

# DESIGN BULLETIN 32

## LAYOUT OF RESIDENTIAL ROADS AND FOOTPATHS

This Briefing Sheet is intended to provide an introduction and overview to Design Bulletin 32. It should be read in conjunction with the briefing sheet on *Places Streets and Movement*, published in October 1998.

### INTRODUCTION

The majority of the length of new roads constructed in any year are those to serve new developments with a large proportion of these being to serve new residential development. It is essential that these are planned and constructed to acceptable standards in order to minimise the risk of future accidents, provide an acceptable living environment and reduce the future liability of the highway authorities who adopt the roads after completion.

Design Bulletin 32 (DB32) was originally published in 1977 to provide guidance on standards and layout of residential roads. The 1977 edition brought about a change of attitudes towards such roads both within planning and highway authorities and within the housebuilding profession. The result was a change in emphasis from car dominated layouts to a more human environment. The 1977 DB32 set down design principles and left detailed interpretation to the highway authorities. As a result there are different interpretations around the country and most highway authorities have produced their own design guides, including more detailed standards and guidelines - which are often greatly influenced by local factors both in terms of materials and layout - and which can vary greatly from one area to another. DB32 also had a major influence on highway design thinking in that it was probably the first "official" publication to endorse the concept of traffic calming which has in more recent years become considerably more popular on roads other than residential estate roads.

The second edition of DB32, like the first, describes the main considerations that should be taken into account in the design of residential layouts. The second edition updates and amends the information in the original bulletin in the light of experience of its use and changes in housing over the intervening years. It also takes into account new initiatives on matters such as road safety and includes references to improvement schemes on existing estates. The second edition supersedes the first but does not include requirements relating to distributor roads, construction specification or parking controls.

### DB32 - A REVIEW OF THE CONTENTS

#### SECTION 1 THE DESIGN BRIEF

This section outlines the matters that need to be considered in a Design Brief for a development site e.g. visual character, building density, dwelling sizes and types, access for all modes of transport, open space, parking needs, landscaping etc. and also the need to recognise the physical characteristics of the site, existing and potential safety hazards and traffic nuisances, incidence of crime and vandalism, traffic volumes and routes, nearby traffic attractors, need for bus links, functions of roads and likely speeds.

The needs of pedestrians, cyclists and public transport are also emphasized in the document and these aspects should be considered in all proposed layouts.

It is necessary to draw all these various aspects together in order to create an acceptable layout that provides a safe and pleasant environment which is visually attractive, safe, convenient, nuisance free and secure, where adequate access is provided for all modes of transport but the transport needs are secondary to the safety and environmental factors.

#### SECTION 2 THE LAYOUT OVERALL

This section continues the theme of Section 1 but expands upon various factors defining the main objectives that should be recognised when considering development layouts. The need to discourage non-access traffic (to minimise danger and nuisance) and keep vehicle volumes and speeds low on residential roads are paramount. However designs must also reflect the needs of emergency services vehicles, easy access for residents and deliveries, direct routes for cyclists and pedestrians, effective provision for parking, easy access to public transport and clear layouts.

Advice is given on the considerations that apply to encouraging public transport; including making the layouts easy and safe to use for drivers and passengers without creating nuisance for residents and ensuring that any necessary street furniture is appropriately designed and located within the development.

Restraint measures should reduce speeds over distances that drivers would find acceptable and ensure that accelerating and braking vehicles do not create additional hazards and that unexpected conditions are not met by pedestrians, cyclists or drivers. Drivers need to be made aware that they are in areas where pedestrian and cyclist needs have precedence.

The need for acceptable direct routes for services and provision of street lighting is also emphasized although this should not be at the expense of adequate landscaping.

Adequate safe, secure and convenient off-street parking should be provided to avoid excessive on-street parking and the consequent hazards that this creates, although provision for safe, convenient casual parking for visitors must also be made.

Various types of road networks are described that will meet these objectives without creating difficulties or hazards. The provision of alternative accesses to reduce vehicle flows and ensure access in emergencies, without encouraging through traffic, is supported. Direct access to dwellings is encouraged in the interest of economy and the need to maintain/provide visual character and natural surveillance is also encouraged. As a general rule it is suggested that direct access to dwellings is appropriate from roads serving up to around 300 dwellings; the provision of additional access routes to residential areas assists in reducing the number of dwellings to be served to that figure. Residential roads formed as loops with appropriate traffic calming are also recommended in order to cover these points and to permit deliveries without the need for reversing/turning of large vehicles.

Advice is given that shared surface access roads can serve up to 25 dwellings as culs-de-sac and up to 50 dwellings with two appropriately designed accesses to the general road network. Roads serving more than 50 dwellings should be loops or through roads or at least have an emergency access route via a footpath link. Roads serving from 100 to 300 dwellings should either have two accesses to the main network or be formed as a loop with the stem of the loop (kept as short as possible) connecting to the main network.

The principles and various methods of speed restraint are covered with the need for adequate visibility in all cases being stressed; although this can be provided at a level appropriate to the restraint method used. Examples of restraints that are appropriate are changes in horizontal or vertical alignment or combinations of measures. Recommended measures include short culs-de-sac, carriageway offsets, junctions, small radius 90 degree bends or careful location of on-street parking to provide changes in alignment of the carriageway. In addition measures such as

mountable shoulders on tight bends, Chicanos and islands may be appropriate but in these and other cases the safety of cyclists must be carefully considered. Changes in vertical alignment should be localised in the form of road humps, speed tables or raised junctions and these measures can clearly also be combined with the other measures described above at appropriate sites. Examples of the 85th percentile speeds on lengths of unrestrained roads are quoted as :-

60 m length      20 mph  
 100 m length    25 mph  
 200 m length +   30 mph +

Reference is made to the guidelines and powers available to Highway Authorities in relation to 20 mph zones, varying the width of carriageways/footways and provision of road humps.

It is suggested that Highway Authorities may wish to encourage some speed restraint measures on an experimental basis before supporting their wholesale use.

Whatever restraint measure is used it is essential to ensure that it is well lit and complies with any appropriate regulations with signing as specified. The aim of the measures should be to restrain speeds to the following levels :-

- (i) Shared Surface Roads - well below 20 mph - no more than around 40m of unrestrained road.
- (ii) Minor Access Roads - about 20 mph - no more than around 60m of unrestrained road.
- (iii) Major Access Roads - under 30 mph - no more than 80 to 120m of unrestrained road.

The need to restrain speeds to well below 20 mph near schools and at or near other sites of high risk is especially important.

Further advice in this Section covers the number of restraints, direction finding within the layout and the need to provide safe, adequate and convenient pedestrian and cycle links.

Shared surface access roads are then described in some detail in terms of access needs, visual character and general layout matters. Detailed advice is given on the points to be covered to ensure that it is clear to users that they are in a "shared-surface" situation. These include the need to provide appropriate layout, design, surfacing materials and street furniture to emphasise the change in character from the segregated conventional highways.

Reference is also made to the needs of statutory and other services, lighting provision and shared driveways. It is suggested that up to five dwellings can be served off a private drive although this appears to be a limitation in relation to service provision rather than for any other reasons.

Car parking needs are an important factor in design of layouts and provision needs to be made for safe, secure, adequate and convenient parking for residents, visitors and service vehicles; both for short and long term needs. In order to reduce walking distances and encourage safe parking each group of dwellings should be self sufficient in parking provision with parking within curtilages and/or grouped parking within view and visitor and delivery parking immediately outside. The needs of people with disabilities to gain access to and from dwellings and vehicles must not be overlooked. The allocation, control and visual character of parking areas is also covered.

### SECTION 3 THE LAYOUT IN DETAIL

This Section addresses the details of layout referring to objectives, that support the main objectives referred to in the earlier sections of the document, in relation to :-

- (i) Layout of carriageways, bends, junctions and turning spaces and their relationship to volumes and speeds of traffic, frequency of passing traffic, provision of parking and alternative means of access.
- (ii) Spacing and layouts of junctions bearing in mind level and type of use, directions of movement and potential delays.

(iii) Spacing and layout of turning bays and the need to accommodate likely users, avoid unnecessary reversing and keep them clear of parked vehicles for use as turning bays.

(iv) Further objectives are addressed in relation to the need to provide adequate visibility, adequate design and layout for footways, footpaths, cycle routes, verges (including planting therein) and parking areas.

Design objectives are given at the start of each section, followed by commentaries and design data, based on empirical evidence and experience from home and abroad, and guidance on design standards.

Advice is given on vehicle dimensions and necessary widths (including widening on bends) for both carriageways and pedestrian routes together with advice on emergency access, gradients, junction and turning space configurations and radii, visibility requirements, dimensions for parking spaces, headroom for pedestrian routes and verge widths and landscaping. Further advice relates to the layout and dimensions for parking bays and communal parking areas.

It is indicated that in normal circumstances a carriageway width of 5.5 m will be required where there is direct access to dwellings but this can be reduced where there is no direct access. Further information on widths is provided as follows :-

5.5 m - allows all vehicles to pass each other - below this width passing places may be required depending on the frequency of use by large vehicles;

4.8 m - allows a wide car to pass a pantechicon - traffic can still be regarded as free flow in residential areas;

4.1 m - allows wide cars to pass each other but a pantechicon will only be able to pass a cyclist - can still be regarded as free flow for most vehicles;

Under 4.0 m - apart from cars passing cycles, widths of less than 4.0 m should be regarded as for single file traffic;

2.75 m - should be considered as the minimum width but an increase on this will be needed to cater for cyclists as well as cars (3.25 m being the desirable minimum).

It is indicated that the width of 5.5 m is normally sufficient for cars to manoeuvre around parked vehicles to use accesses but where lengths of road do not provide direct access widths can be reduced as follows :-

	around	around	up to around
No. of dwellings served	50-300	25-50	25
Carriageway Width (m)	5.5	4.8	4.1

The need to cater for access by fire appliances is covered and it is necessary to ensure that appliances can reach within 45 m of a suitable entrance to any dwelling via a road of at least 2.75 m width with 3.66 m being the minimum necessary to allow for operating space around the vehicle.

It is indicated that it should not normally be necessary to cater for widths in excess of 5.5 m because this width will also allow a 3 m wide lane to remain open in the event of a breakdown and / or maintenance work.

In view of the need to keep vehicle speeds low by appropriate design it is also necessary to consider the movement of the larger vehicles around bends. Carriageway widening is needed as follows on a road curving through more than 10 degrees along roads serving more than 25 dwellings (the widening to be undertaken on both sides of the road) :-

Centre Line Radius (m)	20	30	40	50	60	80
Min. Widening (m)	0.60	0.40	0.35	0.25	0.20	0.15

As a general guide gradients of non-priority roads at junctions should not exceed 5% when rising towards the junction or 4% when falling towards the junction and these gradients should be

maintained for a distance of twice the kerb radius. The gradient of a shared surface road should not exceed 7%.

Crossroads are discouraged on the higher grade of roads but can be used at the lower end of the scale where speeds are low and raised junction tables can be used. The staggering of junctions or provision of an island is recommended as the scale of the layout increases. Right-left staggers are preferred and the stagger distance should be at least one carriageway width. The use of priority markings should also be considered if there is danger of conflicts arising. General guidance on junctions is given as follows :-

- (a) Where road serves no more than 100 dwellings - no restrictions on spacing, and crossroads may be used;
- (b) Between 100 and 300 dwellings - minimum centre line spacing of 15 m (opposite side) and 30 m (same side) should be maintained;
- (c) Where a residential road joins a distributor road it should be 5.5 m wide for around 20 m from the junction with footways and no other junctions along that 20 m length.

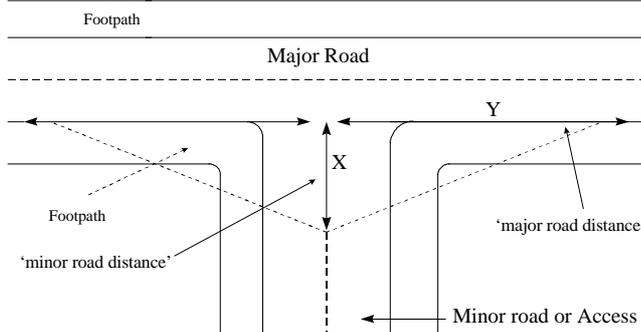
Guidance on junction radii is provided as follows :-

- (a) Kerb radii should be 10 m at junctions with local distributor roads (subject to 30 mph speed limit) and 6 m elsewhere where either road serves more than 50 dwellings;
- (b) 4 m kerb radii may be used where both roads are 5.5 m wide and the no-priority road serves no more than around 50 dwellings;
- (c) 4 m kerb radii may be used with mountable shoulders at junctions between shared surface roads with the inner radius being 6 m - 7.5 m if roads are narrower than 5.5 m;
- (d) No driveway should enter at the bellmouth of a junction.

Turning spaces should be provided to ensure that refuse vehicles do not have to reverse more than 40 m and pantechincons do not have to reverse more than 60 m. When it is assumed that such vehicles have to reverse into a road it should not serve more than 100 dwellings and kerb radii should be 6 m. Parking spaces in culs-de-sac should be clear of the turning area which should be capable of accommodating the vehicle movements covered in the appendix to DB32, i.e. normal turning movements of the vehicles likely to be found in these roads.

Visibility should be available within the range of height from 1.05 m to 2 m above ground and in areas where children are likely to be present (all residential roads) the visibility should be available from a minimum height of 600 mm. Planting can be used in visibility plays but it must not obstruct the above areas of sight, and should generally not have to rely upon frequent maintenance. The recommended sight distances relate to vehicle stopping distances and are as follows :-

Speed (mph)	0	5	10	15	20	25	30
(kph)	0	8	16	24	32	40	48
Distance (m)	0	6	14	23	33	45	60



Visibility at junctions is recommended to be available from 4.5 m back at the centre line of the side road ("x" distance) with the available visibility along the priority road ("y" distance) being

dependant upon the vehicle speeds. For residential roads a "y" distance equal to the distances quoted above is appropriate where speeds are restricted to 30 mph or below. In addition visibility should be provided for traffic entering the minor road with the dimension as follows :-

Junction Deflection (degrees)	Kerb radius /metres		
4	6	10	
80	10	11	19
90	9	10	19
100	8	9	19

Visibility should also be maintained across bends and along the carriageway edge and it is particularly important to provide and maintain visibility from drives to pedestrians (and vice-versa) at drive crossovers. An further "x" and "y" distance of 2.4 m is recommended in these cases in addition to any necessary visibility along the road.

Recommendations on footways widths are as follows :-

- (a) 2 m where more than 50 dwellings are served - allows for wheelchairs and/or prams to pass each other;
- (b) Lesser width for less intensive use e.g 1.35 m is sufficient to allow wheelchairs/prams to pass pedestrians;
- (c) An additional 800 mm should be provide where parked vehicles are likely to overhang the footway;
- (d) A minimum width of 900 mm should be carried through past drives etc. to allow wheelchairs / prams to pass and avoid the ramps to dropped kerbs;
- (e) 3 m minimum outside schools and community buildings;
- (f) increased width where bus shelters and/or other obstructions are located.

Headroom should be maintained at 2.6 m with a minimum of 2.3 m over a distance no greater than 10 m - restricted headroom must not extend closer than 500 mm to the carriageway edge.

The use of extensions to footways (where appropriate) and tactile surfacings, with gradients no greater than 8% and flush dropped kerbs, is recommended at crossings.

Footpath widths should be 2 m minimum with 3 m where there may be occasional vehicular use and 3.3 m for subways or under buildings. Ramps should not exceed 8% and preferably not exceed 5%. Alternative routes via steps may be necessary in some cases and these should always be provided with handrails. Visibility where footpaths join roads should have an "x" distance of 2.4 m and "y" distance to suit vehicle speeds with barriers to avoid any possibility of children and / or cyclists moving straight out into the road.

Recommendations on cycle provision is as follows :-

- (a) Cycle tracks 2 m wide when combined cycle / pedestrian flows less than 200 per hour (unsegregated use);
- (b) For segregated use a minimum overall width of 3 m is required with 1.5 m for each use and segregation by (preferably) a raised kerb or white line;
- (c) Appropriate signs should always be provided;
- (d) Headroom should be at least 2.7 m - with a minimum of 2.4 m over a distance no greater than 23m;
- (e) Gradients should be no more than 3% - 55 for up to 100 m 7% for up to 30 m if necessary;
- (f) Barriers may be needed at ends of routes and a minimum width of 1.2 m should be provided to allow for passage for all users;
- (g) At entries to carriageways dropped kerbs should be provided and entries should be at 90 degrees;
- (h) Visibility along cycle routes should be 20 m on gradients less than or equal to 2% and 26m where there are steeper gradients.

Verges should be 2 m wide except where there are minimal services when 1.5 m is sufficient. Where no verges are provided a 500 mm wide paved margin is recommended which can be flush with the carriageway when abutting a wall or bollards. The need to consider appropriate planting is also covered.

Recommendations on parking are that drives should be at least 5.5 m (and preferably) 6 m long in front of garages together with additional length if gates are installed. Shorter lengths may be acceptable on shared surfaces where there is other adjacent provision. Width of drives should be 3.2 m with a narrower width being suitable if the drive is not also the path to the house. Gradients should be no more than 12.5% and preferably be below 10%.

Parking bays should be 6 m x 2 m (2.4 m where there is no footway or paved margin) when parallel and contiguous with carriageways. At right angles to carriageways they should be 4.8 m x 2.4 m with 6 m in front of the bays (to permit ease of access) and an extra 800 mm at the rear of bays to accommodate overhangs. Such parking bays are normally not acceptable on roads serving more than 100 dwellings. When in communal parking areas bays should be 4.8 m x 2.4 m with bays for people with disabilities being 3.6 m wide (or 3 m wide where two adjacent bays share a loading area).

A variety of dimensions are also included for communal parking bays together with the necessary vertical clearances and advice on demarcation of bays.

This Section includes a considerable amount of detail in terms of dimensions and recommended standards relating to both layouts and safety standards and, whilst it is not fully comprehensive, it provides a basis and philosophy upon which layouts can be designed.

## SECTION 4 LOCAL GUIDANCE AND STANDARDS

As indicated above, the revised DB32 provides guidance on layout and design with a considerable amount of dimensional detail. However it is not comprehensive and needs to be augmented by local design guidance.

It is recommended that an approach is adopted which strikes a balance between housing, planning and highway objectives and allows a range of options in design terms. Design Guides should not plan for the worst possible combination of events. It is recommended that the adoption of the contents of the revised DB32 will result in such a balanced approach and more onerous requirements will only be appropriate in special cases. Local Design Guides should be compatible with Planning Authority objectives, set out in Local Plans, and should also be applied flexibly in relation to the principles set out in DB32. Emphasis is placed on the need to provide advice on service provision, public transport, crime prevention and landscaping.

In addition the Design Guides should include information on procedures and requirements for adoption under Section 38 of the Highways Act 1980. Advice is given as to the areas which Highway Authorities should be prepared to adopt. These include casual parking areas (adjacent to the carriageway), landscaping which forms an integral part of speed restraints, service strips and visibility splays as well as the carriageways, footways and cycle routes.

Parking standards for residential areas should be included within local Design Guides and these should be based on policies in Local Plans and include advice and standards for assignment and location of spaces in relation to properties. It is recommended that local parking standards should be published and take into account the location of development, the size(s) of dwellings and the proportions of parking to be publicly and privately allocated.

## SECTION 5 IMPROVEMENT SCHEMES

This section outlines how the principles of DB32 can be applied when improvements are being carried out to existing road layouts. This largely draws together the advice in previous sections and

relates it to existing road layouts highlighting the benefits and drawbacks likely to arise. In addition reference is made to the various legal powers available for amending road layouts and functions and the need to reflect in a flexible manner the existing local characteristics.

It is essential to involve the local residents in schemes for improvements to existing layouts at all stages and for this to be successful a corporate approach by all interested parties is recommended.

### APPENDICES

Three appendices are included within the document.

Appendix 1 Geometric Characteristics of Vehicles Turning: Diagrams and dimensions of turning circles and other turning movements for pantechinons, refuse vehicles, fire appliances and private cars are included to illustrate areas required on culs-de-sac and elsewhere.

Appendix 2 Passing Places on Narrowed Carriageways: Guidance is included on the location and spacing of passing bays on narrowed lengths of carriageway.

Appendix 3 Acknowledgements: are given to members of the working party who drafted the document, and other bodies who offered comments and assisted in its preparation.

There is also a four page list of references and notes, which identifies other sources of relevant information, and an index.

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