

Notes:

1. Formation of trench beds and inspection chambers

i) Excavate immediately before laying beds and pipes or base slabs for inspection chambers.

ii) Remove all mud, rock projections, boulders and hard spots and replace with well compacted selected fill. localised soft spots are to be hardened by tamping in granular bedding material.

iii) If oil contamination is found adjacent to trench, the trench profile is to be cut back by 150mm from the face of bedding material and replaced with crushed concrete.

2. Concrete and mortar

i) The concrete used to surround pipes and in the construction of gullies and inspection chambers is to be grade C20P (unless noted otherwise) and mixed using SRPC unless directed otherwise by the engineer or local authority. sulphate resisting cement is to be used for in-situ or precast concrete and mortars to foul drains.

3. Covers and frames

All inspection chamber cover and frames are to be laid to have the top surface in alignment with both the longitudinal and transverse gradients of adjacent roads, drives, footways and verges. they are otherwise to be laid level. all cover levels as shown on the drainage layout/longsection are approximate. actual cover levels are to be determined on site from the position in the road, drive, footpath or otherwise.

4. Pipes to as follows:

Pipe dia. (mm)	Type	Remark
100 Internal (110 NOM. dia.)	uPVC	BS EN 1401
150 Internal (160 NOM. dia.)	uPVC	BS EN 1401

5. The contractor/developer is to ensure that all of the works comply with the following:

i) BS 8301: 1985 (code of practice for building drainage)

ii) The Building Regulations: Approved Document H 2002

iii) NHBC Technical requirements

iv) BRE Digest No. 363

6. The storage and installation of all proprietary drainage items used are to be strictly in accordance with the manufacturers instructions.

7. All uPVC items as specified on this drawing are to comply with BS EN 1401.

8. Mortar

Mortar shall be mixed only as and when required, the relevant proportions indicated in the following table, until its colour and consistency are uniform. The constituent materials shall be accurately gauged, allowance being made for bulking of sand.

Alternative Nominal Mixes by Volume		
Cement:Lime:Sand	Cement:Sand	Cement:Sand with plasticiser
1 : $\frac{1}{4}$: 3	1 : 3	1 : 2 $\frac{1}{2}$ to 3

9. Ready-mixed lime: Sand for mortar and ready-to-use retarded mortar shall comply with the relevant provisions of BS 4721 and to be of category 1.12 and designation (i) respectively.

10. All mortar shall be conveyed fresh to the works as required for use. mortar which has begun to set or which has been site-mixed for a period of more than 1 hour shall not be used. Plasticising and set retarding mortar admixtures shall comply with BS 4887: part 1 and 2, respectively and shall be supplied with instructions for use.

11. Crushed natural stone and shall comply in all respects with BS 1200.

Notes:

Mortar

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Alternative Nominal Mixes By Volume		
CEMENT-LIME-SAND	CEMENT-SAND	CEMENT-SAND WITH PLASTICISER
1 : $\frac{1}{4}$: 3	1 : 3	1 : 2 $\frac{1}{2}$ TO 3

2. Ready-mixed lime:sand for mortar and ready-to-use retarded mortar shall comply with the relevant provisions of BS 4721 and to be of category 1.12 and designation (i) respectively.

3. All mortar shall be conveyed fresh to the works as required for use. mortar which has begun to set or which has been site-mixed for a period of more than 1 hour shall not be used. plasticising and set retarding mortar admixtures shall comply with BS 4887: part 1 and 2, respectively and shall be supplied with instructions for use.

4. Fine aggregate for mortar shall be washed natural sand or crushed natural stone and shall comply in all respects with BS 1200.

5. 20mm thick flexcell, or similar approved filler to be used to form a flexible joint to the concrete surround at the leading edge of a sleeved coupling. dimensions shown are irrespective of type or diameter of pipe, the surrounds must terminate at a pipe joint.

6. If pipes are surrounded in concrete, the joints are to be protected from the ingress of concrete by wrapping them in polythene sheet or building paper.

General fill material

May be of selected locally excavated material or imported. it shall be uniform readily compacted material free from stones larger than 40mm dia. lumps of clay over 100mm, timber, frozen material, vegetable matter, tree roots and building rubbish. the material shall be placed and compacted in layers not exceeding 300mm loose depth. mechanical compaction equipment shall not be used until there is a minimum of 450mm of compacted material above the crown of the pipe.

Selected fill material

To be free from stones larger than 40mm dia. lumps of clay over 100mm, timber, frozen material, vegetable matter, tree roots and building rubbish. the material shall be placed uniformly on each side of the pipe in layers not exceeding 100mm. each layer being compacted by hand tamping. care to be taken not to displace the pipe from its correct line and level.

Notes:

1. Inspection chamber covers and frames as follows:-

Brickwork and pre-cast concrete -

i) Private drives accepting vehicle traffic: BS EN124 class D400, 600mm clear opening, solid top cover and frame.

ii) Footpaths, verges and gardens: BS EN124 class B125, 600mm clear opening, solid top cover and frame.

Polypropylene

iii) Areas accepting vehicle traffic: Class B

iv) Soft landscaped areas: Class C

2. Mortar haunching to inspection chamber and frames.

3. i) For use with brick inspection chambers in non adopted roads, private drives, footways and verges; heavy duty (150mm nominal thickness) precast reinforced concrete cover slab to BS 5911, bedded on 10mm thick mortar bed; or 150mm grade C25P in-situ concrete (reinforced with A393 mesh to BS 4483) cover slab.

other locations inaccessible to vehicles; light duty (75mm nominal thickness) precast reinforced concrete cover slab to BS 5911, bedded on 10mm thick mortar bed; or 100mm grade C25P insitu concrete (reinforced with A193 mesh to BS 4483) cover slab.

ii) For use with precast concrete inspection chambers in non adopted roads, private drives, footways and verges; heavy duty (150mm nominal thickness) precast reinforced concrete cover slab to BS 5911, of size and type to suit chamber sections.

Other locations inaccessible to vehicles: light duty (75mm nominal thickness) precast reinforced concrete cover slab to BS 5911, of size and type to suit chamber sections.

4. With precast or brick inspection chambers, cover slabs with a clear opening of 600x600mm are required. Offset to suit chosen face for step rungs.

5. 215mm thick walls in class b engineering bricks to BS 3921 layered in English bond with frogs up. Inner faces to be plumb and in true alignment. brick course to be level. flush jointing to brickwork inner faces and precast concrete chamber sections to BS 5911.

6. All step rungs to BS 1247

i) General purpose pattern (with 230mm tail) to be built into chamber wall of brick inspection chambers.

ii) Precast concrete manhole pattern "let in" to chamber wall of precast inspection chambers. All step rungs to be horizontally and vertically staggered as shown on section x-x. Step rungs are not required to either type of inspection chamber where depth to soffit is less than 750mm.

7. Mass concrete infill.

8. Benching to rise vertically from edges of channel to a height not less than pipe (full section) soffit level. Steel float smooth hard surface with cement mortar 1:1 mix, 25mm thick.

9. 50mm min.thick mortar bed to half round channels.

10. 150mm min. thick mass concrete base slab (grade C20P) to precast, uPVC and brick types of inspection chamber.

11. 75mm thick lean mix concrete blinding.

12. Minimum of 2, and maximum of 4 courses of 215mm thick engineering bricks (Class B) to underside of cover & frame, built off cover slab, may be required to facilitate road or drive construction.

13. A brick relieving arch shall be turned over all pipes where they pass through the walls of a brick inspection chamber.

14. Pipes entering inspection chambers shall have a flexible joint within 150mm of the outer face of the brickwork or concrete surround.

15. Channel junctions within brick or precast concrete inspection chambers to be half round channel sections.

16. Backfill material to be as detailed above for normal pipe bedding.

17. Following the flexible joint from either a precast or brick inspection chamber (note 14 above) a 'rocker' pipe of 600mm length shall be installed.

18. Precast concrete inspection chambers may (if chosen for use) have a purpose made base units.

19. Where precast concrete inspection chambers are constructed wholly above the water table, joints are to be sealed with mortar. In waterlogged ground or where the water table is above the base slab, joints are to be water tight using a mastic sealant or rubber rings of a type suitable to the chamber units.

Minimum Dimensions for Manholes

Type	Size of largest pipe (DN)	Internal dimensions (minimum).1		Minimum clear opening size.1		Type of cover & frame
		Length (mm) x Width (mm)	Circular (mm dia.)	Length (mm) x Width (mm)	Circular dia. (mm)	
<1.5m to soffit	150 225 300 >300	750x675.7 1200x675 1200x750 1800x(DN+450)	1000.7 1200 1200 The larger of 1800 or (DN+450)	750x675.2 1200x675.2	N/A.3	See note 1. i), ii), iii) & iv)
>1.5m to soffit	225 300 375-450 >450	1200x1000 1200x1075 1350x1225 1800x(DN+775)	1200 1200 1200 the larger of 1800 or (DN+775)	600x600	N/A	See note 1. i) & ii)
Manhole shaft. 4 >3.0m deep to soffit of pipe	Steps.5	1050x800	1050	600x600	600	See note 1. i) & ii)
	Ladder.5	1050x800	1200			
	Winch.6	900x800	900	600x600	600	

NOTES

- Larger sizes may be required for manholes on bends or where there are junctions.
- May be reduced to 600x600 where required by highway loading considerations, subject to safe system of work being specified.
- Not applicable due to working space needed.
- Minimum height of chamber in shafted manhole 2.0m from benching to underside of reducing slab.
- Min. clear space between ladder or steps and the opposite face of the shaft should be approximately 900mm.
- Winch only-no steps or ladders, permanent or removable.
- The minimum size of any manhole serving a sewer (i.e. any drain serving more than one property) should be 1200x675mm rectangular or 1200mm dia.

Table of Protection Requirements Relative to Cover

Location	Gardens (no traffic loading)		Paved or hard surfaces (light traffic loading)		Roads (carriageways & footways)	
Cover (mm) [from barrel of pipe]	Less than 600	More than 600	Less than 900	More than 900	Less than 900	More than 900
Type of protection required	Reinforced conc. or paving slab bridging	None	Reinforced conc. or paving slab bridging	None	Concrete surround	None

Notwithstanding these requirements the contractor is to give further consideration to the protection of drainage items from construction traffic and building works.

Table 1 construction details of paved areas

		Sub-base	Base (Road base)		Binder course (Base course)	Surface course (wearing course)				Bedding course	Pavers
		Granular sub-base material Type 1 to clause 803 Table 8/2 MCHW1 Series 800 (see note 2)	Dense Bituminous Macadam (100/150) Pen Paving grade bitumen with crushed rock aggregate to BS 4987 (Group 1 Mix)	Concrete designation (BS 8500-2 Table 7)	Dense Bituminous Macadam (100/150 Pen paving grade bitumen) with crushed rock aggregate to BS 4987 (Group two mix)	Dense Bituminous Macadam (100/150 Pen paving grade bitumen) with crushed rock aggregate to BS 4987 (Group three mix)	Hot Rolled asphalt to BS 594-1	Mastic Asphalt to BS 1447	Concrete designation (BS 8500-2 Table 7)	Sharpe sand to BS 7533-3 category II of Annex D	Block pavers to BS 6717 of class markings W2, A2, and S3 (weathering, abrasion and slip/ skid classes) (see note 6)
Shared drives having infrequent use by commercial vehicles	Macadam	Table 2	See Note 5	N/A	80 (0/32mm size to clause 6.4) or (0/20mm size to clause 6.5)	30 (0/10mm size to clause 7.4)	40 (designation 30% 0/14)	30 (grade 5-40% 0/10mm size)	N/A	N/A	N/A
	Concrete	Table 2	N/A	N/A	N/A	N/A	N/A	N/A	150 Grade PAV2	N/A	N/A
	Block pavers	Table 2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	50	80
	Gravel	Table 2	N/A	N/A	N/A	See Note 7	N/A	N/A	N/A	N/A	N/A

Notes

1. Names of pavement layers show both the european harmonised names and in brackets the names traditionally used in the UK.

2. If a capping layer is specified then sub-base thickness can be reduced. DMRB Volume 7 Section 2 Part 2 HD 25/95 Foundations Chapter3 Capping and Sub-base gives guidance on capping and Sub-base thickness design based on CBR Values and with and without a capping layer.

3. Thickness is based on the provision of a geotextile membrane underneath the sub-base. If no geotextile membrane is provided see table 2.

4. Bond and tack coat should be provided for bituminous mixtures in accordance with BS 4987-2 or BS 594-2

5. Asphalt based materials can be used as partial replacement of full thickness of granular sub-base type 1 material.

6. When laid to either 90 or 45 degrees herringbone pattern then the edge perimeter to be laid with one single row of strecher bond set parallel to the edge restraint. Where block pavers are laid abutting drainage channels, gully grates and the like, the upper surface of the block pavers shall be set between 3 and 6mm above the grating. Manufacturers declared value markings W3 and S4 are acceptable if W3 is 1.0kg/m² or less and S4 is 45 or more based on 'C scale unit' (with regard to abrasion, Class A2, no test result is greater than 23mm; and Class A1 = no performance determined)

7. Use 38mm thickness of graded 15/20mm unbound aggregate to BS EN 13242 (gravel) well rolled and compacted.

8. N/A = Not Applicable

Minimum Dimensions for Access Fittings and Inspection Chambers

Type	Depth to invert from cover level (m)	Internal dimensions		Cover dimensions	
		Length (mm) x width (mm)	Circular dia. (mm)	Length (mm) x width (mm)	Circular dia. (mm)
Rodding eye		As drain but 100 min.			Same size as pipework.1
Access fitting Small Large	150 dia. 150x100 225x100	0.6 or less, except where situated in a chamber	150x100 225x100	150 225	150x100.1 225x100.1
Inspection chamber shallow Deep	0.6 or less 1.2 or less >1.2	225x100 450x450 450x450	190.2 450 450	MIN. 430x430 MAX 300x300.3	190.1 430 access restricted to max 350.3

NOTES

- The clear opening may be reduced by 20mm in order to provide proper support for the cover and frame.
- Drains up to 150mm.
- A larger clear opening cover may be used in conjunction with a restricted access. the size is restricted for health and safety reasons to deter entry.

Materials for Access Points

Material	British Standard
1. Inspection chambers and manholes.	
Clay brick & blocks Vitrified clay Concrete-precast Concrete-in situ Plastics	BS 3921 BS EN 295, BS 65 BS 5911 BS 8110 BS 7158
2. Rodding eyes and access fittings (excludes covers and frames).	As pipes refer to materials for below ground drainage

Materials for Below Ground Drainage

Material	British Standard
1. Rigid pies	
Vitrified clay Concrete Grey iron Ductile iron	BS 65, BS EN 295 BS 5911 BS 437 BS EN 598
2. Flexible pipes	
UPVC PP Structure walled Plastic pipes	BS EN 1401* BS EN 1852* BS EN 13476

*Application area code ud should normally be specified
Note
Some of these materials may not be suitable for conveying trade effluent.

Scale

As Shown

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