference: Contractor's choice.

329 PIPES, BENDS AND JUNCTIONS - SUPPLY

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

336 PIPELINES FOR FOUL AND SURFACE WATER PIPELINES (100-300 DIA) – Clay – Flexible Joints.

Pipes, bends and junctions: Vitrified clay to BS EN 295-1, with flexible joints, Kitemark certified.

- Manufacturer: Hepworth Drainage, Hazlehead, Crow Edge, Sheffield S36 4HG. Tel: 01226 763561, Fax: 01226 764827 (or similar approved)

Product reference: Supersleve (or similar approved) & Supersleve Housedrain (for 100mm diameter) (or similar approved).

- Strength: 40KN/m (100 & 150) 45KN/m (225), 72KN/m (300).

- Sizes: DN 100, 150, 225, 300

- Jointing: Polypropylene flexible coupling joints (Joint System E)- Table 12 BS EN 295-1, Nitrile seals (where shown)

Type of subsoil: Refer to site investigation report.

Bedding class: 'S' where cover to crown of pipe is >1.2m under roads, service yards and car parks and any area subject to vehicular traffic and >0.6m in all other areas. Class 'Z' is required where cover is less than specified above or where protection is required during construction, or where noted on the layouts.

Warning marker tape: Not Required.

- Colour/ message: N/A.

- Wire detection aid: N/A.

344 PIPES, BENDS AND JUNCTIONS - PLASTICS - STRUCTURED WALL SURFACE WATER DRAINAGE

- Standard: To WIS 04-35-01, Kitemark or Agrément certified & BS EN 13476-1, -2, -3

- Material: PVC-U, Polypropylene (PP), Polyethylene (PE).

- Manufacturer: Wavin or Polypipe Civils.

-Product reference: UltraRib or Polysewer/Ridgisewer.

- Recycled content: Contractor's choice.

- Sizes: 100, 150, 225 to 300 mm.

- Jointing type: Spigot and socket.

352 ACCESS POINTS - PLASTICS - FOUL & SURFACE WATER DRAINAGE

- Standard: To BS 4660 and Kitemark certified, to BS EN 13589-1, or Agrément certified.

- Manufacturer: Wavin or Polypipe Civils.

- Nominal diameter: 150mm, 225mm.

- Bases:

-Product reference: Contractor's choice.

- Raising pieces:

-Product reference: Contractor's choice.

-Heights: As required.

- Access covers and frames:

-Product reference: Contractor's choice.

-Loading grades to BS EN 124: A15 (pedestrian areas), B125 (lightly trafficked areas), C250 (heavily trafficked areas).

357 CONNECTORS - SADDLE

- Standards:

R12 – Below ground drainage systems

- 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: Plastics, clay, concrete.
- Manufacturer: Contractor's choice.
- Product reference: Contractor's choice.
- Sizes: 100mm, 150mm & 225mm

359 FLEXIBLE COUPLINGS

- Standard: To BS EN 295-4 or WIS 04-41-01 and Kitemark certified, or Agrément certified.
- Manufacturer: Contractor's choice.
- Product reference: Contractor's choice.

365 PUDDLE FLANGES

- Manufacturer: Contractor's choice.
- Product reference: Contractor's choice.

367 RAT BARRIERS

- Manufacturer: Contractor's choice.
- Product reference: Contractor's choice.

371 RODDING POINTS GENERAL

- 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: Plastics.
- Manufacturer: Wavin or Polypipe Civils.
- Product reference: Contractor's choice.
- Sizes: DN 110 and DN 150.

380 DRAINAGE CHANNEL (CAR PARK AREAS) – Generally (refer to drawings)

ACO Drain, ACO Business Park, Hitchin Road, Shefford, Bedfordshire, SG17 5TE. Tel: 01462 816666 (or similar approved). Installation in accordance with manufacturer's requirements.

- Loading grades to BS EN 124:
- C250; and
- D400.

401 INSPECTION CHAMBERS - PLASTICS FOUL AND SURFACE WATER DRAINAGE (100 AND 150 DIA.)

- Standard: To BS 7158 or BS EN 13598-1, or Agrément certified.
- Diameter: 450 mm.
- Manufacturer: Contractor's choice.
- Bases:
 - Product reference: Contractor's choice.
- Shaft units:

R12 – Below ground drainage systems

-Product reference: Contractor's choice.

- Access covers and frames:

-Product reference: Contractor's choice.

- Loading class as shown on Manhole Schedules. (A15 pedestrian areas, B125 lightly trafficked areas)

401A INSPECTION CHAMBERS - PLASTICS FOUL AND SURFACE WATER DRAINAGE (150,225 AND 300 DIA.)

- Standard: To BS 7158 or BS EN 13598-1, or Agrément certified.

- Diameter 600mm

- Manufacturer. Hepworth

- Product reference: 'Tegra' PPIC

- Depths; up to 3.0m depth. 350mm diameter restricted access.

Loading class as shown on Manhole Schedules. (A15 pedestrian areas, B125 lightly trafficked areas)

407 MANHOLES AND INSPECTION CHAMBERS - CONCRETE FOUL AND SURFACE WATER DRAINAGE

- Standards:

-To BS 5911-3 and BS EN 1917 and Kitemark certified; or

-To BS 5911-4 and BS EN 1917.

- Manufacturer: Contractor's choice.

- Shape: Circular, Rectangular.

- Sizes: DN 1200.

- Cement type and content: To BS 5911-3 and BS EN 1917.

- Chamber sections:

-Product reference: Contractor's choice.

-Jointing type: Proprietary sealant, mortar, Plastomeric or elastomeric seal.

- Cover slabs to BS EN 1917 & BS 5911-3.

-Product reference: Contractor's choice.

-Thickness: as specified by the manufacturer for loading grade.

- Loading grades (to BS EN124) as shown on Manhole Schedules.

-B125

-D400 as specified on the Engineer's drawings.

-Openings: To suit access covers, to BS EN 752 2008, BS EN 1917 & BS 5911-4.

- Steps: Not required.

421 OIL/ PETROL SEPARATOR UNITS

Type: To suit application, by-pass separator or full retention as shown on Engineer's drawings

Class: To suit application, class 1 or 2, as shown on Engineer's drawings.

Standard: To Environment Agency PPG 3 and BS EN 858-1, BS EN 858-1:2002 with oil and silt level alarms.

Manufacturer: SPEL Products, Lancaster Road, Shrewsbury, SY1 3NQ. Tel No. 01743 445200, or similar approved.

Product reference: as shown on Engineer's drawings.

Nominal size: as shown on Engineer's drawings.

Inlet pipe: as shown on Engineer's drawings.

Outlet pipe: as shown on Engineer's drawings.

Vent pipes: as shown on Engineer's drawings.

Instillation: Tanks to be lifted when empty using slings only & lifting eyes provided.

Base: Concrete mix ST4, min. thickness 150 mm.

Surround: Fill tank with water to maximum depth of:

-200 Series, 200mm

-300 Series, 300mm

R12 – Below ground drainage systems

-400 Series, 400mm

then encase tank and access shafts with mass concrete to fully support tank and not less than 150 mm thick and to manufacturer's requirements and recommendations.

Access covers and seating: Ductile iron, seated on Class B engineering bricks or precast concrete cover frame seating rings.

Cover specification: as shown on Engineer's drawings.

433 MANHOLE CHANNELS AND BRANCHES - CONVENTIONAL

- 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 (structural).

- 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 (adoptable manhole benching and topping).

- Application: Before benching concrete has set, and with dense smooth uniform finish.

435 MANHOLE CHANNELS AND BRANCHES - PREFORMED PLASTICS

- Manufacturer: Contractor's choice.

- Product reference: Contractor's choice.

444 SEALING FOR CONCRETE MANHOLES – BITUMINOUS STRIPS

- Manufacturer: Contractor's choice.

- Product reference: Contractor's choice, to comply with BS EN 1917 & BS 5911-3

446 SEALING FOR CONCRETE MANHOLES – MORTAR

- Manufacturer: Contractor's choice.

- Product reference: Contractor's choice, to comply with BS EN 1917 & BS 5911-3

448 SEALING FOR CONCRETE MANHOLES - SEALANT

- Manufacturer: Contractor's choice.

- Product reference: Contractor's choice, to comply with BS EN 1917 & BS 5911-3

464 BELOW GROUND MODULAR GEO-VOID STORMWATER ATTENUATION UNITS

Modular geo-void attenuation system using 'VersaVoid' cellular storage units by Environmental Sustainable Solutions Ltd., Sladen Mill, Halifax Road, Littleborough, OL15 0LB all as shown on the Engineer's drawings. Tel. No. 01706 374416. To be installed in accordance with manufacturer's specification.

472 ACCESS COVERS AND FRAMES - EXTERNAL FOUL DRAINAGE

- Standard: To BS EN 124 and BS 7903.

- Types: Double seals and grease, neoprene seals, Nitrile seals, lock bolts.

- Manufacturer: Contractor's choice.

R12 – Below ground drainage systems

- Product reference: Contractor's choice.
- Materials: Ductile cast iron.
- Finishes: Recessed tray to hold architectural finishes, hot dip galvanised, shot blasted and zinc sprayed, black bitumen painted & plastic coated.
- Sizes: 300 x 300 mm, 600 x 600 mm and 750 x 675 mm.
- Loading grades to BS EN 124:
 - A15;
 - B125; and
 - D400.
- Edging trims: Stainless steel.
- Accessories: Stays to restrain covers.

473 ACCESS COVERS AND FRAMES - PRECAST CONCRETE SEATINGS FOUL AND SURFACE WATER DRAINAGE

- Standards: To BS 5911-3 and BS EN 1917 and Kitemark certified.
- Manufacturer: Contractor's choice.
- Product reference: Contractor's choice.
- Opening sizes: To suit access covers.
- Opening position / size: refer to Engineer's drawings.

483 CONCRETE (GENERAL)

- Standard: To BS 8500-1 and 2.
- Concrete: Designated, GEN1.

485 CONCRETE (STRUCTURAL)

- Standard: To BS 8500-2.
- Concrete: Designated, GEN3.

487 CONCRETE (ADOPTABLE MANHOLE BENCHINGS AND SURROUNDS)

- Standard:
 - To WRc 'Sewers for Adoption' 7th Edition, August 2012
 -
- Concrete: In situ.

489 CONCRETE (ADOPTABLE MANHOLE BENCHING TOPPING)

- Standard:
 - To WRc 'Sewers for Adoption' 7th Edition, August 2012
- Concrete: High strength.

496 GRANULAR MATERIAL – NATURAL

- Standard: To BS EN 12620.
- Recycled content: Contractor's choice.
- Size: Dependent on location – see Execution clauses in this section.

498 GRANULAR SUB-BASE MATERIAL

- Standard: To Highways Agency Volume 1, 'Specification for Highway Works', Type 1 Unbound mixtures for sub-base.
- Recycled content: Contractor's choice.

R12 – Below ground drainage systems

EXECUTION**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 EXTERNAL FOUL AND SURFACE WATER DRAINAGE

R12 – Below ground drainage systems

- Refer to drawing 097204-CAP-TB-00-DR-C-5001 for further information.

678 CLASS Z SURROUND INTERNAL DRAINAGE AND EXTERNAL DRAINAGE WITH <1200 mm COVER

- Type of subsoil: All.
- 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: Not required.
- Surround:
 - Material: Concrete (structural).
 - Depth: To 200 mm MIN. 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 precut to profile of pipe.
 - Socketed pipes: Fill gaps between spigots and sockets with resilient material to prevent entry of concrete.
- Refer to drawing 097204-CAP-TB-00-DR-C-5001 for further information.

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 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 – Below ground drainage systems

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: Large radius.
 - Radius to centreline of pipe (minimum): 200 mm.
- Bedding: Do not impair flexibility of pipe couplings.
 - Material: Concrete (structural).

695 BACKDROP PIPES OUTSIDE MANHOLE WALLS

- Excavation beneath backdrop pipe: Backfill.
 - Material: Concrete (structural).
- Pipe encasement:
 - Material: Concrete (structural).
 - 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.

R12 – Below ground drainage systems

711 TRENCH SUPPORTS

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

715 BACKFILLING TO PIPELINES

- Backfilling above top of surround or protective cushion: Material excavated from trench, compacted in layers 150 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 subbase material, laid and compacted in 150 mm layers.

732 TEMPORARY BRIDGES

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

734 INSTALLING ACCESS POINTS AND GULLIES

- Bedding:
 - Material: Concrete.
 - Thickness (minimum): 150 mm.
- Surround:
 - Material: Concrete (structural).
 - Thickness (minimum): 150 mm.
 - Height: Full height.
- Backfilling: .
 - Material: Selected fill.
 - Compaction: By hand in 100 mm layers.
- 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 (structural).
 - Thickness (minimum): 150 mm..
- Permissible deviation in level of external covers and gratings: +0 to -6 mm.

741 INSTALLING INSPECTION CHAMBERS - PLASTICS

- Bedding:
 - Material: Concrete (structural).

R12 – Below ground drainage systems

- Thickness (minimum): 150 mm.
- Surround:
- Material: Concrete (structural).
- Thickness (minimum): 150 mm.
- Backfilling: Selected fill.
- Compaction: By hand in 100 mm layers.
- Concrete collar:
- Material: Concrete (structural).
- Thickness (minimum): 200 mm.
- Width (minimum): 200 mm.
- Seating: Not required.

743 INSTALLING CONCRETE MANHOLES

- Bases:
 - Material: Concrete (structural).
 - Thickness (minimum): 225 mm.
- Surround:
 - Material: Concrete (structural).
 - Thickness (minimum): 150 mm.
 - Height: Full height.
- Backfilling:
 - Material: Selected fill.
 - Compaction: By hand in 100 mm layers.

755 JOINTING CONCRETE MANHOLE CHAMBER SECTIONS

- Jointing and sealing: Proprietary sealant.
- 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 (structural).
 - 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 (adoptable manhole benching and topping).
 - 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:

R12 – Below ground drainage systems

- 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 (structural).
- 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.
- Topping:
Material: Concrete (structural).
- Application: Before benching concrete has set, and with dense smooth uniform finish.

773 INSTALLING ACCESS COVERS AND FRAMES

- Seating: Precast concrete.
- 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.

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

R12 – Below ground drainage systems

- Dates for testing and inspection: Give notice.
- Period of notice: 72 hours.

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: Water and Air.

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.

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.
- 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: Foul and surface water drains.
- 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.