Leicestershire County Council

Leicestershire Highway Design Guide Part 3a & 3b: Highway layouts and design – overview and road layouts and design

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Part 3a: Highway layouts and design overview

1. Overview

1.1 The Design Layouts section of the Leicestershire Highway Design Guide (LHDG) is intended to help developers to design safe and accessible layouts for all highway users.

1.2 It covers:

- The council's requirements in relation to road layouts that are proposed for adoption, to ensure they provide for the safe and free movement of users of all highways, including public rights of way;
- The council's expectations regarding layouts that recognise highway's expanding role in delivering broader objectives through the provision of green infrastructure, active travel and sustainable drainage systems;
- The obligations relating to parking and the provision of electric vehicle charging facilities.

1.3 Highway layouts should:

- meet travel the needs of all users including the prioritisation of active travel modes of transport and the promotion of public transport;
- be designed with consideration for road safety and personal safety of all users; and
- help create high quality, durable developments in which to live, work and play.

1.4 The council's approach, coupled with the flexibility that the LHDG guidance allows, reflects many of the key themes of the National Design Guide (NDG), Manual for Streets (MfS) and Local Transport Note 1/20 "Cycle Infrastructure Design" (LTN 1/20). The council recognises that roads as part of residential development layouts have a wider role to play in creating a sense of place and community as opposed to simply moving people from A to B.

1.5 Where this cannot be achieved by layouts that are explicitly covered in this section, the council will assess proposals that meet LHDG policies and principles on a case-by case basis.

1.6 Where LHDG guidance is not presented as absolute policy, for example where the word should or normally are used, the developer/owner applicant may be requested to submit a request in writing (email acceptable) to the relevant officer for approval.

On receipt of the written request, consideration will be given to the query in full and within a reasonable timeframe. After consideration the applicant will be provided with a decision. At the heart of the decision will be the LHA's duty to be mindful of highway safety and public interest.

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Part 3b: Road layouts and design

2. Overview and definition of a street

2.1 This section sets out the council's design guidance for adoptable roads. Guidance on passenger transport and providing for pedestrians, cyclists and horse riders can be found in the Active and Sustainable Travel section of the LHDG.

Definition of a street

2.2 MfS introduced the concept of a street and the distinct characteristics and design approach that applied for this type of road. MfS defines a street as "highway that has important public realm functions beyond the movement of traffic" and states that "streets should have a sense of place, which is mainly realised through local distinctiveness and sensitivity in design". Streets usually provide direct access to the buildings and the spaces that line them.

Under the council's definition, a street:

- has a speed limit of 40 mph or less and with 85th percentile speed of traffic generally below 40 mph;
- is mainly built up on both sides with residential or a mix of residential and local facilities, shops and so on;
- has a high place function e.g. direct frontage access, on street parking etc.

2.3 Commuted sums will be sought for areas and assets within a layout that are not required for the safe functioning of the highway and/or the use of bespoke materials identified (but not limited to) those listed in the Commuted Sums Schedule and Surfacing Materials Palettes documents.

2.4 The local context should be considered and influence the final design. In accordance with National Model Design Code guidance, junctions and crossings must be "safe, convenient and attractive" and encourage active travel. Proposals must also comply with the LHDG section "Junction type, geometry and spacing."

2.5 The council encourages developers to create road layouts that are intended for adoption and built to the guidance and standards detailed in the LHDG. Where significant constraints mean that a developer cannot conform to these standards, then this should be highlighted with the council at the earliest opportunity. The council reserves the right to refuse adoption of roads that do not meet assessment criteria relating to safety and functionality of highway.

2.6 For employment and commercial developments, the council will expect road layouts serving developments of more than one building and with more than one occupier to meet the council's adoptable design policy and guidance and be offered for adoption. However, developers are encouraged to contact the council to discuss adoption requirements for specific proposals. (Developments Served by Private Drives)

2.7 Advice on how roads can be adopted can be found under the Approvals and Adoption sections of the LHDG.

External Roads and Other Off-site Highway Works

2.8 These are roads that have a strong movement function, such as a distributor or spine roads, which provide a more strategic link into the highway network. Unless they fall outside the definition of a road (street) (see above), developers should design external roads in line with MfS and the council's Specification and standard drawings or Design Manual for Roads and Bridges (DMRB) as appropriate. Road safety audits will be required in all cases. The council may accept direct frontage access from properties to such roads providing that they are subject to a 40mph speed limit and 85th percentile speeds are 40mph or less.

Site Access to External Roads

2.9 Roads that meet the council's definition of a street should be designed in line with the LHDG, MfS and the council's specification and standard drawings.

2.10 Mini-roundabouts are not acceptable for providing access to a development unless they form part of a more comprehensive traffic-calming scheme that is either required to reduce the development's impacts or that has previously been identified.

2.11 A mini- roundabout will not be acceptable where it is proposed simply because the necessary visibility for a priority junction cannot be achieved. The council may be prepared to consider permitting direct frontage access from properties to the external road providing that they are subject to a 40mph speed limit and 85th percentile speeds are 40mph or less.

2.12 Selection of junction types will depend on site-specific requirements and conditions including:

- location;
- safety considerations;
- traffic, pedestrian and cycle flows including mobility scooters/wheelchairs;
- passenger transport requirements; and
- Recorded 85th percentile speeds.

2.13 When designing layout proposals, the demographics of any neighbouring communities should be considered to ensure that access requirements are fully understood.

2.14 Developers should establish and agree the council's requirements in the preliminary stages of preparing the development proposals. In all cases Road Safety Audits will be required for external roads.

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3. Road Types

Internal Development Road Types

3.1 For the purposes of the LHDG the five main internal road typologies commonly used within development in Leicestershire are:

- Major Residential Access Road (Primary Streets) (Figure 1)
- Residential Access Road (Secondary & Local Streets) (Figure 2)
- Shared Surface Residential Accesses (Tertiary Streets) (Figure 3)
- Major industrial access road
- Minor industrial access road

3.2 Shared Surface and Minor Residential Roads should have a stronger place identity, but Major Residential Access Roads in particular serve a significant movement function.

3.3 The Figures 1 to 3 below define the expected layouts for residential provision; for Major Residential and Residential Access Roads an absolute minimum and augmented (enhanced) standard are shown. The illustrative drawings provided below are not intended to be prescriptive but illustrate the council's general expectations regarding layout principles.

3.4 LCC will facilitate and encourage the provision of the augmented standard. The requirement for provision should be identified at the planning stage in discussion with the Local Planning Authority (LPA) and the LCC. The type of provision will depend on the aspirations for the development and local plan policy. Design should accord with active travel guidance and highway constructed to an adoptable standard.

3.5 Please also refer to the LHDG's Active Travel Matrix

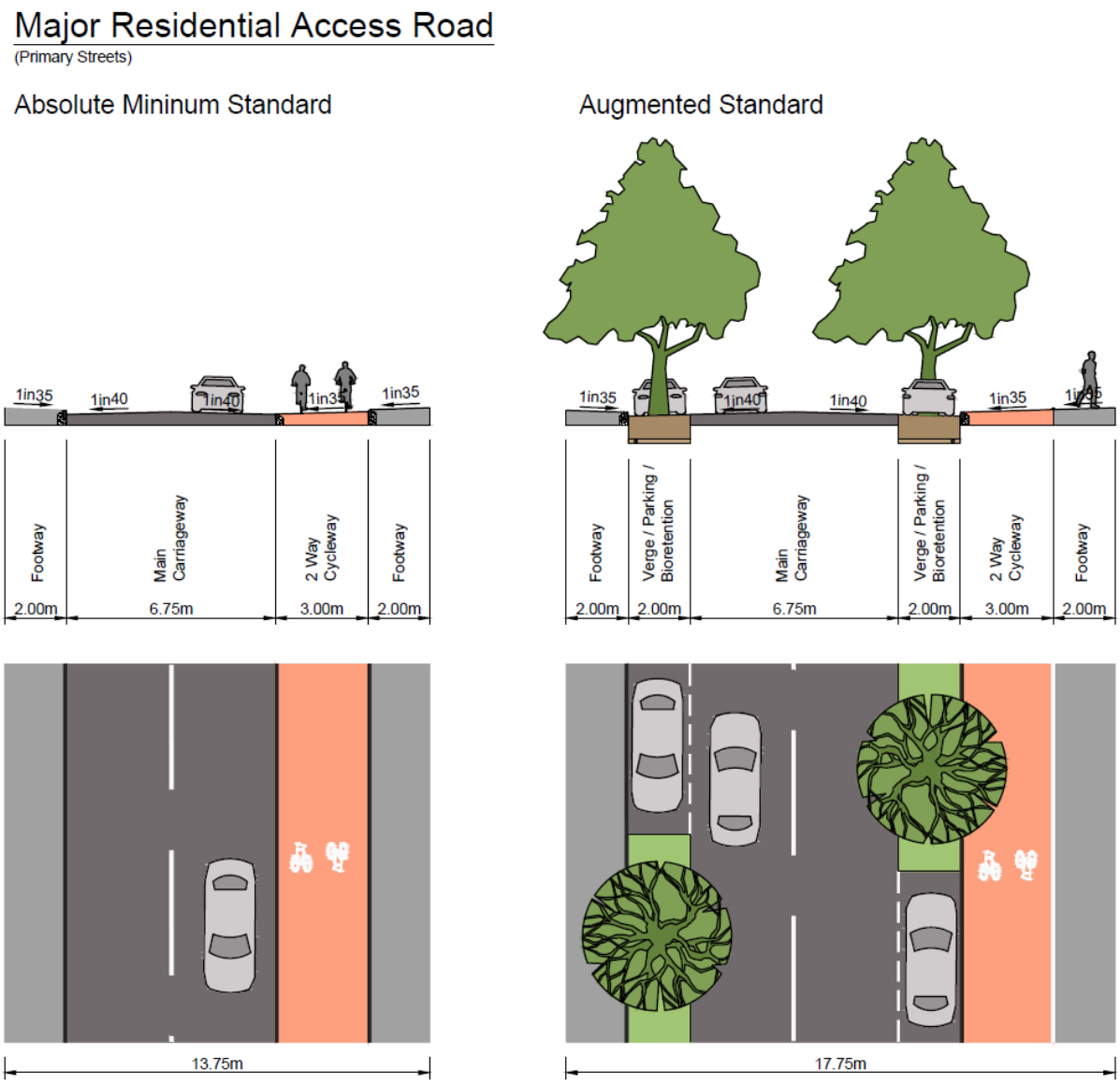

Figure 1: Major Residential Access Road (Primary Streets)

Typically provide a primarily movement function.

Road between strategic routes or linking urban centres.

Primarily segregated active travel routes.

Bus access is likely

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Residential Access Road

(Secondary & Local Streets)

Absolute Mininum Standard Augmented Standard

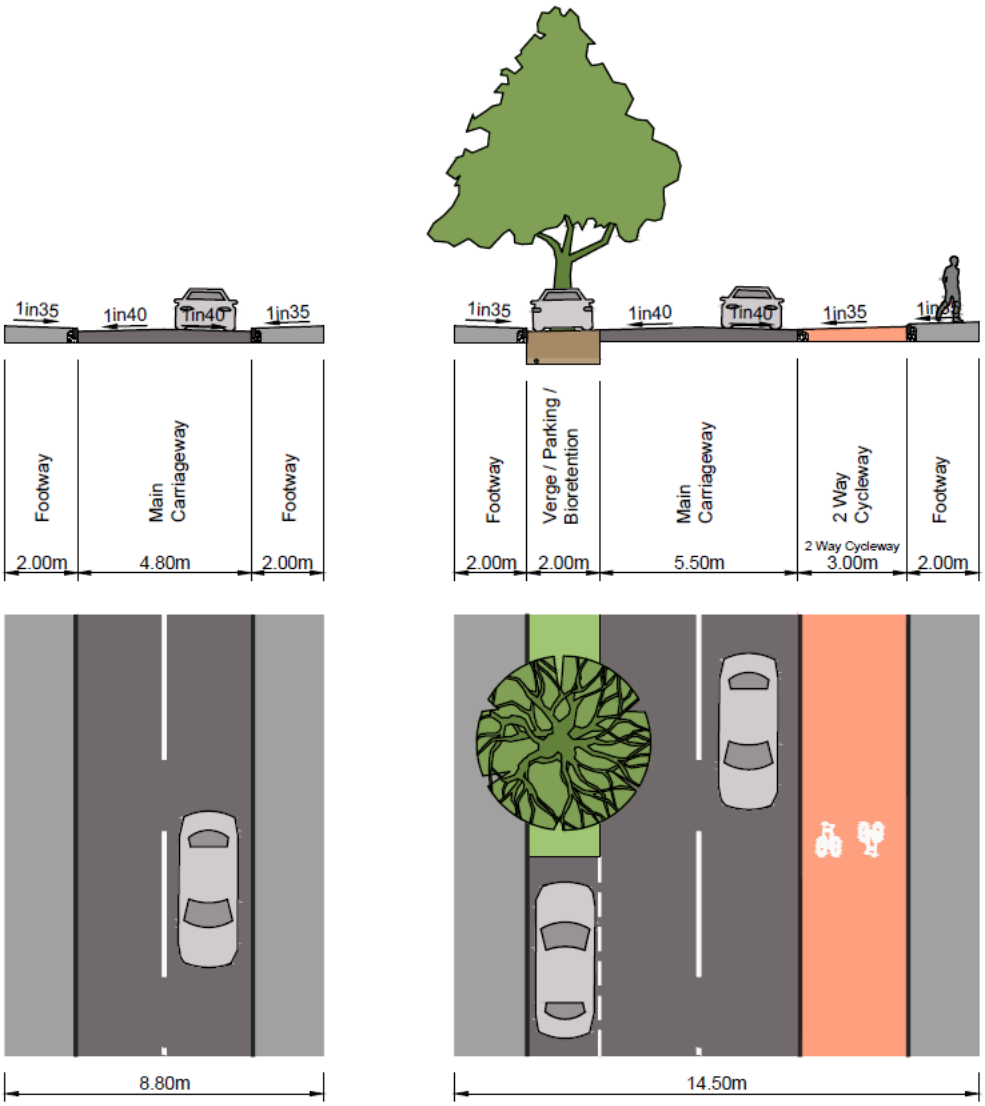

Figure 2 - Residential Access Road (Secondary & Local Streets)

Both movement and place function.

Multi-modal corridor with pedestrian, cycle, bus and other motor vehicle activity.

Active travel interventions will depend on traffic flows and speeds.

Shared Surface Residential Access Road

(Tertiary Streets)

Absolute Mininum Standard

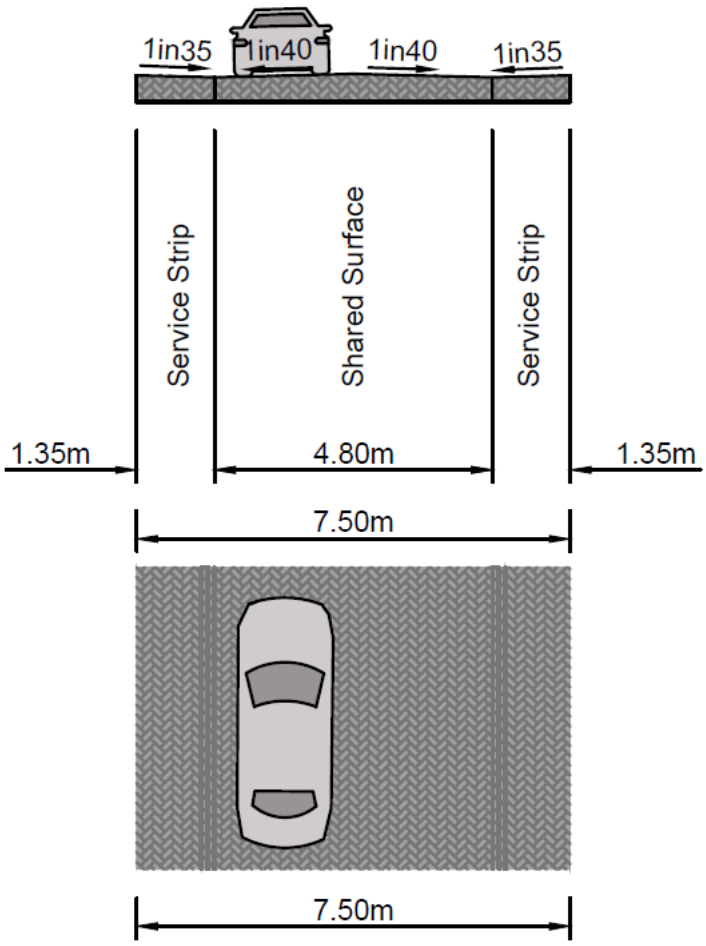

Figure 3: Shared Surface Residential Access (Tertiary Street)

Strong place function.

Emphasis on pedestrian and cyclist use.

Not acceptable for use as a bus route

Residential developments of more than 1000 dwellings and commercial developments

3.6 Internal roads for residential development of more than 1000 dwellings and employment and commercial developments should be designed to comply with LHDG guidance, and the council's specification and standard drawings. The council will consider the design of development roads for sites of more than 1000 dwellings, or which are otherwise not covered by the following guidance, on a site-by-site basis.

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4. General layout and geometry - residential sites

4.1 Geometric design refers to the dimensions and arrangements of the visible features of a roadway. This includes pavement widths, horizontal and vertical alignment, slopes channelization, intersections and other features that can significantly affect the operations, safety and capacity of the roadway network.

Introduction and purpose of geometric design

4.2 The basic objectives in geometric design are to optimize efficiency and safety while minimizing cost and environmental damage. Geometric design also affects an emerging fifth objective called liveability, which is defined as designing roads to foster broader community goals, including providing access to employment, schools, businesses and residences, accommodate a range of travel modes such as walking, bicycling, transit, and automobiles, and minimizing fuel use, emissions and environmental damage. [The Role of FHWA Programs in Liveability: State of Practice Summary – U.S. Department of Transportation]

Residential road geometry

4.3 Table 3 provides information on the general geometry and usage for internal residential roads. Residential access roads are generally conventional cross-section roads with separate provision for motor vehicles and active travel users. On a Shared Surface Residential Access all users navigate a common surface.

Table 3: General geometry of residential roads (internal)

	Major Residential Access Road (Primary Streets)	Residential Access Road (Secondary & Local Streets)	Shared Surface Residential Access (Tertiary Street)
Type of use Also refer to Active Travel Design Layouts	Typically provide a primarily movement function. Road between strategic routes or linking urban centres. Primarily segregated active travel routes. Bus access is likely	Both movement and place function. Multi-modal corridor with pedestrian, cycle, bus and other motor vehicle activity. Active travel interventions will depend on traffic flows and speeds.	Strong place function. Emphasis on pedestrian and cyclist use. Not acceptable for use as a bus route

	Major Residential Access Road (Primary Streets)	Residential Access Road (Secondary & Local Streets)	Shared Surface Residential Access (Tertiary Street)
Single point of access dwelling limits	1000 Normally no more than 400 from a single point of access. This threshold can only be exceeded based on a robust evidenced justification to be agreed with the LHA.	400 Normally no more than 150 from a single point of access. This threshold can only be exceeded based on a robust evidenced justification to be agreed with the LHA.	50 Normally no more than 25 from a single point of access. This threshold can only be exceeded based on a robust evidenced justification to be agreed with the LHA.
Access to schools	Yes	Yes, but not as a cul-de-sac.	No
85th percentile design speed	20mph	20 mph	15mph
Shared surface	No	No	Yes

	Major Residential Access Road (Primary Streets)	Residential Access Road (Secondary & Local Streets)	Shared Surface Residential Access (Tertiary Street)
Widths for two-way traffic.	Carriageway width 6.75m	Carriageway width 4.8m up to 50 dwellings and 5.5m for 50 to 400 dwellings Except on a bus route where the carriageway should be a minimum of 6m wide (subject to tracking assessment) or on a road serving a school where the carriageway should be 6.75m wide in all cases.	Overall highway corridor width of 7.5m required to accommodate all road users, green infrastructure and utility equipment.
Where a road is to be narrowed, to help control vehicle speeds, for example, the minimum carriageway width (kerb to kerb) = 3.7m. Minimum lane width at a restriction, such as pedestrian refuge in the middle of the road = 3.2m.			
Centre-line radius	Defined by tracking	Defined by tracking	Defined by tracking
Crossfall	1:40	1:40	1:40

	Major Residential Access Road (Primary Streets)	Residential Access Road (Secondary & Local Streets)	Shared Surface Residential Access (Tertiary Street)
Longitudinal gradient	Flexible surfacing minimum: 1:100 Block surfacing minimum: 1:80 In all cases maximum: 1:20 In all cases, at junctions: not to exceed 1:30 for first 10m of the side road	Flexible surfacing minimum: 1:100 Block surfacing minimum: 1:80 In all cases maximum: 1:20 In all cases, at junctions: not to exceed 1:30 for first 10m of the side road	Flexible surfacing minimum: 1:100 Block surfacing minimum: 1:80 In all cases maximum: 1:20 In all cases, at junctions: not to exceed 1:30 for first 10m of the side road
Vertical curves	See vertical curves section	See vertical curves section	See vertical curves section

	Major Residential Access Road (Primary Streets)	Residential Access Road (Secondary & Local Streets)	Shared Surface Residential Access (Tertiary Street)
Visibility distance at junctions, bends and vertical crests See Swept path analysis	25m	25m	17m
Cycles and footways	Please refer to tables in the Active Travel Section of LHDG		
Verges	Grassed verges minimum 1m wide, minimum area 10sqm. Hard paving otherwise. Minimum 2m width to accommodate sufficient space for tree planting.		
Steps	Not normally acceptable in areas to be adopted as public highway unless a suitable alternative ramp is provided for those unable to climb steps.		

Pavement parking

4.4 Highway layouts that encourage pavement parking must be avoided. The council will apply its experience and knowledge from best practice and lessons learnt from existing development during the assessment of designs and will resist adoption of proposals where it considered that pavement parking is likely to become an issue.

Designing roads layouts that serve schools

4.5 Parking in the vicinity of schools, as children are dropped-off or collected, is a safety hazard and can cause traffic congestion.

4.6 For new residential developments, the need for a new school on the site and its planned location must be established at the master planning stage in consultation with the council and the LPA, see the Highway Development Management section. This will avoid future issues related to road safety and traffic congestion and ensure that the adoptable carriageway width standard of 6.75m is adhered to on school access roads.

4.7 The design of highways adjacent to new and existing school sites must:

- Encourage active travel options;
- provide 'safe routes to school'; and
- minimise the risk of on-street parking problems.

4.8 These measures will need to be considered as part of the transport assessment for the development, alongside the requirement for a school travel plan. The same requirements also apply to proposals for the expansion of an existing school and provision of new highway close to an existing school site.

4.9 Whilst the council will seek to ensure that sustainable transport opportunities are taken up through the planning process, it is recognised that there will still be a demand for drop-off and pick-up to school by car. Accordingly, the council will seek to ensure that safe off-street drop-off / pick-up provision is provided for at school sites.

Shared surfaces

4.10 MfS suggests that shared surfaces work well in short lengths (doesn't require motor vehicle dominant features) or where they form cul-de-sacs, where traffic is less than 100 vehicles per hour, and where parking is controlled. Care must be taken in the design of shared-surface layouts to ensure that the development's whole design, including building type and layout and use of street furniture conveys to users the nature of the area. Motor vehicles should not dominate, and the layout should not simply appear to be a road without footways.

4.11 It is also important that any shared surface is designed for safe use by people with visual impairments and that they include an alternative means for visually impaired people to navigate by. In accordance with MfS, developers must consult with relevant representative groups and access officers in designing proposals. Guidance in the Royal National Institute of Blind People's (RNIB) Key Principles of Inclusive Street Design, helps designers make positive decisions about provision for people with sight related problems and other disabilities.

4.12 The type of surfacing materials will normally be a secondary feature in defining the nature of the area. It is not normally acceptable to simply use a different material to convey the nature of an area to users. The council will assess the proposed surfacing material for any shared-surface area in terms of safety and effectiveness of design, including proposed housing layouts.

Setbacks

4.13 In addition to accommodating the needs of all road users, green infrastructure and utility equipment, where buildings front directly onto the highway outward-opening windows, drainage downpipes and other adjacent facilities, should be set back at least 0.5m behind the proposed highway boundary.

Inclusive highway

4.14 Principle 6 "Supporting Inclusive Highway" sets out the council's values regarding expectations for the delivery of accessible highway. This principle applies to all road types including those serving employment and

commercial properties. Developers must ensure that they are meeting the statutory duty under the Equality Act 2010 through the design of highway layouts. It is strongly recommended that during the design process reference is made the Department for Transport's "Inclusive Mobility" document and RNIB's Key Principles of Inclusive Street Design.

4.15 In exceptional circumstances the council may consider a relaxation of the 1:20 longitudinal gradient standard on sites with particularly difficult topography. However, relaxations must be a last resort for longitudinal design. The impacts of the development on more vulnerable users must be fully assessed by the developer where this is being proposed. The financial cost of cut/fill is not a material consideration when assessing the ability to achieve gradients to aid active travel options.

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5. General layout and geometry - employment sites

5.1 Table 4 gives the general geometry for internal employment and commercial roads. Generally, both major industrial access roads and minor industrial roads are conventional cross-section roads with separated provision for vehicles and pedestrians, but their designs vary depending on likely levels of heavy goods vehicles (HGVs).

Table 4: General geometry of employment and commercial roads

	Type of internal development road	
	Major industrial access road	Minor industrial access road
Planning use class	B2 and B8	E(g)(i), E(g)(ii), E(g)(iii)
Single-access development limit	Normally no more than 8 hectares	
85th percentile design speed	30mph	25mph
Shared surface	No	
Widths for two-way traffic	Carriageway width: 7.3m	Carriageway width: 6m for E(g)(i) [offices] ; 6.75m for E(g)(ii) and E(g)(iii)
Centre-line radius	55m minimum	Defined by tracking
Crossfall	1:40	

	Type of internal development road	
	Major industrial access road	Minor industrial access road
Longitudinal gradient	Minimum: 1:100 Maximum: 1:20 At junctions: not to exceed 1:30 for first 10m of the side road	
Vertical curves	See paragraph 3.28	
Visibility distance at junctions, bends and vertical crests	70m	45m
Footways and cycleways	Please refer to tables in the Active Travel Section of LHDG	
Verges	Grassed verges minimum 1m wide, minimum area 10sqm. Hard paving otherwise.	
Steps	Not normally acceptable in areas to be adopted as public highway unless a suitable alternative ramp is provided for those unable to climb steps	

Planning use class

5.2 Other use classes, for example shopping and leisure, will be considered on a site-by-site basis and assessment will be dependent on the likely numbers of HGVs.

5.3 The council may recommend planning conditions to restrict change of use from E, B2 and B8 developments unless the roads – including construction specification –are designed to the major industrial road standard or the development layout provides for their future improvement at the developer's expense.

5.4 Where a B1 development is large enough to generate significant numbers of HGVs, a major industrial road may be required. However, provision of a minor industrial access road may be acceptable for B2/B8 developments, such as business starter units, where they only generate a small number of HGVs traffic.

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6. Well-connected road networks

6.1 Well-connected street networks have significant advantages regarding:

- shorter user routing options across a given area;
- the avoidance of reversing manoeuvers;
- minimisation of land-take by avoiding the need for wasteful turning areas at the ends of cul-de-sacs;
- encouraging active travel to local destinations, improving a community's health while reducing motor traffic, energy use and pollution;
- improved personal security and road safety from greater active travel use. Research shows that the presence of pedestrians on streets causes drivers to travel more slowly;
- the provision of services and alternative service routes for utility companies;
- highway and utility maintenance operations. Traffic can be routed around a point of closure if it is necessary to excavate the carriageway for maintenance.

6.2 New residential streets should be designed to form part of a well-connected street network. The tables above provide guidance on limits to development from single points of access for both residential and commercial sites. Developments exceeding these limits will be assessed on a site-by-site basis.

6.3 Developments will typically require at least two access points to the highway network. The number of external connections that a development provides depends on the nature of its surroundings. These access points should be to adoptable standards and available for public use.

6.4 Under limited circumstances cul-de-sacs may provide the best solution for developing difficult sites that, for example are, linear in nature or have difficult topography.

Emergency accesses

6.5 Due to issues relating to misuse and safety, emergency accesses should only be a design option of last resort and a case for their use must be agreed by the council. Additionally, the developer must demonstrate that:

- highway safety is not compromised and the access is not likely be a source of crime or anti-social behaviour;
  there are appropriate means of controlling its use;
- the emergency services have been consulted and the proposals are deemed acceptable. Consultation with the police must include officers that deal with both traffic management and antisocial behaviour;
- the access is designed to safely accommodate all vehicles likely to use it; and
- long-term maintenance responsibilities are clearly defined and secured.

6.6 Failure to provide suitable access arrangements may jeopardise the success of the planning application and result in the council declining the adoption of the road.

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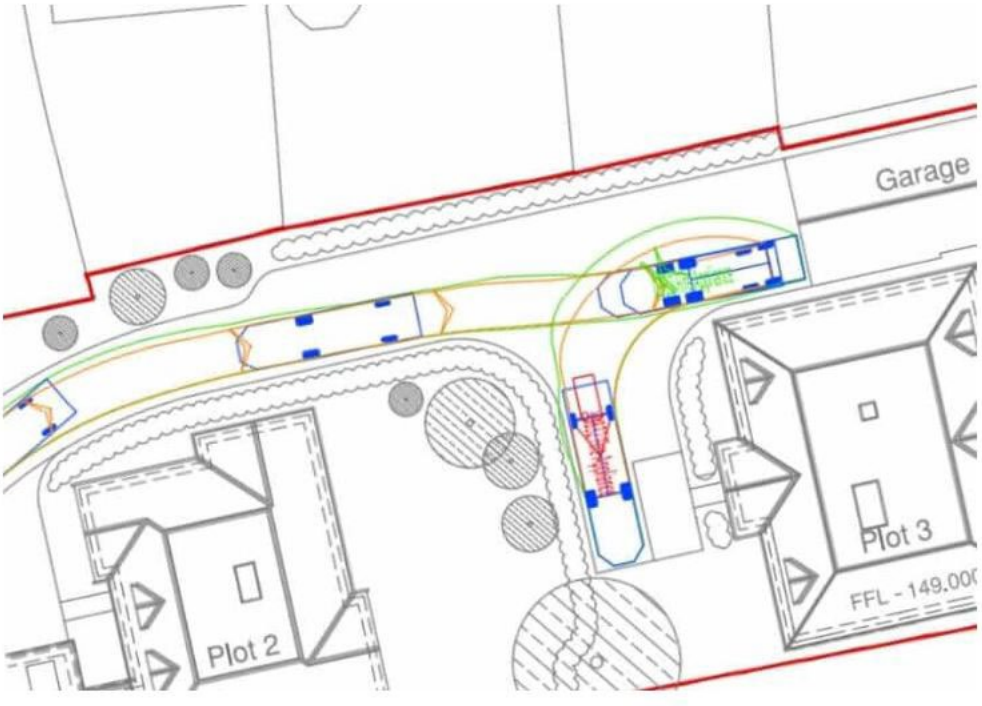
7. Swept path analysis

7.1 Swept path analysis assesses the required width for vehicle movement within the overall width of the road. It can also be used to establish appropriate bend radii. This means that the arrangement of the buildings and the boundaries of the development can be considered first, rather than taking the highway engineering requirements as the starting point for layout design. Building layouts can suit a particular form, with kerblines helping to define and emphasise spaces. The width between kerbs can vary. Further information on how to use swept path analysis is available in the MfS.

7.2 Where tracking of large vehicles results in the use of the whole width of the carriageway to manoeuvre on narrow roads, it is important to ensure that forward visibility to bends, including at junctions, is provided in accordance with Table 6: Visibility splays to enable this to be achieved safely. There should be no recourse to reducing the width of roads that result in cars needing to make use of the whole width of the carriageway to make similar manoeuvres.



Swept Path Analysis example, Image provided by Lapworth Architects

Figure 4: An example of swept path analysis tracking a refuse vehicle

7.3 Following swept path analysis, the widths and bend radii must be checked to ensure that the vehicles expected to use the road layout can manoeuvre safely and effectively, without overrunning of kerbs. The vehicle types might typically include a refuse lorry, fire tender and pantechnicon (such as a removal lorry) and a bus if the development will be served by public transport.

7.4 A minimum modelling speed of 15 kph going forwards and 2.5 kph going backwards is to be used when analysing swept paths. At turning heads and for reversing movements in service yards, the slower, default swept path vehicle speed is acceptable.

7.5 Swept path analysis details are required for 11.2m long refuse vehicles and 18.55m long heavy goods vehicles at turning heads (unless the borough or district already uses a larger vehicle, in which case that vehicle should be used) to ensure they can be satisfactorily navigated.

7.6 Swept path assessments need to take account of any planned or likely on-street parking (See Parking and EVC section).

7.7 The council should be given the opportunity to assess and agree the proposed layout before a planning application is submitted. The layout will also need to satisfy other relevant design guidance for the road type to achieve the design speed and to create a safe environment for all road users, including pedestrians and cyclists.

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8. Vertical curves

8.1 Vertical curves will be required where changes in gradient occur at sags and crests. Except where indicated in the note to Table 5, curve lengths should be either:

- the sum 'K' x 'A', where 'K' is given in Table 5 and 'A' is the algebraic difference of the gradients expressed as a percentage; or
- the 'minimum length for appearance' given in Table 5 whichever is higher.

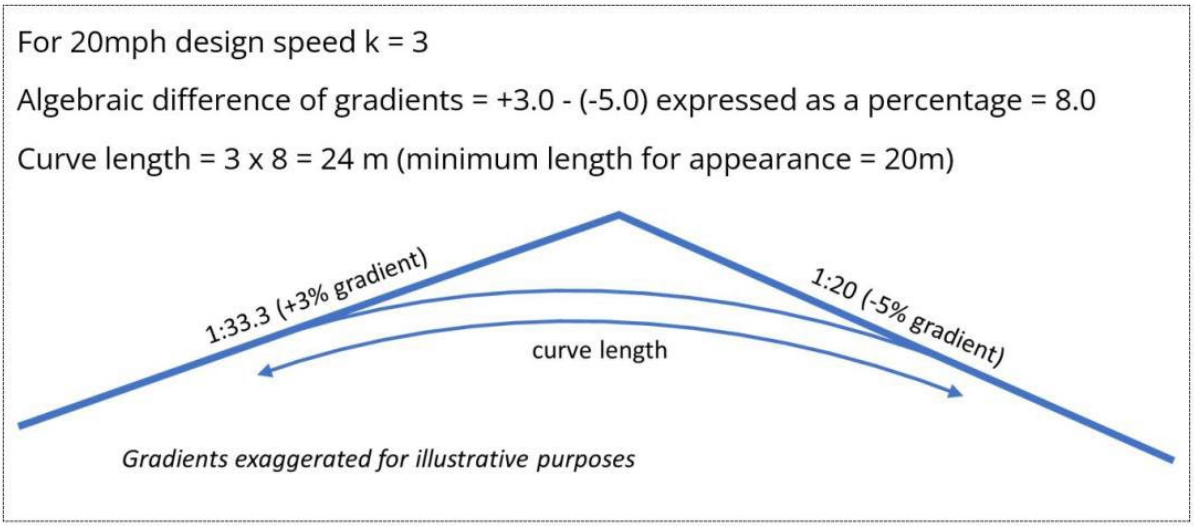

Figure 5: Example calculation of length of vertical curve

8.2 Shorter curve lengths may be acceptable where there are exceptional difficulties in achieving the length normally required.

Table 5: Vertical curves for all internal roads

85th percentile design speed (mph)	Minimum length of vertical curve	
	K	Minimum length for appearance
30 [(a)]	6.5	30
25 [(a)]	4	25

85th percentile design speed (mph)	Minimum length of vertical curve	
20	3	20
15	2	20

a) Design speeds on new residential development roads should be restricted to 20mph or less. Please refer DMRB for speeds above 30mph.

8.3 To avoid stretches of road where water gathers, do not apply the minimum length where "A" is less than five on any sag curve that results in a low point on the road.

8.4 Early discussions should be held with the council regarding large, flat sites to ensure that the vertical alignment is acceptable. It may be necessary to provide combined kerb and drainage units to ensure both an acceptable alignment and drainage of the highway.

8.5 For crests it may be necessary to increase the length of vertical curve derived to achieve the visibility distance as set out in Table 5 above.

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9. Visibility Splays

9.1 For proposed internal development roads, the visibility splay should be based on an assessment of likely 85th percentile vehicle speeds. For existing roads, it should be based on measured 85th percentile vehicle speeds. Where information does not exist, the council requires the developer to conduct surveys in line with the Data Collection section.

9.2 MfS provides guidance on the use of calculated values for Stopping Sight Distances (SSD), for which clause 10.1.3 of MfS states are suitable for streets where the 85th percentile vehicle speeds are up to 60kph (37mph).

Assessing visibility

9.3 The council therefore allows for calculated SSDs to be used for 85th percentile vehicle speeds up to and including 60kph (37mph), and for vehicle speeds above this the DMRB is to be used.

9.4 While considering the design speeds in Tables 3 and 4, the council will assess visibility requirements based on likely vehicle speeds within a proposed development. Where it can be demonstrated that speeds are, in practice, likely to be lower than the design speeds, correspondingly shorter splays may be acceptable. Equally, if speeds are likely to be higher, the splays will need to be correspondingly greater in length.

Table 6: Visibility splays
(Use figures for HGV and buses if these vehicles make up more 5% of actual or predicted total traffic flow)

Assessed likely vehicle 85th percentile vehicle speed (mph)	Measured 85th percentile vehicle speed (mph)	Visibility distance at junctions, bends and vertical crests (m) Light vehicles	Visibility distance at junctions, bends and vertical crests (m) HGV
15	11 to 15	17 [a]	19 [a]
20	16 to 20	25 [a]	27 [a]
Speeds on new residential development roads should normally be controlled to 20mph or less [b]	21 to 25	33 [a]	36 [a]
	26 to 30	43 [a]	47 [a]
	31 to 35	54 [a]	59 [a]
	36 to 40	65 [a]	73 [a]
	41 to 44	120 [b]	120 [b]
	45 to 53	160 [b]	160 [b]
	54 to 62	215 [b]	215 [b]
	63 to 75	295 [b]	295 [b]

[a] Based on the Manual for Streets documents, 'adjusted for bonnet length'

[b] Based on DMRB, desirable minimum criteria for deceleration rate (0.25g) and reaction / perception time (2 seconds). The application of a higher

standard value for deceleration rate and a lower standard value for reaction time would need to be based on a robust evidenced justification for the location under consideration to be agreed with the council.

9.5 Calculated values will be accepted for actual agreed 85th percentile speeds.

9.6 Where speed is assessed to be over 20mph, splay provision will normally be based on the appropriate measured 85th percentile vehicle speed distance.

9.7 For all road types within a development, visibility (at junctions, bends or crests) in the vertical plane should normally be measured from a driver's eye-height of no less than 1.05m above the road surface to a point no less than 0.6m above the road surface. On roads outside of the development, for example at the site access, the visibility should be measured from an eye-height of not less than 1.05m to a point not less than 0.26m, in line with the DMRB. However, if roads fall within the definition of a road (street) as defined in the "Road design and layout", visibility can be measured as if the road lies within a development.

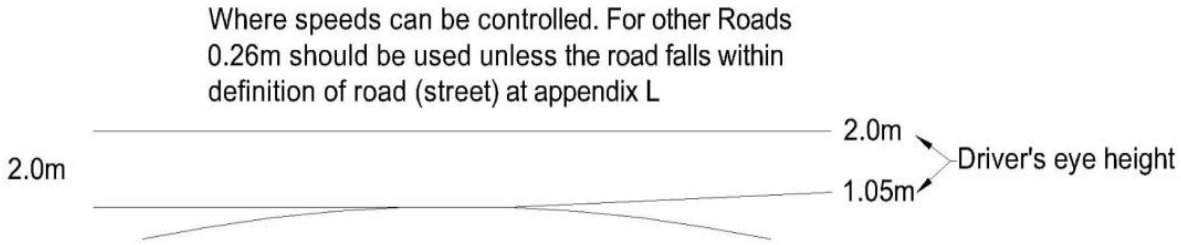

Figure 6: Crests in road (brow of hill)

Designing of visibility splays

9.8 For all horizontal visibility splays, the rear of a footway, cycleway or similar should coincide with (match) the rear edge of the visibility splay. A more accurate assessment of visibility splay is made by measuring to the nearside edge of the vehicle track. The measurement is taken from the point where this line intersects the centreline of the minor arm unless there is a splitter island in the minor arm.

9.9 Figure 7 shows an offset visibility splay 1m from the kerbline. Whilst this does not conform to MfS or DMRB requirements (which require no offset), it represents a permitted relaxation under LHDG guidance.

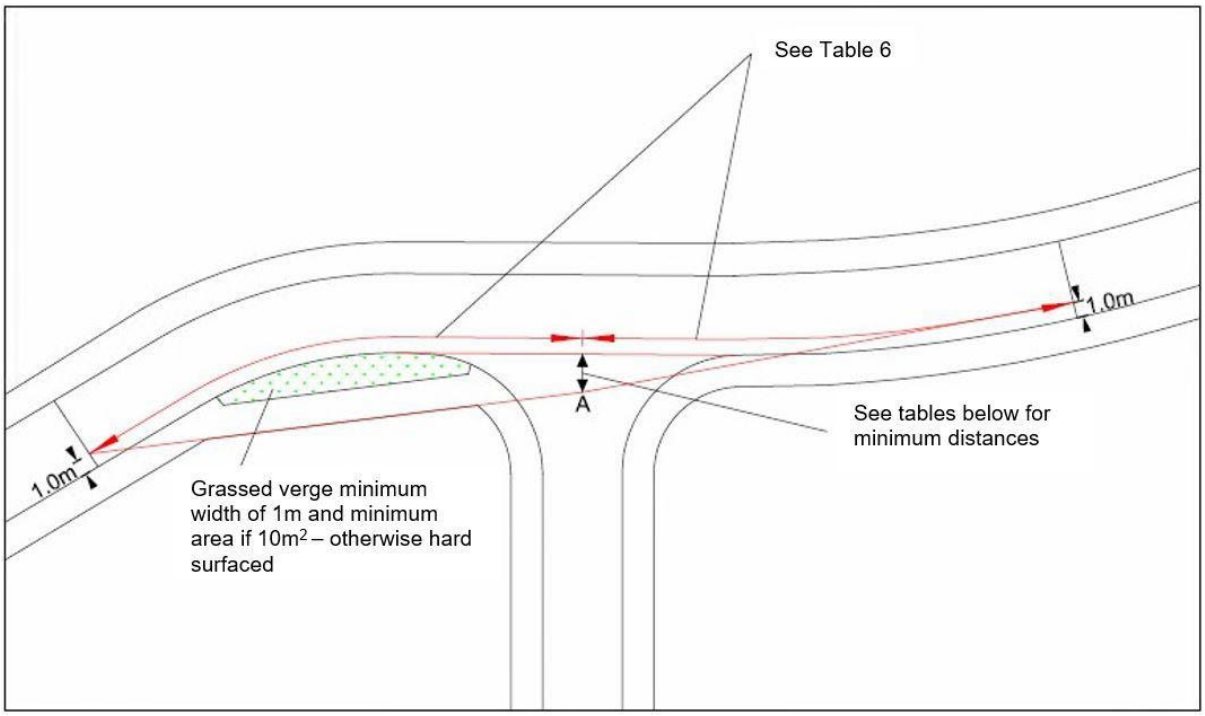

Figure 7: Visibility at junctions

9.10 The required set back will depend on scale and nature of proposed development. The council will accept a minimum set-back distance of 2.4m (i.e. to point 'A) unless a greater set-back distance is required for junction capacity reasons. 4.5m will be required for all major industrial access roads and for those minor industrial access roads where the scale of development and volume/nature of traffic movements dictate it necessary.

9.11 Developers should refer to DMRB CD123 Clause 3.9, where the junction is on the outside of a bend.

9.12 Evidence that the correct vertical visibility can be provided for the junction visibility splay will also be required. This should be achieved by producing a long section along the line of the visibility splay.

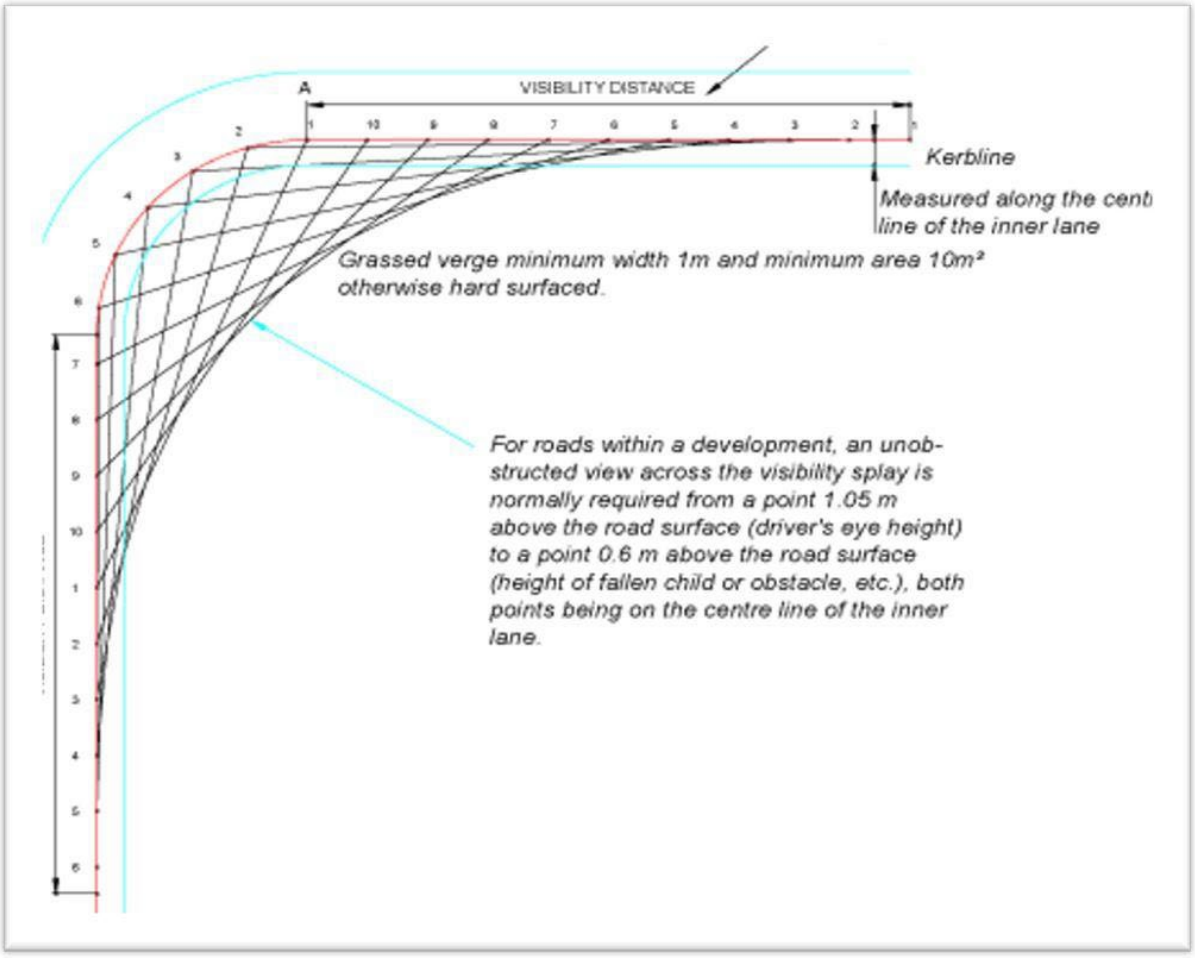

Figure 8: Designing bends

Widening at Bends

9.13 On residential roads serving more than 25 dwellings, carriageways should be widened at bends that curve through more than 10 degrees.

Table 7: Residential roads – widening on bends

Centre-line radius (m)	20	30	40	50	60	80
Minimum widening	0.60	0.40	0.35	0.25	0.20	0.15

9.14 Bends should be widened in industrial and commercial developments.

Table 8: Industrial and commercial roads – widening on bends

Centre line radius (m)	55 to 74	75 to 89	90 to150
Minimum widening	1.2	0.7	0.6

9.15 For any proposals not conforming to the figures in the above tables, vehicle swept path analysis must be produced to show that the proposed layout can accommodate appropriate vehicles without danger to other road users, including pedestrians and cyclists. There should be no overrunning of the centreline or kerbline and no overhanging of footways by vehicles.

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10. Junction type, geometry and spacing

10.1 For guidance on active travel crossings at side roads please see the Active Travel Section of the LHDG.

Principles of junction provision

10.2 Basic junction forms should be determined at the concept layout (master planning) stage with the more detailed proposals provided as the development proposal evolves.

10.3 Whilst Figure 7.9 of MfS identifies a range of possible junction types, The council expects junctions designs to be in the form of:

- a priority T-junction;
- a staggered priority junction at a 90° angle to the main road;
- a mini-roundabout - mini-roundabouts are acceptable where they form part of a more comprehensive traffic-calming scheme that is either required to reduce the development's impacts or that has previously been identified.

10.4 The council recognises that for roads with high expected flows and/or speeds, or site accesses that require a high level of operational capacity, a compact / full roundabout or signal controlled junction may be required. Such circumstances will be considered on their own merits and the council recommends early discussions in this respect.

10.5 Any design that deviates from the council's expected layout above should be accompanied by a designer's risk assessment to ensure the safety of the junction is not compromised. The council reserves the right to refuse to adopt roads where it is considered junction design is inappropriate.

10.6 Provision of priority-controlled ('give way') crossroads should be avoided. In circumstances where directly opposing junctions are the only option, a justification for their use must be made to the council. In this context, the provision of a roundabout controlled junction would be the expected form of control.

Priority junction provision

10.7 Table 9 below shows the expected geometric requirements for all priority junctions within different development types including external junctions including, subject to circumstances. Please also refer to Materials and Construction "Signing and Lining"**.**

10.8 Please note that, where a corner radius is less than 7.5m, footway strengthening must be provided. Please see Materials and Construction "Road Pavement".

Table 9: Priority junction geometric requirements

Development type	Road type	Corner radii (metres)
Residential	Entry to a Residential access way or road or junction between access ways and roads	6m
Industrial and commercial Use class B1 offices	Entry to Minor industrial access road or junction between access roads	6m
Industrial and commercial Other B1 uses	Entry to Minor industrial access road or junction between access roads	10m
Industrial and commercial Use classes B2 to B8	Entry to Major industrial access road or junction between access roads	See Figure 9 below

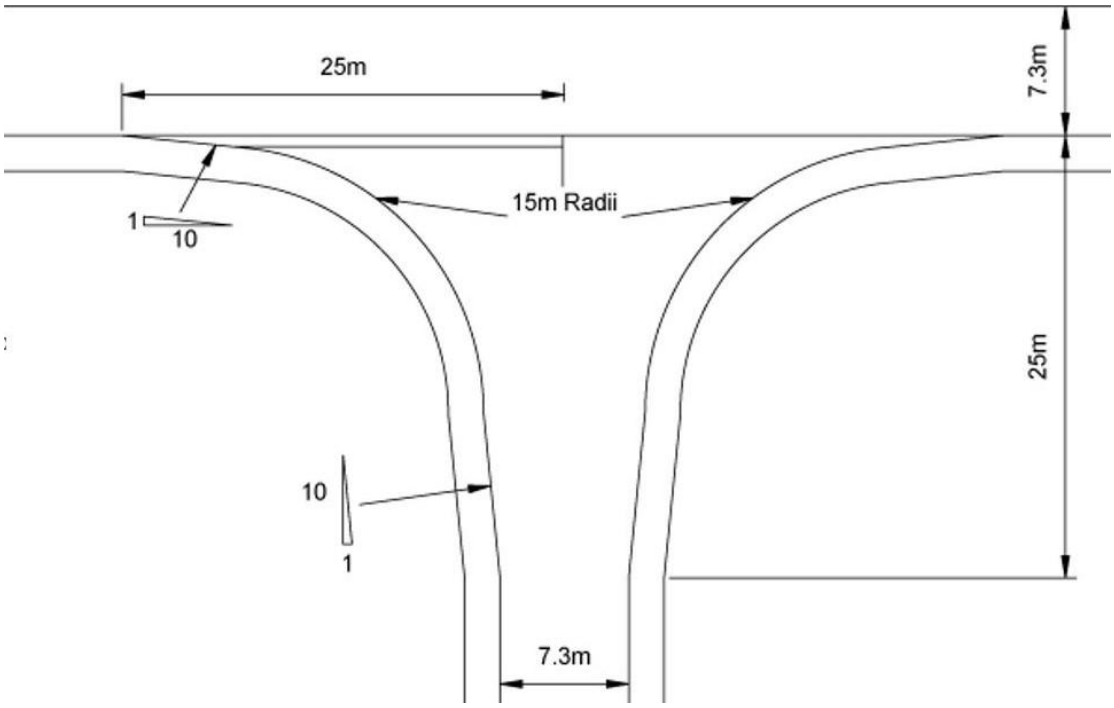

Figure 9: Priority junction geometric requirements

10.9 Development types not listed will be considered on a site-by-site basis.

10.10 Radii based on road widths set out in Table 3 and Table 4 above, where roads meet at an angle of 90 degrees. For other circumstances (including any proposals for tighter radii), tracking assessments will be required (see paragraph 3.21) of the proposed layout.

10.11 Other factors will be considered in assessment of the junction proposals, including the likelihood of on-street parking problems in the vicinity of the junction and whether the roads are likely to form part of a bus route.

Junction spacing

10.12 Road junctions on the same side of a road should be spaced so that a vehicle waiting to enter the main road at one does not interfere with visibility for a vehicle waiting at another.

10.13 Opposite side spacing should be half of the forward visibility required for same side junctions.

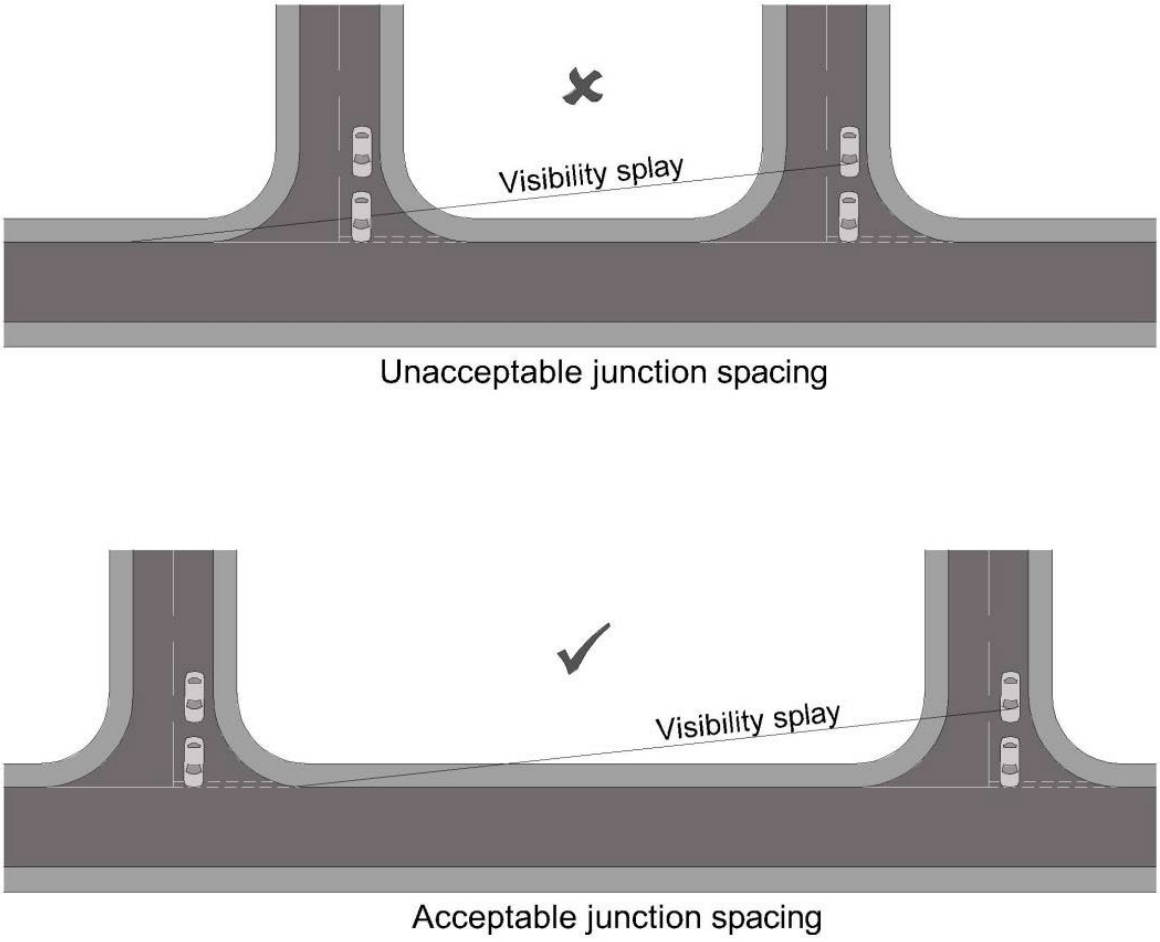

Figure 10: Junction spacing

Private access restrictions

10.14 Vehicle access should not be provided:

- within the vicinity of the junction, with consideration of the status of the major road (in terms of class, daily volume, 85th percentile etc.);
- on to the corners (radii) of the junction;
- at bus stops or lay-bys;
- close to a pedestrian or cycle refuge;
- close to a traffic-calming feature (accesses should not be sited on the ramp of a road hump or speed table due to the risk of a vehicle grounding as it manoeuvres into or out of the access); and

- close to street furniture (see Materials and Construction "Street Furniture and Art").
- Where vehicle movement is the primary function of highway (distributor road or similar).

10.15 Accesses will normally be acceptable where they comply with LHDG policy in relation to safety and functioning of the highway network and the National Planning Policy Framework. Junctions must also comply with the guidance on the design of private accesses.

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Leicestershire County Council

11. Turning heads

Locating turning heads

11.1 A turning head should be provided at the end of all cul-de-sacs or wherever vehicles would otherwise have to reverse over 20m or more. Turning heads should also be provided where turning vehicles might damage adjacent verges or footways. Figures 11-14 show the minimum turning dimensions and areas. Tracking details are required for turning heads to ensure that a 11.2m long waste/recycling vehicle can satisfactorily negotiate a turning area.

11.2 Careful consideration must be given to the design of the development surrounding the turning head to ensure that its use is not reduced by on–street parking. Where on-street parking is likely to cause problems, measures must be taken to control it (see "Parking Provision").

11.3 The use of a residential square or similar as an alternative to a turning head may be acceptable where it can be shown that it is unlikely to be impacted by on-street parking. Clear details will be required of who is responsible for maintenance. Where it is intended that the council adopts any extra areas, a commuted sum for future maintenance will be required.

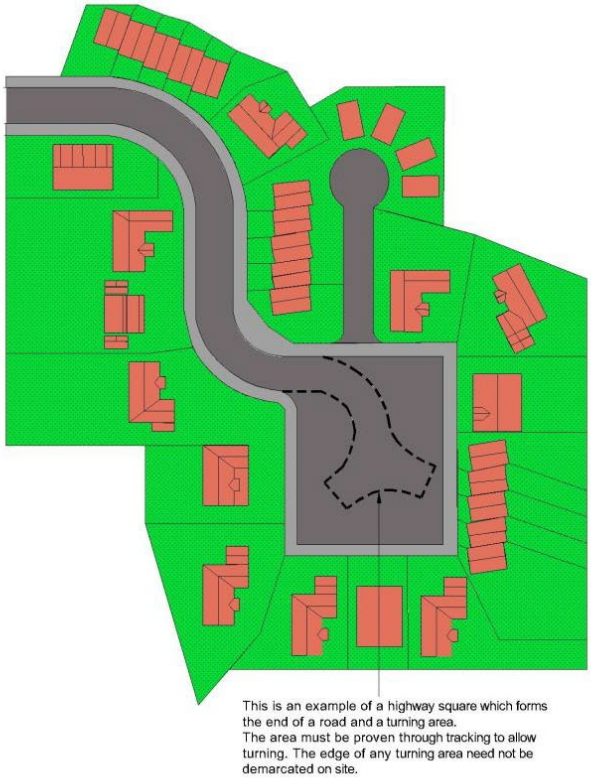

Figure 11: Example turning head with square

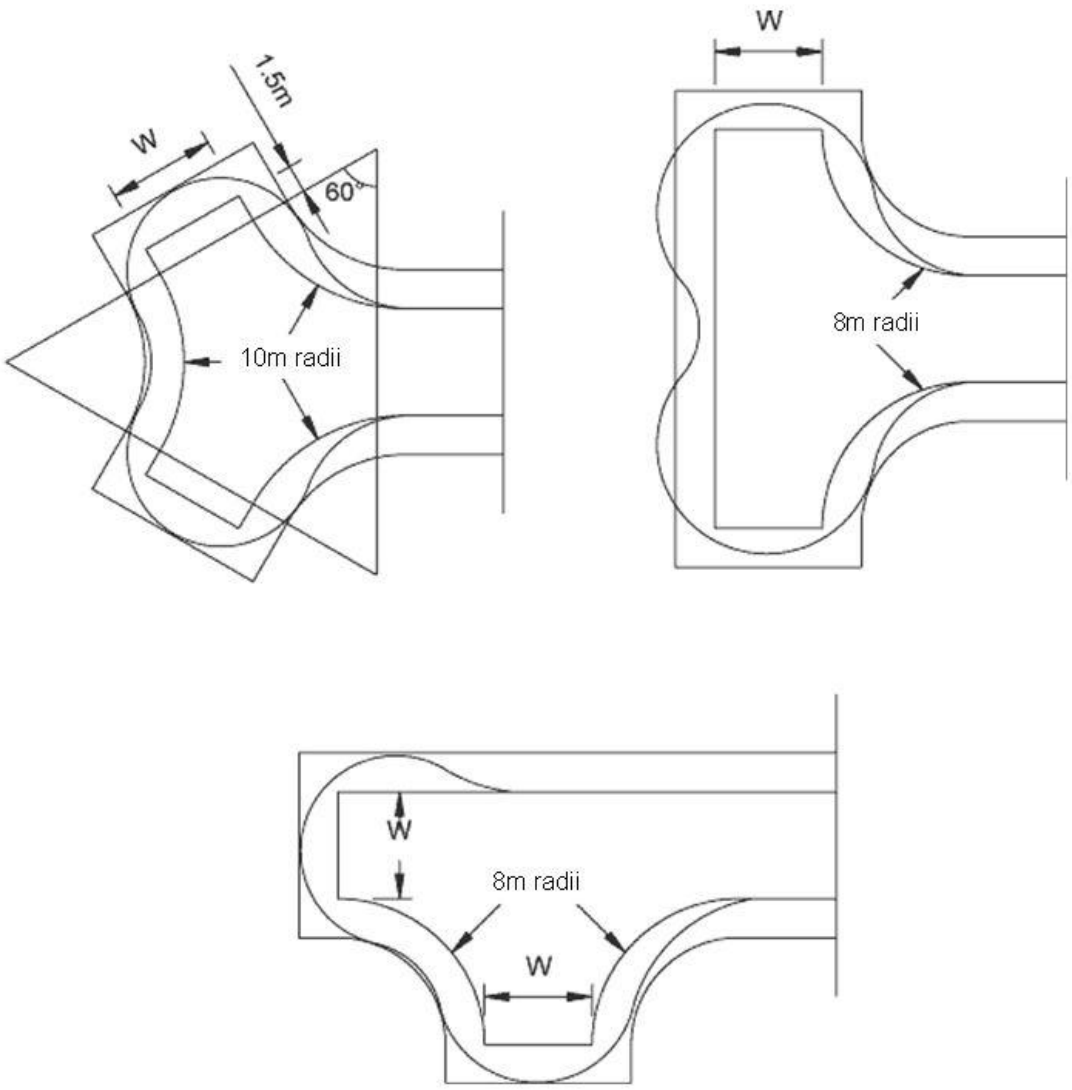

Figure 12: Turning heads residential and minor industrial

W = 4.8m up to 50 dwellings

W = 5.5m from 50 - 400 dwellings

W = 6m for E use class office developments

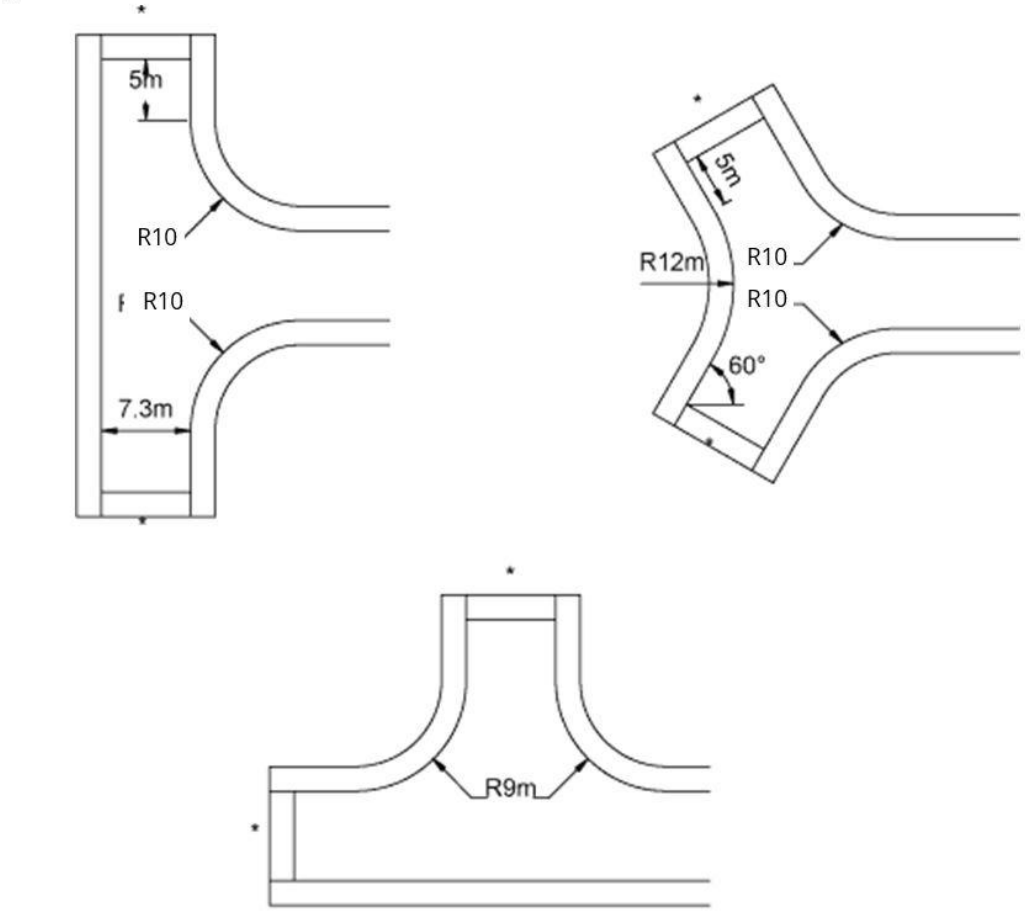

Figure 13: Turning heads for use on industrial and commercial estate roads

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12. Mixed-use developments

12.1 In the interests of road safety and to reduce environmental impacts, commercial and employment developments that generate larger goods vehicles should be segregated from residential areas. Layouts should be designed so that commercial and employment traffic does not need to use residential roads.

12.2 To support sustainability, the council may accept mixed-use developments that include small commercial premises that generate limited goods vehicles, such as offices or a shop, particularly in or close to town centres.

12.3 The materials and construction methods used for a road must be based on the largest vehicle expected to use it.

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13. Developments served by private drives and areas

13.1 section provides design guidance on private drives and areas. For guidance on the Advance Payments Code (APC), please refer to the sections on Adoptions and Approvals. A private or unadopted road is owned, maintained and controlled by a private person, persons or corporation rather than the Local Highway Authority. Private roads are not usually open to the public.

Design principles

13.2 The council will encourage developers to create 'road' layouts that are to an adoptable standard and that will be offered for adoption where they directly serve/front:

- at least 6 residential dwellings;
- employment sites with more than one building;
- one commercial building with multiple-occupancy employment; and
- commercial developments (occupied by more than one company).

13.3 Where highway remains private, issues for both the developer and house purchasers can involve:

- liabilities for future maintenance;
- public liabilities;
- street cleansing responsibilities;
- lack of specific pedestrian facilities;
- no guarantee of the suitable standard of lighting or drainage being provided;
- Limitations to statutory powers for both the Local Highway Authority and the police.

13.4 Should highway within private areas become poorly maintained, this can detract from the quality, appearance and future value of a development.

13.5 Private developments are typically in the form of a cul-de-sac. Private 'through' routes must not be provided as they are more likely to be used by

the public, possibly adding to the liabilities and future problems for residents.

13.6 For private roads, the council will normally serve a notice on developers with an assessment of the cost of the proposed roadworks under the APC, to protect frontagers' interests. This does not apply to exempted employment and commercial development.

13.7 If it is clearly indicated that development roads are to be private, the developer will be required to:

- deposit a map with the council under Section 31 (6) of the Highways Act 1980 identifying the roads which are to remain private (and any to be adopted, as appropriate);
- At the developer's expense, erect and maintain road signs indicating that the roads are unadopted;
- evidence that potential future residents have been informed of the unadopted status of the road and what this would mean to them in practice;
- evidence that future maintenance of the roads is secured;
- Indemnify the council against future petitioning by residents to adopt a road under Section 37 of the Highways Act 1980; and
- clearly mark the boundary between private and publicly maintained General geometry for site access to the external road network

13.8 In all cases, highway access proposals must be acceptable to the LHA regarding the safety of highway users, functionality of the network and location (see figures below). Under certain circumstances, such as an access to high-speed carriageway, a design to a higher standard such as DMRB will be required.

13.9 Office developments (use class E(g)(i)) up to 3000m2 gross floor area (GFA) may be served by a dropped-kerb access arrangement as shown in Figure 16. However, if this option is chosen, the council will recommend imposing planning conditions that restrict any change of use to general employment (use class B2 to B8). Depending on the scale of the development, the

council's specific approval will be required for the construction details of the access.

13.10 Depending on the scale of the development, a site access point should accord with either Figure 14, 15 or 16. If layouts to Figure 14 and 15 cannot be achieved, the council may advise refusal where there are highway safety concerns.

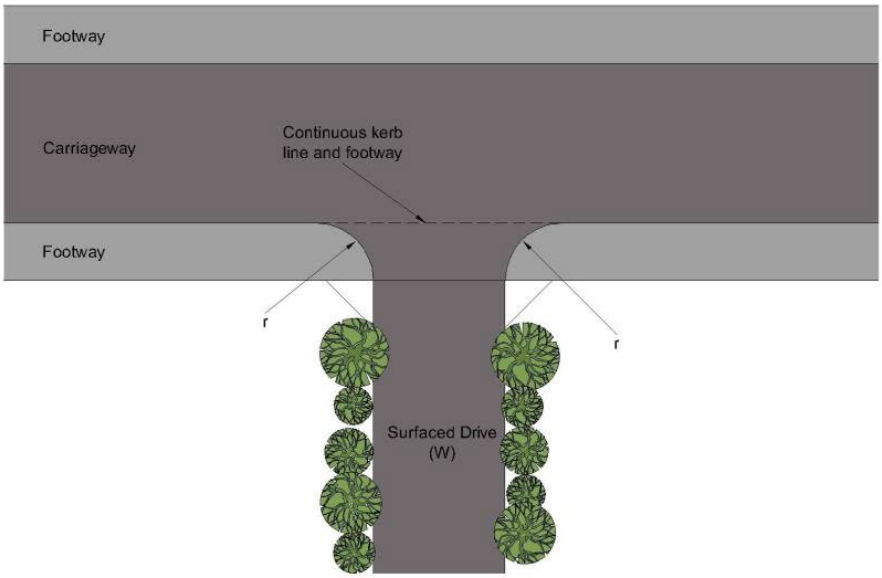

Figure 14: Design of unadopted shared drive for up to 25 dwellings

Table 13: Unadopted residential drive serving up to 25 dwellings

Minimum effective width	Single dwelling = 2.75m Two to five dwellings = 4.25m for a minimum distance of 5m behind the highway boundary. Six to 25 dwellings = 4.8m for a minimum distance of 5m behind the highway boundary If the driveway length is more than 25m, its minimum width should be 5m (plus any widening, where bounded by walls) to enable access by refuse vehicles (In all cases add 0.5m if bounded by a wall, fence, hedge, line of trees or other similar obstruction on one side, 1m if bounded on both sides. Also see Swept path analysis regarding refuse collection and Well connected network. Add 0.5m if bounded by a wall on one side, 1m if bounded on both sides. Also see Swept path analysis regarding refuse collection and Well connected network.	
Minimum drop crossing	For lightly trafficked residential streets [(a)]	For classified or highly trafficked streets [(b)]
Single dwelling	4 dropped kerbs (3.7m)	7 dropped kerbs (6.4m)

2 to 5 dwellings	6 dropped kerbs (5.5m)	8 dropped kerbs (7.3m)
6 to 25 dwellings	8 dropped kerbs (7.3m)	10 dropped kerbs(9.2m)
	In certain circumstances, such as when parked vehicles restrict access, it will be necessary for a longer drop crossing to be provided. Demonstration that an access is suitable may be required by providing an appropriate vehicle swept path assessment.	
Vehicle visibility splays	As in Table 6, measured from a setback of 2.4m	
Pedestrian visibility splays	Normally 1m x 1m both sides (no planting permitted) unless there are local circumstances which apply e.g. a significant pedestrian traffic generator is located in the vicinity (such as a school, playground or playing fields etc.) in which case 2m x 2m is required	
Gradient	Preferably not greater than 1:20 for first 5m from behind the highway boundary, (for 6-25 dwellings not greater than 1:30 for the first 10m), and should never exceed 1:12m (assuming the gradient in the highway is in accordance with the standard drawing)	

Surfacing	Bound material, for example, bituminous or concrete, or block paving for at least the first 5m from behind the highway boundary (assuming the gradient in the highway is in accordance with the standard drawing)
Gates and gradient	Preferably not greater than 1:20 for the first 5m (6m where they open outwards) from behind the highway and should never exceed 1:12.

(a) Typically, this includes streets which primarily serve a place function and have 85th percentile speeds of 30mph or less and where encroachment on the opposite traffic lane when exiting the site is not considered to create a safety hazard.

(b) Typically, this includes streets which primarily serve a movement function and have 85th percentile speeds of 40 mph or less and where encroachment on the opposite traffic lane when exiting the site should be minimised.

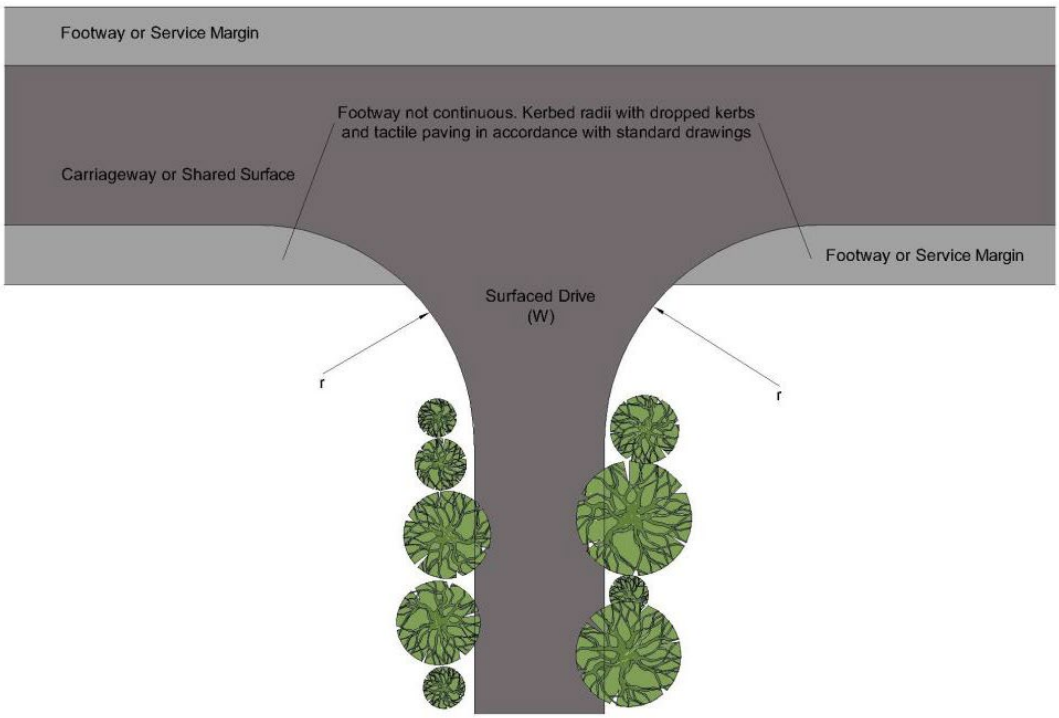

Figure 15: Design of unadopted shared drive for more than 25 dwellings

Table 14: Unadopted shared residential drive serving more than 25 dwellings

Minimum effective width (w)	5.5m Add 0.5m if bounded by wall on one side, 1m if bounded on both sides. Also see Swept path analysis regarding refuse collection and Well connected network(link is external and opens in a new window).
Minimum kerbed radii (r)	6m

Vehicle visibility splays	As in Table 6, measured from a setback of 2.4m
Pedestrian visibility splays	Normally 1m x 1m both sides (no planting permitted) unless there are local circumstances which apply e.g. a significant pedestrian traffic generator is located in the vicinity (such as a school, playground or playing fields etc.) in which case 2m x 2m is required
Gradient	Preferably not greater than 1:20 for the first 5m from behind the highway and should never exceed 1:12
Surfacing	Bound material, for example, bituminous or concrete, or block paving for at least the first 5m from behind the highway.
Gates and gradients	Preferably not greater than 1:20 for the first 5m (6m where they open outwards) from behind the highway and should never exceed 1:12.

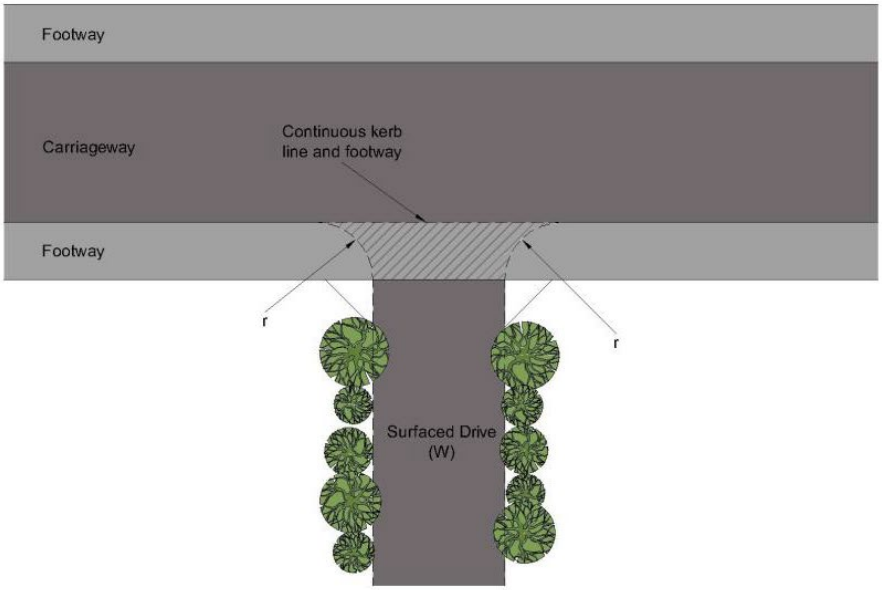

Figure 16: Design of unadopted access serving up to 3000m2 gfa of offices

Table 15: Unadopted access serving up to 3000m2 GFA of offices

Minimum effective width (w)	6m (Add 0.5m if bounded by a wall on one side, 1m if bounded on both sides.)
Minimum kerbed radii (r)	6m
Vehicle visibility splays	As in Table 6 and Fig 9, measured from a setback of 2.4m
Pedestrian visibility splays	Normally 1m x 1m both sides (no planting permitted) unless there are local circumstances which apply e.g. a significant pedestrian traffic generator is located in the vicinity (such as a school, playground or playing fields etc.) in which case 2m x 2m is required. No planting permitted

Gradient	Preferably not greater than 1:20 for first 15m behind the highway, and should never exceed 1:12
Surfacing	Bound material, for example, bituminous or concrete, or block paving for at least the first 15m behind the highway

General layout of a private development

13.11 Even if a road is not to be adopted, it should be ensured that:

- layouts are safe (both in terms of road safety and personal safety);
- the design is accessible to all likely users, including those with mobility impairments; and
- turning facilities are provided where a proposed development takes access from a road with a speed limit above 40 mph, or for roads subject to speed limits less than 40 mph on any road carrying 300 vehicles per hour at its peak. Elsewhere, turning facilities will not normally be required unless road safety would be compromised.

13.12 Provision of turning facilities will ensure as far as possible that vehicles can use an access without having to reverse onto or off the road. In any location, vehicles reversing can present dangers for others, including pedestrians.

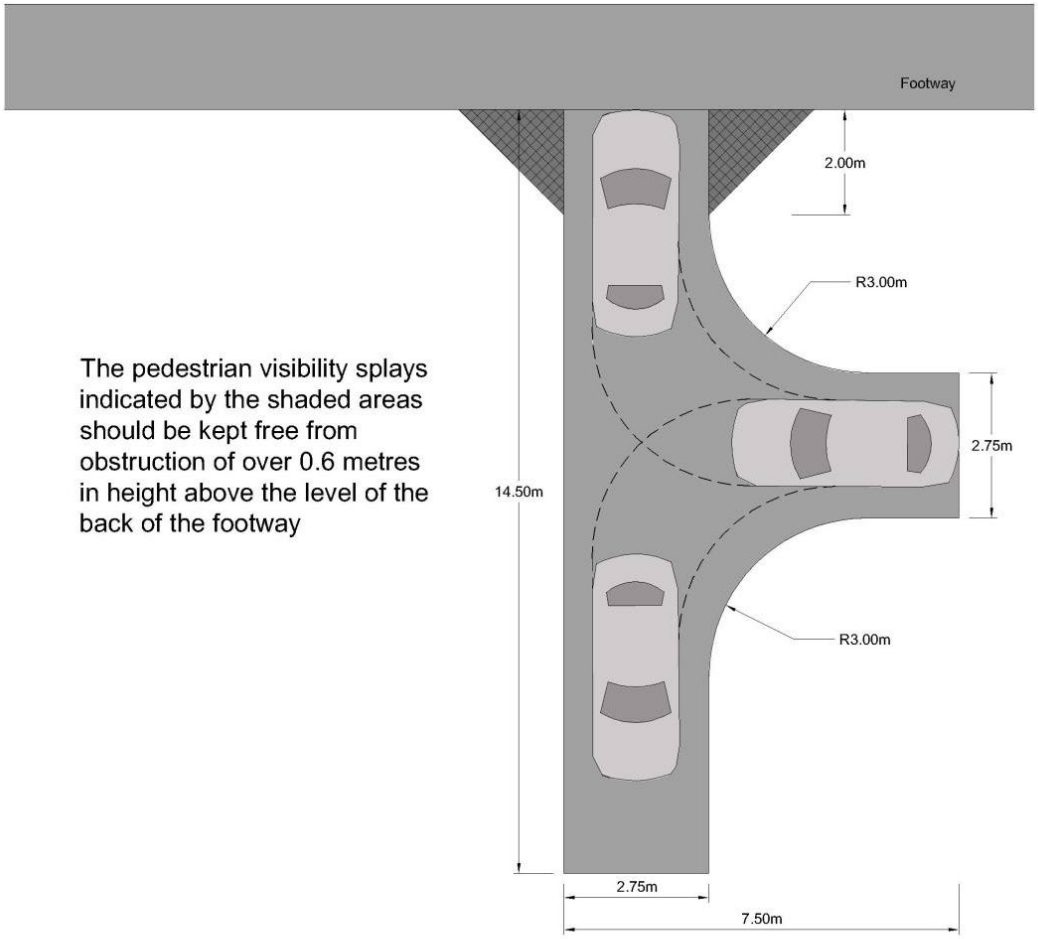

Figure 17: Design of private drive turning facilities

13.13 For long drives and accesses, Building Regulations Approved Document B, Fire Safety 2006, must be considered regarding access for refuse collection and emergency vehicles. The regulations set out a maximum carry distances of 25m for residential refuse collection. Where this distance is exceeded, the British Standard recommends:

- a minimum drive width of 5m;
- providing turning heads within the site; and
- constructing the drive so it can carry a refuse vehicle.

13.14 The layout of the development should include measures to ensure that parked vehicles do not prevent the use of turning heads. The provision of a communal collection point for wheelie bins, close to the highway, should be provided within the site.

13.15 Where a development is situated more than 45m from the highway, emergency vehicles must be catered for by constructing the drive and any turning areas so they can accommodate commercial or service vehicles. The minimum width for access should be at least 3.7m (between kerbs) and fire vehicles should not have to reverse more than 20m. Development must be in line with British Standard BS5906, 2005 and Building Regulations Approved Document B, Fire Safety 2006.

Garages and gated accesses

13.16 "On plot" garages to individual properties should be located so that:

- cars can park in front of the garage doors; and
- garage doors can be opened while the car is on the drive (see Table 16) without the obstructing any part of the highway.

13.17 Setting back garage doors enables a vehicle to stand clear of the highway while garage doors are opened or closed so as not to block footways and endanger pedestrians.

13.18 Where an access is to be gated, the gates should be set back 5m where they open inward and 6m where they open outwards. This is to ensure that the public highway (particularly areas used by pedestrians) is not obstructed if a vehicle is parked on the access in front of the gates.

Table 16: Garage set-back distances

Garage door type	Minimum distance from highway boundary
Roller-shutter, sliding or inward opening	5.5m
'Up-and-over'	6.1m
Hinged, outward opening	6.5m

13.19 Garages should have the following minimum internal dimensions.

- Standard single = 6m x 3m, with minimum door width of 2.3m.
- Additional accessibility requirements = 6m x 3.3m with minimum door width of 2.8m.
- Double = 6m x 6m, with minimum door width of 4.2m.

13.20 If a dwelling has no separate parking for cycles, it may affect whether a garage should be counted towards parking provision.

13.21 During the planning process the developer should assess the requirements for provision of garages to the disability standard.

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