King Edwards Road

R12 Below Ground Drainage Systems

On behalf of Linden Homes
Document Control Sheet

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For and on behalf of Peter Brett Associates LLP

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GENERAL
110 BELOW GROUND DRAINAGE SYSTEMS All
   • Surface water and rainwater drainage sources: One piece gullies and Rainwater downpipes (nonsiphonic), as section R10.
   • Foul drainage sources: Sanitary appliances, as section N13.
   • Land drainage sources: None.
   • Pressure relief drainage sources: None.
   • Pipes, bends and junctions: Refer to Drawing 28584-C-DR-02.
   • Accessories: Refer to Drawing 28584-C-DR-02.
   • Manholes, inspection chambers, traps, and separators: Refer to Drawing 28584-C-DR-02.
   • Disposal: To sewers.
   • Accessories – general: Refer to Drawing 28584-C-DR-02.

SYSTEM PERFORMANCE
211 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: Silt, clay, sandy clay - soft.
   • Performance criteria: To Building Regulations.
   • Proposals: Submit drawings, technical information, calculations and manufacturers' literature.

PRODUCTS
311 ADAPTORS TO CLAY DRAINAGE
   • Material and standard: Polypropylene to BS EN 295-1 and Kitemark certified.
   • Type: Submit proposals.
   • Manufacturer: Submit proposals.
   • Product reference: Submit proposals.

312 ADAPTORS TO PLASTICS DRAINAGE
   • Material and standard: Plastics to BS 4660 and Kitemark certified or to BS EN 1401-1 and Kitemark certified.
   • Type:
     - DN 100 discharge stack to DN 100 plastics;
     - DN 100 rainwater pipe to DN 100 plastics; and
     - DN 100 rainwater pipe to DN 150 plastics.
   • Manufacturer: Submit proposals.
   • Product reference: Submit proposals.

315 ONE PIECE GULLIES AND COVERS- YARD
   • Standards: To BS EN 1253-1, -2, -3, -4 and -5; or
     - 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.
     - Polypropylene: To BS EN 1852-1.
   • Material: Plastics.
   • Manufacturer: Contractor's choice.
   • Product reference: Contractor's choice.
   • Sizes: 600 x 300 mm.
   • Outlet sizes: DN 100.
   • Covers: All.
   • Product reference: Submit proposals.
   • Type: Hinged grating.
   • Material: Ductile cast iron.
317 COMPOSITE GULLIES- PAVED AREAS
- Standards: To BS EN 1253-1, -2, -3, -4 and -5; or
- Cast iron: To BS 437 and Kitemark certified, or Agrément certified.
- Clay: To BS EN 295-1 and Kitemark certified, or Agrément certified.
- Plastics: To BS 4660 and Kitemark certified, or Agrément certified.
- Polypropylene: To BS EN 1852-1.
- Material: Plastics.
- Manufacturer: Submit proposals.
- Traps:
  - Product reference: Submit proposals.
- Raising pieces:
  - Product reference: Submit proposals.
- Heights: TBC.
- Hoppers:
  - Product reference: Submit proposals.
- Covers:
  - Product reference: Submit proposals.
  - Type: Hinged grating.
  - Material: Heavy duty cast iron.
  - Sizes: TBC.
  - Loading grades to BS EN 124: B125 in non-vehicular areas.
  - Silt buckets: Plastics.
- Product reference: Submit proposals.

329 PIPES, BENDS AND JUNCTIONS - SUPPLY
- Pipes and fittings: From same manufacturer for each pipeline.

336 PIPES, BENDS AND JUNCTIONS - CLAY - FLEXIBLE JOINTS For foul water drainage
- Material and standard: Vitrified clay to BS EN 295-1, Kitemark certified.
- Manufacturer: Submit proposals.
- Product reference: Submit proposals.
- Sizes: Refer to Drawing 28584-C-DR-0250.
- Crushing strength (minimum): FN 40.
- Jointing type: Polypropylene sleeve.

342 PIPES, BENDS AND JUNCTIONS - CONCRETE - SURFACE WATER DRAINAGE
- Standards: To BS 5911-1 and BS EN 1916, with flexible joints.
- Manufacturer: Submit proposals.
- Product reference: Submit proposals.
- Sizes: Refer to Drawing 28584-C-DR-02.
- Shapes: Circular.
- Cement type and content: To BS 5911-1 and BS EN 1916.
- Accessories: Cast in lifting anchors.

344 PIPES, BENDS AND JUNCTIONS - PLASTICS - STRUCTURED WALL - SURFACE WATER DRAINAGE
- Standard: Type A, to BS EN 13476-1 and -2, Kitemark or Agrément certified.
- Supplementary requirements: Puncture resistance, jetting resistance and longitudinal bending to requirements of WIS 4-35-01, issue 2.
- Material: PE.
- Manufacturer: Submit proposals.
- Product reference: Submit proposals.
- Sizes: Refer to Drawing 28584-C-DR-02.
• Jointing type: Spigot and socket.

352 ACCESS POINTS - PLASTICS - SURFACE WATER DRAINAGE
• Standard: To BS 4660 and Kitemark certified, to BS EN 13589-1, or Agrément certified.
• Manufacturer: Submit proposals.
• Nominal diameter: 450mm.
• Bases:
  - Product reference: Submit proposals.
• Raising pieces:
  - Product reference: Submit proposals.
• Heights: TBC.
• Access covers and frames:
  - Product reference: Submit proposals.
  - Loading grades to BS EN 124: B125 in vehicular areas. D400 in vehicular areas.

355 ANTIFLOOD VALVES
• Manufacturer: Submit proposals.
  - Product reference: Submit proposals.

357 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: Clay for foul water drainage.
• Manufacturer: Submit proposals.
  - Product reference: Submit proposals.
• Sizes: Refer to Drawing 28584-C-DR-02.

357A 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: Plastics for surface water drainage.
• Manufacturer: Submit proposals.
  - Product reference: Submit proposals.
• Sizes: Refer to Drawing 28584-C-DR-02.

357B 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: Concrete.
• Manufacturer: Submit proposals.
  - Product reference: Submit proposals.
• Sizes: Refer to Drawing 28584-C-DR-02.

359 FLEXIBLE COUPLINGS
• Standard: To BS EN 295-4 or WIS 04-41-01 and Kitemark certified, or Agrément certified.
• Manufacturer: Submit proposals.
  - Product reference: Submit proposals.

367 RAT BARRIERS
• Manufacturer: Submit proposals.
-Product reference: Submit proposals.

401 INSPECTION CHAMBERS - PLASTICS For surface and foul water drainage
• Standard: To BS 7158 or BS EN 13598-1, or Agrément certified.
• Diameter: 450 mm.
• Manufacturer: Wavin or similar accepted.
• Bases:
  -Product reference: Range 450.
• Shaft units:
  -Product reference: Submit proposals.
• Access covers and frames:
  -Product reference: Recessed, rectangular, unless otherwise stated.
  -Loading grades to BS EN 124: B125.

407 MANHOLES AND INSPECTION CHAMBERS - CONCRETE For surface and foul water drainage
• Standards:
  -To BS 5911-3 and BS EN 1917 and Kitemark certified; or
  -To BS 5911-4 and BS EN 1917.
• Manufacturer: Submit proposals.
• Shape: Circular.
• Sizes: Refer to PBA Construction Details Drawings.
• Cement type and content: To BS 5911-1 and BS EN 1916.
• Chamber sections:
  -Product reference: Submit proposals.
• Jointing type: Proprietary sealant.
• Cover slabs:
  -Product reference: Submit proposals.
• Thickness: Refer to PBA Construction Details Drawings.
• 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.

409 MANHOLES - CONCRETE - 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: Submit proposals.
• 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: Submit proposals.
• Sizes: TBC.
• Reducing slabs:
  -Product reference: Refer to PBA Construction Details Drawings.
• Sizes: Refer to PBA Construction Details Drawings.
• Straight backed tapers:
  -Product reference: Submit proposals.
• Nominal sizes: TBC.
• Shaft sections:
  -Product reference: Submit proposals.
• Sizes: TBC.

433 MANHOLE CHANNELS AND BRANCHES - CONVENTIONAL
• Material: Clay.
• Manufacturer: Submit proposals.
• Product reference: Submit proposals.
433A MANHOLE CHANNELS AND BRANCHES - CONVENTIONAL
• Material: Plastics.
• Manufacturer: Submit proposals.
Product reference: Submit proposals.

435 MANHOLE CHANNELS AND BRANCHES - PREFORMED PLASTICS
• Manufacturer: Submit proposals.
Product reference: Submit proposals.

437 VORTEX FLOW CONTROL UNITS For surface water drainage flow control.
• Manufacturer: Submit proposals.
-Product reference: Submit proposals.
• Material: Stainless steel.
• Drain down secondary outlet pipe: Integral.
-Operation: From surface.

439 MANHOLE STEPS For all manholes
• Standard: To BS EN 13101.
• Type: To adoptable standard.
• Manufacturer: Submit proposals.
-Product reference: Submit proposals.
• Material: Adoptable.

448 SEALING FOR CONCRETE MANHOLES - SEALANT
• Manufacturer: Submit proposals.
Product reference: Submit proposals.

464 MODULAR STORMWATER ATTENUATION UNITS For surface water drainage system.
• Manufacturer: SDS or similar accepted.
-Product reference: Geolight or similar accepted.
• Unit size: Manufacturer's standard.
• Tank capacity/ size (minimum): Refer to Drawing 28584-C-DR-02.

471 ACCESS COVERS AND FRAMES All manholes and inspection chambers
• Standard: To BS EN 124.
• Types: Recessed covers.
• Manufacturer: Submit proposals.
-Product reference: Submit proposals.
• Materials: Ductile cast iron.
• Finishes: Black bitumen painted.
• Sizes: 450 x 450 mm and 600 x 600 mm.
• Loading grades: To BS EN 124: B125 and D400.
• Edging trims: Not required.
• Accessories: TBC.

475 ACCESS LADDERS For manholes
• Standard: To BS 4211.
• Manufacturer: Submit proposals.
-Product reference: Submit proposals.
• Finish: Galvanized to BS EN ISO 1461.
• Accessories: Safety chains and hoops.

483 CONCRETE (GENERAL)
• Standard: To BS 8500-2.
• Concrete: Designated, GEN1.

485 CONCRETE (STRUCTURAL)
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- Standard: To BS 8500-2.
- Concrete: Designated, GEN3.

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**
- Manufacturer: SDS or similar accepted.
- Product reference: Non-woven geotextile or similar accepted.

494 **GEOTEXTILE MEMBRANES - IMPERVIOUS**
- Manufacturer: SDS or similar accepted.
- Product reference: GM400 or similar accepted.

496 **GRANULAR MATERIAL – NATURAL**
- Standard: To BS EN 12620.
- Recycled content: Submit proposals.
- 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.
- Recycled content: Submit proposals.

FABRICATION

510 **VERMIN GRATINGS FOR OUTFALLS AND OUTLET HEADWALLS**
- Construction: Mild steel frame extending 75 mm beyond pipe opening all around, with 25 mm maximum opening steel mesh grille. Top hinged on built-in fish-tail straps and with bottom pin lock.
- Finish: Galvanized to BS EN ISO 1461 after fabrication.
- Submit: Shop drawings.
- Timing: Before manufacture.

EXECUTION

610 **STRIPPING OUT**
- Extent of stripping out: Refer to Drawing 28584-C-DR-02.
- Exposed ends of existing drainage to be abandoned: Seal with concrete (general).

611 **EXISTING DRAINS**
- Setting out: Before starting work, check invert levels and positions of existing drains, sewers, inspection chambers and manholes against drawings. Report discrepancies.
- Protection: Protect existing drains to be retained and maintain normal operation if in use.

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

616 **SELECTED FILL FOR BACKFILLING**
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- Selected fill: As-dug material, free from vegetable matter, rubbish, frozen soil and material retained on a 40 mm sieve.
  - Compaction: By hand in 100 mm layers.

623 LOWER PART OF TRENCH – GENERAL
- Trench up to 300 mm above crown of pipe: Vertical sides, width as small as practicable.
  Width (minimum): External diameter of pipe plus 300 mm.

625 LOWER PART OF TRENCH - TRANSITION DEPTH
- Trench widths up to 300 mm above crown of pipe (maximum):
  -DN 100 pipelines more than 6.0 m deep: 600 mm.
  -DN 150 pipelines more than 5.4 m deep: 700 mm.
  -DN 225 pipelines more than 4.0 m deep: 800 mm.
  DN 300 pipelines more than 2.9 m deep: 900 mm.

631 TYPE OF SUBSOIL
- General: Where type of subsoil at level of crown of pipe differs from that stated for the type of bedding, surround or support, give notice.

635 FORMATION FOR BEDDINGS
- Timing: Excavate to formation immediately before laying beddings or pipes.
- Mud, rock projections, boulders and hard spots: Remove. Replace with consolidated bedding material.
- Local soft spots: Harden by tamping in bedding material.
- Inspection of excavated formations: Give notice.

641 PIPES AT DIFFERENT LEVELS IN COMMON TRENCH
- Subtrench: Permissible provided soil of step is stable and unlikely to break away.
  -Subtrench not permissible: Trench depth as required for lower pipe. Increase thickness of bedding to upper pipe as necessary.
- Lower pipe: Backfill with compacted granular material to at least half way up higher pipe.
- Clear horizontal distance between pipes (minimum):
  -Pipes up to DN 700: 350 mm.
  -Pipes exceeding DN 700: 500 mm.

669 CLASS T SURROUNDRefer to PBA Standard Details
- Type of subsoil: Silt, clay, sandy clay - soft.
- Granular material: Submit proposals.
  -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.
- Bedding:
  -Material: Granular, compacted over full width of trench.
  -Thickness (minimum): 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: Granular.
  -Depth: To 100 mm above crown of pipe.
  Compaction: By hand.

673 CLASS W SURROUNDRefer to PBA Standard Details
- Type of subsoil: Silt, clay, sandy clay - soft.
- Timing: Excavate trench after hardcore has been laid and compacted.
- Granular material: Submit proposals.
  -Pipe sizes DN 100 and DN 150: Size 4/10.
  -Pipe sizes DN 225 and DN 300: Size 4/10 or 10/20.
- Bedding:
  -Material: Granular, compacted over full width of trench.
  -Thickness (minimum): 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: Granular.
  - Depth: To 100 mm above crown of pipe.
  - Compaction: By hand.
• Backfilling:
  - Material: Hardcore as section D20, or granular.
  - Depth: Up to slab formation.
  - Compaction: In 300 mm (maximum) thick layers.

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 SURROUND FOR CROSSES
• Class Z surround: Provide where two pipelines (other than plastics pipes) cross with less than 300 mm separation.
  - Extent, on both pipes: 1 m centred on the crossing point, and beyond as necessary to come within 150 mm of nearest flexible joints.

689 PIPELINES PASSING THROUGH STRUCTURES
• Pipelines that must be cast in or fixed to structures (including manholes, catchpits and inspection chambers): Provide 600 mm long rocker pipes adjacent to the external face of the structure (or both faces where appropriate, e.g. walls to footings), with flexible joints at both ends.
  - Distance to rocker pipe from structure (maximum): 150 mm.
• Provision for movement for pipelines that need not be cast in or fixed to structures (e.g. walls to footings):
  - Rocker pipes as specified above; or
  - Openings in the structures to give 50 mm minimum clearance around the pipeline. Closely fit a rigid sheet to each side of opening to prevent ingress of fill or vermin.

691 BENDS AT BASE OF SOIL STACKS
• Type: Two nominal 45° bends.
  - Radius to centreline of pipe (minimum): 200 mm.
693 DIRECT CONNECTION OF GROUND FLOOR WCS TO DRAINS
- Height of invert of horizontal drain at base of stack below centreline of lowest branch pipe (minimum): 750 mm.
- Bedding: Do not impair flexibility of pipe couplings. Material: Concrete (general).

695 BACKDROP PIPES OUTSIDE MANHOLE WALLS
- Excavation beneath backdrop pipe: Backfill.
  - Material: Concrete (adoptable manhole benchings and surrounds).
  - Pipe encasement:
  - Material: Concrete (adoptable manhole benchings and surrounds).
  - Thickness (minimum): 150 mm.

697 INSTALLING FLEXIBLE COUPLINGS
- Ends of pipes to be joined: Cut cleanly and square.
- Outer surfaces of pipes to be joined: Clean and smooth. Where necessary, e.g. on concrete or iron pipes, smooth out mould lines and/or apply a cement grout over the sealing area.
- Clamping bands: Tighten carefully to make gastight and watertight seals.

699 CONNECTIONS TO SEWERS
- General: Connect new pipework to existing adopted sewers to the requirements of the adopting authority or its agent.

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

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

713 INSTALLING ROOT BARRIERS
- •

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.

722 PUBLIC ROADS AND PAVINGS – E&W, SCOT
- • Excavating and backfilling of trenches: To Department for Transport 'Specification for the reinstatement of openings in highways'.

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.

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

INSTALLING ACCESS POINTS AND GULLIES
• Bedding:
  • Material: Granular material - manufactured, size 4/10.
  • Thickness (minimum): 100 mm.
• Surround:
  • Material: Not required.
  • Thickness (minimum): Not required.
  • Height: Not required.
• Backfilling: To excavation.
  • Material: Granular material - manufactured, size 4/10, to 100 mm above crown of pipes, then 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.

INSTALLING INSPECTION CHAMBERS - PLASTICS
• Bedding:
  • Material: Granular material - manufactured, size 4/10.
  • Thickness (minimum): 150 mm.
• Surround:
  • Material: Not required.
  • Thickness (minimum): Not required.
• Backfilling: Granular material - manufactured, size 4/10, to 100 mm above crown of pipes, then selected fill.
  • Compaction: By hand in 100 mm layers.
• Concrete collar:
  • Material: Concrete (general).
  • Thickness (minimum): 200 mm.
  • Width (minimum): 200 mm.
• Seating: Brickwork as section F10.

INSTALLING CONCRETE MANHOLES
• Bases:
  • Material: Concrete (adoptable manhole benchings and surrounds).
  • Thickness (minimum): 225 mm.
• Surround:
  • Material: Concrete (adoptable manhole benchings and surrounds).
  • 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.

INSTALLING VORTEX FLOW CONTROL UNITS
• Benching:
  • Material: Concrete (adoptable manhole benching and topping).
  • 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 (adoptable manhole benching and topping).
  - Application: Before benching concrete has set, and with dense smooth uniform finish.
  - Vortex flow control mounting block (cast in situ):
    - Material: Concrete (adoptable manhole benching and topping).
    - 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: Proprietary sealant.
- Inner joint surface: Trim surplus jointing material extruded into chamber and point neatly.

**757 LAYING CONVENTIONAL CHANNELS, BRANCHES AND BENCHING**
- Main channel: Bed solid in 1:3 cement:sand mortar.
  - Branches: Connect to channel, preferably at half pipe level, so that discharge flows smoothly in direction of main flow.
  - Branches greater than nominal size 150 mm: Connect the branch soffit level with the main drain soffit.
  - Connecting angles more than 45° to direction of flow: Use three-quarter section channel bends.
  - Benching:
    - Material: Concrete (adoptable manhole benching and topping).
    - Profile: Rise vertically from top of main channel to a level not lower than soffit of outlet pipe, then slope upwards at 10% to walls.
  - Topping:
    - Material: Concrete (adoptable manhole benching and topping).
    - Application: Before benching concrete has set, and with dense smooth uniform finish.

**759 LAYING PREFORMED PLASTICS CHANNELS, BRANCHES AND BENCHING**
- Main channel: Bed solid in 1:3 cement:sand mortar.
  - Branches: Connect to channel, preferably at half pipe level, so that discharge flows smoothly in direction of main flow.
  - Connecting angles more than 45° to direction of flow: Use three-quarter section channel bends.
  - Bedding: 1:3 cement:sand mortar. Use clips or ensure adequate mechanical key.
  - Benching:
    - Material: Concrete (general).
    - Profile: Rise vertically from top of main channel to a level not lower than soffit of outlet pipe, then slope upwards at 10% to walls.
  - Topping:
    - Material: Concrete (structural).
    - Application: Before benching concrete has set, and with dense smooth uniform finish.

**761 LAYING SEALED ACCESS FITTINGS, BRANCHES AND BENCHING**
- Unused branches: Fit caps.
  - Bedding: 1:3 cement:sand mortar.
  - Benching:
    - Material: Concrete (general).
    - Profile: 10% fall from manhole walls to component rim.
    - Topping:
      - Material: Concrete (structural).
      - Application: Before benching concrete has set, and with dense smooth uniform finish.
766 INSTALLING UNDERGROUND STORAGE TANK UNITS
- Base:
  - Material: Type 2 material.
  - Thickness (minimum): 100mm.
- Stabilizing: Before placing surround, fill with water to Not required.
- Surround:
  - Material: Compacted selected fill.
  - Thickness (minimum): As required.
  - Height above top of base: Full height of tank.
- Backfilling to upper part of tank: Compacted selected fill.
  Compaction: By hand in 100 mm layers.

773 INSTALLING ACCESS COVERS AND FRAMES
- Seating: Submit proposals.
- 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.

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.

931 FINAL TESTING OF ADOPTABLE AND LARGE PRIVATE SEWERS
- Standard (sewers up to and including size DN 750):
  - England, Wales and Northern Ireland: To WRc ‘Sewers for adoption’.
  - Scotland: To WRc ‘Sewers for Scotland’.
941 WATER TESTING OF MANHOLES AND INSPECTION CHAMBERS
• Timing: Before backfilling.
• Standard:
  - Exfiltration: To BS EN 1610.
  - Infiltration: No identifiable flow of water penetrating the chamber.

951 TESTING OF ANCILLARY COMPONENTS
• Components: Surface water storage tanks.
• Standard: To BS EN 1610.
  - Tests: Exfiltration.

971 CCTV INSPECTION OF PRIVATE PIPELINES
• General: Carry out and record internal inspection using CCTV equipment.
  - Locations to be inspected: Foul and surface water drains.
• Illumination: Of adequate intensity.
• Recording: Provide continuous position recording, still photographs and stopping of the camera at any point.
Copy of videotape recording: Submit.

976 CCTV INSPECTION OF ADOPTABLE PIPELINES
• General: Permit the Adopting Authority or its agent to carry out and record internal CCTV inspection of pipelines and associated manholes after completion.
  - Locations to be inspected: Foul and surface water drains.
• Pipelines under highways: Complete construction, except for laying of wearing course, before inspection.

978 LIFTING KEYS
• Lifting keys: Supply suitable keys for each type of access cover.
  - Timing: At completion.