

Underground Drainage

To be read with Preliminaries/General conditions

GENERAL REQUIREMENTS

100 REFERENCE DOCUMENTS

This specification should be read in conjunction with the General Arrangement and Detail drawings by Northern Structural Services, other project specific drawings and specification by the Architects and MEP Consultants.

110 DRAINAGE STRATEGY

The surface water drainage strategy to discharge the surface water from the development site to a United Utilities surface water sewer at a reduced rate. Surface water to be reduced to a peak rate of 2.50 l/s. and attenuated within an attenuation pond.

The foul drainage strategy is to discharge the foul water by gravity to a United Utilities foul water sewer.

120 SCOPE OF WORKS

The Contractor shall supply, install and commission a complete system of below ground drainage to collect and convey, without nuisance to health, foul and surface water flows from all areas of the development as generally described below and as detailed on the below ground drainage drawings. These shall discharge to the United Utilities sewer networks via new outlet pipes. Work is to include (but not limited to):

- Liaison with other designers and contractors for the purposes of coordination with above ground drainage;
- 1 x flow control chamber
- Installation of pipework, manholes and access chambers connecting SWP and RWP throughout the site;
- Installation of channel and threshold drains;
- Attenuation pond formation.

The Contractor shall provide for the supply and installation of all pipework fittings, and ancillary equipment and is to include for all necessary, jointing, bedding, manhole construction, trenching, supports, etc to satisfy the tests and performance requirements detailed within this specification.

Notwithstanding the normal testing and inspection procedures, it shall be noted that there is a requirement contained within this specification to carry out a CCTV survey, video, and report on the completed below ground drainage installation immediately prior to practical completion for this package.

The Contractor shall verify, prior to the commencement of the works detailed in this package, that the location, size and invert level of all points of connection to sewer outfalls are as indicated on the design drawings.

The Contractor is responsible for co-ordinating all works within the Public Highway (if any become required) with the Local Highway Authority, the Police Authority, the Statutory Authorities and any other bodies or persons that may be affected by the works.

130 DESIGN STANDARDS

The completed drainage systems shall meet the performance requirements stated in the Building Regulations (England and Wales), BS 6031, BS EN 752: 2008, BS EN 1295-1 BS EN 1610-1 and where applicable, Sewers for Adoption 6th Edition.

200 TEMPORARY CAPS

The below ground drainage system shall be capable of withstanding periods of surcharge within the drainage system, and or sewer, under periods of heavy rainfall. Systems under installation shall be capped off appropriately at all times, in accordance with manufacturer's instructions to prevent deposits of waste or rodents. The use of non-approved temporary capped ends in all instances shall not be permitted. Mechanical capped ends capable of withstanding an increased pressure rating under periods of drainage surcharge shall be installed in accordance with the manufacturer instructions.

210 GROUNDWATER

The contractor shall carry out a risk assessment to assess the possibility of ground water ingress, in particular, to ensure that water does not affect the integrity of manholes and associated below ground drainage pipe work, bedding and supports.

The system at all times shall be kept drained and clear of water below the lowest level of the system. No water shall be permitted to run over, rise behind or against brickwork or concrete, in order to protect the works.

The contractor may require to pump water from trenches, in order to contend with rising groundwater or rainfall during construction. Such water arising during the construction works shall only be discharged to public sewers and watercourses with the prior written consent of the Local Water Authority or the Environment Agency. A risk assessment shall be undertaken by the contractor to ensure that no contaminants enter the drainage system. Any associated interception required of such contaminants shall be dealt with in accordance with the requirements of Building Control, EHO and the Local Water Authority.

The contractor may deem the installation of a temporary drainage system necessary. The contractor shall ensure that the installation and construction of temporary drainage shall not undermine the actual drainage installation. Temporary drainage shall be removed upon final connection of the permanent drainage system. Alternatively, the temporary drainage shall be cut and grouted in a manner to permanently seal the temporary drainage system. This will be to the requirements, satisfaction and inspection of Building Control and the Design Engineer.

230 INTERFACES WITH OTHERS

It shall be the Contractor's responsibility to accurately set out the drainage in accordance with the requirements of the above ground drainage. The Contractor shall check the coordination of setting out information before installation and liaise with the appropriate designers and installers to establish the exact locations and dimensions from the structure and/or building fabric.

240 PROTECTION AND STORAGE OF MATERIALS

All materials shall be stored, stacked and protected in full accordance with the respective Manufacturer's recommendations and accepted good practice.

Such measures should include protection against damage arising from ultraviolet attack, exposure to extremes of temperature, wind, rain, superimposed loads, instability of stacking, abuse and damage by vehicular manoeuvres.

250 EXISTING SERVICES

Where records of existing services are available, the Contractor shall undertake investigations as necessary to confirm the accuracy and completeness of all information received.

Where records of existing services are not available, the Contractor shall determine the precise size, location and level of all sewers and services to which he is required to make a connection or cross the path of.

Where such connections are located between manholes, the level shall not be interpolated by known levels upstream and downstream, but shall be verified by trial hole investigation at the point of connection. In the event of an obstruction by other services to the proposed route of sewer outfall or incoming service connections, the Contractor shall report immediately, the prevailing circumstances to the CA for his direction.

Surveys and investigations into existing services are to be undertaken as soon as practically possible after taking possession of the site in order to verify the information indicated on the contract drawings. Any discrepancies are to be brought to the attention of the CA in writing.

Protect any existing drains affected by the works and maintain normal operating conditions during construction. The Contractor shall allow for all necessary diversions, temporary drains and over pumping in order to complete the works indicated on the drawings.

Where generally indicated on the drawings the Contractor shall make new connections to the existing foul and surface water network at the gradients and depths shown on the drawings and to the satisfaction of the Engineer.

The Contractor shall be responsible for establishing the exact location, level, size and material of the existing sewers to which he is to make a connection. Levels for such connections, shall be verified by adequate trial holes formed at the point of connection. Should the connection be obstructed, the Contractor shall notify the Engineer of the problems encountered with an accompanying proposal for overcoming the problem based upon the site conditions, for approval by the Engineer. Prior to breaking in to or connecting to the existing sewer, the Contractor shall give a minimum 48 hours' notice to the CA of their intentions.

MATERIALS

300 PIPEWORK AND FITTINGS

PIPES, BENDS AND JUNCTIONS - PLASTIC – TO FOUL AND SURFACE WATER

Material and standard: Plastic Kitemark certified.

Manufacturer: Polypipe.

Product reference: Ridgidrain Adaptors, Junctions and Couplings for Surface Water & Rainwater, and Polysewer Adaptors, Junctions and Couplings for Foul Drainage

Sizes: DN150

Crushing strength (minimum): FN 40.

Jointing type: Polypropylene sleeve.

PIPES, BENDS AND JUNCTIONS - SUPPLY

Pipes and fittings: From same manufacturer for each pipeline.

CONNECTORS - DISCHARGE STACKS AND RAINWATER PIPES TO PLASTIC DRAINAGE

Material and standard: Plastics Kitemark certified.

Type:

DN 100 discharge stacks to DN 150 plastic;

DN 100 rainwater pipes to DN 150

Manufacturer: Polypipe.

Product reference: Ridgidrain for Surface Water & Rainwater, Polysewer for Foul Drainage.

ADAPTORS TO PLASTIC DRAINAGE

Material and standard: Polypropylene to BS EN 1401 and Kitemark certified.

Type: DN 100 discharge stack and DN 100 rainwater pipe to DN 150

Manufacturer: Polypipe

Product reference: Ridgidrain Spigot for Surface Water & Rainwater and Polysewer Spigot for Foul Drainage

CONNECTORS - SADDLE

Standards:

Plastics: To BS 4660 and Kitemark certified, or Agrément certified.

Material: Plastic.

Manufacturer: Polypipe.

Product reference: Ridgidrains Junctions for Surface Water & Rainwater, and Polysewer Junctions for Foul Drainage

Sizes: to suit requirements as shown on Northern Structural Services drainage layout drawing

FLEXIBLE COUPLINGS

Standard: To BS EN 295-4 or WIS 04-41-01 and Kitemark certified, or Agrément certified.

Manufacturer: Polypipe

Product reference: Ridgidrain Couplings to Surface Water & Rainwater, and Polysewer Couplings to Foul Drainage

FRESH AIR INLETS FOR HEAD OF FOUL RUNS

Manufacturer: Contractor's choice.

Product reference: Contractor's choice.

303 LINEAR DRAINAGE CHANNELS

Channel and Threshold Drain

Product reference: ACO M100D and DoorWay Drain

Size: Constant invert depth channels:

Accessories:

Side outfall trap for 100 mm drainpipe.

Joints: M-Seal bituminous mastic or M Flex gun applied polyethylene sealant jointing for Base Channels.

Cover gratings: As Architect specification

Fixings: Gratings bolted into channel wall sockets.

Loading grade: Class B to pedestrian only areas.

304 MANHOLE CHAMBERS

PRTECAST CONCRETE CIRCULAR FOR FLOW CONTROL (HYDRO-BRAKE)

Standards:

- To BS 5911-3 and BS EN 1917 and Kitemark certified; or
- To BS 5911-4 and BS EN 1917.

Manufacturer: FP McCann

Shape: Circular

Sizes: 1200

Cement type and content: To BS 5911-1 and BS EN 1916.

Chamber sections:

- Product reference: Manhole Components – 1200x250mm
- Jointing type: Bituminous strips.

Cover slabs:

- Product reference: Manhole Cover Slab
- Thickness: 150 mm
- Loading grades to BS EN 124: B125
- Openings: To suit access covers.

INSPECTION CHAMBERS – PLASTIC CIRCULAR

Manufacturer: Polypipe

Shape: Circular

Sizes: 460mm Diameter

Product reference: PPIC

INSPECTION CHAMBERS – SILT TRAP

Manufacturer: Polypipe

Shape: Circular

Sizes: 460mm Diameter

Product reference: Advanced Silt Trap

305 MANHOLE ACCESSORIES**MANHOLE CHANNELS AND BRANCHES - CONVENTIONAL**

Material: Hepworth Clay.

Manufacturer: Hepworth Drainage.

Product reference: Contractor's choice.

MANHOLE STEPS – FOR MANHOLE DEEPER THAN 900mm

Standard: To BS EN 13101.

Type: A.

Manufacturer: Contractor's choice.

Product reference: Contractor's choice.

Material: Galvanized steel.

SEALING FOR CONCRETE MANHOLES - BITUMINOUS STRIPS

Manufacturer: Contractor's choice.

Product reference: Contractor's choice.

PRECAST CONCRETE COVER SLABS - CIRCULAR

Standard: To BS 5911-3 and BS EN 1917 and Kitemark certified.

Manufacturer: FP McCann

Product reference: Concrete Slabs.

Size: 1450x150

Openings: 750 x 750mm and 600 x 600mm

306 **MANHOLE COVERS**

Types as listed on the manhole schedule. Note, **all are recessed for inlaid finishes:**

ACCESS COVERS AND FRAMES – CIRCULAR MANHOLE

Standard: To BS EN 124.

Types: Recessed

Manufacturer: Peter Savage Ltd

Product references: PS3100

Materials: Steel

Finishes: Self finish.

Sizes: 750 x 750

Loading grades to BS EN 124: B125

Edging trims: Steel

ACCESS COVERS AND FRAMES – INSPECTION CHAMBER

Standard: To BS EN 124.

Types: Recessed and Solid

Manufacturer: Polypipe

Product references: UG520 (Reduced Opening), URP760 (Recessed), UG419 (Solid Circular)

Materials: Polypropylene

Finishes: Self finish.

Sizes: 460x460mm (Reduced Opening), 460x460 (Recessed), 460mm diameter (Solid Circular)

Edging trims: N/A

309 CONCRETE

Standard: To BS 8500-2.

Concrete: Standardized prescribed, ST2, ST4.

CONCRETE (BENCHINGS AND SURROUNDS)

Standard: England and Wales, Northern Ireland: To WRc 'Sewers for Adoption'.

Concrete: In situ ST2.

CONCRETE (BENCHING TOPPING)

Standard: England and Wales, Northern Ireland: To WRc 'Sewers for Adoption'.

Concrete: High strength ST4.

310 GRANULAR MATERIAL

Standard: To BS EN 12620

Recycled Content: Contractor's Choice

Size: Dependent on location – see Execution and Workmanship clauses in this section.

EXECUTION AND WORKMANSHIP**320 CONNECTIONS TO ABOVE GROUND PIPEWORK**

Where drainage pop-ups are to terminate within a ground floor or basement slab the correct transitional fitting for connection to the above ground installations shall be provided. The transitional fitting shall terminate flush with the finished floor level unless otherwise described herein.

It shall be the Contractors responsibility to accurately set out these points in accordance with the above ground drainage designer's requirements. The Contractor shall be responsible for full liaison with the above ground drainage designer to establish the exact locations and dimensions from the structure and/or building fabric.

All connections between the soil and waste pipe-work and the underground drainage system are to be made using proprietary HDPE to PVC-u/Stainless Steel/Cast Iron "O" ring seal socketed joint of a minimum size diameter to suit the material involved with an integral SBR/Nitrile insert to suit the effluent involved. All reductions are to be supplied and installed by the above ground drainage Contractor.

At no point throughout the installation, shall mechanical clamps be used to connect HDPE to PVC-u. Any mechanical clamps found shall be replaced with the appropriate adaptor at the Contractors own expense.

330 HANDLING OF PIPES

The Contractor will provide apparatus for the off-loading and handling pipes in accordance with manufacturer's requirements/recommendations and good practice. Under no circumstances will a wire sling be permitted through the pipe barrel, and any pipes suffering damage resulting from any means, will be immediately rejected from the site. Making good of damaged pipes will not be permitted.

340 ROCKER PIPES

Where drains pass through, over or beneath foundations, the Contractor shall supply and install rocker pipes in accordance with the requirements of British Standard BS EN 752 and the Building Regulations latest edition.

Rocker pipes shall be formed using two flexible couplings at 150mm and 750mm centres either side of the face of the foundation, which it is to pass through, over or beneath in accordance with the manufacturer's instructions.

350 GRANULAR BEDDING TO PIPES

The granular bedding will be placed and carefully compacted by means of a vibrating plate or other approved apparatus, care being exercised to avoid disturbance of the bedding beneath the pipe, and any disturbance must be made good. The bedding will be dug out under the pipe sockets so that the pipes are supported along the whole length of their barrels. After the pipes have been laid the haunching of the pipes with further granular material can proceed in layers not exceeding 75mm and thoroughly compacted by hand up to half pipe level. This will be carried out on both sides of the pipe in such a manner to prevent lateral or vertical displacement of the pipeline.

360 CONCRETE PROTECTION TO PIPES

Where concrete protection is specified it will be installed in accordance with the following:

After completion of the excavation, concrete blinding will be laid and will be sufficiently hard to avoid damage, before further operations are carried out. The pipes will then be laid upon precast concrete blocks resting upon this base, whereupon concrete will be placed on one side of the pipe only and vibrated until it appears on the other side of the barrel. Thereafter the remainder of the concrete will be placed evenly on both sides of the pipe and at the same time vibrated and worked into position. No timbering or steel sheeting will be fixed inside the concrete protection, and all timber sheets likely to interfere with the concrete will be withdrawn before concreting is commenced.

The concrete will be thoroughly compacted and suitable precautions taken against flotation of pipes during this operation.

Where concrete protection is required to flexibly jointed pipelines the concrete protection is to be interrupted over its full cross section at intervals not exceeding 5m by a shaped former of bitumen impregnated compressible filler. The interruptions will coincide with pipe joints.

370 MARKER TAPES

All below ground drainage pipework shall be provided with durable marker tapes suitably worded to identify the pipeline service, in lettering no less than 50mm high.

The marker tape shall be worded "SURFACE WATER DRAIN BELOW" or "FOUL WATER DRAIN BELOW" located a minimum of 300mm below the finished surface/ground level.

610 STRIPPING OUT

Extent of stripping out: Existing within site.

Exposed ends of existing drainage to be abandoned: Seal with concrete (general).

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.

620 EXCAVATION GENERALLY

The Installer will excavate for the works in open cutting in straight lines, and to the levels and gradients as shown on the drawings.

During the progress of the works the Installer will ensure that all trenches and shafts are properly supported as necessary in order to ensure the safety of the works.

621 EXCAVATION TO MANHOLES AND TRENCHES

The excavations are to be trimmed and finished accurately to the required construction depths, the bottom of the sewer trenches being parallel to the invert gradients of the sewer.

All trenches will be of sufficient width at formation level to give the minimum width of bed specified.

Adequate trench supports will be provided to ensure stability and safety. Trench support timbers should be withdrawn in stages as the backfilling proceeds. Particular attention should be paid to the compaction at the sides of the trench where the previous layer of backfill is thus disturbed.

Trenches will be excavated such that the horizontal width measured at the top of the pipe barrel between the undisturbed trench faces does not exceed the widths required by BS 8000 Pt.14.

622 TRENCH WIDTHS

Trench widths to comply with the requirements of clause 625

Trench sides will be vertical to at least 300mm above the top of the pipe barrels.

Should any of the conditions described below occur, the Engineer may make such modifications to the type and class of pipe bedding or surround material as he will deem necessary:-

- Where the maximum permitted trench width is exceeded.
- Where any collapse of the trench side occur.
- Where the trench sides are not vertical to at least 300mm above the top of the pipe barrel.
- Where the trench depth varies from that shown on the drawings.
- Where the backfill or the bedding conditions do not comply with those shown on the drawings.

623 EXCAVATION TO EXTRA DEPTHS AND PATCHES OF BAD GROUND

If, due to an error on the Installer's part or his method of working, the excavations are taken out deeper than required, then the excavated material will be removed and the extra depth filled in with a suitable granular Class S material.

If patches of loose, soft or bad ground are encountered at the proper foundation levels, the Installer will excavate to a solid foundation and fill up to the proper level with a suitable granular Class S material.

624 INSPECTION OF FOUNDATIONS AFTER EXCAVATION

Before any concrete or granular bed is deposited, the excavations will be kept drained and any soft mud or slurry removed, and on receiving approval that a satisfactory foundation has been obtained, the placing of the concrete or granular bed may proceed.

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.

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.

670 CLASS S SURROUND FOR PIPES UNDER BUILDINGS GREATER THAN 300MM DEPTH AND EXTERNALLY 900MM

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: Contractor's choice.
- 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, 150 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: Not 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.

678 CLASS Z SURROUND FOR PIPES WITH LESS THAN 900MM COVER EXTERNALLY or LESS THAN 300mm UNDER BUILDINGS**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): 150 mm.
- Adjust pipes to line and gradient.

Initial testing before placing surround: Not required.

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.

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.

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 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, 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.

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.

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 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.

732 TEMPORARY BRIDGES

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

773 INSTALLING ACCESS COVERS AND FRAMES

Seating: Brickwork as section F10.

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.

777 INSTALLING CONCRETE MANHOLES

Bases: Material: Concrete (general).

Thickness (minimum): 225 mm.

Surround: Material: Concrete (general).

Thickness (minimum): 150 mm.

Height: Full height.

Backfilling Material: Granular material - manufactured, size 4/10, to 100 mm above crown of pipes, then selected fill.

Compaction: By hand in 100 mm layers.

778 INSTALLING INSPECTION CHAMBERS

Bases: Material: Concrete (general).
Thickness (minimum): 150 mm.

Surround: Material: Concrete (general).
Thickness (minimum): 150 mm.
Height: Full height.

Backfilling: Material: Granular material - manufactured, size 4/10, to 100 mm above crown of pipes, then selected fill.
Compaction: By hand in 100 mm layers.

779 FIXING MANHOLE STEPS

Fixing: Secure to chamber wall.

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

780 JOINTING CONCRETE MANHOLE CHAMBER SECTIONS

Jointing and sealing: as required.

Inner joint surface: Trim surplus jointing material extruded into chamber and point neatly.

781 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: 1:3 Cement:sand mortar.
-

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

COMPLETION - CLEANING, TESTING AND INSPECTION
900 GENERAL

The Contractor shall carry out all tests requested by Local and Statutory Authorities and the Engineer / CA on the entire installation and shall supply everything necessary to safely and effectively undertake / demonstrate the tests, i.e. clean water, appliances and equipment and personnel.

The Contractor shall be fully aware of the Construction Design and Management Regulations and the requirements of the publication "Safe Working in Sewers and at Sewage Works", published by the National Joint Health and Safety Committee for the Water Service.

The Contractor shall provide the necessary protective clothing, safety harnesses, breathing apparatus, gas or oxygen detectors, etc. and shall carry out the recommended safety procedures prior to entry of any personnel to any sewer access shaft or chamber.

Mains water only shall be used for the testing of water services pipework.

The Contractor is to make available any tests requested within a period of seven days.

All tests shall be carried out in accordance with BS EN 752.

901 SUMMARY OF REQUIREMENTS

All sections and components of the installation are to be covered by the following unless agreed otherwise and agreed in writing with the CA;

TEST	TIMING	REQUIREMENT
Interim	As works proceed, prior to backfilling.	Visual inspection, Water or Air Test, obstruction test
Final	At completion of the system.	Water test or Air Test
Pre-Handover	Just prior to handover of the system	Pressure jet and system clean, CCTV Inspection

902 INTERIM TESTS

A minimum of 48 hours' notice shall be given prior to any backfilling, covering up or Interim Tests to both the Engineer and the building Control Officer giving the opportunity to witness the tests.

Interim tests shall consist of water or air pressure tests.

903 FINAL TESTS

The Engineer and Building Control Officer shall be given a minimum of seven days' notice of all Final Tests. The Contractor shall have ready for the tests certificates for signature and drawings indicating the as-installed positions and levels of all drainage under test.

904 PRE_HANDBOVER CLEANING

Immediately prior to handover but as far as possible after all external works are complete, the whole of the drainage system shall be pressure jet cleaned by a specialist company. The CCTV inspection of the system shall be undertaken as soon as possible after pressure jet cleaning of the system.

Thoroughly clean all gullies, channels and other components including frames, walls, benching, step-irons and so on.

All interceptors, silt pits and pump stations will be pumped clean of all liquid prior to final inspection and all silt, debris and extraneous material removed.

905 WATER TEST

An air test will be accepted as an alternative to a water test. If the pipework fails the air tests, carry out a water test which will determine acceptability.

The procedure for water testing of non-pressure drainage pipes shall be;

1. Temporarily seal low ends of drains and connections
2. Fill the system with water to produce 1.2m head at the high end and not more than 2.4m head at the low end.
3. Allow the pipeline to stand for 2 hours for initial absorption, topping up at intervals before testing commences.
4. The subsequent loss of water is to be measured over thirty minutes, measured by adding water at ten minute intervals, noting the amount required to maintain the original level in the standpipe. The loss of water (for pipes up to 300mm diameter) shall not be more than;
 - 0.05 litres per metre run for a 100mm diameter pipe
 - 0.08 litres per metre run for a 150mm diameter pipe
 - 0.12 litres per metre run for a 225mm diameter pipe
 - 0.15 litres per metre run for a 300mm diameter pipe

906 AIR TEST

The procedure for air testing of non-pressure drainage pipes shall be;

1. Temporarily seal low ends of drains and connections
2. Connect an appropriate glass 'U' tube gauge to a drain plug in the length to be tested.
3. If sanitary appliances are connected to the system use a test pressure of 50mm water gauge, otherwise, test to a minimum of 100mm water gauge. Pump air into the system to achieve the desired pressure.
4. Allow five minutes for stabilisation due to air temperature and then re-adjust to the test pressure if necessary.
5. Without further pumping, the head of water should not fall by;
 - Using 100mm pressure, maximum fall = 25mm water gauge in a period of 7 minutes

– Using 50mm pressure, maximum fall = 12mm water gauge in a period of 7 minutes

910 RECORDING OF TESTS AND INSPECTIONS

A marked-up drawing is to be kept on-site readily available to the Engineer and Building Control Officer throughout the works highlighted to show which sections of the installation have been completed. This should be further highlighted to indicate those sections which have been tested.

Records shall be kept of all tests carried out, with copies of the certificates being issued to the Engineer and CA. The test records shall include the following information;

- Date
- Location and identity of pipeline
- Reference to the appropriate installation drawing
- Method of test
- Name and signature of Contractors' representative
- Name and signature of witnessing Engineer
- Name and signature of Building Control Officer
- Result of test

915 HANDOVER CCTV INSPECTION

Prior to Handover all sections of the installation covered by this specification are to be inspected internally by employing a specialist CCTV survey company.

A minimum of 5 working days' notice is to be provided to the CA inviting them to witness the inspection. Provision is to be made to allow the CA to view the monitor screen during the inspection.

Two copies of the inspection records are to be provided to the CA within ten days of completion of the inspection. The records shall consist;

Colour VHS videotape or DVD recordings

Full interpretative reports

Still photographs / images of significant defects

Prior to commencing the CCTV inspection the system is to be flushed with water to identify any backfalls or areas of standing water.

Ensure that the intensity of in-pipe illumination is adequate and maintained throughout the inspection. Provide for continual recording and for the camera to be stopped, its position recorded and still images to be taken at any point requested by the CA.

Still images are to be taken of all chambers, pits, soakaways and other such elements.

Obtain instructions for remedying any defects which may be revealed.

920 DEFECTS AND REMEDIAL WORKS

If any defects are identified at the interim installation or backfilling stages of the works, remedial works shall be affected immediately and that section of the drainage system satisfactorily re-tested before further drain laying proceeds.

If any defects are identified at the time of the final inspection and testing, the Contractor shall endeavour to establish the precise location and nature of the defect without recourse to random trial hole excavations, where this could be avoided by the use of the CCTV inspection.

Upon completion of the remedial works, this section of the works shall be re-tested to the entire satisfaction of the CA.

If, in the course of the CA's inspection, it is found that any part of the drainage system is subject to ingress of water, the Contractor shall be held responsible and shall, at his own expense, repair or replace such defective parts of the system to the entire satisfaction of the CA.