

Doc Ref: **2459**

Date: **7th May 2020**

Client

Hologic

Heron House

Oaks Business Park

Crewe Road

Wythenshaw

M23 9HZ

Site Address

Hologic

Crewe Road

Wythenshaw

M23 9HZ

Document Title

**Below Ground Drainage
Specification**

Project Title Hologic, Crewe Road, Wythenshawe, M23 9HZ
Project No 2459
Date 7th May 2020



Contents

1.0	Drainage generally.....	3
2.0	Products.....	3
3.0	Execution	6
4.0	Completion	12
5.0	Kerbing and channel drainage.....	13

Revision History

Issue	Date	Status	Prepared By	Signature
1	07.05.20	First Issue	Lee Meadowcroft BSc(Hons) PgDip MScCHE CEng MStructE MICE IHBC	

1.0 Drainage generally

1.1 Application of specification

- Any clauses in this specification which relate to work or materials not required by the work shall be deemed not to apply.
- All British Standards, Codes of Practice, or other Statutory Documents referred to in this specification shall be the current edition at the time of signing any contract.
- Where a standard has been withdrawn or superseded the provisions of its replacement shall apply.

2.0 Products

2.1 Adaptors to clay drainage

- Material and standard: Polypropylene to BS EN 295-1 and Kitemark certified.
- Type: As recommended by manufacturer.
- Manufacturer: Contractor's choice.
- Product reference: Contractor's choice.

2.2 Adaptors to plastics drainage

- Material and standard: Plastics to BS 4660 and Kitemark certified or to BS EN 1401-1 and Kitemark certified.
- Type: As recommended by manufacturer.
- Manufacturer: Wavin or similar approved.
 - Product reference: Wavin Twinwall or similar approved.

2.3 One piece gullies: Back Inlet

- 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 150.
- Silt buckets: Plastics.
 - Product reference: N/A.

2.4 Clay pipelines

- Pipes, bends and junctions: Vitrified clay to BS EN 295-1, with flexible joints, Kitemark certified.
 - Manufacturer: Contractor's choice.
 - Product reference: Contractor's choice.
- Strength: FN 40.
- Sizes: DN 150.
- Type of subsoil: Gravel, sand.
- Bedding class: As structural drawings.

- Warning marker tape: Not required.

2.5 Gullies - road

- Standards:
 - Clay: To BS EN 295-1 and Kitemark certified, or Agrément certified.
 - Plastics: To BS 4660 and Kitemark certified, or Agrément certified.
- Material: Clay.
- Manufacturer: Contractor's choice.
 - Product reference: Contractor's choice.
- Sizes: As structural drawings.
- Outlet sizes: DN 100.
- Covers: Hinged grating.
 - Product reference: Contractor's choice.
 - Type: Hinged grating.
 - Material: Ductile cast iron.
 - Sizes: As structural drawings.
 - Loading grade to BS EN 124: C250.
- Silt buckets: As structural drawings.
 - Product reference: Contractor's choice.

2.6 Rodding points general

- 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.
- Manufacturer: Contractor's choice.
 - Product reference: Submit proposals.
- Sizes: as drawings.

2.7 Inspection chambers - plastics general

- Standard: To BS 7158 or BS EN 13598-1, or Agrément certified.
- Diameter: 450 mm.
- Manufacturer: Contractor's choice.
- Bases:
 - Product reference: Submit proposals.
- Shaft units:
 - Product reference: Submit proposals.
- Access covers and frames:
 - Product reference: Submit proposals.
 - Loading grades to BS EN 124: B125.

2.8 Manholes and inspection chambers - concrete general

- 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 drawing.
- Cement type and content: To BS 5911-1 and BS EN 1916.
- Chamber sections:
 - Product reference: Contractor's choice.
 - Jointing type: Proprietary sealant.
- Cover slabs:
 - Product reference: Contractor's choice.
 - Thickness: 175 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: As drawing.

2.9 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: Contractor's choice.
- 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: As drawing.
- Reducing slabs:
 - Product reference: Submit proposals.
 - Sizes: As drawing.
- Straight backed tapers:
 - Product reference: Contractor's choice.
 - Nominal sizes: As drawing.
- Shaft sections:
 - Product reference: Contractor's choice.
 - Sizes: As drawing.

2.10 Cast iron access covers and seating

- Covers: Grey iron or ductile iron to BS EN 124.
- Manufacturer: Contractor's choice.
- Types: Contractor's choice.
- Seating:
 - Brickwork: As masonry specification.
- Bedding and haunching to frame: Solid, in 1:3 cement:sand mortar, square with joints in surrounding finishes. Cut back top of haunching to 30 mm below top of cover.

2.11 Oil and petrol separator units - plastics

- Standards: To Environment Agency PPG 3 and BS EN 858-1, with oil level alarm.
 - Manufacturer: Submit proposals.
 - Product reference: Submit proposals.
- Type: Class 1.

- Size: NS 15.
- Inlet pipe size: As drawing.
- Outlet pipe size: As drawing.
- Accessories:
 - Access covers and frames;
 - Access equipment and tools; and
 - Extension shafts.

2.12 Vortex flow control units adjacent attenuation tank

- Manufacturer: Hydro International.
 - Product reference: Hydro Brake.
- Material: Stainless steel.
- Drain down secondary outlet pipe: Integral.
 - Control type: pivoting bypass door.
 - Operation: From surface.

2.13 Manhole steps to manholes over 1 m deep

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

2.14 Modular stormwater attenuation units general

- Manufacturer: As drawing.
 - Product reference: As drawing.
- Unit size: As drawing.
- Tank capacity/ size (minimum): As drawing.

3.0 Execution

3.1 Stripping out

- Extent of stripping out: as drawings
- Exposed ends of existing drainage to be abandoned: Seal with concrete

3.2 Existing drains

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

3.3 In situ concrete for use in drainage below ground

- Standard: To BS 8500-2.
- Concrete: Designated, GEN3.
- Concrete (Structural): Designated, GEN3.

3.4 Excavated material

- Turf, topsoil, hardcore etc: Refer to Excavations and Filling Specification

3.5 Selected fill for backfilling

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

3.6 Excavating pipe trenches

- Trench from bottom up to 300 mm above crown of pipe: With vertical sides.
 - Width: As small as practicable but not less than external diameter of pipe plus 300 mm.
- Type of subsoil: Where the type of subsoil at the level of the crown of the pipe differs from that stated for the type of pipeline, give notice.
- Timing: Excavate to formation immediately before laying beds or pipes.
- Mud, rock projections, boulders and hard spots: Remove. Replace with bedding material, well consolidated.
- Local soft spots: Harden by tamping in bedding material.

3.7 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.

3.8 Formation for bedding

- 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.

3.9 Pipes at different level 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

3.10 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.

3.11 Jointing

- Connections: Durable, effective and free from leakage
- Cut ends of pipes: Clean and square. Remove burrs and swarf. Chamfer pipe ends before inserting in to ring seal sockets.
- Jointing: Clean and lubricate. Leave gaps at ends of spigots to allow for movement.

3.12 Class F granular bedding

- Granular material: To BS EN 12620, size 4/10.
-

- Bedding: Compacted granular material.
 - Thickness: 50 mm.
- Laying pipes: Scoop out locally at couplings and sockets and lay pipes digging slightly into bed and resting uniformly on their barrels. Adjust to line and gradient.
- Backfilling: After initial testing, backfill to 150 mm above crown of pipe with a protective cushion of selected fill, free from vegetable matter, rubbish and frozen soil and material retained on a 40 mm sieve. Thoroughly hand compact in 100 mm layers.

3.13 Class S surround general

- Type of subsoil: TBC / Unknown
- 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: 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 150 mm layers.

3.14 Class W surround under buildings

- Type of subsoil: TBC / Unknown
- Timing: Excavate trench after hardcore has been laid and compacted.
- 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 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.

3.15 Class Y concrete surround for shallow pipes under buildings

- Locations: Where crown of pipe is less than 300 mm below underside of slab.
- Timing: Excavate trench after hardcore has been laid and compacted.
- Concrete blinding: 25 mm thick, over full width of trench.
- Temporary pipe support: Folding wedges of compressible board, pipe inverts 100 mm (minimum) above blinding.
- Concrete pipe surround: Same mix as slab and cast integrally with slab. Extend length to within 150 mm of nearest flexible joint.

3.16 Class Z concrete surround as drawings

- Concrete blinding: 25 mm thick, over full width of trench.
- Temporary pipe support: Folding wedges of compressible board, pipe inverts 100 mm (minimum) above blinding.
- Vertical construction joints: At face of flexible pipe joints using 18 mm thick compressible board precut to profile of pipe. Fill gaps between spigot and socket with resilient material to prevent entry of concrete.
- Concrete surround: After testing, place and compact concrete for full width of trench to encase pipe to 150 mm above crown.

3.17 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.

3.18 Bends at base of soil stacks

- Bends: 90° nominal rest bend with a minimum radius of 200 mm to centreline of the pipe.
- Height of invert of horizontal drain at base of stack below centreline of lowest branch pipe (minimum): 450 mm.
- Stabilizing bends: Bed in concrete without impairing flexibility of couplings.

3.19 Installation of fittings

- Appearance: Square with and tightly jointed to adjacent construction as appropriate.
- Bedding and surround of fittings, traps, etc: Concrete, 150 mm thick.
- Permissible deviation in level of gullies: +0 to -10mm.

3.20 Installing access points and gullies

- Bedding:
 - Material: Concrete.
 - Thickness (minimum): 150 mm.
- Surround:
 - Material: Concrete (general).
 - Thickness (minimum): 100 mm.
 - Height: Full height.
- Backfilling: as adjacent pavement specification.
 - Material: as above.
 - 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.

3.21 Installing rodding points

- Bedding and surround:
 - Material: Concrete (general).
 - Thickness (minimum): 100 mm.
- Permissible deviation in level of external covers and gratings: +0 to -6 mm.

3.22 Installing inspection chambers - plastics

- Bedding:
 - Material: Concrete (general).
 - Thickness (minimum): 150 mm.
- Surround:
 - Material: Concrete (general).
 - Thickness (minimum): 150 mm.
- Backfilling: Granular material - manufactured, size 4/10, to 100 mm above crown of pipes, then selected fill.
 - Compaction: By hand in 100 mm layers.

3.23 Installing concrete manholes

- Bases:
 - Material: Concrete (structural).
 - Thickness (minimum): 225 mm.
- Surround:
 - Material: Concrete (structural).
 - 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.

3.24 Fixing manhole steps

- Fixing: As drawings.
- 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.

3.25 Jointing concrete manhole chamber sections

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

3.26 Conventional channels, branches and benching to manholes

- Main channel: Bedded solid in 1:3 cement:sand mortar, branches connected to main channel at half channel level, so that discharge flows smoothly in direction of main flow.
- Benchings: Concrete rising vertically from main channel to a height not lower than soffit of outlet pipe, then sloping upwards at 10% to walls, and with dense smooth uniform finish.

3.27 Installing access covers and frames

- Seating: Brickwork as Masonry Specification.
- 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.

3.28 Backfilling to pipelines generally

- Backfill from top of surround or protective cushion: Material excavated from trench, compacted in 300 mm layers. Do not use heavy compactors before there is 600 mm of material over pipes.

3.29 Backfilling under roads and pavings

- Backfill from top of specified surround or protective cushion up to formation level: Well graded gravel or hardcore passing a 75 mm sieve, well compacted in 150 mm layers.

3.30 Connections to sewers

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

3.31 Temporary bridges

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

4.0 Completion

4.1 Testing and inspection generally

- Obstructions and debris: Remove. Check that the installation is clear before testing.

4.2 Initial testing of pipelines

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

4.3 Final testing of drains

- Before testing:
 - Cement mortar jointing: Leave 24 h.
 - Solvent welded pipelines: Leave 1 h.
- Standard: In accordance with Building Regulations Approved Document H1.
- Method: Contractor's choice.

4.4 Water testing of manholes and inspection chambers

- Timing: Before backfilling.
- Standard:
 - Exfiltration: To BS EN 1610, water testing (method W).
 - Infiltration: No identifiable flow of water penetrating the chamber.

4.5 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.

4.6 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: Adoptable foul and surface water sewers.
- Pipelines under highways: Complete construction, except for laying of wearing course, before inspection.

4.7 Lifting keys

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

5.0 Kerbing and channel drainage

5.1 Drainage channel systems with gratings

- Manufacturer: Aco or similar approved.
 - Product reference: Channel Dain / Slot Drain as shown on drawings.
- Size: To manufacturer's recommendations for catchment area.
- Type of fall: To manufacturer's recommendations.
- Finish: Standard.
- Colour: To landscape architect's preference.
- Accessories:
 - Casting in anchors;
 - Drain unions;
 - Endcaps - closing pieces;
 - Endcaps - outlets;
 - Endcaps - inlets;
 - Step connectors ; and
 - Sump units.
- Bedding: As per drawings.
- Joints generally: As per manufacturer's recommendation.
- Cover gratings: Galvanized steel, slotted.
 - Fixings: Locking bars and bolts.
 - Loading grade to BS EN 124: D400
 - Finish/ Colour: To landscape architect's preference.

5.2 Laying kerbs, edgings and channels

- Cutting: Neat, accurate and without spalling. Form neat junctions.
 - Long units (450 mm and over) minimum length after cutting: 300 mm.
 - Short units minimum length after cutting: The lower of one third of their original length or 50 mm.
- Bedding of units: Positioned true to line and levelled along top and front faces, in a mortar bed on accurately cast foundations or on a race of fresh concrete.
- Securing of units: After bedding has set, secured with a continuous haunching of concrete or on a race of fresh concrete with backing concrete cast monolithically.

5.3 Adverse weather

- Conditions: Do not construct if the temperature is below 3°C on a falling thermometer or 1°C on a rising thermometer. Adequately protect foundations, bedding and haunching against frost and rapid drying by sun and wind.

5.4 Concrete for foundations, races and haunching

- Standard: To BS 8500-2.
- Designated mix: Not less than GEN0 or Standard mix ST1.
- Workability: Very low.

5.5 Cement mortar bedding

- General: To section Z21.
- Mix (Portland cement:sand): 1:3.
 - Portland cement: Class CEM I 42.5 to BS EN 197-1.

- Sand: to BS EN 12620, grade 0/4 or 0/2 (MP).
 - Bed thickness: 12-40 mm.
- 5.6 Bedding/backing of units on fresh concrete races
- Standard: To BS 7533-6.
- 5.7 Drainage channel systems
- Installation: To an even gradient, without ponding or backfall. Commence laying from outlets.
 - Silt and debris: Removed from entire system immediately before handover.
 - Washing and detritus: Safely disposed without discharging into sewers or watercourses.
- 5.8 Drainage channel systems with built in fall
- Installation: Top of channels to levels on drawings, installed in correct sequence to form an even gradient without ponding or backfall. Commence laying from outlets.
 - Silt and debris: Removed from entire system immediately before handover.
 - Washings and detritus: Safely disposed without discharging into sewers or watercourses.
- 5.9 Accuracy
- Deviations (maximum):
 - Level: ± 6 mm.
 - Horizontal and vertical alignment: 3 mm in 3 m.