

# whitby wood

College Road, Bristol

R12 - National Building Standard

Below Ground Drainage Specification

Client:



Date: 29/09/2023

CRB-WWS-XX-XX-T-C-00001

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## REVISION RECORD

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## 1.0 INTRODUCTION

This document sets out the specifications to be followed in accordance with the National Building Standards, section R12 (Below Ground Drainage). All subsequent specifications and clauses should be read in conjunction with the project preliminaries and general conditions. Whitby Wood should be informed as to any deviations from the specifications provided.

The Local Water Authority, Building Control and Whitby Wood should be made fully aware of the proposed installations, and the contractor should ensure all necessary approvals have been obtained prior to commencement of works on site. Works should be carried in accordance with, but not limited to the following standards and documents.

### 1.1 Standards

- Building Regulations 2015 - Approved Document Part H.
- Design and Construction Guidance 2021 –Sewerage Sector Guidance Appendix C.
- BS EN 752:2008 - Drain and Sewer Systems Outside Buildings.
- BS 12056-3:2000 - Gravity Drainage Systems Inside Buildings.
- BS EN 1295-1:1997 - Structural Design of Buried Pipelines.
- BS EN 1610:1998 - Construction and Testing of Drains and Sewers.

### 1.2 Drawings

- CRB-WWS-XX-XX-D-C-01000 –PROPOSED DRAINAGE LAYOUT
- CRB-WWS-XX-XX-D-C-01001 –MANHOLE SCHEDULES
- CRB-WWS-XX-XX-D-C-01030 –DRAINAGE CONSTRUCTION DETAILS SHEET 1
- CRB-WWS-XX-XX-D-C-01031 –DRAINAGE CONSTRUCTION DETAILS SHEET 2
- All relevant Architectural, Landscape, MEP and Structural drawings and specifications.

## 2.0 GENERAL

### 100 EXISTING DRAINS

- Before starting work, check invert levels and positions of existing drains, sewers, inspection chambers and manholes against information shown on drawings and report any discrepancies to the Contract Administrator.
- Adequately protect existing drains and maintain normal operation during construction.
- All existing drainage which forms part of the new works is to be CCTV surveyed at the earliest opportunity prior to construction.

### 101 APPLICATIONS

- Submit all relevant applications to the local water authority and pay applicable fees where required prior to construction. These include but are not limited to:
  - o Pre-planning enquiry to ensure capacity;
  - o Build-over or build near Agreements;
  - o S185 Agreement (diverting a public sewer);
  - o S104 Agreement (adoption of new sewers);and
  - o S106 Agreement (connection to a public sewer).
- Apply for all appropriate licences and pay applicable fees where required.

### 102 WORKMANSHIP

- Comply with BS 8000-14 –Workmanship on building sites, code of practice for below ground drainage.

### 103 SEQUENCE OF WORK

- At contractor's discretion, however, works should be undertaken to ensure that existing accesses are maintained throughout construction.
- Meetings with affected parties should be undertaken to ensure disruption is kept to a minimum.
- The below ground drainage should be built in a sequence which allows any attenuation features to be installed as soon as practically possible.

### 104 APPROVALS

- Ensure that the Local Authority and Building Control are fully aware of the proposed installation, and that they have all the necessary documentation.
- Approval if required, should be gained before commencement of works on site.

## 105 WORKS TO LOCAL AUTHORITY SEWERS AND APPLIANCES

- All work shall be in accordance with the current edition of the 'Civil Engineering Specification for the Water Industry' and be in accordance with the Design and Construction Guidance 2021, Sewerage Sector Guidance Appendix C.
- Where design guidance from the Water Authority differs from the above, Whitby Wood should be contacted in the first instance to verify.
- All work shall be to the approval and supervision of the local Water Authority.

## 106 IN-SITU CONCRETE

- Unless specified otherwise, in-situ concrete for use in drainage below ground is to be in accordance with BS 8500, as shown in the table below or an equivalent or higher-grade mix subject to approval:

Application	Concrete Mix
<ul style="list-style-type: none"> <li>- Structural protection to pipelines</li> <li>- Surrounds to chambers, separators and tanks</li> <li>- Bed and surround to drainage channels</li> </ul>	C20/ST4/GEN3
<ul style="list-style-type: none"> <li>- Plain concrete in structures (eg manhole bases)</li> </ul>	C20/ST4/GEN3 with Sulphate Resisting Cement
<ul style="list-style-type: none"> <li>- Reinforced concrete (eg chamber cover slabs)</li> </ul>	RC30

- Different mixes may be used for different parts of the drainage work.
- Wearing screeds (also known as "high strength toppings" or "granolithic finish") for benching to be in accordance with BS 8204-2, class AR4/WS or AR4/DF or better.

## 107 AS BUILT RECORDS

- Keep marked up copies of drawings showing As Built information.
- Maintain records of inspections and tests carried out.

## 108 REDUNDANT DRAINS (WHERE APPROPRIATE)

- The drain run should be removed in its entirety and sealed at the manhole/branch connection; or
- The drain run should be filled with a weak mix concrete or cement grout to prevent collapse (this may not be necessary if the drain is under the building as it will be encased in concrete).
- The drain can be sealed at either end by the use of concrete plugs.

## 109 EXECUTION

- Study all drawings and specifications to familiarise with the structural and architectural details and the work of other trades.

- Ensure that the work under this section will not interfere with those of other trades and are compatible with the architectural finishes, prior to placing orders, fabrication and installation.
- Coordinate with structural, electrical and mechanical works to ensure drainage elements do not clash with other services.
- Furnish necessary templates, patterns, setting out plans and other items for incorporation in the works or for leaving necessary provisions for the work. Ensure timely placement of sleeves, inserts and similar.
- Where work is installed in close proximity to or will interfere with other works, assist in working out satisfactory space requirements. Prepare composite site drawings to a suitable scale showing how the work is installed in relation to other trades.

#### 110 QUALITY CONTROL

- For each product specified, provide from same manufacturer throughout where possible.
- Test certificates from approved independent laboratories, accreditation or testing agencies shall be furnished at no extra cost if required by the Contract Administrator.
- Maintain uniformity in respect of connection standards, (socket or flange if required) throughout.

#### 111 DELIVERY, STORAGE AND HANDLING

- Deliver products to site, store and protect appropriately.
- Store plastic and uPVC pipes on elevated racks only.
- Store plastic and uPVC pipes out of direct sunlight.
- Keep ends of pipes closed with factory manufactured plugs to prevent entry of foreign matter.
- Repaint ductile iron and cast iron fittings with factory recommended paint prior to installation where factory coating has been damaged.



### 3.0 TERMINAL AND ACCESS FITTINGS

#### 609 DRAIN POINT

- Manufacturer and reference: Vitrified Clay - Hepworth Code RBR1 or RBR2; Cast Iron.
- Drains cast in or through structural foundations - Timesaver Code 02374 or 02375.
- Install in accordance with manufacturer's recommendations.

#### 617 FLOOR GULLY (internal areas if required)

- Manufacturer and reference: Wade GC144 or to Architects Specifications and to suit floor finishes
- Grate: B125.
- Install in accordance with manufacturer's recommendations.

#### 618 YARD GULLY (external yard areas if required)

- Manufacturer and reference: Hepworth Drain Yard Gully or to Architects Specifications.
- Grate: D400.
- Install in accordance with manufacturer's recommendations.

#### 619 DRAINAGE CHANNEL - EXTERNAL

- Manufacturer and reference: ACO Multichannel M100 D or to Architects Specification.
- Cover: C250.
- Install in accordance with manufacturer's recommendations.

## 4.0 PIPELINES

### 332 CAST IRON PIPELINES - DUCTILE

(Drains cast in beneath or through structural foundations, located above ground level and located below the lowest basement level foundation)

- To BS EN 598 with flexible joints to BS 6087.
- Manufacturer and reference: St Gobain Timesaver or equal approved.
- Size(s): DN100/150/225/300/375.
- Jointing: Flexible Bolted Mechanical Joints.
- Additional corrosion protection: None.
- Assumed type of subsoil: Refer to Site Investigation Reports.
- Bedding: Class Z (fully surrounded in concrete).
- Warning marker tape: N/A.

### 334 CAST IRON PIPELINES - GRAY

(To be used as an alternative to ductile cast iron at the discretion of the Contract Administrator)

- To BS EN 877 with flexible joints to BS 6087.
- Manufacturer and reference: St Gobain Ensign or equal approved
- Size(s): DN100/150/225/300/375.
- Jointing: Double spigot with proprietary coupling system.
- Additional corrosion protection: Internally lined with a two part epoxy (ochre in colour).
- Assumed type of subsoil: Refer to Site Investigation Reports.
- Bedding: Class Z (fully surrounded in concrete).
- Warning marker tape: N/A.

### 336 VITRIFIED CLAY PIPELINES

- To BS EN 295-1, with flexible joints, Kitemark certified.
- Manufacturer and reference: Hepworth or equal and approved
- Size(s): DN100/150/225/300/375 (For larger sizes defer to concrete or plastic pipelines).
- Jointing: Polypropylene Couplers.
- Crushing strength (minimum): DN 100 and DN 150 –40kN/m, DN 225 –54kN/m, DN 300 and DN 375 –72kN/m.

- Bedding class: Class Z under building slab, in car parking and access roads where cover is less than 0.75m. Class S in vehicle access areas where cover is between 0.75m and 1.2m, and in pedestrian/paving areas where cover is less than 0.45m. Otherwise, use Class B.
  - Assumed type of subsoil: Refer to Site Investigation Reports.
  - Warning marker tape: Not required.
- 346 PVC U PIPEINES – SOLID WALL
- To BS EN 1401-1, with flexible joints to BS EN 2951-1, Kitemark certified.
  - Manufacturer and reference: Hepworth or equal and approved.
  - Size(s): DN100-600 (For larger sizes concrete or twin wall pipelines should be used).
  - Bedding class: Refer to construction detail drawings.
  - Recycled content: Permitted.
  - Assumed type of subsoil: Refer to Site Investigation Reports.
  - Warning marker tape: Not required.
- 350 PERFORATED PIPELINES
- Manufacturer and reference: Polypipe Rigidrain or equal and approved.
  - Size(s): DN100-900.
  - Bedding class: Refer to construction detail drawings.
  - Recycled content: Permitted.
  - Assumed type of subsoil: Refer to Site Investigation Reports.
  - Warning marker tape: Not required.
- 359 FLEXIBLE COUPLINGS
- Standard: To BS EN 295-4 or WIS 4-41-01 and Kitemark certified.
  - Manufacturer and reference: Hepworth, Fernco or equal and approved.
- 360 SERVICE SLEEVES
- Sleeve Size: To provide a minimum 25mm annular space between the outside diameter of the drainage service material and the inside diameter of the sleeve material.
  - Infill: The infill material to be of a suitable flexible consistency to form a watertight joint between the drain service and the sleeve.

## 5.0 MANHOLES AND INSPECTION CHAMBERS

### 401 INSPECTION CHAMBERS – PLASTIC POLYPROPYLENE

- To BS EN 13598-1, BS EN 13598-2 or Agrément certified
- Wavin or equal and approved.
- Sizes: DN450, DN600.
- Bedding: min 150mm granular material.
- Access covers to loading grades as per BS EN124. Refer to manhole schedule.

### 407 MANHOLES AND INSPECTION CHAMBERS – CONCRETE

- To BS 5911-3 and BS EN1917 and kitemark certified; or
- To BS 5911-4 and BS EN 1917.
- Manufacturer and reference: Milton Precast (Rectangular) FP McCann (Circular).
- Cement type and content to BS 5911-1 and BS EN 1916. Refer to construction details drawing for any sulphate requirements.
- Cover slabs: Heavy Duty Cover Slabs with openings to suit required access.
- Joints: as recommended by manhole manufacturer.
- Access covers to loading grades as per BS EN124. Refer to manhole schedule.

### 409 MANHOLES – CONCRETE – ADDITIONAL REQUIREMENTS FOR DEEP MANHOLES

- To BS 5911-3 and BS EN1917 and kitemark certified; or
- To BS 5911-4 and BS EN 1917.
- Manufacturer and reference: FP McCann (Circular).
- Cement type and content to BS 5911-1 and BS EN 1916. Refer to construction details drawing for any sulphate requirements.
- Landing Slabs: To suit DN1500 and above.
- Reducing Slabs: To suit up to and including DN4000.
- Cover slabs: Heavy Duty Cover Slabs with openings to suit required access.
- Joints: as recommended by manhole manufacturer.
- Access covers to loading grades as per BS EN124. Refer to manhole schedule.

### 433 MANHOLE BRANCHES AND CHANNELS - CONVENTIONAL

- Material: **Vitrified Clay.**
- Manufacturer: **Hepworth or equal and approved**
- Product reference: **Half or three-quarter channels.**

- 435 MANHOLE CHANNELS AND BRANCHES – PREFORMED PLASTICS
- Manufacturer: Wavin, PIFA standard 6/38A or equal and approved.
  - Product reference: OsmaDrain.
- 439 MANHOLE STEPS
- Standard: To BS EN 13101.
  - Type: Built in type with 230mm shank.
  - Manufacturer: Saint Gobain or equal and approved.
  - Material: Galvanized iron.
- 444 SEALING FOR CONCRETE MANHOLES – BITUMINOUS STRIPS
- Manufacturer: Wimn & Coales (Denso) Ltd.
  - Product reference: Tokstrip.
- 446 SEALING FOR CONCRETE MANHOLES – MORTAR
- Manufacturer: Contractor's Choice.
  - Product reference: Contractor's Choice.
- 448 SEALING FOR CONCRETE MANHOLES – SEALANT
- Manufacturer: Contractor's Choice.
- Product reference: Contractor's Choice.

## 6.0 FLOW CONTROLS AND ATTENUATION TANKS

### 464 MODULAR STORMWATER ATTENUATION UNITS

A modular stormwater cellular system that can be built up to form an underground storage structure to receive rainwater

- Manufacturer: Polypipe or equal and approved.
- Product reference: Polystorm Range.
- Unit size: Refer to general arrangement drawings and construction details.
- Individual Unit Dimensions (Nominal): 400mm (H) x 500mm (W) x 1000mm (L).
- Nominal Weight (Nominal): 9kg.
- Void Ratio: 95%.
- Individual Storage Volume: 0.190m<sup>3</sup>.
- Ultimate Compressive Strength: Min 400kN/m<sup>2</sup> (Tested in accordance with BS EN 124:1994, Section 8).
- Maximum inlet and outlet size: DN375.

## 7.0 GRANULAR MATERIAL

### 496 GRANULAR MATERIAL – NATURAL

- Standards: To Water Industry Specification WIS 4-08-02 (as amended by WIS 4-08-02A, 2008).
- Supplier: Contractor preference.
- Size: Dependent on location –see Execution clauses in this section, and in sections R16, R17 and R18, if used.

### 498 GRANULAR SUB-BASE MATERIAL

- Standard: To Highways Agency Volume 1, 'Specification for Highway Works', Type 1 Unbound mixtures for sub-base.
- Or To Highways Agency Volume 1, 'Specification for Highway Works', Type 3 Unbound mixtures for sub-base where attenuation is required.

## 8.0 EXECUTION AND BEDDING

### 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).

Diameter and Depth	Width
DN 100 pipelines more than 6.0 m deep	600mm
DN 150 pipelines more than 5.4 m deep	700mm
DN 225 pipelines more than 4.0 m deep	800mm
DN 300 pipelines more than 2.9 m deep	900mm

### 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 halfway up higher pipe.
- Clear horizontal distance between pipes (minimum):
  - o Pipes up to DN 700: 350 mm.
  - o Pipes exceeding DN 700: 500 mm.

## 9.0 BEDDING AND JOINTING

### INSTALLATION GENERALLY

Obtain pipes and fittings for each pipeline from the same manufacturer unless otherwise specified. Joint differing pipes and fittings with adaptors recommended by pipe manufacturer. Lay pipes to true line and regular gradient on an even bed for the full length of the barrel with sockets (if any) facing up the gradient. Joint using recommended lubricants, leaving recommended gaps at ends of spigots to allow for movement. Adequately protect pipelines from damage and ingress of debris. Seal all exposed ends during construction. Arrange the work to minimise time between laying and testing. Backfill after successful testing.

#### 667 CLASS S GRANULAR SURROUND

- Granular material: To BS 882:

Pipe Size (DN)	Nominal single size (mm)	Graded size (mm)
100	10	Not permitted
101-150	10 or 14	Not permitted
151-500	10, 14, or 20	Not permitted
501 and above	10, 14, 20 or 40	Not permitted

- Alternatively, as-dug material with a compaction fraction of not more than 0.3, or all-in aggregate, nominal size 10 mm, or fine aggregate to BS EN 13242 may be used.
- Lay and compact to a thickness not less than 50 mm for sleeve jointed pipes, 100 mm for socket jointed pipes, over full width of trench. Where trench bottom is uneven due to hard spots or other reason, increase depth by 100 mm. Scoop out locally at couplings/sockets and lay pipes digging slightly into bed and resting uniformly on their barrels. Adjust to line and gradient.
- After initial testing, lay and compact more granular material in 100 mm layers to 150 mm (250 mm for adoptable sewers) above crown of pipe.

#### 678 CLASS Z CONCRETE SURROUND

- Concrete mix as specified under General.
- Lay concrete blinding, 25 mm thick over full width of trench and allow setting.
- Lay pipes on blinding on folding wedges of compressible board to give a minimum 150 mm clearance under the pipe. Anchor the pipeline or fill with water, if necessary, to prevent flotation.
- Form vertical construction joints in surround at face of flexible pipe joints using 18 mm thick compressible board (or similar compressible material) pre-cut to profile of pipe. Fill any gap between spigot and socket with resilient material to prevent entry of concrete.

- After initial testing, place and compact more concrete for full width of trench to encase pipe to 150 mm above crown or to other height as specified or shown on the drainage details drawing.

#### 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.

#### 687 CONCRETE SURROUNDS 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.
- Where pipework is cast into a structure, cast iron should be used.

#### 691 BENDS AT BASE OF SOIL STACKS

- Unless specified otherwise, use a 90 degree nominal rest bend with a minimum radius of 200 mm to centreline of the pipe.
- Invert of horizontal drain at base of stack to be not less than 450/750 mm below centreline of lowest branch pipe.
- Stabilise bend(s) by bedding in concrete without impairing the flexibility of couplings.

#### 695 BACKDROP PIPES – OUTSIDE MANHOLE WALL

- Encase with not less than 150mm of concrete as specified under 'General'. All excavation beneath the backdrop pipe and its surround must be replaced with concrete.

## 10.0 BACKFILLING AND INSTALLATION

### 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 FORMAL 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 and other obstacles: 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:
  - o Backfilling generally: 24 h.
  - o 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 – ENG, WALES, 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.
- 734 INSTALLING ACCESS POINTS AND GULLIES
- 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.
- 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.
- 757 LAYING CONVENTIONAL CHANNELS, BRANCHES AND BENCHING
- Main channel: Bed solid in 1:3 cement:sand mortar.
  - Branches: Connect to main channel at or slightly above invert level, but not higher than half channel 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.
  - 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.
- 759 LAYING PREFORMED PLASTICS CHANNELS, BRANCHES AND BENCHING
- Main channel: Bed solid in 1:3 cement:sand mortar.
  - Branches: Connect to main channel at or slightly above invert level, but not higher than half channel 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.
  - 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.
- 766 INSTALLING UNDERGROUND STORAGE TANK UNITS
- Stabilizing: Before placing surround, fill with water to the lip.

- Backfilling to upper part of tank as minimum.
- Compaction: By hand in 100 mm layers.

#### 773 INSTALLING ACCESS COVERS AND FRAMES

- Bedding and haunching of frames: Continuously.
- Material: Cement Mortar 1:3
- Top of haunching: 30 mm below surrounding surfaces.
- Horizontal positioning of frames:
  - o Centered over openings; and
  - o Square with joints in surrounding paving.
- Vertical positioning of frames:
  - o Level; or
  - o 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.

## 11.0 CLEANING, TESTING AND INSPECTION

### 901 REMOVAL OF DEBRIS AND CLEANING

- Flush out the whole of the installation with water to remove all silt and debris before final testing, before CCTV inspection if specified and immediately before handover.
- Safely dispose of washings and any detritus without discharging them into sewers or watercourses.

### 911 TESTING/INSPECTION GENERALLY

- Give Contract Administrator advance notice to allow the opportunity to attend all tests and inspections.
- Give the Statutory Authority appropriate notice to enable pipelines to be inspected and tested as required.
- Provide water, assistance and apparatus as required.
- All lengths of drain, manholes and inspection chambers must pass the tests specified. If permitted test loss or infiltration is exceeded, remedy defect(s) before re-testing after an appropriate period.

Note: where permanent sumps and pumps form part of a drainage system, waste water used for testing must not be conveyed nor discharged in to these chambers, if such instances occur, all effected sumps, pumps, valves and discharge pipelines shall be fully emptied of all debris, flushed/cleaned and verified free of waste matter and fit for purpose.

### 921 TESTING GRAVITY DRAINS AND SEWERS UP TO DN300

- To ensure that all pipelines are sound and properly installed, air test short lengths to BS 8000-14, paragraph 5.1.4.4 immediately after completion of bedding/surround.
- For final checking and statutory authority approval, water test to BS 8000-14, clause 5.1.4.3 all lengths of pipeline from terminals and connections to manholes/chambers and between manholes/chambers.

### 931 FINAL TESTING OF ADOPTABLE AND LARGE PRIVATE SEWERS UP TO DN900

- England, Wales and Northern Ireland: To WRc 'Sewage Sector Guidance'.
- Scotland: To WRc 'Sewers for Scotland'.
- Method: Water test.

### 941 WATER TESTING OF MANHOLES/INSPECTION CHAMBERS:

- Before backfilling test each manhole or chamber in accordance with BS 8000-14, clause 5.1.4.5 for:
  - o Exfiltration: Drop in water level to be not more than relevant dimension in Table 2; and
  - o Infiltration: Inflow to be not more than 5 litres per hour per manhole.



## 971 CCTV INSPECTION PIPELINES

- After practical completion and before practical completion of the drainage installation, carry out and record in a written illustrated report, internal inspection of all underground/under slab drainage with CCTV equipment.
- Provide all necessary equipment, including suitable covered accommodation for viewing monitor screen, together with personnel experienced in operation of the equipment and interpretation of the results.
- Ensure that adequate intensity of illumination within pipe(s) is maintained. Provide for continual position recording, still photographs and stopping movement of the camera at any point requested by Contract Administrator. If present at the inspection, or at any point where the condition is suspect:
  - o Provide copy of DVD recording and the report to Contract Administrator; and
  - o Obtain instructions from Contract Administrator on remedying any defects which may be revealed.

## 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:
  - o Pipelines under highways: Complete construction, except for laying of wearing course, before inspection.
- Lifting keys: Supply suitable keys for each type of access cover.
- Timing: At completion.

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