

ROADS
Development
GUIDE



East Ayrshire
COUNCIL

Chapter 1

Introduction



The purpose of this chapter is to explain the basis and framework of the Guidelines to aid developers in designing and constructing new roads to the standards required by the Local Roads Authority.

Purpose and Structure of the Document 1.1

The aim of the Guidelines is to identify a set of standards which will ensure that new and existing roads are safe and convenient to all users. They also aim to promote the sympathetic visual and physical integration of roads in order to enhance the quality of the environment.

1.1.1
Aim

The Guidelines contain certain desirable and absolute minimum standards which should be used in the design of new roads and in the alteration of existing road layouts and are intended to help ensure that the design is acceptable for adoption by the Roads Authority.

1.1.2
Design
Standards

It should be noted that developers will not be discouraged from attempts to use innovative and new design techniques. However, the Roads Authority must be consulted to ensure the suitability and legality of these new concepts. **The desirability of consultation from the earliest stage of road design proposals cannot be over emphasised.**

1.1.3
New
Techniques/
Consultation

The Roads Development Guide is supported by two additional Strathclyde Regional Council publications. The **Footways Development Guide** examines the various factors affecting the existing condition of footways and makes recommendations that will lead to improvements in the condition of existing and new footways.

1.1.4
Supporting
Publications

Streetscape : a Design Guide sets the context within existing roads where Streetscape can be considered, highlighting specific constraints and problems, whereby the mechanics of good design solutions can be applied. The Guidelines are presented in the form of a design manual providing a framework for the developer to follow through all the stages of road provision from planning procedures and design to construction and adoption. The guidance given relates to the design of **new development roads the redevelopment or refurbishment of existing roads and traffic calming techniques.**

1.1.5
Framework

The subjects covered by the document are presented in the order in which they are generally considered during the design process. However, colour coding has been employed to allow for easy access to any part of the document.

1.1.6
Order of
Information

1. Introduction

1.1.7 The document is subdivided as follows:

The purpose of the document and how to use it:

Chapter 1 introduces the document and its structure.

Policy and procedures to follow to obtain consent and ensure adoption:

Chapter 2 outlines the consultation, policy, procedures and legal requirements for road design and adoption, explaining what must be submitted for construction consent. Appropriate forms are contained in Appendix F.

Initial design considerations :

Chapter 3 considers development integration, recognising the design requirements in the wider context of the environment, existing and proposed infrastructure, user needs and transportation considerations.

Choosing an appropriate type of road :

Chapter 4 introduces the hierarchy of road types which comprise the road network and indicate the size and nature of development suitable for each road type.

Designing the layout of roads, parking and servicing :

Chapter 5 contains the road design standards for each type of road and includes guidance on the layout of accesses, footpaths and cycletracks.

Chapter 6 contains traffic calming design standards which should be applied to residential roads as an integral part of the road layout. The type of calming may therefore influence the road alignment.

Chapter 7 contains parking and servicing design standards for both on and off road parking. Appropriate levels of parking provision and design layouts are included.

Assessing the impact of the proposals :

Chapter 8 advises on the requirements for Transport Impact Assessment to be undertaken for major development in order to assess transportation requirements and the effect of the development on the road network.

Chapter 9 explains the procedure to be followed in order to undertake self check audits or independent safety audits. Relevant forms and check lists are contained in Appendix E.

Selecting suitable materials and construction techniques :

Chapter 10 details suitable construction design standards for geotechnics, pavement make up, drainage, landscaping and lighting, with the relevant specifications contained in Appendices A and B.

Objectives of the Guidelines

1.2

For a new road to be adopted by the Local Roads Authority it will be necessary for the development to be built to the standards specified in these Guidelines and designed to meet the following objectives:

1.2.1 Design Objectives

- *Road layouts should be designed to integrate with their surroundings and combine road design, parking and landscaping to create a high quality, attractive environment for all.*
- *The road layout should be designed to meet the needs of the development and all its users, including vulnerable road users.*
- *The speed of vehicular traffic should be at an acceptable level to improve safety by reducing the number and severity of accidents.*
- *Pedestrians and cyclists should be considered in the design of residential areas. Provision for these groups should be considered on their own merit and not just as an adjunct to the road layout.*
- *Adequate car parking must be provided, preferably off road and convenient for the user.*

Developers should note that in certain circumstances they may be asked to traffic calm existing roads where these roads will be adversely affected by a proposed new development.

1.2.2 Traffic Calming Existing Roads

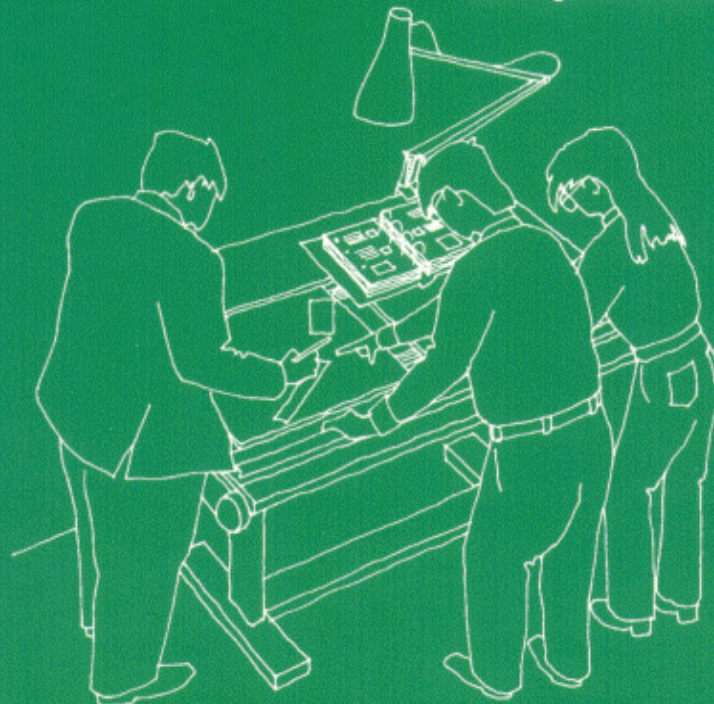
The legal basis of the Guidelines is included and the developer should be aware that much of the procedure and the methods to be employed have a legislative framework which must be adhered to.

1.2.3 Legal Considerations

Chapter 2

Policy and Procedures

- 2.1 Planning Policy Regarding Roads**
- 2.2 The Need for Consultation**
- 2.3 Necessary Consents to Construct New Roads**
- 2.4 Application for Planning Consent**
- 2.5 Policy Regarding Adoption and Maintenance**
- 2.6 Application for Construction Consent**
- 2.7 Inspection Procedures During Construction**
- 2.8 Application for Adoption of Development Roads, Footpaths and Cycle Tracks**



This chapter details the procedures and legal requirements inherent in the various stages from design submission through construction to road adoption.

Planning Policy Regarding Roads

2.1

Developers submitting planning applications will need to be aware of relevant planning policy. Scottish Executive planning guidance such as NPPG 1, NPPG 3 and PAN 44 highlight broad objectives to promote good urban design and safeguard and enhance the character of urban and rural environments. They recognise that roads are often conspicuous features and include recommendations that the wider environmental implications of roads proposals be considered as an integral part of the design process. Further guidance on these Government recommendations is included in Chapter 3.

*2.1.1
National
Planning Policy*

Regional planning policy is contained in the Ayrshire Structure Plan which sets out strategic policies on issues such as land use, housing, industry, shopping, offices, transportation and tourism.

*2.1.2
Structure Plan*

Local planning policies and issues are set out in Local Plan documents prepared by the Council. Developers are advised to consult these documents when formulating development proposals.

*2.1.3
Local Plan*

2. Policy and Procedures

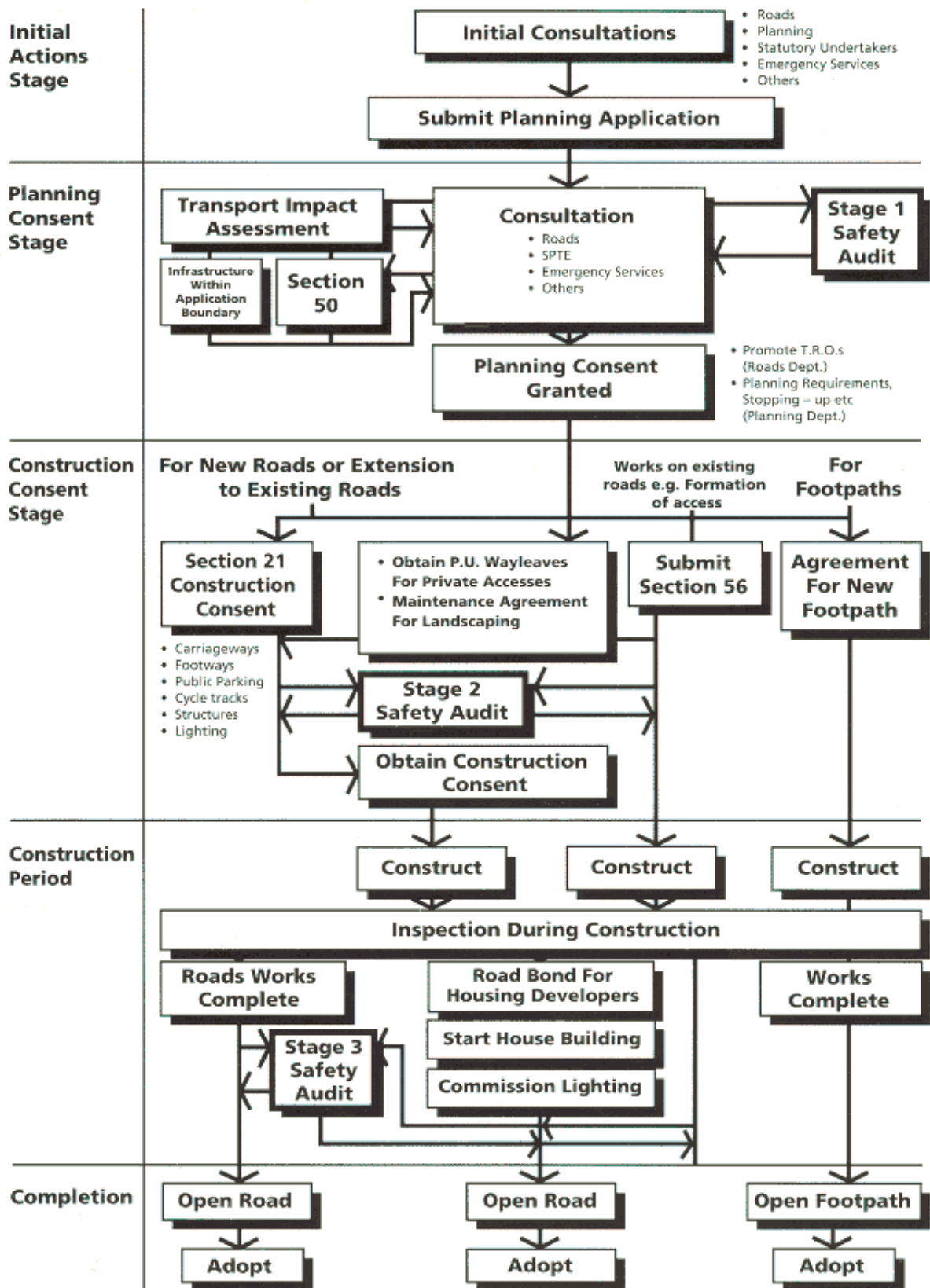


Fig 2.1 Typical Procurement Flow Diagram

2. Policy and Procedures

The Need for Consultation

2.2

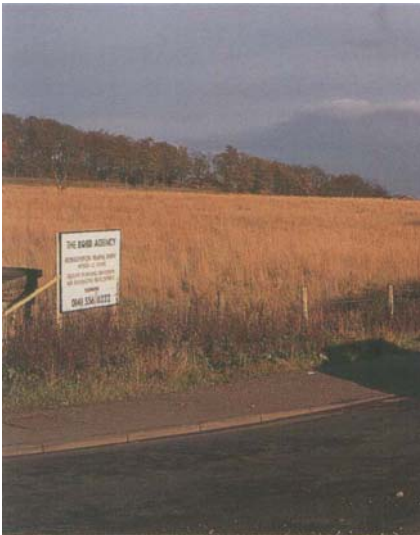


It is important that developers consult the appropriate Roads Authority officials, as listed in Appendix G, at an early stage in their preparations as:

2.2.1
*Initial
Consultation*

- (a) The location chosen for development may not be suitable for the type of development envisaged in terms of access and/or may be affected by future road schemes.
- (b) The proposed layout may not be acceptable in relation to development control standards.
- (c) Minor adjustments to the layout may be necessary to meet Construction Consent requirements.
- (d) Some discretionary powers are available and the Head of Roads and Transportation may advise developers in respect of variation to the Specification to suit certain specific local conditions.
- (e) Technical approval procedures outlined in the Design Manual for Roads and Bridges may apply where structural works or alterations are involved.
- (f) A Transport Impact Assessment (TIA) and/or Safety Audit may be required to be submitted in support of a Planning Application.

If not noted at an early stage, any of the above possibilities could result in considerable abortive work and expense.



Potential Development Site

Before recommending to the Council's Planning and Building Control Division that Outline Planning Consent for a development be granted, the Head of Roads and Transportation will have assessed;

2.2.2
*Outline
Planning
Consent*

- (a) the adjacent road hierarchy based on the volume, type and destinations of vehicular and pedestrian traffic using it,
- (b) how traffic patterns are likely to change in the foreseeable future,
- (c) the volume, type and distribution of vehicular traffic likely to be generated by the proposed development,
- (d) the contents and conclusions of the Transport Impact Assessment (TIA) and / or Safety Audit,
- (e) the adequacy of the adjacent road network and the need for traffic management or traffic calming measures, including any implications for land take,
- (f) any restrictions on road access to the site including location, sight distances, traffic calming etc,
- (g) any requirement for structures and adequacy of watercourses, pipes and road culverts and their outfalls,
- (h) in conjunction with Strathclyde Passenger Transport Executive (SPTE), possible alterations to the provision of Public transport to allow integration into the development,
- (i) any requirements for cyclists including their integration into existing provision.

2. Policy and Procedures

2.2.2 Detailed Planning Consent

Before recommending to the Council's Planning and Building Control Division that Detailed Planning Consent for a development be granted, in addition to the above the Head of Roads and Transportation will have assessed;

- (a) the types of road which it might be necessary to provide,
- (b) the location of existing or proposed community facilities, such as shops, schools, relative to the development,
- (c) the location and treatment of particular problem areas external to the site, including any implications for land take,
- (d) desire lines for pedestrian and cyclists movements,
- (e) the location of pedestrian and cyclist routes and crossing facilities,
- (f) the provision and location of traffic calming measures,
- (g) any special provision necessary for the disabled,
- (h) the location and amount of parking provision,
- (i) the form of any structures required and Approval in Principle, including the hydraulic capacity of pipes and culverts under roads and the adequacy of the outfall, watercourse or sewer,
- (j) the provision of road drainage,
- (k) the provision of road lighting,
- (l) the location of underground services,
- (m) the need for public transport facilities,
- (n) servicing requirements.

2.2.4 Road Lighting

An approved lighting design, generally in accordance with BS5489, will be required before Construction Consent is granted. Design, construction and installation shall be at the expense of the developer but following satisfactory completion of the works, the Road Authority will accept responsibility for future operation and maintenance when requested. Any other lighting will be private and must have separate and distinct circuitry, not connected in any way to the road lighting network or apparatus and with independent power supplies from and arrangements with the supply authority.

2.2.5 Consultation with other bodies.

The information contained in these guidelines refers principally to Local Roads Authority requirements. The requirements of the Council's Planning and Building Control Division, Statutory Undertakers (see Appendix I), Strathclyde Passenger Transport Executive, Fire Brigade and Police (particularly with respect to "Secured by Design") and Scottish Ambulance Services will be extra to these requirements and should be checked out individually at an early stage.



2. Policy and Procedures

Necessary Consents to Construct New Roads 2.3

Before undertaking any new road construction the developer must obtain both Detailed Planning Consent and Construction Consent. It should be noted that the granting of one does not necessarily imply the granting of the other.

2.3.1
Necessary Consents

Detailed Planning Consent is normally granted by the Council's Planning and Building Control Division from whom further advice should be sought.

2.3.2
Planning Consent

In terms of Section 21 of the Roads (Scotland) Act 1984, any person other than a Roads Authority who wishes to construct a new road or an extension (including lateral widening) to an existing road must obtain Construction Consent, irrespective of whether or not such roads are to be submitted for adoption as public. It is an offence under this Act to commence any construction of a road prior to obtaining Construction Consent. Construction Consent is granted by the Local Roads Authority and road construction works may only be undertaken while the Construction Consent (Form CC4) remains valid.

2.3.3
Construction Consent

Construction Consent will be granted only where proposals for the layout and construction of roads, structures, road drainage and lighting meet the Local Roads Authority's standards as detailed in this document. Since economy of maintenance will be a major consideration in the assessment of applications for Construction Consent, the use of structures to support roads (e.g. retaining walls and bridges) should be avoided wherever possible

2.3.4
Design Standard

The granting of Construction Consent signifies the Local Roads Authority's approval of the proposed roads, structures, road drainage and lighting. Construction Consent does not exempt the applicant from obtaining any other permissions which may be required such as Planning Consent, Building Warrant or approval for connection to a sewer.

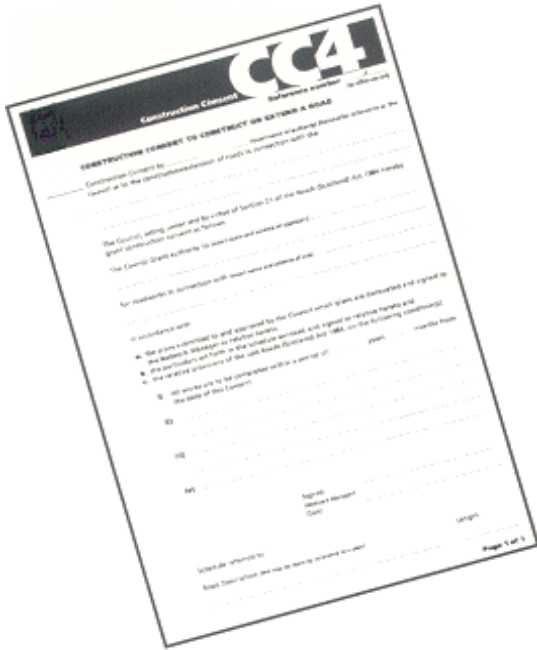
2.3.5
Other Consents

It is important to make the distinction between roads and private accesses. Roads have a public right of passage whereas private accesses are controlled by the owner(s) and there is no public right of passage.

2.3.6
Private Access

3 or more individual dwellings must be served by a road which will require Construction Consent and the submission of a Road Bond in a residential area (see paragraph 2.5.10). Less than 3 dwellings (this can be increased to 5 in a brownfield or gap site or 20 in a Housing Court (see Section 4.7)) will be served by a private access which, as there is no right of public access, will not require Construction Consent and will not be available for adoption.

2.3.7
Provision of Roads



A private access – two houses



A Road

Application for Planning Consent

2.4

Application for Planning Consent must be made to the Council's Planning and Building Control Division.

2.4.1

Place of Application

The developer may wish to ascertain whether his proposals are likely to be acceptable, in principle, to the Council's Planning and Building Control Division and for this purpose may apply for Outline Planning Consent. Before submitting such an application to the Council's Planning and Building Control Division, the developer should seek the advice of the Head of Roads and Transportation (Paragraph 2.2.2) to ensure that the requirements of these guidelines can be met and to ascertain, at this early stage, any other requirements.

2.4.2

Outline Consent

An application for Outline Planning Consent should include a 1:2500 scale site plan. This plan should desirably indicate the location of the proposed point(s) of access and if possible an indicative site layout.

2.4.3

Site Plan

Before submitting an application for Detailed Planning Consent to the Council's Planning and Building Control Division, the developer should consult the Head of Roads and Transportation for consideration of all roads matters.

2.4.4

Detailed Planning Consent

The developer should ensure that the road proposals detailed in the finalised planning application meet the Local Roads Authority's requirements for Construction Consent.

2.4.5

Layout plans

Subsequently, the Head of Roads and Transportation will make observations to the Council's Planning and Building Control Division on the application submitted for Planning Consent. This application should therefore include a layout plan (minimum scale 1:500) in sufficient detail to enable the site layout, associated traffic calming and the geometric standards of the roads to be fully appraised.

2.4.6

Construction Consent

It should be noted that the granting of Detailed Planning Consent does not relieve the developer of the requirement, in terms of Section 21 of the Roads (Scotland) Act 1984, to obtain Construction Consent from the Local Roads Authority for permission to construct new roads.

2.4.7

Section 50 Agreement

For infrastructure improvements outwith the development site deemed necessary by the Head of Roads and Transportation, the Developer may be required to enter into a Section 50 Agreement (Town and Country Planning (Scotland) Act 1972) with the planning authority. An example of this may be where an existing junction remote from but affected by the new development is deemed, by the Roads Authority, to require improvement, widening or reconfiguration. This could involve the developer in any or all of the following procedures:- purchase of additional and adjacent to the junction, remote from the development site; construction consent for the new roadworks; planning permission for the land take area; Section 56 Agreement Roads (Scotland) Act 1984 with the Roads Authority for permission to work on the existing road.

Policy Regarding Adoption and Maintenance

2.5

In terms of Section 16 of the Roads (Scotland) Act 1984, the Local Roads Authority will, upon request, adopt i.e. add to its list of public roads, any new road, excluding footpaths, (including any associated footway or verge) constructed in accordance with a Construction Consent.

2.5.1
Adoption of Roads

To avoid long delays between construction and adoption of roads, developers are recommended to programme construction to enable the adoption of roads to be phased as sections of work are completed, subject to the following conditions:

2.5.2
Phased Adoption

- (a) Each phase should have a separate Construction Consent.
- (b) Carriageways, footways, verges and lighting will not be adopted separately.
- (c) Only lengths of road between junctions or completed culs-de-sac will be adopted.
- (d) All roads submitted for adoption should form a continuous system with existing roads.



Figure 2.2 Diagrammatic Development Layout

2. Policy and Procedure

2.5.3

Adoption of Footpaths

In terms of Section 18 of the Roads (Scotland) Act 1984, the Local Roads Authority will, upon request, adopt any footpath which is the subject of an Agreement (Form CC5). Furthermore, should a developer fail to complete a footpath to the Authority's satisfaction within the period specified in such an Agreement, the Local Roads Authority may itself carry out the work and recover reasonably incurred expenses from the developer. The suitability of footpaths for adoption under Agreement will be judged against the following criteria:

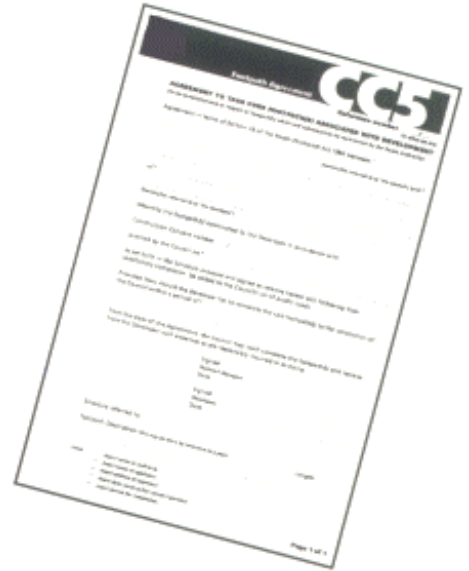
- (a) Footpaths should be constructed in accordance with a Construction Consent.
- (b) Footpaths should form part of a general pedestrian network interconnecting houses, shops, schools, public transport, etc. and be available to pedestrians on an unrestricted basis.
- (c) Footpaths should serve more than one dwelling.
- (d) In the case of multi-storey buildings, the footpath may be adopted up to the point where it is deemed to enter the curtilage (i.e. garden, landscaped or forecourt area surrounding the building).
- (e) Surfaced areas surrounding buildings and intended essentially for maintenance purposes will not be considered.
- (f) Where footpaths lead to both front and rear, only one will be considered.
- (g) At least one end of a footpath should be connected to a public road to facilitate access for maintenance purposes.
- (h) Arrangements of steps which prevent access to isolated lengths of footpath should be avoided.

2.5.4

Parking Areas Adoption and Maintenance

In both new development and redevelopment, the developer will normally be required to provide parking spaces off the carriageway in accordance with the parking standards detailed in Chapter 7 of this document. The suitability of such areas for adoption or maintenance by the Local Roads Authority will be judged against the following criteria:

- (a) Parking areas contiguous with the carriageway will normally be adopted as public roads provided that their use by the general public is not restricted in any manner.
- (b) Off-road parking areas, which have been identified as meeting a general public parking need and have been constructed to appropriate standards may be taken over for maintenance purposes only in exceptional circumstances.



2. Policy and Procedures

- (c) Parking areas provided in lieu of garages or private driveways for the regular parking of residents' cars will not be taken over for maintenance purposes by the Local Roads Authority and must, therefore, be subject to private maintenance agreements. They will remain either the responsibility of the Local Housing Authority or of the proprietors or factors in the case of private housing.
- (d) For residential developments, between 0.1 and 0.25 spaces per bedroom will be adopted (0.1 in shared surfaces).

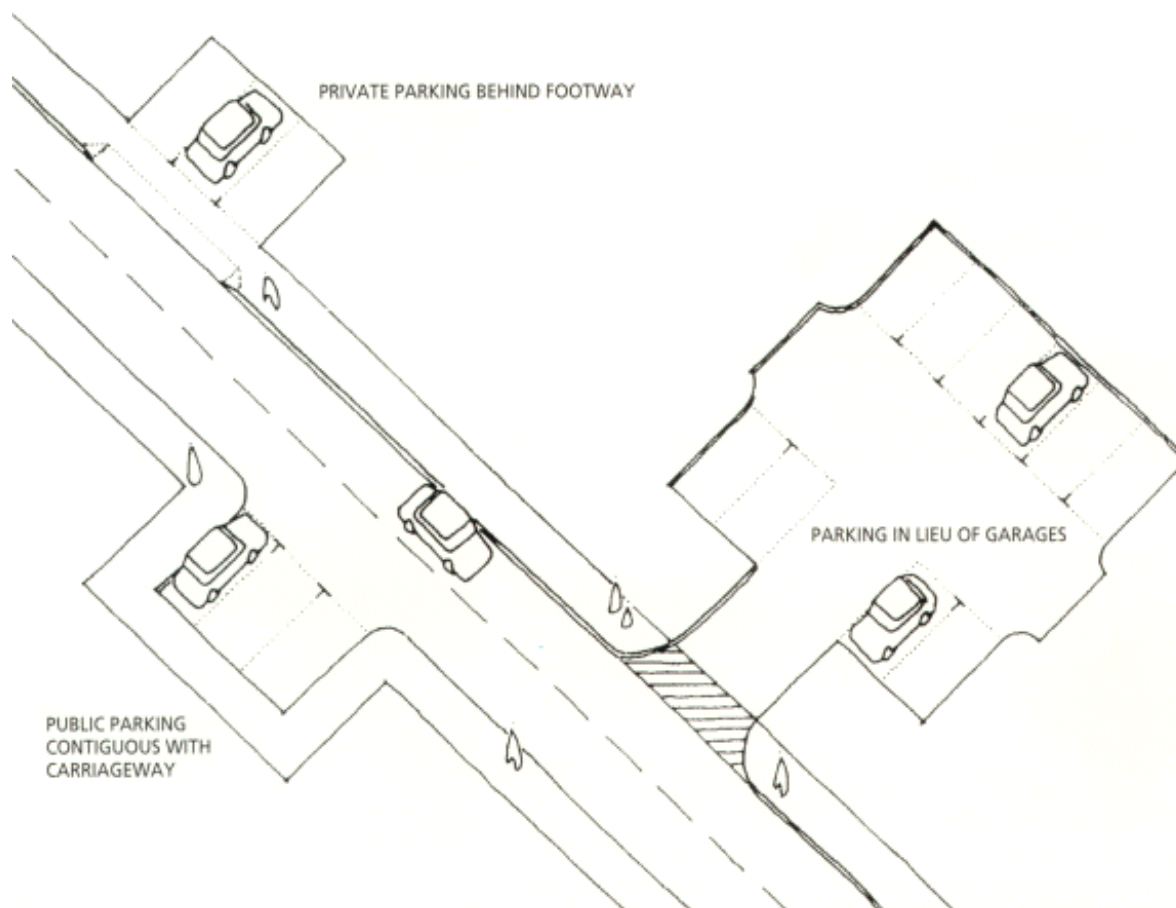


Figure 2.3 Parking Types

Housing Courts will not be adopted by the Roads Authority.

2.5.5
*Housing
Courts*

Service areas in industrial or commercial developments, which provide loading facilities for the premises, will not normally be considered for adoption even though these may take the form of paved areas contiguous with the carriageway. A clear delineation of the private area will be required.

2.5.6
*Service
Areas*

2. Policy and Procedure

2.5.7

Adoption of Road Lighting

Lighting installations on publicly maintainable roads, footpaths and parking areas will be taken over by the Roads Authority for operation and maintenance possibly prior to the completion of the road works, provided that the following requirements are met;

- (a) the submission of a separate acceptable Completion and Inspection Certificate (form CC10) for any lighting installation or part thereof that requires to be adopted during the construction period,
- (b) acceptance by the developer of responsibility for any necessary repairs or replacements, arising from faulty workmanship or from the failure of materials, during the twelve months following adoption,
- (c) written assurance from the developer that all roads concerned will be offered for future adoption,
- (d) final acceptance will be withheld until all columns and control pillars etc. have been numbered and, if required painted.
- (e) Where the development involves self build plots all driveways and site lines are finalised.

2.5.8

Adoption of Cycle Tracks

The road will not be adopted until the road lighting is completed.

A cycle track is a road for use by pedal cycles only or by pedal cycles and foot only. The adoption of cycle tracks will therefore follow the procedures for the adoption of roads (Paragraph 2.5.1). The suitability of cycle tracks for adoption will be judged against the following criteria:

- (a) Cycle tracks should form part of a general cycling network interconnecting houses, shops, schools, public transport, etc. and be available to cyclists or cyclists and pedestrians on an unrestricted basis.
- (b) At least one end of the cycle track should be connected to a public road carriageway to facilitate access for maintenance purposes.
- (c) Where a cycle track is provided on land primarily intended for recreational or similar purposes to be managed by the Council, the cycle track will not be adopted and a Construction Consent is not required; Road (Scotland) Act 1984 Section 151 (3).



2. Policy and Procedures



Where a Construction Consent provides for a road to be supported by a bridge, the Roads Authority will normally enter into an agreement with the developer, in terms of Section 79(1)(c) of the Roads (Scotland) Act 1984, whereby the bridge will heritably vest in the Local Roads Authority. Other essential structures will also require an agreement to enable these structures and solums to vest in the Local Roads Authority. However, where the bridge or other structure and solum has not been so acquired, the Local Roads Authority will be responsible only for maintaining the road surface.

2.5.9
*Structural
Agreements*

In terms of Section 17 of the Roads (Scotland) Act 1984 and the Security for Private Roadworks (Scotland) Regulations 1985 (S.I. 2080) developers are required to make financial provision with the Local Roads Authority in order to safeguard the completion of housing development roads which are the subject of a Construction Consent. Such provision as submitted under form CC7 which may take the form of a Road Bond or deposit, protects prospective house purchasers from having to bring incomplete roads up to adoptable standards. It should be noted that no building works can commence until such securities have been lodged. A security in favour of the Roads Authority will also require to be lodged in cases where substantial works for commercial developments affecting the existing road network are being undertaken by private bodies e.g. roundabout, underpass etc. (this by means of a Section 50 Agreement made under the Town and Country Planning Act 1972). The Regulations concerning Road Bonds do not, however, cover private accesses.

2.5.10
*Roads
Bond*

Delineation will be required between all private areas and the public road. This should be achieved by means of flush kerbs at the boundary and may incorporate gateways and/or change of surfacing.

2.5.11
*Delineation
Public/Private*

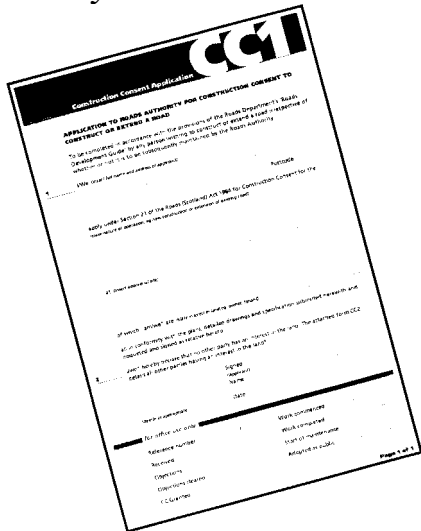
Developers will require to arrange maintenance of planting by means of factoring or by an agreement with the Local Authority.

2.5.12
*Maintenance
Of Planting*

Local Roads Authorities will not generally adopt planted areas except for grass verges within the road boundary.



2. Policy and Procedures



Application for Construction Consent

2.6

An application for Construction Consent should be made on

2.6.1

*Place and date
Of Application*

Form CC1. Completed application forms should be submitted at least three months prior to the commencement of construction to the Head of Roads and Transportation appropriate to the locality of the development. Layouts which clearly do not conform to the Guidelines may have the drawings and documents returned for a new application to be submitted.

Applications for Construction Consent should be accompanied by one durable and three paper copies of each of the following (initially only one paper copy is required for a preliminary check of the proposals):

2.6.2

*Submission of
Plans*

(a) A location plan, preferably on the Ordnance Survey base, to a scale of 1:1250 or 1:2500, showing the proposed road network and its relationship to existing development.

(b) A layout plan of the carriageways, footways, verges, footpaths, retaining walls, cycle tracks, bridges and earthworks to a scale of 1:500 (1:200 where pedestrian/vehicle shared surfaces are proposed) showing;

(i) the proposed centre, building and kerb lines (and also the heel of the footway where this differs from the building line),

(ii) curve radii of the road alignment and junctions,

(iii) traffic calming measures,

(iv) dimensioned visibility splays at road junctions and private accesses,

(v) forward visibility distances at bends,

(vi) vehicular access points to properties,

(vii) pedestrian crossing points at junctions and other locations,

(viii) the location of all road gullies,

(ix) the location of the road drainage system and its discharge points (applicants can obtain information on discharge points from Strathclyde Water Services),

(x) the location and type of lighting columns and lanterns, wall-mounted lighting units (if applicable), control pillars, underground cables and road crossing ducts,

(xi) the location of all underground services and ancillary apparatus,

(xii) the full extent of all cut and fill slopes,

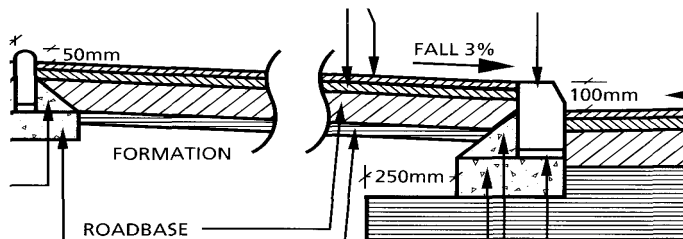
2. Policy and Procedures

(xiii) the boundaries of any areas which it is intended will subsequently be offered for adoption or maintenance,

(xiv) road signs and road markings etc.

(c) **A longitudinal section** along the carriageway, footpaths and cycle tracks giving vertical alignment details, road drainage gradients with manhole positions marked thereon, together with the nature of the substrata to a depth of 1 metre below road formation level or to rock head where bedrock is at a depth less than 1 metre.

(d) **Typical cross sections** through the carriageways, footways, footpaths, verges, cycle tracks and adoptable parking areas detailing widths, crossfalls, construction depths and materials used, kerb and edge details and typical details of gullies and gully connections.



(e) **A safety audit** for the design should also be included, where appropriate.

(f) A **Factual Ground Investigation Report** and corresponding **Interpretative Report** making specific recommendations on the design of the proposed road.

The details submitted for construction and the specification for materials therein must comply with these guidelines. This may be indicated by quoting the relevant clause number of the specification, but it will not be sufficient merely to state that construction is to the agreed specification.

2.6.3

Structures Design and Check

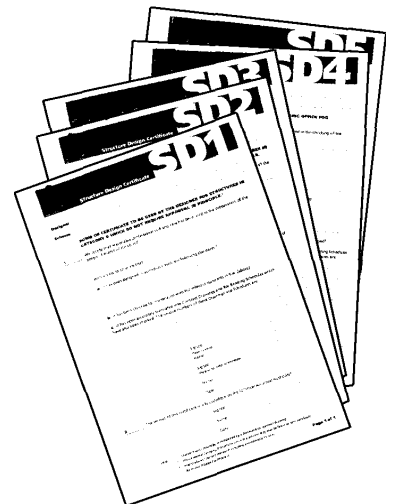
Where the submission includes structural design (e.g. retaining walls or bridges) the application must include;

(a) a copy of the agreed application for Approval in Principle or, alternatively, notice of confirmation from the Local Roads Authority that such application is not required,

(b) design and check certification (refer Appendix D) certificates SD1 to SD5, as appropriate to the structure category, in accordance with BD 2/89. Copies of certificates will be returned after acceptance/ endorsement by the Local Roads Authority,

(c) detailed drawings and design and check calculations (design check certificates are to be independent of the applicant or agent).

If the need for an additional or amended structure arises after the granting of Construction Consent, the developer should seek the approval of the Local Roads Authority before commencing the associated construction.



2. Policy and Procedure

The granting of Construction Consent does not imply that the Local Roads Authority accepts any responsibility for the accuracy and suitability of any elements of the design.

2.6.4
*Responsibility
For Design*



Figure 2.5 Docqueting of Plans

It is essential that the plans, detailed drawings and specification submitted with the application are docqueted, "This is the plan/drawing/specification referred to in the application", and personally signed and dated by the applicant or agent.

2.6.5
*Docqueting
of
Plans*

Where any person other than the developer owns land which fronts, abuts or is comprehended in **the new road(s) or the extension of the existing road(s)** for which Construction Consent is being sought, the developer will be required to declare on Form CC2 that all such persons have been notified of the application for Construction Consent by the issuing of Form CC3. Notice for Service on Owner.

2.6.6
*Notification
of
Owners*

Any person to whom the application has been intimated under the provisions of the preceding paragraph may, within twenty-eight days of the date of intimation, make written representation to the Local Roads Authority. Any such representations will be considered before Construction Consent is determined.

2.6.7
*Owners
Objections*

Should it be considered that the application for Construction Consent should be refused or granted subject to special conditions, the applicant will be afforded an opportunity to be heard prior to such a decision being made.

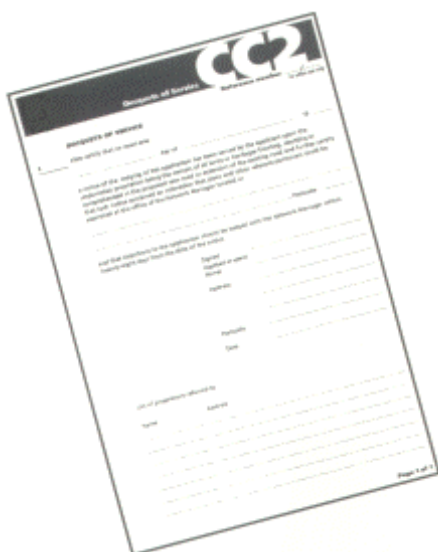
2.6.8
*Hearing of
Objection*

If an application for Construction Consent is (i) refused or (ii) granted subject to special conditions, the applicant may within twenty-eight days of the date of intimation of such a decision appeal to the Secretary of State for Scotland.

2.6.9
*Right of
Appeal*

It will be a standard condition of any Construction Consent that the construction be completed within the period specified in the Consent. This period will be not less than three years. If, as a result of a change in circumstances during construction, it is demonstrated that the specified period is no longer realistic, the Local Roads Authority may grant an extension. In the absence of such an extension a new application for Construction Consent must be made.

2.6.10
*Construction
Period*



2. Policy and Procedures

2.6.11 Amendments To Consent

Should the developer, for any reason, wish to depart from the construction or layout details for which Construction Consent has been granted, he must seek the approval of the Head of Roads and Transportation. Major changes may require the submission of a new application for Construction Consent. Construction Consent approvals cannot be transferred from one applicant to another and any change of applicant must result in a resubmission.

2.6.12 Footpath Agreement

In addition to obtaining Construction Consent, the developer should enter into an agreement with the Local Roads Authority before constructing any footpaths which it is intended should subsequently be adopted.

2.6.13 Road Lighting and Signing

The developer will be responsible for the provision of all road, footpath and cycletrack lighting, signing (whether illuminated or not) and alterations to existing lighting deemed necessary under Construction Consent.

2.6.14 Private Signs

It should be noted that it is illegal to erect private signs on street furniture or within the road boundary; for example, signs directing the public to developments. Approved signs, to the recognised standard, can be erected with the prior approval of the Head of Roads and Transportation.



Approved sign



2.6.15 Road Bonds

Illegal Signs – Can cause confusion at junction and affect visibility

Where a developer is required to lodge a Road Bond or deposit, Form CC7 should be completed prior to any housing building commencing.

2. Policy and Procedures

All the relevant Construction Consent forms, as detailed below, are included in Appendix F for the use of the applicant. Permission is hereby granted for these forms to be photocopied.

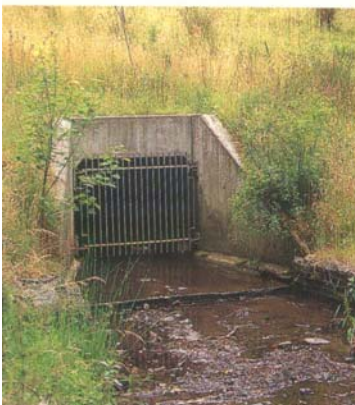
6.76
*Construction
Consent Forms*

Form	Title
CC1	Application for Construction Consent to construct or extend a road
CC2	Notification of adjacent proprietors (Docquets of Service)
CC3	Notice of Service
CC4	Construction Consent
CC5	Footpath Agreement
CC6	Application for addition of roads (including footways/cycle tracks) to list of public roads
CC7	Road bond
CC8	Carriageway Design Certificate
CC9	Construction Consent Checklist
CC10	Lighting Completion and Inspection Certificate



Where the developer proposes or is required to use, in the opinion of the Head of Roads and Transportation, non standard materials the developer should maintain a stock of 5% of non standard materials at all times for the design life of the road. Alternatively the developer should deposit a stock of 5% of these materials with the Local Roads Authority within 3 years of completion of the contract subject to the availability of depot space.

2.6.17
*Non Standard
Materials*



For pipes and culverts under roads a hydrological study of the catchment area along with a hydraulic design of the proposed pipe or culvert and outfall should be provided along with confirmation that this has been checked independently. Grills should be designed to facilitate ease of maintenance and prevent flooding and, where possible, grills should allow for overflow during flood conditions or where the grill face is blocked with debris.

2.6.18
*Pipes and
Culverts under
Roads*

Where connection of the road drainage to a public sewer is not possible the road drainage should outfall into a water course approved by the Water Authority. The hydraulic capacity of this outfall should be established in a manner as described in Section-2.6.18, for pipes and culverts under roads.

2.6.19
*Drainage
Outfall to
Watercourse*

It should be remembered by developers that failure to comply with the procedures given in this document will result in refusal of Construction Consent. Developers are therefore encouraged to liaise with the relevant Head of Roads and Transportation at all stages of a scheme.

2.6.20
*Failure to
Comply*

2. Policy and Procedures

Inspection Procedures during Construction 2.7

Two weeks notice must be given to the Head of Roads and Transportation of the start of roadworks together with names and telephone numbers of responsible persons who may be contacted in connection with the construction of the works.

2.7.7 *Notice of Commencement*

2.7.2 *Inspection and Testing*

During the construction period, irrespective of whether or not it is intended that the road(s) be subsequently adopted as public, the Head of Roads and Transportation's representative must be afforded access to the site to ensure that the works are being undertaken in conformity with the Construction Consent. The developer and/or his contractor should provide every facility to enable the Head of Roads and Transportation's representative to examine the works being executed and the materials being used, but will remain responsible for ensuring that standards are met.

2.7.3 *Charges for Inspection and Testing*

The Local Roads Authority reserves the right to charge for expenses incurred in inspecting and testing arising from the granting of Construction Consent. Samples of the various materials proposed to be used should be supplied, free of cost to the Local Roads Authority, together with particulars as to the source of supply or manufacture of such materials; or, at the discretion of the Head of Roads and Transportation, test certificates may be submitted indicating the suitability of the materials proposed

2.7.4 *Notice of Operations*

The developer or his contractor must give the Head of Roads and Transportation's representative a minimum 48 hours notice (excluding weekends and public holidays) of;

- (a) completion of formation,
- (b) commencement of each pavement layer to the carriageways, cycle tracks, footways and footpaths,
- (c) each concrete pour (including blinding) and commencement of steelfixing where reinforced concrete is used,
- (d) striking of formwork,
- (e) setting out of road lighting plant positions, backfilling of cable trenches and painting of lighting columns.

It should be noted that these are minimum requirements and that, in certain cases, the developer may be required to notify the Head of Roads and Transportation's representative of additional construction stages.

2.7.5 *Completion Inspection*

Towards completion of any development incorporating new roads, a request should be made to the Head of Roads and Transportation to have a completion inspection carried out. As a result of this inspection, a list of any remedial work required to bring the road(s) up to the Local Roads Authority's standards will be prepared. Following the satisfactory completion of any such remedial work, an application may be made as detailed in Section 2.8 for the addition of the road(s) to the Local Roads Authority's list of public roads.



Two stage completion inspection

Application for Adoption of Development Roads, Footpaths and Cycle Tracks

2.8

Following completion of a development road constructed in accordance with a Construction Consent, an application (using Form CC6 for its inclusion in the Local Roads Authority's list of public roads) may be submitted to the appropriate Head of Roads and Transportation by the person to whom such consent was granted.

2.8.7
Application for Adoption

Only those footpaths which are the subject of an Agreement (Paragraph 2.5.3) will be eligible for adoption.

2.8.2
Footpaths

The submission should include two copies of the plans described in Paragraph 2.6.2 and contain all relevant details as built. The roads offered for adoption should be shown in colour, and the plans should clearly indicate the ownership of all areas so coloured. The application for adoption should include the Safety File as required under the Construction Design and Management Regulations 1994.

2.8.3
Documents to Accompany Application

The submission should include two copies of a signed Lighting Completion and Inspection Certificate CC10 together with as installed plans. These plans must show the positions and circuit, arrangements of all lighting apparatus and be in ink on a transparent material which will permit the unlimited reproduction of prints.

2.8.4
Road Lighting

Within a period of twelve months from the time of application for adoption of a development road, an inspection will be undertaken by the Head of Roads and Transportation to ensure that the road has not deteriorated to a standard below that required for adoption.

2.8.5
Adoption Inspection

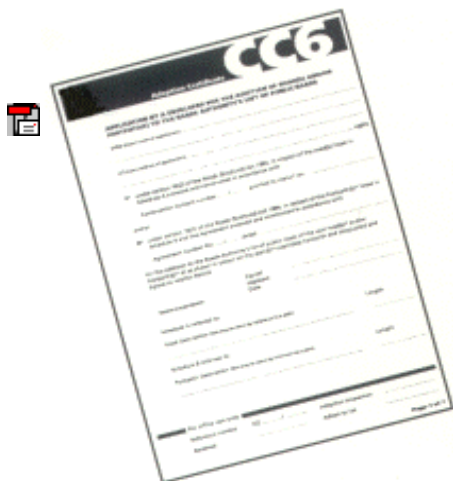


Figure 2.6 Plan indicating adopted areas

2. Policy and Procedures

2.8.6
*Addition to
List of Public
Roads*

Following a satisfactory adoption inspection, the road(s) shall be added to the list of public roads, in terms of Sections 16 and 18 of the Roads (Scotland) Act 1984, as appropriate.

2.8.7
*Car Parking
Areas*

A separate written application must be made in respect of any car parking areas which serve a recognised public parking need and do not form part of the road. These areas are ineligible for adoption but may be taken over for maintenance purposes by the Local Roads Authority (Paragraph 2.5.4).

2.8.8
*Release of
Road
Bond*

The Local Roads Authority may on request of the Developer release up to 80% of the Road Bond in respect of a section of road within a Construction Consent where ;

- (a) the construction of carriageways, footways, etc is complete to basecourse including street lighting over the whole of the section, and
- (b) a turning facility up to basecourse level is provided at the 'end' of the section, and
- (c) the section is not isolated within the development by other sections not yet up to the standard specified in paragraph (a) above, but connects to the public road network through sections at least up to that standard.

The Local Roads Authority will retain a minimum of 20% of the original security lodged until such time as the road has been added to the list of Public Roads.



Inspection for Adoption

Chapter 3

Development Integration

3.1 Design Context

3.2 Integration with the Road Network



At the outset of design it is necessary to consider the requirements of the wider context of the environment, existing and proposed infrastructure, user needs and related transportation issues.

3. Development Integration

Design Context

3.1

An integrated approach is necessary for the design of the internal layout of a new development, such that all factors are co-ordinated and give a final result which creates a pleasing and attractive environment for all users of the development.

3.1.1 Production

Above all, the new development must be designed and constructed within the existing road network to ensure that the safety of all road users is respected.

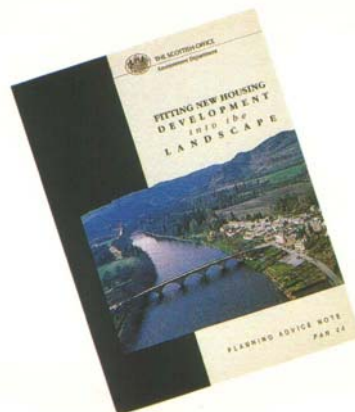
Visual Impact of Roads

3.1.2 Integrated Design Process

When assessing the potential visual impact of new development, designers should work within the context of broad urban design aims, taking cognisance of such aspects as existing landscape character, urban and architectural qualities of the area, historical patterns of development and social and cultural factors which impact on the environment. National planning advice contained in PAN 44 describes a method by which these issues may be addressed in a comprehensive way to help create development which contributes to local identity and enhances the sense of place.

Roads are often key determinants of urban and rural character and their treatment must seek to create harmonious relationships between the road, buildings and landscape. Successful design of the environment requires that all the various elements of the road corridor-the road itself, buildings, gardens, play areas, pedestrian areas, open spaces and planting- should be considered together, with the aim of creating a safe and attractive environment for road users and adjacent residents. Comprehensive treatment is more easily achieved if the landscape proposals are considered at the outset of the design, at the same time as the costs, feasibility and safety requirements.

3.1.3 Comprehensive Approach



3. Development Intergation

It is important that at the inception of the design, an analysis carried out of the existing assets and constraints of the site which may have a bearing on the layout or treatment of the road. Issues to be considered include;

- **landform** - in order to assist with the alignment of new roads,
- **landscape or townscape character** - to help determine factors such as the geometry, scale and detailed treatment of the road,
- **existing vegetation**-to assist with design of new planting,
- **existing structures** (walls, fences, signs, historical artifacts etc) - to protect valuable elements and guide the design of new elements,
- **established patterns of use** - to accommodate or make alternative provision for existing uses,
- **significant buildings or public open spaces** - to identify potential areas for environmental enhancement,
- **key views** to and from the area - to enhance important views and identify areas for screening,
- **significant flora and fauna habitats**-to protect and enhance features of ecological importance.

The design of roads in residential areas can be a positive determinant in the character and sense of place that is created. Housing types, density, plot shapes, frontage widths, parking provision and the integration of traffic calming measures within the residential layout are major factors that influence the design of development sites. Important detail considerations that contribute the quality of the environment include the appearance of trafficked surfaces, the treatment of road edges, the consideration of boundary walling and other devices that can visually extend and connect the dwellings to the residential road.



A safe and attractive environment should be created



Figure 3.1 Housing Design and Parking Provision

Note to Figure

Note 1: *Differing requirements for off road parking achieved by traffic calming to road alignment rather than adjustment of building line.*

Note 2: *Wider frontage house types reduce the visual impact of driveway parking.*

Note 3: *Use of areas to the side of houses for parking can maximise the amenity of front and back gardens.*

3. Development Integration

Integration with the Road Network

3.2

3.2.1
User Needs

Developments can take a variety of forms, with different requirements both internal and external to the site. The designer must therefore examine the road hierarchy in the proximity of the development to ensure that relevant design standards are achieved and that the needs of all road users are met, especially the requirements of pedestrians, cyclists and public transport.

3.2.2
Integration with Road Network

A new development must be designed in such a manner that it integrates fully with and takes access from the existing road network. This access must be at an appropriate location with a junction which can accommodate both the traffic on the existing road and that generated by the development.

3.2.3
Nature of Existing Road

The existing road network must be capable of coping with the level of traffic generated by the development. Where traffic calming is to be introduced to a Traffic Distributor Road the impact of the measures requires to be examined, particularly in relation to the possible displacement of traffic to another location to ensure that problems are not created there. The road hierarchy created within a development must connect into the existing road network in a logical and progressive manner.

3.2.4
External Traffic flow

The existing traffic routes in proximity to the development will require to be assessed to ensure that the traffic generated by the new development does not cause "rat runs" through residential areas (figure 3.2). In the instances where the creation of "rat runs" is considered by the Head of Roads and Transportation to be a problem, the developer will be required to design the development to ensure that it is constructed as discrete blocks, each with their own access, or fund any appropriate remedial measures on adjoining roads.

3.2.5
Design Speed

As speed is a primary cause of road accidents, it follows that a reduction in speed will reduce both the number of accidents and the severity of casualties. It is essential that the designer understands the concepts of speed reduction and the introduction of appropriate traffic calming techniques into the overall design of a scheme to ensure that vehicle speeds are restricted to an appropriate level conducive to road safety. The design of traffic calmed development roads should follow the guidance given in Traffic Calming Design Standards (Chapter 6).

3.2.6
Parking and Servicing

It is also essential that adequate and well located servicing and parking areas are provided within developments to preclude vehicle manoeuvring and obstructive parking on the road and footway network. In certain types of developments this may include provision for taxis and coaches. The design standards for servicing are contained in Section 5.5 and those for parking in Chapter 7.

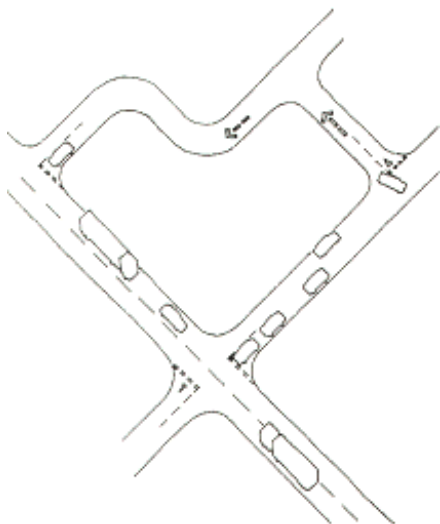


Figure 3.2 Generated Traffic must not cause "Rat Runs"

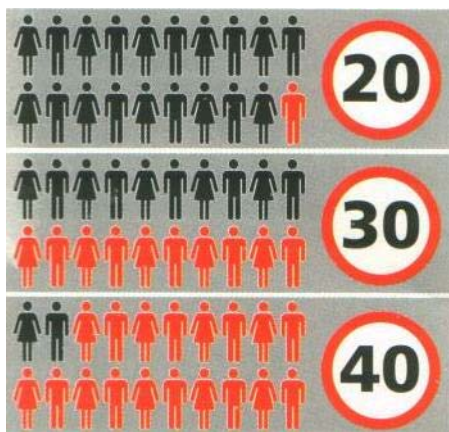


Figure 3.3 Pedestrian injuries and fatalities at impact speeds.

Chapter 4

Road Hierarchy

4.1 The Hierarchy of Roads

4.2 Road Types

4.3 Strategic Roads

4.4 Traffic Distributor Roads

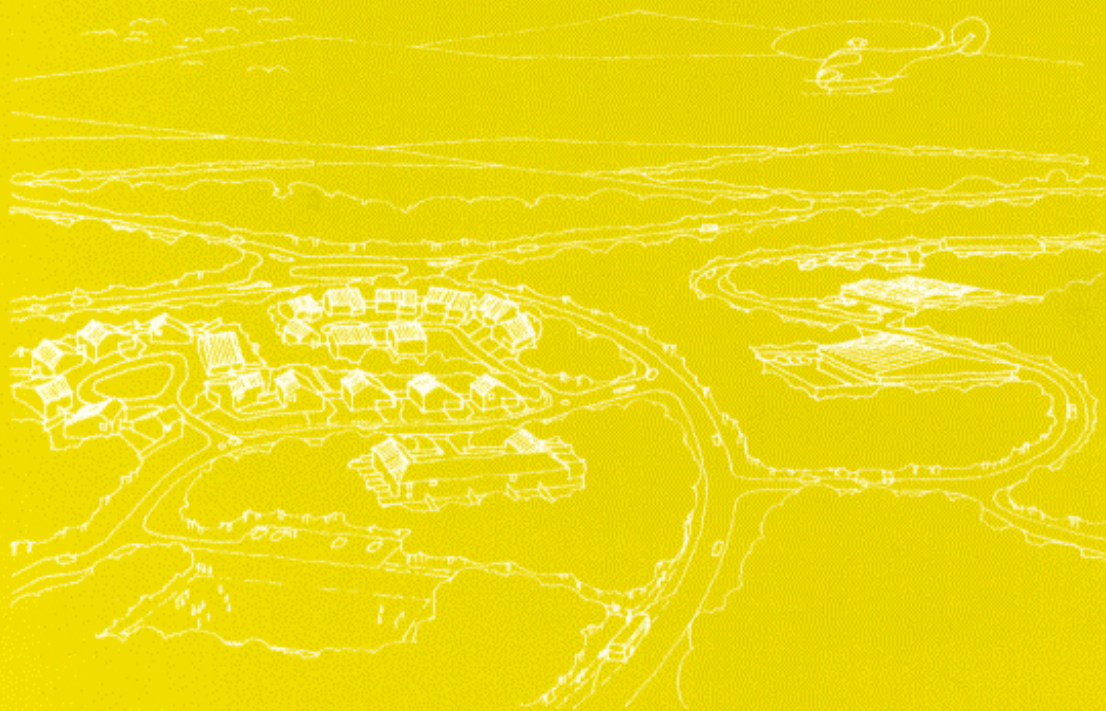
4.5 Industrial Roads

4.6 Residential Roads

- Residential core roads (serve up to 300 dwellings, loops up to 400 dwellings)
- Housing Roads (serve up to 150 dwellings)
- Shared surface roads (serve up to 25 dwellings, loops up to 40 dwellings)

4.7 Housing Courts (Serve up to 20 dwellings)

4.8 Rural Areas



A safe and efficient road network combines the various types of roads in a hierarchical form thus facilitating the stepped adjustment of driving techniques from arterial routes to the domestic environment. The development of an integrated scheme is illustrated as a worked example in Chapter 5.

4. Road Hierarchy

The Hierarchy of Roads

4.1

The road network fulfils a variety of functions ranging from the strategic movement of traffic to vehicle access, to individual premises. To fulfil these contrasting functions requires roads of different characteristics.

*4.1.1
Road Network*

A stepped approach to road characteristics has therefore been defined in the form of a roads hierarchy as indicated in Figure 4.1. Other combinations of hierarchy may be permissible for small gap sites at the discretion of the Head of Roads and Transportation.

*4.1.2
Hierarchy*

New roads will be designed and constructed in accordance with this hierarchy with consideration being given to the position in the hierarchy of existing roads. This hierarchy establishes the principle of access, designated design speed and the spacing and nature of junctions.

4.2

Road Types

*4.2.1
Definitions*

In considering the road infrastructure for new developments, it is necessary to define each element of the road network, both existing and proposed. The different types of road can be identified generally under the following headings:

- (a) Strategic Roads - provide for major traffic movement between centres of population and economic activity on a national and regional level.
- (b) Traffic Distributor Roads - distribute traffic within a district and link Strategic Roads to Residential Roads/Industrial Roads.
- (c) Industrial Roads- link industrial/commercial premises and associated parking and service areas to Traffic Distributor Roads.
- (d) Residential Roads - provide frontage access to properties within a residential area and link with Traffic Distributor Roads.



4. Road Hierarchy

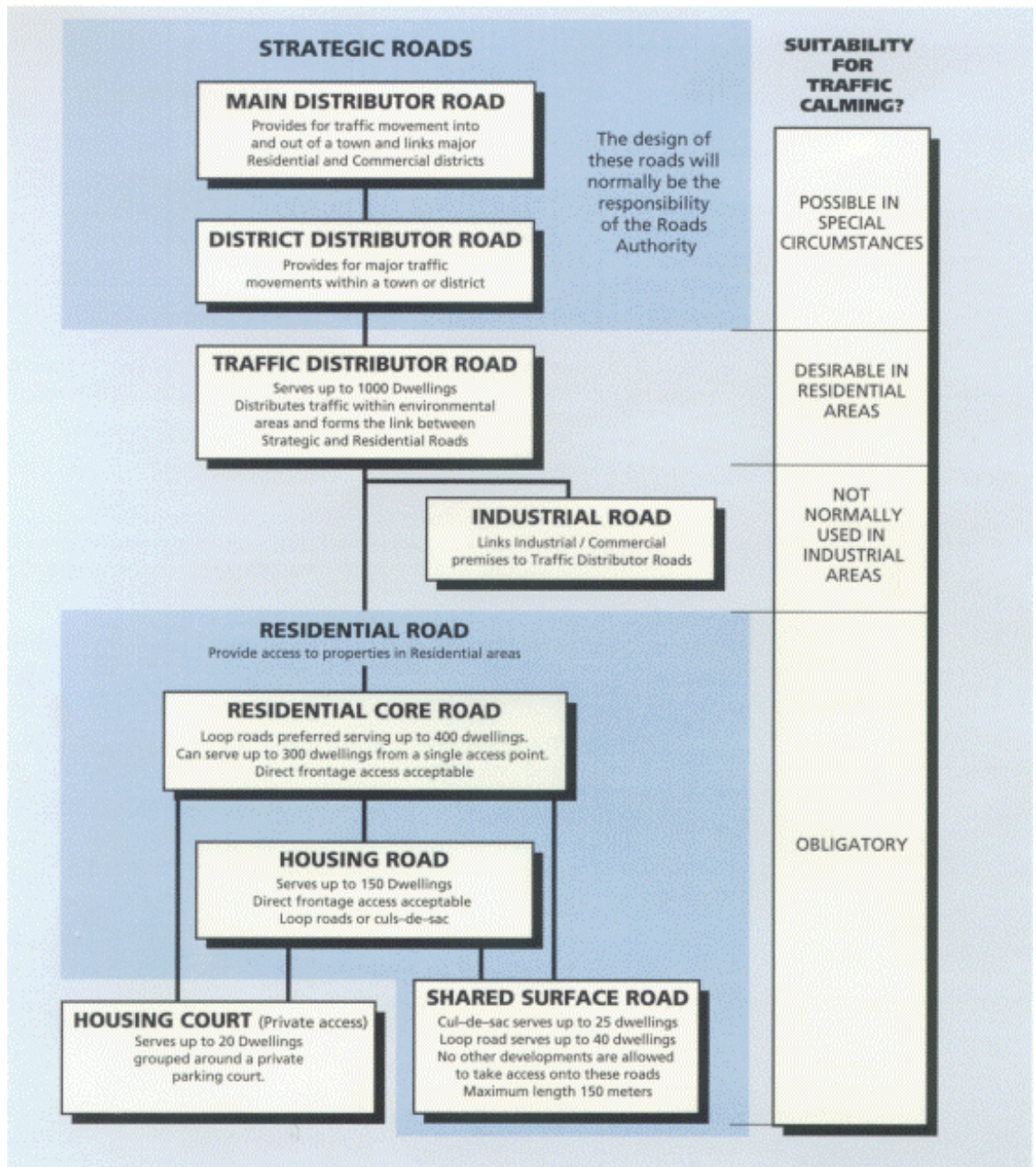


Figure 4.1 Road Hierarchy Diagram

Note: Emergency access must also be considered, as shown in table 5.1 and 5.2

4. Roads Hierarchy

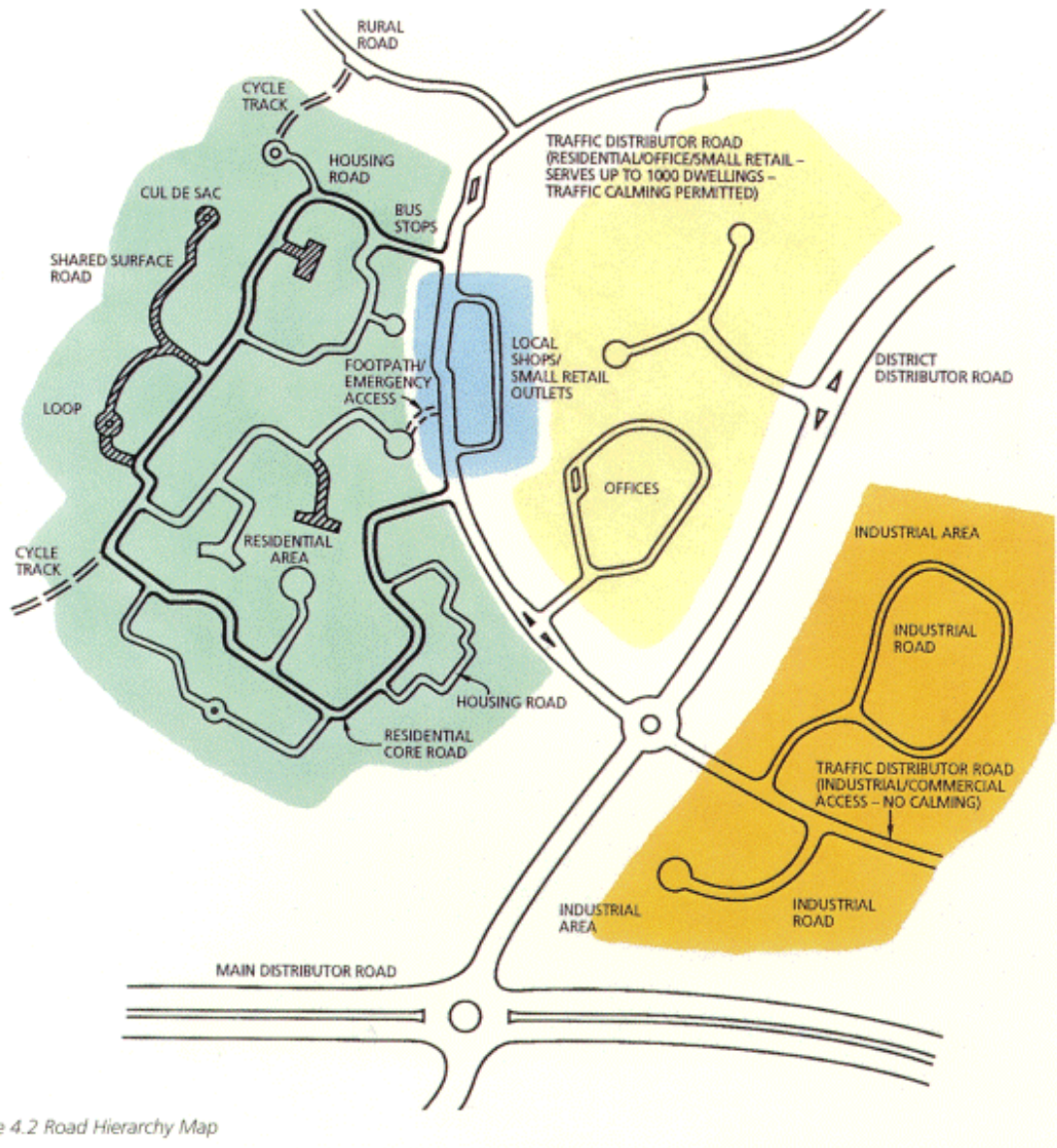


Figure 4.2 Road Hierarchy Map

4. Road Hierarchy

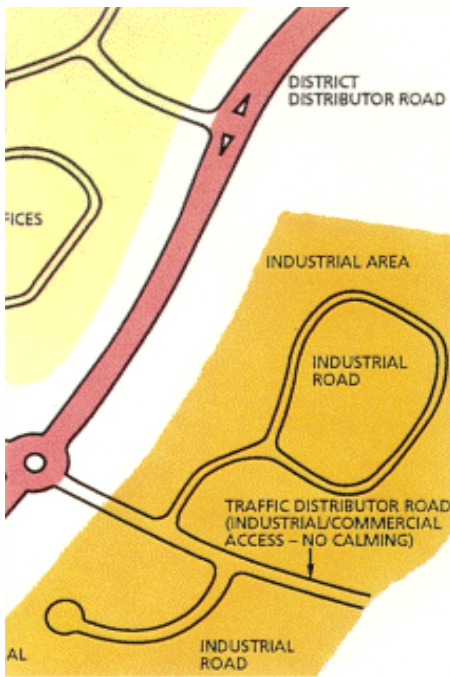


Figure 4.3 Strategic Roads



Main Distributor Road



District Distributor Road

Strategic Roads

4.2

Roads fulfilling the requirements of strategic traffic will generally provide largely uninterrupted flows and occupy the highest positions in the roads hierarchy. Such routes will be designated by their primary function as follows:

4.3.7 Primary Function

- (a) **Main Distributor Roads** provide for traffic movements into and out of a town and link major residential and commercial districts.
- (b) **District Distributor Roads** provide for major movements within a town or district.

It is unlikely that developers will design a Strategic Road. If this should be necessary however, advice should be sought from the Head of Roads and Transportation regarding matters such as design speed.

4.3.2 Design Speed

Where pedestrian movements are high and demand routes cross a strategic route, facilities for pedestrians should be provided by means of a grade separated crossing. In urban environments, 'at grade' crossings may be permitted.

4.3.3 Pedestrian Crossing Facilities

When the main function is strategic and the route is classified appropriately, a general presumption against access to individual premises will be assumed. Additionally, junction spacing will be large to ensure road safety and effective signing (Table 5.3).

4.3.4 Access/Junction

Carriageway width and road geometry will be designed to accommodate predicted traffic flows and desired vehicle speed. Roads connecting to Main and District Distributors will preferably be Traffic Distributor Roads, as described later in this Chapter. Due to the diverse appearance of the road network it is not always immediately obvious what the classification of a road should be. Strategic routes vary from rural dual carriageways to urban roads. By considering the primary function of the route as described in section 4.3.1 (a) and (b) it will be possible to decide whether a route is a Main or District Distributor.

4.3.5 Main/District Distributor

Strategic Routes passing through urban areas will therefore generally follow the principle of route designation by function and steps may be taken to reduce frontage access and conflict points. Where the nature of an existing route changes substantially such that the primary function is no longer strategic - such as a busy shopping street - the road hierarchy requirements may be relaxed to accommodate the commercial activity of the street. Advice should be sought from the Head of Roads and Transportation with respect to the strategic significance of roads affected by a development.

4.3.6 Application in Urban Areas

4. Road Hierarchy

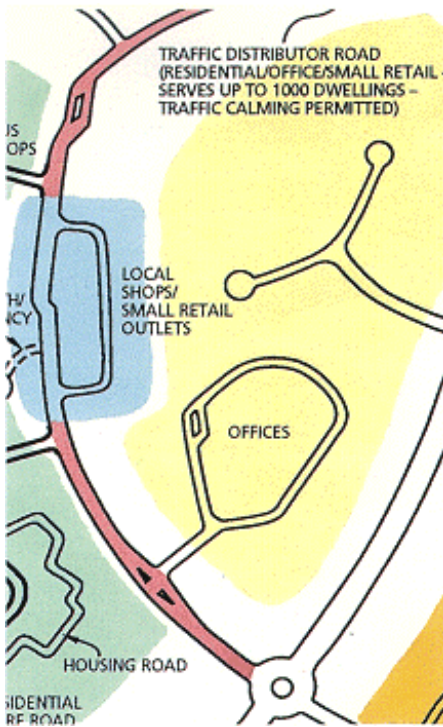


Figure 4.4 Traffic Distributor Road



Traffic Distributor Road

Traffic Distributor Roads

4.4

Traffic Distributor Roads keep environmental areas free from extraneous traffic, form the links between Strategic Roads, Industrial Roads and Residential Roads and should form part of a network. **Traffic Distributor Roads are mainly vehicular traffic routes and not suitable for frontage development with direct access.**

4.4.1 *Function*

In view of the potential for vehicle and pedestrian conflict, it is important that road design ensures that vehicle speeds are appropriate for the function of the route.

4.4.2 *Design Speed*

The nature of such roads will depend on the anticipated mix and volume of traffic, the location and number of junctions and pedestrian/ cyclist movements. An appropriate design speed will be determined as defined in Table 5.6.

Normally, where pedestrian movements are high and the criteria can be met, facilities for pedestrians will be provided by means of a controlled or a grade separated crossing. However, in certain circumstances it may be more appropriate to reduce the vehicle speed to allow the pedestrians to cross in a safer manner. These will generally be at locations which attract vulnerable road users. Details of appropriate traffic calming measures are highlighted in Chapter 6.

4.4.3 *Pedestrian Crossing Facilities*

Typical locations where there are major pedestrian activity may be as follows;

- (a) in the proximity of a school,
- (b) where there are a number of shops,
- (c) on a defined pedestrian route.

Notwithstanding Paragraph 4.4.3, traffic calming may be provided generally on Traffic Distributor Roads serving only residential developments and/or office developments, and this will enable relaxation to design parameters as per Table 5.6.

4.4.4 *Traffic Calming*

Calming of Traffic Distributor Roads carrying traffic from Industrial or Commercial Developments will not be appropriate unless treated specifically as described in Paragraph 4.4.3.

On both sides of the roads, a 2 metre wide footway should be provided at all times and be separated from the carriageway by a 2 metre wide verge, unless otherwise directed by the Head of Roads and Transportation.

4.4.5 *Footways and Cycle tracks*

The aim both in new development and in redevelopment should be to achieve a system whereby pedestrians and cyclists are segregated from traffic. Where footways and cycle tracks run alongside Traffic Distributor Roads they should be separated from the carriageway by a verge. However, cycle lanes may be provided on the carriageway.

4. Road Hierarchy

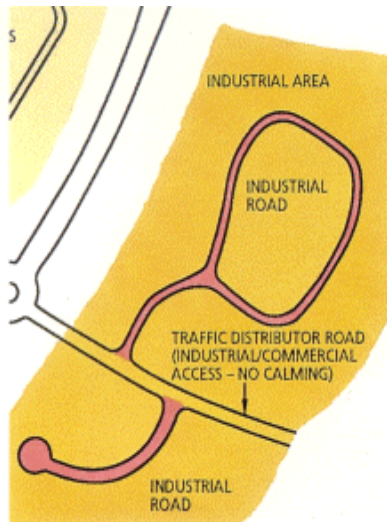


Figure 4.5 Industrial Road

Industrial Roads

An Industrial Road provides a link to industrial and commercial areas by means of access to servicing yards or allowing frontage development of these premises onto the road.

An Industrial Road may be a cul-de-sac in which case a turning facility should be incorporated (Paragraph 5.3.42). Elsewhere loop roads should be provided to discourage general through traffic movement.

Industrial Roads are transitional in nature between full standard Traffic Distributor Roads and the local industrial/commercial environment and may therefore be constructed to reduced standards of alignment compared with Traffic Distributor Roads. This will largely depend upon the length of the roads and it is still desirable to use a formal design speed for assessing curve radii and visibility. 32 kph is suggested as an appropriate figure, with a minimum centreline radius of 25 metres. A minimum carriageway width of 7.3 metres will normally be required, but this may be reduced to 6 metres where commercial vehicle activity is likely to be limited (e.g. in small-scale industrial developments comprising nest units) or where the roads operate one-way. In all cases, carriageways will require widening on small radius curves as detailed in Chapter 5.

4.5

4.5.1 Function

4.5.2 Layouts and Design Speed



Industrial Road



A footway at least 2 metres wide (Paragraph 5.4.13) should be provided on each side of the carriageway. However, if development is to one side of the road only, the requirement for a footway on the opposite side of the road may be relaxed. Only in exceptional cases, where it can be demonstrated that pedestrian activity is unlikely, may the requirement for any footway be waived

Wherever a footway is not provided, a 2 metre wide grass verge or, sightlines and Statutory Undertakers' services permitting, a 0.6 metre wide hard-landscaped berm will be required between the edge of the carriageway and any vertical face.

4.5.3 Footways and Verges

4. Road Hierarchy

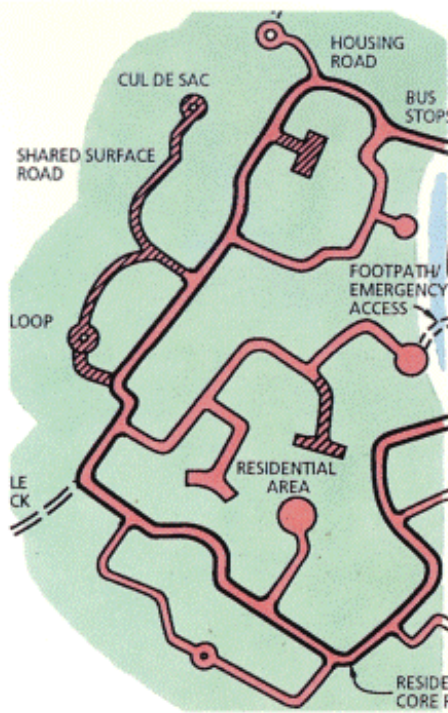


Figure 4.6 Residential Roads



Residential Roads

4.6

Residential Roads distribute vehicular traffic from the Traffic Distributor Roads to the dwellings within the residential area and must be designed as part of an integrated road network which discriminates in favour of pedestrians.

4.6.1
Function

The transition from a Traffic Distributor Road to any Residential Road must be highlighted by a gateway feature, as described in Paragraph 5.1.12.

As such, the road layout for all Residential Roads will require traffic calming to be a dominant feature in the design and this may facilitate the future promotion of 20mph speed limit zones. Frontage development is permitted on to all types of Residential Road.

4.6.2
Layout/Design
Speed

Minimum forward visibility should always be achieved for all Residential Roads but in no circumstances should reduced visibility be used as a method of reducing vehicle speeds. The roads in a residential area must be designed to ensure that the extremities of the zone are not further than 1 km from an entrance to the development. Isolated sections of traffic calming at reduced spacings may be permissible at locations where there is a high predominance of vulnerable road users.

The ability to achieve self enforcing vehicle speeds should not depend simply on traffic calming measures but should be brought about, in part, by the road layout. As far as possible, geometry and natural features should be used to encourage speed reduction and provide the most environmentally friendly layout (Figure 4.7). Details on Traffic Calming measures are given in Chapter 6, which outlines design standards and method of application.

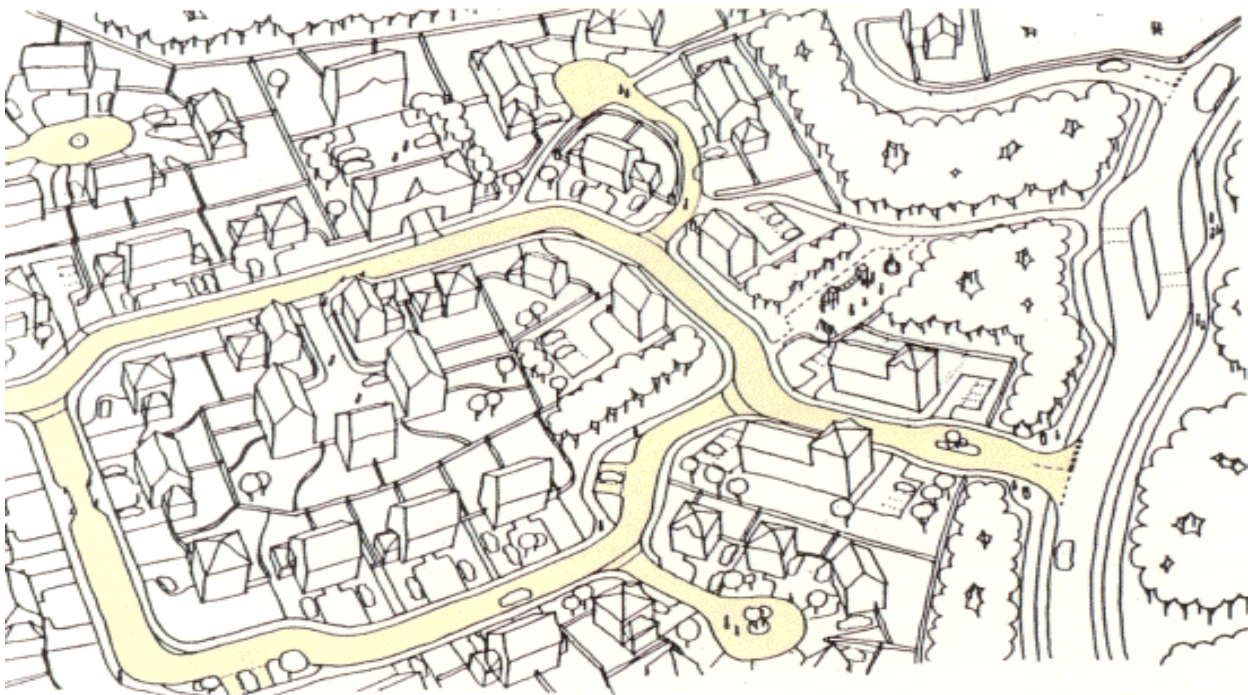


Figure 4.7 Diagrammatic residential road network

4. Road Hierarchy

Residential Core Roads (culs-de-sac serve up to 300 dwellings, loops up to 400 dwellings)

4.6.3 Function

A Residential Core Road is the major route within a residential area. Its function is to provide general access from Traffic Distributor Roads to the other roads in a residential area.

4.6.4 Road Layout

Residential Core Roads should be laid out to discourage through traffic movements and be of loop form where possible, and may serve up to 400 dwellings. However, only 300 dwellings may be served from a single access point.

4.6.5 Side Roads/ Junctions

The layout of the Residential Core Road should be such that its function is clearly defined and the design and layout of junctions taking access from the Residential Core Road will be of paramount importance if the dominance of the Core Road is to be obvious to all drivers. Therefore, measures should be employed to indicate positively where side roads leave the Core Road. A method of achieving this emphasis is illustrated in Figure 4.9.

4.6.6 Small Development

In small developments where the road layout is not complicated and less than 150 dwellings are being served then there is no need for a Residential Core Road.



Residential Core Road

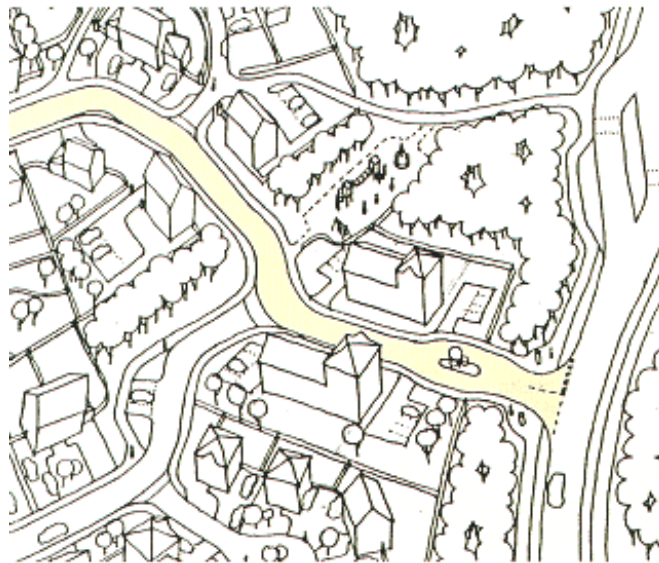


Figure 4.8 Residential Core Road

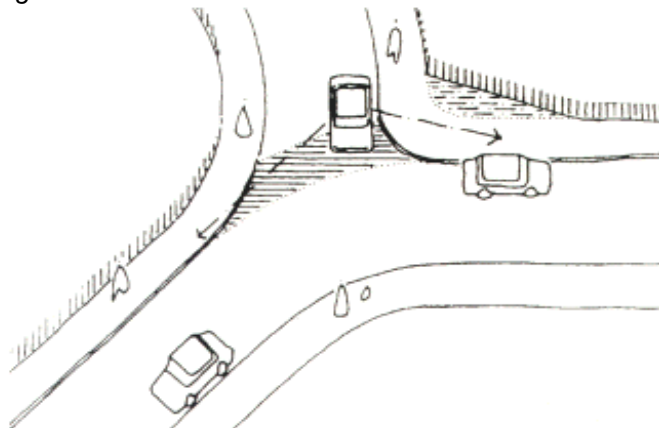
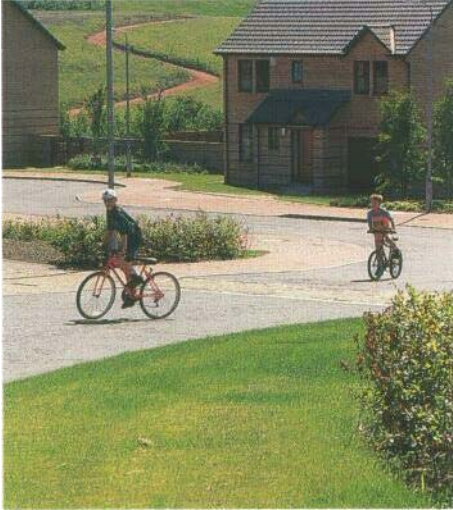


Figure 4.9 Definition of Core Road

4. Road Hierarchy

Housing Roads (serve up to 150 dwellings)



Housing Roads give access to dwellings and therefore provide the links between these dwellings and Traffic Distributor Roads either directly or via Residential Core Roads.

4.6.7
Function

Housing roads can be located and arranged in any form, taking access from the Residential Core Road and from each other as either loops, links or culs-de-sac. The layout should be convenient and accessible for the driver without creating long lengths, or areas which can only be reached by a long tortuous route.

4.6.8
Layout

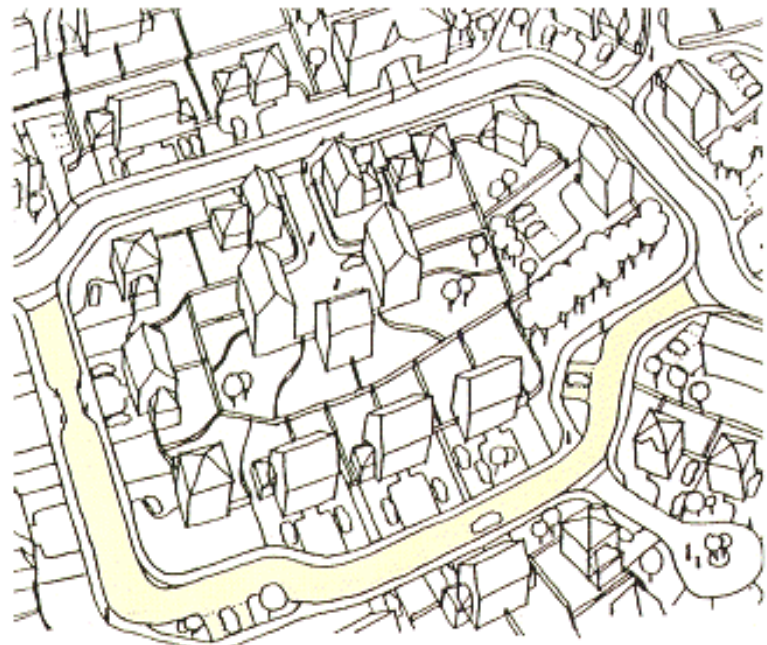


Figure 4.10 Housing Road

4. Road Hierarchy

Shared Surface Roads (culs-de-sac serve up to 25 dwellings, loops up to 40 dwellings)

4.6.9 Application

Shared surfaces in residential areas comprise a road without footways where the carriageway is shared by pedestrian and vehicles. A Shared Surface Road can be incorporated into the design of a residential area at points with mainly frontage development where vehicular traffic will be low and consequently there is the possibility of creating an area where vulnerable road users will feel more secure. It is desirable that vehicle speed should not exceed 10 mph in Shared Surface Roads and the road layout should reflect this.

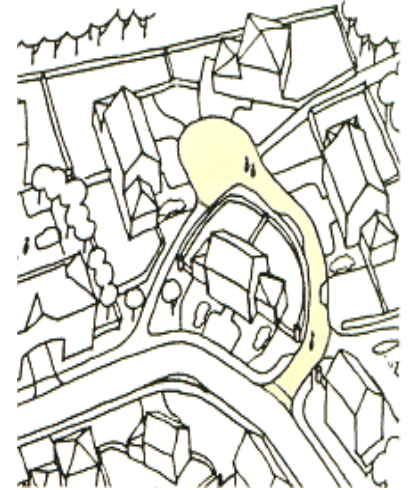


Figure 4.11 Shared Surface Roads

4.6.10 Layout/ Dwellings Served

A Shared Surface layout comprising a cul-de-sac or a number of culs-de-sac can serve up to a total of 25 dwellings. Shared Surface loop roads should be discrete i.e. not interconnected with other loops, although Shared Surfaces culs-de-sac will be permitted off a Shared Surface loop road. Up to a total of 40 dwellings may be served by a Shared Surface loop road layout.



4.6.11 Shared Surface Junctions

A Shared Surface road can form a junction at a point along the Housing or Core Road. However, where a Shared Surface road is located at the end of a Housing or Core Road cul-de-sac, a speed control island in the form of a turning circle or a roundabout should be provided at the entrance to the Shared Surface road in order to permit vehicles to turn in the Housing or Core Road.

4.6.13 Service Strips

The total length of a Shared Surface layout should not exceed 150 metres and where appropriate intervisible passing places should be provided.

2 metres wide service strips (Paragraph 5.6.10) must be provided to accommodate Statutory Undertakers' services.

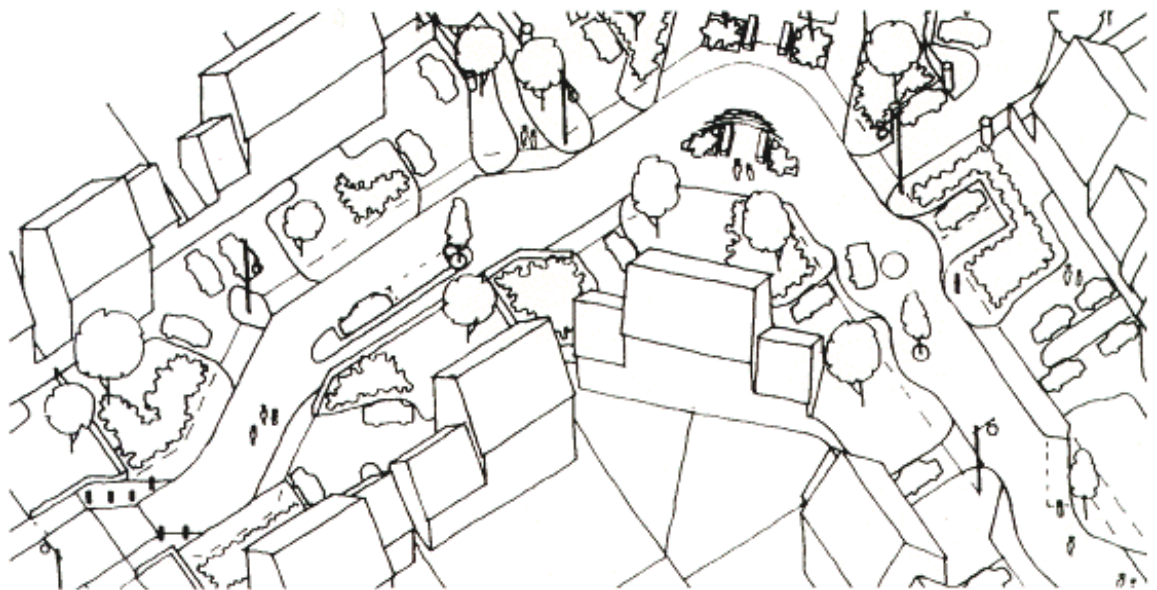


Figure 4.12 Shared Surface Layout



Housing Courts (serve up to 20 dwellings)

4.7

A Housing Court is similar in concept to a car park with a shared surface finish for joint pedestrian and vehicular use. The associated dwellings are located around the court. A Housing Court will not be adopted by the Roads Authority.

4.7.1
Application

The Court will provide parking spaces relative to the number of dwellings, up to a maximum of 20 dwellings, and generally no point within the court should be more than 40 metres from the access point.

4.7.2
Layout

The access road to a Housing Court must be a minimum of 4.5 metres wide and a strong physical definition must be provided to indicate the nature of the layout to the driver and that it is a private area.

Where a Housing Court is provided at the end of a Housing Road cul-de-sac, a separate turning head should be provided to ensure that drivers do not need to enter the Court in order to turn.

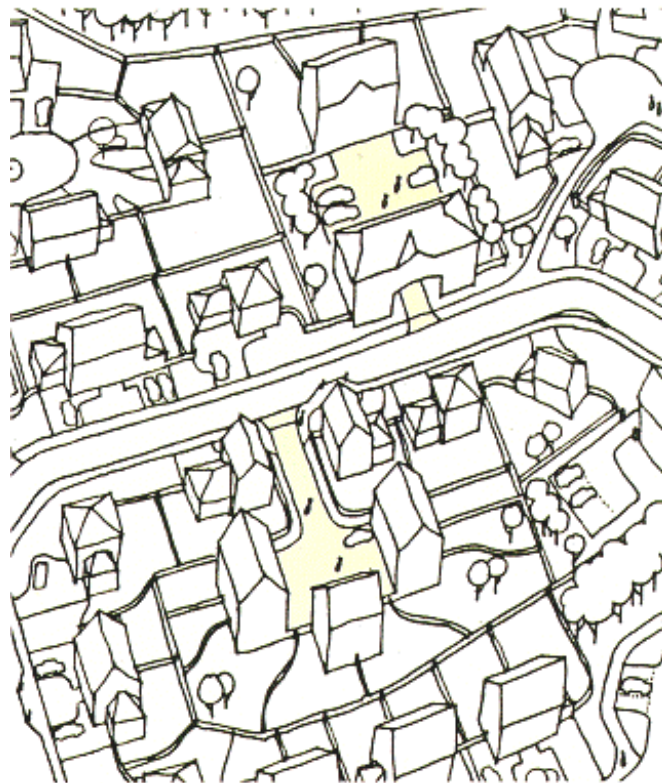


Figure 4.13 Housing Courts

Where possible, provision should be made within a Housing Court for servicing where there is a servicing provision, the service vehicle must be able to enter and leave in a forward gear at all times.

4.7.4
Servicing

Statutory Undertakers should be encouraged to use any footways or landscaped areas outwith the Housing Court, otherwise a wayleave agreement will have to be reached with the house owners to allow access to apparatus.

4.7.4
Statutory Undertakers

As these Housing Courts will not be adopted by the roads authority, **all lighting must be provided and maintained by the developer.**

4.7.5
Lighting

4. Road Hierarchy

Rural Areas

4.8

It should be noted that these Guidelines refer essentially to urban areas. In rural areas, where higher vehicle speeds necessitate more stringent design criteria, reference should be made to current Scottish Executive Industry Department technical memoranda.

4.8.1
Application

Developers are advised to consult the Head of Roads and Transportation at an early stage to determine the road requirements of the development.

Rural areas can be treated as having a similar road hierarchy as the urban areas but the significant difference will be to ensure that adequate visibility is provided on roads which are subject to speed limits which are in excess of 30 mph.

4.8.2
Hierarchy

As in urban areas there is the need for a clear and logical road hierarchy. The general framework of roads within the hierarchy does not change and can be applied in the rural framework.

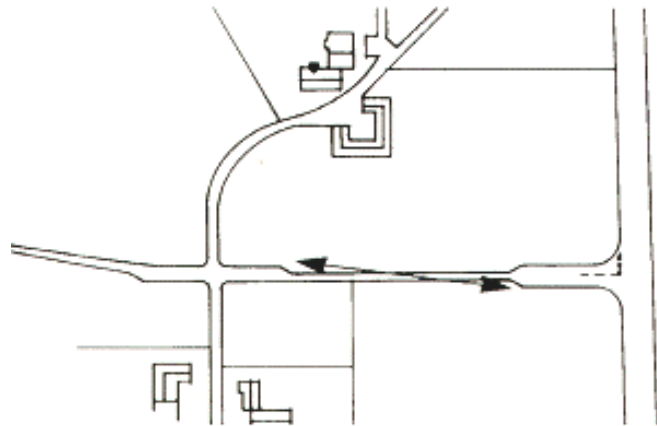


Figure 4.15 Passing Places

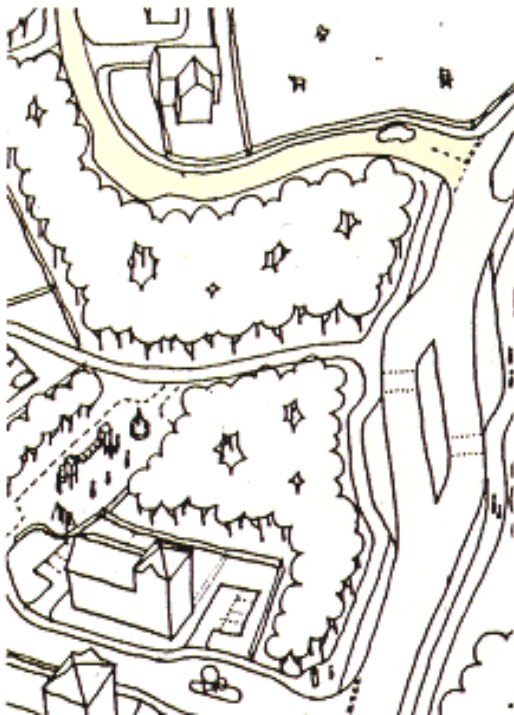


Figure 4.14 Rural Roads

Residential Roads will remain essentially the same but it is unlikely that a rural development will be of such a size as to require a Residential Core Road. However, an additional type of road will be permitted, which is a Single Track Access Road and can be used to serve small developments where the following criteria are met:

4.8.3
*Residential
Roads Criteria*

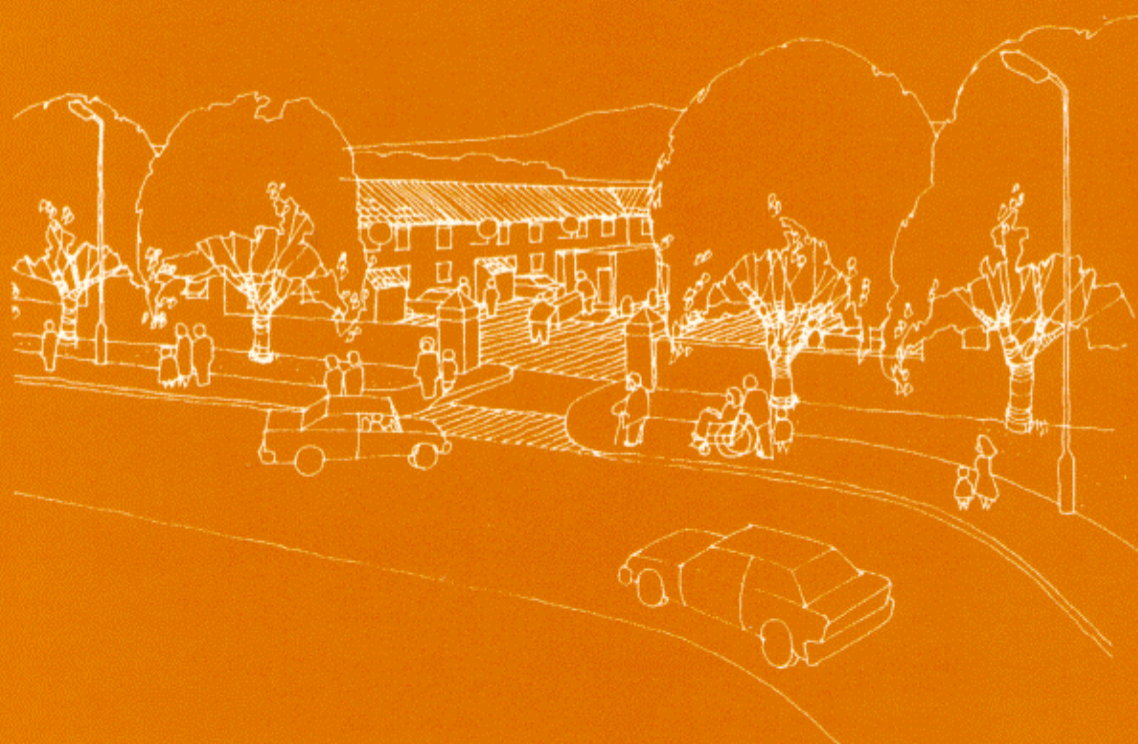
- (a) A maximum of 50 dwellings will be permitted on the road.
- (b) The new road should take access to the existing road network at a distance of at least 10 miles from a tier 1,2 or 3 shopping centre (see Table 7.4a).

The SingleTrack Access Road should not be less than 3.5 metres wide and with intervisible passing places to be provided, designed to the standard defined in Paragraph 5.7.6 (Figure 5.45).

Chapter 5

Roads Design Standards

- 5.1 Junctions**
- 5.2 Private Access**
- 5.3 Link Design Details**
- 5.4 Pedestrians and Cyclists**
- 5.5 Servicing**
- 5.6 Statutory Undertakers**
- 5.7 Rural Areas**
- 5.8 Landscape Considerations**
- 5.9 Additional Considerations**



Having identified the hierarchical status of the new road network, the appropriate design standards can then be applied to each of these roads, footpaths and cycle tracks. Complementary additional guidance relating specifically to traffic calming and parking standards is given in more detail in Chapters 6 and 7.

5. Road Design Standards



Junctions

Virtually all developments will be required to provide vehicular access to some extent. This can be by means of a road junction or a private access. The type of vehicle, and subsequently the form and layout required, will vary from private cars to large articulated vehicles depending upon the nature of the development. The location, layout and geometry should be such that a safe access is provided and that minimal delays are experienced by both vehicles entering from and exiting to the existing road network and must comply with the criteria laid down within the guidelines. The road layout should allow, where possible, 2 ways to reach most points, but generally culs-de-sac can be served by a single route, subject to emergency access requirement (see Paragraph 5.1.3).

Where a residential development is proposed, the number and nature of the junctions will affect the traffic flow within the development as well as affecting the traffic flow on the Traffic Distributor Road surrounding the Development. Generated traffic is proportional to the number of dwellings within the development and for the purposes of the guidelines shall be considered to be one car per dwelling.

In addition to the requirements of Chapter 4, Road Hierarchy, it is essential that adequate and unhindered emergency access is provided to all points within the development and therefore, larger retail developments and residential developments should provide at least two access points, where possible. However, a maximum of 300 dwellings can be served from the existing road network by a single junction. However a wider side road and strengthened footways will be required in order to accommodate emergency access as detailed in Tables 5.1, 5.2 and Figure 5.1.

5.1

5.7.7 Access to Developments

5.1.2 Residential Development

5.1.3 Emergency Access

Number of Dwellings	Minimum Number of access Points Required
200 or less	1
201 - 300	1 (with widened approach - see Figure 5.1) or; 1 + an emergency access or; More than 1 access
301 or more	More than 1 access

Table 5.1 Emergency Access from Existing Roads into the Development

Number of Dwellings	Minimum Number of Access Points Required
50 or less	1
51-100	1 (with widened approach – see Figure 5.1) or; 1 + an emergency access or; More than 1 access
101 or more	More than 1 access

Table 5.2 Emergency Access from Proposed Roads within the Development

5. Road Design Standard

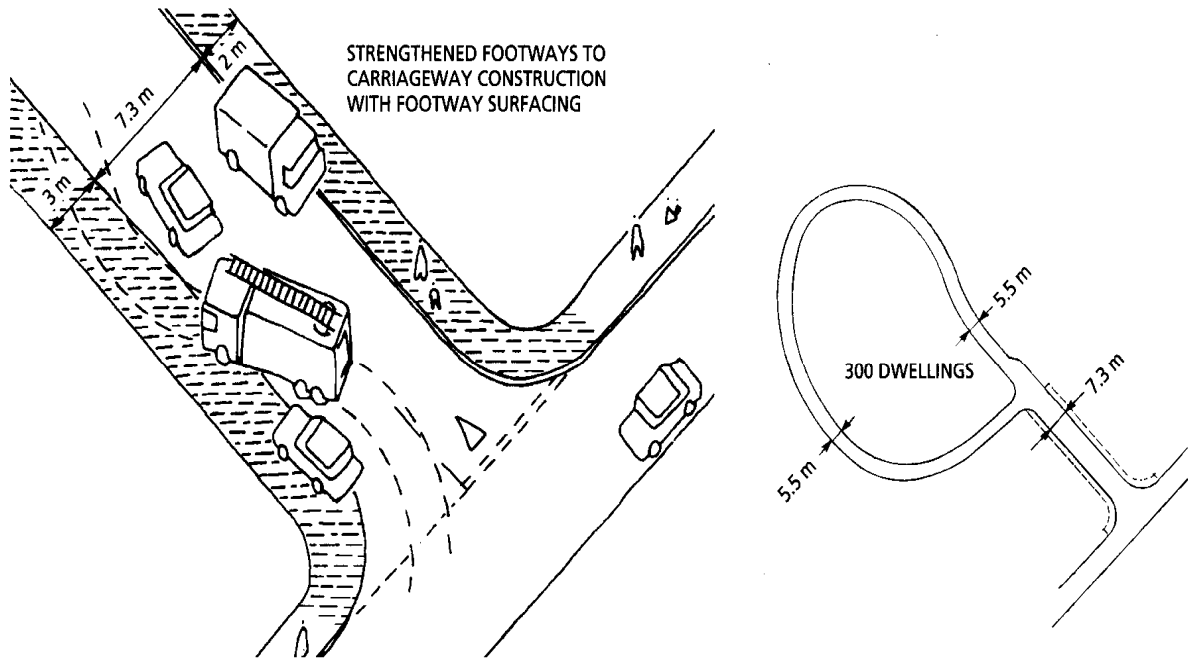


Figure 5.1 Strengthened Footways

5.7.4 Junction Spacing

Road junctions should be designed to meet the criteria listed in Table 5.3.

Major Road Type	Junction Spacing (m)
District Distributor Road	210
Traffic Distributor Road	100
Residential Road (Residential Core Road, Housing Road)	25
Industrial Road	25

Table 5.3 Junction Spacing for Major Road Types

5.1.5 Local Conditions

Development access should, as far as possible, meet the criteria for the spacing of junctions. However, a relaxation may be permitted, at the discretion of the Head of Roads and Transportation, depending upon local conditions.

5.1.6 Effect of Spacing

Junction spacing is related to the likely volumes and speed of traffic and to the distance required by moving vehicles to take up position between junctions for particular turning movements. The need to maintain road safety and minimise the likelihood of congestion will dictate the spacing and location of major access points.

5.1.7 Location of Access Points

Development access location is crucial as this will define how the area will interact with the existing and future traffic (i.e. if the flow from the development is strongly tidal then the access points will require to be located to ensure that one access point is not more attractive than another as this could lead to excessive traffic using the more attractive access). See also worked example (Paragraph 5.3.18)

5. Road Design Standards

Where any new development gains access to the existing road network, the form of the junction will depend on various factors including number of approaches, volume and type of traffic, the manoeuvres made by these vehicles, the potential delays and queues, provision for vulnerable road users etc. The simplest form of junction is where 2 roads intersect at a right angled T junction where the major road typically carries the greater volume of traffic through the junction.

5.1.8
*Form of
Junctions*

Where two minor roads approach a major road from opposite sides, a staggered junction comprising two T's should be used. Alternative layouts may be considered, at the discretion of the Head of Roads and Transportation. Right/ left staggers (where minor road crossing the major road first turns right out of the minor road, proceeds along the major road and then turns left) are preferred to left/ right staggers.

5.1.9
*Staggered
Junctions*



In general the geometric layout should clearly establish the priority of the major road to approaching drivers. Measures which identify the core road from side roads are illustrated in Figure 6.3. The Head of Roads and Transportation may additionally require that road signs and/or road markings be provided to emphasise this priority or alternatively the developer may be required to provide a form of controlled junction if a TIA indicates this to be necessary.

5.1.10
Priority

It is preferable to site junctions on level ground or in sags rather than at, or near, the crests of hills. Where possible, T-junctions on curves should be sited so that the minor road is on the outside of the curve. Junctions on the inside of sharp curves are most undesirable.

5.1.11
Location

Where a traffic calmed area is proposed a "gateway" must be provided at the transition between the adjacent road types. This "gateway" is a traffic calming measure with some associated vertical measures, such as signs, posts or trees, which will indicate to the driver that an altered style of driving is required.

5.1.12
Gateways

Further details are contained in Chapter 6.

It should be noted that at junctions on roads narrower than 5.5 metres the carriageway must be locally widened to 5.5 metres to minimise the risk of congestion and allow for larger vehicles negotiating the junctions. The form of such widening should ensure that traffic proceeding into the narrower road encounters an offset to the right in the nearside kerb alignment.

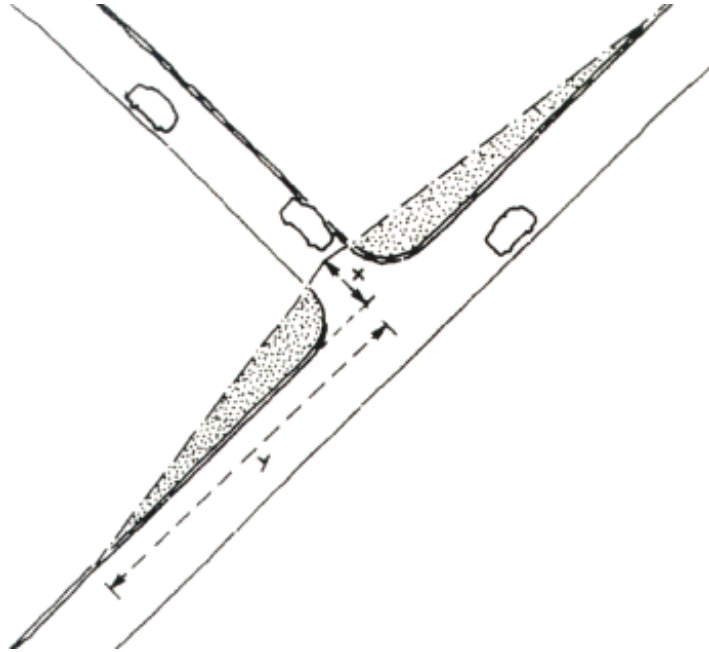
5.1.13
*Widening at
Junctions*

5. Road Design Standards

5.7.74

Visibility Splay Area

At priority junctions there should be full visibility to the left and to the right between points 1.05 metres above carriageway level over the visibility splay area defined in Figure 5.2. The Y distance is determined solely by the major road type while the X distance is dependent upon the traffic volume on the minor road. This basis will be applied to junctions comprising combinations of road types not specifically listed in the Table 5.4.



5.1.15

Visibility Splay at Bend

Figure 5.2 Visibility Splay Area

Where the side road joins the road at a bend the Y distance should be measured on the kerb line along the bend but the visibility splay will be determined in a straight line (see Figure 5.3).

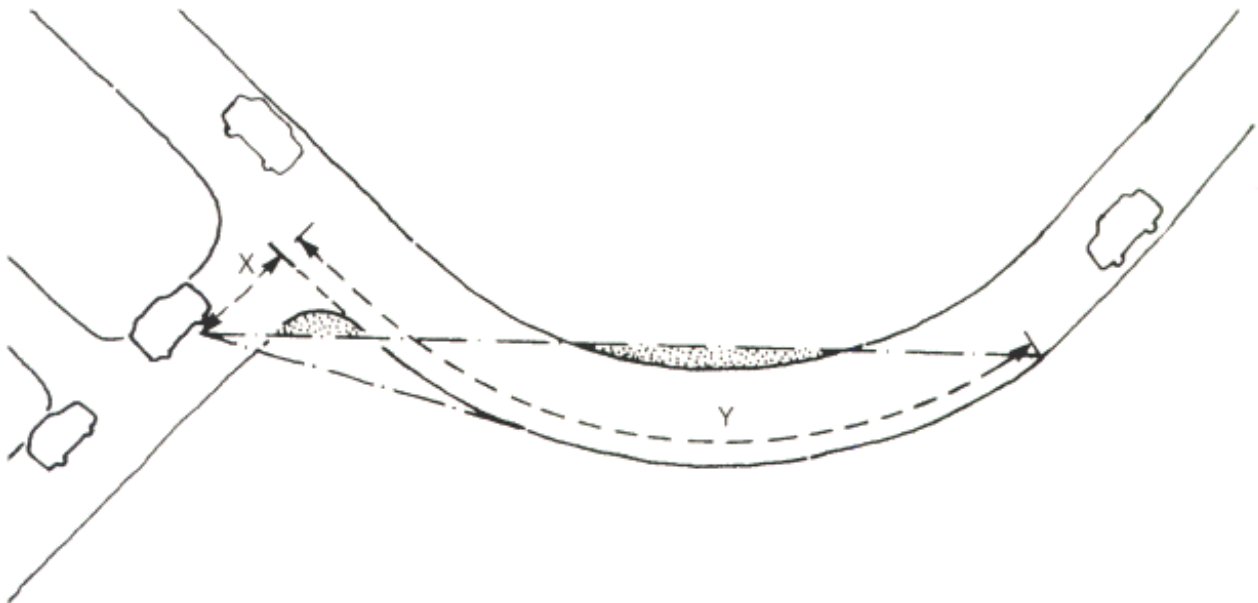


Figure 5.3 Visibility Splay on Bends

5. Road Design Standards

When a minor road forms an uphill approach to the major road care should be taken to ensure that objects within the visibility triangle although less than 1.05 metres above carriageway level do not interfere with visibility.

5.1.16
Effects of Gradients on Visibility

On no occasion will parking be allowed to be located within the visibility splays at junctions or within the forward visibility splay.

5.1.17
Frontage Access And Parking at Visibility Splays

The dimensions given in Table 5.4 apply only where there is a 40mph speed limit or less. Where speeds are higher, and particularly in rural areas, further advice is given in Section 5.7.

5.1.18
Speed Limits/ Visibility parameters

Major Road Type	Minor Road Type	Visibility Splay	
		X (metres)	Y (metres)
District Distributor Road	Traffic Distributor Road	9	20
Traffic Distributor Road	Traffic Distributor Road	9	90 or 120
Traffic Distributor Road	Industrial Road	9	90 or 120
Traffic Distributor Road	Residential Core Road	9	90 or 120
Industrial Road	Industrial Road	4.5	60
Residential Core Road	Residential Core Road	4.5	35
Residential Core Road	Housing Road or Shared Surface	2.5	35
Housing Road	Housing Road or Shared Surface	2.5	35

See
Note 1
below

Table 5.4 *Visibility splays for Major Road Types*

Note 1 : Y distance of 90 metres are appropriate on a road with a 30 mph speed limit and 120 metres on a road with a 40 mph speed limit.

Note 2 : In certain circumstances, where the Y distance cannot be achieved, consideration may be given, at the discretion of the Head of Roads and Transportation, to the introduction of traffic calming on the major road consequently reducing the traffic speed and thus reducing the Y value required, (see Chapter 6).

Note 3: Relaxation of the X distance will be permissible in appropriate cases subject to the following minimum values:

- a) 2.5 metres for minor road vehicle flows up to 40 v.p.h.
- b) 4.5 metres for minor road vehicle flows up to 300 v.p.h.
- c) 9.0 metres for minor road vehicle flows in excess of 300 v.p.h.

Note 4 : Notwithstanding the provisions of Note 3 above, where the major road is a District Distributor or Traffic Distributor Road an X distance of 9.0 metres will normally be required, subject to the provisions of TD 42/95 paragraph 7.8.

5. Road Design Standards

5.1.19 Corner Radii

The minimum radii for corners (Table 5.5) are determined by the need for vehicles using the junction to manoeuvre safely. Most vehicles using the junction should be able to turn without obstructing oncoming traffic although some larger vehicles may need to use the full width of road.

Major Road Type	Minor Road Type	Minimum Corner Radii (metres)
District Distributor Road	Traffic Distributor Road	10.5
Traffic Distributor Road	Traffic Distributor Road	10.5
Traffic Distributor Road	Industrial Road	10.5
Traffic Distributor Road	Residential Core Road	7.5
Industrial Road	Industrial Road	9.0
Residential Core Road	Residential Core Road	6.0
Residential Core Road	Housing Road or Shared Surface Cul-de-Sac	4.5
Housing Road	Housing Road or Shared Surface Cul-de-Sac	4.5

Table 5.5 Corner Radii for Major/Minor Road Types

Junctions with a 10.5 metre radius will allow almost all goods vehicles to turn without interfering with the traffic on the major road. Junctions with a 6 metre radius will allow goods vehicles such as refuse vehicles, to turn in and out of the side road with only some larger vehicles requiring to use both sides of the road.

5.1.20 Traffic Calming

Within residential areas where the traffic speed has already been reduced by the introduction of traffic calming measures, low radii corners can be incorporated which will also assist speed reduction.

5.1.21 Nearside Taper: Long Vehicles

At junctions where it is anticipated that long vehicles will emerge from the minor road such as where an Industrial Road joins a Traffic Distributor Road then the nearside kerb should incorporate a taper as detailed in Figure 5.4.

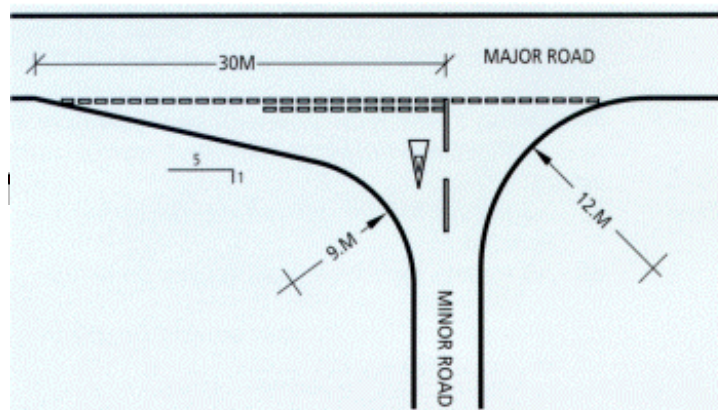


Figure 5.4 Junction layout for long vehicles

5. Road Design Standards



Private Commercial Access



Private Residential Driveway

Private Access

5.2

Private vehicular access to developments will require to accommodate the numbers and types of vehicles using the access in a safe manner, with minimum delay to both road traffic and to traffic within the development. The form of access may also require to be enhanced in order to accommodate pedestrians and cyclists.

5.2.7

Access Criteria

In the case of commercial developments, vulnerable users should be provided with a separate pedestrian access and it will be essential to achieve segregation of service and customer vehicles. A traffic generation limit of up to 1000 vehicles per hour can be served by a single access. However, additional emergency access should be provided.

5.2.2

Segregation at Commercial Accesses

5.2.3

Location and Spacing

Within Residential Areas where all the roads are traffic calmed then it will be permissible to construct accesses directly onto a junction. Private access should be no closer than 25 metres from the channel of a Traffic Distributor Road or Industrial Road and access spacing along an Industrial Road should also be 25metres. Access onto other road types for major developments may be permitted at the discretion of the Head of Roads and Transportation and be located in a similar manner to road junctions.

5.2.4

Individual Dwellings

Access to individual dwellings should be by means of a dropped kerb footway crossing as shown in Figure 5.5. Visibility at driveways should be 2 x 20metres for vehicular traffic. The Y distance is dependent on the speed of traffic on the road.

5.2.5

Layout/Vehicles Visibility

Layouts of other types of access are shown in figure 5.6 - 5.8 appropriate visibility should be determined by choosing an X distance relative to the number of vehicles using the access as per note 3 of table 5.4, with a Y distance appropriate to the speed of traffic on the road.

5.2.6

Corner Radii

Corner radii should be suitable for the type and numbers of vehicles using the access, as described in Paragraph 5.1.19.

5. Road Design Standards

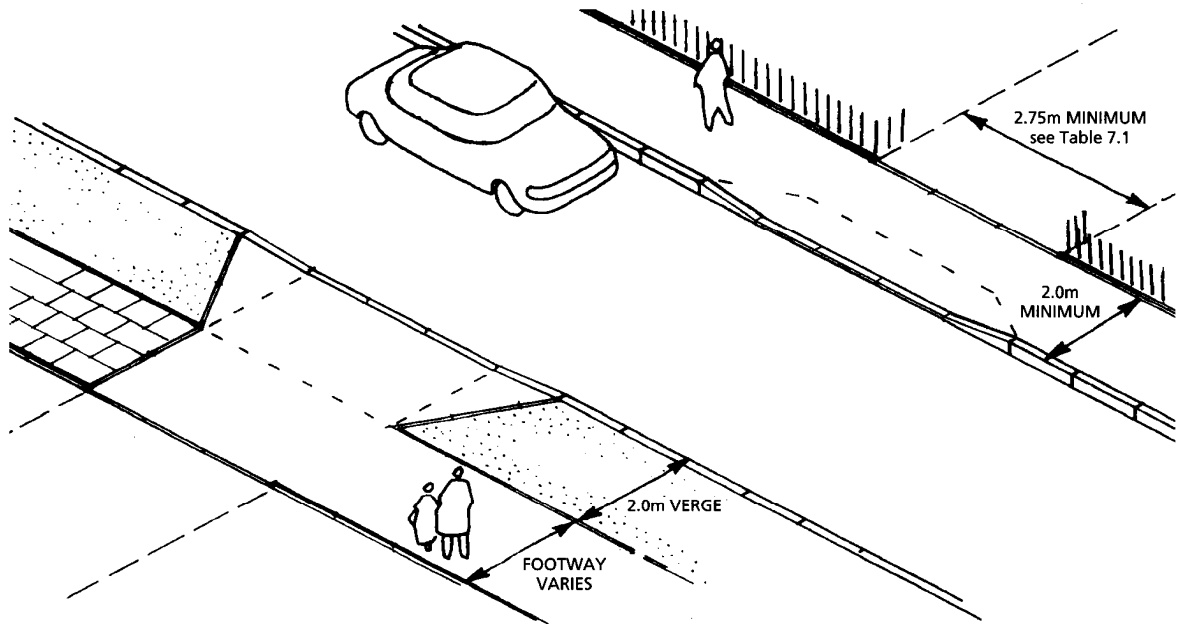


Figure 5.5 Driveway Access

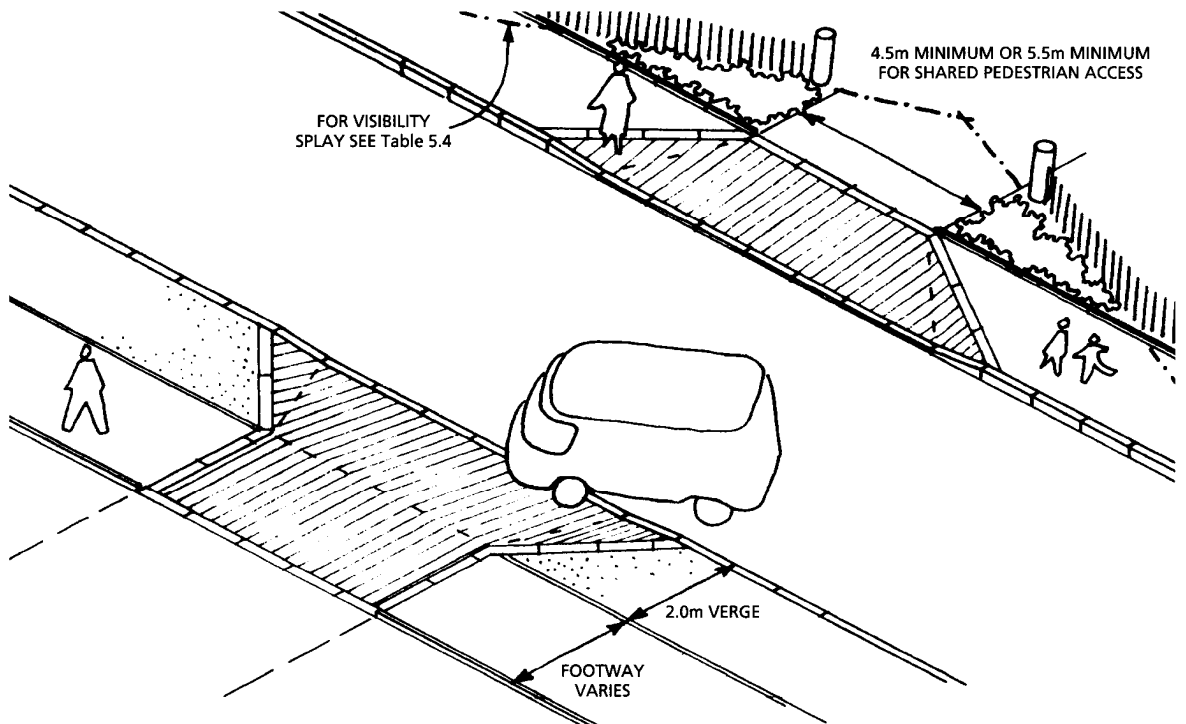


Figure 5.6 Single Minor Commercial Access, Housing Court or Car Park up to 50 spaces

5. Road Design Standards

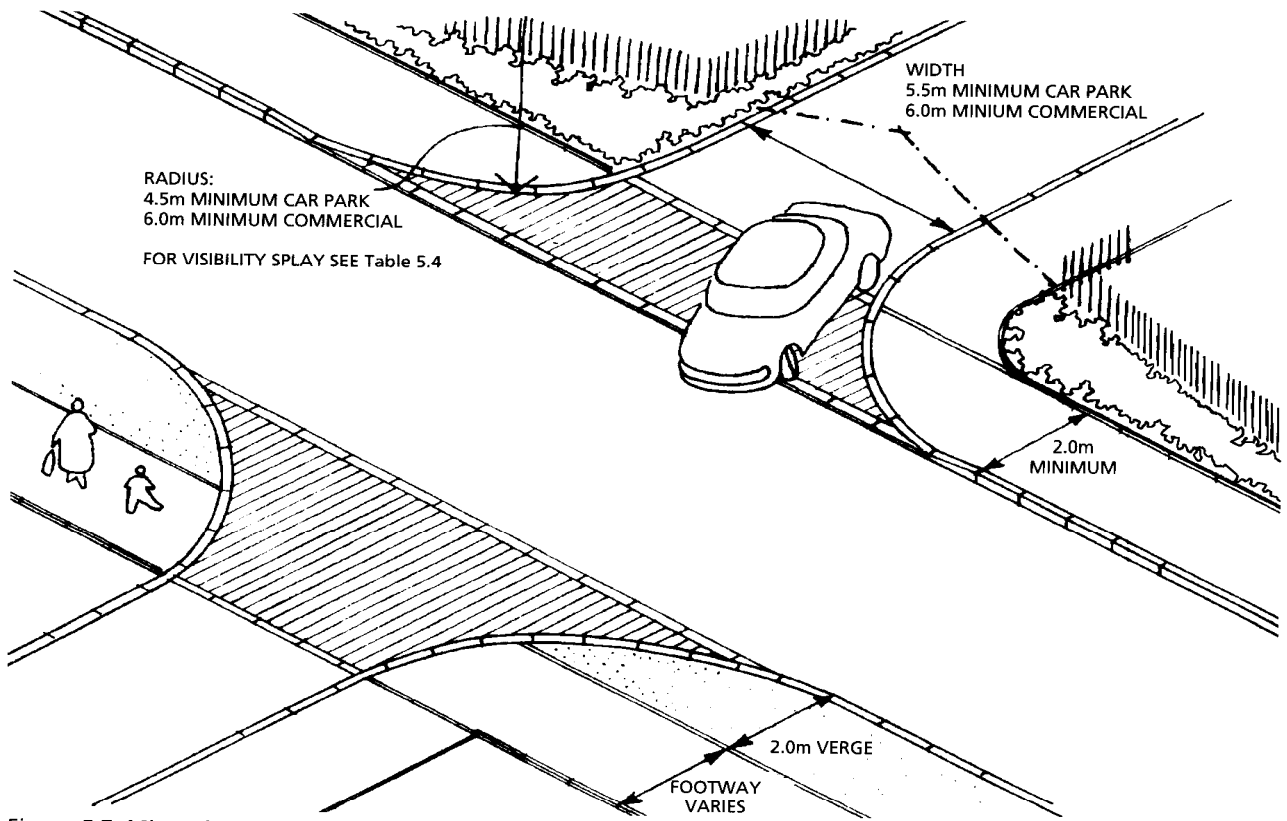


Figure 5.7 Minor Commercial Access or Car Park with more than 50 spaces

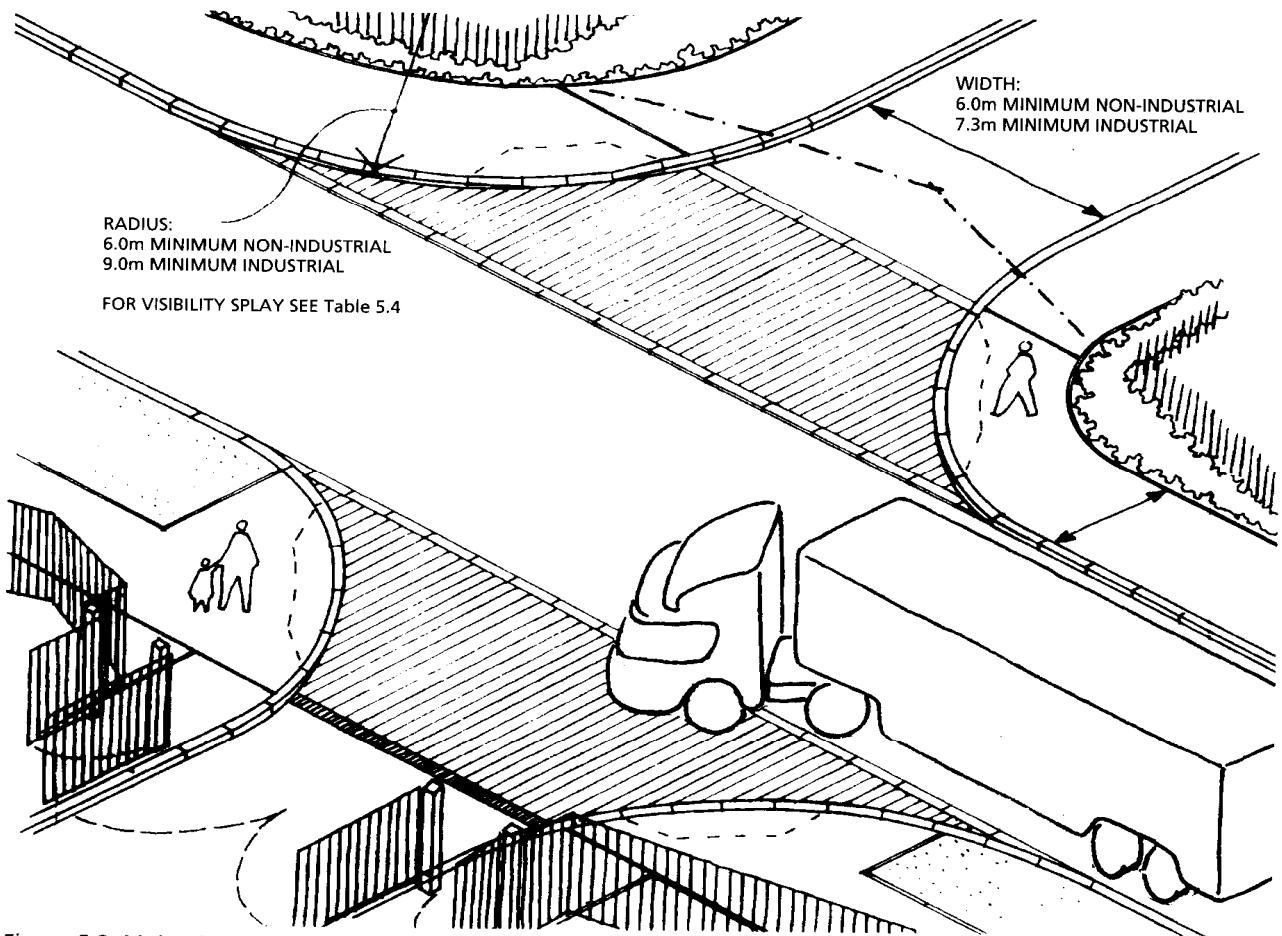


Figure 5.8 Major Commercial or Industrial Access

5. Road Design Standards

Link Design Details

5.3

"Link design" refers to the requirements for the geometry and alignment of roads which form links between junctions.

5.3.1
Definition

Link Design Parameters

The link design parameters to be utilised for each type of road within the road hierarchy are given in Tables 5.6 to 5.10 inclusive. In Table 5.6a for Traffic Distributor Roads, relaxations to design parameters as a result of traffic calming are shown in **bold**

5.3.2
Design
Parameters

Feature	Standard	Comment
Speed Limit	30 mph (48 kph)	No frontage Access
Design Speed	38 mph (60 kph) 31 mph (50 kph)	
Carriageway Width	7.3m 6.0m	Bus routes, commercial or industrial development Residential, Office or Class 4
Maximum Gradient	6%	May be increased in hilly terrains at the discretion of the Head of Roads and Transportation
Minimum Gradient	0.8% 0.5%	Desirable Absolute minimum, with special drainage provision
Minimum Vertical Curve Length	K x algebraic difference in percentage gradient	K= 17 (crests) K=10 (crests) K= 13 (sags) K= 9 (sags)
Minimum Horizontal Curve Radius	180m 90m	
TransitionLength(m)	$\frac{[\text{DesignSpeed (kph)}]}{[46.7 \times \text{Radius (m)} \times q]}$ Limited to $\sqrt{(24 \times \text{Radius})}$ on bends	q=0.45 m/sec ³ Desirable q=0.6 m/sec ³ Maximum
Minimum Forward Sight Distance	90m 70 m 70m 50m	Desirable Absolute minimum (K=10 permitted) (K=6.5 permitted) Minimum forward sight distance is not permitted within 135m (105m) of a junction.
Verges	2m	Grass or deterrent paving
Footways	2m	If provided, should be separated by 2 m verge

Table 5.6a Traffic Distributor Road Geometry

5. Road Design Standards

Radius (m)	720	510	360	255 or less
Superelevation (%)	no elimination of adverse crossfall required	2.5	3.5	5

TABLE 5.6b *Traffic Distributor Road Superelevation*

Table 5.6 Notes:

Note 1 : Transitions may only be omitted on traffic calmed Traffic Distributor Roads. Superelevation should be introduced gradually over the transition length or, where there is no transition, over a length equal to the transition length. Where necessary, the transition length should be increased in order to ensure that the channel does not vary in grade by more than 1% from the line about which the carriageway is pivoted.

Note 2 : Where transitions are omitted, between 1/2 and 2/3 of the superelevation should be introduced on the approach straight or on a curve of radius greater than or equal to 720 metres and for back to back curves on the curve itself.

Note 3 : TD 9/93 should be referred to for the design of all roads. Relaxation of the above parameters, in accordance with TD 9/93, will only be permitted for roads without traffic calming.

5. Road Design Standards

Feature	Standard	Comment
Design Speed	20 mph (32 kph)	
Carriageway Width	7.3m	6 m for small units or one-way working
Maximum Gradient	5%	
	0.8%	May be increased at the discretion of Head of Roads and Transportation
Minimum Gradient	K x algebraic difference in %age gradient	K = 6; absolute minimum length = 20m
Minimum Vertical Curve Length	25 m	
Minimum Horizontal Curve	60 m (40m)	2.5 % Superelevation (Above 90 m Radius no superelevation required)
Minimum Forward Sight Distance Radius	2m 0.6m	Desirable minimum (Absolute minimum)
Verges	2m	
Footways	2m	Grass or; Hard landscaping at vertical faces where there are no footways

Table 5.7 Industrial Road

Feature	Standard	Comment
Design Speed	20 mph (32 kph)	
Carriageway Width	5.5m	Min 6m on Bus route or with no additional driveway manoeuvrability requirements (Section 7.4.7)
Maximum Gradient	8%	Max 6.7 % on Bus route
Minimum Gradient	0.8%	
Minimum Vertical Curve Length	K x algebraic difference in %age gradient	K=6 Absolute minimum length = 20 m
Minimum Horizontal Curve Radius	25 m	Except speed control bends Superelevation not essential
Minimum Forward Sight Distance	35 m	Except at traffic calming where reduced speed will permit reduced forward visibility
Verges	2m	Grass or deterrent paving
Footways	2m	Desirable on both sides. Essential on at least one side of the road

Table 5.8 Residential Core Road

5. Road Design Standards

Housing Road Width Reduction

Where the carriageway can be expected to be free of obstructive parking and where low volumes of traffic are expected to use Housing Roads the carriageway width should generally be reduced in relation to the number of dwellings being served by the road. For the purposes of these Guidelines the flow used to assess road widths is based on a figure of 1 car per dwelling.

5.3.3 Introduction

Where less than 100 dwellings are being served and desirable driveway manoeuvrability is provided as described in Paragraph 7.4.7, then the Housing Road width can be reduced to 4.8 metres which is sufficient to allow a car and HGV to pass each other. There is no restriction on the length of road over which this width restriction can be applied, however, in order to permit servicing type vehicles to pass, 5.5 metre wide intervisible passing places should be provided at not more than 60 metres intervals.

5.3.4 Application of 4.8m Width

A road width of 4.1 metres with intervisible passing places will be permitted on a Housing Road serving less than 100 dwellings where there is no frontage development. Where the number of dwellings on a Housing Road is in excess of 100 the road should have a width of 5.5 metres.

5.3.5 Application of 4.1m Width

To derive the estimated traffic, the number of dwellings on each length of road should be totalled progressively from the ends of culs-de-sac towards the junctions of the development. The points at which the values detailed above and therefore the widths change can be identified. The necessary alterations to the road width will have to be applied in a suitable manner. This reduction in carriageway width can also be seen as a method of reducing speeds but not on its own, only as a reinforcing measure of other traffic calming methods. Changes to the carriageway width should take place at junctions or at traffic calming measures with the additional width being added on the nearside as drivers are making their way towards the exit of the development as detailed in Figure 5.9.

5.3.6 Location and treatment of change in width

In order to prevent obstructive parking in passing places they require to be located within the development at points where drivers will feel uncomfortable parking. Normally they will be located at driveways, junctions and at right angled parking bays

5.3.7 Location of Passing Places

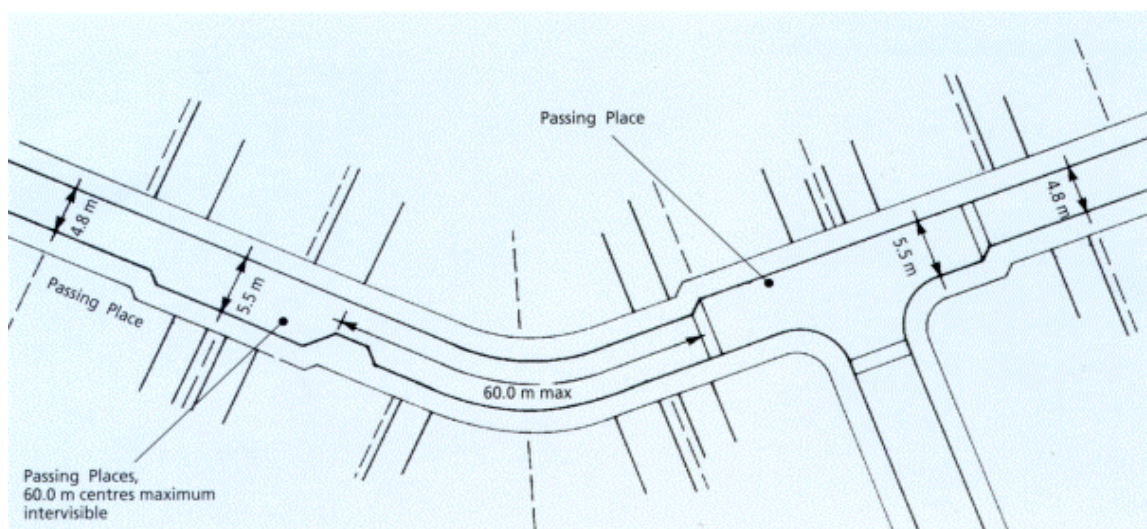


Figure 5.9 Passing Places and Carriageway widening

5. Road Design Standards

5.3.8 Passing Place Configuration

The configuration of passing places is indicated in Figure 5.10. Where driveways are more than 60 metres apart intermediate passing places should be provided.

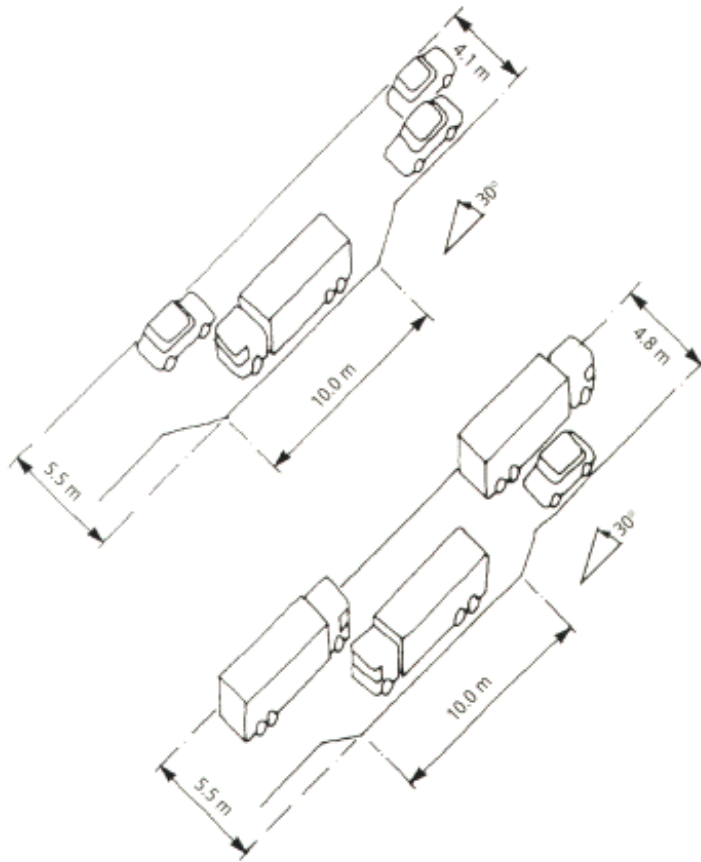


Figure 5.10 Car and HGV Passing Places

5.3.9 Example of Hierarchy and Road Width

Figure 5.11 shows a possible layout with the cumulative traffic, based on the number of dwellings, shown along with the consequent road widths. Housing Courts and car parks, are treated similarly, with the number of dwellings they serve being assessed and this figure being added to the cumulative flow at the junction. To this is added more detail with all the road types and widths being shown. It should be noted that the layouts for the Core Road, Shared Surface Roads and Housing Courts are all specified and are not subject to altered widths.

5. Road Design Standards

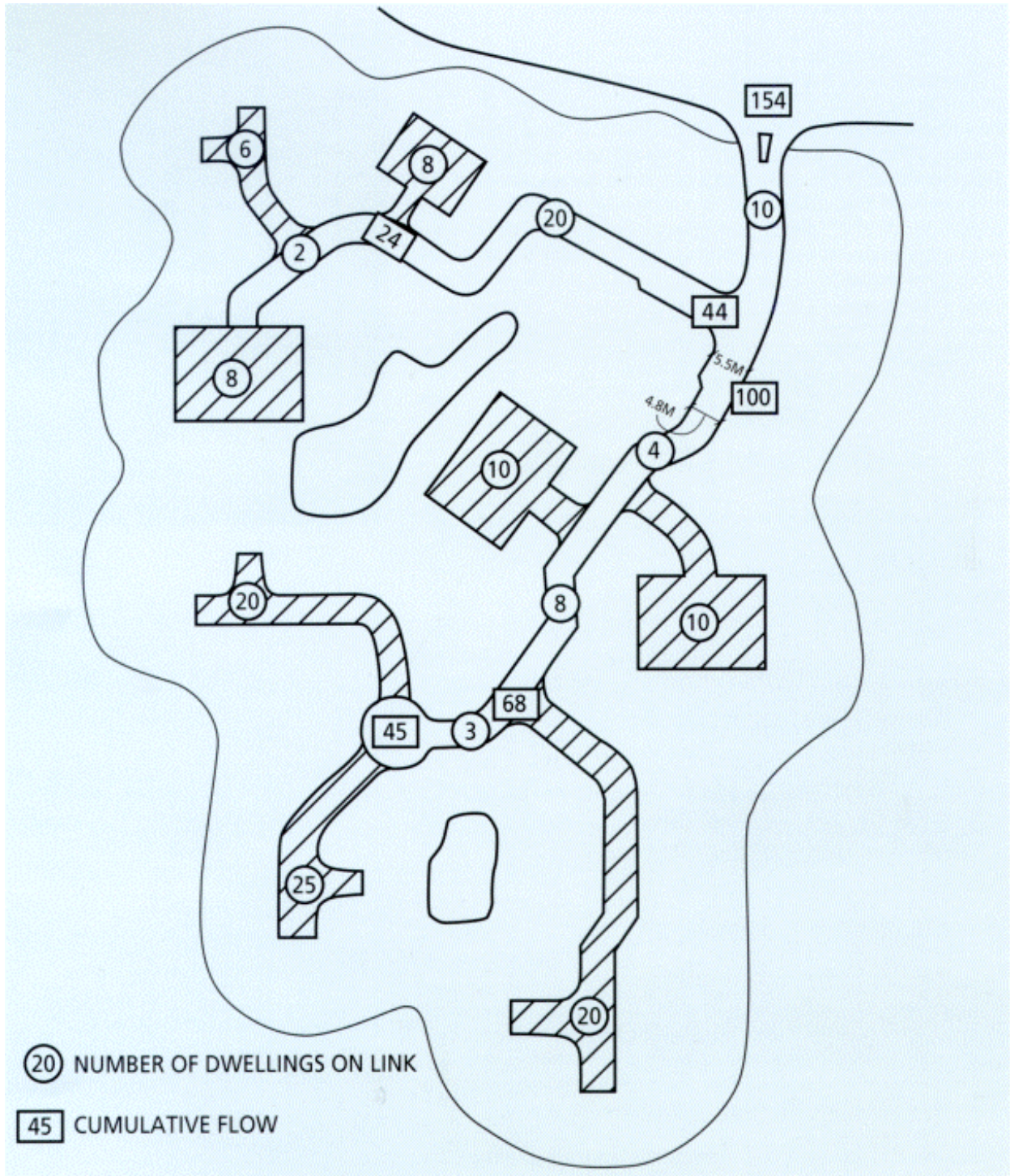


Figure 5.11 Development of Residential Road Design

5. Road Design Standards

Core Road Watershed and Calming

5.3.10 Application

Larger developments will require the creation of a Core Road and possibly more than one access depending upon the number of dwellings within it. Where more complex layouts are used with the inclusion of a looped Residential Core Road the position where the lowest traffic flows are anticipated must be determined and the loop road can then be assumed to be equivalent of two culs-de-sac which meet at this point. This is designated as the "watershed" point, which is the point on a loop road where it can be anticipated that traffic can go in either direction and exit the development in the same journey time.

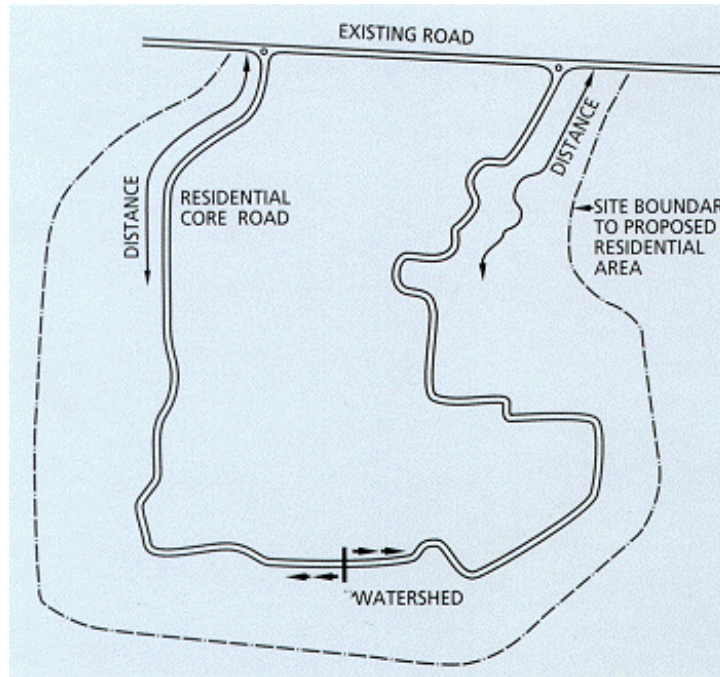


Figure 5.12 Watershed on Residential Core Road

5.3.11 Example

Figure 5.12 shows a Residential Core Road within a site boundary being developed as a residential area. It should be noted that the geometric layout of the Core Road has been used to control traffic speeds to an appropriate level rather than creating a conventional layout and adding the traffic calming measures after. No alterations are made to the Core Road width.

5.3.12 Calculation of Watershed Point

The method of calculating a "watershed" point is based on the assumption that traffic will be restricted to the same average speed of 20mph, by the appropriate use of traffic calming, such that the distance travelled by a driver is directly proportional to the journey time. The principle of establishing a "watershed" point is based on an approximation and consequently the position can only be an estimate.

5.3.13 Watershed Gateway Design

"Watershed" points, being points of potential zero flow, should also be reinforced to ensure that drivers can identify them and to ensure that the expected flow patterns are realised. This should be achieved by the introduction of a Gateway feature which should not unduly restrict the flow of traffic. An example of such a Watershed Gateway is shown in Figure 5.13, which comprises a mix of three Type A or B traffic calming measures at 20 metres spacing.

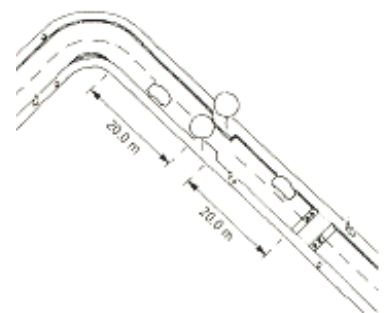
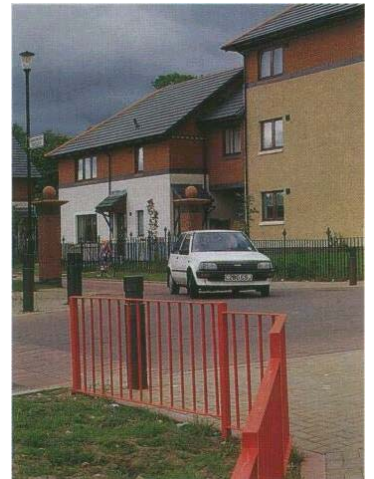


Figure 5.13 Watershed Gateway

5. Road Design Standards



Watershed Gateway with vertical features and change in surface



Normally, it can be assumed that traffic will leave a development in equal proportions by the different exits. However, in certain circumstances, where one, or more, factors affect only one of these junctions such that the majority of traffic leaving the Development will use another junction, assumptions will require to be made about how this will affect the location of the "watershed" point.

*5.3.14
Factors
Affecting
Watershed
Provision*

This unbalanced flow can be caused when a major attractor is located in such a way as to attract drivers to one particular junction within a development. Figure 5.14 shows a development with the same layout and access points with the "watershed" point being shown in different locations due to the presence in one example of an attractor drawing traffic in one direction. The point is selected in a similar manner but instead of the measurement being taken from different access points to the development, the nearest junction to the attractor is chosen and the distance is measured from that point.

*5.3.15
Effect of
Major
Attractor*

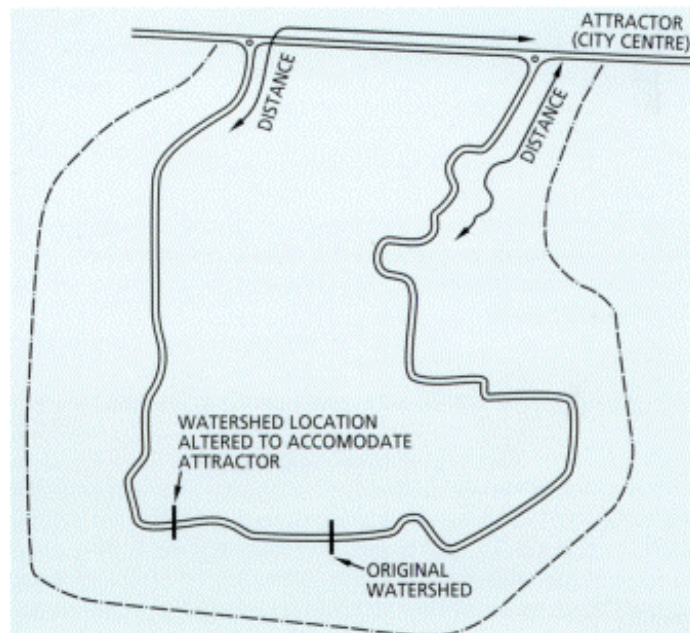


Figure 5.14 Watershed with attractor

Figure 5.15 shows the situation where an intervening junction is located on this measured distance on the road outwith the development in which circumstances an appropriate adjustment should be made to compensate for the anticipated delay at the junction.

*5.3.16
Effect of
Traffic Delay*

5. Road Design Standards

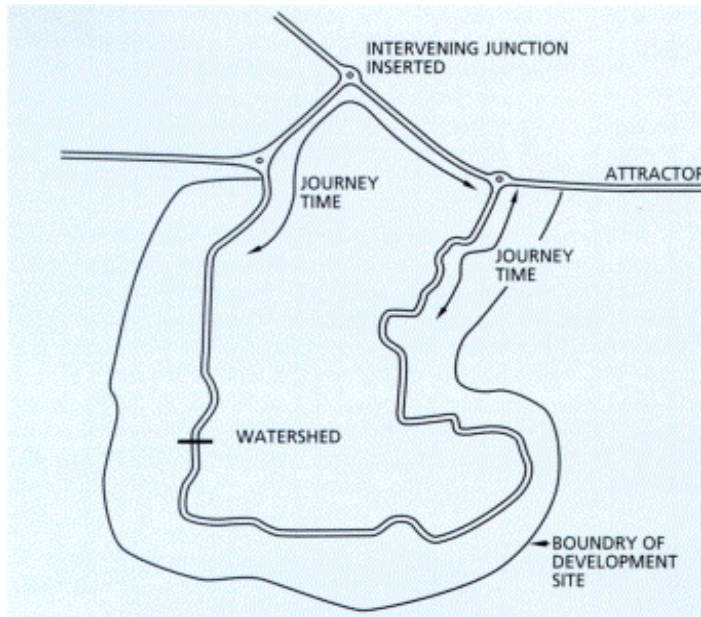


Figure 5.15 Intervening junction inserted

5.5.77

Further Advice

In situations where such factors affect the development the Head of Roads and Transportation will inform the developer and advise what alterations are necessary to adjust the location of the "watershed" point.

Integration of Core Roads and Housing Roads

5.3.18

Example

After locating the "watershed" point on the Core Road the Housing Roads can be added to the layout. It is essential that the selection of these routes ensures that a shorter alternative route to the Core Road is not created. Figure 5.16 shows a development layout with some examples of Housing Roads added. These examples are annotated to highlight the relevant points.

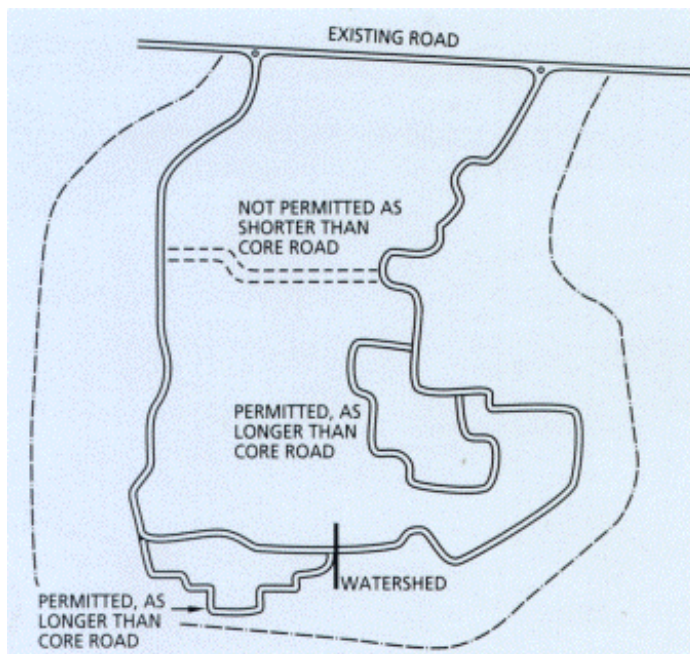


Figure 5.16 Residential Core road with Housing Roads inserted

5. Road Design Standards

Figure 5.17 details the complete layout with the dwellings added on each stretch of road within the layout and with the "watershed" point on the Core Road also shown. It should be noted that while a "watershed" point exists on Housing Roads there is no need to introduce a Watershed Gateway to affect driver behaviour as the level of traffic flow that will be affected is low.

5.3.19
Completed
Layout

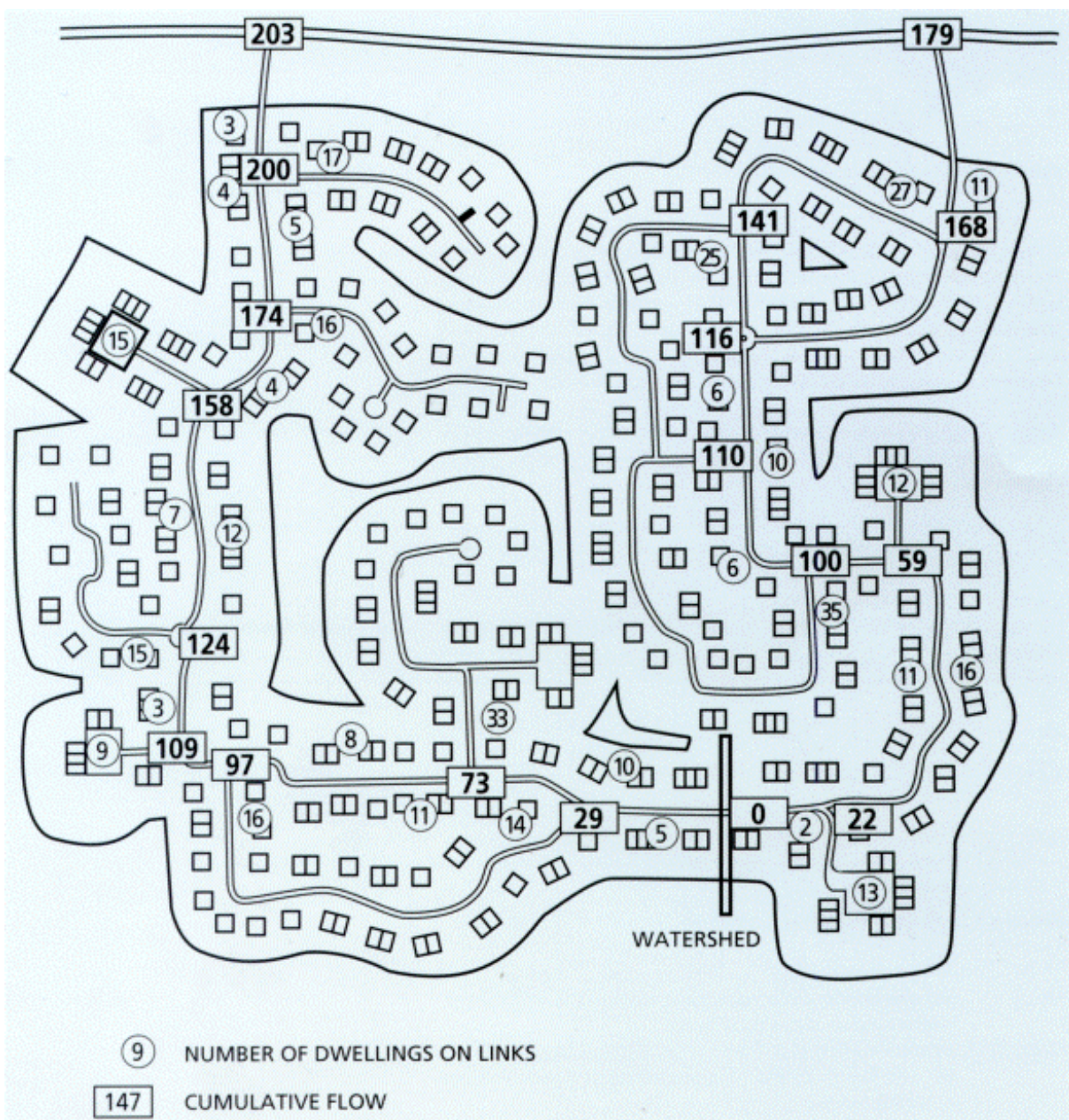


Figure 5.17 Development layout with watershed

5. Road Design Standards

Carriageway Widening on Curves

5.3.20 Introduction

The need for widening on curves depends on the radius and length of the curve and the types of vehicles using the road (Figure 5.18).

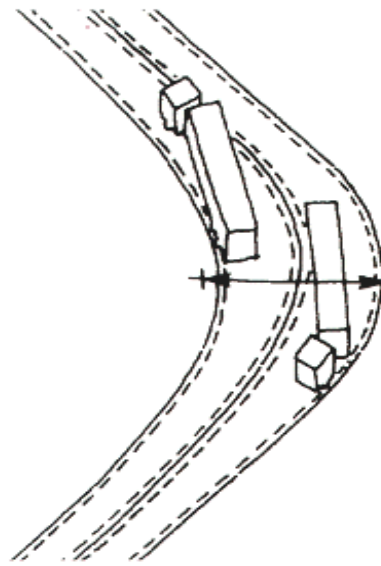


Figure 5.18 Carriageway widening diagram

5.3.21 Applications of Widening

Widening should be applied over the transition length. Where transitions are not provided, widening is most simply achieved by maintaining the outer kerb line as a circular arc and increasing the road width on the inside of the curve. Further details of inside kerblines for Industrial Roads are found in 'Designing for Deliveries' published by the Freight Transport Association.

5.3.22 Parameters

Table 5.11 shows the increased widths required on 90° bends to allow two vehicles to pass, while maintaining appropriate clearances.

Road Widening (metres)/lane required at apex of 90° bend			
Centreline Curve Radius (metres)	Widening/Lane Traffic Distributor Road	Industrial Access Roads	Residential Roads
10			1.1*
25		1.95	0.9
50		1.05	0.65
75	0.7	0.7	0.4
150	0.3	0.35	0.2
300	0.0	0.0	0.0

* Shared Surface vehicle path

Table 5.11 Road Widening on curves

Note 1 : Where an intermediate curve radius is specified the higher value should be used.

Note 2 : Widening not required on residential roads serving 50 dwellings or less except shared surfaces vehicle running track.

Note 3 : Widening at a 45° bend may be reduced at the discretion of the Head of Roads and Transportation.

5. Road Design Standards

Where HGVs share the road with other vehicles the increased width on a curve can allow other vehicles to drive at a higher speed. In this case the provision of an occasional strip (see Paragraph 6.6.4) either at the edge or the centre of the carriageway will prevent other vehicles driving at excessive speed while still allowing the HGV to safely negotiate the curve.

5.3.23
Occasional Strips

Curve widening on Housing Roads should be provided in the form of overrun areas. See Paragraph 10.5.12 for construction details.

5.3.24
Curve Widening: Housing Roads

Forward Visibility

Forward visibility for drivers depends on actual vehicle speeds and is essential for the road network to function safely and efficiently. On no account should a reduced level of visibility be used as a method of attempting to reduce vehicle speeds. However, if problems are experienced in achieving the correct forward visibility then it may be acceptable to introduce traffic calming, which will reduce speeds and thereby reduce the forward visibility requirement.

5.3.25
Application



To calculate forward visibility the driver eye height should be taken as 1.05 metres. On residential roads the object height should be taken as 0.6 metres, the average height of a small child, and on all other roads as 0.26 metres.

5.3.26
Height of Visibility Envelope

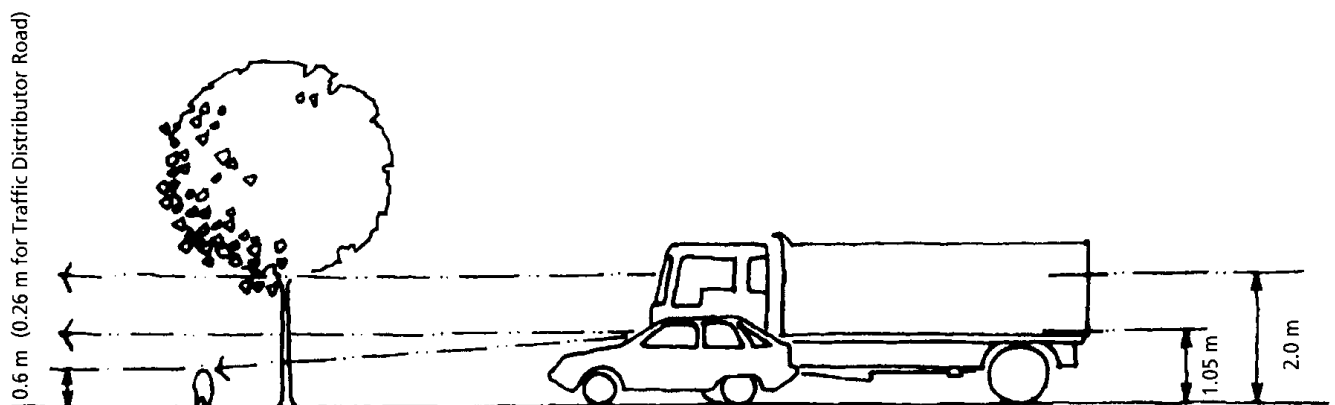


Figure 5.19 Forward Visibility - Driver Eye Height

5. Road Design Standards

5.3.27 Construction of Forward Visibility Splay

To ascertain whether the appropriate forward visibility will be achieved a line should be drawn along the vehicle path at a distance of 1.5 metres from the kerb to represent the driver's position (Figure 5.20).

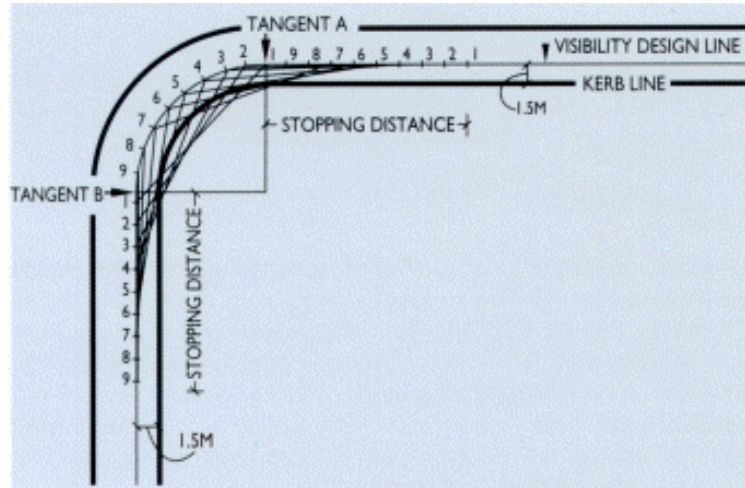


Figure 5.20 Construction of Forward Visibility Splay

5.3.28 Visibility at Curves

The appropriate forward visibility should be ascertained for the road (see Tables 5.6 - 5.10 and 6.2) and marked on the vehicle path every 10 metres round the curve with both ends connected to provide the visibility splay. This should be carried out from the straights on either side and the area created should be shaded to indicate the forward visibility splay.

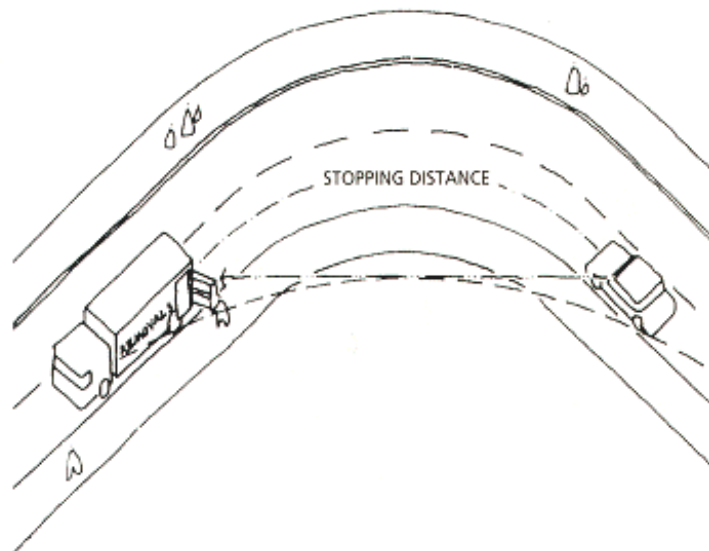


Figure 5.21 Forward Visibility at Bends

5. Road Design Standards



Steep gradients can cause mobility problems

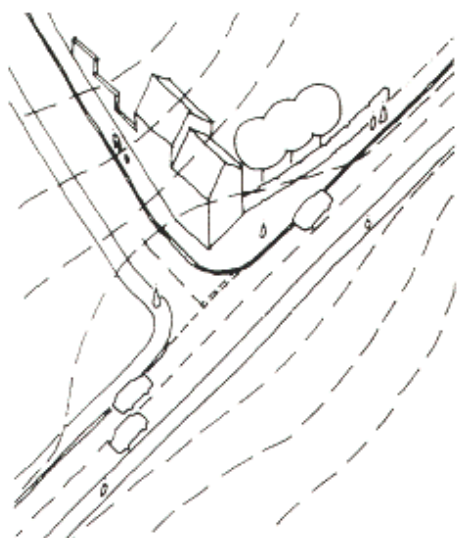


Figure 5.22 Improved Gradient at junctions

Gradients and Crossfalls

Channel gradients should not be flatter than 0.8% (1 in 125). A change from camber to crossfall should not coincide with a sag point in the longitudinal gradient or on a section of road where the gradient is less than 1 % (1 in 100).

Carriageways should be cambered with a fall of 2.5 per cent from the centreline to the channel except on curves where, to eliminate adverse camber, a crossfall between channels should be provided as per Tables 5.6 to 5.10.

Steep gradients should be avoided as the associated footways can cause problems for those with a mobility handicap. Gradients in excess of those shown in Tables 5.6 to 5.10 may be permitted in hilly terrain at the discretion of the Head of Roads and Transportation.

Lay-bys should be provided with a 2.5 per cent crossfall towards the road channel. Channel gradients should not be flatter than 0.8%(1 in 125).

For roads surfaced with block paving a 2.5 per cent crossfall should be provided throughout with a minimum longitudinal fall of 1.25% (1 in 80).

The maximum gradient, rising or falling, on the final approach of a minor road at a junction with a Traffic Distributor Road should be limited to 2 per cent for a minimum distance of at least 12 metres from the major road. At other locations the gradient of the minor road over the X distance at a junction should not exceed 5% when the road is rising towards the major road, and should not exceed 4% when falling towards the major road. At a junction, the carriageway of the minor road should be graded into the channel of the major road (Figure 5.22).

The lengths of gradients which are near to the maximum permitted gradient should be kept as short as possible and should not include any horizontal curves within them, except where the radius of the horizontal curve is very large.

The length of a vertical curve is based on the difference in gradient multiplied by the factor K, the appropriate values of which are given in Tables 5.6 to 5.10 subject to a minimum length which is also detailed in the tables.

5.3.29
*Minimum
Gradients*

5.3.30
Crossfalls

5.3.31
*Maximum
Gradients*

5.3.32
Laybys

5.3.33
*Shared
Surfaces*

5.3.34
Junctions

5.3.35
*Length of
Maximum
Gradient*

5.3.36
*Vertical Curve
Length*

5. Road Design Standards

Vehicle Clearance

5.3.37 Vehicle Dimensions

Apart from the 4.2 metres height restriction for 38 tonne lorries loaded in excess of 32.5 tonnes, there is no regulation governing maximum height but most vehicles are less than 4.5 metres high.

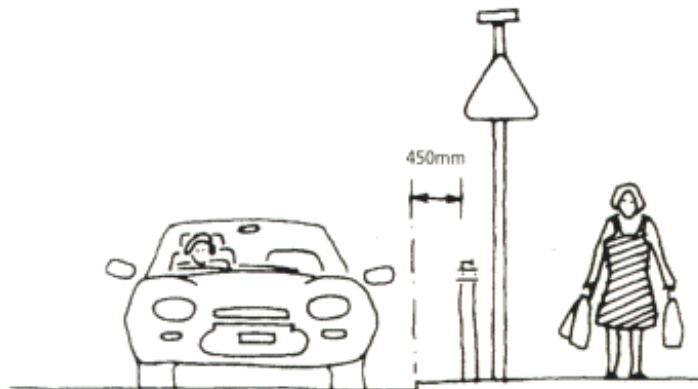
5.3.38 Vertical Clearance

The minimum headroom for any structure, other than a footbridge (which must be constructed with a 5.7 metres clearance), must be 5.3 metres when spanning a Strategic or Traffic Distributor Road and 5.1 metres for all other roads, including access through pends where servicing is required.

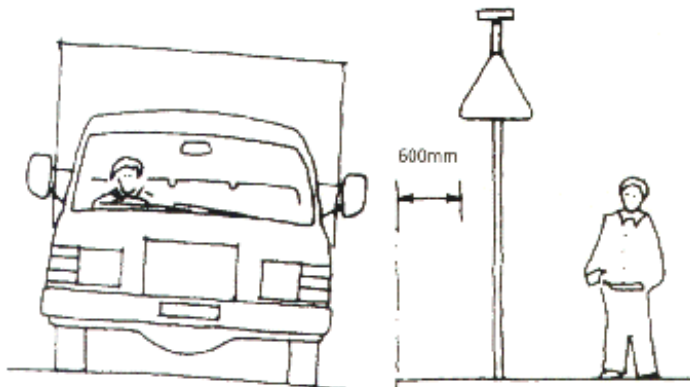
Generally, 2.1 metres clearance will be all that is required for an access, or covered parking area, which will only be used by private cars, but care should be taken to ensure that refuse vehicles can safely service the area without blocking the adjacent road.

5.3.39 Horizontal Clearance

A horizontal clearance of 0.45 metres should always be provided between the edge of the carriageway and any vertical objects such as signs. Where the crossfall on the carriageway exceeds 4% this clearance should be increased to 0.6 metres.

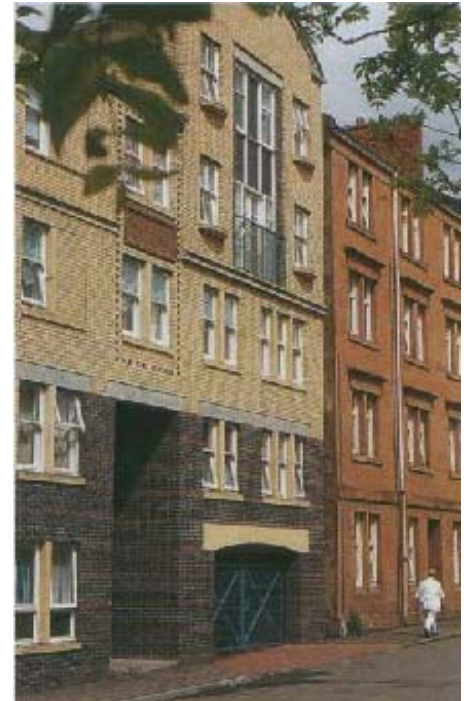


450mm CLEARANCE FOR CROSSFALL UP TO 4%



600mm CLEARANCE FOR CROSSFALL GREATER THAN 4%

Figure 5.23 Horizontal Clearance



Pend Access

5. Road Design Standards

Turning Areas

It is desirable for road layouts to be designed so that service vehicles do not need to reverse. Wherever possible this should be achieved by the provision of roads forming loops thus avoiding the need for turning areas and minimizing mileage for delivery and service vehicles.

5.3.40
Loop Road Preferences

In general where roads are not provided in a loop form and culs-de-sac are used in a layout, they should terminate in turning circles. Where lack of space precludes the creation of a turning circle, turning heads may be substituted.

5.3.41
Provision

The dimensions of turning areas should suit the characteristics of the largest vehicles to use the facility regularly. In residential roads these will normally be refuse collection vehicles, while in industrial/commercial development it may be necessary to cater for 15.5 metres long articulated vehicles or 18 metres long draw bar trailers. The turning areas detailed in Figure 5.24 are based on the turning circles of these vehicles between kerbs. The length of any hammerhead may be extended from the minimum values shown in Figure 5.24 at the discretion of the Head of Roads and Transportation.

5.3.42
Dimensions

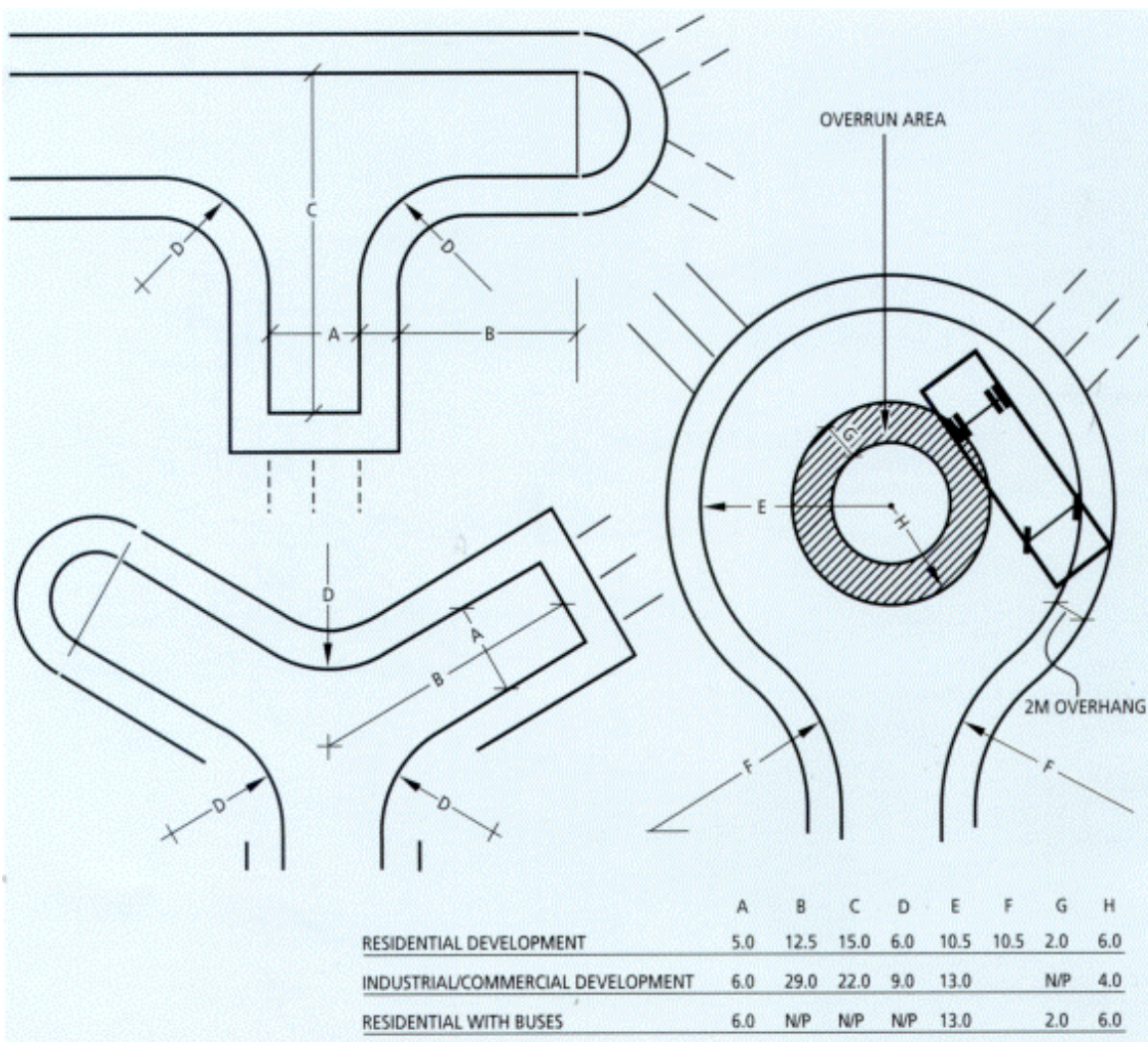


Figure 5.24 Turning Area (all dimensions in metres)

5. Road Design Standards

5.3.43
Overhang

Where there is no adjacent footway, turning areas should be provided with a 2 metres wide verge or margin to allow for any overhang of vehicle bodies when manoeuvring.

5.3.44
Self-policing

Casual parking in turning areas should be discouraged by locating turning circles well clear of frontage development, or by arranging for premises and designated parking bays to take access via the turning area.

5.3.45
Environmental Design

In residential areas the use of less formal shapes for turning heads in a cul-de-sac may be acceptable as illustrated in Figure 5.25 as long as the shape used still incorporates the basic turning head dimensions which must be detailed on drawings submitted for construction consent.

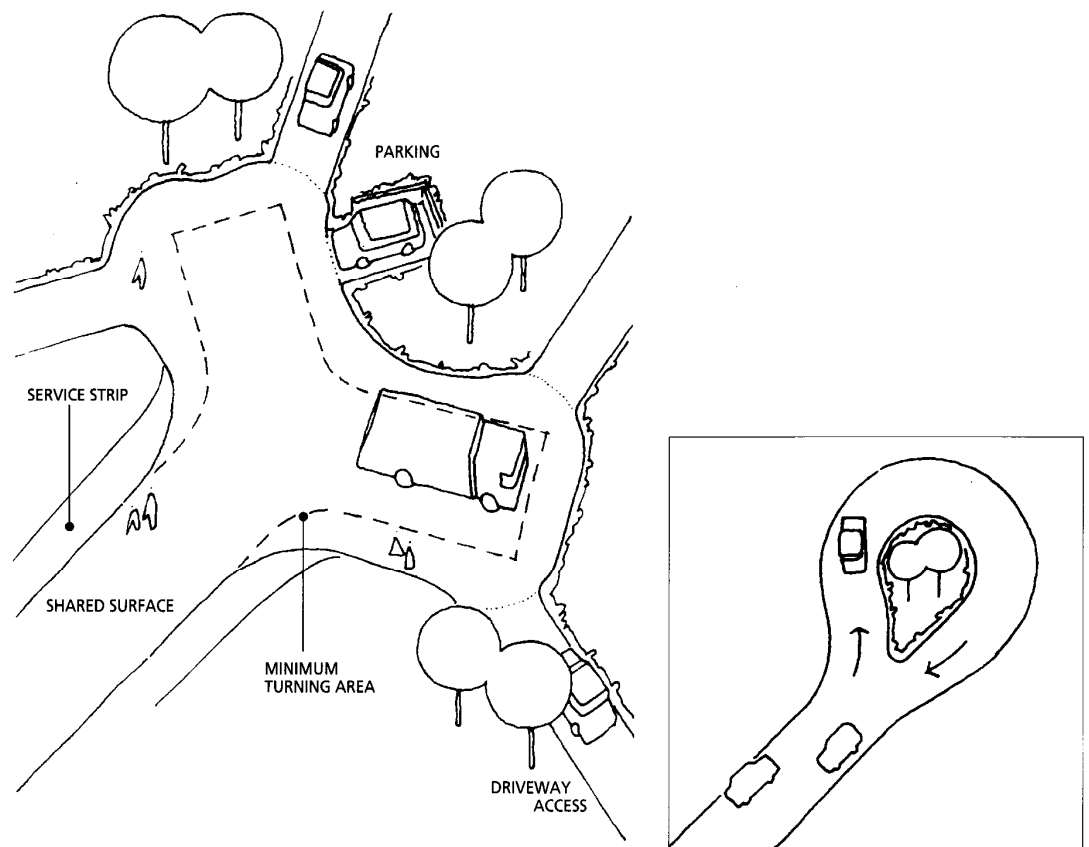


Figure 5.25 Arrangements for informal turning areas

5. Road Design Standards

Provision for Public Transport

Developers should identify the potential for bus penetration within large developments to give convenient accessibility. Amendments to accommodate bus penetration may be required, at the developers expense. All details in relation to the provision of bus operation should be obtained at an early stage by consultation with the Director General of the Strathclyde Passenger Transport Executive.

5.3.46
Provision for Buses

Developers should be aware of the existing structure of the public transport network, including proposed additions or alterations. Measures can be provided in the design of a development to encourage the use of the public transport network by ensuring that it is readily accessible. This will require direct footpath and cycleway links to existing or proposed bus and light rail stops and stations. Direct vehicular access may also be made available to permit dropping off and picking up, where space and demand exists. For exceptionally large developments, developers may be asked to provide a new station within the rail network. Bus routes should have a minimum width of 6.0 metres.

5.3.47
Public Transport

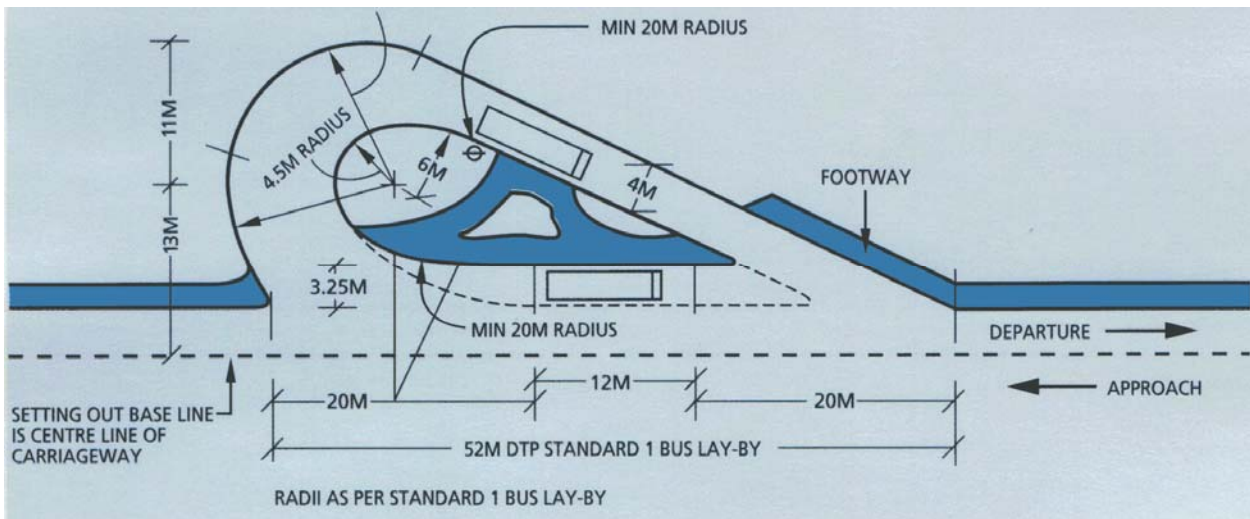
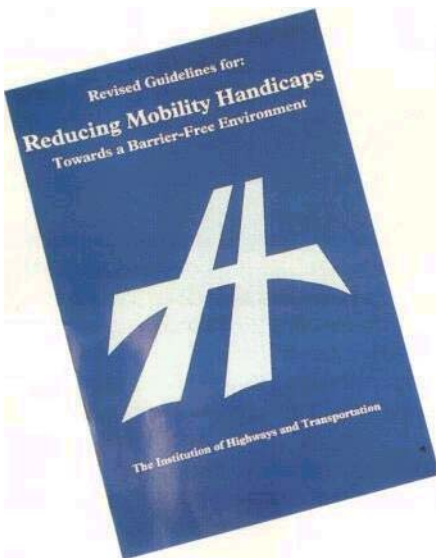


Figure 5.26 Bus Turning Area (2 metre overhang required)

5. Road Design Standards



Combined pedestrian and cycle route



The pedestrian network must be considered

Pedestrians and Cyclists

5.4

A network of routes, which are safe and convenient, should be established to cater for the needs of the pedestrian, including those with a mobility handicap, and cyclists.

*5.4.1
Provision for
Vulnerable
Users*

Cycle routes can comprise either cycle tracks (for pedal cycles only or pedal cycles and pedestrians), or cycle lanes, (part of the carriageway reserved for the exclusive use of pedal cycles) (Paragraphs 5.4.24 to 36).

*5.4.2
Definition of
'Mobility
Handicapped'*

The term mobility handicapped relates not only to those with a permanent disability but others who are temporarily denied full mobility e.g. someone pushing a pram, a pregnant woman or a person recuperating from an illness or accident. In these circumstances even the simplest journey may involve a significant degree of extra effort, stress and pain.

Pedestrian routes should ensure that the built environment is sympathetic to the needs of the mobility handicapped. For further guidance reference should be made to the Institution of Highways and Transportation publication 'Guidelines for Reducing Mobility Handicaps' (1991).

*5.4.3
Pedestrian
Network and
Routes*

Pedestrian Provision

Pedestrian movements should be made as convenient, safe and pleasant as possible by careful attention to the design and layout of pedestrian routes. The pedestrian network should reflect natural desire lines and be more attractive for pedestrians to use than the vehicular route. The provision for cyclists should be examined at the same time as the provision for pedestrians as the two can often be combined.

*5.4.4
Definition of
Footways and
Footpaths*

The Roads (Scotland) Act 1984 defines a "footway" as a way, over which there is a public right of passage by foot only, which is associated with a carriageway and a "footpath" as a way, over which there is a public right of passage by foot only, which is not associated with a carriageway.

*5.4.5
Routes to
Pedestrian
Attractions*

Those features which generate or attract pedestrian traffic such as shopping areas, schools, bus routes, clinics and car parks should be identified at an early stage in the planning process. These will dictate the main spinal pedestrian routes and be segregated as far as possible from major traffic routes, involving a minimum number of carriageway crossings. The developer should also provide suitable routes for pedestrians with prams and wheelchairs, from residential areas to shops and community facilities. These routes should have a nonslip surface and must be laid out to avoid the need for steps even if this means slightly longer ramped routes. Steep crossfalls, gratings likely to trap wheels and obstruction by lighting columns, sign posts etc. should also be avoided.

5. Road Design Standards

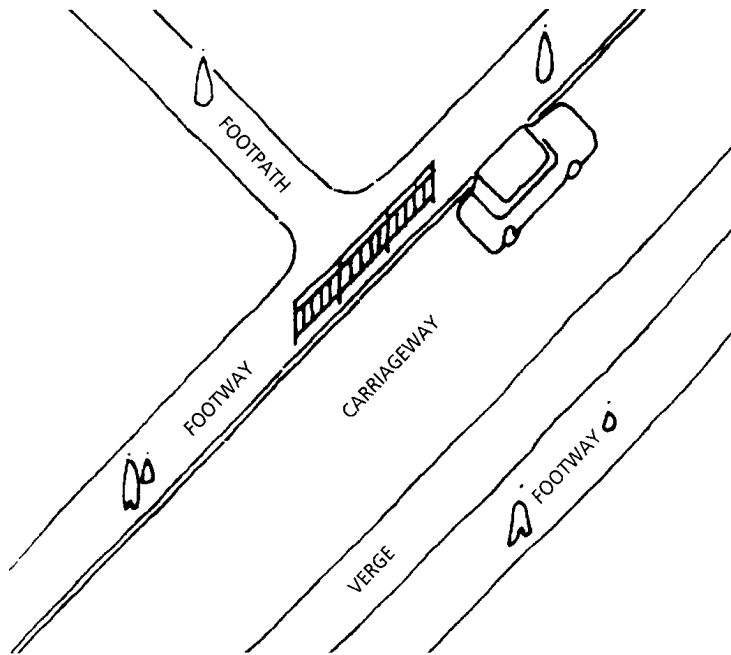


Figure 5.27 Protecting Pedestrians from danger

5.4.6

Pedestrian Crossings Considerations

Particular attention should be paid to the locations at which pedestrian routes cross the carriageway (e.g. at road junctions) so that footway and footpath users are not exposed to unappreciated dangers (Figure 5.28). Judicious use of hard and soft landscaping can guide pedestrians to suitable crossing points and help prevent children running directly onto the carriageway and consideration should be given to the possible need for crossing facilities adjacent to shops, clinics, community facilities and other generators of pedestrian traffic.

5.4.7

At grade Pedestrian Crossings

At designated pedestrian crossing points, other than those at which a suitable grade separated facility is provided, kerbs should be dropped to permit easy access to and from the carriageway for pedestrians with prams and wheelchairs.

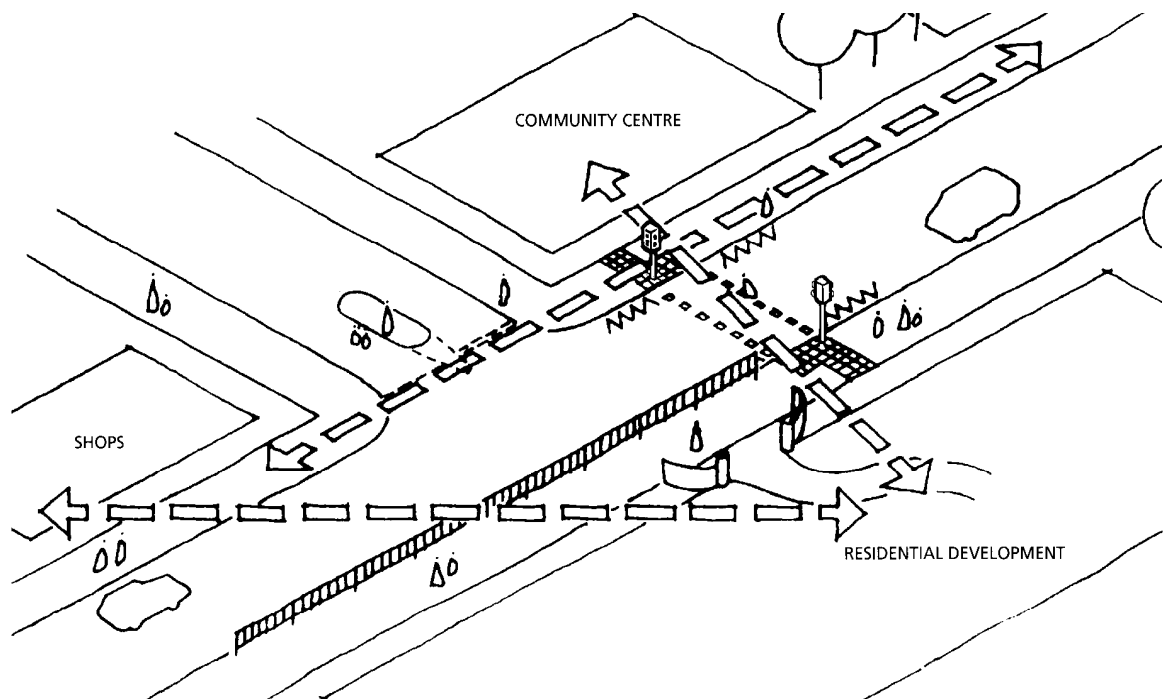


Figure 5.28 Consideration of crossing facilities

5. Road Design Standards

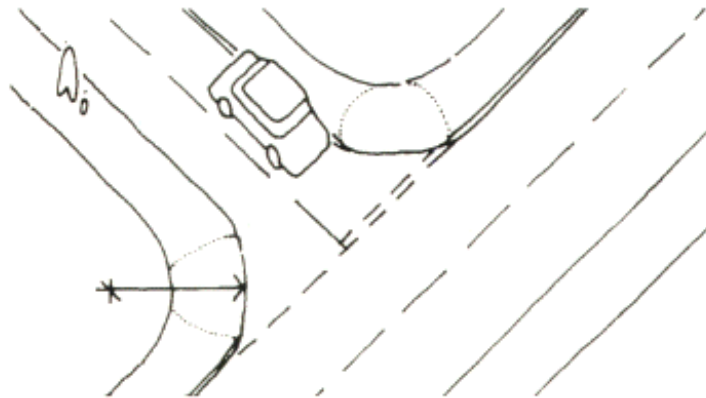


Figure 5.29 Dropped kerb at crossing point

5.4.8 Grade Separated Pedestrian Crossings

Where both vehicular and pedestrian flows are very high, footbridges and underpasses may be appropriate for carriageway crossings. They should be designed to be obviously more convenient, pleasant and safe to use than any alternative route. This will often involve elevating or depressing the carriageway to ensure that footways and footpaths have minimal changes in level.

5.4.9 Controlled Pedestrian Crossings

Where grade separation cannot be justified or provided it may be necessary to balance the competing demands of pedestrians and vehicles by providing a controlled crossing e.g. a pelican crossing or pedestrian stage in traffic signals.

5.4.10 Tactile Slabs at Controlled Crossings

A tactile surface should be provided on the approach to all controlled crossing points as detailed in Figure 5.30. Further details of the layouts and use of tactile slabs are given in the Department of Transport Disability Unit advice note DU/1/91.

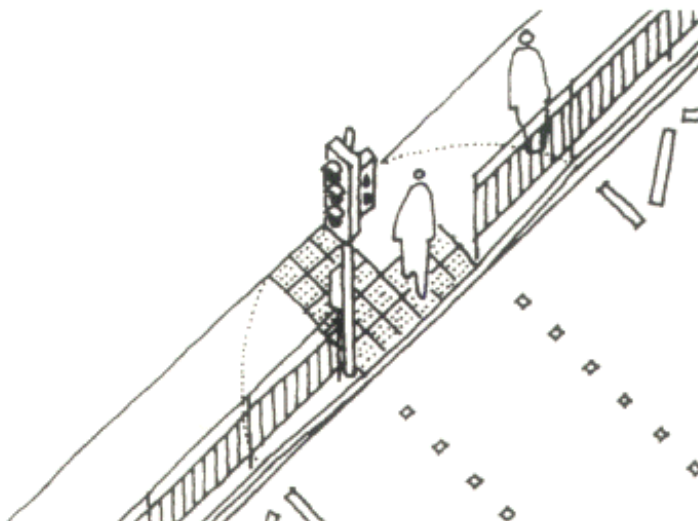


Figure 5.30 Tactile surface at crossing points

5.4.11 Enhancement of At-grade Pedestrian Crossings

Uncontrolled crossings may be necessary where the path and road networks cross but the flows are not high enough to justify a controlled or grade separated crossing. These crossing points may be enhanced by introducing traffic calming, thereby making it easier for pedestrians to cross the road.



5. Road Design Standards

5.4.72 Pedestrian Routes on Traffic Distributor Roads

Where pedestrian routes of necessity run beside Traffic Distributor Roads, they should be separated from the carriageway by either a hard or soft landscaped strip, at least 2 metres wide, in the interests of road safety and of improving the environment of the road.

5.4.13 Width of new Footways

Table 5.12 specifies the required widths of footways which depend upon the level of pedestrian activity. These widths may require to be increased to cater for high pedestrian volume.

Frontage Development	Width (metres)
None	2.5-3.0*
Industrial	2.0-5.0
Residential	2.0-3.0
Local Shops	4.0
Major Shops	5.0

*Minimum 3.0 metres for Traffic Distributor
Table 5.12 *Footway Widths*

5.4.14 Width of New Footpaths

Table 5.13 details appropriate widths for footpaths and pedestrian areas intended for adoption. These widths may require to be increased to facilitate maintenance of the footpath and/or underlying services.

Type of Footpath	Width (metres)
Minor pedestrian routes	2.0*
Major pedestrian routes	3.0
Shopping Precinct	6.0
Footbridge	2.5
Underpass (2.3m headroom)	2.5

* May be inadequate for maintenance purposes or in order to accommodate services
Table 5.13 *Footpath Widths*

5.4.15 Reduced Footway Width at Refurbished Buildings

Where existing buildings are being rehabilitated or modernized it may be permissible, with the approval of the Head of Roads and Transportation, to reduce the footway width. For further details of the acceptable width reduction, reference should be made to 'Streetscape: A Design Guide' published by East Ayrshire Council.

5.4.16 Pedestrian Priority at Vehicle Access

Where vehicular access to premises is taken across a footway, the ramped portion should be confined to that immediately adjacent to the carriageway, thus emphasising the pedestrians' priority. The short ramp adjacent to the dropped kerb also encourages a reduction in the speed of vehicles crossing the footway. Suitable access treatments are described in Section 5.2.



Ramped access to bus stop

5. Road Design Standards

Desirably, gradients on footways and footpaths should not exceed 5 per cent, with a nominal maximum of 8 per cent. They should be constructed with crossfall of 3 per cent. Steeper gradients may occasionally be permitted, subject to the provision of a handrail on at least one side and rest platforms at 10 metre intervals.

5.4.77
*Footway,
Footpath
maximum
Gradients*

Pedestrian ramps should have a maximum gradient of 10 per cent. Ramps with gradients of between 5 per cent and 8 per cent should be no more than 6 metres long and steeper ramps a maximum of 3 metres in length. Landings should be provided at the top and bottom of every ramp, and at every turn within a ramp. Stepped ramps should be avoided wherever possible and must not provide the sole means of pedestrian access or be used on wheelchair routes.

5.4.18
**Steps or
Ramps
on Footway**

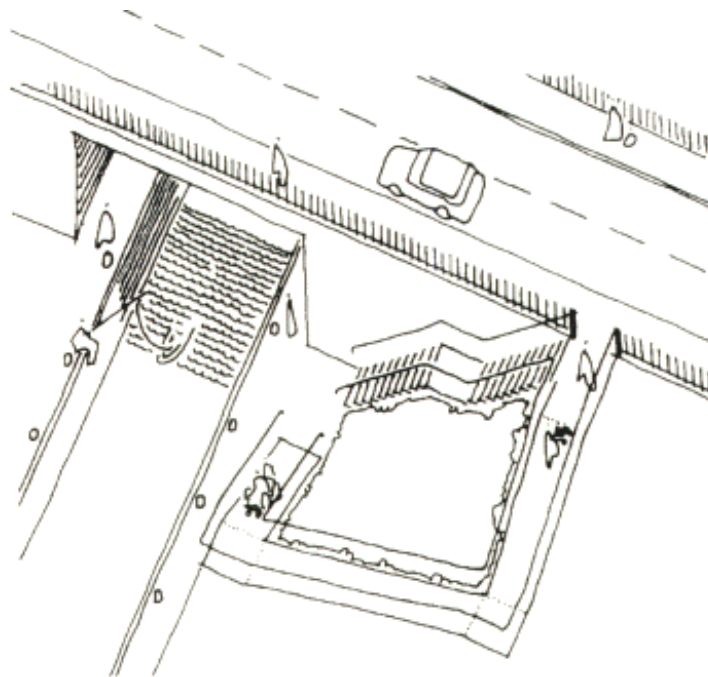


Figure 5.31 Ramped and stepped access



Steps access to bus lay-by

Steps will not normally be adopted as they pose problems not only for prams and wheelchairs but also for mechanized maintenance. They should therefore never form the sole pedestrian route and wherever practicable steps should be avoided. However, since some people find walking on any sloping surface difficult or impossible, steps may be provided in addition to long ramps where they are essential to meet the requirements of a pedestrian desire line. Each flight should rise a maximum of 1.2 metres and comprise between three and twelve uniform steps. Longer flights should be split into sections by landings. Steps should have 0.3 metre permanently nonslip treads and a minimum clear width of 1.4 metres (Figure 5.32).

5. Road Design Standards

5.4.19 Landing
Landings on ramps and stairways, and rest platforms provided adjacent to footpaths and footways, should preferably be 2 metres long x 2 metres wide with an absolute minimum dimension of 1.35 metres by 1.35 metres.

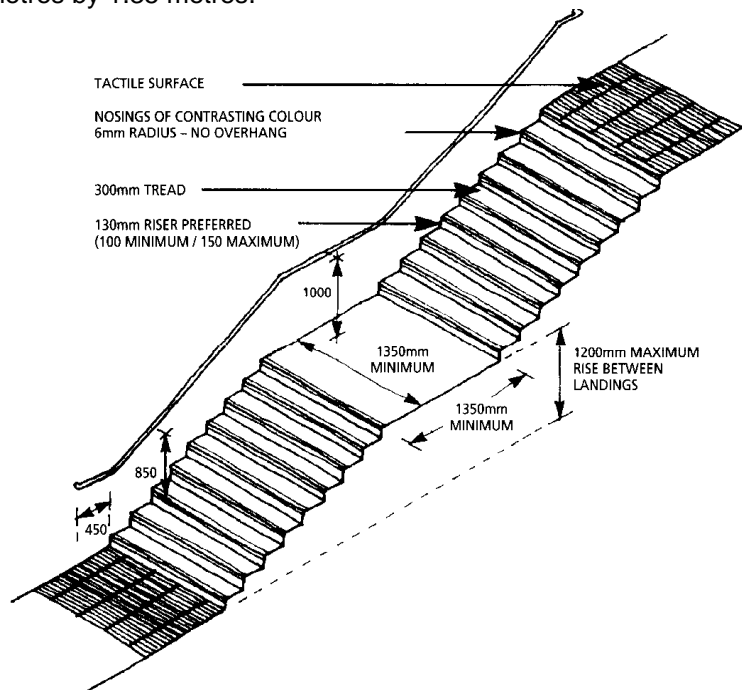


Figure 5.32 Dimensioning for Steps

5.4.20 Handrails

Handrails should be provided at both sides of steps (or centrally on steps a minimum of 3 metres wide) so they can be used by either hand. Handrails should comprise 50 mm diameter, galvanised, mild steel tube and must be securely fixed. They should be set 1 metre above a ramp and 0.85 metres above the tread of a step. They should extend at least 0.3 metres horizontally beyond the top and bottom of a ramp or flight of steps and should be returned at each end. Handrails can sometimes be difficult for people to grip and the most comfortable cross section for a handrail is circular with a diameter of 45 or 50 mm. Handrails where fixed to a wall should have a gap of 45 mm between the rail and the wall. Freestanding handrails should be complemented with a lower rail set not more than 0.3 metre above the walking surface.

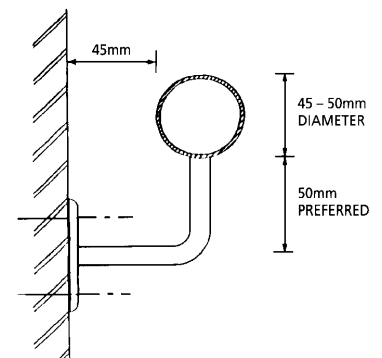


Figure 5.33 Handrail Detail

5.4.21 Disabled Access to Building

For disabled access to buildings, ramps should be incorporated off road. Where this is not possible then ramps on existing footways may be permitted for refurbishment of existing buildings as per Figure 5.34 and Table 5.14. Reference should be made to the Technical Standards (Scotland) Buildings Regulations and the Institution of Highway and Transportation publication "Guidelines for Reducing Mobility Handicaps" (1991). The categories of buildings requiring disabled access are ;

- 1 Home*
- 2 Institutional
- 3 Offices Any shops above 500m²
- 5 Assembly place, eg pubs, halls
- 6 Industrial

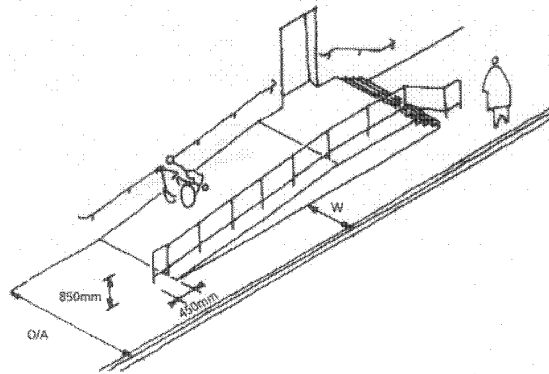
*Where a house contains a Surgery, ie Doctor, Dentist, then the requirement applies.

5. Road Design Standards

TYPE A

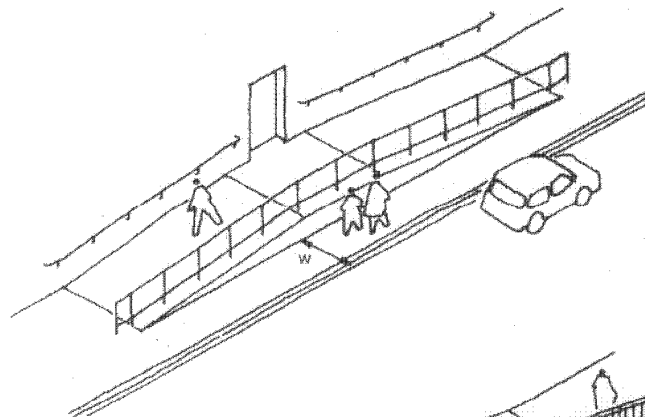
Type A is a ramp with steps on one side using part of the available footway. Where this type is used the underlying footway will require to be stopped up subject to the approval of the Statutory Undertakers.

Where steps are employed it may also be necessary, dependent on the layout, to provide a barrier to prevent those with visual impairment from falling down the steps.



TYPE B

Type B is a through ramp using part of the available footway.



TYPE C

Type C is a through ramp using all of the available footway.

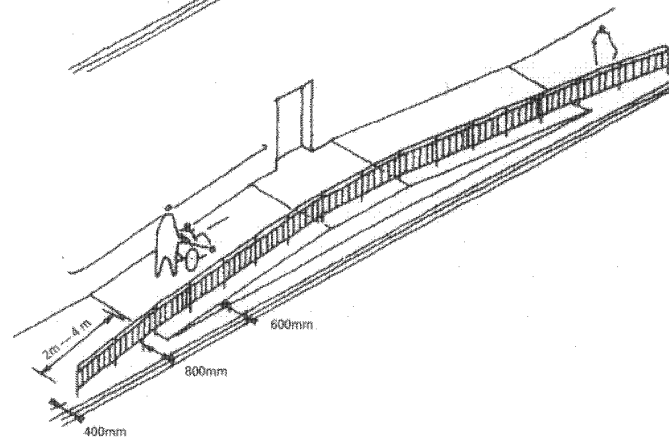


Figure 5.34 Ramp Dimensions

	W (m)	O/A Width (m)			
		Type A	Type B	Type C	
Non Shopping	1.40	3.20	3.20	2.25	Desirable Minimum "W" on Ramp * Absolute Minimum **
		-	3.00	-	
		3.00	2.80	2.05	
Local Shopping	2.80	4.60	4.60	3.65	Desirable Minimum "W" on Ramp * Absolute Minimum **
		-	4.40	-	
		4.40	4.20	3.45	
Major Shopping	3.50	5.30	5.30	4.35	Desirable Minimum "W" on Ramp * Absolute Minimum **
		-	5.10	-	
		5.10	4.90	4.15	

* On the through ramp layout original footway level is preferred to have minimum width. However, marginal o/a width reduction possible if ramp is made to provide minimum width with 1 m footway alongside.

** Absolute minimum achieved with min edge width 400mm reducing to 200mm in Type A & B, and 600 to 400mm for Type C.

Table 5.14 Footway Ramp Widths

5. Road Design Standards

5.4.22 Obstacles to Pedestrian Desire Lines

Any street furniture which is to be provided, such as planters and waste paper bins, should be located in such a way as to maintain a 2 metre wide obstacle free footway. Local narrowing to 1.4 metres over a 3 metre length may be permitted to accommodate street furniture, however, furniture should be reduced to a minimum and grouped together outwith the pedestrians' desire lines of movement (Figure 5.35).

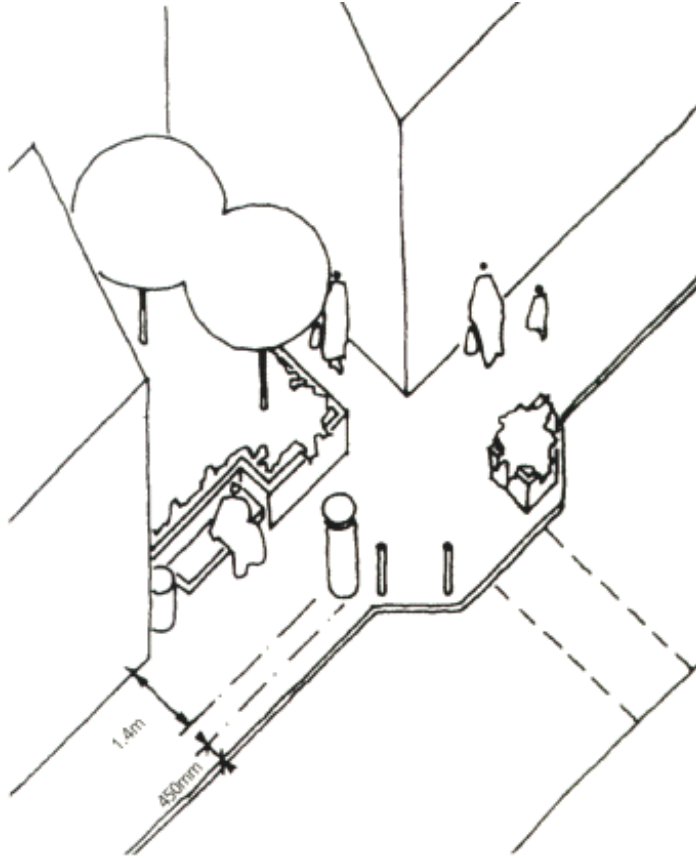


Fig 5.35 Obstacles to pedestrian desire lines

5.4.23 Vertical Features

Generally free standing objects such as bollards and seats should be 1 metre high so that they are more obvious and can be more readily seen at waist height than at knee height. Where possible they should also be in a contrasting colour to further highlight their position.

5. Road Design Standards



Cycle lane on road

The Cycle Network

A cycle network should be established to serve the needs of cyclists with the main objectives being the following:

- (a) Cyclists should be kept away from large volumes of vehicular traffic, especially where roundabouts are located.
- (b) Vehicle speeds should be reduced where there is a large number of cyclists.
- (c) Safe crossing points should be provided for cyclists at roads with major traffic flows.

5.4.24
Objectives

Further and more comprehensive details of provision for cyclists can be obtained from The Institution of Highways and Transportation Guidelines called "Providing for the Cyclist" (1983) and the Scottish Development Department Cycling Advice Notes 1/89 and 1/90.

5.4.25
Further Advice

The following definitions apply to facilities for cyclists:

- (i) A safer signed route is a route signed along minor roads, cycle tracks and cycle lanes.
- (ii) A cycle track has the same meaning as described in the Roads (Scotland) Act 1984. It is thus a 'road' for cyclists or cyclists and pedestrians segregated from the carriageway.
- (iii) A cycle lane is a lane provided for cyclists within a carriageway.

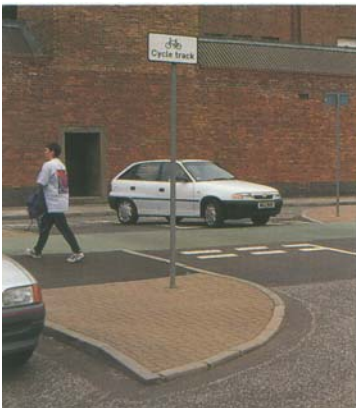
5.4.26
Cycling
Facilities

Collectively these facilities can be used to form a cycle route.

Geometric Standards for Cycle Routes

To allow the free movement of cyclists certain standards will require to be met and typical dimensions are given in Table 5.15.

5.4.27
Dimensions



Cycle Track Crossing

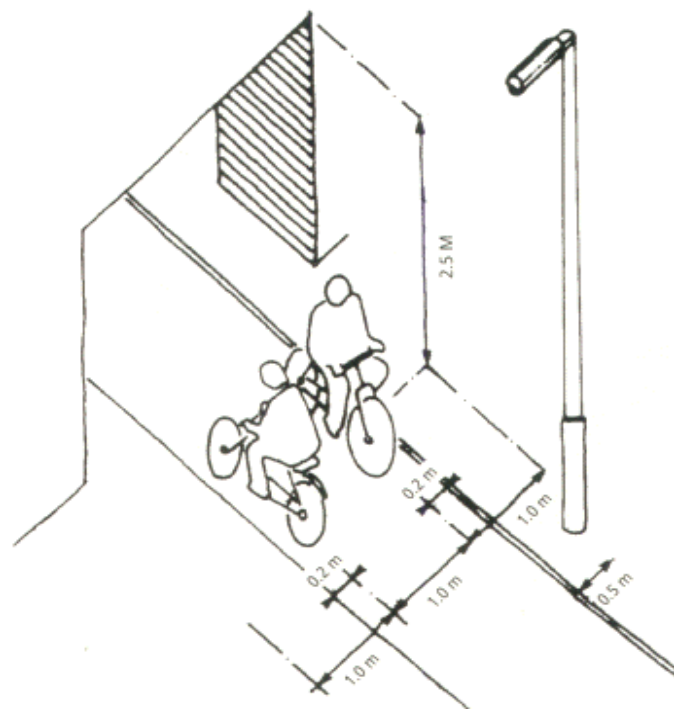


Figure 5.36 Dimensions for free movement of cyclists

5. Road Design Standards

5.4.28
Surface

The surface of all cycle routes should preferably be a smooth non-skid wearing surface with a different colour from any adjacent traffic surfaces. Where the cycle route is part of the carriageway then particular attention should be paid to the surface condition on the inside edge where cyclists ride.

5.4.29
On Road Cycle Lanes

With-flow cycle lanes marked on the carriageway, whether mandatory or advisory, should ideally be a minimum of 1.5 metres wide. A contra-flow cycle lane may be provided on a one-way street and should ideally be 2.0 metres wide but, where the road width is restricted, it can be a minimum of 1.5 metres.

5.4.30
Crossfalls

A standard crossfall of 2.5% is required generally but may be increased over short lengths, such as superelevation being applied on a tight bend.

5.4.31
Minimum Radius

The minimum acceptable radius for a bend on a cycle track is 6 metres.

5.4.32
Gradients

Generally, cycle track gradients should not exceed 3% but a gradient of 5% is allowed over a maximum length of 100 metres and 7% over a maximum length of 30 metres. Gradients of 7% or more are not recommended except over very short lengths.

Constraints at Boundary	Segregated			Shared
	Footway/ Footpath	Cycle Track	Verge	
Open Site or 0.5m verges	1.2m	1.3m	-	2.5m
Wall, bushes etc on kerbline	1.2m	1.5m	-	2.7m
Carriageway on cycle track side	1.2m	1.5m	0.5m	3.2m

Table 5.15 Dimensions for cycle routes

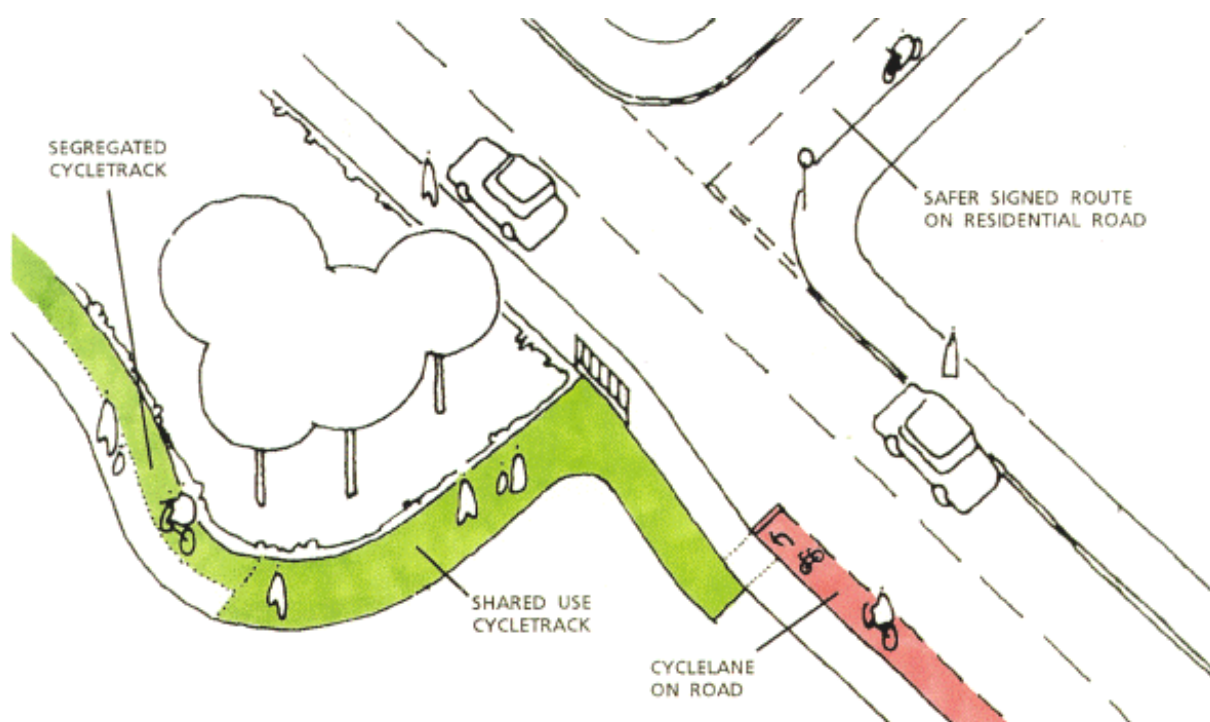


Figure 5.37 Types of cycle provision

5. Road Design Standards



Cycle lane



Cycle by-pass at Traffic Calming measure

Care must be taken where a cycle route crosses a road and that adequate visibility is provided, otherwise barriers or posts will be required to slow cyclists down. Where cycle routes cross pedestrian routes then it may be necessary to introduce some form of traffic calming, such as a footway rumble strip, on the cycle route itself to alert cyclists that pedestrians are likely to be crossing ahead.

5.4.33
Road Crossings

Grade separated crossings where facilities have been provided for the mobility handicapped will also be suitable for cyclists. However, where subways are concerned a clear headroom of 2.5 metres is required as a desirable minimum and on bridges a parapet height of 1.5 metres will be required.

5.4.34
Grade Separated Crossings

Care should be taken in the installation of roundabouts where there is a large number of cyclists using the junction as they often experience difficulty in using roundabouts. Further information and guidance on junction control may be obtained from the appropriate technical memoranda or advice may be given by the Head of Roads and Transportation.

5.4.35
Roundabouts

Where the use of the road by the cyclist is high, ie where a cycle route uses residential roads, or traffic calming has been added to a Traffic Distributor Road, then it may be appropriate to consider alterations which would assist the cyclist as outlined in Paragraph 6.5.2 and 6.5.3.

5.4.36
Traffic Calming

5. Road Design Standards



Servicing of Residential Area

Servicing

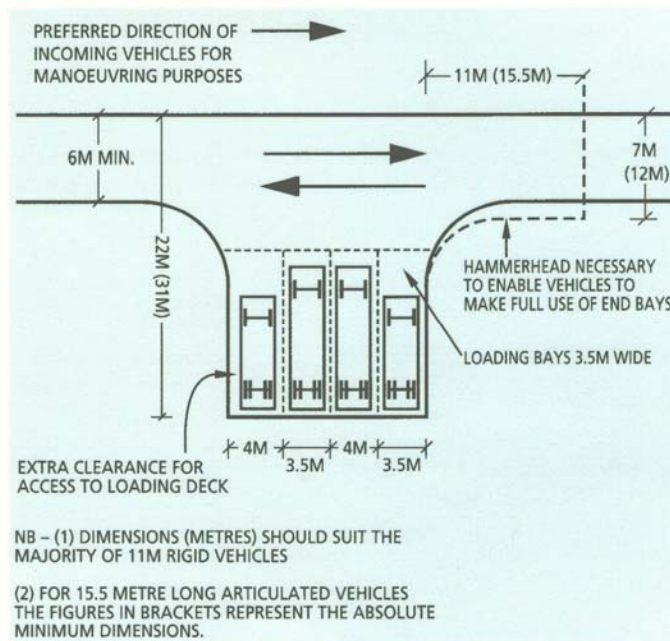
All developments should be designed such that premises can be serviced from vehicles parked off the main carriageway without adversely affecting road safety. For residential and small commercial properties, servicing can generally be satisfactorily undertaken via access driveways but, for major commercial and industrial premises, a separate service area should be provided.

Service areas range from single bays to sophisticated structures incorporating loading bays and mechanical goods handling equipment. The size and layout of all service areas should be such that all vehicles can enter and leave in a forward gear and do not need to reverse on the public road. Developers will be required to prove that all the necessary manoeuvres can be successfully completed (Figures 5.38 and 5.39).

5.5

5.5.7 *Off Road Servicing*

5.5.2 *Range of Servicing Provision*



Loading and Parking Manoeuvrability

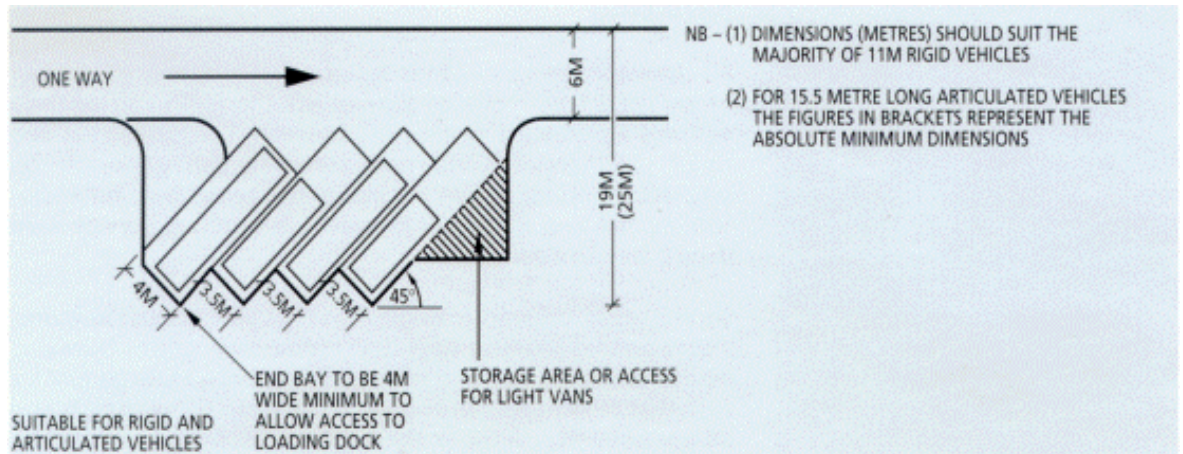
Advice given in the Freight Transport Association's (FTA) guide "Designing for Deliveries" will assist in producing an internal layout suitable for the type of goods vehicle likely to be servicing the development.

5.5.3 *FTA Guidance*

The standards given in the FTA guide are representative of the standard driver in standard conditions and should not be compromised. Use of the recommendations will ensure that all drivers and vehicles can manoeuvre in the service yard within reasonable safety margins.

5.5.4 *Interpretation of FTA Guidance*

5. Road Design Standards



5.5.5 Service Yard Design

Service Yards should be designed to allow access to the adjacent road without causing delay to through traffic, even if a vehicle is waiting to exit. Loading bays should be provided to allow goods vehicles to load and unload in a convenient and safe manner. Most of these loading bays will be arranged to allow access to the rear of the vehicle and consequently adequate space must be provided to allow the goods vehicles to turn and reverse into the loading bay. The total depth of the bays can be reduced where vehicles are parked at an angle with a saw-tooth loading deck but this arrangement is appropriate only when used with a one-way circulation system. Drivers should not incur blind spots when manoeuvring in the yard (Figure 5.40).

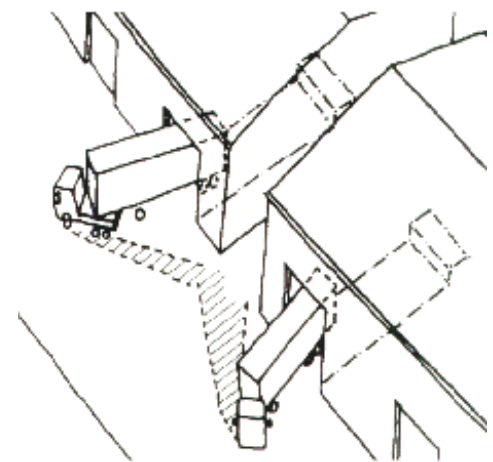


Figure 5.40 Reversing blindspots

5.5.6 Loading from Parallel Bays

Where vehicles are to be loaded or unloaded while parked parallel to the kerb in service roads, parking bays, 3 metres wide and at least 3 metres longer than the vehicles using them, should be clearly designated, the width of the service road should be increased accordingly. Bay widths should be increased where side loading of vehicles by fork lift trucks is contemplated to give a clear width of 3 metres between adjacent vehicles (Figure 5.41).

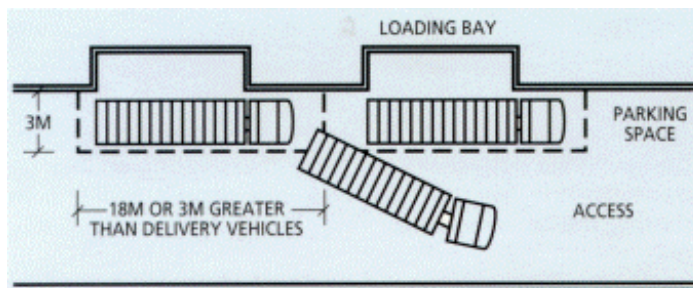


Figure 5.41 Service Bays parallel to Kerb



5. Road Design Standards

The Buildings Standards (Scotland) Regulation permit a maximum carry distance for dustbins of up to 46 metres. However, British Standard Code of Practice, BS5906, suggests a maximum carry distance of 25 metres and it is recommended that this standard be adopted as far as possible. Where communal refuse storage accommodation is provided, the Regulations require that this be located no more than 15 metres from an access road and where such accommodation forms part of a chute system, or is used for the storage of bulk refuse containers, the access road should extend to the door of the accommodation. While the size of vehicles used by local cleansing authorities varies, the length is usually less than 9 metres and the turning circle less than the 10.5 metres radius standard turning circle on which Figure 5.24 is based.

5.5.7
Refuse
Collection

Provision must be made in commercial and industrial developments for the overnight parking, off the public road, of all associated vehicles. Where large numbers of servicing movements are anticipated, consideration should be given to the provision of parking bays for vehicles awaiting access to loading bays. It is essential that these vehicles can park at locations which will not interfere with the safe manoeuvring of any other vehicles. The dimensions of the parking bays should be similar to those of the loading bays but reference should be made to "Designing for Deliveries" published by the FTA for layout details. Provision must also be made for car parking as detailed in Chapter 7.

5.5.8
Overnight
Parking



5. Road Design Standards

Statutory Undertaker Services

5.6

The provision of statutory or other services laid underground constitutes a basic element of development design. The Statutory Undertakers, who provide such services, must therefore be consulted during preparation of design briefs, so that their requirements can be coordinated in the design and a balance struck between their needs and other objectives.

5.6.1
Consultation

In the interests of both the Statutory Undertakers and their consumers, all mains and services serving more than one proprietor should be located in land which is both publicly maintained and readily accessible. It has been recognised that these criteria are best met by public roads and, as well as making provision for pedestrian and vehicular movement, it is therefore a function of most roads to provide routes for underground services.

5.6.2
*Services
Located in
Roads*



Sewers under Carriageway

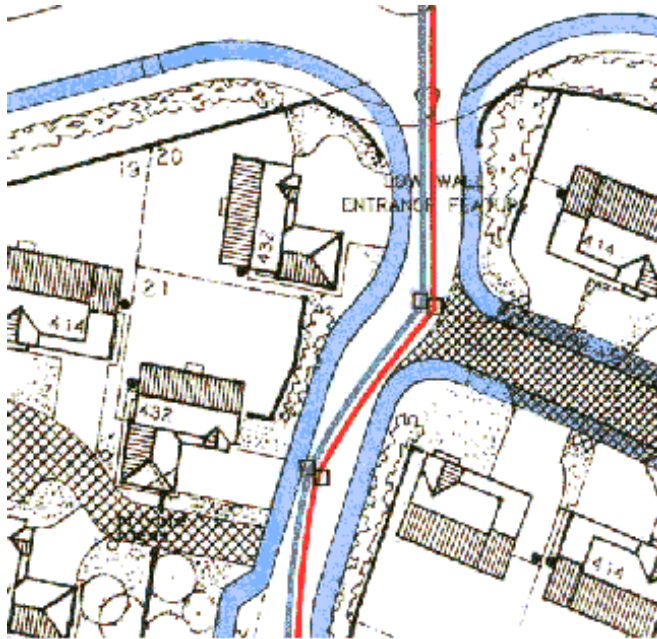


Figure 5.42 Service Strips

Sewers will normally be placed under the carriageway and early consultation should be made with the Local Water Authority regarding their provision, in accordance with the Sewerage (Scotland) Act 1968. Early consultation should include surface water sewers for the drainage of roofs and paved areas within the curtilage of premises, and the foul water drainage system. All services other than sewers, and occasionally water mains, should be grouped in "service strips" located within the limits of the footways, verges and adoptable footpaths with a minimum of service connections across the carriageway.

5.6.3
*Services in the
carriageway*

5. Road Design Standards

5.6.4 Services in Service Strips

The width of a service strip will depend on the number and type of premises served. For up to two hundred dwellings, all domestic services (gas, electricity, lighting, water and telephones) will normally be accommodated in a 2 metres wide reservation and Figure 5.43 shows typical positions. The minimum clearance between each service should be to the satisfaction of the Statutory Undertakers. This diagram is, however, only a guide and does not absolve the designer from negotiating with each Statutory Undertaker at the earliest possible stage. In any development, the depth, clearance and relative position of each service will require to be decided by the Statutory Undertakers and the method of laying cables and pipes left to their discretion. Special arrangements will require to be made where a footway is less than 2 metres wide and local widening in excess of 2 metres may be necessary to accommodate access chambers or where roads have tight bends.

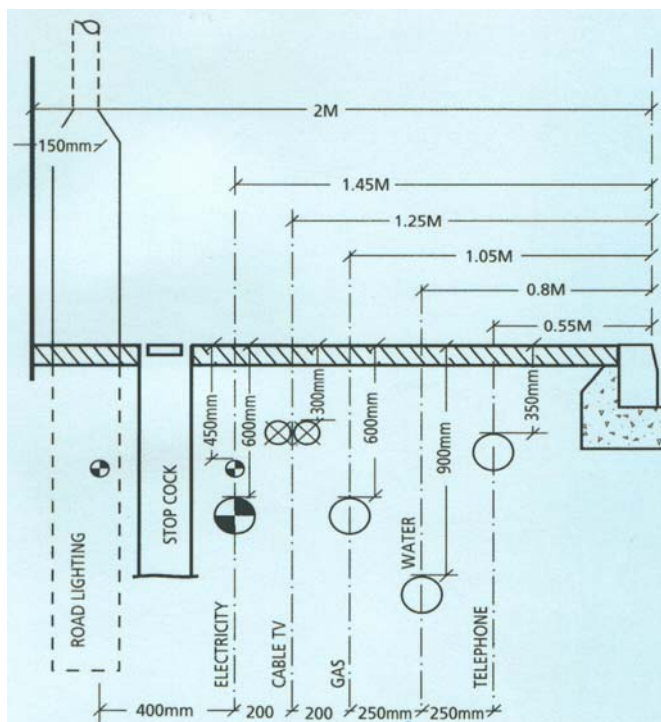
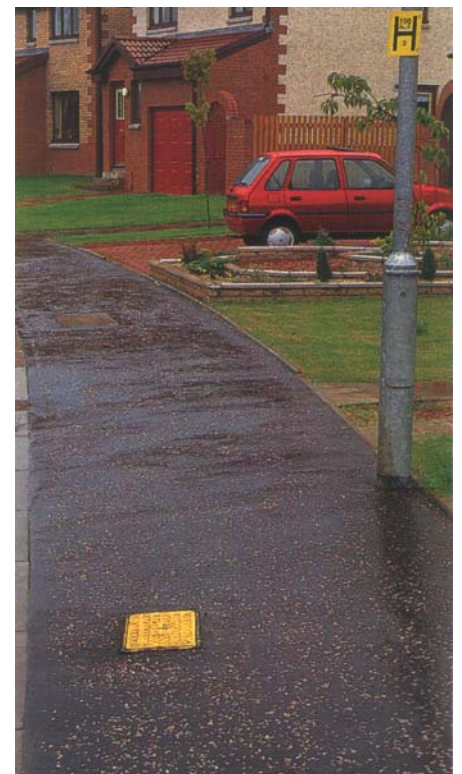


Figure 5.43 Services under footway



5.6.5 Street furniture and Lighting Columns

All street furniture should normally be located at the rear of footpaths/footways or recessed behind them and no furniture or structures should obstruct any road junction sight line. Conversely, no services other than road lighting cables should be located within 0.5 metre of the rear of the footway to allow for lighting columns and joint pillars or other street furniture.

Detailed guidance regarding the provision of road lighting is contained in Section 10.11.

5.6.6 Service Strip Remote from Carriageway

Where service strips are not located adjacent to carriageways their width must allow for access by mechanical plant and/or vehicles for maintenance or repair. In all cases there must be a permanent and continuous demarcation of the boundary between the service strip and any adjacent private property [e.g. by a fence, wall or concrete edge kerbing].

5. Road Design Standards



Ready access must be available at all times to all parts of service routes for maintenance and in cases of emergency. Lorry access will be needed to some places such as manholes, electricity sub-stations, telecom junction boxes and gas governor house installations; and the Statutory Undertakers requirements for such facilities should be ascertained at an early stage. They should be positioned so as to minimise disruptions to vehicle and pedestrian access when service maintenance is being carried out, whilst ensuring that access to services will not itself be obstructed by parked vehicles. Special consideration in this respect will be necessary where services run beneath or adjacent to single lane carriageways and parking bays.

5.6.7
Maintenance and Emergency Access



The position of all hydrants should be agreed with the Firemaster and Water Authority. Hydrants should not be located where vehicles are likely to park.

5.6.8
Hydrants

Where service strips or branch connections cross the carriageway, cabled services should be individually ducted at increased depths in accordance with the requirements of the Statutory Undertakers as directed by the Head of Roads and Transportation. Crossings of narrow residential roads should be located at passing places to minimise disruption to traffic flow during maintenance/repair works.

5.6.9
Services Crossing under Carriageway

In shared surface layouts, all services should continue to be located in land eligible for adoption by the Local Roads Authority. Shared Surface roads should generally have a 2 metre contiguous service strip which is delineated by means of a flush kerb. Where a service strip must underlie a Shared Surface road, under no circumstances should any manhole be located within the 3.5 metres wide running width of the shared surface unless an alternative vehicular access is provided. Manholes should preferably be located in the service strip but may also be located within parking areas or widened areas within the total road width, by agreement with the Statutory Undertakers. In Housing Courts the discipline of a service strip should be maintained although this will be in private control and therefore a wayleave agreement will be required.

5.6.10
Services in Shared Surfaces and Housing Courts

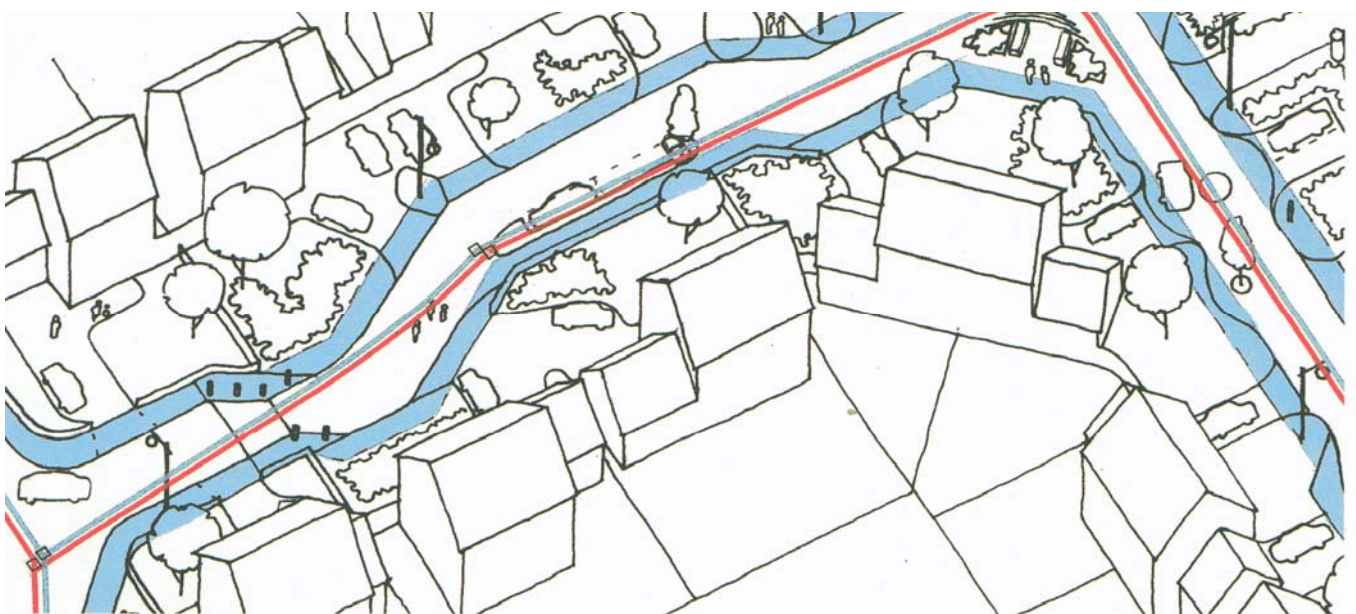


Figure 5.44 Service Strip within Shared Surface

5. Road Design Standards

5.6.11 *Surface Finish of Service Strip* The surface finish of all service strips must-form an integral part of the environment and be accept able for general maintenance by the Local Roads Authority. Service strips should be protected when there are risks from damage from occasional overriding by vehicles.

5.6.12 *Planting and Service Strips* It is essential that any trees adjacent to service strips are located so that their roots will not damage services underground or be damaged themselves during the maintenance of such services. Advice should always be sought from the Statutory Undertakers when considering planting in the vicinity of services

5.6.13 *Road Opening Consultations and Consents* The developer is responsible for contacting the Statutory Undertakers regarding the position of, and connection to, any existing underground plant. In all cases, the necessary Road Opening Permit under the Roads (Scotland) Act, 1984 or permission in Writing under the New Roads and Street Works Act, 1991 must be obtained from the Head of Roads and Transportation before any excavation is undertaken in a public road.

5.6.14 *List of Statutory Undertakers* A list of Statutory Undertakers is included in Appendix I.



5. Road Design Standards



Rural Areas

The main part of the Guidelines considers the urban situation and its immediate environs. However, areas of a rural nature should be considered differently.

Rural areas can be treated as having a similar road hierarchy as the urban areas but the significant difference will be to ensure that adequate visibility is provided on roads which are subject to speed limits which are in excess of 30 mph.

Road Widths

Consideration will also require to be given to road widths in a remote rural situation. The basic road widths for Residential Roads, within this document, are based on the traffic flow which will be generated by the development. This general premise will still hold true in the remote rural areas except that there will be no restriction on the maximum length which will be permitted.

The developer will have to demonstrate the level of the existing traffic flow and the likely peak generated flow created by the new development and depending upon the new total flow the following road types and widths will be appropriate. Using similar methods for calculating the traffic flow as Paragraph 5.3.3 the alternative widths can also be based on the number of dwellings.

< 50 dwellings	single track access road with passing places will be permitted
50 -100 dwellings	4.8 metre wide carriageway with passing places will be permitted
>100 dwellings	5.5 metre wide carriageway will be permitted

Table 5.16 Roads widths for Traffic Flow

Where a development is proposed on a road which does not meet these criteria then the developer will be required to widen the road along the frontage of the development or the access road to the development to the appropriate width (Table 5.16).

5.7

5.7.1 Introduction

5.7.2 Hierarchy

5.7.3 Introduction

5.7.4 Dwellings/ Traffic Flow/ Road Widths

5.7.5 Developing on Existing Roads

5. Road Design Standards

5.7.6 Passing Places

All passing places in rural areas should be constructed to the dimensions given in Figure 5.45. All passing places should be intervisible or up to a maximum distance of 150 metres apart. Adjacent passing places should be placed on alternate sides of the road.

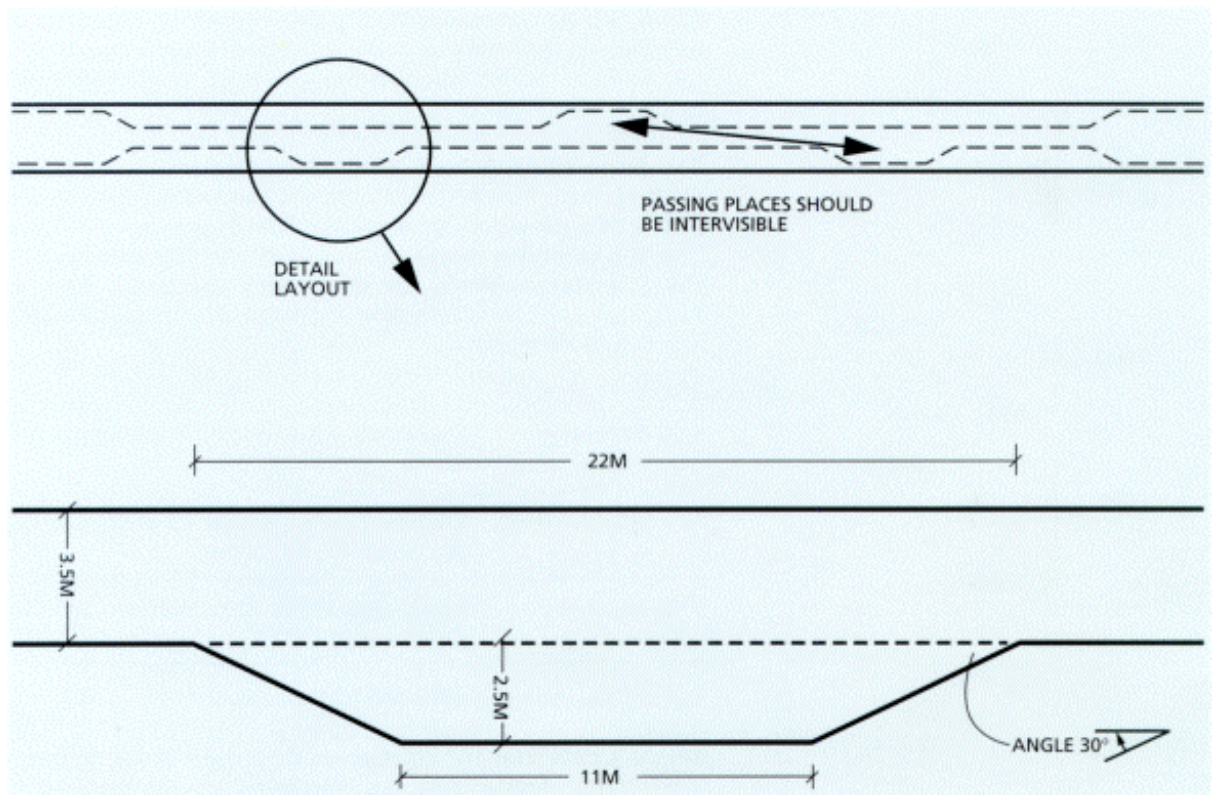


Figure 5.45 Dimensions for Passing Places

5. Road Design Standards

Visibility splays are calculated in the same manner to the method used in the Urban area for the X distance, but the speed which the Y distance is based on will be higher. In certain circumstances, the design speed for the road will not be known and it may be necessary to measure the actual speed at which the traffic is travelling in order to calculate the Y distance.

5.7.7
Visibility Splay

Where the traffic speed can be measured, the 85%ile speed should be measured in wet weather and then this measured speed can be compared against the speed, or the next highest speed in Table 5.17, which then gives the Y distance. If there is not an opportunity to measure the speed then Table 5.18 should be used and the Y distance obtained from the appropriate speed limit.

5.7.8
Speed Visibility Relationship

Major road speed (mph)	75	62	53	44	37.5	30
Y Distance (m)	295	215	160	120	90	70

Table 5.17 *Wet weather — 85 percentile speed*

Speed Limit (mph)	70	60	50	40	30
Y Distance (m)	295	215	160	120	90

Table 5.18 *Speed limit*

Where a development is proposed from a road with a high traffic flow which is not subject to a 30 mph speed limit, particularly in more rural areas, and the access is to be gated then the gate should be set back by at least 6 metres so that cars entering or leaving do not require to stand on the carriageway while the gates are opened and closed. All gates must open inwards towards the site. If the development is to cater for larger vehicles or is a field access then it will be necessary to set the gate back by a distance which will accommodate a turning manoeuvre appropriate for the vehicles which are likely to be using it. On roads with a low traffic flow this requirement may be waived at the discretion of the Head of Roads and Transportation.

5.7.9
Access Points



Private access

Developers are advised to consult the Head of Roads and Transportation at an early stage to determine the road requirements of the development.

5.7.10
Consultation

5. Road Design Standards

Landscape Considerations

5.8

It is important to the general appearance of a housing development that emphasis is placed on the careful design of gardens and public open spaces. Every attempt should be made to reduce the visual intrusion of roads in a housing environment by the judicious use of hard and soft landscape treatments while ensuring that security is not compromised.

5.8.1
*Visual Aspects
of Housing
Developments*

A clear planting concept is required which satisfies the relevant functional and aesthetic objectives and helps form a relationship between the road and the surrounding environment. For example, planting may be employed to provide

5.8.2
*Function of
Planting*

- screening
- reduce impact of noise
- direct pedestrians
- create vistas or focal points
- act as a barrier
- create shade
- provide seasonal colour.



The style of planting should suit the context of the road; for example, an urban environment will often demand more formal, geometric planting design whereas in rural areas naturalistic planting and informal treatments can be more appropriate. Simplicity is often the best approach; a correct choice can create maximum impact while minimising initial and maintenance costs.

Landscape design should seek to provide an attractive environment. In a planted area to be offered for adoption, consideration must not only be given to the function but also to the maintenance requirements. Management and maintenance problems can be largely avoided by appropriate design and proper consideration from the initial stages of the design process. The role of the Local Authority with regard to maintenance of planting is discussed in Paragraph 2.5.12.

5.8.3
*Maintenance
Consideration*

Other landscape elements such as lighting, signs, barriers, walls and bridges should be considered within the overall design of the scheme and seen as opportunities to give a sense of place and provide interest for the road user. Colour, scale and style all require careful consideration to ensure that these elements reflect an appropriate character. Boundary treatments are especially important; appropriate wall and fencing techniques should be used to create enclosure and properly define land in private or public ownership.

5.8.4
*Other
Landscape
Features*

Additional Consideration

5.9

The Council reserves the right to amend any of the standards contained within the Roads Development Guide to suit local circumstances.

A relaxation will be given only when there is no alternative, and in any case must comply with the 'Design Manual for Roads and Bridges' or other approved national good practise publication.

Where no such guidance is available, approval will only be given on condition that road safety is not compromised, this will be done by means of a site specific risk measurement process.

The layout of a development may be influenced by existing or proposed traffic management measures and the Head of Roads and Transportation should be consulted about these at an early stage. Where the Local Roads Authority decides that traffic management measures should be introduced to facilitate a particular development, the developer may be required to reimburse the Authority for expenses incurred in the promotion and implementation of these measures.

The developer should consult with the Council's Planning and Building Control Division to determine their requirements for dealing with external noise. Traffic noise from the following sources should be taken into account;

- (a) existing roads,
- (b) new roads being constructed as part of the proposed development,
- (c) alterations to the road network to accommodate the proposed development,
- (d) alterations to the road network listed in the Road Authority's Transport Policies and Programmes document for construction within a period of five years and/or included in the Structure Plan.

In all residential developments, and especially within culs-de sac or where pedestrian or vehicular routes have maximum permissible gradients, it will be necessary for the developer to provide either a widened portion of footway or an area of hardstanding to facilitate the placing of grit bins.

Notwithstanding the recommended road widths in these guidelines, all roads should accommodate access and operation of fire tenders. The width of roads and reinforced emergency vehicle paths and their proximity to buildings is detailed in Part E of the Building Standards (Scotland) Regulations. This document specifies a minimum width of 3.7 metres adjacent to low rise dwellings to facilitate the use of pumping appliances this width is increased to 4.5 metres to permit the use of heavy rescue and fire fighting equipment where buildings are 9 metres or more in height). It should be noted that a basic vehicle path of 3.5 metres width (2.75 metres at pinch points) is appropriate for access but not operation of the fire tender.

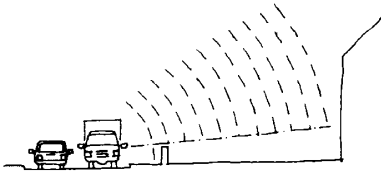


Figure 5.46 Traffic Noise

9.9.1
Amendments to standards

5.9.2
Traffic Management

5.9.3
Traffic Noise

5.9.4
Grit Bins

5.9.5
Fire Fighting

Chapter 6

Traffic Calming Design Standards

6.1 The Need for Traffic Calming

6.2 Traffic Calming Legislation

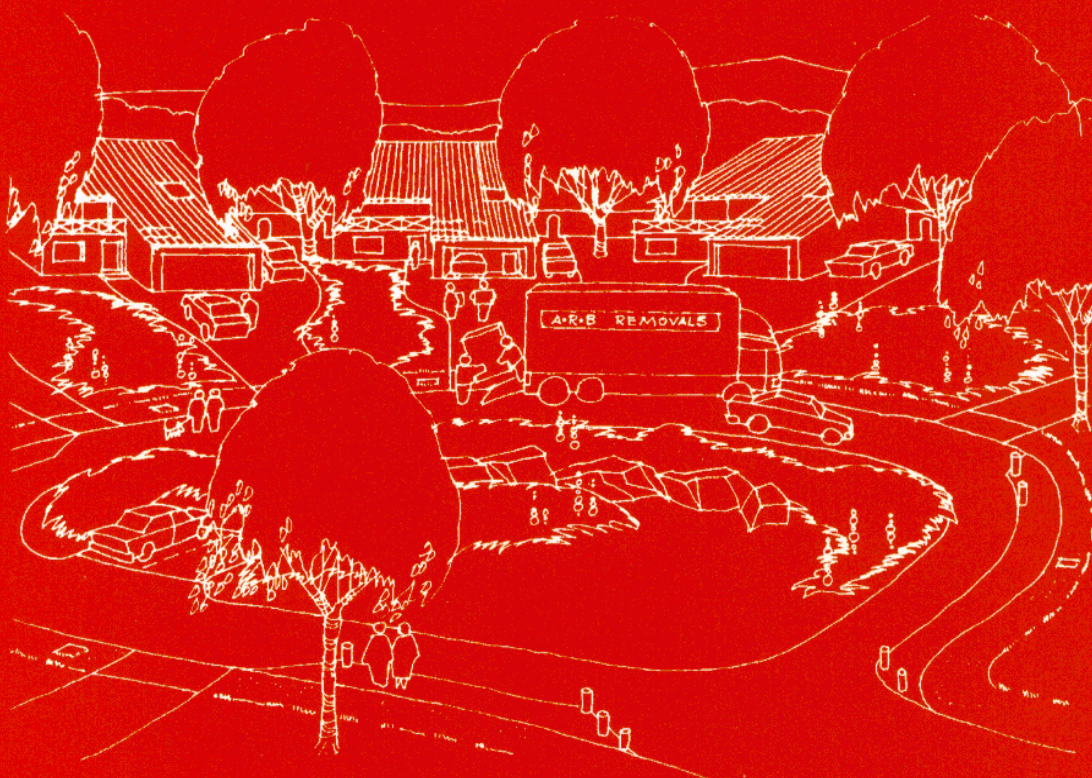
6.3 Traffic Calming Measures

6.4 Complementary Features

6.5 Additional Considerations

6.6 Details of Calming Measures

6.7 Design of Shared Surface Roads



The integration of suitable traffic calming measures in a new scheme can create safer and less intimidating roads and places. Such designed environments can be more suitable for the location as well as reducing vehicle speeds, thereby leading to less accidents and reduced severity of accidents. The standards in this Chapter are complementary and additional to those outlined in Chapter 5. Notwithstanding the contents of this Chapter, developments must comply with the guidance in Chapter 5

6. Traffic Calming Design Standards

The Need for Traffic Calming

6.1

Within many existing road layouts, especially in residential areas, certain problems often arise such as;

6.1.1
*Design
Considerations*

- road accidents
- inappropriate traffic speeds
- indiscriminate parking
- extraneous through traffic
- environmental intrusion

Conventional traffic management techniques can be useful in addressing these issues but it is often more effective to integrate specific traffic calming measures to encourage appropriate behaviour.

6.1.2
*Driver
Behaviour*

Environmental Considerations

Lower vehicle speed will result in a reduction in the number and severity of accidents. Residential areas particularly benefit from the associated reduction in traffic noise. The use of reduced road widths combined with a more flexible geometry gives an opportunity to create space for accommodating planting or amenity/play areas. A traffic calmed layout accompanied by sympathetic environmental enhancement will help create residential areas which protect vulnerable road users such as pedestrians and cyclists.

6.1.3
*Environmental
Benefits*



6. Traffic Calming Design Standards

Traffic Calming Legislation

6.2

The primary legislation is contained within the Roads (Scotland) Act 1984 as modified by the Traffic Calming Act 1992. Under these pieces of legislation various regulations have been introduced initially in The Road Humps (Scotland) Regulations 1990 and subsequently The Roads (Traffic Calming) (Scotland) Regulations 1994, issued under The Traffic Calming Act. Certain criteria in the Scottish Executive Circular 10/92 '20 mph Speed Limit Zones' must also be adhered to.

6.2.1
*Primary
Legislation*

Any Road Hump with a vertical change in the level of the carriageway of between 50 and 100 mm, which can take the form of either a circular arc or a flat top with ramps and can be constructed of any material will be subject to the Road Humps (Scotland) Regulations 1990. Raised junctions may be constructed under section 24 of the Roads (Scotland) Act 1984 and H Humps and Cushions require authorisation from the Scottish Executive. The measures included in this Chapter which are subject to the Road Humps (Scotland) Regulations 1990 are indicated in the tables.

6.2.2
Road Humps



For measures which involve build outs to the footway, or islands in the carriageway, to form restrictions in the carriageway (such as a Pinch Points or Chicanes) or measures over which vehicles can travel (such as rumble strips or overrun areas). The Roads (Traffic Calming) (Scotland) Regulations 1994 must be adhered to. The measures included in this Chapter which are subject to these Regulations are indicated in the tables and where these features incorporate pedestrian crossing facilities then the Regulations do not apply.

6.2.3
*Traffic
Calming*

Traffic Calming Measures

6.3

Application of Traffic Calming to Road Hierarchy

Traffic Calming measures are applicable to the road hierarchy as described below in Table 6.1.

6.3.7
*Application/
Hierarchy*

Road Hierarchy	Suitability for Traffic Calming
Strategic Roads <ul style="list-style-type: none"> • Main Distributor Road • District Distributor Traffic Distributor Road	Possible in special circumstances Desirable in Residential areas
Industrial Road	Not normally used in industrial areas
Residential Roads <ul style="list-style-type: none"> • Residential Core Road • Housing Road • Shared Surface Road 	Obligatory

Table 6.1 *Application of Traffic Calming to Road Hierarchy*

The type and design of specific traffic calming measures are described in Section 6.6; the general approach to traffic calming for each road type is described below.

6.3.2
*Application
Distributor Roads*

Traffic Calming Traffic Distributor Roads

Where traffic calming measures are required on Traffic Distributor Roads they should be introduced over the appropriate length preceded at both ends by a gateway. The measures should be located at a spacing of no more than 150 metres and be of types selected from the measures in Section 6.6. Where these measures prove to be inappropriate other measures included in Section 6.6 can be incorporated as advised by the Head of Roads and Transportation. Where other factors may make certain types of measures unacceptable then the Head of Roads and Transportation will inform the developer of the measures not to be used.

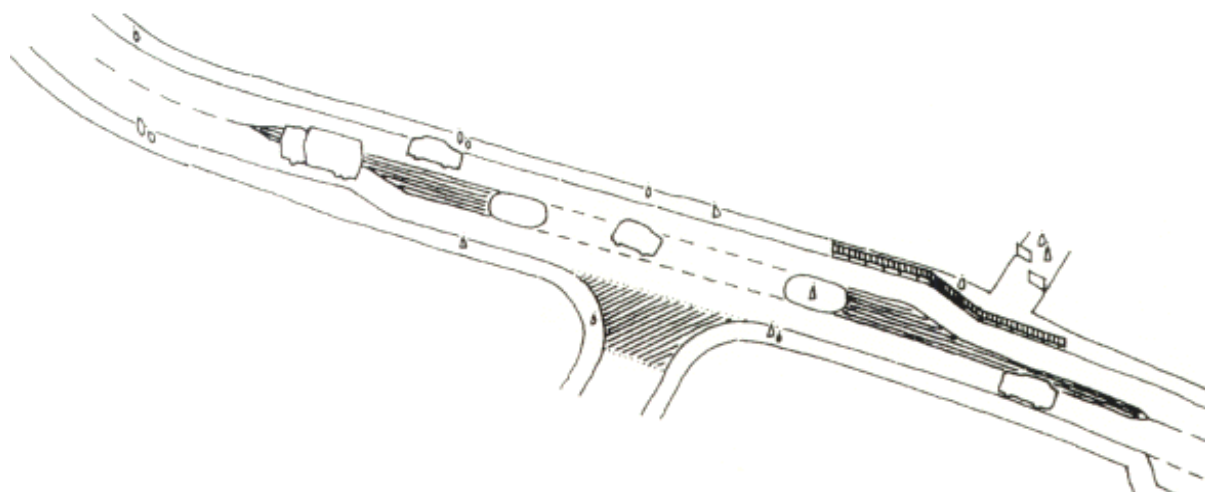


Figure 6.1 Deflected path on Traffic Distributor Road

6. Traffic Calming Design Standards

Traffic Calming Residential Roads

6.3.3
20mph
Residential
Roads

As indicated in Chapter 4 on Road Hierarchy, all Residential Roads should be designed such that vehicle speeds are restrained by means of traffic calming measures, allowing for the potential to introduce a 20 mph zone. Any necessary promotion of traffic orders will be undertaken by the local Roads Authority.

6.3.4
Length of
Road/Design
Speed

20 mph zones are legally required to have no point within the zone at a greater distance than 1 kilometre from the road from which access is taken. No individual limit is applied to the lengths of different road types in the road hierarchy. However, in general terms, the design speed should decrease from the entrance to more distant points within the development. This should be achieved by the proper use of the traffic calming techniques.

6.3.5
Gateway

A gateway feature should be introduced to indicate the start of the traffic calmed area to the driver (Figure 6.2). Preferably this will be applied at a junction giving access to an area but can also be applied on a straight, in exceptional circumstances, at the discretion of the Head of Roads and Transportation.

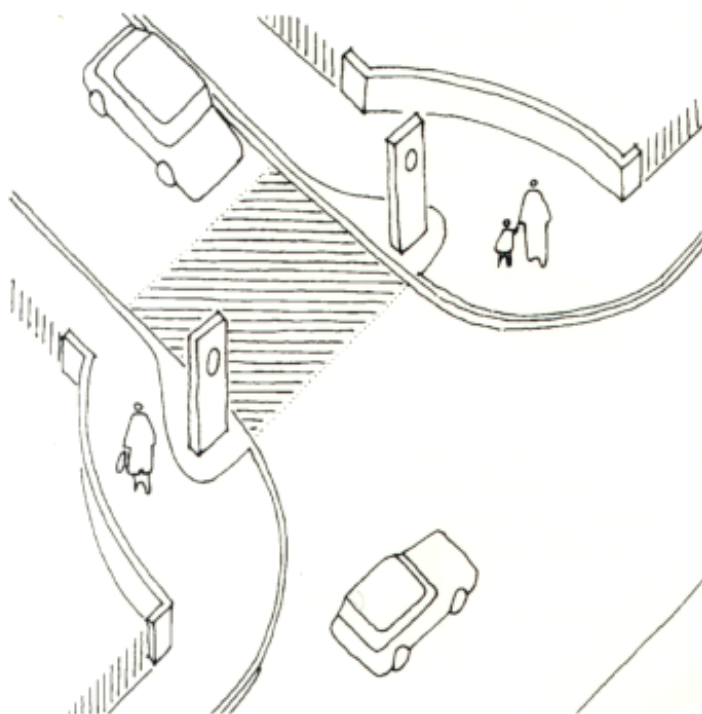


Figure 6.2 Gateway Feature



6. Traffic Calming Design Standards

It is essential that all sites have a clear internal layout and that Residential Core Roads are easily identifiable. Any traffic calming measures, or change in carriageway alignment, should be applied in such a way that the Residential Core Road appears to have a continuous alignment. Figure 6.3.

6.3.6
Retaining the identity of Core Roads

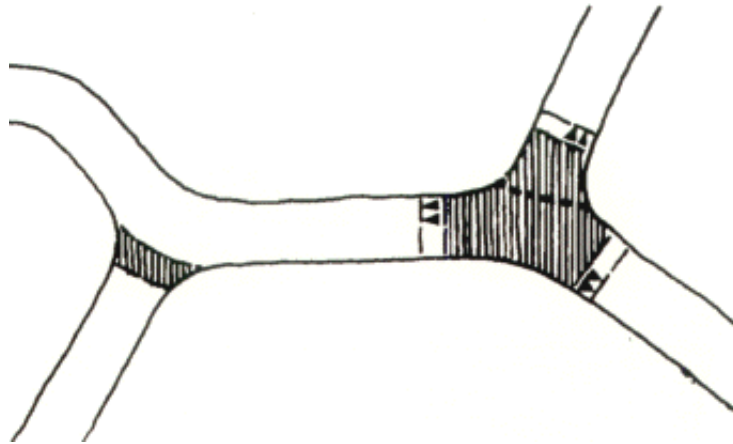


Figure 6.3 Residential Core Road identification

Traffic calming encompasses a wide range of speed reduction measures, and combinations of measures and layouts will be acceptable provided the overall concept is one of promoting the safety of persons using the road and / or preserving or improving the environment. Consideration of wider urban design issues will be helpful in ensuring that the traffic calming measures are appropriate to the surrounding townscape. Traffic calming can be complemented by the factors identified in Section 6.4.

6.3.7
Safety/Urban Design

The effectiveness of the traffic calming measures is based on their capability to reduce speed. Each of the specific measures, with relevant facts, are illustrated in detail at the end of this section. The measures are classified under three categories based on their effectiveness in reducing speeds, as detailed in Table 6.2.

6.3.8
Speed Reduction Categories

Category	A	B	C
Effectiveness of Speed Reduction	substantially reduced	generally reduced	slightly reduced
Typical speed at the measure (mph)	10	15	20
Example	speed control Bend	chicane	pinch point
Minimum forward visibility at the measure (m)	15	25	35

Table 6.2 *Traffic Calming Speed Reduction Categories*

6. Traffic Calming Design Standards

6.3.9 Spacing Between Traffic Calming Measures

Average deceleration and acceleration rates have been researched to calculate the permitted spacing of traffic calming measures. In order to meet 20 mph zone criteria the maximum distance between the categories is detailed in Table 6.3. The spacing is based on the distance between the leaving edge of one measure to the entry of the next as detailed in Figure 6.4. As the aim is to produce an acceptable speed for the possible introduction of a 20 mph zone under no circumstances should the specified spacing be exceeded, but reductions will be permitted. As the justification for a 20 mph zone also depends on speeds between measures so the spacing is of vital importance to achieve an average speed. Absolute minimum spacing between measures must be 15 metres to allow long vehicles to manoeuvre.

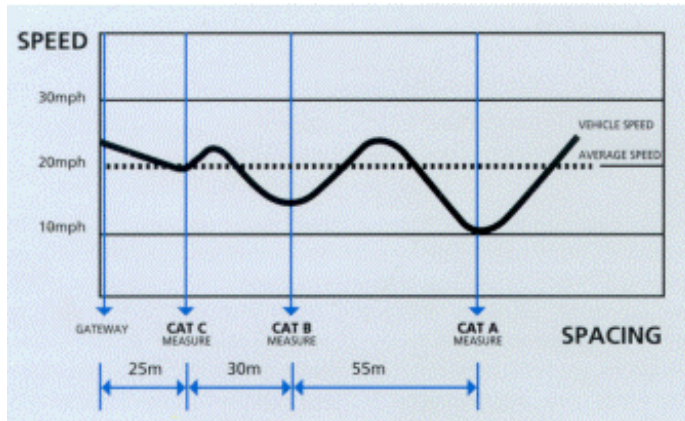


Figure 6.4 Spacing of Traffic Calming Measures

Traffic Calming Measure from I to	A	B	C
A	60	55	40
B	55	45	30
C	40	30	25

Table 6.3 Distances between measures in metres to facilitate 20mph zone

6. Traffic Calming Design Standards

The use of various types of traffic calming methods is encouraged to maintain driver awareness and to improve the amenity of the area. Consecutive Type C measures will only be permitted where the adjacent measures are used in the form of a chicane, made of a build out, followed by an island.

6.3.70
Combining
Measures

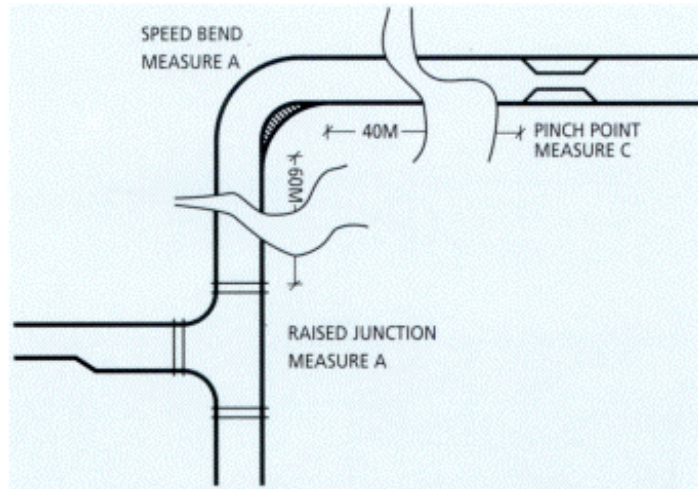


Figure 6.5 Combining Traffic Calming Methods

Drainage must be considered in detail as vertical and lateral traffic calming measures affect the carriageway channel level and line. This will entail additional gullies being added or a bypass channel being incorporated in the design of the traffic calming measure, as detailed in Figure 6.6.

6.3.11
Drainage

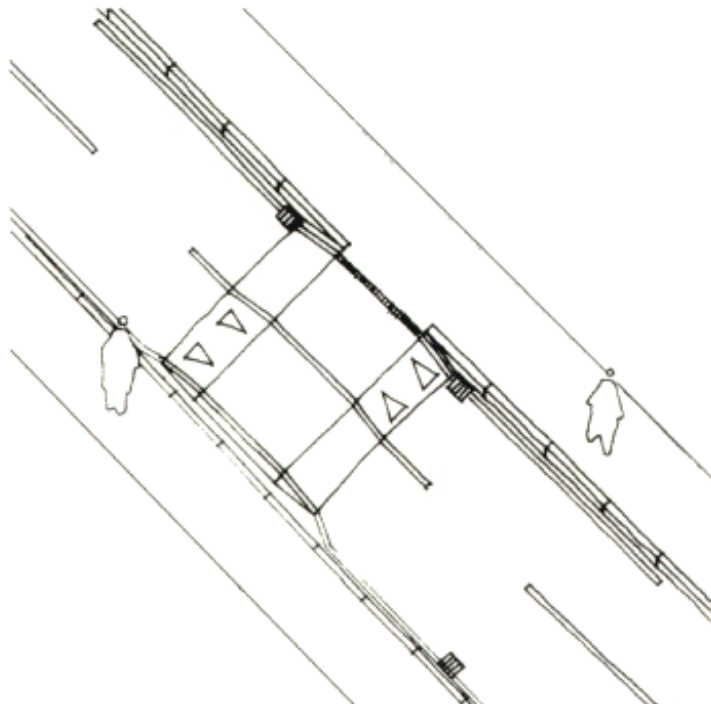


Figure 6.6 Drainage at Traffic Calming Measures

6. Traffic Calming Design Standards

6.3.12
Introduction

Worked Example

Indicated in Fig 6.7 is the worked example from Paragraph 5.3.19 that is developed further by the integration of traffic calming measures and road design standards.

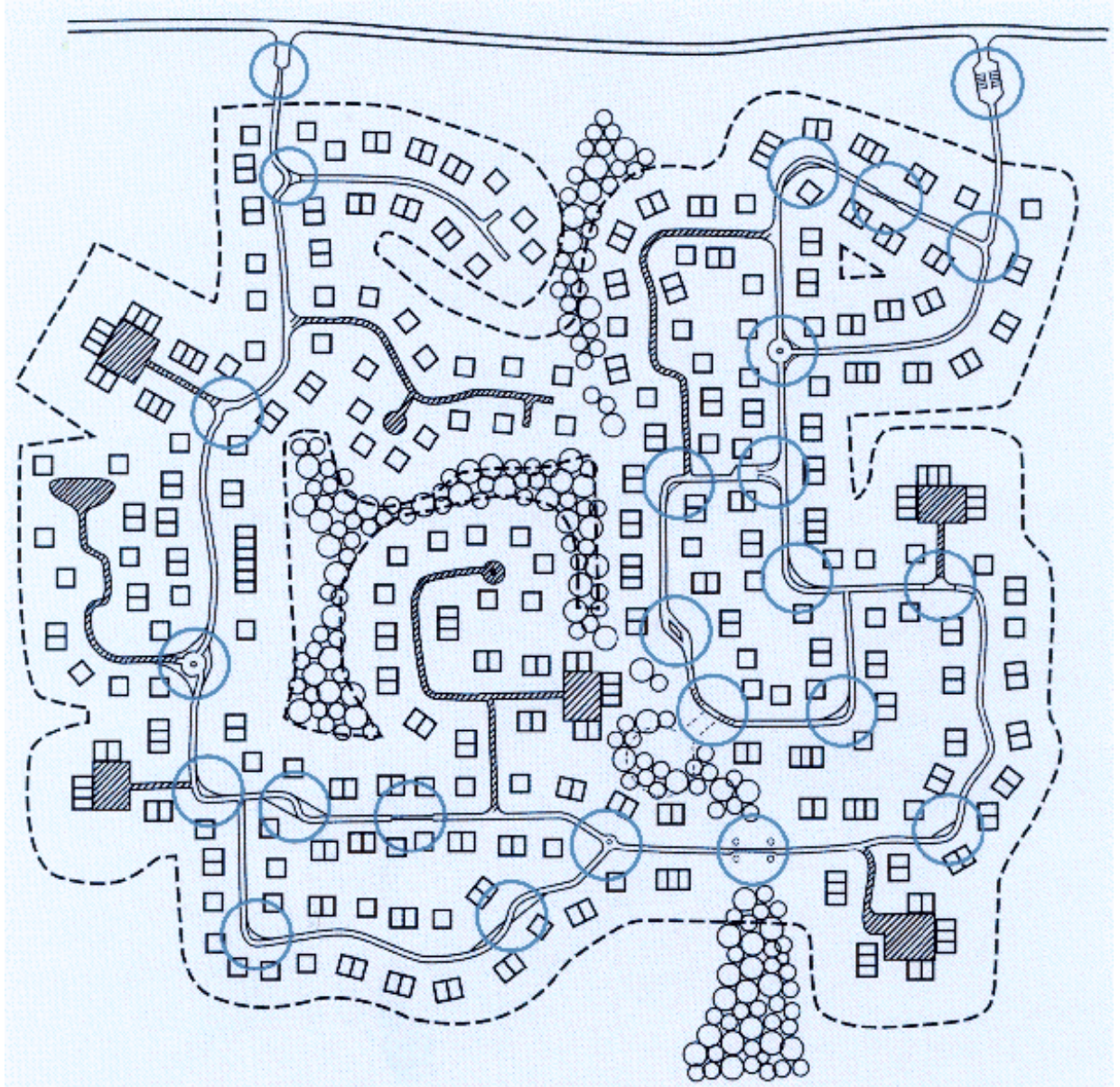


Figure 6.7 Worked Example with Traffic Calming Measures

6. Traffic Calming Design Standards

Complementary Features

6.4

Complementary features to traffic calmed areas can help to reduce speed by giving emphasis to calming measures that are incorporated into the design. This can effect the behaviour of drivers, cyclists and pedestrians in the following ways:

6.4.1
*Effect of
Complementary
Features*



(a) visual narrowing - by making the road appear narrower and more enclosed by bringing planting, walls or tall objects close to the road,

(b) perception of speed - by increasing a sense of speed by, for example, adjusting the spacing of avenue trees,

(c) emphasising changes in road function - by changing the type of the landscape treatment, altering the perceived scale of spaces or changing materials or colours to underline a transition in the nature of the road,

(d) accentuating traffic calming measures- by concentrating the deployment of complementary features at the speed reduction measures,

(e) directing or segregating road users - by directing pedestrians to crossing points, forming physical barriers where necessary or helping delineate footpaths, footways, cycletracks and carriageways.

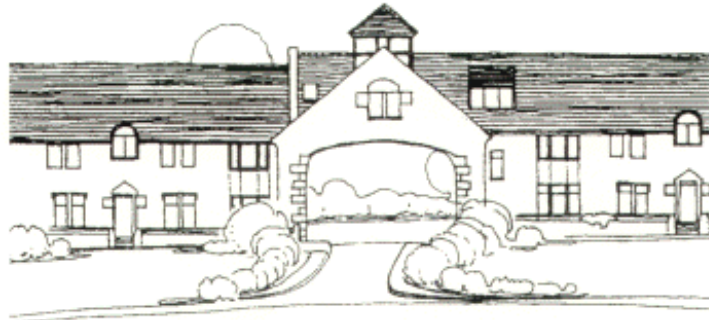


Figure 6.8 Visual narrowing by means of pend

Four categories of complementary features can be identified as follows:

6.4.2
Types of
Complementary
Features

(a) vertical features - such features would include bollards, pillars, walls, raised planters, rails and fences. Other types of street furniture such as road signs, lighting columns and pillar boxes can fulfil the same function while avoiding street clutter. Vertical features can be used to restrict unsafe vehicle manoeuvres, channel pedestrians to crossing points and prevent parking on the footway.

(b) planting - trees, shrubs and ground cover can all be utilised as complementary features in traffic calming design. Trees can be effective in creating an obvious visual narrowing to measures that restrict carriageway width. Simplicity in design, using a limited number of species is recommended for any shrub and ground cover specification.

6. Traffic Calming Design Standards

- c) paving - the change in carriageway surface to paved material can heighten awareness of traffic calming measures. Within paved carriageways the colour of paving can be used to create the same contrasting effect. Textural contrast can also be achieved by changing the paving materials, eg from blocks to setts or in the laying of the paved materials. Different paving surfaces can be used to either highlight an appropriate route for vulnerable road users or alternatively to deter pedestrians from walking on a part of the footway.
- (d) overhead structures - bridges or other structures spanning the road can be used to emphasise the gateway to a traffic calmed scheme. Where it is intended to erect any structure which crosses the road permission from the Head of Roads and Transportation, under the Roads (Scotland) Act 1984, will be required.

6. Traffic Calming Design Standards

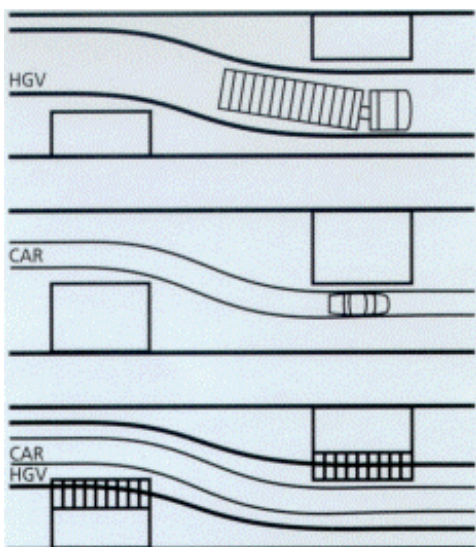


Figure 6.9 Overrun areas diagram



Additional Considerations

Accommodating Large Vehicles

Where many large vehicles use the road, then it will be necessary to design lateral shifts in two stages. This can be achieved by first designing a layout which is suitable for the larger types of vehicles as detailed in Figure 6.9. A further design is then superimposed over this layout which will restrict cars to an appropriate speed using the dimensions detailed in Section 6.6. When the two designs are amalgamated the areas between the different alignments which is required for HGVs but not for cars is treated to provide an overrun finish which constrains the cars to a tight alignment but allows the HGVs to manoeuvre through the measure by using the overrun areas.

Accommodating Cyclists

A cycle bypass should be created to the side of the traffic calming measures either on road or adjacent to the footway, unless alternative routes exist. This can be created individually for each measure or as a longer diversion avoiding several measures and covering a longer length. The access and egress for these cycle bypasses should be constructed as detailed in Figure 6.10.

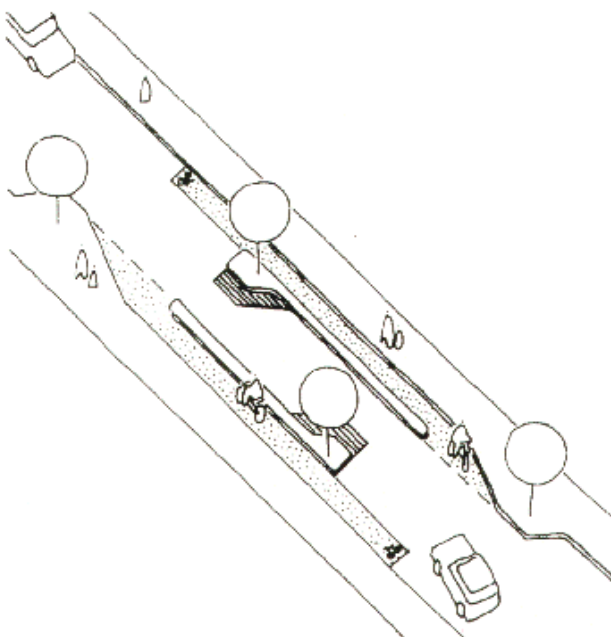


Figure 6.10 Cycling bypass of Traffic Calming Measures

6.5

6.5.7
Overrun areas

6.5.2
Cycle Bypasses

6. Traffic Calming Design Standards

6.5.3

*Widths/Cycle
Calming*

Cycle bypasses avoiding one measure should be a minimum of 0.75 metres wide and longer cycle bypasses should be between 1.5 and 2 metres wide depending upon the number of cyclists using the route. Where this cycle bypass crosses a pedestrian route it will be necessary to introduce some form of traffic calming, such as a rumble strip, on the cycle route itself to alert cyclists that pedestrians are likely to be crossing ahead. These provisions are detailed in Figure 6.11.

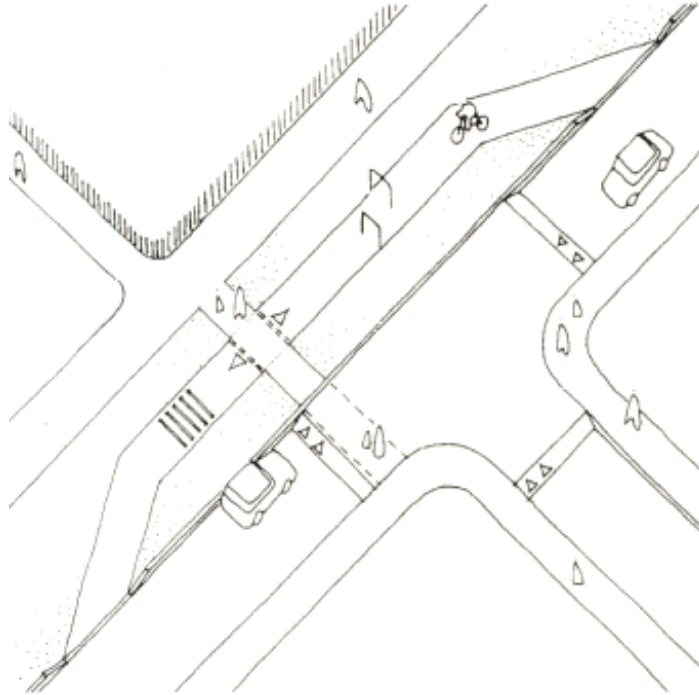


Figure 6.11 Provision of traffic calming on cycle routes

6. Traffic Calming Design Standards



Details of Calming Measures

6.6

A range of Traffic Calming measures are identified in this section. Guidance is given on the suitability of incorporating each measure into development proposals. Dimensional information is supported by a brief schedule which covers aspects of implementation, assisting features, complimentary measures and any other additional comment.

6.6.1 *Introduction*

Care should be taken if the measure is implemented using alternative dimensions as this may effect the speed reduction category. Approval from the Head of Roads and Transportation will be required for the case of adjusted dimensions or altered measures.

6.6.2 *Alternative Dimensions or Measures*

The following graphic devices have been used to illustrate aspects of the measures :

6.6.3 *Graphic Legend*



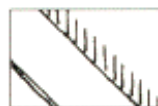
Surface of road in contrasting colour, texture or material



Footway surfacing with carriageway construction



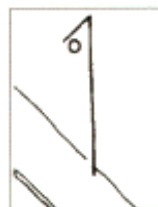
Overrun areas



Preferred location for driveway access



Alternative location for driveway access



Street lighting



Bollard

6. Traffic Calming Design Standards

6.6.4 List of measures

The names of the measure feature are listed below under generic headings as follows :

Generic Name	Measure Number	Measure Name	Speed Reduction Category
Vertical Measures	6.6.4	(1) Road hump	A
		(2) Speed table	A
		(3) Raised Junction	A
		(4) Cushion	B
		(5) H Hump	A
Lateral Measures	6.6.4	(6) Chicane Type 1	A, B or C
		(7) Chicane Type 2	A, B or C
		(8) Chicane Type 3	C
Measures which affect the carriageway width	6.6.4	(9) Width restriction to carriageway	B
		(10) Central Island	C
		(11) Width restriction by means of a central reserve	C
		(12) Pinch Point	C
Measures which can be overrun by vehicles	6.6.4	(13) Occasional Strip	C
		(14) Rumble Strip	C
		(15) Median Strip	C
Geometric Alignment	6.6.4	(16) Speed bend	A
		(17) Lateral shift in alignment	B or C
Measures at Junctions	6.6.4	(18) Change in junction Alignment	B or C
		(19) Reduction in junction area	B
		(20) Overrun corners	B
		(21) Conventional Roundabout	B
		(22) Mini-roundabout	B
		(22) Mini-roundabout	B
Restricted Manoeuvre	6.6.4	(23) Diagonal closure	A
Gateway	6.6.4	(24) Gateway on straight	B or C
		(25) Gateway on side road	B
		(26) Two road gateway	B

6. Traffic Calming Design Standards

Conditions of Use

- Suitable for any road width
- Road Hump Regulations apply
- Not suitable for Traffic Distributor Road

Aspects of Implementation

- Should be clearly visible
- Should be well illuminated
- Installation at right angles to the direction of travel
- Signing and lining to conform with Road Hump Regulations or change in material in 20mph zones.

Assisting Features

- Vertical measures such as bollards or planting of trees/shrubs etc at road hump to increase awareness of the sensitive nature of the area.
- Hump can be surfaced using a different material from the road and footway

Additional Comments

- Series can be annoying for cyclists
- Increase in noise/vibration
- Use on bus routes should be restricted

Complementary Calming Measures

- 6.6.4(10) Central Island
- (12) Pinch Points

6.6.4(1)
ROAD HUMPS
SPEED
REDUCTION
CATEGORY A

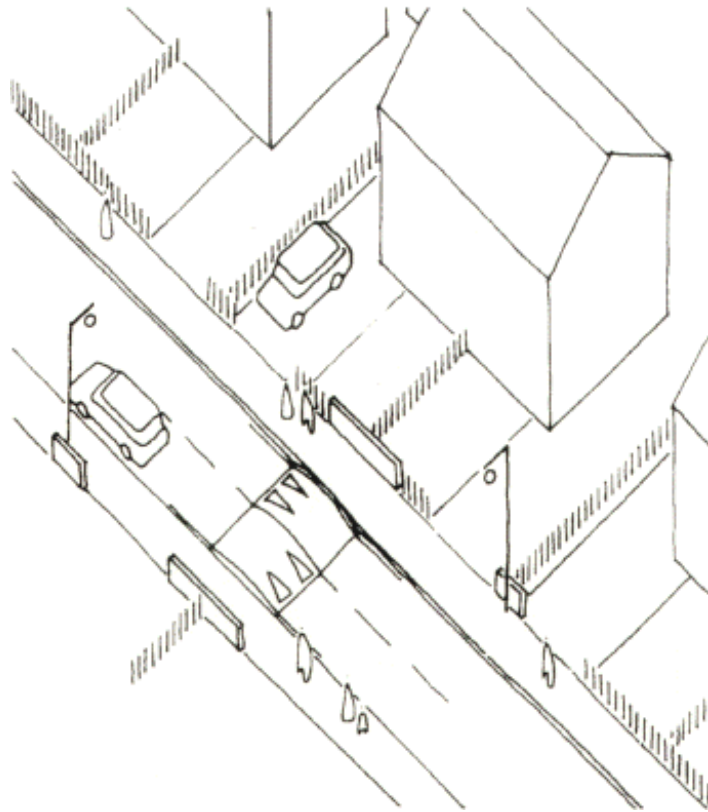


Figure 6.12 View of Road Hump

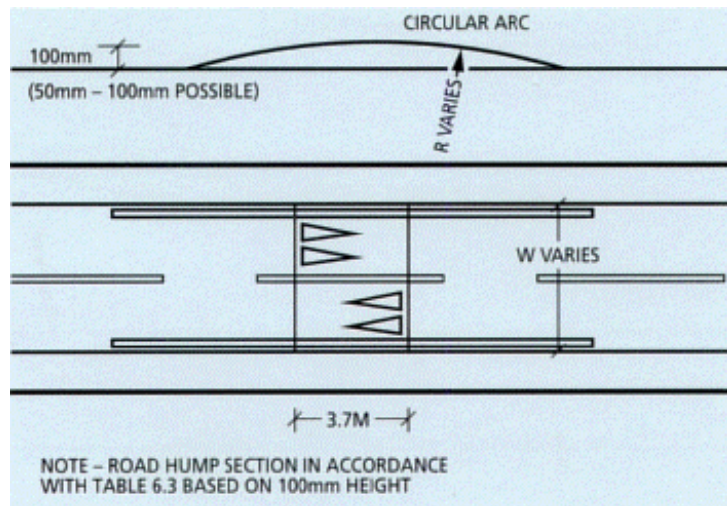


Figure 6.13 Road Hump Design

6. Traffic Calming Design Standards

6.6.4 (2)
SPEED
TABLE
SPEED
REDUCTION
CATEGORY A

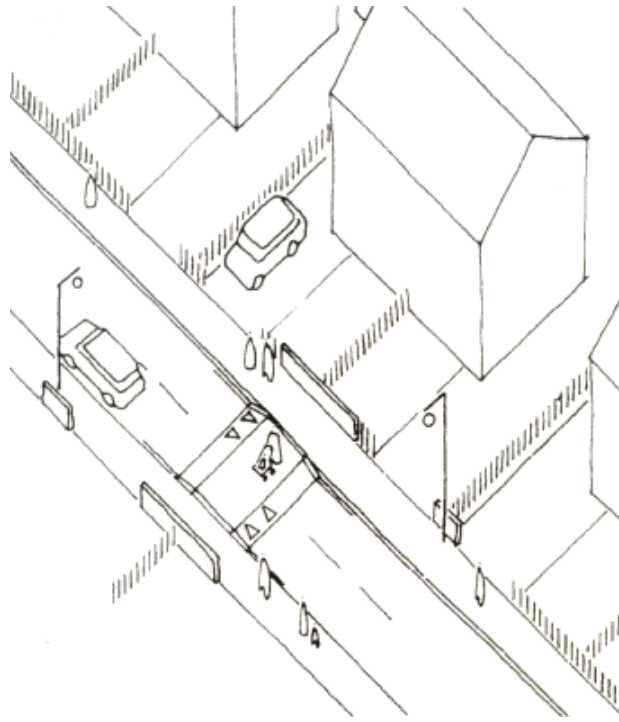


Figure 6.14 View of Speed Table

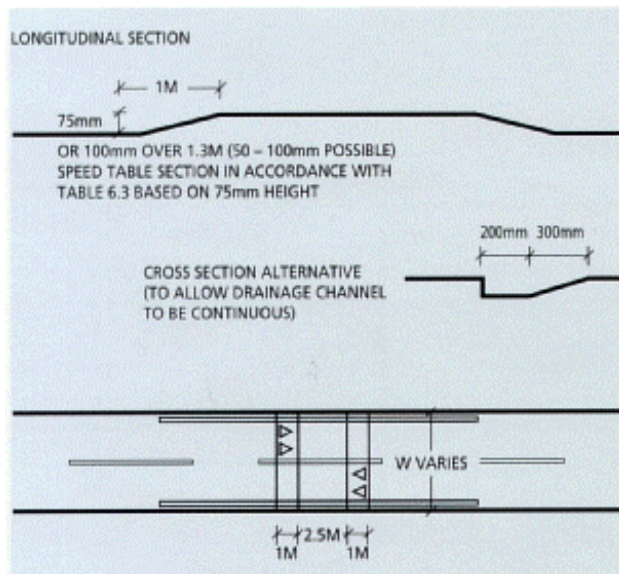


Figure 6.15 Speed Table Design

Conditions of Use

- Suitable for any road width
- Road Hump Regulations apply
- Not suitable for Traffic Distributor Road

Aspects of Implementation

- Crossing should be installed where there is a high degree of pedestrian attraction
- Should be clearly visible
- Should be well illuminated
- Installation at right angles to the direction of travel
- Signing and lining to conform with Road Hump Regulations or change in material in 20mph zones

Assisting Features

- Vertical measures such as bollards or trees and shrubs can be planted at speed table to increase awareness
- Speed table can be in a different material to the road surface

Additional Comments

- Good crossing facility for pedestrians, particularly those with a mobility handicap
- Series may prove annoying for cyclists
- Increase in noise/vibration
- Use on bus routes should be restricted

Complementary Calming Measures

- 6.6.4(10) Central Island
(12) Pinch Points

6. Traffic Calming Design Standards

Conditions of Use

- Raise to same level as footway
- Not suitable for Traffic Distributor Road
- Suitable for any road width

Aspects of Implementation

- Signing and lining to conform with Road Hump Regulations or change in material in 20mph zones
- Should be well illuminated
- Vertical measures to segregate pedestrians and vehicles

Assisting Features

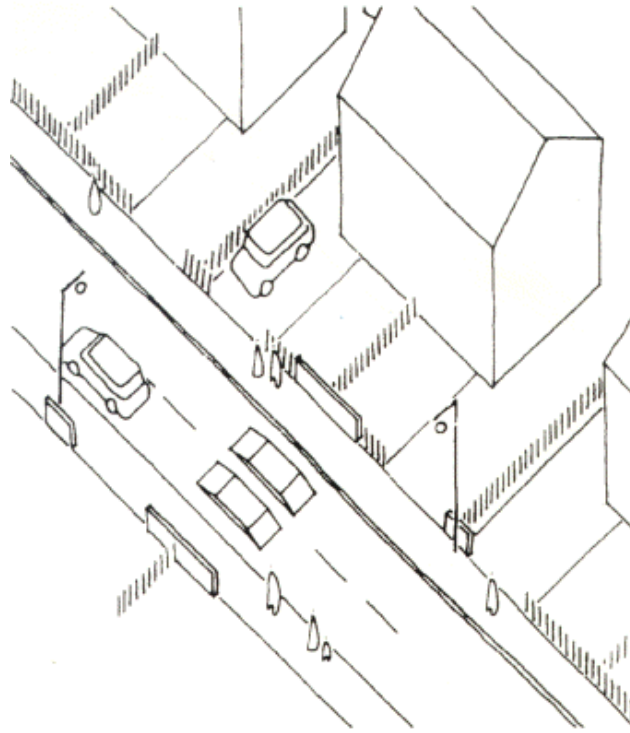
- Different surface
- Vertical measures such as bollards or trees and shrubs can be planted to increase awareness

Additional Comments

- Vehicle parking on junction should generally be avoided
- Good crossing facilities for pedestrians
- Series may prove annoying to cyclists
- Limited use on bus routes

Complementary Calming Measures

- 6.6.4(10) Central Island
- (20) Overrun Corners



6.6.4 (3)
RAISED
JUNCTION
SPEED
REDUCTION
CATEGORY A

Figure 6.16 View of Road Junction

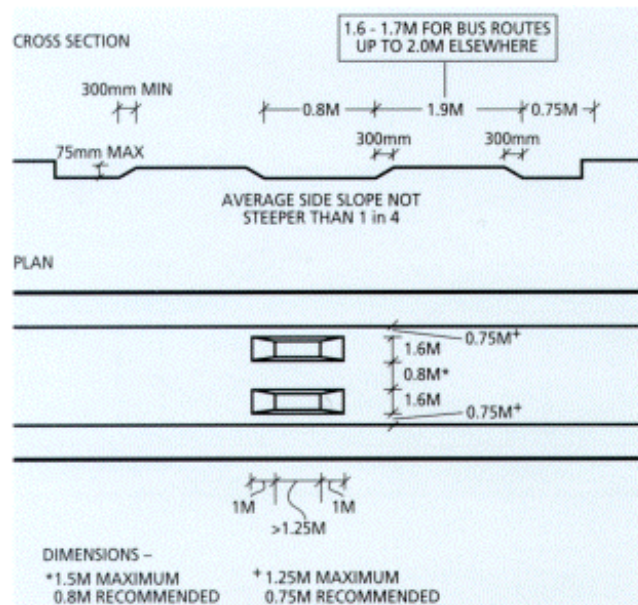


Figure 6.17 Road Junction Design

6. Traffic Calming Design Standards

6.6.4 (4)
CUSHION
SPEED
REDUCTION
CATEGORY B

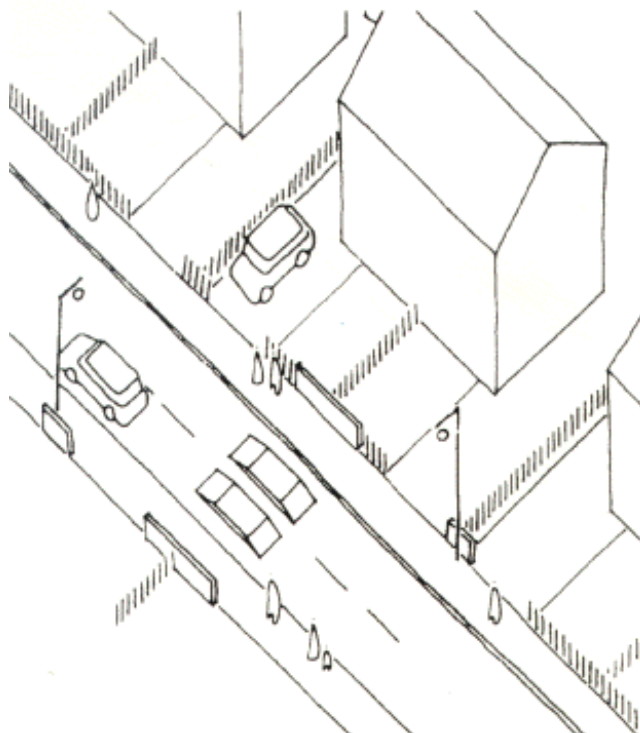


Figure 6.18 View of Cushion

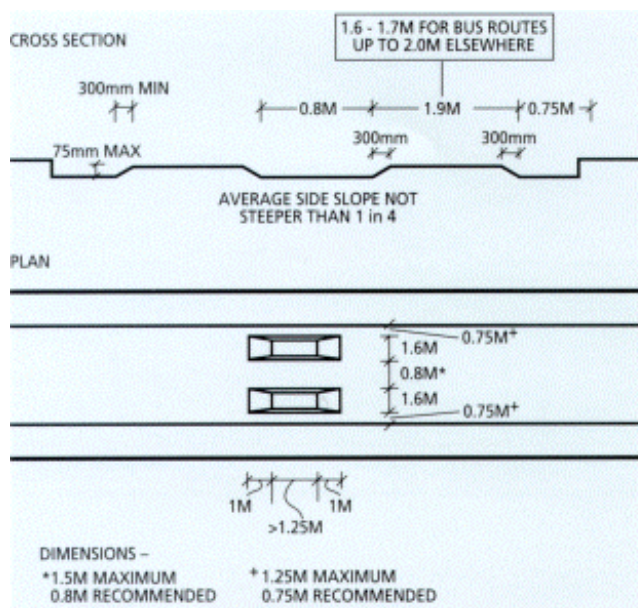


Figure 6.19 Cushion Design

Conditions of Use

- Authorisation required from Scottish Executive
- Can be used on roads with heavy HGV and bus flows
- Can be used on Traffic Distributor Road
- Road narrowing by build cuts or islands may be essential if road is wide

Aspects of Implementation

- Signing and lining to conform with Road Hump Regulations or change in material in 20mph zones
- Should be well illuminated

Assisting Features

- Cushion can be in different material to the road surface
- Vertical measures such as bollards or trees and shrubs can be planted to increase awareness

Additional Comments

- Can assist cycle movements
- Does not reduce motorcycle speeds
- Does not assist pedestrians crossing
- Smoother passage for buses

Complementary Calming Measures

- 6.6.4(10) Central Island
- (12) Pinch Points

6. Traffic Calming Design Standards

Conditions of Use

- Suitable for any road width but may require additional traffic calming measures
- Authorisation from Scottish Executive required
- Suitable for Traffic Distributor Road

Aspects of Implementation

- Should be clearly visible
- Should be well illuminated
- Should have road markings to increase visibility
- Installation at right angles to the direction of travel
- Signing and lining to conform with Road Hump Regulations or change in material in 20mph zones

Assisting Features

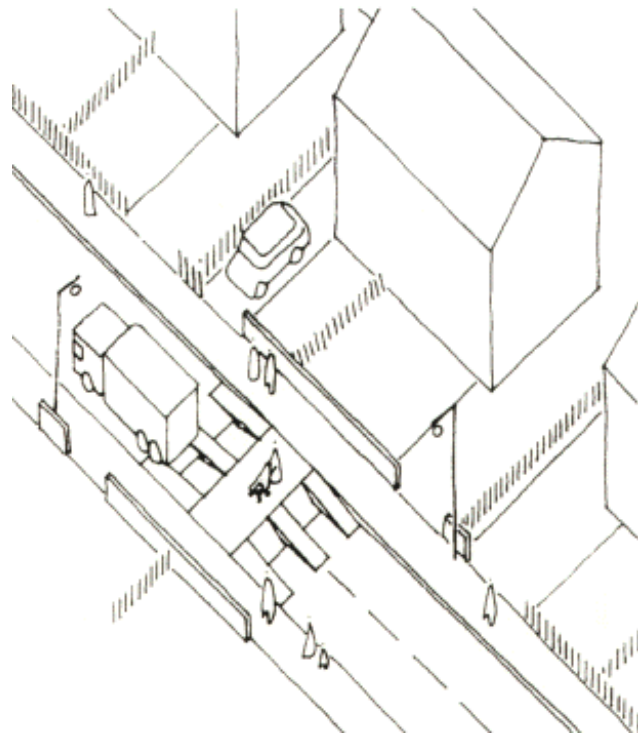
- Vertical measures such as bollards or trees and shrubs can be planted at H-hump to increase awareness
- H-hump can be in a different material to the road surface

Additional Comments

- Allows cyclists to pass with minimum disruption
- Smoother passage for buses
- Good crossing facility for pedestrians particularly those with a mobility handicap

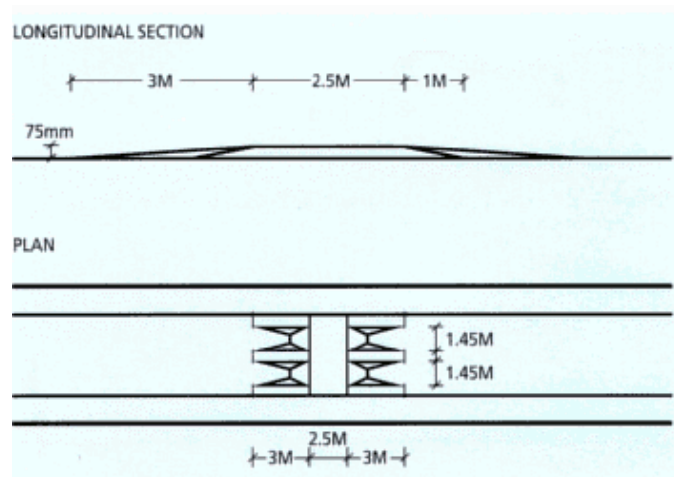
Complementary Calming Measures

- 6.6.4(10) Central Island
- (12) Pinch Points



6.6.4 (5)
H HUMPS
SPEED
REDUCTION
CATEGORY A

Figure 6.20 View H-hump



- 6.6.4(10) Central Island
- (12) Pinch Points

6. Traffic Calming Design Standards

6.6.4(6) CHICANE TYPE 1 - SPEED REDUCTION CATEGORY A, B or C

Overall Road Width "W" (metres)	Road Free View "a" [For Information only] (metres)	Stagger length L_L for Enhancement Overmarking to achieve desired lorry or bus speed through measure			
		Measure Type/Desired Speed			
		5mph	A 10mph	B 15mph	C 20mph
7.3	-1.3	20m*	21m	22m	25m
6.0	0	17m*	18m	19m	22m
5.5	0.5	15m*	16m	17m	19m
4.8	1.2	13m*	14m	15m	17m
4.1	1.9	10m*	11m	12m	13m

Note 1: (*) denotes absolute minimum dimensions. Articulated vehicles cannot pass at these dimensions without overriding the kerb.

Note 2: For a Type C car measure, a Type A, B or C for Lorry can be used. For a Type B car measure, a Type A or B for Lorry can be used. For a Type A car measure, a Type A only for Lorry can be used.

Note 3: Only Type B or C Lorry measures can be used on a bus route.

Table 6.4 Chicane Type 1 - Stagger Lengths for Heavy Vehicles

Overall Road Width "W" (metres)	Free View "a" [For Information only] (metres)	Stagger length L_c for Enhancement Overmarking to achieve desired car speed through measure			
		Measure Type/Desired Speed			
		5 mph	A 10mph	B 15mph	C 20mph
7.3	-1.3	7.5m*	10m	14m	17m
6.0	0	6.5m*	8m	10m	13m
5.5	0.5	5.5m*	6.5m	9m	11m
4.8	1.2	4m*	6m	8m	9.5m
	1.9	0m*	0m	0m	0m

(*) denotes absolute minimum dimensions

Table 6.5 Chicane Type 1 - Enhancement Overmarking Stagger Lengths for Cars

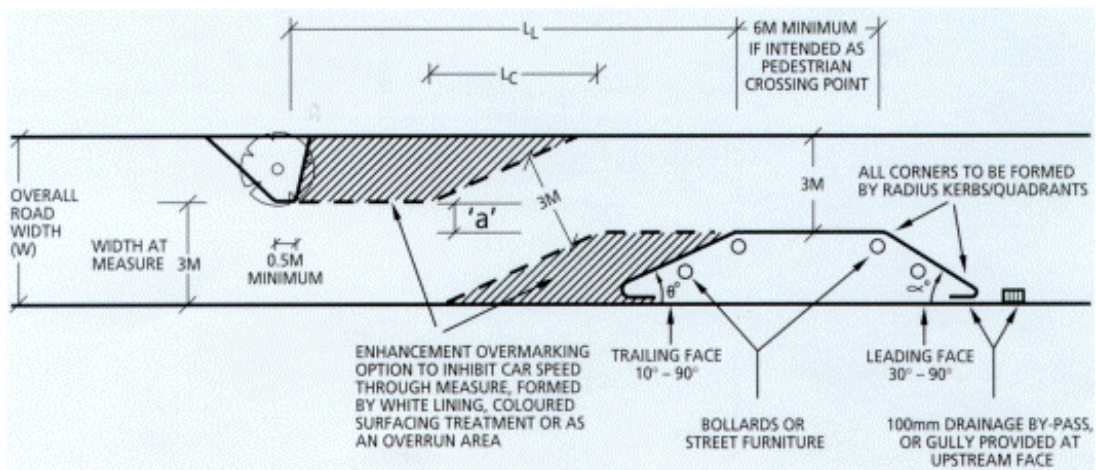


Figure 6.22 Chicane Type 1 Design

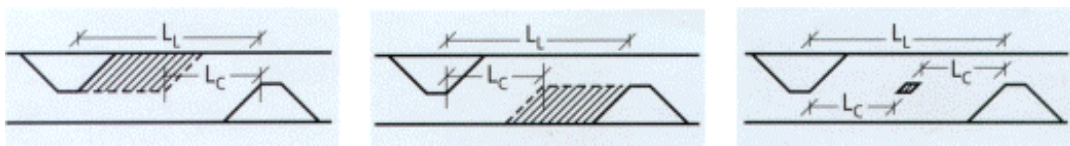


Figure 6.23 Chicane Options

Conditions of Use

- Traffic Calming Regulations apply
- Appropriate width required
- Suitable for conversion to alternate working for peak traffic flows of less than 300 vehicles per hour with appropriate reduction in carriageway width
- Not suitable for Traffic Distributor Road

Aspects of Implementation

- Clear vision of opposing traffic is vital
- Good illumination essential
- Chicane deflection to the right in driving direction is preferable

Assisting Features

- Vertical elements such as bollards or trees and shrubs can be planted to increase awareness

Additional Comments

- Speed reduction can be dependent on traffic flow
- Can be rendered ineffective when illegal parking occurs
- Cyclists in opposing directions have no physical protection

Complementary Calming Measures

- 6.6.4(2) Speed Table
(4) Cushion
(14) Rumble Strip

6. Traffic Calming Design Standards

Conditions of Use

- Traffic Calming Regulations apply
- Appropriate width required
- Not suitable for Traffic Distributor Road
- Suitable for conversion to alternate working for peak traffic flows of less than 300 vehicles per hour with appropriate reduction in carriageway width

Overall Road 'W' (metres)	Available Width at Measure for Cars 'W _c ' (metres)	Available Width at Measure for large vehicles 'W _L ' (metres)	Length of Stagger 'L' (metres)		
			Type A Measure 10mph	Type B Measure 15mph	Type C Measure 20mph
7.3	3.0	4.0	7	9	11
6.0	2.75	3.75	5	7	9
5.5	2.75	3.75	4	5	7
4.8	2.7	3.4	3	4	6
4.1	2.6	3.2	3	4	5

6.6.4(7)
CHICANE TYPE 2
SPEED REDUCTION CATEGORY A, B OR C

Table 6.6 Chicane Type 2 - Dimensions for Various Design Speeds

Aspects of Implementation

- Overrun areas must be provided
- Good illumination essential

Assisting Features

- Vertical elements such as bollards or trees and shrubs can be planted to increase awareness

Additional Comments

- Visual interruption of straight through alignment
- Poor visibility when leaving parking space can cause problems
- Cyclists following ideal riding lines can encounter problems traversing overrun areas
- Certain layouts may leave cyclist travelling in the opposing direction with no physical protection

Complementary Calming Measures

- 6.6.4(2) Speed Table
- (4) Cushion
- (13) Rumble Strip

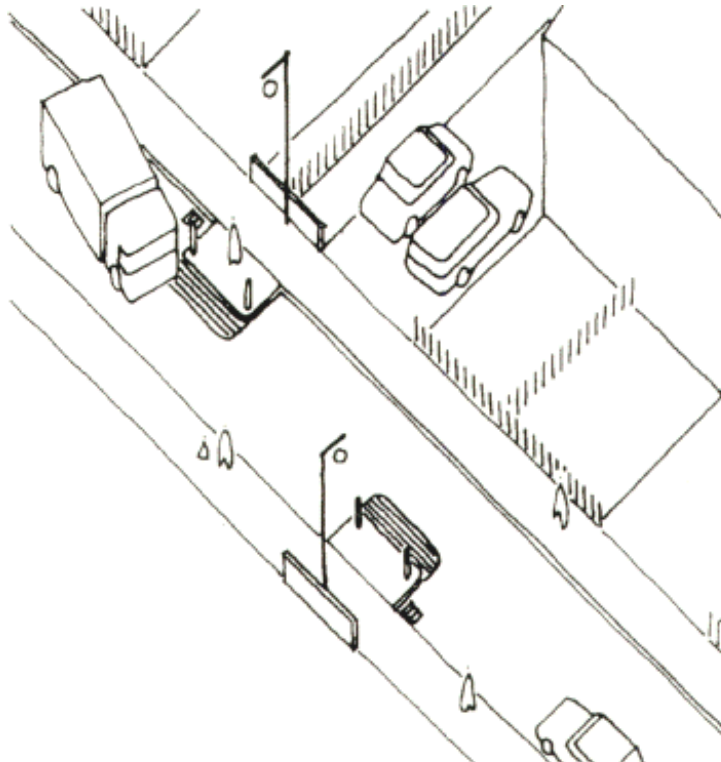


Figure 6.24 view of Chicane Type 2

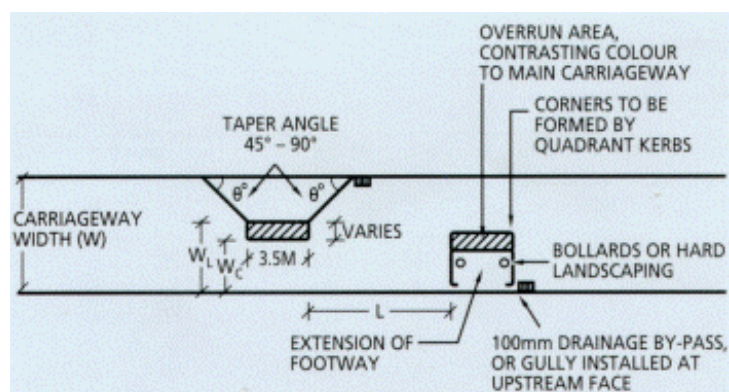


Figure 6.25 Chicane Type 2 Design

6. Traffic Calming Design Standards

6.6.4(8) CHICANE TYPE 3 SPEED REDUCTION

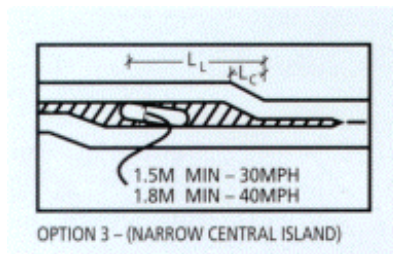
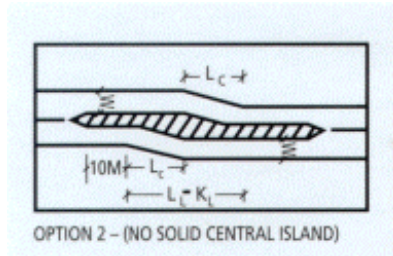
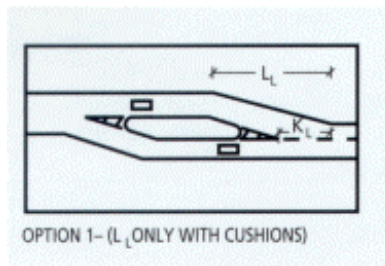


Figure 6.26 Chicane Type 3 options

Conditions of Use

- Traffic Calming Regulations apply
- Suitable for Traffic Distributor Roads
- Suitable for flows of more than 300 vehicles
- Suitable for bus routes in residential areas

Aspects of Implementation

- Overrun areas must be provided
- Good illumination essential

Assisting Features

- Vertical elements such as bollards or trees and shrubs can be planted to increase awareness

Additional Comments

- Visual interruption of straight through alignment
- Poor visibility when leaving parking space can cause problems
- Cyclists following ideal riding lines can encounter problems traversing overrun areas
- Certain layouts may leave cyclist travelling in the opposing direction with no physical protection

Complementary Calming Measures

- 6.6.4(2) Speed Table
(in residential areas)
(4) Cushion
(14) Rumble Strip

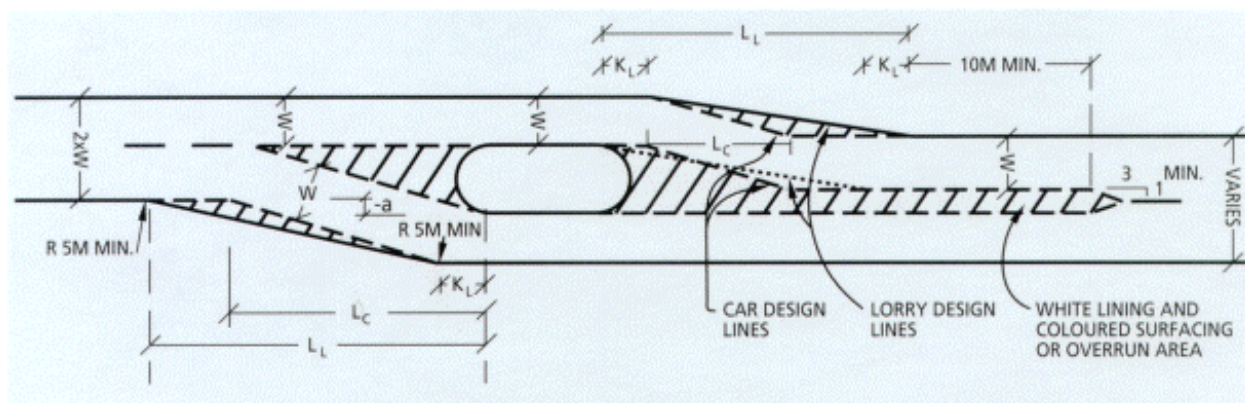


Figure 6.27 Chicane Type 3 Design

	Residential Use (Type C)			Traffic Distributor Use			
	L _L	K _L	L _C	L _L	K _L	L _C	
Speed @ Measure (mph)	20			25			
Width at Measure W (m)	2.75			3.0			
Vehicle Type	Lorry/Bus	Car		Lorry/Bus	Car	Lorry/Bus	Car
Free View a (m)	L _L	K _L	L _C	L _L	K _L	L _C	L _C
-0.1	26	5	13.5	25	3	14	16.5
-0.5	25	5	12.5	24	3	13	14
0.0	22	5	11.5	23	3	11.5	12
0.5	20	4	9.5	21	3	9.5	10
1.0	18	4	8.5	18	3	8.5	9

Table 6.7 Chicane Type 3 Road Geometry

6. Traffic Calming Design Standards

Conditions of Use

- To conform with Traffic Calming Regulations if not used for pedestrians
- Suitable or conversion to alternate working for peak traffic flows of less than 300 vehicles per hour with appropriate reduction in carriageway width
- Needs balanced two way flow
- Situated away from junctions
- Not suitable for Traffic Distributor Road

Aspects of Implementation

- Should have good view of opposing traffic
- Should be well illuminated
- Large lengths will require intervisible passing places (and possibly priority signs)
- Driveway widening required

Assisting Features

- Change of colour or surface material can emphasise change of nature of road where alternate working is in operation
- Vertical elements such as bollards or trees and shrubs can be planted to increase awareness
- Visual narrowing

Additional Comments

- Reasonable reduction in vehicle speeds only if balanced flow
- Easier crossing can be provided for pedestrians
- Can be annoying for cyclists if long lengths
- Dual decision required on right of way by approaching drivers

Complementary Calming Measures

- 6.6.4(1) Road Hump
 (2) Speed Table
 (4) Cushion
 (14) Rumble Strip

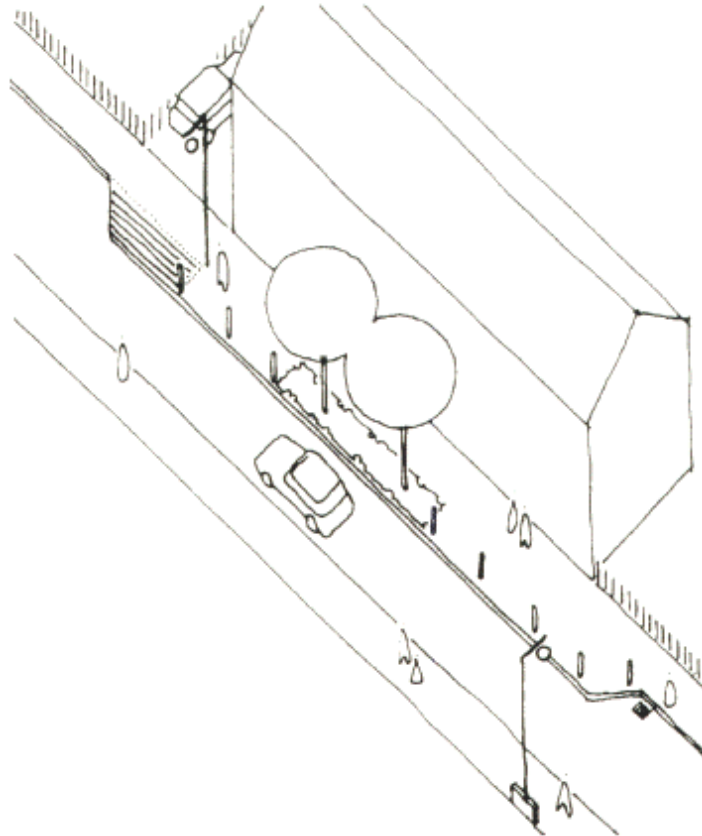


Figure 6.28 View of with restriction to carriageway

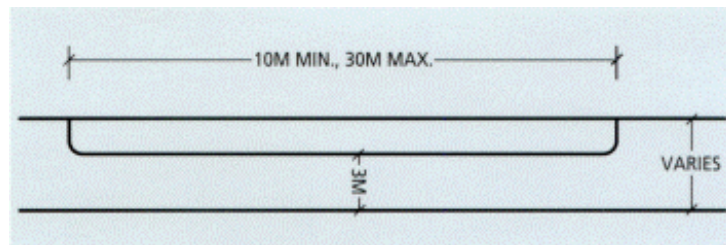


Figure 6.29 With restriction to carriageway Design

6.6.4(9)
WIDTH
RESTRICTION
TO
CARRIAGEWAY
 SPEED
 REDUCTION
 CATEGORY B

6. Traffic Calming Design Standards

6.6.4(10) CENTRAL ISLAND SPEED REDUCTION CATEGORY C

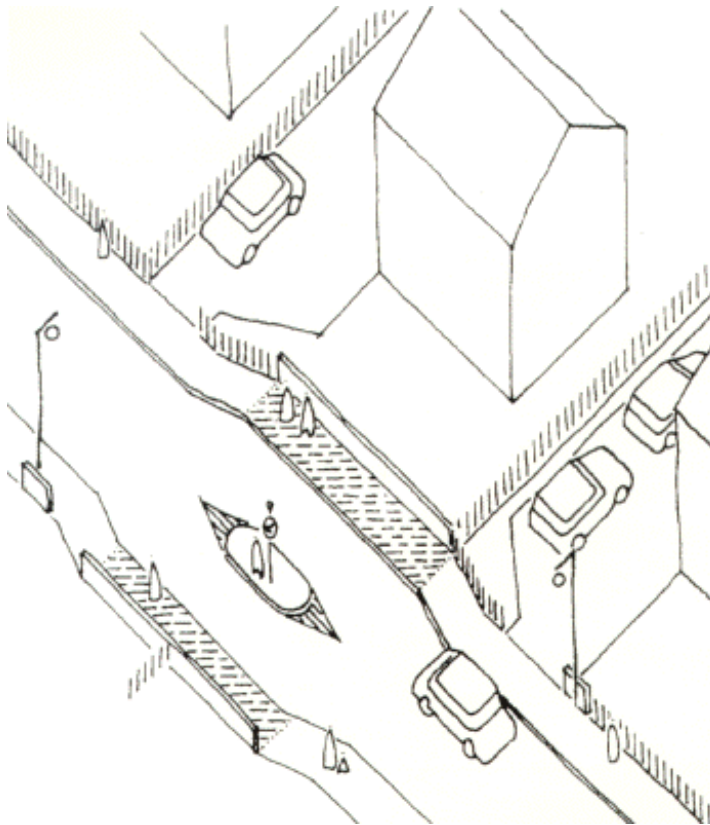


Figure 6.30 View of Central Island

Conditions of Use

- Conform with Traffic Calming Regulation if not designed as a pedestrian refuge (which is covered by the Roads (Scotland) Act 1984)
- Suitable for Traffic Distributor Road

Aspects of Implementation

- Assure visibility by means of vertical elements on island
- Overrun area to have carriageway construction with footway material

Assisting Features

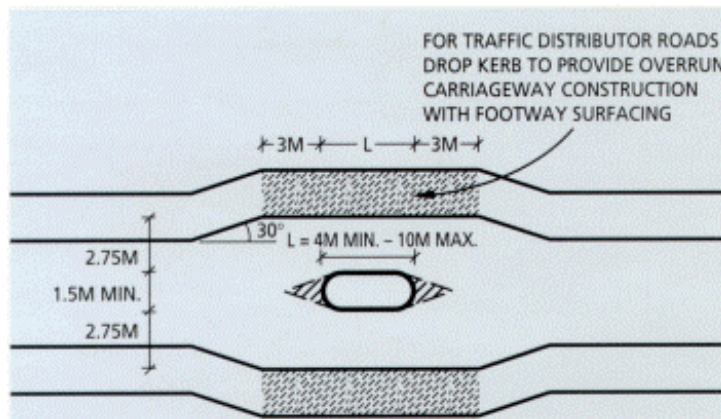
- Vertical elements such as bollards or trees and shrubs can be planted to increase awareness

Additional Comments

- Limited overtaking opportunities between islands
- Speed reduction minimised where measure requires to accommodate buses unless constructed at a bus stop where following traffic is also stopped
- Obstructive parking near island could create problems
- Table 5.11 should be referred to when road widening is necessary to accommodate island measure
- Easier crossing can be provided for pedestrians

Complementary Calming Measures

- 6.6.4(2) Speed Table
- (14) Rumble Strip



6.31 Central Island Design

6. Traffic Calming Design Standards

Conditions of Use

- Suitable for Traffic Distributor Road
- To conform with Traffic Calming Regulations if not used for pedestrians
- Not suitable for driveways

Aspects of Implementation

- Road markings and vertical elements could be used to form central reserve, allowing buses to be accommodated

Assisting Features

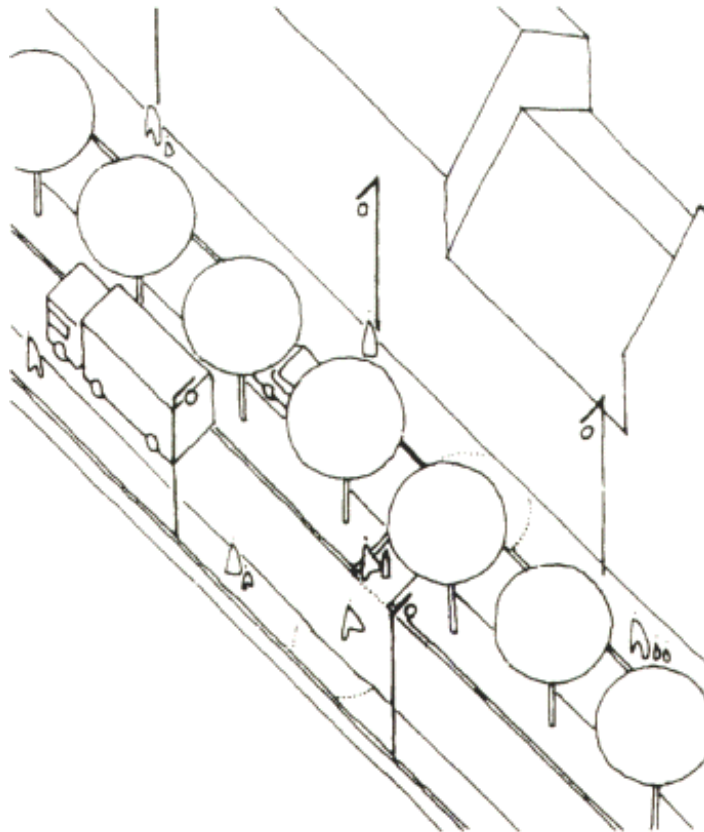
- Different surface materials can identify the measure
- Road markings should be used
- Use of planting
- Vertical elements such as bollards or trees and shrubs can be planted to increase awareness
- Dropped kerbs for pedestrians

Additional Comments

- No overtaking manoeuvres can be performed
- Can provide good crossing facilities for pedestrians
- Standing vehicles eg delivery lorries and milk floats could pose an obstacle
- Could be difficult for cyclist depending upon lane width.

Complementary Calming Measures

- 6.6.4(1) Road Hump
 (2) Speed Table
 (4) Cushion
 (8) Chicane Type 3
 (13) Occasional Strip
 (14) Rumble Strip
 (17) Lateral Shift



6.6.4(1)
**WIDTH
 RESTRICTION
 BY MEANS
 OF A
 CENTRAL
 RESERVE**
 SPEED
 REDUCTION
 CATEGORY C

Figure 6.32 View of width restriction by means of central reserve

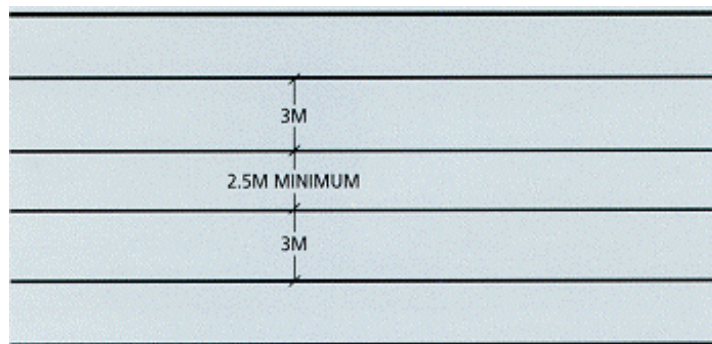


Figure 6.33 View of width restriction by means of central reserve

6. Traffic Calming Design Standards

6.6.4(12)
PINCH POINT
SPEED REDUCTION
CATEGORY C

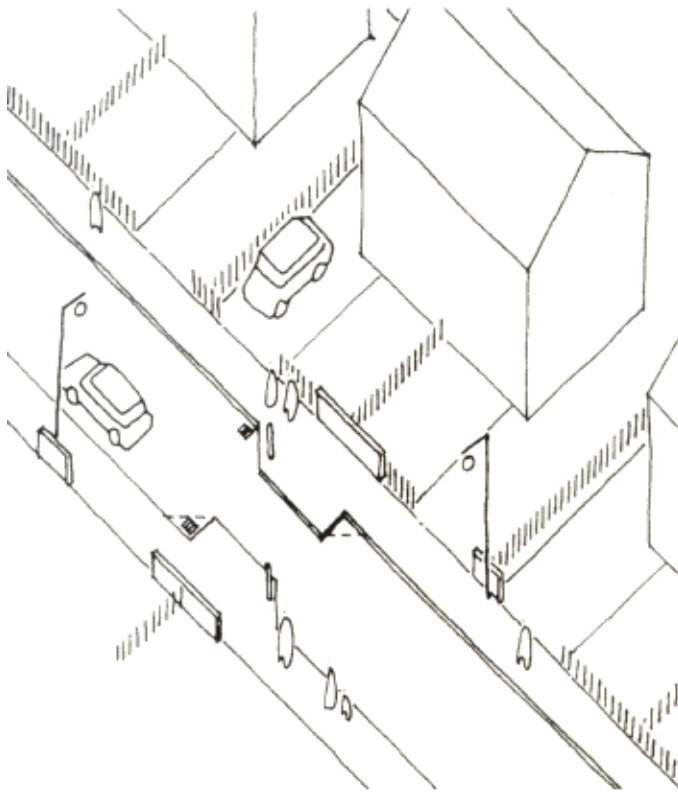


Figure 6.34 View of pinch point

Conditions of Use

- To conform with Traffic Calming Regulations if not used for pedestrians
- Balanced traffic flow away from junctions
- Suitable for less than 300 vehicles
- For Traffic Distributor Road, two way flow must be catered for with width of 5.5m

Aspects of Implementation

- Should be well illuminated
- Good view of oncoming traffic

Assisting Features

- Vertical elements such as bollards or trees and shrubs can be planted to increase awareness
- Contrasting colour and material surface should be considered
- Visual Narrowing should be considered

Additional Comments

- Speed reduction only effective with balanced opposing flow
- Reduces crossing width
- Chicane effect can be achieved by parking on alternative sides
- Can cause problems for cyclists
- Reduces space for available parking
- Illegal parking can cause problems
- Chicane effect can be achieved by providing build-outs on alternate sides

Complementary Calming Measures

6.6.4(2) Speed Table
(14) Rumble Strip

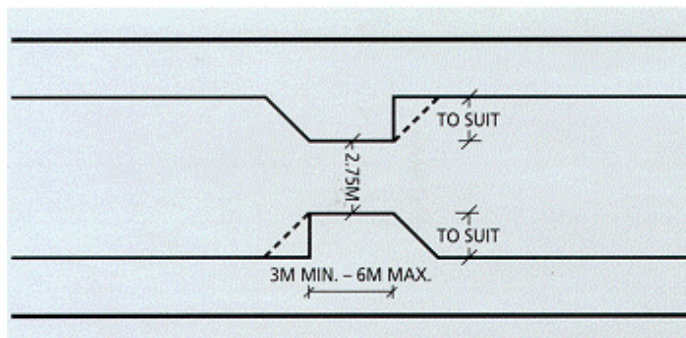


Figure 6.35 Pinch Point Design

6. Traffic Calming Design Standards

Conditions of Use

- Traffic Calming Regulations apply
- Suitable for roads with heavy HGV and bus flows
- Suitable for Traffic Distributor Road if occasional strip is flush with carriageway

Aspects of Implementation

- Thermoplastic line or change in material
- May require signing

Assisting Features

- Colour or material change to surface should be considered
- Overrun areas can be used at corners
- Lining should be considered

Additional Comments

- Occasional strip may be in the form of a cycle lane with wider vehicles using associated strip/cycle lane
- Modification would be required to allow pedestrians to cross
- Imbalanced skid resistance along the measure
- Overrun strips could be used as an alternative form of construction. See detail section Chapter 10

Complementary Calming Measures

- 6.6.4(14) Rumble Strip
- (20) Overrun corners

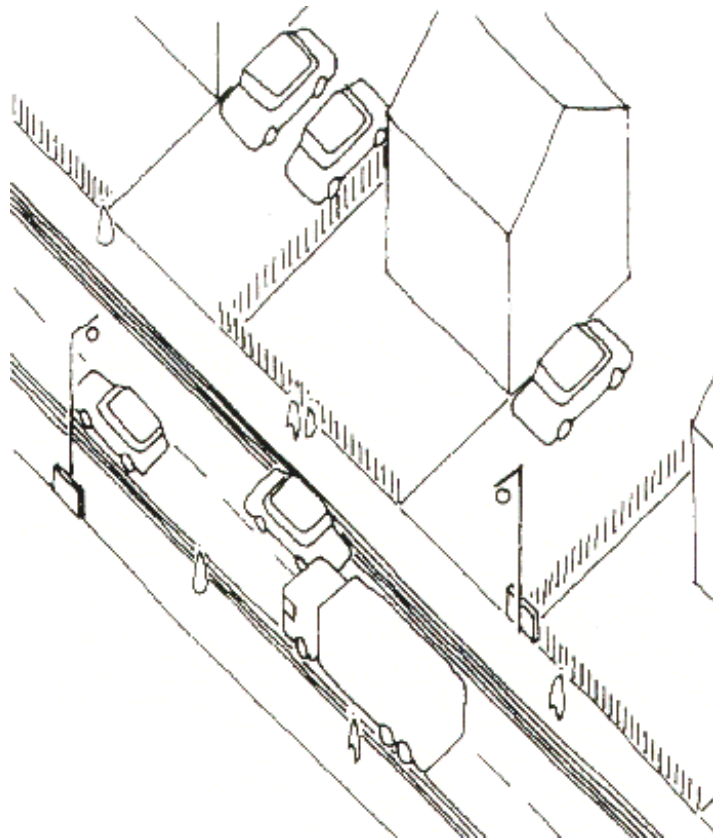


Figure 6.36 View of occasional strip

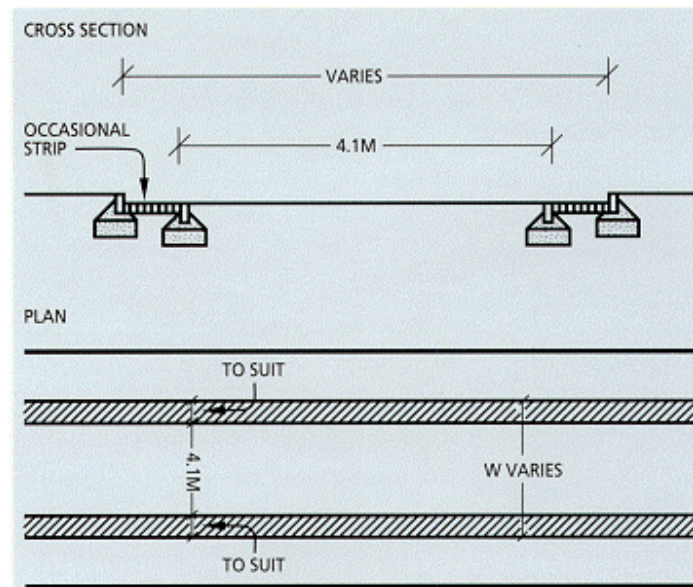


Figure 6.37 Occasional Strip Design

6. Traffic Calming Design Standards

6.6.4(14) RUMBLE STRIP SPEED REDUCTION CATEGORY C

Height	Impact of Measure
10mm	Increased awareness
20mm	Minor speed reduction
30mm	Good speed reduction (special authority required)

Table 6.8 Speed reduction for rumble strip height

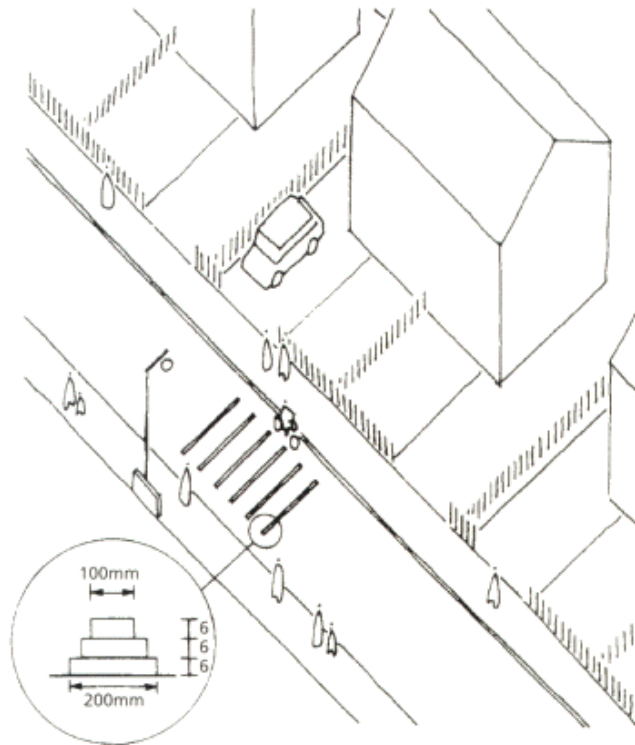


Figure 6.38 View of Rumble Strip (inset profile suitable where remote from dwellings)

Conditions of Use

- Traffic Calming Regulations apply
- Can be applied over any road width
- Suitable for Traffic Distributor Road

Aspects of Implementation

- Rumble effect can be achieved by concrete blocks, setts, surface dressing or thermo-plastic
- Should be well illuminated
- Applied at right angles to kerb
- Located as far as possible from dwellings
- Applied across full carriageway width (unless cycle bypass)
- The effective speed reduction is based on the overall strip height as indicated in Table 6.8
- Strip height of over 10mm is not recommended in proximity to dwellings

Assisting Features

- Vertical elements such as bollards or trees and shrubs can be planted to increase awareness

Additional Comments

- More likely to increase driver awareness than reduce speed.
- No effect on parking
- Can be inconvenient for cyclists
- Increase in noise and vibration for residents
- Drivers can try to avoid the measure by using cycle bypass (if present)
- Suitable for Gateways

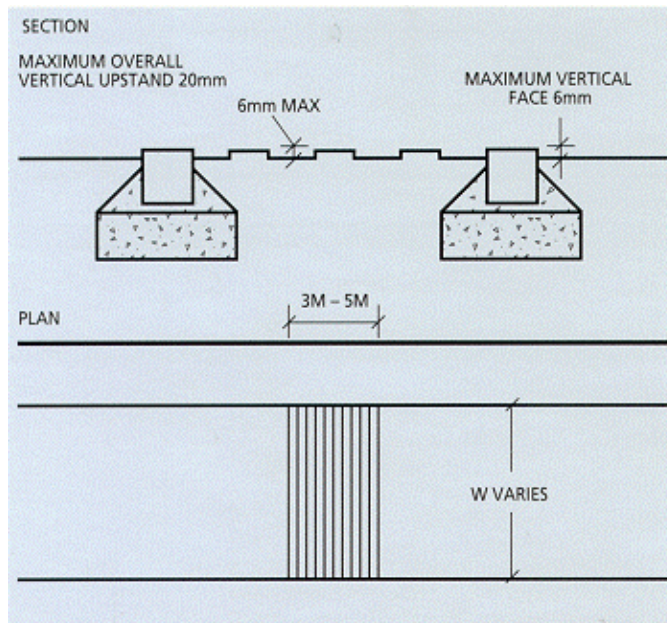


Figure 6.39 Rumble Strip Design

6. Traffic Calming Design Standards

Conditions of Use

- Suitable for Traffic Distributor Road
- Traffic Calming Regulations apply

Aspects of Implementation

- Suitable profile to allow buses and HGVs to overrun otherwise widening will be required
- Thermoplastic not suitable for Traffic Distributor Roads

Assisting Features

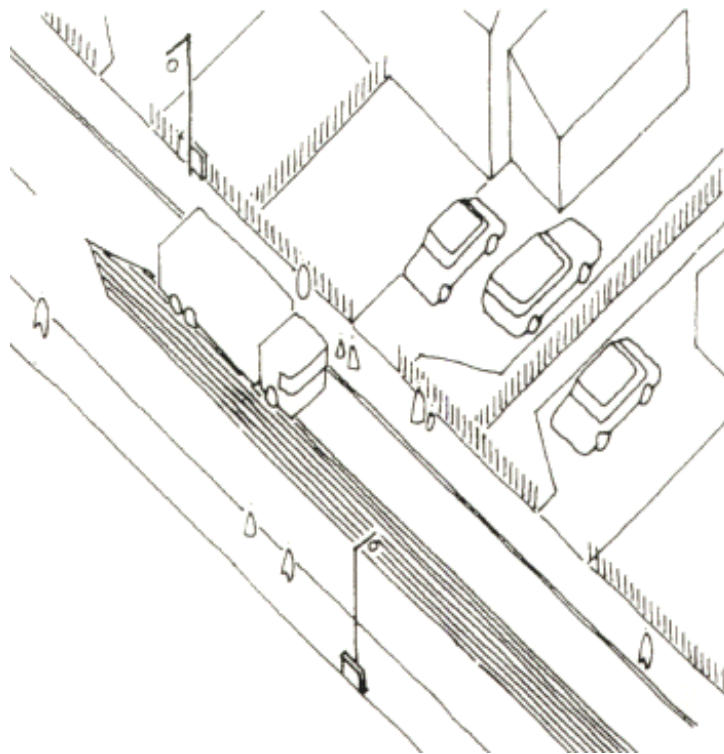
- Road Markings should be used to assist definition
- Contrasting colour or materials can be used for Median Strip
- Profile of Median strip can be angled to overrun dimensions in Regulations

Additional Comments

- Allow no facility to overtake
- Overrun can be used to pass standing vehicles

Complementary Calming Measures

- 6.6.4(10) Central Island
(widening required)
- (14) Rumble Strip
- (20) Overrun Corners



6.6.4(15)
**MEDIAN
STRIP**
SPEED
REDUCTION
CATEGORY C

Figure 6.40 View of Median Strip

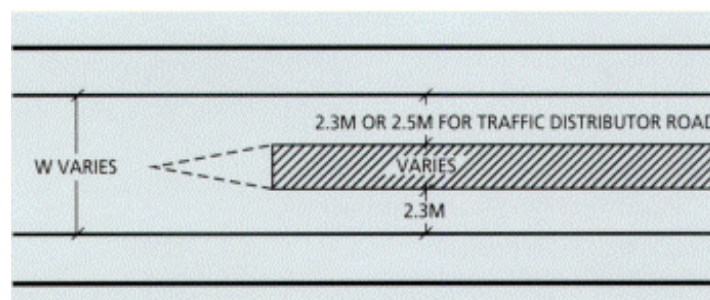


Figure 6.41 Median Strip Design

6. Traffic Calming Design Standards

6.6.4(16)

SPEED BEND

SPEED

REDUCTION

CATEGORY A

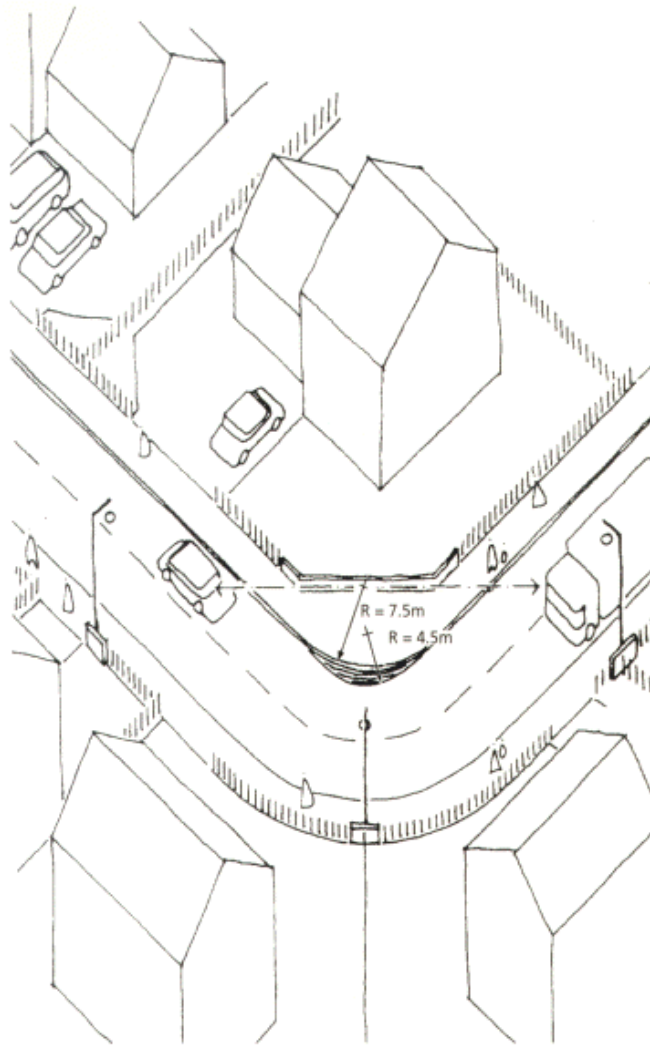


Figure 6.42 View of Speed Bend

Conditions of Use

- New bend constructed to angle between 80° and 100°
- Not suitable for Traffic Distributor Road

Aspects of Implementation

- Overrun area located on inside of bend
- Good visibility across bend to be ensured
- The straight through view should be blocked, eg building or wall
- Should be well illuminated
- 15 metres straight required between speed bend and adjacent reverse curve

Assisting Features

- Vertical elements such as bollards or trees and shrubs can be planted to increase awareness

Additional Comments

- Easily recognised feature
- Increases driver awareness

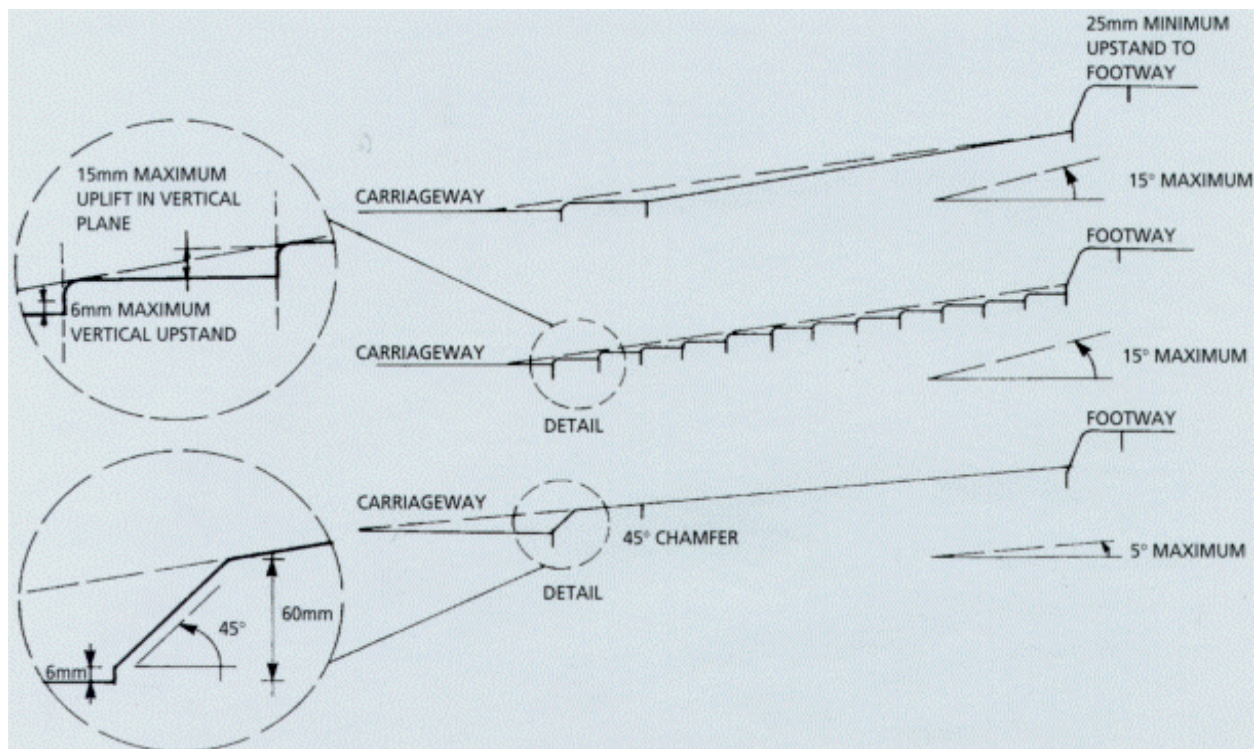


Figure 6.43 Speed bend overrun profile

6. Traffic Calming Design Standards

Conditions of Use

- New construction to shift carriageway laterally to one side
- Suitable for Traffic Distributor Road

Aspects of Implementation

- The straight through view should be blocked eg building or wall
- Should be well illuminated

Assisting Features

- Overrun as in Chicanes
Vertical elements such as bollards or trees and shrubs can be planted to increase awareness

Additional Comments

- Easily recognised

Complementary Calming Measures

- 6.6.4(2) Speed Table
- (4) Cushion
- (14) Rumble Strip

6.6.4(17)
**LATERAL SHIFT
IN ALIGNMENT**
SPEED REDUCTION
CATEGORY B OR C

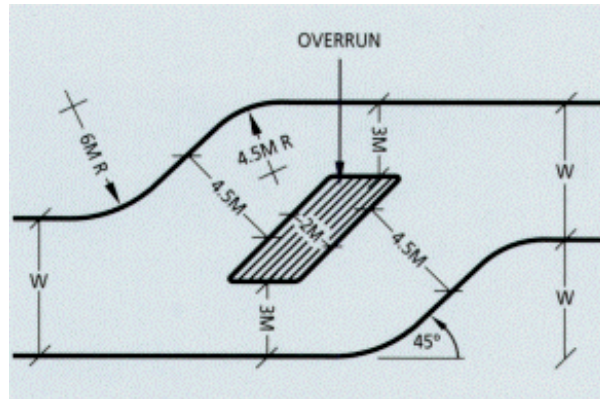


Figure 6.44 Overrun Area for large vehicle Residential Only - Category B

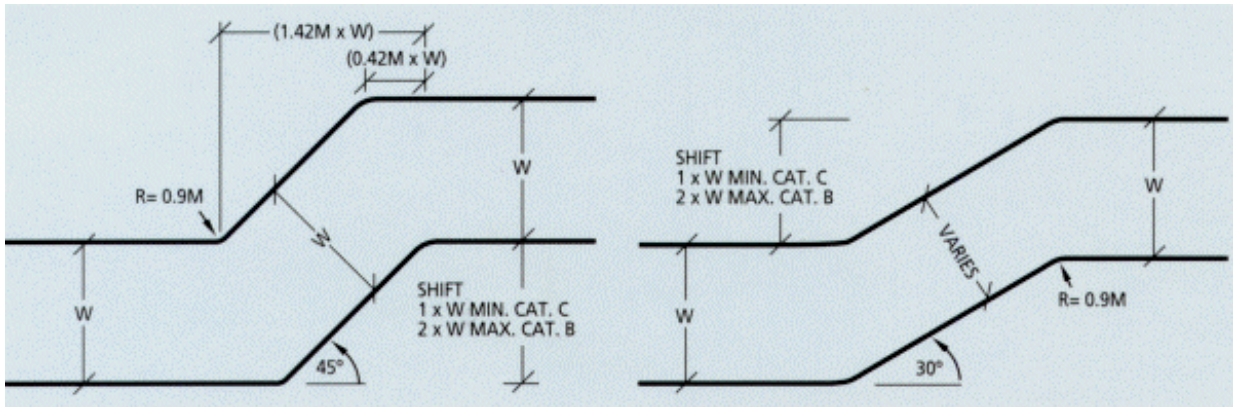


Figure 6.45 Carriageway width maintained Residential Only - Two way working - Category B or C

Carriageway width narrowed Residential Only - Two way working - Category B or C

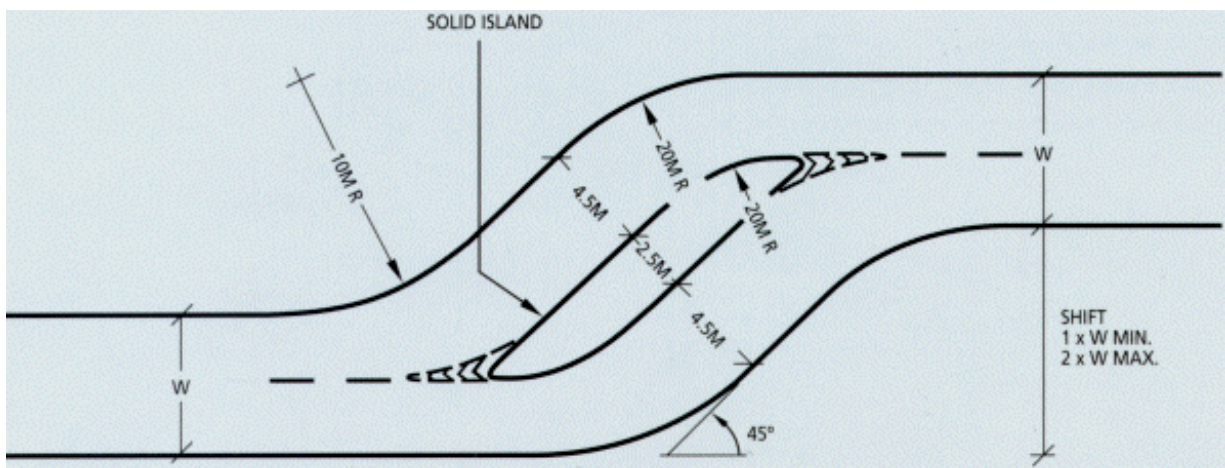


Figure 6.46 Residential or Traffic Distributor Road - Category C

6. Traffic Calming Design Standards

6.6.4(18) CHANGE IN JUNCTION ALIGNMENT SPEED REDUCTION CATEGORY B OR C

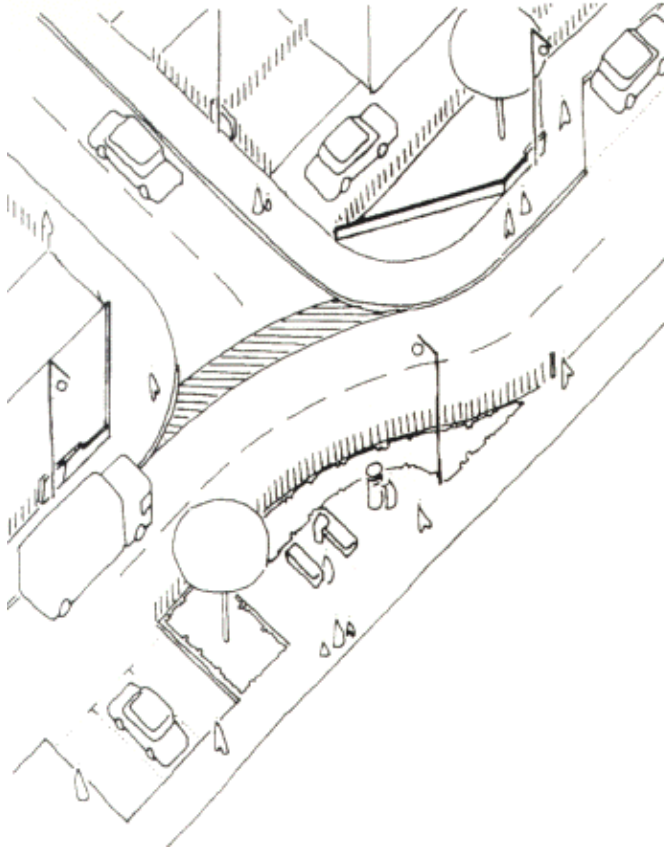


Figure 6.47 View of Change in Junction Alignment

Conditions of Use

- For new construction the measure should incorporate a lateral shift at Junction
- Not suitable for Traffic Distributor Road

Aspects of Implementation

- The threshold of the side road must be defined by a contrast in the material surface or colour
- Should be well illuminated
- The straight through view should be blocked eg building or wall

Assisting Features

- Vertical elements such as bollards or trees and shrubs can be planted to increase awareness

Additional Comments

- Parking can cause problems

Complementary Calming Measures

- 6.6.4(3) Raised Junction
- (14) Rumble Strip
- (20) Overrun Corners

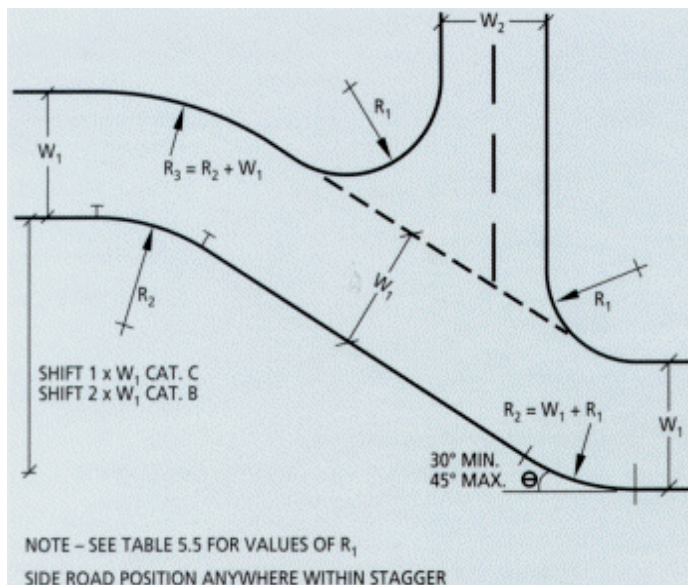


Figure 6.48 Change in Junction Alignment Design

6. Traffic Calming Design Standards

Conditions of Use

- To conform with Traffic Calming Regulations if not used for pedestrians
- Width not relevant
- Suitable for Traffic Distributor Road when build-out constructed as overrun

Aspects of Implementation

- Vertical measures should be used to highlight narrowing
- Side roads should be defined
- Should be well illuminated

Assisting Features

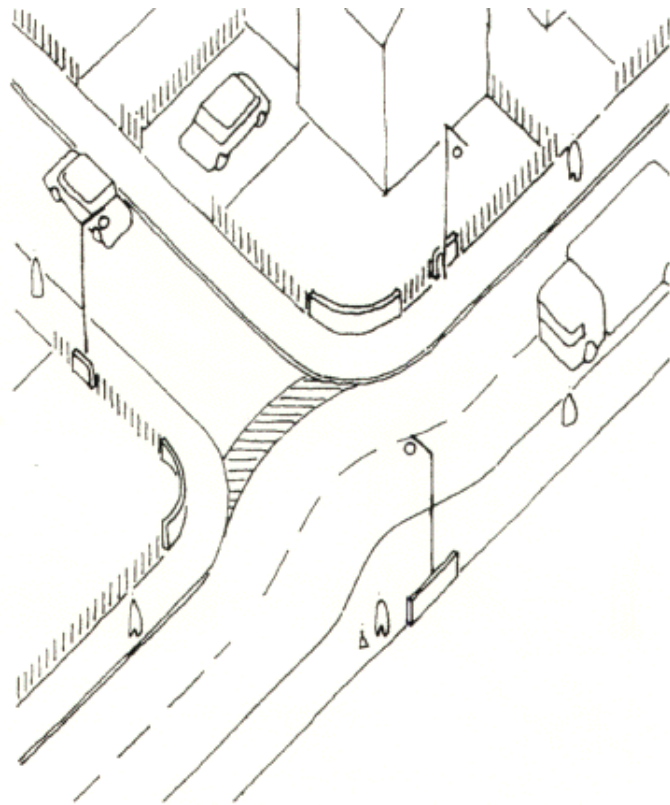
- Vertical elements such as bollards or trees and shrubs can be planted to increase awareness
- Contrasting materials or colour should be used to define surface areas

Additional Comments

- Speed reduction mainly affects turning traffic
- Crossing distance for pedestrians is reduced
- Pedestrians are more obvious

Complementary Calming Measures

- 6.6.4(3) Raised Junction
- (14) Rumble Strip
- (20) Overrun Corners



6.6.4 (19)
**REDUCTION IN
JUNCTION
AREA**
SPEED REDUCTION
CATEGORY B

Figure 6.49 View of Reduction in Junction Area

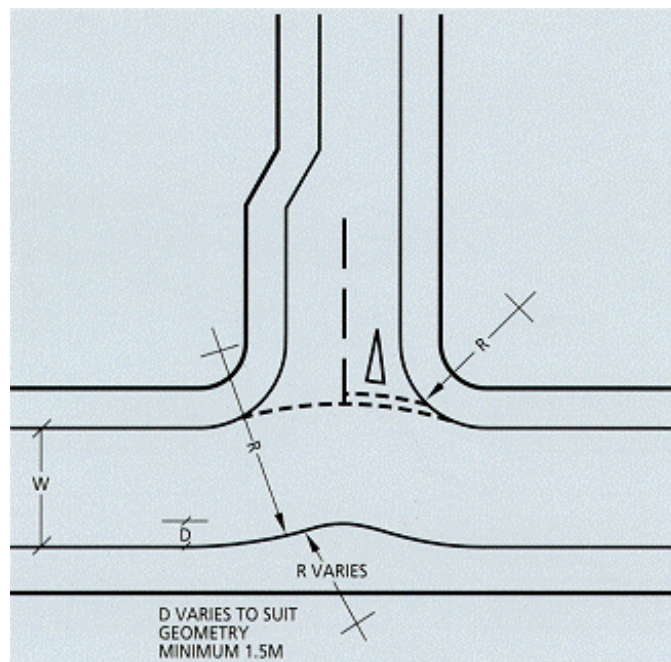


Figure 6.50 Reduction in Junction Area Design

6. Traffic Calming Design Standards

6.6.4 (20)
**OVERRUN
 CORNERS**
 SPEED REDUCTION
 CATEGORY B (SIDE
 ROAD)

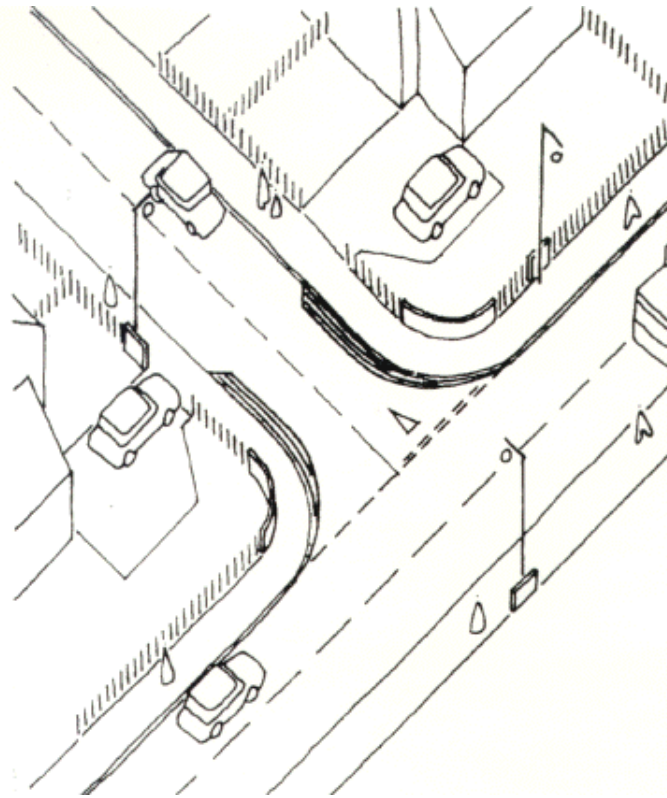


Figure 6.51 View of Overrun Corners

Conditions of Use

- Traffic Calming Regulations apply
- Can be used at junctions to Traffic Distributor Road

Aspects of Implementation

- Requires illumination
- Smooth pedestrian route to be incorporated at overrun areas

Assisting Features

- Vertical elements such as bollards or trees and shrubs can be planted to increase awareness
- Deterrent surface texture at corners

Additional Comments

- Suitable where large numbers of turning HGVs
- May not reduce straight through speeds
- Imbalanced skid resistance across the measure
- Can be annoying for turning cyclists or pedestrians crossing

Complementary Calming Measures

- 6.6.4(10) Central Island
- (13) Occasional Strip
- (14) Rumble Strip
- (15) Median Strip

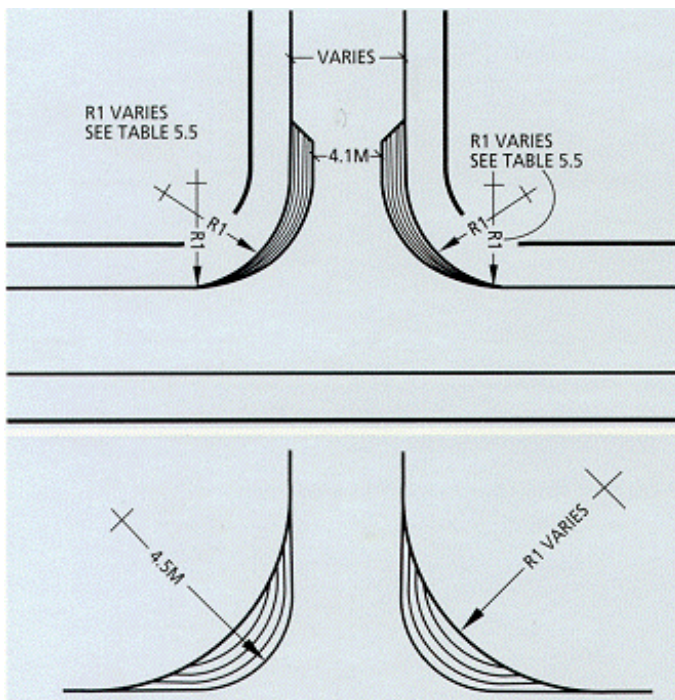


Figure 6.52 Overrun corners Design

6. Traffic Calming Design Standards

Conditions of Use

- Not suitable on cycle route
- Suitable for Traffic Distributor Road
- Large area required to accommodate measure
- Design to TD 16/93

Aspects of Implementation

- Roundabout level of illumination required
- Signing and lining required
- Visual interruption to straight through view
- Thresholds of side roads defined

Assisting Features

- Vertical elements such as bollards or trees and shrubs can be planted to increase awareness
- Contrasting materials or colours should be used to define surface areas

Additional Comments

- Can present difficulties for cyclists
- Parking can cause problems
- Provides visual interruption of side roads
- Can be used at junction of 2 core roads

Complementary Measures

6.6.4(20) Overrun Corners

6.6.4(21)
CONVENTIONAL
ROUNDAABOUT
SPEED REDUCTION
CATEGORY B

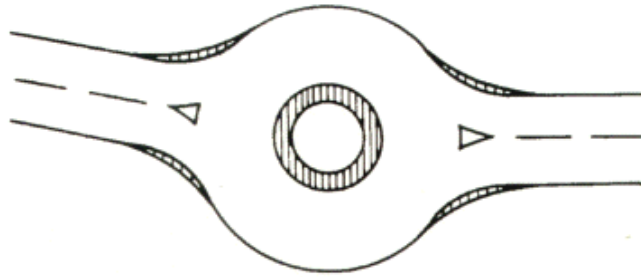


Figure 6.53 Conventional Roundabout Option

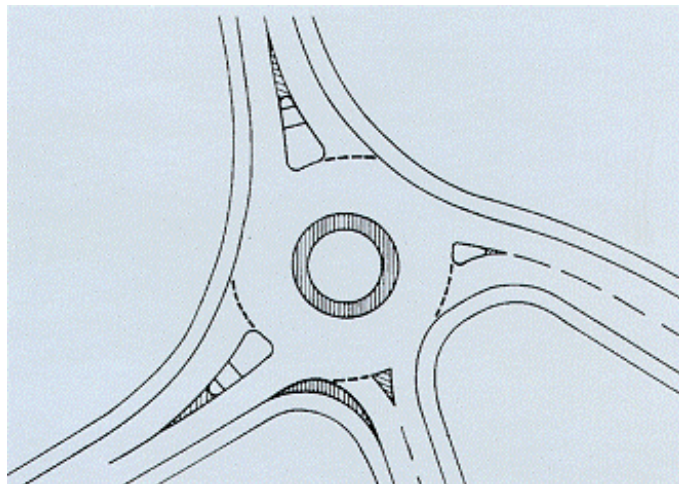


Figure 6.54 Conventional Roundabout Design

6. Traffic Calming Design Standards

6.6.4 (22)

**MINI
ROUNDABOUT**
SPEED
REDUCTION
CATEGORY B

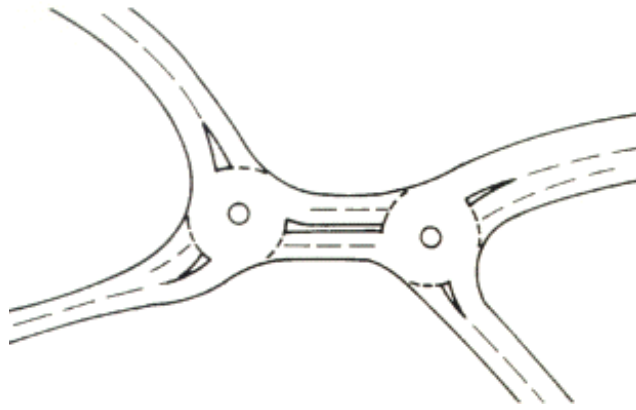


Figure 6.55 Mini Roundabout OptiFigure

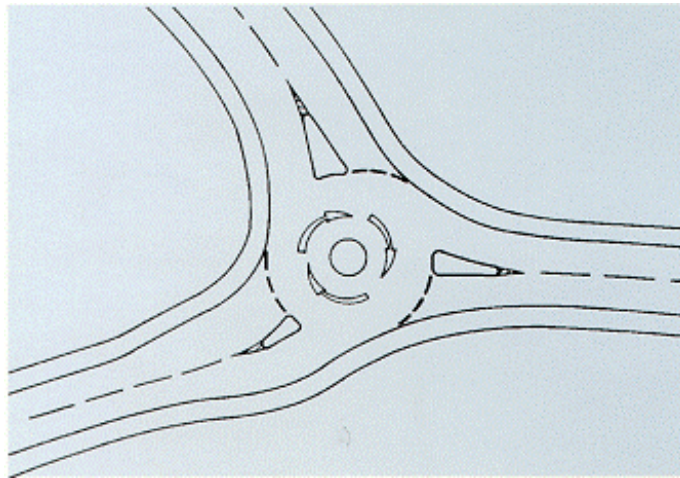


Figure 6.56 Mini Roundabout Design

Conditions of Use

- Suitable for Traffic Distributor Road
- Design to TD 16/93

Aspects of Implementation

- Roundabout level of illumination required
- Diameter of central island to restrict turning of cars
- Height of central island to deter cars but allow HGVs to traverse
- Signing and lining required

Assisting Features

- Different materials should be considered for the island

Additional Comments

- Can cause difficulties for pedestrians crossing
- Can cause difficulties for cyclists

Complementary Measures

6.6.4(20) Overrun Corners

6. Traffic Calming Design Standards

6.6.4 (24) GATEWAY ON STRAIGHT

SPEED REDUCTION
CATEGORY B OR
C

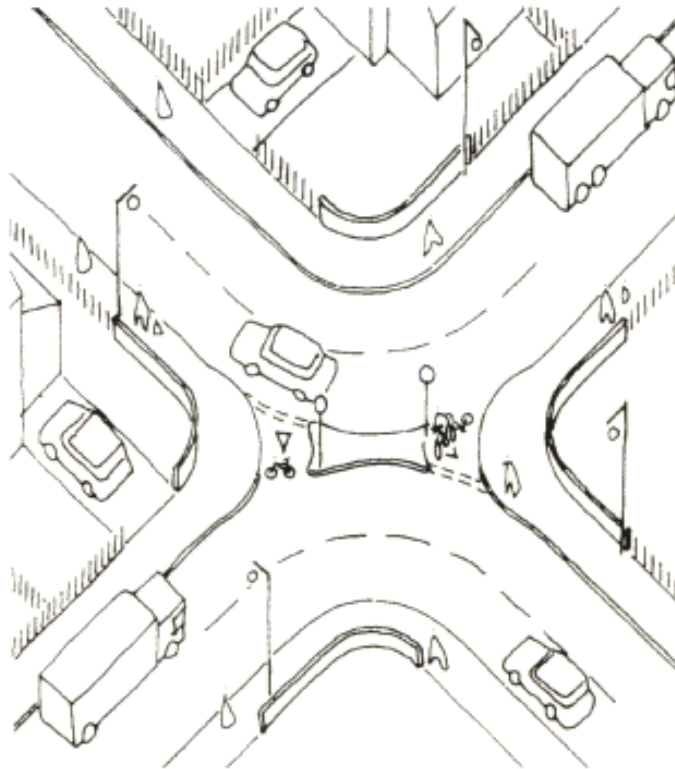


Figure 6.59 View of Gateway on Straight

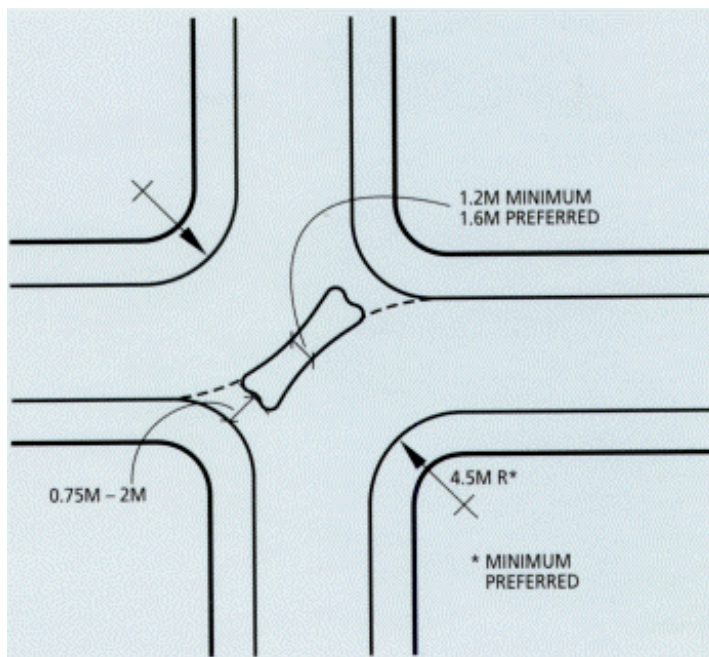


Figure 6.58 Diagonal Closure Design

Conditions of Use

- Suitable for Traffic Distributor Road when using appropriate gateway of Traffic Calming measures as indicated on preceding sheets
- In Residential Roads, type B or C measures only should be used
- The first measure will incorporate a Type B or C. In residential roads the next measure should occur within 40m

Aspects of Implementation

- Two speed reducing features required
- Speed should be reduced sequentially (ie B before A)
- Appropriate traffic signs to be located according to regulations if entering a residential area
- Vertical elements are essential to increase awareness of the measure
- Gateway on straight should not occur within 10m of a junction

Assisting Features

- Vertical elements such as bollards or trees and shrubs can be planted to increase awareness
- Contrasting material or colour should be used to define surface areas.

Additional Comments

- Provides a clear transition between different types of roads
- Route selection should not be influenced by the type of gate/measure

6. Traffic Calming Design Standards

Conditions of Use

- Suitable for Traffic Distributor Road - See options

Aspects of Implementation

- Manoeuvring space required for largest vehicles
- Vertical features must be considered

Assisting Features

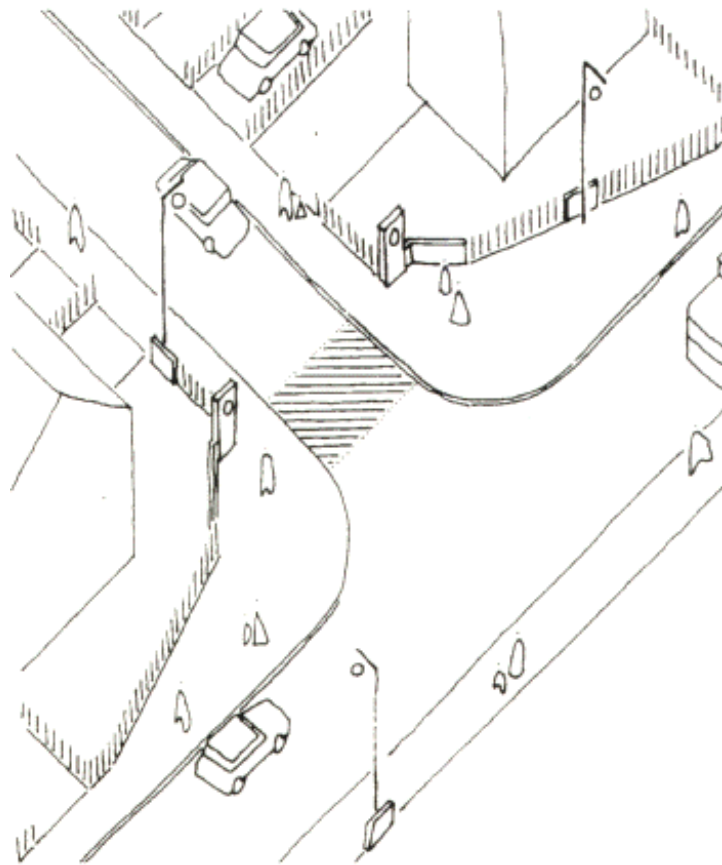
- Boundary walls, incorporating signing
- Vertical features on which signs can be mounted
- Tree and shrub planting can increase awareness
- Contrasting materials or colour of carriageway may be used to further define gateway

Additional Comments

- Junction Traffic Calming provides low entry speed into side road
- In residential area as a further Traffic Calming feature should appear within 40m from the gateway. On Traffic Distributor Roads there is no requirement
- The options indicate gateway features where Traffic Calming is achieved by altering priority on an existing road

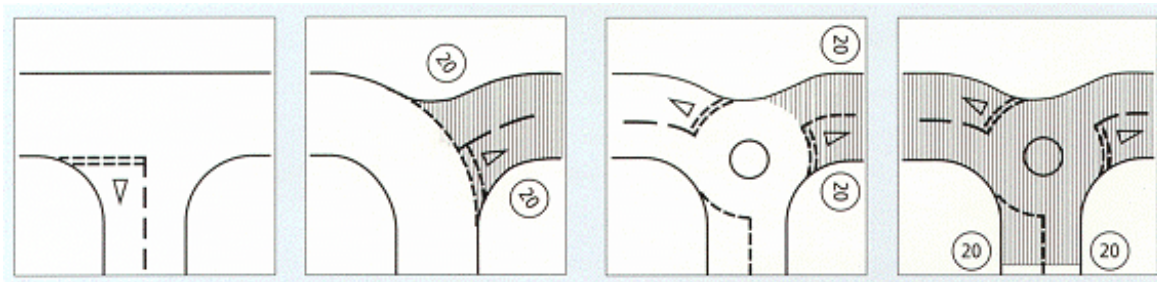
Complementary Calming Measures

- 6.6.4(14) Rumble Strip
- (20) Overrun Corner



6.6.4 (25)
**GATEWAY
ON SIDE
ROAD**
SPEED
REDUCTION
CATEGORY B

Figure 6.60 View of Gateway on Side Road



EXISTING CONDITION

OPTION 1

OPTION 2

OPTION 3

Figure 6.61 Gateway on Side Road Options

6. Traffic Calming Design Standards

6.6.4 (26) TWO ROADS GATEWAY SPEED REDUCTION CATEGORY B

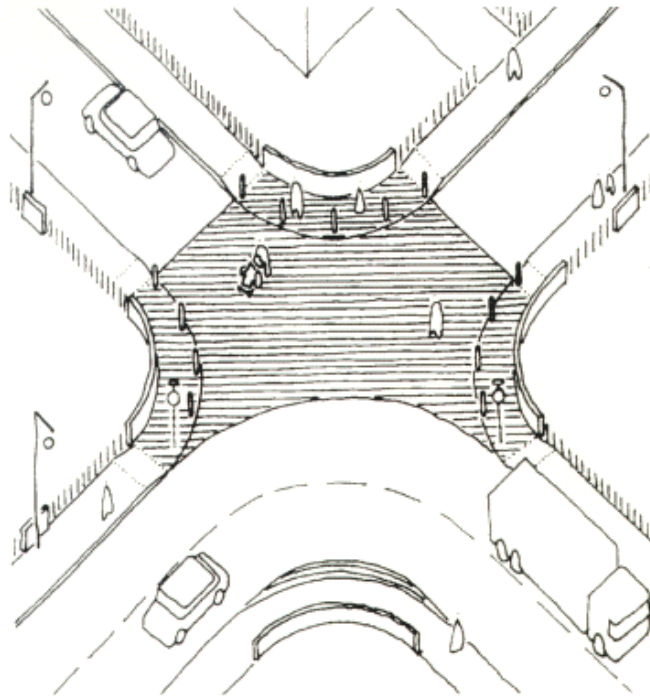


Figure 6.62 View of Two Roads Gateway

Conditions of Use

- Only for use on existing roads
- Traffic Calming Regulations apply
- Not to be applied on cycle bus and/or delivery route
- Length of the dropped kerb depends on manoeuvre space required by largest design vehicle and the width of the 30mph road
- Maximum slope in footpath 1:10
- Not suitable for Traffic Distributor Road

Aspects of Implementation

- A change of material or colour required
- Dropped kerb along main carriageway
- Footway should continue in same surface material
- Traffic signs to be installed conforming to regulations
- Footway dropped to level to gateway

Assisting Features

- Vertical elements such as bollards or trees and shrubs can be planted to increase awareness

Additional Comments

- Gives low entrance speed to residential area
- Provides clear transition of traffic area to residential area
- Priority is obvious to drivers

Complementary Calming Measures

- 6.6.4(2) Speed Table
- (14) Rumble Strip
- (20) Overrun Corners

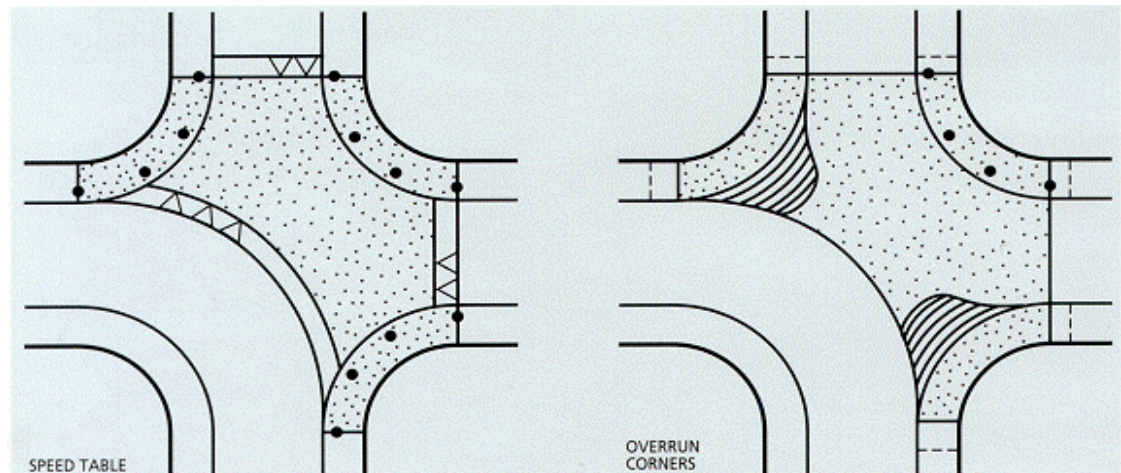


Figure 6.63 Two Roads Gateway Options

6. Traffic Calming Design Standards

Design of Shared Surface Roads

6.7

6.7.1
Concept



The basic design concept of a Shared Surface is to create a varying total road width (minimum width 5.5 metres) which is for the use of both vehicles and pedestrians. The vehicles are then constrained into a running track of 3.5 metres wide, which by lateral shifts within the full width of the road, restricts vehicle speeds to an appropriate level, using geometry rather than vertical features as the main method of controlling speed. The different measures should create some form of character and generally enhance the environmental aspect of the development and Figure 6.64 details some examples of what can be used. For Shared Surface Roads with lengths less than 40 metres an overall width of 5.5 metres will be permitted with no restrictions to vehicle path necessary.

Shared Surface less than 40 metres long



Figure 6.64 Example of Shared Surface Features

6. Traffic Calming Design Standards

6.7.2 Transition

Transitions from conventional to shared surface roads should be located as described in Paragraph 4.6.11. In order to draw the attention of drivers to the change in the nature of the road and the need for a different driving techniques, all transition should be emphasised by the incorporation of features as detailed in Figure 6.65.

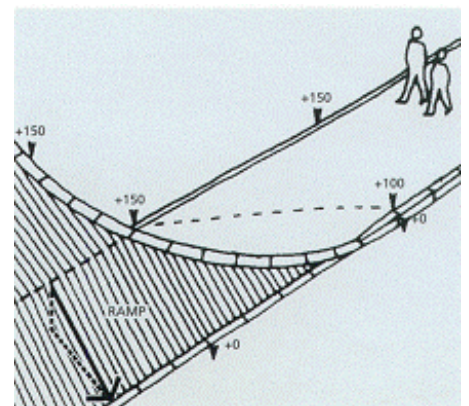
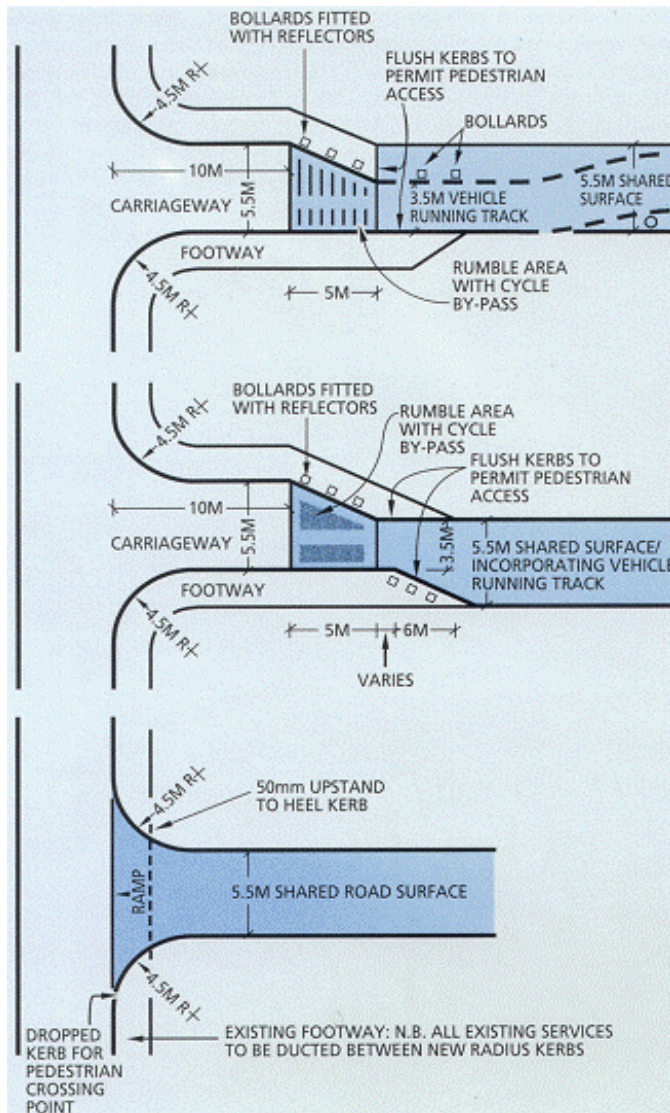


Figure 6.65 Optional Arrangements at Transition to Shared Surface Road

6.7.3 Materials

Shared Surface Roads must be constructed to ensure that the altered character of the road is apparent to all drivers and encourage them to adopt a different driving style. The preferred material is concrete or clay blocks. The design concept is a simple one which is easily understood by drivers and pedestrians alike, and by its very nature restricts vehicle speeds to approximately 10mph. Consequently the appropriate forward visibility can be reduced to a minimum distance of 20 metres.

6.7.4 Layout

Overrun areas may be required at speed control measures to enable larger vehicles to make the necessary manoeuvres. The overall width of the road can widen to allow sufficient space for parking where required, and alterations may also be necessary to allow pedestrians to remain within the Shared Surface. Primary pedestrian routes should be considered as indicated in Figure 6.66.

6. Traffic Calming Design Standards

Constraints introduced by the layout which might impede the free movement of pedestrians should be avoided but may be permitted under exceptional circumstances at the discretion of the Head of Roads and Transportation. Shared Surface Roads are beneficial for those with a mobility handicap as there are no level changes over the surface area and vehicle speeds are low.

6.7.5
*Pedestrian
Consideration*

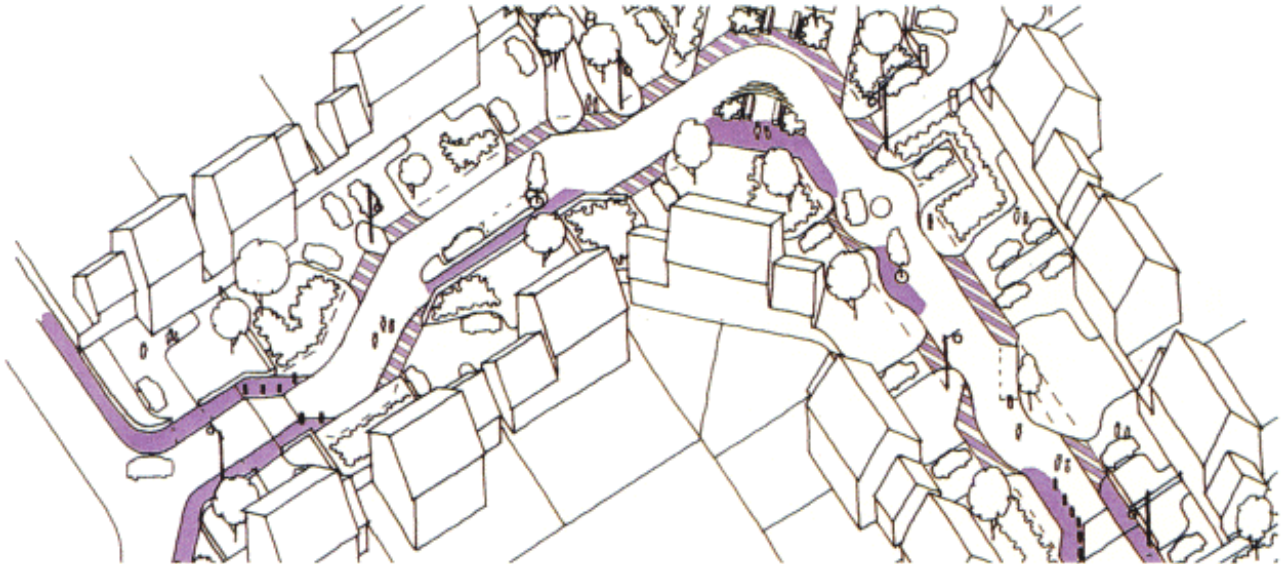


Fig 6.66 Pedestrian routes (shading indicates protected route, hatching indicates pedestrian refuge area)

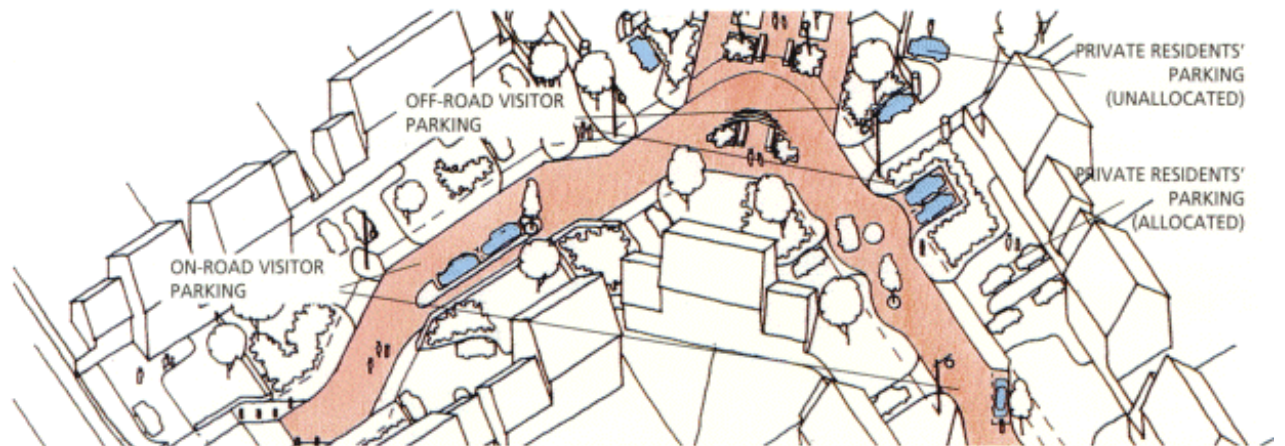


Fig 6.67 Parking Options on Shared Surface Road

Parking provision is crucial in the design of a Shared Surface Road as any parking on the running track will severely disrupt traffic flow if not completely block the passage of vehicles. Examples of possible alternatives are detailed in Figure 6.67. Parking places can be provided within the total road space and located in such a manner that they are incorporated in the traffic calming measures. The width of the bays should ensure that vehicles can enter and leave the spaces with ease and reference should be made to Paragraph 7.1.9 dealing with parking maneuverability to ensure this.

6.7.6
Parking

6. Traffic Calming Design Standards

- 6.7.7 *Passing Places* It will be necessary to provide passing places which are intervisible and no more than a maximum of 35 metres apart. These spaces should be provided as detailed in Figure 6.68 with a width of 5.5 metres which is sufficient width to allow 2 servicing vehicles to pass each other.

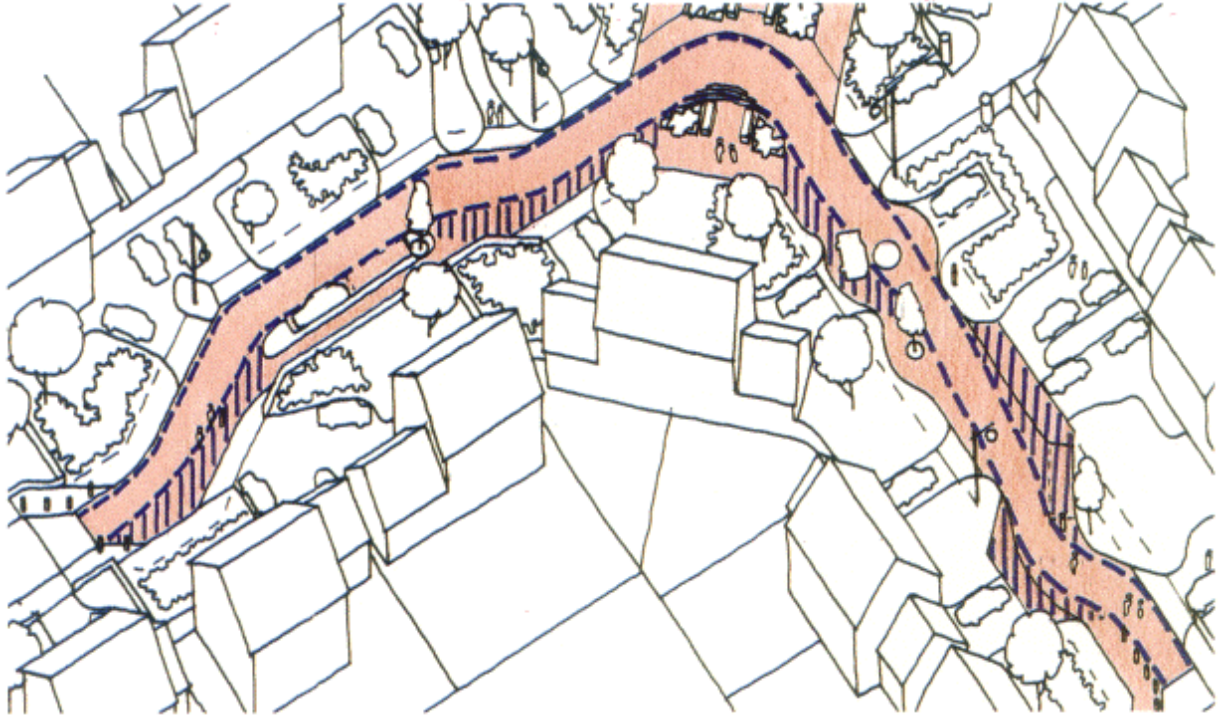


Fig 6.68 Intervisible passing places for shared surface roads (running track indicated, with passing places hatched)

- 6.7.8 *Statutory Undertakers* Care should be taken when locating service manholes to ensure that they are located outwith the running track. Advice on this matter is given in Paragraph 5.6.10.
- 6.7.9 *Play Areas* Where dwellings are likely to contain children, gardens and/or nearby play areas should be provided to obviate the need for the shared surface to be used as a main location for play.
- 6.7.10 *Statutory Undertaker Services* The layout of services in shared surfaces is described in Paragraph 5.6.10.



Chapter 7

Parking Design Standards

- 7.1 General**
- 7.2 On Road Parking**
- 7.3 Off Road Parking**
- 7.4 Residential Parking Requirements**
- 7.5 Commercial Parking Requirements**
- 7.6 Industrial, Recreational and Service Industry Parking Requirements**
- 7.7 Mobility Handicapped Parking**
- 7.8 Cycle Parking**



The provision of adequate suitably located on and off road parking is essential to ensure the efficient operation of a new development layout. These standards should be considered in conjunction with the other road design standards contained in Chapters 5 and 6.

7. Parking Design Standards



Good Residential Parking Provision



Under provision of parking at Commercial Site

General

In general, adequate parking should be provided adjacent to all new developments to ensure that vehicles are not parked on the carriageway of a road where they may impede traffic flow and constitute a safety hazard.

Parking requirements for developments are given according to their particular function and are classified into the following types:

- (a) Residential.
- (b) Commercial.
- (c) Industrial, Recreational, Service Industry.

Provision for car, coach, taxi, pedal cycle and lorry parking should be considered at an early stage in the design process so that a balanced distribution of spaces can be conveniently sited according to the use and trip destination.

The factors which can affect the required level of parking provision within each of the above groups are as follows;

- (a) car ownership levels,
- (b) competing Centres,
- (c) local conditions governed by the Structure Plan,
- (d) requirement for future provision/ demand.

The levels of provision detailed in Tables 7.3 to 7.9 and the following pages are typical requirements; developments in isolated locations are likely to require parking in excess of these levels while in urban areas, well served by public transport, fewer spaces may be required. In certain circumstances where it is possible to encourage the use of public transport, developers may be asked to consider making a commuted payment in lieu of the provision of some of the on-site parking provision. Since the actual parking requirement will ultimately depend upon such local conditions and may also be governed by the Structure Plan, advice on provision should be sought from the Head of Roads and Transportation before any design work is undertaken.

In the majority of cases the parking provision for a proposed development will be predominately off-road and take the form of either dedicated spaces for individual use, as in a residential development, or in a car park for the general use of visitors/customers/staff for that development. Where provision of off road parking is not possible, on road parking may be permitted in conjunction with traffic calming of the carriageway.

In developments involving the refurbishment or modernisation of existing buildings within town centres, the local Roads Authority may agree to the provision of a minimum standard of 0.5 spaces per dwelling where space is severely limited. However, where possible, every effort should be made to provide parking at the level required for comparable new development. Selective demolition of certain derelict buildings, utilisation of former garden ground or some adjustment of road boundaries can be used to create off-road parking areas. Careful attention to "built form" and landscaping details will often be necessary to incorporate appropriate parking provision while meeting aesthetic design criteria, and the developer should discuss such matters with the Head of Roads and Transportation at an early date.

7.1

7.7.1 Introduction

7.1.2 Development Function

7.1.3 Factors Affecting Provision

7.1.4 Level of Provision

7.1.5 Off Road Provision

7.1.6 Refurbishment Development

7. Parking Design Standards

7.1.7 *Mix of Development Types* Where a development contains a mix of differing facilities then each part should be considered in its own right and the appropriate parking provided to give an overall total parking figure. However, in the case of commercial/leisure developments some overlap of parking provision can be accepted, provided that peak accumulations for both uses do not coincide.

Dimensions and Manoeuvrability

7.1.8 *Typical Dimensions*

The size of the standard car in the UK is approximately 4.75 metres by 1.8 metres. Allowing suitable clearances all round and for the opening of doors, the standard design module for right-angled car parking bays should be 4.8 metres by 2.5 metres where a manoeuvring width of 5.5 metres is available. In areas where turnover is low i.e. staff parking, office developments etc., it may be possible to reduce this to an absolute minimum of 4.8 metres x 2.4 metres. Narrower road or aisle widths will require the parking bay to be widened in accordance with the dimensions in Paragraph 7.1.9. Parallel parking bays should be 2.4 metres wide and 5.5 metres long where the bays are internal or constrained by physical means. Free access to an end space will permit the bay length to be reduced to 5.0 metres. An internal minimum dimension of 5.5 metres by 3 metres is recommended, in order to encourage use of the garage for parking.

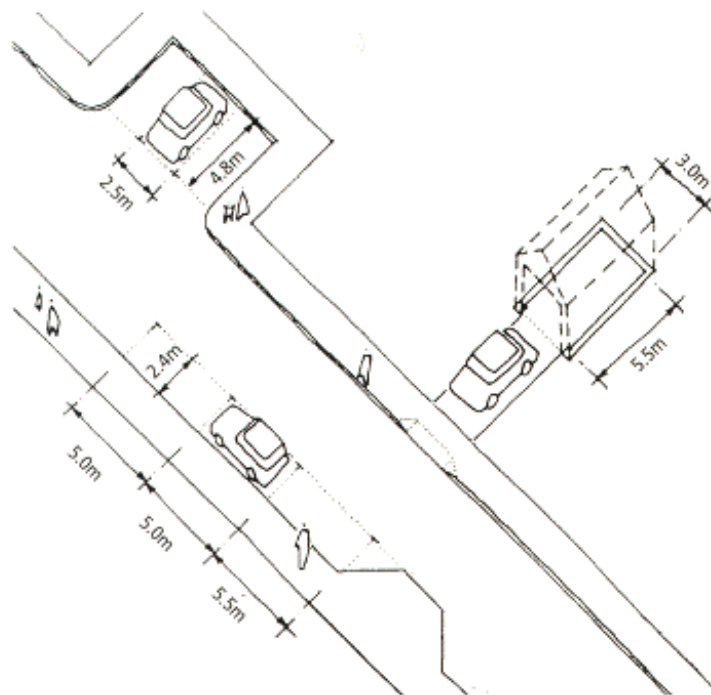
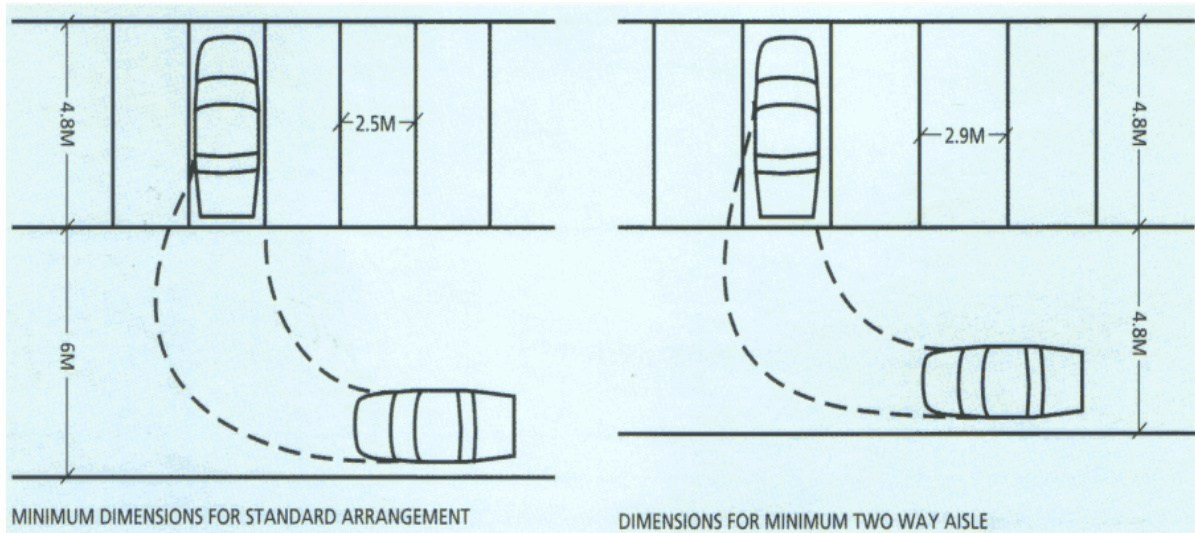


Figure 7.1 Dimensions for parking bays

7. Parking Design Standards

Figure 7.2 details the layout and aisle width associated with the standard right angle parking layout. The necessary width of entry to a parking bay is related to the available width of carriageway of a road or aisle of a car park. Where this width is limited, alternatives can be developed by adjusting the width of the parking bay to suit the available carriageway or aisle width. The dimensions to be used for the parking bay widths and the parking lane widths are given in Table 7.1 which also gives the corresponding widths of driveways.

7.7.9
Aisle Parking/
Driveway
Width



Aisle Width m	Bay Width m	Driveway Width m
6	2.5	2.75
5.5	2.5	2.75
5.3	2.75	2.75
5.0	2.8	3.0
4.8	2.9	3.0
4.5	2.95	N/A
4.0	3.1	N/A
3.5	3.2	3.2*

* Shared surface and traffic calming measures only

Note : Where parking is provided adjacent to a road, the equivalent aisle width is based on the road width (see Figure 7.2)

Table 7.1 Aisle widths and driveway dimensions

7. Parking Design Standards

7.1.10

Restricted Widths

Where the parking bay is adjacent to an area with restricted width and overrun of cars is to be prohibited then a kerb or other appropriate barrier can be employed to restrict the forward movement of the car on to this area (see Figure 7.3.)-

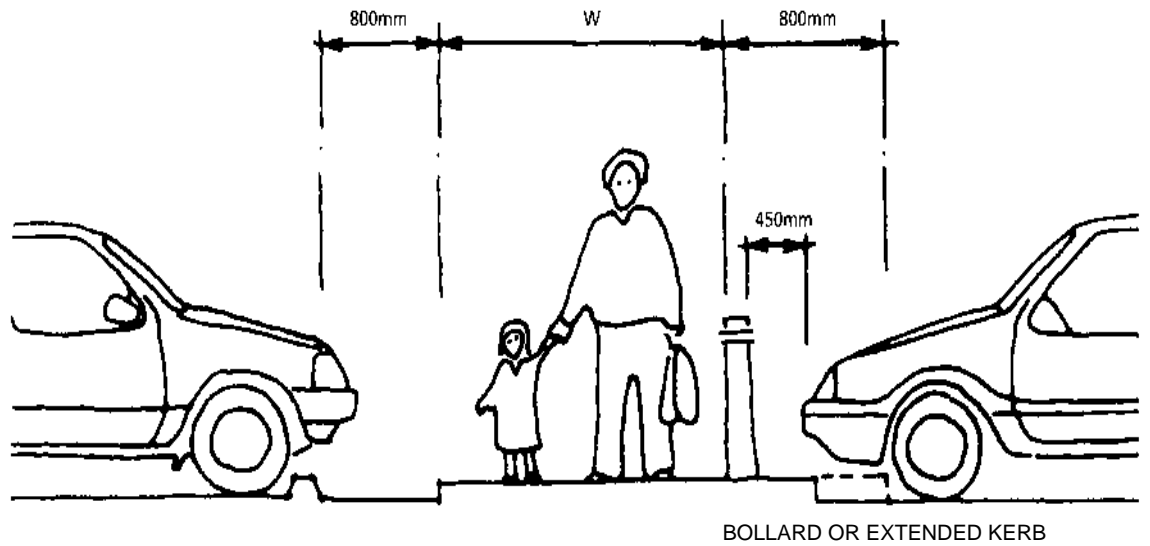


Figure 7.3 Means of restricted car movement

7. Parking Design Standards

On Road Parking

7.2

On road parking bays require to be clearly marked and can be provided in any of the following forms; end on parking,

7.2.1
On Road Types

- (i) end on parking,
- (ii) parallel parking
- (iii) angled parking - on one way road only or central reserve.

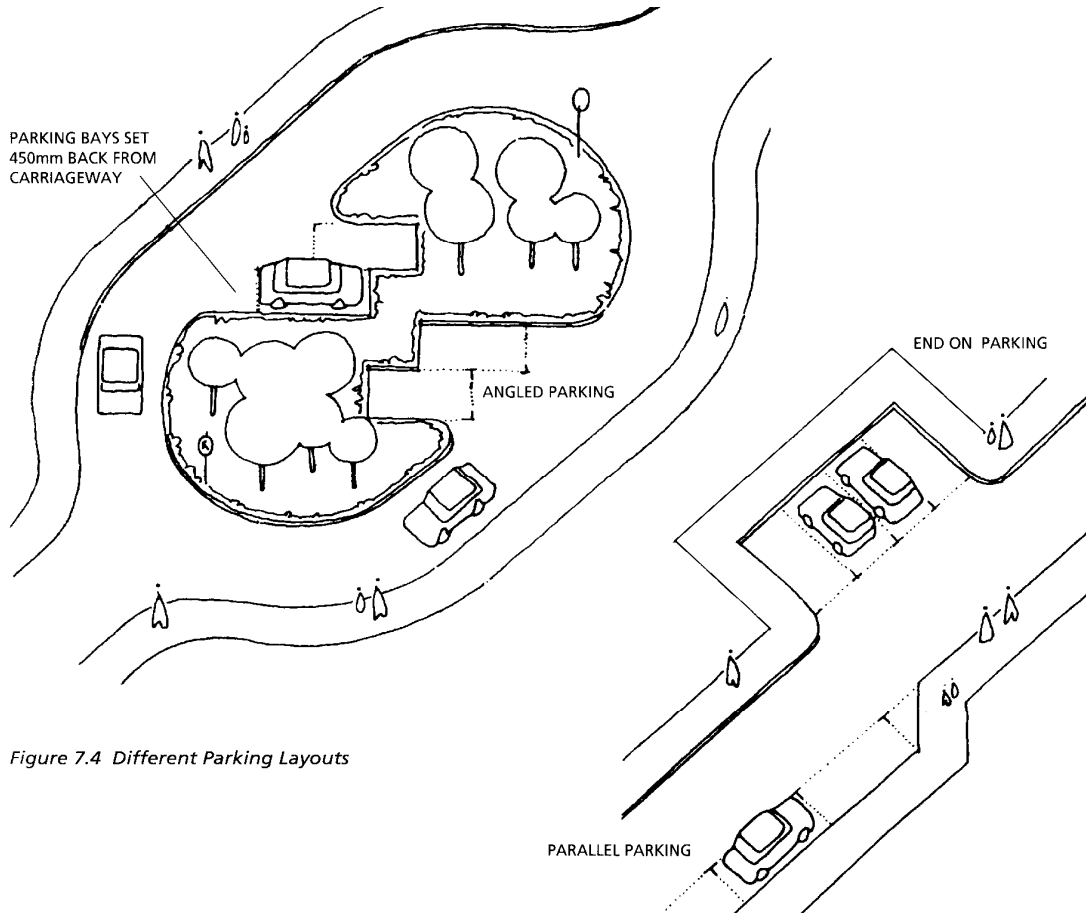


Figure 7.4 Different Parking Layouts



Angle of Parking (°)	Aisle Width (m)
30°	3.2
45°	3.4
60°	4.0
75°	4.7
90°	6.0

Table 7.2 Aisle widths with Angled Parking Note: One Way Circulation or on central reserve

Long rows of parked cars should be avoided, where possible, as this creates difficulty and inconvenience for pedestrians to cross the adjacent carriageway. Conversely, small groups of parking spaces can encourage random pedestrian movements. Groups of 4 to 6 are appropriate to keep pedestrians to the footway.

7.2.2
Groups of Spaces

7. Parking Design Standards

7.2.3

Obstructions to Traffic Flow

Poorly located on-road parking can create difficulty on all roads, especially Traffic Distributor Roads where traffic should flow freely. Individual bays require to be of sufficient size to allow the drivers to enter and leave the spaces without delay thereby not interfering with the traffic flow (See Paragraph 7.1.9).

7.2.4

Obstruction to Access and Visibility

Spaces must also be located to ensure that they do not interfere with access points or service bays and create a problem with queuing traffic at junctions. They should be located such that they do not compromise junction or forward visibility splays.



Parallel Parking

7. Parking Design Standards

Off Road Parking

7.3

Off road parking will normally occur as either spaces located for the use of individual premises, or as a larger area designated as a car park for multiple users. The location of car parking areas in any development should be considered at an early stage in the design process to achieve a balanced distributor of spaces throughout the site, conveniently related to user destinations.

7.3.1
Location

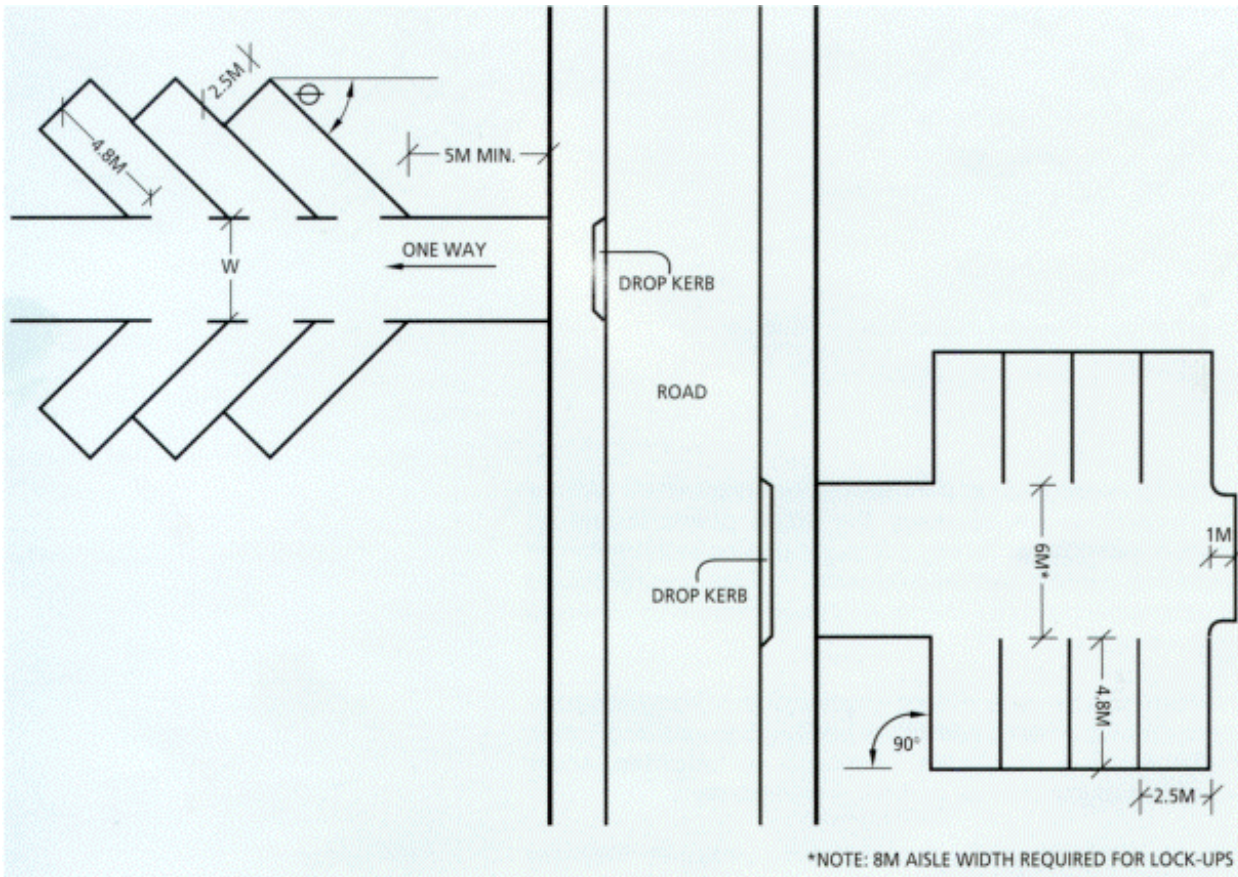


Figure 7.5 Off Road Parking



Surveillance of off-street parking

Typical layouts for off-road parking areas are shown in Figure 7.5. It should be noted that angled parking layouts tend to be appreciably less efficient inland use than right angled parking layouts even with the narrower aisle widths possible with single-way working. The use of angled parking may, however, be appropriate on narrow sites.

7.3.2
Typical Layout

Since parked vehicles can be visually intrusive, particularly in the residential environment, it is desirable to have an element of screening of the actual parking bays, either by the judicious use of landscaping or by setting them behind building lines. However, communal parking areas can be subject to anti-social behaviour where these areas are not overlooked. Off-road parking should, therefore, be located in such a manner that parking spaces are within sight of associated premises and, where spaces are allocated to individual dwellings, ideally they should be visible from the appropriate house.

7.3.3
Screening/
Security

7. Parking Design Standards

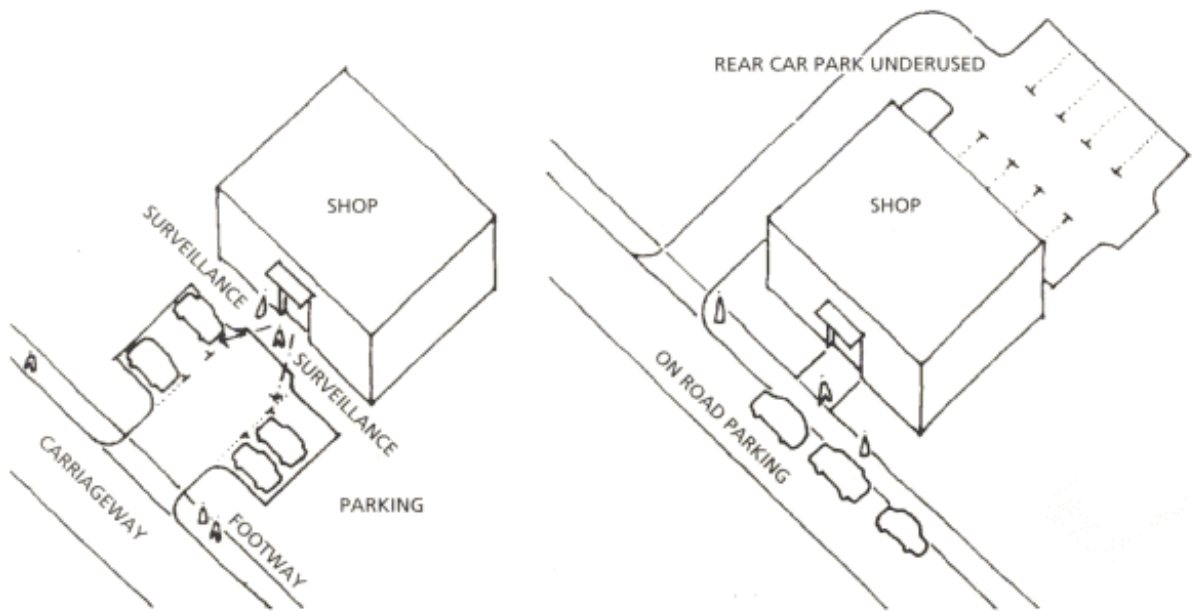


Figure 7.6 Recommended Parking Areas in relation to road

7.3.4 Access Restrictions

Normally, access to a car park should be unrestricted. Where any restrictions are necessary the access points should be clearly marked for drivers by adequate signing and reinforced by physical measures where necessary. Parking areas provided for communal use should be located to be obvious to visitors to the development.

7.3.5 Traffic Calming

The entry to a car park should emphasise the changed nature of the car park where pedestrians and cars have equal priority. Traffic calming should be employed to heighten driver awareness of the change in driving environment.

7.3.6 Footway Crossing

Vehicular access to small off-road parking areas with 50 spaces or less will normally be taken from the public road via a footway crossing as described in Paragraphs 5.2.5 and 10.8.2.

7.3.7 Vehicle Priority Access

For large car parks of more than 50 spaces which are liable to generate substantial traffic flows, access should be taken via a vehicle-priority footway crossing, formed in accordance with Paragraph 5.2.5. The car park access should be constructed to the appropriate details contained in Paragraph 10.8.2.

7.3.8 General Consideration

Pedestrian access to premises should be so arranged that it is easier and more convenient to use the designated parking areas than to park casually on the road (see Figure 7.7) The access should be of sufficient capacity to ensure that cars do not queue back into the road, particularly where there are large surface or multi-storey car parks associated with industrial, commercial and shopping developments or where barrier control is in operation. The exit capacity should be sufficient to avoid internal congestion.

7. Parking Design Standards

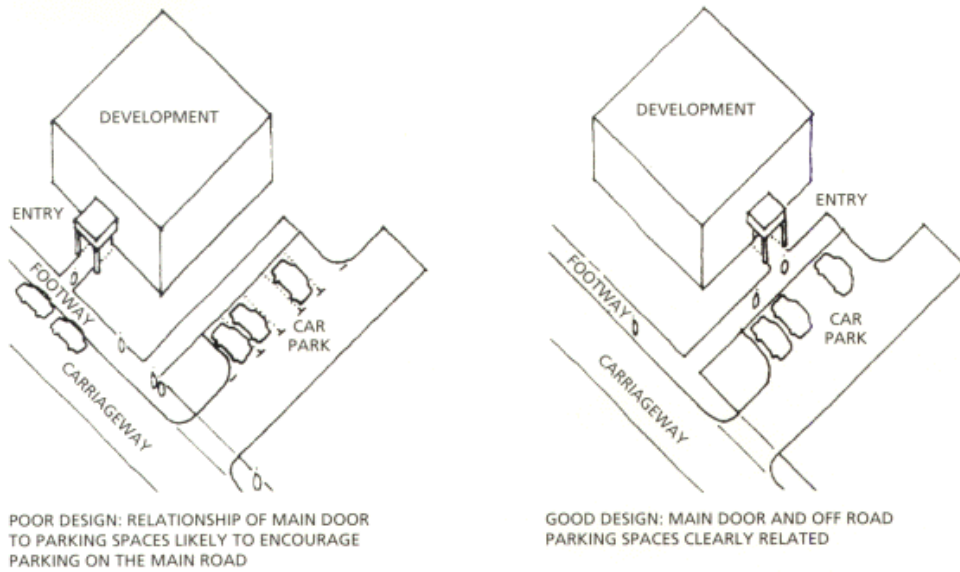


Figure 7.7 Building entrance in relation to parking area

Large unbroken expanses of parking are visually unattractive and can be confusing. It is desirable, therefore, for larger parking areas to be subdivided, with the use of appropriate landscaping, into units of between fifty and one hundred spaces, often with identification being provided for each area to assist drivers to find their car when returning.

7.3.9
Large car parks

Adequate lighting will be required in all car parks to ensure that users feel secure. Developers should liaise with the local crime prevention officer with regard to appropriate advice on car park security.

7.3.10
Lighting Security

The detailed design for multi-storey car parks is beyond the scope of this document but the same basic principles may be applied to the layout.

7.3.11.
Multi Storey Car Parks

A developer wishing to operate a charging public car park should contact the Head of Roads and Transportation to determine if a car park licence is required.

7.3.12
Charging Public Car Park

7. Parking Design Standards

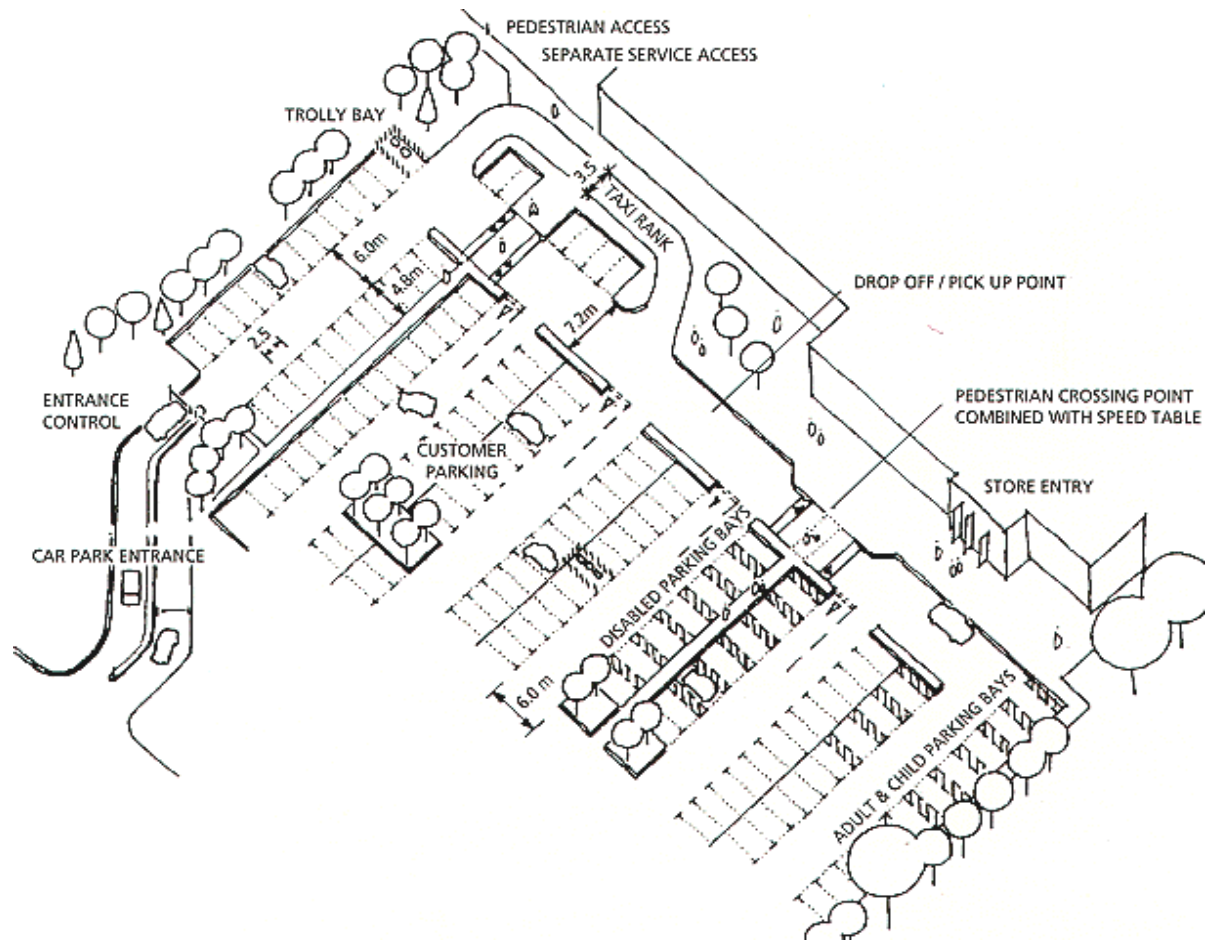


Figure 7.8 Car Park layout



7. Parking Design Standards



Residential Parking Requirements

7.4

In residential development specific provision should be made for residents' and visitors' parking.

7.4.7
Application

The parking requirement in residential areas depends on the size of the dwellings (i.e. number of bedrooms). The appropriate values are given in Table 7.3 for each size of house, with different proportions of "allocated" and "unallocated" spaces.

7.4.2
Provision

"Allocated" spaces are those which are either contained wholly within the curtilage of a dwelling and could be either garages, the driveways in front of the garages or in areas specially designated such as lock ups or individual spaces with lockable bollards. These spaces will relate to the specific dwelling and will be for the exclusive use of the residents of the dwelling and their visitors.

7.4.3
Allocated Spaces

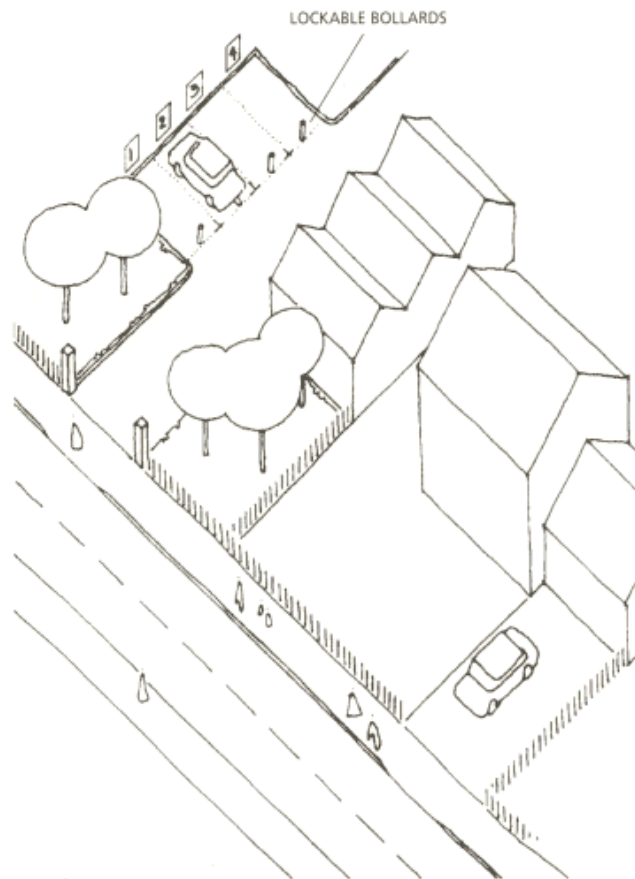
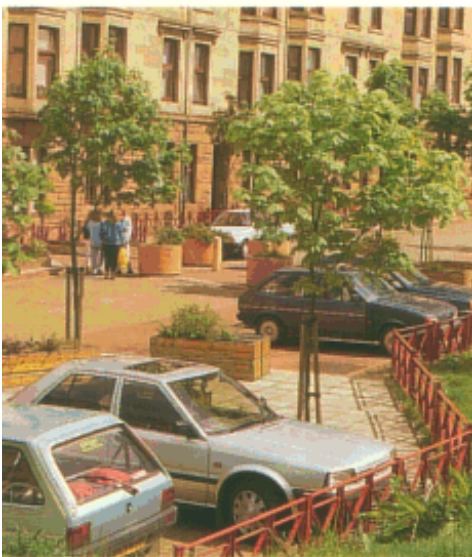


Figure 7.9 Allocated Parking

7. Parking Design Standards

7.4.4 Unallocated Spaces

Unallocated" spaces are those which are considered to be for the use of either residents or visitors and will be used on a "first come first served" basis. These spaces will not relate directly to any particular dwellings, but should be appropriately located for general use. Between 0.1 and 0.25 spaces per dwellings should be provided "on road" for adoption as public spaces. For Shared Surfaces, 0.1 should be provided on road. The remainder of unallocated spaces should be provided within private parking areas conveniently located near the dwellings.

7.4.5 Distance from Dwelling

It is essential that provision is appropriately located to avoid indiscriminate and obstructive parking. The maximum distance from any dwelling to the nearest "allocated" space should not exceed 30 metres and it is desirable that the maximum distance to "unallocated" spaces should also be 30 metres.

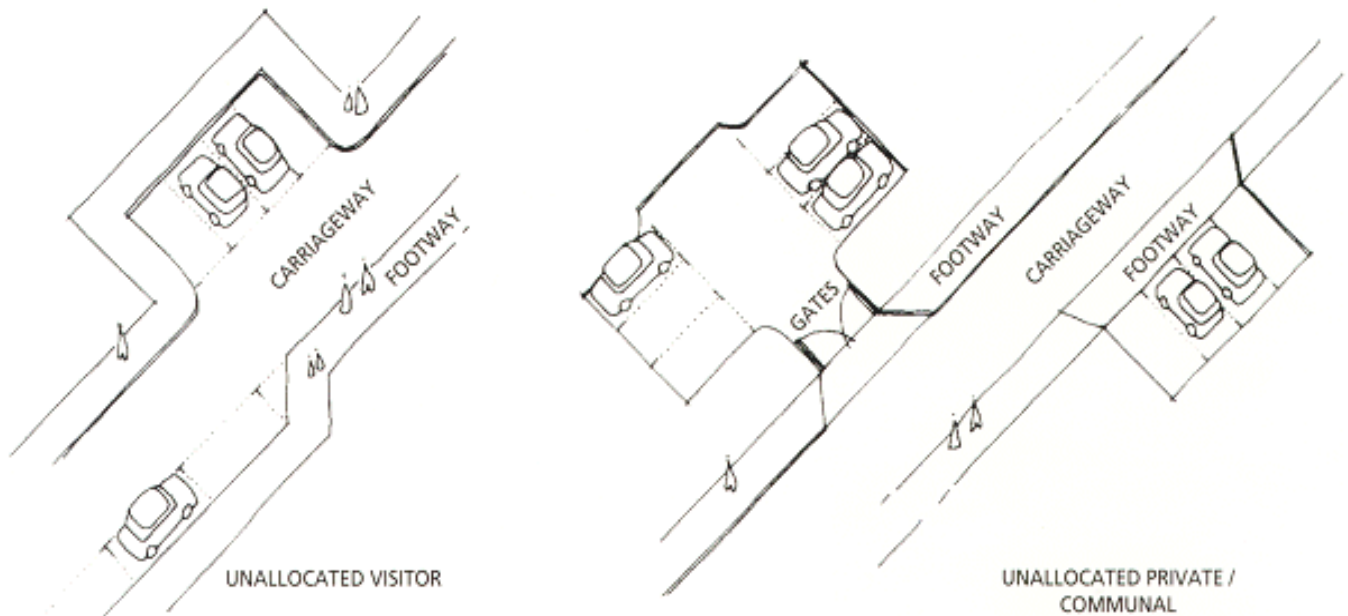


Figure 7.10 Unallocated parking

7.4.6 Lock Up Garages

Where lock-up garages are provided more than 30 metres from the dwellings they serve, other provision will be required for the convenient temporary parking of residents' cars.

7.4.7 Layouts in Driveways

Where a second or third parking space is part of the necessary parking provision within the curtilage of the dwelling these spaces should desirably be located in such a manner to allow garage and all parking spaces to be accessed directly from the road without the need to remove vehicles already parked in the driveway.

Where this desirable manoeuvrability is not provided, parking on the carriageway can be expected, in addition to visitor parking in lay bays, and therefore in these circumstances the minimum carriageway width for Housing Roads should be 5.5 metres and for Residential Core Roads 6.0metres.



Double driveway allows manoeuvrability within curtilage of site

7. Parking Design Standards

Private driveways should normally meet the road at right angles at dropped kerb access and unless giving direct access to a garage should be at least 12 metres long. This will facilitate the future construction of garages. The minimum width of driveways should be 2.75 metres with widening required on narrow carriageways as shown in Table 7.1. Widening within the curtilage may be required to accommodate off road parking and manoeuvrability. The desirable size of parking spaces in a driveway layout should be 2.5 metres wide by 5 metres long. However, considering that the majority of parking in driveway can be expected to be long term duration the minimum bay size can be 2.4 metres wide by 4.8 metres long. Table 7.1 and Figures 7.11 and 7.12 indicate appropriate driveway dimensions and suggested layouts. A width of 4.5 metres will accommodate a parked car with sufficient space to allow access. Double width parking can be accommodated on a 4.8 metres wide driveway; however, wheelchair or perambulator access may not be possible in these circumstance and therefore consideration should also be given to providing a segregated pedestrian access or local widening of the driveway. The length of driveways required in front of a garage to accommodate a parked vehicle and access to the garage should be a minimum of 10.5 metres.

7.4.8
*Driveway
Dimension*

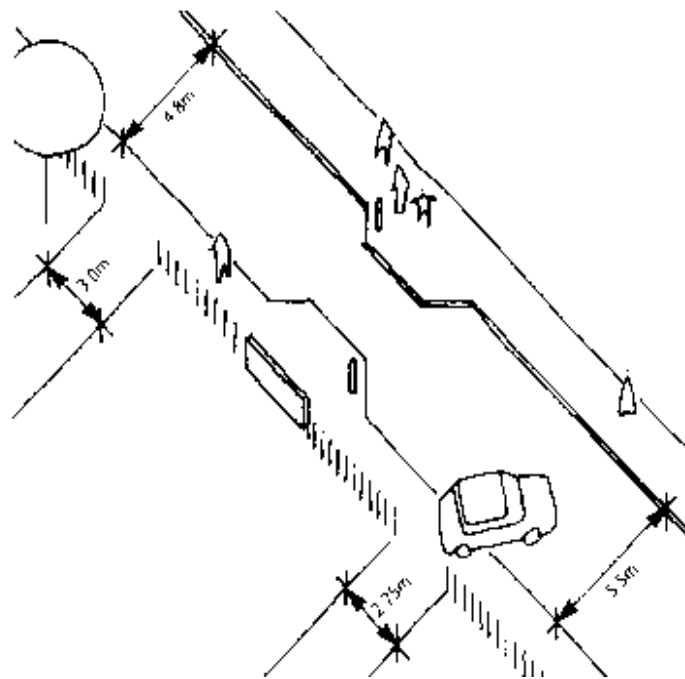


Figure 7.11 Driveway width in relation to carriageway with

Individual garages or car parks provided adjacent to buildings should be set back by at least 6 metres from the heel of the footway (or 8 metres from the kerbline if there is no footway). This provides space for car washing purposes and allows garage doors to be opened when the car is in the driveway.

7.4.9
*Position of
Garages*

The first 2 metres of a driveway should be paved to prevent deleterious material (e.g. loose chippings) being carried on to the road. Severe gradients, which render driveways unsuitable for car parking, should be avoided (desirable maximum 10%, absolute maximum 12.5%).

7.4.10
Paving

7. Parking Design Standards

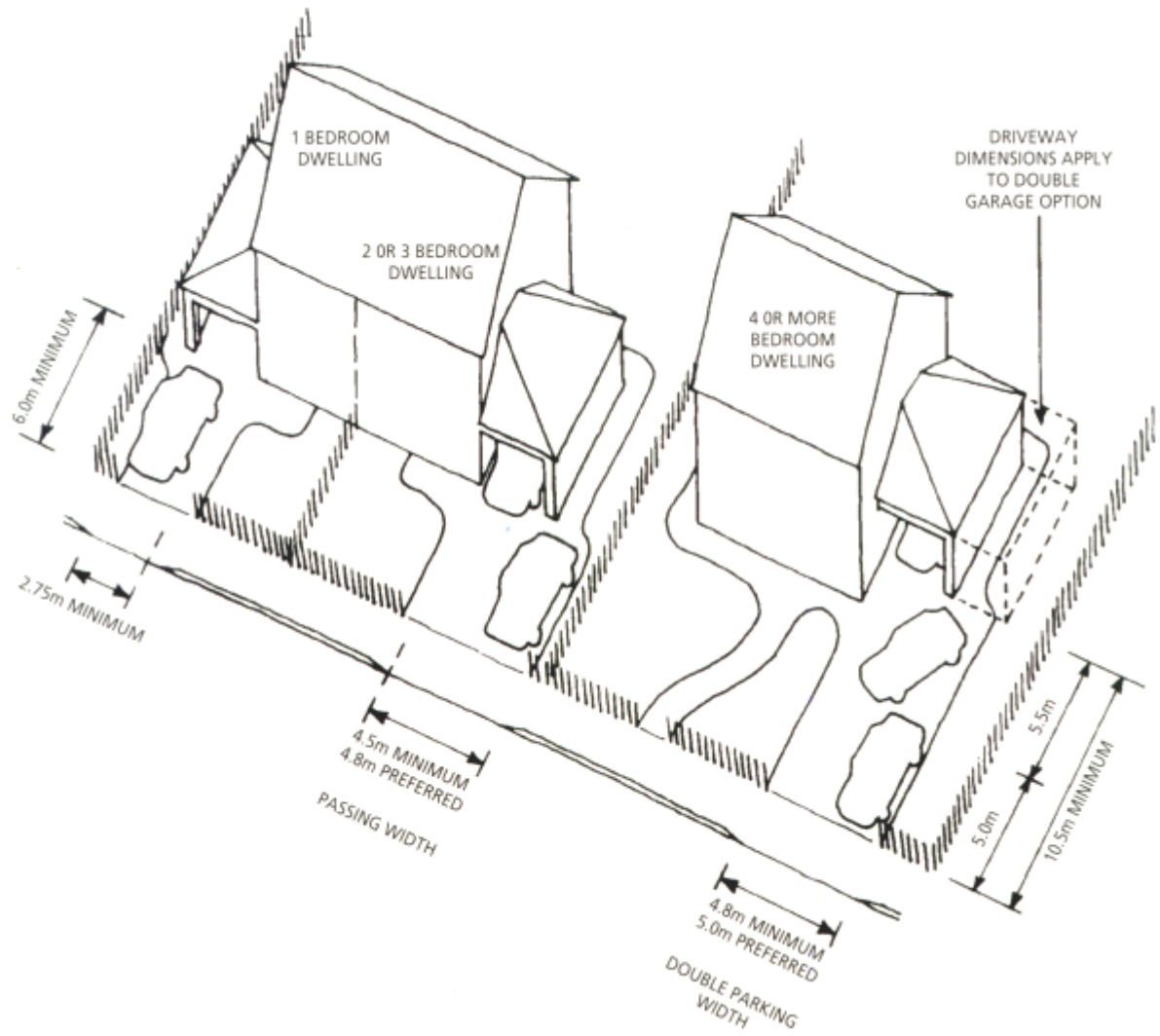


Fig 7.12 Driveway Dimensions

7. Parking Design Standards

Type of Development	Appropriate Provision		Comment
Housing Size of dwelling (number of bedrooms)	Allocated Spaces	Unallocated Spaces	
1	1	0.25	
	0	1.25	
2 or 3	2	0.25	
	1	0.65	
4 or more	3	0.10	
	2	0.50	
Redevelopment and Refurbishment	1 space per dwelling		<i>In certain circumstances, the Structure Plan allows for a lower provision of 0.8 spaces/dwelling (0.5 where the building facade is retained), to be agreed by the Head of Roads and Transportation</i>
Private sheltered housing & Housing Associations	0.2 - 0.5 spaces per dwelling + 0.3 spaces visitor parking per dwelling + 1 spaces per warden		<i>Provision dependant on size of units, degree of communal facilities and location of development</i>
Amenity Housing	0.5 spaces per dwelling + 0.3 spaces visitor parking per dwelling		
Local Authority Sheltered Housing	0.25 spaces per dwelling + 1 space per warden		<i>Includes provision for visitors</i>
Old People's Homes /Childrens Homes	1 space per 4 residents		<i>Includes provision for staff and visitors</i>
Students Flats	1 space per 7 students + 1 space per 3 staff + 1 space per warden		<i>Allowance should be made for future provision of parking assessed on the basis of possible subsequent occupation as mainstream housing</i>
Halls of Residence	1 space per 4 beds +1 space per 3 part time staff +1 space per resident staff		

Table 7.3 Residential Development Provision

7. Parking Design Standards



Commercial Parking Requirements

7.5

The Structure Plan (Section TRANS 5) states that an adequate supply and distribution of public off road parking related to short stay parking needs shall be provided within the regional shopping hierarchy.

7.5.1 *Public off Road*

The Structure Plan (Section TRANS 6) states that within the regional shopping hierarchy, unless it can be shown that the existing supply of public parking spaces will be adequate, retail development proposals over 2000 square metres gross floor space shall include public parking provision.

7.5.2 *Town Centre Retail*

The Structure Plan (Section TRANS 7) states that within the regional shopping hierarchy development proposals involving the loss of public off road parking spaces shall ensure that a minimum level of provision is maintained.

7.5.3 *Town Centre Minimum Provision*

The Structure Plan (Sections TRANS 8 and 9) states that parking associated with hotel and office developments is limited to that required for operational or servicing needs.

7.5.4 *Hotels and Offices*

Schedule 3A of the Structure Plan has a shopping hierarchy with centres being designated into levels from 1 to 4. Car parking provision for commercial developments is based on these tiers and the centres which fall into each tier are detailed in Table 7.4 a.

7.5.5 *Shopping Hierarchy*

Where a high use of taxis is anticipated, adequate safe and convenient facilities should be provided with an uninterrupted access.

7.5.6 *Taxis*



7. Parking Design Standards

Type of Development	Appropriate Provision (spaces per 100m ² gross floor area (GFA) unless otherwise indicated)	Comment
Office Accommodation	0.8	<i>Maximum permissible provision. May be permitted in exceptional circumstances at the discretion of the Council's Planning and Building Control Division</i>
Tier 2,3 and 4 Town Centres	0.4	
Elsewhere	2.0	
Banks	1 Space per 10m ² public floor space + 1 space per 3 staff	
Shops in Established Centres		
Tier 2	3.0	
Tier 3/Tier 4	5.0	
Food Superstore (Stand Alone) (includes Hypermarkets and Supermarkets)		
0- 500 m ² GFA	5.0	<i>Extensions to freestanding shopping developments to be assessed according to their incremental effect on the Gross Floor Area rather than as a separate development</i>
500-2000 m ² GFA	6.5	
2000-5000 m ² GFA	8.0	
5000-8000 m ² GFA	7.0	
>8000 m ² GFA	6.0	
Shopping Centre (Food & Non-food)		
0- 500 m ² GFA	4.0	<i>A number of retail units sharing parking facilities</i>
500-2000 m ² GFA	5.0	
2000-8000 m ² GFA	6.0	
>8000 m ² GFA	5.0	
Retail Parks (Non-food Only)		
2000-5000 m ² GFA	5.0	<i>A mixed site of DIY and other uses but not containing food retail</i>
5000-8000 m ² GFA	4.5	
>8000 m ² GFA	4.0	
DIY Superstore (Stand Alone)		
0-2000 m ² GFA	5.5	<i>Non-food retail warehouse specialising in DIY goods & possibly including garden centres</i>
2000-5000 m ² GFA	5.0	
>5000 m ² GFA	4.0	
Markets and Car Boot Sales	1 Space per stall holder/pitch +1 Space per 50m ² sale area	

Table 7.4 Commercial Development Provision

7. Parking Design Standards

Type of Development	Appropriate Provision (spaces per 100m ² gross floor area (GFA) unless otherwise indicated)	Comment
Cash and Carry Warehouse Trade Retail	5.0 5.0-10.0 +1 Space per 3 staff	<i>Includes staff parking. Lower figure applicable to bulky non-food sales such as carpets and furniture.</i>
Motor Trade Vehicle Display Area Spares Department Servicing / Bodywork Tyre & Exhaust Centre Car Wash Scrapyards Staff	2.0 4.0 4 spaces per service bay 2 spaces per service bay 5 spaces queuing space 2 spaces 1 space per 2 staff	<i>Includes showrooms and any external display area. Provision stated is for customers only and must be reserved and marked for their use. Developers will be required to demonstrate that space has been allowed for storage of new/used cars and other operational requirements.</i>
Petrol Stations	1 space per 2 staff at busiest time	<i>Additional parking to be assessed where there is a shop.</i>
Car Auction Rooms	1 space per 20m ² of display +1 space per 2 staff	
Hotels and B & B	1 space per 2.5 bed spaces (+1 space per 3 staff)	<i>For bars open to non residents additional parking will be required as for public houses (see Table 7.6).</i>
Tier 1	Not used in East Ayrshire	
Tier 2	Kilmarnock	
Tier 3	Not used in East Ayrshire	
Tier 4.	Stewarton, Cumnock,	

Table 7.4 a East Ayrshire Structure Plan Shopping Hierarchy

7. Parking Design Standards



Industrial, Recreational and Service Industry Parking Requirements

7.6

Where a development contains a mix of differing facilities then each part should be considered in its own right and the appropriate parking should be provided to give an overall total parking figure. It will be permissible to provide this parking at one centralised location provided that the differing facilities are clearly signed from the car park.

7.6.7
*Mixed
Development*

Provision will require to be made for staff parking and for visitor parking. There is no need for separate accesses to be made for these two users but the staff parking should be clearly marked to ensure that it is only available for staff.

7.6.2
Staff

The location of car parking areas in a development should be considered at an early stage in the design process to achieve a balanced distribution of spaces throughout the site, conveniently related to user destinations.

7.6.3
Location



Where different units are serviced from one car park, the car park should be located such that indiscriminate parking will not occur on internal development roads or on roads adjacent to the development and the pedestrian routes from the car park must follow a safe and convenient route.

7.6.4
*Shared
Facilities/
Pedestrian
Route*

In industrial developments consisting of individual units the provision of communal car parking, instead of parking for each unit, may lead to parking adjacent to the individual units on the road possibly causing difficulties for larger vehicles.

7.6.5
*Communal
Considerations*



At certain developments, especially in the service industry, such as schools and railway stations, a minimum number of 5 spaces should be provided to allow the dropping off/ picking up of car passengers. Where these points are required, they should be located preferably within the curtilage of the development but bays adjacent to the carriageway may be considered. Particular attention should be given to the provision of facilities for buses and their passengers at schools.

7.6.6
*Dropping Off/
Picking Up*

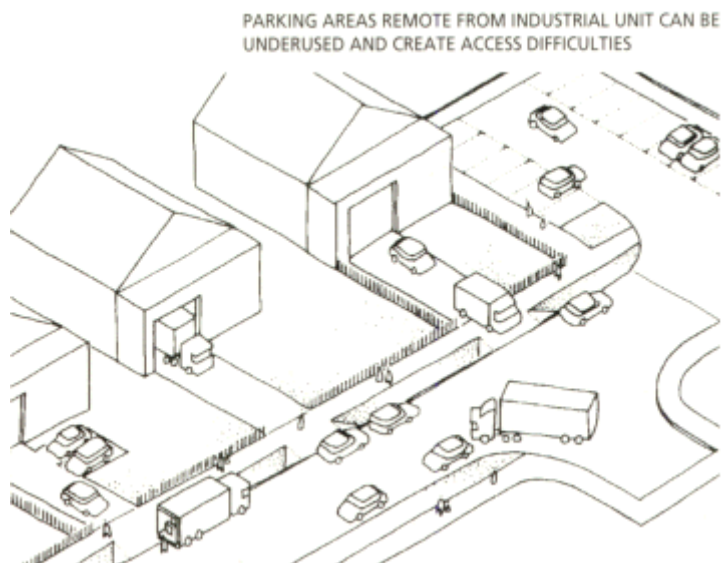


Figure 7.13 Inappropriate Location of Parking Provision

7. Parking Design Standards

7.6.7 Lorry Parking

Lorry parks and transhipment depots will often require spaces to be set aside for overnight parking where external deliveries may arrive at inappropriate times.

Type of Development	Appropriate Provision (spaces per 100m ² gross floor area (GFA) unless otherwise indicated)	Comment
Factories and Warehouses	1.1	<i>Special provision may be required for buses</i>
Warehousing (non-sales)	0.5	<i>Office space to be assessed separately</i>
Business Park	2.0	
Science Park	2.0	

Table 7.5 Industrial Development Provision

7.6.8 Recreational Developments

Special provision for buses, coaches and taxis may be necessary for certain recreational developments. Where the need for coach parking is identified, suitable access/egress arrangements to the car park should be provided.

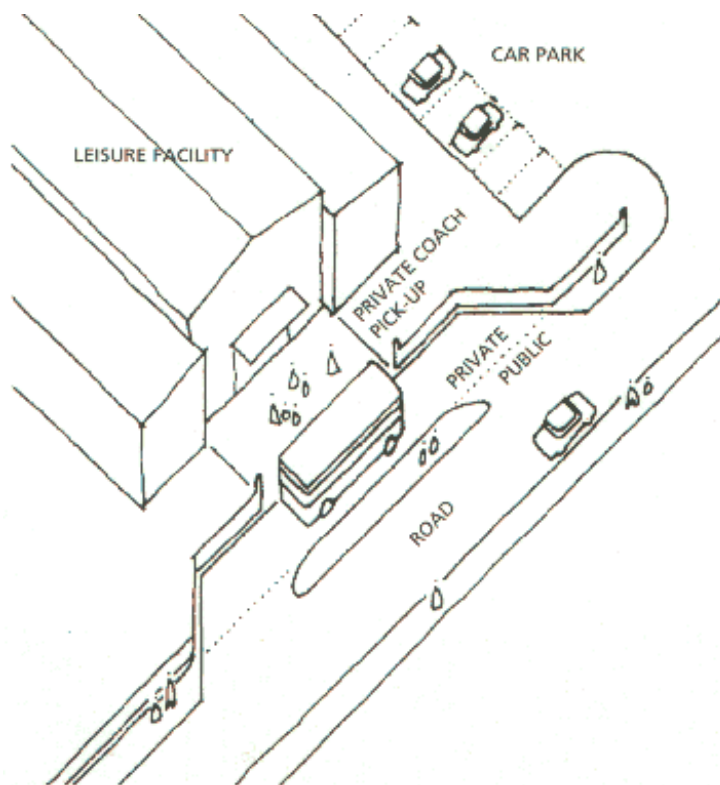


Figure 7.14 Details of coach provision

7. Parking Design Standards

Type of Development	Appropriate Provision (spaces per 100m ² public floor area (PFA) unless otherwise indicated)	Comment
Social Clubs/Function Rooms/Cafes and Restaurants	20	
Public Houses	10	
Theatres and Concert Halls	1 space per 5 seats	Special provision for buses / coaches may be necessary
Cinemas/Bingo Halls	1 space per 10 seats	
Sports Centres		
Swimming Baths	10 spaces per 100m ² pool area	
Snooker Halls	1 space per table	
Other Facilities	1 space per 2 players at peak time	
Spectators	1 space per 10 seats	
Staff	1 space per 3 staff at peak time	
Marinas	1 space per berth +1 space per 3 staff	
Museums/Public Art Galleries	1 space per 30m ² public display space +1 space per 2 staff	
Licensed Clubs	20 +1 space per 3 staff +1 space per solo performer and /or group	
Dance Halls and Discotheques	10 +1 space per 3 staff +3 spaces for performers	
Bowling Alleys	2 spaces per bowling lane	

Table 7.6 Recreational Development Provision

7. Parking Design Standards

Type of Development	Appropriate Provision (spaces per 100m ² gross floor area (GFA) unless otherwise indicated)	Comments
Hospitals	1 space per 3 beds +1 space per doctor/surgeon +1 space per 3 other staff	Includes provision for visitors
Health Centres/Clinics Includes Dental and Veterinary Surgeries	4 spaces per consulting room +1 space per practitioner +1 space per 3 other staff	
Schools — Nursery, Primary and Secondary	1 space per staff member + provision for buses where required	<i>Includes for casual visitors but playgrounds should be used to accommodate visitors parking on open days and for evening activities. Intensive staffing at nursery schools.</i>
Universities and Colleges	1 space per staff member +1 space per 10 students.	<i>(Additional parking for residences: see Table 7.3)</i>
Libraries	3 + 1 space per 3 staff	
Community Centres	5.0 - 20.0	<i>Lower figure applicable to centres with catchment within walking distance</i>
Churches	1 space per 10 seats	
Crematoria	1 space per seat	<i>Will require to be increased by 10% if adjacent roads can not be used as overspill parking. Provision will be required for buses</i>

Table 7.7 Service Industry Development Provision

Mobility Handicapped Parking

7.7

Disabled Persons' Parking

Special consideration should be given to the needs of disabled people concerning the number of designated spaces, their location and the pedestrian routes to these spaces.

7.7.1
Application

Table 7.8 details the number of disabled parking bays to be designated in car parks provided for employees and visitors associated with various developments.

7.7.2
Allocation

Type of Development	Size of Car Park	Number of Spaces Designated for Disabled	Comment
Employment Premises	Up to 200 spaces	5% of total	Minimum of 2 spaces
	Over 200 spaces	6 spaces plus 2% of total number	
Shopping, Leisure or Recreational	Up to 200 spaces	6% of total	Minimum of 3 spaces
	Over 200 spaces	4 spaces plus 4% of total number	

Table 7.8 Number of Designated Disabled Parking Bays

Bays provided for the disabled should be a minimum of 4.8 metres (and up to 6.6 metres) long, with access to the rear of the vehicle where wheelchairs are often stored. Spaces should be 2.4 metres wide plus a minimum of 0.9 metres (and up to 1.2 metres) wide cross-hatched strip to facilitate the transfer of wheelchair passengers. Economy of space can be gained by combining spaces in pairs of standard 4.8 x 2.4 metres dimensions with a common transfer zone. Alternatively, space may be saved by designating the end bays of a row of parking spaces, provided that access can be gained onto the adjacent road surface.

7.7.3
Dimension/ Layout

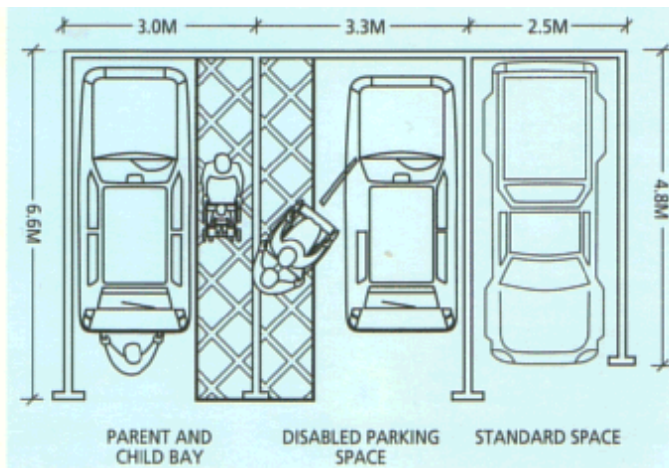


Figure 7.15 Dimensions for Special Needs Parking Bays

7. Parking Design Standards

7.7.4
*Footway
/Access* A flush dropped kerb must be provided at any disabled parking bay to allow access to the footway. Dedicated spaces should be located to give direct and safe access to the building.

7.7.5 **Child Parent and Parking**

Application

Parents with children can be considered as persons with a temporary mobility handicap and the provision of dedicated parking should be considered in retail developments. Provision may be equal to that for disabled persons (Table 7.8) with a suggested layout shown in figure 7.15.



Cycle Parking

7.8

Consideration should be given to the installation of secure cycle parking facilities at shopping and other communal centres where significant cycle usage is anticipated. A suitable method of creating secure parking is the "Sheffield" stand design.

7.8.1 Secure Parking Facilities

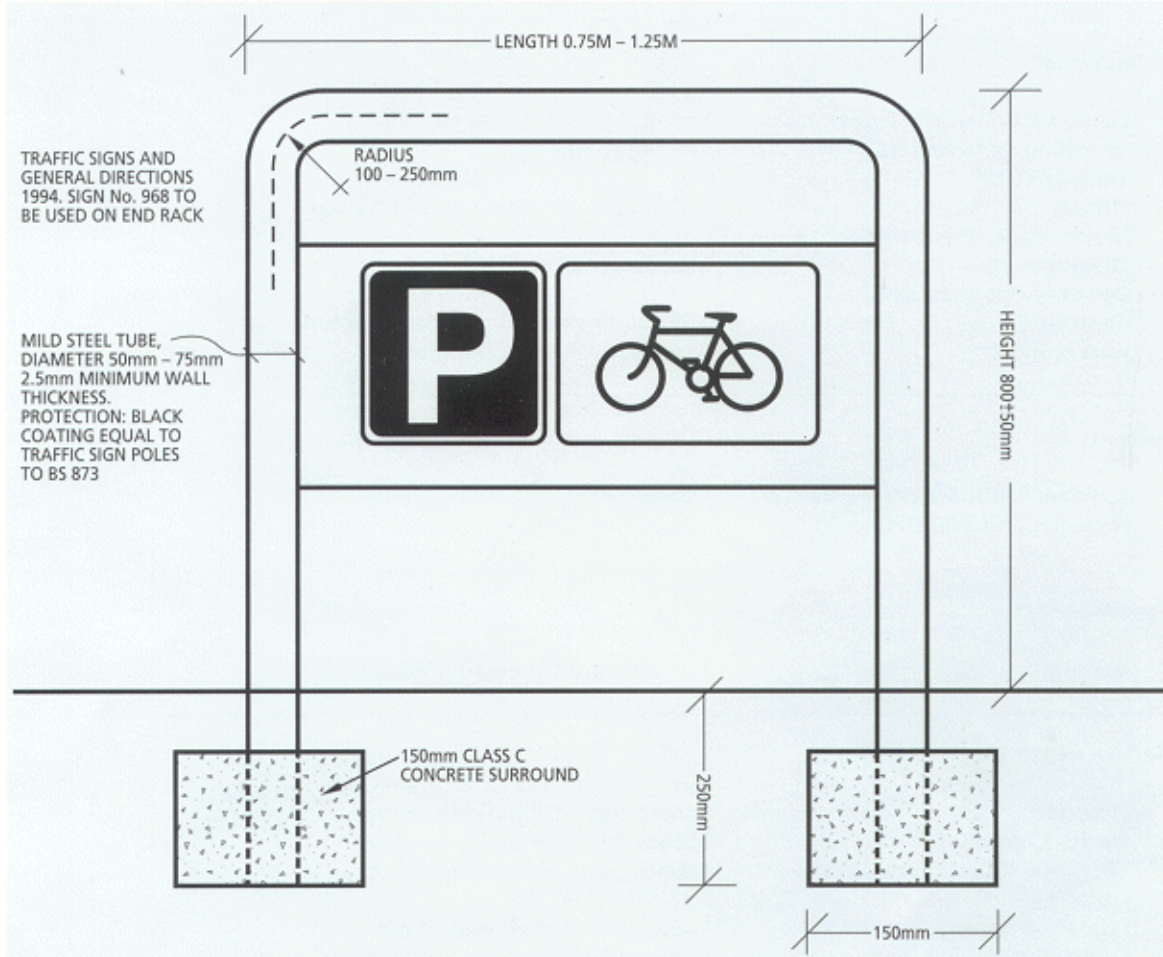


Figure 7.16 Sheffield Stand



Surveillance of Cycle Stands

For maximum security, stands should be placed away from access by motor vehicle. The location of cycle stands is also important as incorrectly located parking stands will lead to them being ignored and cycles being chained to drainpipes, railings and other such objects at locations throughout the area.

7.8.2 Location

The different needs of the cyclist should also be considered and where it is expected that longer term parking will be required a more secure and sheltered system of parking may be necessary. Changing and shower facilities should be considered at places of employment.

7.8.3 Assessing Needs

Cycle parking stands should be provided in new developments and where possible for refurbishments, at the rate shown in Table 7.9. For developments within Glasgow city centre, cycle parking should be provided at the rate based on the car parking requirements of an equivalent out-of-town development.

7.8.4 Level of Provision

Cycle parking stands/ spaces should be designated such that they cannot be abused by vehicular parking.

7.8.5 Designation

7. Parking Design Standards

Type of Development	Appropriate Provision
Residential Requirements	
Student Flats/Halls of Residence	1 space per 8 staff and residents
Commercial	
General Commercial (Superstores Shopping Centres Retail Parks and Markets)	2 spaces, plus 4 spaces per 100 car parking spaces
Offices	0.25 spaces per 100m ² gross floor area
Motor-trade, Trade and Warehousing	1 space per 25 staff
Banks, Shops in Established Centres	0.25 spaces per 100m ² gross floor area
Hotels, B & B	1 space per 8 car parking spaces
Industrial	
Business Parks, Science Parks Factories and Warehouses	1 space per 8 car parking spaces
Recreational	
General	1 space per 8 car parking spaces
Service Industry	
Hospitals	1 space per 8 car parking spaces
Health Centres	1 space per 8 car parking spaces
Churches, Community Centres	1 space per 8 car parking spaces
Libraries	0.25/100m ²
Primary & Secondary Schools	1 space per 25 staff and pupils
Universities and Colleges	1 space per 25 staff and students
Crematoria	1 space per 25 staff

Table 7.9 Cycle Parking



Chapter 8 :

Transport Impact Assessment

8.1 Transport Impact Assessments

8.2 Prospective Site Considerations



An assessment of the effect that development traffic will have on the existing road network on opening and in the future is necessary to determine what measures may be require to accommodate this additional generated traffic.

8. Transport Impact Assessment



Transport Impact Assessments

8.1

Transport Impact Assessments (TIAs) are necessary when a development will have a significant effect on the operation of roads in the vicinity.

8.1.1 Introduction

In these general circumstances assessment is sought to quantify the effect the development will have on the surrounding road network. The effects of a development will normally be considered for both year opening and future years. Appropriate improvements to the road system or other transportation measures may then be proposed to mitigate against the effect of the development.

8.1.2 Effect on Road Network

The Local Roads Authority is a statutory consultee with respect to planning applications. If a development is considered by the Roads Authority to require a TIA, this request will be conveyed to the Council's Planning and Building Control Division as part of the consultation process at the outline planning stage.

8.1.3 LRA request for TIA

Consideration will be given to the TIA and a view will be formed on whether the development can be supported in transportation terms.

8.1.4 Adequacy of Transportation

Developers are strongly advised therefore, to have early discussions with the Local Roads Authority regarding proposals likely to involve TIAs, prior to submitting outline planning applications.

8.7.5 Preplanning Consultation

A TIA will be required when a development is likely to have road implications. The following circumstances will result in a request for a transport impact assessment;

8.1.6 Circumstance: requiring TIA

- (a) a development greater than 2,000 square metres (21,500 square feet) retail floor space (gross),
- (b) a development which generates greater than 150 vehicle trips in/out combined in a peak hour,
- (b) other special circumstances which the Head of Roads and Transportation deems necessary to require an assessment.

The scope of the TIA will vary greatly, depending on the manner and location of development. Small scale development may only require a very brief statement of traffic implications, large developments may involve very extensive and detailed studies. As a general rule the following issues will be assessed in a typical TIA;

8.1.7 Scope of TIA

- (a) defined area and road network and specific junctions subjected to analysis,
- (b) traffic generation of proposals
- (c) distribution of traffic within study area,
- (d) assignment of traffic to the road network,
- (e) traffic growth and external influences,
- (f) parking provision,



8. Transport Impact Assessment

- (g) access, circulation and egress,
- (h) pedestrians, cyclists and public transport,
- (i) impact of proposal on traffic network,
- (j) impact of proposal on road safety,
- (k) conclusions and recommendations.

8.7.8 Traffic Growth

With respect to traffic growth, advice will be given on appropriate growth factors and future year traffic flows for the area under consideration. Transport assessments will normally be requested for the following time periods;

- (a) present day,
- (b) base year, ie opening year of development,
- (c) (i) base year, plus 10 years,
or
(ii) base year, plus 15 years, where there is new or altered roads infrastructure.

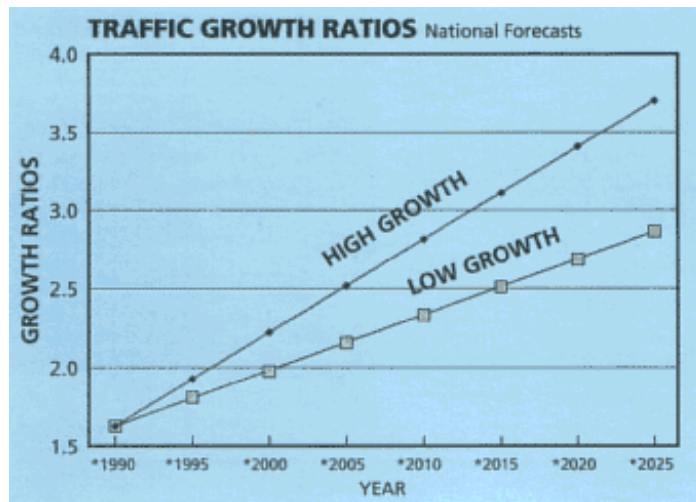


Figure 8.2 Traffic Growth Graph

8.1.9 Internal Layout

Developers are recommended to consider the internal layout of sites at the earliest stages in the planning process to ensure that sufficient levels of parking and the circulatory road system can be accommodated. Assessment may have to demonstrate that internal traffic flows will not affect the public road due to queuing at internal junctions etc.

8.1.10 Traffic Growth Constraint Measures

It is now widely acknowledged that predicted traffic growth may not be able to be accommodated in the traditional manner. Traffic growth constraint measures have been implemented in many urban centres already and such practice may continue to expand in certain areas. Such factors have Implications for TIAs.



8. Transport Impact Assessment



Prospective Site Considerations on Traffic Impact Analysis

Developers are advised to consider East Ayrshire Council's adopted "Guidelines" at the site search stage and having decided to proceed with a specific site, the following issues should be considered:

Location

- within a City or Town Centre, car parking requirements may be reduced (see Chapter 7).

Public Transport

- where development is adjacent to a rail terminal, design can encourage the use of this facility and reduce the dependence on private cars.
- existing or proposed bus services may be utilised effectively to reduce car dependence.
- park and ride remote from the development may be appropriate.

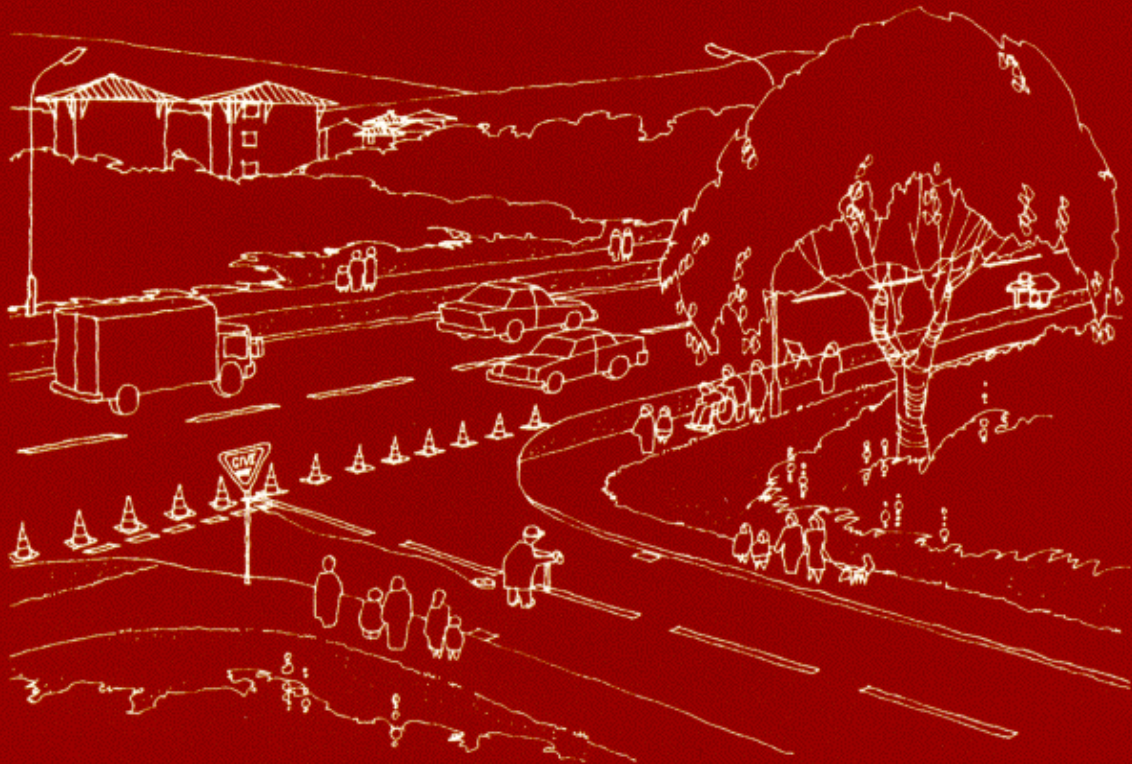
A developer should consider the overall transportation issues surrounding a development and promote, where possible measures which will reduce dependence on the car. In many cases, careful consideration of public transport issues may prove to be cost effective to a developer, in view of the potential reduction in parking areas.



Chapter 9

Safety Audit

- 9.1 Introduction**
- 9.2 Philosophy**
- 9.3 Procedures**
- 9.4 "Self Check" Audits**
- 9.5 Independent Audits**
- 9.6 Stage 1 - Feasibility/Preliminary Design**
- 9.7 Stage 2 - Detailed Design**
- 9.8 Stage 3 - Prior to Opening Scheme to Traffic**
- 9.9 Certification Procedure**



A formal systematic procedure is applied at various stages and levels of design and construction of road schemes to ensure that these new roads operate as safely as possible.

9. Safety Audit

Introduction

9.1

The purpose of this chapter is to explain the philosophy behind Road Safety Audits and to lay down the procedures that are to be adopted by the various parties involved in the Safety Audit of Development Road Schemes. Failure to comply with these procedures will result in refusal of Construction Consent. Developers are therefore encouraged to liaise with the relevant Head of Roads and Transportation at all stages of a scheme.

9.1.1
Purpose

It is a requirement of the 1988 Road Traffic Act (Section 39) that a Local Roads Authority, in constructing new roads, must "... take measures as appear to the authority to be appropriate to reduce the possibility of accidents when the roads come in to use". Safety Audit is a suitable procedure to use to meet this requirement.

9.1.2
Legal Requirements

The Safety Audit Proformas referred to in this Chapter are included in Appendix E.



9. Safety Audit

Philosophy

9.2

Safety Audit is a formal systematic procedure which is applied at various stages and levels of design and construction of a road scheme. Its main objective is to ensure that all road schemes, when opened to the public, operate as safely as possible. By applying practical road safety experience at the various stages and levels the possibility of unsafe features being introduced into a scheme is reduced. Consequently, the likelihood of road accidents is reduced.

9.2.7
*Formal
Procedure*

To assist the designer, Safety Audit can be classed as a design approach which should be applied by road engineers throughout the design and construction stages of a scheme: i.e. the designer should not just ask 'Does this scheme meet the design criteria?' but also 'Is this scheme safe for the user?' since the strict adherence to design standards does not always mean safety problems are avoided.

9.2.2
*Design
Assistance*

It should be appreciated and accepted that the objectives of safety audit may be in conflict with other scheme objectives. In particular a conflict in cost may frequently arise and it may be difficult to decide whether additional costs, resulting from acting on safety audit recommendations and observations, are justified. Conflicts of interest such as this can reduce the effectiveness of the Safety Audit procedure. To make the audit an effective procedure it is best that the auditors be independent of the designers.

9.2.3
*Safety Audit
Objectives*



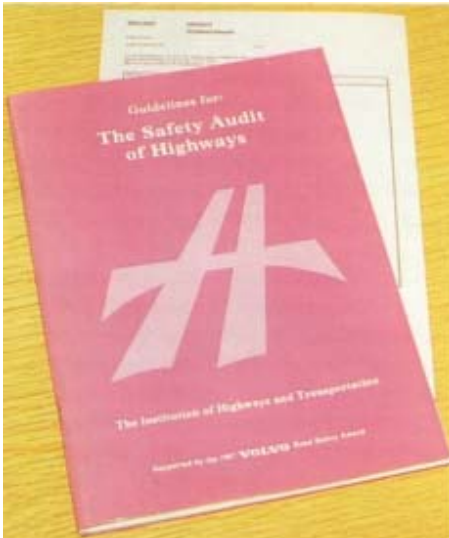
It is not the job of the auditor to attempt to resolve such conflicts, nor to redesign a scheme or to implement changes. By using the Safety Audit procedures to identify safety faults or omissions, due consideration can be given to the benefits and disadvantages of a situation before a decision is made regarding change. It is then up to the project manager (Developer) as to whether he acts on what has been highlighted by the auditor. If he chooses not to act, the project manager must justify his decision and then receive authorisation from an arbiter (Head of Roads and Transportation) to back that decision.

9.2.4
*Resolving
Conflicts*

Adherence to the philosophy of this chapter should reduce the number of problems found by the auditor. It will not, however, remove the need for an audit. Similarly, if the audit procedure is effective at the initial stages then the problems encountered at the latter stages should be minimal in terms of scale and cost.

9.2.5
*Problems raised
by Audit*

9. Safety Audit



Procedures

Based on guidance regarding safety audits contained in the publication 'Guidelines for: The Safety Audit of Highways' issued by the Institution of Highway and Transportation it has been decided to adapt one of the methods of organising safety audits contained therein to suit the needs of the Local Roads Authority.

Within Local Authorities the independent auditors are the Accident Investigation and Prevention (A.I.P.) Unit. They have been chosen because of their daily involvement in accident studies and their knowledge of safety research. The Unit has direct access to relevant accident data and can use this information to assess the likely changes in accident pattern due to changes in traffic movements resulting from a new road scheme.



It should be noted that the definition of the Safety Auditor can mean either an individual or a team of experienced safety consultants.

The following points should be remembered at all times:

- (a) The Safety Audit is not a check of the designer's adherence to or compliance with standards. It is an assessment of the suitability, with respect to road safety, of the standards when applied to particular situations.
- (b) The involvement of the Safety Auditor does not remove the responsibility of safe design from the designer.
- (c) If, at any time during the design or construction stages, any significant changes to a scheme design are made the Safety Auditor must be notified to enable an assessment of the safety implications to be made.
- (d) The design checklist used should be per DMRB HA 42/94, Annexes A-C. The checklist submitted for audit must include notification of all departures from current design standards or where design criteria are not met. Also included must be the reason(s) for the departures and the locations where they have taken place.

9.3

9.3.1 Procedural Basis

9.3.2 Roads Authority's AIP Unit

9.3.3 Safety Auditor's Definition

9.3.4 Points to Remember

9. Safety Audit

9.3.5

*Development
Roads*

- (e) Any arrangements entered into with adjacent landowners which affect the design should be noted under "Additional Items" in the checklist.
- (f) While the checklists are extensive, it must be emphasised that they are not exhaustive and the designer should add whatever extra comments are deemed to be necessary.

Development Roads will be subject to Safety Audits under the following conditions:

(as detailed in the flow chart in Figure 9.1).

- All developments with roads infrastructure exceeding £225,000 in value but less than £1 million shall be subject to "self check" Safety Audits.
- All developments with roads infrastructure exceeding £1 million in value shall be subject to independent Safety Audits.



9. Safety Audit

"Self Check" Audits

9.4

The roads designer will complete checklists for Stages 1 and 2 of the scheme, giving due consideration to the safety issues the checklists raise and will also complete a Safety Audit Notice at Stage 1 and Stage 2. Self check audits will normally be undertaken by the designer; however, it does not preclude the developer from employing an independent auditor as described elsewhere.

9.4.1
*Self Check
Procedure*

The Safety Audit Notices, Appendix E and the checklists will then be submitted to the relevant Head of Roads and Transportation as part of the package when seeking Construction Consent. The Head of Roads and Transportation will consider the checklists as part of the submission for Construction Consent. As a result of his deliberations, the Head of Roads and Transportation may place conditions (other than that referred to in the paragraph below) upon the developer, when granting Construction Consent. Failure to follow this procedure will result in refusal of Construction Consent.

9.4.2
*Development
Roads*

It will be a condition of Construction Consent that the developer undertakes a Stage 3 (Section 9.8) audit with a representative of the Head of Roads and Transportation in attendance. As for an independent audit, this should take the form of a site inspection. The new layout should be driven, under normal conditions, and where appropriate walked or cycled. A checklist and Safety Audit Notice shall then be submitted to the Head of Roads and Transportation. The Head of Roads and Transportation may require the developer to act on issues raised by the Stage 3 audit.

9.4.3
*Self Check Site
Inspection*



9. Safety Audit

Independent Audits

9.5

Developers have two options as to who can be appointed Safety Auditor for the independent Safety Audit of Development Roads

9.5.7
Appointment of Safety Auditor

- (a) The audit may be undertaken, for the developer, by the Local Roads Authority's A.I.P. Unit. This will be in response to the issuing by the roads designer of a Safety Advice Notice. The costs (based on the scale and complexity of the scheme) incurred by the AIP Unit in carrying out the audit and preparing the report must be borne by the developer.
- (b) The Audit may be undertaken for the developer by a professional firm of consultants with relevant experience of safety audit. The consultants will be expected to submit a CV which would show their experience in auditing and also demonstrate their independence from the design process. Both these points are to be to the satisfaction of the Local Roads Authority.

There are various parties involved in the independent Safety Audit of Development Roads. These are;

9.5.2
Parties involved in Safety Audit

- (a) the developer and/or architect who represents the developer (the client),
- (b) the design organisation who design the road content of the scheme (if different from (a)),
- (c) the Head of Roads and Transportation's Office who represent the Roads Authority,
- (d) an independent Audit Team comprising one or more safety consultants.

Where additional parties are involved these are detailed in the appropriate section for that stage of the Audit.

The Developer will be required to submit his design for Safety Audit at three stages of the scheme as described in Sections 9.6, 9.7 and 9.8.

9.5.3
Three Stages of Safety Audit



9. Safety Audit



Stage 1 - Feasibility / Preliminary Design

9.6

The Stage 1 audit will be undertaken as an input to feasibility/ preliminary design of schemes and may be required to be considered as apart of the planning process. It is required to assess route or layout choice, standards, impact on and continuity with existing network (i.e. how it fits into its environment), road type, i.e. single / dual carriageway, horizontal and vertical alignments and sightlines. Also considered are junction provision (i.e. number and type etc.), and the location and layout of junctions including slip roads and lay-bys.

9.6.1
Stage 1 Audit

9.6.2 *Stage 1 Submissions*

The following submissions will be required for a Stage 1 audit;

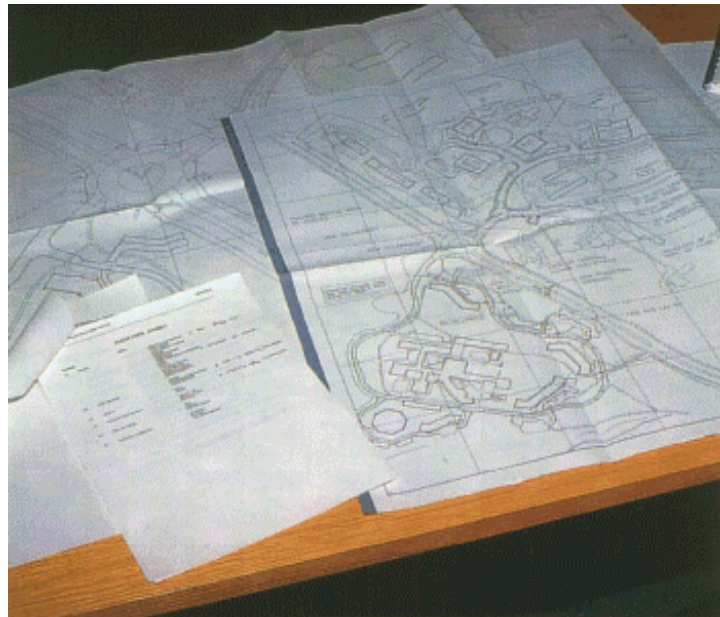
- (a) draft design (preferably at 1:2500 or 1:1250 scale),
- (b) predicted traffic flows or Transport Impact Assessment (TIA),
- (c) checklist for Stage 1,
- (d) Safety Audit Notice for Stage 1 (signed by the road designer).

9.6.3 *Stage 1 Certification*

9.6.4 *Stage 1 Completion*

The certification procedure will be as shown in the flow chart (Figure 9.1) and described in Section 9.9.

The audit should be completed by the independent auditor within two weeks of submission.



Checklist with Design

9. Safety Audit



Stage 2 - Detailed Design

9.7

The Stage 2 audit will be undertaken on completion of the detailed design and is required to assess detailed junction layout, road markings, road signs, traffic signals and lighting details, future maintenance etc.

9.7.1
Stage 2 Audit

The following submissions will be required for a Stage 2 Audit:

9.7.2
Stage 2 Submissions

(a) Construction Consent drawings showing:

- layout
- drainage
- road markings, road signs, traffic signal layout and staging
- lighting
- safety fencing and/or pedestrian barrier
- any Traffic Regulation, Stopping Up or other Orders required

(b) Checklist for Stage 2,

(c) Safety Audit Notice for Stage 2 (signed by the road designer).

In order that the road designer can sign the Safety Audit Notice they may have to obtain, for elements of design undertaken outwith their office, a checklist and signed Safety Audit Notice from the appropriate design source. This should be included in the submission.

9.7.3
Stage 2 Certification

The certification procedure will be as shown in the flow chart (Figure 9.1) and described in Section 9.9. Construction Consent will not be granted until the Safety Audit process has been satisfactorily completed.

9.7.4
Stage 2 Completion

The independent auditor should complete the audit within three weeks of submission.



Signs at Junctions can affect visibility

9. Safety Audit



Stage 3 - Prior to Opening Scheme to Traffic

9.8

The Stage 3 audit will take place prior to the opening of the scheme and will take the form of a site inspection. Since it takes place after the granting of Construction Consent, the Stage 3 audit will be a condition of the Construction Consent. The Stage 3 audit is required to prove that previously accepted recommendations and observations have been incorporated and that, as far as possible, no previously unidentified problems exist. All road markings must be laid signs in place and lighting (where applicable) operational. It will be necessary to view the site during both daylight and night time conditions to enable all potential problems to be identified. Circumstances may also dictate that the Stage 3 audit is undertaken in phases (e.g. if phased opening is required).

9.8.1
Stage 3 Audit

The following submissions will be required for a Stage 3 Audit:

9.8.2
Stage 3
Submissions

- (a) Checklist for Stage 3,
- (b) Safety Audit Notice for Stage 3 (signed by the Developer's Representative).

Additional personnel require to be involved in a Stage 3 Audit:

9.8.3
Additional
Personnel

- (a) Developer's Representative staff,
- (b) Traffic Police.



The inspection will be chaired by the Safety Auditor and will involve a preliminary discussion of the scheme to familiarise those present of its layout. The new layout shall then be driven, under normal conditions, and when appropriate walked or cycled. Any comments shall be noted and discussed following the inspection. The independent auditor will then prepare the Safety Audit Report taking cognisance of the views expressed by those attending the audit. The report, however, will not necessarily recommend all or any of the views expressed by those attending but will be based on the judgement of the Audit Team. The Safety Audit Report and Audit Team Statement will then be issued as described in Section 9.9.

9.8.4
Stage 3
Inspection

The road should not be open to traffic until a Confirmation Report is issued to the Head of Roads and Transportation and copied to the Safety Auditor under the certification procedure (Section 9.9).

9.8.5
Stage 3
Confirmation
Report



9. Safety Audit

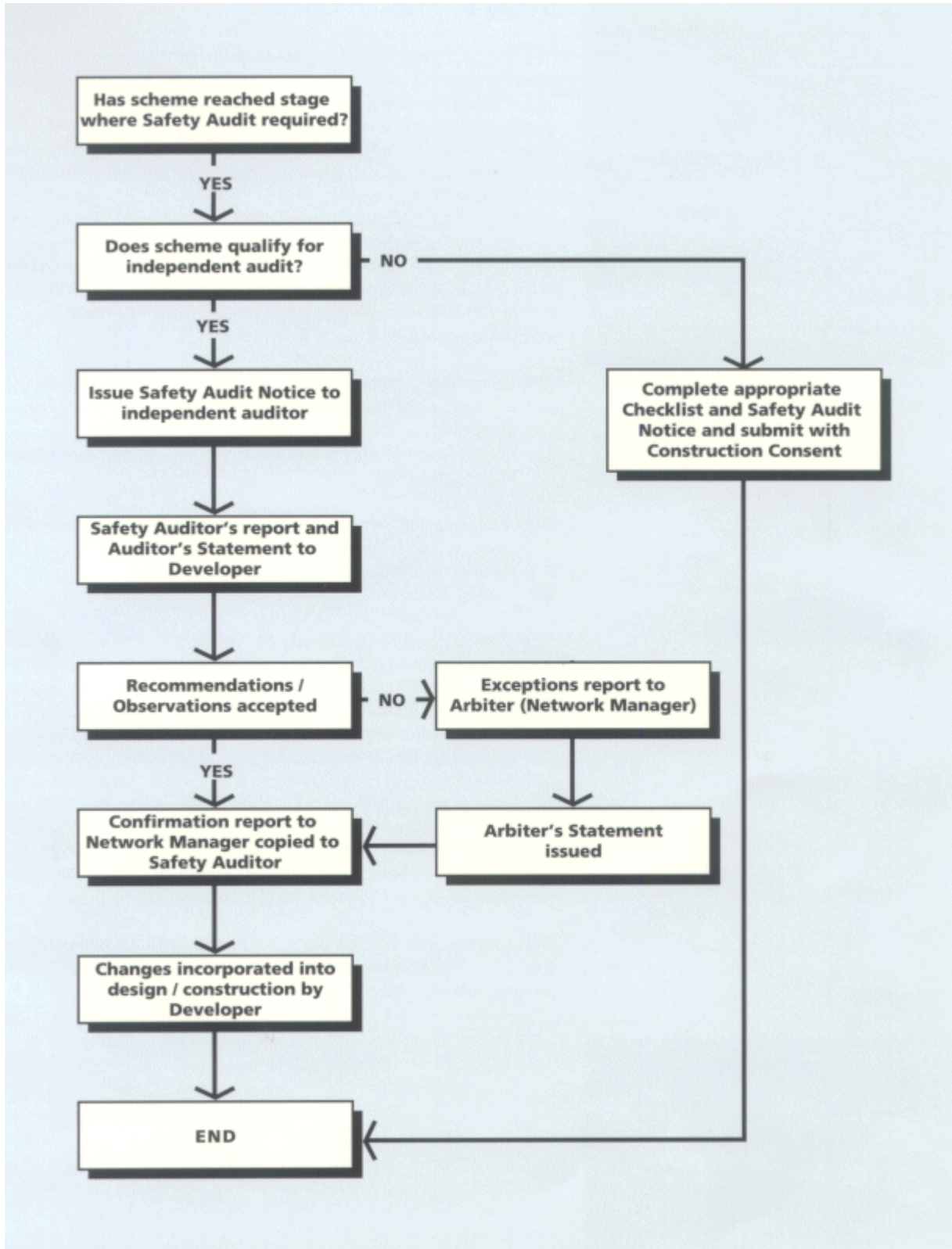


Figure 9.1 Flow Chart for Each Stage of Audit Procedures for Development Roads

9. Safety Audit

Certification Procedure

9.9

The procedure is as detailed in the flow chart in Figure 9.1 and is as follows:-

9.9.1
*Certification
Procedure*

The Safety Auditor will be informed of the requirement for a Safety Audit by the issuing of a Safety Audit Notice by the road design organisation. The Safety Auditor will study the design/ visit the site and make relevant comments. A completed report and Audit Team Statement will be issued by the Safety Auditor to the developer.

If the developer accepts that the identified problems should be acted upon then a Confirmation Report should be forwarded to the Head of Roads and Transportation and copied to the Safety Auditor. The accepted changes will be incorporated into the design/ construction.

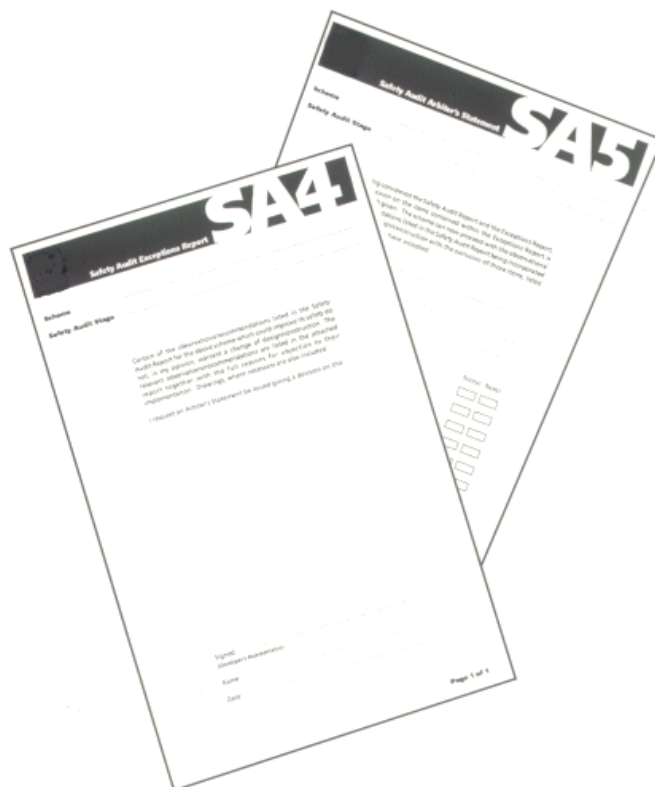
9.9.2
*Confirmation
Report*

If the developer does not accept that the identified problems should be acted upon then an Exceptions Report, must be forwarded giving reasons, to the Arbiter (the Head of Roads and Transportation) for his decision. The Arbiter's decision will then be given to the developer in the Arbiter's Statement. The developer can then issue the Confirmation Report to the Head of Roads and Transportation, and a copy to the Safety Auditor, and the final changes can be incorporated into the design/construction.

9.9.3
*Exceptions
Report*

Only when the Confirmation report is issued to the Head of Roads and Transportation and copied to the Safety Auditor, should the scheme progress to the next stage.

9.9.4
*Scheme
Progression*



Chapter 10

Construction Design

10.1 Geotechnical Considerations

10.2 Specifications

10.3 Subgrade Drainage

10.4 Carriageway Construction

10.5 Traffic Calming

10.6 Footway, Footpath and Cycle Track Construction

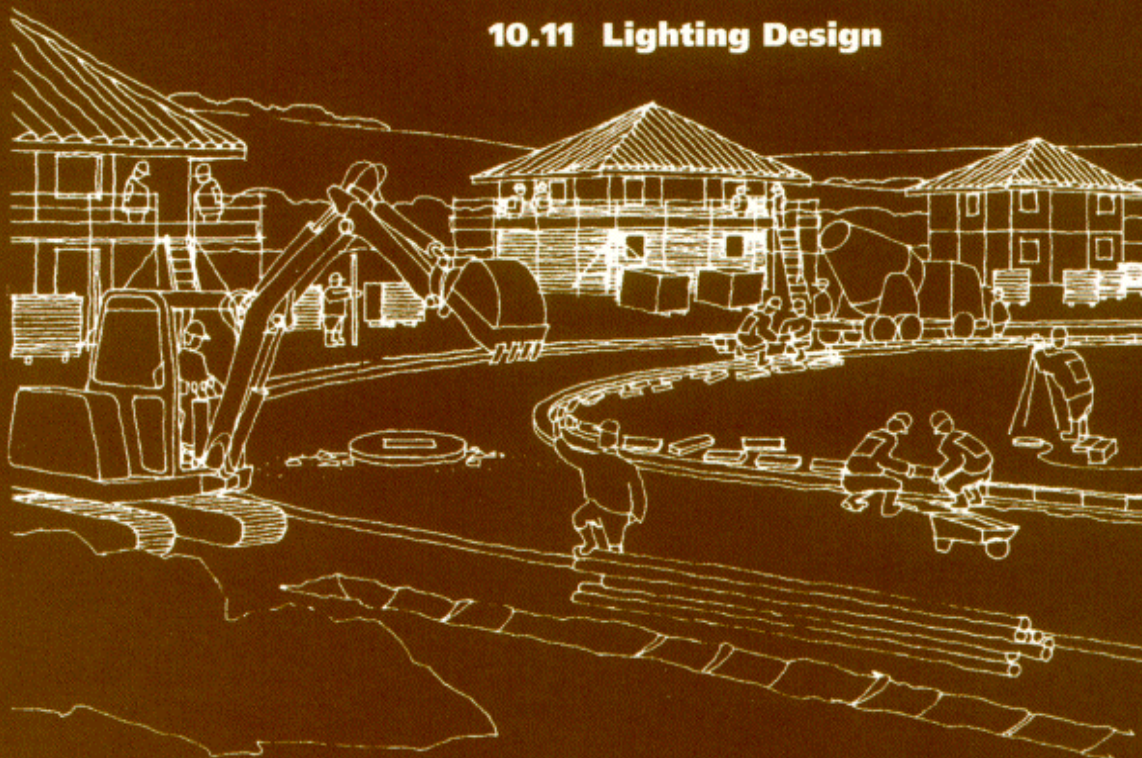
10.7 Kerbs and Edging

10.8 Accesses

10.9 Road Drainage

10.10 Landscape Treatment

10.11 Lighting Design



All new roads, footpaths and cycle tracks must be constructed to at least the standards described in this chapter to ensure that they perform effectively over their design life.

10. Construction Design



Geotechnical Considerations

10.1

The extent and type of ground investigation requirements with detailed reporting will be dictated by the nature of the proposed development, former land use, local ground conditions and mining history.

10.1.1 *Introduction*

The Interpretive Report which must be submitted with the application for Construction Consent will be examined against the engineering drawings submitted and the supporting factual information.

All ground investigation reports should comply with BS 5930:1981 Code of Practice for Site Investigation. The Factual Ground Investigation Report should include the following minimum information;

10.1.2 *Supporting Technical Documentation*

- (a) exploratory hole logs to BS 5930 : 1981,
- (b) laboratory test data to BS 5930 : 1981 and BS 1377 : 1990 relevant to the proposed form of road construction,
- (c) a location plan of the site at 1/2500 scale with the proposed road superimposed,
- (d) a plan at 1/500 scale showing the co-ordinated location of all exploratory holes and the proposed road.

The spacing between and the nature and depth of exploratory holes is dependent upon the ground conditions and nature of development. Typically, exploratory holes should be sunk at a maximum spacing of 25 metres offset from the centreline of the proposed road where necessary to ensure sufficient transverse coverage along the site. Where changing conditions demand clarification closer spacing may be necessary.

Where it is proposed to locate a road over land previously used for industrial purposes or waste disposal, it is essential that chemical analysis and gas monitoring information is submitted in addition to standard laboratory testing to BS 5930:1981 and BS 1377 :1990

10. Construction Design

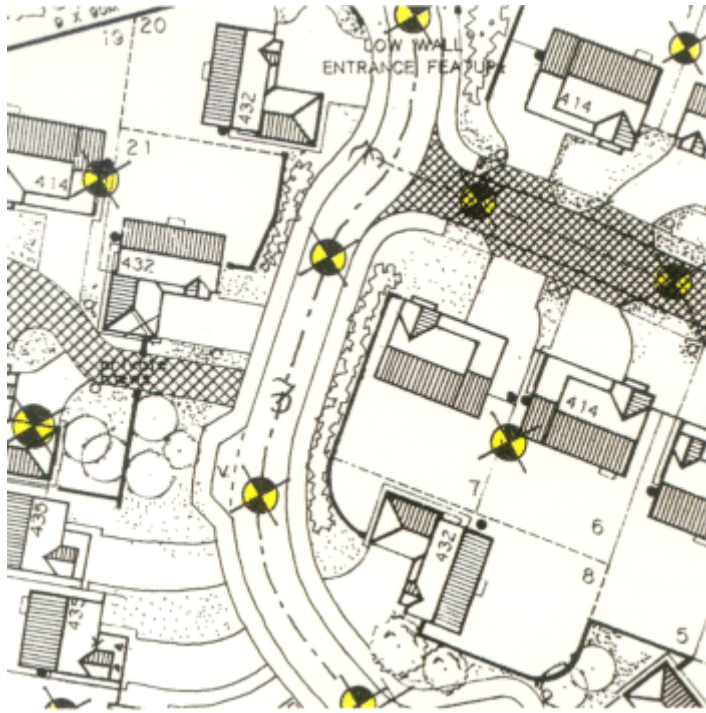


Figure 10.1 Exploratory Borehole Survey

10.1.3 Interpretive Report

The Interpretive Report must include a Mineral Report specifically dealing with the implication for the proposed road construction.

10.1.4 Mine Workings

Where a mineshaft lies within the site it is not acceptable to locate the road over the shaft irrespective of how it has been or, will be treated.

In the situation where a proposed road is underlain by shallow mine workings, the designer of that road must identify the risk of loss of support to the road. Based on an evaluation of the method of mining, the current condition of the mine, the groundwater regime and condition of superincumbent strata, the applicant should identify whether precautions are necessary to ensure mineral stability. Specific guidance on the requirements for road structures is contained in the Department of Transport's Design Manual for Roads and Bridges. The Department of Transport's Departmental Standard BD10/82, 'Design of Highway Structures in Areas of Mining Subsidence' can also be applied to all roads, whether major or minor, however, specific site conditions may require treatment even where there is more than 10 times the extraction thickness in terms of rock cover.

10. Construction Design

It will be necessary to consult The Coal Authority before any ground investigation is carried out where coal seams are likely to be encountered by drilling operations. The Coal Authority must also be consulted before any proposed treatment of coal seams or shafts and other mine entrances vested with them are undertaken. The Coal Authority may impose certain conditions under which drilling or treatment may be carried out; any such conditions must be complied with and are conditional upon Construction Consent being granted.

10.1.5
The Coal Authority

Where a site has formerly been developed it will likely be covered in fill material i.e. a brownfield site. The nature, depth and extent of this material should be defined. The possibility of the ground being contaminated must be considered. The Interpretive Report should assess any contamination and its implications for both road construction and maintenance of the completed road and its drainage system.

10.1.6
Brown field Sites

Where a proposed development road is to be constructed over peat or buried peat, it will be necessary to excavate and replace the peat in virtually all cases.

10.1.7
Peat

Geotextiles or polymer geogrids may be used as a construction expedient to assist construction; however they cannot prevent consolidation settlement or secondary compression in soft compressible soils.

10.7.8
*Geotextiles/
Polymer Grids*

Geotextiles or polymer geogrids may not be used as a substitute for a capping layer or as a means of reducing subbase thickness in normal road construction. They may be used in addition to a capping layer or normal pavement construction to resolve a particular problem. The decision to use geotextiles or polymer geogrids must consider the need for long term integrity, damage from road openings and the practicality of effective repairs to the geotextile/geogrid.

Geogrids or geotextiles should not be used below roads and footways/cycle tracks as an alternative to grouting in an area where shallow mine workings are present. If the workings are at a depth where the normal criteria as applied to development roads would require treatment by grouting or excavation and replacement then such treatment should be carried out.

The CBR value of the soil shall be determined by the laboratory CBR test in accordance with BS 1377: Part 4:1990 and test data shall be incorporated in the Factual Ground Investigation Report. Further guidance on pavement design may be found in Sections 10.3 and 10.4.

10.1.9
CBR

10. Construction Design

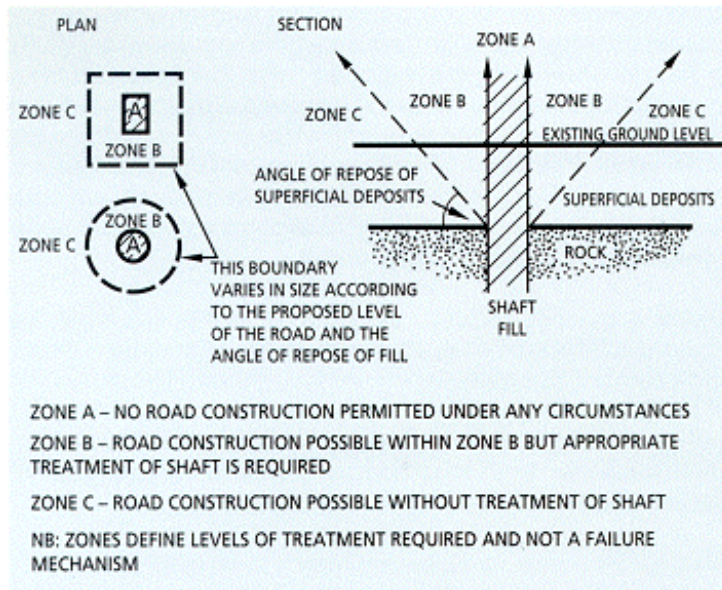


Figure 10.2 Ground Treatment A

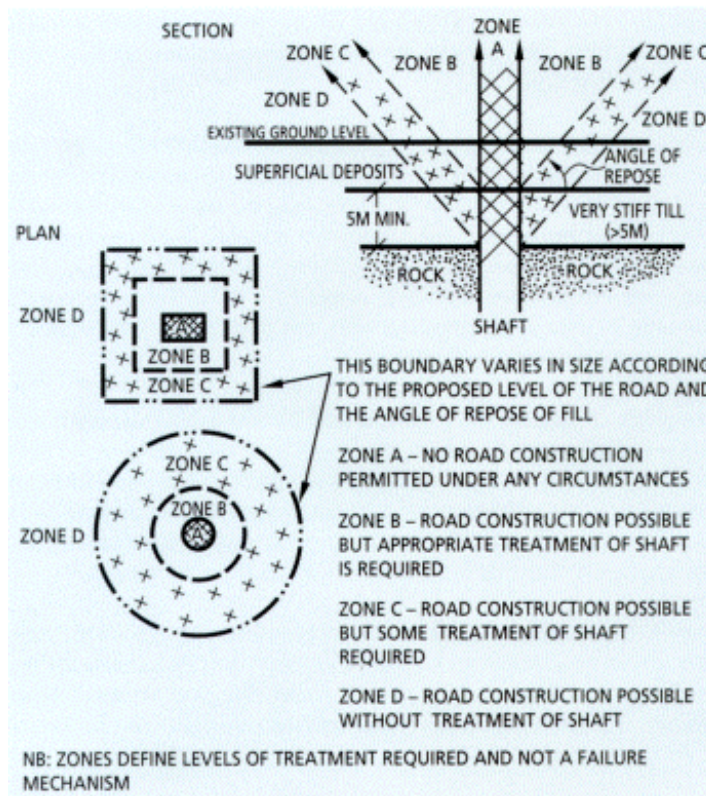


Figure 10.2 Ground Treatment B

10. Construction Design

Specifications

10.2

The specification for the construction of road pavements and associated structures is detailed in Appendix A. Clause and Appendix numbers in the following text refer to that specification.

10.2.1
Specification

Subgrade Drainage

10.3



In addition to the requirement for surface water drainage detailed in Section 10.9, it is important to provide efficient permanent drainage of the subgrade and any other permeable layers of the Road.

10.3.1
Subgrade
Drainage

Where Roads have no frontage development, subgrade drainage will be effected as follows:

- (a) In cuttings, filter drains which will be required to cater for surface water run off from slopes will also provide a sub grade drainage function by being located deep enough to prevent the water table from rising to within 0.6 metre of the formation level.
- (b) In embankments, capping layers and/or sub-base layers must be extended periodically to the face of the embankment to effect drainage of these layers.

Where roads do have frontage development and adjacent ground levels do not involve embankments or cuttings, it is unlikely that specific measures will be required to effect drainage of the permeable layers unless the site investigation indicated that either the water table is likely to rise to within 0.6 metres of formation level or that the material below formation level is highly impermeable.

In either of these cases, sub-grade drainage can be effected by ensuring that backfill material to gully connections is permeable and that water which will accumulate in this backfill is provided with an outlet which, while allowing water to permeate into manholes, ensures that bedding and backfill materials of the drain are retained.

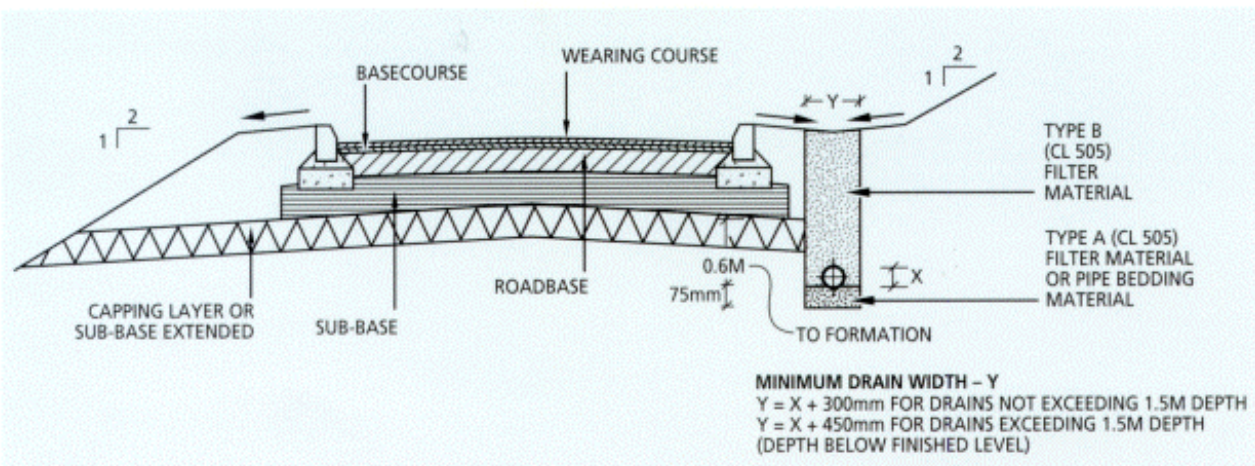


Figure 10.4 Cross section through road indicating sub grade drainage

10. Construction Design



Carriageway Construction

10.4

10.4.1 Flexible Pavements

Rigid pavement construction will not normally be accepted except for individual accesses to industrial or commercial premises. Carriageways should be designed as flexible pavements in accordance with TRRL Report LR1132 for bituminous roads, and BS7533 for block paving and the additional qualifications and exceptions listed here.

10.4.2 Capping Layer

It will be permissible for developers constructing short lengths of roads to adopt the construction thicknesses detailed in Table 10.2 where the California Bearing Ratio (CBR) is greater than 5%. However where the CBR value is less than or equal to 5%, a capping layer is required as per Table 10.1.

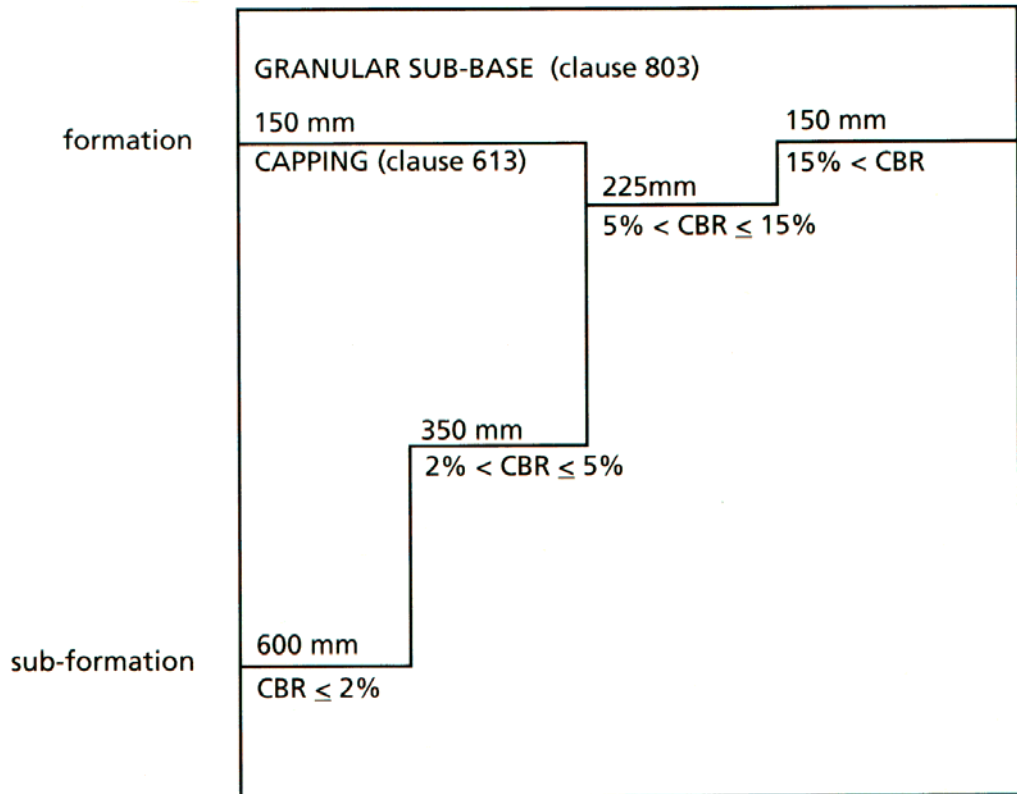


Table 10.1 - Capping Layer Requirements: subject to frost susceptibility: see Paragraph 10.4.3

NB. CBR testing is only relevant in natural soils and cannot be used for pavement design in fill materials. By their nature fills are random and highly variable in density and CBR testing in them only assesses the quality of the material at the locus of the test. Therefore for pavement construction on fill materials, unless the fill material is equivalent to or better than the specified capping material, a full capping layer is required.

10. Construction Design

10.4.3
Frost Susceptibility

It is possible for roads designed to have a total bituminous thickness of 170 mm and, with a CBR value \leq to 2%, a 150 mm sub-base and 600 capping layer. In such circumstances the upper 130 mm of the capping layer should be non frost-susceptible. In practical terms this effectively means that the sub-base becomes 280 mm with a capping layer of 470 mm. For a $2\% < \text{CBR} \leq 5\%$ where the total bituminous thickness and sub-base thickness together are less than 450 mm the same principle applies (i.e. the sub-base is increased to achieve 450 mm of non frost susceptible material and the capping layer can be correspondingly reduced). This need not be done if the capping layer is non frost-susceptible.

10.4.4
Increased Capping layer Thickness

Although Table 10.1 gives various thicknesses of capping layer dependent upon CBR, where CBR is significantly below 2%, these thicknesses may require to be increased dependent upon site and weather conditions prevailing at the time of construction. Additional material may require to be removed and replaced by more suitable material. Although the new material may be of good quality, the subgrade shall be assumed to be equivalent to one of a CBR just under 2% and requiring 600 mm of capping layer. The developer should consult the Network Manager for advice in these circumstances

10.4.5
Formation on Rock

Where the formation is on rock, the granular sub-base will act as a 150 mm depth regulating layer.

10.4.6
Carriageway Construction

Where suitable technical facilities exist it is recommended that the specific circumstances of each site are catered for by designing the road in accordance with the criteria stipulated above, Subject to a minimum construction as required to carry 0.5 Million Standard Axles (MSA), for all roads. In this circumstance it will be necessary to complete and return form CCS "Carriageway Design Certificate"

10.4.7
Two Stage Construction

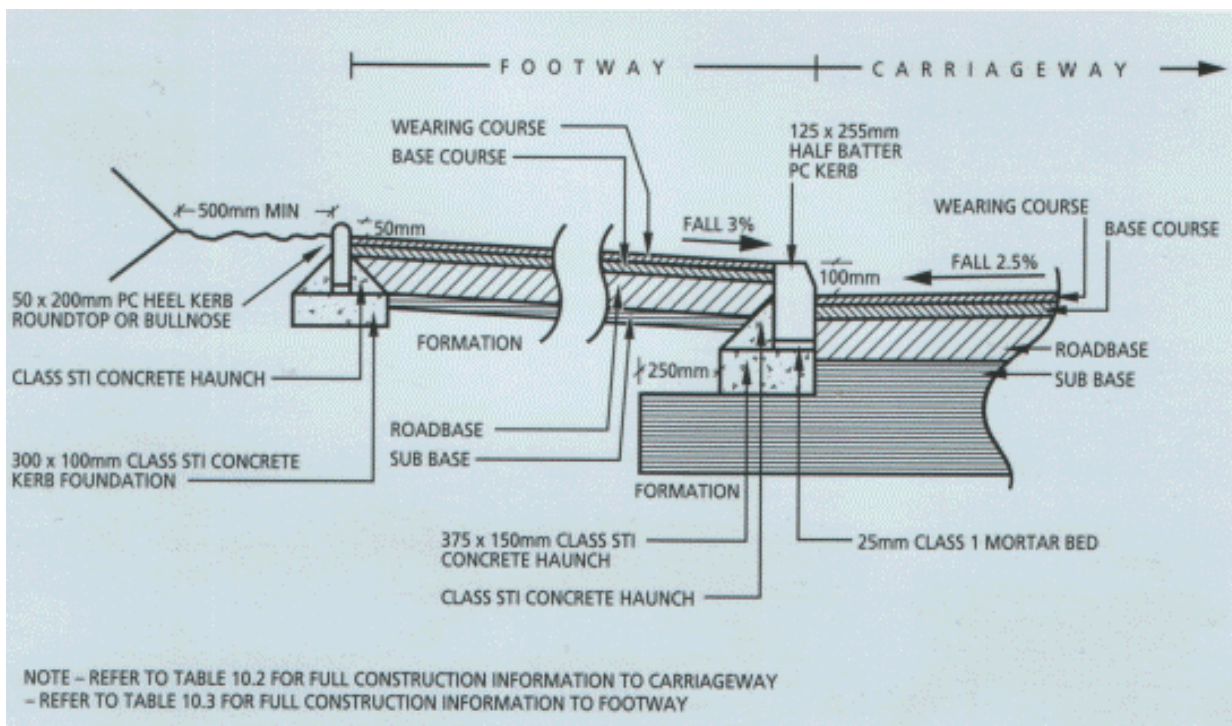
Where, owing to the continued use of the road by construction traffic, it is necessary (in order to avoid damage to the wearing course) to adopt a two stage construction, the pavement layers specified in Table 10.2 for this method of working shall be adopted.



10. Construction Design

The first stage for both bituminous and block paved road, shall be the top of the specified bituminous basecourse. Consideration should be given to the temporary drainage of the first stage, to minimise ponding caused by the projection of gully gratings above the temporary surface, either by adjustment of gully frames or other approved method. This applies particularly in large projects where the construction period may be long and the wearing course not laid before a winter work period. Any settlement which may occur in the basecourse of bituminous roads shall be made up with regulating course before the laying of the wearing course, and early reinstatement of openings or failed areas is essential.

10.4.8
Stage One



Before the regulating course and the wearing course - where it is bituminous - is laid, the top surface of the basecourse must be well cleaned and a tack coat applied at the rate of 0.6 litres per square metre. In the case of block paved roads the bituminous basecourse material must be adequately maintained during the first stage and any openings or failed areas reinstated as soon as possible to ensure that the bedding layer thickness is regular and within tolerance.

10.4.9
Stage Two

10. Construction Design

Road Type	Sub-Base	Roadbase	Basecourse	Wearing Course
Traffic Distributor Road or Industrial Roads (3.5 MSA)	225 mm (cl 803)	200mm Dense Macadam Combined Roadbase and Basecourse (cl 903)		40mm Rolled Asphalt (cl 910)
		for two stage construction		
		140mm Dense Macadam Roadbase (cl 903)	60mm Dense Macadam Basecourse (cl 906)	
Residential Core Road(1.5 MSA)*	300mm (cl 803)	160mm Dense Macadam Combined Roadbase and Basecourse (cl 903)		40mm Rolled Asphalt (cl 910)
		for two stage construction		
		100mm Dense Macadam Basecourse (cl 906)	60mm Dense Macadam Road base(cl 903)	
Housing Road and Parking areas contiguous with the road and Housing Courts (0.5 MSA*)	300 mm (cl 803)	130 mm Dense Macadam Combined Roadbase and Basecourse (cl 903)		40mm Rolled Asphalt (cl 910) (see Note 1)
		for two stage construction		
		80mm Dense Macadam Roadbase (cl 903)	50mm Dense Macadam Basecourse (cl 906)	
Non-contiguous Car Parking Area) (0.08 MSA*)	250 mm (cl 803)	80mm Dense Macadam Combined Roadbase and Basecourse (cl 903)		As for Residential Roads or 40mm Close Graded Macadam (cl 912)
		60mm Dense Macadam (cl 903)		
				65mm Open Graded Macadam (cl 91 6) Combined Basecourse/ Wearing Course
Pedestrian/Vehicular Shared Surface Housing Road cul-de-sac or Minor Commercial Access (0.5 MSA*)	225 mm (cl 803)	175mm Type 1 Granular Material (cl 803)		200 x 1 00 x 80mm thick Concrete Rectangular Block Paving (cl 1043) or 200 x 100 x 65mm Clay Pavers (cl 1044)
		50 mm Bedding Layer of Sharp Sand or Crushed Rock(Appendix 7/1)		
		for two stage construction		(see note 2) (see note 3)
	300mm (cl 803)	75mm Dense Macadam Basecourse (cl 906)	30mm Bedding Layer of Sharp Sand or Crushed Rock (Appendix 7/1)	

* MSA = Million Standard Axles.

Table 10.2 *Carriageway Construction*

10. Construction Design

Notes for Table 10.2 on Carriageway Construction

Note 1: For non-contiguous car parking areas in any location and residential roads in island locations, the 40 mm rolled asphalt wearing course may be replaced with 40 mm close graded macadam wearing course (clause 912), at the discretion of the Network Manager. Also, in island locations with the agreement of the Network Manager, deferred set material may be permitted.

Note 2: Care must be taken in the selection of clay pavers to ensure that they are capable of withstanding the climatic conditions experienced in East Ayrshire.

Note 3: Where mechanical sweepers will be used a water based bonding agent should be applied to seal the joints and blocks hand swept for one month.

Note 4: (a) This table is for guidance only, refer to Paragraph 10.4.6. However it is based on the following criteria, which must be used in designs for specific circumstances:

- (i) design life - 40 years,
- (ii) (ii) traffic growth rate - 4%.

Based on the above, the construction specified in the table caters for the following traffic:

Traffic Distributor Road or Industrial Access Road - up to 75 commercial vehicles per day on day of opening.

Residential Core Road-up to 40 commercial vehicles per day on day of opening.

Housing Road and Pedestrian/Vehicular shared surfaces or Minor Commercial Access - up to 15 commercial vehicles per day on day of opening.

In specific circumstances which would permit future overlay in order to extend the pavement life to 40 years (e.g. where there is no frontage development and the number of commercial vehicles exceeds 100 per day), the design life can be restricted to 20 years, with the agreement of the Network Manager.

(b) Clause and Appendix numbers in brackets refer to the Specification.

Note 5: Asphalt or Macadam wearing course and basecourse may be substituted by block pavers on 30mm bedding in accordance with Paragraph 10.4.10.

Note 6: A typical cross section of the carriageway and footway construction is shown in figure 10.5.

10. Construction Design

10.4.10 Concrete Block Paving and Clay Pavers

Concrete block paving (cl 1043) and clay pavers (cl 1044) are particularly suitable for;

- (a) pedestrian/vehicle shared surfaces (Figure 10.6) where a change of material is required to emphasise the different character of the thoroughfare,
- (b) bus termini or other locations at risk from diesel spillage,
- (c) commercial or industrial accesses.

Block pavements should be designed in accordance with Paragraph 10.4.6, with the block paving and bedding layer replacing the basecourse and wearing course. It is particularly important that the design incorporates adequate provision for the drainage of unbound roadbase, Sub-base and subgrade materials (Paragraph 10.3.1). Exceptionally, where sections of the pavement have a high longitudinal fall or where block paving is laid on concrete, cement or bituminous road base, adequate drainage of the sand bedding must be provided.

Light colours of blockwork are not appropriate where there is a risk of staining from diesel or oil spillage.

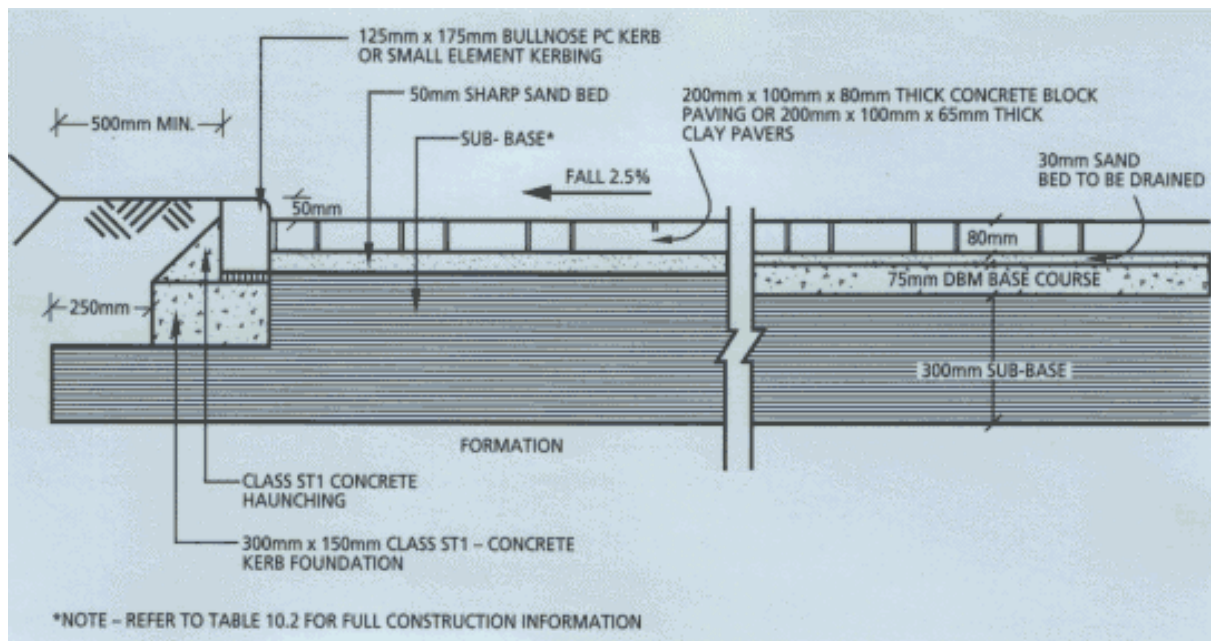


Figure 10.6 Typical Shared Surface Construction

10. Construction Design

Traffic Calming

10.5



Vertical Measures

A road hump may be defined as a vertical change to the carriageway which, in residential areas, takes the preferred form of a flat top hump with ramps. Alternatively, a round top hump in the form of a circular arc may be permitted.

10.5.1
Definition

Flat top Road humps in new developments should have a 1 metre ramp and the length of the flat top should be 2.5 metres. Where the vertical measures are Cushions or Raised Junctions they will have the same ramp profile; the Cushion will have the same flat top profile but the Raised Junction should extend across the whole junction between the tangent points. Alternative dimensions for both the flat top and ramp lengths are permitted, but variations will require authorisation from the Network Manager prior to construction.

10.5.2
Dimensions

Figures 10.7 and 10.8 detail Road hump construction. Round top humps are constructed in asphalt laid in accordance with Figure 10.7. Surface material for Speed Tables (Flat Top Hump) may be asphalt, blockwork or preformed elements laid in accordance with Figure 10.8.

10.5.3
Permitted
Construction

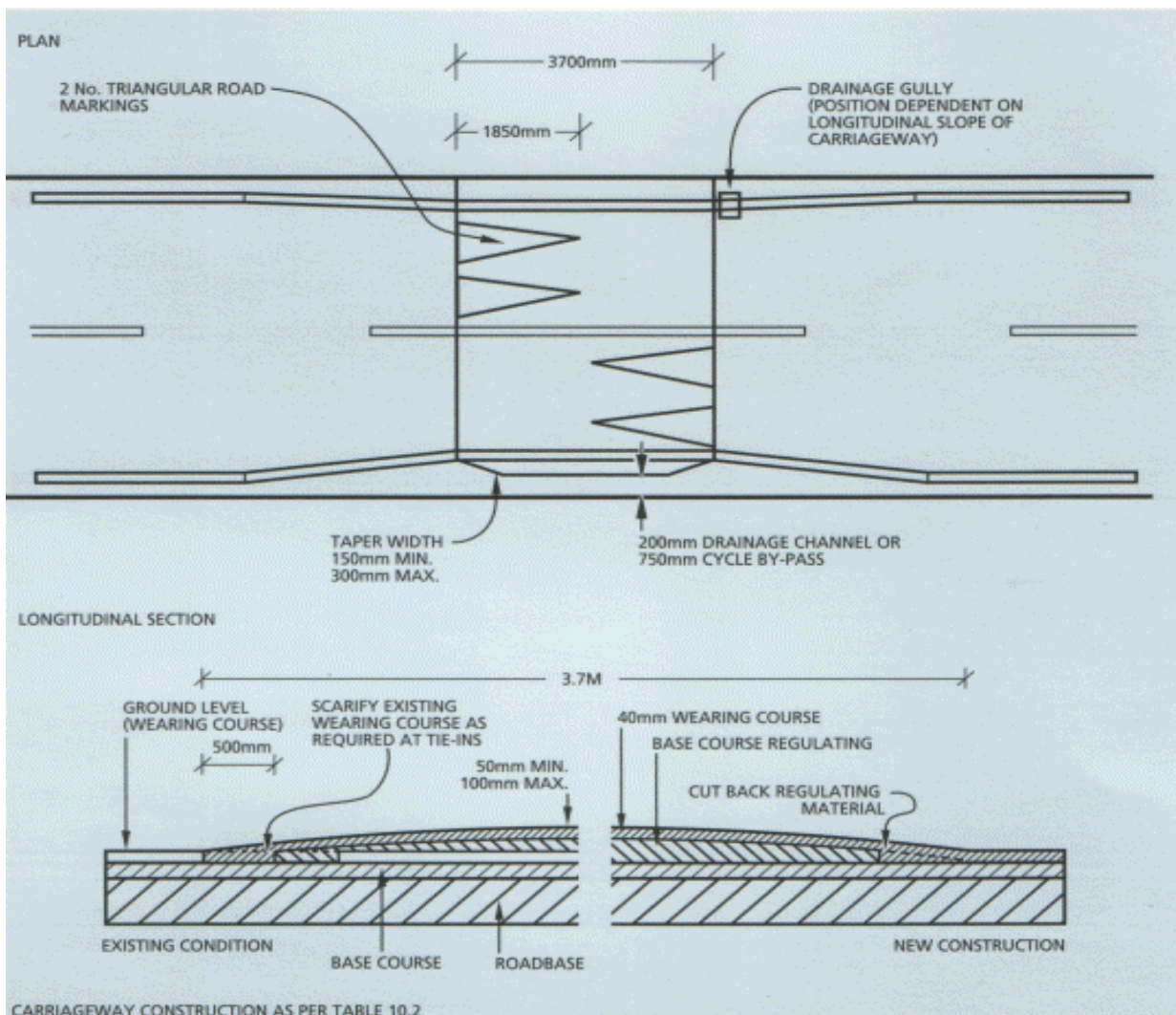


Figure 10.7 Round top hump construction

10. Construction Design

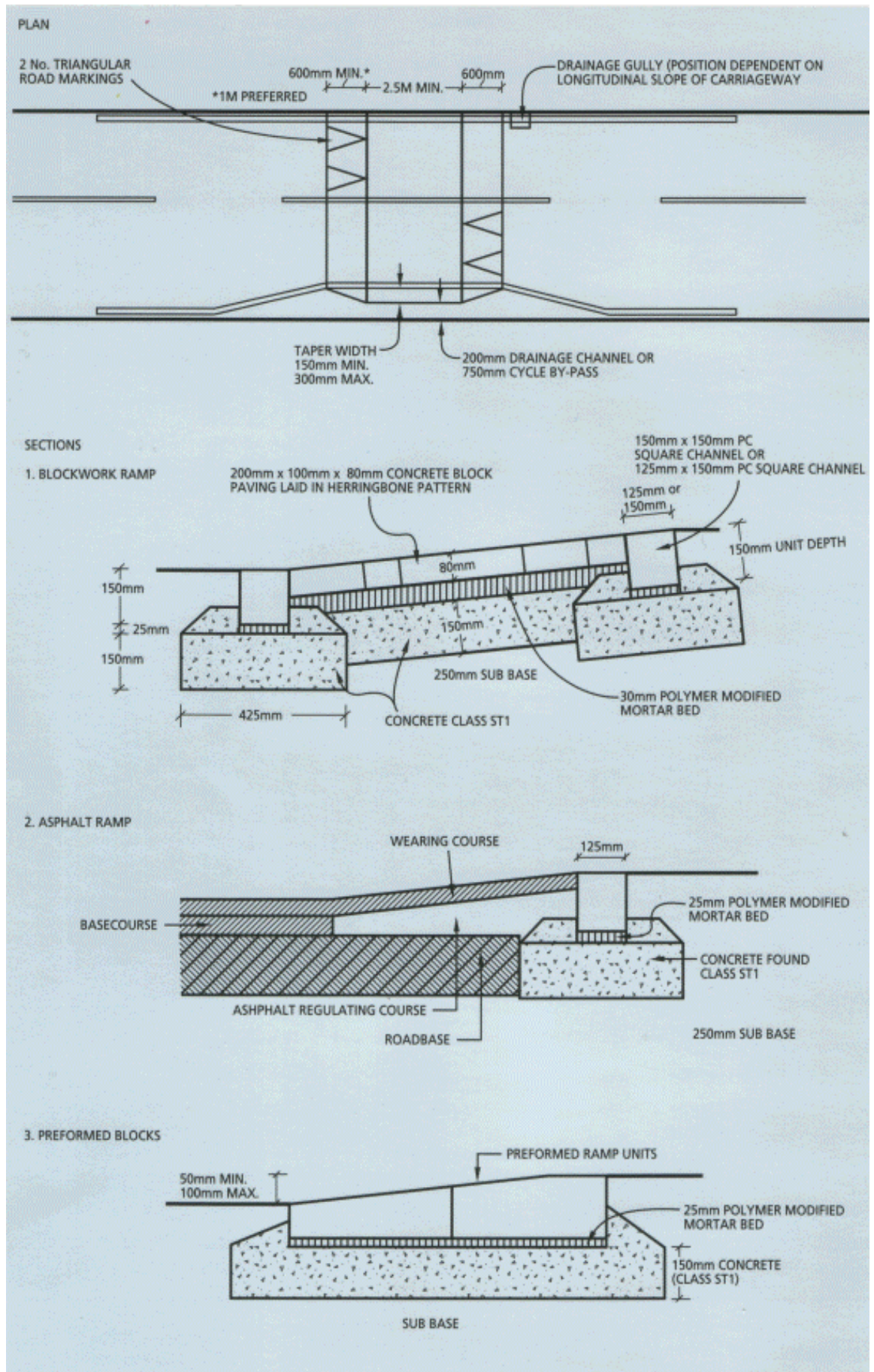


Figure 10.8 Flat top hump

10. Construction Design

Under normal circumstances the hump should be constructed to be flush with the footway but where a drainage channel or cycle bypass is being provided then the edge construction should be as detailed in Figure 10.9. The same edge construction will be used for Cushions. Raised junctions should always be flush with the footway and road furniture such as bollards should be added to prevent overrun of the footway.

10.5.4
Edge
Treatment

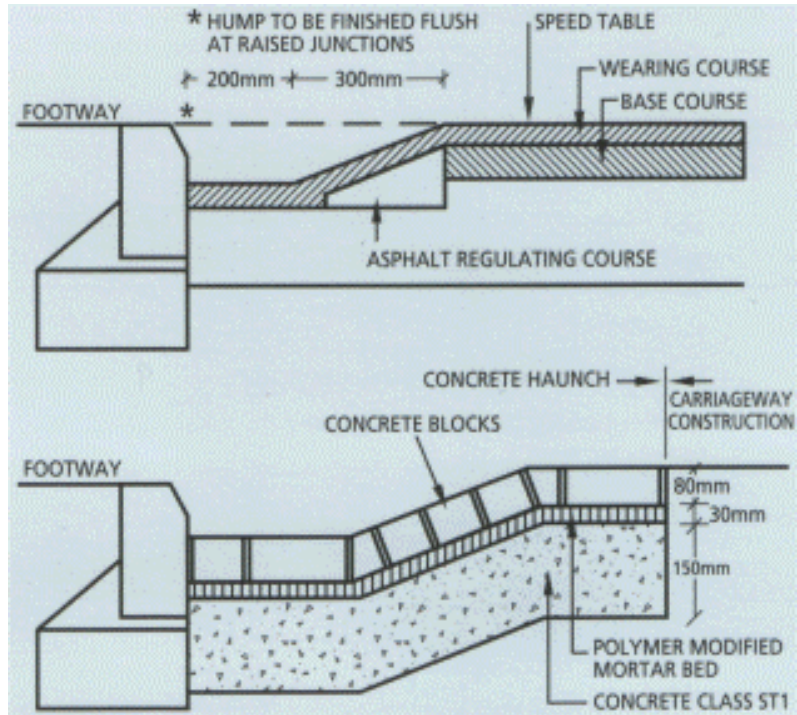


Figure 10.9 Flat top hump edge construction

All vertical measures should be highlighted to identify their presence which can be achieved by a change in colour or texture. Where the Network Manager has advised that a 20mph zone will not be introduced then vertical measures require to be marked in accordance with Figure 10.10.

10.5.5
Road
Markings

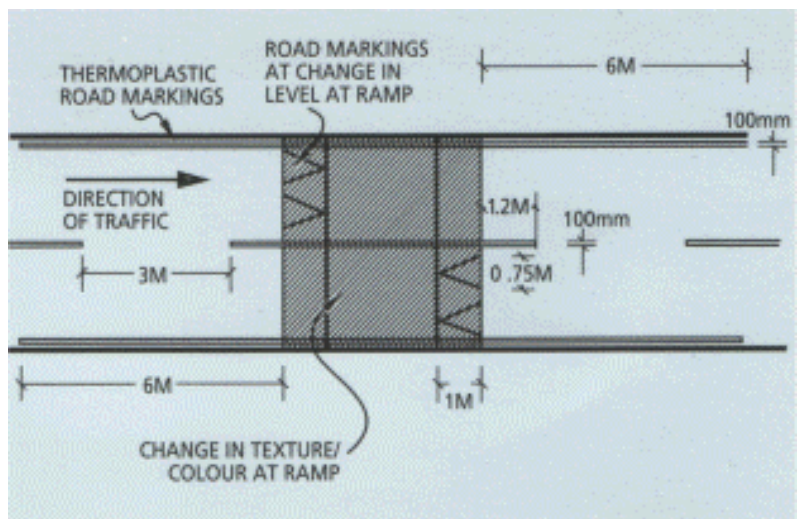


Figure 10.10 Road marking at vertical measures

10. Construction Design

Rumble Devices should be applied across the full width of the carriageway and in no circumstances will be permitted over half widths. However, to aid cyclists the Rumble Devices may be laid with a 1 metre clear space adjacent to the kerb to permit easy passage.

10.5.9
*Types of
Rumble Strips*

The area adjacent to the rumble strips should be well illuminated.

10.5.10
Illumination

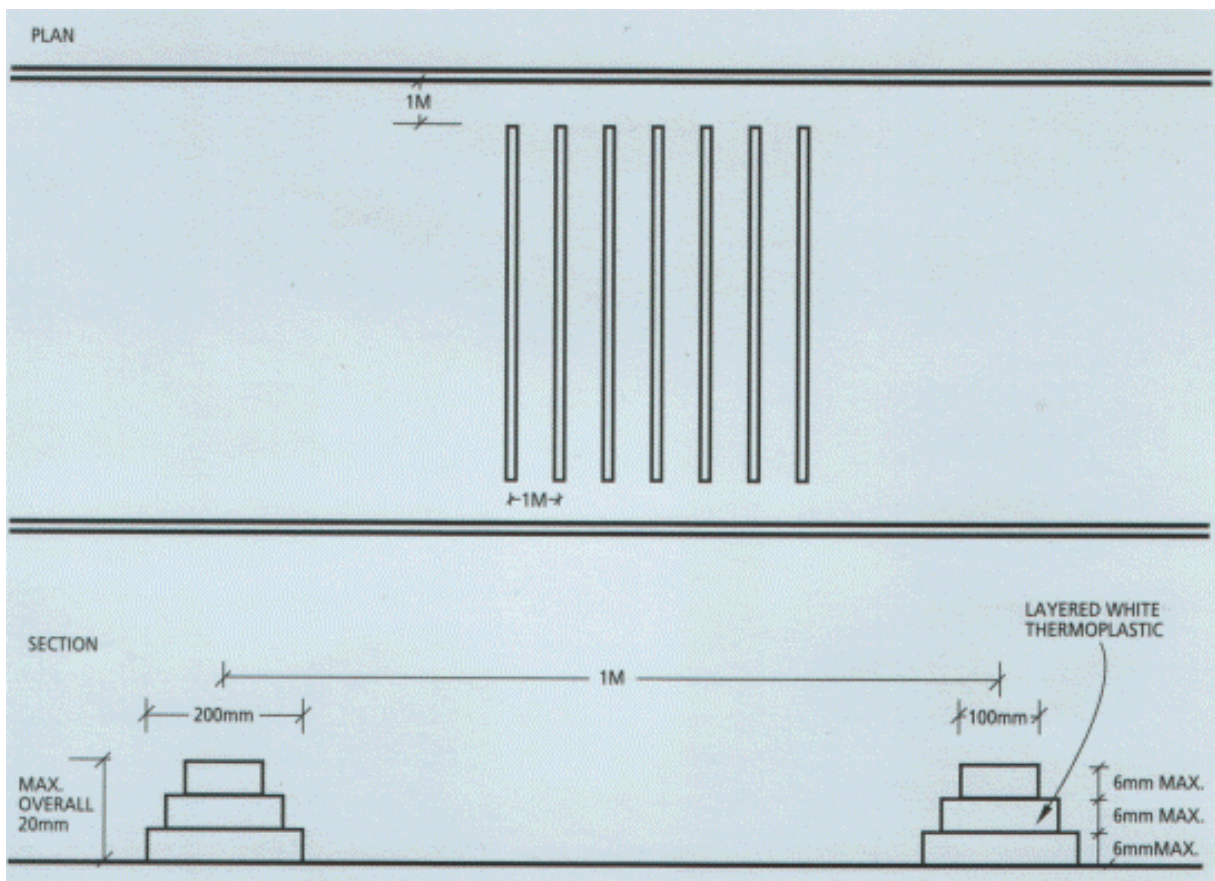


Figure 10.12 Design of Rumble Strip Bands

10. Construction Design

Overrun Areas

10.5.11 Definition

An Overrun Area is an area of the carriageway constructed with textured or coloured material which allows the full carriageway to be available for larger vehicles to travel and complete turning manoeuvres while restricting the space available for cars thus introducing a calming effect.

10.5.12 Construction

Where overrun areas are provided they must be constructed to one of the profiles which are specified by the Regulations and are detailed in Figure 6.43. Overrun areas should not have any vertical face which exceeds 6 mm in height and sloping areas should not exceed a slope angle of 15° or 5°, depending upon the profile selected, measured from the surface of the carriageway. Construction of Overrun Areas should be as detailed in Figure 10.13.

10.5.13 Pedestrian Provision

For the additional benefit of pedestrians, it is essential that good illumination is provided and the overrun area is modified by the omission of a strip in line with the footway which is smooth as detailed in Figure 10.14

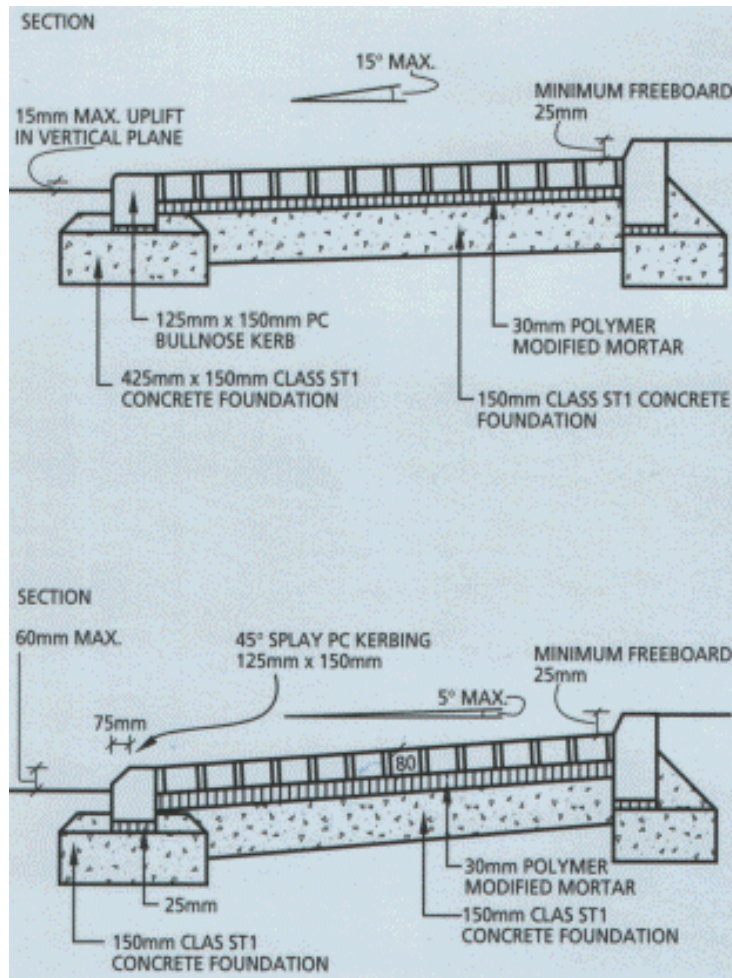


Figure 10.13 Overrun corners construction

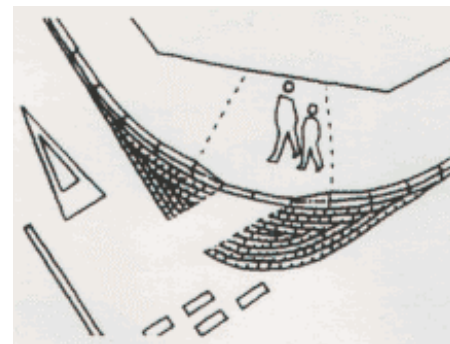


Figure 10.14 View of Overrun Corners with pedestrian route

10. Construction Design



Pinch Point Under Construction

Islands and Build Outs

Other traffic calming measures involve the build out of the footway to create such features as nibs or chicanes. Where these are to be constructed the normal kerb construction detailed in Figure 10.5 should be used. The infill to the footway build outs can be normal footway construction as detailed in Figure 10.5 or soft landscaping can be incorporated, subject to normal visibility conditions.

*10.5.14
Construction*

Where the Construction works are in the carriageway the normal kerb construction should again be used. Where pedestrians are likely to cross, drop kerbs should used or breaks should be provided. In normal conditions short lengths in the carriageway should be constructed as footway construction or some form of deterrent surface. Only where long lengths or greater widths are employed should landscaping be considered. For solid features (not overrun features) within the carriageway, bollards or lights with appropriate signing must be erected.

*10.5.15
Pedestrian
Provision/
Deterrent
Surfacing*

Footway, Footpath and Cycle Track Construction

Footways, footpaths and cycle tracks should be constructed in accordance with Table 10.3 and 10.4 as detailed in Figures 10.5 and 10.15 respectively unless an alternative design is agreed with the Network Manager.

10.6.1
Construction
Material

Type	Sub-Base	Roadbase	Basecourse	Wearing Course
Flexible Surfacing	50 mm Granular Sub-base Type 1 (cl 803)	100 mm Type 1 Granular Material (cl 803)	50 mm Dense Macadam (cl 906)	30 mm Rolled Asphalt (cl 910) (see Note 1)
Precast Concrete Flags suitable for cycletracks) (Not suitable for Type 1)	150mm Granular Sub-base Type 1 (cl 803)		25±10 mm Bedding Layer for small slabs or 40±10 mm Bedding Layer for large slabs of Sharp or Crushed Rock Fines (Appendix 11/1)	Footways and Footpaths: Slabs 400 x 400 x 65 mm (cl 1104(S)) Footpaths only: Slabs 450, 600 or 900 x 600 x 65 mm (cl 1104(S))
In situ Concrete	150mm Granular Sub-base Type 1 (cl 803)		75mm 25/37.5 Concrete (cl 1704)	40 mm Granolithic (cl 11 06 A)
Concrete Block Paving or Clay Pavers	150mm Granular Sub-base Type 1 (cl 803)		40±10 mm Bedding Layer of Sharp Sand or Crushed Rock Fines (Appendix 11/1)	200 x 100x65 mm thick Rectangular Concrete Block Paving (cl 11 07) or Clay Pavers (cl 1108) (see Note 3)

Table 10.3 Footway, Footpath and Cycletrack Construction in Urban Areas

Note 1: Prior to compaction 6mm or 10mm limestone or other approved chippings shall be applied to the surface at a nominal rate of 1 kg/m².

Note 2: In rural areas or in little trafficked locations, the alternative shown in Table 10.4 may be permitted at the discretion of the Network Manager.

Note 3: A water based bonding agent should be applied to seal the joints, and blocks hand swept for the first month.

Note 4: Footway and footpath thicknesses will require to be increased where, in the opinion of the Network Manager, they are liable to be subject to overrun.

NB: Clause numbers in brackets refer to the Specification (Appendix A)

Type	Sub-Base	Roadbase	Basecourse	Wearing Course
Flexible Surfacing	200mm Type 1 or recycled suitable material (eg planings)		40 mm Dense Macadam (cl 906)	25 mm Rolled Asphalt (cl 910) or 25 mm Close Graded Macadam (cl 912)
				Combined 50mm Close Graded Macadam (cl 912)

Table 10.4 Footways, Footpaths and Cycletracks in Rural Areas

10. Construction Design

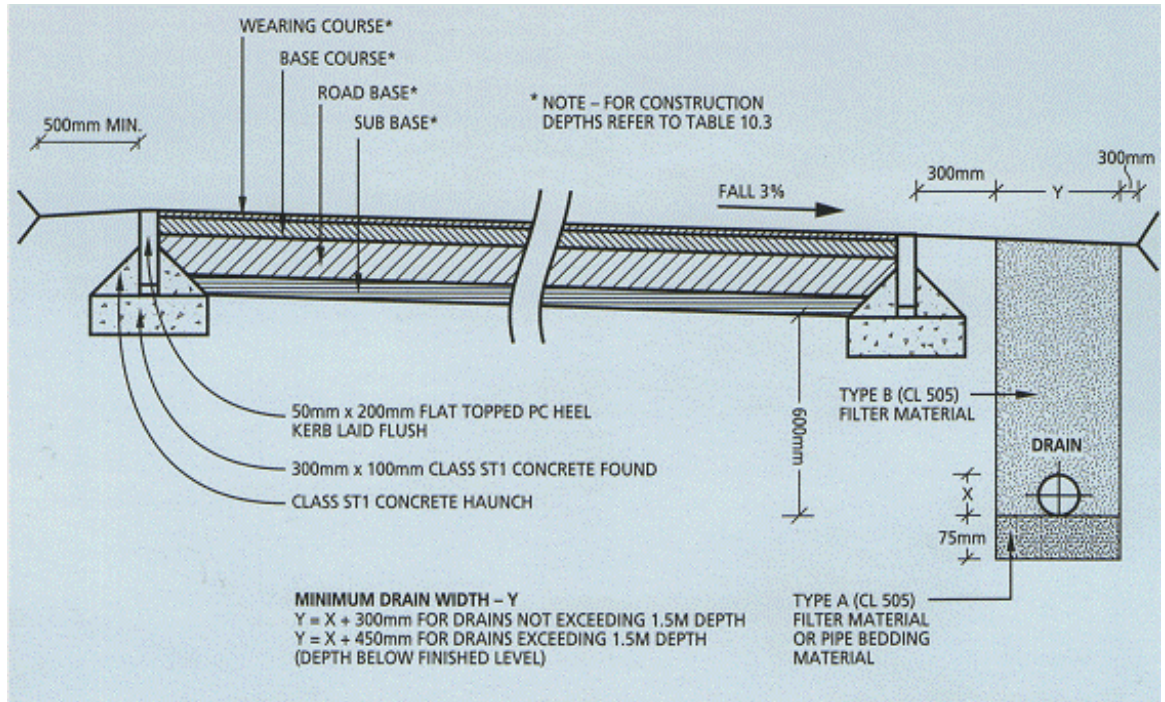


Figure 10.15 Typical Footpath/Cycle Path Construction

10. Construction Design



Kerbs and Edging

All carriageways, footways and footpaths should be provided with precast concrete kerb or edging as detailed in Figures 10.5 and 10.15. On conventional roads, kerbs should be set 100mm above finished carriageway channel level, except at pedestrian and vehicular crossings where this dimension is reduced to nil and 20mm respectively. Edging at the heel of footways should have an upstand of 50mm, whereas on footpaths it should be set flush with the walking surface. On shared surfaces an upstand of 50mm should normally be provided (Figure 10.6), except at junctions with footpaths and private accesses where kerbs should be flush with the walking surface. Approval for any departure from these standard details should be sought from the Network Manager prior to construction commencing.

In remote areas, and with the agreement of the Network Manager, cycleways may be constructed without kerb edgings, where the sub-base is laid 500mm wider than the surfacing to provide shoulders.

10.7

10.7.1
*Materials/
Construction*

10.7.2
Remote Areas



Vehicular access crossings of the footway for individual dwellings should comply with Figure 10.16 and be constructed to the footway specification. Maintenance difficulties preclude the use of slab footway construction for vehicle access crossings.

10.8.1 Driveways

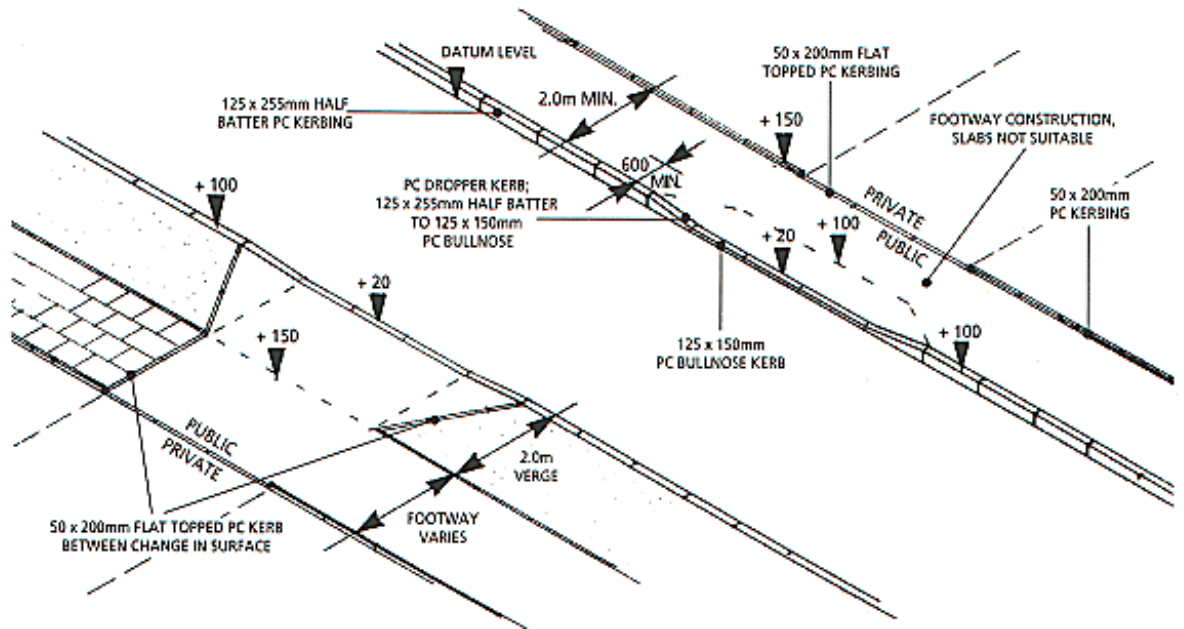


Figure 10.16 Driveway Access

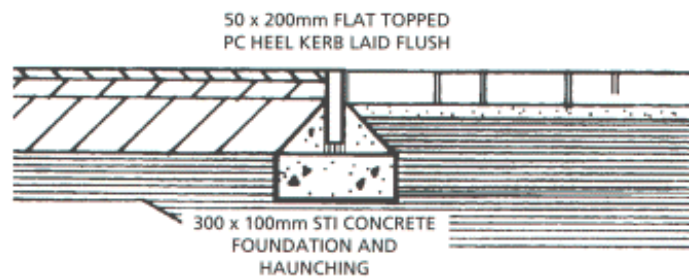


Figure 10.17 Kerb Detail along the Footpath

10. Construction Design

10.8.2 Other Access Details

Where vehicular access, other than to individual dwellings, is taken over a footway, a crossing, as detailed in Figures 10.18, 19 and 20 should be constructed. If the crossing is being built in isolation from other roadworks it is recommended that the block paving specification be adopted. Alternatively, rigid construction may be acceptable but reinforcement may be required where the use of heavy vehicles is expected

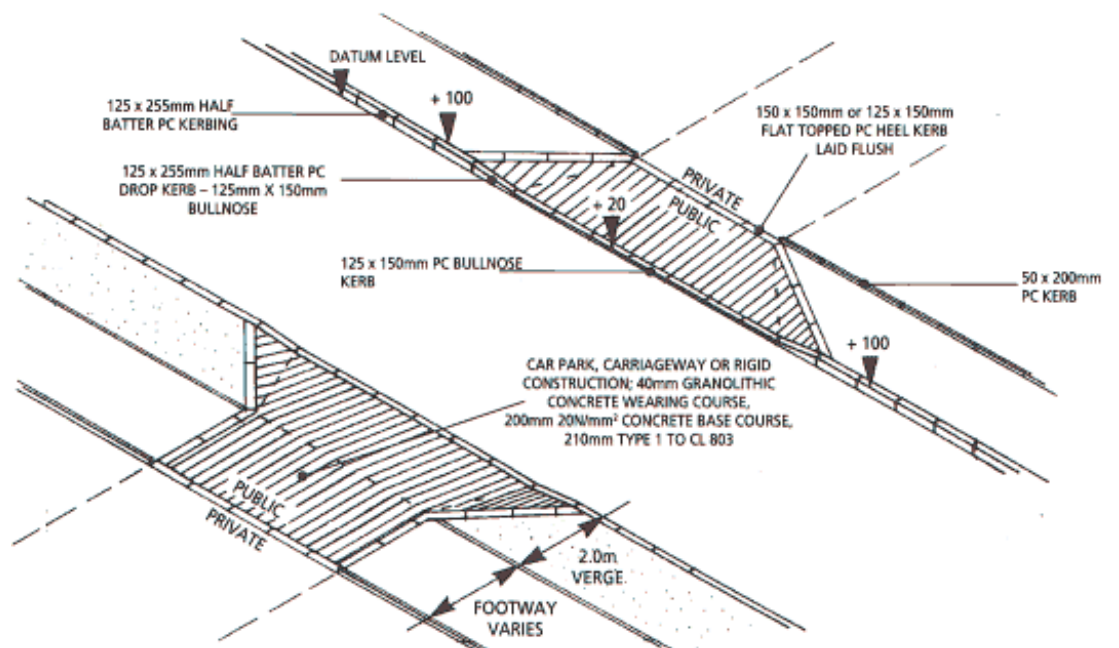


Figure 10.18 Single Minor Commercial Access or Car Park of up to 50 Spaces

10. Construction Design

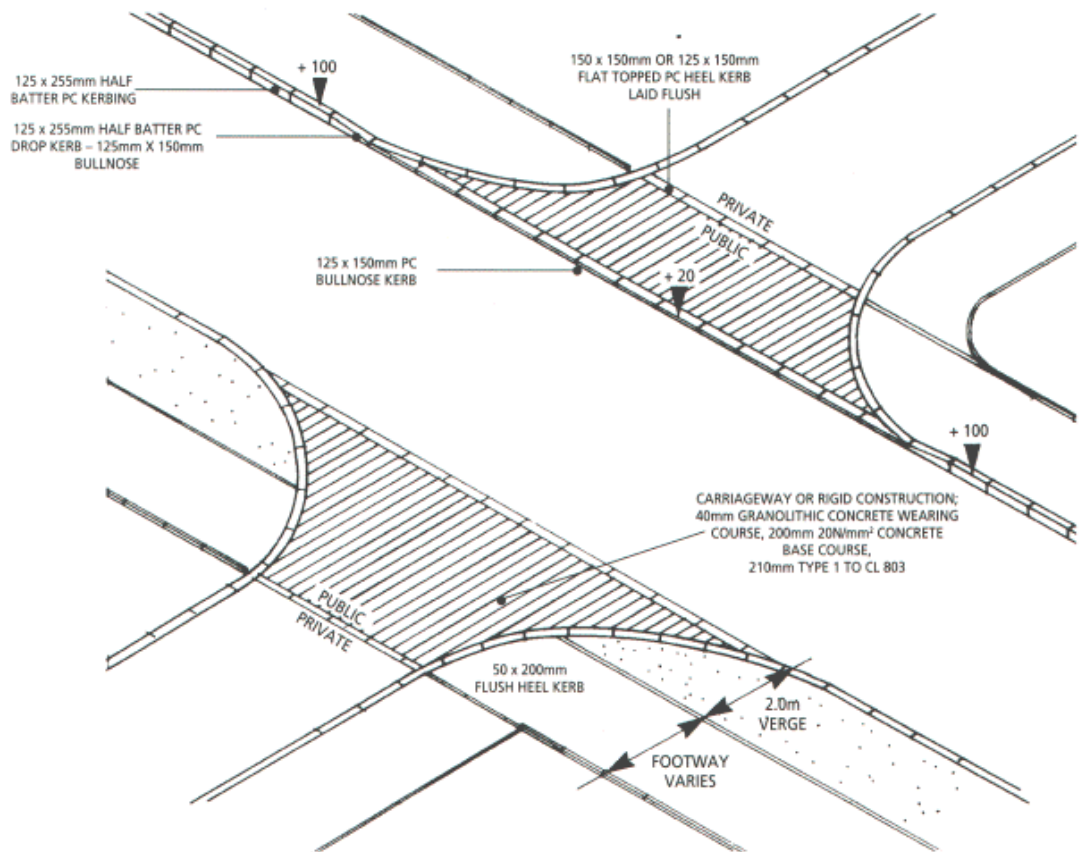


Figure 10.19 Minor Commercial Access or Car Park with more than 50 spaces

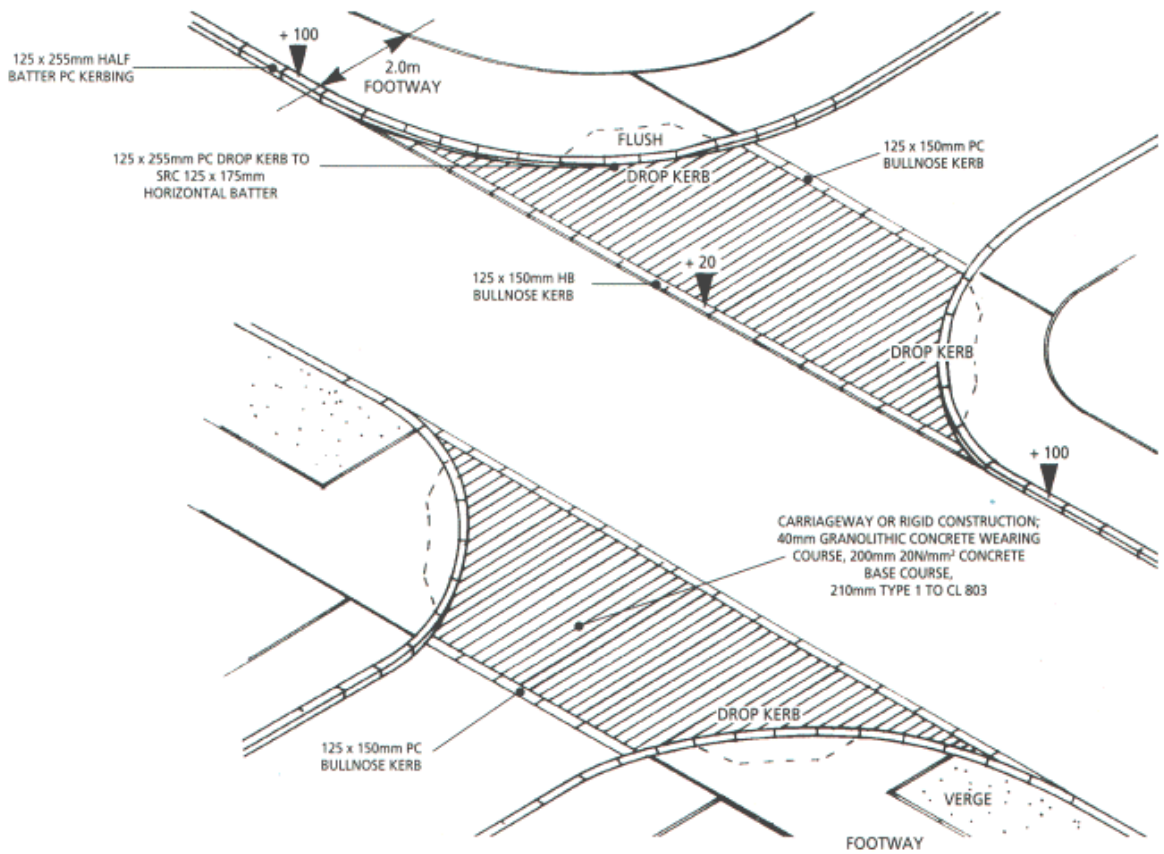


Figure 10.20 Major Commercial or Industrial Access

10. Construction Design

10.8.3
Pedestrian
Access/ Crossings

Figure 10.21 details the requirement for dropped kerbs where pedestrian routes cross the carriageway from adjacent footways e.g. at T-junctions and pelican crossings. Note the large dished area which is to minimise footway gradients (7.5 per cent maximum) and avoid abrupt changes of slope. Pedestrian crossings of a carriageway with an adjacent grass verge should comply with Figure 10.16 except that the dropped kerb should be set flush, or not more than 10mm upstand, with the carriageway and extend for a minimum length of 1.85 metres.

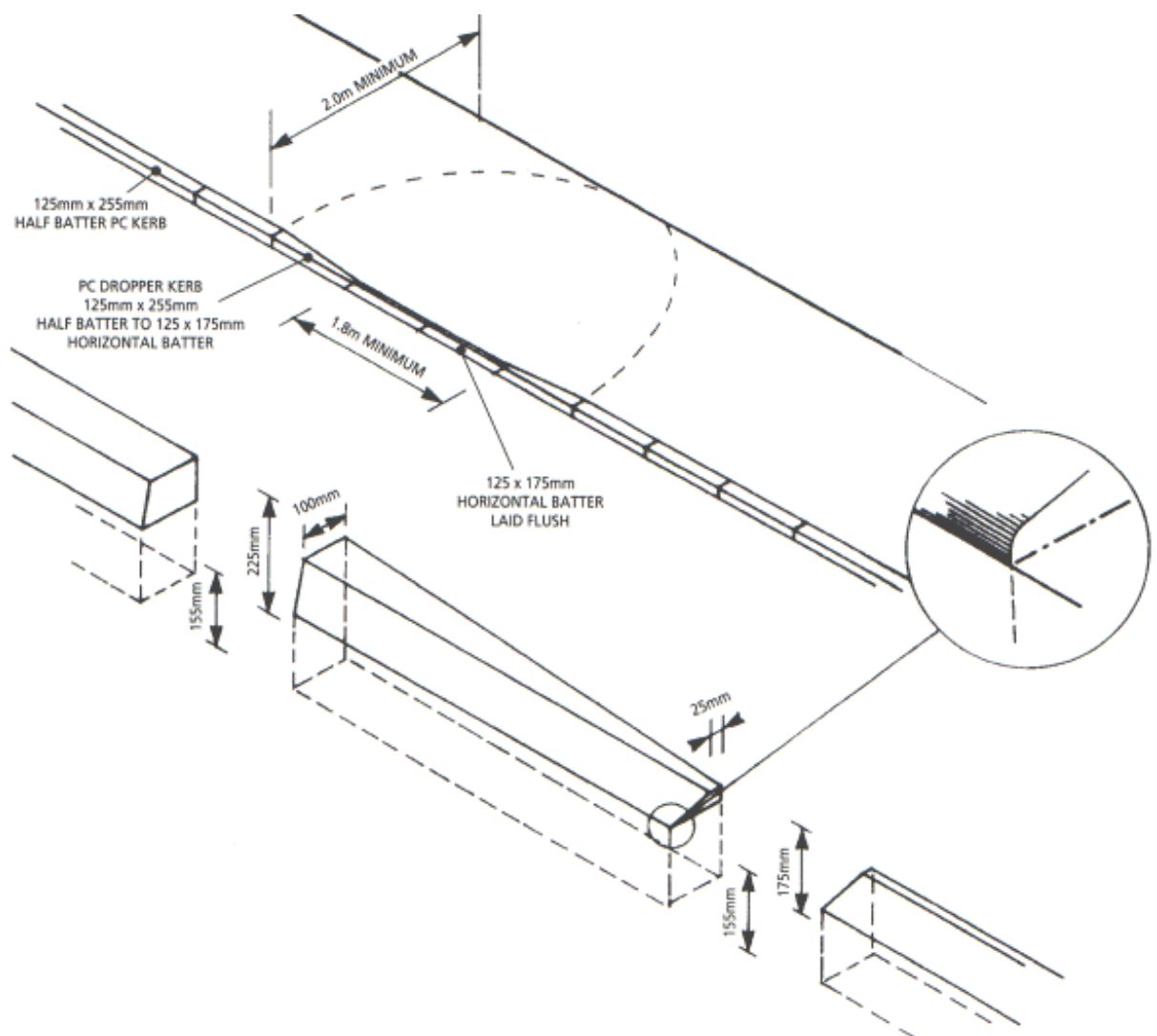


Figure 10.21 Dropped Kerb Detail at Designated Pedestrian Crossing

10. Construction Design



Road Drainage

10.9

The specification for the construction of road drainage is detailed in Appendix A. Where discharging into an existing watercourse or public sewer, road drainage should additionally meet the requirements of the appropriate water authority.

10.9.1
Specification

Road drainage design should be in accordance with the current edition of Road Note 35 as regards hydraulic design subject to the qualification that the minimum pipe diameter permitted will be 150mm and HA40/89 as regards pipe strength and bedding for main road loading for pipes in or adjacent to carriageways. Land drainage or other appropriate measures must be taken to prevent water flowing on to the road from adjacent properties.

10.9.2
Design

Table 10.5 details the acceptable channel distance between gullies for a road comprising carriageway with two number 2 metres wide footways, based on criteria adapted from TRRL Report LR277. (Table 10.5 is based on rainfall intensity of 50 mm/hour and width of channel flow of 600 mm). The spacing may require to be altered according to the road layout (e.g. at junctions) and special measures will be required where the grade is necessarily flatter than 0.8 per cent (sags, crests, etc). Advice on these matters should be sought from the Network Manager who should be consulted at an early stage by any developer wishing to carry out a full drainage design. Irrespective of design spacings, a gully should be positioned;

10.9.3
Gully Spacing

- (a) just upstream of the tangent point at road junctions,
- (b) short of the point where adverse camber is removed when applying super-elevation,
- (c) at any local low point,
- (d) at traffic calming measures, where necessary.

They should not be positioned;

- (e) at pedestrian crossing points,
- (f) at driveways.

Gradient:	Flatter than 1/150(0.66%)*	1/150* 0.66%	1/100 1.00%	1/80 1.25%	1/60 1.66%	1/40 2.50%	1/30 3.33%	1/20 5.00%	
Cross Section	C/Way Width	Gully Spacing (metres)							
1 in 40 (2.5%)	5.5m	20	30	35	40	45	55	60	75
Camber	6.0m	20	25	30	35	40	50	60	70
1 in 40 (2.5%)	7.3m	15	20	25	30	35	40	45	55
Crossfall	5.5m	10	15	17	20	22	27	30	37
	6.0m	10	12	15	17	20	25	30	35
	7.3m	7	10	12	15	17	20	22	27

* Gradients flatter than 0.8% are applicable to sags and crests only

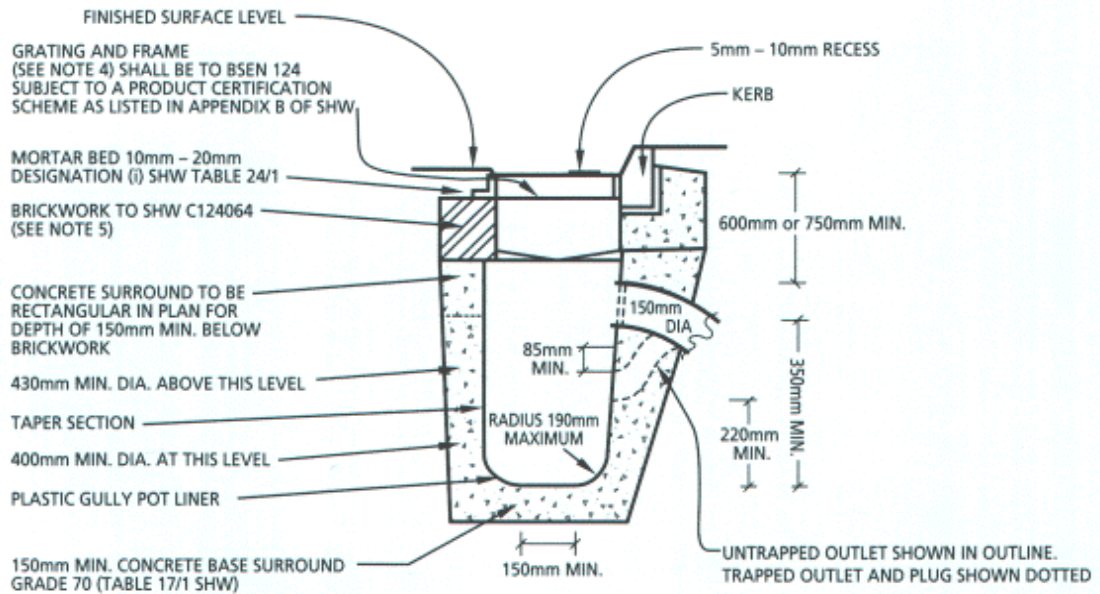
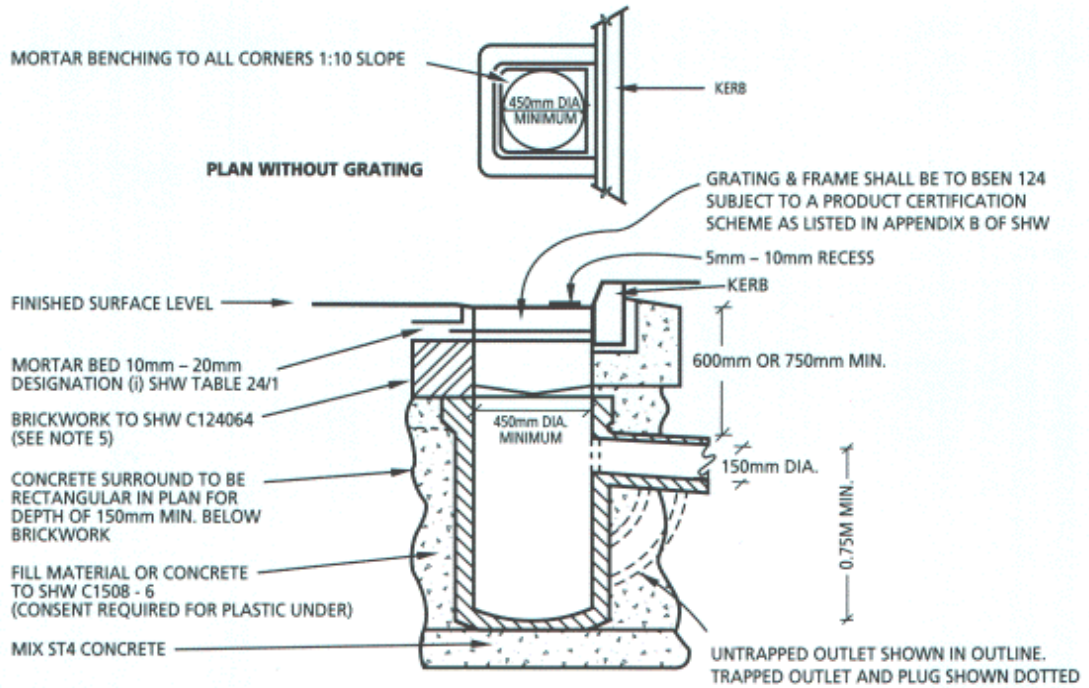
Table 10.5 - *Gully Spacing for Carriageways*

10. Construction Design

- 10.9.4 *Irregular Areas* Lay-bys should be drained by means of gullies located along the road channel; it should not, therefore, be necessary to provide gullies at the rear of lay-by parking areas.
- 10.9.5 *Lay-by Drainage* For large, irregularly shaped areas the empirically derived formula of one gully for each 200 square metres of catchment may be used. Additional gullies will be required where gradients are steeper than 1/20 or flatter than 1/150 and where surface water draining from adjacent areas may be anticipated.
- 10.9.6 *Footpath Drainage* To obviate gully-clearing difficulties, remote footpaths should be constructed with flush edging and adjacent land drainage provided as detailed in Figure 10.15. Only in exceptional circumstances, and where there is appropriate access for gully cleaning vehicles as agreed with the Network Manager, should direct drainage into gullies be considered as an alternative.
- 10.9.7 *Gullies* Road gullies should be constructed in accordance with clause 508 of the Specification. Gully gratings and frames must be positioned with grating bars not parallel to the kerb to facilitate cyclists and shall be of the captive variety. They shall comply with BS EN 124 and Class C250, or at corners, bends and other areas likely to be trafficked Class D400, (minimum nominal width 450mm, minimum area of waterway 900cm² and minimum depth of frame 100mm) except in non contiguous car parks where the use of Class B125 (minimum nominal width 325mm, minimum area of waterway 650cm² and minimum depth of frame 100mm) will be permissible.
- 10.9.8 *Connections* Connections should be constructed in accordance with clause 508 of the Specification. They must be formed with junction pipes unless the Network Manager has specifically approved the use of saddles.
- 10.9.9 *Chambers* Chambers should be constructed in accordance with Clause 507 of the Specification. Manhole covers and frames shall be non rock and comply with BS EN 124 and be Class D400 (minimum clear opening 600mm dia or equivalent, minimum depth of frame 100mm) except in non contiguous car parks or verges where the use of Class B125 (minimum clear opening 600mm dia or equivalent, minimum depth of frame 100mm) will be permissible.
- 10.9.10 *Outfall Connection* The connection of road drainage systems to the public sewer network should be undertaken only on the authority and to the requirements of the Director of Water Services (Paragraph 5.6.12). Similarly, when connecting to an existing watercourse, approval should be sought from the River Purification Board.



10. Construction Design



NOTES

1. THE MINIMUM DEPTH FROM THE TOP OF THE GRATING TO THE TOP OF THE GULLY OUTLET IS TO BE 750mm WHEN THE CONNECTING PIPE IS UNDER A CARRIAGEWAY OR A HARD SHOULDER AND 600mm ELSEWHERE.

2. PRECAST CONCRETE GULLIES SHALL BE TO BS 5911: PART 2.

3. WHEN AN INSITU CAST GULLY HAS A TRAP, THE STOPPERS SHALL COMPLY WITH REQUIREMENTS OF BS 5911: PART 2.

4. THE GULLY GRATING NORMALLY SHALL BE D400 OR C250 TYPE AS APPROPRIATE WITH MINIMUM FRAME DEPTH OF 100mm OR B125 FOR NON-CONTIGUOUS PARKS.

5. BRICKWORK SHALL BE FLAT BEDDED (MORTAR THICKNESS 10mm to 25mm) AND NOT TO BE TRAFFICKED UNTIL SPECIFIED STRENGTH (AS INDICATED IN THE CONTRACT DOCUMENT) IS ATTAINED.

6. THE BACK FACE OF THE GULLY POT SHALL BE IN A VERTICAL LINE WITH THE FRONT FACE OF THE KERB AND THIS WILL PRECLUDE CORBELLED BRICKWORK.

7. CORBELLING TO BRICKWORK IF NECESSARY, 25mm MAXIMUM.

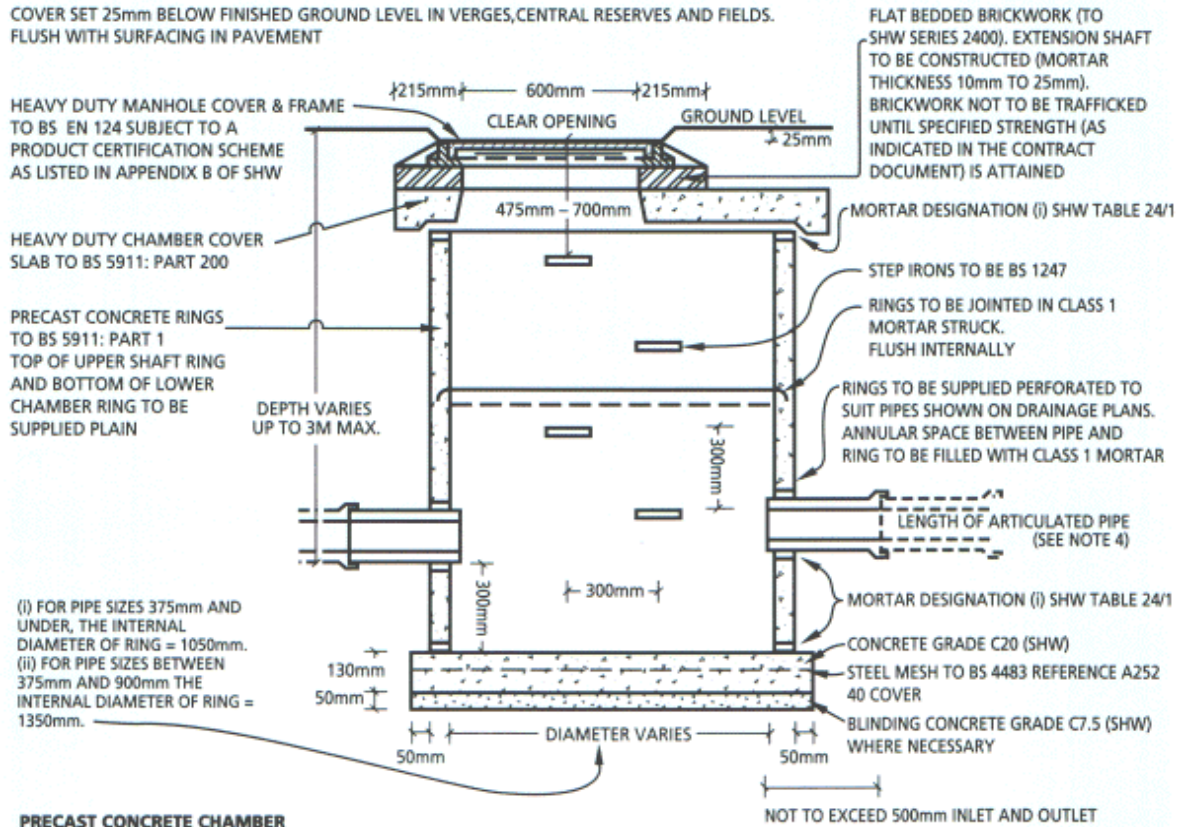
8. LEVELLING BRICKWORK DEPTH SHALL BE A MULTIPLE OF 75mm.

9. WHERE INSITU CONCRETE GULLIES ARE FORMED WITH PERMANENT SHUTTERING SUCH SHUTTERING SHALL HAVE A CURRENT BRITISH BOARD OF AGREEMENT ROADS AND BRIDGES CERTIFICATE.

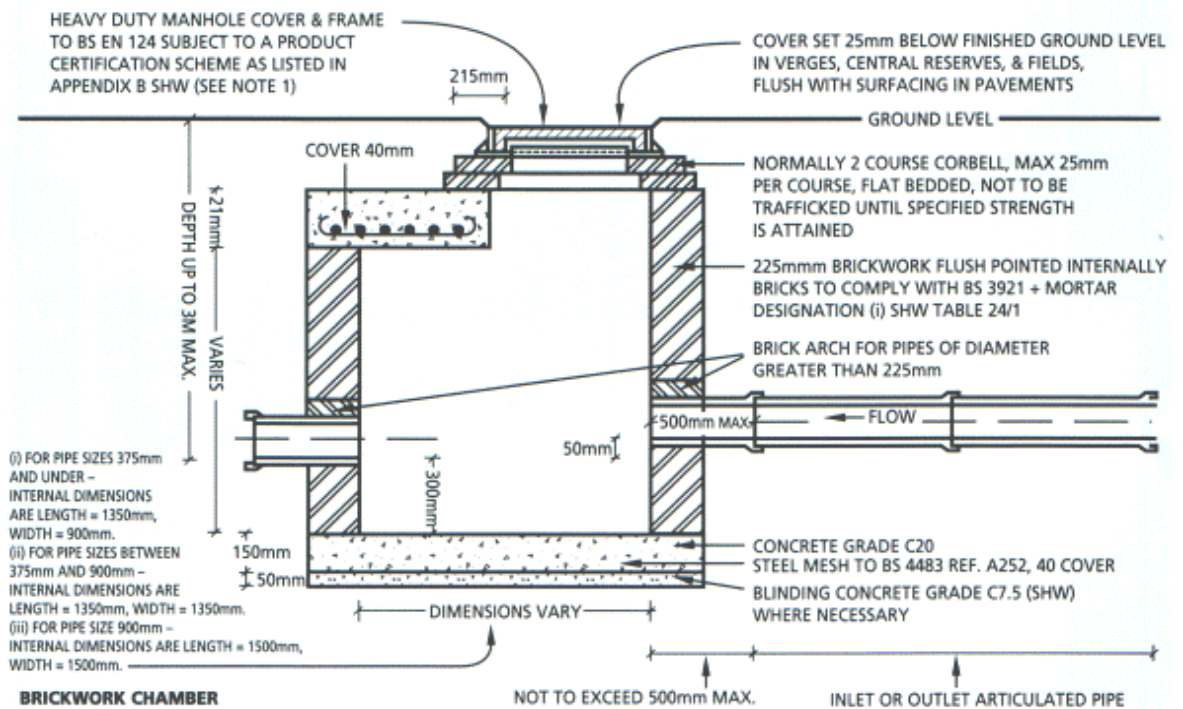
10. WHERE BOTH NON ROCK AND CAPTIVE HINGE GRATING IS REQUIRED, THEN TYPE D400 SINGLE PIECE, HINGED, NON ROCK WATERSHED OR SIMILAR APPROVED TYPE CAN BE USED.

Figure 10.22 Road Gullies

10. Construction Design



PRECAST CONCRETE CHAMBER



BRICKWORK CHAMBER

NOTES COMMON TO BOTH CHAMBER TYPES

1. MANHOLE COVER SHALL BE DOUBLE TRIANGULAR 600mm x 600mm SQUARE OPENING, MIN. FRAME DEPTH 100mm.
2. WHERE THE OUTLET PIPE IS GREATER THAN 450mm DIAMETER A SAFETY CHAIN (DRAWING AVAILABLE FROM THE NETWORK MANAGER) HAS TO BE PROVIDED ACROSS THE OUTLET FACE.
3. REFER TO THE SPECIFICATION FOR HIGHWAY WORKS (SHW) REGARDING BACKFILLING TO CHAMBER.

4. FOR LENGTH OF ARTICULATED PIPE REFER TO SHW TABLE 5/6.

5. THE BOTTOMMOST STEP SHOULD NOT BE MORE THAN 300mm FROM THE FLOOR.

6. WHERE CHAMBER IS LOCATED IN THE CARRIAGEWAY THE LEVEL OF THE TOP OF THE COVER SLAB SHALL BE BELOW THE TOP OF THE ROAD BASE LEVEL. EXTENSION SHAFT SHOULD NOT BE MORE THAN 300mm.

Figure 10.23 Chamber Construction

10. Construction Design

Landscape Treatment

10.10



The specification for road landscaping is detailed in Appendix A. Selection of trees and shrubs are given in Appendix C. Clause numbers in the following text refer to that specification. Materials chosen should be appropriate in appearance and performance and should be used in a consistent manner according to the function of different areas. Local materials and styles should be used, avoiding over-elaborate detailing and pastiche. Inappropriate standard details should not be imported from an area with a different landscape character.

10.10.1 *General Issues*

Planting

Any planting carried out within the road or on land adjacent to the road will require to receive written permission from the Roads Department prior to the commencement of the planting. Landscape treatments should be designed for effective long-term maintenance and the highest standards of ground preparation are required to ensure successful establishment and the ongoing health of plants.

10.10.2 *Required Permission*

Plant material comprises trees, shrubs, ground cover, climbers, bulbs and grass. Plant selection must take into account the following points as well as the desired design objectives;

10.10.3 *Appropriate Species Selection*

- suitability for the site,
- hardiness and tolerance to pollution and road salts,
- commercial availability,
- initial and eventual size above and below ground,
- shape,
- colour and seasonal variation,
- growth rate,
- maintenance requirements,
- other traits such as over-searching roots, weak branches, attractiveness to aphids.

With all "native" or "naturalised" planting, advice on suitable species, mixes, densities and soil preparation can be sought from various sources such as local Landscape Professionals and Ecologists. Many areas of Scotland have appointed Area Ecologists. Ecological societies can also be a valuable source of information.



Trees should be located to allow full branch spread as trees which are too close to the kerb may grow asymmetrically due to continuing contact with tall vehicles. This can be avoided by ensuring that all tree branches do not encroach within 450 mm of the kerblines up to a height of 5.3 metres. Tree planting proposals should also take full cognisance of the road lighting layout to ensure that no inappropriate shaded areas are created.

10.10.4 *Siting Plants*

Trees and shrubs should not be located where they are likely to cause damage to adjacent pavings, building, or services underground; where necessary protection should be provided. Care must also be taken in the siting of trees to make allowance for access to buildings by emergency vehicles and fire engine turntables.

10.10.5 *Protection of Services*

10. Construction Design

10.10.6 Maintaining Visibility

Trees can be located on their own, in a group, or in lines which can be parallel to the carriageway or at an angle to the carriageway. The required spacing between plant material and the carriageway or footway are detailed in Figure 10.24. They should not obscure visibility when planted or when mature. To ensure good visibility without having to rely on frequent maintenance, the growth potential of shrubs planted in verges should be under 600mm in height.

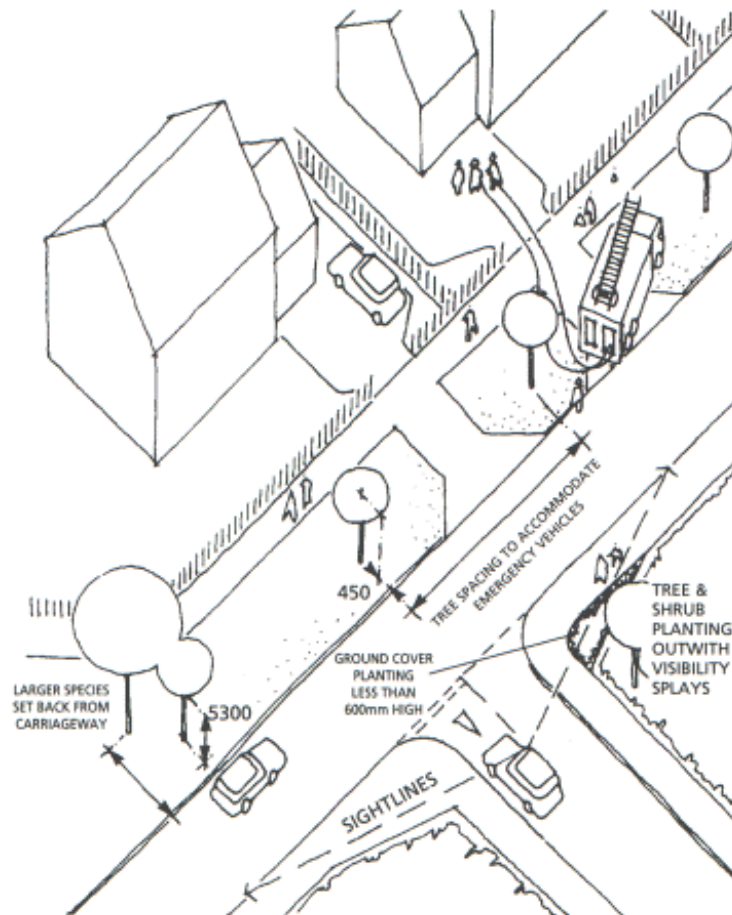


Figure 10.24 Landscape Considerations

10. Construction Design



Soft verges should be grassed (cl 618) unless an alternative form of surfacing is authorised by the Network Manager. There must be a permanent and continuous demarcation of the boundary between the verge and the adjoining private property (e.g. by concrete edge kerbing or boundary walls).

10.10.7
Soft Verges

Topsoil is to comply with clause 618 and appendix 6/8.

10.10.8
Topsoil

Unless otherwise agreed by the Network Manager, grass seed should comprise the mixture listed in Appendix 6/8 of the Specification. The developer will be responsible for resowing, in the following season, any area where the seeding is not successful for carrying out all requirements of clause 618 until the road is adopted.

10.10.9
Grass Seed

The form of any hard landscaping should be agreed with the Network Manager at an early stage of the design process. Where hard verges are provided on Traffic Distributor Roads, they should be surfaced with pedestrian deterrent paving.

10.10.10
Hard Verges

The restrictions which can be enforced on planting by Statutory Undertakers' services have to be identified at an early stage and the appropriate selection and modifications made as necessary.

10.10.11
Statutory Undertakers' Requirements

Whenever possible trees should be planted in free draining, uncontained tree pits as this creates the best environment for establishment and the ongoing health of the tree. However, it is acknowledged that in certain locations it may be necessary to restrict root growth through containing the root zone. In such cases, it is vital that the container provide an adequate volume for root growth; 3m³ is considered acceptable. It may be noted however, that root growth is rarely symmetrical and an irregular shape of container can still provide healthy growing conditions. Typical details for growing trees with or without containment and showing the implications for tree anchorage are shown in figures 10.25 and 10.26.

10.10.12
Root Containment

In urban locations, where new trees are likely to be vulnerable to vandalism or impact from vehicles, tree guards should be employed to provide a measure of protection.

10.10.13
Tree Protection

10. Construction Design

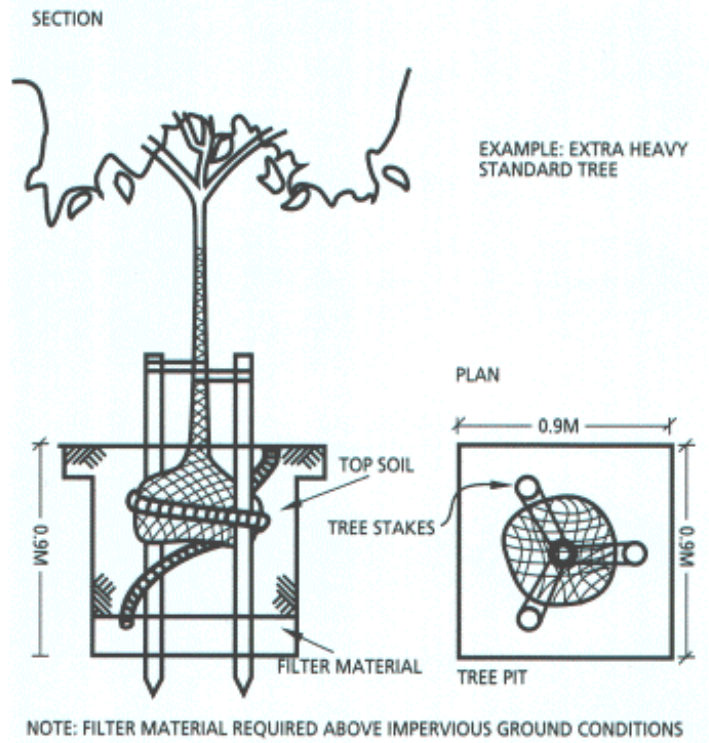


Figure 10.25 Tree Planting Detail without containment

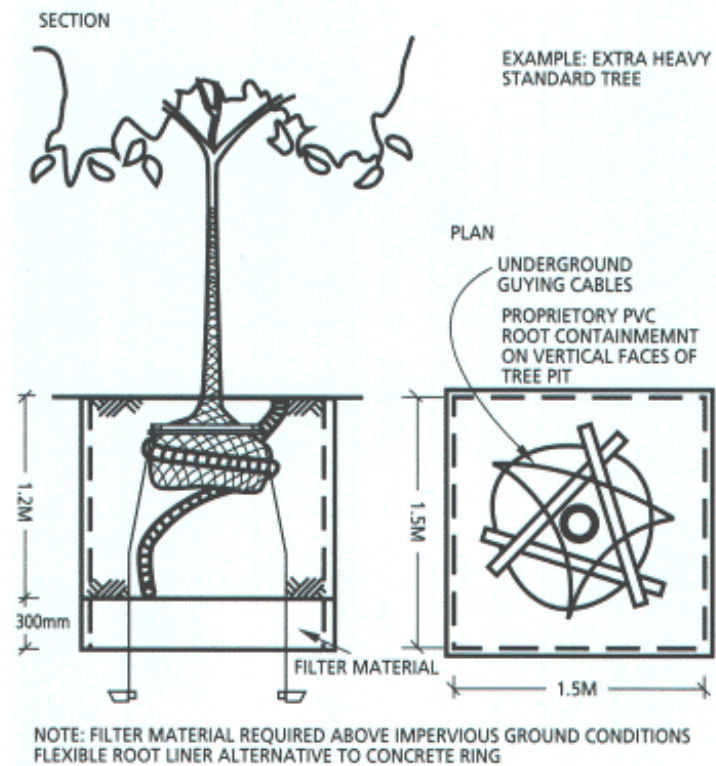


Figure 10.26 Tree Planting Detail with containment

Road Lighting Design

10.1

Developers are required as part of their Construction Consent application to provide details of lighting for roads and footpaths which are, or will be, maintainable by the Council and in the Council's opinion should be lit.

10.11.1
compliance

Lighting in residential areas shall be designed to BS13201:2003 Class S4. Residential roads used as a distributor road shall be classed as Class S3. Traffic calmed roads in residential roads will be classed as S3 and S2 respectively. Lamps must have a Ra \geq 60.

10.11.2
CEN Lighting
Class

Where adjacent footpaths, cycleways and verges are greater than 5m beyond the effective width of the carriageway, a suitable CE Class is to be selected from BS13201:2003 and agreed with the Head of Roads and Transportation.

10.11.3
Connection to
existing
apparatus

Where the road lighting in a development is to be connected electrically to any existing Roads Authority column or feeder pillar, the Head of Roads and Transportation's representative will, on receipt of an installation Certificate CC10, carry out the necessary connection or connections at the point of supply in accordance with the Electricity at Work Regulations 1989, the cost to be borne by the developer. The Head of Roads and Transportation's representative will require a minimum of 48 hours notice (excluding weekends) from receipt of the installation Certificate CC10 to provide the connections facility. Alterations to existing services and equipment which the Head of Roads and Transportation deems necessary to accommodate the development will be charged to the developer on a time and material basis.

Electrical test and inspection shall be carried out jointly by the Developer's electrical personnel and East Ayrshire Council's Lighting Section staff in accordance with the specification detailed in the appendices to this document.

Where traffic and other routes external to the development are affected, for example at a junction improvement remote from the site, the Head of Roads and Transportation will advise on the Local Roads Authority's requirements.

10.11.4
Head of Roads
and
Transportation's
requirements

The equipment used should comply with the specification detailed in the 'Roads Development Guide Appendices'. A list of approved materials known to comply with this specification is available from the Head of Roads and Transportation's representative on request.

10.11.5
Equipment

Application for use of alternative equipment must be made to the Local Roads Authority, but it should be noted that as a general principle use of heritage or special design equipment will be confined to those parts of Conservation Areas with existing buildings of particular merit.

10.11.6
Alternative
Equipment

The developer is responsible for the procurement of listed building or other planning consents as necessary.

10.11.7
Planning
Consents

Column, lantern and light source combinations should be as follows to the direction of Head of Roads and Transportation

10.11.8
Column and
lantern
Combinations

Column Mounting Height	Maximum Bracket Projections	Lamp	Lantern Mounting	Area of Use
4/4.5/5 m	Nil	45W CPO-TW 60W CPO-TW	Post Top/Post Mounted	Footpaths and shared surfaces
6 m	0.5 m	45W CPO-TW 60W CPO-TW	Post Mount	3-6 m road width
8 m	0.75	60W CPO-TW 90W CPO-TW	Side Entry	6-7.3 m road width

Table 10.6 Lighting Design Criteria

Where LED lighting is being proposed the developer will refer to the Head of Roads and Transportation for further guidance.

Non standard lanterns on the rare occasion when agreed by the Local Roads Authority must have an optical compartment to IP 65 (BS EN 60529) and have evidence of photometric performance in TM14 format.

Luminaire maintenance factor shall be assumed to be 0.91. Lamp flux maintenance factor shall be 0.8.

The 100 hour lumen output values for lighting design calculations are detailed below:

LAMP	100 HOUR OUTPUT (Lumens)
45W CPO-TW	4300
60W CPO-TW	9000
90W CPO-TW	10450

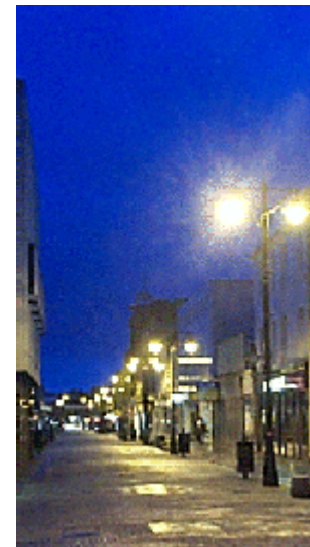
Table 10.7 Lumen Output Values

Calculations justifying achievement of illuminance criteria shall be computer generated in accordance with EN 13201-3:2003, Road Lighting - Part 3: Calculation of Performance. Calculations of luminance and illuminance as appropriate shall be submitted with the design.

For luminance calculations the road surface shall be assumed to be CIE type R1 but with a luminance coefficient $q_0=0.08$.

Photometric tests to verify calculations shall be undertaken by a mutually approved third party at the developer's expense on completion of the works and commissioning of the installation where requested by the Head of Roads and Transportation.

In the event of failure to meet the specified standards the developer shall effect the necessary remedial actions at his expense within four months or responsibility for operation and maintenance shall revert to him.



10.11.9
Illuminance
Calculations

10.11.10
Remedial
Action

In residential areas columns should be sited with consideration to the house design and remote from the visual line of the main house windows, the preferred position being at the division of property where possible, with allowance for entrance and drivers.

10.11.11
Residential
Areas

Columns must not be sited at the toe of the footway or service area.

10.11.12
Column
Siting

Where calculations or luminance templates require the spacing on bends to be reduced from the design spacing, the following minimum spacing shall apply:

10.11.13
Spacing at
bends

Mounting Height 8 metres
Minimum Spacing 20 metres

10.11.14
Amendments
To BS5489 -
1:2003
annex J

BS5489-1:2003 Annex J is amended as follows:

J.1.1 add :

e) The siting requirements of columns at T junctions shall apply also to a hammer head end of cul-de-sac in respect of points A and D. Relaxation shall be applied to junctions of either a Housing Road, Shared Surface Road or Housing Court with a Traffic Distributor Road in one of the following manners:

- A. Positions 'A' and 'D' maintained and spacing to positions 'B' and 'C' extended.
- B. Position 'A' omitted with positions 'B' and 'C' in a staggered arrangement sited beyond the junction on the left hand side of the road as seen by the approaching driver. Position 'D' is maintained.

J.2 add

Junctions on bends with radius of curvature in excess of 80H shall be treated as conventional T-junctions.

Where the radius of curvature is less than 80H the following shall apply:

- (i) For Class S2 and S3 lighting, relaxation may be applied by the omission of position 'A' for the stem road on the outside of the bend, and position 'B' and 'C' for the stem road on the inside of the bend.
- (ii) For Class S4 lighting, position 'A' shall be omitted where the stem road is on the outside of the bend, and positions 'B' and 'C' where the stem road is on the inside.

J.5 add:

A column positioned at the apex of an acute angle Y-junction should be at a minimum distance of 2 metres from the apex and protected by crash barrier or similar.

Electrical Design

10.11.15
Electrical
Design

The electrical design shall be in all respects comply with the requirements of BS 7671 'Requirements for Electrical Installations' current at the time of the submission of the construction consent, the Electricity at Work Regulations 1989 and the I.L.E Code of Practice for Electrical Safety in Highway Electrical Operations (2003)

10.11.16
Main Supply

Live services from the supply company will only be taken into the control pillar.

10.11.17
Distribution
Pillar

Distribution pillars shall be sited in the side road away from major traffic routes and the junction itself, in positions where they are least likely to sustain impact or malicious damage whilst being readily accessible for maintenance purposes and to facilitate cable links to the adjacent lighting network.

10.11.18
Road
Distribution
Circuit

Road Distribution Circuits shall be 230 volt single phase primarily looped in or spurred from road lighting units. All other items of street furniture shall be spurred from a convenient road lighting unit; these spurs looping through two or more such items as appropriate. Electrical feeds to bollards and traffic signs must spurred from the nearest lighting column and be suitably fused allow proper fault discrimination. The maximum number of Lighting circuits shall be group controlled with a single photocell controlling all circuits within a control pillar.

10.11.19
Earth Fault
Loop
Impedance

In the event of the supply earth fault loop impedance not being provided by the supply authority or obtainable by measurement the undernoted typical values shall be applied:

TN-C-S system, 0.35 ohms
TN – S system 0.8 ohms

For fixed equipment, which can be touched by persons in contact with the general mass of the earth, including lighting columns and other illuminated street furniture, the earth fault loop impedance shall be such that disconnection under fault conditions occurs within 0.4 seconds. Earth electrodes should be installed at all salient points (i.e. at each feeder pillar and at the end of the circuits with three or more lighting units).

10.11.20
Final Circuit
Protective
Devices

Loading on final circuit protective devices shall be such that no nuisance tripping occurs. This means that final circuit protective devices shall generally be rated at 20 Amperes loaded to maximum 80% and shall be the maximum size permissible taking into account the earth loop impedance at the end of the circuit (Z_s).



Drawings

A minimum of three paper copies of the lighting proposals must be supplied together with an electronic copy in AutoCAD dwg or dxf format at the time of construction consent application.	10.11.21 Numbers of Drawings
A schematic circuit layout for each feeder pillar shall be provided on all drawings giving;	10.11.22 Schematic Circuit Layout
(i) phase and number or circuit	
(ii) size and type of protective device	
(iii) size and type of cables	
(iv) calculated values of line-earth fault loop impedance at all salient points.	
All columns and distribution pillars shall be numbered in accordance with the schedule supplied by the Council.	10.11.23 Column and Pillar Numbering
All columns and structural steelwork shall be hot dip galvanised. Further protective coatings, if required, shall meet the requirements of the Head of Roads and Transportation.	10.11.24 Protection
Drawings shall show such detail of contiguous lighting installations that the geometry can be fully assessed and the compatibility of the proposed systems confirmed. Alterations to existing services and equipment which the Head of Roads and Transportation deems necessary to accommodate will be charged to the Developer on a time and materials basis.	10.11.25 Geometry and Compatibility
Where relevant, roads and footpaths scheduled for adoption shall be clearly differentiated from those that are not.	10.11.26 Adoption
'As-installed' drawings at 1:500 must be provided prior to adoption. The drawings must also incorporate a legend and symbols as described in Appendix B.	10.11.27 As Installed Drawing

SUBJECT INDEX

A

Access:

Development 5.1.1;
Emergency 5.1.3, 5.6.7, Fig 5.1, Table 5.1 and 5.2;
Private Access -Construction 10.8.1 & 2, Fig 10.16 to 20, Definition 2.3.6, Design 2.5.11, 5.1.17, 5.2, Fig 5.5 & 5.6, Location and Spacing 5.2.3, 4.3.4,4.4.1,4.5.1,4.6.1.

Accident Investigation and Prevention 9.3.2,9.5.1.

Adoption:

Adoption and Maintenance Policy 2:5, 2.6.12, Fig 2.2 & 2.3;
Application for Adoption 2.8, Fig 2.6;
Inspection 2.8.5;
Phase Adoption 2.5.2.

Allocated Parking

7.4.2, 7.4.3.

Amendments

2.6.11.

Appeals to Construction Consent

2.6.9.

Approval in Principal (Structures)

2.2.3, 2.6.3.

Asphalt

Fig 10.8, Tables 10.2 to 10.4.

B

Basecourse

10.4.8, 10.4.9, 10.4.10, Fig 10.4 to 10.9, 10.11, 10.13, 10.15, Table 10.2 to 10.4.

Bedding Layer

see Block Paving Construction.

Berms

4.5.3 Table 5.7.

Block Paving:

Construction 10.4.1, 10.4.10, 10.5.3 & 4, 10.5.8, 10.5.11, 10.6.1, fig 10.6, 10.8, 10.9, 10.11, Table 10.2 & 10.3; Shared Surfaces Design 6.7.3; Traffic Calming Design 6.4.2 & 6.6.4.

Bollards

5.3.39, 6.4.1, 6.4.2, 6.6.4, 10.5.4, 10.5.5. Fig 5.23, 6.16, 6.65.

Bonds for Housing Development Roads

2.5.10,2.6.15,2.6.16,2.8.8.

Borehole Surveys

10.1.2, Fig 10.1.

Bridges

2.5.9, 2.6.3.

Build Outs:

Construction 10.5.14,10.5.15; Design 6.2.3.

Buses:

Pavement Construction 10.4.10; Provision 2.2.2, 2.2.3, 2.2.5, 3.2.1, 5.3.46, 5.3.47, 7.6.8, 8.2.1, 8.2.2; Road widths Table 5.6 & 5.8; Termini Fig 5.24 & 5.26.

C

California Bearing Ratio

10.1.9, 10.4.2 to 4. Table 10.1.

Calming

see Traffic Calming.

Camber

5.3.29, Table 5.6b to 5.9.

Car Parks

see Parking.

Carriageway Construction:

Block Paving 10.4.10;
Capping Layer 10.4.2 to 10.4.4;
Design Table 10.2;
Design Certificate 10.4.6;
Design Life Table 10.2;
Flexible/Rigid Construction 10.4;
Specification 10.2;
Staged Construction 10.4.7 to 10.4.9, Table 10.2;
Subgrade Drainage 10.3;
see also Drainage.

Carriageway Widths

5.3.3 to 9, Table 5.6 to 5.10.

CEN Lighting Class

10.11.2

Central Island:

Regulations 6.2.3; Layout 6.6A (10); Construction 10.5.14 & 15.

Central Reserves:

Regulations 6.2.3;
Layout 6.6.4 (11, Tables 6.2 & 3);
Construction 10.5.14 & 15.

Chambers:

Positioning 5.6, Fig 5.42 to 44;
Connections 10.9.10; Construction 10.9.9, Fig 10.23.

Change in Junction Alignment

6.6.4(18).

Charges for Inspection and Testing

2.7.3.

Charges for Parking

7.3.12.

Checklists for Safety Audit

9.3.4(d), 9.4.1, 9.4.3, 9.6.2, 9.7.2, 9.8.2.

Chemical Analysis of industrial or waste ground

10.1.2.

Chicanes:

Regulations 6.2.3;
Layout 6.5.1, 6.6.4(6) to (8), Table 6.2 & 3;
Construction 10.5.11 & 12, 10.5.14 & 15.

Clay Paviers

see Blockwork

Clearances:

Cyclists 5.4.34, Fig 5.36 & Table 5.15; Horizontal 5.3.39, Fig 5.23; Turning 5.3.43, Fig 5.24; Vertical 5.3.38.

Coaches

7.1.2, 7.6.6 & 8, Fig 7.14.

Coal

10.1.5.

Commercial Development:

Access 5.2, 10.8.2, Fig 5.6 to 8, 10.18 to 20;
Parking Design 7.1, 7.2 & 7.3;
Parking Provision 7.5, 7.7, 7.8, Table 7.4, 7.8, 7.9;
Servicing 5.5.

Commuted Payments

7.1.4.

Concrete Block Paving

see Blockwork

Confirmation Reports for Safety Audits

9.8.5, 9.9.

Connection to Sewers/ Watercourse

10.9.10.

Connection to Lighting Apparatus
10.11.3.

Consultation:

General 2.2.1, 2.2.5;
Traffic Calming/Road Hump 6.2.6.

Construction Consent:

Adoption Policy and Procedure 2.5;
Application for Adoption 2.8; Application
Requirements 2.6; Forms 2.6.3, 2.6.16,
9.1.2; General 2.3.3, Fig 2.1; Inspection
During Construction 2.7; Safety Audit
9.1.1; Submission of plans 2.6.2.

**Construction Design and Management
Regulations 1994**

2.8.3.

Core Roads:

Construction Table 10.2;
Hierarchy 4.6.3 to 4.6.6, Fig 4.1, 4.2,
4.8;
Identification 4.6.5 & 6.3.6, Figs 4.9
& 6.3;
Junction Design 5.1.4, 5.1.18, 5.1.19,
Table 5.3, 5.4, 5.5,
Link Design Table 5.8 & 11;
Traffic Calming 6.3.1, 6.3.3, Table
6.1.

Corner radii:

Junctions 5.1.19 to 21, Table 5.5; see also
Access Design.

Crossfall:

Carriageways 5.3.30, Table 5.6 to
5.10;
Cyclists 5.4.30;
Footways/Footpaths 5.4.17;
Lay-bys 5.3.32;
Shared Surfaces /Blockwork 5.3.33.

Cul(s)-de-sac:

General Fig 4.1;
Industrial 4.5.2;
Residential Core Road 4.6.4;
Residential Housing Road 4.6.8;
Shared Surfaces 4.6.10;
Turning Area 5.3.40 to 45, Fig 5.24
to 26.

Culverts

2.2.2(g), 2.5.9, 2.6.3, 2.6.18 & 19.

Curve Widening

5.3.20 to 5.3.24, Fig 5.18, Table 5.11.

Cushions:

Construction 10.5.2 to 5, Fig 10.7 to
10;
Design 6.6.4(4), Tables 6.2 & 3;
Regulations 6.2.2.

Cycle Facilities:

Adoption/Construction Consent
2.5.8;
Construction 10.6, Table 10.3 & 4,
Fig 10.15;
Design 5.4.27 to 36, Fig 5.36 & 37;
Table 5.15;
Provision 5.4.1, 4.4.24 to 26;
Parking Design and Provision 7.8,
Table 7.9, Fig 7.16;
Traffic Calming 6.5.2, Fig 6.10.

D

Deleterious Material

7.4.10.

Demarcation Public Private:

/Access 2.3.6;
Landscaping 10.10.7;
Public/Private 2.5.11;
Service Strips 5.6.6, 5.6.10, Fig 5.44.

Design Life of Carriageway

Table 10.2.

Design Speed

See Link Design Parameters.

Designers Responsibility

2.6.4.

**"Designing for Deliveries" Freight
Transport Association:**

Curve Widening 5.3.21; Servicing 5.5.3
& 4, 5.5.8.

Development Integration:

Parking and Servicing 3.2.6;
Road Network 3.2.1 to 5;
Visual Impact 3.1.1 to 5.

Development Road Types

See Road Hierarchy

Diagonal Closure

6.6.4(23)

Disabled

see Mobility Handicapped

District Distributor Road:

Hierarchy 4.3, Fig 4.1 & 4.2.

Docqueting of Plans

2.6.5. Fig 2.5.

Drainage:

Chamber Construction 10.9.9, Fig
10.23;
Connections 10.9.8; 10.9.10;
Footpath/Cycletrack Fig 10.15;
Gully spacing 10.9.3;
Gully Construction 10.9.7, Fig 10.22;
In Brownfield sites 10.1.6;

Outfall Capacity 2.6.18 & 19;
Road Design 10.9;
Specification 10.9.1;
Subgrade 10.3;
Traffic Calming 6.3.11, Fig 10.7 to 9,
10.12.

Driveways

7.4.3, 7.4.7 to 10, Fig 7.9, 7.11 & 12,
Table 7.1.

see also Access: Private Access.

Dropped Kerbs:

Pedestrian Crossings 5.4.7, 10.8.3,
Fig 10.21;

see also Access: Private Access

Design

and Construction.

Dropping off/picking up

7.6.6 & 8, Fig 7.8 & 7.14.

E

Edging

10.7.1, Fig 10.5 & 10.15 to 20.

Electricity Supply

2.2.4, 2.8.4, 10.11.3, 10.11.16 to 20.

Emergency Access

see Access

Emergency Services:

Consultation 2.2.5; Fire Access 5.9.4,
10.10.5, Fig 10.24; Police Secured by
Design 2.2.5; see also Access:
Emergency Access.

End on Parking

see Parking Layout.

Environmental Design

2.1, 3.1.1 to 5, 4.6.2, 5.3.45, 5.8,
6.1.1, 6.1.3, 6.3.7, 6.7.11, 7.3.3,
10.10.

Exceptions Report/Safety Audits

9.9.3.

Existing Roads:

Calming 1.1.4, 1.2.2, 6.2.6, 6.6.4;
Consent 2.4.7, 5.6.13, Fig 2.1;
Emergency Access 5.1.3, Table 5.1.

Existing Traffic

3.2.3, 8.1.8, 8.1.10.

**Expenses reimbursed for
Traffic Management**

5.9.1.

F

Fire Bridge:

Consultation 2.2.5;
Plant Operation 5.9.4, 10.10.5, Fig 10.24;
see also Access: Emergency Access.

Filter Drains

10.3.1, Fig 10.4 & 10.15.

Flexible Pavements

see Carriageway Construction

Flood Prevention

2.6.18 & 19

Footpath

Adoption and Maintenance 2.5.3, 2.8.2;
Agreements 2.6.12 & 2.6.16;
Construction 10.6, Table 10.3 & 4, Fig 10.15;
Provision/Design 5.4, Table 5.13.

Footway

Adoption and Maintenance 2.5.1 & 2, 2.6, 2.7, 2.8;
Construction 10.6, Table 10.3 & 4, Fig 10.5;
Provision/Design 5.4, 7.3.6, Table 5.12.

Footbridges

4.33, 4.4.3, 5.4.8.

Formation

10.3.1, 10.4.2, 10.4.5, Fig 10.4, 5, 6 & 15, Table 10.1.

Forward Visibility

4.6.2, 5.3.25 to 28, 7.2.4, Fig 5.19 to 21, Tables 5.6 to 5.10 & 6.2.

Frontage Development

Industrial Roads 4.5.1, 5.2.3; Residential Roads 4.6.2; 5.2.3; Strategic Roads 4.3.4; Traffic Distributor Roads 4.4.1.

Frost Susceptible Material

10.4.3.

Furniture

5.3.38 & 39, 5.3.43, 5.4.22 & 23, 6.4, Fig 5.23, 5.35.

G

Gap Sites

2.3.7, 7.1.6, 7.5, Table 7.3.

Garages

7.1.8, 7.4.3, 7.4.6, 7.4.8, 7.4.9, Fig 7.12.

Gas

see Statutory Undertakers

Gas Monitoring

10.1.2.

Gates

5.7.9.

Gateways:

Design 6.6.4(24), (25) & (26);
Residential/Calmed Provision 4.6.1, 5.1.12, 6.3.2, 6.3.5, Fig 6.2; Watershed Gateway 5.3.12 to 19, Fig 5.13 to 5.17.

Geometry:

Access 5.2;
Cydetracks 5.4.29 to 32, Table 5.15;
Junctions 5.1.1 to 21, Table 5.2 to 5.5, Fig 5.1 to 4;
Parking 7.1.8 to 10, 7.2, 7.3, 7.4, Table 7.1 & 2, Fig 7.1 to 12;
Roads 5.3.1 & 2, 5.3.20 to 39, Table 5.6 to 5.10;
Shared Surface 6.7, Table 5.10;
Traffic Calming 6.6.2, 6.6.4;
Turning Areas 5.3.40 to 42, Fig 5.24 to 26.

Geotechnical Considerations:

Borehole Surveys 10.1.2, Fig 10.1;
Brownfield sites 10.1.6;
Ce/MO.1.9;
Construction Consent 2.6.2(f), 2.7.4;
Contaminated Ground 10.1.2, 10.1.6;
Document/Reports 10.1.1 to 10.1.5;
Geotextiles 10.1.8;
Mine Workings/Coal 10.1.4, 10.1.5, 10.1.8, Fig 10.2 & 3;
Peat 10.1.7;
Structures 10.1.4.

Grade Separation:

Cyclists 5.4.34;
Pedestrians 4.3.3, 4.3.5, 5.4.8.

Gradients:

Blockwork/Shared Surfaces 5.3.33;
Cydetracks 5.4.32;
Footway/Footpaths 5.4.17 & 18, Fig 5.31;
Junctions 5.3.34, Fig 5.22;
Lay Bys 5.3.32;
Maximum 5.3.31, 5.3.35;
Minimum 5.3.29, 5.3.32, 10.9.3.

Granolithic Footways

Table 10.3.

Grass

10.10.1, 10.10.7, 10.10.9.

Grit Bins

5.9.3.

Ground Cover Planting

2.5.12, 3.1.4, 6.4, 7.3.3, 10.10.

Gullies:

Construction 10.9.7, Fig 10.22;
Drainage Design 10.9.2; Footpaths 10.9.6;
Spacing/Positioning 10.9.3, Fig 10.7, 10.8, Table 10.5; Specification 10.9.1.

H

Hammer Head:

Lighting 10.11.13 see also Turning Areas

Hard Landscaping

3.1.3 & 4, 6.4, 10.10.1 & 10.

Headroom:

Cydetracks 5.4.34; Vehicles 5.3.38.

H Humps:

Construction 10.5.2 to 5, Fig 10.7 to 10;
Design 6.6.4(5), Table 6.2 & 3;
Regulations 6.2.2.

Hierarchy:

Core Roads 4.6.3 to 6;
Housing Courts 4.7;
Housing Roads 4.6.7 & 8;
Industrial Roads 4.5;
Integration 3.2;
Residential Roads 4.6;
Roads 4.1.4.2, Fig 4.1 & 4.2;
Rural Areas 4.8;
Shared Surface Roads 4.6.9 to 13;
Strategic Roads 4.3;
Traffic Distributor Roads 4.4.

Horizontal Curves

5.3.2, 5.3.20 to 28, Tables 5.6 to 5.11,
Fig 5.18 to 5.21.

Housing Courts:

Adoption/Consents 2.3.7, 2.5.5;
Construction Table 10.2;
Hierarchy and Layout 4.7, Fig 4.1, 2 & 13;
Lighting 4.7.5;
Servicing 4.7.3;
Statutory Undertakers 4.7.4.

Housing Road:

Construction Table 10.2;
Hierarchy 4.6.1, 4.6.2, 4.6.7, 4.6.8, Fig 4.1 & 10;
Junction Design 5.1.4, 5.1.18, 5.1.19, Table 5.3, 5.4, 5.5;
Link Design Table 5.9 & 11;
Traffic Calming 6.3.1, 6.3.3, Table 6.1;
Watershed 5.3.10 to 19, Fig 5.12 to 17.
Width Reduction 5.3.3 to 9, Fig 5.9 to 11.

Hydraulic Design:

Outfalls 2.6.18, 2.6.19, 10.9.10;
Road Drainage 10.9.2.

Hydrological Study

2.6.18, 2.6.19, 10.9.10.

I

Independent Safety Audits

9.4.3, 9.5, 9.6.4, 9.7.4.

Independent Structures Check

2.6.3.

Industrial Developments:

Access 5.2, 10.8.2, Fig 5.8, 10.20; Parking Design 7.1 to 7.3;
Parking Provision 7.6, 7.7, 7.8, Fig 7.13, Table 7.5, 7.7, 7.8, 7.9;
Servicing 5.5.

Industrial Roads:

Construction Table 10.2;
Hierarchy 4.2.1, 4.5, Figs 4.1, 4.2 & 4.5;
Junction Design 5.1.4, 5.1.18, 5.1.19, 5.1.21, Table 5.3 to 5.5, Fig 5.4;
Link Design Tables 5.7 & 5.11;
Traffic Calming 6.3.1.

Infill Development

2.3.7, 7.1.6, 7.5, Table 7.3.

Infilled Sites

10.1.1, 10.1.2, 10.1.6, 10.1.8.

Inspection and Testing

2.7, 2.8.4 & 5, 9.8.4, 10.11.2.

Interpretive Report

2.6.2(f), 10.1.1, 10.1.3, 10.1.6.

Introduction

Chapter 1

Irregular Areas Drainage

10.9.4 & 5.

J

Junctions:

Core Road Identification 4.6.5 & 6.3.6, Figs 4.9 & 6.3;
Corner Radii 5.1.19 to 21, Table 5.5, Fig 5.4;
Emergency Access 5.1.3, Table 5.1 & 5.2, Fig 5.1;
Gateways 5.1.12;
General 5.1;
Layout 5.1.8, 5.1.9, 5.1.10;
Location 5.1.7, 5.1.11;
Long Vehicles 5.1.21, Fig 5.4;
Rural 5.7.7 to 9, Table 5.17 & 18;
Shared Surfaces 4.6.11 & 6.7.2, Figs 6.64 & 65;

Spacing 5.1.4 to 5.1.6, Table 5.3;
Traffic Calming 5.1.20, 6.6.4(3), (18) to 23, (25) and (26), Table 5.4 Note 2.
Visibility 5.1.14 to 18, Figs 5.2 & 3, Table 5.4;
Widening SAAB.

K

Kerbs:

Access 10.8, Figs 10.16 to 10.20;
Carriageway/Footway 10.7, Figs 10.5 10.6, 10.15;
Pedestrian Crossings 10.8.3, Fig 10.21;
Traffic Calming 10.5.14, Figs 10.8, 10.11, 10.13, 10.14.

L

Land Drainage

10.9.2, 10.9.6, Figs 10.4 & 15.

Land Use

2.1

Landscaping:

Consideration 5.8;
Fire Access 10.10.5, Fig 10.24;
Grass 10.10.7, 10.10.9;
Hard Verges 10.10.10;
Integrated Design 3.1.1 to 4;
Maintenance 2.5.12;
Parking 7.1.6, 7.3.9;
Pedestrians 5.4.6, 5.4.22, Fig 5.35;
Specification 10.10.1;
Statutory Undertakers 5.6.12, 10.10.5 & 11;
Topsoil 10.10.8;
Traffic Calming 6.4, 6.6.4;
Treatment 10.10;
Trees 10.10.1 to 6, 12 & 13, Fig 10.24 to 26;
Visibility 10.10.6.

Lanterns

10.11.7, Table 10.6 & 10.7 see also Lighting.

Large Vehicles

5.1.21, 5.3.20 to 23, 5.5.6.5.1, 7.1.2, Fig 5.4, 5.18, 5.24, 5.38 to 40, 6.9, Table 5.11.

Lateral Shifts

6.5.1, 6.6.4(17), Tables 6.2 & 3.

Lay bys:

Adoption 2.5.4, 2.5.6; Bus Provision Fig 5.26; Construction Table 10.2; Drainage 10.9.4; Gradients and Cross/a// 5.3.32; Lighting 10.11.12;

Parking Dimensions and Layout 7.1.8 to 10, 7.2, Fig 7.1 to 7.4, Table 7.1 & 7.2;
Residential Unallocated Visitor 7.4.4, 7.4.5, Fig 7.10;
Servicing 5.5, Figs 5.38 to 41;
Traffic Calming 7.1.5.

Licencing of Car Parks

7.3.12.

Light Rail:

Pedestrian Links 5.3.48; Transport Impact 8.2.

Lighting:

Adoption 2.5.2, 2.5.7, 2.8.4;
Bone/ Release 2.8.8;
Car park 7.3.10;
Construction Consent 2.2.4, 2.3.4 & 5.2.6.2, 2.6.13, 2.6.16;
Drawings 10.11.20 to 25
Electrical Design 10.11.15 to 20;
Housing Courts 2.7.5;
Inspection 2.7, 2.8.4;
Lighting Completion and Inspection Certificate 2.6.16, 2.8.4;
Lighting Design 10.11.1 to 14, Table 10.6 & 10.7;
Position of Apparatus 5.4.5, 5.4.22, 5.6, 5.8.4, Fig 5.36;
Provision 2.2.3, 2.6.13;
Safety Audits 9.7.1, 9.7.2, 9.8.1;
Specification 10.11;
Traffic Calming 6.6.3, 6.6.4, 10.11.1.

Lining and Signing:

Humps 10.5., Fig 10.10;
Junctions 5.1.10.

Link Design:

Core Road Watershed and Calming 5.3.10 to 19;
Curve Widening 5.3.20 to 5.3.24, Fig 5.18, Table 5.11;
Forward Visibility 5.3.25 to 28, Fig 5.19 to 21, Tables 5.6 to 5.10;
Gradients and Crossfalls 5.3.29 to 35, Fig 5.22, Table 5.6 to 5.10;
Housing road width reduction 5.3.3 to 5.3.9;
Parameters 5.3.1 & 2, Tables 5.6 to 5.10;
Public Transport Provision 5.3.46, Tables 5.6 to 5.10;
Vertical curves 5.3.36, Table 5.6 to 5.10;
Vehicle clearance 5.3.37 to 39, Fig 5.23;

List of Public Roads

2.7.5, 2.8.1, 2.8.6.

Loading Areas

5.5, Fig 5.38 to 41.

Long Vehicles

see Lorries.

Loop Roads

3.2.4, 4.5.2, 4.6.4, 4.6.8, 4.6.10, 5.1.3, Tables 5.1, 5.2, Fig 3.2, 4.1, 5.1.

Lorries:

Junctions 5.1.21, Fig 5.4; Loading/Servicing 5.5, Fig 5.38 to 41; Parking 5.5.8; Traffic Calming 6.5.1, Fig 6.9.

M

Main Distributor Road

4.3,6.3.1, Figs 4.1 to 4.3.

Maintenance:

Access 10.8.1;
Cycle Tracks 2.5.8;
Footpaths 2.5.3;
Housing Courts 2.5.5, 4.7.1 & 5;
Lighting 2.5.7,4.7.5, 10.11.10;
Parking Areas 2.5.4;
Planting/Landscaping 2.5.12, 5.8.2, 10.10.2;
Policy 2.5;
Ramp Access to Buildings 5.4.21, Fig 5.34, Table 5.14;
Safety 9.7.1;
Service /Areas 2.5.6;
Statutory Undertakers 5.6.2, 5.6.6 to 13;
Steps 5.4.18;
Structures 2.5.9.

Manholes:

Construction 10.9.9, Fig 10.23; Connection 10.9.10; Positioning 5.6, Fig 5.42 to 44.

Manoeuvrability:

Driveways 7.1.8 & 9, 7.4.7 & 8, Fig 7.1 & 7.2, 7.11 & 12, Table 7.1; Shared Surfaces 6.7 A, 6.7.6; Parking 7.1.8 to 10, 7.2.1 to 3, 7.3, Fig 7.1 to 5, Table 7.1, 7.2; see also Lorries.

Materials

2.6.17, 6.4.2, 6.6.4, 6.7.3, Chapter 10.

Median Strips:

Construction 10.5.11, Fig 10.13; tayout 6.6.4(13), Table 6.2 & 3; Regulations 6.2.3.

Million Standard Axles

10.4.6, Table 10.2.

Mineral Report

10.1.3.

Mining

10.1.1, 10.1.4, 10.1.5, Figs 10.2 & 3.

Mini Roundabout

6.6.4(22).

Mobility Handicapped:

Definition 5.4.2;
Disabled Access to Buildings 5.4.21, Fig 5.34, Table 5.14;
Disabled Parking 1.1 A to 4, Fig 7.15;
Footway/Footpath Gradients 5.4.17, 5.3.31;
"Guidelines for Reducing Mobility Handicaps (1991)" 5.4.2;
Obstacles 5.4.22 & 23, Fig 5.35;
Parent and Child Parking 7.7.5, Fig 7.15;
Pedestrian Crossings 5.4.6 to 8, 5.4.10, 10.8.3, Fig 5.30,10.21;
Provision 5.4.1;
Routes 5.4.5;
Shared Surfaces 6.7.5;
Steps/Ramps on Footway/Footpaths 5.4.18 to 20, Fig 5.31 to 33;
Traffic Calming 6.6.4(2), (3) & (5).

Modernisation/Refurbishment Parking

7.1.6.

Multi-storey car parks

7.3.11.

N

Nibs:

Construction 10.5.14 & 15;
Design/Regulations 6.2.3.
Noise
5.8.2, 5.9.2,6.6.4(14), 10.5.6.

Non Standard Materials

2.6.17.

Notification of Owners

2.6.6,2.6.16.

Notice of Commencements

2.7.1,2.7.4.

Numbers of Dwellings:

Core Roads 4.6.4, 5.1.3, Fig 4.1 & 2, 5.1, Table 5.1 & 2;
Housing Courts 4.7.1, Fig 4.1 & 2;
Housing Roads 4.6.7, Fig 4.1 & 2;
Provision of Roads 2.3.7;
Rural 4.8;
Shared Surfaces 4.6.10, Fig 4.1 & 2;
Traffic Distributor Roads 4.4.1, Fig 4.1 & 2.

Numbering of Columns

10.11.22.

O

Occasional Strips:

Construction 10.5.1 to 13, Fig 10.13;
Design 5.3.23, 6.6.4(13), Table 6.2 & 3;
Regulations 6.2.3.

Office Development:

Access 5.2, 10.8.2, Fig 5.6 to 8, 10.18 to 20; Parking Design 7.1 to 7.3; Parking Provision 7.5.4, Table 7.9; Servicing 5.5.

Off Road Parking

7.1.1,7.1.5 & 6, 7.3; see also Parking.

On Road Parking

7.1.5,7.2,7.4.4; see also Parking.

Opening Permits

5.6.13.

Outfalls

2.2.2(g), 2.6.18 & 19, 10.9.8 & 10.

Outline Planning:

Application 2.4.1 to 3;
Consultation 2.2.1;
Network Manager's Assessment 2.2.2;
Policy 2.1;
Safety Audit 9.6;
Transport Impact Assessment 8.1.3, 5 & 9.

Overhang of Vehicles

5.3.39, 5.3.43, 7.1.10, Fig 5.23 to 26, 7.3.

Overnight Parking

5.5.8, 7.6.7.

Overrun Areas:

Construction 10.5.11 to 13, Fig 10.13 & 14;
Emergency 5.1.3, Table 5.1 & 2, Fig 5.1;
Regulations 6.2.3;
Pedestrians 10.5.13, Fig 10.14;
Profile 6.6.4(16), Fig 6.43;
Provision 5.3.24, 6.5.1, 6.6.3, 6.6.4(6), (7), (8), (10), (13), (15), (16), (17), (19), (20), (22), (25), (26), Fig 5.24, 6.9;
Shared Surfaces 6.7 A.

Overrun Corners:

Construction 10.5.11 to 13, Fig 10.13 & 14;
Design 6.6.4 (20), Table 6.2 & 3;
Regulations 6.2.3.

Owners Objections
2.6.7 to 9.

P

Parallel Parking
7.1.8, 7.2, Figs 7.1, 7.4.

Parent and Child Parking
7.7.5, Fig 7.15.

Park and Ride
8.2.1.

Parking:
Access 5.2, 10.8, Fig 5.5 to 5.8, 10.16 to 20;
Adoption and Maintenance 2.5.4, 2.8.7;
Construction Consent Drawings 2.6.2(d)
Delineation 2.5.11;
Design and Provision Chapter 7;
Housing Design 3.1.5, Fig 3.1;
Layout- Bay Dimensions 7.1.8, Fig 7.1, Aisle/Parking Bay Widths 7.1.9, Fig 7.2, Table 7.1, Driveway/Road Width 7.1.9 & 7.4.8, Fig 7.2 & 7.11, Table 7.1, Restrictions to overhang 7.1.10, Fig 7.3, Angled Parking Fig 7.4 & 7.5, Table 7.2;
Off Road Parking 7.3, Fig 7.5 to 7.8;
On Road Parking 7.2, Fig 7.4;
Planning Consent 2.2.3(h);
Provision - General 7.1.1 to 7, Residential 7.4, Fig 7.9 to 7.12, Table 7.3, Commercial (shop, office, hotels) 7.5, Table 7.4 & 7.4(a), Industrial Recreational and Service Industry 7.6, Fig 7.13 & 14, Table 7.5 to 7.7, Disabled 7.7.1 to 4, Fig 7.15, Table 7.8, Parent and Child 7.7.5, Fig 7.15, Table 7.8, Cycles 7.8, Fig 7.16, Table 7.9;
Residential Parking - 7.4, Allocated 7.4.2 & 3, 7.4.5 & 6, Fig 7.9
Unallocated 7.4.4 & 5, Fig 7.10, Visitor/On Road 7.4.4, Fig 7.10, Driveway Manoeuvrability 7.4.7, Fig 7.12, Driveway Layout 7.1.9, 7.4.7 to 10, Fig 7.2, 7.11 & 12, Table 7.11;
Shared Surfaces 6.7 A, 6.7.6, Fig 6.67
Statutory Undertaker Access 5.610;
Traffic Calming 6.1.1, 6.6.4(6) to (8), (10), (12), (18);
Transport Impact Assessment 8.1.7, 8.2;
Turning Areas/Self Policing 5.3.44, Fig 5.25.

Parallel Parking
7.1.8,7.2, Fig 7.1 & 7.4.

Passing Places:
Housing Roads 5.3.4 to 7, Fig 5.9 & 10;
Rural Roads 5.7 A, 5.7.6, Fig 5.45;
Shared Surfaces 6.7.7, Fig 6.68.

Paving
see Footway Construction.

Pavement Construction
see Carriageway Construction.

Peat
10.1.7.

Pedestrians:
Adoption Footways 2.5.1, Footpaths 2.5.3;
Crossing Facilities 4.3.3, 4.4.3, 5.4.6 to 10, Fig 5.28 to 30;
Definition Footway/Footpath 5.4.4;
Disabled Access to Buildings 5.4.21, Fig 5.34, Table 5.14;
Dropped Kerb 5.4.7, 5.4.16, 10.8.3, Fig 5.29, 10.21;
Footway/Footpath Widths 5.4.13 to 15, Tables 5.12 & 13;
Grac//ents 5.4.17;
Guideline for Reducing Mobility Handicaps 5.4.2;
Housing Courts 4.7.1;
Obstacles 5.4.22 & 23, Fig 5.35;
Parking 7.1.10, 7.2.2, 7.3.5 to 8, 7.6.4, 7.7.1, 7.7.4, Fig 7.3;
Planning Consent Information 2.2.3;
Provision 4.4.5, 4.5.3, 5.3.47, 5.4, Table 5.6 to 5.10;
Routes 5.4.3, 5.4.5, 5.3.47, 5.4.12;
Shared Surfaces 4.6.9, 6.7.1 to 5, Fig 6.66;
Steps or Ramps 5.4.18 to 20, Fig 5.31 to 33;
Traffic Calming 6.1.3, 6.2.3, 6.4.1 & 2, 6.6.4(2), (3), (5), (9), (10), (11), (12);
Vulnerable Users 5.4.1, 5.4.2.

Pelican Crossings
5.4.9 & 10, Fig 5.30.

Pends
5.4.9.

Phased Construction
2.5.2, 2.5.7, 10.4.8 & 9, Table 10.2.

Phased Release of Bond
2.8.8.

Pipes and Culverts
2.2.2(g), 2.5.9, 2.6.3, 2.6.18 & 19.

Pipe Diameter
10.9.2.

Pinch Points:
Construction 10.5.14 & 15; Design 6.6.4(12), Tables 6.2 & 3; Regulations 6.2.3.

Planning:
Application 2.4, Fig 2.1;
Consultation 2.2.1 to 3;
Lighting 10.11.7;
Policy 2A;
Safety Audit 9.6;
Transport Impact Analysis 8.1.3, 5 & 9.

Planting
5.8
see also Landscaping

Play Areas
3.1.3 & 4, 6.7.9.

Police
2.2.5

Preliminary Design Safety Audit
9.6.

Private Access
2.3.6;
see also Access.

Private Parking
2.5.4, 7.1.1 & 5, 7.3, 7.4.3, 7.4.4;

Private Roads
2.3.3, 2.3.6.

Private Signs
2.6.14.

Public Parking
2.5.4, 7.1.1 & 5, 7.2, 7.4.4, 7.5.1 & 2.

Public Transport
2.2.3, 2.2.5, 5.3.46 & 47, 7.1.4, 8.1.7, 8.2, Fig 5.26.

Public Utilities
see Statutory Undertakers.

Q

R

Radii:
Corner 5.1.19 to 21, Table 5.5, Fig 5.4;
Curves 6.6.4(16), Tables 5.6 to 5.10.

Raised Junctions:
Construction 10.5, Fig 10.8 to 10;
Design 6.6.4(3), Table 6.2 & 3;
Regulations 6.2.2.

Ramps:

Driveways 7.4.10;
Pedestrian 5.4.18, 5.4.21, Fig 5.31,
5.34, Table 5.14.

Redevelopment//Refurbishment

7.1.5 & 6, 7.8.4, Table 7.3;
see also Mobility Handicapped :
Disabled Access to Buildings.

Recreational Development:

Access 5.2, 10.8.2, Fig 5.6 to 5.8, 10.18 to
20:
Parking Design 7.1 to 7.3; Parking Provision
7.6, 7.7, 7.8, Fig 7.14, Table 7.6, 7.8, 7.9;
Servicing 5.5.

Reduction in Junction Area:

Construction 10.14 & 15; Design 6.6.4(19),
Table 6.2 & 3; Regulations 6.2.3; see also
Overrun Areas

Refuse Collection

5.1.19, 5.3.40, 5.3.42, 5.5.7, Fig 5.24.

Regional Shopping Hierarchy

7.5, Table 7.4a.

Regulations:

Buildings 5.4.21, 5.9.4; Road Bonds 2.5.10,
2.8.8; Road Hump 6.2.1, 6.2.2, 6.2.4 to 6;
Traffic Calming 6.2.1, 6.2.3 to 6.

Regulating Layers

10.4.5, 10.4.8, 10.4.9, Fig 10.7 to 9.

Residential Development:

Access 5.2, 10.8.1 & 2, Fig 5.5 to 7,
10.16 to 19;
Parking Design 7.1 to 7.3;
Parking Provision 7.4, fig 7.9 to 7.12,
Table 7.3;
Servicing 5.5;
see also Housing Courts.

Residential Roads

4.1, 4.2, 4.6, Fig 4.1, 4.2, 4.6 & 7; see also
Housing Roads, Core Roads.

Retail Developments

see Commercial Developments.

Remedial Works

2.7.5, 10.11.9.

Rigid Construction

10.4.1, 10.6.1, 10.8.2, Table 10.3, Fig 10.18
to 20.

Roadbase

10.4.1, 10.4.6, 10.4.10, Table 10.2, Fig 10.5.

Roads:

see Bonds, Carriageway Construction,
Drainage, Geometry, Hierarchy etc.

Roads Humps:

Construction 10.5.2 to 5, Fig 10.7 &
10;
Design 6.6.4 (1), Table 6.2 & 3;
Legislation 6.2.2.

Road Note 35

10.9.2.

Roads (Scotland) Act 1984

2.3.3, 2.4.6, 2.5.1, 2.5.3, 2.5.8, 2.5.9,
2.5.10.2.8.6.6.2.2.

Road Traffic Act 1988

9.1.2.

Rock

10.1.4, 10.4.5.

Roundabouts

6.2.4, 6.6.4 (21) & (22), 10.11.14.

Rumble Devices:

Construction 10.5.6 to 10, Fig 10.11
& 12;
Design 6.5.3, 6.6.4(14), 6.7.2, Fig
6.65, Tables 6.2 & 3;
Regulations 6.2.3.

Rural Roads:

Design 5.7, Table 5.16 to 18, Fig
5.45;
Hierarchy 4.8.

Saddled Drainage Connections

10.9.8

Safety Audit:

Arbitration 9.9.3;
Auditor 9.3.3, 9.3.4, 9.5.1, 9.6.4,
9.7.4, 9.8.4 & 5, 9.9.1, 2 & 4.
Audit Notice 9.6.2, 9.7.2, 9.8.2, 9.4.2;
Audit Team Statement and Report
9.8.4, 9.9;
Certification 9.9;
Checklists 9.3.4, 9.6.2, 9.7.2, 9.8.2;
Confirmation Report 9.9.2 & 4, 9.8.5,
9.9.
Developers Representative 9.8.3,
9.4.3;
General Procedures 9.3, Fig 9.1;
Independent Audits 9.5;
Philosophy 9.2;
Police 9.8.3, 9.4.3;
Requirements for 2.2.1, 2.2.2,
2.6.2(e), 9.1;
Self Check Audits 9 A;
Stage 1 (Feasibility/Preliminary
Design) 9.6;
Stage 2 (Detailed Design) 9.7;
Stage 3 (Prior to Opening) 9.8.

Section 50 Agreement

2.4.7, Fig 2.1.

Section 56 Agreement

2.4.7, Fig 2.1.

Security

2.25,7.33,7.3.10.

Schools

4.4.3, 5.4.5, 7.6.2, 3, 4 & 6, Table 7.7.
Seeding
10.10.9.

Servicing Facilities 2.2.3, 2.5.6, 3.2.6,
5.3.40 to 42, 4.7.3, 5.5, fig 5.24, 5.38 to
41.

Service Industry:

Access 5.2, 10.8.2, Fig 5.8, 10.20;
Parking Design 7.1 to 7.3; *Parking
Provision* 7.6, 7.7, 7.8, Fig 7.13, Table
7.7, 7.8, 7.9; *Servicing* 5.5.

Service Strips

4.6.13, 5.6, 6.7.8, Fig 5.42 to 44.
Sewerage
2.2.5, 5.6.3, 5.6.6 & 7, 5.6.10, 5.6.13,
10.9.10.

Shafts

10.1.5.

Shared Surface Roads:

Construction 10.4, Table 10.2, Fig
10.6;
Design 6.7, table 5.10;
Hierarchy 4.1, 4.6.9 to 13, Fig 4.1, 4.2
& 4.12;
Statutory Undertakers 5.6.10.

Sheltered Housing:

Access 5.2, 10.8.2, Fig 5.6 & 7, 10.18
& 19;
Parking Design 7.1 & 7.3;
Parking Provision 7.4.1, Table 7.3;
Servicing 5.5.

Shopping Development

see Commercial Developments

Shrubs

5.8.6.4, 10.10.1 to 6, 10.10.11 & 12, Fig
10.24 to 26.

Sight lines:

Forward 4.6.2, 5.3.25 to 28, 6.6.4, 7.2.4,
Fig 5.19 to 21, Table 5.6 to 5.10, 6.2;
Junctions 5.1.14 to 18, 7.2.4, Fig 5.2 &
3, Table 5.4.

Signs

5.1.10, 5.8.4, 6.2.1 to 3, 6.2.7, 6.6.4,
7.3.4,9.7.1,9.8.1, 10.5.15.

Single Track Roads

see Rural Roads

Site Investigation

10.1, Fig 10.1.

Slabbed Footway/Footpath Construction

10.6, 10.8.1, Table 10.3.

Spacing of Junctions

5.1.4, Table 5.3.

Spacing of Traffic Calming

6.3.2, 6.3.9, Table 6.3, Fig 6.5.

Spacing of Boreholes

10.1.2, Fig 10.1.

Spacing of Gullies

10.9.2 & 3, Table 10.5.

Spacing of Lighting Columns

10.11.1, 6.6.4.

Specification

10.2.1, 10.9.1, 10.11.

Speeds & Speed Limits

4.3.2, 4.4.2, 4.5.2, 4.6.2, 4.8.2, 5.1.18, 5.1.20, 5.7, 6.2.1, 6.3.3, 6.3.8 & 9, 6.6.4, Table 5.4, 5.6 to 5.10, 5.17 & 18, 6.2, 6.3, Fig 6.4.

Speed Control Bends

6.2.4, 6.6.4(16), Table 6.2 & 3; see also Overrun Areas : Construction.

Speed Control Island

4.6.6, 6.6.4(21), Fig 6.53.

Speed Tables:

Construction 10.5.2 to 5, Figs 10.8 to 10;
Design 6.6.4(2), Table 6.2 & 3;
Regulations 6.2.2.

Staged Construction

see Phased Construction

Staggered Junctions

5.1.9.

Staff Parking

7.1.8, 7.6.2, Table 7.3 to 7.7.

Statutory Undertakers

2.2.5, 4.7.4, 5.6, 6.7.8 to 10, 10.10.11.

Steelfixing

2.7.4.

Steps

5.4.18 to 21, Fig 5.31 to 34, Table 5.14.

Stopping up Orders

Fig 2.1

Strategic Roads

4.1, 4.2, 4.3, 5.1.4, 5.1.18, Fig 4.1 to 3, 5.3, 5.4.

Strathclyde Passenger Transport Executive (SPTE)

2.2.2, 2.2.5, 5.3.46 & 47, Fig 2.1.

Street Furniture

5.4.22, 5.6.5, 6.4, Fig 5.35.

Structures:

Agreements 2.5.9,
Construction Consent/Design 2.3.4,
2.5.9, 2.6.3, 3.1.4;
Consultation 2.2.1;
Cycle Facilities 5.4.34, Fig 5.36;
Planning Application 2.2.2 & 3;
Traffic Calming 6.4.2;
Vehicle Clearance 5.3.37 to 39, Fig 5.23.

Structure Plan

2.1.2, 5.9.2, 7.1.4, 7.5.1 to 5, Table 7.4(a).

Subbase

10.1.8, 10.2, 10.3, 10.4.1 to 3, 10.4.5, 6 & 10, 10.6, 10.7.2, Table 10.1 to 4, Fig 10.4 to 6, 10.15.

Subgrade

10.1.6 & 7, 10.1.9, 10.3, 10.4.2 to 5 & 10, Table 10.1, Fig 10.4 & 10.6.

Superelavation

5.3.29 & 30, 5.3.33, Table 5.6 to 5.9.

Surfacing:

Access 10.8 Fig 10.16 to 20; Carriageway and Parking 10.2, 10.4.1, 10.4.6 to 10, Table 10.2, Fig 10.5 & 6;
Footway, Footpath and Cycletrack 10.6, Table 10.3 & 4, Fig 10.5 & 15; Traffic Calming 10.5.3, 10.5.8, 10.5.12, 10.5.14 & 15, Fig 10.7 to 14.

Surface Water

2.6.18 & 19, 10.3, 10.9, Table 10.5, Fig 10.4, 10.15, 10.22 & 23.

T

Tack Coat

10.4.9.

Taxis

7.1.2, 7.5.6, 7.6.6, 7.6.8, Fig 7.8.

Testing

2.5.7, 2.7.3, 2.8.4, 10.1.2, 10.1.6, 10.1.9, 10.4.2, Table 10.1.

Through Traffic

4.6.4, 4.6.10, 5.3.18, 6.1.1, Fig 5.16.

Topsoil

10.10.8.

Town and Country Planning Act 1972

2.4.7, 2.5.10.

Traffic Calming:

Application to Hierarchy 1.2.1 & 2, 3.2.5, 4.4.3, 4.4.4, 4.6.2, 4.6.9 & 11, 6.3.1, Table 6.1, Fig 4.1 & 2.
Combining Measure 6.3.10, Fig 6.5;
Consents 2.2.2, 2.2.3, 2.6.2, 6.2.2;
Construction 10.5;
Consultation 6.2.6;
Corner Radii 5.1.20;
Curve Widening 5.3.23 & 24;
Cyclists 5.4.35 & 36, 6.5.2 & 3, Fig 6.10 & 11;
Drainage 6.3.11, 10.9.3, Fig 6.6, 10.7 & 8;
Environmental Considerations/ Complementary Features 6.1.3, 6.4;
Example 6.3.12, Fig 6.7;
Large Vehicles 6.5.1;
Layout Details 6.6;
Legislation 6.2;
Measures 6.3;
Weed for Calming 6.1;
Sight Lines/Visibility 4.6.2, 6.3.8, Table 5.4, Note 2, 5.6, 5.8 to 5.10, 6.2;
Spacing Between Measure 6.3.9, 6.6.4, Fig 6.4, Table 6.3;
Speed Reduction Categories 6.3.8, 6.6.4, Table 6.2;
Traffic Distributor Roads 4.4.3, 6.3.2, 6.6.4;
20mph zones 4.6.2, 6.3.1, 6.3.3 & 4, 6.3.9, Fig 6.4, Table 6.3;
see also Gateways and Shared Surface Roads.

Traffic:

Assignment 8.1.7; Generation 3.2.3, 5.3.3, 8.1.7; Growth 8.1.8, 8.1.10, Fig 8.2; see also Through Traffic.

Traffic Management

5.9.1, 6.1.2, 6.2.4, 9.3.2.

Traffic Regulation Orders

5.9.1, 6.3.3, 9.7.2, Fig 2.1.

Traffic Signals

4.4.3, 5.4.9 & 10, 9.7.1 & 2, 9.8.1, Fig 5.30.

Transitions at Curves

5.3.21, Table 5.6 & Notes 1 & 2.

Transitions to Shared Surfaces

4.6.11, 6.7.2, 6.6.4(21) Fig 6.65.

Transport Impact Assessment
2.2.1 to 3, 5.1.10, 8.1.8.2, Fig 2.1, 8.1 & 2.

Transport Policies and Programmes
5.9.2, 8.1.8.

Trees
10.10, Fig 10.24 to 26.

Traffic Distributor Roads:
Construction 10.4, Table 10.1 & 10.2, Fig 10.5;
Hierarchy 4.1, 4.2, 4.4, Fig 4.1, 4.2, 4.4;
Junction Design 5.1.2, 5.1.4, 5.1.18, 5.1.19, 5.1.21, Tables 5.3 to 5.5, Fig 5.4;
Link Design 5.3.20 to 28, Tables 5.6 & 5.11.

Turning Areas:
Design 5.3.42 to 45, Fig 5.24 to 26;
Provision 4.4.1, 4.5.2, 4.6.4, 4.6.8, 4.7.2, 4.7.3, 5.3.40 & 41, 5.5.1 to 7, 5.7.9;
see also Carriageway Construction and Overrun Areas.

Types of Road
see Hierarchy

Two Stage Construction
10.4.7 to 10.4.10, Table 10.2, Fig 10.5 & 6;
see also Phased Construction.

U

Underground Services
see Statutory Undertakers.

Underpasses
2.2.1 to 3, 2.3.4, 2.5.9, 2.6.3, 3.1.4, 4.3.3, 4.4.3, 5.4.8, 5.4.34, Fig 5.31 to 33 & 36; see also Ramps and Steps.

V

Vandalism & Safety
2.2.5, 3.1.3, 5.4.3, 5.4.8, 5.8.1, 7.3.3, 7.3.10.

Verges
2.5.1 & 2, 2.5.12, 2.6.2, 4.4.5, 4.5.3, 5.4.12, 10.10.7, 10.10.9, Fig 5.37, Tables 5.6 to 5.10; see also Overhang of Vehicles, Service Strips and Sight lines.

Vertical Calming Measures
6.2.1 & 2, 6.2.5 to 7, 6.3.2, 6.3.8, 6.6.4(1) to (5), 10.5.1 to 5, Table 6.2 & 3, Fig 6.4, 6.6, 10.7 to 10.

Vertical Faces at Calming:
Overrun Areas 6.6.4(16), 10.5.12, Fig 6.43, 10.13;
Rumble Areas 6.6.4(14), 10.5.7, Fig 6.39, 10.11.

Vertical Features
6.4, 6.6.4.

Visibility Splays
see Sight Lines.

Visitor Parking
2.5.4, 5.1.17, 7.4.1 to 5 & 7, 7.6.2, Fig 7.10, Table 7.3;
see also Parking : Layout and Construction.

Visual Narrowing
6.4.

Vulnerable Road Users
1.2.1, 3.2.1, 4.6.1 & 2, 4.6.9, 5.3.31, 5.4, 6.1.3, 6.5.2 & 3, 10.8.3, Fig 10.21.

W

Warrants/Permits
2.3.5, 5.6.13.

Water Courses
2.6.2, 2.6.18 & 19, 10.9.10.

Water Mains
see Statutory Undertakers.

Water Table
10.3, 10.9.6, Fig 10.4, 10.15.

Wayleaves
4.7.4, Fig 2.1.

Wearing Course
see Surfacing.

Widening on Curves
5.3.20 to 24, Fig 5.18, Table 5.11.

Widening at Junctions
5.1.13, 5.3.7 & 8, Fig 5.9 & 10,

Width of Carriageway
5.3.3 to 9, Table 5.6 to 5.10
see also Widening on Curves and Junctions.

Width of Driveways and Parking Bays
7.1.9, 7.4.8, Fig 7.2 & 7.11, Table 7.1.

Width Restriction to Carriageway:
Construction 10.5.14 & 15; Layout 6.6.4(9), Table 6.2 & 3; Regulation 6.2.3.

X

X distance
see Sight Lines.

Y

Y distance
see Sight Lines.

Z

20mph zones
see Traffic Calming : 20mph zones