SPECIFICATION

FOR THE CONSTRUCTION AND DRAINAGE OF NEW STREETS

(BEING OFFERED FOR ADOPTION PURSUANT TO SECTION 38 OF THE HIGHWAYS ACT 1980)

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100 GENERAL

101 INTRODUCTION

1. This Specification should only be used for the construction of New Streets pursuant to Section 38 of the Highways Act 1980. Any works required by an agreement pursuant to Section 278 of the Highways Act 1980 must conform to the Department for Transport's Design Manual for Roads and Bridges (DMRB) and the Manual of Contract Documents for Highway Works – Specification for Highway Works (MCHW). Before any design is carried out for works under Section 278, the Developer must contact the Principal Engineer Developer-Led Infrastructure (01305 221000).

2. Any clauses in this Specification, which relate to work or materials not required by the Works, shall be deemed not to apply.

3. Unless stated to the contrary, any thickness of material described means thickness after full compaction.

4. The nomenclature adopted for this Specification is that in the Glossary of Highway Engineering Terms BS6100-4 Section 3 (Road Transport):2008 and abbreviations are in accordance with the recommendations given in BS ISO 80000-2:2009.

5. Where a British Standard is in existence for design, equipment or material detailed hereinafter, the works shall comply with the relevant Standard whether or not it is referred to specifically in the document, unless otherwise approved by the Engineer. It is the Developer's responsibility to ensure that the works comply with the current British Standard (BS) or British Standard European Number (BS EN) should the British Standard mentioned be superseded.

6. Where reference is made to any other Act, specification, manual, technical reference or guidance document within this Specification, it is Developer's responsibility to ensure that design and/or construction complies with the latest revision of that document (or its successor).

7. Wherever possible and practical, materials should be sourced from within the County of Dorset.

102 DEFINITIONS

1. **'Engineer'** means the Proper Officer of the Environment Directorate or his representative.

2. **'Agreement'** means an Agreement under Section 38 of the Highways Act 1980, together with any other documents bound with it.

3. **'Developer'** means the person or persons, firm or company developing the site and constructing new streets in accordance with the Agreement.

4. **'Works'** means the works to be executed in accordance with the Agreement.

5. **‘Specification’** means the Specification for the Construction and Drainage of New Streets.

6. **‘Formation’** means the surface of the **‘**Sub-Grade**’** with or without capping layer in its final shape after compaction of the earthworks.

7. **‘Capping Layer’** (required where CBR value is equal to or less than 5.0%) means the constructed top layer of the **‘**Sub-Grade**’**.

8. **‘Sub-Grade’** means the upper part of the soil, natural or constructed which supports the loads transmitted by the ‘Sub-Base’

9. **‘Sub-base’** means the layer of material between the formation and the **‘**Base**’** or ‘ Road-base**’**

10. **‘Base’ or ‘Road-base’** means the bituminous Macadam, which constitutes the main structural elements of the pavement.

11. **‘Binder Course’ or ‘Base Course’** means a course forming part of the surfacing immediately below the **‘**Surface course**’**.

12. **‘Surface Course’ or ‘Wearing Course’** means the part of the surfacing which directly supports the traffic.

13. **‘Surfacing’** means a **‘**Surface**’** or ‘Wearing’ course or a combination of **‘**Surface**’** or ‘Wearing’ course and **‘**Binder**’** or ‘Base’ course.

14. **‘Footway’** means pedestrian way adjacent to the carriageway.

15. **‘Footway Link’** means pedestrian way that is not associated with the carriageway.

16. **‘Safety Margin’** means a hardened margin (forming part of the highway) between the carriageway and third party land/property provided for reasons of safety. The margin shall be hardened and with a minimum width of 500mm.

17. **‘Service Margin’** means a margin (forming part of the highway) provided for the installation of public utility services. The margin shall usually be soft landscaped and of adequate width to accommodate services placed therein.

103 COMMUTED SUMS

1. Commuted sums are required to pay for the maintenance costs for items offered for adoption that are in addition to that required for the normal safe operation of the highway. The commuted sum shall be paid, in full, at the same time as the inspection and legal fees (immediately prior to the signing of the Agreement).

2. An explanation of such items, or enhancements, that attract commuted sums is detailed in the document entitled “Adopting New Streets”.

104 TRAFFIC SAFETY AND CONTROL

1. The Developer shall provide, erect and maintain such traffic signs, lamps barriers and traffic control signals as may be necessitated by the construction of the Works in accordance with the requirements and recommendations contained in Chapter 8 of the Traffic Signs Manual published by Her Majesty's Stationary Office for the Department for Transport (and any amendments thereof) and in accordance with the New Roads and Street Works Act 1991.
2. A minimum carriageway width of 3.500m shall be maintained by the Developer at all times.
3. The Developer shall not commence any work, which affects the public highway, until all traffic safety measures necessitated by the works are fully operational and an accredited supervisor and operative(s) only present.
4. The traffic signs, lamps, barriers and traffic control signals shall be in accordance with the requirements of the current edition of "Traffic Signs Regulations and General Directions" at the time of the execution of the works.
5. Traffic signs shall comply with BS EN 1463-2, BS EN 12899-2:2007, BS EN 13422:2004 and road danger lamps with BS EN 12352:2006.
6. The flashing rate for flashing lamps shall be within in accordance with BS EN 12352. The minimum luminous intensity of the lamps shall be in accordance with the six design classes from the standard (prescribed by the TSRGD) and given in the National Annex.
7. The road danger lamps shall be positioned no higher above the surface of the carriageway than 1.200m.
8. The Developer shall keep clean and legible at all times all traffic signs, lamps, barriers and traffic control signals and he shall position, re-position, cover or remove them as necessitated by the progress of works.

105 TEMPORARY DIVERSION OF TRAFFIC

1. The Developer shall construct temporary diversion ways wherever the works will interfere with existing public or private roads or other ways, which there is a public or private right of way for any traffic.
2. The standard of construction shall be suitable in all respects for the class or classes of traffic using the existing ways and the width of the diversion shall not be less than that of the existing way.
3. Diversion ways must be constructed in advance of any interference with the existing ways and shall be maintained in a condition satisfactory to the Engineer for as long as required.
4. The provisions of this Clause shall not apply to any temporary access or accommodation works, which the Developer may construct for his sole use in the execution of the works.

106 PRIVATELY OWNED SERVICES

1. If any privately owned services for water, electricity, drainage, et cetera passing through the Site shall be affected by the Works, the Developer shall provide a satisfactory alternative service in full working order to the satisfaction of the owner of the service and of the Engineer before cutting the existing service.

2. A license to register the existence of private apparatus in the carriageway must be obtained from the Highways Manager (Community & Customer Liaison) prior to technical approval of the site layout.

107 EXISTING GROUND LEVELS

1. The Developer shall satisfy himself that the existing ground levels as indicated on the Drawings or schedules of cross section levels are correct. Should the Developer wish to dispute any levels he shall submit to the Engineer a schedule of the position of the levels considered to be in error and a set of revised levels. The existing ground relevant to the disputed levels shall not be disturbed before the Engineer's decision as to the correct levels is given.

108 SITE CLEARANCE

1. Subject to the appropriate Planning Approval, the Developer shall demolish, break up and remove buildings, structure and superficial obstructions on the Site in the way of or otherwise affected by the Works.

2. The Developer shall clear each part of the Site at times and to the extent required or approved by the Engineer.

3. All materials arising from the site clearance, which are surplus to or unsuitable for use in the Works, shall become the property of the Developer and shall be disposed of by the Developer off the site to an appropriate licensed commercial site or commercial waste transfer site licensed by Environmental Agency.

4. It is the responsibility of the Developer to ascertain whether part, or all, of the site lies within a conservation area. In addition, it is the Developer's responsibility to prove the status of trees and bushes with regard to Tree Preservation Orders (TPOs). This information can be obtained from the Local Planning Authority.

5. A plan for the protection of any existing bushes, hedgerows, undergrowth and trees within a conservation area, or protected by a TPO, must be agreed with the Tree Officer from the Local Planning Authority prior to the commencement of the Works.

6. In conservation areas, bushes, undergrowth or small trees, the trunks of which are less than 75mm in girth at 1.500m above ground level, tree stumps less than 75mm diameter and hedges may be uprooted and disposed of. See sub-clause (3), above.

7. Where TPOs do not exist and the site does not lie within a conservation area, bushes, undergrowth or small trees, the trunks of which are less than 300mm in girth at 1m above ground level, tree stumps less than 100mm diameter and hedges may be uprooted and disposed of. See sub-clause (3), above.

8. All trees within the limits of the highway shall be lopped and trimmed to provide a minimum vertical clearance of 5.105m (16'9") under the supervision of the Tree Officer from the Local Planning Authority. Trees should only be removed where specifically identified by the Tree Officer as part of the planning process.

9. Stumps and tree roots shall, unless otherwise directed by the Engineer be grubbed up and deposited off the Site. Holes left by the stumps or roots shall within one week be filled with suitable material and properly compacted.

10. The disposal of any material off site shall be to an appropriate licensed commercial landfill site or commercial waste transfer site licensed by Environmental Agency.

109 WORKS IN EXISTING HIGHWAY

1. All works within the existing highway must only be undertaken by appropriately certificated Supervisor and Operatives. Evidence of the qualification must be provided to the Engineer.

2. No works shall commence until a Section 50 (New Roads and Street Works Act 1991) application has been submitted to, and approval received from, the Road Space Manager (01305 221000).

3. The Section 50 application consists of 7 parts, including the guidance notes, and all relevant parts must be completed before approval will be granted. The application pack comprises:

   a) Form SWL.1 (Part 1) Notes for Guidance for Applicants;
   b) Form SWL.2 (Part 2) Application for Placing Apparatus in the Highway;
   c) Form SWL.3 (Part 3) Consent to Work on Existing Apparatus in the Highway;
   d) Form SWL.4 (Part 4) Notice of the Works (including responses);
   e) Form SWL.5 (Part 5) Registration of the Works;
   f) Form SWL.6 (Part 6) Declaration Form (Statutory Undertakers);
   g) Form SWL.7 (Part 7) Duty of Care: Controlled Waste Transfer Note.

4. All works shall be signed and protected in accordance with Clause 104.

110 STEPS AND STAIRS

1. This Authority will not accept steps, or stairs, for adoption on footways, or footway links, forming part of the prospective highway maintainable at the public expense.

2. Any change in level, or gradient, for any way provided for pedestrians, steeper than 1:10 must be achieved only by a ramp, or a series of ramps, with appropriate landings, handrails, barriers and indicative paviours.

3. Such landings, handrails, barriers, and indicative paviours must comply with the Disability Discrimination Act 1995, the Department for Transport publication entitled Inclusive Mobility, and this Specification.

200 DRAINAGE

201 GENERAL

1. Only surface water from the proposed highway is permitted to drain into the existing, or proposed, highway drainage system.

2. If the proposed surface water system takes surface water run off from other surfaces, the system is deemed to be a public surface water sewer and must be the subject of a Section 104 Agreement, Water Industry Act 1991 (to be adopted by the relevant Water Authority) before the highway drainage will be approved.

3. All works for a new system deemed to be creating a public sewer (foul water or surface water) must conform to current edition of Sewers for Adoption, or its successor, and is to be approved by the Water Authority, in writing. A copy of the letter of approval is to be provided to the Engineer.

4. Subject to the provisions of Section 106 of the Water Industry Act 1991, and written approval from the Water Authority, the Developer may connect to an existing public surface water sewer. A copy of the letter of approval must be provided to the Engineer. Such a connection will have a restriction to the flow/discharge rate (typically 6.7 l/s, or less) and full attenuation shall be required.

5. Consideration must be given to the Flood and Water Management Act 2010 (FWMA 2010) with regard to incorporating Sustainable Drainage Systems (SuDS) and the attenuation and management of all surface water run-off, both private drainage and that intended for adoption as a highway system.

6. When fully enabled, the County Council, as the SuDS Approving Body (SAB), must approve the design for the surface water drainage (including those private areas not to be offered for adoption) before any works commence. Such approval must be obtained from the Principal Engineer (Flood Water Management) 01305 221000.

7. Attenuation systems for surface water (other than the capacity of a carrier that does not conflict with Clause 104(2) or sub-clause (23), below) shall be positioned away from the carriageway construction in areas of open space.

8. If the surface water system, for other drained areas, is not to be adopted by the Water Authority, the highway drainage system must be entirely separate.

9. Subject to approval, separate highway drainage systems may discharge into a positive adopted drainage system, a watercourse (approved by the Environmental Agency and protected by interceptors), or into a sustainable drainage systems (protected by interceptors). Only those systems that have maintenance requirements that fall within the scope of the Authority's usual maintenance capabilities, and that do not constitute a health and safety risk, shall be considered for adoption in residential areas.

10. The minimum clearance between the face of kerb and any parallel highway drain is to be 1.000m (with the exception of pipes or structures of 900mm diameter, or more, as described in sub-clause (23), below).

11. Manholes, in accordance with Clause 208, must be constructed (to facilitate any of the following):

    a) at the head of each highway drain;
    b) at every change of direction/alignment and gradient;
    c) at every change of pipe diameter;
    d) at every junction of two, or more, highway drains.

12. Manholes, in conjunction with drainage runs set into granular surround, must incorporate the trench drain as detailed in the Standard Detail Drawings 803-1, 803-2, 805-1, and 805-2 and Clause 208.

13. Pre-formed (pre-benched) manhole bases are permitted but consideration must be given to the provision of the trench drain for drainage runs set into granular surround.

14. The maximum permitted length, or run, of highway drain between manholes is 45.000m, unless otherwise approved by the Engineer.

15. The maximum drained area per single gully shall not exceed 200m^2.

16. Specific dispensation from the Environment Agency must be sought not to provide Class 1 Bypass Interceptors on outfalls to a watercourse or soakaways (either grouped or singly in areas of sensitivity). The South Wessex Area Office of the Environment Agency is located in Blandford 08708 506 506 (general enquiry line 0845 9 333 111).

17. Soakaways are to be constructed in accordance with Standard Detail Drawing 807-1 or 807-2, and Clause 620. Attention is drawn to the special order requirements for pre-cast concrete soakaway rings as this Authority will only accept 45mm diameter perforations (or slits 110mm x 25mm).

18. Calculations for rainfall are included, automatically, within the s for the two permissible types of soakaway construction, Standard Detail Drawings 807-1 and 807-2.

19. The rainfall frequency and intensity details are obtained from the Revised Bilham Formula and the “Rational” Lloyd-Davies method shall be used for the design of highway drainage, as detailed in Road Note 35 – A Guide for Engineers to the Design of Storm Water Sewer Systems.

20. Where surcharge from a highway drain affects private property, a one in a hundred year return period must be used together with a minimum of 30% increase (currently) to the rainfall rate (148.4mm/hr minimum) due to the Environment Agency’s concern regarding the potential impact from climate change.

21. Protection to gully connections may be concrete bed and surround.

22. Concrete slab protection, to proposed Section 102 or 104 (Water Industry Act 1991) Public Surface Water Sewers, within the adoptable highway is acceptable only between cover depths of 700mm and 1.200m. Where less

than 700mm of cover is proposed, ductile iron (to BS EN 598:2007) must be specified.

23. Concrete pipes, with diameters equal to or greater than 900mm, and other conduits where the larger dimensions equals or exceeds 900mm, are considered to be structures and are to be positioned in the centre of a lane of the carriageway. If, when such a pipe (or structure) would be exposed, a minimum carriageway width of 3.500m is not achievable (see Clause 104(2)), the pipe (or structure) must be positioned away from the carriageway construction.

24. If sub-clause (23), above, is applicable then a structure design submission and check shall be undertaken and separate technical approval must be gained from this Authority.

202 TYPES OF PIPE

1. Pipes for drainage shall comply with Clause 610.

2. Unless otherwise specified or agreed by the Engineer, only one type of pipe shall be used within any individual drain length between manholes, soakaways, or catch-pits.

3. Un-plasticised polyvinyl chloride (PVC-U) pipes shall be laid, jointed and back-filled in accordance with BS EN 1401-1:2009, BS3506:1969 and BS4660:2000 and the manufacturers' recommendations. PVC-U pipes laid beneath the carriageway will only be approved where cover exceeds 1.200m.

4. Un-plasticised polyvinyl chloride (PVC-U) pipe shall be smooth bore, twin wall construction and concentrically reinforced.

5. The minimum self-cleansing and desired ranges of gradients for pipes are detailed in Table 200/1 (below).

6. The design criteria for pipes over 525mm (21") diameter shall be based upon a minimum flow velocity of 0.75m/sec.

7. To utilise smaller diameter pipes in replacement of a larger diameter, the following information, in Table 200/2 (below), must be considered.

TABLE 200/1 Diameters and minimum self-cleansing gradients

Diameter of pipe		Minimum Self-cleansing gradients	Desired range of gradients	
Metric (mm)	Imperial equivalent (")		Steepest	Slackest
150	6	1:100	1:22	1:87
225	9	1:167	1:38	1:154
300	12	1:250	1:55	1:222
375	15	1:333	1:74	1:300
450	18	1:417	1:95	1:380
525	21	1:500	1:115	1:460

TABLE 200/2 Equivalent cross-sectional area of pipes

Diameter of pipe		Cross-sectional area (mm^2)	Equivalent number and diameters for same cross-sectional area
(mm)	(")		
150	6	17,672	n/a
225	9	39,761	3 x 150mm
300	12	70,686	4 x 150mm 2 x 225mm
375	15	110,447	4 x 225mm 2 x 300mm
450	18	159,044	3 x 300mm 2 x 375mm
525	21	216,476	3 x 375mm 2 x 450mm

203 EXCAVATION FOR PIPES, MANHOLES, AND SOAKAWAYS

1. The sides or pits and trenches shall be adequately supported at all times. Except where specified, the sides shall not be battered. The supports shall be left in pits or trenches where specified or directed by the Engineer.

2. Trenches for pipes shall be excavated to a sufficient depth and width to enable the pipe and any specified or agreed joint, bedding, haunching and surround to be accommodated. Trench widths shall be in accordance with the Transport Research Laboratory's publication "Simplifies Tables of External Loads on Buried Pipelines" 1986.

3. Soft spots in the bottom of drainage excavations shall be removed and the resulting void immediately back-filled with Type 1 sub-base material or pipe bedding material to Clause 204 or with ST2 Mix/C10 Grade concrete to Clause 509 as directed by the Engineer.

4. The following shall be made good at the Developer's expense with one of the materials described in sub-clause (3), above, as directed by the Engineer:

   a) Any additional excavation at or below the bottom of drainage trenches if the Developer allows the trench to become soft or otherwise unsuitable for the construction of a pipeline;
   b) Any excavation greater than the nett volume required for the drainage works below the upper level of any pipe surround as described in sub-clause (2).

204 BEDDING AND LAYING OF PIPES

1. Immediately following the excavation of the trench, the pipes shall be laid and jointed on the pipe bed. Pipes shall be laid so that each one is in contact with the bed throughout the length of its barrel. The bed shall be cut away and removed at each socket and sleeve in the case of socketed, or sleeve jointed, pipes to give a clearance of at least 50mm so that the socket or sleeve does not bear on the bed.

2. Unless otherwise specified, pipe bedding material shall be a granular material having a compaction fraction value of 0.2 or less and grading within the range shown in Table 200/3 (below).

TABLE 200/3 Grading for pipe bedding material

BS Sieve Size	Percentage by mass passing
20 mm	100
5 mm	0 - 10

3. Except where the pipeline is to be tested, the completion of the bedding and the surrounding of the pipes is to be carried out immediately after jointing. The bedding and surround shall be brought up equally on both sides of the pipe ensuring that it is in contact with the underside of the pipe barrel and be carefully compacted in layers not exceeding 150mm thickness and shall extend to 150mm above the top of the pipe barrel. Where pipelines are to be tested, the bedding or surrounding material shall only be brought up sufficiently to support the pipeline and joints shall be left exposed until the test is completed and the pipeline accepted by the Engineer.

4. Concrete surround shall be ST2 Mix/C10 Grade concrete to Clause 509. Ready-mix concrete may be used in accordance with Clause 509 and Clause 513.

5. Where a concrete bed or surround, a compressible board or a pre-formed joint filler shall be placed in contact with the end of the socket of the pipe joint and shall extend through the full thickness of any concrete in contact

with the pipe. Such joints in any concrete bed or surround shall be at intervals not exceeding 5.000m.

6. Where pipelines are laid within 2.000m of each other they shall be protected as directly by the Engineer.

7. Concrete slab protection to sewers subject to Section 102 or 104 (Water Industry Act 1991) within the adoptable highway is acceptable only between cover depths of 700mm to 1.200m. Where less than 700mm of cover is proposed, ductile iron (to BS EN 598:2007) must be specified.

205 JOINTING OF PIPES

1. All sewers and highway drains shall have watertight joints.

2. Pipes shall be flexibly jointed in accordance with the recommendations of the manufacturers of the pipes and joints. A space shall be left between the ends of the pipe unless otherwise agreed by the Engineer. Clay pipes shall have joints that comply with BS EN 295 and BS65:1991.
3. Where concrete bed and surround is used, a flexible joint/separator shall be inserted directly above the flexible joint in the pipe.

206 BACK-FILLING OF DRAINAGE AND SOAKAWAYS

1. Back-filling shall, wherever practicable, be undertaken immediately the specified operation preceding it has been completed and approved by the Engineer.

2. Where concrete protection to the pipes has been provided, no back-filling shall be done until, at least, four days after placing the concrete has passed.

3. Filling to the sides of pipes with no concrete protection, and filling over the pipes, shall be pipe bedding material (Table 200/3) so that there is no displacement or damage.

4. The granular surround for soakaways must be a 40mm uniform size, hard, clean, crushed rock or gravel obtained from local sources wherever possible. It shall be clean and free from dirt, refuse, clay or other foreign matter.

5. The granular material for highway soakaways shall be deposited in layers each not exceeding 225mm loose depth and each layer shall be lightly compacted.

6. The minimum dimension of the granular material surrounding the soakaway chamber shall be 500mm.

7. The faces of the soakaway excavation shall be lined with a geotextile membrane and shall be kept clean and free from any contamination. The granular fill shall be placed between the completed soakaway structure and the covered, protected, faces of the excavation.

207 CONNECTIONS TO EXISTING SEWERS, DRAINS, MANHOLES AND SOAKAWAYS.

1. Existing sewers and drains shall be properly extended, connected and jointed to new sewers, culverts, drains or channels. All such connections shall be made during the construction of the new main sewer, drain or other

work and their positions recorded by the Developer who shall hand to the Engineer a copy of the record of the connections made the previous day.

2. Where the pipe connections made to a brick sewer, concrete culvert, stone built or lined channel, the pipes shall be well and tightly built into the concrete, brick or masonry work, and be so placed as to discharge at an angle no greater than 60º from direction of flow from main sewer, drain or channel and with the end of the pipe carefully cut to the necessary angle. Where the connections are between pipe sewers or drains, special connecting pipes shall be laid true and properly jointed.

3. Under no circumstances are saddle connections to be used. New manholes are to be constructed. It is the preference of this Authority to use manholes rather than 'Y' connections.

4. Before entering or breaking into an existing sewer or drain, the Developer shall give notice of his intention and obtain approval to do so to the Authority responsible for the pipeline to which the connection is to be made.

208 MANHOLES, CATCHPITS, INSPECTION CHAMBERS AND SOAKAWAYS

Manholes, inspection chambers and soakaways shall be constructed in accordance with Standard Detail Drawing 803-1, 303-2, 804, 805-1, 805-2, 807-1 or 807-2 unless otherwise directed by the Engineer. Attention is drawn to the requirement of a trench drain, as detailed within the Standard Detail Drawings 803-1, 803-2, 805-1, and 805-2, where a drainage run is placed into granular surround. In all other respects, all chambers are designed in accordance with current edition of Sewers for Adoption, or its successor.

Foundations

1. The formation shall be properly levelled and, after approval by the Engineer, the C20 Grade Sulphate Resisting concrete foundation shall be laid thereon with a minimum thickness in accordance with Table 200/5.

TABLE 200/5 Thickness of foundation per depth of chamber

Depth of chamber (m)	Thickness (mm)
< 1.500m	150
≥ 1.500 and ≤ 3.000	225
> 3.000	225 *

* *The Engineer may request a greater thickness of foundation for chambers in excess of 3.000m depth.*

Inverts and Benching

2. Inverts shall normally be formed with a half pipe of similar material to the main pipe. It shall be made to the required radius and shall be laid on a bed of cement mortar. Close fitting, watertight joints with the incoming and outgoing pipes shall be made.

3. Inverts and benchings constructed in situ shall be formed in C20 Grade Sulphate Resisting concrete rendered with 40mm minimum thickness of granolithic rendering to a smooth hard surface, true to line, curves and falls.

Benchings to pre-cast inverts shall be formed to the required size, shape and falls in concrete and the surface shall have a hard smooth finish.

Connections

4. All pipes shall be cut to fit flush with the internal walls of the manhole. All pipes shall be laid soffit to soffit and bedded in position before the manhole walls are built.

Pre-cast Chambers

5. Pre-cast chamber rings, cover slabs, corbel slabs, reducing slabs, landing slabs, cover seating rings and shaft rings shall comply with BS EN 1916:2002 and BS5911-1:2002, and BS EN 1917:2002 and BS5911-3:2010, BS5911-4:2002 and be firmly bedded in cement mortar.

6. The manhole shall be surrounded with ST4 Mix/C20 Grade concrete, not less than 150mm thick.
7. The minimum diameter of the chamber shall be 1.200m and the shaft diameter shall not be less than 900mm (step access) and 1.200m (ladder access), to comply with BS EN 752:2008 Table NA.22.

8. The minimum diameter of a soakaway chamber shall be 1.200m to comply with Standard Detail Drawing 807-2 (or fixed at 2.400m to comply with Standard Detail Drawing 807-1) and Clause 620.

9. The base, pipes and all benching shall be constructed first, with a minimum of 125mm C20 Grade Sulphate Resisting concrete over the highest pipe to receive the lower chamber ring.

10. The lower pre-cast chamber ring, of pre-cast concrete manholes and soakaways (strip foundation), shall be recessed into the concrete foundation by a minimum of 75mm.

11. If the Engineer approves the lower chamber to be cut to receive connecting pipes, holes shall be 25mm larger than the outside diameters of the pipes to be received. C20 Grade Sulphate Resisting concrete shall be thoroughly compacted around inlet and outlet pipes and side connections.

Brick Chambers

12. Chamber walls shall be constructed in Class B Engineering bricks laid in cement mortar to English Bond (not stretcher bond). The joints shall be struck flush with the work as it proceeds. Two ring brick arches shall be formed over pipes larger than 300mm diameter. All joints shall be watertight. The inner surface of the manhole shall be plumb and smooth throughout.

13. Where a pipe of 300mm diameter, or larger, is to be joined to either new or existing brick manholes the opening and the pipe shall be protected by the construction of a brick arch of two rings of bricks on edge.

14. The space between the brickwork and the face of the excavation shall be filled with ST4 Mix/C20 Grade concrete as the work proceeds, and shall be of not less than 150mm thickness.

15. In-situ concrete shaft and chamber cover slabs shall be of not less than 150mm thickness of C30 Grade concrete to Clause 508(2) suitably reinforced to BS EN 1917:2002 for its appropriate location and use.

Manhole covers and Frames

16. All manhole covers and frames shall be to BS EN 124 D400. Double triangular covers must be securely bolted together at all times when in position.

17. Where manholes equal or exceed 1.500m to invert, covers and frames shall be double triangular, non-ventilating type of an approved pattern with a minimum clear opening of 675mm x 675mm for Type A, B, D, and E manholes, and 1220mm x 685mm for Type C manholes and coated with a bitu-mastic paint.

18. Where manholes are situated in the footway or verge, and are less than 1.500m to soffit (type C, D, or E only), covers and frames may be to BS EN 124 C250. These shall be double triangular or rectangular (as chamber type dictates) solid cast iron and a minimum size of 1220mm x 685mm.
19. The minimum depth of cover and frame shall be 100mm for access roads, shared surface roads, courts, and squares only (BS EN 124 D400N). For block pavers and for all other categories of road (feeder, collector, local distributor, and industrial) the minimum depth of cover and frame shall be 150mm (BS EN 124 D400H).

20. Manhole covers and frames shall be set on at least two but no more than four courses of 215mm Class B Engineering brickwork or pre-cast concrete seating rings.

21. Covers in paths and verges shall conform to the level of the surrounding surface. Covers in fields and gardens shall be flush with a concrete apron 100mm deep and 300mm wide of ST2 Mix/C10 Grade concrete.

22. Covers and frames in the carriageway shall be permanently bedded on mortar and set at the level required for the surface course. The maximum thickness of mortar bed shall be 25mm. Permanent mortar haunching, no steeper than 45°, shall surround the frame. The haunching shall extend from the outside edge of the brickwork, or pre-cast concrete cover frame seating rings, to 30mm below the top of the frame.

23. Where the surface course is pre-cast concrete block pavers (see Clause 430 and Clause 613), the haunching must be a minimum of 80mm below the top of the frame (150mm deep, BS EN 124 D400H only). Temporary haunching shall be provided to the top of the frame and be broken out immediately prior to providing the laying layer and block pavers.

Step Iron and Ladders

24. Where the depth of invert of a chamber exceeds 900mm below the finished surface, double manhole step irons to BS EN 13101:2002 shall be provided.

25. Where the depth of invert of a chamber exceeds 3.500m below the finished surface, a ladder to BS4211:2005 (Class A) shall be provided.

26. Where the depth of invert of a chamber exceeds 6.000m, a landing slab(s) to BS EN 1916:2002, BS EN 1917:2002 and BS5911-1:2002, BS5911-3:2010, BS5911-4:2002 shall be provided no more than 6.000m apart. Step irons or ladders shall be positioned so as to conform to BS EN 752:2008.

27. Soakaways (to Standard Detail Drawing 807-1 or 807-2) are not intended for access other than by use of winch. To comply with BS EN 752:2008, step irons and ladders must not be installed.

Trench Drains

28. Trench drains shall be constructed into the upstream side of manhole chambers where the main carrier drain is set into granular surround (see Standard Drawing Details 803-1, 803-2, 805-1, and 805-2).

29. The trench drain shall comprise 75mm diameter PVC-U pipe, to Clause 202 and Clause 610, set parallel with the line of, but no closer than 150mm to, the main carrier drain. This may be reduced to 130mm for Type C and Type D chambers with a carrier diameter in excess of 225mm.

30. The invert level of the drain shall be, at least, 25mm above the soffit of the main carrier to prevent surcharge leaving the chamber and entering the granular bedding material.

31. The trench drain shall be installed horizontally and with the invert set level with the benching.

32. The PVC-U pipe shall extend into the chamber no more than 25mm, and no less than 150mm beyond the concrete surround.

33. A 75mm soffit vent shall be placed into the upstream end of the trench drain to prevent the loss, and subsequent migration, of bedding material into the chamber.

209 GULLIES AND GULLY CONNECTIONS

Gully Pots

1. Gully pots shall be trapped with rodding eyes and shall be 375mm internal diameter by 910mm deep.

2. Pre-cast concrete gully pots shall be un-reinforced and conform to BS5911-6:2004.

3. Gully pots (formers) of polypropylene, polyethylene, PVC-U or other plastic materials are permitted only if surrounded with a minimum of 225mm thick, and be of (minimum) C30 Grade concrete.

4. The concrete surround shall be compacted by vibrating poker and, if required, the level and the position of the former shall be checked before and after pouring to the satisfaction of the Engineer.

Gully Gratings and Frames

5. Gully gratings are not to be installed by pedestrian crossing points. If such positioning is unavoidable then “mesh” covered (pedestrian friendly) gullies must be used.

6. Gully gratings and frames shall be GA2-450 square in cast or ductile iron, size approximately 450mm x 450mm obtained from an approved manufacturer in accordance with BS EN 124 D400.

7. Footway gully gratings shall be “mesh” covered (pedestrian friendly) and a minimum of 300mm square and fixed down securely (fixed grating).

8. Concrete gully pots shall be set on a 150mm thick foundation and surrounded with a minimum of 150mm thickness of ST2 Mix/C10 Grade concrete which shall be brought up to the top of the pot and struck level. At least two courses of 215mm Class B Engineering brickwork or square gully cover slab(s) (to comply with BS5911-6:2004) shall be laid on the concrete to form a base for the grating and frame.

9. Brick gullies shall be built on a 150mm thick foundation of ST2 Mix/C10 Grade concrete. Carriageway gullies shall be 215mm engineering brickwork with internal dimensions 500mm x 350mm x 1.000m deep and surrounded with a minimum of 150mm thickness of ST2 Mix/C10 Grade concrete which shall be brought up to the top of the brickwork and struck level.
10. Footway gullies shall have a 150mm diameter outlet and be 215mm brickwork with internal dimensions 340mm x 340mm x 600mm deep. The surround shall be a minimum thickness of 150mm of ST2 Mix/C10 Grade concrete which shall be brought up to the top of the brickwork and struck level. The trap shall be 170mm deep to the invert of the outlet.

11. Gratings and Frames shall be set temporarily 20-25mm below the level of binder course laid for the Part I roads and raised immediately prior to surfacing, and concreted into position. The level of the grating shall be set 10-15mm below finish surface line.

12. Junction pipes, which are laid but not immediately connected, shall be fitted with temporary stoppers or seals and the position of all such junctions shall be clearly defined by means of stakes or tracing wires properly marked and labelled. Junction pipes shall be manufactured of the same type and class of material as the remainder of the pipes in the run or shall be in accordance with the manufacturer’s recommendations.

210 TESTING AND CLEANING

1. All sewers and drains shall be tested as directed by the Engineer, in sections, e.g. between manholes, before the pipes are covered or surrounded by means of the air test described below. Alternatively, they shall be tested by the water test described below. Before testing, the ends of the pipeline to be tested, including those of short branches, shall be plugged and sealed to the satisfaction of the Engineer. Any section not passing any of the tests shall have the defects made good and shall be re-tested, using either of the alternative tests given below chosen by the Engineer.

2. For the air test, air shall be pumped in by suitable means until a stable pressure of 100mm head of water is indicated in a U-tube connected to the system. The air pressure shall not fall to less than 75mm head of water during a period of 5 minutes without further pumping after an initial period to allow stabilisation. Drains with traps shall be tested to 500mm head of water and the permissible loss shall then be no more than 13mm head of water in 5 minutes after the initial stabilising period.

3. For the water test, the pipes shall be filled with water under a head of not less than 1.200m above the crown of the pipe at the high end and not more

than 6.000m above the pipe at the low end. Steeply graded pipelines shall be tested in sections so that the above maximum shall not be exceeded. Unless otherwise agreed by the Engineer the test shall commence one hour after filling the test section at which time the level of water at the vertical feed pipe shall be made up to produce the required 1.200 m minimum test head. The loss of water over a 30 minute period shall be measured by adding water at regular 10 minute intervals to maintain the original water level and recording the amounts added. The drain will have passed the test if the volume of water added does not exceed 0.12 litres per hour per 100m of drain per mm of nominal internal diameter.

4. On completion of the Works, or earlier if the Engineer agrees, all manholes and drains shall be flushed from end to end with water and left clean and free from obstructions to the satisfaction of the Engineer. Where in the opinion of the Engineer any part of the pipeline may have sustained damage or where back-filling has occurred in the absence of the Engineer's approval, the Developer shall arrange for a television survey to be undertaken.

211 EXISTING LAND DRAINS

1. Existing land drains permanently severed by the Works shall be located and connected into a new drain, pipe or ditch. Existing drains remaining within the Works shall be cleaned out from the new drain trench face as necessary. Any pipe disturbed by the Works shall be re-laid to ensure a free discharge into the new drain. Disused ends of intercepted land drains shall be adequately sealed.

2. Where an existing land drain is exposed and severed by temporary trench excavation, the position of the drain shall be marked and recorded. The drain shall be diverted into an existing drain or watercourse. Alternatively, the formal functioning of the drain shall be continued by the construction of a pipeline or channel adequately supported across the excavation until permanent restoration is made on their original line or as otherwise agreed by the Engineer.

3. The Developer shall notify the Engineer of any land drain, which is blocked or is otherwise defective when the drain is first exposed.

212 DUCTS

1. Pipes used for service ducts shall comply with Clause 610(9), and shall have a smooth internal bore without any sharp edges to the ends of the pipes. All ducts shall be appropriately colour-coded for each utility and to the depth in accordance with arrangement of utilities (Standard Detail Drawings 806-1 and 806-2).

2. Pipes for cuts shall be joined so that no silt, grit, grout or concrete surround is able to enter the duct. Pipes with flush fit joints shall have a register to ensure that the joint is fully pushed home.

3. Each duct shall be fitted with a pigmented, stranded polypropylene draw rope of 5.3kN breaking load, the ends of which shall be made fast as described in the Agreement. Immediately after laying, the position of the ducts shall be marked and the ends sealed by removable stoppers.

213 PROTECTION OF EXISTING DRAINS, SEWERS, ET CETERA

1. Adequate precautions shall be taken to prevent sand, silt or other matter entering existing pipes. The Developer will be held responsible for the cost removal of such material and for making good any damage caused by its presence.

2. The Developer will be required to repair and make good any existing pipes, manholes, cables, services et cetera which are damaged or disturbed during the course of the Works, and no such repair shall be covered until it has been approved by the appropriate Authority or owner concerned.

214 REINSTATEMENT OF TRENCHES

1. Trenches shall not be permitted in new estate roads and all trench/drainage work shall be completed prior to the construction of the sub-base, base, binder, and surface courses.

2. The material used for the filling of the excavation for drainage works shall be either Type 1 Material (Clause 408) or, if permitted by the Engineer, graded granular material in accordance with Clause 407.

3. Refilling shall be in 150mm layers, each layer being thoroughly compacted before the succeeding layer is added. Material shall be deposited in even layers and shall not be heaped in the trench before spreading. Water may be used in cases where it will assist compaction.

4. Where the excavation of a trench has cut through or damaged a sub-grade membrane, prior to back-filling the whole trench shall be lined with a membrane of similar grade to that damaged and the back-filling material shall be in accordance with sub-clauses (2) and (3) above.

215 WATER METER/STOP TAP COVERS AND HYDRANTS

1. No covers for water meters/stop taps shall be permitted within the carriageway construction and must be located only beyond a full height kerb within footways, service margins, or safety margins. The covers shall not to be positioned within the dropped entrance to private driveways or other dropped or vehicular accesses.

2. Hydrant covers, in accordance with BS EN 124 D400, are permitted within the carriageway construction.

3. Water meters/stop tap covers and hydrant covers, within the footway, are only permitted within the limits indicated on Standard Detail Drawings 806-1 and 806-2 to prevent conflict with other services. These shall be connected by spurs only from the water supply set at the depth and position indicated on the Standard Detail Drawings 806-1 and 806-2.

4. Telescopic non-locking plastic covers will only be permitted, singly or grouped (a maximum of 2 x 4 units) when set into a single area defined by 50 x 150mm EF edging kerbs with a minimum of 100mm between the cover(s) and the edging kerb.

5. The edging kerbs shall be laid on a bed of ST2 Mix/C10 Grade concrete not less than 100mm deep and the 100mm wide concrete haunch is to be brought up to the front and back to within 20mm of the top of the kerb.

6. The edging kerbs shall be set as a rectangle (parallel in direction with that of the carriageway) with a maximum external dimension of 700 x 1100mm.

7. The rectangle shall be in-filled with ST4 Mix/C20 Grade concrete to a depth of 60mm and struck level with the top of the edging kerb, the plastic cover(s) and the finished surface course of the footway or margin.

216 PRE-CAST CONCRETE (FILLED) TELECOMMUNICATION COVERS

1. Pre-cast covers, rated less than BS EN 124 D400, shall only be permitted within footways, hardened safety margins, or service margins, set beyond and protected by a kerb with a face height of between 80mm and 125mm (see Clauses 428 and 429).

2. The minimum rating permitted for the pre-cast concrete covers, protected from traffic as indicated in sub-clause (1) above, shall be BS EN 124 B125.

300 EARTHWORKS

301 EXCAVATION

1. Turf and topsoil shall be stripped from the whole of the area of the road works including areas of cutting or those to be covered by embankment. Excavation shall be to the lines, levels and contour shown on the Drawings. Any excess excavation shall be made up with capping material Clause 407 or approved filling material.

302 FORMING EMBANKMENTS AND CUTTINGS

1. Embankments and other areas of fill shall be formed of approved material deposited and spread in horizontal layers not exceeding 225mm in the loose. The fill material shall be laid over the full width of the embankment and compacted, as specified below, to the lines, levels, and contours shown on the Drawings.

2. The filling at the top of any embankment shall be level for at least 1.000m beyond the back of the footway, service or safety margin.

3. In cutting the foot of any bank shall be level for at least 500mm from the back of the footway, service or safety margin.

4. If applicable, the visibility splay shall include the level berm at the rear of the highway at embankment situations.

303 RETAINING STRUCTURES

1. Retaining walls, and other structures, that support the highway must undergo a full design check and must receive full specific approval prior to technical approval being issued for the entire site (see Clause 201).

2. Retaining walls, and other structures, that support third party land and abut the highway, equal to or greater than 1.000m in height, shall be subjected to a full design calculation check for both structural integrity and suitability of design.

3. For retaining structures that are essential in supporting the highway due to the site topography, no commuted sum will be applicable.

4. For retaining structures that support the highway and exist as a direct benefit for any adjoining plot(s), then a commuted sum is charged (see Clause 103).

5. Sub-structures shall not be considered as suitable support for the highway and a separate highway retaining structure must be used. It shall be subject the sub-clauses detailed above.

6. Permanent unrestricted access for an inspection regime, to enable operatives to inspect the structure shall be made available and included within the design submission. For details of the appropriate dimensions, please contact the Group Manager of Bridge Management and Structures (01305 221000).

7.

304 COMPACTION OF EMBANKMENTS AND OTHER AREAS OF FILL

1. The required compaction of the filling material specified shall be obtained by using a smooth wheel roller weighing not less than 8 tonnes, or an approved vibrating roller.

2. The number of passes shall be as determined by the Specification for Highway Works (MCHW), Series 600, Clause 612(10) and Table 6/4. The method employed shall be determined by the Class of material detailed in the Specification for Highway Works (MCHW), Series 600, Clause 612(10) and Table 6/1.

3. For capping material (Clause 407), the number of passes shall be determined by the Specification for Highway Works (MCHW), Series 600, Table 6/4, Method 6 where the depth (D) shall be 110mm. For the smooth wheel roller, weighing not less than 8 tonnes (or vibrating roller without vibration, weighing not less than 5.4 tonnes), 8 passes shall be required.

4. Each layer shall be separately compacted to the satisfaction of the Engineer.

305 PREPARATION AND SURFACE TREATMENT OF FORMATION

1. The formation shall be regulated and trimmed to the requirements of Clause 401(10) and compacted with a roller weighing not less than 8 tonnes or an approved vibrating roller. When raising the finished road level above existing ground level, excavation of the existing ground shall be to a depth of 220mm, or as otherwise directed by the Engineer.

2. The formation shall extend a minimum of 450mm beyond the back of the kerb (a minimum of 300mm beyond the concrete backing) for residential roads and where dropped accesses/footway crossings give access to a single drive (or pair of drives).

3. The formation shall extend a minimum of 450mm beyond the back of the rear of footway crossing (a minimum of 300mm beyond the concrete backing) where the dropped access/footway crossing serves a private courtyard, or driveway (serving more than a single drive, or pair of drives).

4. For industrial roads, the formation shall extend a minimum of 450mm beyond the back of the rear of footway (a minimum of 300mm beyond the concrete backing) and the footway construction shall be, at least, the same as the carriageway construction.

5. Where there is an adjacent footway the formation shall be extended to 200mm beyond the edging kerb at the rear of footway (100mm beyond the concrete surround) as directed by the Engineer. Soft places in the formation shall be excavated to additional depth and back-filled with approved material and properly compacted prior to laying the sub-base.

6. Sub-base material shall be spread and compacted immediately following the excavation and preparation of the formation. Otherwise the Developer shall maintain the level of the bottom of the cutting 300mm above formation level until the day the sub-base is to be laid.

7. Where reinforcement of the sub-grade is required a purpose made membrane of a suitable grade material shall be provided and laid in

accordance with the manufacturer's directions (see Clause 432 and Clause 619).

8. Where directed the formation shall be treated with an approved weed-killer in the presence of the Engineer (see Clause 618).

306 PROTECTION OF EARTHWORKS FROM WATER

1. The formation and excavations shall be kept free from water during the course of the work. The Developer shall provide all labour and equipment necessary for this purpose.

2. Adequate means for trapping silt shall be provided on temporary systems discharging into permanent drainage systems or water courses. Approval must be obtained from the appropriate Authority before any water is discharged. A copy of the approval must be provided to the Engineer.

307 PROTECTION OF TREES DURING EXCAVATION

1. The Root Protection Area (RPA) is defined in BS5837 (Section 5 and Table 2) as an area equivalent to a circle with a radius 12 time the stem diameter no higher than 1.500m above ground level (10 times basal diameter for trees with more than one stem). The area is capped at 707m^2 (equivalent to 15m radius or 26.500 x 26.500m).

2. Tree roots are not to be disturbed or removed unless the Devloper has obtained specific Planning Approval (see Clause 108).

3. The approved reduction in root system must be balanced by approved branch thinning.

4. No compaction of soil within root spread is to take place.

5. No material is to be stored, nor spillage of fluids to occur, within the root spread.

6. The water table near trees should be checked before any adjacent excavation work begins and maintained at the correct level whilst the work is in progress. Excavated material should be replaced in the correct geological sequence as early as possible.

7. In accordance with BS5837, fencing must be erected around the circumference of the tree canopy and maintained during the occupation of the site where trees are specifically required to be preserved.

308 SOILING, GRASS AND TURFING

1. The whole area shall be rotovated or dug over to a minimum depth of 150mm. If the existing ground at this stage is unsuitable for the sowing of grass or acceptance of turf, then at least 100mm of quality top-soil (to conform to BS3882:2007) shall be spread and levelled.

2. The surface shall be broken down to a fine tilth and raked over to remove all stones, roots and other items exceeding 25mm in any dimension. Unless otherwise agreed all seedbeds shall be top dressed with approved base fertiliser as specified in Clause 606 at 50g/m² and raked in.

3. Verges shall be sown with grass seed with an even distribution using the grass mixture as specified in Clause 607 from an approved source, at a rate of application of 25g/m² or turfed with a good quality turf, a sample of which has been approved. After seeding or turfing the area shall be rolled to the satisfaction of the Engineer.

4. The Developer will be responsible for the safeguarding the grassed areas during the growth period and providing such fences and making good as necessary, and for the cutting during the period of the works and the maintenance period, so that it does not exceed 100mm in height.

309 OBSTRUCTION IN VERGES

1. All posts, distribution pillars, signposts, et cetera which stand in the grassed areas are to be surrounded with a concrete apron. The concrete shall be ST2 Mix/C10 Grade, 100mm thick and 300mm wide, finished to conform to the general levels of the area, and level to within 25mm of the settled or compacted grass level.

2. Similar aprons, 300mm wide, shall be provided along all house and boundary walls, et cetera, which adjoin grassed areas as detailed in Standard Detail Drawing 801-1.

3. Attention is drawn to Clause 712 and Clause 714 and Standard Detail Drawings 810-2 and 810-3 with regard to lamp columns in areas of soft landscaping.

4. No street furniture (telegraph posts, street lighting, signs, cabinets, et cetera) shall be permitted within the designated visibility splays (for either junction or forward visibility) higher than 600mm above the level of the adjacent carriageway surface.

310 USE OF ROOT BARRIER

1. Root barrier shall be used, immediately beyond the haunch defining the rear of the constructed highway, to protect the construction where the actual (or anticipated) canopy of any tree (whether existing or newly planted) shall overhang the limit of the construction of the highway (whether existing or proposed).

2. Root barrier shall be used in the construction of tree pits to protect carriageway construction and utility services and shall be installed as defined in Standard Detail Drawings 808-1, 808-2, and 808-3.

400 ROADWORKS

401 HORIZONTAL ALIGNMENTS, SURFACE LEVELS, AND SURFACE REGULARITY OF PAVEMENT COURSES

Horizontal alignments

1. Horizontal alignments shall be determined from one edge of the pavement surface as shown on the Drawings. The edge of the pavement as constructed and all other parallel alignments shall be correct within a tolerance of ± 13mm therefrom.

Surface Levels of Pavement Courses

2. The levels of pavement courses shall be determined from the true finished road surface calculated from the vertical profile and cross-falls as shown on the Drawings. The vertical depth below the true pavement surface of any point on the constructed surface of the formation or pavement courses shall be within the following appropriate tolerances.

Surface course	± 6mm
Binder course	± 6mm
Base	± 15mm
Sub-base	+ 10mm
	- 30mm
Formation	+ 20mm
	- 30mm

3. The surface level of the pavement at any point shall not deviate vertically from the true finished road surface by more than ± 6mm. However, the combination of permitted tolerances in different pavement levels shall neither result in a reduction of the surface course thickness by more than 5mm from that specified for a flexible road nor a reduction in the thickness of the whole pavement, excluding the sub-base, by more than 15mm from the specified thickness.

4. For checking compliance with the above tolerances, measurements of surface levels will be taken at points to be selected by the Engineer at 10.000m centres longitudinally and at 2.000m centres transversely. In any length of pavement, compliance with these requirements shall be regarded as met when not more than one measurement in any consecutive ten longitudinally or one in any transverse line, exceeds the above tolerances, but this one measurement shall not exceed 5mm more than the tolerance for the layer concerned.

Surface Regularity

5. The longitudinal regularity of the surfaces of surface and binder courses shall be within the relevant tolerances stated in Table 400/1.

   An irregularity is a variation not less than 4mm or 7mm of the profile of the road surface as measured by the rolling straight-edge, set at 4mm or 7mm as appropriate. No irregularity exceeding 10mm shall be permitted.

TABLE 400/1 Maximum permitted number of irregularities

	Flexible Surface Courses				Flexible Binder Courses			
Irregularity	4mm		7mm		4mm		7mm	
Length (m)	300	75	300	75	300	75	300	75
District, local distributor and industrial estate roads	20	9	2	1	40	18	4	2
Feeder, collector, access and shared surface roads	40	18	4	2	60	28	6	3

6. Compliance with Table 400/1 shall be tested by the rolling straight-edge, of the type designed by the Transport and Research Laboratory, along any line or lines parallel to the centre line of the carriageway on sections of 300.000m selected by the Engineer, whether or not it is constructed in shorter lengths. Where the total length of pavement is less than 300.000m the measurements shall be taken on 75.000m lengths.

7. Pavements shall be measured transversely for irregularities at points decided by the Engineer, by a 3.000m long straight-edge placed at right angles to the centre line of the road. The maximum deviation of the pavement surface below the straight-edge shall not exceed 3mm.

8. For lengths of surface course and binder courses less than 75.000m, or where the use of the rolling straight-edge is impracticable, the surface regularity shall be tested where necessary, at points decided by the Engineer, with a straight-edge 3.000m long placed parallel with or at right angles to the centre line of the road. The maximum allowable deviation of the surface below the straight-edge shall be 3mm for surface course and 6mm for binder course.

Rectification

9. Where any tolerences in this Clause are exceeded the Developer shall determine the full extent of the area, which is out of tolerance, and shall make good the surface of the pavement course or formation in the manner described below.

    a) Formation Level
        i) If the surface is too high it shall be re-trimmed and re-compacted in accordance with Clause 305. If the surface is too low the deficiency shall be corrected by the addition of suitable material of the same classification and moisture content or other approved material of the same classification and moisture content or other approved material laid and compacted to Specification.
        ii) When raising the finished road level above existing ground level, excavation of the existing ground shall be to a depth of 220mm, or as otherwise directed by the Engineer.

b) Base and Sub-Base

i) Where these consist of unbound material the top 75mm shall be scarified, re-shaped, with material added or removed as necessary and re-compacted all to Specification. The area treated shall be not less than 30.000m long and 2.000m wide or such area as to be determined by the Engineer as necessary to obtain compliance with the Specification.

ii) With coated Macadam or asphalt road bases, the full depth of the top layer as laid shall be removed and replaced with fresh material laid and compacted to Specification. Any areas so treated shall be at least 5.000m long and the full width of the paving laid in one operation. Alternatively for low areas in flexible pavements the Developer may make up with the material of the layer immediately above the one being rectified, when the subsequent layer is laid.

c) Binder and Surface Course

i) These shall have the full depth of the layer removed and replaced with fresh material laid and compacted to Specification.

ii) Where the surface level of a binder or surface course is too high or too low, the area rectified shall be the full width of the paving laid in one operation, and at least 5.000m long if binder course or 15.000m if surface course, (where this affects the junction with a major road, the minimum length shall be 45.000m). With footways (with no vehicular access) the distances may be reduced to at least 2.000m long if binder course or 5.000m if surface course, but it will apply to the full width.

iii) Where the number of surface irregularities exceeds the limits in Table 400/1, the area to be rectified shall be 300.000m or 75.000m long as appropriate and the full width of the lanes affected, or such lesser area to be determined by the Engineer as necessary to make the surface regularity conform to the limits.

iv) Testing the surface course for compliance with sub-clauses (3) and (4), above, and Table 400/1 shall be carried out as soon as practicable after completion of the surfacing, and remedial works completed before the road is opened to traffic.

v) Details of the appropriate PSV (Polished Stone Value) can be found in Table 400/18.

402 ADVERSE WEATHER CONDITIONS

1. No material in a frozen condition shall be incorporated in the Works but shall instead be retained on the Site for use if suitable when unfrozen.

2. Material for use in the road pavements shall not be laid on any surface, which is frozen or covered with ice.

5. Laying material containing bitumen binders shall cease if the temperature of the surface to be covered is at or falls below + 2ºC (36ºF). Where, however, the surface is dry, unfrozen and free from ice, laying may proceed at temperature at + 1ºC (34ºF) on a rising thermometer.

4. Laying of roadworks materials containing cement shall cease when descending air temperature in the shade falls below + 3ºC (37ºF).

5. Laying of bituminous materials shall be suspended while free-standing water is present on the surface to be covered. Laying should be avoided as far as practicable during rain, snow, and hail.

403 USE OF SURFACES BY CONSTRUCTION TRAFFIC

1. Construction traffic used on pavements under construction shall be suitable in relation to the thickness of the courses it traverses so that damage is not caused to the sub-grade or the material already constructed.

2. The wheels or tracks of plant moving over the various pavement courses shall be kept free from deleterious materials.

3. Bituminous binder course material shall be kept clean and uncontaminated for so long as it remains uncovered by a surface course or surface treatment. The only traffic permitted access to binder course material shall be that engaged in laying and compacting the surface course or, where the binder course is to be blinded and/or surface dressed that engaged on such surface treatment.

4. Should the binder course become contaminated, the Developer shall make good by cleaning it to the satisfaction of the Engineer and, if this proves impracticable, by removing the layer and replacing it to Specification.

5. If a granular, unbound, base course is used (to Clause 408), a sacrificial surface course must be laid to protect the binder course if any construction traffic is intended to use the surface.

404 ROAD PAVEMENTS – BITUMINOUS BOUND MATERIALS

Materials not detailed in this Section shall be approved by the British Board of Agrément (BBA) and Highway Authority Product Approval Scheme (HAPAS) certificated for use.

Transporting and Storage before use

1. Bituminous materials shall be transported in clean insulated vehicles, unless otherwise agreed by the Engineer, and shall be covered while in transit. Machine and hot handling material shall be kept, prior to laying, within the insulated vehicle, or be stockpiled on a site insulated from the ground and kept covered.

Testing

2. If requested, the Developer will arrange for an accredited, independent, material test of particle size and grading. A copy of the test results shall be provided to the Engineer.

3. If requested by (and in the presence of) the Engineer, the Developer will provide a temperature test of the material prior to removal from the vehicle.

Laying

4. Road surfacing materials shall be laid by in accordance with BS EN 13108:2006 and the specification examples given in Annex B, C, and D of PD6691:2010. The Developer shall give the Engineer seven days' notice of the name of the firm for this work and the quarry from which the material is to be drawn.

5. The materials shall be laid in one or more layers, by agreement with the Engineer, so that the compacted thickness of each layer shall be in accordance with Table 400/2 below and shall not normally exceed 150mm. Thickness in excess of those given in Table 400/2 may provide better compaction if adequate equipment is used by agreement with the Engineer, to avoid possible problems with surface irregularity and level control.

TABLE 400/2 Nominal and minimum layer thicknesses for bituminous materials

Material Description	DCC Clause No.	Nominal Size (mm)	Nominal Layer Thickness (mm)	Minimum Layer Thickness (mm)
AC 6 Dense surf (Close Graded Surface Course)	Cl 420 (SWC5)	6	25 – 35	15
AC 10 Close surf (Close Graded Surface Course)	Cl 420 (SWC9)	10	30 – 35	25
AC 14 Close surf (Close Graded Surface Course)	Cl 420 (SWC4)	14	40 – 55	35
AC 20 Dense Bin (Close Graded Binder Course)	Cl 414 (SWC3)	20	50 – 80	50
AC 32 Dense Bin (Close Graded Binder Course)	Cl 414 (SWC2)	32	70 – 100	80
AC 32 Dense Base (Close Graded Base)	Cl 410 (SWC2)	32	70 – 100	80
AC 40 Dense Base (Close Graded Base)	Cl 410 (SWC1)	40	90 – 150	100
Hot Rolled Asphalt	Cl 418 (SWC6)	14	45 – 55	40
Hot Rolled Asphalt	Cl 418 (SWC6)	20	45 – 55	40
SMA 6 surf Stone Mastic Asphalt (Variant)	Cl 419	6	25 – 35	20
SMA 10 surf Stone Mastic Asphalt (Variant)	Cl 419	10	30 – 35	25
SMA 14 surf Stone Mastic Asphalt (Variant)	Cl 419	14	40 – 50	30

Note: Thickness less than the above shall not be used except for regulating purposes, where the minimum thickness shall be greater than 1.5 times the nominal size.

6. Wherever practicable, road pavement materials having a bituminous binder shall be spread, levelled and tamped by approved self-propelled pavers. The material shall immediately on arrival at the site be supplied continuously to the paver and laid without delay. The rate of delivery of the material to the paver shall be so regulated as to enable the paver to operate continuously and it shall be so operated wherever practicable.

7. The rate of travel of the paver and its method of operation shall be adjusted to ensure an even and uniform flow of material across the full laying width, free from dragging, tearing and segregation of the material. The speed of the paver during laying shall not exceed 5.000m per minute.

8. Hand laying of any bituminous materials shall be permitted only in the following circumstances:

   a) When laying regulating courses of irregular shape and varying thickness;
   b) In confined spaces where it is impracticable for a paver to operate;
   c) Laying footways and footway links;
   d) Where the quantity is small and is agreed by the Engineer;
   e) Where directed by the Engineer.

Compaction

9. Bituminous materials shall be laid and compacted in layers which enable the specified thickness, surface level, regularity requirements and compaction to be achieved.

10. Material shall be compacted as soon as rolling can be effected without causing undue displacement or surface cracking of the material and while this has at least the minimum rolling temperature stated in Table 400/3. The material shall be uniformly compacted by an 8 tonnes smooth steel wheel roller having a width of roll not less than 450mm or by mutli-wheeled pneumatic tyred roller of equivalent weight except that surface course material shall be surface finished with a smooth wheel roller. In areas where the 8 tonnes, smooth steel wheel or equivalent multi-wheeled pneumatic tyred roller is precluded from operating by localised impediment, compaction must be effected by a smaller roller; a twin drum vibratory roller, single drum (pedestrian) vibratory roller or other type as agreed by the Engineer.

11. Temperatures of the materials supplied and laid shall be in accordance with BS594987:2010, PD6691:2010, BS EN 13108:2006 and Table 400/3 below.

12. With regard to bitumen macadam surface courses, compaction will normally be obtained after a minimum of 5 passes of the roller over any point of the carpet surface before the minimum rolling temperatures are reached by normal chilling. For hot rolled asphalt a minimum of 10 passes of the roller can usually be obtained, although compaction of the carpet containing pre-coated chippings should anticipate a final coverage of 1.5mm texture depth.

TABLE 400/3 Temperatures of materials (ºC)

Material	Grade	Maximum Temp. at any Stage (ºC)	Minimum Delivery Temp. (ºC)	Minimum Rolling Temp. (ºC)
Bitumen	50 pen S/C (40/60)	190	140	110
	50 pen B/C (40/60)	170	130	105
	125 pen S/C (100/150)	170	120	95
	125 pen B/C (100/150)	160	120	90
	190 pen (160/220)	150	110	85

Note: Care should be taken to guard against surface cracking occurring as a result of rolling temperature close to the appropriate minimum temperature. Finishing rolling may be carried out at a temperature below that given, where agreed by the Engineer, but vibration should not be employed.

13. The material shall be rolled in a longitudinal direction working from the sides to the centre of the carriageway. Successive passes of the roller should compact to an echelon pattern to prevent the formation of a ridge. Notwithstanding the general side to centre rolling procedure, the centre joint of the second rip, which abuts the newly laid carpet, should always be nipped in first in order to prevent an open joint forming. This is of great importance in relation to high viscosity surface course macadams.

14. Rollers shall not stand on newly laid material while there is a risk that it will be deformed thereby.

15. Hand-raking of surface course material which has been laid by a paver and the addition of such material by hand-spreading to the paved area for adjustment of level shall be permitted only in the following circumstances:

    a) At the edge of the layers of material and at gullies and manholes;
    b) Where otherwise directed by the Engineer.

16. Hand laid work shall conform to all Specification requirements of the Clause except those relating to the manner of operating pavers.

17. Where longitudinal joints between laying widths or transverse joints have to be made in surface courses, the material shall be fully compacted and the joint made flush in one of the following ways, method b) being always used for transverse joints:

    a) By heating the joint with an approved joint heater at the time when the additional width is being laid but without cutting back or coating with binder. The heater shall raise the temperature of the full depth of the surface course to a figure within the specific range of minimum rolling temperature and maximum temperature at any stage as given in Table 400/3 above, for the material and for a width not less than 75mm on each side of the joint. The Developer shall have available for use in the event of breakdown, equipment necessary for operating method b);

b) By cutting back the exposed joints to a vertical face of not less than the specified layer thickness, discarding all loosened material and coating the vertical face completely with a grade of hot bitumen suitable for the purpose before the adjacent width is laid.

18. All joints shall be offset/stepped by, at least, 300mm from the joint in the layer immediately below. Each subsequent overlap shall continue in the same direction.

19. Where the binder course material is to be used as a running surface, it shall be blinded with coated grit complying with Clause 424.

20. The laid carpet shall remain isolated from any form of trafficking until it has cooled to the ambient temperature.

21. Irrespective of the materials used or the method of compaction employed, the Engineer shall be satisfied that adequate compaction has been achieved. Where required by the Engineer, the Developer shall arrange for this to be determined by either method detailed within Clause 427.

22. Where the requirements for compaction are not met, the Engineer will determine the area of defective material, which shall be removed and the pavement course rectified to the satisfaction of the Engineer.

Bond Coat

23. Tack coats are no longer considered best practice and shall not be used.

24. If more than 24 hours has elapsed before surface course material is to be laid (or if overlaying cement concrete), a cationic bitumen emulsion bond coat shall be applied as directed by the Engineer.

25. The bond coat shall be supplied and laid in accordance with BS EN 13808:2005, BS EN 14023:2010, BS3434-1, BS594987:2010, BS 343-2, the Manual of Contract Documents for Highway Works (MCHW), Volume 1 Clause 920(1), and Clauses 404 and 624 of this Specification.

26. The bond coat shall be a hot-applied cationic bitumen with a minimum bitumen content of 40%. To suit the particular system, it may be modified with a polymer.

27. The rate of spread shall as specified by the supplier and in accordance with sub-clause (25), above. In the absence of any such advice, the rate shall be 0.35kg/m^2. Higher rates of spread may be applied at the kerb face, or edge of carriageway, where less compaction occurs or where water ingress may be an issue.

28. The bond coat shall be spray applied by calibrated, mechanical means and should be by conventional spray tanker or by sprayer integral with the paving machine. The coat shall be applied uniformly and evenly so as to cover the entire surface.

29. Where the use of a mechanical sprayer is not possible, and the use of a hand lance has been approved, the emulsion shall be sprayed evenly with a circular action (not side to side) at an approximate rate of 0.5l/m^2. The drums shall be well rolled, protected from frost during storage, and shall be set out

in the appropriate positions to reduce lost time and prevent loss of temperature.

30. The bond coat shall be allowed to break completely (i.e. turn from brown to black) before any site traffic is permitted onto the surface.

31. Where the treated surface is to be subjected to temporary use by site traffic, coated grit shall be applied (at a rate of 2.5kg/m^2) to prevent pick-up.

Overbanding

32. Where a new surface is abutting an existing surface course, hot-pour bitumen overbanding shall be applied to ensure a waterproof seal between the different surface courses.

33. The bitumen shall be laid with the use of a shoe (if surface texture permits). An alternative method of application may be used if approved by the Engineer.

34. The overbanding shall not exceed 3mm thickness or 20mm in width. Up to 40mm width is permitted if the Skid Resistance Value (SRV) is greater than 60 (see Clause 625).

405 CONSTRUCTION REQUIREMENTS FOR MATERIALS TO CLAUSE 407 TO CLAUSE 409 (INCLUSIVE)

1. Materials complying with the above-mentioned clauses shall be used in the construction of the Works in the following manner.

Transporting

2. Transport vehicles carrying plant mixed material shall have a capacity suited to the output of the mixing plant and the site conditions and be capable of discharging cleanly. Material, when mixed, shall be removed at once from the mixer, transported directly to the point where it is laid, and protected from the weather both during transit from the mixer to the laying site and whilst awaiting tipping.

Laying

3. All materials shall be placed and spread evenly. Spreading shall be undertaken either concurrently with placing or without delay. Base material shall be spread using a paving machine or spreader box operated with a mechanism which levels off the material to even depth. Except where otherwise specified in individual clauses, the material should be spread in one layer so that after compaction the total thickness is as specified. Before works proceeds against a longitudinal joint the edge compacted earlier, shall, if it has been exposed for more than one hour, be cut back vertically to produce a face of the specified thickness of layer and of properly compacted material.

Protection and Curing

4. The Developer shall in his choice of permitted base materials have regard to the nature of those materials and of the sub-base and sub-grade and the need to protect them from deterioration due to the ingress of water and the use of construction plant. The Developer shall programme the laying of the sub-base and the subsequent pavement courses and take such other steps

as may be considered necessary to afford protection to the base, sub-base and sub-grade.

406 MATERIALS FOR SUB-BASE, BASE, FLEXIBLE SURFACING AND FOOTWAYS

1. Sub-bases, bases, flexible surfacing and footways shall be made and constructed using one or other of the materials as given in Table 400/17 for the appropriate Road Type specified in the Agreement, or the particular materials described in the Agreement.

2. The composition of the materials used in the sub-base, base, flexible surfacing and footways shall comply with the appropriate Clauses in this Specification read in conjunction with Table 400/18.

3. The supplier of bituminous materials shall operate a Quality Assurance System, which shall comply with the requirement of BS EN ISO 9000-1, BS EN ISO 9000-2, BS EN ISO 9001, and BS EN ISO 9002. A list of approved suppliers may be obtained from the Engineer.

407 CAPPING MATERIAL

1. Capping shall only be provided in those areas and to extent as directed by the Engineer.

2. No unprotected sub-grade/formation shall remain continuously exposed to rain causing degradation, or (unless permitted by the Engineer) be left uncovered overnight.

3. Capping material can be made of any material except un-burnt colliery spoil or chalk.

4. Capping shall have a maximum compacted layer thickness of 110mm.

5. The number of passes shall be determined by the Specification for Highway Works (MCHW), Series 600, Table 6/4, Method 6 where the compacted depth (D) shall be 110mm. For the smooth wheel roller, weighing not less than 8 tonnes (or vibrating roller without vibration weighing not less than 5.4 tonnes), 8 passes shall be required.

6. If material classified as 6F5 (see sub-clause (9), below) is permitted, the compacted depth (D) shall be 150mm. For the smooth wheel roller, weighing not less than 8 tonnes (or vibrating roller without vibration weighing not less than 5.4 tonnes), 16 passes shall be required.

7. The material shall be well graded and comply with Table 400/4 below:

TABLE 400/4 Capping material (Testing shall be to BS1377-2:1990)

BS Sieve Size	% by Mass Passing
75mm	100
37.5mm	75 - 100
10mm	20 - 75
5mm	10 - 50
600µm	0 - 25
63µm	0 - 12

Note: The overriding consideration is that the material is well graded and is of a nominal size which will allow placing and compaction without segregation, bearing in mind the thickness of the layer and the plant available. Material that does not conform to the above grading, but can be shown to be otherwise satisfactory, can be used with the consent of the Engineer.

8. The material shall have a 10% fines value in excess of 30kN when tested in accordance with BS812 with the aggregate tested in a soaked condition.

9. Material graded as 6F2, 6F3, 6F4 or 6F5 (Specification for Highway Works (MCHW), Series 600, Table 6/2) may be permitted, at the discretion of the Engineer, and if sourced from a local supplier. The Developer must provide a certificate of grading, and allow the Engineer to inspect a well-graded example, prior to tipping and laying.

10. Due to the potential size of the aggregate, 6F5 shall only be permitted if blinded with an alternative graded, subsequent, layer of capping, to a compacted thickness of 110mm, prior to the laying of the sub-base material.

408 GRANULAR SUB-BASE AND BASE MATERIAL

1. The granular material free from all rubbish, dirt and other foreign material shall comprise crushed rock or slag and comply with the Dorset Variant Type 1 Aggregate (Table 400/5), or other Type 1 Aggregates (Table 400/6) from approved sources, be well graded and lie within the limits of the following tables. The Developer must provide a certificate of grading to the Engineer.

Type 1 Aggregate (Dorset Variant) Only

2. Crushed rock sub-base from quarries in the Purbeck and Portland areas which consists substantially of Oolitic limestone shall be supplied to the grading detailed in Table 400/5.

TABLE 400/5 Dorset Variant Type 1 (Testing shall be to BS EN 993-1:1997 and BS812-103-1:1985)

BS Sieve Size	% by Mass Passing
75mm	100
37.5mm	80 - 100
10mm	20 - 50
5mm	10 - 30
600µm	5 - 15
63µm	2 - 8

3. The material shall have 10% fines in excess of 30kN when tested in accordance with BS812 with the aggregate tested in a soaked condition.

4. Crushed rock sub-base from other areas shall be supplied to Clause 803 of the Department of Transport Specification for Highway Works (MCHW).

Type 1 Aggregate

5. In the case of all Type 1 Aggregates the material shall be delivered with a moisture content between 5% - 7% and the surface of the sub-base shall be uniformly rolled until full compaction is obtained and the "in situ" CBR test gives a value of not less than 30%.

6. The material shall be compacted in layers of not more than 110mm finished thickness at a moisture content of 5% - 7% and shall be carried out with either an 8 tonnes smooth wheel power roller or other plant approved by the Engineer to the required thickness.

7. Should any instability occur in the sub-base, the Developer shall cut out the affected area to such depths as directed, and make good the sub-base and finishes to conform to the adjacent surface.

8. At the discretion of the Engineer, a blinding layer (see sub-clause (9), below) shall (in addition) be laid and compacted so as to provide a smooth and even surface.

9. The blinding layer shall comprise crushed stone graded evenly from 20mm down to dust with a true representation of all sizes.

TABLE 400/6 Type 1 Aggregates (crushed rock, crushed slag)

BS Sieve Size	% by Mass Passing
75mm	100
37.5mm	85 - 100
10mm	40 - 70
5mm	25 - 45
600µm	8 - 22
63µm	0 - 10

409 CRUSHER-RUN HARDCORE BASE (FOR USE IN RESIDENTIAL ROADS ONLY)

1. Crusher-run material, where permitted by the Engineer, shall be the output of the crusher, which has passed only through a 100mm screen crusher gap, or grizzly, to give a true representation of all subsequent sizes to dust acceptable to the Engineer.

2. The material shall be compacted in layers of not more than 110mm finished thickness and shall be carried out with either an 8 tonnes smooth-wheeled power roller or other plant approved by the Engineer to the required thickness.

3. Fine aggregates shall pass the 20mm BS sieve and be graded evenly (from 20mm down to dust).

4. If necessary, fine aggregate shall be spread on to a thickness of approximately 25mm, by a suitable spreading machine, and vibrated into the voids of the coarse aggregate by a vibrating plate compactor (having a mass per unit area of the base plate of at least 1400kg/m^2) or a vibrating roller having a mass per metre width of vibrating roll of at least 1800kg.

5. The operation of spreading and vibrating the fine aggregate shall be repeated as necessary until no more will penetrate into the layer of coarse aggregate and no hungry patches are visible on the surface, when it shall be brushed to remove the excess fines and leave the coarse aggregate standing 3mm - 6mm proud. The layer shall then be rolled with a smooth-wheeled roller having a mass per metre width of at least 5400kg on at least one roll.

6. The whole operation shall be repeated as necessary to provide the full specified thickness of base.

7. At the discretion of the Engineer, a blinding layer (see sub-clause (8), below) shall (in addition) be laid and compacted so as to provide a smooth and even surface.

8. The blinding layer shall comprise crushed stone graded evenly from 20mm down to dust with a true representation of all sizes.

410 ASPHALTIC CONCRETE - DENSE, HEAVY DUTY BASE AC 32 DENSE BASE OR AC 40 DENSE BASE (PREVIOUSLY CLOSE GRADED BITUMEN MACADAM TO SWC1 OR SWC2)

1. The materials shall be made in accordance with the general requirements of PD6691:2010 and BS EN 13108:2006 subject to the following provisos, and shall comply with the appropriate tables and sections thereof for close graded base Macadam and Table 400/2 of this Specification. It shall be transported, laid and compacted to Clause 404.

Aggregate

2. The aggregate shall be in a surface dry condition prior to mixing.

Filler

3. When gravel, other than limestone gravel, is the aggregate, the material passing the 75µm BS sieve shall include 2% of Portland cement or hydrated lime by mass of the total aggregate.

Binder

4. The binder shall be petroleum bitumen complying with BS3690-1 and BS EN 12591:2009. The penetration of the bitumen shall be in accordance with the requirements of Table 400/18.

411 CLAUSE REMOVED

412 MAINTENANCE OF THE SURFACE OF BASE

1. On completion of the base and until any surfacing is laid on it, the finished surface shall be maintained free from potholes, ruts and undulations, irregularities, depressions, loose material or other defects.

413 REGULATING COURSE

1. Regulating course material shall be made and laid in accordance with the requirements for one or other of the bituminous materials in this Specification. It shall include the appropriate nominal sized aggregate to ensure compliance with the requirements of Clause 404.

414 ASPHALTIC CONCRETE – DENSE, HEAVY DUTY BINDER COURSE AC 20 DENSE BIN OR AC 32 DENSE BIN (PREVIOUSLY CLOSE GRADED BITUMEN MACADAM TO SWC2 OR SWC 3)

1. The material shall be made in accordance with the general requirements of PD6691:2010 and BS EN 13108:2006 subject to the following provisos. It shall comply with the appropriate tables and sections thereof for 20mm or 32mm nominal size close graded binder course Macadam and Table 400/2 of this Specification. It shall be transported, laid and compacted to Clause 404.

Aggregate

2. The aggregate shall be in a surface dry condition prior to mixing.

Filler

3. When gravel other than limestone gravel is the aggregate, the material passing the 75µm BS sieve shall include 2% of Portland cement or hydrated lime by mass of the total aggregate.

Binder

4. The binder shall be petroleum bitumen complying with BS3690-1 and BS EN 12591:2009. The penetration of the bitumen shall be in accordance with the requirements of Table 400/18.

415 CLAUSE REMOVED

416 ASPHALTIC CONCRETE – OPEN GRADED BINDER COURSE AC 20 OPEN BIN (PREVIOUSLY BITUMEN MACADAM) (FOR USE IN FOOTWAYS ONLY)

1. The material shall be made in accordance with the general requirements of PD6691:2010 and BS EN 13108:2006 subject to the following provisos. It shall comply with the appropriate tables and sections thereof for 20mm nominal size material, with the exception that for machine laid material the binder shall be Pen Grade 125 (100/150) straight run bitumen. The traffic category shall be in accordance with Table 400/18. It shall be transported, laid and compacted to Clause 404.

Filler

2. When gravel other than limestone gravel is the aggregate, the material passing the 75µm BS sieve shall include 2% of Portland cement or hydrated lime by mass of the total aggregate.

417 CLAUSE REMOVED

418 ROLLED ASPHALT (HRA) SURFACE COURSE (SWC6)

1. The material shall be made in accordance with the guidance within PD6691:2010 and the requirements of BS EN 13108:2006 for surface course mixtures, subject to the following provisos. Its composition shall be determined by the method described in PD6691:2010, BS EN 13108:2006 and Table 400/2 of this Specification. Material shall be transported, laid and compacted to Clause 404.

2. The initial texture depth shall be not less than 1.5mm (average per 1,000m section) or less than 1.2mm average depth for a set of 10 measurements.

Asphaltic Concrete

3. The penetration shall be in accordance with Table 400/18.

Coarse Aggregate Content

4. The coarse aggregate shall comply with the requirements of Table 400/18.

Binder Content/Bulk Density of Blast Furnace Slag Relationship

5. When the bulk density of the slag aggregate requires the soluble bitumen content to be increased, the percentage of aggregate passing the 2.36mm BS sieve and retained on the 75µm BS sieve shall be correspondingly reduced.

6. Coated chippings are to be in accordance with Clause 423.

419 STONE MASTIC ASPHALT VARIANT (SMA) SURFACE COURSE (RESIDENTIAL ROADS ONLY)

1. This Specification is based on the March 1998 version of Clause 942 of the Specification for Highway Works and Appendix A of TRL Project Report 65 with amendments and additions by ESG (Environmental Scientifics Group), formally Soil Mechanics, Dorset.

General

3. Stone Mastic Asphalt variant (SMA) shall comply with this Clause and shall otherwise be manufactured and laid in accordance with BS EN 13108:2006 and the guidance within PD6691:2010.

Aggregates and Filler

3. Coarse aggregate shall be crushed rock complying with PD6691:2010, BS EN 13108:2006, and BS EN 13043:2002, Table 2.

4. When tested in accordance with the procedures of BS812, the coarse aggregate shall additionally have the following properties:

   a) Polished Stone Value (PSV) as specified in Table 400/18;
   b) Ten Per Cent Fines Value (TPV) not less than 180kN;
   c) Aggregate Abrasion Value (AAV) as specified in Table 400/18;
   d) Flakiness Index (I_F) not more than 25%.

5. Fine aggregate shall comply with PD6691:2010 and BS EN 13108:2006 and shall be either crushed rock fines or natural sand or a blend of both. Fine aggregate shall be added as required to suit the particular design.

6. The filler shall be crushed limestone complying with the requirements of BS EN 13108:2006 and the guidance within PD6691:2010. Filler shall be added as required to suit the particular design.

7. The design and selection of aggregates, filler and bitumen proportions shall be the responsibility of the Contractor, who shall supply the necessary details to the Engineer for record purposes together with the properties of the constituents.

8. The target aggregate grading and target binder content shall fall within the envelope formed by the limits given in Table 400/7.

9. When sampled and tested in accordance with the procedures of BS598-112:2004, the aggregate grading shall fall within the envelope formed by the targets provided by the Contractor and the tolerances given in Table 400/8.

TABLE 400/7 Aggregate grading

	Nominal Size (% by Mass Passing)		
BS Sieve Size	**14mm**	**10mm**	**6mm**
20mm	100	-	-
14mm	90 - 100	100	-
10mm	35 - 60	90 - 100	100
6.3mm	23 - 35	30 - 50	90 - 100
2.36mm	18 - 30	22 - 32	30 - 60
75µm	3 - 13	3 - 13	3 - 13
Binder content	minimum 5.5	minimum 6.0	Minimum 6.5

TABLE 400/8 Grading tolerances

	Nominal Size		
BS Sieve Size	**14mm**	**10mm**	**6mm**
20mm	-	-	-
14mm	±5	-	-
10mm	±10	±5	-
6.3mm	±8	±10	±5
2.36mm	±7	±7	±10
75µm	±2	±2	±2
Binder content	±0.6	±0.6	±0.6

Binder

10. The bitumen component of the binder shall be petroleum bitumen complying with BS EN 12591:2009 and BS3690-1:1989. The penetration of the bitumen shall be grade 50 (40/60), or 125 (100/150) penetration, as selected by the Contractor. The bitumen may be modified by the addition of a polymer and/or fibres, as selected by the Contractor.

11. The choice of the bitumen grade and the penetration and softening point of the modified or unmodified binder shall be notified to the Engineer before the commencement of work.

12. Where appropriate to the system, the target binder content shall be determined by the binder drainage test in BS594987:2010, except that the range to be tested shall be amended to suit the grading of the aggregates proposed for use. The target binder content determined in the laboratory may be adjusted to suit the mixing plant and the aggregate type, which is used, subject to plant trial and delivery distance. The adjusted binder content shall be notified to the Engineer prior to delivery and shall not be lower than that specified above.

Surface Preparation

13. Existing surfaces shall be cleaned using steel brooms and suction sweeping or other appropriate means. The surface may be moist but not wet; standing water shall not be present. All mud, dust, dirt and other debris and organic material shall be removed.

14. Where necessary, existing surfaces shall be regulated.

15. Unless raised prior to surfacing, iron-work and reflecting road studs shall be located for lifting and relaying after completion of surfacing works. Gullies shall be covered prior to surfacing.

16. Where possible, existing road markings shall be removed.

Mixing

17. The material shall be mixed in accordance with the guidance within PD6691:2010 and the requirements of BS EN 13108:2006, such that an homogeneous mixture of aggregate, filler and bitumen is produced at a temperature of 150 to 190 ^{0}C.

Transportation

18. Mixed materials shall be protected from contamination and undue heat loss by being transported to site in sheeted, insulated, lorries. To facilitate discharge of the materials, the floor of the lorry may be coated with the minimum of light vegetable oil or liquid soap or other non-solvent solution. When such coating is used, the lorry body shall be tipped to its fullest extent with the tailboard open to ensure drainage of any excess, prior to loading. The floor and sides of the lorry shall be free from adherent bituminous materials or other contaminants before loading the surfacing material.

Laying

19. The bond coat shall be spray-applied at a rate recommended by the supplier, and in accordance with Clause 404. The particular spray rate shall be dependent on the proprietary system and the porosity of the surface being covered.

20. Bituminous materials shall be applied at a suitable temperature and compacted by at least two passes of a tandem roller, capable of vibration, and with the minimum dead weight of 5.4 tonnes, before the material cools below 85^{0}C, measured at mid-layer depth.

21. Course thicknesses shall comply with Table 400/9.

TABLE 400/9 Course thicknesses

Nominal size (mm)	Nominal Thickness (mm)	Minimum Thickness (mm)	Maximum Thickness (mm)
14	40	30	50
10	30	25	35
6	25	20	35

Surface Texture

22. Whilst the texture depth is as measured according to BS EN 13036-1:2010, there is no texture depth requirement for Feeder, Collector and Access roads. Table 400/10 is deleted, as is sub-clause (23).

23. Sub-clause removed.

24. Immediately prior to rolling, lightly coated grit shall be applied, at a rate of between 0.7 to 1.0 kg/m^2, to avoid the potential early-life reduced abrasive characteristics.

25. The required air void content (Va), by percentage, shall be in accordance with Table 400/13.

Details to be Supplied

26. The Contractor shall supply the Engineer with test certificates stating the properties of the materials used. Samples of emulsion bond coat, modified or unmodified bitumen or mixed bituminous materials from either the spray bar or storage tank or the pavement surface or other suitable sampling point shall also be supplied if required by the Engineer.

420 ASPHALTIC CONCRETE – CLOSE GRADED SURFACE COURSE AC 10 CLOSE SURF (PREVIOUSLY CLOSE GRADED BITUMEN MACADAM TO SWC5)

1. The material shall be made in accordance with the general requirements of BS EN 13108:2006, the guidance within PD6691:2010, and Table 400/2 of this Specification subject to the following provisos.

Aggregate

2. The aggregate shall consist of hard, clean durable crushed rock, steel slag, electric furnace slag or blast furnace slag, with the minimum polished stone value and maximum aggregate abrasion value in accordance with Table 400/18.

Binder

3. The binder shall be petroleum bitumen complying with BS3690-1 and BS EN 12591:2009. The penetration of the bitumen shall be in accordance with the requirements of Table 400/18.

Table 400/11 Asphaltic Concrete - close graded surface course

BS Sieve Size	% by Mass Passing
10mm	100
6.3mm	90 - 100
3.33mm	55 - 75
1.18mm	20 - 50
300µm	8 - 25
75µm	– 10

421 CLAUSE REMOVED

422 CLAUSE REMOVED

423 COATED CHIPPINGS FOR APPLICATIONS TO PRE-MIXED SURFACINGS

1. Coated chippings shall be 20mm or 14mm nominal size and spread at the appropriate rate (between 9 and 12 kg/m^2) stated in BS594-108:2005; the rate of 11kg/m^2 is preferred.

2. The chippings and the manner of coating when used for rolling into the surface of rolled asphalt shall be in accordance with BS EN 13108:2006, BS598-108:2005, and the guidance within PD6691:2010 subject to the following provisos.

3. The minimum polished stone value and the maximum aggregate abrasion value of the chippings shall be in accordance with Table 400/18.

4. Coated chippings shall comply with one of the following requirements:

   a) Not more than 7.5% of chippings shall fail the Solvent Test;
   b) The mass of sand retained in the Hot Sand Test shall be not less than 40g/kg for 20mm chippings (50g/kg for 14mm chippings) and not more than 7.5% of chippings shall fail the visual assessment of sand cover.

   The test to be used shall be that required by the Engineer.

424 COATED GRIT FOR BLINDING

1. Coated grit shall be in accordance with BS EN 13108:2006 and PD6691:2010 except that the soluble binder content table shall be 4.0% ± 0.5%. The material shall be deferred set 72 hours unless otherwise specified by the Engineer.

425 CLAUSE REMOVED

426 CLAUSE REMOVED

427 TESTING OF COMPACTION FOR BITUMINOUS BOUND MATERIALS

1. To determine that satisfactory compaction has been achieved in accordance with Clause 404, testing shall be carried out by the use of either method a) or b) below:

   a) After compaction the air void content of relevant material shall comply with Table 400/13. Measurement shall be made using the method given in BS EN 12697, except that for asphalt surface course the pre-coated chippings shall not be removed from the core samples;
   b) After compaction the PRD (Percentage Refusal Density) of relevant materials shall comply with Table 400/14. Measurement shall be by cutting cores and testing as specified in BS EN 12697.

2. A nuclear density gauge may be used in conjunction with either test a) or b) above for acceptance purposes, in which case adequate compaction shall be judged in accordance with the method given in BS EN 12697.

TABLE 400/13 Compacted material – required air void content (Va)

Material Type	SWC Ref	Va(%)
HRA Surface Course	6	2 - 6
AC Close Surf (Close Graded Surface)	4 and 9	4 - 12
AC Close/Dense Surf (Close/Dense Graded Surface)	5	2 - 10
AC Dense Base/Bin (Close Graded Base/Binder)	1, 2, and 3	3 - 10
Stone Mastic Asphalt variant (SMA) Surface Course	-	2 - 6

TABLE 400/14 Compacted material – required minimum PRD

Material Type	SWC Ref	Minimum PRD
AC Dense Base/Bin (Close Graded Base/Binder)	1,2 & 3	93

428 PRE-CAST CONCRETE KERBS, CHANNELS AND EDGINGS

1. Pre-cast concrete kerbs, edging and quadrants shall comply with Clause 611 and shall be laid on a bed of ST2 Mix/C10 Grade concrete not less than 150mm deep and 200mm or 300mm wider (as applicable) than the kerb or kerb channel.

2. The kerbs shall be laid in accordance with BS7533-3:2005.

3. The kerb is to be bedded and laid to the lines and levels shown on the Drawings and the 100mm or 150mm wide (as applicable) concrete haunch is to be brought up to the back to within 50mm of the top of the kerb.

4. Pre-cast channels are to be bedded and laid as specified for kerb and they shall be jointed with cement mortar.

5. Precautions shall be taken to prevent kerbs being stained or damaged. All damaged, stained and broken kerbs are to be replaced before any arrangements are made for the surfacing of carriageway or footways.

6. Pre-cast concrete edging complying with Clause 611 shall be provided as support to the footway and laid true to line and level, bedded on and haunched to within 50mm of the top with 100mm ST2 Mix/C10 Grade concrete.

7. For radii of less than 12.000m, kerbs of appropriate radius shall be used.

8. Any unit of kerb, channel edging and quadrant deviating more than 3mm in 3.000 m from line and level shall be made good by lifting and relaying.

9. The kerb face, or up-stand, shall be less than (or equal to) 25mm or 125mm (125mmm only for distributor, local distributor, or industrial roads).

10. Any kerb cut shall be at least 1/3 of the original full length.

429 NATURAL/RECONSTRUCTED STONE KERBS

1. Natural stone or re-constructed stone kerbing may only be used where permitted by the Engineer.

2. Natural stone or re-constructed stone kerbs shall comply with Clause 612.

3. The kerb face, or up-stand, shall be less than (or equal to) 25mm or between 80mm and 125mm (125mmm only for distributor, local distributor, or industrial roads).

4. The kerbs shall be laid in accordance with BS7533-3:2005 and so that the faces adjoining shall be flush so as not to present an outward step of more than ±6mm.

5. Joints shall be parallel and less than 6mm or, if greater, pointed with mortar to Clause 609.

430 PRE-CAST CONCRETE BLOCK PAVERS

1. Block pavers are to comply with Clause 613.

2. **Under no circumstances shall the binder course be disturbed or punctured.**

3. The blocks, when laid and sanded in accordance with this Clause, shall form a waterproof surface course.

4. The laying layer and paver layer shall replace the surface course only.

5. The laying layer (blinding layer) is to be 50mm thick. It is not to be used as a regulating layer.

6. The only accepted laying pattern shall be Herringbone (a continuous 45º or 90º pattern will only be achievable on uniform areas).

7. Pavers are not to be laid on a saturated laying course or in inclement weather conditions.

8. The sand for the laying layer shall be graded in accordance with Table 400/15.

TABLE 400/15 Grading for the laying course sand

	% by Mass Passing		
BS Sieve Size	**Category IA**	**Category IB**	**Category II**
5mm	90 – 100	90 - 100	90 - 100
2.36mm	75 –100	75 -100	75 -100
1.18mm	55 - 90	55 - 90	55 - 90
60µm	35 - 65	35 - 65	35 - 65
300µm	10 - 45	10 - 45	10 - 45
150µm	0 – 10	0 - 10	0 - 10
75µm	0.3 max	0 - 0.5	0 - 1.5

9. At every channel edge of pavers, 3 bonded stretcher courses must be used.

10. At the surround of any ironwork, only a single soldier course is acceptable. A stretcher course will not be permitted.

11. Any paver cut must be at least 1/3 of the original size (either in width or length but not both).

12. No joint shall exceed 5mm. If the maximum of 5mm is not achievable (due to cutting of the pavers), the oversized joint (of 5mm plus the <1/3 of paver) is to be filled with C35 Grade air entrained concrete conforming to BS EN 206-1:2000 and BS8500-1:2006, or equivalent, with a maximum aggregate size of 10mm.

13. Joints are to be filled, by brush, with a kiln-dried, free flowing, silica sand in dry weather conditions with dry pavers only.

14. The sand is to be graded in accordance with Table 400/16.

TABLE 400/16 Kiln-dried free-flowing silica sand for joint filling

BS Sieve Size	% by Mass Passing
2.36mm	100
1.18mm	95 – 100
600µm	50 – 100
300µm	15 - 60

150µm	0 – 15
75µm	0 - 3

15. Where block pavers are laid in a junction, or a square, and the replacement of the surface would isolate a considerable part of the development beyond, a fixed central “seam” must be incorporated so as permit continued access to the development.

16. The seam shall comply with Standard Detail Drawing 815 and comprise either the following;

    a) 3 courses of 125x255BN or 145x1255BN kerb, in stretcher bond, and shall be laid on a bed of ST2 Mix/C10 Grade concrete not less than 150mm deep nor less than 300mm wider (overall) than the width of the 3 courses;
    b) 3 courses of 255x125CS1 or 255x145CS1 channel block (set sideways), and shall be laid on a bed of ST2 Mix/C10 Grade concrete not less than 150mm deep nor less than 300mm wider (overall) than the width of the 3 courses.

17. The joints between the courses are to be between 25mm and 30mm and filled with an epoxy resin mortar or joint sealant to comply with Clause 627, which shall be mixed upon site.

431 TACTILE PAVING FLAGS

1. Pre-cast concrete tactile paving flags shall comply with Clause 614.

2. Paving flags shall be laid to the required cross-falls.

3. The layouts shall be in accordance with the Guidance on the Use of Tactile Paving Surfaces produced by the DfT (Figures 6, 7, or 8 in Chapter 1, sub-section 1.5.2) and conform to Standard Detail Drawing 813.

4. The crossing point on the minor arm shall be immediately beyond the tangent of the radii and shall be a minimum of 2.400m wide with the tactile element (1.200m wide) furthest from the junction.

5. The construction depth of footway at crossing points shall be 280mm (minimum). The construction depth shall be approved by the Engineer and shall consist of:

    a) 180mm layer (minimum) of ST2 Mix/C10 Grade concrete;
    b) 35mm blinding layer of sharp sand/cement to a ratio of 20:1 (by weight);
    c) 65mm depth tactile paving slab.

6. The flags are to be aligned with the flush kerb and to lie fully within the taper kerbs.

432 GEOTEXTILE MEMBRANE

1. Geotextile membrane may only be used where permitted by the Engineer and shall comply with Clause 619.

2. The geotextile membrane shall not be left exposed to direct sunlight. It shall be stored in the original coloured wrapper until required for use.

3. The Engineer is to be notified regarding the intended laying or lapping pattern.

4. Refer to Clause 214 with regard to drainage trenches cut after the laying of the geotextile membrane to the formation or sub-formation layer.

433 SOAKAWAYS AND INTERCEPTORS

1. Soakaways and all components shall comply with Standard Detail Drawings 807-1 and 807-2, Clause 206, and Clause 620. This Authority expresses no preference as to which soakaway design is proposed, or used, by the Developer.

2. The use of SuDS must comply with the Flood and Water Management Act 2010 and must be approved by the SuDS Approval Body (SAB).

3. Class 1 By-pass interceptors are to be installed to protect the water table from pollution. It is the responsibility of the Developer to obtain the specific dispensation, from the Environment Agency, not to install such interceptors.

4. Only 45mm diameter perforations (or slits 110mm x 25mm) shall be permitted by this Authority (conforming to BS EN 1917:2002 and BS5911-3:2010). **This Authority will not accept 75mm diameter perforations in pre-cast concrete soakaway rings.**

5. Soakaways are to be linked at the top of effective depth only (inlet level) with a horizontal connection equal in diameter to the main inlet carrier.

6. No part of the soakaway is to be constructed closer that the total depth (2.500m minimum) to any part of the carriageway construction (including footways).

7. No soakaway shall be constructed in any paved area (private courtyards, et cetera) without site-specific detailed approval from the Engineer.

8. No part of the soakaway construction shall be closer than 5.000m to any tree (private or highway) or any building (Building Regulations 2000, Approved Document H, Section H3, Paragraph 3.25).

9. Interceptors shall be Class 1 Bypass interceptors (to achieve a concentration of less than 5mg/l oil) and shall comply with Standard Detail Drawings 807-1 and 807-2, and Clause 620.

10. The interceptor shall be no closer than 1.000m to the carriageway construction (including the rear of the footway or hardened margin). The interceptor should be positioned to facilitate easy access for maintenance.

11. The alarm cabinet (if used) shall be positioned adjacent to the rear of the footway or hardened margin, with a concrete apron 100mm deep and 300mm wide of ST2 Mix/C10 Grade concrete.

12. If an alarm is used, it shall be visual only (a flashing beacon). Audible alarms shall not be installed due to the proximity to residential dwellings.

434 TREE PITS, GRILLES, AND GUARDS

1. Consideration must be given to BS5837 with regard to the intended position(s) of, and provision and protection for, the tree(s).

2. Tree grilles and frames are required for all tree pits that are constructed in paved areas (carriageway, footway, et cetera). There is no requirement for tree grilles or frames for trees planted in grass or verge areas.

3. Tree pit construction and all components shall comply with Standard Detail Drawings 808-1, 808-2, and 808-3 and Clauses 621 to Clause 622 (inclusive).

4. The tree frame is to be fixed to the tree pit structure. It must be capable of being dismantled and removed without disturbing either the tree pit or the planted tree.

5. The tree grille is to be fixed to the tree frame. It must be capable of being dismantled and removed without disturbing the tree frame or the planted tree. Therefore, it is not to be welded to the frame.

6. Tree guards are required for all trees planted in tree pit where the trunk (at the time of planting) is less than 300mm in diameter.

7. The tree guard shall be fixed to the tree frame or grille. It must be capable of being dismantled and removed without disturbing the tree grille, frame, or the planted tree. Therefore, it shall not be welded to the grille or frame.

435 BOLLARDS

1. Bollards will only be used with the permission of the Engineer and shall comply with Clause 623.

2. Retro-reflective tape, or roundels, must be affixed to the upper of the bollard to the correct colour for approaching traffic (red, white, amber, or a combination thereof as traffic direction and installation position dictates).

3. Details of the white collapsible bollard for the emergency link are shown in Standard Detail Drawing 809-1.

436 FOOTWAYS - FLEXIBLE SURFACING

1. The surface area of footways and footway links shall be treated with an appropriate weed killer to Clause 618, not more than 7 days prior to the surfacing. The work is to be undertaken in the presence of the Engineer.

2. Materials for flexible surfacing shall comply with Tables 400/17 and 400/18.

3. The flexible surfacing shall be laid to the specified levels and cross falls on a base compacted to be the thickness required and of a material complying with Table 400/18.

437 LEVEL ACCESS (BUILDING REGULATIONS 2000, APPROVED DOCUMENTS, PART M), WINDOWS, AND STORM PORCHES

1. Level access landings and ramps to private properties will not form part of the highway and shall be constructed beyond the limit of the land to be offered as highway maintainable at public expense.

2. Neither doors nor casement windows shall open out over the highway. Doors shall open inwards and windows shall be either non-opening or fitted with restrictors, or a private margin will exist between the back of the footway and the building frontage (see Standard Drawing Detail 801-1).
3. The width, line, and level of the footway shall not be compromised to cater for level accesses.

4. No storm porch, nor any part of the roof structure, shall overhang the highway.

5. Raised gas meter boxes shall be set behind the limit of the footway, or safety margin, so as not to constitute either a trip or maintenance hazard.

6. Flying freeholds will not be accepted in any form whatsoever.

7. The rear of the footway/service margin will not deviate in line to cater for gas meter boxes, steps, porches, casement windows, private surface water drainage, or private covers and frames.

8. Covers and frames for public utilities will not straddle the boundary but will be sited wholly on one side.

9. A continuous private hardened or gravelled margin (must exist between the rear of the highway and the property façade (see Standard Detail Drawings 801-1 and 801-2). The margin may be soft landscaped if it is greater than 1.000m in width.

438 ROAD SIGNS AND MARKINGS

1. All necessary road signs and markings to be erected and laid shall be in accordance with the Traffic Signs Regulations and General Directions and Chapters 3, 4, and 5 of the Traffic Signs Manual published by Her Majesty's Stationary Office for the Department for Transport.

2. Road signs and markings shall be provided as detailed within the approved drawings, prior to the conclusion of the adoption process, and at the discretion of the Engineer.

3. Road signs and markings shall be installed, erected, or laid by an approved contractor.

439 EPOXY BOUND PAVING JOINTING MORTAR

1. Jointing mortar compound shall comply with BS7533 and Clause 627.

2. Site prepared and mixed epoxy resin mortars only are to be used, pre-mixed (polymeric) jointing mortars are not permitted.

3. Filler and aggregate for resin mortars shall be pre-packed in the correct proportions and mixed with the resin all in accordance with the manufacturer's instructions.

4. Laying shall only be permitted when the temperature is at or above + 3ºC (37ºF) on a rising thermometer (or higher if specified by the manufacturer).

5. Setts shall be pre-wetted, or primed, in accordance with the manufacturer's recommendations, to ensure the mortar does not adhere to the exposed surfaces.

6. Excess material shall be disposed of and shall not be collected and re-used.

TABLE 400/17 Materials and construction details for flexible pavements

CONSTRUCTION COURSE	ALTERNATIVE MATERIAL	DCC SPEC. CLAUSE NUMBER	SOUTH WEST COUNTY CLAUSE NUMBER	MINIMUM CARRIAGEWAY COURSE THICKNESS (mm)				FOOTWAY
				ROAD TYPE				Pre-cast concrete pavers may be used where permitted by the Engineer and shall be in accordance with Specification Clause numbers 430 and 613
				District Distributor	Local Distributor and Industrial	Feeder	Collector and Access	
SURFACE COURSE (WEARING COURSE)	ROLLED ASPHALT (HRA) (with pre-coated chippings)	418	SWC6	40	40	30	30	20
	ASPHALTIC CONCRETE – CLOSE GRADED SURFACE AC 10 CLOSE SURF (AC 6 DENSE SURF FOR FOOTWAY)	420	SWC4, SWC5 or SWC9	-	-	30	30	20
	STONE MASTIC ASPHALT VARIANT (SMA) SURFACE (Residential roads only)	419	-	-	-	30	30	20
BINDER COURSE (BASE COURSE)	ASPHALTIC CONCRETE – DENSE HEAVY DUTY BINDER AC 20 DENSE BIN OR AC 32 DENSE BIN (CLOSE GRADED BITUMEN MACADAM)	414	SWC2 or SWC3	60 / 80	60 / 80	50	50	40
	ASPHALTIC CONCRETE – OPEN GRADED BINDER AC 20 OPEN BIN (BITUMEN MACADAM)	416	-	-	-	-	-	40
BASE (ROAD BASE) (AND FOOTWAY BASE)	ASPHALTIC CONCRETE – DENSE HEAVY DUTY BASE AC 32 DENSE OR AC 40 DENSE (CLOSE GRADED BITUMEN MACADAM)	410	SWC1 or SWC2	140	130	100	80	-
	GRANULAR MATERIAL	408	-	-	-	220 (2 x 110)	220 (2 x 110)	220 (2 x 110)
	CRUSHER-RUN HARDCORE	409	-	-	-	-	220 (2 x 110) plus blinding layer	220 (2 x 110) plus blinding layer
SUB-BASE	GRANULAR MATERIAL	408	-	TO BE DETERMINED BY THE ENGINEER FOR EACH SITE				
CAPPING	CAPPING – Graded to Table 400/4	407	-	TO BE DETERMINED BY THE ENGINEER FOR EACH SITE				
	6F2, 6F3, 6F4	407	-	MAY BE PERMITTED AND TO BE DETERMINED BY THE ENGINEER FOR EACH SITE				
	6F5	407	-	IF PERMITTED, MUST BE BLINDED BY LAYER OF GRADED CAPPING MATERIAL				

Minimum carriageway construction depth of 450mm (frost susceptibility). Minimum footway construction depth 280mm (390mm if block pavers). Footway construction equal to carriageway construction when footway crossings or vehicular accesses serve more than a single private drive.

TABLE 400/18 Materials and mix requirements for flexible pavements

COURSE	ALTERNATIVE MATERIAL	ELEMENT	ROAD TYPE				FOOTWAY
			District Distributor	Local Distributor and Industrial	Feeder	Collector and Access	Industrial Estate, footway crossings, and accesses
SURFACE COURSE (WEARING COURSE)	HOT ROLLED ASPHALT (HRA)	Asphaltic Concrete	Lake Asphalt and/or Petroleum Bitumen	Lake Asphalt and/or Petroleum Bitumen	Lake Asphalt and/or Petroleum Bitumen	Lake Asphalt and/or Petroleum Bitumen	
		Penetration	50	50	80	80	
		Coarse Aggregate Composition	Crushed Rock or Slag	Crushed Rock or Slag	Crushed Rock or Slag	Crushed Rock or Slag	
		BS EN 13108-4:2006, Section 5	1A or 3A 30%	1A or 3A 30%	Clause 418	Clause 418	
		Coated Chippings (nominal size)	20mm	20mm	14mm	14mm	
		Polished Stone Value (PSV)	60	60	55	55	
		Maximum Aggregate Abrasion Value	12	12	14	14	
	ASPHALTIC CONCRETE CLOSE GRADED SURFACE (CLOSE GRADED BITUMEN MACADAM)	Polished Stone Value (PSV)	-	-	55	55	#
		Maximum Aggregate Abrasion Value	-	-	14	14	#
		Traffic Category	-	-	B	B	#
		Binder Grade	-	-	125 (100 / 150)	125 (100 / 150)	# 125 (100 / 150) or 190(160 / 220)
		Nominal Size Aggregate	-	-	10 / 14mm	10 / 14mm	6mm or #10 / 14mm
	STONE MASTIC ASPHALT VARIANT (SMA) SURFACE (Residential roads only) (Not for industrial use)	Polished Stone Value (PSV)	-	-	55	55	55
		Maximum Aggregate Abrasion Value	-	-	14	14	14
		Binder Grade	-	-	50 (40 / 60) or 125 (100 / 150)	50 (40 / 60) or 125 (100 / 150)	125 (100 / 150)
		Nominal Size Aggregate	-	-	Clause 419	Clause 419	6 / 10mm
		Coarse Aggregate Content	-	-	Clause 419	Clause 419	Clause 419
BINDER COURSE (BASE COURSE)	ASPHALTIC CONCRETE DENSE HEAVY DUTY BINDER (CLOSE GRADED BITUMEN MACADAM)	Nominal Size Aggregate	32mm	32mm	20mm	20mm	20mm
		Binder Grade	125 (100 / 150)	125 (100 / 150)	125 (100 / 150) or 190 (160 / 220)	125 (100 / 150) or 190 (160 / 220)	# 125 (100 / 150) or 190 (160 / 220)
	ASPHALTIC CONCRETE OPEN GRADED BINDER (BITUMEN MACADAM) (Footways use only)	Traffic Category	-	-	-	-	-
		Binder Grade	-	-	-	-	190 (160 / 220)
BASE (ROAD BASE)	ASPHALTIC CONCRETE DENSE HEAVY DUTY BASE (CLOSE GRADED BITUMEN MACADAM)	Binder Grade	125 (100 / 150)	125 (100 / 150)	125 (100 / 150) or 190 (160 / 220)	125 (100 / 150) or 190 (160 / 220)	-
		Nominal Size Aggregate	32 / 40mm	32 / 40mm	32 / 40mm	32 / 40mm	-

 # Industrial Estate footways and crossings/other vehicular accesses serving more than a single drive to be the binder/surface course and Pen shown.

500 STRUCTURES

501 CONSTRUCTION OF FORMWORK

1. Formwork shall include all temporary or permanent forms required for forming the concrete, together with all temporary construction required for their support.

2. All formwork shall be so constructed that there shall be no lost of material from the concrete. After hardening the concrete shall be in the position of the shape, dimensions and surface finish described in the Agreement or on the approved Drawings.

3. The formwork shall be so arranged as to be readily dismantled, and removed, from the cast concrete without shock, disturbance or damage.

4. Where internal metal ties are permitted, they or their removable parts shall be extracted without damage to the concrete and the remaining holes filled with mortar. No permanently embedded metal part shall have less than 40mm cover to the finished concrete surface.

502 FORMED SURFACES - CLASSES OF FINISH

1. The requirements extra to those given in Clause 501 to provide the class of finish described in the Agreement or on the approved Drawings, details shall be:

   a) **CLASS F2** - The irregularities in the finish shall be no greater than those obtained from the use of wrought thickness square edged boards arranged in a uniformed pattern. The finish is intended to be left as struck but imperfections such as fins and surface discolouration shall, if required, be made good by methods approved by the Engineer;
   b) **CLASS F3** - The formwork shall be lined with material approved by the Engineer to provide a smooth finish of uniform texture and appearance. This material shall leave no stain on the concrete and shall be jointed and fixed to its backing that it imparts no blemishes. It shall be of the same type and obtained from only one source throughtout any one structure. The Developer shall make good any imperfections in the finish as required by the Engineer. Internal ties and embedded metal parts will not be allowed;
   c) **CLASS F4** - The requirements for Class F4 are as for Class F3 except that internal ties and embedded metal parts will be permitted. The ties shall be positioned only in rebates or in other positions agreed by the Engineer.

2. The Developer shall ensure that permanently exposed concrete surfaces, to Class F2, F3 and F4 finish, are protected from rust marks, spillage, and stains of all kinds.

3. All formwork joints for exposed surfaces of concrete to Class F2, F3 and F4 finish shall form a regular pattern with horizontal and vertical lines continuous throughout each structure and all construction joints shall coincide with these horizontal and vertical lines.

503 PREPARATION OF FORMWORK BEFORE CONCRETING

1. The inside surfaces of forms shall, except for permanent formwork, or unless otherwise agreed by the Engineer, be coated with an approved material to prevent adhesion of the concrete. Release agents shall be applied strictly in accordance with the manufacturer's instructions and shall not come into contact with the reinforcement or pre-stressing tendons and anchorages. Different release agents shall not be used in formwork to concrete, which will be visible in the finished works. Immediately before concreting all forms shall be thoroughly cleaned.

504 REMOVAL OF FORMWORK

1. The Engineer shall be informed in advance when the Developer intends to strike any formwork.

2. The time at which the formwork is struck shall be the Developer's responsibility, but the minimum periods between concreting and the removal of forms shall be as set out in Table 500/1.

TABLE 500/1 Minimum period before striking formwork

Type of Support	Minimum Period Before Striking	
	+ 16°C (61°F)	+ 5°C (41°F)
Vertical formwork to columns, walls and beams	12 hours	24 hours
Soffit formwork to slabs	5 days	7 days
Props to slabs	10 days	15 days
Soffit formwork to beams	9 days	14 days
Props to beams	14 days	20 days
Arch Centres	9 days *	14 days *

* *This period shall commence from the time of completion of the last shrinkage key.*

3. The periods stated in Table 500/1 above are based on a constant surface temperature of the concrete of + 16°C (61°F) and + 5°C (41°F) and the use of Ordinary Portland Cement. They shall be increased during cold weather as directed by the Engineer and may be changed if other types of cement are used, subject to the Engineer's agreement.

4. Formwork shall be constructed so that the side forms of members can be removed without disturbing the soffit forms and, if props are to be left in place when the soffit forms are removed, these props shall not be disturbed during the striking.

5. For pre-stressed units the side forms shall be eased as early as possible and the soffit forms shall permit deformation of the member when the pre-stress is applied.

6. All formwork shall be removed without damage to the concrete.

7. Where it is intended that formwork is to be re-used it shall be cleaned and made good to the satisfaction of the Engineer.

505 UNIFORM SURFACES - CLASSES OF FINISH

1. **Class U1 -** The concrete shall be uniformly levelled and screeded to produce a plain textured or ridged surface. No further work shall be applied to the surface unless it is used as the first stage for a Class U2 or Class U3 finish.

2. **Class U2 -** After the concrete has hardened sufficiently, the concrete Class U1 surface shall be floated by hand or machine sufficiently only to produce a uniform surface free from screed marks.

3. **Class U3 -** When the moisture film has disappeared and the concrete has hardened sufficiently to prevent laitance from being worked to the surface, a Class U1 surface shall be steel-trowelled under firm pressure to produce a dense, smooth uniform surface free from trowel marks.

4. In addition, surface finish, which is to receive deck waterproofing, shall be to such accuracy that, when tested with a 3.000m straight edge, the maximum depression does not exceed 10mm.

506 REMEDIAL TREATMENT OF SURFACES

1. Any remedial treatment to surface shall be agreed with the Engineer following inspection immediately after removing the formwork and shall be carried out without delay.

2. Any concrete, the surface of which has been treated before being inspected by the Engineer, shall be liable to rejection.

507 STEEL REINFORCEMENT FOR STRUCTURES

1. Steel reinforcement shall conform to BS4449:2005 and shall be stored in clean conditions. It shall be clean and free from loose rust and mill scale at the time of fixing in position and subsequent concreting. It shall be bent or shaped in accordance with BS8666:2005.

2. Cover blocks required for ensuring that the reinforcement is correctly positioned, shall be as small as possible, consistent with their purpose, of a shape acceptable to the Engineer, and designed so that they will not overturn when the concrete is placed. They shall be made of concrete with 10mm maximum aggregate size and the mix proportions shall produce the same strength as the adjacent concrete. Stainless steel tying wire shall be cast in the block for the purpose of tying it to the reinforcement.

508 CONCRETE MIXES FOR STRUCTURES

1. All concrete shall, unless agreed with the Engineer, be composed of Ordinary Portland Cement and aggregate to BS EN 12620:2002 and shall be mixed in the proportions and quantities described. If the Developer wishes to use an alternative mix this shall generally to the requirements of the current edition of the Department of Transport's "Specification for Highway Works", and shall not be used without the prior approval of the

Engineer. All structural concrete mixes must be approved by the Engineer by the use of trial mixes.

2. Class C30 concrete shall be composed of aggregate not exceeding 20mm as appropriate and graded in accordance with BS EN 12620:2002 and Ordinary Portland Cement, to such proportion as to give a minimum characteristic compressive cube strength of 30N/mm² 28 days after mixing, in accordance with BS EN 206-1:2000, BS8500-1:2006 and BS8500-2:2006.

3. The cement content shall not be less than 275kg/m³ nor exceed 550kg/m³ and the water cement ratio shall not exceed 0.65 but shall be sufficient to produce a concrete with suitable workability to be placed and compacted when required.

509 CONCRETE FOR ANCILLARY PUPOSES (ST2 MIX/C10 GRADE)

1. ST2 Mix/C10 Grade concrete shall be composed of Ordinary Portland Cement to BS EN 197-1:2000 and aggregate complying with BS EN 12620:2002 including all-in aggregate within the grading limits of Tables 3 and 5 of the British Standard. The nominal maximum size of aggregate shall be 20mm unless agreed by the Engineer.

2. The ratio of the combined or all-in aggregate to the cement shall not be more than 8:1 by volume or 10:1 by weight. No account need be taken of bulking.

3. The concrete shall be mixed by machine or by hand to a uniform colour and consistency before placing. The quality of water shall not exceed that required to produce a concrete with sufficient workability to be placed and compacted in the required location. The concrete mix shall have a slump of not more than 75mm.

4. The concrete shall be compacted by hand or by mechanical vibration.

5. Where sulphates are present in the soil or where required by the Engineer sulphate resisting cement shall be used.

510 ADMIXTURES

1. Admixtures or cements containing additives shall not be used unless agreed by the Engineer. The use of calcium chloride in any form is prohibited.

511 DELIVERY AND STORAGE OF MATERIALS

1. Cement shall be stored in a dry weatherproof shed with a raised wooden floor or in a silo and shall be delivered in quantities sufficient to ensure that there is no suspension or interruption of the work of concreting at any time. If stored in sheds, each consignment shall be kept separate and distinct. Any cement that has become contaminated by damp or other causes shall be removed from site immediately.

2. Coarse aggregates, unless otherwise agreed by the Engineer shall be delivered to the sites in separate sizes and stored in different stockpiles, which shall be separated from each other and kept free from contamination.

512 MIXING CONCRETE

1. The weighing and water-dispensing mechanisms shall be maintained in good order. Their accuracy shall be maintained within tolerances described in BS1305:1974 and checked against accurate weights and volumes when required by the Engineer.

2. The mass of cement and each size of aggregate as indicated by the mechanisms employed shall be within tolerance of 2% of the respective mass per batch agreed by the Engineer.

3. Mixers, which have been out of use for more than 30 minutes, shall be thoroughly cleaned before any fresh concrete is mixed. Unless otherwise agreed by the Engineer, the first batch of concrete through the mixer shall then contain only two thirds of the normal quantity of coarse aggregate. Mixing plant shall be thoroughly cleaned before changing from one type of cement to another.

4. Concrete shall not be mixed when the air temperature in the shade is below + 3°C (37°F) unless special precautions are taken, which have been approved by the Engineer. No frozen material or materials containing ice shall be used.

5. During the hot weather the Developer shall ensure that the constituent materials of the concrete are sufficiently cool to prevent the concrete from stiffening in the interval between its discharge from the mixer and compaction in its final position.

513 READY-MIXED CONCRETE

1. Ready-mixed concrete as defined in BS EN 206-1:2000, BS8500-1:2006 and BS8500-2:2006, batched off the site, may be used subject to the Engineer's approval, and shall comply with all requirements of the Agreement.

2. Ready-mix concrete shall be carried in purpose-made agitators operating continuously, or truck mixers. The concrete shall be placed and compacted in its final position within 2 hours of the introduction of cement to the aggregate. This time shall be recorded on the delivery note together with the weight of the constituents of the mix.

3. When concrete is transported in a truck mixer, water shall be added under supervision either at the site or at the central batching plant as agreed by the Engineer. **Under no circumstances shall water be added in transit.**

514 SAMPLING CONCRETE

1. Sampling shall be in accordance with the requirements given in BS EN 12350-1:2009. A single batch sampling procedure shall be adopted and the number, frequency, and location of batches to be sampled shall be decided by the Engineer.

515 TRANSPORTING AND PLACING

1. The method of transporting and placing concrete shall be to the approval of the Engineer. The concrete mix shall be to the approval of the Engineer. Concrete shall be so transported and placed that contamination, segregation or loss of the constituent materials does not occur.

2. All formwork and reinforcement contained in it shall be clean and free from standing water, snow, or ice immediately before the placing of the concrete.

3. Concrete shall not be placed in any part of the works until the Engineer's approval has been given.

4. If concreting is not started within 24 hours of approved being given, approval shall again be obtained from the Engineer. Concreting shall then proceed continuously over the area between construction joints. Fresh concrete shall not be placed against in-situ concrete, which has been in position for more than 30 minutes unless a construction joint is formed in accordance with Clause 517. When in-situ concrete has been in place for 4 hours no further concrete shall be placed against it for a further 20 hours.

5. Concrete when deposited shall have a temperature of not less than + 5°C (41°F) and not more than + 32°C (90°F). It shall be compacted in its final position within 30 minutes of discharge from the mixer unless carried in purpose-made agitators, operating continuously, when the time shall be within 2 hours of the introduction of cement to the mix and within 30 minutes of discharge from the agitator.

6. Except where otherwise agreed by the Engineer, concrete shall be deposited in horizontal layers to a compacted depth not exceeding 450mm where internal vibrators are used or 300mm in all other cases.

7. Unless otherwise agreed by the Engineer, concrete shall not be dropped into place from a height exceeding 2.000m. When trunking or chutes are used they shall be kept clean and used in such a way as to avoid segregation.

8. No concrete shall be placed in flowing water. Underwater concrete shall be placed in position by Tremie tube or by pipeline from the mixer. Full details of the method proposed shall be submitted in advance to the Engineer and his approval obtained before placing begins. Where the concrete is placed by a Tremie tube, its size and method of operation shall be in accordance with BS EN 1997-1:2004. During and after concreting under water, pumping or de-watering operations in the immediate vicinity shall be suspended until the Engineer permits them to be continued.

516 COMPACTION OF CONCRETE

1. All concrete shall be compacted to produce a dense homogeneous mass. Unless otherwise agreed by the Engineer, it shall be compacted with assistance of vibrators. Sufficient vibrators in serviceable condition shall be on site so that spare equipment is always available in the event of breakdowns.

2. Vibration shall not be applied by way of reinforcement. Where vibrators of the immersion type are used, contact with reinforcements and all inserts shall be avoided, so far as is practicable.

3. Concrete shall not be subjected to vibration between 4 and 24 hours after compaction.

517 CONSTRUCTION JOINTS

1. The position and detail of any construction joints shall be subject to the approval of the Engineer, and shall be so arranged as to minimise the possibility of the occurrence of shrinkage cracks.

2. The upper surface of lifts of concrete walls and columns shall be horizontal and if the formwork extends above the joint on the exposed face it shall be cleaned of adhering concrete before the next lift is placed.

3. Where a construction joint contains a formed surface, that surface shall be roughened to expose the aggregate and the arrisses of the joint. The roughened surface shall then be washed with clean water to remove loose particles.

4. Where sections of the work are carried out in lifts, the reinforcement projecting above the lift being cast shall be adequately supported so as to prevent movement of the bars during the casting and setting of the concrete.

5. Wherever possible laitance and all loose material shall be removed while the concrete is still green and no further roughening shall be required. Where this is not possible, it shall be removed by mechanical means provided the concrete has been in position for more than 24 hours. The roughened surface shall then be washed with clear water.

518 CURING OF CONCRETE

1. Immediately after compaction and for 7 days thereafter, concrete shall be protected against harmful effects of weather, including rain, rapid temperature changes, frost and from drying out. The methods of protection used shall be subject to the approval of the Engineer.

2. Alternatively when elevated-temperature curing is used, 4 hours must elapse from the completion of the placing of the concrete before the temperature is raised. The rise in temperature within any period of 30 minutes shall not exceed + 10°C (50°F) and the maximum temperature attained shall not exceed + 70°C (158°F). The rate of subsequent cooling shall not exceed the rate of heating.

3. The method of curing used shall prevent loss of moisture from the concrete. On concrete surfaces, which are to be waterproofed, curing membranes shall be used. Details of all curing methods to be used shall be subject to the approval of the Engineer.

519 EARLY LOADING

1. Concrete shall, unless agreed by the Engineer, at no time be subjected to loading, including its own mass, which will induce a compressive stress in its exceeding 0.33 of its compressive strength at the time loading or of the specified 28 days strength.

2. For the purpose of this Clause, the assessment of the strength of the concrete and stresses produced by the loads shall be subject to the agreement of the Engineer.

600 MATERIALS

601 SUBMISSION OF SAMPLES AND TEST CERTIFICATES

1. The Developer shall submit to the Engineer a list of the suppliers from whom he proposes to purchase the materials necessary for the execution of the Works. Each supplier must be willing to admit the Engineer, or his representative, to his premises during ordinary working hours for the purpose of obtaining samples of the material in question. Alternatively, if required by the Engineer, the Developer shall deliver the samples of the materials to the Engineer's office. Samples shall be taken in accordance with the relevant British Standard where applicable. Materials subsequently supplied shall conform to any specific tolerances to the quality of samples, which have been approved by the Engineer,

2. The information regarding the names of suppliers may be submitted at different times, as may be convenient, but no sources of supply shall be changed without the Engineer's prior approval.

3. When any material or article is required to comply with a British Standard, such material or article or its container shall bear the stamp of the registered certification trade mark of the British Standards Institution. Alternatively, the Developer shall submit to the Engineer test certificates furnished by the supplier or manufacturer of the material or article indicating compliance with the relevant British Standards.

602 AGGREGATES FOR CONCRETE

1. The aggregates for concrete shall consist of naturally occurring material complying with the requirements of the BS EN 12620:2002.

603 BRICKS

1. Bricks for the construction of manholes, inspection chambers, catchpits, et cetera, shall be clay Engineering bricks conforming to BS EN 771-1:2003, BS EN 772-3:1998 BS EN 772-7:1998 for Class B Engineering bricks (50N/mm²). Sand lime bricks shall conform to BS EN 771-2:2003 for Special Purpose Bricks and shall have a crushing strength of not less than 22.5N/mm². Concrete bricks shall conform to BS EN 771-3:2003 and BS EN 772-2:1998 and have a crushing strength of not less than 17.5N/mm².

2. Samples of all bricks intended for use in the Works shall be submitted to the Engineer for his approval.

604 CEMENT

1. Ordinary cement shall comply with BS EN 197-1:2000 for Ordinary Portland Cement.

2. Sulphate resisting cement, in accordance with BS4027:1996, shall be used for all manholes and soakaways. Class 3 (≥32.5N/mm^2) is a minimum requirement.

3. All cement shall be delivered in the original sealed bags of the Manufacturer and shall be stored in a suitable building as required by Clause 511.

605 CLASSIFICATION OF CONCRETE STRENGTHS AND MIXES

1. The classification and testing of concrete shall comply with BS EN 206-1:2000 and BS8500-1:2006.

TABLE 600/1 Mixes, grades, and characteristic cube strengths of concrete

Standard Mix	Grade/Class	Minimum Characteristic Cube Strength at 28 days (N/mm^2)
ST1	C6/8	8
ST2	C8/10	10
ST3	C12/15	15
ST4	C16/20	20
ST5	C20/25	25
-	C25/30	30
-	C28/35	35
-	C30/37	37
-	C32/40	40
-	C35/45	45
-	C40/50	50

606 FERTILISER

1. Fertiliser shall be a mineral (or inorganic), powdered or granular, pre-seeding type for an impoverished soil. The Developer may add extra plant nutrients, if so advised, but the approved compound (N:P:K ratio) shall contain no less than:

   a) 10% Nitrogen (N);
   b) 15% Phosphate (P or P_2O_3);
   c) 10% Potash (K or K_2CO_3).

607 GRASS SEED AND TURF

1. The mixture for seeding verges shall consist of the following grass seed:

   a) 50% Festuca Rubra (Creeping Red Fescue);
   b) 25% Pea Pratensis (Smooth Stalked Meadow Grass);
   c) 15% Agrostis Tenuis (Brown Top);
   d) 10% Phleum Pratense (Timothy),

   or other approved mixture.

2. Turves shall be, approximately, 300mm x 1.000m and 38mm thick. They shall be free from weeds.

608 GULLIES, GULLY COVERS AND FRAMES

1. Gully pots shall be trapped with rodding eyes, 375mm internal diameter by 910mm deep.

2. Pre-cast concrete gullies shall be un-reinforced and conform to BS EN 1916:2002 and BS5911-1:2002.

3. Clayware gullies shall comply with the requirements for round street gullies of BS65:1991.

4. Cast iron gullies shall be of approved manufacture and conform to the masses and dimensions as specified.

5. Gully formers, made of polypropylene, PVC-U, or other approved plastic materials of a pattern approved by the Engineer shall be permitted only when used as permanent formwork to an in-situ concrete gully constructed as described in sub-clauses 209(3) and 209(4).

6. Gully grating and frames shall be GA2-450 square in cast or ductile iron, size approximately 450mm x 450 mm obtained from an approved manufacturer in accordance with BS EN 124 D400.

7. Footway gully gratings shall be “mesh” covered (pedestrian friendly) and a minimum of 300mm square and fixed down securely (fixed grating).

8. Footway gully gratings shall be obtained from an approved manufacturer in accordance with BS EN 124 C250.

609 MORTAR

1. Cement mortar shall consist of Ordinary Portland Cement and sand in the following proportions:

a)	For brickwork	-	1 volume of OPC to 3 volumes of sand;
b)	For rendering, channels, pointing setts, and pipe joints	-	1 volume of OPC to 2 volumes of sand;
c)	For granolithic rendering	-	1 volume of OPC and 1 volume of granolithic chippings to 1 volume of sand;
d)	For in-situ channels and benching in manholes	-	1 volume of OPC to 1 volume of sand.

2. The materials shall be measured in proper boxes and thoroughly mixed on a clean watertight platform three times in a dry state, and again while water is added to produce a consistent mix.

3. Any mortar mixed shall be used within 1 hour of mixing.

610 PIPES FOR DRAINAGE AND DUCTS

1. Protection to highway drains and gully connections may be concrete bed and surround between cover depths of 450mm to 1.200m.

2. Concrete slab protection to proposed Section 104 (Water Industry Act 1991) sewers is acceptable only between cover depths of 700mm and 1.200m. Where less than 700mm of cover is proposed, ductile iron (to BS EN 598:2007) must be specified.

3. All pipes and joints for use in drains shall comply with the requirements of this Clause. Pipes for service ducts shall only be those specified in sub-clause (9), below.

Clay Pipes

4. a) Clay pipes to be used for sewage shall be British Standard pipes and pipes for surface water shall be either 'British Standard' or 'British Standard Surface Water' all manufactured to the requirements of BS EN 295 and BS65:1991. The pipes shall be Type 1 sockets and supplied complete with the manufacturer's recommended flexible joints, or with Type 2 Sockets for cement mortar joints or plan ended pipes supplied with sleeve couplings;
   b) Watertight Flexible Joints for clayware pipes shall comply with BS EN 295 and BS65:1991.

Concrete Pipes

5. a) Concrete pipes for general drainage shall comply with the requirements of BS EN 1916:2002 and BS5911-1:2002, except that they may be complete with watertight flexible joints, as supplied by the manufacturer;
   b) Watertight flexible joints shall be so constructed as to tolerate a longitudinal movement of ±10mm without breaking the seal;

Strengthened Pipes

6. Strengthened pipes shall be specifically designed and made to withstand the loading specified.

7. Where less than 700mm cover is available, ductile iron (to BS EN 598:2007) must be used.

Ducts

8. Service ducts shall have a smooth internal bore without any sharp edges to the ends of pipes. They shall be constructed of either of the following:

   a) Vitrified clay ducts with self-aligning flexible sleeve joints manufactured in accordance with the tolerances, permeability and strength requirements of BS EN 295 and BS65:1991. The internal ends of ducts shall be radiused to 3mm minimum;
   b) Un-plasticised polyvinyl chloride (PVC-U) pipes complying with Class B or C of BS EN 1401-1:2009, BS3506:1969 and BS4660:2000.

Un-plasticised Polyvinyl Chloride (PVC-U) Pipes

9. PVC-U pipes shall conform to BS EN 1401-1:2009, BS EN 13598-1:2003, BS3506:1969 and BS4660:2000 for pipes up to 160mm nominal external diameter and to BS EN 1401-1:2009 for pipes above 200mm nominal external diameter.

611 PRE-CAST CONCRETE KERBS, CHANNELS AND EDGINGS

1. Pre-cast concrete kerbs, quadrants, edgings and channels shall be hydraulically pressed and supplied by an approved manufacturer with an approved aggregate. They shall comply in all respects with BS EN 1340:2003 and BS EN 1339:2003.

2. Kerbs shall be 125mm x 255mm or 145mm x 255mm (HB2 or BN). Edging kerbs shall be either 50mm x 200mm or 50mm x 150mm with bull nose (EBN) or flat (EF) edge. Channel blocks shall be 150mm x 125mm (CS2), 150mm x 150mm (CS), 255mm x 125mm (CS1) or 255 x 145mm (CS1).

3. Radius kerbs and channels (of the appropriate radius) shall be used on radii less than 12.000m.

612 COUNTRYSIDE/CONSERVATION KERBS

1. Natural stone or re-constructed stone kerbs shall comply with BS EN 1343:2001.

2. The face of the kerb shall deviate no more than ±12mm along a 1.000m length

3. The face of the kerb at the joints shall align and shall step no more than ±6mm as detailed in Clause 429.

613 PRE-CAST CONCRETE BLOCK PAVERS

1. Pre-cast concrete block pavers shall comply with BS EN 1338:2003.

2. Pre-cast concrete block pavers shall be laid in accordance with BS7533-3:2005 for categories IA, IB and II as appropriate with the following exceptions:

   a) the tolerance for the laying course thickness shall be same as that for the surface course, ±6mm;
   b) the block pavers and the laying course replace the surface course only (see Clause 430).

3. The tolerance of the surface levels are to comply with BS7533-3:2005 Table B.1. The tolerances for the binder course and the base (road base) are to comply with Clause 401.

4. Finished surface regularity shall comply with Table 600/2.

TABLE 600/2 Surface regularity

Flatness	10mm under a 3.000m straight edge
Level	2mm between adjacent units

5. The block paver thickness is to be 80mm only, as defined in BS EN 1338:2003 Table NA.1. The other dimensions are to be the following:

   a) True rectangular in shape where the length is twice the width;
   b) A nominal length of 200mm.

6. Acceptable colours are red, brindle, charcoal, brown, and silver grey/light grey only. However, silver grey/light grey is not acceptable for lay-by, kerbside parking or other parking areas.

7. Block pavers shall be retained, beyond the channel line, by a full PCC kerb as detailed in Clause 611. Block pavers are not to be laid to a natural stone kerb with an uneven kerb face. Shaped or pre-formed block paving kerbs are not to be used.

614 TACTILE PAVING FLAGS

1. Tactile paving flags shall conform to BS EN 1339:2003 and, currently, the draft document DD CEN/TS 15209:2008.

2. The size of the tactile paving flags shall comply with BS EN 1339:2003 Table NA.1 (designation F) and have a thickness of 65mm only (400mm x 400mm x 65mm).

3. The colour of the flags shall be buff or a contrasting colour to that of the surrounding paved area. Red is only to be used if the crossing point is a controlled crossing.

615 SAND

1. Sand for cement mortar and concrete shall be in accordance BS EN 13139:2002.

2. Testing of all sand shall comply with requirements of BS812.

3. All sand shall be washed sand and shall be in accordance with BS EN 12620:2002 and BS EN 13139:2002.

4. The sand used for jointing block pavers shall be kiln-dried free-flowing silica sand. It shall comply with BS7533-3:2005 Table D.4 and BS EN 12620:2002.

616 STEEL REINFORCEMENT

1. Steel reinforcement shall comply with any of the following standards and be free from oil, dirt, loose rust or mill scale:

    a) Steel fabric reinforcement with the requirements of BS4483:2005 and shall be delivered to the Site in flat mats;
    b) Hot rolled mild steel bars and hot rolled high yield bars shall comply with the requirements of BS4449:2009;
    c) Cold worked steel bars shall comply with the requirements of BS4449:2009;
    d) Hard drawn stainless steel wire shall comply with the requirements of BS4482:2005.

617 WATER FOR USE WITH CEMENT

1. If water for the works is not available from a Public Utility Undertaking supply, the Engineer's approval shall be obtained regarding the source of supply and manner of its use. When required by the Engineer, the Developer shall arrange for tests of the water to be carried out in accordance with BS EN 1008:2002. Water from the sea or tidal rivers shall not be used for structural concrete.

618 WEED KILLER

1. The Engineer will only approve the need for the use of a weed killer and will not approve any type or brand.

2. The weed killer shall be Glyphosate based only, and applied in accordance with the Manufacturer's instructions.

3. The weed killer shall be applied only by licensed operatives.

619 GEOTEXTILE MEMBRANE

1. Geotextile membrane shall conform to, and may be tested in accordance with, BS EN ISO 10319:2008, BS EN ISO 10320:1999, BS EN ISO 11058:2010, BS EN 12224:2000, BS EN ISO 12236:2006, BS EN ISO 12956:2010, and BS EN 14030:2001.

620 SOAKAWAYS AND INTERCEPTORS

1. Due to the varying geological characteristics within the County, specific approval is required for the proposal of a separate highway drainage system discharging to soakaways.

2. The constructional dimensions and performance of the individual soakaway construction(s) or chamber(s) will comply with Standard Detail Drawing 807-1 or 807-2. The particular design(s) for the individual construction(s) or chamber(s) will be provided upon request.

3. The effective depth (depth of inlet invert to the base of the chamber) of the soakaway is fixed at 2.500m for the pre-cast concrete chamber construction (Standard Detail Drawing 807-2) or within the range of 0.750m to 1.950m for the circular brickwork soakaway construction (Standard Detail Drawing 807-1).

4. The minimum diameter of the pre-cast soakaway chamber shall be 1.200m to comply with Standard Detail Drawing 807-2 or, for the circular brickwork soakaway, fixed at 2.400m to comply with Standard Detail Drawing 807-1.

5. The permitted range of internal diameters for the pre-cast chambers permitted is 1.200m to 3.000m (inclusive) in steps of 300mm only (with the exception of 1.350m chamber diameter).

6. All pre-cast concrete components (perforated and non-perforated chamber rings, corbel slabs, cover slabs, landing slabs, reducing slabs, et cetera) shall conform to BS EN 1917:2002, BS5911-3:2010, and BS5911-4:2002.
7. Only 45mm diameter perforations (or slits 110mm x 25mm) shall be permitted by this Authority (conforming to BS EN 1917:2002 and BS5911-3:2010). **This Authority will not accept 75mm diameter perforations in pre-cast concrete soakaway rings.**

8. It is to be expected that a long “lead in” time will be required for a manufacturer to produce pre-cast concrete chamber sections with 45mm diameter perforations.

9. Step irons, or ladders, are not to be installed. Access into the soakaway chamber is intended to be by winch. The soakaway chambers are not vented and all appropriate measures should be taken to conform to working in confined spaces procedures.

10. The access cover is to be of double triangular or single rectangular heavy ductile type and conform to BS EN 124 D400H with a minimum clear opening of 600mm x 600mm. The minimum weight of the cover is to be 70Kg.

11. No part of the soakaway construction is to be closer than 5.000m to any tree (private or highway) or any building (Building Regulations 2000, Document H, Section H3, Paragraph 3.25).

12. The minimum depth to the top of the upper-most non-perforated chamber ring is 450mm; comprising cover and frame, minimum 2 courses of brickwork, and the depth of the cover slab.

13. The nominal flow for interceptors shall be, at least, 10% of the minimum calculated peak flow. The NSB rating of 0.0018xA(m^2) shall be used and interceptors will accept a minimum peak flow of 6.7l/s (for the M5-10 rainfall rate of 59.8mm/hr). If the M100-10+30% rainfall rate, of 148.4mm/hr, is used the minimum peak flow shall be 21.1l/s.

14. **If soakaways are grouped together with a single interceptor, the NSB3 rating is likely to be insufficient with the 1 in 100 year +30% scenario and the interceptor size shall be increased accordingly.**

15. As the Authority is committed to undertake an annual emptying regime, currently, there is not a requirement to install an oil level alarm system.

16. If an alarm system is incorporated, only a flashing beacon is to be used. It is not appropriate to install an audible warning in a residential development.

17. The power supply for the alarm is to be provided by way of battery, with a constant trickle-charge provided by a photo-voltaic panel. The panel is to be an integral part of the top of the cabinet.

621 TREE GRILLES AND FRAMES

1. Tree grilles and frames are to conform to the requirements in Standard Detail Drawing 808-1, 808-2, or 808-3.

2. Tree grilles shall be manufactured from iron and be capable of withstanding the following minimum load categories:

   b) 15kN for pedestrian areas (not intended to be trafficked);
   c) 50kN for courtyard or street situations (areas which will be trafficked).

3. The central aperture in the tree grille must be suitable for the potential diameter of the trunk.

622 TREE GUARDS

1. Tree guards are to conform to the requirements in Standard Detail Drawing 808-1, 808-2, or 808-3.

2. The tree guard shall be manufactured from galvanised steel. The finish and colour must match that of the tree grille.

3. The minimum internal diameter of the tree guard shall be 450mm.

623 BOLLARDS

1. Unless otherwise specified, bollards are to be of the “socketed” type.

2. White is reserved for collapsible bollards only. There shall be no deviation from this colour coding.

3. Retro-reflective tape to Diagram 561 of the Traffic Signs Regulations and General Directions, or roundels to Diagram 560, must be affixed to the bollard at a height of no less than 550mm nor greater than 1.000m above the surface of the adjacent carriageway.

4. The bollard colour and reflective tape, or roundel, size and colour must conform to Schedule 19, Part II Traffic Signs Regulations and General Directions, Section 44.

5. The correct colour as viewed by the driver of approaching traffic shall be:

   a) red for nearside;
   b) white for offside;
   c) or, if the road is a one-way road, the colour for the offside shall be amber.

6. Details of the white collapsible bollard for the emergency link are shown in Standard Detail Drawing 809-1.

624 BOND COAT

1. The bond coat shall be a hot-applied cationic bitumen emulsion complying with BS EN 13808:2005, BS594987:2010, BS434-1:2011 and BS434-2:2006, with a minimum bitumen content of 40%.

2. To suit the particular system, it may be modified with a polymer and shall, in addition, comply with BS EN 14023:2010.

3. The Developer shall notify the Engineer of the choice of bond coat before commencement of work.

625 OVERBANDING

1. Overbanding shall be a hot applied sealant to BS2499-3:1992 Type N2 or a BBA Roads and Bridges Certificate/Assessment.

2. The joint sealant will be laid no more than 3mm in depth.

3. The acceptable width of the sealant is equal to, or less than, 20mm.

4. If the width of the sealant exceeds 20mm and is less than 40mm, then the sealant must provide an initial Skid Resistance Value (SRV) of, at least, 60 as evidenced by testing by a U.K. Accredited Services (UKAS) accredited laboratory.

5. The SRV shall be attained by the inclusion of a grit (either contained or added) to provide a fine macro-texture surface.

626 ROAD SIGNS AND MARKINGS

1. Road signs and markings shall be manufactured, erected or laid in the prescribed form as detailed in the Traffic Signs Regulations and General Directions and Chapter 3 (Regulatory Signs 2008), Chapter 4 (Warning Signs 2008), Chapter 5 (Road Markings 2003) and Chapter 7 Design of Traffic Signs (2003) of the Traffic Signs Manual published by Her Majesty's Stationary Office for the Department for Transport.

2. Road signs, where applicable, will be externally illuminated in accordance with the Traffic Signs Regulations and General Directions and Section 700, Street Lighting and Illuminated Traffic Signs/Bollards, of this Specification.

3. Road markings shall be thermoplastic screed, with applied Ballotini, with the exception of markings that are to be laid on pre-cast concrete block pavers (to Clause 613).

4. Road markings shall be white or primrose in colour.

627 EPOXY BOUND PAVING JOINTING MORTAR

1. Jointing compound in conjunction with the appropriate carriageway construction shall comply with BS7533.

2. Joint dimensions shall be between 25mm and 30mm in width and no less than 30mm in depth.

3. Cement mortar (to Clause 609) may be used between setts from the concrete bed to no higher than 30mm from the surface.

700 STREET LIGHTING AND ILLUMINATED TRAFFIC SIGNS/BOLLARDS

701 GENERAL

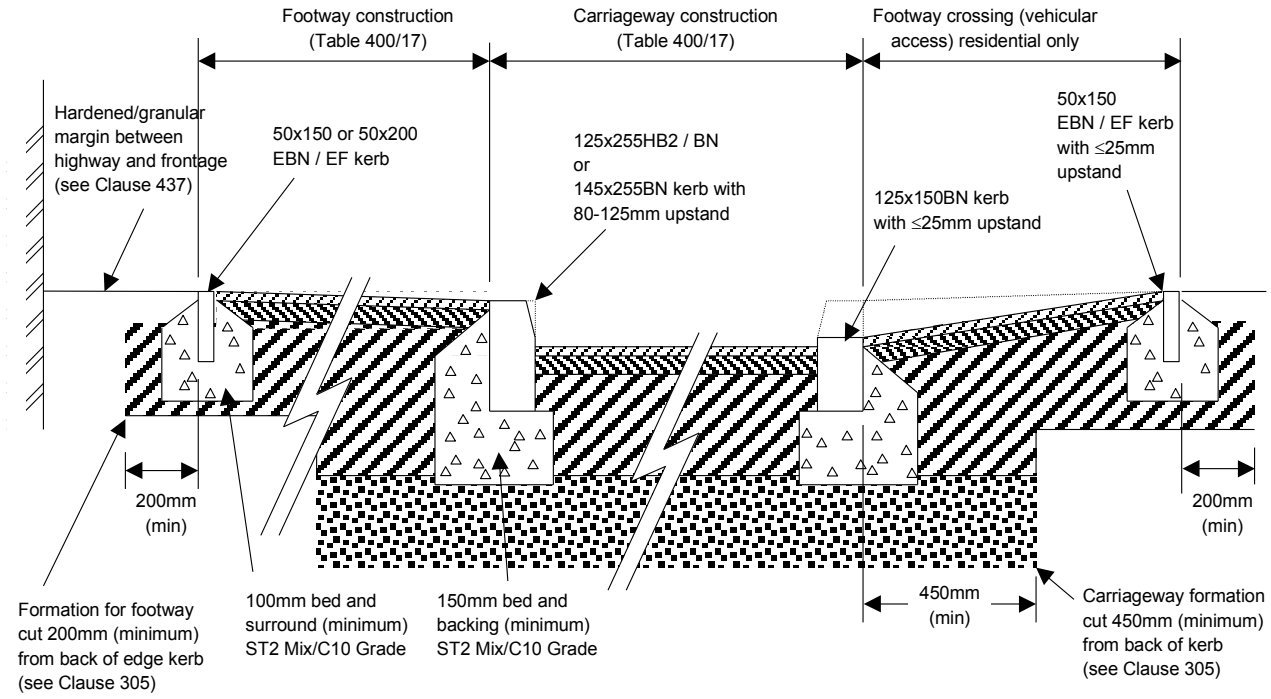
1 The Council's current street lighting specification is available on the internet at:

https://www.dorsetforyou.com/travel-dorset/roads-and-driving/road-information/street-lighting

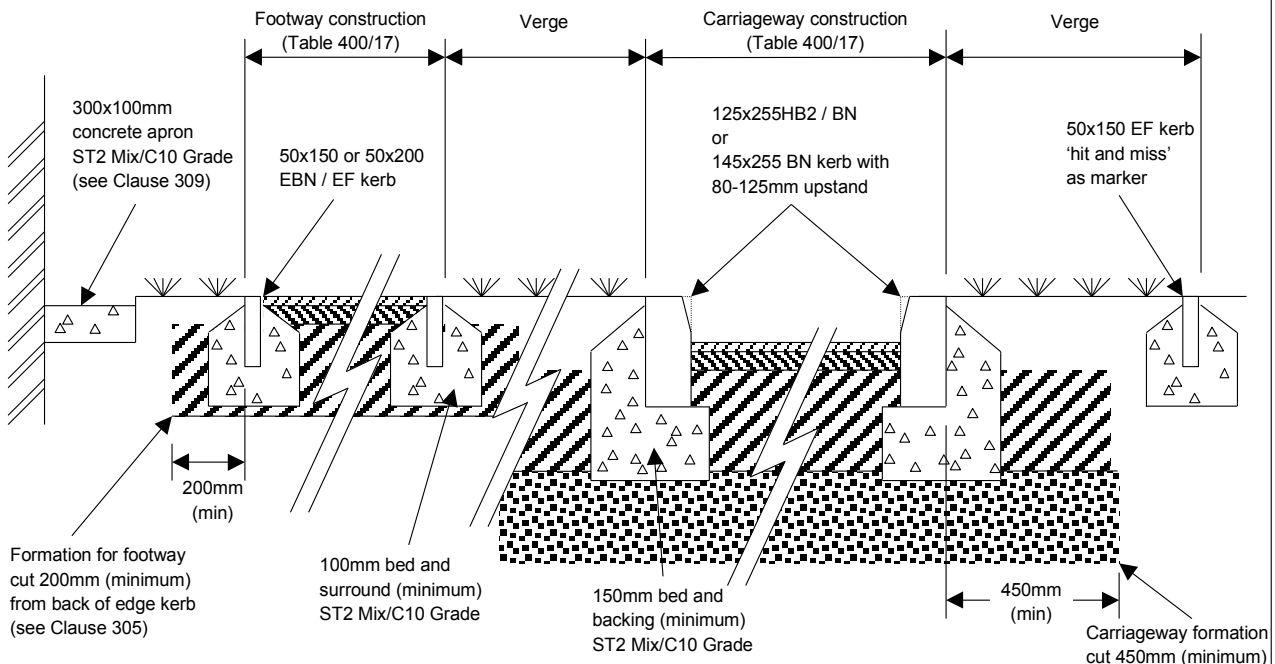
800 STANDARD DETAILS

STANDARD DETAIL DRAWING 801-1

HIGHWAYS ACT 1980 – SECTION 38 AGREEMENT
FORMS OF CONSTRUCTION (RESIDENTIAL ONLY)



FOOTWAY AND/OR DROPPED ACCESS

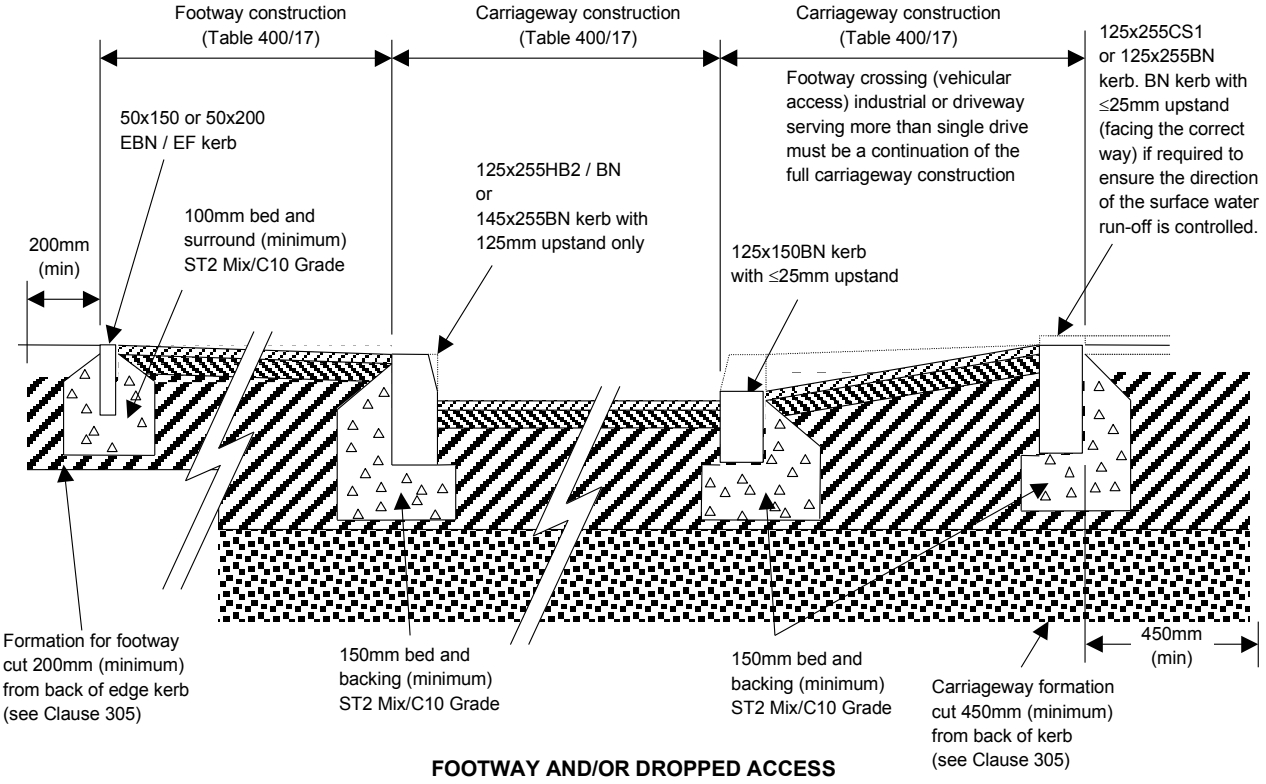


SOFT VERGE/MARGIN (WITH OR WITHOUT FOOTWAY)

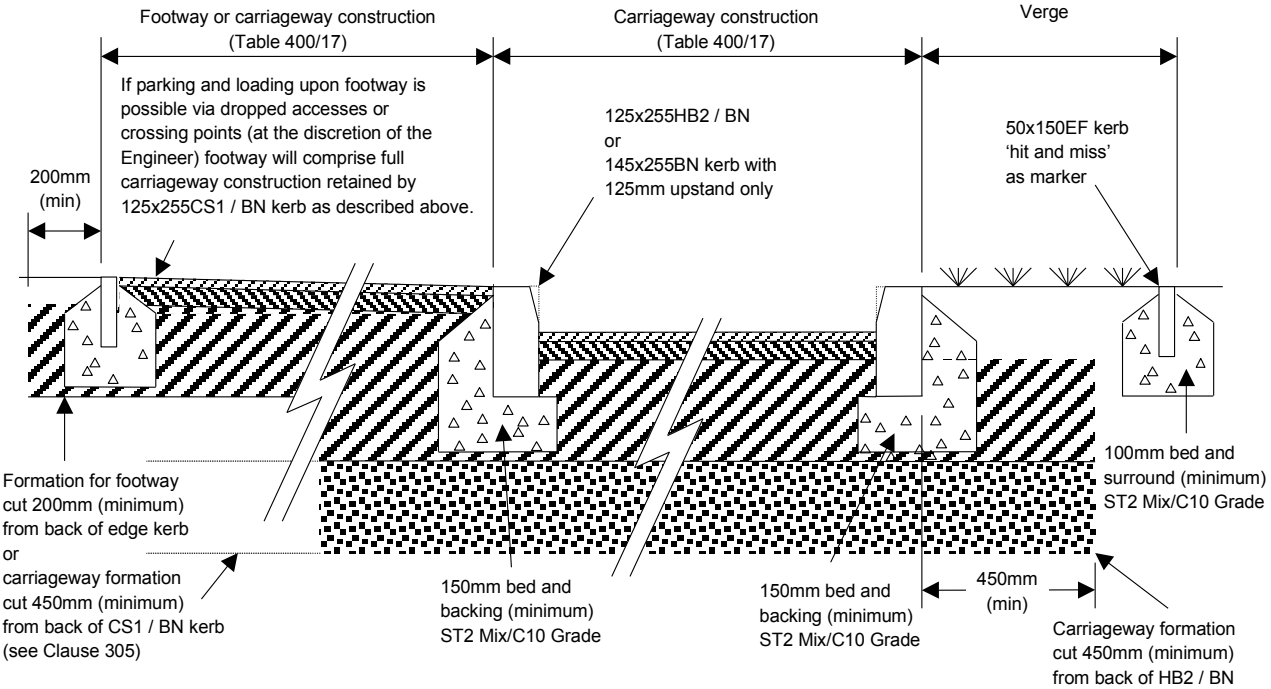
DATE:- September 2011	SCALE:- NOT TO SCALE	DRAWING No: 801-1 Revision Orig
DRAWN BY:- VMP TRACED BY:- CHECKED BY:- PSB	**DORSET COUNTY COUNCIL** **DEVELOPER LED INFRASTRUCTURE** **TYPICAL RESIDENTIAL ROAD CONSTRUCTION DETAILS**	Miles Butler, Director Environment Directorate County Hall Dorchester DT1 1XJ

STANDARD DETAIL DRAWING 801-2

HIGHWAYS ACT 1980 – SECTION 38 AGREEMENT
FORMS OF CONSTRUCTION (INDUSTRIAL AND VEHICULAR ACCESS/CROSSING)



FOOTWAY AND/OR DROPPED ACCESS

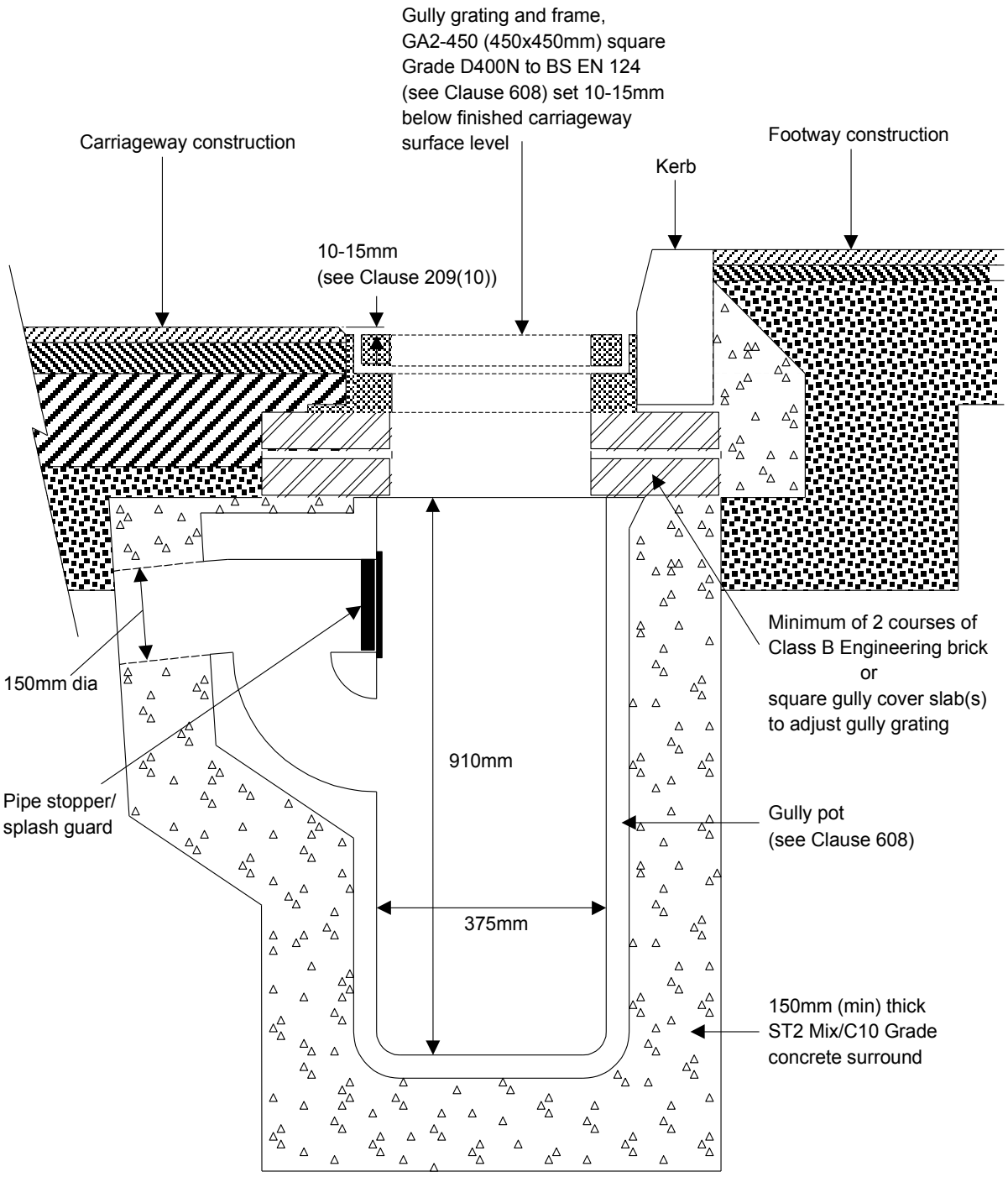


FOOTWAY AND/OR VERGE

DATE:- September 2011	SCALE:- NOT TO SCALE	DRAWING No: 801-2 Revision Orig
DRAWN BY:- VMP TRACED BY:- CHECKED BY:- PSB	**DORSET COUNTY COUNCIL** **DEVELOPER LED INFRASTRUCTURE** **TYPICAL INDUSTRIAL ROAD CONSTRUCTION DETAILS**	Miles Butler, Director Environment Directorate County Hall Dorchester DT1 1XJ

STANDARD DETAIL DRAWING 802

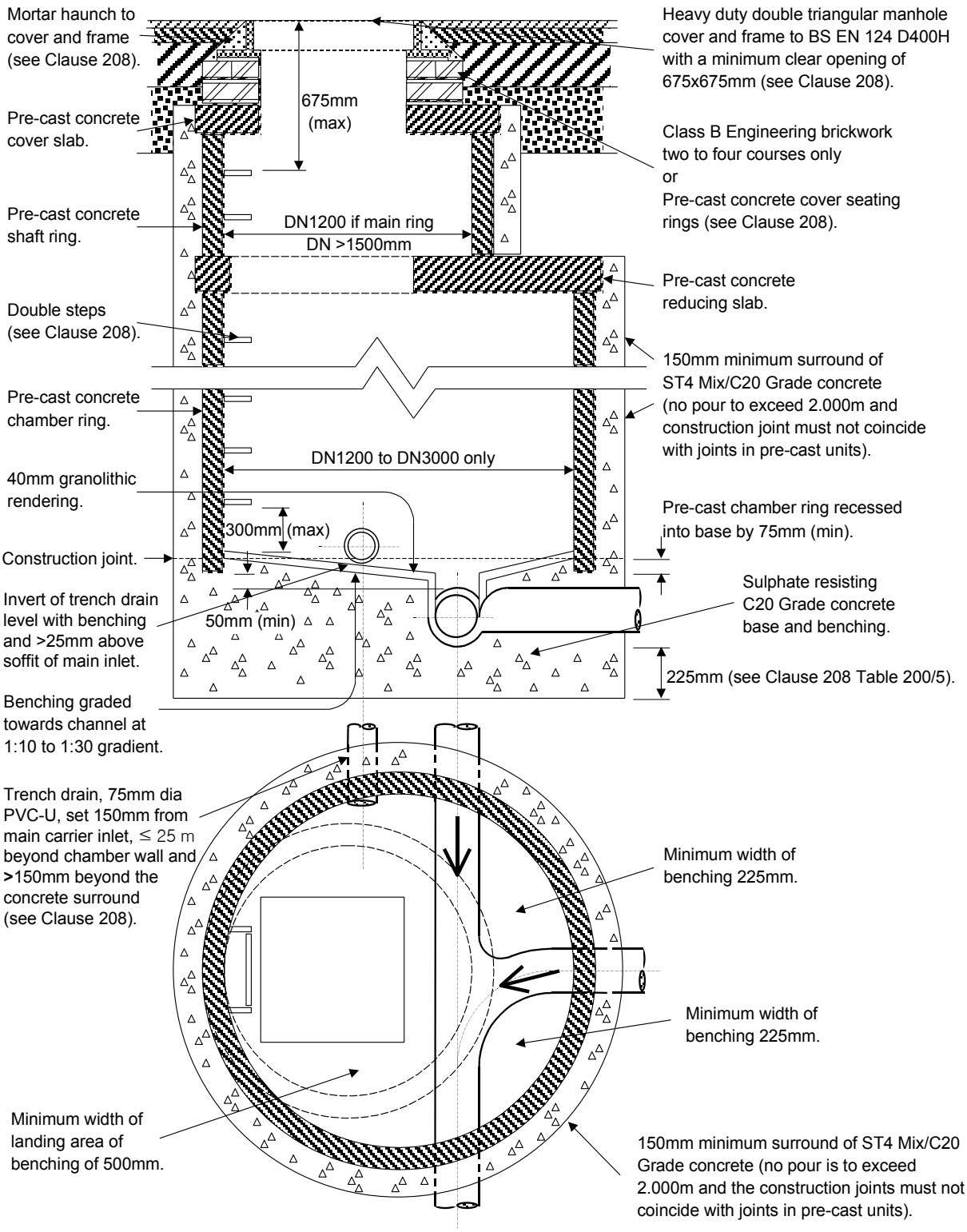
HIGHWAYS ACT 1980 – SECTION 38 AGREEMENT
GULLY CONSTRUCTION DETAILS



DATE:- September 2011	SCALE:- NOT TO SCALE	DRAWING No: 802 Revision B
DRAWN BY:- VMP TRACED BY:- CHECKED BY:- PSB	**DORSET COUNTY COUNCIL** **DEVELOPER LED INFRASTRUCTURE** **TYPICAL GULLY CONSTRUCTION DETAILS**	Miles Butler, Director Environment Directorate County Hall Dorchester DT1 1XJ

STANDARD DETAIL DRAWING 803-1

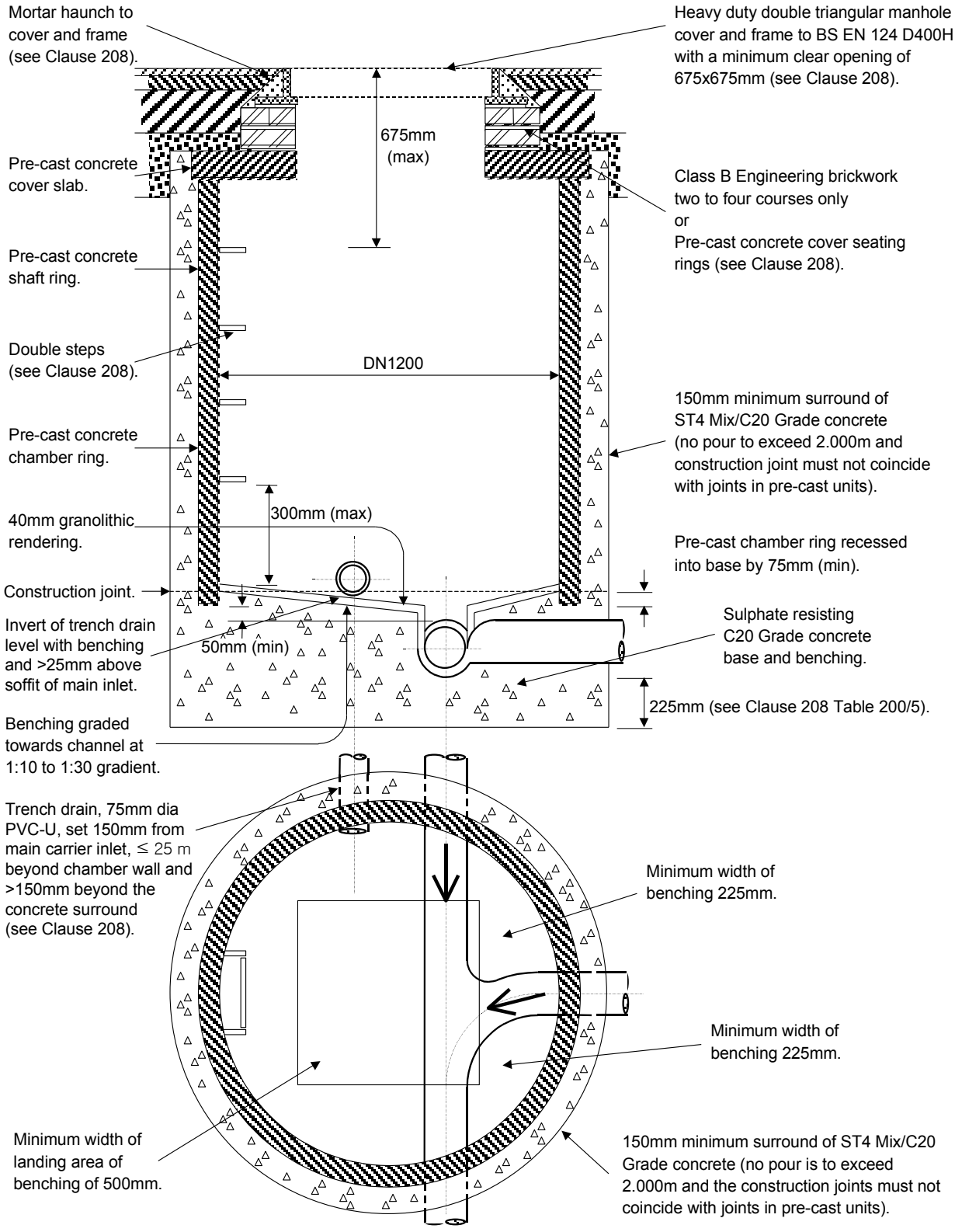
HIGHWAYS ACT 1980 – SECTION 38 AGREEMENT
PRE-CAST CONCRETE MANHOLE - TYPE A (>3.000m ≤6.000m) OR TYPE B (≤3.000m)



DATE:- September 2011	SCALE:- NOT TO SCALE	DRAWING No: 803-1 Revision Orig
DRAWN BY:- VMP TRACED BY:- CHECKED BY:- PSB	**DORSET COUNTY COUNCIL** **DEVELOPER LED INFRASTRUCTURE** **TYPICAL PRE-CAST CONCRETE MANHOLE DETAILS**	Miles Butler, Director Environment Directorate County Hall Dorchester DT1 1XJ

STANDARD DETAIL DRAWING 803-2

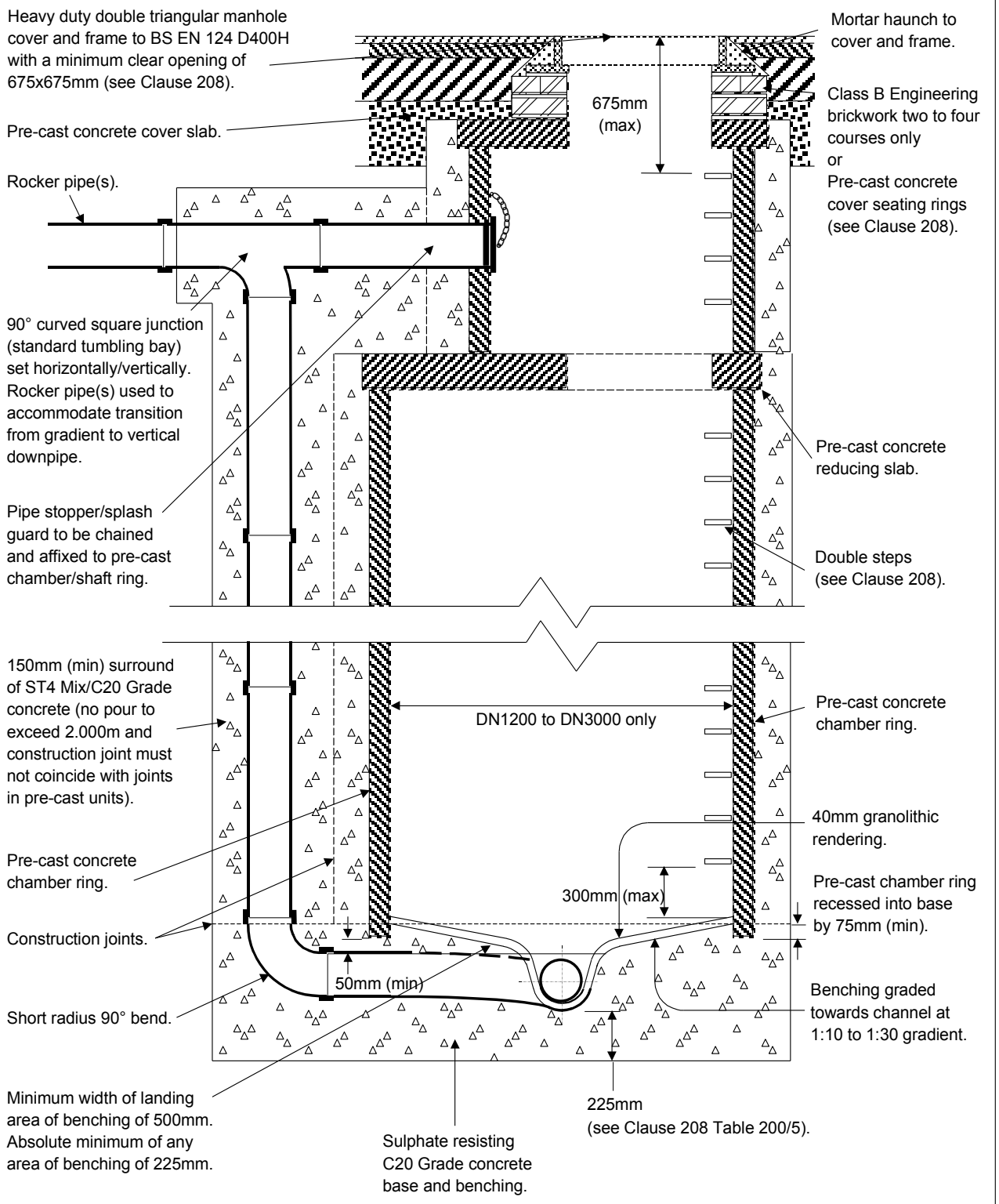
HIGHWAYS ACT 1980 – SECTION 38 AGREEMENT
PRE-CAST CONCRETE MANHOLE - TYPE E (>1.000m ≤1.500m)



DATE:- September 2011	SCALE:- NOT TO SCALE	DRAWING No: 803-2 Revision Orig
DRAWN BY:- VMP TRACED BY:- CHECKED BY:- PSB	**DORSET COUNTY COUNCIL** **DEVELOPER LED INFRASTRUCTURE** **TYPICAL PRE-CAST CONCRETE MANHOLE DETAILS**	Miles Butler, Director Environment Directorate County Hall Dorchester DT1 1XJ

STANDARD DETAIL DRAWING 804

HIGHWAYS ACT 1980 – SECTION 38 AGREEMENT
VERTICAL BACKDROP MANHOLE - TYPE A (>3.000m ≤6.000m) OR TYPE B (≤3.000m)

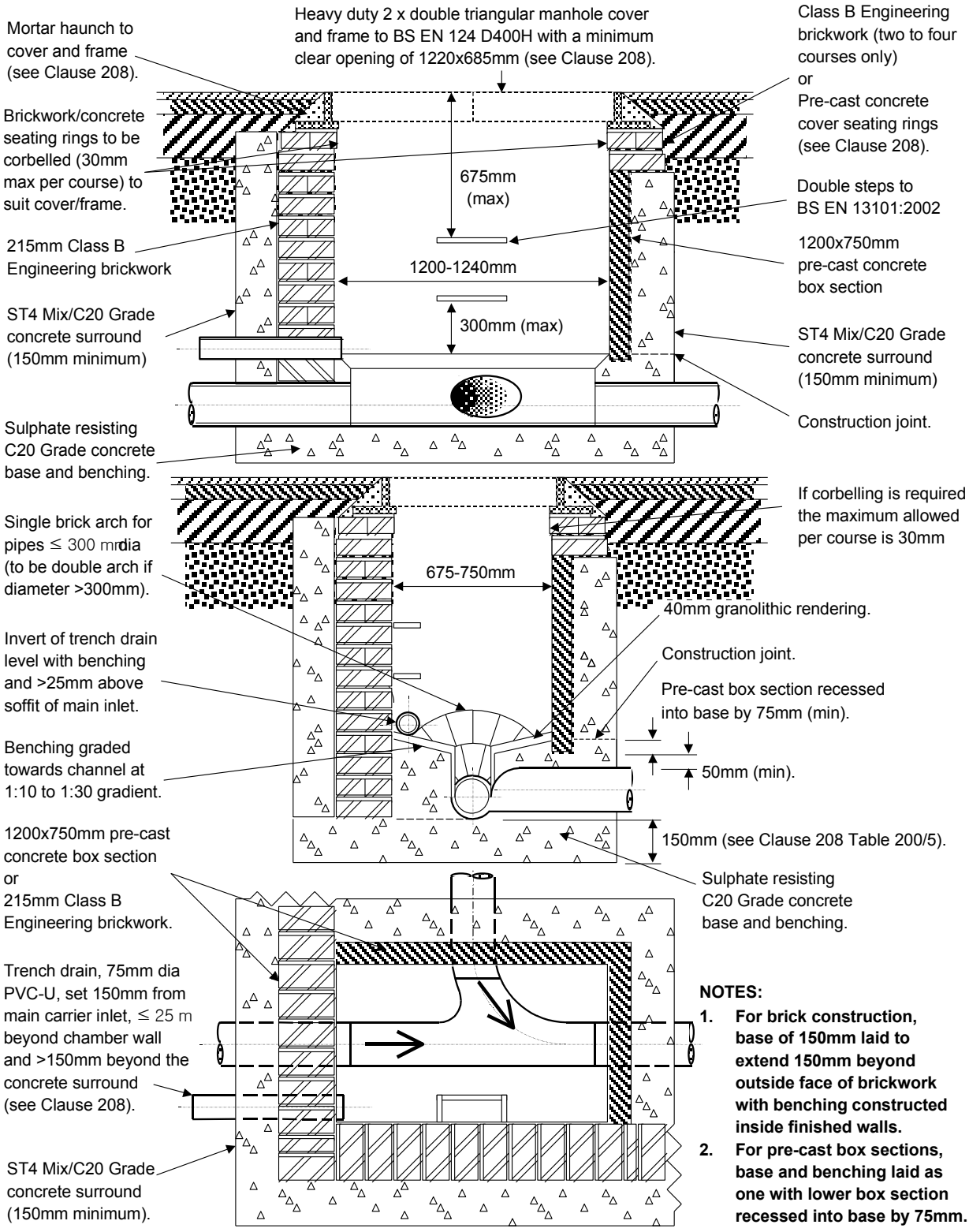


DATE:- September 2011	SCALE:- NOT TO SCALE	DRAWING No: 804 Revision C
DRAWN BY:- VMP TRACED BY:- CHECKED BY:- PSB	**DORSET COUNTY COUNCIL** **DEVELOPER LED INFRASTRUCTURE** **TYPICAL VERTICAL BACKDROP MANHOLE DETAILS**	Miles Butler, Director Environment Directorate County Hall Dorchester DT1 1XJ

STANDARD DETAIL DRAWING 805-1

HIGHWAYS ACT 1980 – SECTION 38 AGREEMENT
BRICK OR PRE-CAST CONCRETE SECTION MANHOLE - TYPE C (>1.000m ≤1.500m)

(Brick construction is shown on the left, and pre-cast concrete construction is depicted on the right)



NOTES:

1. **For brick construction, base of 150mm laid to extend 150mm beyond outside face of brickwork with benching constructed inside finished walls.**
2. **For pre-cast box sections, base and benching laid as one with lower box section recessed into base by 75mm.**

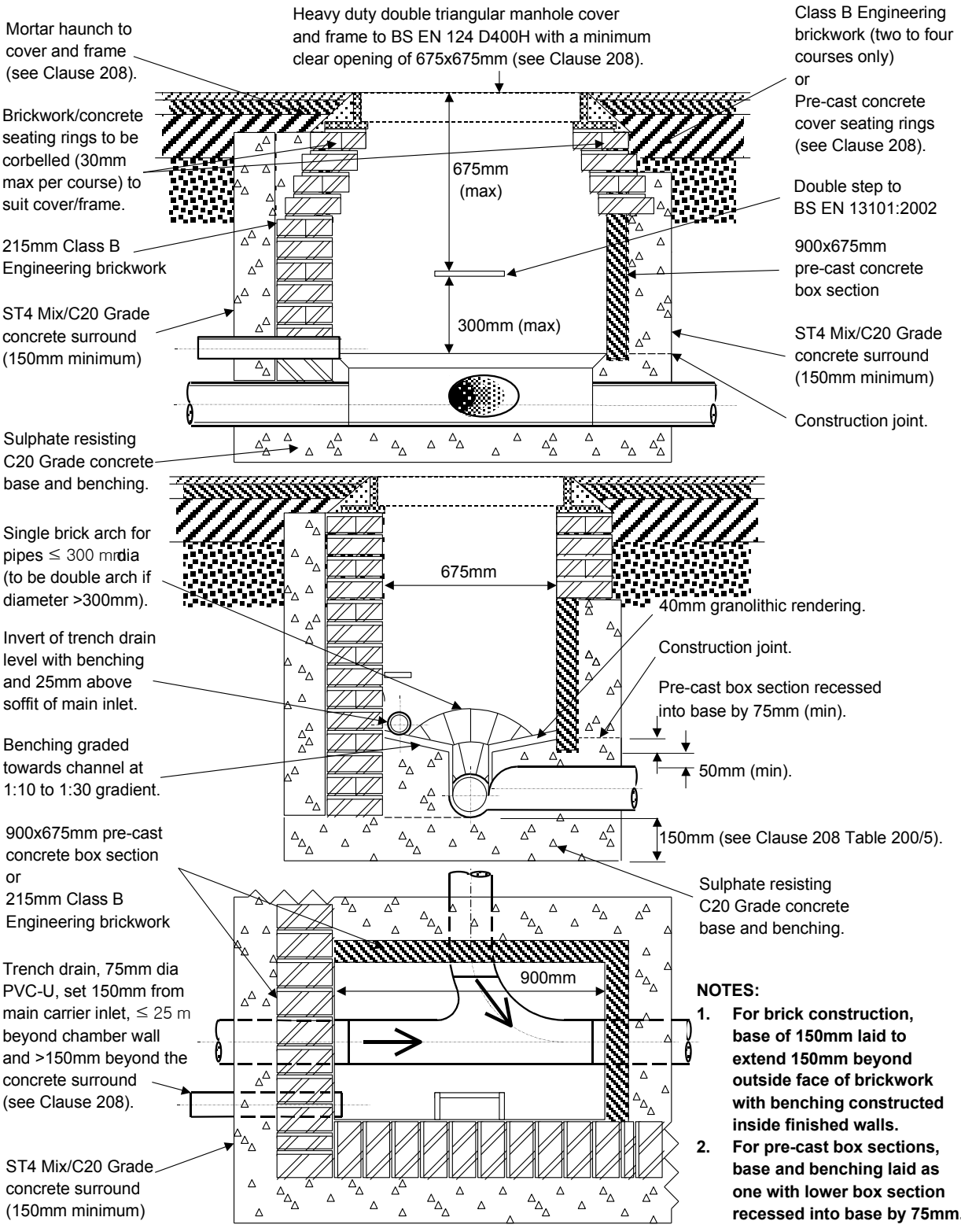
DATE:- September 2011	SCALE:- NOT TO SCALE	DRAWING No: 805-1 Revision Orig
DRAWN BY:- VMP TRACED BY:- CHECKED BY:- PSB	**DORSET COUNTY COUNCIL** **DEVELOPER LED INFRASTRUCTURE** **TYPICAL BRICK OR BOX SECTION MANHOLE DETAILS**	Miles Butler, Director Environment Directorate County Hall Dorchester DT1 1XJ

STANDARD DETAIL DRAWING 805-2

HIGHWAYS ACT 1980 – SECTION 38 AGREEMENT
BRICK OR PRE-CAST CONCRETE SECTION MANHOLE - TYPE D (≤1.000m)

DORSET County Council

(Brick construction is shown on the left, and the pre-cast concrete construction is depicted on the right)

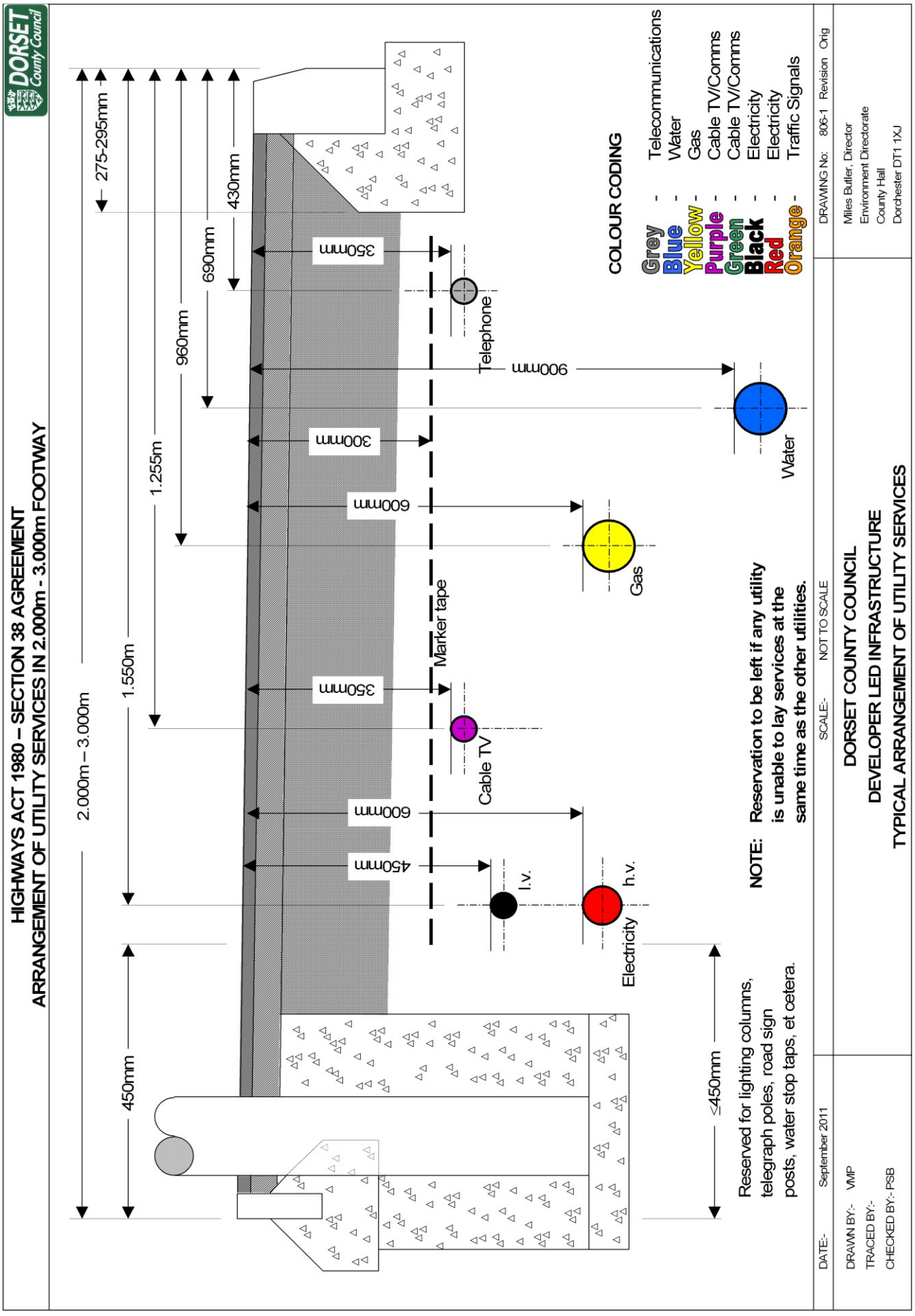


NOTES:

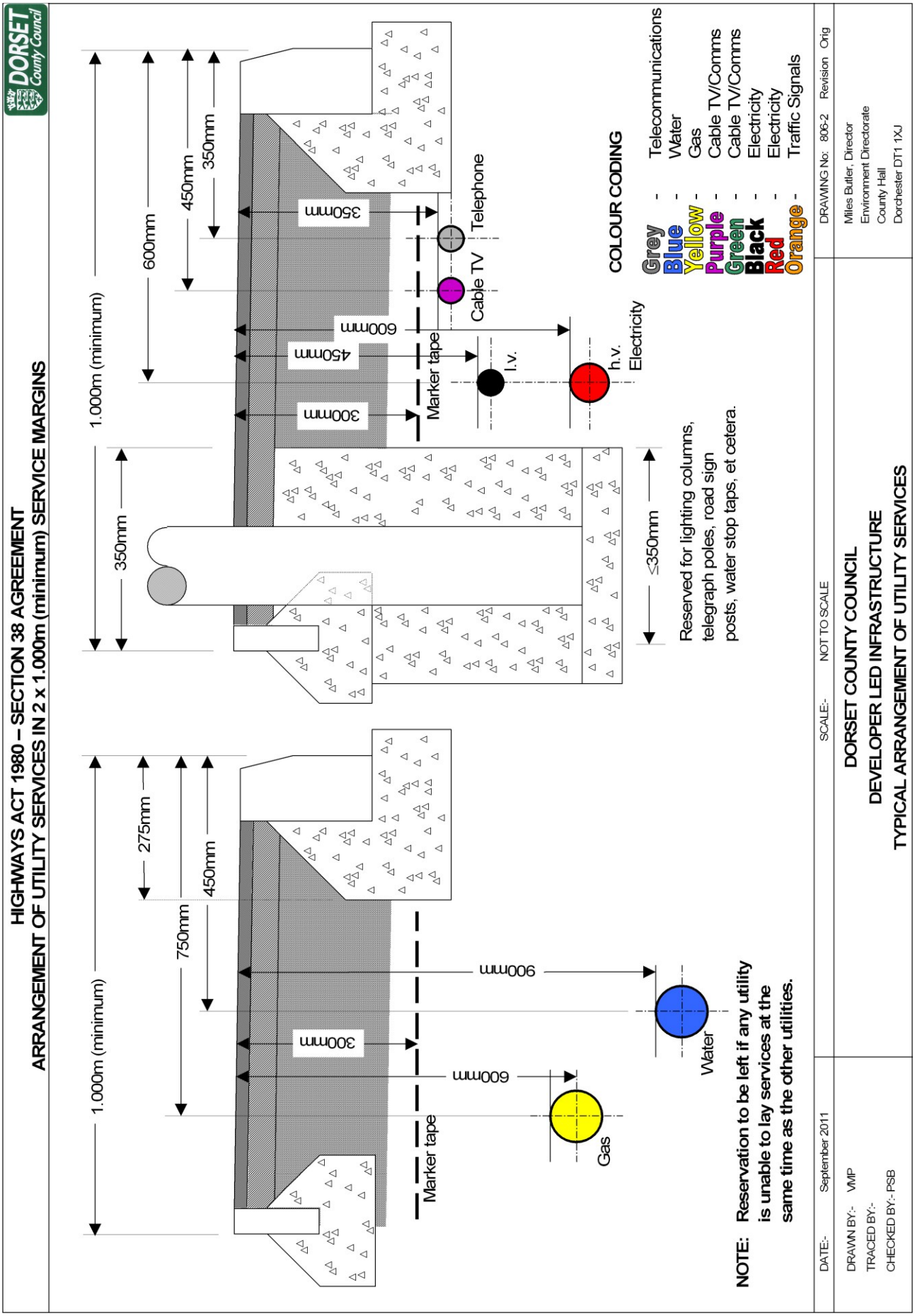
1. **For brick construction, base of 150mm laid to extend 150mm beyond outside face of brickwork with benching constructed inside finished walls.**
2. **For pre-cast box sections, base and benching laid as one with lower box section recessed into base by 75mm.**

DATE:- September 2011	SCALE:- NOT TO SCALE	DRAWING No: 805-2 Revision Orig
DRAWN BY:- VMP TRACED BY:- CHECKED BY:- PSB	**DORSET COUNTY COUNCIL** **DEVELOPER LED INFRASTRUCTURE** **TYPICAL BRICK OR BOX SECTION MANHOLE DETAILS**	Miles Butler, Director Environment Directorate County Hall Dorchester DT1 1XJ

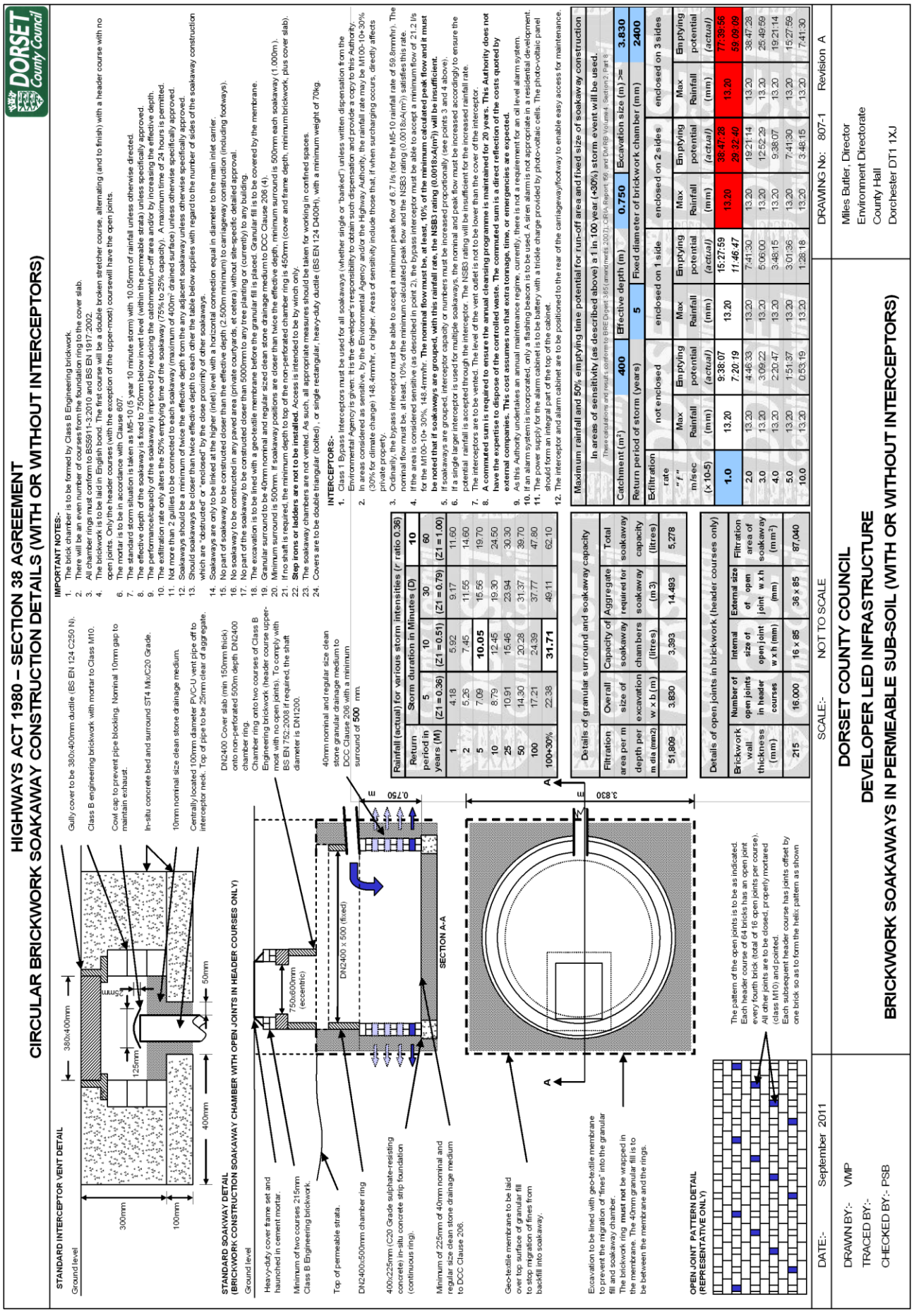
STANDARD DETAIL DRAWING 806-1



STANDARD DETAIL DRAWING 806-2



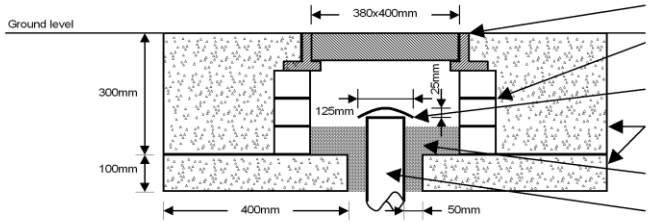
STANDARD DETAIL DRAWING 807-1



HIGHWAYS ACT 1980 – SECTION 38 AGREEMENT
PRE-CAST CONCRETE SOAKAWAY CONSTRUCTION DETAILS (WITH OR WITHOUT INTERCEPTORS)

DORSET County Council

STANDARD INTERCEPTOR VENT DETAIL



Gully cover to be 380x400mm ductile (BS EN 124 C250N).

Class B engineering brickwork with mortar to Class M10.

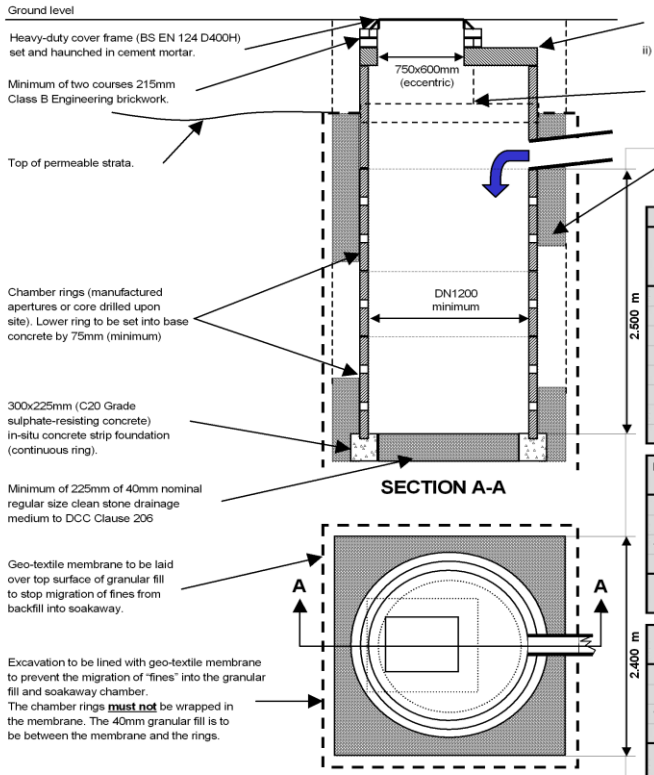
Cowl cap to prevent pipe blocking. Nominal 10mm gap to maintain exhaust.

In-situ concrete bed and surround ST4 Mix/C20 Grade.

10mm nominal size clean stone drainage medium.

Centrally located 100mm diameter PVC-U vent pipe off to interceptor neck. Top of pipe to be 25mm clear of aggregate.

STANDARD SOAKWAY DETAIL
(PRE-CAST CHAMBER RING WITH MANUFACTURED OR CORE-DRILLED APERTURES)



i) Cover slab (min 150mm thick) onto full non-perforated chamber ring (to comply with BS EN 752:2008, no shaft is required if DN1200 or DN1500 is used).
or
ii) Second slab (min 150mm thick) with a smaller diameter chamber ring (to comply with BS EN 752:2008, if main ring is DN1800 or more, the preferred shaft diameter is DN1200).

40mm nominal and regular size clean stone drainage medium, to DCC Clause 206, with a minimum surround of **510** mm.

Rainfall (actual) for various storm intensities (*r* ratio 0.36)				
Return period in years (M)	Storm duration in Minutes (D) 5 (Z1 = 0.36)	10 (Z1 = 0.51)	30 (Z1 = 0.79)	60 (Z1 = 1.00)
1	4.18	5.92	9.17	11.60
2	5.26	7.45	11.55	14.60
5	7.09	**10.05**	15.56	19.70
10	8.79	12.45	19.30	24.50
25	10.91	15.46	23.94	30.30
50	14.30	20.28	31.37	39.70
100	17.21	24.39	37.77	47.80
100+30%	22.38	**31.71**	49.11	62.10

Details of manufactured or core-drilled perforations (45mm hole) and granular fill requirements (40mm aggregate only) for an individual square soakaway design						
Chamber wall thickness (mm)	Number of 45mm dia holes per m depth	Filtration area per m depth per m dia (mm²)	Overall size of excavation w x b (m)	Capacity of soakaway chambers (litres)	Aggregate required for soakaway (m³)	Total soakaway capacity (litres)
90	40	53,000	2.400	2,827	10.661	6,026

Details of manufactured aperture type (110mm x 25mm slot) and granular fill requirements (40mm aggregate only) for an individual square soakaway design						
Chamber wall thickness (mm)	Number of 110mm slits per m depth	Filtration area per m depth per m dia (mm²)	Overall size of excavation w x b (m)	Capacity of soakaway chambers (litres)	Aggregate required for soakaway (m³)	Total soakaway capacity (litres)
90	24	52,320	2.400	2,827	10.661	6,026

IMPORTANT NOTES:-

1. **Standard 75mm diameter soakaway holes are not accepted by this Authority.** The 45mm diameter perforations are the preference of this Authority but are not favoured by the manufacturers. To achieve 45mm holes, a standard chamber ring can be core-drilled upon site. Caution is advised with regard to the positioning of the reinforcing bars.
   i) The number of 45mm diameter holes, per 1000mm depth, can be obtained from the table (bottom left). Please note that the perforation size is a special order and, if an order is accepted, a severe delay is inevitable.
   ii) If used, slit perforations in chamber rings are to be 110mm x 25mm vertical slits. The 110mm includes a 25mm diameter finish top and bottom (for anti-crack). The number, per 1000mm depth, can be obtained from the table (bottom left). Please note that the slits are unlikely to be used and are a special order and, if an order is accepted, a severe delay is inevitable.
2. All chamber rings must conform to BS5911-3:2010 and BS EN 1917:2002.
3. The standard storm situation is taken as M5-10 (5 year 10 minute storm) with a total of 10.05mm of rainfall.
4. The effective depth of the soakaway is fixed to 2500mm below invert level (within the permeable strata) unless otherwise specifically approved.
5. The performance of the soakaway is improved by the reducing the catchment/run-off area and/or by increasing the chamber ring/excavation size.
6. The exfiltration rate only alters the 50% emptying time of the soakaway (75% to 25% capacity). A maximum time of 24 hours is permitted.
7. Not more than 2 gullies to be connected to each soakaway (maximum of 400m² drained surface) unless otherwise specifically approved.
8. Soakaways should be a minimum of twice the effective depth from the any adjacent soakaway unless otherwise specifically approved.
9. Should soakaways be closer than twice effective depth to each other the table below applies with regard to the number of sides of the soakaway construction which are "obstructed" or "enclosed" by the close proximity of other soakaways.
10. Soakaways are only to be linked at the higher (inlet) level with a horizontal connection equal in diameter to the main inlet carrier.
11. No part of the soakaway to be constructed closer than total depth (2.500m minimum) to any part of carriageway construction (including footways).
12. No soakaway to be constructed in any paved area (private courtyards, et cetera) without site-specific detailed approval.
13. No part of the soakaway to be constructed closer than 5000mm to any tree planting or (currently) to any building.
14. The excavation is to be lined with a geo-textile membrane before the granular fill is placed.
15. Granular surround to be 40mm nominal and regular sized clean stone drainage medium to DCC Clause 206 (4).
16. The minimum dimension of granular surround is shown to the left to match the chamber diameter and excavation size. The minimum is 500mm.
17. Minimum depth to top of the upper-most non-perforated chamber ring is 450mm (cover and frame depth, minimum brickwork, plus cover slab).
18. **Step irons or ladders are not to be installed.** Access is intended to be by winch only.
19. The soakaways are not vented. All appropriate measures should be taken for working in confined spaces, including breathing apparatus.
20. All covers are to be double triangular (bolted) , or single rectangular, heavy-duty ductile (BS EN 124 D400H), with a minimum weight of 70kg.

INTERCEPTORS:-

1. Class 1 Bypass Interceptors must be used for all soakaways (whether single or "banked") unless written dispensation from the Environmental Agency is given. It is the developer's responsibility to obtain such written dispensation and provide a copy to this Authority.
2. In areas considered as sensitive, by the Environmental Agency and/or the Highway Authority, the rainfall rate may be M100-10+30% (30% for climate change) 148.4mm/hr, or higher. Areas of sensitivity include those that, if when surcharging occurs, directly affects private property.
3. Ordinarily, the bypass interceptor must be able to accept a minimum peak flow of 6.7 l/s (for the M5-10 rainfall rate of 59.8mm/hr). The nominal flow must be, at least, 10% of the minimum calculated peak flow and the NSB3 rating (0.0018xA(m²)) satisfies this rate.
4. If the area is considered sensitive (as described in point 2), the bypass interceptor must be able to accept a minimum flow of 21.2 l/s for the M100-10+ 30%, 148.4mm/hr. **The nominal flow must be, at least, 10% of the minimum calculated peak flow and it must be noted that if soakaways are grouped, with this rainfall rate, the NSB3 rating (0.0018xA(m²)) will be insufficient.**
5. If soakaways are grouped, interceptor capacity or numbers must be increased proportionally (see points 3 and 4 above).
6. If a single larger interceptor is used for multiple soakaways, the nominal and peak flow must be increased accordingly to ensure the potential rainfall is accepted through the interceptor. The NSB3 rating will be insufficient for the increased rainfall rate.
7. The interceptors are to be vented. The level of the vent outlet is not to be lower than the cover of the interceptor.
8. **A commuted sum is required to ensure the annual cleansing programme is maintained for 20 years. This Authority does not have the expertise to dispose of the controlled waste. The commuted sum is a direct reflection of the costs quoted by external companies. This cost assumes no that extra tonnage, time, or emergencies are expected.**
9. As this Authority undertakes an annual maintenance regime, currently, there is not a requirement for an oil level alarm system.
10. If an alarm system is incorporated, only a flashing beacon is to be used. It is not appropriate to incorporate a siren in a residential development.
11. The power supply for the alarm cabinet is to be battery with a trickle charge provided by photo-voltaic cells. The photo-voltaic panel should form an integral part of the top of the cabinet.
12. The interceptor and alarm cabinet are to be positioned to the rear of the carriageway/footway to facilitate easier access for maintenance.

Maximum rainfall and 50% emptying time potential for selected size of soakaway chamber

In areas of sensitivity (as described above) a 1 in 100 year (+30%) storm event will be used.

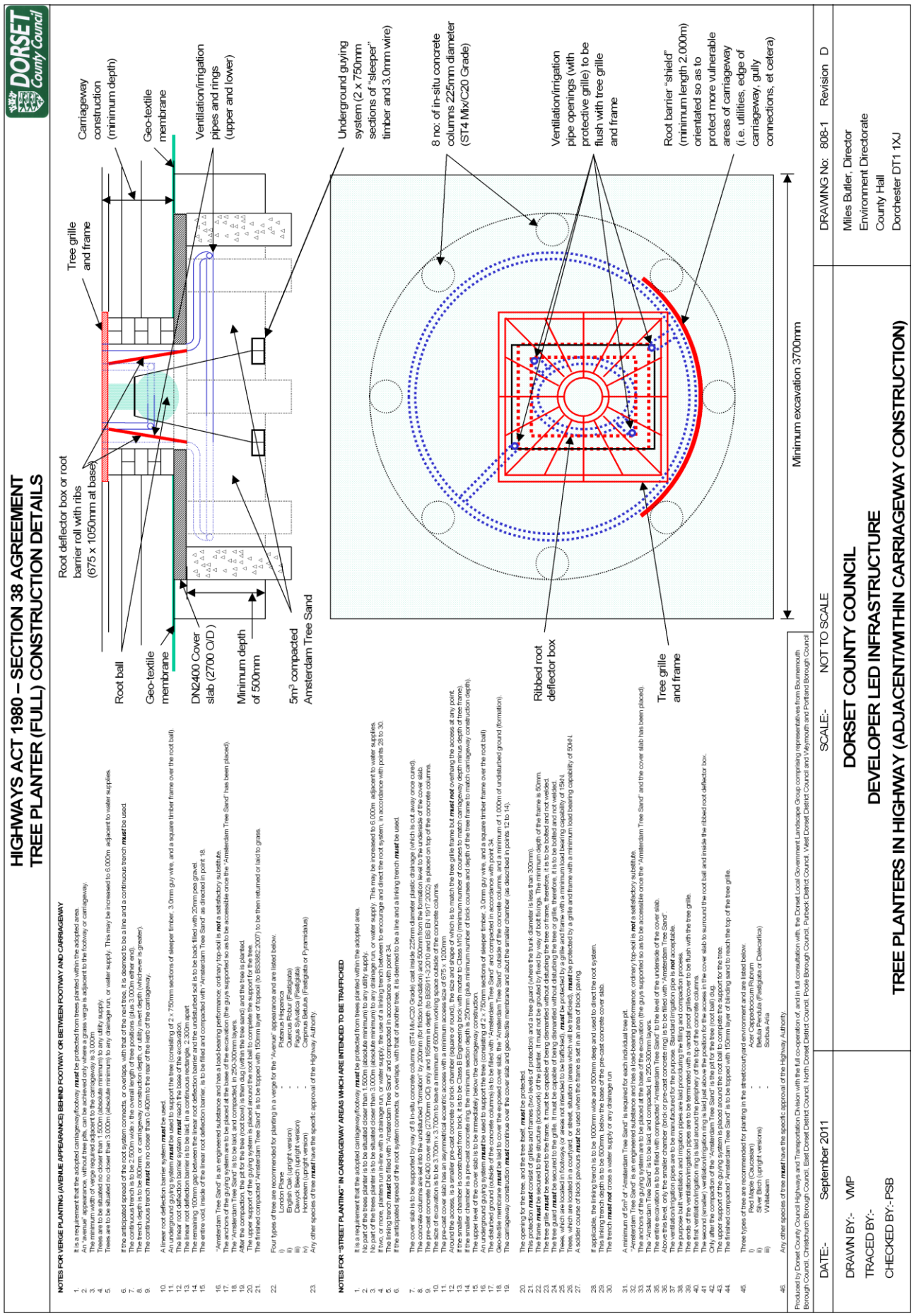
These calculations and results conform to BRE Digest 365 (amendments 2007), CIRIA Report 156, and DMRB Volume 4, Section 2, Part 8.

Catchment (m²)	400	Effective depth (m)	2.500	Fixed size of pit (m)	2.400
Return period of storm (yrs)	5	Diameter (DN) of perforated units (mm)			1200

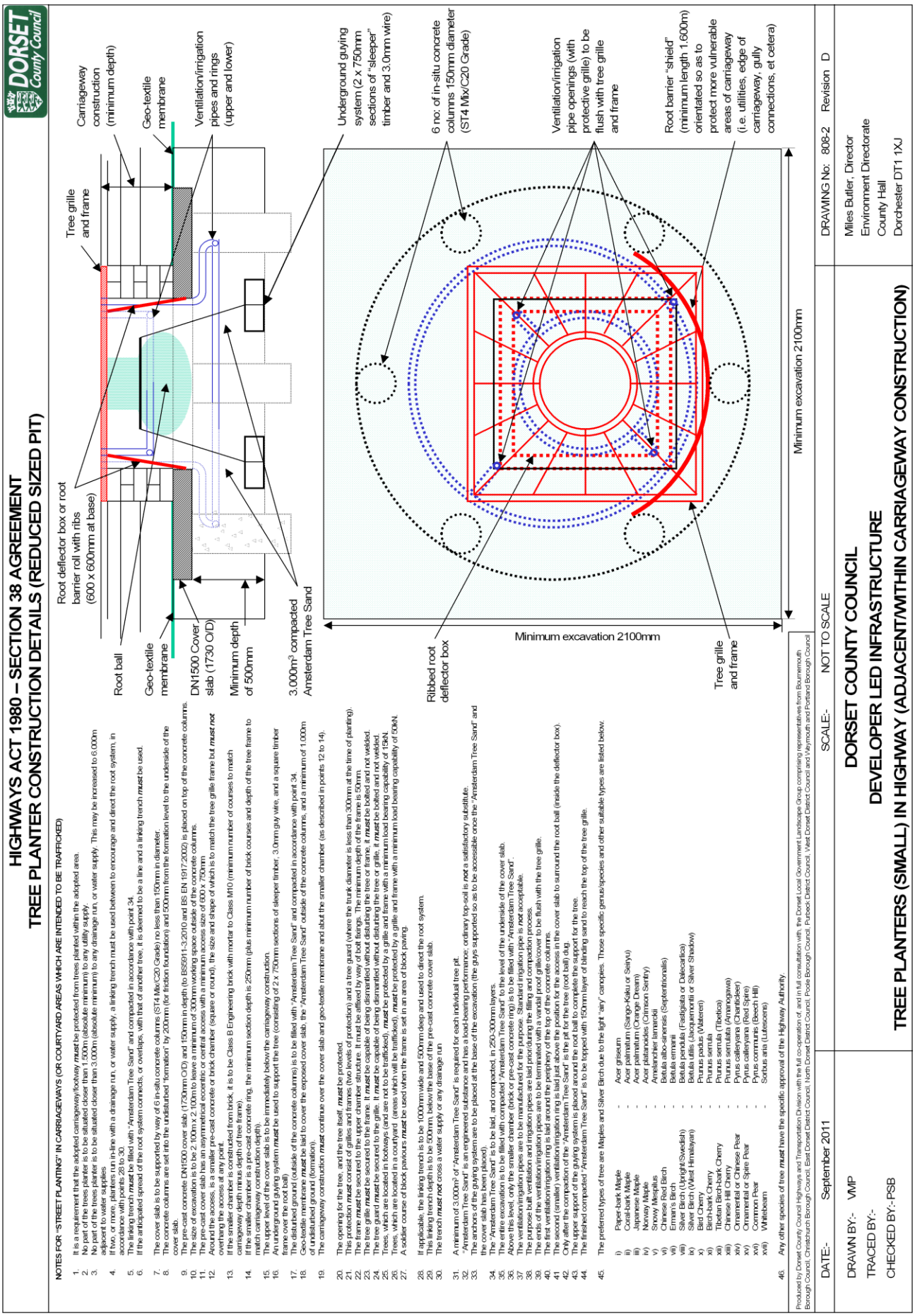
Exfiltration rate "f" m/sec (x 10⁻⁶)	not enclosed		enclosed on 1 side		enclosed on 2 sides		enclosed on 3 sides	
	Max Rainfall (mm)	Emptying potential *(actual)*	Max Rainfall (mm)	Emptying potential *(actual)*	Max Rainfall (mm)	Emptying potential *(actual)*	Max Rainfall (mm)	Emptying potential *(actual)*
1.0	15.06	4:34:10 *3:02:55*	15.06	7:21:40 *4:54:39*	15.06	18:31:40 *12:21:39*	15.06	37:08:20 *24:46:38*
2.0	15.06	2:14:35	15.06	3:38:20	15.06	9:13:20	15.06	18:31:40
3.0	15.06	1:28:03	15.06	2:23:53	15.06	6:07:13	15.06	12:19:27
4.0	15.06	1:04:47	15.06	1:46:40	15.06	4:34:10	15.06	9:13:20
5.0	15.06	0:50:50	15.06	1:24:20	15.06	3:38:20	15.06	7:21:40
10.0	15.06	0:22:55	15.06	0:39:40	15.06	1:46:40	15.06	3:38:20

DATE:- September 2011	SCALE:- NOT TO SCALE	DRAWING No: 807-2 Revision G
DRAWN BY:- VMP TRACED BY:- CHECKED BY:- PSB	**DORSET COUNTY COUNCIL** **DEVELOPER LED INFRASTRUCTURE** **PRE-CAST SOAKAWAYS IN PERMEABLE SUB-SOIL (WITH OR WITHOUT INTERCEPTORS)**	Miles Butler, Director Environment Directorate County Hall Dorchester DT1 1XJ

STANDARD DETAIL DRAWING 808-1



STANDARD DETAIL DRAWING 808-2



HIGHWAYS ACT 1980 – SECTION 38 AGREEMENT
TREE PLANTER CONSTRUCTION DETAILS (REDUCED SIZED PIT FOR FOOTWAYS ONLY)

NOTES FOR "STREET PLANTING" IN FOOTWAYS ONLY (AREAS WHICH ARE NOT INTENDED TO BE TRAFFICKED)

1. It is a requirement that the adopted carriageway/footway ***must*** be protected from trees planted within the adopted area.
2. No part of the tree planter is to be situated closer than 1.500m (absolute minimum) to any utility supply.
3. No part of the tree planter is to be situated closer than 3.000m (absolute minimum) to any drainage run, or water supply. This may be increased to 6.000m adjacent to water supplies.
4. If two, or more, planters run in-line with a drainage run, or water supply, a linking trench must be used between to encourage and direct the root system, in accordance with points 24 to 26.
5. The linking trench ***must*** be filled with "Amsterdam Tree Sand" and compacted in accordance with point 30.
6. If the anticipated spread of the root system connects, or overlaps, with that of another tree, it is deemed to be a line and a linking trench ***must*** be used.

7. The depth of the excavation is 700mm plus the construction depth of the footway
8. The size of excavation is to be 1.800m x 1.800m only and lined with a suitable "ribbed" root barrier/deflector. The fixed size of the pit will leave a minimum of 300mm working space outside of the concrete columns.
9. The position of the pit will be such that a minimum of 1.800m unobstructed/available footway exists between the outer edge of the central tree grille aperture and the limit of the footway.

10. The tree grille frame is to be supported by way of 4 in-situ concrete columns (ST4 Mix/C20 Grade) no less than 150mm in diameter.
11. The concrete columns are set into the undisturbed "formation" by 200mm (for friction foundation) and to the underside of the tree grille frame.
12. The position of the 4 columns is dependant upon the size/shape of the chosen grille/frame. Examples are listed below.

Square frames size	Distance c/c for columns	Round frame diameter	Distance c/c for columns
1200mm (max)	1050mm	1500mm (max)	950mm
1100mm	950mm	1400mm	880mm
1000mm	850mm	1300mm	810mm
900mm	750mm	1200mm	740mm

13. An underground guying system ***must*** be used to support the tree (consisting of 2 x 750mm sections of sleeper timber, 3.0mm guy wire, and a square timber frame over the root ball)
14. The disturbed ground (outside of the concrete columns) is to be filled with "Amsterdam Tree Sand" and compacted in accordance with point 30.
15. Geo-textile membrane ***must*** be laid to cover the exposed "Amsterdam Tree Sand" defined by the outside edge of the tree grille and frame, turned up to meet the underside of the tree grille and frame, and extend a minimum of 1.000m over the undisturbed ground (formation).
16. The footway construction ***must*** continue over the geo-textile membrane and abut the tree grille frame.

17. The opening for the tree, and the tree itself, ***must*** be protected.
18. This protection ***must*** consist of a grille and frame and, where the trunk diameter is less than 300mm at the time of planting, a tree guard.
19. The frame ***must*** be secured to the concrete columns. It must be affixed by way of bolt fixings. The minimum depth of the frame is 50mm.
20. The tree grille ***must*** be secured to the frame. It ***must*** be capable of being dismantled without disturbing the tree or frame, it ***must*** be bolted and not welded.
21. The tree guard ***must*** be secured to the grille. It ***must*** be capable of being dismantled without disturbing the tree or grille, it ***must*** be bolted and not welded.
22. The tree grille and frame ***must*** have a minimum load bearing capability of 15kN.
23. A soldier course of block paviours ***must*** be used when the frame is set in an area of block paving.

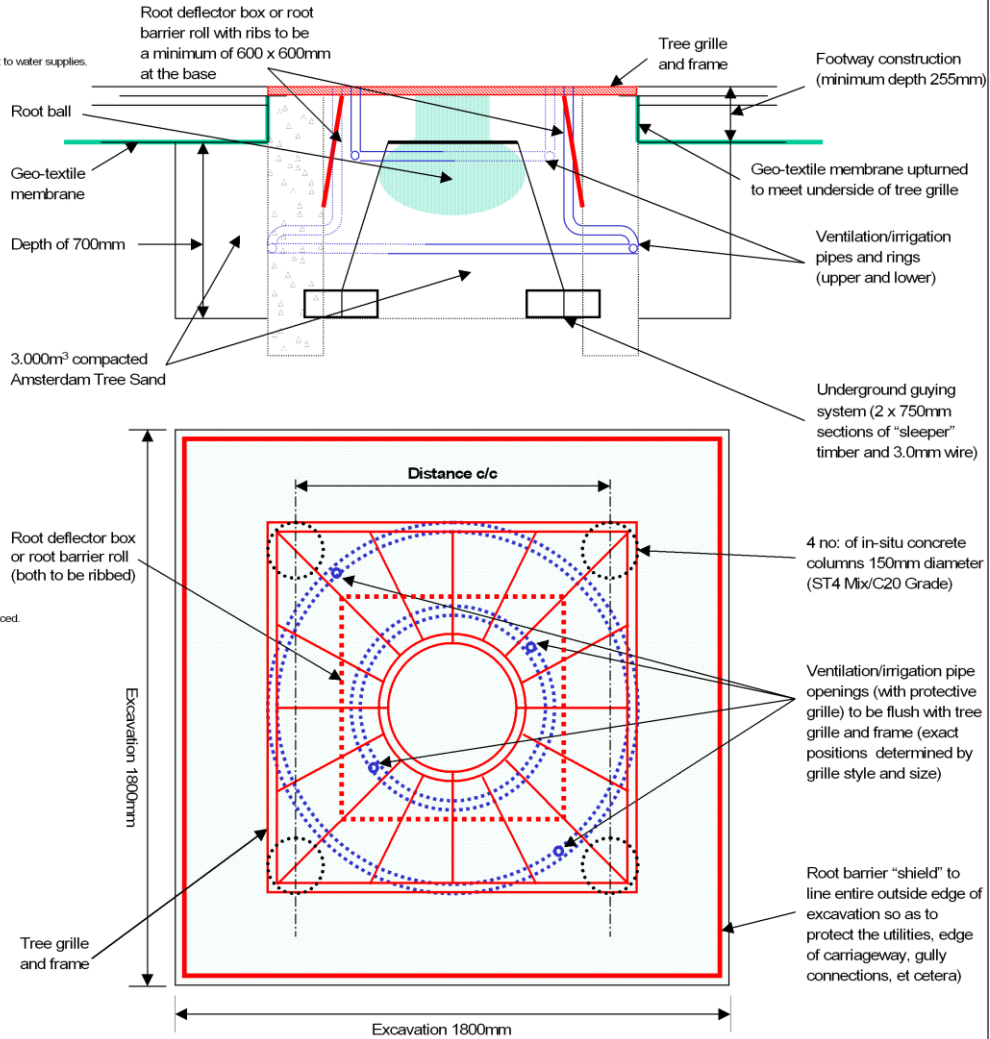
24. If applicable, the linking trench is to be 1000mm wide and 500mm deep and used to direct the root system.
25. This linking trench depth is to be 500mm, below the level of the footway construction.
26. The trench ***must not*** cross a water supply or any drainage run

27. A minimum of 3.000m^3 of "Amsterdam Tree Sand" is required for each individual tree pit.
28. "Amsterdam Tree Sand" is an engineered substance and has a load-bearing performance; ordinary top-soil is ***not*** a satisfactory substitute.
29. The anchors of the guying system are to be placed at the base of the excavation and the guys are to be accessible once the "Amsterdam Tree Sand" has been placed.
30. The "Amsterdam Tree Sand" is to be laid, and compacted, in 250-300mm layers.
31. The entire excavation is to be filled with compacted "Amsterdam Tree Sand" to the level of the underside of the footway construction.
32. The ventilation/irrigation pipes are to be manufactured for the purpose. Standard irrigation pipe is ***not*** acceptable.
33. The purpose built ventilation and irrigation pipes are laid prior/during the filling and compaction process.
34. The ends of the ventilation/irrigation pipes are to be terminated with a vandal proof grille/cover to be flush with the tree grille.
35. The first ventilation/irrigation ring is laid inside the concrete columns at a depth of 700mm.
36. The second (smaller) ventilation/irrigation ring is laid at a depth of 300mm to surround the root ball (inside the deflector box).
37. Only after the compaction of the "Amsterdam Tree Sand" is the pit for the tree (root ball) dug.
38. The upper support of the guying system is placed around the root ball to complete the support for the tree.
39. The finished compacted "Amsterdam Tree Sand" within the confines of the grille/frame is to be topped with 50mm layer of blinding sand.

40. The preferred types of tree are Maples and Silver Birch due to the light "airy" canopies. Those specific genus/species and other suitable types are listed below.

i)	Paper-bark Maple	-	Acer griseum
ii)	Coral-bark Maple	-	Acer palmatum (Sango-Kaku or Seiryu)
iii)	Japanese Maple	-	Acer palmatum (Orange Dream)
iv)	Norway Maple	-	Acer platanoides (Crimson Sentry)
v)	Snowy Mespilus	-	Amelanchier lamarckii
vi)	Chinese Red Birch	-	Betula albo-sinensis (Septentrionalis)
vii)	Erman's Birch	-	Betula ermanii
viii)	Silver Birch (Upright/Swedish)	-	Betula pendula (Fastigiata or Dalecarlica)
ix)	Silver Birch (West Himalayan)	-	Betula utilis (Jacquemontii or Silver Shadow)
x)	Bird Cherry	-	Prunus padus (Watereri)
xi)	Birch-bark Cherry	-	Prunus serrula
xii)	Tibetan Birch-bark Cherry	-	Prunus serrula (Tibetica)
xiii)	Chinese Hill Cherry	-	Prunus serrulata (Amanogawa)
xiv)	Ornamental or Chinese Pear	-	Pyrus calleryana (Chanticleer)
xv)	Ornamental or Spire Pear	-	Pyrus calleryana (Red Spire)
xvi)	Common Pear	-	Pyrus communis (Beech Hill)
xvii)	Whitebeam	-	Sorbus aria (Lutescens)

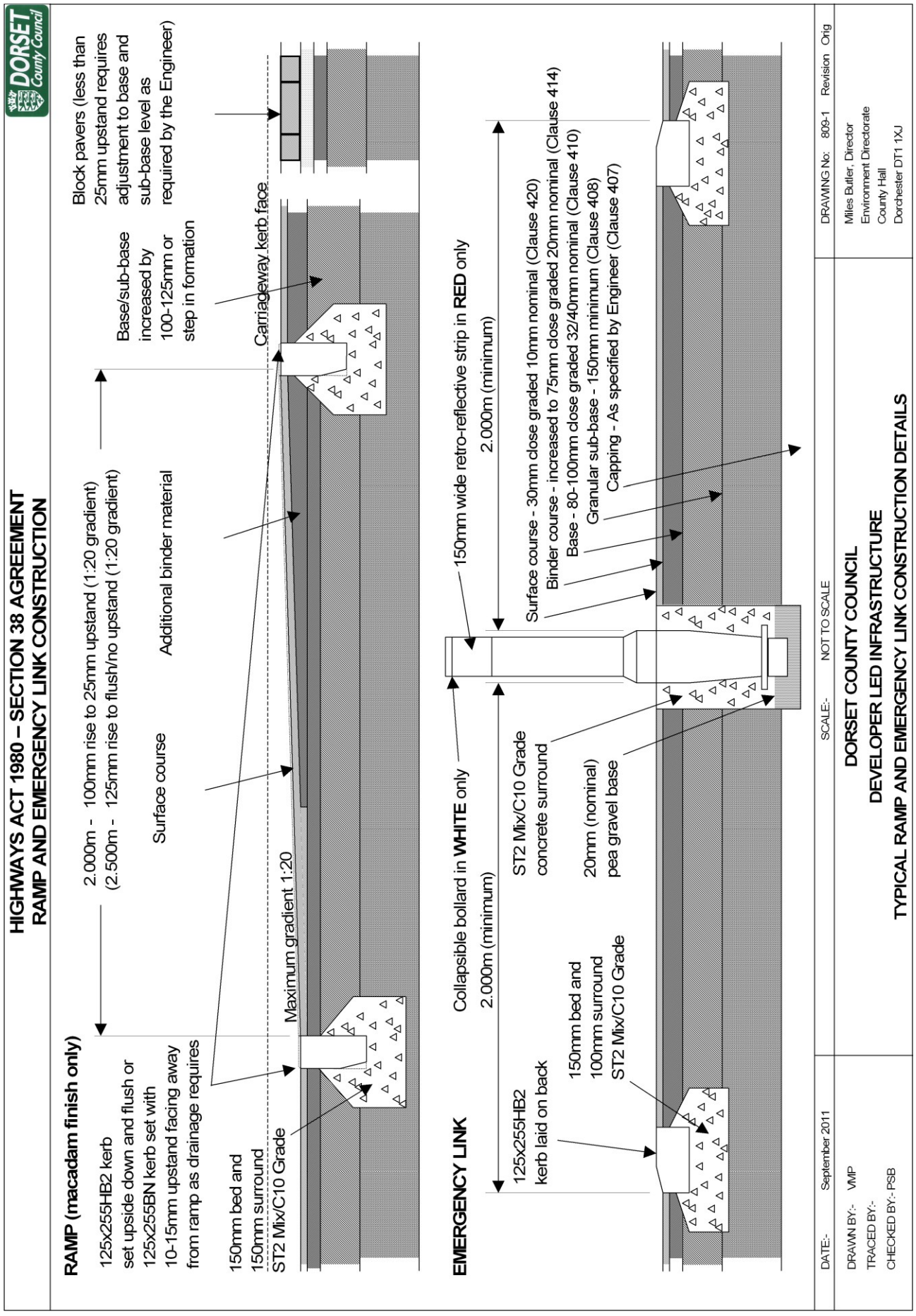
41. Any other species of tree ***must*** have the specific approval of the Highway Authority.



Produced by Dorset County Council Highways and Transportation Division with the full co-operation of, and in full consultation with, the Dorset Local Government Landscape Group comprising representatives from Bournemouth Borough Council, Christchurch Borough Council, East Dorset District Council, North Dorset District Council, Poole Borough Council, Purbeck District Council, West Dorset District Council and Weymouth and Portland Borough Council

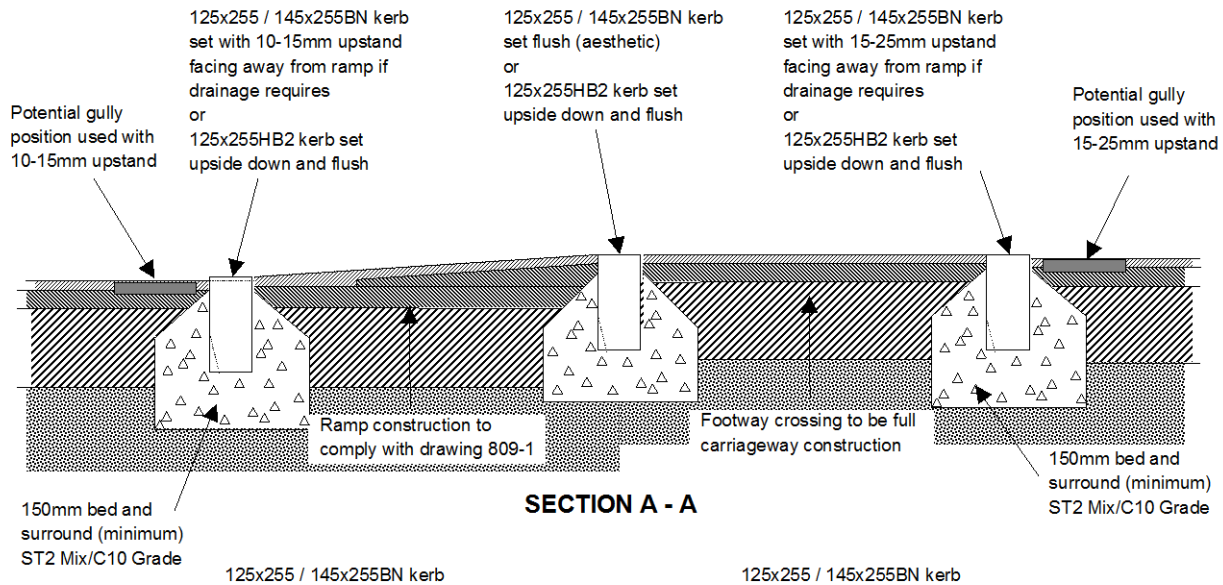
DATE:- September 2011	SCALE:- NOT TO SCALE	DRAWING No: 808-3 Revision D
DRAWN BY:- VMP TRACED BY:- CHECKED BY:- PSB	**DORSET COUNTY COUNCIL** **DEVELOPER LED INFRASTRUCTURE** **TREE PLANTERS (SMALL) WITHIN HIGHWAY (FOOTWAYS ONLY)**	Miles Butler, Director Environment Directorate County Hall Dorchester DT1 1XJ

STANDARD DETAIL DRAWING 809-1

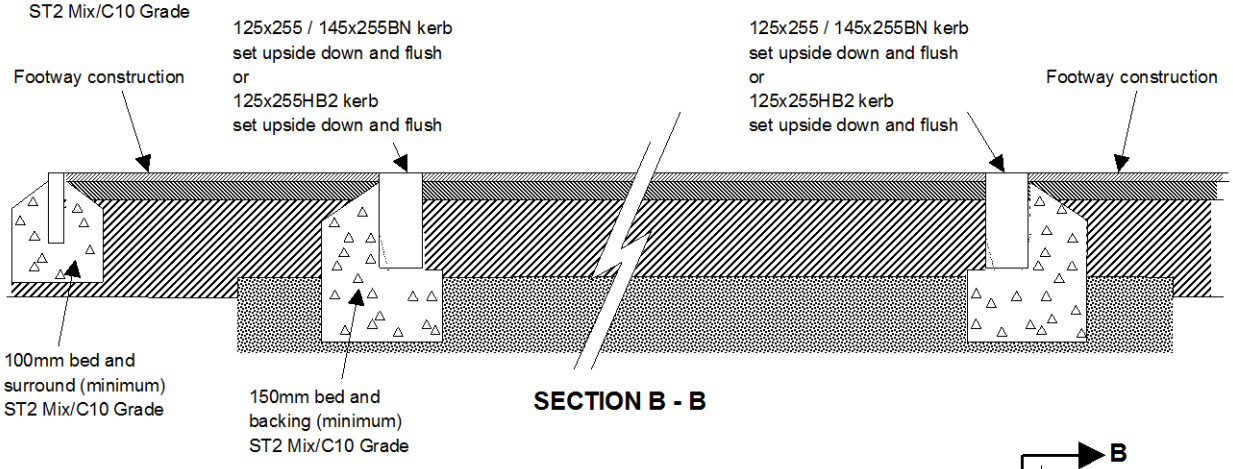


STANDARD DETAIL DRAWING 809-2

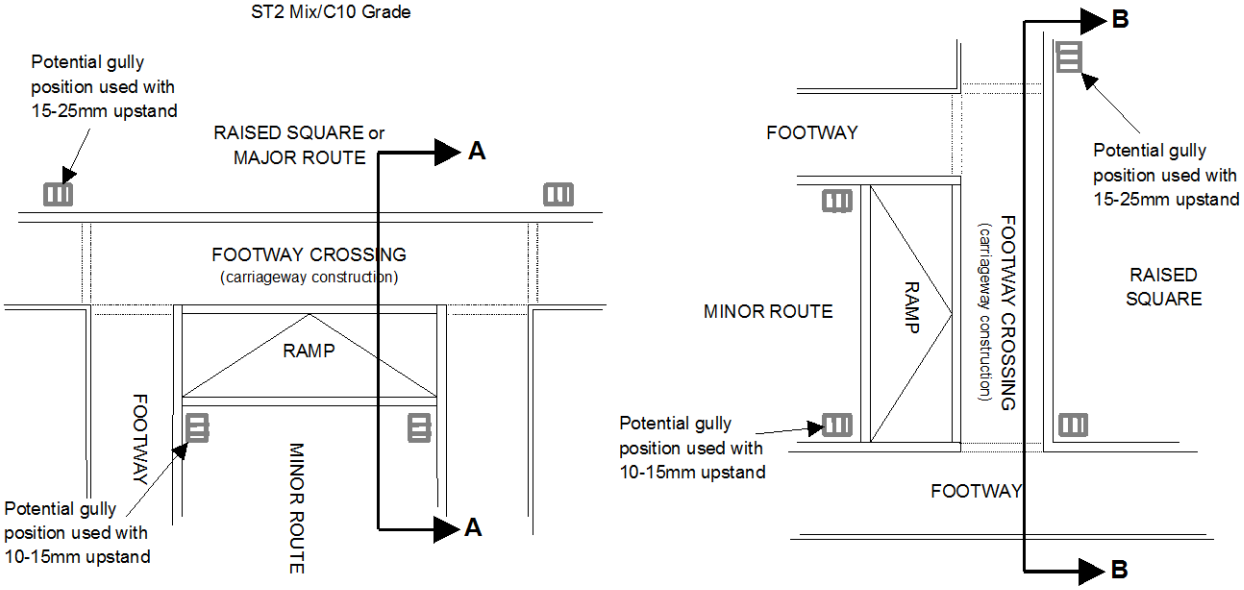
HIGHWAYS ACT 1980 – SECTION 38 AGREEMENT
RAMP AND FOOTWAY CROSSING CONSTRUCTION AT RAISED SQUARE / JUNCTION



SECTION A - A



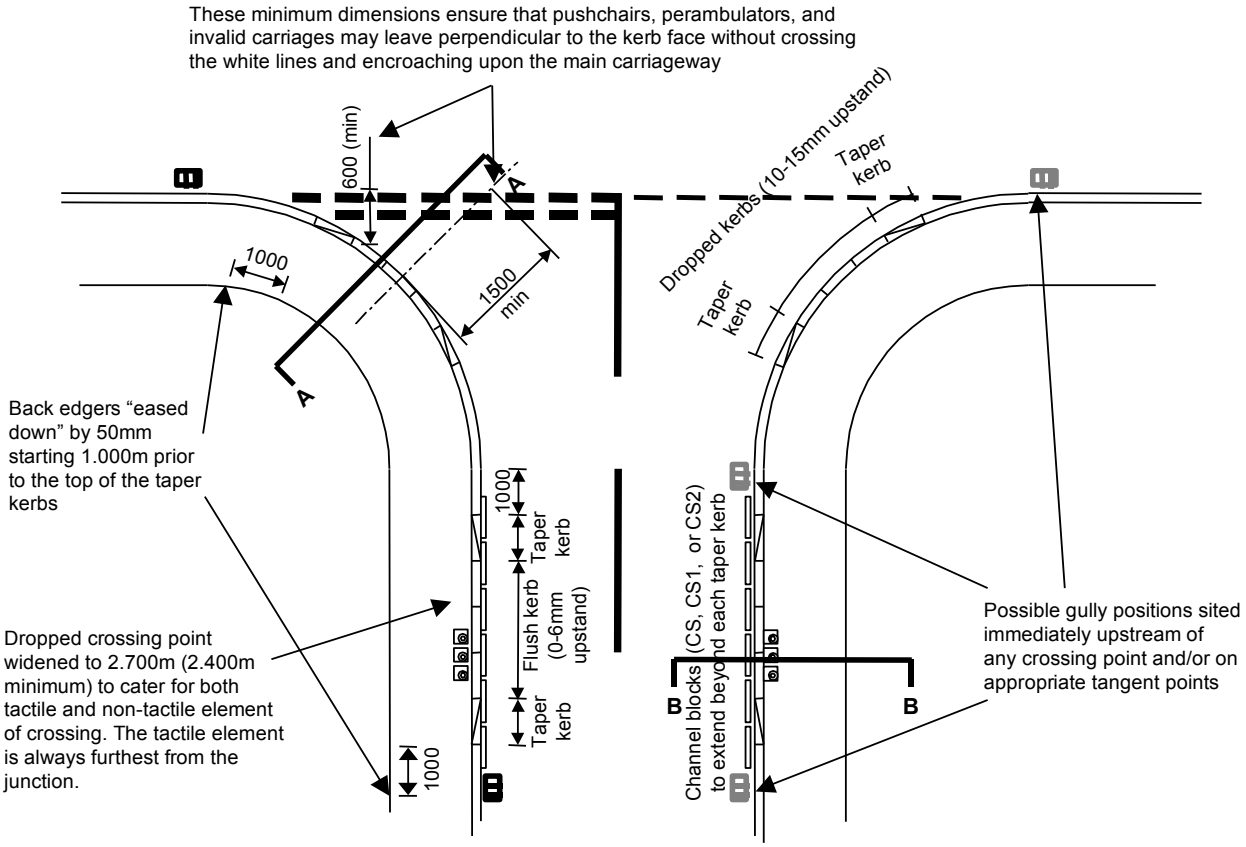
SECTION B - B

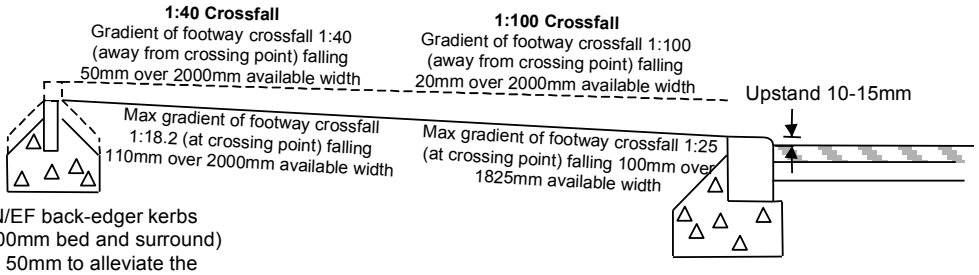


DATE:- September 2011	SCALE:- NOT TO SCALE	DRAWING No: 809-2 Revision Orig
DRAWN BY:- JHF TRACED BY:- CHECKED BY:- VMP	**DORSET COUNTY COUNCIL** **DEVELOPER LED INFRASTRUCTURE** **TYPICAL RAMP FOOTWAY CROSSING DETAILS**	Miles Butler, Director Environment Directorate County Hall Dorchester DT1 1XJ

STANDARD DETAIL DRAWING 813

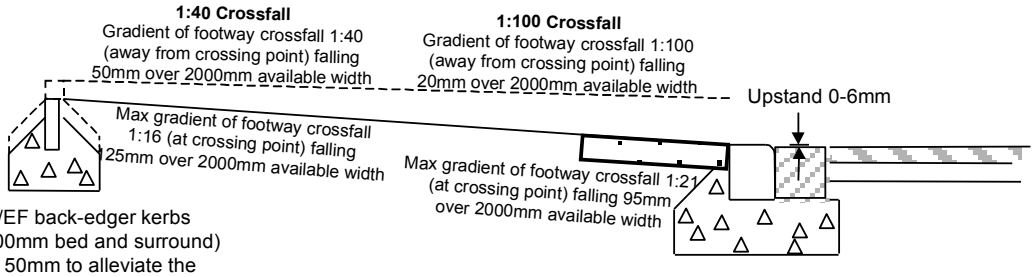
HIGHWAYS ACT 1980 – SECTION 38 AGREEMENT
PEDESTRIAN CROSSING AND TACTILE PAVING LAYOUT AND CONSTRUCTION





50x150 EBN/EF back-edger kerbs (including 100mm bed and surround) eased down 50mm to alleviate the steep gradient at crossing point

Section A-A



50x150EBN/EF back-edger kerbs (including 100mm bed and surround) eased down 50mm to alleviate the steep gradient at crossing point

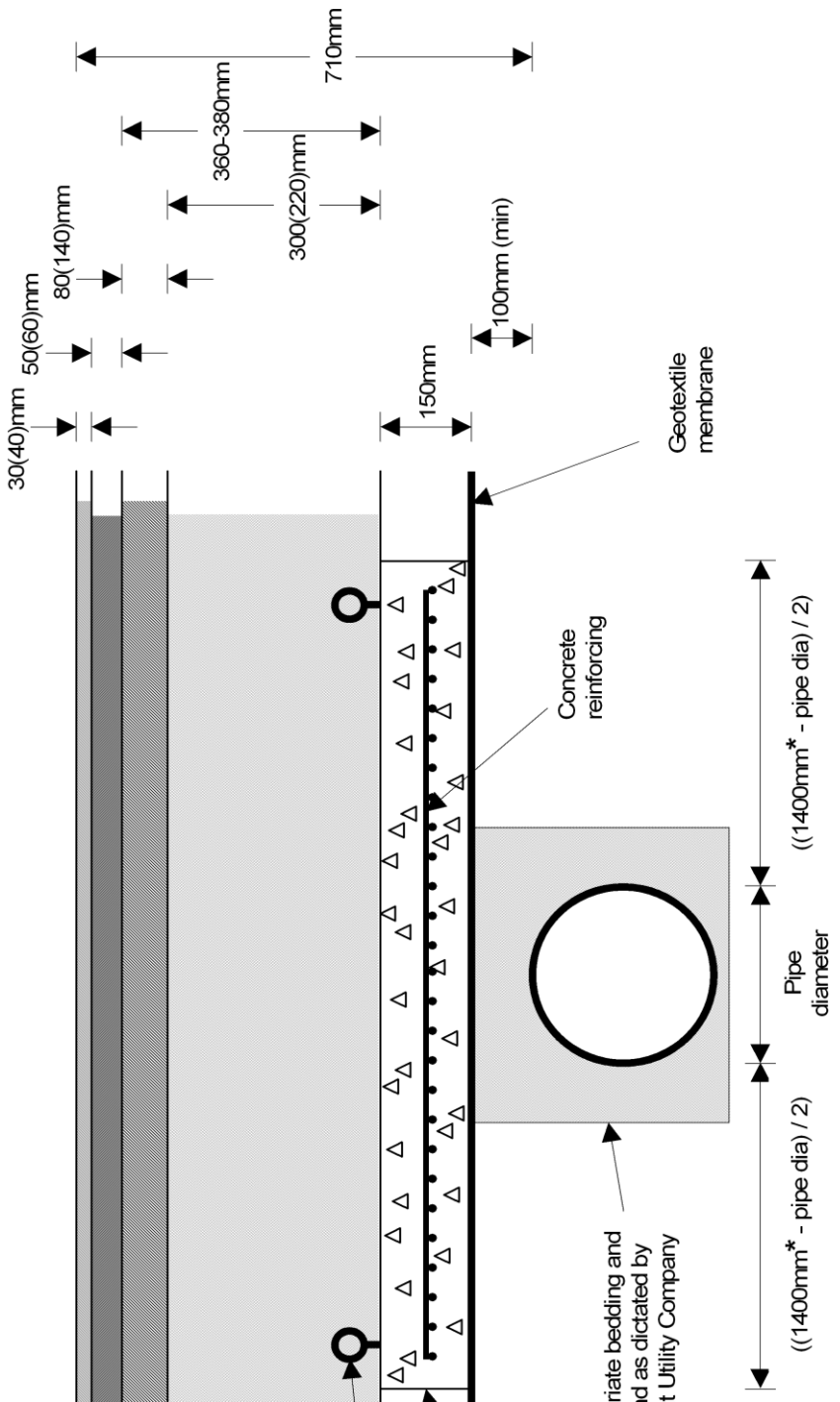
Section B-B

DATE:- September 2011	SCALE:- NOT TO SCALE	DRAWING No: 813 Revision F
DRAWN BY:- VMP TRACED BY:- CHECKED BY:- PSB	**DORSET COUNTY COUNCIL** **DEVELOPER LED INFRASTRUCTURE** **TYPICAL PEDESTRIAN CROSSING DETAILS**	Miles Butler, Director Environment Directorate County Hall Dorchester DT1 1XJ

STANDARD DETAIL DRAWING 814

DORSET County Council

DORSET COUNTY HIGHWAYS - NEW STREETS SECTION
CONCRETE PROTECTION FOR UTILITY SERVICES - CONSTRUCTION DETAILS



NOTE:-

Concrete cover slab (either pre-cast or in-situ) 150mm x 1400mm* x section length. Resulting weight of slab section (approx) 0.500 tonne per linear metre.

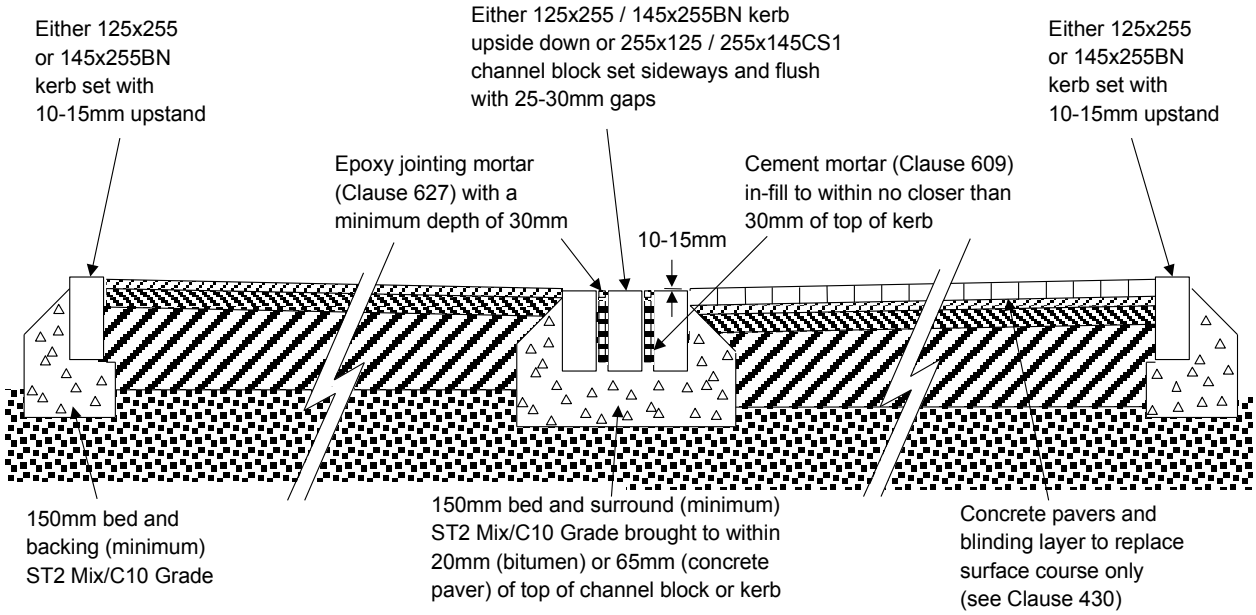
Each slab section to have lifting eyes to facilitate removal without the need for, or cause of, excessive vibration.

Length of concrete cover section dependant upon lifting weight and convenience on site. 1400mm is shown as example width only but is the suggested minimum.

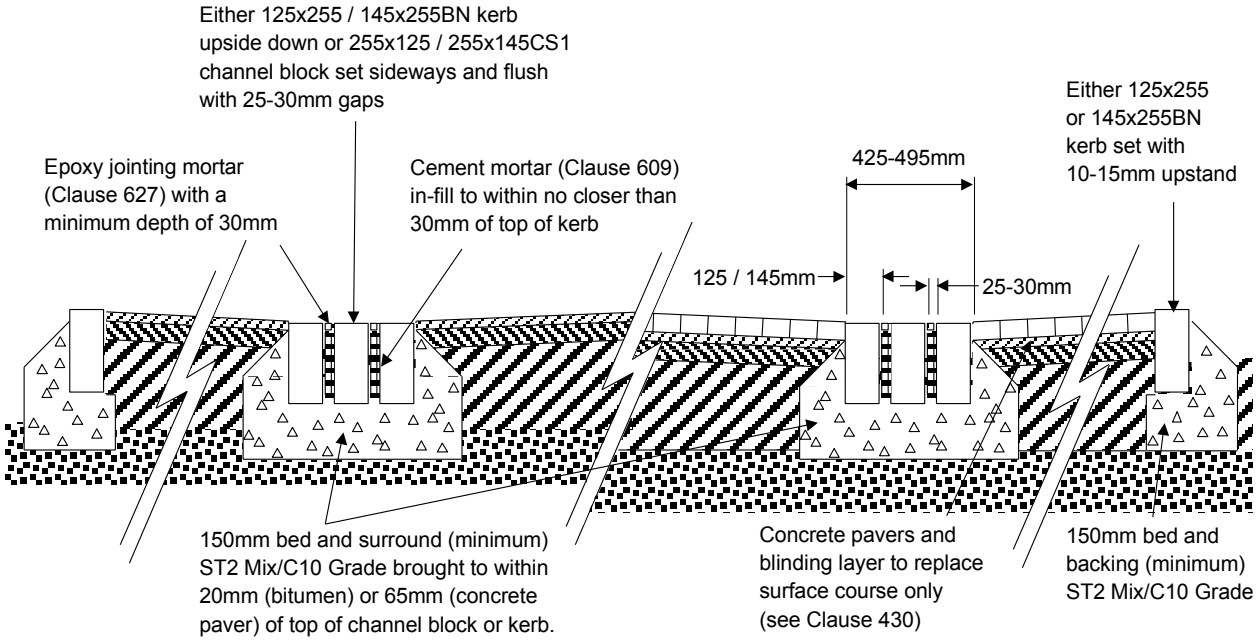
DATE:- September 2011	SCALE:- NOT TO SCALE	DRAWING No: 814 Revision A
DRAWN BY:- VMP TRACED BY:- CHECKED BY:- PSB	**DORSET COUNTY COUNCIL** **DEVELOPER LED INFRASTRUCTURE** **CONCRETE PROTECTION FOR UTILITY SERVICES BETWEEN 710mm AND 1200mm COVER**	Miles Butler, Director Environment Directorate County Hall Dorchester DT1 1XJ

STANDARD DETAIL DRAWING 815

HIGHWAYS ACT 1980 – SECTION 38 AGREEMENT
FEATURE "DISHED" CHANNEL (SHARED OR LEVEL SURFACE) CONSTRUCTION



SHARED SURFACE - BITUMEN OR CONCRETE PAVER SURFACE COURSE



LEVEL SURFACE (DEFINED PEDESTRIAN WAYS / MARGINS) - BITUMEN OR CONCRETE PAVER SURFACE COURSE

NOTE: I) Channel blocks/kerbs defining the channel are set level and true to each other (not dished) and set 10-15mm below the finished carriageway surface.

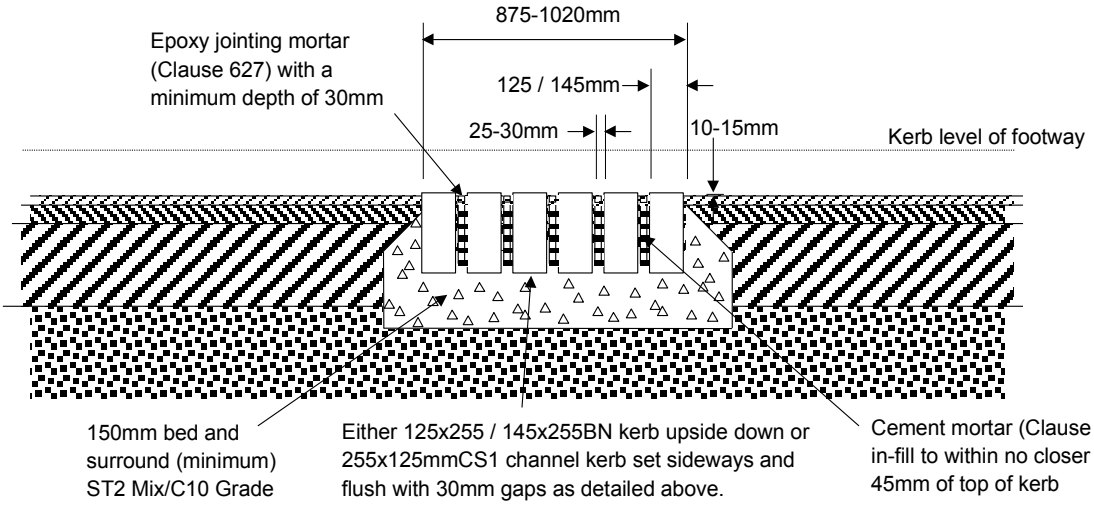
ii) Gully grating and frame GA2-450 (450x450mm) Grade D400N to BS EN 124 (Clause 608) set flush with the finished channel surface level.

Iii) Level or shared surface to be retained by 125x255BN or 145x255BN kerb only (Clause 613).

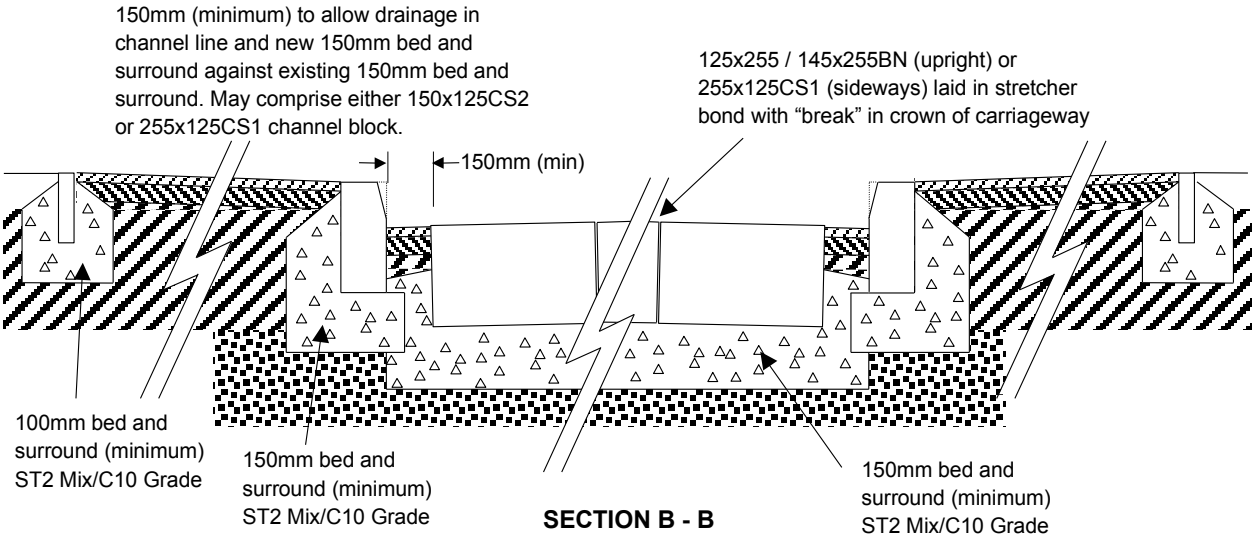
DATE:- September 2011	SCALE:- NOT TO SCALE	DRAWING No: 815 Revision Orig
DRAWN BY:- VMP TRACED BY:- CHECKED BY:- PSB	**DORSET COUNTY COUNCIL** **DEVELOPER LED INFRASTRUCTURE** **TYPICAL FEATURE CHANNEL DETAILS**	Miles Butler, Director Environment Directorate County Hall Dorchester DT1 1XJ

STANDARD DETAIL DRAWING 816

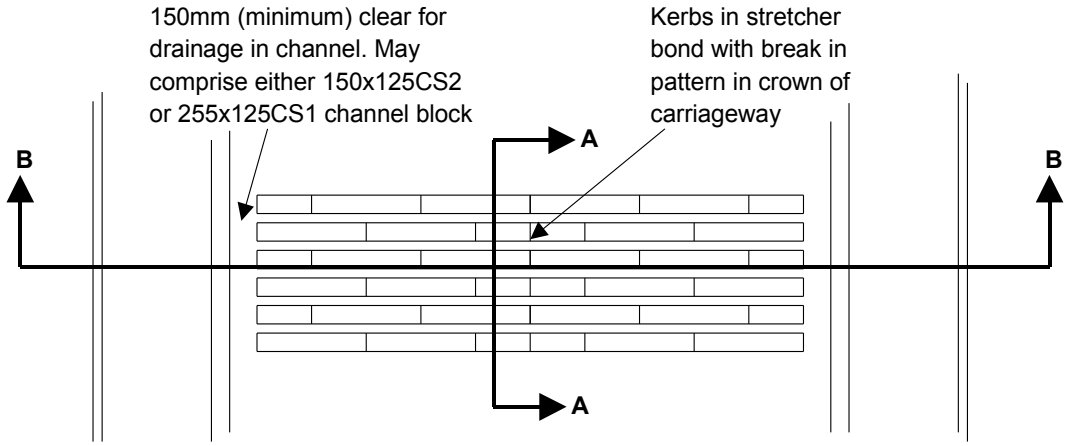
HIGHWAYS ACT 1980 – SECTION 38 AGREEMENT
TRANSVERSE RUMBLE / FEATURE CONSTRUCTION



SECTION A - A



SECTION B - B



DATE:- September 2011	SCALE:- NOT TO SCALE	DRAWING No: 816 Revision Orig
DRAWN BY:- VMP TRACED BY:- CHECKED BY:- PSB	**DORSET COUNTY COUNCIL** **DEVELOPER LED INFRASTRUCTURE** **TYPICAL FEATURE RUMBLE / FEATURE DETAILS**	Miles Butler, Director Environment Directorate County Hall Dorchester DT1 1XJ

900 AMENDMENTS

901 FIRST RELEASE September 2004

1. Complete re-write

902 SECOND RELEASE (AMENDMENTS) October 2007

1.	Clause 103	Commuted sums no longer apply to standard DCC soakaways, but will be required for additional maintenance costs for trees in carriageway/footway for pollarding. Commuted sums applicable for certain retaining structures (as defined in Clause 303).
2.	Clause 201	Clearance distance between highway drain and face of kerb. Maximum distance specified between manholes. Large diameter pipes defined as structures; design checks and technical approval applicable. Pre-formed bases permitted and trench drains included into manholes where drainage runs are set into granular surround.
3.	Clause 202	Diameters and minimum gradient details for carrier drains. Reference to new soakaway Standard Detail Drawings.
4.	Clause 206	Granular fill for soakaways detailed.
5.	Clause 303	New Clause - Design checks and approvals given for retaining structures. Commuted sums defined to re-enforce Clause 103.
6.	Clause 437	New Clause - Level access, windows, porches and flying freeholds.
7.	Table 400/17	Binder course thicknesses for collector and access roads, base thicknesses for footways, bound base only for all roads except for feeder, collector/access roads.
8.	Table 400/18	Nominal aggregate size corrected from 28mm to 32mm to conform to BS EN 13108:2006.
9.	Clause 620	Amendment to cater for circular brickwork soakaway chamber. Amendments to pre-cast soakaway chamber construction. Re-iteration of 45mm perforations only.
10.	Clause 710	Painting specification enhanced for columns and brackets.

11.	Drawing 807	Amended soakaway construction details; Standard Detail Drawing 807-1 brickwork circular design and Standard Detail Drawing 807-2 pre-cast concrete chambers.

902 SECOND RELEASE (AMENDMENTS) October 2007

12.	Drawing 808	In addition to Standard Detail Drawing 808-1 (full size tree planter), extra tree planter/barrier designs for reduced size and for use in footways (non-trafficked areas), Standard Detail Drawing 808-2 reduced size, and Standard Detail Drawing 808-3 footway planter.
13.	Drawing 813	New Standard Detail Drawing 813 for pedestrian and tactile crossing points at junctions.
14.	Drawing 814	New Standard Detail Drawing 814 for protection to utilities.

903 THIRD RELEASE (AMENDMENTS) September 2011

1.	General	Update of all BS and BS EN references and removal of existing errors. Minor amendments within other clauses. Inclusion of sub-clauses referring to steps and the use of root barrier. Major amendments, additions, or omissions are detailed, separately, below.
2.	Clause 102	Additional definitions added for margins (safety and service).
3.	Clause 103	Specific commuted sum details removed. All to be included into “Adopting New Streets” document produced by Highway Authority.
4.	Clause 108	Change to the definition referring to site clearance and the Developer’s responsibility with regard to Planning Approval.
5.	Clause 109	New Clause – Works in the existing highway. Requirement for all operatives to be qualified to work within the highway. Safety signing reference to Clause 104. List of relevant forms to register road space and works.
6.	Clause 110	New Clause – Steps and Stairs. Steps and stairs not to be adopted as part of highway maintainable.
7.	Clause 201	Reference to the Flood and Water Management Act 2010, desirable gradients (minimum and maximum) listed for pipe-work and trench drain detail added (also to relevant Standard Detail Drawings).

8.	Clause 206	Reference to French drains removed from the Specification and other relevant sub-clauses moved to Clause 214.
9.	Clause 208	Pre-cast diameter ring of 1.350m reinstated into BS5911-3. Covers and frames defined as 150mm section depth only for block paved areas.
10.	Clause 209	Upgraded concrete surround for plastic gully formers.
11.	Clause 214	Reinstatement of Trenches redefined also consolidated and amalgamated with elements removed from Clause 206
12.	Clause 215	New Clause – Water meter/stop tap covers and hydrants. Detailing the positions of covers within the footway and the issue of plastic non-locking telescopic water meter covers failing within the highway.
13.	Clause 216	New Clause – Pre-cast telecommunication covers rated less than D400 set into margins/footways protected from traffic by kerb face.
14.	Clause 304	Reference to the number of passes required for compaction of fill and capping in accordance with MCHW.
15.	Clause 305	Formation extended beyond footways for private accesses and all footways on industrial roads.
16.	Clause 307	Sub-clause added regarding the requirement for planning approval to undertake work on existing trees and the Root Protection Area (RPA) is defined. No roots to be removed without specific approval.
17.	Clause 310	New Clause – Use of Root Barrier. Root barrier required to ensure protection of highway construction from tree roots.
18.	Clause 404	BBA/HAPAS approval required for materials to be used that are not detailed in Section 400. Material descriptions and nominal thicknesses updated. Temperature and grading testing/certification to be provided for bituminous materials. Tar macadam references removed due to the toxicity of hydrocarbons. Overbanding information added. Bond coat reference enhanced. Use of tack coat prohibited.
19.	Clause 407	Reference to the number of passes required for compaction of capping in accordance with MCHW.

		Alternative grading for capping material defined (if sourced locally).
20.	Clause 411	Close-graded tarmacadam base clause removed.
21.	Clause 415	Close-graded tarmacadam binder clause removed.
22.	Clause 416	Open graded binder course amended for use on footways only.
23.	Clause 417	Tarmacadam base clause removed.
24.	Clause 419	Air void content added for SMA. Lightly coated grit to be rolled into surface to reduce potential for skidding.
25.	Clause 421	Close-graded tarmacadam surface clause removed.
26.	Clause 422	Cold asphalt (fine) surface course (footways only) removed.
27.	Clause 423	Spread rate for coated chippings detailed.
28.	Clause 425	Surface dressing clause removed.
29.	Clause 426	Bituminous sprays clause removed.
30.	Clause 428	Kerb face/up-stand set at ≤25mm or between 80mm and 125mm.
31.	Clause 429	Reference to Countryside or Conservation kerbs changed to natural/reconstructed stone. Kerb face/up-stand set at ≤25mm or between 80mm and 125mm.
32.	Clause 430	Block paver “seam” specified if repair of paved area isolates development.
33.	Clause 433	Class 1 Bypass Interceptors included within the clause. Reference to commuted sums removed.
34.	Clause 434	Clause enhanced to include grilles and guards. Reference to commuted sums removed.
35.	Clause 437	Amendment to title and clause enhanced to determine rear of footway and adjacent private margin detail.
36.	Clause 438	New Clause – Road signs and markings provision made.
37.	Clause 439	New Clause – Epoxy bound paving jointing mortar.
38.	Table 400/17	Table updated to remove reference to tar (Clauses 411, 415, 417, 421)

39.	Table 400/18	Table updated to remove reference to tar (Clauses 411, 415, 417, 421)
40.	Clause 612	Reference to natural/reconstructed stone. Kerb face/up-stand set at ≤25mm or between 80mm and 125mm and face irregularity considered.
41.	Clause 613	Clause enhanced and elements removed from Clause 430 added. Block pavers to be retained by a full kerb.
42.	Clause 620	Interceptor detail added, from Standard Detail Drawings, and reference to nominal flow rates and oil warning alarm.
43.	Clause 623	Detail added for bollards referring to TSRGD regarding height, colour, and size.
44.	Clause 624	New Clause – Bond coat.
45.	Clause 625	New Clause – Overbanding
46.	Clause 626	New Clause – Road signs and markings.
47.	Clause 627	New Clause – Epoxy bound paving jointing mortar.
48.	Clause 701	Clause amended for the provision of lighting within the Environmental Zones 1 to 4.
49.	Clause 706	Maximum column heights added to comply with Street Lighting policy.
50.	Clause 710	Steel column and bracket protection system clause removed.
51.	Clause 719	Now Electrical Control Gear. Sub-clause (2) detailing changes to the switching regimes to comply with Street Lighting policy (part night lighting). Ballasts covered by Clause 719.
52.	Clause 720	Ignitors clause covered by Clause 719.
53.	Clause 721	Starters clause covered by Clause 719.
54.	Clause 722	Capacitors clause covered by Clause 719.
55.	Clause 723	Cut-outs clause covered by Clause 719.
56.	Clause 724	Fuse holders, fuses and miniature circuit breakers (MCBs) clause covered by Clause 719.
57.	Clause 725	Base compartment fixing arrangements clause covered by Clauses 715, 716, and 719.
58.	Clause 727	NEMA Sockets clause covered by Clause 719.

59.	Appendix 1	Inventory Update Form added.
60.	Drawing 801	Drawing renumbered (801-1) and 801-2 added detailing different construction and haunch details for residential and industrial/footway crossing/accesses.
61.	Drawing 803	Drawing renumbered 803-1 and drawing 803-2 added detailing Type A or B (803-1) and Type E (803-2) pre-cast chamber manhole constructions. Trench drain details included for carriers in granular surround.
62.	Drawing 804	Drawing updated and detailed as vertical backdrop for Type A or B pre-cast chamber manholes only.
63.	Drawing 805	Drawing renumbered 805-1 and drawing 805-2 added detailing Type C (805-1) and Type D (805-2) brick or pre-cast box section manhole constructions. Trench drain details included for carriers in granular surround.
64.	Drawing 806	Drawing renumbered (806-1) and 806-2 added detailing the differences between utility positions in a single 2.000m – 3.000m margin or split (2 x 1.000m) margins.
65.	Drawing 807-1	Drawing updated to prevent duplication/copying (without acknowledgement) by external parties.
66.	Drawing 807-2	Drawing updated to prevent duplication/copying (without acknowledgement) by external parties.
67.	Drawing 808-1	Drawing updated for increased distances between tree pits and utility services. Cover slab size confirmed.
68.	Drawing 808-2	Drawing updated for increased distances between tree pits and utility services. Cover slab size confirmed.
69.	Drawing 808-3	Drawing updated for increased distances between tree pits and utility services.
70.	Drawing 809	Drawing renumbered and updated (809-1) and drawing 809-2 added detailing the ramp construction and layout with a footway at the head of the ramp where a route joins a raised square.
71.	Drawing 810	Drawing amended and updated (810-1) and drawings 810-2 and 810-3 added detailing installation of columns in highway and non-highway verge situations.

72.	Drawing 811	Drawing removed.
73.	Drawing 813	Drawing updated to cater for crossfall range of 1:40 to 1:100 for footways. Dropped crossing point widened for visually impaired and elderly/infirm pedestrians away from junction.
74.	Drawing 814	Drawing updated.
75.	Drawing 815	New drawing detailing a feature channel or seam for block paved areas.
76.	Drawing 816	New drawing detailing a transverse feature.

904 FOURTH RELEASE (AMENDMENTS) November 2014

1.	700 - Street Lighting	Street Lighting specification removed and replaced with web link.
2.	Drawing 810-1	Drawing Removed
3.	Drawing 810-2	Drawing Removed
4.	Drawing 810-3	Drawing Removed
5.	Drawing 812	Drawing Removed