

Suffolk County Council
Environment and Transport

Specification for Estate Roads

MAY 2007

Environment and Transport

Endeavour House 8 Russell Road Ipswich IP1 2BX

contact: S F Cordery 01473 264749

Contents

- 1 INTRODUCTION
 - 1.1 Purpose
 - 1.2 Adoption of Works
 - 1.3 Definition and Interpretation
 - 1.4 Terms and Abbreviations
 - 1.5 Thickness of Material & Tolerances

- 2. GENERAL REQUIREMENTS
 - 2.1 Site Investigation and Construction Design
 - 2.2 Works Compliance
 - 2.3 Goods, Materials, Sampling and Testing
 - 2.4 Notices for Inspections
 - 2.5 Dealing with Water
 - 2.6 Protection of work from Weather,
including Cold Weather Working
 - 2.7 Control of Noise
 - 2.8 Services or Supplies
 - 2.9 Works on Public Highways
 - 2.10 Damage and Danger to Highways
 - 2.11 Street Nameplates
 - 2.12 Programme of Works
 - 2.13 New Roads and Street Works Act 1991

- 3. SPECIAL REQUIREMENTS

- 4. SITE CLEARANCE

- 5. FENCING AND BARRIERS

Contents

6. EARTHWORKS

- 6.1 Choice of Specification
- 6.2 General
- 6.3 Excavation in Cutting
- 6.4 Construction of Fills
- 6.5 Standards of Compaction
- 6.6 Filling of Existing Watercourses
- 6.7 Clearing Existing Ditches
- 6.8 Completion of Formation

7. DRAINAGE AND SERVICE DUCTS

- 7.1 General
- 7.2 Excavation
- 7.3 Pipes
- 7.4 Bedding and Jointing
- 7.5 Concrete Bed and Surround
- 7.6 Jointing
- 7.7 Backfilling
- 7.8 Filter Drains and Subsoil Drains
- 7.9 Bedding and Backfilling of Filter and Subsoil Drains
- 7.10 Connections to Existing Sewers and Drains
- 7.11 Manholes and Catchpits
- 7.12 Soakaways
- 7.13 Gullies and Connections
- 7.14 Headwalls
- 7.15 Acceptance and Adoption
- 7.16 Service Ducts

8. ROADWORKS GENERAL

- 8.1 Horizontal and Vertical Alignment

Contents

- 8.2 Junctions between Development Roads and County Roads
- 8.3 Use of Surfaces by Construction Traffic
- 8.4 Construction Requirements for Materials for Sub-base and Concrete Roadbase
- 8.5 Construction Requirements for Bituminous Bound Roadbase and Surfacing
- 8.6 Testing Unbound, Cement Bound and Bituminous Bound Materials

- 9. ROADWORKS
 - 9.1 Thickness of Pavement Courses
 - 9.2 Sub-base Construction
 - 9.3 Granular Sub-base Type 1
 - 9.4 Granular Sub-base Type 2
 - 9.5 Concrete Roadbase Materials
 - 9.6 Bituminous Bound Materials
 - 9.7 Pre-cast Concrete Block Paving

- 10. KERBING, CHANNELS, FOOTWAYS, TACTILE PAVING AND CROSSINGS.
 - 10.1 Kerbing
 - 10.2 Channels
 - 10.3 Kerbing at Vehicular and Pedestrian Crossings
 - 10.4 Footways and Vehicular Crossings
 - 10.5 Ramps
 - 10.6 Adoptable Verges

Contents

11. STREET LIGHTING

11.1 Street Lighting

11.2 Signing

12. COMPLETION OF WORKS

13. STANDARD DRAWINGS

5/101B	Pedestrian Guardrails and Barriers for Footpaths
7/101B	Surface Water Drains – Drains & Beddings Details
7/102B	Filter Drains – Trench & Bedding Details
7/103B	Catchpits
7/104B	Soakaway
7/105B	Gullies
7/106B	Service Ducts
7/107	Access to chambers
10/101B	Kerb Types
10/102B	Domestic Vehicular & Pedestrian crossings
10/103B	Footway Edges and Crossings
10/104B	Paving Slab Revetment
10/105B	Ramp Detail for Shared Surface Road
10/106B	Pedestrian Crossing Detail

MAP OF SUFFOLK – showing areas and contacts

1 Introduction

- 1.1 Purpose
- 1.2 Adoption of Works
- 1.3 Definition and Interpretation
- 1.4 Terms and Abbreviations
- 1.5 Thickness of Materials & Tolerances

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1 Introduction

1.1 Purpose

- 1.1.1 It is the responsibility of the user to ensure they have the latest version of this document.
- 1.1.2 This document specifies standards of materials and workmanship which shall be used in residential or industrial developments.
- 1.1.3 The manner is described in which the works shall be carried out, the procedures to be adopted and the tolerances to be met in construction of the works.
- 1.1.4 This Specification shall apply to any works (excluding public sewers) in, under or over a highway or proposed highway being constructed or installed as part of residential or industrial development.

1.2 Adoption of Works

- 1.2.1 Adherence to the standards set out in this specification will normally ensure that works designed in accordance with Suffolk Design Guide (a companion volume) are eligible for adoption by the Highways Authority as maintainable at public expense.
- 1.2.2 It shall be noted that, if surface water drainage systems also accept discharge from areas outside future highway limits (e.g. roof water, private drives etc), then this specification and adoption shall apply to gullies and connections only leading to such systems. All other components shall comply with the requirements of Anglian Water Services, or the appointed agents to which application shall be made for adoption as a public sewer.
- 1.2.3 Any areas of planting or landscaping, other than grass, within the area of the highway will require approval by the Planning Authority prior to adoption of the works.

1.3 Definition and Interpretation

- 1.3.1 In this specification the following words and expressions shall have the meanings hereby assigned to them:
 - a) 'Director' means the Director of Environment and Transport, Suffolk County Council.
 - b) 'Area Manager' means the Director's representative, to whom reference shall be made in the first instance.
 - c) 'Director's Representative' means a person appointed from time to time by the Director to perform functions associated with the works and will normally be the Area Development Control Engineer or Clerk of Works from the appropriate Area Manager's office.
 - d) Where an Agency Agreement exists with Suffolk County Council the above definitions and interpretations shall mean the relevant Chief

Officers and appropriate representatives of the respective organisations.

- e) 'Developer' means the person or persons firm or company carrying out the works and includes the Developer's personnel representatives, successors and permitted assigns.

1.4 Terms and Abbreviations

1.4.1 Unless specifically defined otherwise, this specification uses the definition of terms in BS 6100 (Glossary of Buildings and Civil Engineering Terms).

1.4.2. Abbreviations used accord with recommendations given in BS 5775.

1.5 Thickness of Material and Tolerances

1.5.1 Unless otherwise stated to the contrary, the description of material thickness shall mean the finished or compacted thickness.

1.5.2 Where necessary, tolerance requirements are incorporated in this specification by reference in the British Standards.

2 General Requirements

- 2.1 Site Investigation and Construction
- 2.2 Works Compliance
- 2.3 Goods, Materials, Sampling and Testing
- 2.4 Notices for Inspections
- 2.5 Dealing with Water
- 2.6 Protection of Work from Weather, including Cold Weather Working
- 2.7 Control of Noise
- 2.8 Services or Supplies
- 2.9 Works on Public Highways
- 2.10 Damage and Danger to Highways
- 2.11 Street Nameplates
- 2.12 Programme of Works
- 2.13 New Roads and Street Works Act 1991

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2 General Requirements

2.1 Site Investigation and Construction Design

2.1.1 The developer shall submit with his proposals for the site layout a geotechnical report giving details of:

- a) Site contamination of any type.
- b) Soil classification at formation level.
- c) CBR values.

Formation level CBR values used for design shall be the lesser of:

- i) CBR value at natural moisture content measured insitu (BS 1377:1990:Pt.9) or in the laboratory (BS 1377:1990:Pt.4)
and

- ii) Equilibrium CBR value anticipated beneath the completed pavement as described in TRRL Laboratory Report 1132 "The structural design of bituminous roads", 1984.

Laboratory tests for CBR may be carried out on undisturbed samples recovered from formation level or on samples recompacted to the anticipated density below the completed pavement. The CBR determination shall be carried out on both ends of the sample. Where the results differ by more than 10% from the mean, the CBR value shall be calculated as follows:

$$\text{CBR} = 0.75 \text{ CBR}_{\text{bottom}} + 0.25 \text{ CBR}_{\text{top}}.$$

- d) Ground water levels.
- e) Safe earthworks slopes.

2.1.2 The in-situ testing and laboratory testing shall be carried out by a laboratory holding N.A.M.A.S. (National Accreditation of Measurement and Sampling) issued by U.K.A.S. for that test. Drilling and engineering reports shall be third party quality assured.

Sub-contracting shall not be allowed except by prior approval of the Director. Engineering interpretive reports shall be approved by a qualified Civil Engineer.

2.1.3 Special Engineering considerations will be required where the geotechnical report indicates poor ground conditions as a result of a combination of poor soil at formation level, formation level CBR values of less than 2% and high ground water tables. The Developer will be expected to show that a stable platform on which to construct the highways can be achieved.

2.1.4 On subgrades of poorly graded sand or with CBR of less than 5%, a geotextile separator shall be laid on the full width of the compacted subgrade prior to spreading the sub-base.

2.1.5 On sites where groundwater levels are within 600mm of the formation level, sub-soil drainage shall be installed and connected to the positive surface water drainage system. This sub-soil drainage shall take the form

of a 150mm perforated land drainage pipe laid with its invert 600mm below formation level in a trench 300mm wide. the pipe shall be wrapped in an approved geotextile filter and the trench backfilled with material complying with Table 6.1 of this specification.

- 2.1.6 The Developer shall submit with his proposals for the site all calculations on which which he has based his designs for surface water disposal and retaining walls.
- 2.1.7 The Developer shall not commence work on any site which is to be the subject of Adoption by the Highway Authority, until the requirements for clauses 2.1.1 to 2.1.6 above have been met and the Director has confirmed his acceptance of the designs.
- 2.1.8 Approval of the Developer's proposals for the site will not discharge the Developer of his legal liabilities to the community as a whole.

2.2 Works Compliance

- 2.2.1 The Developer shall construct, complete and maintain the works in strict accordance with this specification and approved drawings to the satisfaction of the Director and shall comply with and adhere strictly to the Director's instructions and directions on any matter connected therewith.
- 2.2.2 The Developer shall be responsible for ensuring that the works comply with this specification, and shall keep records on site at all times which shall be available for inspection by the Director or his Representative showing clearly:
 - a) Tabulations of design levels and constructed levels of drainage and sub-grade and each course of carriageway and footway construction at positions previously agreed with the Area Manager to substantiate tolerance requirements;
 - b) Drawings showing the line of the works and any deviations from the designed lines;
 - c) Details of materials ordered and delivered for inclusion in the works (e.g. delivery tickets);
 - d) Details of all compaction plant and the work to which it is put on site for each day on which drainage or highway construction is in progress.
- 2.2.3 All such records shall be signed and dated by the Developer as being a true record.
- 2.2.4 During progress of the works and on completion the Area Manager shall inspect the works and shall take cores or dig trial pits to check the validity of records and quality of materials or workmanship as appropriate.
- 2.2.5 If the records are found to be invalid then the Area Manager may deem any part or the whole of the works as unacceptable.
- 2.2.6 If the Developer's monitoring of the work indicates non-compliance with the Specification, the incidence shall be brought to the attention of the Area Manager, in writing, together with proposals for remedying the work

to comply with the Specification. Approval or otherwise will be given within 14 working days of receipt of any such notification.

2.3 Goods, Materials, Sampling and Testing

- 2.3.1 The Developer shall consult the Director to determine any work, goods or materials to be used in the Works which are the subject of a Quality Management Scheme or Product Certification Scheme and only work, goods or materials conforming with such a Scheme shall be used.
- 2.3.2 In each case, the Developer shall submit to the Director copies of the Certificates of Conformity affirming compliance with the Schemes, unless the goods or materials bear a prescribed certification mark.
- 2.3.3 No work, goods or materials shall be employed by the Developer which do not comply with the standards in the Specification.
- 2.3.4 The Developer shall submit to the Area Manager a list of the suppliers from whom the Developer proposes to purchase the goods and materials necessary for carrying out the Works, and no change in the list of suppliers and the Developer's proposals shall be made without the prior approval of the Area Manager.
- 2.3.5 Sampling of materials shall be undertaken in accordance with the relevant British Standard where applicable or otherwise as instructed by the Area Manager's Representative and the Developer shall ensure that any such samples are supplied in sufficient time for satisfactory testing, for which all costs in sampling and testing shall be borne by the Developer.
- 2.3.6 Tests on materials quality or site workmanship are to be ordered and funded by the Developer at the Area Manager's request. Under certain circumstances, the tests may be ordered by the Area Manager on behalf of the Developer who shall still be responsible for the costs of such.
- 2.3.7 All testing of materials and workmanship shall be carried out by a laboratory having N.A.M.A.S. accreditation for the test or tests specified.
- 2.3.8 Materials subsequently used in the Works shall be consistent with the samples as tested or approved by the Area Manager.
- 2.3.9 The Developer shall submit to the Area Manager test certificates furnished by the Supplier or Manufacturer of the material to indicate compliance with the relevant British Standard or other requirements of the Specification.
- 2.3.10 Where alternative specified materials are permitted, the Area Manager shall be informed in writing by the Developer of the chosen alternative at least 14 days in advance to their use and the materials shall not then be altered without the prior approval of the Area Manager.

2.4 Notices for Inspections

2.4.1 The Developer shall give the Area Manager not less than two working days notice (exclusive of weekends) of the date for each of the following works at which time the Area Manager will carry out inspections.

a) Carriageway and Footways

- 1 Intention to commence work
- 2 Setting out
- 3 Commencement of excavation (inspect subsoil conditions)
- 4 Inspection of completed formation
- 5 Commencement of laying sub-base
- 6 Kerbing
- 7 Commencement of laying road-base
- 8 Commencement of laying base course to carriageway
- 9 Commencement of laying wearing course to carriageway
- 10 Commencement of laying sub-base to footpaths
- 11 Commencement of laying base course to footpaths
- 12 Commencement of laying wearing course to footpaths
- 13 Commencement of laying of any blockwork.

b) Drainage Works

- 1 Setting out
- 2 Break into existing pipe runs before installation of saddle connection or manhole
- 3 Completion, Bedding and Haunching, but before concrete surrounding or haunching, and completion of manholes – before backfilling (tests where applicable)
- 4 Completion of backfill (tests where applicable)
- 5 Cleaning and jetting out.

2.5 Dealing with Water

2.5.1 The Developer shall keep all works free of water, including the arranging for the rapid removal of water shed on the works or entering the works from any source and including the lowering and maintaining by appropriate measures the water level in excavations sufficiently to enable the works to be constructed.

2.5.2 Any material, article or workmanship rendered unsuitable by the Developer's failure to comply with sub-clause 2.5.1 shall be remedied by the Developer at the Developer's expense and the Area Manager notified accordingly.

2.6 Protection of Works from Weather, including Cold Weather Working

- 2.6.1 The Developer shall take all necessary precautions to protect all works and materials which may be subject to damage or injury by inclement weather.
- 2.6.2 No material in a frozen condition shall be incorporated into the works, nor shall any materials be laid on a frozen surface.
- 2.6.3 Laying of material containing tar or bitumen shall cease if the temperature of the surface to be covered falls below 2° C. Where, however, the surface is dry, unfrozen and free of ice, laying may proceed if air temperatures in the shade are at or above -1°C on a rising thermometer.
- 2.6.4 Laying of materials containing cement shall cease when the descending air temperature in the shade reaches 3° C and shall not be resumed until the ascending air temperatures in the shade reaches 3° C.
- 2.6.5 If material used on the road pavement contains cement, and frost occurs during the first seven days, one day shall be added to the period which would otherwise be required before running of traffic of any sort on it for each night on which the temperature of the surface of the layer in question falls to 0°C or below.

2.7 Control of Noise

- 2.7.1 The Developer shall comply with the recommendations set out in BS 5228 Noise Control on Construction and Open Sites together with any specific requirements of the appropriate Local Planning Authority or Environmental Health office.

2.8 Services or Supplies

- 2.8.1 The Developer shall verify and be satisfied as to the exact position of apparatus for Statutory Undertakers, Publicly Owned Services and Privately Owned Services.
- 2.8.2 During the progress of the works, the Developer shall take all measures required by any Statutory Undertaker, the Management of other Publicly Owned Service, or owners of privately owned services for the support and full protection of all such services and supplies and shall ensure that no such services or supplies are interrupted without the written consent of the appropriate authority or owner.
- 2.8.3 The developer shall be solely responsible for orders given or informal arrangements made for the installation , alteration or removal of Statutory Undertakers' plant and other publicly or privately owned services or supplies.
- 2.8.4 The exception to sub-Clause 2.8.3 is street furniture and traffic signs having an electricity supply, and in which case the Developer shall give not less than 8 weeks notice in writing to the Road Lighting Engineer at Suffolk County Council.

- 2.8.5 The Developer shall be solely responsible for ensuring that the backfilling and reinstatement of Statutory Undertakers openings is completely in accordance with the requirements of this Specification.
- 2.8.6 The use of plastic covers will not be permitted within the carriageway.
- 2.8.7 Groups of three or more stop-cock covers (e.g. adjacent to blocks of flats), will not be permitted within the adoptable Highway limits, unless they are accommodated within a suitable chamber. The Developer shall submit details to the Area Manager for approval.
- 2.8.8 Covers, other than single stop-cock covers, shall not be sited within vehicular accesses or the ramped/tactile area of pedestrian crossings.
- 2.8.9 Covers shall be set to a tolerance of zero to -3mm with the surrounding surfacing.

2.9 Works on Public Highways

2.9.1 Permission

- a) If as part of the development it is necessary to carry out work affecting a public highway (including verges and footways) the Developer shall make a written application to the Director for permission to execute such works. It will be necessary for the Developer to enter into a legal Agreement, supported by a Bond, under the Highways Act (1980) before any works are commenced in the highway.
- b) The Developer shall undertake work on the public highway strictly in accordance with the Planning consent for the site and in an expeditious manner so as to cause no unnecessary inconvenience or danger to the public.
- c) The Developer shall indemnify the County Council against all third party claims resulting from his works on the public highway. The minimum amount of third party insurance to be carried by the Developer shall be £5,000,000 (£5 million).

2.9.2 Traffic Safety and Management

- a) The Developer shall take into account, when planning and carrying out work on trafficked and public highways, the recommendations of the joint report of the County Surveyors Society and the Department of Transport titled 'Safety at Roadworks : Notes for Guidance' (1994 – third edition).
- b) The Developer shall take such measures as may be necessitated by the works in accordance with recommendations contained in Chapter 8 of the 'Traffic Signs Manual' (published by Her Majesty's Stationery Office), and any amendments thereto.
- c) A Code of Practice, titled 'Safety At Street Works And Road Works' and issued by the Secretary of State for Transport, has statutory backing under the New Roads and Street Works Act 1991. Sections 65 and 124 of the Act require anyone carrying out work under the Act to do so in a safe manner as regards the signing, lighting and

guarding of the works. The Developer shall note that these Sections make it a criminal offence to fail to comply with this requirement, and these Sections make a provision:

- i) that compliance with the Code is to be taken as compliance with the legal requirements to which it relates;
and
 - ii) that failure to comply with the Code will be evidence of failure to comply with those legal requirements.
- d) When planning traffic safety and management measures, the Developer shall, after consultation with any statutory undertaker, Police or other authorities concerned, submit to the Area Manager for his consent a traffic management programme based on such consultation.
 - e) Before any work is commenced which affects the public highway, the Developer shall make fully operational all traffic safety and management measures necessitated by such works and shall have the consent of the Area Manager.
 - g) On or adjacent to trafficked highway normally open to the public, where work is carried out, the Developer shall ensure that personnel shall, at all times, wear safety helmets to the current standards and high visibility fluorescent garments which must incorporate retro-reflective marking in accordance with Chapter 8 of the Traffic Signs Manual.

2.10 Damage and Danger to Highways

- 2.10.1 Any damage caused by construction or other traffic to the highways, the surface water drains, adjacent highways maintainable at the public expense, Statutory Undertakers apparatus or other services shall be rectified at the Developer's own cost by the Developer.
- 2.10.2 The Developer shall not allow materials or equipment to be deposited on the highway so as to cause damage or obstruction or to cause the creation of nuisance or danger.
- 2.10.3 The Developer shall, in the vicinity of the works, keep highways including drains and ditches free from mud, debris or dust arising from the works.
- 2.10.4 No materials, plant, apparatus or equipment shall be left and deposited or stored on the new highways or other areas so as to constitute an actual or potential hazard or obstruction to users of such highways or areas.

2.11 Street Nameplates

- 2.11.1 The Developer shall be responsible for submitting proposals for street names to the relevant District Council in accordance with Clause 17 of the Public Health Act 1925.
- 2.11.2 Street nameplates shall, wherever possible, be wall mounted or erected on posts in hardened areas such as the back edge of footways. Grass verges

and grassed visibility splays shall not be used for the location of street nameplates.

2.12 Programme of Works

- 2.12.1 No later than 21 days before the start date of works, the Developer shall submit to the Area Manager a Programme of Works in the form of a Network Diagram or Bar Chart showing the order of procedure in which it is proposed to carry out the works.
- 2.12.2 If so requested by the Area Manager, the Developer shall furnish further details and information reasonably required or provide in writing a general description of the arrangements and methods of construction which it is proposed to adopt for the carrying out of the works.
- 2.12.3 In producing a Programme of Works to be furnished, the Developer shall demonstrate the full compliance with both this specification and the conditions attached to the relevant planning permissions imposed by the Local Planning Authority.

2.13 New Roads and Street Works Act 1991

- 2.13.1 Under the New Roads and Street Works Act 1991, the Secretary of State for Transport has issued codes of practice for certain sections of the Act.
- 2.13.2 Other Sections of the Act covered by Codes of Practice include Sections 56, 59, 60, 115, 118, 119, 84 and 143 with which the Developer shall comply as appropriate. A Code of Practice for Inspections has also been issued.
- 2.13.3 In addition and of paramount importance, it is the duty of the Developer to secure that the execution of any such works is supervised by a person having a prescribed qualification as a supervisor and that there is on site at all times when any such works are in progress at least one person having a prescribed qualification as a trained operative. The Developer shall supply the Area Manager with appropriate documentation as proof of the qualifications of the personnel which the Developer proposes to use on such works.

3 Special Requirements

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3 Special Requirements

3.1 In carrying out development proposals, the Developer will be required to comply with the requirements of other bodies.

3.2 The following are the principal bodies which may need to be contacted in respect of apparatus, drains and watercourses under their jurisdiction. Any works necessary as a result of the development will need to be agreed with them before works commence.

Environment Agency

Cobham Road
Ipswich
IP3 9JE
Tel 01473 - 727712

Anglian Water Development

Anglian Water Services
PO Box 495
Huntingdon
Cambs.
PE29 6YY
Tel 01733 - 414188

Essex and Suffolk Water Co.

Main Projects Dept
Hall Street
Chelmsford
CM2 0HH
Essex
Tel 01245 - 491234

Transco PLC

Network Support Manager
British Gas Transco
Padholme Road
Peterborough
PE1 5XR
Tel 01733 - 897940

EDF

NRSA department
Fore Hamlet
Ipswich
IP3 8AA
Suffolk
Tel 08701 - 963797

British Telecom

BT Diversionary Works Planning
Post Point HH 504
Howard House
St Andrews Street
Norwich
NR2 4TP
Norfolk
Tel 01603 - 725023/4/5/6

There are other bodies, for example, the British Pipeline Agency and Railtrack, which may need to be contacted on certain developments.

- 3.4 A cable television and communications company currently has a franchise which includes areas of Suffolk. Developers should note, that some sites will require the installation of Cable TV ductwork and associated drawpits and any other apparatus that forms part of the works. All details shall be agreed with the cable company.

4 Site Clearance

4 Site Clearance

- 4.1 Underground structures, chambers and foundations within the area of the highway shall be removed or made safe in an approved manner. Impervious structures, slabs, hardstanding areas etc, which are permitted to remain shall have holes to full depth made at uniform spacings to allow free drainage such that the total area of perforation shall not be less than 10% of the impervious area to be drained.
- 4.2 Disused soil and surface water drains within 1m of formation shall be removed.
- 4.3 All trees, hedges and undergrowth within the boundaries of the new road shall be taken down, grubbed-up and removed from site. Particular care must be taken to ensure all tree stumps and roots are removed and any holes left shall be filled with an acceptable material and compacted in layers not exceeding 225mm in loose depth to the same relative density as the surrounding soil.

5.0 Fencing and Barriers

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5 Fencing and Barriers

- 5.1 Where required, pedestrian barriers shall be provided at specified locations to layout dimensions as agreed by the Director in accordance with the Institution of Highways and Transportation document titled 'Revised Guidelines for Reducing Mobility Handicaps: Towards a Barrier-Free Environment' (published July 1991).
- 5.2 Pedestrian guard rails parallel to carriageway shall comply with the detail on Drg. No. 5/101, detail (a).
- 5.3 Pedestrian barriers for link footway shall be either:
 - a) staggered barriers as shown on Drg. No. 5/101 detail (b); or
 - b) staggered 'Kee Klamp' barriers as shown on Drg. No. 5/101 detail (c).
- 5.4 In certain locations, the Planning Authority may request alternative types of barrier to be provided and in such cases the Developer shall submit and agree detail with this Authority for approval, prior to erection.
- 5.5 In all cases components for barriers shall be hot dipped galvanised to BS 729 after fabrication.
- 5.6 At some locations, bollards will be specified to prevent the use of cycleways and footpaths by other vehicles. The Developer shall submit and agree details with this Authority, prior to erection.
- 5.7 Where roads are in cutting or on embankment, fencing may be required to delineate the highway boundary. The Developer shall submit and agree details with this Authority, prior to erection.

6 Earthworks

- 6.1 Choice of Specification
- 6.2 General
- 6.3 Excavation in Cutting
- 6.4 Construction of Fills
- 6.5 Standards of Compaction
- 6.6 Filling of Existing Watercourses
- 6.7 Clearing Existing Ditches
- 6.8 Completion of Formation

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6 Earthworks

6.1 Choice of Specification

6.1.1 The Developer shall have the option to construct the whole earthworks by:

EITHER

a) the use of this Specification, clauses 6.2 to 6.5;

OR

b) the use of the current Department of Transport Specification for Highways Works.

6.1.2 Option (b) above may only be used where the Developer provides full time, adequate, systematic, documented supervision by suitably experienced personnel under the supervision of a qualified Civil Engineer to ensure that the works comply with this alternative Specification. Supervisory and Quality Assurance systems are to be scheduled and submitted, for approval by the Area Manager, not later than four weeks prior to commencing construction of the earthworks.

6.2 General

6.2.1 All organic material shall be stripped and removed from within the boundaries of the new highway.

6.3 Excavation in Cutting

6.3.1 Excavation shall be completed to 300mm above formation level. The final 300mm of excavation shall be carried out as part of the road works construction.

6.3.2 Trial pits shall be excavated at not less than 100m centres, as required by the Surveyor, to 300mm and 750mm depth in two stages. Laboratory CBR tests shall be carried out on samples from these depths to determine the depth of sub-base required.

6.3.3 Excavation to formation level shall only take place after approval of the CBR results by the Area Manager.

6.4 Construction of Fills

- 6.4.1 Fills shall be constructed from naturally occurring, or approved manufactured, granular material and shall have the properties in Table 6.1, and shall be compacted to the requirements of the specification as follows in Table 6.2.

TABLE 6.1 FILL MATERIAL FOR EARTHWORKS AND TRENCH BACKFILL	
DESCRIPTION	PARAMETER
coefficient of uniformity	2 (min)
10% fines value	30 kN (min)
coefficient of linear shrinkage of material passing 425mm, BS sieve	4% (max)
mass passing 125mm. BS sieve	100%
mass passing 37.5mm. BS sieve	40-100%
mass passing 5mm. BS sieve	10-100%
mass passing 600mm. BS sieve	5-100%
mass passing 63mm. BS sieve	0-15%
frost heave (BS 812) of fill material below formation level and within 450mm of finished carriageway level	15mm (max)
CBR of laboratory recompact sample 4.5kg rammer method (for material within 300mm of formation)	7% (min)

TABLE 6.2 COMPACTION REQUIREMENTS FOR EARTHWORKS, TRENCH BACKFILL AND FORMATION			
COMPACTION PLANT AND WEIGHT CATEGORY	GRANULAR MATERIAL (More than 20% granular content including cement bound granular) Min. compaction, passes/layer for compacted layer thickness up to -		
	100mm	150mm	200mm
Vibrotamper 50 kg minimum	4	8	NP
Vibrating roller			
Single drum			
1000 – 2000kg	6	NP	NP
2000 – 3500kg	3	5	7
over 3500kg	3	4	6
Twin drum			
600 – 1000kg	6	NP	NP
1000 – 2000kg	3	6	NP
over 2000kg	2	3	4
Vibrating plate			
1400 – 1800kg	5	NP	NP
over 1800kg	3	5	7
Alternative compaction plant for areas of restricted access Including small excavations and trenches less than 200mm wide			
Vibrotamper 25kg minimum	Minimum of 6 compaction passes		
Percussive rammer 10kg minimum	Maximum of 100mm compacted layer thickness		
NP = Not Permitted			

Notes to Table 6/2

- 1 Single drum vibrating rollers are rollers providing vibration on one drum only
- 2 Twin drum vibrating rollers are rollers providing vibration on two separate drums.

6.5 Standards of Compaction

6.5.1 The Developer shall be responsible for achieving compactions that comply with the following:

- a) Formations and Earthworks within 200mm of formation level: Compaction to a dry density of not less than 94% of the optimum dry density obtained by the BS 1377 vibrating hammer method.
- b) Earthworks and Trench Backfill greater than 200mm below formation level: Compaction, as measured in accordance with BS 1377 Part 9 Cl. 3.2 (1990) DPSH method, shall comply with the formula.

$$N = 3 + D$$

where: N = Minimum number of blows to achieve 100mm penetration

D = Depth of test in metres.

6.6 Filling of Existing Watercourses

6.6.1 Where watercourses are encountered which are to be discontinued or diverted from the sites of carriageways, footways or other works, the original channels shall be cleared of all vegetable growths and soft deposits and carefully filled in with materials complying with Table 6/1 and compacted in accordance with Table 6/2 and Clause 6.5.

6.6.2 If in the course of construction of roadworks any springs are discovered, where possible these should be connected to the stormwater system provided for the new roads with the prior approval of the adopting authority.

6.7 Clearing Existing Ditches

6.7.1 Wherever possible, ditches within the curtilage of development areas shall be piped.

6.7.2 However, where required, existing ditches shall be cleared of all vegetable growths and deposits. The sides shall be shaped fair throughout and the bottoms properly graded. Material removed from existing ditches shall be removed from the site and deposited in approved tips to be provided by the Developer.

6.8 Completion of Formation

6.8.1 The final 300mm of excavation in cutting or removal of surcharge in fill shall be carried out not more than 36 hours in advance of laying the sub-base and with due regard to the nature of the subgrade and weather conditions.

6.8.2 The formation shall be trimmed and rolled to the compaction requirements of Table 6/2.

7 Drainage and Service Ducts

- 7.1 General
- 7.2 Excavation
- 7.3 Pipes
- 7.4 Bedding and Jointing
- 7.5 Concrete Bed and Surround
- 7.6 Jointing
- 7.7 Backfilling
- 7.8 Filter, Drains and Subsoil Drains
- 7.9 Bedding and Backfilling of Filter and Subsoil Drains
- 7.10 Connections to Existing Sewers and Drains
- 7.11 Manholes and Catchpits
- 7.12 Soakaways
- 7.13 Gullies and Connections
- 7.14 Headwalls
- 7.15 Acceptance and Adoption
- 7.16 Service Ducts

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7 Drainage and Service Ducts

7.1 General

- 7.1.1 Where any item of Highway drainage unavoidably passes under, or lies within, land which will ultimately be conveyed to the purchaser of a dwelling, an Easement will be required giving the Highway Authority right of access at all times for repair and maintenance purposes. Acknowledgement of the presence of such drainage and the maintenance thereof must be safeguarded by the inclusion of an Easement by the Developer within the conveyance of each affected property. The Developer is required to submit a draft of any such Easement to the County Solicitor for approval prior to the sale of the affected property.
- 7.1.2 Covers, other than single stop-cock covers, shall not be sited within vehicular accesses or the ramped/tactile area of pedestrian crossings.
- 7.1.3 All pipes, manholes, catchpits, soakaways and gullies shall be installed at the position, line and level as shown on the approved drawings. The Developer shall note that soakaways are not normally acceptable in urban areas.
- 7.1.4 Before construction of the carriageway, footways and visibility splays are commenced all drains, sewers and chambers within the adoptable Area shall be completed. Developers shall note that conditions attached to planning permissions require that visibility splays and junction works shall be completed before any other work commences.
- 7.1.5 A Code of Practice, titled 'Specification for the Reinstatement of Openings in Highways' and issued by the Secretary of State for Transport, has statutory backing under the New Roads and Street Works Act 1991. Sections 71 and 130 of the Act require reinstatements to comply with the Specification prescribed for materials to be used and standards of workmanship to be observed, and to ensure that reinstatements conform to prescribed performance standards:
- a) in the case of an interim reinstatement, until a permanent reinstatement is effected;
- AND
- b) in the case of a permanent reinstatement, for the prescribed period after the completion of the reinstatement.
- The Code of Practice gives practical guidance on the reinstatement standards required, and the Developer shall note that failure to comply with the duties under Section 71 or 130 constitutes a CRIMINAL OFFENCE. Compliance with the Code will satisfy the Developer's statutory obligations. The Developer shall also be aware that off site works within the public highway require the approval of the Area Manager.
- 7.1.6 No surface water drainage shall pass beneath any building.

7.2 Excavation

- 7.2.1 Trenches shall be excavated to the widths shown on Drawing Nos. 7/101 and 7/102, with the method of working and support complying with the current legislation and Codes of Practice.
- 7.2.2 Control of water into the excavation shall be sufficient to prevent standing water in the trench works.
- 7.2.3 All soft spots in the trench bottom are to be removed and filled with approved compacted material before the pipe bedding material is laid.
- 7.2.4 The trench bottom is to be completed to a smooth grade and of no greater depth than is necessary to achieve the depth of bedding specified.
- 7.2.5 With spigot and socket pipes sufficient clearance must be allowed for any sockets to avoid point loads on the pipes.

7.3 Pipes

- 7.3.1 All pipes and fittings are to carry the relevant BS number and be kitemarked. Pipes may be either rigid or flexible and shall be to the current issue of the British Standard and as in Table 7.2.
- 7.3.2 The developer shall submit pipe strength calculations if so requested by the Director.

7.4 Bedding and Jointing

- 7.4.1 Pipes shall be bedded according to Drawing Nos. 7/101 and 7/102. Flexible pipes shall use Bed Type S, and rigid pipes may use any of Bed Types A, Z, B, or S.
- 7.4.2 Material for Bed Type B, (granular Bed) and Bed type S (Bed and surround) shall comply with BS 882 to the following sizes, in Table 7.1.

TABLE 7.1	
NOMINAL PIPE DIAMETER	SINGLE SIZED AGGREGATE TO BS 882
less than 150mm	10mm
including 150mm up to 300mm	10mm or 14mm
including 300mm up to 525mm	14mm or 20mm
including 525mm and above	14mm, 20mm or 40mm

TABLE 7.2			
USE	TYPE OF PIPE	BS	NOTES appropriate for particular conditions
Surface water	Vitrified clay	65	Strength to be (Rigid) standard, extra or super
	Concrete	5911	Strength to be (Rigid) class L, M, or H
	UPVC (flexible)	4660 or 5481	Not to be used when cover is less than 1.2m under carriageway and 0.9m under footway or verge
Filter drains and sub-soil drains	Vitrified clay	65	Perforated
	Concrete	1194	Porous with ogee or rebated joints and impervious inverts
	UPVC	4660 or 5481	Perforated
	Flat invert corrugated	4962	Perforated
	For all perforated pipes the total area of perforation shall not be less than 1000mm ² /m length pipe.		

- 7.4.3 The material for bed and surround shall be well compacted beneath and to the sides of the pipes to the depths shown on the standard drawings.
- 7.4.4 The minimum pipe diameter for carrier drains shall be 225mm.

7.5 Concrete Bed and Surround

- 7.5.1 Where cover to pipes is less than 1.2m below carriageway and vehicular crossings and 0.9m below footways and verges, only rigid pipes shall be permitted and such shall be laid with a bed and surround of Mix ST2 concrete to BS 5328 and Drawing No 7/101 Type Z.
- 7.5.2 For bed type A, the concrete shall be Mix ST4.
- 7.5.3 Backfilling and compaction shall not take place until the concrete has achieved its 7 days strength.

7.6 Jointing

- 7.6.1 All joints shall be flexible type and to the appropriate British Standard for the type of pipe used.
- 7.6.2 Where a concrete surround is used with rigid pipes the flexibility of the joint must be maintained by incorporating a 12mm thick joint filler material across each joint.
- 7.6.3 Joints shall be water tight and the Area Manager may require an air test in sections such that a 100mm head of water has not dropped more than 25mm after a period of 5 minutes.
- 7.6.4 Drains passing this test must retain the air until at least 0.5m of backfill has been placed and compacted.
- 7.6.5 Drains failing to pass the air test shall have the defects made good and be re-tested.

7.7 Backfilling

- 7.7.1 In addition to the bed, surround and haunch provided above, a further layer of granular backfill shall be provided to a height of 300mm above the top of the pipe but lightly compacted only, i.e., excluding power rammers etc.
- 7.7.2 The remainder of the trench is to be filled and compacted in layers up to the formation level of the carriageway, footway, or verge level with granular backfill in accordance with the Earthworks Section (see Clauses 6.4 and 6.5).
- 7.7.3 Special care shall be taken to fill and compact voids left by the removal of trench support or shuttering.

7.8 Filter Drains and Subsoil Drains

- 7.8.1 Filter drains and subsoil drains shall be installed to the line and level as shown on the approved drawings.
- 7.8.2 Pipes shall be as Table 7/2, jointed flexibly with the recommendations of the appropriate British Standard.

7.9 Bedding and Backfilling of Filter and Sub-soil Drains

7.9.1 Filter drains shall be laid to the bed/backfill detail H or M of the Standard Drawing with the addition of any filter membrane if shown on the approved drawing.

7.9.2 The backfill material shall be Type A or Type B as Table 7.3 below.

TABLE 7.3								
PERCENTAGE BY MASS PASSING BS SIEVE SIZE								
MILLIMETRES					MICRONS			
	63	37.7	20	10	5	1.18	600	150
Type A		100			60 - 100	15 - 45	0 – 25	0 - 5
Type B	100	85 - 100	0 – 25	0 - 5				

7.9.3 Type A is to be used for subsoil drainage and Type B if surface water is to flow to the pipe.

7.9.4 Backfill material is to be deposited in layers not exceeding 225mm and compacted.

7.10 Connections to existing sewers and drains

7.10.1 Where shown on the deposited drawings existing pipes shall be extended, satisfactorily connected and jointed to the new drains with the approval of the appropriate authority.

7.10.2 Connections between such pipes and sewers shall be made with purpose built oblique junctions surrounded by Grade C10P concrete.

7.10.3 No drain, duct or service discovered during the course of construction shall be blocked off or diverted without the consent of the Area Manager or the appropriate District Council or other Statutory Authority as required.

7.10.4 The method of connections of any such pipe must be agreed with the Area Manager or other inspecting Authority.

7.10.5 Where highway drains are fractured or a diversion is required all such work shall be at the Developer's expense.

7.11 Manholes and Catchpits

- 7.11.1 Catchpits and manholes shall be constructed in the locations and to the levels shown on the approved drawings and as Drg. No. 7/103, including a 300mm sump, and as Drg. No. 7/107. The spacing between chambers shall not exceed 75m.
- 7.11.2 In cases where maximum full bore velocities are in excess of 2m/sec, and the direction of flow changes more than 45 degrees or where access to clean out a sump by mechanical means cannot be achieved then the sump shall be omitted and the base of the manhole benched in a mix ST4 concrete with 25mm granolithic concrete finish and half-round channels to the manhole invert.
- 7.11.3 On any catchpit, manhole, or soakaway, the first two pipes of any inlet or outlet shall be a short length pipe not exceeding a maximum 300mm from the concrete surround/backfill surround face plus a rocker pipe not exceeding 600mm length except for pipes over 450mm diameter when rocker pipes can be 1m long. Precast units shall be jointed with permitted types of mortar and the manhole or catchpit shall be watertight with no identifiable loss of water into the permanent works.
- 7.11.4 Manhole tops shall be to BSEN124:1994 Class D400, be silent in use, and have a minimum frame depth of 100mm, where located in the carriageway. All manhole tops shall be clearly marked on the upper surface with the maker's name/logo, EN124, the appropriate loading class and mark of the certifying body, additionally the letters "SW" or "FW" as appropriate in one corner. Manhole tops shall incorporate prising slots to enable covers to be loosened prior to attempting to lift them from their frame. In addition, manhole tops shall incorporate a non-captive hinge and be designed in such a way as to ensure that the covers can be fully removed without the need for any single operative being exposed to loads in excess of 25 kg.
- 7.11.5 Manhole tops shall be bedded on a resin mortar in accordance with the recommendations set out in the Highway Agency Guidance Note HA104/2 on between 2 and 4 courses of Class B engineering brickwork laid 225mm header pattern. Precast concrete cover seating rings to BSEN124:1994 may be used instead of brickwork.
- 7.11.6 All tops in the carriageway shall be placed after completion of the basecourse layer and shall remain at basecourse level (inclusive of gullies) unless the wearing course is to be laid within the following 3 days, in which case such covers shall be raised to finished levels.
- 7.11.7 Backfill to the concrete surround of manholes and catchpits shall be granular fill placed and compacted in layers not exceeding 125mm thickness to clause 7.7 and the Earthworks Section.
- 7.11.8 Where compaction to the appropriate standard cannot be obtained the backfill shall comprise Mix ST2 concrete.
- 7.11.9 To enable satisfactory construction and completion of roadbase and basecourse materials, manholes and catchpits shall be left at cover slab level until completion of the basecourse layer. The cover slab openings shall be protected with steel road plates and paving machine allowed to

run through without interference. Gully topss may be set at basecourse level prior to the laying of roadbase and basecourse.

- 7.11.10 On completion of the basecourse layer the road plates shall be exposed and removed and the covers and frames bricked up to basecourse level. Any making good between the brick work and surrounding surfacing shall be carried out in Mix ST2 concrete.
- 7.11.11 In areas of high risk, e.g. outside schools, on approaches to traffic signals, roundabouts and crossing, or other areas where a high skid resistant surface is specified, manhole covers shall have a minimum PSV of 70.

7.12 Soakaways

- 7.12.1 Soakaways are normally not acceptable in urban situations.
- 7.12.2 The Highway Authority will only consider the use of soakaways on developments where it is not possible to drain the highways by a positive system. The Developer must produce written evidence of approval to drainage by soakaway from the Environment Agency.
- 7.12.3 The Developer is advised to contact the Environment Agency at an early stage if the use of soakaways is considered the only feasible solution and the first point of contact should be the Regional Office as follows:

Environment Agency

Cobham Road

Ipswich IP3 9JE

Tel 01473 727712 or 0845 933 3111

- 7.12.4 Commuted sums will be required at the time of completion of any Section 38 or other agreement under the Highways Act (1980) which includes soakaways for highway drainage intended for adoption by this Authority.
- 7.12.5 Soakaways shall be located in areas of public open space within a development. Other areas for the location of soakaways may be adopted as highway.
- 7.12.6 Soakaways shall be designed to take account of the prevailing ground conditions and in accordance with design parameters and methods agreed with this Authority.
- 7.12.7 Soakaways shall be constructed as Drg. No. 7/104 and Drg. No. 7/107 unless otherwise agreed with the edge of the excavation located clear of the carriageway channel a distance equal to the full depth (cover level to sump) of the soakaway with a minimum of 4m clearance. They shall be linked wherever possible.
- 7.12.8 Soakaway tops shall be to BSEN124:1994 Class D400, be silent in use, and have a minimum frame depth of 100mm. All soakaway tops shall be clearly marked on the upper surface with the maker's name/logo, EN124, the appropriate loading class and mark of the certifying body, additionally the letters "SW" in one corner. Soakaway tops shall incorporate prising slots to enable covers to be loosened prior to attempting to lift them from their frame. In addition, soakaway tops shall incorporate a non-captive hinge and be designed in such a way as to ensure that the covers can be

fully removed without the need for any single operative being exposed to loads in excess of 25 kg.

- 7.12.9 Soakaway tops shall be bedded on a resin mortar in accordance with the recommendations set out in the Highway Agency Guidance Note HA104/2 on between 2 and 4 courses of Class B engineering brickwork laid 225mm header pattern. Precast concrete cover seating rings to BSEN124:1994 may be used instead of brickwork.

7.13 Gullies and Connections

- 7.13.1 Gullies and connections shall be installed at the locations shown on the approved drawings unless otherwise agreed by the Area Manager.

- 7.13.2 Gullies shall be constructed to Drawing No. 7/105. Gully pots must be precast concrete to BS 5911 part 2 and uPVC pots used as formers are not acceptable.

- 7.13.3 The internal diameter of gully pots shall be 375mm on all carriageways. Pots shall be 750mm deep with a 150mm diameter outlet and trapped.

- 7.13.4 Gully tops shall be to BSEN124:1994 Class C250, be silent in use and have a minimum frame depth of 100mm where located in housing estate roads. Where located on Local Distributor or roads of a higher classification, class D400, silent in use and have a minimum frame depth of 100mm, shall be used. On cyclepath/footways covers and frames will be Class C250 provided they are silent in operation, have a minimum frame depth of 100mm and be pedestrian friendly mesh grate design. All gully tops shall be clearly marked on the upper surface with the makers name/logo, EN124, the appropriate loading and mark of the certifying body

The dimensions of the clear opening to be approximately 370mm (along the kerblines) by 430mm, to give a waterway area of approximately 1000cm². Gully tops shall incorporate a captive hinge arrangement to prevent removal and theft.

Double-triangular gratings are not permitted.

- 7.13.5 Gully tops must be placed directly over the gully pot and bedded on a resin mortar in accordance with the recommendations set out in the Highway Agency Guidance note HA104/2 on between 1 and 3 courses of 225mm Class B engineering brickwork except where the connecting pipe crosses the carriageway and the invert of the spigot is required to be 175mm minimum below formation level when more than 3 courses of brickwork will be permitted. Precast concrete cover seating rings to BSEN124:1994 may be used instead of brickwork.

- 7.13.6 The frames are to be supported by brickwork laid as the Drawing, in a header pattern and with any corbelling not more than 25mm per course.

- 7.13.7 The use of lintels for support is not permitted.

- 7.13.8 The misalignment of gully pots from the kerblines by more than 50mm is not acceptable and the gully frame must be tight up against the kerb face in order to prevent water over-running.

- 7.13.9 The change from the rectangular internal profile of the brickwork to that of the circular gully pot must be neatly benched in Class 1 mortar to BS 5628 and BS 5224.
- 7.13.10 Gully connections shall have flexible joints with the first joint not exceeding 2m from the gully.
- 7.13.11 The length of any gully connection shall not exceed 12m.
- 7.13.12 Junctions to the main pipe runs will be by means of purpose made oblique junctions and fitted seals if not immediately connected to the gullies to enable testing to take place if required.
- 7.13.13 Purpose made saddles will not be acceptable to form junctions to a new system unless previously agreed with the Area Manager. All holes cut for saddles shall be inspected and checked for position, pipe damage and debris in pipeline prior to fixing saddles.
- 7.13.14 Gully tops shall be installed at such a level so as to drain the carriageway at the base course level, unless the wearing course is to be laid within 3 days of the base course. Gully tops can then be raised to the final levels just prior to the wearing course being laid.
- 7.13.15 Gullies shall be covered during construction and must not be used as a means of disposing of mud and site debris during the construction period.

7.14 Headwalls

- 7.14.1 At the inlet and outfall of pipes to all open ditches and watercourses, headwalls shall be constructed in accordance with details which the Developer shall have agreed with the Environment Agency and which have been submitted as detailed drawings previously approved by the Director.
- 7.14.2 Headwalls shall be fitted with such grills, frames and traps as required by the Director which are childproof but that will still allow access.

7.15 Acceptance and Adoption

- 7.15.1 In accordance to any testing during construction the Area Manager may require an air test between chambers before a Substantial Completion Certificate is issued.
- 7.15.2 At this stage all gullies, chambers and soakaways shall be cleared out by mechanical suction and all works left clean and free of silt, debris etc.
- 7.15.3 On adoption a further emptying will be required along with pressure clean of all pipe runs by a competent Contractor and the Area Manager will require to see the written report of the operator concerning any defect, blockages etc.
- 7.15.4 In addition the Area Manager may ask for a CCTV survey with interpretation by a trained operative and a copy of the video tape recording supplied to the Area Manager. All costs for such shall be borne in full by the Developer.
- 7.15.5 It is the policy of the Highway Authority not to finally adopt a road unless all the drainage within it and to the outfall, but which may also include some off-site works, is to be publicly maintainable by the County Council or other Statutory Undertaker and an Agreement to that effect has been engrossed.
- 7.15.6 The Developer shall therefore ensure that at the same time the request to adopt a road is made to the County Council, the Developer also arranges for adoption of any sewers, manholes, drains etc. that are to be the responsibility of other Authorities under a Section 104 Agreement of the Water Industry Act.
- 7.15.7 Failure to do this may delay adoption of the highway.

7.16 Service Ducts

- 7.16.1 Service ducts are to be laid to Drawing No. 7/106. All service ducts shall be laid at such times and in such a manner as to ensure that no disturbance is caused to any construction already executed.
- 7.16.2 Backfill materials and compaction standards shall be as for drainage trenches with special care required around covers and boxes.
- 7.16.3 Pipes for service ducts shall be GREY for British Telecom and BLACK for lighting and electricity services and laid so that no concrete or debris is able to enter the duct.

- 7.16.4 Any ducts and/or cables installed for private apparatus (viz. apparatus that is not the responsibility of a Statutory Undertaker) must be licensed by the County Council prior to adoption. Application for the licence must be made by the Company owning the apparatus.
- 7.16.5 Failure to comply with 7.16.4 above may delay adoption of the highways.
- 7.16.6 Service ducts for streetlighting or traffic/pelican signal installations shall be ORANGE in colour, constructed from a low density polythene material with the wording STREET LIGHTING or TRAFFIC SIGNALS as appropriate stamped at one metre intervals along the length of the duct.

8 Roadworks General

- 8.1 Horizontal and Vertical Alignment
- 8.2 Junctions between Development Roads and County Roads
- 8.3 Use of Surfaces by Construction Traffic
- 8.4 Construction Requirements for materials for Sub-base and Concrete Roadbase
- 8.5 Construction Requirements for Bituminous Bound Roadbase and Surfacing
- 8.6 Testing Unbound, Cement Bound and Bituminous Bound Materials

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8 Roadworks General

8.1 Horizontal and Vertical Alignment

8.1.1 Submission of records

- a) A log of the levels relative to O.D. shall be available on site and kept for inspection by the Area Manager.
- b) The measurements and levels shall be made either by a qualified Civil or Structural Engineer and/or Chartered Surveyor, approved by the Area Manager.
- c) Records shall indicate:
 - i) a grid of points with not more than 10m between any two longitudinal stations or 2m between any two traverse stations, except where the Area Manager shall direct that a closer spacing be used to cater for abnormal vertical curvature.
 - ii) the design level of each station.
 - iii) the achieved level at the station measured to an accuracy of $\pm 5\text{mm}$.
 - iv) the difference between the design level and the achieved level.
 - v) certification that levels between stations were not more than $\pm 5\text{mm}$ from a 'straight bone' line and followed by a smooth curve where the general levels or the area indicated a curve.
 - vi) certificate that the levels had not been adjusted since the taking of readings.
 - vii) the name, signature and qualifications of the person who recorded the levels.

8.1.2 Tolerance in Surface Levels of Carriageway Pavement Courses

Carriageway surface	0 to + 6mm
Basecourse (upper level)	- 6mm to + 6mm
Roadbase (upper level)	- 10mm to + 10mm
Sub-base (upper level)	- 10mm to + 10mm
Formation	- 40 mm to 0

8.1.3 Surface Regularity

- a) The longitudinal regularity of wearing course surfaces shall be within the relevant tolerances stated in Table 8.1.

TABLE 8.1					
IRREGULARITY EXCEEDING (mm)	MAXIMUM NO. OF IRREGULARITIES AS MEASURED BY A DOT ROLLING STRAIGHT EDGE				
	4		7		10
Traverse length	20	50	20	20	any
Shared surface road	11	22	3	5	none
Minor access road	8	16	1	2	none
Major access road					
Local distributor road	6	12	1	2	none

- b) Compliance with Table 8/1 shall be tested by a rolling straight edge of the type designed by the Transport and Road Research Laboratory, operated parallel to the centre line of the carriageway and 1.2m from the nearside edge of each lane of the carriageway.

8.1.4 Rectification of Tolerance Errors

- a) Where any tolerance is exceeded the Developer shall determine the full extend 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.

- b) Formation Level

If the surface is too high it shall be re-trimmed and re-compacted. If the surface is too low the deficiency shall be corrected by the addition of fresh suitable material of the same classification laid and compacted to specification.

- c) Roadbases and Sub-bases

Where these consist of unbound material the top 75mm shall be scarified, reshaped, with added material as necessary, and re-compacted all to specification. The area treated shall normally be less than 10m long and 2m wide or such less length to be determined by the Director as necessary to obtain compliance with the specification.

Where the courses consist of cement treated material, the method of correction will depend on the period which has elapsed between detection of the error and the time of mixing of the material. If this is less than two hours, the surface shall be scarified to a depth of not less than 50mm supplemented with freshly mixed material as necessary and re-compacted all to specification. If the period is two hours or more the full depth of the layer shall be removed from the pavement and replaced to specification. In either case the area treated shall be not less than 5m long by 2m wide. For areas corrected, within seven days of laying, no construction traffic or compaction plant shall use the surrounding satisfactory areas.

Coated macadam or asphalt roadbases shall have the full depth of the top layer removed and be replaced with fresh material laid and compacted to specification. Any area so treated shall be at least 5m long and not less than one lane wide.

d) Basecourses and Wearing Courses

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

Where the surface level of a basecourse or wearing course is too high or too low, the area rectified shall be at least 5m or 15m long respectively and not less than one lane wide.

Where the number of surface irregularities exceeds the limits in Table 8/1 the area to be rectified shall be 200m or 50m long, as appropriate, and not less than one lane wide, or such less length to be determined by the Director as necessary to make the surface regularity conform with limits.

8.2 Junction Between New Estate Roads and Existing County Roads

8.2.1 The new estate road, where it joins the existing County Road, shall have its bellmouth, footpaths and visibility splays constructed to finished surfacing levels prior to any other works taking place on the site in accordance with Planning Conditions for the Development.

8.2.2 The existing carriageway shall be cut back to a clean vertical edge and the development constructed up to that edge.

8.2.3 The wearing course shall be overlapped by 100mm to 150mm with the vertical joint receiving hot applied 50 pen. bitumen.

8.3 Use of Surfaces by Construction Traffic

8.3.1 Construction traffic shall be allowed to run over the construction layers only after the periods in the following table have elapsed:

LAYER DESCRIPTION	PERIOD
Cement bound materials in flexible pavement	7 frost free days from laying*
Bituminous material	Sufficient time to allow hardening
Unbound materials	N.A
*Where the Developer can demonstrate that a pavement will reach its 7 day specified strength in less than 7 days, the pavement may be trafficked once the 7 days strength has been obtained.	

- 8.3.2 Before placing any layer of pavement, the preceding layer shall be clean and free from contamination. If unbound materials become contaminated they shall be cleaned, scarified and recompact to the approval of the Director before the succeeding layer is placed.
- 8.3.3 Sub-base, concrete roadbase and bituminous roadbase shall not be used by construction traffic except for that traffic required to construct the next layer. If the Developer requires to traffic roadbase with plant for any other purpose, then the Developer shall increase by 20mm the design thickness of the roadbase at his own expense and this shall be clearly indicated on the approved drawings and detailed in the programme of works to be furnished.

8.4 Construction Requirements for Materials for Sub-Base and Concrete Roadbase

- 8.4.1 Material for sub-base and concrete roadbase shall be supplied and laid to conform with the following:

a) Transporting

- 1) 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 to be laid and protected from the weather both during transit from the mixer to the laying site and while awaiting tipping.

b) Laying

- 1) All material shall be placed and spread evenly. Spreading shall be undertaken either concurrently with placing or without delay. Except where otherwise specified in individual clauses, the material shall be spread in one layer so that after compaction the total thickness is as specified. For cement treated materials the Developer shall so organise the work that the longitudinal joints against hardened material are avoided so far as possible. Before work proceeds against a longitudinal joint of such material 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.

c) Compacting

- 1) Unbound and cement bound materials shall be compacted using a vibrating roller to a dry density of not less than 94% of the optimum dry density obtained by the BS1377 vibrating hammer method.
- 2) Compaction of unbound materials is to be carried out in the same day and for cement bound materials within two hours of either the adding of the cement or the water.

- 3) Compacting equipment shall not bear directly on hardened or partially hardened cement treated material previously laid other than that necessary for achieving the specified compaction at the joint.
 - 4) Special care shall be taken to obtain full compaction in the vicinity of both longitudinal and traverse joints and in the case of cement treated material the developer shall use special small compactors in addition if necessary. Any poorly compacted cement treated material in the vicinity of construction joints shall be removed and replaced with fresh material.
 - 5) The surface of any layer of material shall, on completion of compaction, be well closed, free from movement under compaction plant and from compaction planes, ridges, cracks or loose material. All loose, segregated or otherwise defective areas shall be made good to the full thickness of layer and re-compacted. If, in the case of cement treated material, this cannot be done within two hours of batching the making good shall comprise the material being broken out to the full thickness of layer, removed and replaced with freshly mixed material compacted to specification.
- d) Protection and Curing
- 1) Any layer of cement treated material shall, immediately on completion of compaction, be cured for a period which shall not be less than seven days.

Curing the surface of the layers shall be achieved by one of the following methods:
 - 2) Covering until the next pavement layer is laid with approved impermeable plastic sheeting, adequately secured from being blown off the surface with joints overlapped at least 300mm and set to prohibit egress of moisture.
 - 3) Bituminous spraying at a rate of 1 ± 0.3 l/m². Binders used shall be either road tar to BS 76, cut-back bitumen to BS 3690, Class 1 spray grade anionic bitumen road emulsion to BS 434 or spray grade cationic emulsion, Cationic emulsion shall comply with BS 434 in respect of general properties.

8.5 Construction Requirement for Bituminous Bound Roadbase and Surfacing

- 8.5.1 Material for bituminous bound roadbase and surfacing shall be supplied and laid to conform with the requirements for BS 594 for asphalt materials or BS 4987 for macadams, except that a minimum percentage refusal density (PRD) of 94% shall be achieved.
- 8.5.2 Where a bituminous course is not overlaid with a further course within 3 days the course shall have an approved tack coat applied in accordance with the general requirements of BS 594 immediately prior to overlaying.

8.6 Testing Unbound, Cement Bound and Bituminous Bound Materials

8.6.1 The testing of aggregates shall comply with BS 812 and of bitumen with BS 3690.

a) Unbound Material

- 1) Material shall be sampled once for each 200 tonnes delivered from sub-base material. In cases of dispute the sampling precedence deemed to apply shall be the taking of samples as described in BS 812 from a 'stockpile' being that arising from the tipping of one full truck load.
- 2) Crushed material shall be sampled as in paragraph (i) above except that, providing that the material is not to be stockpiled, the material may be sampled from the crusher or loading conveyor by the agreement of the Director.

b) Cement Bound Material

- 1) Four tests for density and four tests for strength shall be taken from each day's work or each 1,000m², whichever is the lesser quantity, and the procedure shall be:
 1. Samples of mixed material will be taken immediately before laying and compacted in 2 cube moulds by the vibrating hammer method BS 1924 (to 'refusal').
 2. An area in the immediate vicinity from which the sample was recovered shall be used for the determination of dry density in accordance with BS 1924 'Sand Replacement Method' or 'Nuclear Densimeter Method' within a period of from four to twenty-four hours after adding the cement to the mix. Where the nominal size of aggregate is 20mm or less the 150mm diameter apparatus may be used in lieu of the BS 200mm diameter apparatus.
 3. One cube from each pair shall be stripped within four to eight hours of making and the dry density calculated. In making the calculation it shall be assumed that the moisture content as laid was higher than the recorded by oven drying by 10% of the oven dried moisture content.
 4. One cube from each pair shall be cured for 7 days for strength testing, on the site or at an approved laboratory. Curing and testing shall be in accordance with BS 1881.

c) Bituminous Bound Material

- 1) Bituminous mixtures shall be sampled and tested at the rate of not less than one sample for each 75 tonnes laid, with a minimum of one sample per day for each type of material. The sampling and analysis shall be in accordance with BS 598.

d) Costs of Sampling and Tests

- 1) The costs of all samples and tests carried out will be borne by the Developer.

9 Roadworks Materials

- 9.1 Thickness of Pavement Course
- 9.2 Sub-base Construction
- 9.3 Granular Sub-base Type 1
- 9.4 Granular Sub-base Type 2
- 9.5 Concrete Roadbase Materials
- 9.6 Bituminous Bound Materials
- 9.7 Pre-cast Concrete Block Paving

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9 Roadworks Materials

9.1 Thickness of Pavement Courses

- 9.1.1 For each road designation, the thickness of the individual pavement courses shall be constructed as Table 9.2

9.2 Sub-base Construction

- 9.2.1 Carriageway sub-base construction shall consist of Type 1 or Type 2 material. However, in all cases the upper 225mm of material shall be Type 1.
- 9.2.2 Recycled materials may be permitted in sub-base construction. Should the developer intend to use such, details of these materials, including results of testing to Cl. 710 and Table 8/3 of the Specification for Highway Works, and the source and estimated final quantity in the works, shall be agreed with the Area Manager before works commence.
- 9.2.3 The full thickness of the sub-base shall continue for a distance of 300mm beyond the limits of the kerb beam.
- 9.2.4 All sub-base materials shall carry a certificate of Non Frost Susceptibility.
- 9.2.5 If the sub-base is contaminated from use by construction traffic, all contaminated material shall be removed and replaced with fresh material and recompacted to the Area Manager's satisfaction.

TABLE 9.1 SUB-BASE TYPES 1 AND 2 RANGE OF GRADINGS		
BS SIEVE SIZE	PERCENTAGE BY MASS PASSING	
	Type 1	Type 2
75mm	100	100
37.5mm	85 – 100	85 – 100
10mm	40 – 70	45 – 100
5mm	25 – 45	25 – 85
600micron	8 – 22	8 – 45
75 micron	0 – 5	0 - 10
The particle size shall be determined by the washing and sieving method of BS812 Part 103		

TABLE 9.2
DEPTH OF PAVEMENT COURSES

ROAD CATEGORY	DEPTH OF SUB-BASE FOR CBR VALUES					ROAD BASE DEPTH (mm)		SURFACING DEPTH (mm)	
	less than 2%	2%	3%	4%	5% and greater	Bitumen bound	Lean concrete	Base course	Wearing course
Shared surface road	See Clause 2.1.3	370	280	225	225	--- 80 HRA 100 DBM	--- --- ---	concrete blocks on 35mm sand	
Minor access road	"	420	320	250	225	--- HRA 100 DBM 120	130 --- ---	HRA 60 HRA 60 HRA 50	HRA 50 HRA 50 HRA 50
Major access road	"	450	340	270	225	--- HRA 130 DBM 150	140 --- ---	HRA 60 HRA 50 HRA 50	HRA 50 HRA 50 HRA 50
Local distributor road	"	500	380	300	225	--- HRA 150 DBM 170	180 --- ---	HRA 70 HRA 50 HRA 50	HRA 50 HRA 50 HRA 50

- Notes: 1 Where sub-grade is frost susceptible, the sub-base depth shall be increased to provide a minimum construction depth of 450mm.
2 Where CBR is less than 5%, see Cl. 2.1.4.
3 Where CBR is less than 2%, special measures will apply
4 For concrete roadbase, see Cl. 9.5.1

9.3 Granular Sub-base – Type 1

- 9.3.1 Type 1 granular material shall be crushed rock, crushed slag, crushed concrete or well burnt non-plastic shale. The material shall be well-graded, and lie within the grading envelope of Table 9.1.
- 9.3.2 The material passing the BS sieve shall be non-plastic as defined by BS 1377, and tested in compliance therewith.
- 9.3.3 The material shall be transported, laid and compacted without drying out or segregation
- 9.3.4 The material shall have a 10% fines value of 50kN or more when tested in compliance with BS 812 except that samples shall be tested in a saturated and surface dried condition. Prior to testing the selected test portions shall be soaked in water at room temperature for 24 hours without previously having been oven dried.

9.4 Granular Sub-base – Type 2

- 9.4.1 Type 2 granular material shall be natural sands, gravels, crushed rock, crushed slag, crushed concrete or well burnt non-plastic shale. The material shall be well-graded and lie within the grading envelope of Table 9.1.
- 9.4.2 The material passing the 425mm BS sieve when tested in compliance with BS 1377 shall have a plasticity index of less than 6.
- 9.4.3 The material shall satisfy the minimum CBR requirement of 30% when tested in accordance with BS 1377 Test 16, with surcharge discs. The material shall be tested at the density and moisture content likely to develop in equilibrium pavement conditions which shall be taken as being the density relating to a uniform air voids content of 5% and the optimum moisture content determined in compliance with BS 5835.
- 9.4.4 The material shall have a 10% fines value of 50kN or more when tested in compliance with BS 812 except that the samples shall be tested in a saturated and surface dried condition. Prior to testing the selected test portions shall be soaked in water at room temperature for 24 hours without previously having been oven dried.
- 9.4.5 The material shall be transported, laid, compacted and maintained while exposed at a moisture content within the range 1% above to 2% below the optimum moisture content determined in compliance with BS 5835 and without drying out or segregation.
- 9.4.6 Because of the difficulty of achieving compliance with Clause 9.4.5 during periods of wet weather, developers are advised to consider the sole use of materials complying with Clause 9.3 (Type 1), as the road sub-base.

9.5 Lean Concrete Roadbase Materials

- 9.5.1 Lean Concrete roadbase may be used as a roadbase for some road designations. Lean Concrete shall be constructed in accordance with the DoT Specification for CBM3 material subject to the following:
- i) The roadbase to be constructed as a continuous operation shall be in excess of 200m length of full width carriageway;
AND
 - ii) This option may only be used if the Developer can demonstrate that the Developer will provide full time adequate systematic documented supervision by a qualified Civil Engineer to ensure that the works comply with the DoT Specification.
- 9.5.2 The material shall comply with the DoT Specification for CBM3 material and shall be laid to the thicknesses in Table 9.1 and compacted using a vibrating roller to a dry density of not less than 94% of the optimum dry density obtained by the BS 1377 vibrating hammer method.
- 9.5.3 Details of the supervision and a method statement for the laying of lean concrete are to be submitted in writing for approval by the Area Manager at least two weeks in advance of the construction of the roadbase.

9.6 Bituminous Bound Materials

- 9.6.1 Bituminous bound materials shall comply with BS 594 for asphalt, or BS 4987 for macadams.
- 9.6.2 The composition shall comply with Table 9.3 of this specification. Where gravel coarse aggregate is used 2% of OPC shall be substituted for 2% of sand.
- 9.6.3 For wearing course mixtures the coarse aggregate shall be crushed rock only.
- 9.6.4 Pre-coated chippings, size 20mm, shall be applied to the wearing course of the carriageway to the requirements of BS 594 and Table 9.3 of this Specification.
- 9.6.5 Carriageway channels shall be free of chippings over a width of 200mm.
- 9.6.6 Stone Mastic Asphalt or Dense Bitumen Macadam may be permitted on certain developments. The use and specification of these materials shall be agreed with this Authority before work commences.

TABLE 9.3
BITUMINOUS BOUND MATERIALS

T = table number C = column number B = binder Cl = clause

ROAD CATEGORY	S.S.R	Minor A.R	Major A.R	L.D.R.
*Roadbase composition	T2, C 2/5	T2, C 2/5	T2, C 2/5	T2, C2/5
Roadbase composition, BS 4987	Cl. 5.2	Cl 5.2	Cl 5.2	Cl 5.2
*Roadbase binder BS 3690: Pt 1 1989 Pen-grade (HRA/macadam)	50/100	50/100	50/100	50/100
*Basecourse composition (in conjunction with lean concrete)	---	C 2/2	C 2/2	C 2/2
*Basecourse composition (in conjunction with bituminous bound base	---	C 2/2	C 2/2	C 2/2
*Basecourse and wearing course binder	---	T1, B3	T1, B3	T1, B3
*Wearing course composition	---	C 6/5	C 6/5	C 6/5
Coarse aggregate PSV minimum	---	---	45	45
PCC PSV minimum	---	55	55	60
PCC nominal size (mm)	---	20	20	20
AAV all coarse aggregate and chippings maximum	---	12	12	12
Texture depth (except for roundabouts) sand patch	---	1.2mm	1.2mm	1.2mm
TRRL mini texture meter	---	0.9mm	0.9mm	0.9mm

All references in these lines refer to BS 594 Part 1 (except where stated)

9.7 Precast Concrete Block Paving

- 9.7.1 Block Paving shall be used as a surfacing material for Shared Surface Roads, and laid in accordance with BS 7533 (part 3). Block paving may also be used on Minor Access Roads.
- 9.7.2 Carriageway channels shall have a minimum grade of 1 in 80.
- 9.7.3 Covers within areas of block paving shall have a minimum clear depth of 100mm continuously around the edge of the casting.
- 9.7.4 Blocks shall measure 200mm x 100mm x 80mm and colour shall be red, charcoal, buff, brindle type or natural. It is recommended that brindle type are used.
- 9.7.5 Pavement construction shall comprise a sub-base and roadbase designed in accordance with Table 9/1, a laying course of sharp sand 35mm thick when compacted and a surface course of closely fitting blocks laid in an interlocking pattern (normally herringbone and two stretcher courses for drainage purposes) to be agreed by the Area Manager. It is recommended that bitumen based joints be used around gully gratings and covers to prevent scour.
- 9.7.6 Block paving shall be completed before the occupation of any dwelling on a development. This may require paving to be completed early within a construction programme, and care will be needed to ensure protection of the finished surface.

10 Kerbing, Channels, Footways, Crossings, Ramps and Verges

- 10.1 Kerbing
- 10.2 Channels
- 10.3 Kerbing at Vehicular and Pedestrian Crossings
- 10.4 Footways and Vehicular Crossings
- 10.5 Ramps
- 10.6 Adoptable Verges

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10 Kerbing, Channels, Footways, Tactile Paving, Crossings, Ramps and Verges

10.1 Kerbing

- 10.1.1 Kerbs shall be hydraulically pressed granite aggregate to BS 7263 and laid upright.
- 10.1.2 Hydraulically pressed small element textured kerbs and granite setts shall only be laid in conjunction with concrete block paved carriageways.
- 10.1.3 Kerbs shall be butt jointed and laid in accordance with Drawing Nos. 10/101, 10/102 and 10/103 to the line and levels shown on the approved drawings or to any revised line or level approved by the Area Manager.
- 10.1.4 Kerbs shall be laid with the top and front faces flush and within $\pm 3\text{mm}$ of the design levels. Temporary kerbs do not give adequate control of line and level and shall not be permitted.
- 10.1.5 The construction of Roadbase and surfacing shall not be permitted without the kerbing having been laid first.
- 10.1.6 Purpose-made Radius Kerbs shall be used where any radius is 12m or less.
- 10.1.7 A kerb upstand of 125mm reducing to 25mm for vehicular accesses, and flush for pedestrian/cycle crossings with tactile paving, shall be maintained for:
 - a) Local distributor Roads.
- 10.1.8 A kerb upstand of 100mm reducing to 25mm for vehicular accesses, shall be maintained for:
 - a) Major Access Roads – flush for pedestrian/cycle crossings with tactile paving.
 - b) Minor Access Roads – flush for pedestrian crossings with tactile paving.
- 10.1.9 A kerb upstand of 25mm shall be maintained for:
 - a) Shared Surface Roads. No dropped kerbs required for vehicular crossings.

10.2 Channels

- 10.2.1 Carriageway channels shall be formed free of chippings over a width of 200mm to a true and even gradient of not flatter than 1 in 125. On block paved surfacing, the gradient shall be not flatter than 1 in 80.
- 10.2.2 Where a minimum fall of 1 in 125 cannot be achieved, precast concrete channel blocks, 250mm x 125mm to BS 7263, shall be provided for gradients between 1 in 125 and 1 in 200.
- 10.2.3 Gradients flatter than 1 in 200 will not be permitted.

10.3 Dropped Kerbing and Tactile Paving

- 10.3.1 Vehicular crossings shall have kerbs dropped to show a 25mm face as Drawing No. 10/102 for at least the width of the access or for such lengths as may be required, or specified on the approved drawing.
- 10.3.2 Purpose made 'taper' kerbs shall be provided to make the transition from 125mm x 250mm half-batter kerbs to 125mm x 150mm bullnose kerbs which shall be used to cross the access.
- 10.3.3 Where special vehicular crossings are specified or required by a condition of planning consent such crossings shall be set out in accordance with the requirements of the condition or as specified on an approved drawing.
- 10.3.4 Where pedestrian routes cross carriageways and side road junctions, tactile paving shall be provided, generally in accordance with current advice and practice. Provision of tactile paving shall be generally in accordance with Standard Drg. No. 10/106. The fall across a pedestrian crossing shall not exceed 1 in 12, except with the prior approval of the Highway Authority.
- 10.3.5 Where the spacing of adjoining vehicular crossings would result in less than two kerbs of 100mm face between them, then these kerbs shall also be 125mm x 150mm bullnose kerbs and the intervening footway constructed to vehicular crossing standards.
- 10.3.6 Where excessive access falls may result, the concrete rear edging kerbs, where agreed, may exceptionally also be lowered by up to 75mm to maintain the crossfall of 1 in 36 towards the carriageway.

10.4 Footways, Vehicular Crossings and Cycleways

10.4.1 General

- a) Footways and vehicular crossings shall be constructed to Standard Drawing No. 10/103.
 - 1) Footways adjoining carriageways shall be constructed as Type A.
 - 2) Domestic Vehicular Crossings of footways shall be constructed as Type B.
 - 3) Independent footpaths and cycleways shall be constructed as Type B.
- b) Crossfalls shall be normally 1 in 36 increasing to 1 in 15 only at Vehicular Crossings.
- c) Footways shall be constructed to the widths shown on the construction drawings and shall have a minimum clear width of 1.5m free of street furniture.
- d) Footway construction to base course level is to be attained prior to the occupation of adjacent premises unless other conditions (e.g. attached to a planning permission) dictate that the footway be completed in its entirety.
- e) Covers, other than single stop-cock covers, shall not be sited within vehicular accesses or the ramped/tactile area of pedestrian crossings.

- f) All covers shall be set at base course level and only raised to finished levels immediately prior to the wearing course being laid.
- g) All pipes, ducts, utilities apparatus, lighting columns and street furniture shall be installed prior to the wearing course being laid.

10.4.2 Formation

- a) The formation shall be cleared of all topsoil and weedgrowth, levelled, shaped and compacted to enable the full construction depth to be achieved.
- b) Compaction shall be carried out with a twin drum Vibroll with a mass/m width of 700-1300kg (e.g. Bomag 75 or equivalent). Constricted areas shall be compacted with an approved vibrating plate.

10.4.3 Sub-base

- a) Sub-base shall be Type 1 material complying with the requirements of clause 9.3
- b) On 'clay' subgrades defined as P.I. greater than 10% the depth of sub-base shall be increased by 75mm and the extra material may be Type 2 complying with the requirements of clause 9.4.
- c) Compaction of the sub-base shall comply with clause 10.4.2(b).
- d) A weed control fabric shall be placed over the sub-base. This to be a thermally-bonded non-woven fabric, laid with an overlap and pinned to the sub-base in accordance with the manufacturer's recommendations.

Pore size to be sufficiently small to retard weed growth.

Weight to be in excess of 100 g /sq m

Tensile strength – in excess of 7 kN / m

Elongation at peak strength, less than 40%

CBR puncture resistance in excess of 1000 N.

The type of material to be included on drawing.

10.4.4. Surfacing

- a) Footways and vehicular crossing surfacing shall comply with the relevant type (A or B) on Standard Drawing 10/103. Differences in surface texture or colour may be specified for cycleways.
- b) Surfacing materials shall be compacted with a twin drum vibroll with a mass/m width of 700-1300kg (e.g. Bomag 75 or equivalent), or a smooth wheeled roller in the range of 2 to 2.5 tonnes dead weight. Particular attention should be paid to compaction around cover, posts etc.
- c) It shall be noted that concrete and paving slabs are not permitted footway surfacing material on Estate Roads.

- d) Block pavers 65mm thick in footways or domestic accesses are permissible but the blocks, together with the sand bed, shall be substituted for the surfacing only. Block paving may be laid in stretcher bond strictly in accordance with the relevant section of this specification.

10.4.5 Footway edging kerbs

- a) Where a footway does not abut onto a kerb or boundary wall, an edge restraint of 50mm x 150mm precast concrete edging kerb to BS 7263 shall be provided as Drawing No. 10/103. The footway surfacing shall be finished flush with the top of the edging kerbs.
- b) When existing ground levels dictate, paving slab revetment shall be carried out in accordance with Drawing No. 10/104.

10.4.6 Tolerance in surface levels of footway and vehicular crossing pavement courses

Footway surface	Flush with top of kerbs
basecourse	- 5mm to + 5mm
roadbase (where specified)	- 10mm to + 10mm
sub-base	- 5mm to + 5mm
formation	- 20mm to 0

10.5 Ramps

- 10.5.1 A ramp shall be provided at the start of any Shared Surface Road.
- 10.5.2 A typical detail for a ramp for this type of road is shown on Drawing No. 10/105.

10.6 Highway verges and landscaped areas for adoption.

- 10.6.1 Landscaping and planting schemes may be required within the highway verges of Local Distributor Roads and Shared Surface Roads and within some visibility splays. Details of these shall be agreed with the Planning Authority. Unless otherwise specified, species used shall be from the Suffolk Design Guide, Appendix C.
- 10.6.2 Grassed areas of less than 5 square metres and/or of an irregular shape should be avoided, with a minimum width of not less than 0.5m.
- 10.6.3 Verges, and visibility splays shall consist of a layer of top soil between 100 and 150mm in depth, free from weeds, coarse grass and stones, and levelled and raked to a fine tilth.
- 10.6.4 Where adjoining private curtilages or other land not part of the highway for adoption, the back edge of grassed and planted areas shall be marked by 150mm x 50mm edging kerbs set flush with the ground at a spacing of 3m, or as agreed with the Area Manager.

10.6.5 Grass seed shall be to the specification in the following table.

Agrostis Castenillana 'Highland'	10%
Festuca Rubra SSP Litoralis 'Dawson Lowgrow'	15%
Festuca Rubra Pruinoas 'Merlin'	15%
Festuca Rubra SSP Rubra 'Ruby' or 'Boreal'	25%
Festuca longifolia 'Scandis' or 'Tournament'	20%
POA Pratensis 'Parade' or POA compressa 'Reudens'	15%
Total	100%

10.6.6 Grass seed shall be sown at the rate of 20 grams per square metre. Before sowing commences, all weeds and coarse grass shall be eradicated by the use of an approved herbicide, and a pre-seeding fertilizer shall be applied. In the event of failure, sowing shall be repeated until a good growth is obtained.

10.6.7 All grassed and planted areas shall be adequately maintained during the maintenance period including replacement of failed planting, cutting and any necessary treatment with herbicides and fertilizers.

10.6.8 Landscaped areas may be subject to maintenance periods in excess of the normal 12 months.

11 Street Lighting and Signing

11.1 Street Lighting

11.2 Signing

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11 Street Lighting and Signing

11.1 Street Lighting

- 11.1.1 Road lighting systems designed in accordance with the current edition of BS 5489 will in general be required on most roads and footways serving new development, and on existing roads and footways which are to be improved and adopted.

Guidance on the category of lighting required can be found in Sections 6.1.1., 6.1.2 and 6.1.3 of the Suffolk Design Guide. The category to be applied to a particular development shall be agreed with the Highway Authority.

- 11.1.2 Roundabouts at both the entrance to and within any development are to be lit in accordance with BS 5489 Part 2 and Part 4. The minimum value of the lighting level on the roundabout will be equal to the average value on the approach road with the highest defined lighting category.

- 11.1.3 Lighting systems designed to 'footway standard' may be permitted on new estates, subject to approval of the Highway Authority.

- 11.1.4 On small developments, within villages, the lighting level may be varied by agreement with this Authority.

- 11.1.5 Within Conservation Areas, the lighting equipment will be specified by the Authority. This is likely to include decorative lanterns. Early consultation with this Authority is recommended.

- 11.1.6 In all other areas, conventional road lighting and sign equipment shall be used. A schedule of approved equipment will be issued on request.

Please note that the list is regularly reviewed, and designers should ensure they have the current version.

- 11.1.7 Electrical requirements:

- a) All electrical equipment will be fitted with a means of double-pole isolation, in addition to the R.E.C. cutout.
- b) All street lighting columns will be controlled by fully electronic photo-electric cells (P.E.C.U.'s) set with a 70 Lux switching level.
- c) P.E.C.U.'s controlling street lighting shall have a 1 to 0.5 negative switching ratio.
- d) All illuminated signs will be controlled by fully electronic photo-electric cells (P.E.C.U.'s) set with a 100 Lux switching ratio.
- e) P.E.C.U.'s controlling signs shall have a 1:1.5 positive switching ratio.
- f) All P.E.C.U.'s shall have a 6 year guarantee from the manufacturer.

- 11.1.8 All road lights and signs (with the exception of illuminated bollards on traffic islands) shall be supplied directly from the Regional Electricity Company low voltage distribution mains. Only in exceptional circumstances will a private cable network feeding the lighting columns be allowed and only by agreement with this Authority.

- 11.1.9 Illuminated bollards on traffic islands shall be supplied by private cable from an adjacent column, sign, or suitably positioned feeder pillar.
- 11.1.10 All details of street lighting equipment, layout and installation shall be agreed with the Director before work commences.
- 11.1.11 All street lighting columns and feeder pillars to be located within the area for adoption. Unless otherwise agreed with the Area Manager, columns within the footway are to be located adjoining the rear edging.

11.2 Signing

- 11.2.1 Supporting posts for signs shall be in tubular or rectangular rolled hollow section steel (hot dip galvanized and plastic coated) or aluminium, to BS 873, BS 4 and BS 4848 unless otherwise agreed with the Area Manager.
- 11.2.2 All posts shall be supplied with matching caps and base plates where appropriate, and base plates shall have a minimum area of 0.05 square metres. The dimensions of the posts shall be specified.
- 11.2.3 The mounting height for signs within the footway shall be 2.1 metres, and 2.4 metres within any cycleway, unless otherwise agreed with the Area Manager.

12 Completion of Works

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12 Completion of Works

- 12.1 Prior to laying of wearing course materials all damaged and/or displaced kerbs and covers and frames shall be replaced and/or realigned.
- 12.2 Prior to the issue of the Part 2 certificate, the following remedial works shall be completed:
- a) Edge up footways
 - b) Clean out outfall ditches
 - c) Cut grassed areas
 - d) Empty gullies, catchpits and soakaways
 - e) Sweep footways and carriageways
 - f) Bandseal any cracks and reinstatements
 - g) Clean lighting installation
 - h) Any other remedial works required by the Area Manager.
- 12.3 Any other items incidental to the works shall be complete (i.e. barriers, street lighting, boundary markers, road signs, road markings).
- 12.4 During the Maintenance Period the works shall be maintained in a safe and neat condition with particular attention being paid to grass cutting, gully emptying, sweeping and weed-killing.
- 12.5 On completion of the Maintenance Period and prior to Adoption the following works shall be completed:
- a) Items 12.2 (a) to 12.2 (h) as above.
 - b) The highway drainage system shall be pressure cleaned to the outfall or to the previously adopted drainage system by a suitably equipped Contractor who shall submit a report, which either certifies the drainage as satisfactory or lists any defects, for the Area Manager's attention. Further inspection by means of Closed Circuit Television (CCTV) may be ordered by the Area Manager.
 - c) All weed growth shall be removed, the supporting soil weedkilled and the area permanently reinstated to the Manager's satisfaction.
 - d) The covers on all gullies, catchpits and soakaways shall be lifted for inspection by the Area Manager.
 - e) All damaged covers shall be replaced and all displaced covers shall be reset to the correct levels with respect to the surrounding surfacing.
 - f) All damaged and/or displaced kerbs shall be replaced and/or re-aligned. Minor repairs in epoxy mortar may be allowed at the Area Manager's discretion.
 - g) Footway defects and reinstatements resulting from kerb replacements or any other factors shall be made good and any reinstatements shall extend for the full width of the footway. Extensive footway reinstatements shall be combined into one patch at Area Manager's discretion.

- h) Block paving shall be checked for ponding, loose blocks, undersized blocks and open joints and the areas made good as necessary.
- i) A Certificate of the Road Lighting installation shall be obtained from the Road Lighting Engineer.
- j) Any items unique to the site (e.g. retaining wall calculations) shall, when required, be certified as acceptable by the Director.

13 Drawings

5/101B	Pedestrian Guardrails and Staggered Barriers
7/101B	Surface Water Drains – Trench & Bedding Details
7/102B	Filter Drains - Trench & Bedding Details
7/103B	Catchpits
7/104B	Soakaway
7/105B	Gullies
7/106B	Service Ducts
7/107	Access to chambers
10/101B	Kerb Types
10/102B	Domestic Vehicular Access
10/103B	Footway Construction and Edging
10/104B	Paving Slab Revetment
10/105B	Ramp Detail for Shared Surface Road
10/106B	Pedestrian Crossing Detail

Map of Suffolk – showing areas and contacts

SUFFOLK COUNTY COUNCIL

Revisions

Revisions	Date	Inl.	No.
New Issue			A
Title block amended	03/04	J.G	B

TITLE

PEDESTRIAN GUARDRAILS STAGGERED BARRIERS FOR FOOTPATHS

Drawn WS

Ch'd.

Ex'd.

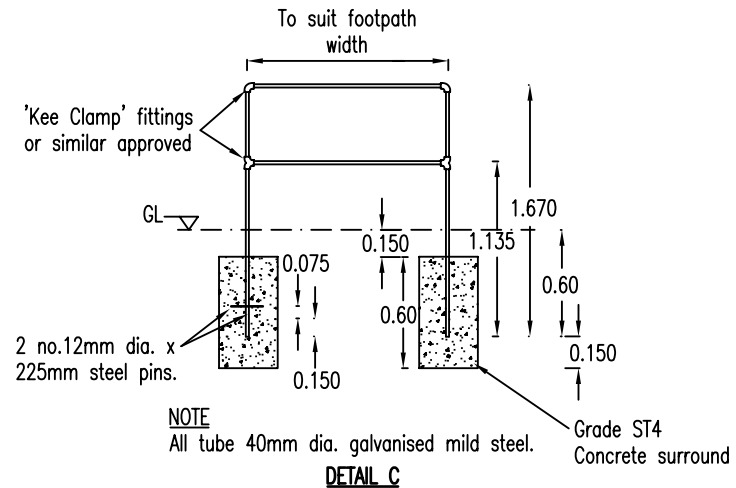
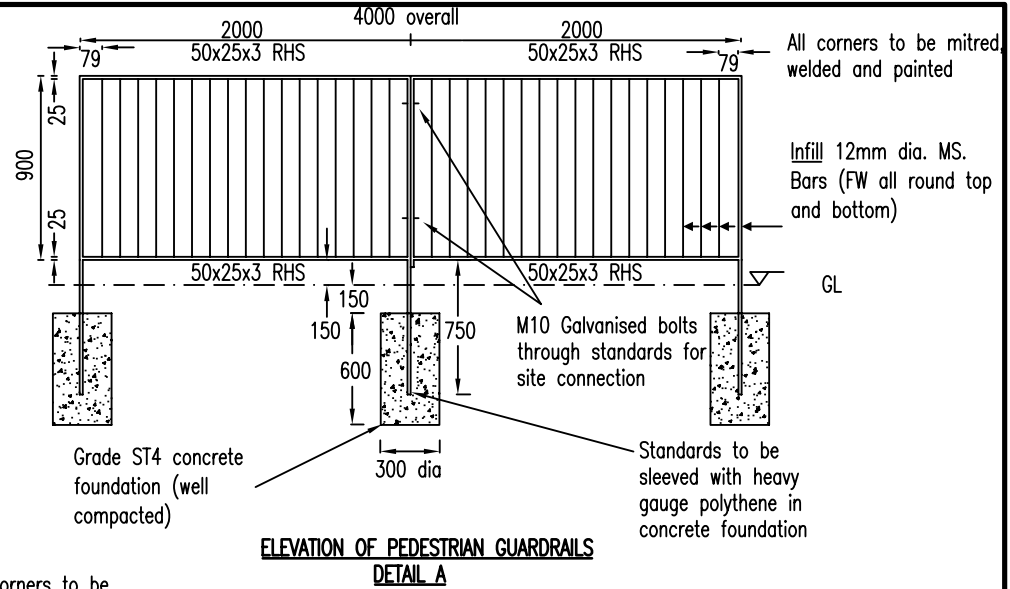
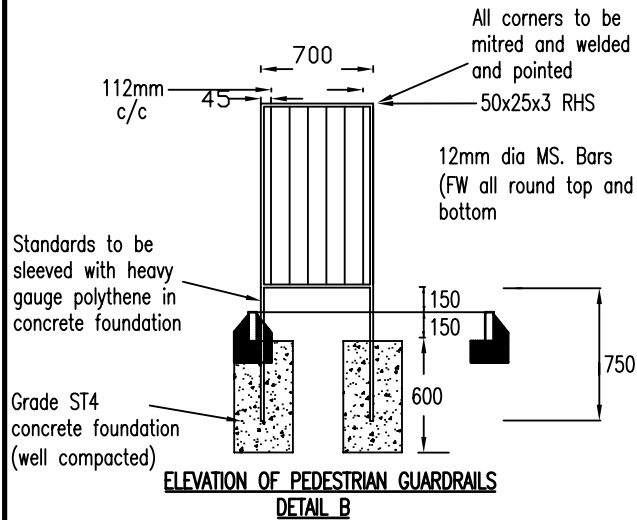
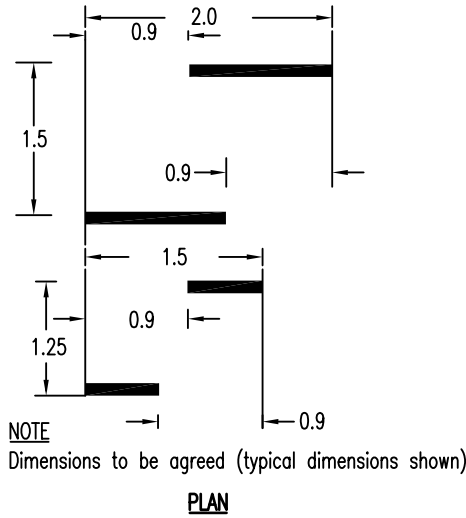
App'd.

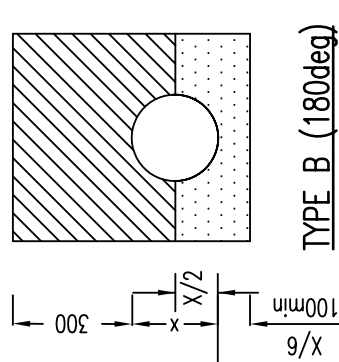
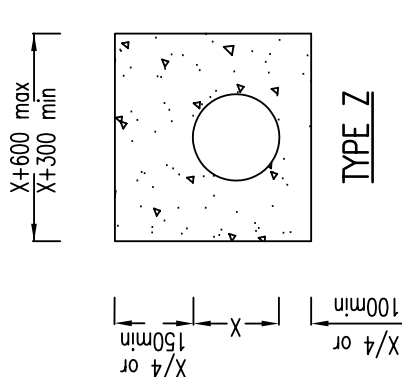
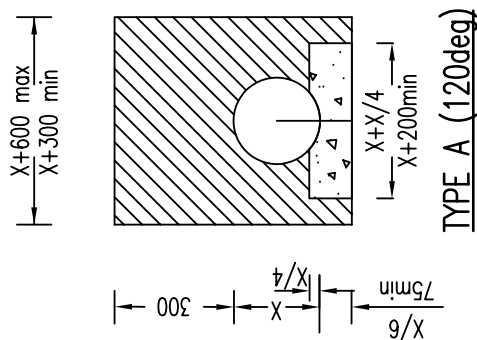
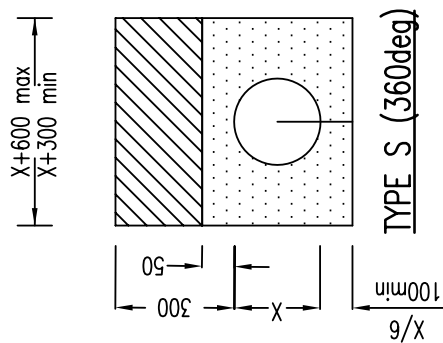
Scale N.T.S.

Date 5/02

Drg. No. 5/101B

Director of Environment & Transport

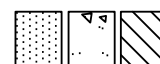




NOTES

1. All dimensions are in millimetres
2. Dimension X is the external diameter of the pipe.
3. The minimum or maximum width of the trench applies on and below a line 300mm above the outside top of the pipe. Above the 300mm line the trench backfill material shall be as described in Clause 7.7.
4. For Type Z trench the concrete cover may be formed to a radius batter or horizontal surface. Min cover of concrete shall be 150.
5. For Flexible pipes Bed Type S only is permitted.
6. For Bed Type Z concrete is to extend full width of trench unless shuttered.

KEY



SUFFOLK COUNTY COUNCIL

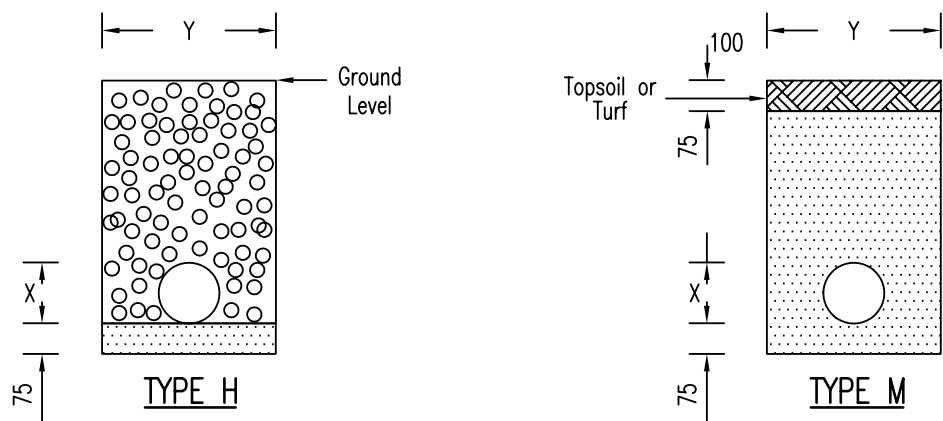
Revisions	Date	Inf.	No.
New Issue			A
Title Block Amended	03/04	J.G	B

TITLE

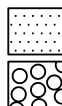
SURFACE WATER DRAINS
TRENCH & BEDDING DETAILS

Drawn WS	Ch'd.
Ex'd.	App'd.
Scale N.T.S.	Date 5/02
Org. No.	7/101B

Director of Environment & Transport



KEY



Type A filter material to Clause 7.9

Type B filter material to Clause 7.9

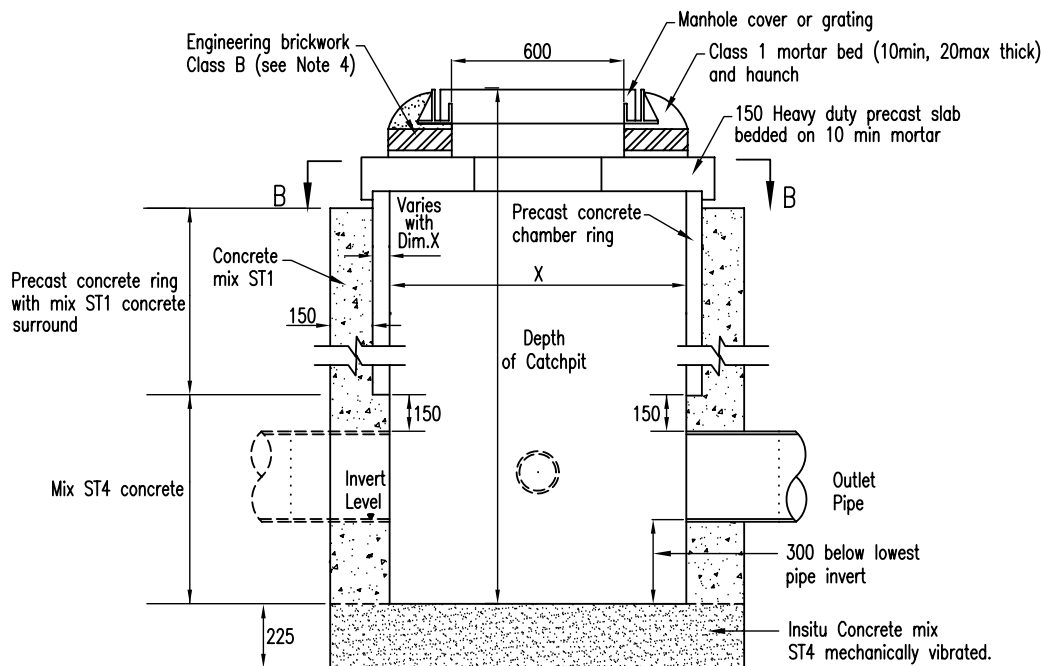
NOTES

1. All dimensions are in millimetres
2. Dimension X is the external diameter of the pipe.
3. Pipes are to be laid with slots or perforations upwards.
4. Minimum Drain width to be $Y=X+300$ for drains not exceeding 1.5m cover below finished level. $Y=X+450$ for drains exceeding 1.5m cover below finished level.

SUFFOLK COUNTY COUNCIL

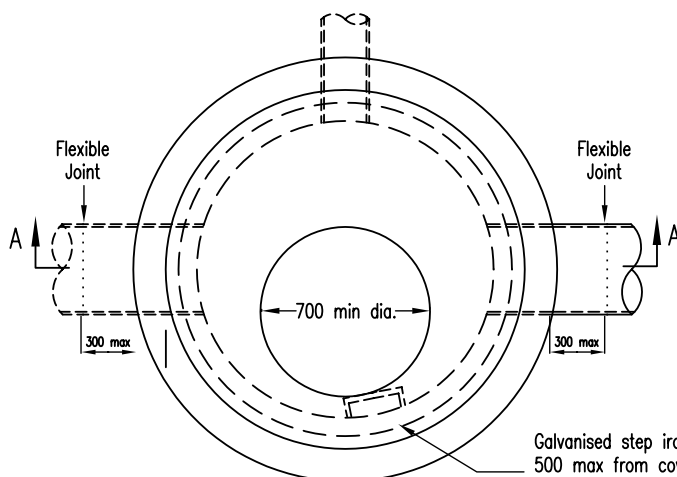
Revisions	Date	Int.	No.	TITLE	Drawn	Ch'd.
New Issue			A	SUB SOIL AND FILTER DRAINS TRENCH AND BEDDING DETAILS	WS	
Title Block Amended	03/04	J.G	B		Ex'd.	App'd.
					Scale	Date
					N.T.S.	5/02
					Drg. No.	7/102B

Director of Environment & Transport



SECTION A-A

DIM. X VARIES TO 1050, 1200, 1500 or 1800 as specified in Appendix 5/1



PLAN ON B-B

Diameter of largest pipe in manhole/catchpit	Chamber Section dia mm.
Less than 375mm	1200, Reducing to 1050 where depth to soffit is between 1.35m and 1.5m
375-450	1350
500-700	1500
750-900	1800

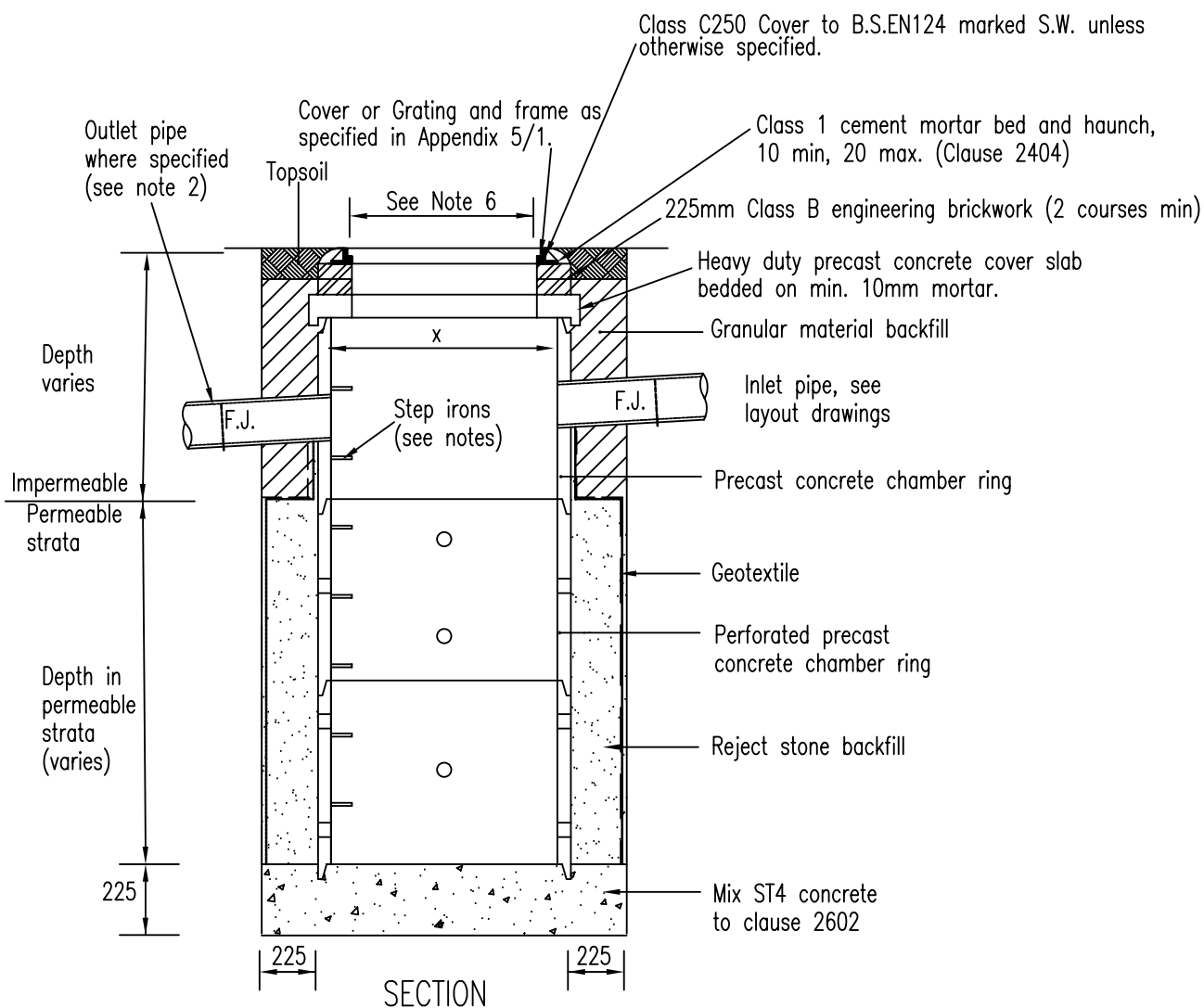
Galvanised step irons at 300 interval. Top iron 500 max from cover level, bottom iron 300 above concrete base. Ladder to be used if depth to invert exceeds 3m.

NOTES

1. All dimensions in millimetres.
2. Manhole cover or grating as detailed in the specification.
3. Heavy duty precast cover slab placed with opening away from traffic wherever possible.
4. Where catchpits are constructed in the carriageway the top of the slab will be at formation level and the depth between the slab and frame will be constructed in engineering brickwork. Elsewhere up to 3 courses may be used.
5. Taper and shaft rings may be used provided bottom of taper is a minimum of 1.8m above concrete base.
6. Number of pipe openings to be as detailed in the specification.
7. All carrier pipes shall have the same soffit level unless detailed otherwise in the specification.
8. A minimum clear opening in cover to be: rectangular - 700mm across the diagonal, circular - 700mm diameter, triangular - 700mm diameter - See also drawing number 7/107.

SUFFOLK COUNTY COUNCIL

Revisions	Date	Inl.	No.	TITLE	Drawn WS	Ch'd.
Redrawn	03/04	J.G.	B	CATCHPITS	Ex'd.	App'd.
					Scale NTS	Date 5/02
					Drg. No.	7/103B
					Director of Environment & Transport	



Shaft/chamber dia.(mm)	900*	1050	1200	1500	1800	2100	2400	3000
Ref.	A	B	C	D	E	F	G	H

*See Note 4

NOTES

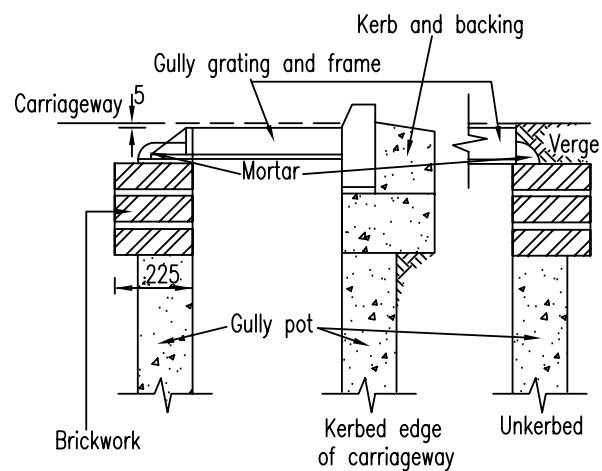
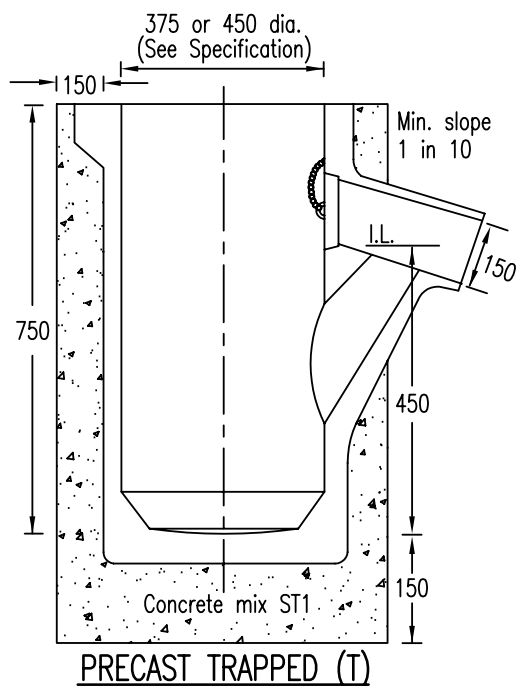
- All dimensions are in millimetres.
- Where specified the outlet pipe invert should be half its diameter below the inlet pipe invert.
- For chambers up to 3 metres deep step irons galvanised to BS 1247 may be used—vertical interval 300mm. For chambers over 3 metres deep, ladders must be used in accordance with the Highway Construction Detail F10.
- The 900mm diameter ring should only be used where restriction of space prevents installation of the normal minimum size of 1200mm dia.
- Pipes to have flexible joints (F.J.) at a maximum of 500mm. from concrete ring.
- A minimum clear opening in cover to be: Rectangular – 700mm across the diagonal, circular – 700mm diameter, triangular – 700mm diameter.

TO BE READ IN CONJUNCTION WITH DRG NO. 7/107

SUFFOLK COUNTY COUNCIL

Revisions	Date	Int.	No.	TITLE	Drawn WS	Ch'd.
New Issue			A	SOAKAWAY	Ex'd.	App'd.
Redrawn	03/04	J.G.	B		Scale N.T.S.	Date 5/02
					Drg. No. 7/104B	

Director of Environment & Transport

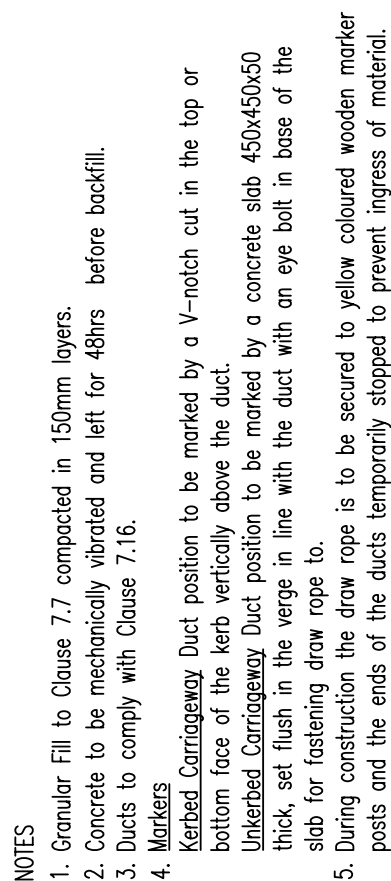


NOTES

1. Gully grating and frame to B.S EN124. Refer to specification. Cl.7.13.4.
2. Gully frame to be set on 10-20 thick Class 1 cement mortar bed, to Clause 2404.
3. Brick work – At least one and not more than three courses of Class B Engineering 225 brickwork laid square. change in profile from square to circular to be shaped in Class 1 mortar.
4. Gully pot to be precast concrete to B.S. 5911 detailed above.
5. Where the gully connection pipe passes under the carriageway the invert of the pipe at the outlet shall be set at least 175 below formation level. The invert shall be at least 315 below the top of the sub-base.
6. All dimensions in millimetres.
7. Grating and frame set 5mm below carriageway surface and flush with the kerb face; any gap to be filled with Class 1 Mortar.
8. See Notes 3 and 5. Where the total road construction depth exceeds 450 and the gully connection pipe passes under the carriageway more than three courses of brickwork will be permitted, to a maximum of five courses.

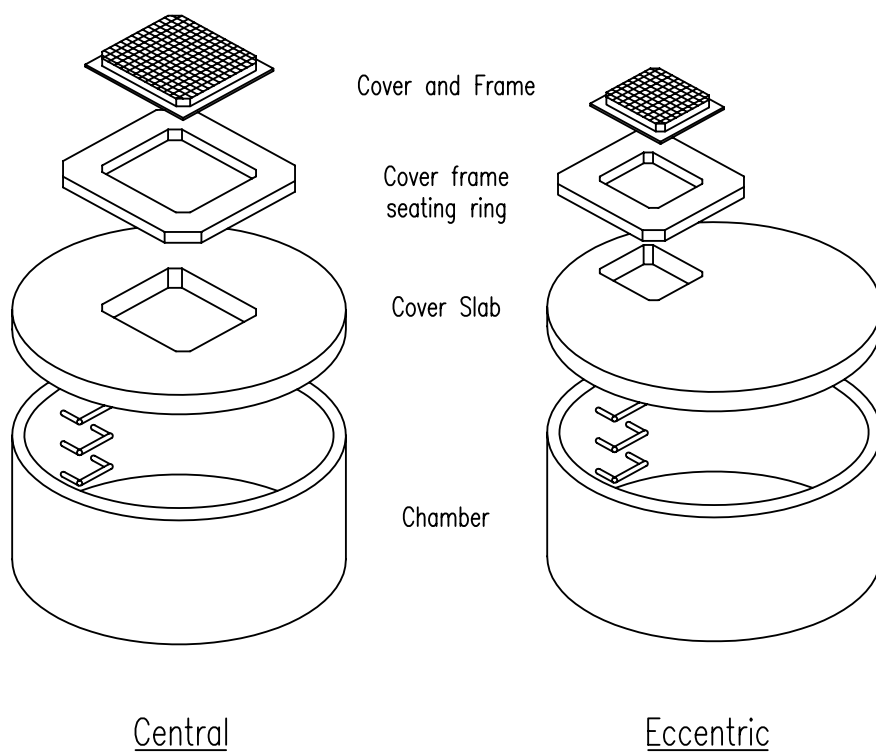
SUFFOLK COUNTY COUNCIL

Revisions	Date	Int.	No.	TITLE	Drawn	Ch'd.
New Issue			A		WS	
Redrawn	03/04	J.G.	B		Ex'd.	App'd.
					Scale	Date
					N.T.S.	5/02
				GULLIES		
				Director of Environment & Transport		
				Drg. No. 7/105B		



Revisions	Date	Inl.	No.	<u>TITLE</u> SERVICE DUCTS	Drawn WS	Ch'd.
New Issue			A		Ex'd.	App'd.
Title Block Amended	03/04	J.G.	B		Scale N.T.S.	Date 5/02
					Drg. No.	7/106B
Director of Environment & Transport						

Director of Environment & Transport

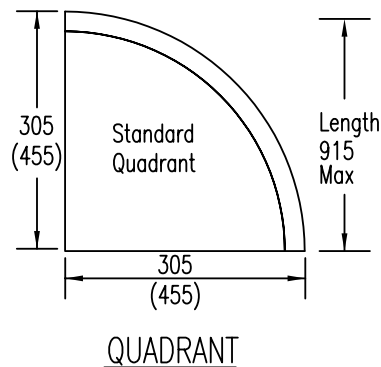
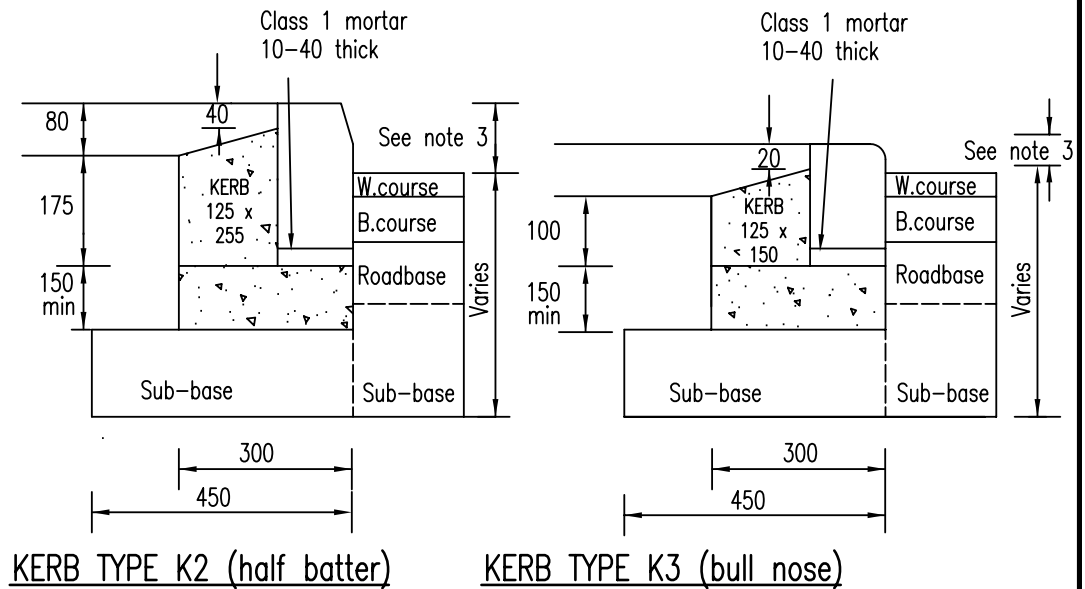


Shaft/chamber size (DN)	Position and size of access	
	Manhole less than 1.5m depth (cover level to pipe soffit – mm)	Manhole greater than or equal to 1.5m depth (cover level to pipe soffit – mm)
900 *	600 × 600 central	600 × 600 central
1050	750 × 750 central	600 × 600 eccentric
1200	750 × 600 eccentric**	750 × 600 eccentric
1500	1200 × 675 central	750 × 600 eccentric
1800	1200 × 675 eccentric	750 × 600 eccentric
2100	1200 × 675 eccentric	750 × 600 eccentric
2400	1200 × 675 eccentric	750 × 600 eccentric
3000	1200 × 675 eccentric	750 × 600 eccentric

**1200 × 675 permitted but not recommended

SUFFOLK COUNTY COUNCIL

Revisions	Date	Inl.	No.	TITLE	Drawn WS	Ch'd.
				ACCESS TO CHAMBERS	Ex'd.	App'd.
					Scale N.T.S.	Date 03/04
					Drg. No. 7/107	



AVAILABLE KERB RADII

(metres)		(metres)	
R2	R3	R2	R3
1	-	1	-
2	-	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
8	8	8	8
10	10	10	10
12	-	12	-

Internal (I)

External (E)

Length 915 Max

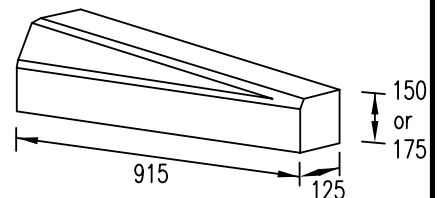
KERB TYPE R2 (half batter) R3 (bull nose)

NOTES

- Concrete bed to be mechanically vibrated and the surface roughened to provide a key for backing.
- The mortar bed may be omitted if method of laying kerbs direct onto wet concrete is approved by the Engineer. The backing concrete must be placed within one hour of laying the concrete bed. All concrete to be Mix ST1.
- Kerb face to be specified. All kerbs to BS 7263.
- All dimensions in millimetres unless otherwise stated.



Right Hand Dropper Type DR2 for K3 to K2



Left Hand Dropper Type DL2 for K3 to K2

KERB TYPE DR & DL 1 and 2

SUFFOLK COUNTY COUNCIL

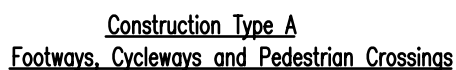
Revisions	Date	Inl.	No.	TITLE	Drawn WS	Ch'd.
New Issue			A	KERB TYPES	Ex'd.	App'd.
Title block & Radii	03/04	J.G	B		Scale N.T.S.	Date 5/02
Amended					Drg. No.	10/101B

Director of Environment & Transport



1. Visibility Splays to be free from all obstructions to visibility 0.25m above carriageway level.
2. For access Construction Details see Specification.
3. For kerb Types see Drg. No. 10/101
4. Full width of formation to be treated with an approved herbicide.

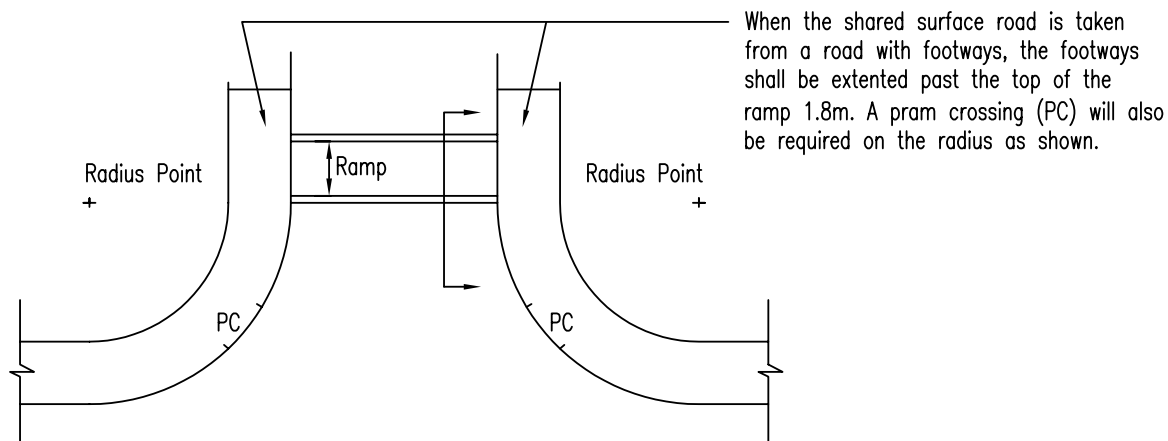
Revisions	Date	Inl.	No.	<u>TITLE</u> DOMESTIC VEHICULAR ACCESS	Drawn WS	Ch'd.
New Issue			A		Ex'd.	App'd.
Title block amended	03/04	J.G	B		Scale N.T.S.	Date 5/02
					Drg. No.	10/102B
Director of Environment & Transport						



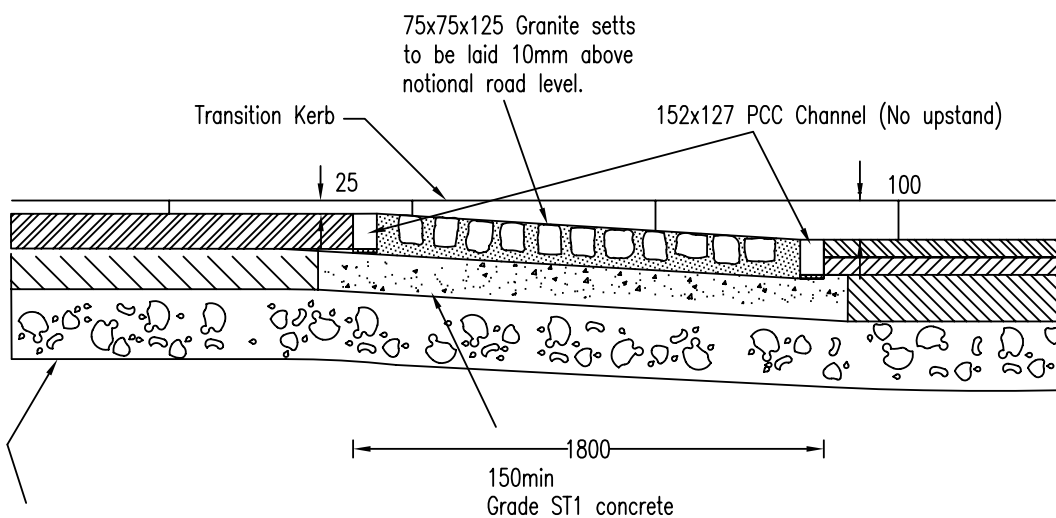
1. Asphalt to B.S.594, Bitumen macadams to B.S.4987. Concrete and sub-base to relevant spec requirements. Compaction of materials to relevant Clause of specification. Precast concrete edgings and precast concrete flags to B.S.7263.
2. Width of footways as shown on layout drawings.
3. Full width of formation to be treated with an approved herbicide.
4. All dimensions in millimetres.
5. On clay subgrades, the depth of sub-base to be increased by 75mm, in accordance with Cl.10.4.3.b.

Revisions	Date	Inl.	No.	<u>TITLE</u> ALTERNATIVE FOOTWAY CONSTRUCTION AND EDGING TYPES.	Drawn WS	Ch'd.
New Issue			A		Ex'd.	App'd.
Title block & Material	03/04	J.G	B		Scale N.T.S.	Date 5/02
description amended.					Drg. No.	10/103B
Director of Environment & Transport						

Director of Environment & Transport



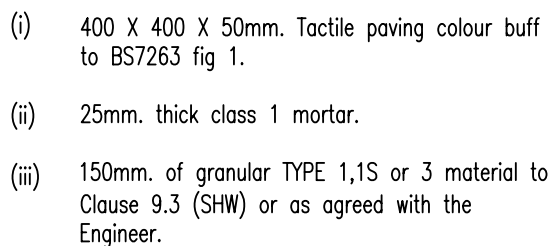
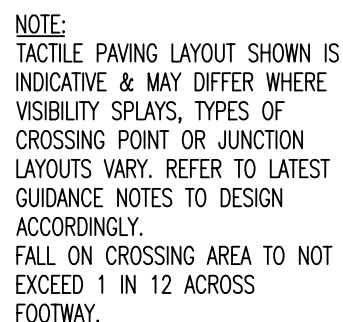
NOTES: Bed granite setts in mortar to fill voids when setts laid.
Maximum thickness of mortar joints, 12mm.



SUFFOLK COUNTY COUNCIL

Revisions	Date	Ini.	No.	TITLE	Drawn	Ch'd.
New Issue			A		WS	
Title block & drawing	03/04	J.G	B		Ex'd.	App'd.
amended.					Scale	Date
					N.T.S.	5/02
					Drg. No.	10/105B
Director of Environment & Transport						

RAMP DETAIL
SHARED SURFACE ROAD



Revisions	Date	Inl.	No.	<u>TITLE</u> TYPICAL UNCONTROLLED PEDESTRIAN CROSSING DETAIL.	Drawn MTC	Ch'd.
New Issue			A		Ex'd.	App'd.
Title block & square	03/04	J.G	B		Scale N.T.S.	Date 5/02
channel note amended.					Drg. No.	10/106B
Director of Environment & Transport						