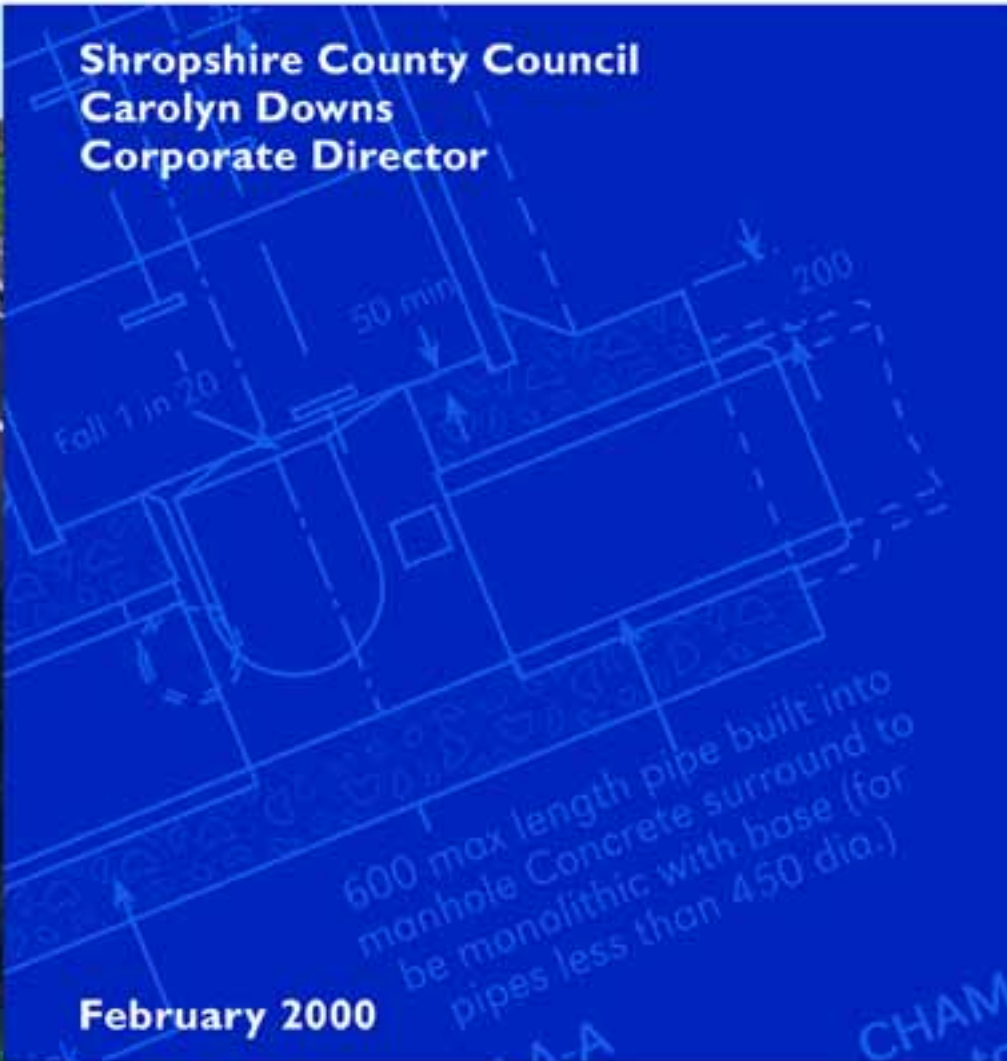




Specification

for Residential/Industrial Estate Roads



February 2000



Shropshire
COUNTY COUNCIL



Specification

for Residential/ Industrial Estate Roads

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Access to Information

All reasonable steps will be taken to supply the information contained in this document in large print, Braille or audio cassette in whole or part form.

However due to the nature of the information contained in this guide this may prove impractical.

If you would like a copy in one of these formats or you wish to ask us anything else about this publication, please telephone (01743) 252515.

You can write to us at:
Community and Environment Services
The Shirehall
Abbey Foregate
Shrewsbury
SY2 6ND

Introduction

The purpose of this guide is to provide advice on the procedures to be followed to secure the adoption of estate roads and to set down the appropriate standards and criteria to achieve the following objectives:

- To ensure an acceptable quality and standard of construction for adoptable areas which can be satisfactorily maintained at reasonable cost.
- To allow for the efficient provision of public utilities and other services.

The guide supersedes the County Council's document "Guide and Specification to the Design of Housing/Industrial Estate Roads" published in April 1989. Advice on the principles of residential estate road design is provided separately in "Residential Developments in Shropshire - A Design Guide", published by the County Council in January 1996 and which should be regarded as an essential supplement to this guide.

Prospective developers are encouraged to engage in early discussions with the County Council, as the highway authority, on the highway element of their proposals in order to avoid unnecessary and abortive design work. It is suggested, however, that in the first instance the principle of the development is discussed with the local planning authority.

Within this guide the term 'highway authority' refers to Shropshire County Council; the term 'local planning authority' means the various district and borough councils throughout Shropshire; and the term "Director" means the Corporate Director, Community and Environment Services.

PART 1

Approvals and agreements

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1.1 The role of the Highway Authority

The purpose of this section of the guide is to explain the role of the County Council, as highway authority, in the planning process.

Insofar as planning applications for residential and industrial estate developments are concerned, the determination of such applications is vested in the local planning authority. The highway authority is a statutory consultee on planning applications for development involving new estate roads and the local planning authority will take highway observations into account when determining applications.

As a general policy, the highway authority require both residential roads serving more than five dwellings and industrial estate roads to be designed and constructed in accordance with the standards and specifications set out in this guide. Upon satisfactory completion the road(s) will be adopted and will become maintainable at the public expense.

1.2 Planning Applications

Whilst the determination of planning applications rests with the local planning authority, the highway authority offers advice to the local planning authority on the highway aspects of the proposed development.

For the purpose of this guide, two types of planning application are relevant - outline planning applications and detailed planning applications.

1.2.1 Outline Applications:

Outline applications seek to establish the principle of development. Typically, the submitted plan delineates the area of the proposed development, although certain elements such as access and siting of buildings can form part of the submitted scheme. In assessing outline planning applications, the highway authority seeks to ensure that the local road network can accommodate the volume of traffic associated with the proposed development; that adequate visibility is available from the site road frontage and for the drivers of vehicles turning right into the site; and that surface water can be drained via a piped system to a suitable outfall. The route of the drainage system should form part of the application with the appropriate notice(s) being served on the owner(s) if the land concerned is outside the developer's ownership or control.

1.2.2 Detailed Applications:

In addition to the information required for an outline planning application, detailed or full applications should show the layout of the proposed development together with longitudinal sections of the roads and details of their construction.

1.3 Agreements for Off-site Works

If off-site highway works are required as part of a development and those works fall outside the boundaries of the application site, Grampian or negatively worded conditions are imposed requiring the submission of the details of and carrying out of certain works before a specified event, typically the commencement of any work on the application site.

It will be necessary for the developer to enter into a legal agreement, supported by a bond, with the highway authority, to cover the cost of the off-site works and the alternative agreements are summarised below:-

1.3.1 Section 106 Agreements:

This is an agreement, pursuant to the Town and Country Planning Act 1990, that results from the granting of planning permission. The agreement is drawn up by the local planning authority with input from the highway authority and upon completion of the agreement planning permission is issued.

1.3.2 Section 278 Agreements:

This type of agreement, which is pursuant to the Highways Act 1980, is more usually used when a developer will derive benefit from an improvement scheme already proposed by the highway authority; and where a contribution by the developer will bring that scheme forward in the highway authority's programme. Section 278 Agreements are also associated with highway works undertaken to overcome objections to developments affecting trunk roads.

1.4 Agreement Requirements

Once the scope of the off-site highway works has been established, the following will be required to enable a suitable draft agreement to be prepared:-

- A plan showing the design of the necessary works sufficient to enable costs and landtake to be defined;
- The costs of the works, together with the costs of preparing the agreement, design checking and site monitoring;
- Names and addresses of parties to the agreement, including the bondsman;
- Name and address of developer's solicitor;
- The highway authority's approval of the contractor to be used for the work;
- Estimated period of time to complete the works;

The text of the agreement will require the developer to obtain the written approval of the highway authority to the detailed design of the works prior to the commencement of any work on the public highway.

Unless otherwise agreed in writing by the highway authority, the developer and/or third party will be required to meet the total cost of the works including ancillary costs such as design, design checking/supervision/monitoring, materials testing and service alterations/diversions.

1.5 The Advance Payments Code

The local authority is required to inform the highway authority when Building Regulation Approval has been issued or when an Initial Building Notice has been received. Upon receipt of such notification the highway authority issues a notice under the provisions of the Advance Payments Code of the Highways Act 1980. This notice either exempts the development from streetworks costs or requires the deposit of a sum equivalent to the highway authority's estimated cost of the streetworks. It is an offence to carry out any works in or for the purpose of erecting buildings unless the appropriate streetworks costs have been deposited with the highway authority or else secured by an agreement under the terms of Section 38 of the Highways Act 1980.

1.6 Section 38 Agreements

When developers choose to discharge their streetworks obligations by entering into a Section 38 Agreement, the highway authority will require:

- (1) A location plan to a scale of 1/2500 or 1/1250 which should cover sufficient area to enable the site to be readily identified.
- (2) A plan(s) to a scale of 1/500 showing the layout of the estate road(s) including footways, footpaths, junction visibility splays, forward visibility splays, foul and surface water drainage layout and outfall.
- (3) Longitudinal sections of the proposed estate road(s) to a scale of not less than 1/500 horizontal and 1/100 vertical.
- (4) Cross sections of the proposed road construction.
- (5) Details of easements to discharge road surface water across third party land.
- (6) Confirmation or otherwise that surface and/or foul drainage is to be included in a Section 104 Agreement of the Water Industry Act 1991 with the drainage authority.

Upon approval of the above details, the developer submits six copies of the approved plans, with one copy showing, coloured pink, the areas of road, footway and footpath being offered for adoption. Visibility splays, forward visibility splays and service strips should be hatched green over the pink colouring. Lengths of surface water drain to be adopted should be coloured blue and drainage easements edged and hatched in brown.

The cost of the roadworks, including lighting and surface water drainage, will then be assessed following which the highway authority will prepare the Section 38 Agreement.

The Agreement will normally have a currency of two years and will be supported by a bond equivalent to the assessed cost of the roadworks, including drainage and lighting. A charge to cover design checking, administration, materials testing and site monitoring will be made. A separate legal charge will also be levied.

On completion, the estate road(s) will be placed on maintenance for a period of twelve months during which time the developer is responsible for their upkeep. At the expiration of the maintenance period, and following completion of any remedial works, the road(s) will be adopted as highway(s) maintainable at the public expense.

1.7 Plans

The plans submitted for inclusion in the Section 38 Agreement should show the following information:-

1.7.1 Location Plan

A plan to a scale of 1/2500 or 1/1250 should be provided covering an area sufficient to readily identify the site which should be delineated by red edging around the site boundaries.

1.7.2 Layout Plan

The layout plan should show:

- At a scale of not less than 1/500, all houses, garages, drives, footpaths, footways and roads with the approximate finished floor level of each house and garage.
- The general layout of the drainage system, including the surface water drainage to each building.
- The location and value of the Ordnance Bench Mark (OBM), Temporary Bench Mark (TBM) or level datum point, used for levelling and setting out. This information should also be shown on the layout plan(s) and sectional drawing(s).
- Full details necessary for setting out the road, including the radius of every curve, the tangent points of each curve including its chainage, and the data for any transition curves when appropriate. (N.B. reverse curves should not be used on industrial estate roads, residential distributor roads or collector roads)
- The centre line chainage should be marked at 10 metre intervals by crosses and notated at intervals no greater than 30 metres.
- The dimensions of all junction and turning-head radii.
- The surface water outfall as well as the legal classification of the drain, sewer, ditch or watercourse to which the site drains.
- All junction and forward visibility splays, including any required for future extensions of the road(s). When any visibility splay extends beyond the normal back edge of the standard footway/service strip, the line of the splay shall be sufficiently dimensioned from the edge of the carriageway to enable the precise line and width of the splay to be checked.
- Carriageway, footway and footpath widths dimensioned. When any carriageway widening is necessary around a bend, the maximum carriageway width should also be dimensioned.

- Spot levels should be shown (normally along the centre line) along all roads at intervals of not more than 15 metres and at any change in gradient. (Levels are not required on footways as these, by definition, abut the carriageway). Gullies should be provided at low points to prevent ponding and should discharge to a suitable outfall.
- The position of any roofwater soakaways. These are not normally permitted within 6.0 metres of the carriageway nor within 5 metres of a building.
- Phases on large developments should be clearly identified without duplication of road numbers.
- Each and every phase terminating with a turning-head or temporary turning-head. The developer should be careful to choose phase boundaries accordingly.

1.8 Superelevation

Superelevation should be applied/adverse camber eliminated whenever the radius of curvature is at less than the critical radius given in the following table which also shows the maximum superelevation which should be used.

- When adverse camber needs to be eliminated or superelevation applied to one curve, the minimum distance between reverse curves shall be sufficient to allow the proper application of superelevation.
- When both curves require superelevation/elimination of adverse camber the distance between the curves should be greater to avoid the centre line and both channels being level at the same chainage.
- Care should be taken in the application of superelevation /elimination of adverse cross fall. If improperly considered/designed it can lead to level or nearly level channels resulting in ponding and special treatment may be necessary. Any temporary turning-heads should be removed as and when additional phases of development take place.

Application of Superelevation		
Road Type	Critical Radius for Elimination of Adverse Camber	Maximum Superelevation
Industrial Estate Road	As TD 9/93	5%
Residential Distributor Road	As TD 9/93	5%
Collector Road	not applicable	not applicable
Traditional Estate Road	not applicable	not applicable
Access Road	not applicable	not applicable
Shared Surface Road	not applicable	not applicable
Mews Courts	not applicable	not applicable

1.9 Junction Markings

The plans should show proposed “Give Way” markings at junctions within the estate where priority may be in doubt.

- “Give Way” marking and appropriate signage should be provided at all road junctions with higher order roads.
- A single intermittent white line should be provided within the development at all junctions of lower order roads.

1.10 Longitudinal Sections & Design

1.10.1 Plans

Longitudinal Sections of each road should be provided at a scale of not less than 1/500 horizontal and 1/100 vertical, to show the following:

- The gradient of each section of straight grade, the radius of curvature of each vertical curve, the tangent point of each vertical curve along with any summit or valley position within the curve length. (N.B. Summit and valley positions rarely coincide with the intersection points).

- The chainage and level of each tangent point, summit or valley. (It is normally necessary to show the levels to an accuracy of 3 decimal places, although it is recognised that construction tolerances are greater being about ± 6 mm).
- Chainages and levels for the full length of each road at regular intervals of not more than 15 metres.
- On any section of road over which changes occur in either superelevation or camber, levels should be shown along the centre line and both channels at intervals not greater than 5 metres. The channel lines should also be plotted along the length of such changes to at least 15 metres either side thereof.

Notes:

- (i) It is helpful if the horizontal alignment of the road is indicated on the long section by defining sections of horizontal curvature and tangent point chainages. (See Drawing TS/1/4 on page 15).
- (ii) Proposed levels at 5 metre intervals over sections of vertical curvature.

1.10.2 Design

- The design of all roads should produce a smooth vertical alignment, and on industrial estate roads and residential distributor roads the vertical alignment should comply with Department of Transport Standard TD 9/93 with full engineering data on curves.

On other roads the following requirements apply:-

- All lengths of straight grade should be joined with a vertical curve.
- The normal length of a vertical curve should be 30 metres except where this has to be varied as follows.
 - At valleys and summits the maximum radius of curvature should be not more than 900 metres. This produces an effective gradient between the valley or summit and points 5 metres either side, of not less than 1 in 360 (0.28%).
 - The radius of curvature should also be not less than 200 metres. This will apply when steeper than normal gradients are approved.
 - On summit curves, the radius of curvature may need to be increased to ensure that junction and forward visibility splays are not obstructed.
- The maximum gradient of carriageway normally permitted is 1 in 15 or 6.67%. In very hilly locations this requirement may be relaxed if the developer can demonstrate that it is impractical to develop the site in any other way. (If the gradient has to exceed 1 in 12 (8.3%) a handrail may be required alongside the footway).

- The minimum channel gradient normally permitted is 1 in 120 (0.83%) or 1 in 80 (1.25%) where the road is block paved. Developers should note that this applies to the gradient of a channel on the outside of a bend. Where such bends occur the minimum centre line gradient will be steeper (the effect of this will be ignored for bends with a radius of at least 50 metres).
- In certain circumstances road gradients of between 1 in 120 (0.83%) and 1 in 150 (0.67%) will be approved with the provision of channel blocks which shall only be terminated at a gully.
- The gradient of the first 5 metres of any section of road from its junction with a more major road should be no steeper than 1 in 25 (4%).
- When the longitudinal gradient of the main road is less than 1 in 120 (0.83%), the side road should fall away from the main road for a distance of at least 30 metres, to reduce the possibility of water ponding within the area of the junction.
- The gradient of all footpaths should not be steeper than 1 in 12 (8.3%) nor flatter than 1 in 120 (0.83%), and should have a crossfall of 1 in 30 (3.3%).
- The maximum gradient of private drives is 1 in 10 (10%).
- In areas of summit vertical curve, developers should check that the forward and junction visibility splays are not impeded by the height of ground within the splay areas. For this purpose a deemed height of 250mm for vegetation shall be taken into account to allow for occasions when grass has not been cut.

Notes

- (i) The forward visibility requirements are otherwise defined in DB 32 paragraphs 5:13-5:15. Developers should note that whilst the drivers' eye height is 1.05 metres they need to be able to see an obstruction (a small child) on the highway, at an height of only 0.26 metres above carriageway level.
- (ii) The junction visibility distances are defined in Tables 4.2 and 4.3. A driver needs to see other car drivers, and this requires clear sight between points 1.05 metres above carriageway level.
- (iii) Where housing is intended for the disabled or elderly, the maximum drive gradient should not exceed 1 in 12 (8.3%).
- (iv) Particularly when houses/garages are lower than the road, developers should bear in mind that the footway/drive crossing rises from the road at a gradient of approximately 1 in 12 (8.3%). It is normally necessary to provide a roll over before commencing the fall of the drive or cars may ground at the junction of the footway and drive. In certain circumstances backfall of a footway may be possible.

1.11 Tying into Existing Roads

When extending an existing road, the new length of road should be tied in to the existing with smooth horizontal and vertical alignments. To demonstrate this the following details should be shown:

- Existing top of kerbs, channel and centre line levels at 5 metre intervals for a distance of at least 30 metres along the existing road. This information should be shown on both the layout plan and longitudinal section.

Notes:

- (i) If any areas of planing, regulation, or reconstruction are required, these should be shown on the plan. Unless the thickness of each layer in the carriageway can be established, no planing in excess of the depth of the new wearing course will be permitted. (See Drawing TS/2/4 on page 16).
- (ii) At junctions with existing roads, channel levels on the main road should run through the junction and side road levels should be designed accordingly.

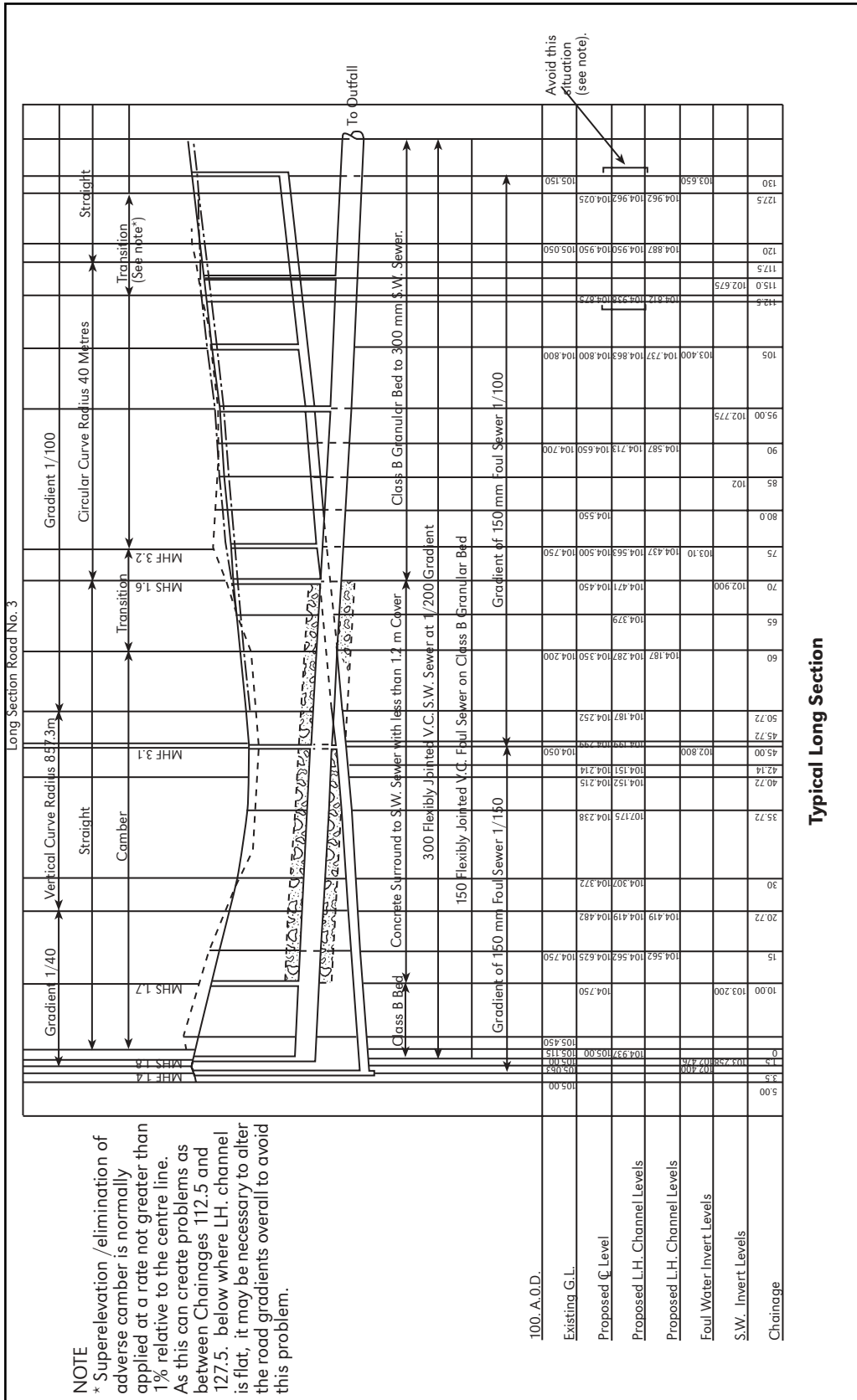
1.12 Cross Sections

Cross sections of the proposed road and footway construction should be shown on the plans indicating the type of materials, relevant depths and Department of Transport specification clauses.

Further details are given in Part 2.

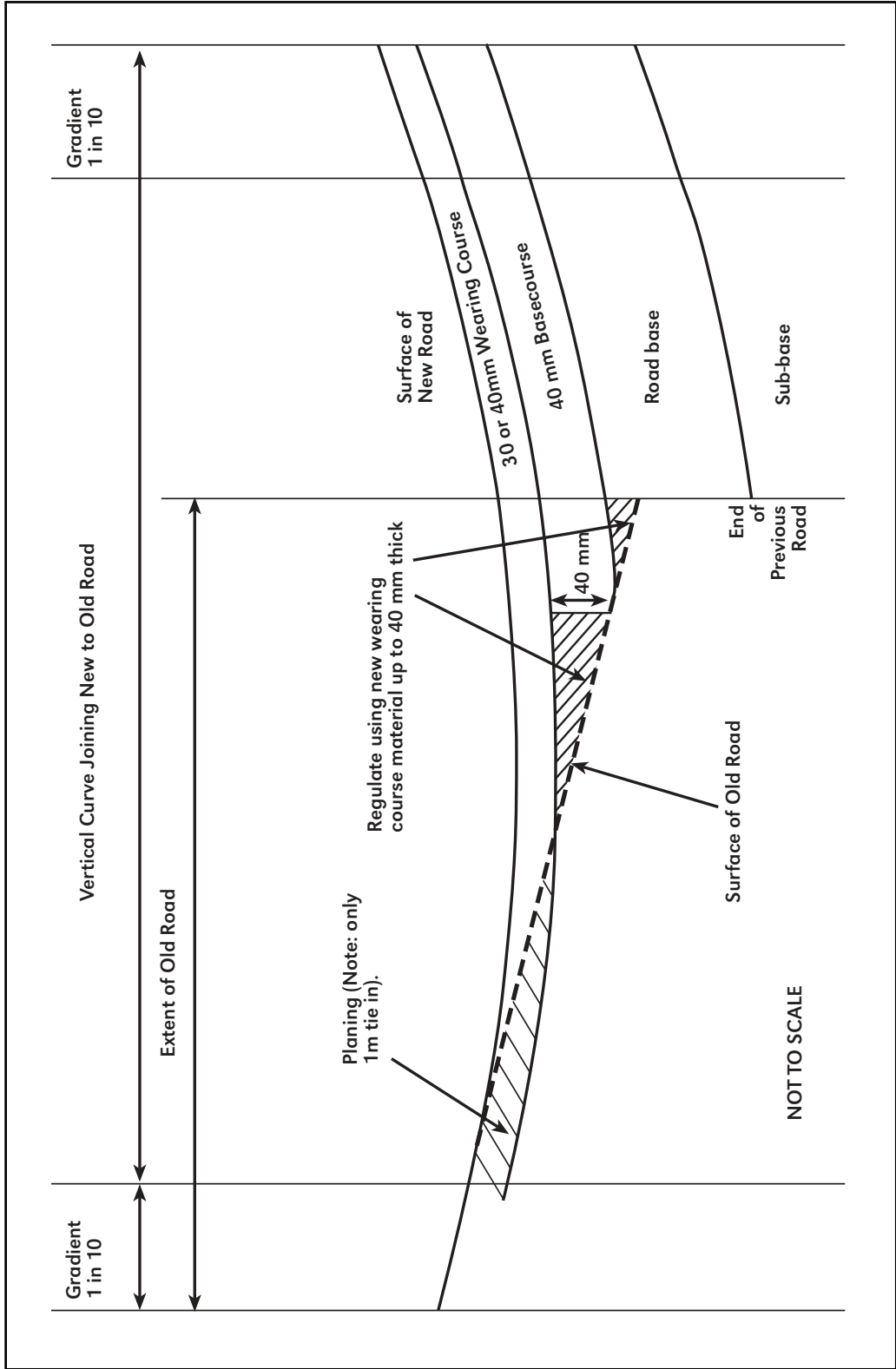
Cross section details of any proposed rumble strips will need to be submitted and the height of the upstand should be no more than 10mm. (See General Detail SD/RS/17)

Typical Long Section DRAWING No. TS/1/4



Typical Section Showing How To Join A New Road To An Existing Road

DRAWING No. TS/2/4



PART 2

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2.1 Specification Objectives

The standards and advice contained in this part of the guide have been produced to ensure the construction of roadworks to a standard suitable for adoption by the highway authority and which can be maintained by them at reasonable cost.

The specification is based upon the Department of Transport's "Specification for Highway Works - 1990 Volume 7" and any amendments thereto, relevant British Standards, advice notes, technical memoranda and other appropriate design standards and bulletins. Clause references, where quoted, refer to the Specification for Highway Works referred to above. The specification supersedes previous guidance issued by Shropshire County Council in its "Guide and Specification to the Design of Highway/Industrial Estate Roads". Only materials from approved sources and complying with the relevant British Standards shall be used in the works. All sources of material must be agreed with the highway authority well in advance of the commencement of any works on site.

2.2 Pavement Assessment and Design

2.2.1 General

The main purpose of the foundation to a road is to distribute the applied vehicle loads to the underlying subgrade, without causing undue distress in the foundation layer(s) or road pavement. The standard practice is to design for construction traffic loading unless a service road to the development is provided.

2.2.2 Subgrade Assessment

The subgrade is not normally strong enough to carry construction traffic and bound or unbound foundation layers of adequate stiffness are required to reduce the stress on the subgrade. A knowledge of the stiffness and shear strength of the subgrade is therefore required to determine the road construction. This is done by means of a California Bearing Ratio (CBR) test on the subgrade. Test results are normally given in percentage figures and from these the road construction can be assessed. Unless CBR test results are submitted and accepted by the highway authority in advance of site work commencing it will be assumed that the subgrade has a CBR value of less than 5% and a capping layer will be required.

2.2.3 Capping and Sub-base

Capping material is used to improve and protect weak subgrades where a CBR of less than 5% has been achieved. This material increases the stiffness and strength of the formation on which the sub-base material will be placed. The following table should be used to determine capping layer thickness.

Table 1 - Capping layer requirements	
Subgrade CBR (%)	Capping thickness (mm)
4%	300
3%	450
2%	600
1% and below	A detailed design will be required

Note:

The above thicknesses are based on the provision of a 150 mm thick MOT Type 1 sub-base layer.

Where a subgrade has a CBR below 2% it becomes unsuitable as a pavement foundation and would tend to deform and 'wave' under construction traffic. If this occurs the material can be removed and replaced by more suitable material if the depth is small. When large areas of material are to be removed, a typical depth of between 0.5 metres and 1.0 metre should be excavated, resulting in a total construction depth of approximately 1.5 metres. A geotextile membrane may be useful for segregation purposes.

Capping and sub-base materials should be provided in accordance with the "Specification for Highway Works".

Normally, capping materials should be provided to Clause 6F2 of the "Specification for Highway Works" but in adverse ground conditions a larger, coarser material should be considered.

All sub-base material should be provided in accordance with Clause 803 of the "Specification for Highway Works".

2.2.4 Drainage

It is imperative that water is kept out of the sub-base, capping and subgrade, both during construction and the service life of the road. Water should be prevented from entering the foundation by providing an escape route by means of a drain located on the downslope route from the capping or sub-base. The drain should be placed below the bottom of the capping or sub-base (see also Section 2.15.3 Sub-Soil Drainage on page 62).

2.2.5 Frost Protection

For all road specifications, materials within 450mm of the finished road surface shall be non-frost susceptible as required by the "Specification for Highways Works".

2.2.6 Proof Rolling

The subgrade shall be trimmed, rolled and shaped to the satisfaction of the Director of Environment prior to the laying of any capping and sub-base material.

2.3 Road Construction Details

2.3.1 Industrial Estate Roads

Technical details

An industrial estate road should be capable of being accessed from primary or district distributors or local distributors.

The internal layout should be designed to ensure that traffic queues do not form on the external highway network.

The design and location of industrial estate road accesses should accord with the recommendations contained in TD42/95*.

The basic requirements for an industrial estate road are as follows:

- (i) Carriageway Width:** 7.3 metres maximum
- (ii) Junction Radii:** 15 metres minimum
- (iii) Centre Line Radius:** 60 metres minimum
- (iv) Kerbs:** 125mm kerb face height
- (v) Footways and Verges:** Footways are normally 1.8 metres wide on both sides. Where highway verges are provided, consideration should be given to the future maintenance of the grassed areas, which must be kept free of obstructions likely to impede easy access to the services beneath. Wherever possible the verges should be sited behind the footway, rather than adjacent to the carriageway.

Note:

*TD 42/95 - Geometric Design of Major/Minor Priority Junctions
Published by the Highways Agency.

Road Construction

- 1) **Note:** General clause references derive from the Department of Transport "Specification for Highway Works".
- 2) Grid for checking surface levels of pavement courses
(Clause 702.4)

Longitudinal dimension	10 metres
Transverse dimension	2 metres
- 3) Surface regularity
(Clause 702.7)

Category of Road	A
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- 4) Percentage Refusal Density required
(Clause 901/15)

Percentage Refusal Density required	93%
-------------------------------------	-----
- 5) Coated Chippings
(Clause 915)

Nominal Size	20mm
Minimum Polished Stone Value (PSV)	62
Maximum Aggregate Abrasion Value (AAV)	12
- 6) Surface Texture
Required (Clause 921)

Sand Patch Method	
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- 7) BS 4987 Traffic Category
(Clauses 908, 909, 912, 914, 916 and 917)

BS 4987 Traffic Category	A
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	Clause	Material	Grade of Binder	Thickness (mm)	Special Requirements
Wearing Course:	911	Hot Rolled Asphalt (HRA)		40	BS 594 Part 1 Table Nos 3 Column Nos 2 Marshall Stability Target 6 kN Tolerance 2 kN Marshall Flow (Clause 917) 5mm Minimum air temperature for laying wearing course (Clause 703.4) 5°C
Basecourse:	906	Dense Bitumen Macadam (DBM)	100 pen	60	BS 4987: Clause 6.5 20mm aggregate
Roadbase:	903	DBM	100 pen	225	BS 4987: Clause 5.2 28mm aggregate
Sub-base:	803	MOT Type 1		225	Minimum CBR: 30% (Clause 804.3)

Total Pavement Thickness: 550mm

24.

**PART 2
2.3.1
cont**

Industrial Estate Road - Width 6.75 - 7.3 Metres

DRAWING No. TS/3A/4

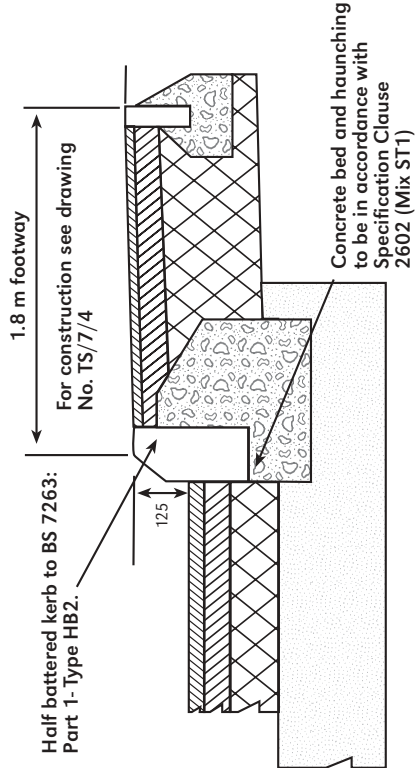
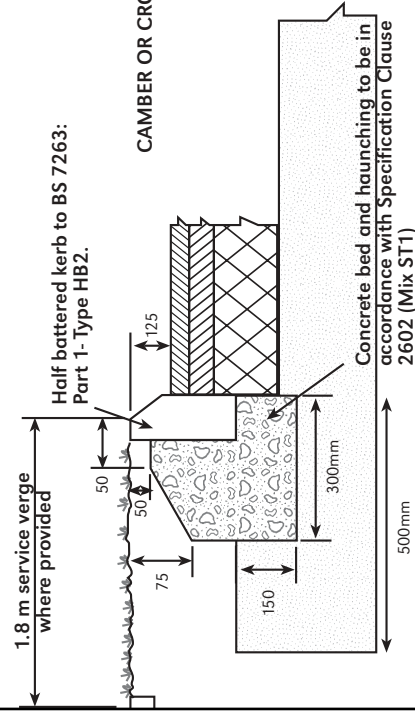
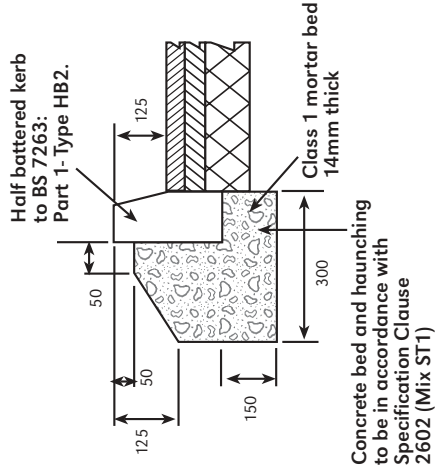
 40mm HOT ROLLED ASPHALT WEARING COURSE to BS 594: Part 1 (DTP Specification Clause 911).

 60mm DENSE BITUMEN MACADAM BASECOURSE to BS 4987: Part 1 Clause 6.5 (DTP Specification Clause 906).

 225mm DENSE BITUMEN MACADAM ROADBASE to BS 4987: Part 1 Clause 5.2 (DTP Specification Clause 903).

 225mm MOT TYPE 1 SUB-BASE MATERIAL to DTP Specification Clause 803.

NOTE: Above design based on a minimum CBR value of 5%.
For Capping Layer thickness see Table 1 Capping Layer Requirements (Part 2 sub section 2.2.3).



Dimensions in millimetres where not stated.

2.3.2 Residential Distributor Road

Technical Details

Residential distributor roads are through routes which distribute traffic within large residential areas where 300 or more dwellings are being served.

This type of road is a through traffic route and frontage access will not normally be permitted. These roads should be designed for a maximum vehicle speed of 30 mph (48 kph).

The basic requirements for a residential distributor road are as follows:

- (i) Carriageway Width:** 6.1 metres - 7.3 metres
- (ii) Junction Radii:** 15 metres minimum
- (iii) Centre Line Radius:** 60 metres
- (iv) Kerbs:** 125mm kerb face height
Pedestrian crossings are required at all road junctions.
- (v) Footways and Verges:** Footways are normally 1.8 metres wide, on both sides of the road. Where highway verges are provided, consideration should be given to the future maintenance of the grassed areas, which must be kept free of obstructions likely to impede easy access to the services beneath. Wherever possible verges should be sited behind the footway, rather than adjacent to the carriageway.

Road Construction

- 1) **Note** General clause references derive from the Department of Transport "Specification for Highway Works".
- 2) Grid for checking surface levels of pavement courses
(Clause 702.4)

Longitudinal dimension	10 metres
Transverse dimension	2 metres
- 3) Surface regularity
(Clause 702.7)

Category of road	A
------------------	---
- 4) Percentage Refusal
Density required
(Clause 901/15)

	93%
--	-----
- 5) Coated Chippings
(Clause 915)

Nominal Size	20 mm
Minimum Polished Stone Value (PSV)	62
Maximum Aggregate Abrasion Value (AAV)	12
- 6) Surface Texture
Required (Clause 921)





Sand Patch Method	
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- 7) BS 4987 Traffic Category
(Clauses 908, 909, 912, 914, 916 and 917)

	A
--	---

	Clause	Material	Grade of Binder	Thickness (mm)	Special Requirements
Wearing Course:	911	HRA		40	BS 594 Part 1 Table Nos 3 Column Nos 2 Marshall Stability Target 6 kN Tolerance 2 kN Marshall Flow (Clause 917) 5mm Minimum air temperature for laying wearing course (Clause 703.4) 5°C
Basecourse:	906	DBM	100 pen	60	BS 4987: Clause 6.5 20mm aggregate
Roadbase:	903	DBM	100 pen	225	BS 4987: Clause 5.2 28mm aggregate
Sub-base:	803	MOT Type 1		225	Minimum CBR: (Clause 804.3) 30%

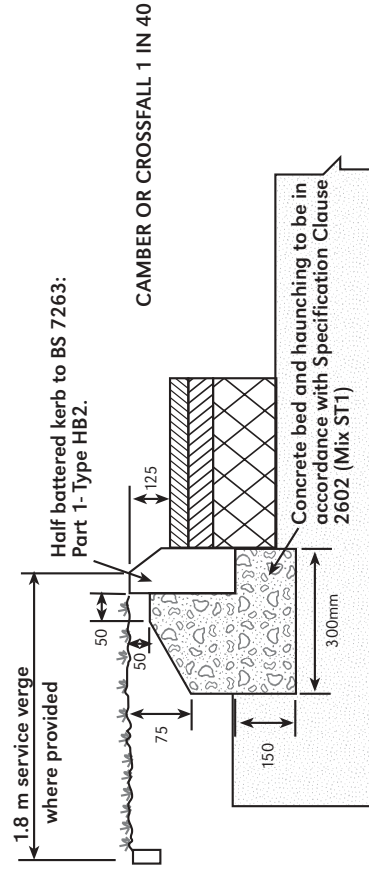
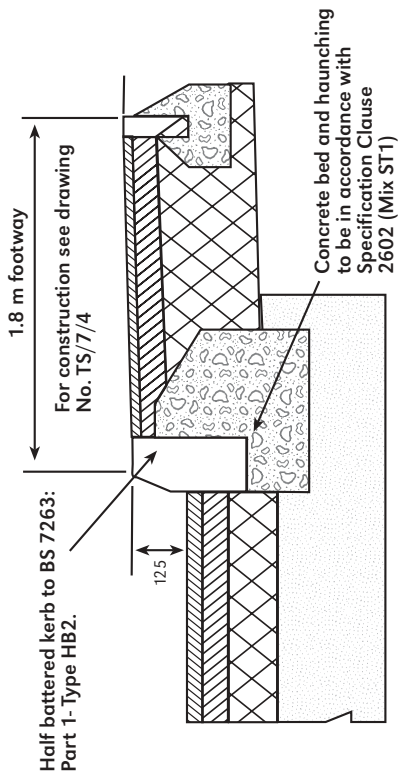
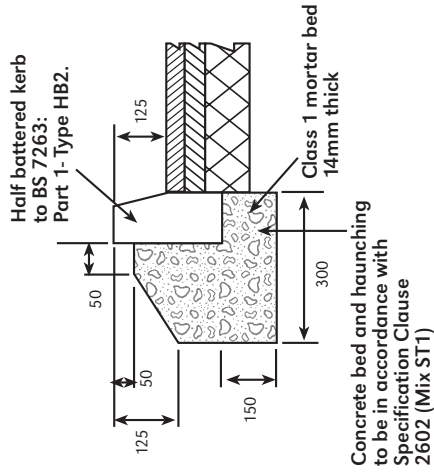
Total Pavement Thickness: 550mm

Residential Distributor Road - Width 6.1 - 7.3 Metres DRAWING No. TS/3B/4

-  40mm HOT ROLLED ASPHALT WEARING COURSE to BS 594: Part 1 (DTP Specification Clause 911).
-  60mm DENSE BITUMEN MACADAM BASECOURSE to BS 4987: Part 1 Clause 6.5 (DTP Specification Clause 906).
-  225mm DENSE BITUMEN MACADAM ROADBASE to BS 4987: Part 1 Clause 5.2 (DTP Specification Clause 903).
-  225mm MOT TYPE 1 SUB-BASE MATERIAL to Specification Clause 803.

NOTE: Above design based on a minimum CBR value of 5%.
For Capping Layer thickness see Table 1 Capping Layer Requirements (Part 2 sub section 2.2.3).

KERB DETAIL



2.3.3 Collector Road

Technical Details

A collector road is a residential road with footways, which collects traffic from within small parts of residential areas and may take the form of a loop.

It should be designed for a maximum speed of 30 mph (48 kph).

The basic requirements for a collector road are as follows:-

- (i) Carriageway Width:** 5.5 metres
- (ii) Junction Radii:** 10.5 metres minimum
- (iii) Centre Line Radius:** 45 metres
- (iv) Kerbs:** 125 mm kerb face height
Pedestrian crossings are required at all road junctions.
- (v) Footways:** Normally 1.8 metres wide on both sides
- (vi) Turning Heads:** These are required at the end of all culs-de-sac.

Road Construction

- 1) **Note** General clause references derive from the Department of Transport "Specification for Highway Works".
- 2) Grid for checking surface levels of pavement courses (Clause 702.4)

Longitudinal dimension	10 metres
Transverse dimension	2 metres
- 3) Surface regularity (Clause 702.7)

Category of road	A
------------------	---
- 4) Percentage Refusal Density required (Clause 901/15)

	93%
--	-----
- 5) Coated Chippings (Clause 915)

Nominal Size	20mm
Minimum Polished Stone Value (PSV)	62
Maximum Aggregate Abrasion Value (AAV)	12
- 6) Surface Texture Required (Clause 921)

Sand Patch Method	
-------------------	--
- 7) BS 4987 Traffic Category (Clauses 908, 909, 912, 914, 916 and 917)

	A
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	Clause	Material	Grade of Binder	Thickness (mm)	Special Requirements
Wearing Course:	911	HRA		40	BS 594 Part 1 Table Nos 3 Column Nos 2 Marshall Stability Target 6 kN Tolerance 2 kN Marshall Flow (Clause 917) 5mm Minimum air temperature for laying wearing course (Clause 703.4) 5°C
	912	Close Grade Macadam	100 pen	40	BS 4987: Clause 7.3 14mm aggregate
Basecourse:	906	DBM	100 pen	60	BS 4987: Clause 6.5 20mm aggregate
Roadbase:	903	DBM	100 pen	125	BS 4987: Clause 5.2 28mm aggregate
Sub-base:	803	MOT Type 1		225	Minimum CBR: 30% (Clause 804.3)

Total Pavement Thickness: 450mm

2.3.4 Traditional Estate Road

Technical Details

A traditional estate road provides access to residential areas and may serve a maximum of 200 dwellings.

Direct access from dwellings is permitted providing adequate off-street parking facilities are made available and on-plot turning facilities are provided.

The traditional estate road should be designed for a maximum speed value of 25 mph (40 kph). A meandering alignment is therefore required.

The basic requirements for a traditional estate road are as follows:

- (i) Carriageway Width:** 5.5 metres
- (ii) Junction Radii:** 10.5 metres minimum
- (iii) Centre Line Radius:** 30 metres
- (iv) Kerbs:** 125 mm kerb face height, 25mm kerb face height at vehicular crossings. Pedestrian crossings are required at all road junctions.
- (v) Footways & Verges:** Footways normally 1.8 metres wide on both sides of the road. Highway verges should be of adequate width to accommodate services not located in the footway.
- (vi) Turning Heads:** These are required at the end of all culs-de-sac.

Road Construction

- 1) **Note** General clause references derive from the Department of Transport "Specification for Highway Works".
- 2) Grid for checking surface levels of pavement courses (Clause 702.4)

Longitudinal dimension	10m
Transverse dimension	2m
- 3) Surface regularity (Clause 702.7)

Category of road	A
------------------	---

- 4) Percentage Refusal Density required (Clause 901/15) 93%
- 5) Coated Chippings (Clause 915) Nominal Size 20mm
Minimum Polished Stone Value (PSV) 62
Maximum Aggregate Abrasion Value (AAV) 12
- 6) Surface Texture Required (Clause 921) Sand Patch Method
- 7) BS 4987 Traffic Category (Clauses 908, 909, 912, 914, 916 and 917) A

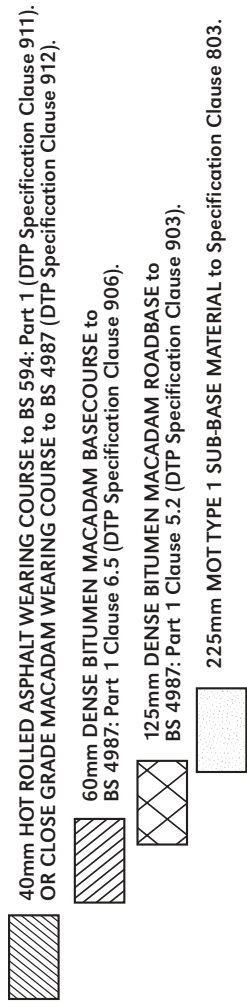
	Clause	Material	Grade of Binder	Thickness (mm)	Special Requirements
Wearing Course:	911	HRA		40	BS 594 Part 1 Table Nos 3 Column Nos 2 Marshall Stability Target 6 kN Tolerance 2 kN Marshall Flow (Clause 917) 5mm Minimum air temperature for laying wearing course (Clause 703.4) 5°C
	912	Close Grade Macadam	100 pen	40	BS 4987: Clause 7.3 14mm aggregate
Basecourse:	906	DBM	100 pen	60	BS 4987: Clause 6.5 20mm aggregate
Roadbase:	903	DBM	100 pen	125	BS 4987: Clause 5.2 28mm aggregate
Sub-base	803	MOT Type 1		225	Minimum CBR: 30% (Clause 804.3)

Total Pavement Thickness: 450 mm

32.

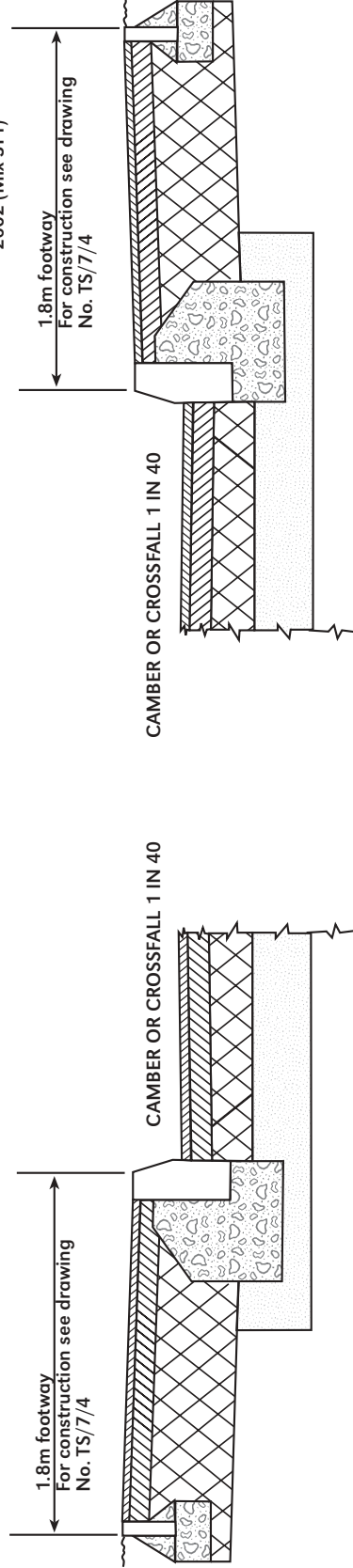
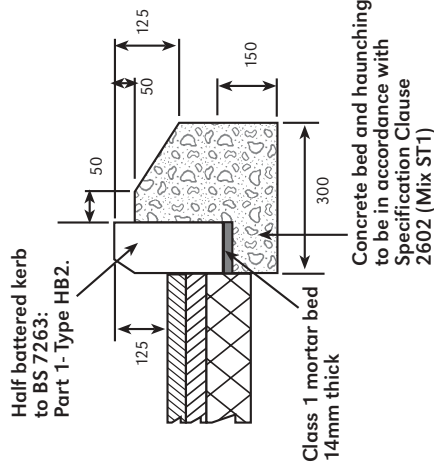
**PART 2
2.3.4
cont...**

Collector/Traditional Estate Road - Width 5.5 Metres
DRAWING No. TS/4/4



NOTE: Above design based on a minimum CBR value of 5%.
 For Capping Layer thickness' see Table 1 Capping Layer Requirements
 (Part 2 sub section 2.2.3).

KERB DETAIL



Dimensions in millimetres where not stated.

2.3.5 Access Road

Technical Details

A standard access road is a short cul-de-sac giving direct access to no more than 50 dwellings. The normal maximum length permitted is 100 metres if not a loop.

Access roads should be designed for a speed value of 20 mph (32 kph).

The basic requirements for an access road are as follows

- (i) Carriageway Width:** 4.8 metres
- (ii) Junction Radii:** Normally 6.0 metres or 10.5 metres at junctions with higher order roads
- (iii) Centre Line Radius:** 20 metres
- (iv) Kerbs:** 125 mm kerb face height, 25mm kerb face height at vehicular crossings. Pedestrian crossings are required at all road junctions.
- (v) Footways & Verges:** 1.8 metres wide footways are required on both sides of the road. One footway can be omitted and replaced with a 0.5 metre wide verge if the access road is over a short length and there are no underground services or street furniture.
- (vi) Turning Heads:** These are required at the end of all culs-de-sac. They may be of an informal shape providing they are capable of containing a standard turning head.

Road Construction

- (1) **Note** General clause references derive from the Department of Transport "Specification for Highway Works".
- (2) Grid for checking surface levels of pavement courses (Clause 702.4)
 Longitudinal dimension: 10 metres
 Transverse dimension: 2 metres
- 3) Surface regularity Category of road A
 (Clause 702.7)
- 4) Percentage Refusal Density required 93%
- 5) Coated Chippings Not applicable
- 6) Surface Texture Required Not applicable
- 7) BS 4987 Traffic Category A
 (Clauses 908, 909, 912, 914 and 916)

	Clause	Material	Grade of Binder	Thickness (mm)	Special Requirements
Wearing Course:	912	CGM	100 pen	30	BS 4987: Clause 7.4 10mm aggregate
Basecourse:	906	DBM	100 pen	50	BS 4987: Clause 6.5 20mm aggregate
Roadbase:	903	DBM	100 pen	110	BS 4987: Clause 5.2 28mm aggregate
Sub-base:	803	MOT Type 1		260	Minimum CBR: (Clause 804.3) 30%

Total Pavement Thickness: 450mm

Access Road - Width 4.8 Metres DRAWING No. TS/5/4

 30mm CLOSE GRADED MACADAM WEARING COURSE to BS 4987: CLAUSE 7.4 (DTP Specification Clause 912).

 50mm DENSE BITUMEN MACADAM BASECOURSE to BS 4987: Part 1 Clause 6.5 (DTP Specification Clause 906).

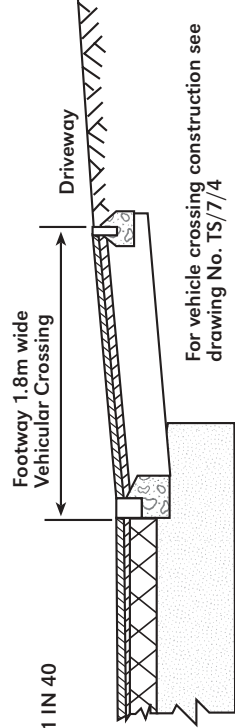
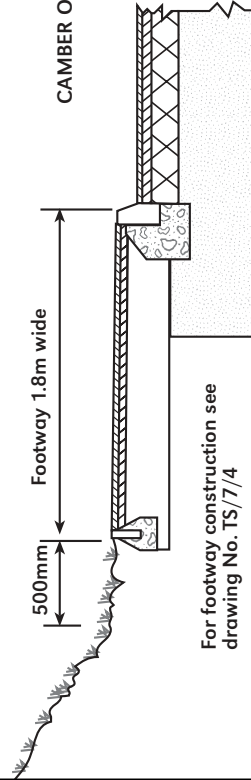
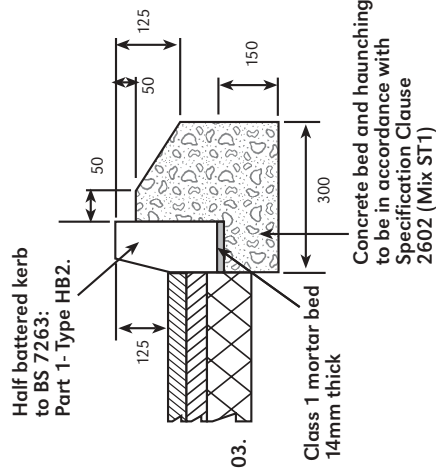
 110mm DENSE BITUMEN MACADAM ROADBASE to BS 4987: Part 1 Clause 5.2 (DTP Specification Clause 903).

 260mm MOT TYPE 1 SUB-BASE MATERIAL to Specification Clause 803.

NOTE: Embankment or cutting slopes not to exceed a gradient of 1 in 2 and to have a minimum level berm of 500mm from back of footway.

NOTE: Above design based on a formation CBR value of 5%. For Capping Layer thickness' see Table 1 Capping Layer Requirements (Part 2 sub section 2.2.3).

KERB DETAIL



Dimensions in millimetres where not stated.

2.3.6 Shared Surface Road

Technical Details

A shared surface road is a joint use pedestrian/vehicular road and normally gives access to no more than 20 dwellings.

These roads are not normally permitted to be accessed off a residential distributor road.

Generally, additional off-street parking facilities are required in order to discourage parking on the highway. Shared surface roads are designed for speeds of 10 mph (16 kph). The length of this type of road is generally restricted to 80 metres.

The basic requirements for a shared surface road are as follows:

- (i) Carriageway Width:** Varies between 4.1 metres and 4.8 metres. The surface finish must contrast visually with the surface of the adjoining road.
- (ii) Junction Radii:** Normally 4.5 metres - vehicle speed ramps are used at the junction to indicate to the driver that they are entering a different pedestrian/vehicular type of environment.
- (iii) Centre Line Radius:** Not applicable
- (iv) Kerbs:** Generally 40mm kerb face height - reduced to 25mm for vehicular crossings. An alternative kerb type to ordinary PCC kerbs is suggested for these roads.
- (v) Footways and Verges:** Footways are not required. A minimum 1.8 metre service verge is generally provided on at least one side of the road.
- (vi) Turning Heads:** A turning head is required at the end of all culs-de-sac.

Road Construction

- 1) **Note** General clause references derive from the Department of Transport "Specification for Highway Works".

	Clause	Material	Grade of Binder	Thickness (mm)	Special Requirements
Wearing Course:		Block Pavior (Clay)		60	BS 6677: Part 1 1986
		OR Block Pavior (Concrete)		80	BS 6717: Part 1 1986
Bedding Layer:		Sharp Sand		50	BS 6677: Part 2 for Clay Paviers BS 6677 Part 3 for Concrete Paviers 30mm thick after compaction
Roadbase:	903	DBM	100 pen	110	BS 4987: Clause 5.2 28 mm aggregate
Subbase:	803	MOT Type 1		225*	Minimum CBR: (Clause 804.3) 30%

Total Pavement Thickness: 465 mm

**When Clay Block Paviers are used the MOT Type 1 Sub-base should be increased to 245mm*

Shared Surface Road - Width 4.1 Metres Minimum DRAWING No. TS/6/4

NOTE:
500mm, minimum clearance required to walls or fences where no service strip is to be provided.
Embankment or cutting slopes not to exceed a gradient of 1 in 2 and to have a minimum level berm of 500mm from back of kerb.

80mm thick CONCRETE BLOCK PAVIORS to Part 1 BS6717 Part 1986 or 60mm thick CLAY BLOCK PAVIORS to BS6677 Part 1 1986

50mm SHARP SAND BEDDING LAYER to BS6677 - Part 2 (clay) or Part 3 (concrete)

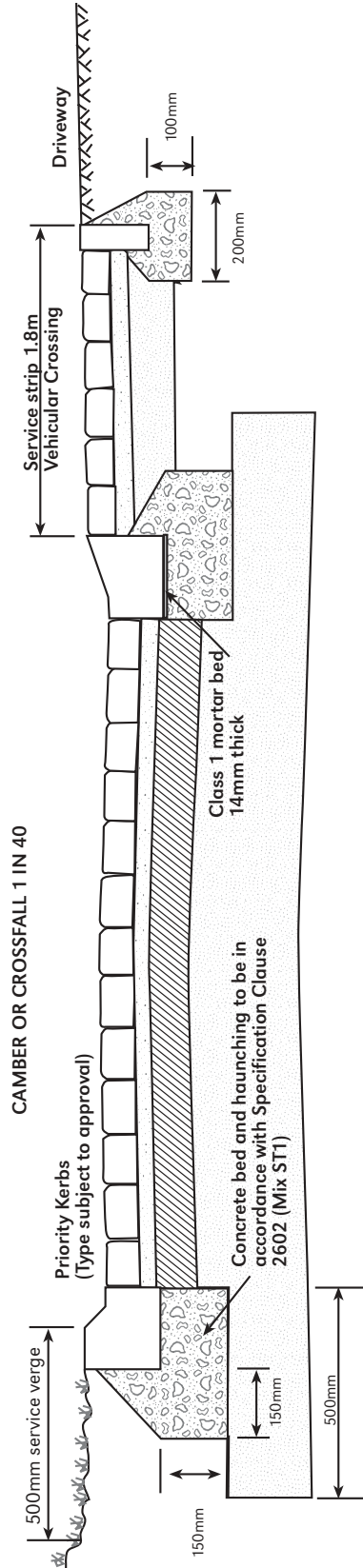
110mm DENSE BITUMEN MACADAM ROADBASE to BS 4987: Part 1 Clause 5.2 (DTP Specification Clause 903).

225mm MOT TYPE 1 SUB-BASE MATERIAL to Specification Clause 803. (increase to 245 for Clay Paviors).

NOTE: Above design based on a minimum CBR value of 5%. For Capping Layer thickness' see Table 1 Capping Layer Requirements (Part 2 sub section 2.2.3).

SERVICE STRIP - 1.8m WIDE

The service strip forms part of the adoptable highway and must not be conveyed with the adjoining property. It must be grassed and kept clear of trees, shrubs, walls, fencing, and any other structures.



2.3.7 Mews Court

Technical Details

The mews court is a short cul-de-sac serving a maximum of ten dwellings. As it is most suited to an urban environment, Conservation Area or village infill site where its narrow entrance can maintain the street scene, it will generally be discouraged within large new housing developments.

As the mews court represents the lowest point of the adoptable road hierarchy it is of the utmost importance that vehicle speeds should be very low, and that drivers are made aware that they are using a road designed primarily for the convenience of pedestrians and not that of motorists. It is therefore necessary to provide a strong physical definition of the changing character of the road, to reinforce to drivers the fact that they are entering an area where the vehicle plays a secondary role to the movement of pedestrians.

The basic requirements for a mews court are as follows:

- (i) Carriageway Width:** Varies between 3.0 metres and 6.0 metres. The surface finish must contrast visually with the surface of the adjoining road.
- (ii) Junction Radii:** Normally 4.5 metres - vehicle speed ramps are used at the entrance to indicate to the driver that they are entering a different pedestrian /vehicular type of environment.
- (iii) Centre Line Radius:** This type of road is generally provided with a straight alignment.
- (iv) Kerbs:** Generally 40mm kerb face height - reduced to 25mm for vehicular crossings.
- (v) Footways and Verges:** No footways are required. A service margin should be provided within the shared surface.
- (vi) Turning Heads:** Subject to the overall length of the mews court carriageway not exceeding 45 metres, it will be necessary only to provide turning facilities capable of accommodating a private car. Turning heads may be of an informal shape but must be capable of accommodating a standard turning head within the outline used.

Road Construction

- (i) **Note:** General clause references derive from the Department of Transport "Specification for Highway Work".

	Clause	Material	Grade of Binder	Thickness (mm)	Special Requirements
Wearing Course:	6717	Block Pavior (Clay)		60*	BS 6677: Part 1 1986
		Block Pavior (Concrete)		80	BS 6717: Part 1 1986
Bedding Layer:		Sharp Sand		50 (30 compacted)	
Sub-base	803	MOT Type 1		340	BS 6677: Part 2 for Clay Paviers BS 6677 Part 3 for Concrete Paviers Minimum CBR: 30% (Clause 804.3)

Total Pavement Thickness: **450mm**

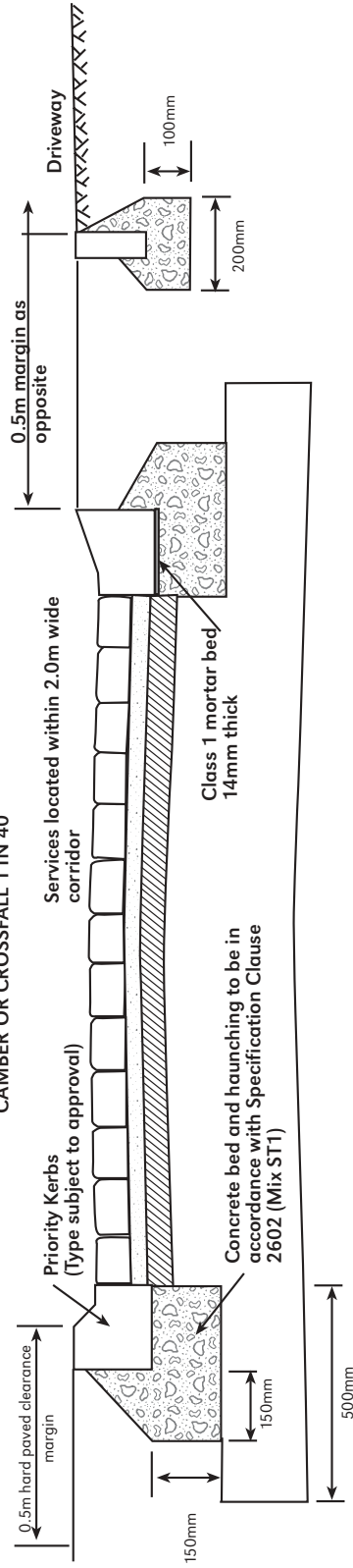
**Note: When Clay Block Paviers are used the MOT Type 1 Sub-base should be increased to 360mm.*

Mews Court - Width 3.0 - 6.0 Metres
DRAWING No. TS/6A/4

80mm thick CONCRETE BLOCK PAVIORS to Part 1 BS6717 Part 1 1986
or 60mm thick CLAY BLOCK PAVIORS to BS6677 Part 1 1986
50mm SHARP SAND BEDDING LAYER to BS6677 - Part 2 (clay) or Part 3 (concrete)
340mm MOT TYPE 1 SUB-BASE MATERIAL to Specification Clause 803.
(increase to 360mm thick for Clay Paviors).

NOTE: Above design based on a minimum CBR value of 5%.
For Capping Layer thickness' see Table 1 Capping Layer Requirements
(Part 2 sub section 2.2.3).

CAMBER OR CROSSFALL 1 IN 40



2.4 Footways, Shared Footways & Cycle Tracks

2.4.1 General

The basic requirements for footways, shared footways and cycle tracks are as follows:

- (i) Width:** 1.8 metres for footways provided adjacent to the carriageway. 2.5 metres minimum for segregated cycle tracks. 3.0 metres minimum for shared footway/cycle tracks.
- (ii) Crossfall and Gradients:** 1 in 30 crossfall for footways 1 in 40 camber (balanced) for cycle tracks.
- (iii) Kerbs and Edging:** Provided as a permanent edge support, laid flush with the finished level of the adjacent ground.

2.4.2 Footway Construction

20mm thick medium grade macadam wearing course to BS 4987: Part 1 - Clause 7.6 using 6mm aggregate. "Specification for Highway Works" - Clause 912.

40mm thick dense bitumen macadam basecourse to BS 4987: Part 1 - Clause 6.5 using 20mm aggregate. "Specification for Highway Works" - Clause 906.

125mm thick granular sub-base material Type 1. "Specification for Highway Works" - Clause 803.

Total thickness 185mm

2.4.3 Vehicular Crossings

Where vehicular crossings are required over footways or verges the kerb shall be dropped to give a face height of 25mm.

The minimum crossing width shall be 2.4 metres, measured along the rear edge of the footway or verge.

Each side of the crossing shall be splayed at an angle of 45° from the edge of the carriageway.

Construction of the crossing shall be as for footway construction, but the Type 1 sub-base material shall be increased to a depth of 200mm.

Notes:

- (i) Where a vehicular crossing serves two or more properties or a car parking area the thickness of basecourse layer shall be increased to 80mm.
- (ii) Vehicular crossings on industrial estate roads shall be constructed using carriageway specification.

2.4.4 Verges/Service Strips

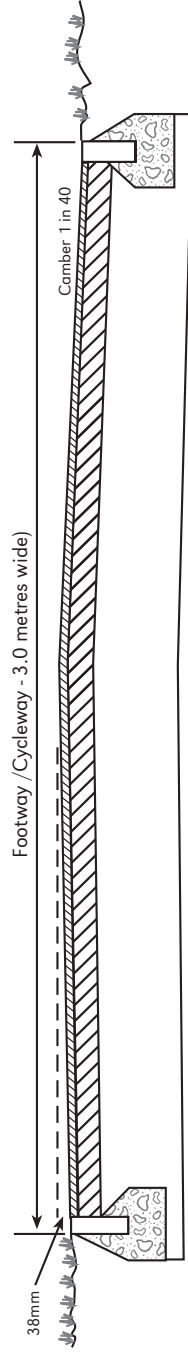
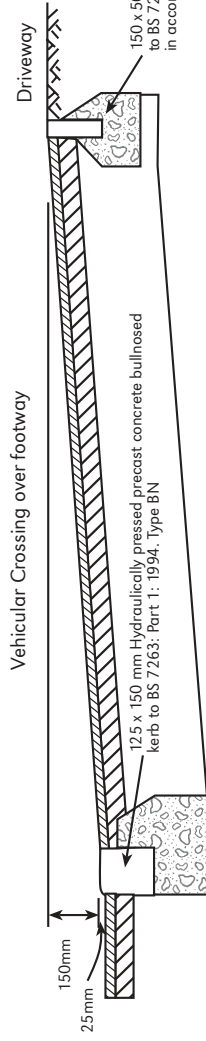
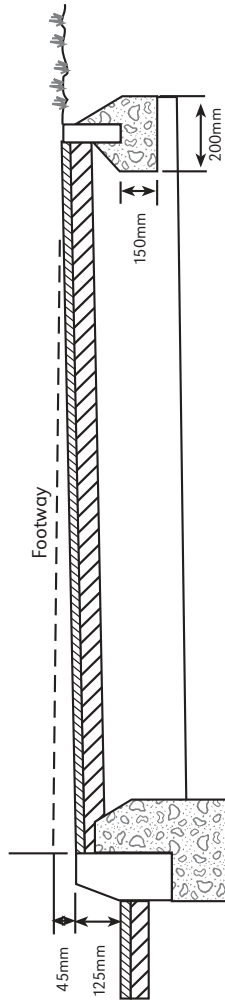
All verges/service strips shall be cleared of all debris, prior to levelling. The verge area shall be of good quality topsoil and dug or rotavated to a minimum depth of 150mm and either seeded or turfed.

Seeding shall be provided at a rate of not less than 25 grams per square metre and not more than 50 grams per square metre. After seeding the area shall be lightly raked and not rolled. If turf is used, the area shall be rolled before and after laying, using a non-vibrating roller, weighing between 250 kg and 500 kg. The finished level of the grass shall be approximately 40 mm above the surrounding paving, edges, manhole covers etc.

The developer will be responsible for maintaining the grassed areas up to the date of adoption.

Footway, Vehicle Crossing & Cycleway Details

DRAWING No. TS/7/4



CONSTRUCTION SPECIFICATION

20 mm thick MEDIUM GRADE MACADAM WEARING COURSE to BS 4987: Part 1: Clause 7.6 (DTP Specification Clause 912).

40mm DENSE BITUMEN MACADAM BASECOURSE to BS 4987: Part 1: 1993, Clause 6.5 (DTP Specification Clause 906).

125mm thick GRANULAR SUB-BASE MATERIAL TYPE 1 to DTP Specification Clause 803.

NOTES.

1. Basecourse thickness to be increased to 80mm for vehicular crossings serving 2 or more properties and parking areas.
2. Sub-base material to be increased to 200mm thick for vehicular crossings.

150 x 50 mm Hydraulically pressed precast concrete edging kerb to BS 7263: Part 1: 1994, Type EF laid and haunched with concrete in accordance with DTP Specification Clause 2602 (Mix ST1)

2.5 Pedestrian Crossings

2.5.1 General

Pedestrian crossings will be required at all road junctions to facilitate the crossing of prams and wheelchairs. The crossing shall be provided in accordance with DU Circular 1/91 - "The Use of Tactile Surfaces and Dropped Kerbs at Pedestrian Crossing Points". (See General Detail SD/PC/3, page 69)

2.5.2 Pedestrian Guardrails and Handrails

Pedestrian guardrails shall be provided where directed by the Director of Environment. Such rails shall be of aluminium alloy or mild steel and shall comply with BS 3049 - Table 1 - Class A. Vertical bar infilling shall be provided. Handrails shall be similarly constructed. (See General Detail SD/PG/1, page 67)

2.5.3 Vehicular Guardrails and Bridge Parapets

Vehicular guardrails, which may fulfil the dual function of being a pedestrian guardrail, shall be provided where directed by the Director of Environment. Such guardrails will normally be required where there exists a substantially lower level adjacent to the highway, such as at bridges, underpasses, culverts and retaining walls and will be required to protect pedestrians and/or vehicles.

The design will be dependent upon the type and speed of traffic using the specific road and shall generally follow the specification laid down in the "Specification for Highway Works."

2.6 Turning Heads

2.6.1 General

Turning heads/spaces should be provided wherever vehicles would otherwise have to reverse over long distances or when they might turn in a location which could result in over-run of and damage to the adjacent footway and/or verges.

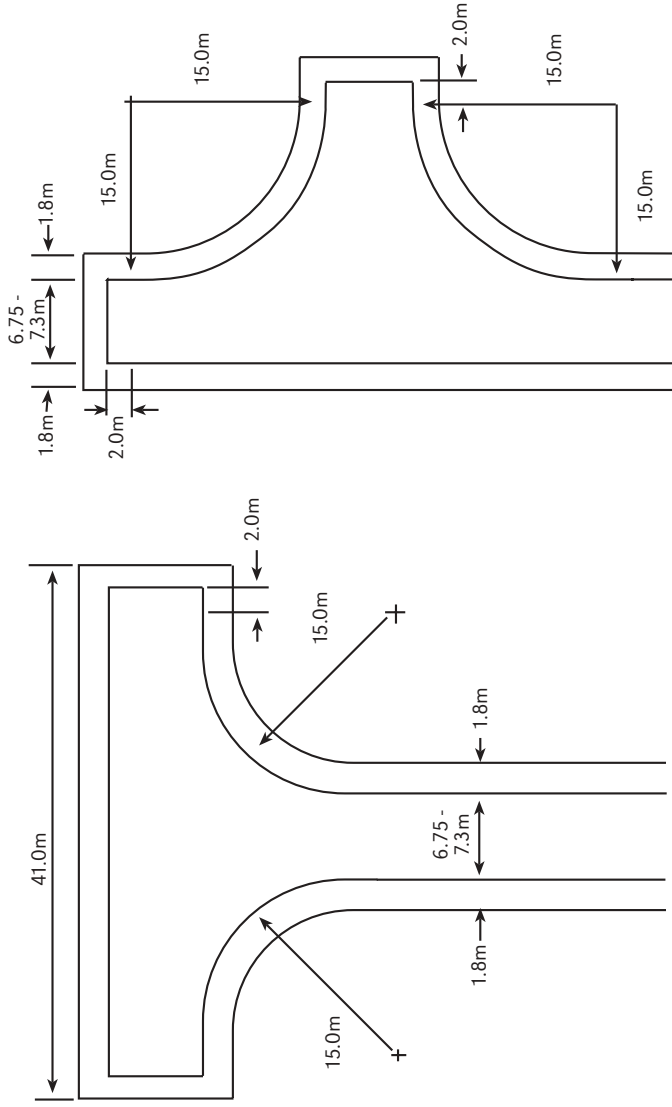
Every estate road should, therefore, terminate with a turning head or a temporary turning head if the estate is phased. However, by terminating phases at road junctions, they can be used as a turning head, thus avoiding the expense of constructing a temporary turning head only for them to be broken out again.

The following turning heads should be provided:-

- (i) Within an industrial estate, the turning head should be designed to accommodate the vehicles likely to use it. Turning head radii will normally be either 10.5metres or 15metres. These should generally comply with Drawing TS/8/4. Further examples may be found in "Designing for Deliveries"*.
- (ii) Turning heads on collector roads and traditional estate roads shall generally comply with Drawing TS/9/4.
- (iii) Turning heads in access roads and shared surface roads may be reduced to the dimensions indicated on Drawing TS/10/4.
- (iv) Amorphous turning heads are acceptable provided they encompass the standard shape applicable to the type of estate road and are constructed using standard radius kerbs.

*Designing for Deliveries, published by the Freight Transport Association.

Turning Heads - Industrial Estate Roads
DRAWING No. TS/8/4

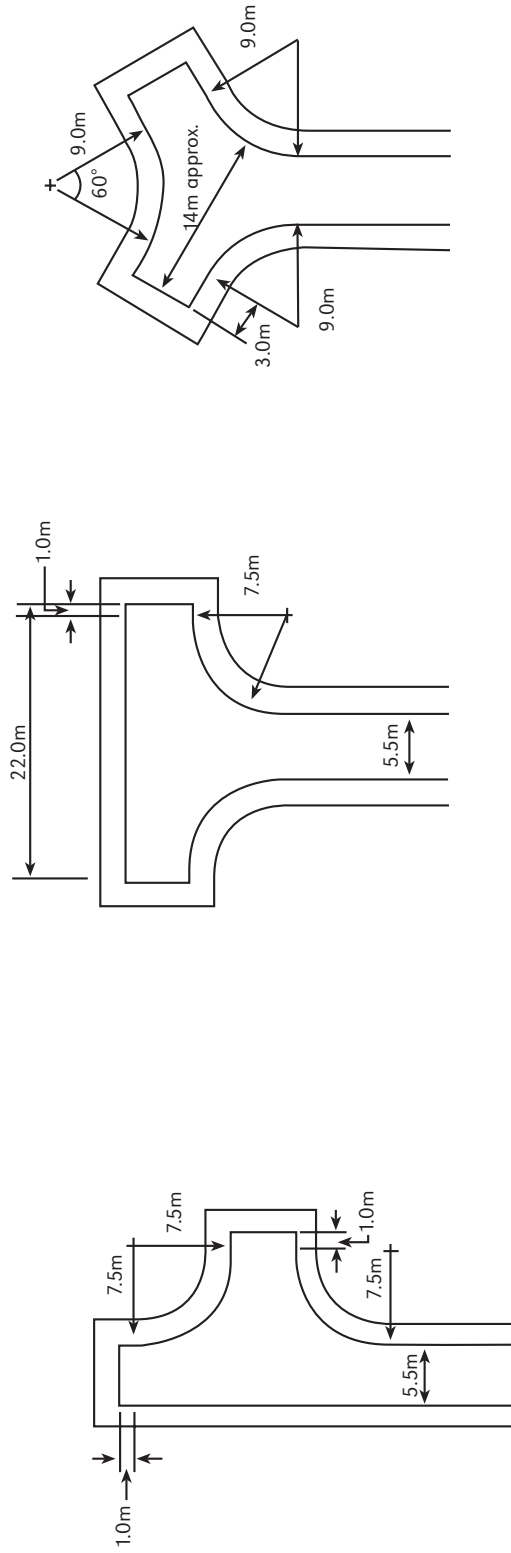


This form of turning head is preferred if a future extension to the industrial estate road is likely.

NOTE:
The turning head radii may be reduced to 10.5 metres if the site serves only small commercial premises. Any reduction must be agreed with the Director of Environment.

Turning Heads - Collector Roads and Traditional Estate Roads

DRAWING No. TS/9/4

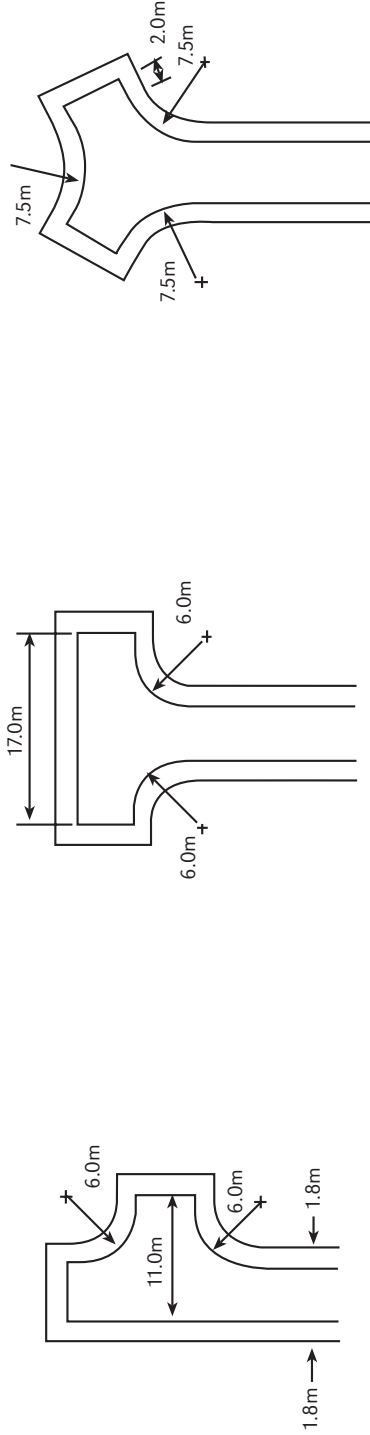


This form of turning head is preferred if an extension to the estate road is likely.

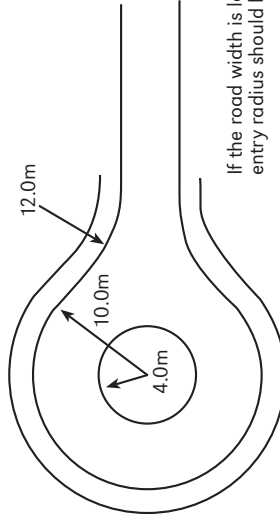
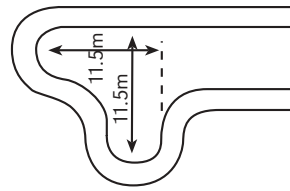
NOTE:
If footway is omitted a minimum verge/ service strip of 1.0 metres width is required to the turning head.

Turning Heads - Access Roads and Shared Surface Roads

DRAWING No. TS/10/4



SMALL STANDARD TURNING HEADS



SMALL AMORPHOUS TURNING HEADS

2.6.2 Access to properties

If access is permitted to properties from residential distributor or major collector roads, the access must be constructed in accordance with Drawing TS/11/4 and provided with a turning space. The whole of the splayed area shall be constructed to a vehicular crossing specification. (See Part 2 Sub-section 2.4.3).

Private vehicular accesses will not normally be acceptable:-

- (i) Within the bellmouth of a junction
- (ii) Along a traditional estate road within 20 metres of its junction with a residential distributor or classified road
- (iii) On any other road, within 15 metres of its junction with a residential distributor or classified road.

Private vehicular access onto traditional estate roads should where appropriate be grouped in order to limit the number of individual access points onto the highway.

Accesses should normally join the carriageway at right angles to prevent difficulties in use.

Vehicular crossings across footways for roads of 6 metres width or less should be set in accordance with General Detail SD/FC/18 p84.

2.7 Junction Visibility

2.7.1 General

Junction visibility splays should be determined from the following tables:

Table 2 Distance along centre line of minor access:- 'x' distance		
Industrial Development and Higher Order Roads		normally 4.5m
Heavy trafficked minor roads		9.0m
Lightly trafficked minor roads		4.5m
Lower Order Roads		2.4m
Private Access	(up to 5 houses)	2.0m

In most cases a distance of 4.5metres should be sufficient for traffic volumes on the minor road of 300 vehicles per hour or less.

An 'x' distance of 2.4metres will normally be acceptable where

traffic volumes on the minor road do not exceed 100 vehicles per hour.

Speed	kph	120	100	80	64	50	40	32	16
	mph	70	60	50	40	30	25	20	10
Distance	(m)	295	215	160	120	90*/60**	45	33	14

*Distance 90 metres where the major road is a higher order road.

**Distance 60 metres where the major road is a lower order road.

2.8 Forward Visibility Splays

2.8.1 General

As with road junctions, the provision of forward visibility splays on bends should relate to the expected speed of vehicles and their stopping distances.

Forward visibility splays for residential distributor and industrial estate roads shall be applied in accordance with the recommendations of the Department of Transport Standard TD 9/93.

For other roads, forward visibility splays shall be determined in accordance with the table below.

Speed	mph	30	25	20	10
	kph	48	40	32	16
Stopping Distance	(m)	*70/50	40	33	14

*Used where the priority road is not an access road but a higher road order.

(Note)

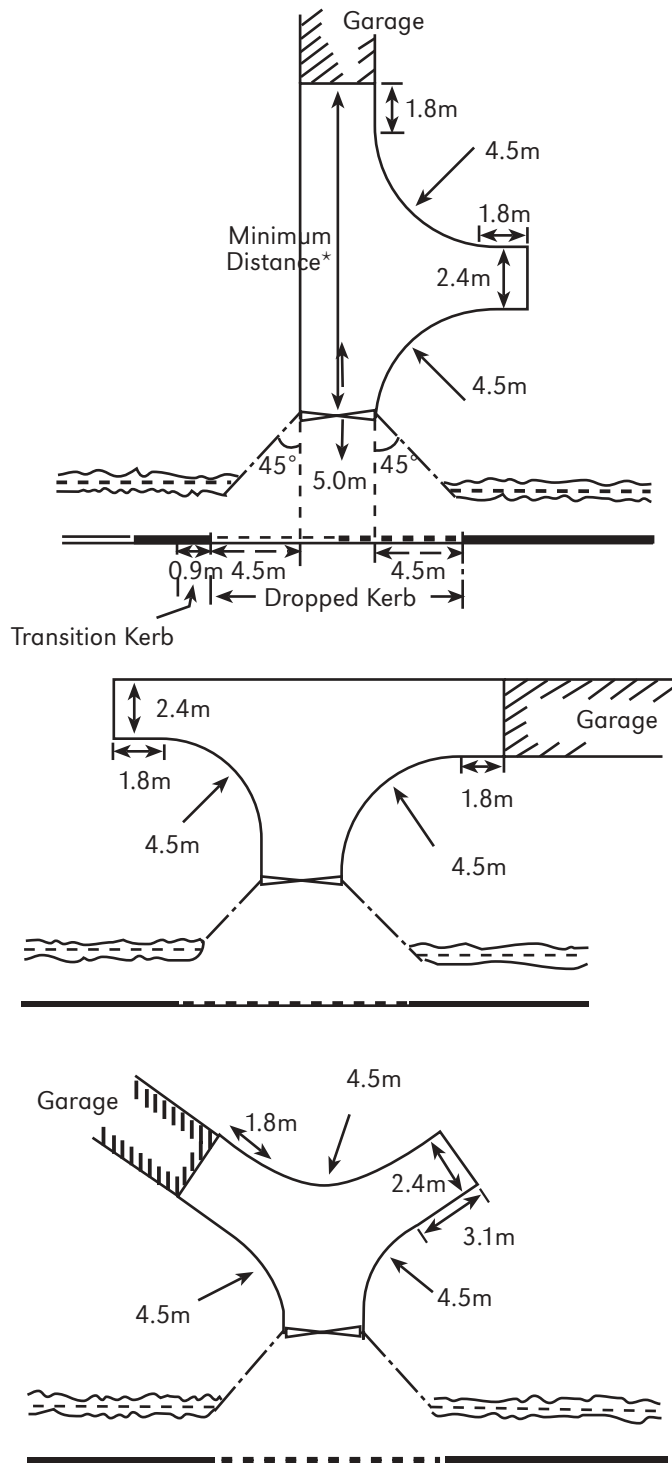
The setting out of a forward visibility splay around a bend is indicated on Drawing TS/12/4 p53..

Splayed Access & Private Turning Areas

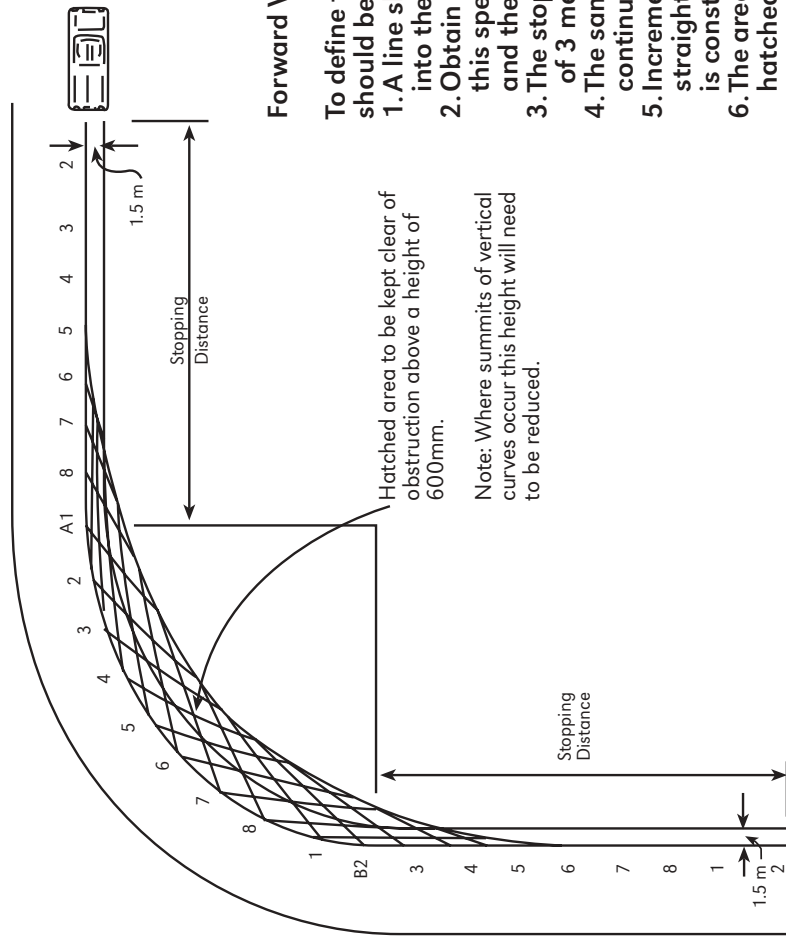
DRAWING No. TS/11/4

***Mimum Distance**

On this arrangement the minimum distance is 13.5m. If the surface area is greater or of different shape this minimum may be reduced.



Forward Visibility On Bends
DRAWING No. TS/12/4



Forward Visibility on Bends

To define the visibility set back required on bends the following method should be used:-

1. A line should be drawn parallel to the inside kerb, 1.5 metres into the carriageway to represent the path of a vehicle.
2. Obtain the vehicle design speed from Table 4 Section 2.8. Using this speed the required stopping distance should be obtained and then measured back along the line from tangent point A.
3. The stopping distance should then be divided into equal increments of 3 metres say, and the increment points numbered in sequence.
4. The same increments should be plotted around the curve and continued to a full stopping distance beyond tangent point B.
5. Increments of the same number should be joined by a series of straight lines. These serve as tangents to a curved line which is constructed by joining the tangents.
6. The area between the line referred to in 5 and the inside kerbs, shown hatched is that which should be kept clear of obstruction.

2.9 Widening on Bends

2.9.1 General

Widening is required on bends when the swept path of vehicles is greater than the width of the carriageway. The widening is normally applied to the inner radius of the bend.

Road widening to distributor roads and industrial estate roads with a carriageway width of 6.75 metres or greater shall be applied in accordance with the recommendations of the Department of Transport Standard TD 9/93 and Advice Note TA 42/95.

For collector roads, widening shall be applied on the inside of the bend in accordance with the following Table.

Table 5						
Centre Line Radius (m)	15	20	25	30	35	40
Amount of Widening (m)	0.75	0.60	0.50	0.45	0.375	0.35
Centre Line Radius (m)	45	50	55	60	70	80
Amount of Widening (m)	0.30	0.275	0.25	0.225	0.20	0.15

2.10 Junction Spacing

2.10.1 General

As a general rule, junctions between adoptable roads on the same side of the street should be spaced at least the visibility 'y' distance apart. (see Table 3 page 51)

Where the junctions are off an Access Road (i.e. serving up to 50 dwellings) the spacing may be reduced to 45 metres.

Junctions on opposite sides of a street should be at least 40 metres apart on Distributor and Industrial Estate Roads, 25 metres apart on Collector Roads, and elsewhere should be so spaced that the bellmouth areas between tangent points do not overlap.

2.11 Demarcation

2.11.1 General

All visibility splays and services verges, entrances to private drives and driveways serving grouped parking areas shall be clearly defined on the ground, by means of a row of granite setts, paviors or a continuous line of edging kerbs.

2.12 Dedication

2.12.1 General

All land enclosed within junction visibility splays, forward visibility splays and services verges shall be dedicated to the Highway Authority in conjunction with the Section 38 Agreement. Covenants are not an acceptable alternative. However, in certain circumstances and upon adoption of the road a 'licence to cultivate' may be obtained subject to the prior approval of the Director of Environment.

2.13 Traffic Calming

2.13.1 General

Traffic calming is becoming an essential design consideration for all residential estate roads whether higher order or lower order type roads. Consideration is required, therefore, to take into account vehicle speeds and methods to restrain them.

Restricted visibility alone cannot be considered a safe means of reducing vehicle speed. For safety, drivers must be able to see potential hazards and be able to slow down or stop before reaching them. It is necessary therefore to consider alternative means of slowing vehicle speeds and by introducing both vertical and horizontal changes this can be achieved.

It is essential to give the impression to drivers that through the road hierarchy they drive progressively slower.

Vehicle speeds can be reduced by a number of design features without causing discomfort and inconvenience to cyclists, drivers and their passengers and pedestrians.

It is suggested that the combination of the following features and restraints may be effective in reducing vehicle speeds:

- Road alignments with short straights or frequent bends.
- Reduced forward visibility on bends in the road
- Tighter radii on bends
- Varying carriageway widths by the introduction of chicanes, narrowings and entrance details
- Entrance details and gateways at the beginning of the road/development.
- Changes in the road surface material using block paviers
- Junction plateau and tables
- Mini islands
- Reducing the apparent width of the carriageway by markings
- Shared surface roads

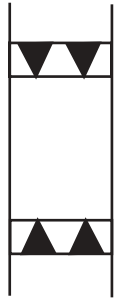
Note: The above measures are not in priority order.

To minimise inconvenience to residents and drivers, every effort should be made to keep to a minimum the number of speed restrictions used. It is essential therefore that the Highway Authority is consulted at an early stage in the design process to agree suitable traffic calming measures.

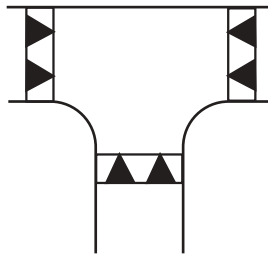
Appropriate warning signage and street lighting will be required where any traffic calming is provided. Street lighting will be required to illuminate chicanes, tight radii bends, islands and raised junctions and platforms.

See Drawing TS/14/4 page 57 for typical examples of traffic calming measures.

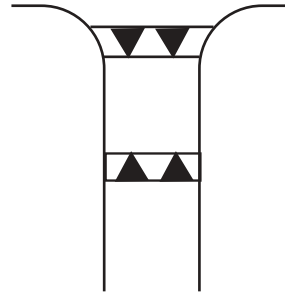
Examples Of Traffic Calming
DRAWING No. TS/14/4



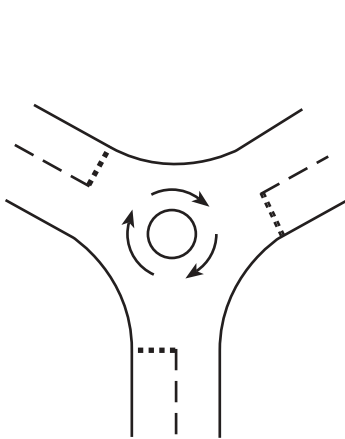
Speed Reducing Plateau



Junction Plateau



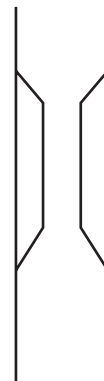
Entry Plateau



Mini-Roundabout



Carriageway Narrowing



Carriageway Narrowing

2.14 Parking Requirements

2.14.1 General Requirements

Parking spaces should be provided in accordance with the standards laid down in the Local Plan(s) by the Local Planning Authority. However the following points should be considered and may assist in satisfying the provisions for residential requirements.

- Parking spaces should be convenient and visible to the householder and any visitors, otherwise they may choose to park on the highway in preference to the parking spaces.
- Parking spaces must not be sited so that vision at junctions is obstructed.
- A garage will be counted as a parking space.
- The front face of any garage should be at least 6 metres from the back of footpath, service strip or visibility splay.
- The Highway Authority will not normally adopt parking areas and if communal parking provision is to be considered the developer should consider how the area is to be maintained. Such parking areas should be designed so as to be conveniently used, and should be visible from both the highway and the houses they serve. Failure to observe this advice may result in the parking areas not being used for fear of vandalism.
- The advice contained in DB 32 and the publication 'Housing Design Awards 1985' both recommend the provision of unassigned parking areas on all housing sites.

2.14.2 Parking along Shared Surface Roads

Car parking facilities for dwellings sited on shared surface roads will frequently exceed "normal" requirements in order to reduce the likelihood of on-street parking on the normal road to the inconvenience of residents and visitors.

2.14.3 Dimensions of Car Parking Spaces and Access to Parking Areas

Generally:-

- (i) 4.8 metres long by 2.4 metres wide for communal parking areas.
- (ii) 6.0 metres long by 2.5 metres wide when parallel with and adjacent to carriageways.
- The minimum aisle width between grouped parking should be 6.0 metres. Between facing garages in garage forecourts the aisle width should be at least 7.3 metres.
- Driveways serving up to 25 grouped garages or parking places may be 3.0 metres wide, with 4.1 metres passing places where necessary.
- Driveways serving more than 25 garages or parking spaces should be 4.1 metres wide.

2.15 Highway Drainage

2.15.1 General

A positive system of drainage should be provided for the collection and disposal of surface water from all estate roads. Surface water from the highway will generally be disposed of by one of the following methods.

- (i) Gullies connecting to a public sewer which is or will be the subject of a Section 104 Agreement with the Water Authority.

In this case only the gullies and their connections to the sewer will be adopted by the Highway Authority.
- (ii) Where the surface water drainage system being provided is for the disposal of water from the roads only, the system will be adopted under the terms of the Section 38 Agreement with the Highway Authority.
- (iii) Soakaways for highway drainage are generally not acceptable. However, where a developer can demonstrate to the reasonable satisfaction of the Director of Environment that no positive surface water outfall can be provided, then the use of soakaways may be considered.

2.15.2 Design Considerations

- (i) Maximum gully connection length 20 metres
- (ii) Minimum pipe diameter 150mm
- (iii) Maximum manhole (catchpit) spacing 90 metres
- (iv) Gully spacing - in accordance with TRRL Laboratory Report 277
- (v) Pipe Capacities - in accordance with "Tables for the Hydraulic Design of Pipes and Sewers": Fourth Edition: 1983 Published by the Hydraulic Research Station
- (vi) Design Method - Modified Rational Method (Volume 4 of the Wallingford Procedure)
- (vii) Design Parameters:
 - Storm Frequency: One in 1 year unless otherwise advised
 - Time of Entry: 2 minutes
 - Velocity at full bore: 0.75m/sec. minimum
 - Roughness value: 0.15mm

Class of Pipe: The classification of the pipe shall be in accordance with "Simplified Tables of External Loads on Buried Pipelines". (HMSO 1986) and with "A Guide to Design Loadings for Buried Rigid Pipes" (HMSO 1983).

Protection: Where pipes are laid with less than 1.2 metres of cover under carriageways or 0.9 metres of cover under footways and verges the pipes shall have 150mm concrete bed and surround protection.

Note:

A worked example for the sizing of highway drains is given on Table No. TS/13/4 page 61

Typical Design For Sizing Highway Drains

TABLE No. TS/13/4

Storm Frequency one in 1 year Roughness coefficient 0.15mm Time of Entry 2 mins

Manhole No.	Chainage m	Channel Level m	Invert Level m	Fall m	Distance m	Gradient 1 in	Velocity m/s	Time of Flow min	Time of con. min	Rate of Rain mm/h	Impermeable Area Cumulative sq.m	Rate of Flow content $\times 2.78 \times 10^{-4}$		Pipe Size mm	Pipe capa. l/s	Remarks
												l/s	mm			
1	445.0	92.164	91.164	0.865	72.5	84	1.67	0.72	2.72	71.5	1485 134	32.1	225	66.4		
2	372.5	91.299	90.299	0.386	72.5	188	1.12	1.09	3.81	60.9	561	36.9	225	42.2		
3	300.0	90.913	89.913	0.455	85.0	187	1.06	1.34	5.15	53.7	405	38.6	225	42.2		
4	215.0	90.658	89.458	1.301	97.5	75	1.74	0.93	6.08	49.7	338	40.4	225	69.1		
5	117.5	89.157	88.157	1.191	97.5	82	1.67	0.97	7.05	46.3	454	43.5	225	66.4		
6	20.0	87.966	86.966	0.270	30.0	111	1.44	0.35	7.4	45.2	45.2	45.3	225	57.3		
Existing Manhole		Existing invert	84.736													

The next gully on the section of road is approximately 330 m from the last proposed pair of gullies at chainage 447. The road width is assumed to be 4.5 metres.

2.15.3 Sub-Soil Drainage

Sub-soil drainage should be provided in areas of high water table. A system of sub-soil drainage or French drains shall be provided to ensure the water table is permanently reduced to a level 600mm below carriageway formation level.

The water table level should be determined by auguring boreholes as required by the Director of Environment.

2.15.4 Manhole and Gully Positions

- (a) Manholes/catchpits should be provided at:
- (i) every change of gradient or alignment
 - (ii) every change in size of pipe
 - (iii) a maximum spacing of 90 metres
- (b) Gullies should be positioned so that:
- (i) The area draining to each road gully does not exceed 200 square metres
 - (ii) The spacing of gullies does not exceed 50 metres along each channel
 - (iii) Double gullies are provided at all low points on a concave channel profile. In this circumstance, separate connections should be provided to each gully.
 - (iv) At all road junctions, pedestrian crossings and private drive entrances they are sited on the upstream side of the road.
 - (v) The maximum length of connection is 20 metres.

2.15.5 Drainage Layout

All information relevant to highway drainage must be provided. Any highways to be adopted by the Highway Authority should be clearly identified on the layout plan and longitudinal sections, indicating the size of the pipe gradient, class and type of pipe to be used.

Capacity calculations will be required - see Table No. TS/13/4 to verify the size and diameter of pipe proposed.

Manholes should be numbered and their internal diameters clearly identified.

All road gullies and their connections should be shown on the plans, including any required at low points, in bell mouths, in turning heads and on footways.

Note: A highway drain by definition takes only surface water from the highway. No connections from private property will be permitted.

2.15.6 Highway Drainage Outfall

A highway drain must discharge to a positive outfall which can be one of the following.

- i) A public sewer (subject to approval from the Water Authority)
- ii) A suitable river or other watercourse (subject to approval from the National Rivers Authority (NRA))
Copies of the written consent to discharge must be provided prior to the completion of the Section 38 Agreement.
- iii) In exceptional circumstances, to an existing highway drain or via a soakaway network (see Section 2.16 Soakaways). A highway drain is a private drain owned by the Highway Authority and there is no right to connect to it. Permission to connect may be given providing there is sufficient capacity within the system and there are no downstream outfall problems or restrictions. A charge may be levied for connection to the highway drain.

If any proposed highway drain passes under ground not within the existing or proposed highway, the developer shall secure an easement for any such drains. The easement shall relate to a 6 metre width, centred upon the drain for the length of the route outside of the developer's control and/ or the existing highway. The Section 38 Agreement will not be completed without such an easement.

2.16 Soakaways

2.16.1 General

The use and discharge of highway surface water into soakaways will only be considered in exceptional circumstances and where no alternative positive surface water drainage system is available ie ditchcourses, watercourses, or surface water sewers.

The use of soakaways will however only be accepted where proof of extensive investigation of the existing ground conditions has been provided and considered.

Guidance on the determination of soakaway sizing and construction details is given in Building Research Establishment Digest 365. Copies of this document may be acquired from Her Majesty's Stationery Office.

In the event that the developer can satisfy all of the required criteria for a soakaway system a detailed submission should be forwarded for checking and/or approving.

In the situation whereby the County Council accept a soakaway system as a means of dealing with the surface water discharge a commuted sum will be levied for the ongoing maintenance and eventual replacement cost of the system.

The standard soakaway detail indicated on Drawing SD/SK/2 page 68 should be provided where the use of soakaways is approved. Where ground conditions are less suitable and the level of the water table is higher than normal, a trench herringbone type soakaway system may be considered.

2.17 Ironwork

2.17.1 Ironwork - Manhole and Catchpit Covers

Covers and frames should comply with EN124 1994 and are to have a minimum square opening of 600mm.

- (a) Covers and frames used on industrial and residential distributor roads shall be to Class D - 400.

Minimum Frame Depth	150mm
Minimum Bedding Width	75mm
Minimum Total Mass Grey Iron	220kg
Minimum Total Mass Ductile Iron	140kg

- (b) Covers and frames in carriageway for all other estate roads shall be to Class D - 400

Minimum Frame Depth	150mm
Minimum Bedding Width	75mm
Minimum Total Mass Grey Iron	190kg
Minimum Total Mass Ductile Iron	125kg

BS497 equivalent MA60.

- (c) Covers and frames used in footways and verges shall be to Class B - 125

Minimum Frame Depth	100mm
Minimum Bedding Width	75mm

BS497 equivalent MB1.

Note: All manhole covers and inspection covers used must be grey or ductile iron manufactured to EN124 and stamped with the BSI Kitemark or approved Third Party Independent Certification Mark.

2.17.2 Manhole and Catchpit Construction Specification

- (a) All precast concrete cover slabs, chamber rings, shaft rings, reducing slabs and tapers are to comply with BS5911 : Part 1 : 1901 AMD 4035 : 1982 and are to be bedded on Class 1 mortar or approved sealant.
- (b) Galvanised malleable step irons are to comply with BS1247.
- (c) Internal surface finishes of manholes to in-situ concrete are to be Class U3 or F3 where applicable. External surface finishes to in-situ concrete to be Class U1 or F1 where applicable.
- (d) A 50mm thick granolithic concrete finish to comply with Table 3 (all in aggregate) BS882.-1983, will be applied to benching and channel within 48 hours of pouring concrete to base. Channels may be formed from precast units in which case a granolithic finish is necessary only on benching.
- (e) All concrete shall comply with Clause 2602 and be fully compacted by vibrator.
- (f) Safety chains to be used in all pipes of 700mm diameter and above.
- (g) Any voids formed below the manhole structure shall be backfilled with concrete to DTP Specification Clause 2602.
- (h) Chamber diameters to comply with the following:

Diameter of Ring (mm)	Type Ref.
1050	A
1200	B
1350	C
1500	D
1800	E
2100	F

- (i) Bricks to comply with Specification Clause 2406.

2.17.3 Gully Gratings and Frames

All gully gratings and frames to be grey or ductile iron manufactured to EN124.1994 and stamped with the BSI Kitemark or approved Third Party Independent Certification Mark.

(a) Grey Iron (for industrial estate and higher order roads)	Class D - 400
Minimum Frame Depth	140mm
Minimum Bedding Width of Frame	75mm
Double Triangular, Bolted, Non-Rock	
(b) Ductile Iron (lower order roads).	
Minimum Frame Depth	100mm
Single Piece, Hinged, Non-Rock	75mm

2.17.4 Gully Brickwork

Brickwork used for adjusting covers shall be Class B Engineering complying with BS3921. All brickwork shall be 225mm English Bond with headers always as the top course.

2.17.5 Mortar

- (a) Cement mortar used for brickwork shall be 1 to 3, cement : sand to Clause 2404, Class 1.
- (b) Over excavation shall be backfilled with Class C20P concrete.

2.18 Highway Structures

2.18.1 General

Any highway structures will need to be assessed individually by the Director. Where structures are anticipated the developer should seek guidance at an early stage as technical approval procedures will apply in most circumstances.

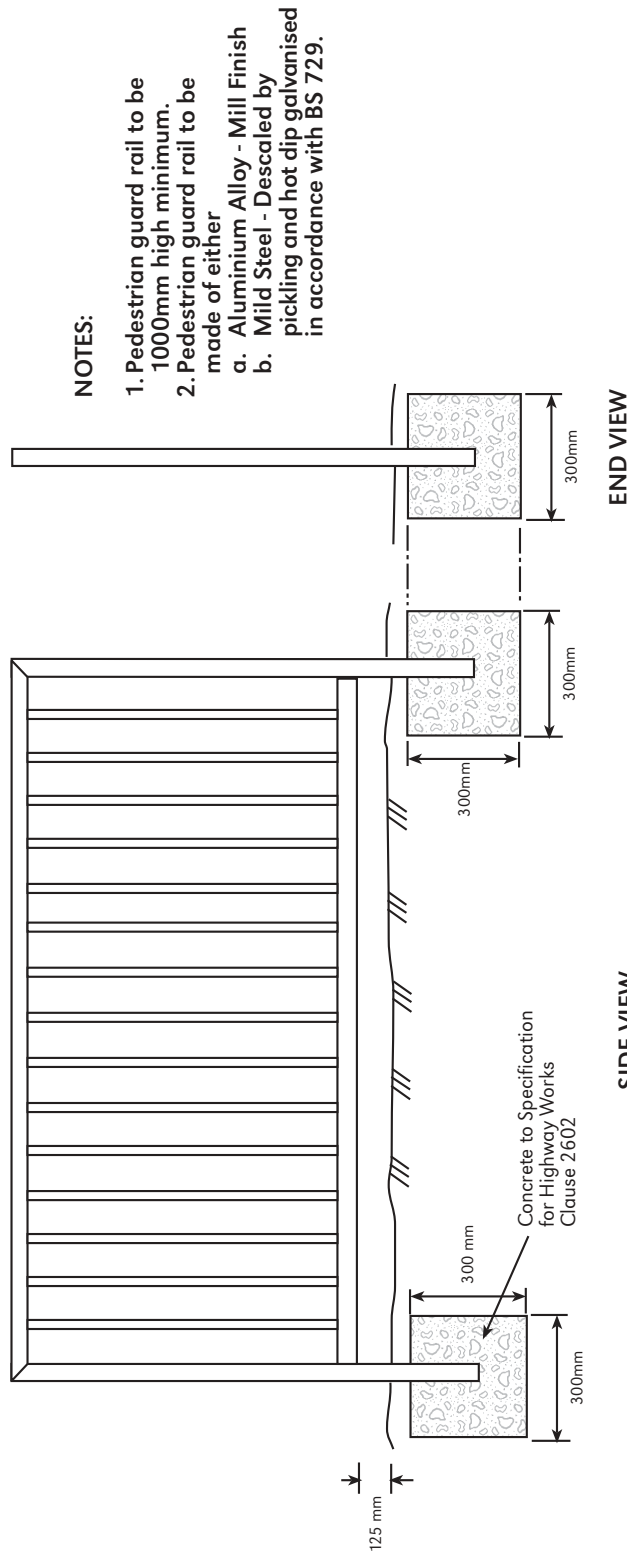
Normally only highway structures which materially affect the structural integrity of and support the highway carriageway will be considered for adoption. All structures must receive structural approval in accordance with the Design Certificate.

All culverts and/or large diameter pipes (greater than 900mm) are considered to be structures and as such require technical approval in accordance with the Design Certificate.

A Design Certificate shall be completed with reference to the specific design standard used and should be signed by a Structural Engineer and/or Chartered Engineer. Certificates and procedures will normally follow those laid down in the Department of Transport Standard BD2/89: Part 1 and Advice Note BA32/89: Part 1. Standard Design Certifications can be obtained from the Director (Development Control Section - Highways).

Framed Pedestrian Guard Rail With Vertical Bar Infilling

DRAWING No. SD/PG/1



NOTES:

1. Pedestrian guard rail to be 1000mm high minimum.
2. Pedestrian guard rail to be made of either
 - a. Aluminium Alloy - Mill Finish
 - b. Mild Steel - Descaled by pickling and hot dip galvanised in accordance with BS 729.

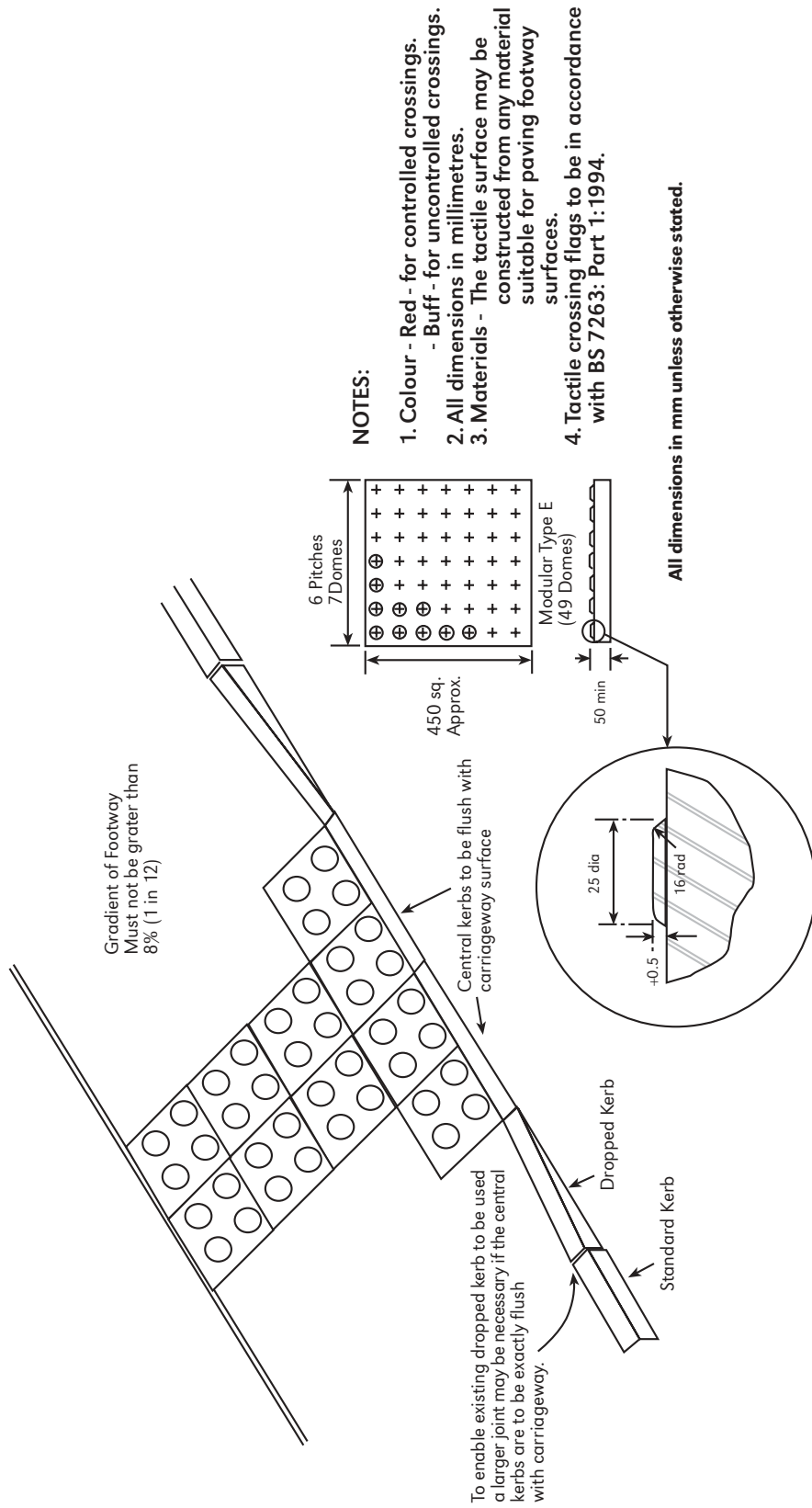
END VIEW

SIDE VIEW

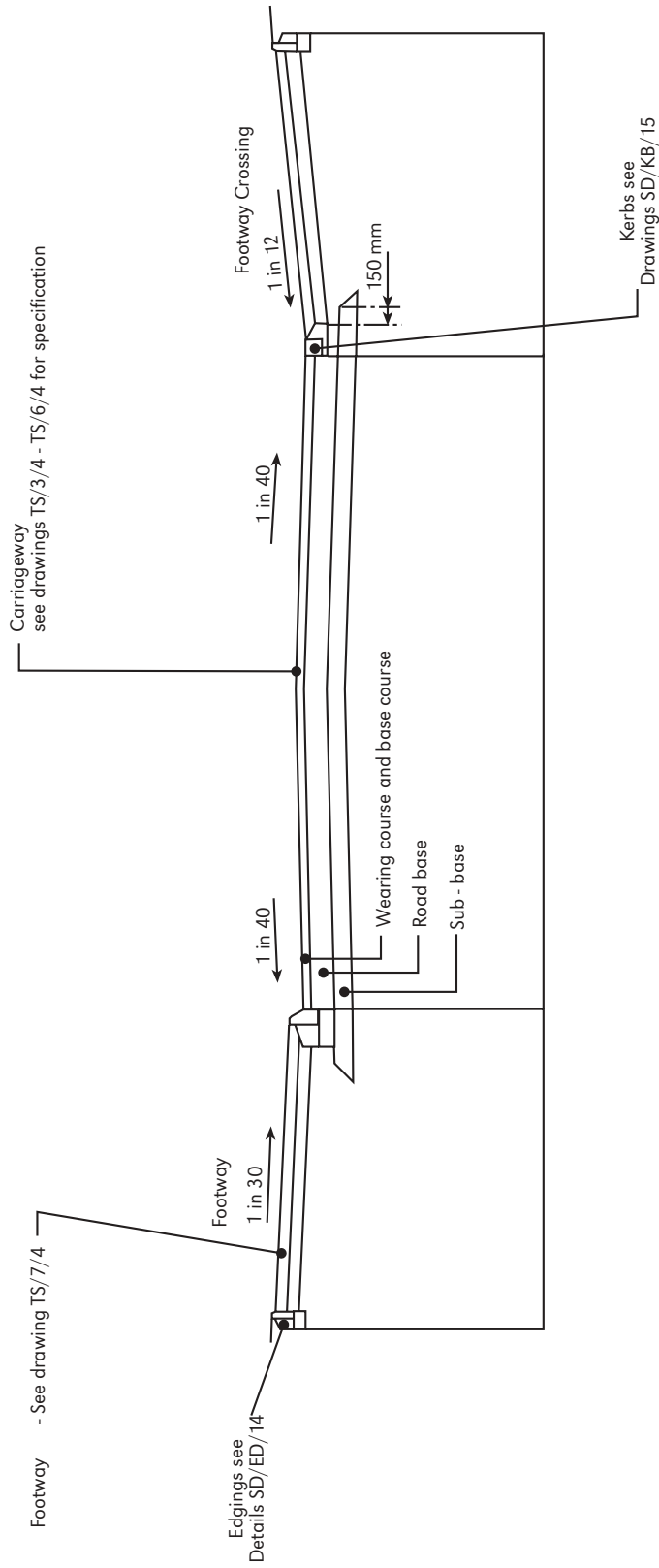
NB: concrete - 0.027 cu.m minimum per post.

Pedestrian Crossing Detail

DRAWING No. SD/PC/3

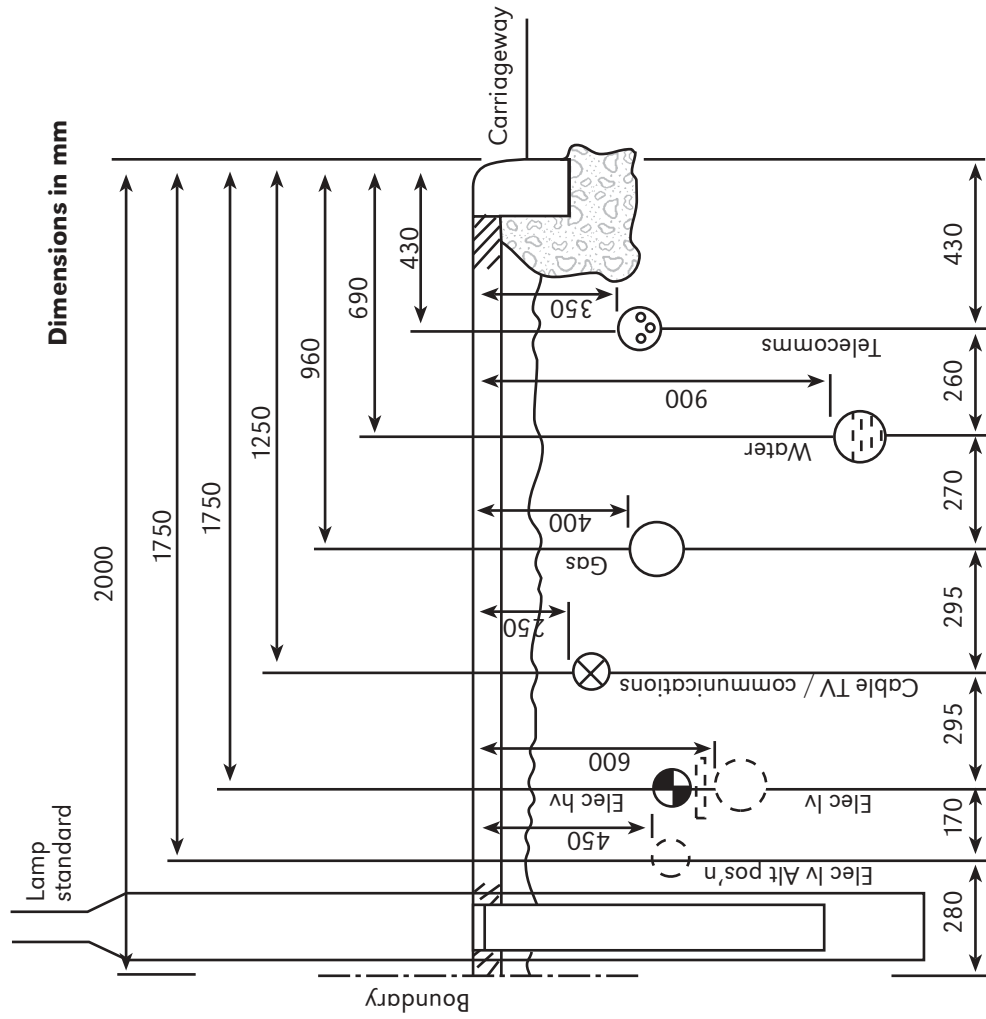


Typical Road Section DRAWING No. SD/RS/4



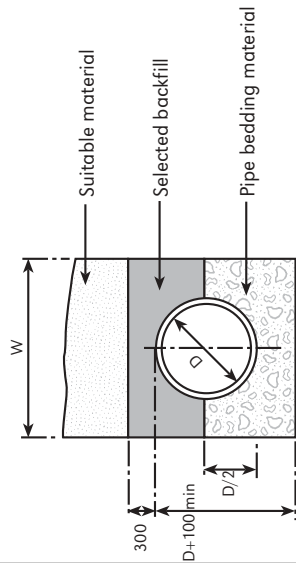
NOTES.
 Upon request consideration will be given to the footway camber falling away from the road.
 A flush back edging kerb will be required in this situation.

Location Of Public Utility Services
DRAWING No. SD/PU/5



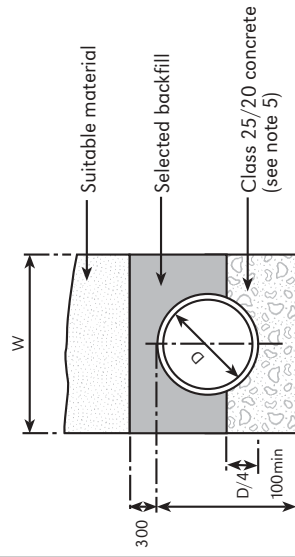
Highway Drains Construction Detail

DRAWING No. SD/HD/6



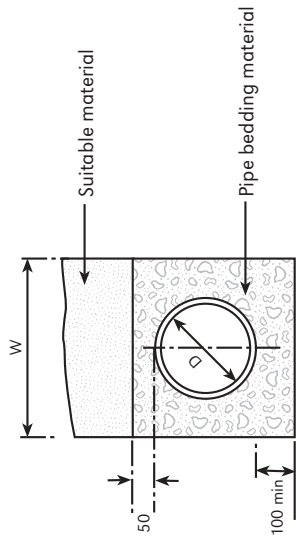
CLASS 'B' BEDDING FOR RIGID PIPES

(Granular Bed & Haunch)



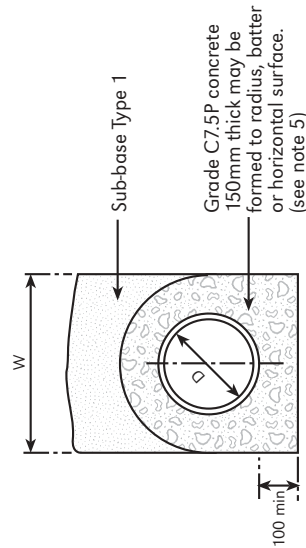
CLASS 'A' BEDDING

(Concrete Bed)



CLASS 'B' BEDDING FOR FLEXIBLE PIPES

(Granular Bed & Haunch)



CONCRETE BED AND SURROUND

All dimensions in mm unless otherwise stated.

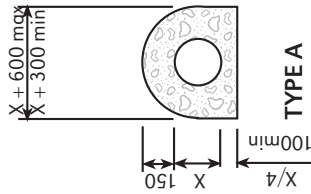
NOTES:

1. To be read in conjunction with Drawing SD/HD/7.
2. Alternative Pipe Specification
(a) Clay to BS 65/540 Type BS for foul and/or surface water
Type BSSW for surface water only
S= Standard strength
ES= Extra strength
(b) Asbestos Cement to BS 3656
L= Class L (AC)
M= Class M (AC)
H= Class H (AC)
(c) Concrete to BS 5911
L= Extra Strength Class L
M= Extra Strength Class M
H= Extra Strength Class H
(d) Unplasticized Poly Vinyl Chloride U.P.V.C. to BS 3506 BS 4660 or BS 5481
B= Relevant British Standard
3. All pipes to have flexible joints.
4. Rigid pipes are glazed vitrified clay, concrete or asbestos cement. Flexible pipes are U.P.V.C.
5. The concrete bed and surround may extend to the sides of the trench or be of minimum width. Selected backfill is to be used to fill any voids so formed.
6. W= width of trench.
D= Diameter of pipe.

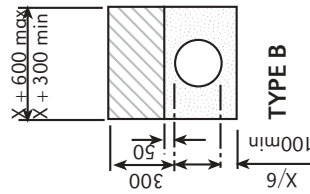
Highway Drains Depth Of Bedding And Trench Widths

DRAWING No. SD/HD/7

PIPE SIZE	DEPTH OF BEDDING BELOW BOTTOM OF PIPE	
NORMAL PIPE DIA D	Excavation in soft material > 5.0m to top of pipe	Excavation in rock & excavation > 5.0m to top of pipe
Up to 600	100	200
675 to 900	150	250
975 to 1200	225	325
1275 to 1500	225	375
1575 to 1800	300	400
1875 to 2100	375	400






TYPE A



TYPE B

NOTES:

- To be read in conjunction with Drawing SD/HD/6.
- For pipeline design tables refer to Simplified Tables of External Loads on Buried Pipelines (HMSO 1986) and A Guide to Design Loadings for Buried Rigid Pipes (HMSO 1983).
- Dimension X is the external diameter of the pipe.
- The minimum or maximum width of each trench applies on and below a line 300 mm above the outside top of the pipe. Above the 300 mm line the trench backfill material shall be described in the contract.

- | | |
|---|-------------------------------|
|  | Concrete grade C7.5P - TYPE A |
|  | Selected backfill - |
|  | Granular bedding material - |

} TYPE B

All dimensions in mm unless otherwise stated.

Chamber and Catchpit Notes

NOTE No. SD/HD/8

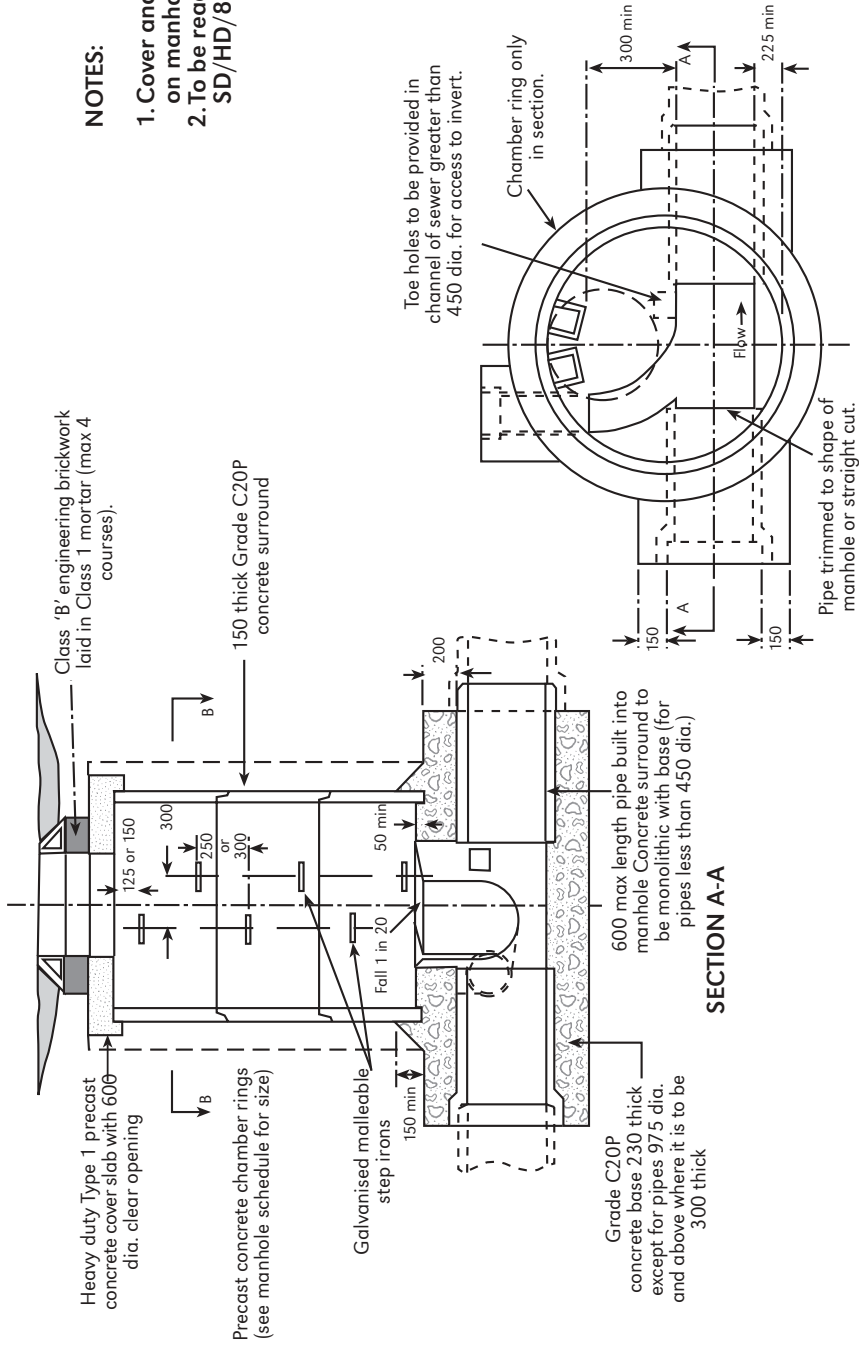
NOTES:

1. Covers and frames are to comply with EN 124, 1994, and are to have a minimum opening of 600 mm.
2. All precast concrete cover slabs, chamber rings, shaft rings, reducing rings and tapers are to comply with BS 5911 and are bedded on Class 1 mortar or approved sealant.
3. Galvanised malleable step irons are to comply with BS 1247.
4. Internal surface finishes of manholes to in-situ concrete to be Class U3 or F3 where applicable. External surface finishes to in-situ concrete to be Class U1 or F1 where applicable.
5. A granolithic concrete finish to comply with BS 882, 50 mm thick will be applied to benching and channel within 48 hours of pouring concrete to base. Channels may be formed from precast units, in which case a granolithic finish is necessary only on benching.
6. All concrete shall comply with Clause 2602 and be fully compacted by vibrator.
7. Safety chains to be used in all sewer pipes of 700 mm diameter and above.
8. Any voids formed below the manhole structure shall be backfilled with grade C20P concrete at the contractors expense.
9. Chamber diameters to comply with the following:

Dia. of ring	Type Ref.
1050	A
1200	B
1350	C
1500	D
1800	E
2100	F

10. If a construction joint in concrete surround does not break joint with that of the chamber or shaft section by at least 150, then a water bar of an approved type shall be installed at the joint.

Chamber Type M2 DRAWING No. SD/HD/9



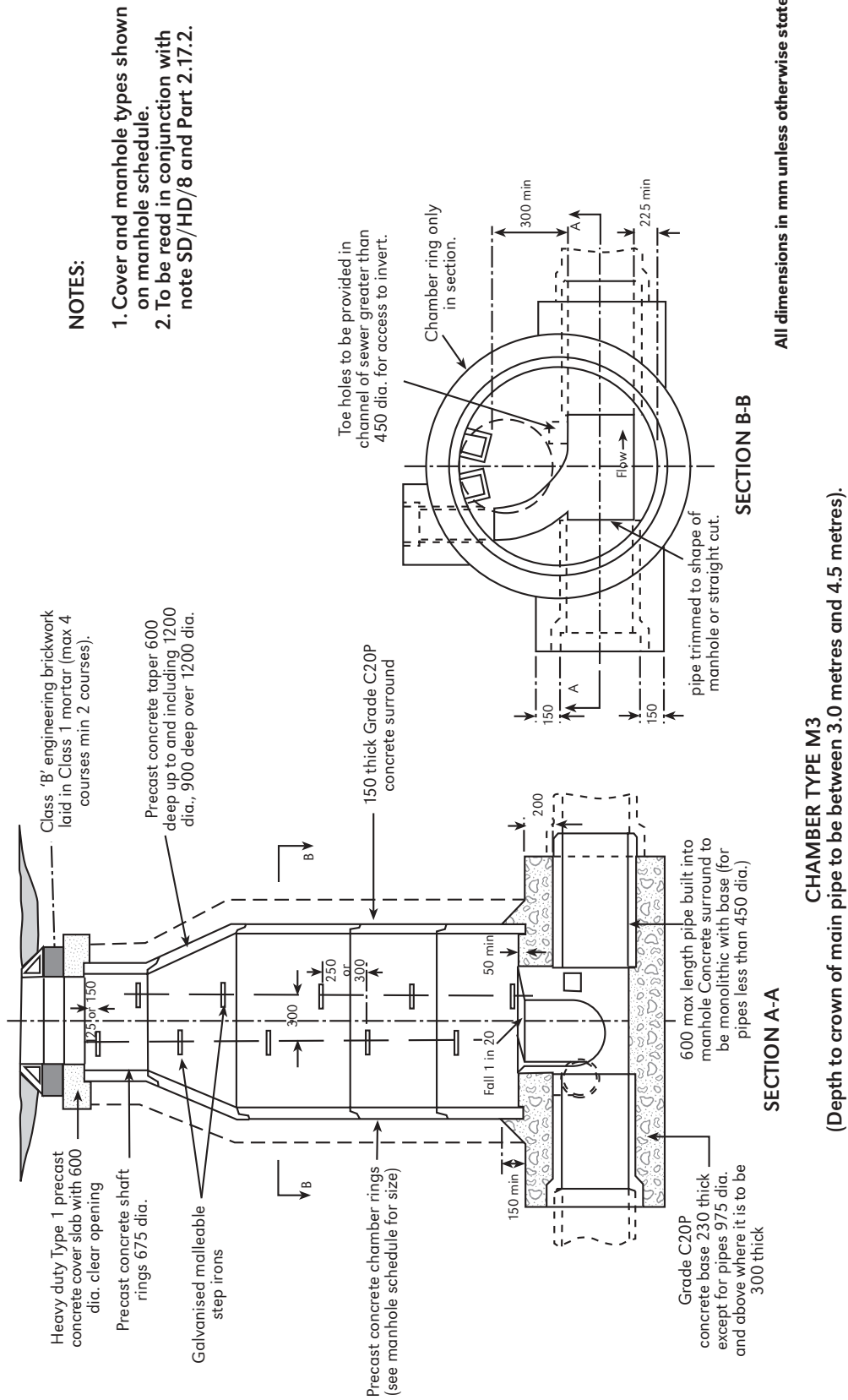
NOTES:

1. Cover and manhole types shown on manhole schedule.
2. To be read in conjunction with SD/HD/8 and Part 2.17.2.

CHAMBER TYPE M2
(Depth to crown of main pipe not to exceed 3.0 metres).

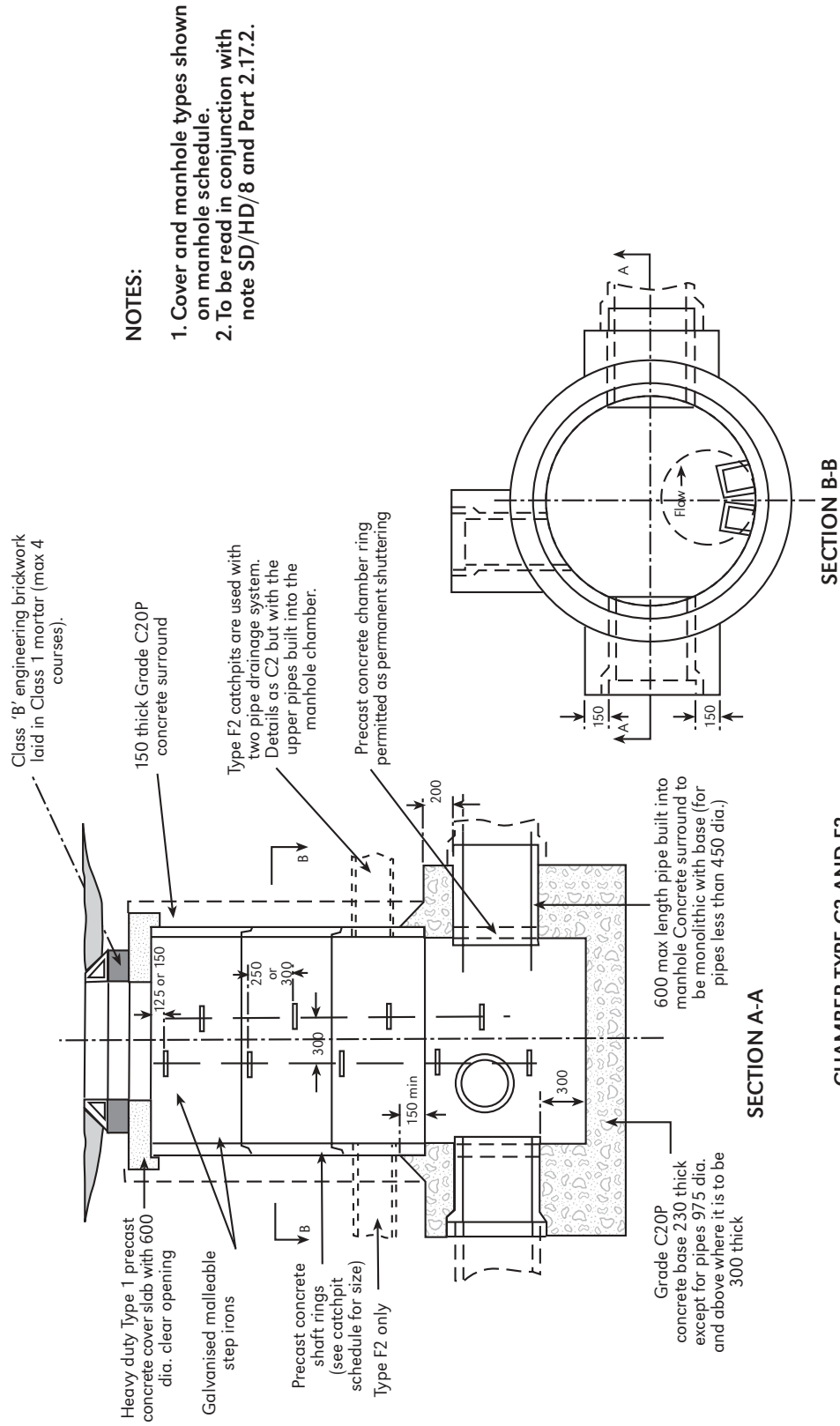
All dimensions in mm unless otherwise stated.

Chamber Type M3 DRAWING No. SD/HD/10



CHAMBER TYPE M3
(Depth to crown of main pipe to be between 3.0 metres and 4.5 metres).

Chamber Types C2 & F2
DRAWING No. SD/HD/11



Class 'B' engineering brickwork laid in Class 1 mortar (max 4 courses).

150 thick Grade C20P concrete surround

Type F2 catchpits are used with two pipe drainage system. Details as C2 but with the upper pipes built into the manhole chamber.

Precast concrete chamber ring permitted as permanent shuttering

600 max length pipe built into manhole. Concrete surround to be monolithic with base (for pipes less than 450 dia.)

Grade C20P concrete base 230 thick except for pipes 97.5 dia. and above where it is to be 300 thick

Heavy duty Type 1 precast concrete cover slab with 600 dia. clear opening

Galvanised malleable step irons

Precast concrete shaft rings (see catchpit schedule for size) Type F2 only

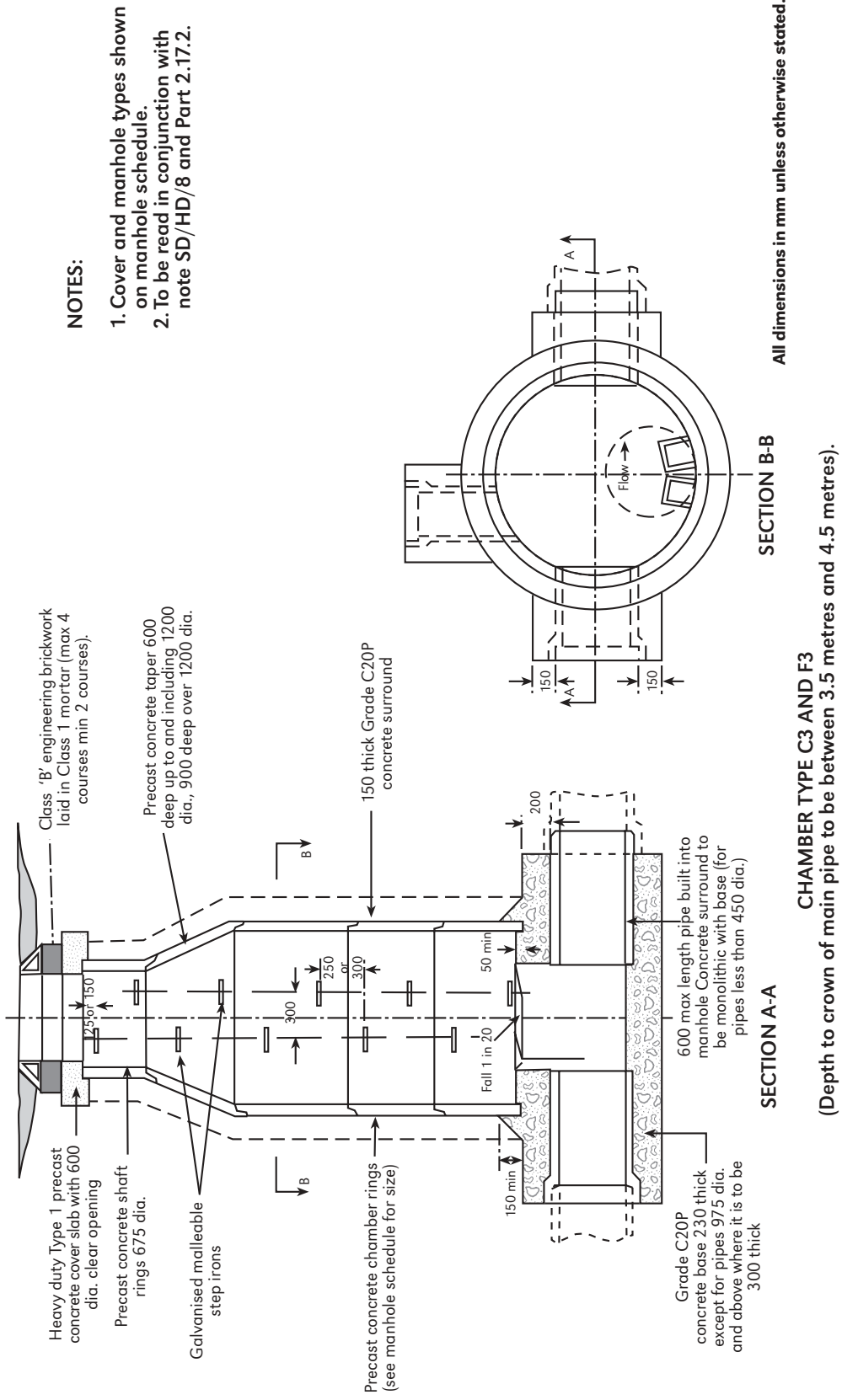
SECTION A-A

SECTION B-B

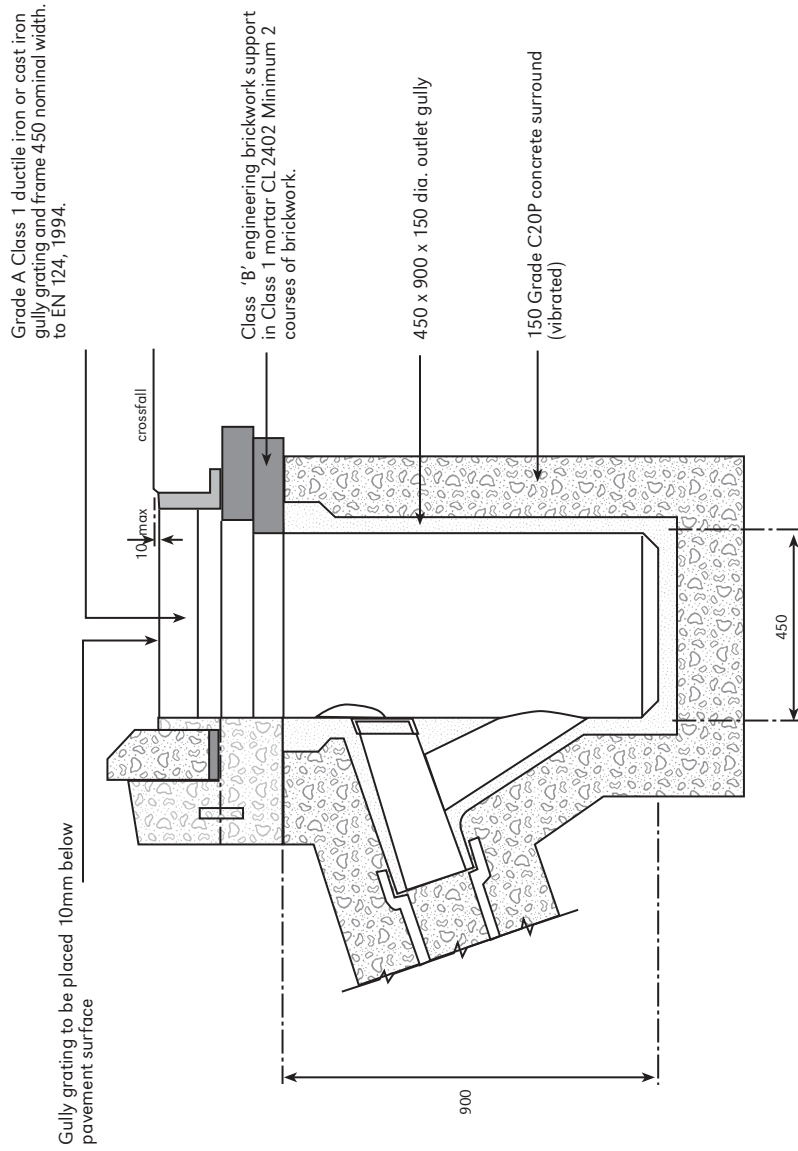
CHAMBER TYPE C2 AND F2
(Depth to crown of main pipe not to exceed 3.5 metres).

All dimensions in mm unless otherwise stated.

Chamber Types C3 & F3 DRAWING No. SD/HD/9



Road Gully & Grating Type 2 Detail DRAWING No. SD/RG/13

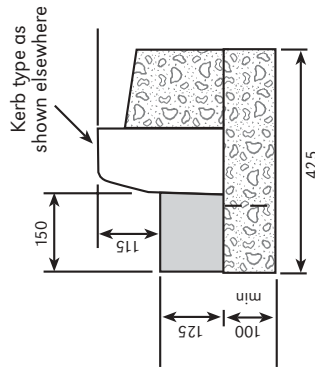


NOTES:

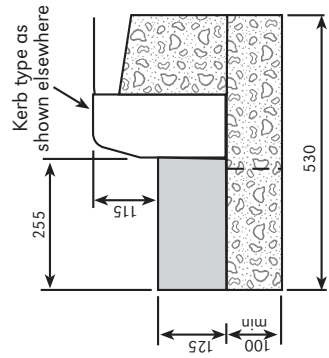
1. Permitted alternative materials:-
 - i. Precast concrete to BS 5911.
 - ii. Vitrified clay to BS 539.
 - iii. C20P insitu concrete 150 mm thickness extending to the sides of the excavation with a polypropylene or similar permanent integral shutter.
2. Gratings supplied in separate sections shall be loosely coupled by means of bolts or other coupling devices in accordance with EN 124: 1994.
3. Method of Construction:-
 - i. Gully pot to be placed in position with temporary cover.
 - ii. All pavement courses excluding wearing course to be laid.
 - iii. Pavement to be excavated not exceeding 200 beyond sides of gully to allow grating and frame to be fixed.
 - iv. Excavation to be backfilled with Class C20P concrete to underside of wearing course.

All dimensions in mm unless otherwise stated.

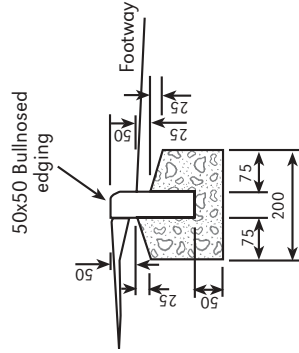
Channel & Edging Kerb Details DRAWING No. SD/ED/14



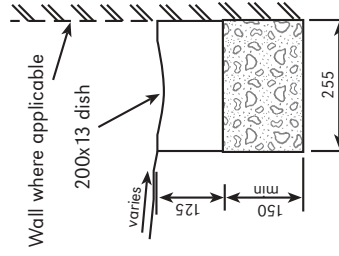
Channel square: Type CS2



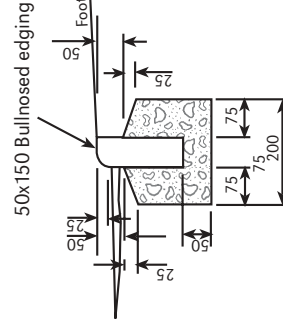
Channel square: Type CS1



Bullnosed edging: Type EBN (raised)



Channel dish: Type CD



Bullnosed edging: Type EBN (flush)

NOTES:

1. Channels and edgings are to be precast concrete to BS 7263.
2. Concrete bed is to be Grade C7.5P in accordance with Specification Clause 2602.
3. Concrete bed for type CS1 and CS2 channels is to rest on or within sub-base layer or on additional concrete measured separately to allow it to rest on sub-base or existing channel bed.

4. Channels and edgings shall be laid directly on a fresh concrete bed within 2 hours of mixing.

Alternatively channels can be placed on Class 1 mortar laid on a sufficiently hardened concrete bed. Mortar is to be in accordance with Clause 2404 and is to have a minimum thickness of 40mm.

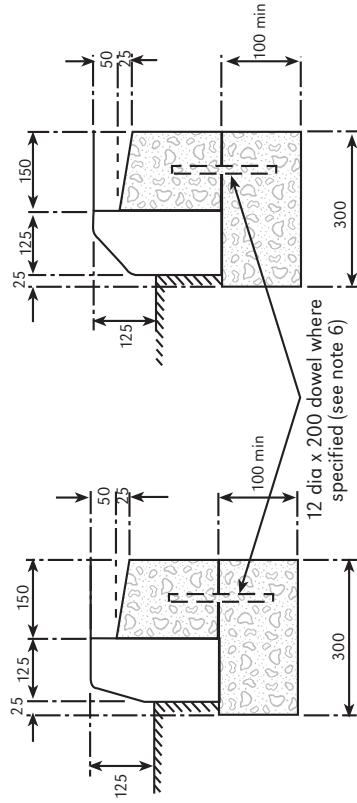
5. Where radius is less than 12.0 metres edgings must be sawn into a length not exceeding that shown below:

R(m)	L(mm)
10 - 11.99	600
5 - 9.99	300
2 - 4.99	150

All dimensions in mm unless otherwise stated.

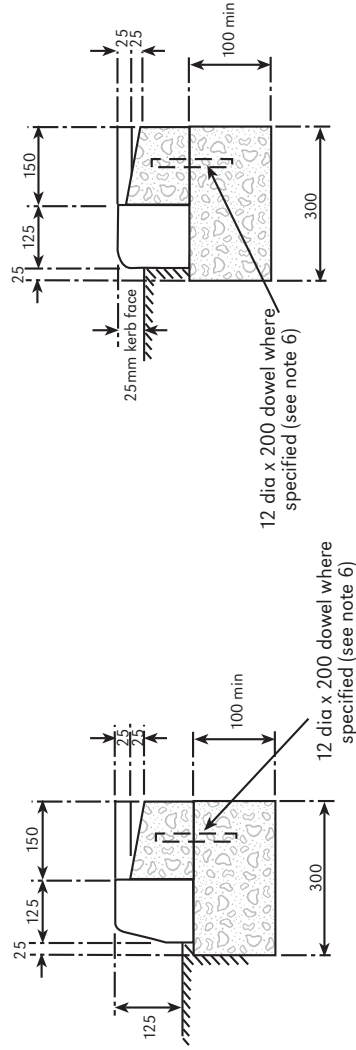
Kerb Details

DRAWING No. SD/KB/15



Half battered kerb: Type HB2

45° splayed kerb: Type SP



Half battered kerb: Type HB3

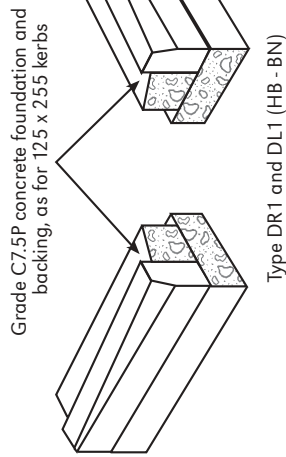
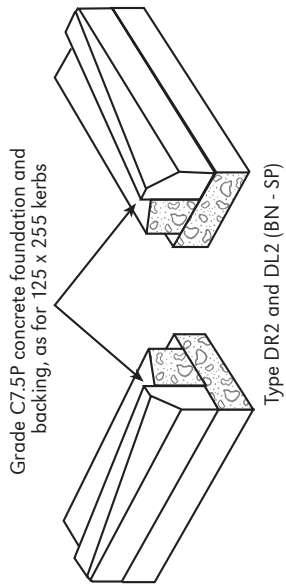
Bullnosed kerb: Type BN

NOTES:

1. Kerbs are to be precast to BS 7263: 1994.
2. Transition kerbs are to be used at all changes of kerb type.
3. Concrete bed and haunching to be in accordance with Specification Clause 2602 (Mix ST1).
4. Concrete bed is to rest on or within sub-base layer or on additional concrete, measured separately to allow it to rest on sub-base or existing kerb race. Sub-base is to protrude 500 mm from face of kerb, behind kerb and is to have a minimum thickness of 100 mm where sub-base is to be drained or an approved method of drainage provided.
5. Kerbs shall be laid directly on a fresh concrete bed within 2 hours of mixing then haunching applied. Alternatively, when concrete bed has sufficiently hardened kerbs may be placed on Class 1 mortar laid on bed in accordance with Clause 2404 and having a minimum thickness of 10mm and a maximum thickness of 40mm.
6. Dowel bars are specified when small element edging is used. They are to be bedded at 500 mm centres.
7. If half battered kerbs are used in conjunction with Safetecurb Type HB2 half battered kerbs, kerb face is to be reduced to 100mm to suit.

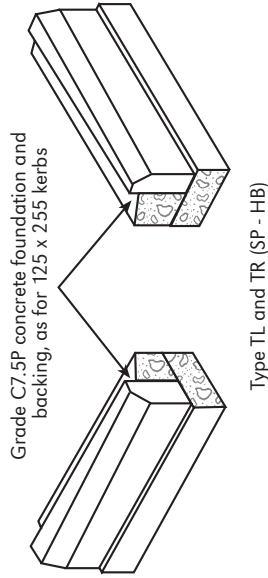
All dimensions in mm unless otherwise stated.

Dropped Kerb (Transition) Detail DRAWING No. SD/DK/16



NOTES:

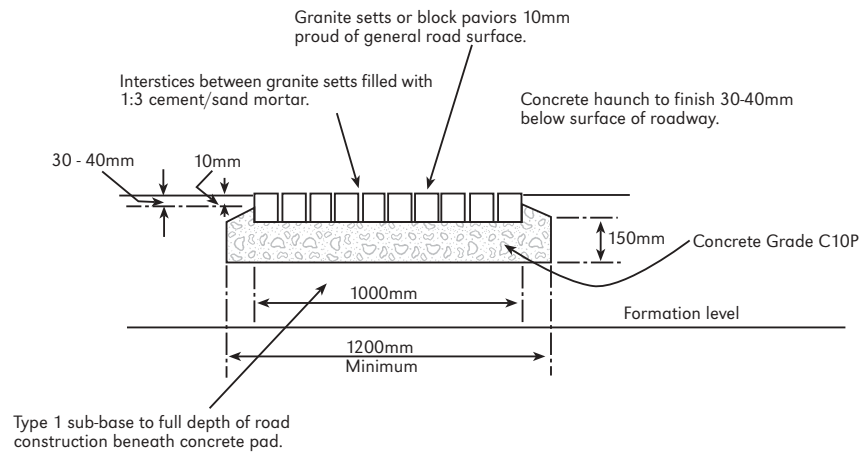
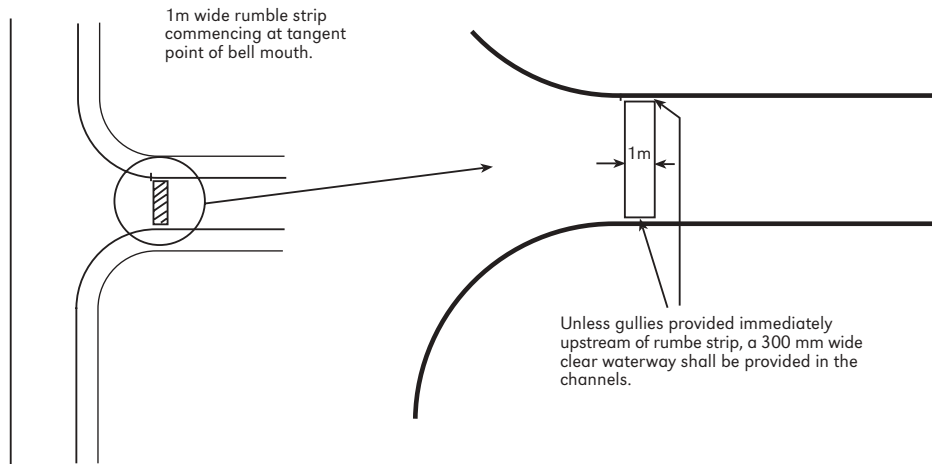
1. All precast concrete kerbs shall be hydraulically pressed and in accordance with BS 7263: 1994.
2. All in-situ concrete for foundation and backing shall be in accordance with Specification Clause 2602 (Mix ST1).
3. The foundation shall be increased in thickness as necessary to rest on the sub-base and shall not be less than 100mm thick. Where the foundation projects into the sub-base and this is required to be drained a minimum sub-base thickness of 100mm shall be provided under the foundation or an approved method of drainage provided.
4. All kerbs shall be laid on mortar in accordance with Specification Clause 2402 laid directly onto fresh concrete kerb race.
5. Raised kerbs shall have a 125 mm face and dropped kerbs a 25 mm face unless otherwise stated.



All dimensions in mm unless otherwise stated.

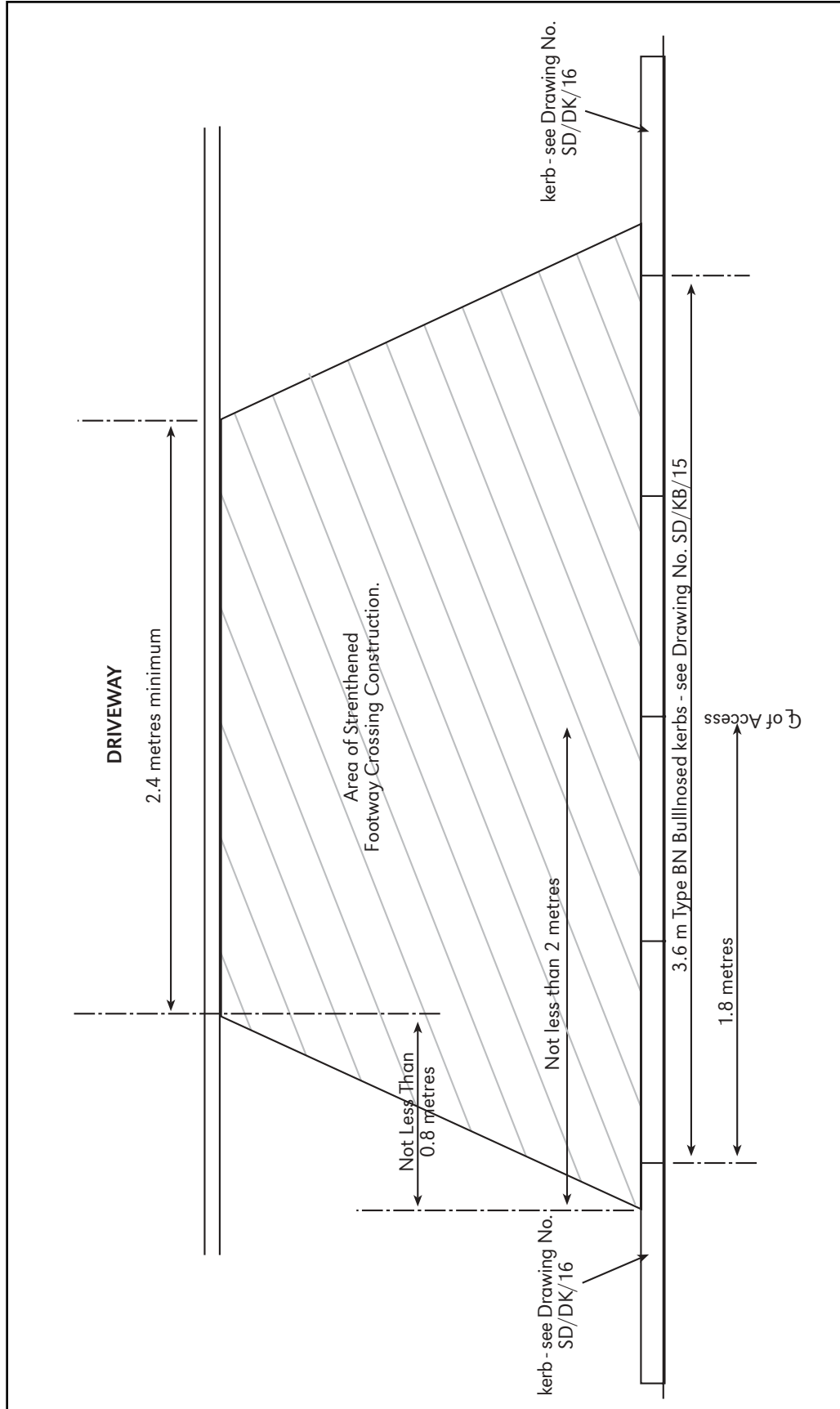
Rumble Strip Detail
DRAWING No. SD/RS/17

PLAN



CROSS SECTION

Standard Footway Crossing Detail
DRAWING No. SD/FC/18



2.19 Street Lighting

Where required the developers of private estates will take full financial responsibility for providing the lighting of roads and footpaths on those estates. The layout plans for such lighting shall be prepared by the developer and together with details of the equipment to be used plus design calculations to show the light levels that will be achieved, shall be submitted to the County Council for approval.

The design of the lighting scheme will, if the developer requires, be carried out by the County Council on a rechargeable basis. The fee involved will be notified to the developer on request.

Where the Agreement, executed between a developer and the County Council, in accordance with Section 38 of the Highways Act 1980, includes the provision of street lighting, nothing in this document shall absolve the developer from his liabilities set out in the Agreement.

2.19.1 Standards

The standard of lighting on new developments shall be highway lighting and conform to the British Standard Code of Practice 5489, except that no lantern shall be mounted at less than 5 metres mounting height.

2.19.2 Design

- (a) General - The design and installation shall be in accordance with the latest edition of the following publications together with the latest amendments thereto, unless stated otherwise:-
- (1) The British Standards Specifications
 - (2) IEE Regulations for Electrical Installations
 - (3) ILE Code of Practice for Electrical Safety in public lighting operations
 - (4) Electrical SUPPLY Authority requirements
 - (5) Health and Safety at Work Act
 - (6) Engineering Recommendation G39
 - (7) ASLC Code of Practice for the Erection of Street Lighting Equipment
 - (8) The Traffic Signs Manual Chapter 8
 - (9) The Electricity at Work Regulations

Where any development forms a new junction with an existing highway or any proposed system requires integration into an existing system. The full cost in altering the existing system to form a unified system of lighting shall be borne by the developer.

- (b) Highway Lighting- Columns shall be of steel construction designed and manufactured in accordance with BS5649, galvanised to BS729 and painted.

Light sources shall be high pressure sodium vapour (SON) or other approved white light source.

Lanterns shall be side entry, or subject to the approval of the County Council, post top mounted.

Highway Lighting shall be photo electric cell controlled, all night burning.

The design of all highway lighting schemes shall be carried out in accordance with BS 5489, supported with information and calculations to show the luminance or illuminance levels specified for the type of road are met.

2.19.3 General Specification

In order to ensure a reasonable standard of uniformity throughout the area, developers will be required to comply with the Specification set out hereafter:-

2.19.4 British Standards

Where a British Standard is in existence for materials or equipment detailed hereinafter, the equipment shall comply with the relevant standard whether or not it is referred to specifically in this document.

2.19.5 Installation

The developer is to supply, erect and install the whole of the equipment specified, together with any material which may not be expressly specified, but which is necessary for the satisfactory completion of the installation. Only workmen experienced in the erection of street lighting columns should be employed on this work, and they must at all times be under the direct supervision of a foreman who is so experienced.

Each column is to be fixed firmly and vertically on a prepared concrete foundation not less than 50mm thick. The planting depth to be that recommended by the manufacturer. The excavation to be backfilled with concrete grade C25P to within not less than 150mm from ground level. The rest of the excavation may be backfilled with suitable recovered material well rammed.

A chase shall be formed in the concrete at the time it is poured to allow for the entry of the electricity service cable. At all times during erection and back filling, care should be taken in handling and positioning the column.

Installation is to be carried out as development proceeds and in accordance with the needs of the occupiers of the new premises. In order that the positions for columns can be correctly established it is advisable that this should be done after the kerbs and/or edging are laid and preferably before any paving is carried out. Lighting columns shall be sited in the rear of the footway.

2.19.6 Columns

Lighting columns and brackets shall be supplied and installed in compliance with BS 5649. Column doors shall be flush fitting, vandal resistant, weatherproof, and have stainless steel locking screws tri-headed, anti-vandal or other design subject to approval.

2.19.7 Lanterns

Lanterns shall comply with the requirements of BS 4533, with vandal resistant polycarbonate dish or curve tempered glass bowls and lamp enclosure protection to at least IP65.

2.19.8 Photo Electric Control Units (PECUs)

Photo electric control units shall be one part or two parts of the silicon diode or cadmium sulphide type, suitably protected against the ingress of moisture, have a switch on level of 70 Lux \pm 10% and an inverse switching ratio of 1:0.5.

2.19.9 Protection of Steel Work Painting System

Columns will be Abcote coated or similar factory produced protection system. Care should be taken in handling, storage and erection of these columns to ensure that the applied coating is not scored or damaged below or above ground level.

Colour to be specified by the County Council.

2.19.10 Numbering of Columns

Each column shall be numbered in accordance with a numbering schedule to be provided by the County Council.

The number will be a Council specified self adhesive sticker fixed at a minimum height of 1 500mm above ground level and positioned on the carriageway side of the column, or as directed by the County Council for wall brackets.

2.19.11 Ballasts

These are to be solid filled polyester type suitable for use with the lamps specified and with tappings to provide suitable voltage steps. All tappings are to be brought to suitable marked screw type terminals to which lamp and supply connections can be made. A suitable earth terminal shall be provided. The ballasts are to be mounted in the lantern or on the baseboards in the bases of columns, with terminals shrouded so that during operation no live metal parts are exposed when base compartment doors are open.

2.19.12 Capacitors

These are to be totally enclosed and proof against condensation and provided with safety leaks and sealed in PVC cable tails or a terminal block suitably shrouded to prevent live parts being exposed during operation and a suitable earth terminal. They are to be suitable for working with lamps and ballasts specified and are to be mounted in the lantern or on the baseboards in the bases of the columns. The capacitance is to be such so as to give a Power Factor of not less than 0.85 Lagging.

2.19.13 Ignitors

Ignitors shall be compatible with the manufacture and type of lamp and control gear specified and shall be a separate component and not form an integral part of any other component.

2.19.14 Wiring

The developer is to provide for wiring the whole installation, complete from the control gear to the lantern and ancillary gear, using 1.5sq.mm. single PVC insulated and sheathed copper cable for columns up to and including 6m mounting height and 2.5sq.mm. single PVC insulated and sheathed copper cable for columns over 6m and up to and including 12m mounting height. A separate 2.5sq.mm. PVC insulated copper earth wire shall bond the lantern and control gear to the column earth terminal and a 2.5sq.mm flexible bonding conductor to the door. A 600mm length of 6.0sq.mm. PVC insulated copper earth wire is to be connected to the column earth terminal for connecting to the main earth by the Supply Authority. Two 600mm lengths of 2.5sq.mm. single PVC insulated and sheathed copper cable shall be provided for connection to the incoming supply.

2.19.15 Isolation

A suitably rated lockable double pole fused safety isolator shall be mounted on the column base board and connected between the control gear and main service cut out.

Note: All connections to the mains cut-out are to be undertaken by supply authority's personnel.

2.19.16 Servicing

The provision of electricity services to each individual column (including the cut-outs in the column bases) will be carried out by the appropriate Electricity Company at the request of the developer who will be required to bear the cost thereof. The provision of private cabling systems will not be permitted without prior consent from the County Council .

2.19.17 Reinstatement

Where any reinstatement of road or footpath surfaces is required within the limits of the development this will be solely the responsibility of the developer. Where, however, any openings are needed in publicly maintainable highways all arrangements and notices are to be made with or delivered to the Director of Community and Environment Services, Shirehall, Shrewsbury, SY2 6ND. When such openings have been made, the developer will be held fully responsible, including lighting, watching and permanent reinstatement to the satisfaction of the Director of Community and Environment Services.

2.19.18 Completion

Upon completion of the lighting installation, the contractor shall submit to the County Council a REC connection certificate for each column together with electrical test certificates in accordance with BS7671 (ICE Wiring Regulations) as attached and two sets of as-built drawings of the installation.

2.19.19 Maintenance and Taking Over

The developer is to be responsible for maintaining the street lighting installation until it is adopted by the County Council in accordance with the terms of the Agreement under the provision of Section 38 of the Highways Act 1980. The County Council will adopt the installation only if they are satisfied that all materials and workmanship are to their entire satisfaction.

The County Council may agree to the commissioning of street lighting in advance of adoption of the highway only if there is a signed adoption agreement between the County Council and the developer, but this shall in no way absolve the developer from the requirement to maintain the installation and to hand it over in a satisfactory condition at the time of adoption.

Shropshire County Council

Street Lighting & Traffic Sign Inspection Certificate

Location: _____	Unit No _____	Cert No _____
IEE Reg No		
312-03		
312-03-01		
713-02-01		
713-03-01		
713-04		
713-04-01		
713-04-03		
713-04-04		
713-09		
713-09-01		
713-10		
713-10-01		
713-11		
713-12		
412-03-04		

Location: _____

Unit No _____

Cert No _____

Type of Earthing

TN-C TN-S TN-C-S TT IT

Continuity of protective conductors

Continuity of P&N

Insulation Resistance

Phase and Neutral MΩ

Phase and Earth MΩ

Neutral and Earth MΩ

Polarity

(1)

(2)

Earth fault loop Impedance

(at cut out) Z_E Ohms

Earth electrode resistance

Operation of residual current operated devices

Protection by barriers to IP 2X

Comments _____

Signed on behalf of the Electrical Contractor _____

Position _____

Date _____