Bedford Passage Development

BELOW GROUND DRAINAGE SPECIFICATION

Middlesex Annexe LLP

Project Number: 60516144
MHA-ACM-XX-XX-SP-C-00001

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Quality information

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Revision History

Revision	Revision date	Details	Authorized	Name	Position
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Preamble to the Specification

The Specification referred to in this document is based on NBS Building 2017 published by RIBA Enterprises LTD (Address: NBS, The Old Post Office, St Nicholas Street, Newcastle upon Tyne NE1 1RH).

R12 Below ground drainage systems

To be read with Preliminaries/ General Conditions.

NOTES
Ensure that the local Authority and Building Control are fully aware of the proposed installation and they have all the necessary documentation and approval has been granted before commencing works on site.

Design: Complete the design of the below ground drainage system in accordance with the latest revisions of:

- Building Regulations 2015 – Approved Document Part H;
- BS EN 752:2008 Drain and sewer systems outside buildings;
- BS EN 1295-1:1998 Structural design of buried pipelines under various conditions of loading. General requirements;
- BS 12056-3:2000 Gravity drainage systems inside buildings. Roof drainage, layout and calculation;
- BS EN 1610:1998 Construction and testing of drains and sewers;
- Sewers for Adoption 7th Edition; and
- Civil Engineering Specification for the Water Industry 7th Edition.

GENERAL

100 EXISTING DRAINS

- Before starting work, Contractor to check invert levels and positions of existing drains, sewers, inspection chambers and manholes against information shown on drawings and report any discrepancies to Engineer for clarification.
- Adequately protect existing drains and maintain normal operation during construction
- All existing drainage which forms part of the new works including sewer connections to undergo full drainage survey including CCTV at the earliest opportunity on acquisition of the site to confirm condition of the pipework for the connection.

102 WORKMANSHIP:

- Comply with BS 8000: part 14.

103 SEQUENCE OF WORK:

- Each site will have its own constraints. The sequence of installing new drains or refurbishing retained drains will relate to the phasing of the development of each site. Contractor is responsible for the phasing/sequencing of the works.
- Appropriate methods of work should be considered for working in areas with a known high water table, risk of floatation of below ground drainage.

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 and that approval has been gained before commencement of works on site.

110A BELOW GROUND DRAINAGE SYSTEM FOUL & SURFACE WATER

- Surface water and rainwater drainage sources:
  - Drainage channels;
  - Gullies; and
  - Rainwater downpipes.
- Foul drainage sources (above ground drainage by MEP Engineer)
  - Floor gullies;
  - Soil vent pipes; and
  - Stub stacks.
- Pipes, bends and junctions:

  - Cast/Ductile iron - grey;
  - Plastics - structured wall; and
  - PVC-U - solid wall.
  - Accessories:
  - Antiflood valves;
  - Flexible couplings;
  - Resin cement mortar for jointing rigid clay pipelines; and
- Manholes, inspection chambers, traps, and separators: Inspection chambers - plastics and Manholes and inspection chambers - concrete.
  - Accessories:
  - Manhole channels and branches - preformed plastics;
  - Manhole steps; and
  - Sealing for concrete manholes – Hydrophilic bituminous strips.
- Disposal: To sewers.
  Accessories – general:
  - Access covers and frames;
  - Brickwork;
  - Concrete;
  - Geotextile - filter;
  - Geomembrane - impervious; and
  - Type 1 granular material.

SYSTEM PERFORMANCE

211A DESIGN – BELOW GROUND DRAINAGE SYSTEMS
- Design: Complete the design of the below ground drainage system in accordance with BS EN 752, BS EN 1295-1 and BS EN 1610.
- Ground conditions: Ground Investigation has not been carried out.
- Proposals: Submit drawings, technical information, calculations and manufacturers' literature.
- PRODUCTS

315 ONE PIECE GULLIES AND COVERS - INTERNAL
- Standards: To BS EN 1253-1, -2, -3, -4 and -5; or
  - Cast iron: To BS 437 and Kitemark certified, or Agrément certified.
- Material: Cast iron.
- Manufacturer: Wade or equivalent approved.
  - Product reference: Vari level. Cast Iron with 'S' trap – G1004
- Sizes: DN100.
- Outlet sizes: DN100.
- Covers:
  - Product reference: L2601,
    L5701 (floor gullies draining cavity drainage)
  - Material: Cast iron.
- Loading grades to BS EN 124: Light vehicular traffic.
- Anti-flooding: Anti-flooding ball valve, PAM Saint Gobain TD756 or equivalent approved

315A YARD GULLY (EXTERNAL AREAS)
- Manufacturer and reference: Hepworth RGP7 (with removable grate) with silt bucket IBP3 or equivalent approved
- Install in accordance with manufacturer's recommendation
- Bed and surround with minimum 150mm concrete to clause 483A

320A DRAINAGE CHANNEL (EXTERNAL AREAS)
- Manufacturer: ACO or equivalent approved

- ACO M100D No. 0.0 (ACO Code 24000) with ACO slotted galvanised steel grating (ACO Code 23465) and ACO brickslot access unit (ACO Code 23467 and ACO Code 23462) or equivalent approved;
- ACO M100D No. 0.0 (ACO Code 24000) with ACO intercept profile galvanised steel (ACO Code 132555) or equivalent approved;
-
- Outlet Size: Refer to Drainage Layout

- Connect to drain using trapped sump unit (ACO Code 24410) or equivalent approved
- Bed and surround with min 150mm of concrete to clause 483A

329 PIPES, BENDS AND JUNCTIONS - SUPPLY

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

334A PIPES, BENDS AND JUNCTIONS – CAST/DUCTILE IRON - GREY INTERNAL DRAINAGE

- Standard: To BS 437 or to BS EN 877, Kitemark or Agrément certified.
- Manufacturer: Saint-Gobain PAM UK or equivalent approved.
  - Web: www.saint-gobain-pam.co.uk.
  - Email: innovations.uk.pam@saint-gobain.com.
  - Product reference: Ensign or Timesaver.
- Sizes: As per drawing.

344A PIPES, BENDS AND JUNCTIONS - PLASTICS - STRUCTURED WALL EXTERNAL DRAINAGE

- Standard: To BS EN 13476-1 and -2 or -3, Kitemark or Agrément certified.
  - Supplementary requirements: Puncture resistance, jetting resistance and longitudinal bending to requirements of WIS 4-35-01, issue 2.
- Manufacturer: OSMA or equivalent approved.
  - Web: www.wavin.co.uk.
  - Email: info@wavin.co.uk.
  - Product reference: Osma UltraRib.
- Sizes: As per drawings.

357 CONNECTORS – SADDLE: SURFACE AND FOUL

- Standard:
  - Cast iron: To BS 437 and Kitemark certified, or Agrément certified.
  - Plastics: To BS 4660 and Kitemark certified, BS EN 13598-1 or Agrément certified.
- Material:
  - Cast iron
  - Plastics
- Manufacturer: Osma or equivalent approved; Saint-Gobain PAM UK or equivalent approved.
  - Product references: Osma UltraRib; Ensign or Timesaver
- Sizes: Refer to drainage layout

359 FLEXIBLE COUPLINGS FOUL & SURFACE WATER

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

379 WARNING MAKER TAPES: SURFACE AND FOUL

- Type: Heavy gauge polyethylene.
- Manufacturer: Contractor to confirm
  - Product reference: Contractor to confirm
- Colour: Red with black lettering
- Widths: 150mm
- Message: "SURFACE WATER DRAIN BELOW" or "FOUL WATER DRAIN BELOW" as appropriate to pipe line

- Wire detection aid: Required

407 MANHOLES AND INSPECTION CHAMBERS - CONCRETE – DEPTH FROM COVER LEVEL TO SOFFIT OF PIPE 3m

- 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.
- Sizes: As per drawing.
- Cement type and content: To BS 5911-1 and BS EN 1916.
- Chamber sections:
  - Product reference: Contractor's choice.
  - Jointing type: Hydrophilic expanding water stop strips.
- Cover slabs:
  - Product reference: Contractor's choice.
  - Thickness: 150mm minimum.
  - Loading grades to BS EN 124: D400.
  - Openings: To suit access covers.
- Steps: Required in chambers over 900 mm deep.
- Vortex flow control device: Hydro-International

409A MANHOLES - CONCRETE – DEPTH FROM COVER LEVEL TO SOFFIT OF PIPE 3m TO 6m - ADDITIONAL COMPONENTS FOR DEEP MANHOLES

- Standards:
  - To BS 5911-3 and BS EN 1917 and Kitemark certified; or
  - To BS 5911-4 and BS EN 1917.
- Manufacturer: Contractor's choice
- Shape: Circular
- Cement type and content: [To BS 5911-3 and BS EN 1917 and Kitemark certified; or to BS 5911-4 and BS EN 1917].
- Landing slabs:
  - Product reference: Contractor's choice
  - Sizes: Refer to Drainage Layout and Details.
- Reducing slabs:
  - Product reference: Contractor's choice
  - Sizes: [Refer to Drainage Layout.
- Straight backed tapers:
  - Product reference: Contractor's choice
  - Nominal sizes: Refer to Drainage Layout
- Shaft sections:
  - Product reference: Contractor's choice.

408A INTEGRAL MANHOLE CHAMBERS: INTERNAL CHAMBER

- Standards:
  - To structural engineer specification
- Shape: Rectangular
- Sizes: 1200 mm x 750 mm, 450 mm x 450 mm
- Covers: 1200 mm x 750 mm clearing opening , 450 mm x 450 mm clearing opening
- Steps: Not required
- Interceptor Traps for outfall manhole:
  - Manufacturer: Hepworth or equivalent approved
  - Material: Clay
  - Size: DN150
  - Location: Refer to drainage layout and details

412 MANHOLES AND INSPECTION CHAMBERS – PLASTICS TYPE 3

- Standard: To BS EN 13598-2.
- Manufacturer: Wavin or equivalent approved.
    - Product reference: Wavin Inspection Chambers or equivalent approved.
- Material: Polypropylene.
- Shape: Circular.
- Size: 600mm diameter.
- Moulded base:
    - Channels and connections: As drawing.
    - Benching: As drawing.
- Formwork for concrete surround: Not required.
- Steps: Required in chambers over 900 mm deep.
- Vortex flow control unit: Not required.

435 MANHOLE CHANNELS AND BRANCHES - PREFORMED PLASTICS FOUL & SURFACE WATER

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

437 VORTEX FLOW CONTROL UNIT

- Manufacturer: Hydro International
    - Product reference: Hydro-Brake Optimum
    - Unit reference: MD-SHE-0129-9300-1800-9300 (9.3 l/s, Design Head: 1.8m)
      MD-SHE-0035-7000-1500-7000 (0.7 l/s, Design Head: 1.8m)
- Material: Stainless Steel

439 MANHOLE STEPS TO MANHOLES OVER 1m DEEP

- Standard: To BS EN 13101.
- Type: D.
- Manufacturer: Contractor's choice.
    - Product reference: Contractor's choice.
- Material: Galvanized steel or plastics coated steel.

444 SEALING FOR CONCRETE MANHOLES – HYDROPHILIC BITUMINOUS STRIPS FOUL & SURFACE WATER

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

464A MODULAR STORMWATER ATTENUATION UNITS SURFACE WATER.

- Manufacturer: Polypipe or equivalent approved.
    - Product reference: Permavoid or equivalent approved.
- Unit size: 150mm
- Tank capacity/ size (minimum): Refer to drainage layout MHA-ACM-XX-00-DR-C-00001 and details

464B PRECAST CONCRETE BOX CULVERT SURFACE WATER.

- Manufacturer: FP McCann or equivalent approved
    - Product reference: Box Culverts or equivalent approved
- Unit size: Refer to drainage layout and details
- Tank capacity/ size (minimum): Refer to drainage layout MHA-ACM-XX-00-DR-C-00001 and details
- Vent Pipe – To BS EN 1401-1

468 PRECAST CONCRETE COVER SLABS

- Standard: To BS 5911-3 and BS EN 1917 and Kitemark certified.
- Manufacturer: Contractor's choice.
    - Product reference: Contractor's choice.

- Size: Refer to drainage layout and construction details.
- Openings: Refer to drainage layout MHA-ACM-XX-00-DR-C-00001 and construction details MHA-ACM-XX-XX-DR-C-00011.

471A ACCESS COVERS AND FRAMES INTERNAL RECESSED

- Standard: To BS EN 124.
- Manufacturer: Peter Savage Limited or equivalent approved.
- - Product reference: PSD3304 Suffix M and PSD3104 Suffix B
- Material: Stainless steel.
- Finishes: Concrete infill or paving finish.
- Sizes: 1200 x 750 mm, 450 x 450 mm
- Loading grades to BS EN 124: A15.
- Accessories: Double polyethylene seal.

471B ACCESS COVERS AND FRAMES EXTERNAL RECESSED

- Standard: To BS EN 124.
- Manufacturer: Peter Savage Limited or equivalent approved.
- - Product reference: PS6006 Suffix D; PS6004 Suffix B
- Material: Stainless steel.
- Finishes: Concrete infill or paving finish.
- Sizes: 600 x 600 mm, 450 x 450
- Loading grades to BS EN 124: D400 and B125
- Accessories: Double polyethylene seal.

475 ACCESS LADDARS

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

479* ENGINEERING BRICKWORK

- Bricks: To BS EN 771-1.
- Type: HD.
- Mean compressive strength: Greater than or equal to 75 N/mm².
- Category: 1.
- Water absorption: Equal to or less than. 7.5%.
- Freeze/ Thaw category: F2.
- Active soluble salts content category: S2.

483A CONCRETE GENERAL

- Standard: To BS 8500-2.
- Trench backfill:
  - Concrete mix: C10, St2 or GEN1.
- Structural protection to pipelines:
  - Concrete mix: C20, ST4 or GEN3 with SR cement in compliance to BRE Special Digest 1
- Surrounds to chambers, separators and tanks:
  - Concrete mix: C20, ST4 or GEN3 with SR cement in compliance to BRE Special Digest 1
- Concrete bagwork:
  - Concrete mix: C20, ST4 or GEN3 with SR cement in compliance to BRE Special Digest 1
- Bed and surround to drainage channels:
  - Concrete mix: C20, ST4 or GEN3 with SR cement in compliance to BRE Special Digest 1

- Plain concrete in structures (eg manhole bases):
  - Concrete mix: C20, ST4 or GEN3 with SR cement in compliance to BRE Special Digest 1
- Reinforced concrete (eg. chamber cover slabs)
  - Concrete mix: RC30

487 CONCRETE (ADOPTABLE MANHOLE BENCHINGS AND SURROUNDS)
- Standard:
  - England and Wales, Northern Ireland: To WRc 'Sewers for Adoption'.
  - Scotland: To WRc 'Sewers for Scotland'.
- Concrete: In situ.

489 CONCRETE (ADOPTABLE MANHOLE BENCHING TOPPING)
- Standard:
  England and Wales, Northern Ireland: To WRc 'Sewers for Adoption'.
- Scotland: To WRc 'Sewers for Scotland'.
- Concrete: High strength.

492 GEOTEXTILE MEMBRANES – FILTER PERMAVOID
- Manufacturer: Polypipe or equivalent approved.
  - Product reference: Permavoid Permafilter Wick Geotextile or equivalent approved.

498 GRANULAR SUB-BASE MATERIAL
- Standard: To Highways Agency Volume 1, 'Specification for Highway Works', Type 1
- Unbound mixtures for sub-base.
- Recycled content: Submit proposals.

EXECUTION

610 STRIPPING OUT
- Extent of stripping out: Any drains encountered.
- Exposed ends of existing drainage to be abandoned: Seal exposed ends with concrete.

611 EXISTING DRAINS
- Setting out: Before starting work, check invert levels and positions of existing drains, sewers, inspection chambers and manholes against drawings. Contractor to validate connection points of new drainage onto existing drains before commencement of construction. Report discrepancies.
- Protection: Protect existing drains to be retained and maintain normal operation if in use.
- Infill existing drainage with concrete where existing drainage does not clash with new works. Existing drainage to be removed where it clashes with new works.

613 EXCAVATED MATERIAL
- Turf, topsoil, hardcore, etc: Set aside in separate stockpiles for use in reinstatement.

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. For bedding material, refer to clauses 653A, 667A, 676 and 678.
- Local soft spots: Dig out soft spot and replace with 150mm compacted layers of well graded capping material (6F2).
- 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.

653A CLASS B SUPPORT FOR RIGID PIPES

- Type of subsoil: To be confirmed.
- Granular material: Type 1 granular material to BS EN 13242.
- Bedding:
  - Material: Granular, compacted over full width of trench.
  - Thickness (minimum): 50 mm for sleeve jointed pipes, 100 mm for socket jointed pipes. If trench bottom is uneven, increase thickness by 100 mm.
- Pipes: Dig slightly into bedding, rest uniformly on barrels and adjust to line and gradient.
- Initial testing before placing support: Required.
- Support:
  - Material: Type 1 granular material to BS EN 13242.
  - Depth: Halfway up each side of pipe.
  - Compaction: By hand.
- Backfilling:
  - Material: Protective cushion of selected fill.
  - Depth: To 150 mm (250 mm for adoptable sewers) above crown of pipe.
    Compaction: Refer to clause 616.

667A CLASS S SURROUND FOR FLEXIBLE PIPES

- Type of subsoil: To be confirmed.
- 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: Type 1 granular material to BS EN 13242.
- Bedding:
  - Material: 10mm pea shingle free from debris, compacted over full width of trench.
  - Thickness (minimum): 50 mm for sleeve jointed pipes, 100 mm for socket jointed pipes. Where trench bottom is uneven, increase depth by 100 mm.
- Pipes: Dig slightly into bedding, rest uniformly on barrels and adjust to line and gradient.
- Initial testing before placing surround: Required.
- Surround:

    - Material: 10mm pea shingle free from debris
    - Depth: To 100 mm above crown of pipe.
    - Compaction: By hand in 100 mm layers.
- Backfilling:
    - Material: Type 1 Granular.
    - Depth: 150 mm (250 mm for adoptable sewers) above crown of pipe.
- Compaction: Refer to clause 616.

676 CLASS Y SURROUND INTERNAL DRAINAGE

- Type of subsoil: To be confirmed.
- Timing: Excavate trench after hardcore has been laid and compacted.
- Blinding:
    - Material: Concrete.
    - Thickness (minimum): 25 mm.
    - Width: Full width of trench.
    - Allow to set before proceeding.
- Pipes:
    - Temporary support: Folding wedges of compressible board. Prevent flotation.
    - Clearance under pipes (minimum): 100 mm.
    - Adjust pipes to line and gradient.
- Initial testing before placing surround: Required.
- Surround, cast integrally with slab:
    - Material: Concrete of same mix as slab.
    - Width (minimum): External diameter of pipe plus 200 mm.
- Extent of surround: To within 150 mm of nearest flexible joint.

678 CLASS Z SURROUND FOUL & SURFACE WATER

- Type of subsoil: To be confirmed.
- Blinding:
    - Material: Concrete.
    - Thickness (minimum): 25 mm.
    - Width: Full width of trench.
    - Allow to set before proceeding.
- Pipes:
    - Temporary support: Folding wedges of compressible board. Prevent flotation.
    - Clearance under pipes (minimum): 100 mm.
    - Adjust pipes to line and gradient.
- Initial testing before placing surround: Required.
- Surround:
    - Material: Concrete.
    - 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.

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.

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.
- Height of invert of horizontal drain at base of stack below centreline of lowest branch pipe (minimum): 450 mm for single dwellings up to 3 storeys or 750 mm for 4 storeys and above.
- Bedding: Do not impair flexibility of pipe couplings.
    - Material: Concrete.

693 DIRECT CONNECTION OF GROUND FLOOR WCS TO DRAINS

- Drop from crown of WC trap to invert of drain (maximum): 1.3 m.
- Horizontal distance from the drop to a ventilated drain (maximum): 6 m.

695 BACKDROP PIPES OUTSIDE MANHOLE WALLS

- Excavation beneath backdrop pipe: Backfill.
    - Material: Concrete.
- Pipe encasement:
    - Material: Concrete.
    - 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.
- Application: To be partly filled in by AECOM and finalised by the Contractor.

705 INITIAL TESTING OF PIPELINES
- Before testing:
  - Cement mortar jointing: Leave 24 h.
  - Solvent welded pipelines: Leave 1 h.
- Method: Block open ends of pipelines to be tested and pressurise. Air test short lengths to BS EN 1610.

711 TRENCH SUPPORTS
- Removal of trench supports 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 compacting plant: 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.

728 LAYING WARNING MARKER TAPES:
- Installation: During backfilling, lay continuously over pipelines
- Depth: 300-400 mm.
  - Pipelines deeper than 2 m: Lay an additional tape 600 mm above the top of the pipeline

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

734 INSTALLING ACCESS POINTS AND GULLIES
- Bedding:
  - Material: Concrete.
  - Thickness (minimum): 150 mm.
- Surround:
  - Material: Concrete.
  - 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.

741 INSTALLING INSPECTION CHAMBERS - PLASTICS

- Bedding:
  - Material: Granular - manufactured, size 4/10 to BS EN 13242.
  - Thickness (minimum): 225 mm.
- Surround:
  - Material: Concrete.
  - Thickness (minimum): 150 mm.
- Backfilling: Granular material - manufactured, size 4/10 to BS EN 13242, to 100 mm above crown of pipes, then selected fill.
  - Compaction: By hand in 100 mm layers.
- Concrete collar:
  - Material: Concrete.
  - Thickness (minimum): 150 mm.
  - Width (minimum): 350 mm.
- Cover Seating: Brickwork.

743 INSTALLING CONCRETE MANHOLES

- Bases:
  - Material: Concrete.
  - Thickness (minimum): 225 mm.
- Surround:
  - Material: Concrete.
  - Thickness (minimum): 150 mm.
  - Height: Full height.
- Backfilling:
  - Material: Granular - manufactured, size 4/10 to BS EN 13242, to 100 mm above crown of pipes, then selected fill.
  - Compaction: By hand in 100 mm layers.

750 INSTALLING VORTEX FLOW CONTROL UNIT CHAMBERS

- Bases
  - Material: Concrete (General)
- Profile: Rise from manhole base to a level not lower than soffit of outlet pipe, then slope upwards at 10% towards soffit of inlet pipe.
- Topping
  - Material: Concrete (Structural)
  - Application: Before benching concrete has set, and with dense smooth uniform finish.
  - Vortex flow control mounting block (cast in situ)
  - Material: Concrete (structural).
  - Profile: Rise from manhole base vertically to provide plane surface for attachment of unit.
  - Outlet pipe: Build in.
  - Drain down secondary outlet pipe: Not applicable.

753 FIXING MANHOLE STEPS

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

755 JOINTING CONCRETE MANHOLE CHAMBER SECTIONS

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

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.
- Benching:
  - Material: Concrete.
  - 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.

761 LAYING SEALED ACCESS FITTINGS, BRANCHES AND BENCHING

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

766 INSTALLING UNDERGROUND STORAGE TANK UNITS

- Base:
  - Material: Concrete.
  - Thickness (minimum): 75 mm blinding layer or as per manufacturer's recommendation
- Stabilizing: Refer to manufacturer's installation requirements.
- Surround:
  - Material: Selected Fill or Concrete as per manufacturer's recommendation.
  - Thickness (minimum): As per manufacturer's recommendation
  - Height above top of base: Full height of tank.
- Backfilling to upper part of tank: As per manufacturer's recommendation

773 INSTALLING ACCESS COVERS AND FRAMES

- Seating: Refer to drawings.
- 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

- Dates for testing and inspection: Give notice.
  Period of notice: 5 working days.

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

- Before testing:
  - Cement mortar jointing: Leave 24 h.
  - Solvent welded pipelines: Leave 1 h.
- Standard: To Building Regulations.
- Method: Water.

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.
- Testing: The first of each type of inspection chamber and manhole shall be tested and approved prior to construction of chambers of similar type.

951 TESTING OF ANCILLARY COMPONENTS

- Components: Surface water storage tanks.
- Standard: To BS EN 1610.
  - Tests: Exfiltration.

  Method: Testing with water (method W).

971 DRAINAGE SURVEY

- General: Carry out full drainage survey including CCTV.
  - Locations to be surveyed: Foul and surface water drainage system including sewer connections.
  - Copy to be submitted to Building Control and AECOM.

978 LIFTING KEYS

- Lifting keys: Supply suitable keys for each type of access cover. Minimum 2 sets of keys for each type to be supplied.
  - Timing: At completion.