(v) A coloured general layout plan incorporating the following colour code :-

Perimeter of site	Edged Red
Carriageways	Light Brown
Footways/footpaths	Grey
Marginal strips	Yellow
Gullies and highway drains	Blue
Open spaces and grassed verges	Green
Street lighting columns	Red
Retaining walls	Orange
Area of land for easement	Pale Blue
Fence/barriers/gate/stile	Dark Brown
Warning signs	Purple

(vi) Single copies of the following will also be required:

(a) Location Plan with the site outlined.

(b) Calculations and/or test results in respect of:

(i) Surface water drainage/water course run-off and pipe strength/bedding construction types.

(ii) Bridges, retaining walls, other structures.

(iii) Carriageway sub grade CBR Values and construction details.

(iv) Such further calculations as the Highway Authority or its Agent which are deemed necessary.

The Highway Authority or its Agent reserves the right to modify or amend the developer's adoption proposals.

A11 Programme and Inspection

11.1. The developer shall submit, at least 7 days before the commencement of any site works, a programme for the works giving the anticipated commencement and completion dates of each operation. Additionally he shall give at least 2 working days notice in writing before commencing the following operations: -

(i) Excavation to formation/foundation level of any road, sewer or structure.

(ii) Laying drains or constructing inspection chambers, catchpits or gullies.

(iii) Placing structural concrete in any location.

(iv) Fixing reinforcement.

(v) Laying capping layers, carriageway sub-base, roadbase, basecourse or wearing course.

(vi) Laying kerbs or channels.

(vii) Erecting signs or columns.

(viii) Laying road markings.

(ix) Undertaking street lighting works.

11.2. Backfilling of any engineering operation shall not be undertaken until the Highway Authority have had an opportunity to inspect the works in accordance with the timescales given above.

11.3 Sitework shall not commence until after the Section 38 Agreement has been signed, where used.

11.4 Reference shall be made to Appendix E, for site inspection requirements.

A12

Structures

12.1. Structures will need to be individually assessed by the Highway Authority and guidance should be sought at an early stage. **The developer should note that technical approval procedures will apply in most circumstances.**

12.2. Structures, which provide support for private property, will not normally be adopted. Nevertheless, in accordance with the requirements of Section 167 of the Highways Act 1980, if any part of a retaining wall is more than 1.37m above ground level at the boundary of the street (highway) and/or within 3.66m of that boundary, the procedures in Para 13.5 must be followed.

12.3. Any wall or basement constructed on private land by an individual or development, which affects the support of the highway, must also be approved, and requires the submission of the information in Para 13.5 because of its structural importance. Structures, which convey sewers, will be adopted by the Water Undertaker, or retained in private ownership, as appropriate. These structures will also require approval as in 13.5.

(Note: the term highway includes all public rights of way)

12.4. **Procedure to be followed:**

12.5. Submissions for approval must be made to the Consultancy Manager.

12.6. A minimum of 4 weeks must be allowed for approval between submissions and construction, and an extension of this period may be required if the documents are inadequate.

12.7. **Information and documentation required.**

12.8. The safety and durability of the structure by compliance with current design standards must be assured. The information required for Structural approval includes the following:

12.9. Site plan, showing the location and extent of all structures and in the case of walls, detailing lengths to be adopted.

12.10. Sufficient details to determine wall heights, ground levels, behind and in front of the wall(s) and any features affecting loading such as cover to culverts.

12.11. Site investigation details and geotechnical assumptions upon which the design has been based. Sufficient information must be repeated on the drawings to enable the designer's assumptions to be compared with the conditions actually found on site by those responsible for construction.

12.12. **Construction details and material specifications.**

12.13. Design certificates will full reference to the design standards used and which a Chartered Civil or Structural Engineer should sign. Certificates and procedures will normally follow those laid down in the Department of Transport Standard BD2/89 Part 1 and Advice Note BA32/89 Part 1. Where appropriate, advance technical approval is required and the Council will act as the technical approval authority.

12.14. **Additional information required if structures are to be adopted or upon which the highway relies for support includes:**

12.15. All details as described in 13.9.

12.16. A set of certified "as built" drawings.

12.17. **Design Certificates and Certified Drawings.**

12.18. Design certificates and certified drawings are required if the structure is to be adopted or if the highway relies upon the structure for support. Certificates must be submitted at the appropriate stage. The position in the organization of signatories and their qualifications must be stated. If another party, such as a precast concrete supplier, undertakes a section of the work then it would be appropriate for that party to take responsibility for his section of the work, and complete a separate Certificate.

12.19. **Design Standards.**

12.20. In addition to the design standards referred to in the Department of Transport Standard BD2/89 the additional requirements set out in the Addendum should apply.

A13

Works in Existing Highways or Highway Land

13.1 Initial access to the development site from the adjoining highway for construction purposes must not be made by the Developer or Developer's contractor without prior reference for approval from the Highways Maintenance Team Leader. No works shall commence until the Highway Agreement has been signed.

13.2 Traffic safety measures for such initial access works must be carried out strictly in accordance with Chapter 8 of the Traffic Signs Manual and to the satisfaction of the Highway Safety.

13.3 When it is necessary to carry out major alteration works to an existing highway or in highway land as a direct consequence of development it will be necessary for the developer to enter into an appropriate legally binding Agreement* with the Highway Authority, supported by a bond to secure the proper implementation of the proposed works.

* Agreements can be in a variety of forms and include inter alia reference to the following:

Section 1 of the Highways Act 1980
Section 278 of the Highways Act 1980
Section 111 of the Local Government Act 1972

13.4 Where works are to be carried out in an existing highway the developers attention is drawn to the necessity to check the requirements of the New Roads and Street Works Act 1991.

A14

Landscaping

14.1 General

14.1.1 Housing developments and industrial developments require an integrated approach to layout, circulation and the definition of space, whilst being responsive to the character and specific features of each site. Such an approach will result in greater harmony of elements within the developments and greater compatibility in terms of the wider context.

14.1.2 The definition of private, semi-private and public open space within the development will involve the use of hard and soft landscape treatments. Walls, fencing, ground shaping, paving materials, as well as planting all have a role in enhancing local character and engendering a sense of place. Careful consideration should be given to the quality and appropriateness of materials used, both hard and soft, so that the development benefits from local distinctiveness, rather than a generic anonymity. The choice of material must suit the function it is expected to fulfill, with minimal maintenance, as well as the scale of space in which it is located or expected to create.

14.1.3 Soft landscape areas should also be designed to provide year round interest

14.1.4 Adoptable vehicular and pedestrian circulation areas and adjacent areas influenced by their safety requirements have certain important design requirements, landscape treatment must remain compatible with these.

14.2 Housing Developments - Type A Roads
(Refer to B3 for Design Standards)

14.2.1 Generally Type A Roads will be the introduction to the housing area. They create an important first impression of the site and require a 'broad brush' approach to planting, using textured, structures or irregularly grouped forms to provide interest and variety. Greater attention to detail will however be necessary at traffic or pedestrian nodes.

- Type B Roads

14.2.2 For access roads and access ways, landscaping is likely to play a large part in the overall design, for example in the provision of gateways. Vehicle speeds will be expected to be lower than on Type A Roads and consequently, a more detailed approach should be adopted toward landscape design. Comprehensive treatment of highway boundary and open space areas can provide a more acceptable integration of the housing and highway layout, better identification of housing groupings and visually enhanced privacy for residents.

14.2.3 Mews courts and housing squares by their nature will be dominated by hard elements but will provide scope for trees, planting boxes and beds, shrubs and climbers in the largely formal setting, albeit in private ownership. All hard surfaces must have load bearing wear and drainage qualities.

14.3 Industrial Developments - Distributor Roads and Access Roads (Refer to C2 for Design Standards)

14.3.1 Generally these roads will be the introduction to the industrial area and should therefore receive the same considerations for landscaping as the Type A Roads associated with housing developments.

Cul-de-Sac

14.3.2 These roads are likely to be dominated by hard elements, which should be softened wherever possible by the introduction of planting to provide variety. All such landscaping must be designed to be in private ownership.

14.4 Statutory Undertakers

14.4.1 Tree, shrub and hedge planting must be sited clear of statutory undertakers services so that root systems at maturity will not damage underground apparatus and so that the planting will not be damaged by excavations to maintain the services. Over service verges, only shallow rooted plants or grass or hard surfacing are acceptable in order to reduce reinstatement costs after maintenance excavations.

14.4.2 Purchasers of properties with private gardens adjacent to or contiguous with verges, which the Highway Authority agrees to adopt, will need to be made fully aware of the rights of access of the statutory undertakers and the Highway Authority. Developers must ensure that the deeds of sale of individual plots clearly define the highway boundary and that house purchasers are made aware of the prohibition of building walls, erecting fences and planting hedges or trees on the verge, and that the statutory undertakers may excavate their services at any time subject only to reinstatement being to the satisfaction of the Highway Authority.

14.5 Visibility Areas

14.5.1 Caution is necessary in the detailing of areas critical to visibility, as these are vital to the safe passage of vehicles and pedestrians. Mounding, walls, fences or other features must be designed and located not to interfere with visibility. Planting must be restricted to species, which do not exceed 0.6 metres in height on reaching maturity in residential developments or 0.9 metres in height on reaching maturity in industrial developments. Grass is an option, subject to agreement. Existing trees may be retained if they have a clear stem of 3.0 metres above road level.

14.6 New Planting

14.6.1 New planting must not impair visibility. Trees and shrubs shall be situated at least 2.4 metres away from the edge of carriageway at locations where a footway exists. Where there is no footway, the dimensions can be reduced to 1.8 metres. Planting must not overhang footways for a height of 3 metres, nor overhang carriageways for a height of 5 metres.

14.6.2 Plant selection should reflect local character and vegetation and draw on native as well as the more ornamental of exotic species. Ultimate heights and spread should be considered in relation to structures.

14.6.3 A useful guide for species choice is "Tress and Shrubs for Landscape Planting" prepared by the Committee on Plant Supply and Establishment on behalf of the Joint Council for Landscape Industries and published by the Landscape Institute. Tel: 0171 - 738 - 9166
Fax: 0171 - 738 - 9134

14.6.4 Developers are advised to consult a qualified designer or horticulturalist so that expensive mistakes may be avoided.

14.7 Retention of Existing Vegetation

14.7.1 Protection of existing trees, shrubs and hedges that are to be retained must be ensured during all site preparation and construction activities by compliance with BS 5837:1991, Guide for Trees in Relation to Construction. The shaping of some existing trees by crown lifting, trimming, or other forms of tree surgery may be necessary for roadside trees, and this must be undertaken in compliance with BS 3998:1989, Recommendations for Tree Work. Developers will be expected to be fully conversant with both British Standards, but should nevertheless also make contact with the Highway Authority and the County Borough's tree Officer at an early stage for guidance.

14.8 Maintenance

14.8.1 All hard and soft landscape treatments should be designed to minimise maintenance input. This can be achieved by a thorough understanding of the site, it's microclimate aspect, and knowledge of the materials specified. This is particulary important with regard to choice of plant species, as local conditions within the County Borough are variable from north to south and from hill top to valley bottom. The vigour of the plant species chosen must be suitable for easy and quick establishment. Selection of species unsuited to a given situation will lead to failures and consequently to an extended maintenance liability for the developer.

14.9 Adoption of Landscaped Areas

14.9.1 Areas of landscaping, other than as referred to elsewhere in this Design Guide, are **not** acceptable for adoption as highway.

14.9.2 Some amenity areas play areas and other areas of either hard or soft landscaping may be suitable for adoption by the Authority's Directorate of Education, Leisure or Housing. Developers should make early contact with the appropriate Directorate to discuss these aspects of their developments proposals.

Public Transport

15.1 General

15.1.1 Developers must ensure that adequate provision is made for the introduction of public transport services into new developments at an early stage before travel patterns become established.

15.2 Buses

15.2.1 Where a developer proposes a site, which consists of 50 houses or more, the developer must provide documentary evidence of consultation with local public transport operators. This is also required on employed sites.

15.2.2 The maximum distance that any person should reasonably be expected to walk to a bus stop is 400m, less if the gradients are steep. Developments must be designed so that this walking distance is not exceeded.

15.2.3 As far as possible public transport services must be able to criss/cross and pass through developments in varying directions, making them as permeable as possible.

15.2.4 Large developments involving phases should make provision for the earliest phases to be served by buses, which may involve developers granting permission for the operation of buses on roads that are awaiting adoption. Agreement on any resultant damage prior to adoption is the responsibility of the developer.

15.2.5 Bus operators' requirements must be taken into account at the outset of design. Buses will be expected to stop on straight lengths of road at stops, unless a suitable bus layby is provided (Refer to Specification) which are situated at locations where good contact with the pedestrian system is available and obstruction of the visibility of other road users is not prejudiced. Bus stops must be located so that departing buses move away from each other.

15.2.6 Bus lay-bys will be required on any road where a stopover may be operationally necessary, and on any other road where dictated by highway safety needs.

15.2.7 Bus shelters shall be strategically sited as directed.

15.3 Rail

15.3.1 Rail operator's requirements must be taken into account.

16.1 A footpath diverted around the development whose width is not restricted by fences, hedges or walls, shall be constructed to a minimum width of 1.4 metres with blinded hard-core (or similar approved material) to a depth of 150mm of which 75mm shall be excavation. Where a footpath is to be enclosed on both sides, the width should be increased to a minimum of 1.8 metres. of similar construction.

16.2 A bridleway diverted around a development shall be constructed of sand hogging (or similarly approved material) to a width of 1.8 metres if unfenced or 2.4 metres if bounded on both sides.

16.3 Where a path enters or leaves a development it may be necessary for a stile or kissing gate to be provided to prevent ingress or egress of livestock or inconsiderate use of motorcycles. If a structure is to be provided it shall be constructed in accordance with current Council specification.

16.4 In all cases it will be necessary to signpost and waymark new paths provided as a result of diversion or stopping up orders.

16.5 No barbed wire is to be erected upon any fence adjacent to any public path.

16.6 Reference must be made to "A Guide for Developers" which is available from the Rights of Way Officer, Tel No. (01633) 648035.

A17

Cycleways

17.1 Rights of way dedicated to cyclists forming a part of a new development are increasing. Generally where the location of a new development is adjacent to a town centre, a public facility, or is near to a Safe Routes To School scheme or adjacent to the National Cycle Network, a cycle link will be required.

17.2 Consideration will be given to the provision of joint cycle/ pedestrian routes on new developments, where dedicated cycleways are not feasible.

17.2 Where a cycleway is provided it should be 2.5 metres wide, have street lighting, and is overlooked by dwellings wherever possible. Sudden changes in direction should be avoided and there should be a minimum radius of 5 metres. Site lines should be such that cyclists have a clear view with a minimum visibility of 20 metres. Signing of cycleways should be made in consultation with the council.

A18

Conservation Areas

18.1 There are two components to a high environment. These are the appearance of the area, (both public and private buildings and spaces) and the way in which it is used.

18.2 Users will feel more at ease and will respect an area better if it has a coherent overall image, has been well designed and is maintained and enforced.

18.3 Footway and carriageway surfaces must complement and blend in with the surrounding buildings.

18.4 Careful attention must be given to the detail of construction and to the overall layout of the surfacing and signs.

18.5 Consideration should be given to combining speed reducing features, with more subtle measures, such as:

- The visual treatment of entry points
- The strategic placing of Street Furniture
- The choice and detailed layout of surfacing materials

18.6 Detailed discussion with the Highway Authority and Planning department is recommended.

SECTION B

RESIDENTIAL ROADS

B1. Design Philosophy

B2. Design Factors and Principles

B3. Hierarchy of Residential Roads

B4. Visibility at Junctions

B5. Horizontal Alignment and Forward Visibility

B6. Forward Visibility and Bends

B7. Carriageway Widening on Bends

B8. Vertical Alignment and Forward Visibility

B9. Parking Requirements

B10. Turning Areas

B11. Traffic Speed Restraint Measures

B12. 20mph Zones and Home Zones

B13. Awareness Strips and Shared Surfaces

B14. Private Drives

B15. Mews Court

B16. Provisions for people with disabilities

B1

Design Philosophy

1.1. This design guide sets out to embrace the principles of Design Bulletin 32: "Residential Roads and Footpaths: Layout Considerations 2nd Edition", whilst defining acceptable layout criteria in accordance with highway design documentation and accepted good practice.

1.2. Design Bulletin 32 recognises the many variables, which make up the local environment and this design guide sets out the general principles to be adopted in residential estate road designs to achieve safe and efficient provisions for pedestrians and vehicles without detracting from individuality.

1.3. The principles and objectives of the design guide are aimed at allowing Developers to create layouts which have a distinctive character in their built environment and landscaping, whilst at the same time applying design standards which will achieve a safe provision for pedestrians, cyclists and motor vehicles. These guidelines will permit a more flexible approach by the developer who nevertheless must have regard to the function and role of the various categories of road involved.

1.4. The principles of traffic calming are being introduced in acknowledgment of research which has shown that at 40 m.p.h. most children struck by cars are killed, at 30 m.p.h. half are killed, but at 20 m.p.h. only 1 child in 20 is killed. It is desirable that road layouts are now produced which will keep traffic to the recommended speeds for the appropriate classification of the road, as indicated later in this guide. There would appear to be advantages to developers if 20 m.p.h. speed limit zones were introduced within an area in terms of the ability to successfully market the new housing.

1.5. The underlying philosophy is one of safety and with that in mind residential layouts should be designed to regulate vehicle speeds, to encourage off-street parking, to cater adequately for pedestrians and to maintain visibility standards.

1.6. Public access to any development should be available to all sections of the community. Provision for motor vehicles should not, therefore, be to the detriment of the access requirements of pedestrians, including those who are physically impaired, and cyclists, though the needs of drivers with disabilities shall be taken into account. New road layout design should comply with the standards contained in Transport in the Urban Environment as published by the Institution of Highways and Transportation.

1.7. The introduction of the advice contained in this guide will assist the Highway Authority to reduce accident casualties by requiring developers to incorporate road safety and traffic calming principles into their design layouts.

B2

Design Factors and Principles

2.1. There are a number of factors to be taken into account: the needs of the pedestrians and vehicles have already been mentioned, but in specific terms these comprise of several elements - the carriageway, the footway, the cycleway as part of the highway, other footpaths separate from the carriageway, car parking and garaging.

2.2.1 These elements inter-relate in many ways and a dominant consideration in that relationship is the potential conflict of pedestrians and vehicles. The design of residential layouts must seek to take into account this relationship and according to circumstances there may be scope for varying degrees of separation of pedestrians and vehicles.

The pedestrian network should facilitate journeys from the home to the shops, schools, playgrounds, bus stops or railway stations and to other local facilities. The location of uses within the development should also be related to the configuration of the network as for example, in the siting of facilities for the old, people with disabilities, or the very young.

2.2.2 The design of the carriageway itself must meet operational and safety requirements. The adoption of physical design constraints will ensure more effective speed control than legislative measures.

2.2.3 Guidance on the vehicle parking and garaging is that it shall be off the highway either inside the curtilage of a dwelling or parallel to the kerbline. The location should be such that there can be natural surveillance of vehicles from owner's properties.

2.3.4 Accesses to properties should be positioned away from the junction radius to discourage parking in the bell mouth area. Where the non-priority road joins a local housing estate distributor road there should be no private access off the non-priority road within 20 metres of the junction channel line or roundabout Give Way line.

2.3.5 Cyclists are one of the most vulnerable groups of users. It would be unreasonable to expect a developer to provide separately for cyclists on a small development except when in close proximity to the National Cycle Network. However on larger developments, consideration should be given to the provision of facilities so as to encourage the protection of such users.

2.3.6 Developers must consider pedestrian desire lines when developing footway routes. Footways adjacent to the carriageway will not be acceptable when such they vary significantly from pedestrian desire lines. Cases may arise where shared pedestrian and cycle facilities will be appropriate.

2.3.7. These guidelines have been prepared to permit a flexible approach by the developer whilst ensuring that the designs create safe, convenient, nuisance free and secure surroundings that are visually attractive as well as economical to construct and maintain. Whilst the standards contained within the guide give details of design arrangements that will be acceptable, alternative arrangements, which conform, to the principles outlined in the guide can also be put forward for consideration.

2.3.8. Developers should note that geometrical requirements of the guide should be met even when adoption is not intended.

2.3.9. Every property on a new development should have a direct access to an adopted highway by means of a drive and footpath.

B3 Hierarchy of Residential Roads

3.1. The Highway Authority reserves the right to determine the road hierarchy within its administrative boundary.

3.2. The following hierarchy is based on the road's intended function and includes only those roads that directly relate to use within residential areas and thus excludes motorways, strategic routes, primary distributors, district distributors and local distributors as these roads are associated with longer distance traffic movements to, from and within towns. Road categories within the scope of this guide are listed in Table 1 below and illustrated in Figure 3.

TABLE 1 Residential Road Categories

GROUP (PRIVATE)	ROAD CATEGORY	CAPACITY
A)	**NON FRONTAGE ACCESS**	
	Main Distributor	600 Dwellings
	Local Distributor	600 Dwellings
	Transition Link	600 Dwellings
	Collector Loop	600 Dwellings
	Collector Cul-de-Sac	300 Dwellings
	Collector Road	300 Dwellings
B)	**FRONTAGE ACCESS**	
	Access Road	100 Dwellings
	Access Way	25 Dwellings
	Mews Court	15 Dwellings
	Housing Square	15 Dwellings

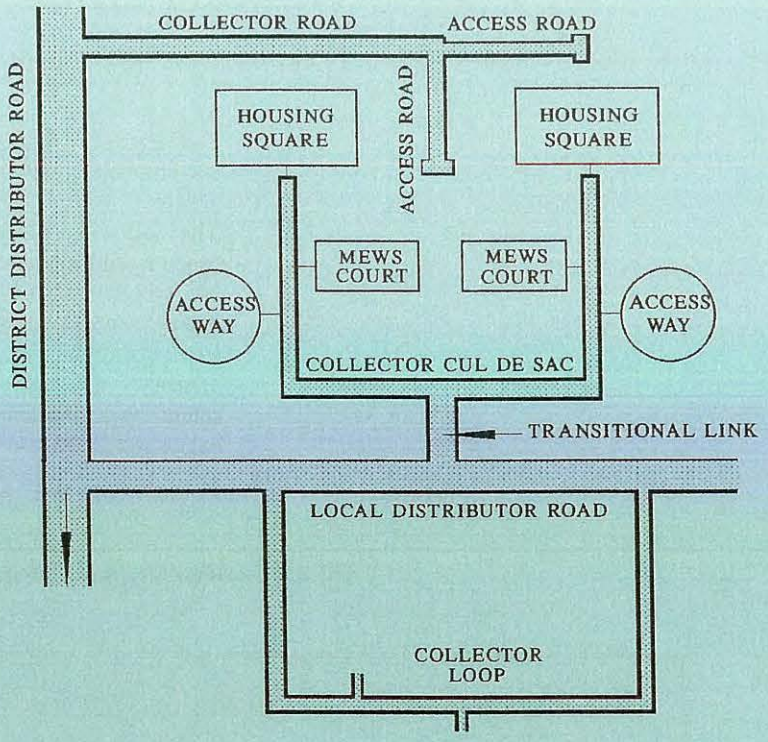

FIGURE 3 Hierarchy of Residential Roads

NOTE This is for illustrative purposes only and does not present a user-friendly approach to public transport or pedestrians.

3.3. **The Urban Road Network**

(i) **Main Distributors**: distribute traffic between the residential, industrial and business functional areas and form the link with the primary network. These have only very limited application in the residential road network.

(ii) **Local Distributors**: distribute traffic within districts. In residential areas they form the link between district distributors and residential roads. They are through routes, generally used as main bus routes and designed to TD 9/93 standards. Direct frontage access would not normally be permitted.

3.4 **The Residential Road Network**

3.4.1. **Non Frontage Access Roads**: (**Group A Roads**) Used to link dwellings with local distributors, they collect traffic from lower hierarchy roads. Bus routes will be permitted. `Direct frontage access to dwellings is not normally permitted, but will be considered with appropriate parking controls and carriageway design. On these roads vehicles would take precedence over pedestrians and vehicle speeds would be relatively high. Two footways are usually required, as are verges on occasion. A curved horizontal alignment is preferred.

(i) **Transitional Link:** is a short through road connecting a network of residential roads to a distributor road. Serves a maximum of 600 dwellings, with appropriate links to bus stops.

(ii) **Collector Loop:** collects traffic from Frontage Access Group B Roads and connects to a distribution Road. Serves a maximum of around 600 dwellings, with appropriate links to bus stops.

(iii) **Collector Cul-de-sac**: Collects traffic from Frontage Access Group B roads and may connect directly to a distributor road or to a transitional link road. Serves a maximum of around 300 dwellings, with appropriate links to bus stops.

(iv) **Collector Road :** Collects traffic from Frontage Access Group B roads and connects to a distributor road. Serves a maximum of 300 dwellings, with appropriate links to bus stops.

GROUP 'A' ROADS	Transitional link	Collector Loop	Collector Cul -de-sac	Collector Road
Maximum number of dwellings served	600	600	300	300
Preferred design speed (Km/h) (Mph)	50 (31)	50 (31)	40 (25)	40 (25)
Minimum carriageway width (m)	6.0	6.0	5.5	5.5
Maximum Cul-de-sac length (m)	N/A	N/A	200	200
Minimum centre line radius (m)	60	60		
Maximum centre line radius on curve (m)	360	127	180	90
Maximum gradient (%)	10	10	10	10
Minimum adjacent junction spacing (m)	Not allowed	50	50	50
Minimum opposite junction spacing (m)	Not allowed	25	25	25
Minimum kerb radius at junction (m)	12	10	10	8
Minimum forward stopping sight distance (m)	70	70	45	45
Frontage Access	Not allowed	Not allowed	Not allowed	Not allowed

TABLE 2A - Group 'A' Roads

3.4.2 **Frontage access Roads: (Group B Roads)**
Used to provide direct access to dwellings. On these lower hierarchy roads vehicles and pedestrians will take equal precedence and lower vehicle speeds will reflect this. Traffic calming measures may be required and a curved horizontal alignment is preferred. Frontage access is allowed.

(i) **Access Road:** can be either a cul-de-sac or a road leading to several access ways. Two footways are required unless access is only required off one side, in which case one footway and one verge are acceptable. Serves a maximum of 100 dwellings

(ii) **Access Way:** is a traditional cul-de-sac. Two footways are required unless access is only required off one side, in which case one footway and one verge are acceptable. Serves a maximum of 25 dwellings.

(iii) **Mews Court:** is a formal shared surface cul-de-sac suitable for higher density developments with minimal soft landscaping in front of the dwellings. Special parking arrangements will be necessary. Distinctive surface finishes and an awareness strip are usually required. Serves a maximum of 15 dwellings.

(iv) **Housing Square:** Is a formal shared surface cul-de-sac of short length, with communal parking areas off the turning area, which is usually centrally located. The turning area is normally a minimum size of 10m x 10m. This is the only road type where refuse vehicle access is not required. Distinctive surface finishes and an awareness strip are usually required to serve a maximum of 15 dwellings.

GROUP 'B' ROADS	Access Road	Access way	Mews Court	Housing Square
Maximum number of dwellings served	100	25	15	15
Preferred design speed (Km/h) (Mph)	40 (25)	24 (15)	16 (10)	16 (10)
Minimum carriageway width (m)	5.5	5.5	4.8	4.8
Maximum Cul-de-sac length (m)	150	50	45	25
Minimum centre line radius (m)	29	20	15	N/A
Maximum centre line radius on curve (m)	300	150	-	-
Maximum gradient (%)	10	10	10	10
Minimum adjacent junction spacing (m)	30	25	25	25
Minimum opposite junction spacing (m)	15	15	15	15
Minimum kerb radius at junction (m)	6	6	6	6
Minimum forward stopping sight distance (m)	45	23	14	14
Frontage Access	yes	yes	yes	yes

TABLE 2B - Group 'B' Roads

B4

Visibility at Junctions

4.1. Visibility standards at junctions for roads where the speed limit or actual vehicle speeds are 50 kph (30 mph) or greater are contained in Department of Transport Advice Note TA 42/95 and TD 9/93. For vehicle speeds below 50 kph (30 mph) advice is given in Design Bulletin 32.

4.2 Planning Guidance Wales Technical Advice Note (Wales) 18 combines the advice of these documents.

4.3 The following information and Figure 4 is extracted from Tan 18.

4.4 "New accesses onto roads should wherever possible be on level ground or in hollows where there is good visibility. They must not be near the crest of a hill, or a sharp bend or where there are double white lines which indicates restricted forward visibility In addition accesses which would be sited within an overtaking section on a single carriageway road should be avoided..

4.4 At most locations, an uninterrupted view from the center-line of the access at a height of 1.05m (eye level) to all parts of the shaded areas shown in Figure 4 overleaf, measured at a height of 0.26m, will satisfy the visibility requirement. The size of the shaded area is defined by the "x" and "y" dimensions. These dimensions are determined by the type of access, and the speed of main road traffic, as follows.

4.5 A minor road "x" distance of 9 metres (m) is the normal requirement for new junctions and for the improvement of existing junctions between access roads and district or local distributor roads. Where the minor road is busy (for example, where it serves as a main connection between the public road system and a housing estate development or a n industrial estate), 9m is required. For less busy, simple and very minor junctions and busy private accesses (for example, those serving a factory, a free standing shop or a fuel filling station), a minor road distance of 4.m will normally be the minimum acceptable. For a lightly trafficked access, serving a single dwelling or a small cul-de-sac of up to 6 dwellings, the minimum acceptable minor road distance is 2.4m. In urban areas, with main road 85 percentile traffic speed of 30mph or less, this distance may be reduced to 2.0m. (Vehicle speeds in wet weather conditions, with the fastest 15% of traffic discounted, will give the 85-percentile figure). Only in exceptional circumstances should an "x" distance of less than 2.4m be considered for an access with multiple useage.

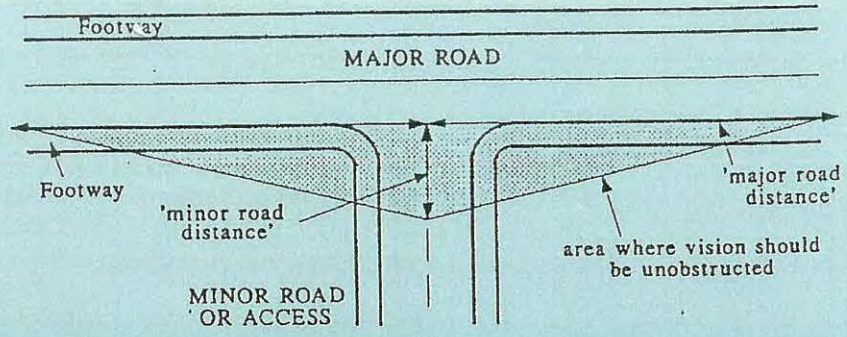

FIGURE 4. Visibility Splays

TABLE 3A

Major Road Speed kph (mph)	120 (75)	100 (62)	85 (53)	70 (44)	60 (37.5)	50 (30*)	50 (30**)	40 (25)	30 (20)
Major Road Distance (metres)	295	215	160	120	90	70	60	45	33

TABLE 3B

Speed Limit kph (mph)	110 (70)	96 (60)	80 (50)	64 (40)	50 (30*)	50 (30**)
Major Road Distance (metres)	295	215	160	120	90	60

* Where major road is not an access road but a higher category road.

** Where major road is an access road with speeds universally below Speed limit.

Table 3. Visibility Standards

4.6 The `major road distance' will depend on the speed of traffic on the major road: the appropriate distance can be read off Table 3A or 3B. If the highest traffic speed on the road in wet weather (excluding the fastest 15% of vehicles) is known then this speed - or the next highest speed which appears on the table - should be used as the major road speed in Table 3A to arrive at the appropriate `major road distance'. Where there is a speed limit and the actual speed of traffic on the major road is not known it will normally be necessary to provide for `major road distances' as shown in Table 3B.

4.7 As a general rule the following vision splay criteria will normally be applied to development proposals: -

(i) Private drive or access road serving up to 6 dwellings will require a vision splay minor road `x' distance of 2.4 metres.

(ii) An access road serving between 6 and 20 dwellings will require a vision splay minor road `x' distance of 3 metres.

(iii) An access road serving between 21 and 50 dwellings will require a vision splay minor road `x' distance of 4.5 metres.

(iv) An access road / approach road serving between 51 and 150 dwellings will require a vision splay minor road `x' distance of 6 metres.

(v) An approach road serving between 151 and 300 dwellings will require a vision splay minor road `x' distance of 9.0 metres.

4.8 300 dwellings will normally be the maximum allowed off one access point.

4.9 Visibility splays for junctions are part of the highway and must be included in the adoptable area. Therefore, it is not permissible for such areas to lie within private gardens or grounds.

4.10 Parking in the visibility zones of bends, or junctions will not be permitted.

4.11 When different gradients meet in the longitudinal plane it will be necessary to provide a smooth transition between them. The minimum length of summit transition curve should be calculated to provide clear visibility over the length of the stopping distance for the speed of the road, at a height of 600mm above the adjacent road levels.

4.12 Where road curvature would cause the sight line to exclude part of the carriageway from the visibility zone, the sight line should be moved back to meet the edge of the carriageway.

4.13 Where an emerging vehicle crosses a footway at a lightly used access, for example from the driveway of a dwelling, pedestrians will not have sufficient warning of its approach. It should be noted that in such cases a sight splay of 3m x 3m will be required to be maintained by the owner of the land such that there is no obstruction to vision above a height of 600mm above the adjoining road level as shown by the shaded area in Figure 5.

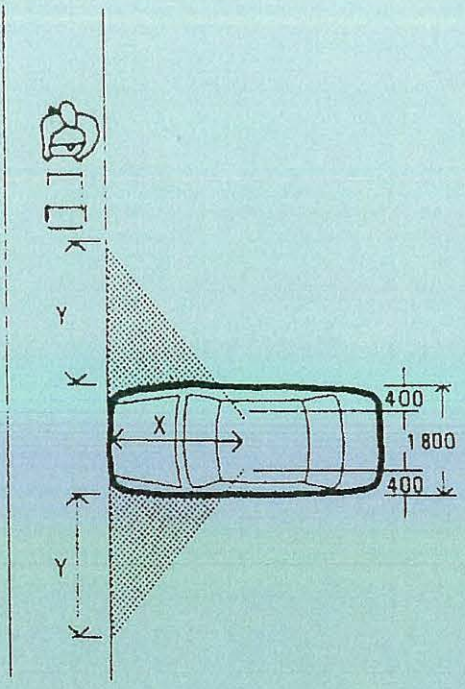

FIGURE 5 Visibility distances onto a public footway

5.1 Local Distributors

5.1.1 Requirements for distributor roads as defined in paragraph 1.57 of Design Bulletin 32 (DB32) are given in the Department of Transport's Directive TD 9/93.

5.2 Other Residential Roads

5.2.1 Minimum requirements for each type of residential road are given in Table 1 and 2.

5.2.2 It is suggested that the combination of restraints may be effective in reducing speeds, and that the effectiveness of restraints may be enhanced by changes in pavings, planting and other features which indicate to drivers that they are in residential surroundings where careful driving at slow speeds is expected - features such as:

(a) curving alignments with short lengths of straight and varying carriageway widths;

(b) roundabout junctions;

(c) chicanes and islands (see DB32 Para 2.40);

(d) frequent bends of severity commensurate with the appropriate design speed (Table 2).

(e) trees, bollards and buildings forming gateways at entrances to villages and housing estates and at narrowings and delineating changes in direction at 90-degree bends.

(f) changes in surface materials and edge restraints highlighting the location of speed restraints and reducing the apparent widths of carriageways.

B6 Forward Visibility at Bends

6.1 To construct a forward visibility curve around a bend as shown in Figure 6: -

(a) A line shall be drawn to represent the path of the driver's eye, 1.5m into the carriageway measured from where the inner kerb would be if there was no carriageway widening, or on the centreline of the traffic lane if the carriageway is greater than 6.0m wide.

(b) The stopping distance shall then be divided into equal increments of approximately 3m and the increment points numbered in sequence.

(c) The same stopping distance with the same number of increments shall then be repeated around the curve, finishing at a full stopping distance beyond the tangent Point B.

(d) The area, which has to be kept clear of obstruction to visibility, shall then be constructed by joining points of the same. number together i.e., 1 to 1, 2 to 2 etc.

TABLE 4 - Minimum stopping distance and horizontal radii on Residential roads, subject to 30 mph speed limit

Group (B) Road Type	Minimum Centre-line Radius (m)	Minimum Stopping Sight Distance (m)
Housing Square	-	14
Mews Court	15	14
Access Way	20	23
Access Road	20	33

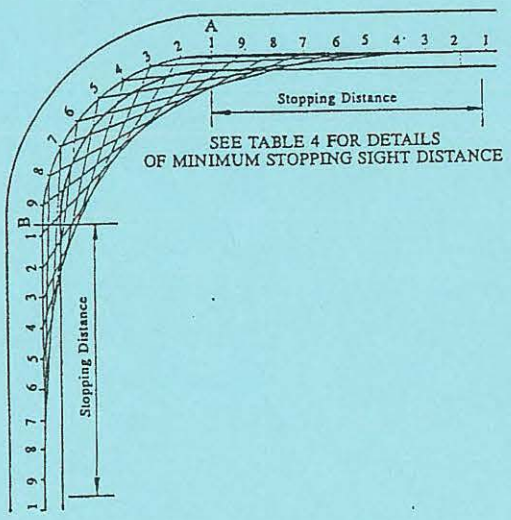

FIGURE 6 Forward Visibility Curve