Pears Building
1415
04-05-2016 Revision P2

Drainage Specification

Issue	Revision	Date	Issue By	Checked
Copntractors Proposal	P1	May 2016	NS	NS
Below ground drainage chaged to uPVC	P2	May 2016	NS	NS

BELOW GROUND DRAINAGE SYSTEMS FOR FOUL AND SURFACE WATER DRAINAGE

Note: Where a manufactuer is noted, this is to be read as similar and approved.

Surface water and rainwater drainage sources: Rainwater downpipes – Non-Syphonic

Foul drainage sources: Soil Vent Pipes

Land drainage sources: None .

Pressure relief drainage sources: None .

Pipes, bends and junctions: Clay - flexible joints.

Accessories:

- Access points;
- Connectors - saddle;
- Flexible couplings;
- Fresh air inlets; and
- Rodding points.

Manholes, inspection chambers, traps, and separators: Manholes and inspection chambers - concrete and plastic

Accessories:

- Manhole channels and branches - conventional;
- Manhole steps; and
- Sealing for concrete manholes - bituminous strips.

Disposal: To existing drainage

Accessories – general:

- Access covers and frames ;
- Access ladders; and
- Concrete (general).

TEMPORARY WORKS

When required by the CA the contractor shall provide sufficient calculations and/or method statements to substantiate any proposed temporary works at least fourteen days prior to starting such works.

CONTRACTOR

The Contractor's particular attention is drawn to the following items: HTS drainage layout drawings, manhole schedule and drainage detail sheets.

PRODUCTS

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 + DN 225 Plastic; and
DN 50 waste pipes to DN 150 Plastic.
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 and DN 225 plastic.
Manufacturer: Polypipe

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

PIPES, BENDS AND JUNCTIONS - SUPPLY

Pipes and fittings: From same manufacturer for each pipeline.

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: DN 150 and DN 225.
Crushing strength (minimum): FN 40.
Jointing type: Polypropylene sleeve.

CONNECTORS - SADDLE

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: Plastic.
Manufacturer: Polypipe.
Product reference: Ridgidrains Junctions for Surface Water & Rainwater, and Polysewer Junctions for Foul Drainage
Sizes: to suit requirements as shown on HTS 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.

MANHOLES - CONCRETE CIRCULAR

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

Manufacturer: Milton Precast.

Shape: Circular.

Sizes: DN 1200 and 1500

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

Chamber sections:
- Product reference: Manhole Components - 1200mm Ring.
- Jointing type: Bituminous strips.

Cover slabs:
- Product reference: Cover and Reducing Slab 1200mm.
- Thickness: 125 mm.

- Loading grades to BS EN 124: D400.
- Openings: To suit access covers.

Steps: Required in chambers over 900 mm deep.

Vortex flow control unit: Required at outfall manhole downstream of attenuation units.

MANHOLES – CONCRETE RECTANGULAR

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

Manufacturer: Milton Precast.

Shape: Recatngular.

Sizes: 1200 x 675 and 600 x 600

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

Chamber sections:
- Product reference: Manhole Components - 1200mm Ring.
- Jointing type: Bituminous strips.

Cover slabs:
- Product reference: Cover and Reducing Slab 1200mm.
- Thickness: 125 mm.
- Loading grades to BS EN 124: D400.
- Openings: To suit access covers.

Steps: Required in chambers over 900 mm deep.

MANHOLE CHANNELS AND BRANCHES - CONVENTIONAL

Material: 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

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

Manufacturer: Milton Precast.

Product reference: Concrete Slabs.

Size: 1200 mm diameter and 750 x 600mm.

Openings: 600x600mm, 675x675mm and 600x450mm

ACCESS COVERS AND FRAMES

Standard: To BS EN 124.

Types: D400 Cast Iron and A15 Grey Iron

Manufacturer: Savage.

Product reference: Conventional Cover

Materials: Ductile cast iron.

Finishes: Self finish.

Sizes: 1200 x 675mm, 750 x 675mm and 600 x 600mm

Loading grades to BS EN 124: D400.

Edging trims: As per Savage specification.

Accessories: Stays to restrain covers.

CONCRETE (GENERAL)

Standard: To BS 8500-2.

Concrete: Standardized prescribed, ST2.

CELLULAR ATTENAUTION TANK

Manufacturer: WAVIN

Product Reference: AquaCell

Size: 8.0m x 5.0m x 1.2m deep

Volume: 48m³

VORTEX CONTROL

Manufacturer: Hydro International

Type: Hydrobrake Md6 SW ONLY

Invert Level: 65.350m

Design Head: 1.900m

Design Flow: 8.0 l/s

Diameter: 100mm.

CONCRETE (BENCHINGS AND SURROUNDS)

Standard:

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

Concrete: In situ.

CONCRETE (BENCHING TOPPING)

Standard:

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

Concrete: High strength.

GEOTEXTILE MEMBRANES - PERVIOUS

Manufacturer: As recommended by Wavin.

Product reference: To Wavin specification.

GRANULAR MATERIAL

Standard: To BS EN 12620.

Recycled content: Contractor's choice.

Size: Dependent on location - see Execution clauses in this section, and in sections R16, R17 and R18, if used.

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.

STRIPPING OUT

Extent of stripping out: As shown on HTS drainage layout drawings

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

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.

EXCAVATED MATERIAL

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

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.

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.

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.

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.

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.

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.

CLASS S SURROUND TO PIPE WORK MORE THAN 900mm DEEP

Type of subsoil: to be confirmed on site.

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, 100 mm for socket jointed pipes.

Where trench bottom is uneven, increase depth by 100 mm.

Pipes: Dig slightly into bedding, rest uniformly on barrels and adjust to line and gradient.
Initial testing before placing surround: 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.

CLASS Z SURROUND TO PIPEWORK LESS THAN 900mm DEEP

Type of subsoil: to be confirmed on site.

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 (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 precut to profile of pipe.
- Socketed pipes: Fill gaps between spigots and sockets with resilient material to prevent entry of concrete.

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.

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.

TOLERANCES IN PIPELINES

The position of the internal face of any pipeline shall not deviate from the line and level described in the agreement by more than ±20mm, provided that no pipe shall have a reverse gradient.

Where rising mains are laid to curves, the deflection at any pipe joint as laid shall not exceed three quarters of the maximum deflection recommended by the manufacturer.

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.

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.

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

BENDS AT BASE OF SOIL STACKS

Type: Nominal 90° rest bends.

Radius to centreline of pipe (minimum): 800 mm.

Height of invert of horizontal drain at base of stack below centreline of lowest branch pipe (minimum): 600mm for Foul and 1200mm for Rainwater Pies.

Bedding: Do not impair flexibility of pipe couplings.

Material: Concrete (general).

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.

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.

TRENCH SUPPORTS

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

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.

BACKFILLING OVER CONCRETE

Minimum times from placing concrete:

- Backfilling generally: 24 h.
- Heavy compactors and traffic loads: 72 h.

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.

TEMPORARY BRIDGES

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

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.

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.

JOINTING CONCRETE MANHOLE CHAMBER SECTIONS

Jointing and sealing: as required.

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

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.

INSTALLING OUTFALLS

Pipe outflow invert (minimum): Seasonal peak level or 150 mm above normal water level, whichever is the higher.

Pipe surround and backfill to the last 2 m run of drain: Excavated subsoil, rammed home.

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.

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

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

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.

TEMPORARY MEASURES

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

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

Before testing:

- Cement mortar jointing: Leave 24 h.
- Solvent welded pipelines: Leave 1 h.

Standard: To Building Regulations.

Method: Air.

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.

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.

LIFTING KEYS

Lifting keys: Supply suitable keys for each type of access cover.

Timing: At completion.