

Place & Movement Planning and Design Guidance for Hertfordshire Part 4

Hertfordshire County Council Highways and Growth & Environment



Chapter 1

Introduction to Detailed Design & Specification

Contents

Introduction

- 1.1** Part 4 of the Highways Planning & Movement Planning and Design Guide (PMPDG) sets out how a general design submitted within a planning application, or the general arrangement (in the case of permitted development schemes) can be translated into detail designs, specifications and requirements during the construction phase.
- 1.2** It covers the standardised project stages from Full Planning Permission to Adoption and the LTP4 Compliance gateway for 'Approval':
- DfT Local Major Projects Business Cases
 - HCC Medium Sized and Major Capital Projects included within the LTP4 Delivery Plan
 - Minor schemes HCC Integrated Transport Projects (ITP) within the Integrated Works Programme (IWP)
 - Developments
- 1.3** Requirements for the 'Lessons Learned Gateway' are covered in Part 1, Chapter 4: LTP4 Compliance.

LTP4 Compliance Testing Gateways

Project Type Place & Movement Planning and Design Guide Part 4							
Business Case Preparation			FBS				
HCC LTP Delivery Plan Transport Projects	Stage 5: Contract Preparation	Gateway 5a: HCC Funding Approval	Stage 5b: Procurement	Gateway 5b: Final Approval	Stage 6: Delivery	Gateway 6: Delivery	Stage 7: Maintain & Operate
	Final Design & Cost Estimate	Decision to proceed to tender	Final Appraisal. Tenders returned and assessed.	DfT & HCC Funding Approval. Contract Award	Construction	Adoption	
HCC ITP Schemes	IWP Delivery Phase						
	Stage 2c - Final Design	Sponsor Approval to Proceed	Stage 3a - Procurement	Stage 3a - Contract Award	Stage 4 - Mobilisation & Construction	Stage 5 & 6 - Post Works Activities & Project Closure	
Developments	Technical Approvals	Section Agreements Prepared		Construction		Adoption	
LTP4 Compliance Testing Gateways		Test 4: Approval - Final Design & Section Agreements				Test 5: Post Construction - Lessons Learned	

Delivering LTP4 Compliant, Integrated Design

- 2.1** This Part helps Scheme Promoters deliver schemes and developments based on the [LTP4](#) compliant strategies and general designs accompanying the approved planning application.
- 2.2** Continuity of policy compliance is particularly important to maintain between the planning approval and the final scheme design as there can often be changes in personnel and/ or time lags between the two, during which the golden threads could otherwise be lost.
- 2.3** The Signing of Section Agreements for developments, the approval to Seek Tenders for HCC major capital projects and the Sponsor Approval to Proceed with HCC's ITP projects are all Gateways that require a final compliance check before commitment to implementation. This check will help ensure that the golden threads are maintained.
- 2.4** Following on from the strategies and outline designs the resulting schemes and developments should have integrated the needs for Place and Movement (P&M), accessibility, safety, health, security, local character, speed management, routes to school, parking, considerations of future maintenance, soft and hard landscape, without conflict, whilst reinforcing the priorities for sustainable travel above other modes.
- 2.5** The Design Menu Cards in Part 3, Chapter 1 for each P&M category provide a handy guide and signpost to appropriate design standards and highway features for use within the detailed and final design described in this Part of the guidance.

Chapter 2

Designing for Walking

Contents

Introduction

- 1.1** This Chapter sets out detailed, technical guidance for the final design of features designed to support walking, which is the principal form of travel for trips under 1 mile and shall be provided for accordingly.
- 1.2** In following the guidance set out in Part 3 the planning application or the general arrangement for the permitted development of highway schemes should already have included proposals for well aligned footways and footpaths that follow a direct route from point to point, having reasonable and practicable gradients and be sufficiently wide and free of obstruction to enable different users (pedestrians, prams, wheelchairs, etc.) to pass each other freely.
- 1.3** Crossing points and the nature of crossings should also have been identified in accordance with Part 3, Chapter 9: Planning Highway Junctions & Crossings.

Design standards

- 2.1** The design standards used throughout this guidance to support walking are derived from the following documents:
 - [LTN 1/20 Cycle Design Infrastructure](#)
 - [LTN 1/08 Traffic management and streetscape](#)
 - [DfT Manual for Streets \(2007\)](#)
 - [CIHT Manual for Streets 2](#)
 - [DfT Inclusive Mobility: A Guide to Best Practice on access to Pedestrian and Transport Infrastructure \(2021\)](#)
 - [DfT Guidance on the use of tactile paving surfaces \(2021\)](#)
 - [DMRB CD 143 Designing for walking, cycling and horse-riding \(2020\)](#)
 - [DMRB CD 127 Highway Cross-sections \(2020\)](#)
 - [DMRB CD 123 Geometric design of at-grade priority and signal-controlled junctions \(2020\)](#)
 - [DMRB CD 116 Geometric design of roundabouts](#)
 - **IHT Providing for Journeys on Foot (2000)**
 - [TSM Chapter 6 Traffic Control \(2019\)](#)
 - [CIHT Designing for Walking \(2015\)](#)
 - [CIHT Planning for Walking \(2015\)](#)

- 2.2** Designers should understand HCC's requirements for designs that minimise and facilitate future maintenance as set out in their Maintenance for Active Travel Strategy which is part of the [Highway Infrastructure Asset Management Plan \(HIAMP\)](#).

Application of Design Standards

- 3.1** The standards referred to in this Chapter are defined in three levels as outlined below:

Recommended

Designers should aim to adopt these standards as the first choice wherever possible.

Acceptable Limits

Whilst it is acceptable for designers to use these standards, their use should be limited, and they shall carefully consider the impact on Non-Motorised Users (NMUs). The use of this category should be documented through the Technical Review process.

Absolute Limits – Departure from Standards

Provision of new facilities below Acceptable Limits will result in a poor standard of provision. As such the scheme promoter should submit the scheme proposal to Design Review Panel so that the overall objectives of the scheme can be reviewed and potential alternative solutions can be discussed.

Absolute Limits are sometimes referred to as absolute minimum in various national standards, but they constitute a Departure from Standard within Hertfordshire.

If there is no alternative solution but to adopt a standard below the Acceptable Limits then a Departure from Standard shall be sought from HCC.

Departures below the Absolute Limit will not be accepted.

User Space requirements

- 4.1** Part 3, Chapter 3: Planning Walking Infrastructure contains the guidance on minimum standards for the geometry of footways and footpaths required to be demonstrated within a planning application or in the general arrangement for a permitted development highway scheme.
- 4.2** These are based on the space requirements of the different users as shown in Figures 1-3 below, which should also be considered when detailing the final design of all public realm.
- 4.3** Recycling and waste bin storage and collection should be designed so as to minimise obstruction of footways on collection days.

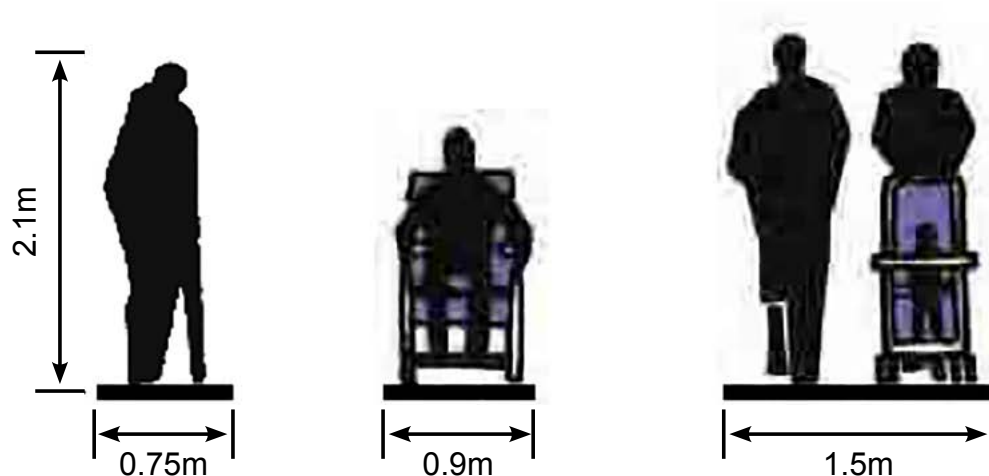


Figure 1
Pedestrian dimensions (Source: [Manual for Streets](#))

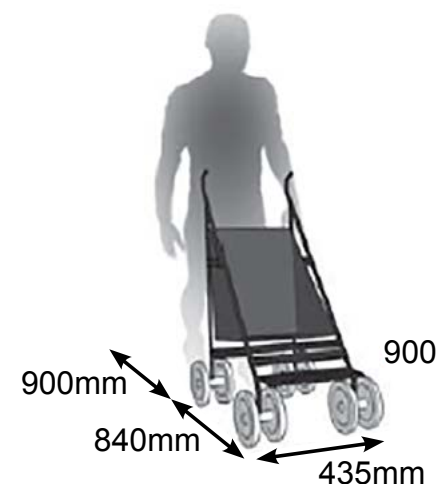
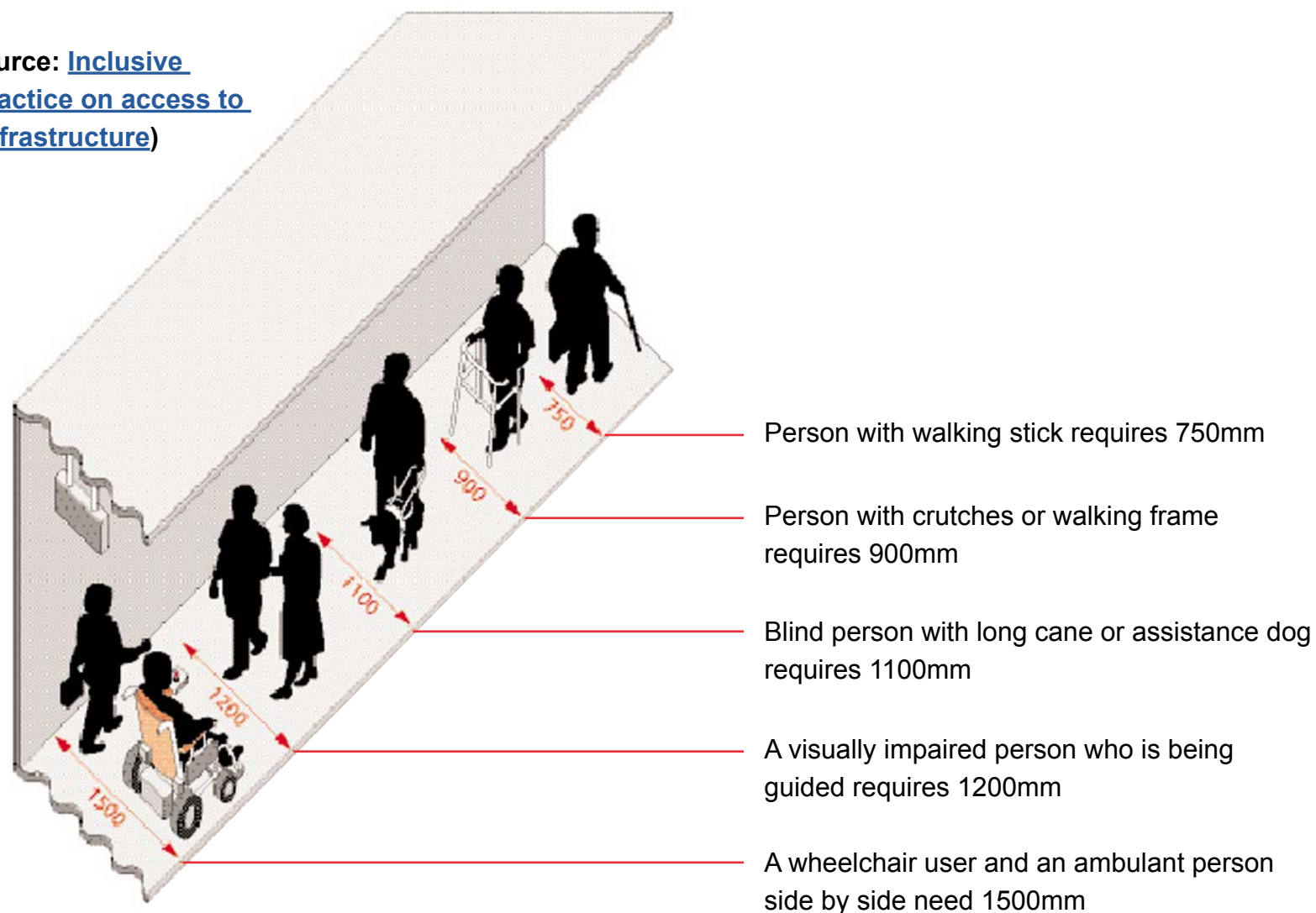


Figure 2
Pedestrian and Pushchair
([Metric Handbook 5th edition](#))

Figure 3
Mobility impaired users (Source: [Inclusive Mobility: A Guide to Best Practice on access to Pedestrian and Transport Infrastructure](#))



Surface Regularity

- 5.1** The surface for all walking areas should be regular, non-polishable and with no trip hazards.
- 5.2** The maximum deviation over 1m should not exceed 3mm.
- 5.3** The palette of acceptable materials for footways, footpaths and other public realm areas is contained in Part 3, Chapter 13: Planning Surfacing Materials.

Kerb Upstands

- 6.1** The following Table sets out the standards for kerb upstands at pedestrian features.

Controlled Crossings

Recommended	6mm
Acceptable Limits	Flush - 10mm

Uncontrolled Crossings

Recommended	6mm
Acceptable Limits	Flush - 10mm rounded bullnose *

Vehicle Crossovers

Recommended	25mm
Acceptable Limits	20 - 30mm

General Use

Recommended	125mm
Acceptable Limits	Min 100mm Max 140mm

Junction Tables / Flat Topped Road Humps

Recommended	Min 50mm
Acceptable Limits	Min 25mm

Bus Stops

Recommended 160mm
Acceptable Limits 155 - 165mm

Stepped Cycle Track

Recommended Max 125mm**Min 60mm
Acceptable Limits Min 60mm

* If essential for drainage

** Refer to Part 3, Chapter 4 and Part 4, Chapter 3 for corresponding cycle track additional widths required for kerb heights of 60mm or more.

6.2 There are no associated Absolute Minimum Standards included as Departures from Standards will not be accepted.

Headroom

7.1 The following Table sets out the standards for the minimum vertical clearance to obstructions for all areas accessible by pedestrians.

7.2 There are no associated Absolute Minimum Standards included as Departures from Standards will not be accepted.

	Feature	Clearance
Recommended	Signs	2.3m
	Obstacles up to 23m	2.3m
	Obstacles longer than 23m	2.6
Acceptable Limits	All features	2.3m

7.3 The minimum clearance to tree branches that overhang any pedestrian facility should be 2.3m. Therefore, where possible trees should be crown lifted to 3m to minimise the need for excessive routine maintenance due to re-growth of branches, or any sag from the weight of the foliage.

Steps and Ramps

- 8.1** Where it is unavoidable to have a new footway or paved urban footpath with a gradient greater than 5%, steps shall be provided with a bypass ramp for wheelchairs and pushchairs.
- 8.2** Steps and ramps within the public highway shall be provided with a handrail running 900-950mm above the pitch line of steps or above the surface of the ramp.
- 8.3** Steps shall also be provided with corduroy paving complying with Guidance on the use of Tactile Paving Surfaces.
- 8.4** Steps, ramps and handrails shall be designed in conform with the recommendations in Building Regulations Part M, Inclusive Mobility or BS8300.
- 8.5** The design standard for steps, ramps and handrails shall be agreed with HCC on a case-by-case basis.

Drainage

- 9.1** Adequate positive drainage shall be provided for all areas intended to be accessible by pedestrians in accordance with Part 4, Chapter 15.
- 9.2** It is not acceptable for run-off from adoptable footpaths and footways to discharge onto adjacent private areas, including gardens.
- 9.3** Gullies should not be placed: -
 - Where edge restraints are lower for pedestrians to cross;
 - On pedestrian desire lines, or where they are likely to cross;
 - Within a footway or footpath.
- 9.4** To reduce standing and running surface water, gullies should be located immediately upstream and downstream of where a cycle track or pedestrian route joins or crosses the carriageway.
- 9.5** Carriageway gullies should not be built in pedestrian or cycle crossing areas. If this is unavoidable then a mesh type gully grating should be used.

- 9.6 Dished channels within pedestrian routes are not acceptable.
- 9.7 To prevent ponding, dropped kerbs shall be laid with an upstand as stated in Part 4 Chapter 2 Section 6, but be laid at a gradient of 1:40 inclined towards the carriageway.

Lighting

- 10.1 Lighting requirements are set out in Part 4, Chapter 16.
- 10.2 Consideration should be given to mounting streetlights on buildings or structures to keep the pedestrian area clear of obstruction. This is likely to require a Wayleave Agreement or Deed of Easement. See Part 3, Chapter 17.

Pedestrian Guardrail

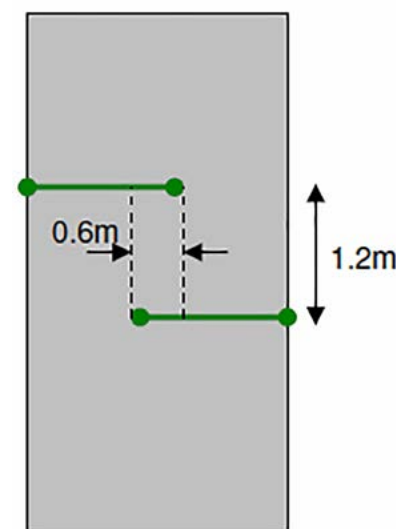
- 11.1 Pedestrian guardrail shall only be installed when there is an overwhelming reason for its installation.
- 11.2 Appropriate guidance for guard railing is provided in [Local Transport Note 2/09](#).

Staggered Barriers

12.1 Staggered barriers have been used to prevent cyclists and motorised vehicles from using pedestrian-only areas. It is preferred to permit cycling and control motor vehicle access to areas with bollards. 12.2 The use of staggered barriers should be avoided as they can create issues for tandems, cycles with trailers, cargo bikes, equestrians and people with sensory and mobility impairment. They can also create street cleansing issues and restrict access for maintenance vehicles.

12.2 The installation of staggered barriers or other access impediments on a Public Right of Way must be authorised in advance by the relevant Highway Authority (PRoW). Choice of the least restrictive option for users is favoured.

12.3 The recommended spacing (1.2m) and offset (0.6m) for this type of configuration is shown below.



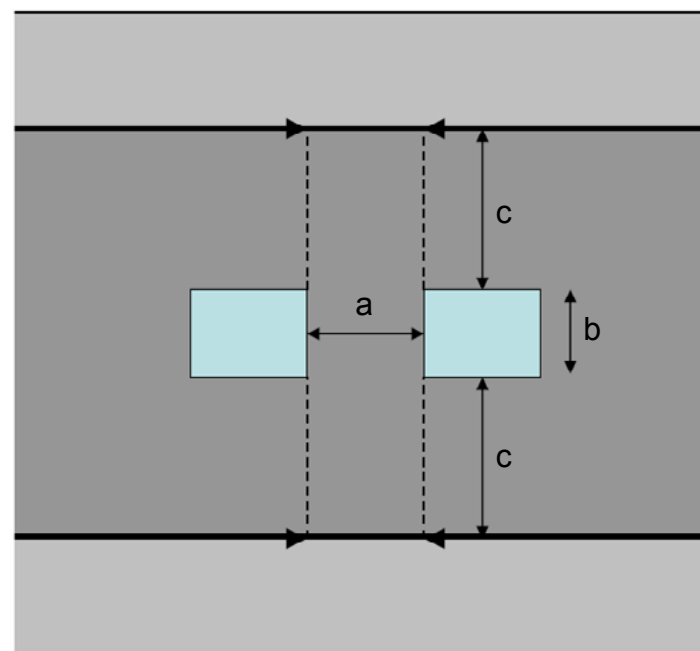
Configuration of Anti-Cycle Barriers

Tactile Paving

- 13.1** All crossing points shall be provided with tactile paving to the standards laid out in [Guidance On The Use Of Tactile Paving Surfaces](#) and dropped kerbs flush with the carriageway.
- 13.2** In exceptional circumstances, for example areas with extremely low pedestrian flows, HCC may consider omitting tactile paving at uncontrolled crossing points, subject to the agreement of local disability groups. However, it shall always be provided at controlled crossings.
- 13.3** The colour and pattern of tactile paving is important and using paving that does not contrast with adjacent paving areas should be avoided. If the paving is due to be laid in a conservation area, then local disability groups shall be consulted before the decision to change the paving colour or type is made. A contrast with surrounding paving is HCC's preference.

Uncontrolled Crossing Points

- 14.1** Where the recommended width of uncontrolled crossing points gives a range of values, the appropriate width should be selected based on the level of pedestrian flow.



Pedestrian Crossing Dimensions

Without Pedestrian Refuge ‘a’

Recommended	2m to 3m	
Acceptable Limits	Min 1.2m	
Absolute Limits – Departure from Standards		Not Applicable

With Pedestrian Refuge ‘a’

Recommended	2m to 4m
Acceptable Limits	Min 1.8m

With Pedestrian Refuge ‘b’

Recommended	Min 2m	
Acceptable Limits	Min 1.5m	
Absolute Limits – Departure from Standards		Min 1.25m*

*A typical illuminated bollard is approx. 0.35m wide therefore 1.25m allows for 0.45m clearance on either side.

With Staggered Pedestrian Refuge ‘a’

Recommended	2m to 4m	
Acceptable Limits	Min 1.8m	
Absolute Limits – Departure from Standards		Not Applicable

With Staggered Pedestrian Refuge ‘b’

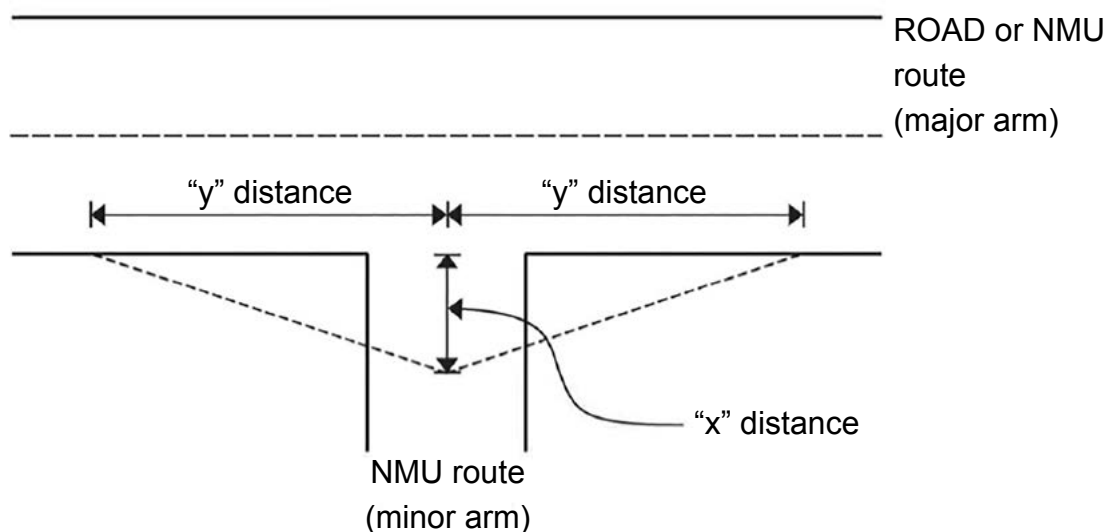
Recommended	Min 4m	
Acceptable Limits	Min 3m	
Absolute Limits – Departure from Standards		Min 2.5m

14.2 The traffic lane widths (dimension ‘c’) should not be between 3m and 4m in order that the lane is wide enough to allow vehicles to safely overtake cyclists or narrow enough to discourage overtaking.

14.3 Side road crossings can be made more comfortable for pedestrians and (where there is a cycle track) cycle users by the inclusion of raised entry features that also reduce vehicle speeds. This helps drivers to comply with [Highway Code](#) Rule H2. These types of priority junction treatments, including continuous footways, should be considered for all priority junctions: their suitability should be determined in accordance with HCC criteria and their design should comply with HCC requirements.

Visibility splays at crossing points

15.1 Visibility splays are measured using the following figure



Visibility splays

'x' distance

Recommended	Min 2m
Acceptable Limits	Min 1.5m
Absolute Limits – Departure from Standards	Not Applicable

'y' distance

Recommended

- Primary or Main Distributor
- 30 mph – 43m
- 40 mph – 120m
- All other 30 mph limits use DfT MfS Table 7.1

Acceptable Limits As above

Absolute Limits – Departure from Standards

If the required visibility cannot be met then speed reduction measures should be considered.

Cycle route

Recommended Design speed	Recommended Min 'y' distance
20 kph (12 mph)	17m
30 kph (19 mph) (general off - carriageway cycle tracks)	31m
40 kph (25 mph) (downhill gradients >3%)	47m
Acceptable Limits	As above
Absolute Limits – Departure from Standards	Not Applicable

Controlled crossings

16.1 Scheme Promoters shall be mindful of LTP4 Policy One: User Hierarchy and there shall be a presumption to provide pedestrian facilities as standard at signal-controlled junctions. Liaison with HCC will be required to assess the need and any impact on capacity. Guidance is given in [TSM Chapter 6, LTN 1/20 and CD 123](#). Pedestrian crossings should be positioned to align as closely as possible to pedestrian desire lines. The junction layout and signal timings should as far as possible minimise pedestrian transit times, including by minimising the number of crossing points at which pedestrians will need to wait.

16.2 Pelican Crossings are no longer used.

16.3 The following tables describe zebra and puffin crossings.

Zebra Crossing widths

Recommended Min	2.4m
Recommended Max	10m
Acceptable Limits Min	2.4m
Acceptable Limits Max	10m
Absolute Limits – Departure from Standard	Not Applicable

The acceptable proximity of a zebra crossing to a junction should be calculated using the distance from driver to give-way line according to the table below.

Zebra Crossing proximity to junctions

Recommended Min	20m
Acceptable Limit Min	20m
Absolute Limit – Departure from Standard	5m

Puffin Crossing widths

Recommended Min	2.4 m (3.2 m)*
Recommended Max	10 m
Acceptable Limits Min	2.4 m
Acceptable Limits Max	10 m
Absolute Limits	Not Applicable

* Consideration should be given to installing Puffin crossings at 3.2 m wide to allow them to be upgraded to Toucan crossings in the future. If this is the case consideration should be given to pole positioning to allow cyclists to make use of the facility in the future. This is especially important on narrow footway where cyclists may (in the future) have difficulty turning.

Puffin Crossing proximity to junctions

Recommended Min	20 m
Acceptable Limit Min	20 m
Absolute Limit	10 m

Chapter 3

Designing for Cycling

Contents

Introduction

- 1.1** The Scheme Promoter should have prepared and submitted a general layout with accompanying narrative at the Planning Application stage demonstrating the proposed cycling network, types of provision and geometric design for vertical and horizontal alignments including clearances and effective widths in accordance with Part 3, Chapter 4 and the Design Menu Cards in Part 3, Chapter 1 as these will typically be some of the dictating factors of the overall highway design. Parking locations for cycles and vehicles and typical forms should have been identified in accordance with Part 3, Chapter 7: Planning Parking. More detailed advice on parking is given in Part 4, Chapter 6: Designing for Parking.
- 1.2** This Part 4 chapter provides additional guidance on detailed design particular to cycling infrastructure following Planning Approval or the general arrangement prepared for the permitted development of highway schemes.
- 1.3** Designers should understand HCC's requirements for designs that minimise and facilitate future maintenance as set out in their Maintenance for Active Travel Strategy which is part of the [Highway Infrastructure Asset Management Plan \(HIAMP\)](#).

Vertical alignment and drainage

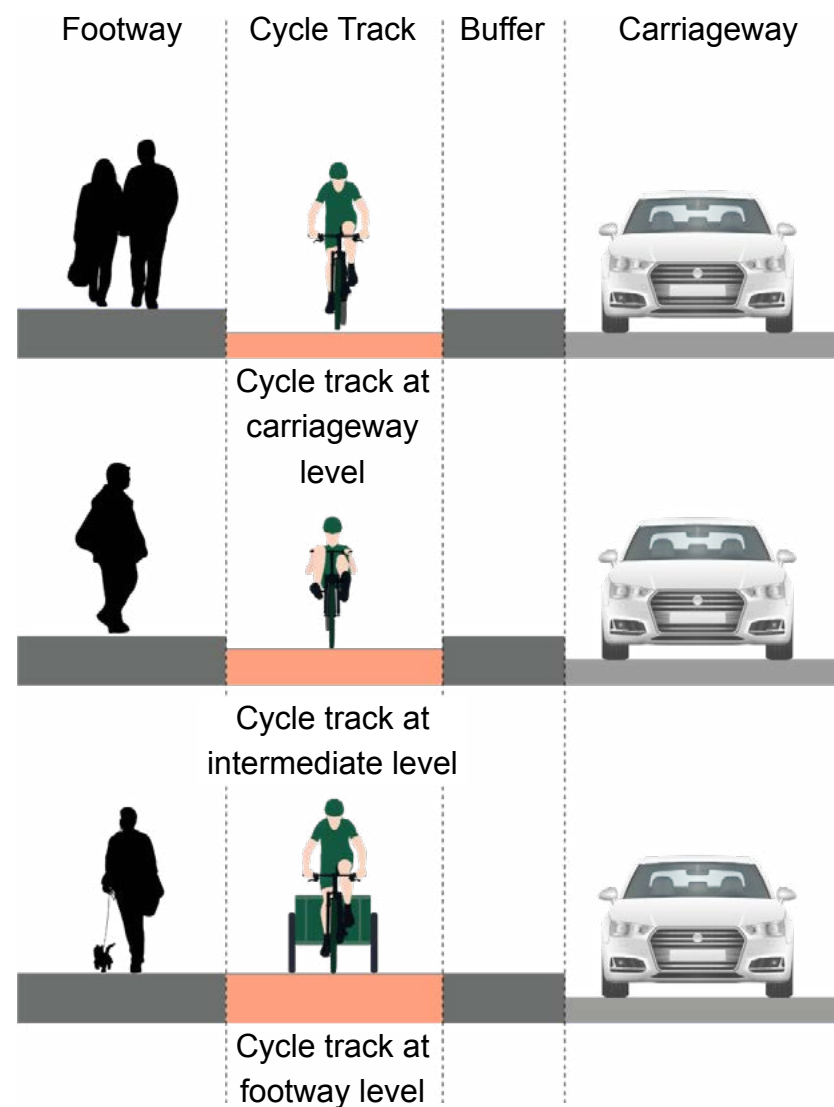
- 2.1** Where the gradient exceeds 5% (1:20) signs to warn cyclists or SLOW markings on the downhill direction should be considered in relation to hazards to cyclists, for example a bend, water or slope. It should always be assumed that cycle users should not have to dismount and push their machines.
- 2.2** While super-elevation is not typically required along a cycle route, negative camber that falls to the outside of a bend should be avoided.
- 2.3** Crossfall and drainage on a cycle track should be arranged to ensure
 - It is adequately drained;
 - The design flow width is no more than 250mm along the lower edge of any crossfall, super-elevation or camber slope;
 - Gullies do not reduce the effective width;
 - It is easy to clean using conventional road sweeping vehicles;
 - It is self-maintaining (i.e. minimal if any need for active maintenance); and
 - The drainage can be maintained safely using conventional equipment.

Protected cycle tracks

- 3.1** Cycle tracks protected from motor traffic may be set at carriageway level, at footway level or at an intermediate height between the two.



- 3.2** Detailed guidance is provided in [LTN 1/20](#) Section 6.2, including on signs and markings, tactile paving, designing for pedestrians, and buffer widths including adjacent to parking and disabled parking.
- 3.3** The design of fully kerbed cycle tracks should address kerbside activity such as parking, servicing, bus stops and disabled access to parking. It should also address the risk of parking on the buffer, cycle track or both.



Light segregation

- 4.1** A margin at least 400mm wide between the cycle lane and the carriageway is recommended to contain the light segregation features and road markings.



Traffic cylinders

- 4.2** On links, spaces between these objects should be not less than 2.5m and not more than 10m. Closer spacing can be considered on bends and junction approaches.

Stepped cycle tracks

- 5.1** If bollards or other vertical features are used to prevent vehicles parking on the cycle track) they should be positioned with an appropriate setback from the carriageway in a margin to maintain the effective width of cycle track as set out in Part 3, Chapter 4: Planning Cycling Infrastructure.
- 5.2** Stepped cycle tracks should be provided with waiting restrictions, if necessary, adjacent to the lower kerb
- 5.3** A single white continuous line must not be laid close to the lower kerb, as this has been found to cause users to miss the kerb.
- 5.4** The height difference up from the carriageway should be a minimum of 60mm with at least a further 60mm step up to the adjacent footway. The width of any sloped part of the kerb should be excluded from the footway and cycle track widths. The cycle track width should be increased according to the footway kerb height as shown in the graph in Paragraph 2.12 in Part 3; Chapter 8.

- 5.5** Crossfalls of both footway and cycle track are normally toward the carriageway.
- 5.6** Stepped cycle tracks should be designed to ensure good drainage and to be largely self-maintaining. Nevertheless, they should be designed to facilitate safe maintenance using conventional equipment including for road sweeping and drainage cleaning.



Stepped cycle track at side road junction

Segregated use requirements

- 6.1** On segregated cycle track / footway surfaces where the pedestrian path and cycle track are at the same level, they must be separated by a raised symmetrical trapezoidal profile delineator strip.
- 6.2** A painted white line is not adequate as it will not be detected by visually impaired pedestrians and has little effect in segregating pedestrians from cyclists. The width of the raised part of the delineator is additional to the required footway and cycle track widths.
- 6.3** The delineator strip should be used on any segregated route where the designated pedestrian side is not physically separated from the designated cyclist side, for example by a verge or a difference in level.
- 6.4** Alternatively, the pedestrian and cycle paths should be separated by a level difference of 60mm or more or a different surface texture should be used to clearly indicate separate surfaces for cycle and pedestrian use.

Cycle lanes and contraflow cycle lanes

- 7.1 Cycle lanes and contraflow lanes shall meet the width requirements set out in [LTN 1/20](#) and shall be signed in accordance with the advice in the [Traffic Signs Manual](#).
- 7.2 Detailed guidance can be found in [LTN 1/20](#) Cycle Infrastructure Design.

Cycle track edge kerbing

- 8.1 Fully battered (splay) kerbs offer a more forgiving edge that is less likely to catch pedals and to throw a shadow across the cycle track, helping to increase the useable width.
- 8.2 Where these kerbs are used next to a footway, any additional cycle track width is measured at cycle track level and the footway width is measured from the top of the splay: this means that splay kerbs require a greater overall width than vertical or half-battered kerbs. The same applies to specialist formats such as the [Cycle Demarcation Kerb](#) by Aggregate Industries.

Buffer strips

- 9.1** Gaps in the buffer strip are needed at side road junctions to enable cyclists to enter and leave the protected cycle track space.
- 9.2** If the buffer has a hard surface and sufficient width, it provides a place for pedestrians to wait to cross. A width of 1.5m will be sufficient to accommodate users of wheelchairs and mobility scooters.



- 9.3** To enable mobility impaired people to cross the carriageway, regular dropped kerbs should be provided along the buffer strip. Alternatively, gaps in the strip should be provided where the cycle track is at carriageway level. Tactile paving should be provided following the principles of [Guidance on the Use of Tactile Paving Surfaces \(DfT, December 2021\)](#).
- 9.4** The buffer between a cycle track (or cycle lane) and parked vehicles should be a minimum of 1m wide to provide enough room so that cycle users can avoid being hit if a car door is opened. Adjacent to disabled parking bays the buffer shall be at least 2m wide.
- 9.5** Buffer strips should be clear of all obstructions except for low features and bollards.

Traffic cylinders

- 10.1** Traffic cylinders (often referred to as wands) are generally plastic cylinders and must be flexible such that they can be overrun many (at least 1,000) times by vehicles without breaking, becoming dislodged or causing undue damage to vehicles. HCC has experience of the successful installation of Rediweld Greenwich WandOrcas at Hunter's Bridge, Welwyn Garden City, and Ermine Street, Buntingford.
- 10.2** Wands should include reflective strips, be tall enough to appear as a barrier to drivers but low enough that they do not catch wing mirrors or bicycle handlebars. They should be positioned at least 200mm from the carriageway edge.
- 10.3** The same requirements apply to passively safe impact bollards, which may be used instead of wands and should include reflective cycle route traffic signs.
- 10.4** A record of the make, model and manufacturer of any traffic cylinders shall be provided to HCC immediately following installation. This is to ensure that any replacement can be identical.

Low level features

- 11.1** Low level features are discrete obstructions secured to the road surface. Examples include low humps such as proprietary Orca and Armadillo bolt down precast plastic products.
- 11.2** They should:
- Incorporate reflective strips or patches of contrasting colour to the surrounding surface
 - Be set back from the carriageway edge by 200mm (100mm minimum): experience indicates this is likely to reduce damage from vehicle contact
 - Be set back from the edge of the effective cycle lane width by the additional width corresponding to their height (Part 3, Chapter 4, Section 8), taking account of how they can be overrun by cycles
 - Be oriented in line with the carriageway edge rather than angled
 - Be installed at approximately 3m spacing, with three to seven features between splitter islands
 - Not be used on pedestrian desire lines, because they can be a tripping hazard for pedestrians

- 11.3** They may be located within a margin hatched using road markings to TSRGD Diagram Nos.1040 and 1049B.
- 11.4** A record of the make, model and manufacturer of any low level features shall be provided to HCC immediately following installation. This is to ensure that any replacement can be identical.

Dividing islands

- 12.1** Dividing islands are narrow islands typically of normal kerb height and part of a light segregation scheme. They may be constructed of conventional precast concrete kerbs with concrete or bituminous surfacing, or proprietary products secured to the road surface.
- 12.2** They should
- Be provided at each gap for a junction or access. The separators should include a passively safe impact bollard and may also include a wand. Wands and/or passively safe impact bollards should also be used on intermediate separators.
 - Be arranged to provide gaps for pedestrians to cross the road away from formal crossing points
 - If constructed of concrete kerbs, those kerbs should be of contrasting colour to the surrounding road surface
 - Provide adequately for drainage under or around them, but be arranged to allow the road and cycle track to drain even if the drainage openings through them become blocked
 - Be set back from the carriageway edge by 200mm (100mm minimum)
 - Have a splayed kerb face on the cycle lane side.

Planters

13.1 Planters may be used to create light segregation, prevent parking encroachment and create plugs.

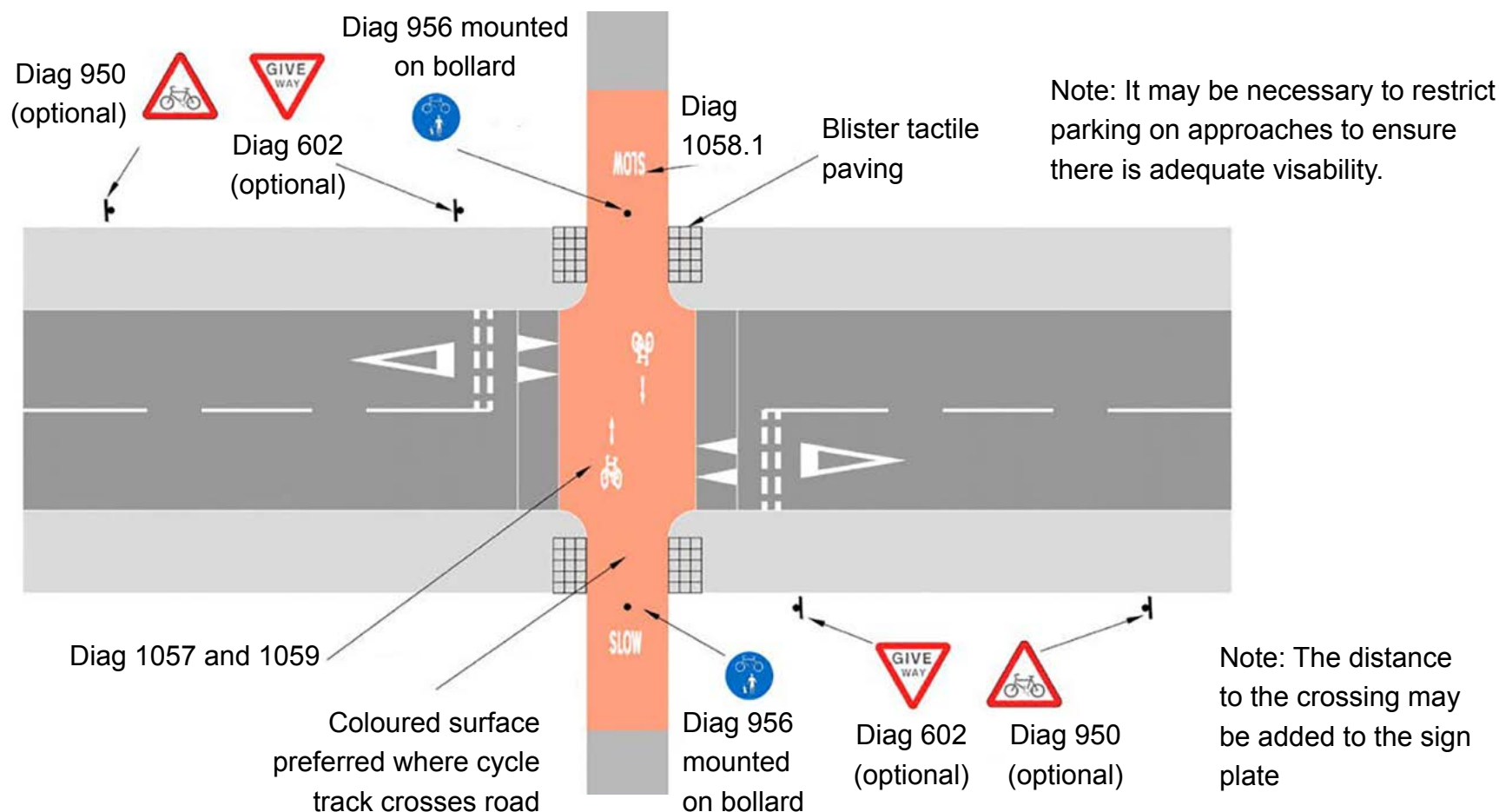
13.2 They should:

- Be set back from the trafficked carriageway edge by at least 200mm if they are higher than 150mm above the carriageway surface
 - Be set back from the edge of the effective cycle lane width by the additional width corresponding to their height (Part 3, Chapter 4, Section 8)
 - Not obstruct sightlines (take account of the planting at its largest maintained size)
 - Be safely and readily maintainable, including replacing, repositioning or refixing following vehicle contact
 - Be durable, including if they are scraped by passing vehicles or cycles
 - Should be of contrasting colour to the surrounding surface
 - Be attractive to enhance the street environment
- Have an agreed owner
 - Have an agreed planting and maintenance regime to ensure they continue to be an asset to the street scene and do not obstruct required sight lines or visibility splays

Transitions and crossings

- 14.1** Transitions between on and off-carriageway provision are essential elements of any coherent cycle route network. It is important that the point of transition offers protection from motor traffic and a comfortable and coherent route that cyclists can follow. There should be appropriate definition for all road users to recognise the boundaries between the footway, the cycle track and the carriageway.
- 14.2** The selection of junction and crossing types is described in Part 3, Chapter 9: Planning Highway Junctions & Crossings.
- 14.3** Supporting guidance is included within [LTN 1/20](#) Chapters 9 and 10.
- 14.4** Transitions between on-carriageway and off-carriageway cycle routes or at crossings should not be across a kerb; the transition should be continuous surfacing course.
- 14.5** If it is essential to include a dropped kerb then it should be set as close as possible to a right angle to the direction in which cycles will cross it and laid flush (no upstand).
- 14.6** Where cycles will not cross the kerb at right angles the kerb should have a non-slip surface.
- 14.7** Kerbs must always be used on central islands, even if laid flush, to aid future resurfacing projects.
- 14.8** If a flush kerb will result in drainage problems then a bull-nosed kerb with a 6 mm upstand may be used. Close monitoring during construction is needed as a standard bull nose is 25mm which in practice tends to be the default installation.

14.9 A cycle route crossing a lightly trafficked street may be given priority over traffic on the carriageway by using give-way markings to [Traffic Signs Regulation and General Directions \(TSRGD\) 2016](#) Diagram No.1003. The cycle track crossing should be placed on a hump, as illustrated below, but this is not a requirement. A parallel crossing may now be used as an alternative, which also provides a crossing for pedestrians.



14.10 The following photos show examples of poor design



Avoid placing street furniture where cyclists will need to turn to reach a crossing point at 90° and avoid siting street furniture that creates obstructions

Parallel crossings

- 15.1** Parallel crossings provide for pedestrians and people cycling to cross a road separately from each other.
- 15.2** [LTN 1/20](#) Table 10-2 indicates the suitability of parallel and signalised parallel crossings depending on speed limit, traffic flow and the road width to be crossed in one movement.
- 15.3** The layout for parallel cycle and zebra crossing is prescribed in [TSRGD](#) Diagram No.1001.5 and includes yellow globes, a controlled area indicated by zigzag markings, and a give way line.
- 15.4** Signalised parallel crossings (sometimes referred to as Sparrow crossings), in which pedestrians and people cycling cross the road separately from each other, may be used instead of a parallel crossing.
- 15.5** A Toucan Crossing may only be used where options which do not involve sharing space between pedestrians and cyclists (such as a parallel or signalised parallel crossing) have been thoroughly examined and found to be undeliverable in a specific location.

Chapter 4

Designing for Passenger Transport

Contents

Introduction

- 1.1** The Scheme Promoter should have prepared and submitted a general layout with accompanying narrative at the Planning Application stage. This should demonstrate the proposed Passenger Transport (PT) infrastructure in accordance with the Design Menu Cards in Part 3, Chapter 1 and guidance in Part 3, Chapter 5: Planning Passenger Transport Infrastructure Including Transport Hubs as these will typically be some of the dictating factors of the overall highway design.
- 1.2** This Part 4 chapter provides additional guidance on detailed design particular to PT infrastructure following Planning Approval or the general arrangement prepared for the permitted development of highway schemes.

Design Guidance

- 2.1** A solar power source should be considered for bus shelters instead of a standard electrical supply.
- 2.2** Bus stop signs are obtained from the HCC Integrated Transport unit.
- 2.3** The design of bus stops and lay-bys should be to the standards laid out in the Guidelines for the Design of Bus Bays and Bus Stops.
- 2.4** Guidance on planning bus infrastructure can be obtained from a variety of sources. In particular:
 - [Local Transport Note 1/97](#)
 - [Manual for Streets](#)
 - The DfT's [Inclusive Mobility: A Guide to Best Practice on access to Pedestrian and Transport Infrastructure](#)
 - [TfL's Accessible Bus Stop Design](#) Guidance

Specific design guidance can be found in the Hertfordshire County Council documents:

 - Bus Infrastructure in Hertfordshire: A Design Guide (available from HCC Passenger Transport team)
- 2.5** HCC is introducing a range of Intelligent Transport Systems in partnership with passenger transport operators across Hertfordshire. More details on this are given in Part 3 Chapter 19.

Chapter 5

Designing for Public Rights of Way

Contents

Introduction

- 1.1 This chapter directs the reader to the technical guidance for the final design for Public Rights of Way (PRoW) and the need to complete statutory procedures before affecting an existing PRoW.
- 1.2 The scale and nature of PRoW, including proposed surface finishes, should have been established in principle at the Master Planning Stage in accordance with Part 2, Chapter 5 and subsequently in more detail in Part 3; Chapters 3, 6, 8 and 20.

Statutory Requirements

- 2.1 Part 3 highlights that the granting of planning permission does not entitle scheme promoters to obstruct, divert or extinguish a PRoW. Separate procedures must be successfully completed before this can be confirmed, under either Section 247 / 257 of the [Town and Country Planning Act 1990 \(TCPA 90\)](#) or Section 118 / 119 of the [Highways Act 1980](#).
- 2.2 Moreover, formal consultation and statutory procedures associated with making and confirming the necessary Orders can be lengthy and need to be started immediately after the details have been approved, as no development can proceed on the line of an existing PRoW before the procedures have been completed.
- 2.3 Development (in so far as it affects a PRoW) shall not be started and the PRoW shall be kept open for public use, until any of the following has come into effect:
 - The necessary temporary order for temporary closures of PRoW under S14 of the [Road Traffic Regulation Act 1984](#); or

- The necessary permanent order, under S247 or S257 of the [Town and Country Planning Act 1990](#) for diversion or extinguishment to enable the development to take place, before the development is ‘substantially complete’; or
 - The necessary permanent order, under S118 or S119 of the [Highways Act 1980](#) for diversion or extinguishment, to enable the development to take place, if the TCPA procedures cannot be used.
- 2.4** TTROs for PRow run for a maximum of 6 months. Extension can be acquired through application to the Secretary of State.

Design Requirements

- 3.1** Pedestrians, cyclists, equestrians, and vehicular users can all use particular types of PRow, depending on the legal status of the route and their location. The interaction between these users and their differing requirements must be taken into consideration when designing width, surface requirements and other infrastructure including road crossings.
- 3.2** The specification for the finish to be achieved for the different typology of route should be informed by the specifications set out Part 4 Chapters 2, 3 and 12.
- 3.3** Designers should understand HCC’s requirements for designs that minimise and facilitate future maintenance as set out in their Maintenance for Active Travel Strategy which is part of the [Highway Infrastructure Asset Management Plan \(HIAMP\)](#).

Chapter 6

Designing for Parking

Contents

Introduction

- 1.1** This chapter sets out guidance for the final design of parking facilities for cycles and motor vehicles.
- 1.2** The planning application should have set out the number, nature and location of parking spaces and their relationship to the built environment and pedestrian desire lines in a general arrangement for the site in accordance with the requirements of Part 3 Chapter 7. Designers should bear in mind that parking standards in Hertfordshire are set by each borough or district council.
- 1.3** Careful design should have ensured that provision for pedestrians, parking, bin storage and waste management complement each other sympathetically and consideration made of safe and accessible pick up and drop off points for on-demand services and MAAS (Mobility As A Service).

Cycle Parking Design

- 2.1** The final design for cycle parking should form an integral part of any full or reserved matters planning application. Full details of the location, type of rack, spacing, numbers, security, method of installation and access to cycle parking should be submitted for approval.
- 2.2** All cycle parking shall:
 - be secure;
 - be covered (unless only for short duration parking);
 - be conveniently located adjacent to entrances to buildings;
 - enjoy good natural surveillance or be covered by CCTV;
 - be easily accessible from roads and/or cycle routes;
 - be well lit;
 - be located so it does not obstruct pedestrian and cycle routes;
 - be well managed and maintained;
 - be fit for purpose (using recommended style of cycle rack);
 - take account of the different types and sizes of cycle;

- be inclusive (including step-free access, signing to accessible facilities where they cannot be provided, and potentially allocating spaces for disabled cyclists)
- be accessed via dropped kerbs from the adjoining carriageway and
- be sympathetic to the surroundings, especially if placed in a conservation area.

2.3 Parking facilities for all cycles should be of high quality in accordance with chapter 8 of the

2.4 In residential developments, designers should aim to make access to cycle storage at least as convenient as access to car parking as per para 8.2.1 in [Manual for Streets](#).

2.5 Houses without garages should have external access to the rear garden where cycles can be stored and not need to be wheeled through the house. Where houses do not have suitable gardens (due to lack of external access, sloping land, or irregular shape, etc), or other external amenity space, or a suitable garage, then secure covered communal cycle parking facilities must be provided.

2.6 Cycle parking for flats should be sited close to the relevant entrance of the building and in all cases closer than the nearest non-disabled car parking space. Parking should preferably be housed within the ground floor of the building. If not, then secure parking should be provided in a separate lockable building. Individual stands should be provided within the cycle store – preferably Sheffield stands or individual lockable boxes. Within existing developments and streets, it may be possible to provide secure covered cycle storage, off the carriageway or replacing car parking spaces.

Types of Cycle Parking

- 3.1 Normally Sheffield stands should be provided. Stands that grip only the front wheels of bicycles do not provide adequate support or security. When placed 1.2m apart and 0.9m from the wall, Sheffield stands can accommodate two cycles.
- 3.2 Where children are likely to attend (schools, leisure facilities etc.) an extra horizontal bar at 650mm above ground level or a reduced sized stand to support the smaller frame of a child's cycle should be considered.
- 3.3 The following pages set out other types of cycle parking facilities and their suitability.

Covered parking



Preferred especially where long stay parking is expected

- Preferably partnered with Sheffield stands
- Available in a range of styles and finishes
- Transparent roofing aids personal as well as cycle security
- Siting should take account of prevailing wind to reduce problems of rain being blown onto saddles
- Raising side and end walls above ground level reduces problems of wind-blown rubbish
- Existing building overhangs can be exploited to form useful covered areas for cycle parking

Compounds



Recommended for long-stay parking where additional security is required e.g. rail and bus stations, schools, workplaces etc.

- Provides additional security when combined with secure access e.g. smart-card or key-pad operation
- Transparent walls that permit natural surveillance are preferred
- Best complemented by additional lighting and CCTV
- Compounds may be created by using two shelters facing each other and the provision of gates at either end
- Requires an owner and maintainer (other than the County Council)

Wall hooks, bars and rings



Recommended for use in secured locations where space is limited

- Also suitable for securing bikes in domestic garages or at workplaces
- May be mounted vertically as well as horizontally to suit a range of bike sizes
- Requires secure tamper-proof bolts to be effective
- Not suitable for all users

Two-tier rack



Recommended for use where a high density of parking is needed such as rail stations and workplaces:

- Works best where there is a management regime that supervises use and helps new users learn how to use racks and lifting mechanism to avoid damage to bikes (and themselves).
- Should be accompanied by ground mounted racks such as Sheffield stands for people unable to use the two-tier racks.

Electronic control of parking



Recommended where very high levels of security are required for both compound and bike locking: 100% security virtually guaranteed and no need for user's lock to be used. Suitable for use in managed cycle parking unit at transport interchanges, centres of retail areas or where users come from a large number of organisations on the same site.

- Electronic control also allows for highly detailed monitoring of patterns of use.

Wall racks and pulley systems



Recommended for non-public use where space is limited
e.g. domestic garage, cycle shed or apartment

- Can also be used in conjunction with upright lockers to minimise 'footprint'
- Available with springs and pulleys to aid lifting

'Innovative' solutions



Picture: Cyclepods

Recommended for high profile sites, such as business premises, where they create opportunities for organisations to make a positive statement about cycling, for example by combining company logos and canopies

Two-level upright and wheel-channel racks



Not recommended except in areas where security is provided by other means, e.g. workplace, and guidance on use is provided

- Offers no opportunity to secure frame
- Poor stability
- Requires bike to be lifted so may be unsuitable for some users for whom alternatives should be provided

Two-level wheel or handlebar racks



Not recommended except in areas where security is provided by other means e.g. workplace

- Offers little or no opportunity to secure bike frame (some systems provide steel cable or chain)
- Poor stability
- Falling bikes can damage others
- Apparent capacity benefits offset by difficulties in inserting and securing bikes in crowded racks

‘Complex’ stands



Not recommended unless it can be clearly demonstrated that security cannot be achieved by other means

‘Butterfly’ racks



Not recommended despite any apparent benefits of taking up little space when unoccupied or low installation costs, this type is unpopular as it offers no means to secure the frame and provides little or no stability when a bike is knocked

Street furniture and railings



Not recommended but a good indication that additional parking provision is needed or what has been provided is unpopular

Wheel Slots



Not recommended under any circumstances

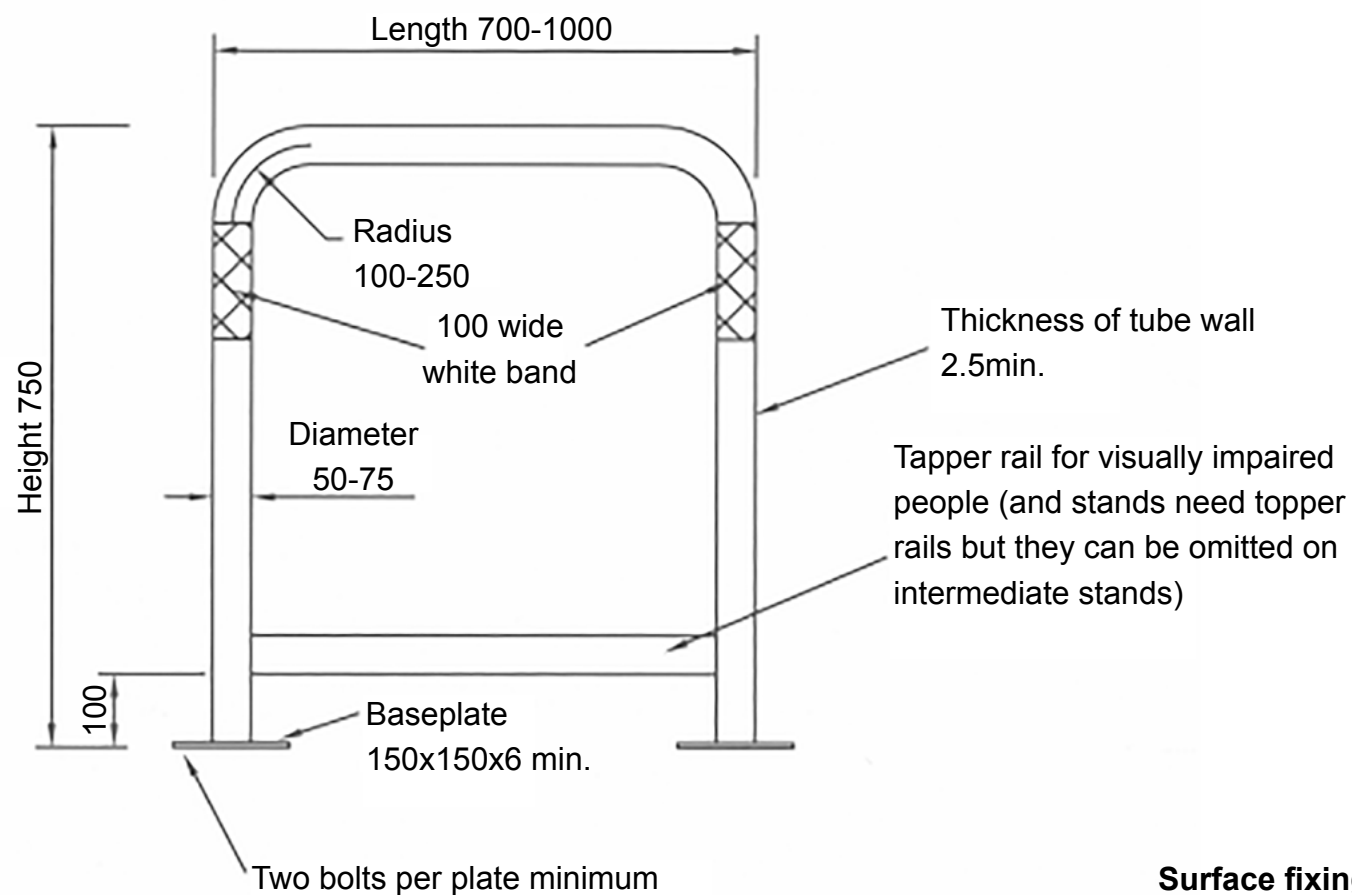
All illustrations © transport Initiatives except where stated

Signs for cycle parking facilities

- 4.1 In some cases where the location of cycle parking is not obvious it may be necessary to provide signage. Signage on the public highway must follow guidance in the [Traffic Signs Manual](#) and adhere to [Traffic Signs Regulation](#) and [General Directions \(TSRGD\)](#).
- 4.2 On non-highway land and if the owner has their own house style for signs within their site they are free to develop their own approach to signing.
- 4.3 Care should be taken to provide a consistent message in geographical areas.



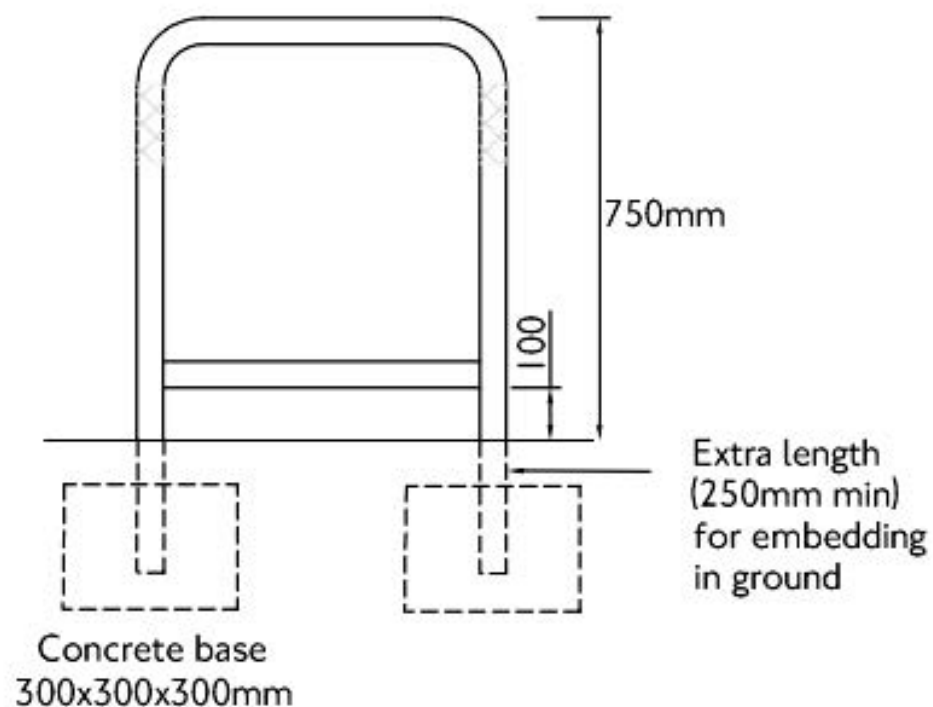
Standard drawings for Sheffield stands



SURFACE FIXING MODEL

Surface fixing stand (Source [London Cycling Design Standards 2005](#))

Ground Embedding model (Source [London Cycling Design Standards](#) 2005) – details as for surface fixing model



Design notes

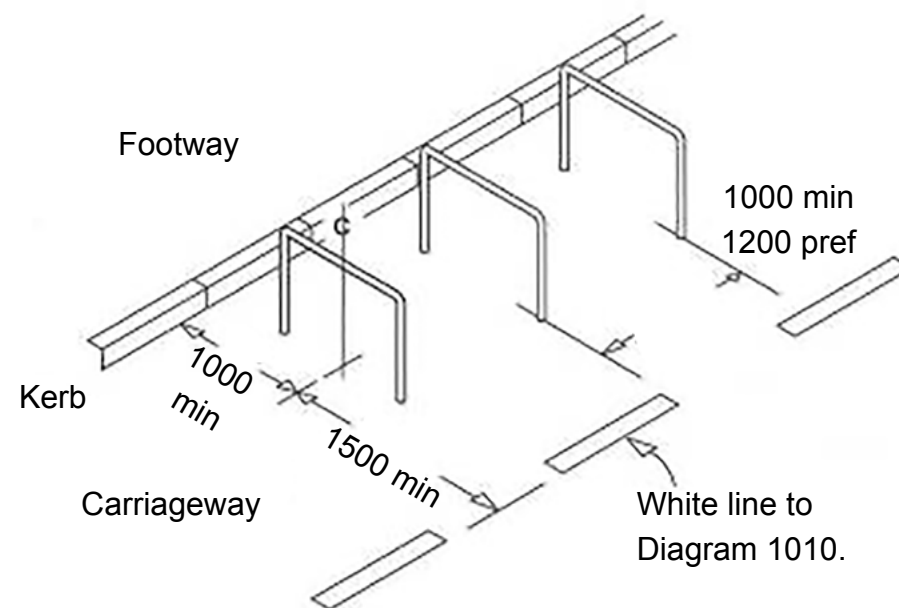
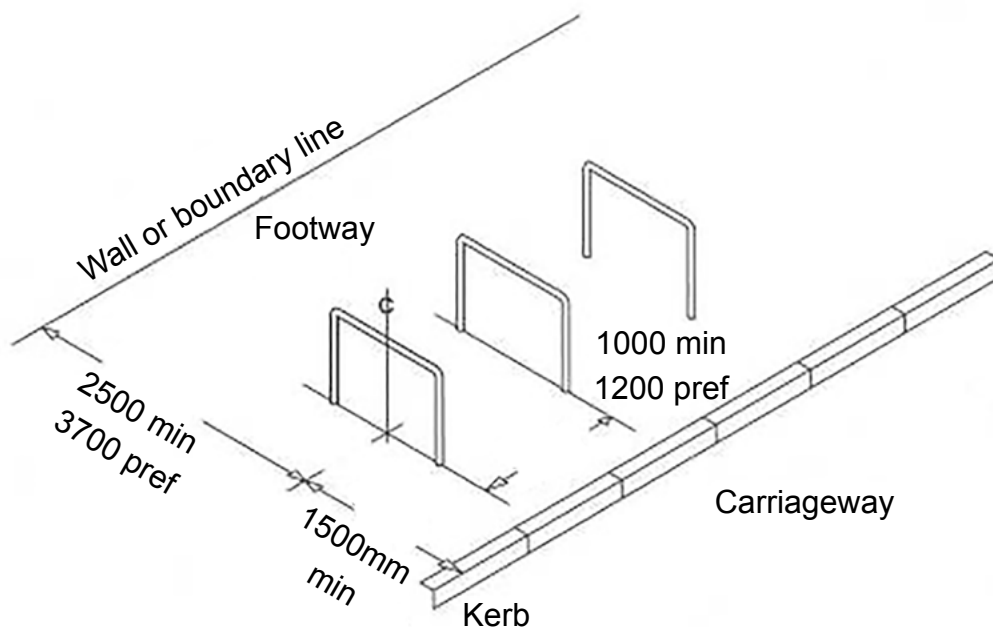
- 1 Extra high-level cross rail may be added for extra security, to support children's bikes or to carry cycle parking symbol (Diagram 968 and 968.1, [TSRGD 2016](#)) – may also carry advertising when sited within the highway subject to the approval of the Highway and Planning Authorities. The height and thickness of the rail will be determined by purpose.
- 2 Where used, contrasting banding may be yellow or white but must be consistent within an area.
- 3 Stainless steel stands must have 'brushed' finish for the benefit of the visually impaired.
- 4 Stands may be joined together to form 'toast racks' for surface mounting or for temporary parking. In both cases 'flat' section connecting bars should be employed for ease of bicycle access and to avoid creating a trip hazard.
- 5 All stands must be approved by Secured by Design, having passed Secured by Design Level 2 testing, and carry a manufacturer's guaranteed service life of at least 10 years in normal use. Further guidance is available in [Standards for Public Cycle Parking](#) published by The Bicycle Association.

Siting Requirements

- 6.1** Cycle parking must not
- **Block visibility** for other road users, especially at junctions and crossings
 - **Block footways** or pedestrian desire lines. (see Part 4 Chapter 2 Designing for Walking)
 - **Prevent access** for servicing of shops or other premises or block emergency exits
 - **Obstruct car door opening** when adjacent to on-street parking areas provided for motorists
 - **Put cyclists at risk** of being struck by passing traffic when they bend to attach/remove their locks
 - **Hinder access to street furniture** such as traffic signal controllers, street lighting columns etc.
- 6.2** Consideration should be given to providing tactile paving or textured surfacing to warn visually impaired people of the presence of parking on the footway.
- 6.3** The use of tapping rails and contrasting or reflective bands on stands should also be considered.
- 6.4** Whether or not these measures are required should be established through local consultation with appropriate representative groups.
- 6.5** Stands should be sited in flat areas or at 90° to any slope to prevent bikes rolling away.

Layout diagrams (not to scale)

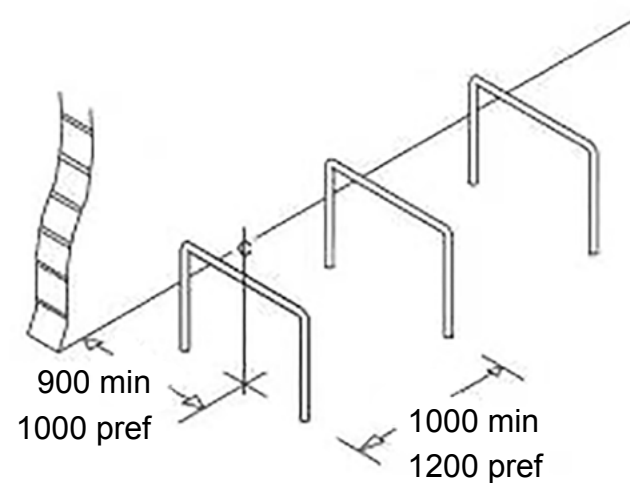
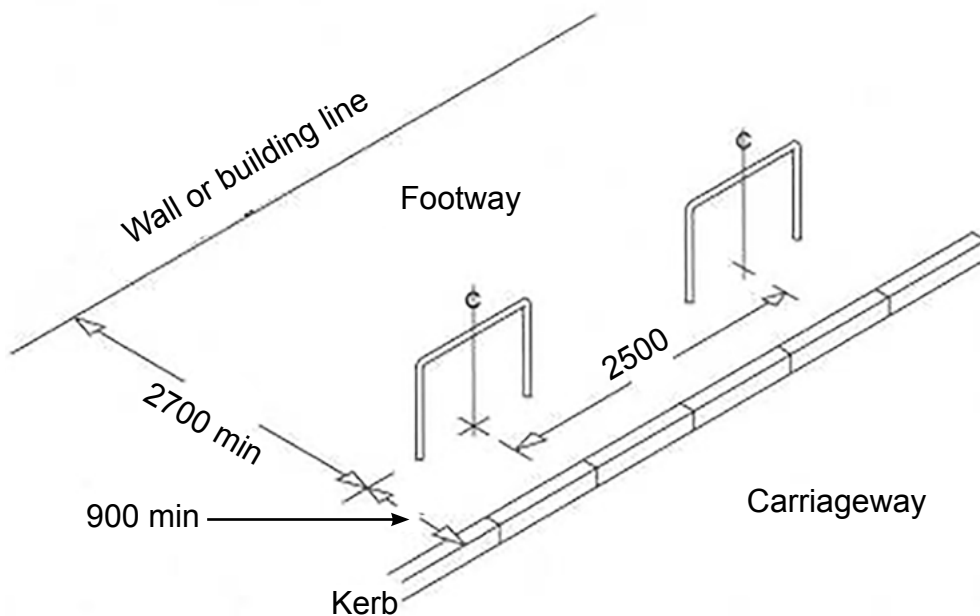
Sheffield stands at 90° to kerb



Stands in carriageway at 90° to kerb (Source [Transport initiatives LLP](#))

Note: Cycle parking within the carriageway should be protected by 'build-outs' or other measures

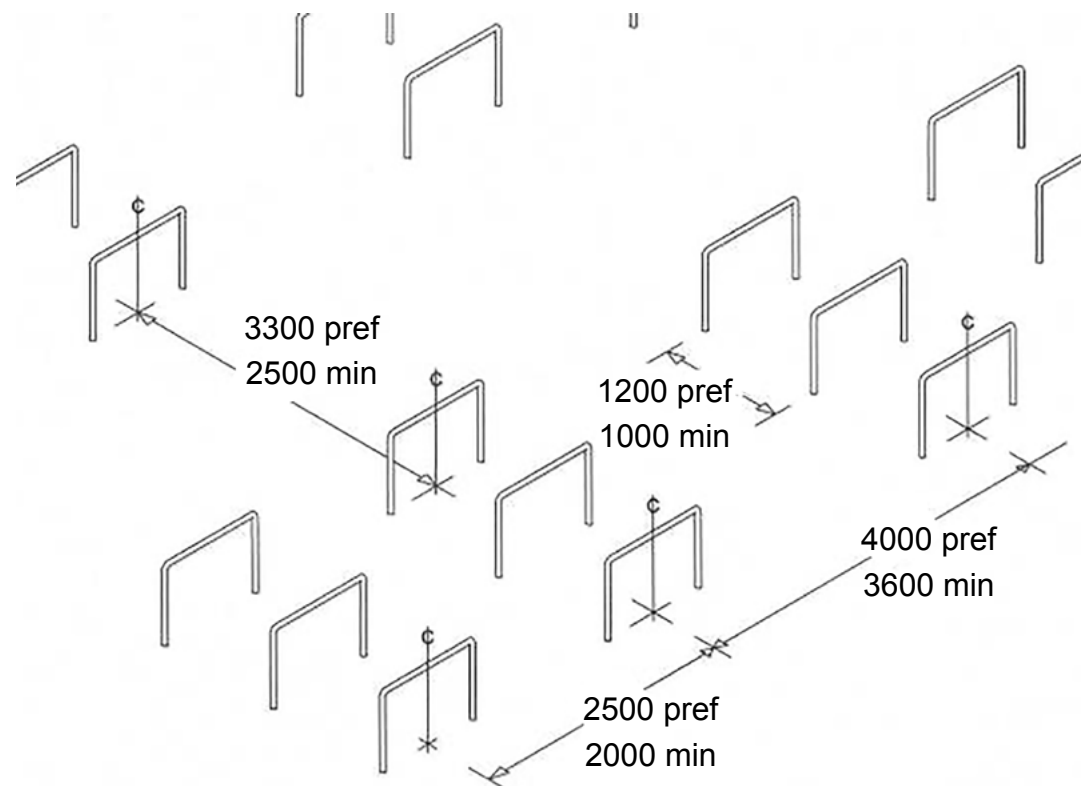
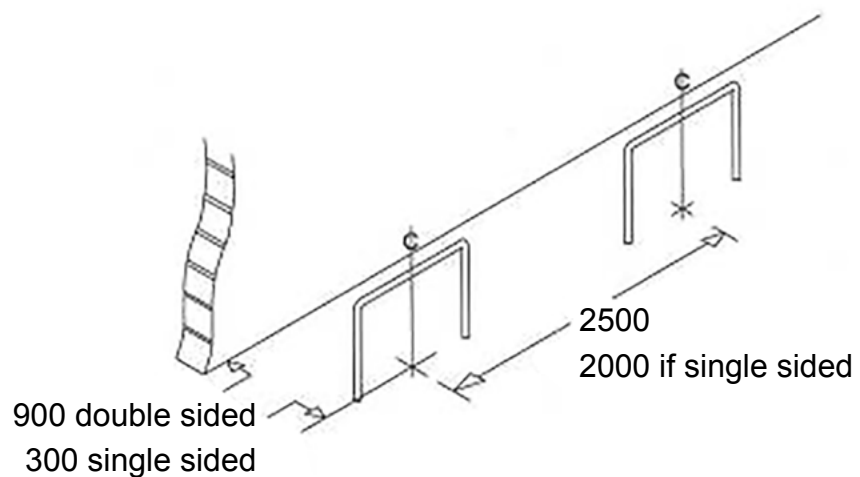
Stands parallel to kerb (Source [Transport initiatives LLP](#))



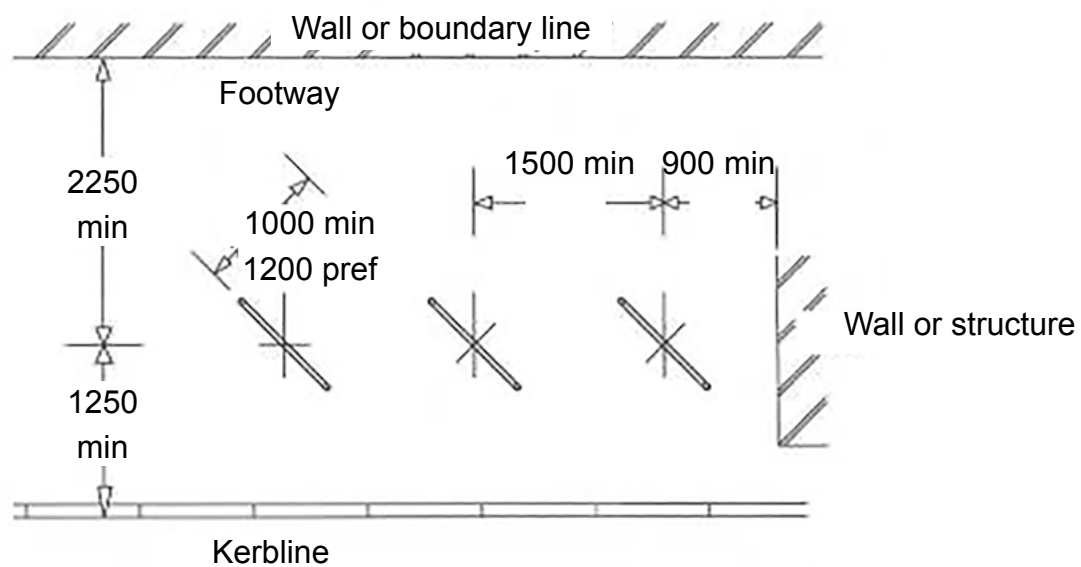
Stands at 90° to wall or building line (Source [Transport initiatives LLP](#))

Stands parallel to wall or building line (Source [Transport initiatives LLP](#))

Note: Where single-sided parking along a wall is being considered, a cheaper alternative could be to use wall bars that bikes can be secured to



Aisle widths (Source [Transport initiatives LLP](#))

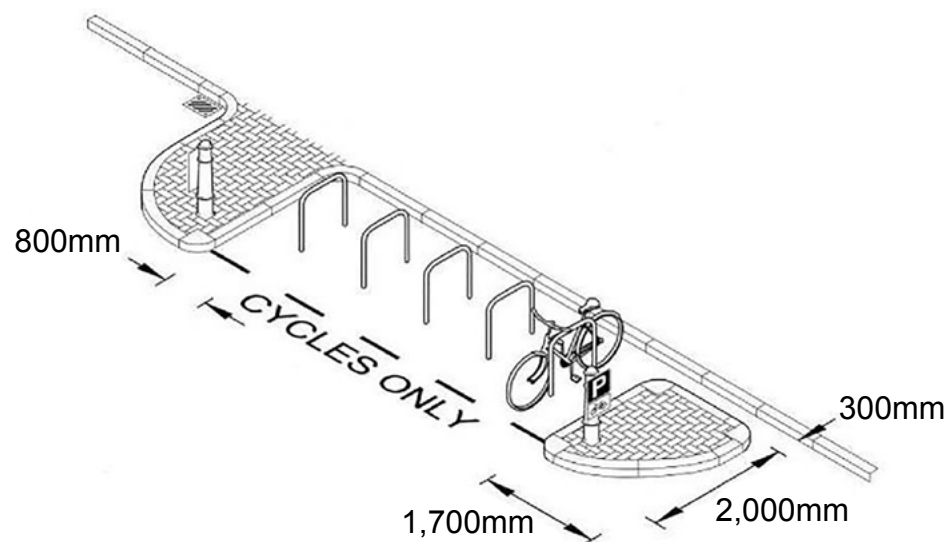


Stands at 45° to kerb (may be appropriate if space is restricted)

(Source [Transport initiatives LLP](#))

Cycle Parking in the Public Realm

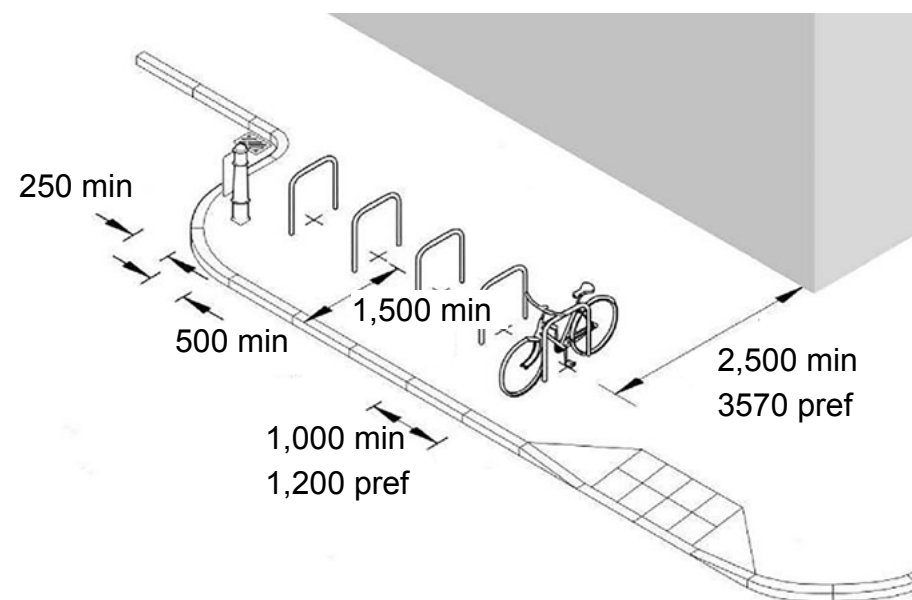
- 8.1** The following layout can be used to avoid reducing footway widths. A single or double car parking bay can be removed if applicable. The number of cycle parking spaces shown is 10. Such bays can for also be used e-scooter and cycle hire.



Carriageway cycle parking protected by buildouts

(Source Hackney Cycle Parking Guide)

- 8.2** The following layout can be used to narrow carriageway at the end of street to provide cycle parking and provide a shorter crossing distance for pedestrians. Where this is done the opportunity should be taken to build the new kerb line at a tight radius.



Footway cycle parking (Source Hackney Cycle Parking Guide)

Cycle Parking Layout dimensions

Stands (see note 1) parallel to:

Wall or boundary

Recommended, mm see note 2	-
Acceptable limit, mm see note 2	-

Parking both sides

Recommended, mm see note 2	900
Acceptable limit, mm see note 2	-

On one side

Recommended, mm see note 2	300
Acceptable limit, mm see note 2	-

Footway in between

Recommended, mm see note 2	2700
Acceptable limit, mm see note 2	1800

Parked bicycles should not obstruct footways

Kerb/carriageway edge (Distance from kerb face)

Recommended, mm see note 2	900
Acceptable limit, mm see note 2	-

May be reduced to 600 where parking takes place only on footway side (unlikely)

Tactile/textured paving (Distance to edge of paving parallel/right angles – see layout diagram)

Recommended, mm see note 2	500/1000
Acceptable limit, mm see note 2	-

The need for paving will be determined by location and local consultation

400 mm paving module preferred but 200 mm may be used

Stands at right angles to:

Wall or boundary

Recommended, mm see note 2	-
Acceptable limit, mm see note 2	-

In front of stand

Recommended, mm see note 2	1000
Acceptable limit, mm see note 2	900

Footway in between

Recommended, mm see note 2	3700
Acceptable limit, mm see note 2	2500

Placing the stand too close to a wall may prevent it from providing adequate for the bicycle

Kerb/carriageway edge

Recommended, mm see note 2	1500
----------------------------	------

Acceptable limit, mm see note 2	-
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Allows small margin for non-centralised parking of bikes against stand

Tactile/textured paving

Recommended, mm see note 2	1000
----------------------------	------

Acceptable limit, mm see note 2	-
---------------------------------	---

Allows small margin for non-centralised parking of bikes against stand

Stands at 45° to:**Wall or boundary with footway in between**

Recommended, mm see note 2	2250
----------------------------	------

Acceptable limit, mm see note 2	-
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May be appropriate where space is limited

Kerb/carriageway edge

Recommended, mm see note 2	1250
----------------------------	------

Acceptable limit, mm see note 2	-
---------------------------------	---

May be appropriate where space is limited

Parallel

Recommended, mm see note 2	1200 see note 3
----------------------------	-----------------

Acceptable limit, mm see note 2	1000
---------------------------------	------

Parallel but 45° to kerb line/wall

Recommended, mm see note 2	1500
----------------------------	------

Acceptable limit, mm see note 2	-
---------------------------------	---

Placing stands too close together will make inserting bikes (see note 4) difficult at busy times and will reduce capacity instead of increasing it

Adjacent stand (in line)

Recommended, mm see note 2	2500
----------------------------	------

Acceptable limit, mm see note 2	2000
---------------------------------	------

To create aisle

Recommended, mm see note 2	4000
----------------------------	------

Acceptable limit, mm see note 2	3600
---------------------------------	------

Reducing aisle width to increase capacity will create difficult user conditions that deter use

Notes

- 1 Assumes Sheffield stand of length 700 to 1000mm
- 2 All measurements to centre line at the middle of the stand. Stands with outside diameter tube thickness of 100 mm or more should be sited further apart
- 3 Measured at 90° to longitudinal axis
- 4 Average bicycle dimensions taken as 1800mm long with handlebars 650mm wide (projecting 350 to 400mm from face of stand when parked)

Powered Two-Wheeler Parking Design

- 10.1 Provision for Powered Two Wheelers (PTWs) should be based on national guidelines including the IHE Guidelines for Motorcycling and the [DfT Traffic Advisory Leaflet 2/02](#).
- 10.2 Powered two-wheeler parking should be clearly signposted from the highway and signed in situ, indicating that it is reserved for powered two wheelers only. Sites should have dropped kerb access, anchor points, quality, level, solid surfacing, CCTV and/or natural surveillance, be located away from drain gratings, manhole covers, studs, cats' eyes, cobbles and gravel, and protected from the elements as well as having good lighting.
- 10.3 Motorcycle parking bays are generally not marked out for individual bikes, allowing flexible and efficient use of limited space by bikes of different sizes, however, the area size for a PTW parking bay (marked or unmarked) should be 2.5m by 1.25m. Consideration should also be given to height clearance, with many bikes measuring upwards of 1.5m not including the rider.

10.4 Provision should be made in which to secure PTWs. There are 2 basic types of anchor points to which motorcycles can be secured to reduce the risk of theft.

- Ground Level – An anchor point below the surface, with a loop allowing the user's own lock to be passed through. Anchor points require regular maintenance and can be dirty to use.
- Raised - A horizontal bar is provided at a height of approximately 400 - 600mm and requires the user to use their own lock. The continuous rail allows for efficient use by bikes of varying style and size, is well understood by users and is compatible with most types of shackling devices.

10.5 Raised horizontal hitchings are the preferred method of security, preventing the ground being used as an anvil to break security chains. Horizontal bars should be welded and screwed into place.

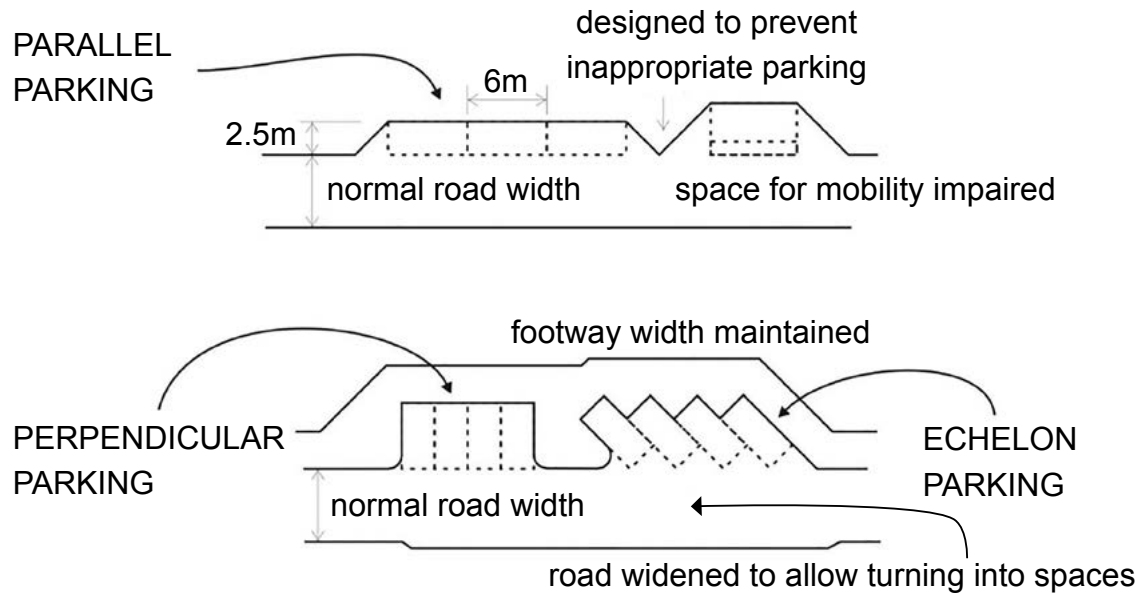
Car Parking Design Layout

11.1 Provision should be made within car parking areas, so that pedestrians can walk through it easily and safely and a tactile and/or colour distinction should be made between pedestrian areas and vehicular areas, in order that people with visual impairment can distinguish between the two. These objectives can be achieved by the provision of raised areas, footway areas and tactile paving at all dropped kerbs.

11.2 The location and overall design should encourage optimum use of the parking areas in order to minimise the risk of on-street parking problems. As well as taking into account design features such as security and landscaping, adequate bay sizes that are easy to enter and exit, and clear directional markings such as exit signs, will increase the appeal of the parking area.

11.3 There are a variety of parking space styles including:

- Square or 90° Square Parking
- Angled or Echelon Parking
- Parallel or 'End to End' Parking
- Tandem Parking



11.4 Parking areas that have end bays adjacent to solid structures (e.g. fence or wall) should be increased in width to provide the necessary manoeuvrability and entry/exit of people to/from the vehicle. Greater widths listed in Table 3.2.

11.5 Where a developer intends to employ a one-way system in a car park a clearly marked route for drivers should be set out using suitable signs and surface arrows.

11.6 Landscaping is important and should be incorporated into parking areas but, in some circumstances, landscaping can reduce the available bay size for vehicles meaning a reduced availability of parking spaces.

11.7 Where entry and exit points are one-way, then appropriate signs will be required, and the planning permission will be conditional on this provision. Continued adherence to the entry and exit directions will be expected. At difficult sites this approach will enable safe vehicular access by maintaining appropriate sight lines.

11.8 In non-estate locations, parking spaces at right angles to and immediately adjacent to the public highway with direct access onto classified roads are not acceptable without sufficient turning space (when all allocated parking is occupied) to turn and exit in a forward gear.

11.9 The minimum bay size for cars should be as follows:

Perpendicular:

e.g. on driveways and parking courts

Space for people with mobility difficulties

Length (m) 5.5 Width (m) 2.9 + 1.0

Standard space (unobstructed)

Length (m) 5 Width (m) 2.5

Standard space (obstructed on one side)

Length (m) 5 Width (m) 2.7

Standard space (obstructed on both sides, includes car ports and undercrofts)

Length (m) 5 Width (m) 2.9

Inside garage

Length (m) 6 Width (m) 3

Parallel:

e.g. adjacent to streets and driveways

Space for people with mobility difficulties

Length (m) 6.5 Width (m) 2.9+1

Standard space

Length (m) 6 Width (m) 2.5

Echelon parking 60°

Permitted overhang (m) 0.1

Length (m) 5.6

Width (m) As above

Echelon parking 45°

Permitted overhang (m) 0.2

Length (m) 5.3

Width (m) As above

Echelon parking 30°

Permitted overhang (m) 0.1

Length (m) 4.7

Width (m) As above

- 11.10** Any smaller than the above minimum bay size and an occupant might be unable to get in or out of an average sized family car parked in the bay with cars parked adjacent and consequently bay sizes smaller than the minimum stated above will not be considered usable.

- 11.11** The minimum bay size for commercial vehicles should be as follows:

Commercial Vehicles

Vans

Length (m) 7.5 Width (m) 3.5

Articulated HGV

Length (m) 17 Width (m) 3.5

Rigid HGV

Length (m) 12 Width (m) 3.5

Blue Badge Parking Design

12.1 Spaces for people with disabilities should be located adjacent to entrances, where possible, should be convenient to use and the dimension conform to the relevant regulations. Further advice on the design of reserved parking bays is contained in [Department of Transport - Traffic Advisory Leaflet 5/95: Parking for Disabled People](#) and [PAS 1899:2022](#).

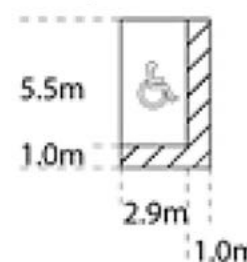
12.2 Parking provision for people with disabilities in residential locations should also be considered, as a parking space on the plot may be inappropriately located or not be of adequate dimension for access by people with disabilities. Guidance from [Lifetime Homes](#) should be considered to meet the changing mobility requirements of residents.

12.3 Parking bays for people with disabilities should be designed so that drivers and passengers, either of whom may have a disability, can get in and out of the car easily and safely. Bays should be longer and wider than the preferred bay size. This ensures easy access from the side and the rear for those with wheelchairs and protects people with disabilities from moving traffic when they cannot get in or out of their car on the footway side of a bay on the highway.

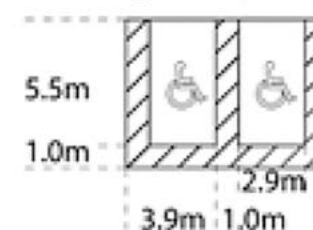
12.4 To accommodate modern vehicles, off-street blue badge parking bays should be at **least 5.5m long by 2.9m wide** with additional space as follows:

Blue badge parking arrangements

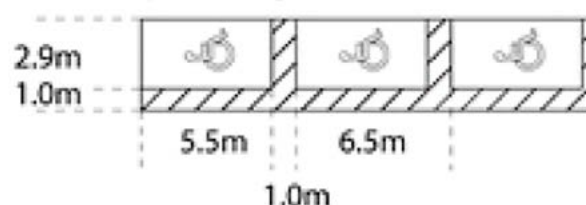
Example of bay



Square parking



Parallel parking

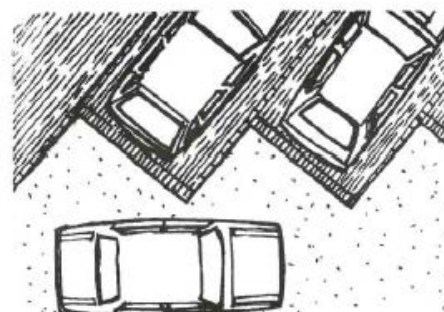


- 12.5** Bays should be marked with lines and the International Symbol for Access with the safety zone/aisle between the bays marked with hatchings.
- 12.6** Dropped kerbs should be provided where necessary and pedestrian routes to and from car parks for people with disabilities should be free from steps, bollards and steep slopes. Further guidance can be sought from “Guidance on the use of Tactile Paving Surfaces” DETR.
- 12.7** On street disabled parking bay markings are obtained from [HCC at Disabled parking bay | Hertfordshire County Council](#).

Shared Surface

- 13.1** Shared surface layouts can offer opportunities for parking to be integrated with the street.

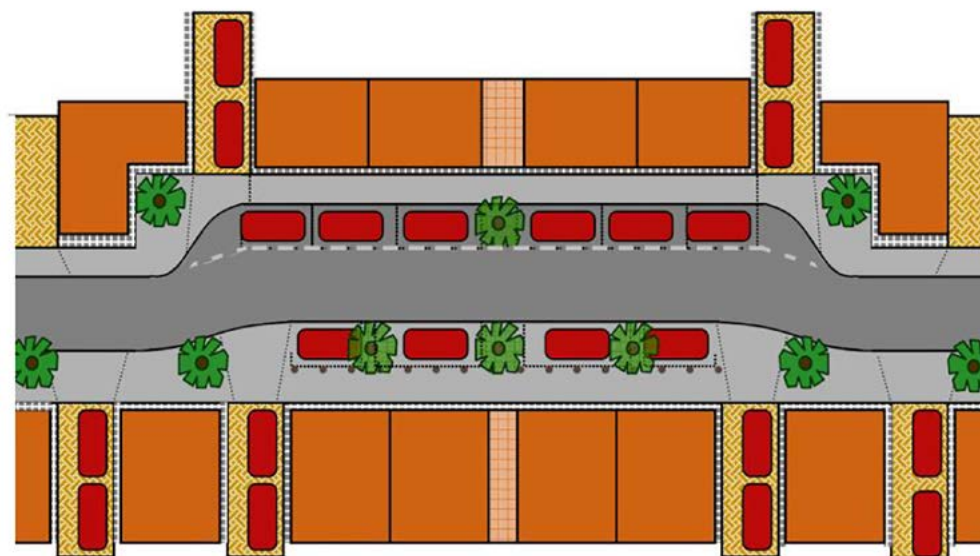
The use of parked cars to necessitate a speed reducing change of direction



The use of trees to delineate parking bays



- 13.2** Careful consideration should be given to ensuring that the use of shared surfaces is appropriate for the location, because shared surfaces can lead to indiscriminate parking, blocking of footway and the narrowing of the road which hampers access by service and emergency vehicles.
- 13.3** Careful and innovative design can enable streets to incorporate a certain level of unallocated on-street parking in the form of parallel or angled parking bays or parking squares (see “Design and Layout, Vehicles”). However, consideration must be given to location, proximity to accesses, sight lines and manoeuvring requirements so that indiscriminate parking and the obstruction of footways and carriageways is avoided. It is also important that the requirements of emergency and other service vehicles are catered for together with the needs of the disabled.



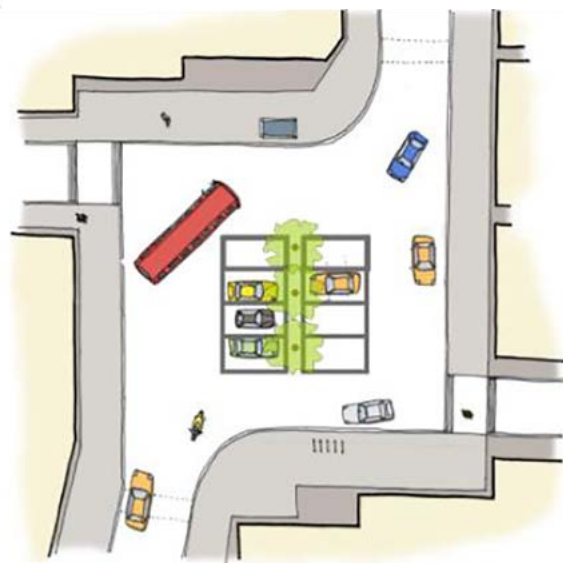
An example showing mixed housing development with some on-street parking

Parking Squares

14.1 These are pedestrian/vehicle shared surfaces, often located at junctions. They should be directly fronted by buildings.



Examples of parking squares



14.2 Car parking can be provided in those areas which are not occupied by the carriageway or footway. Parking requirements of the frontage dwellings can be accommodated within the square, with the remaining provision between or behind the dwellings.

14.3 Parking squares are good opportunities for hard landscaped shared spaces. The siting of trees and street furniture can be used to informally manage parking.

Parking Courts

- 15.1** Careful consideration needs to be given to the location and design of parking courts to minimise any adverse impact. A balance needs to be struck between on-street and on-plot parking.
- 15.2** Rear parking courts can reduce the visual intrusion of cars, but there are disadvantages including inefficient use of land, reduced garden sizes and loss of security and privacy to the rear of the home. As a result, the development can be blighted by cars parked to the front of the house where there is no space designed to accommodate them.



Parking spaces available in parking court but residents preferring to park in road

- 15.3** Parking courts need to be designed carefully and be overlooked with direct access to/from the surrounding dwellings and have adequate lighting (dusk to dawn energy efficient lighting to appropriate levels). Boundary treatment should be designed to allow observation from dwellings over the parking spaces.
- 15.4** They must be high quality in design terms and have a sense of place and feel secure, to encourage ownership.
- 15.5** The entrance to parking courts should generally be a minimum width of 3m for up to 9 parking spaces and 4.1m wide for 10 or more spaces. Where the entrance to a parking area is built over, the headroom should be a minimum of 2.5m. (Separate building regulations may apply where fire tender or emergency access is specifically required.)

15.6 Rear parking courts should ideally serve no more than six dwellings and work best when they:

- Have no more than about 10 spaces
- Have single point of access to the highway
- Are overlooked by living rooms or kitchens
- Have adequate lighting
- Have boundary treatments to allow overlooking and avoid blank walls
- Have direct access to dwellings
- Are high quality in design terms - materials, planting etc
- Are located in accessible areas
- Have sense of place
- Feel secure to users



Example of good design in terms of being overlooked from living space

Underground, Decked, Underdeck and Under-croft Parking

- 16.1** Underground, decked, underdeck and under-croft parking should be provided wherever possible, in accordance with the Institute of [Structural Engineers, Design Recommendations for Multi Storey and Underground Car Parks Fourth Edition \(March 2011\)](#).

Garage Provision and Size

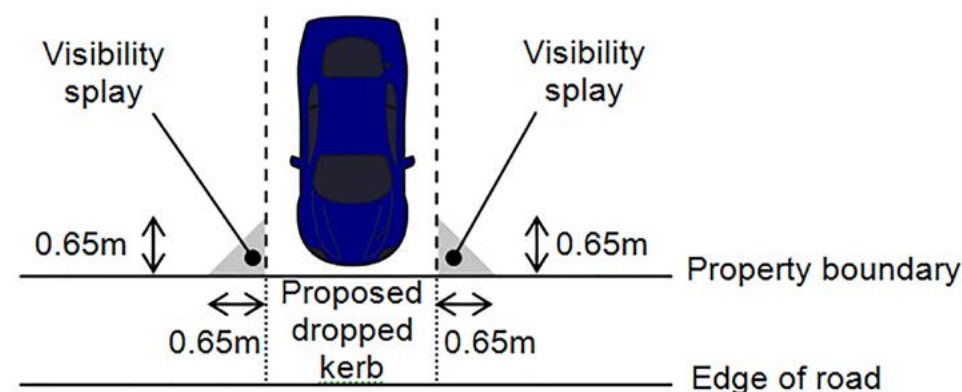
- 17.1** Garages need to be large enough to accommodate a modern, family sized car and some storage as many modern properties do not have much storage space within the dwelling itself.
- 17.2** The minimum internal garage dimensions for cars should be 6m x 3m (internal dimension) based on a large family car of 2m width and a minimum clearance of at least 0.5m each side required to open car doors on both the driver and passenger side and an average car length of about 4.5m.
- 17.3** If the cycle parking provision is to be within a garage, the garage should be designed to store multiple bicycles proportionate to the size of the house with clearance of 0.9m to enable bicycles to be wheeled in and out of the garage without having to move the car.

Set Backs

- 18.1** Where garages, gated and driveways (all gates to open inwards) are placed directly adjacent to the highway the setback should be 6m from the edge of the highway to allow for parking in front of the garage/gates.
- 18.2** Consideration must be given to the safety implications of windows opening into the carriageway/footway. In situations where windows are at street level and there is no setback windows should not open outward.
- 18.3** Setbacks are reliant on good design to give at least some visibility for/ of emerging vehicles.

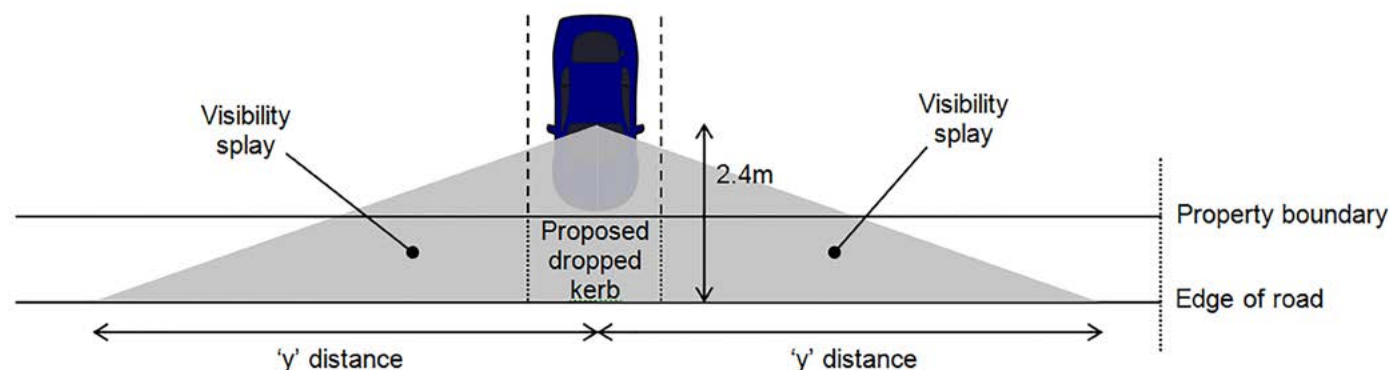
Vehicle Crossings

- 19.1** Any parking space adjacent to a footway or carriageway must have clear visibility of oncoming pedestrians, either side of a driveway of 0.65m. Low level planting is acceptable, but nothing that grows above 0.6m high, so that it is possible to see a small child.
- 19.2** Vehicle Crossings are not normally permitted by HCC off bus cage markings, school zig-zag markings, parking bays and laybys. Exceptions may be permitted through consideration in a Design Review.



Pedestrian visibility

- 19.3** When vehicles emerge from a driveway it is essential that the layout includes clear visibility of oncoming vehicles and pedestrians. The amount of vehicle visibility required ('y' distance) is dependent upon the speed of the traffic. The diagram below shows how this requirement is measured. No allowance is made for cars parking within the visibility splays.



Vehicle visibility

- 19.4** Any new vehicle crossing or dropped kerb should not adversely affect the local parking provision.
- 19.5** Precedence alone is not sufficient to determine the acceptability of a new access. Applications shall be considered against all the criteria and on the site-specific evidence. Those that are considered to be unsafe, shall be recommended for refusal of planning permission.
- 19.6** HCC's specification for domestic accesses via dropped kerbs is set out on the page [Dropped Kerbs on the HCC website](#).

Car Club Parking

- 20.1** Traffic Regulation Orders may be required to accompany the installation of car club parking spaces on the public highway to aid enforcement by the borough or district council.

Chapter 7

Specification, Preliminaries & Site Clearance

Contents

Introduction

- 1.1** The model specification for the construction and improvement of roads in Hertfordshire is [The National Highways - Manual of Contract Documents for Highway Works](#) as amended by HCC, including:
- Volume 1: Specification for Highway Works (SHW);
 - [Volume 2: Notes for Guidance on the Specification for Highway Works](#);
 - [Volume 3: Highway Construction Details](#).
- 1.2** This Chapter sets out general guidance for the application of the specification and sets out requirements for:
- Introduction (000 Series)
 - Preliminaries (100 Series)
 - Site Clearance (200 Series)
- 1.3** Hertfordshire's requirements for the remaining series of the SHW are contained in the relevant chapters in Part 4 of this guidance.
- 1.4** Where works to achieve the construction and improvement of Public Rights of Way, specifications, preliminaries and site preparation will be approved in advance with and guided by the HCC Highway Authority for Rights of Way.

General Guidance

- 2.1** National Highways (formerly the Highways Agency and last Highways England) from time to time update their documents. The Scheme Promoter is expected to use the most recent version of the documents as exist at the time the detailed design and specification for the highway works are submitted to HCC for approval, in accordance with the requirements of the relevant legal agreement.
- 2.2** In the same way, references to British Standards and European Standards contained therein should be taken to include the successor standards where the original reference becomes superseded.
- 2.3** In compiling the specification for a development, the Scheme Promoter shall comply with the requirements of the model specification documents, with the exception of any modifications to it that are contained within the relevant Part 4 chapters of this guidance.
- 2.4** The SHW refers to numbered appendices, in which site-specific specification and design information should be included. A full list of the appendices and guidance on their contents can be obtained from Volume 2, 'Notes for Guidance'.

The Scheme Promoter shall prepare all necessary appendices for the scheme and design proposals. The designer or scheme promoter must make these available for HCC approval.

- 2.5** The Scheme Promoter should not cover any part of the permanent works without giving HCC an opportunity to inspect the works and ensure that it complies with the specification. The Scheme Promoter must give written notice, in accordance with the requirements of the relevant legal agreement with HCC, of the intention to cover part of the Works.
- 2.6** If the Scheme Promoter fails to give sufficient notice, HCC may require the contractor to uncover the works, unless it can be demonstrated to the satisfaction of HCC that the buried works comply with the specification.

SHW Introduction (Series 000)

Clause No. 002 (1)

Title: Terms and Abbreviations

Delete the second paragraph and insert the following:

“Where the specification refers to the ‘Overseeing Organisation’ this shall be taken to mean HCC or its agents.

Where the specification refers to ‘The Contractor’ this shall be taken to mean either:

- The scheme promoter, or any person, company or organisation working on behalf of the scheme promoter;
- A contractor appointed by HCC.

Where the specification refers to the ‘Contract’ this shall be taken to mean either:

- The legal agreement(s) enabling the Works, typically a s38 for new roads and a s278 for off-site highway works, including any conditions contained therein, under which the scheme promoter is given permission to construct the works;
- Any contract entered into by HCC for its Works.”

SHW Preliminaries (Series 100)

Appendix 1/5:

Testing to be Carried Out by the Scheme Promoter

Where the specification (including British Standards) allows for the provision of test certificates, the Contractor shall in each case submit to HCC such test certificates, when requested.

All testing shall be undertaken by a UKAS approved laboratory.

Cube strength tests are not required for concrete complying with Clause 2602.

See the table below for general guidance on material testing requirements. This table should not be regarded as exhaustive and thus other testing may be required by HCC.

Series 300 Testing to be carried out by the Scheme Promoter

Clause	Work, Goods or Materials	Test	Frequency of Testing	Test Certificate	Comments
306 Permanent fencing	Concrete Components	Cover to reinforcement	1 per consignment (max 1 per 100) BS1722 Annex A3-3		Quality management scheme applies
308 Gates and Stiles	Reinforced Concrete Posts	Cover to reinforcement	1 per consignment (max 1 per 100)		Quality management scheme applies

Series 500 Testing to be carried out by the Scheme Promoter

Pipes for drainage and service ducts (not exceeding 900mm diameter)

Clause	Work, Goods or Materials	Test	Frequency of Testing	Test Certificate	Comments
501	Vitrified clay				
	Concrete PC / SRC				Product certification scheme applies
	Concrete Pre-stressed				
	Iron cast				
	Iron-ductile				
	UPVC				
	GRP				
	Plastics				
	Other materials				BBA certification applies

Pipe bedding

Clause	Work, Goods or Materials	Test	Frequency of Testing	Test Certificate	Comments
503		Grading	1 per 500 tonnes (min 3)		
		Soluble sulphate content (N)	1 per source		
		Los Angeles Abrasion			

Sealing existing drains

Clause	Work, Goods or Materials	Test	Frequency of Testing	Test Certificate	Comments
506	Concrete grout			Required	

Chambers

Clause	Work, Goods or Materials	Test	Frequency of Testing	Test Certificate	Comments
507	Precast concrete				Product certification scheme applies
	Manhole steps				Product certification scheme applies
	Steel fittings				Product certification scheme applies
	Covers, grates and frames				Product certification scheme applies
	Cover bolts				Quality management scheme applies

Gullies and pipe junctions

Clause	Work, Goods or Materials	Test	Frequency of Testing	Test Certificate	Comments
508	Precast concrete				Product certification scheme applies
	Clay				Product certification scheme applies
	Cast iron and steel				Product certification scheme applies

Water tightness of joints

Clause	Work, Goods or Materials	Test	Frequency of Testing	Test Certificate	Comments
509		Air test	All pipes with watertight joints		

Series 600 Testing to be carried out by the Scheme Promoter

Acceptable material – Class 1

Clauses 601, 631-637, 640

Work, Goods or Materials	Test	Frequency of Testing	Test Certificate	Comments
Imported granular fill	Grading / uniformity coefficient	1 per 500 cubic m		
	mc / MCV (N)	1 per week		
IC only	Los Angeles Abrasion	Weekly		
As found granular fill		Test as for Imported General granular fill if noticeably different from material described in geotechnical report		

Acceptable material – Class 2

Clauses 601, 631-637, 640

Work, Goods or Materials	Test	Frequency of Testing	Test Certificate	Comments
General cohesive fill	Grading mc / MCV / PL Undrained shear strength (N)	1 per 500 cubic m		

Acceptable material – Class 4**Clauses 601, 631-637, 640**

Work, Goods or Materials	Test	Frequency of Testing	Test Certificate	Comments
Landscape Fill	Grading / mc / MCV(N)	1 per 500 cubic m		Testing only required if material to be used in the construction of slopes or bunds

Acceptable material – Class 5A**Clauses 601, 631-637, 640**

Work, Goods or Materials	Test	Frequency of Testing	Test Certificate	Comments
Topsoil, existing on site	Grading	To be determined by visual inspection		

Acceptable material – Class 5B**Clauses 601, 631-637, 640**

Work, Goods or Materials	Test	Frequency of Testing	Test Certificate	Comments
Imported Topsoil	As required by BS3882		Required	

Acceptable material – Class 6**Clauses 601, 631-637, 640**

Work, Goods or Materials	Test	Frequency of Testing	Test Certificate	Comments
Selected granular fill	Grading / uniformity coefficient	1 per 400 tonnes		Separate out the different types of Class 6 materials as per SHW table 6/1
Selected granular fill	PI / LL (N)	Daily		Separate out the different types of Class 6 materials as per SHW table 6/1
Selected granular fill	Los Angeles Abrasion / SMC (N)	Weekly		Separate out the different types of Class 6 materials as per SHW table 6/1
Selected granular fill	Omc / mc, mc or MCV (N)	1 per 400 tonnes		Separate out the different types of Class 6 materials as per SHW table 6/1
Selected granular fill	Organic matter / water soluble of total sulphate content	Weekly		Separate out the different types of Class 6 materials as per SHW table 6/1
Selected granular fill	PH / chloride ion content (N)	Weekly		Separate out the different types of Class 6 materials as per SHW table 6/1
Selected granular fill	Resistivity (N)	Source		Separate out the different types of Class 6 materials as per SHW table 6/1
Selected granular fill	Undrained and drained shear parameters (N)	Source and monthly		Separate out the different types of Class 6 materials as per SHW table 6/1

Clause	Work, Goods or Materials	Test	Frequency of Testing	Test Certificate	Comments
602	Earthworks materials beneath surface of a road or paved central reserve	Frost heave (N)	Source and 1 every 4 months		
609	Geotextiles	Manufacturers Tests of physical properties		Required	Product test certification to be obtained from manufacturers
612	Compaction of fills	As per Table 6/1 of SHW	Minimum of daily or per layer		NDG acceptable for end product compaction testing
618	Topsoiling and grass seeding	Rate of spread of fertiliser	1 per 100 square m	Required	
618	Topsoiling and grass seeding	Rate of spread of seeding			
618	Topsoiling and grass seeding	Chemical analysis of fertiliser	1 per source		
618	Topsoiling and grass seeding	Grass seed germination and purity (manufacturer's test)	1 per source and mix variety	Required prior to sowing	

Series 700 Testing to be carried out by the Scheme Promoter

Clause	Work, Goods or Materials	Test	Frequency of Testing	Test Certificate	Comments
705	Sub-base and base material beneath surface of a road or paved central reserve	Frost heave (N)	Source and 1 every 4 months	Required	

Series 800 Testing to be carried out by the Scheme Promoter

Clause	Work, Goods or Materials	Test	Frequency of Testing	Test Certificate	Comments
801	Unbound subbase material (other than slag) adjacent to cement bound materials, concrete pavements, structures or products	Soluble Sulphate content (N)	Source 1 per 400 tonnes or per location if less than 400 tonnes	Required	

Granular subbase material Type 1

Clause 803

Work, Goods or Materials	Test	Frequency of Testing	Test Certificate	Comments
Granular subbase material Type 1	Grading plasticity index (N)	1 per 400 tonnes	Required	
Granular subbase material Type 1	Los Angeles Abrasion (N)	1 per source	Required	
Granular subbase material Type 1	Soundness (N)	1 per source	Required	
Granular subbase material Type 1	Water absorption (N)	1 per source	Required	

Series 900 Testing to be carried out by the Scheme Promoter

Aggregate for bituminous materials

Clauses 901, 925, 926

Work, Goods or Materials	Test	Frequency of Testing	Test Certificate	Comments
Hardness	Los Angeles Abrasion (N)	Source		
Hardness	Aggregate Impact value (N)	Source		
Durability	Soundness (N)	1 per source		
Durability	Water absorption (N)	Source		
Cleanness	Sieve test (mass passing 75mm sieve) (N)	Source		
Crushed rock gravel	Flakiness index (N)	Source		
Blast furnace slag	Bulk density (N)	Source		
Blast furnace slag	Stability (N)			
Blast furnace slag	Sulphur content (N)			
Steel slag	Bulk density	Source		
Coarse aggregate for wearing courses	PSV (N)	1 per source		
Coarse aggregate for wearing courses	AAV (N)	1 per source		
Binders for bituminous materials	Penetration (N) Softening point (N)	1 per 750 tonnes		Quality management and product certification schemes apply

Clause	Work, Goods or Materials	Test	Frequency of Testing	Test Certificate	Comments
903-914 916, 925 926, 930 932-934	Bituminous mixtures	Grading (N) Binder content (N)	1 per 100 tonnes (or less)		
921	Surface texture	BS-EN 13036- 1 Volumetric Patch Test (N)			
927	Compacted bituminous material	Percentage refusal density test (N)	As required in BS4987 Part 2		

Series 1100 Testing to be carried out by the Scheme Promoter

Clause	Work, Goods or Materials	Test	Frequency of Testing	Test Certificate	Comments
1101	Precast concrete kerbs, channels, edgings and quadrants	Transverse strength	Source (BS EN 1340:2003)	Required	Product Certification
1107	Concrete & clay block paving	Compressive strength		Required	Product Certification

Series 1200 Testing to be carried out by the Scheme Promoter

Clause	Work, Goods or Materials	Test	Frequency of Testing	Test Certificate	Comments
1202	Permanent traffic signs			Required	Certification that the traffic sign can pass the test in BS EN 12899: 2007 is required
1207	Anchorage in drilled holes to supports of traffic signs	Loading test on site			
1210	Holding down bolts and anchorages to bases of permanent bollards			Required	Certification that the holding down bolts and anchorages can comply with the performance requirements of BS EN 12899: 2007 is required
1212	Thermoplastic road marking materials	Tests specified in BSEN1436	Per source	Required	Quality management and product certification schemes apply

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Clause	Work, Goods or Materials	Test	Frequency of Testing	Test Certificate	Comments
1214	Permanent traffic cones and traffic cylinders	Tests specified in BS EN 13422: 2004 : Part 8	2 of each size and category / type	Required	Certification that permanent traffic cones and cylinders have been tested and comply with BS EN 13422:2004 is required
1214	Temporary cones, cylinders FTD's and other delineators		2 of each size and category type	Required	Certification that at least 1 in 500 of a batch of management traffic cones, cylinders, FTD's and other delineators passed the test in clause 1214 is required

Series 1300 Testing to be carried out by the Scheme Promoter

Clause	Work, Goods or Materials	Test	Frequency of Testing	Test Certificate	Comments
1305	Anchorage for use in drilled holes	Tensile load (manufacturer's tests)		Required	To provide well attested and documented evidence
1306	Anchorage in drilled holes to columns with flange plates	Loading test on site	1 per 50 plates		
1310	Welding	Welding procedures (manufacturer's tests)	Every seven years		Quality management scheme applies
1310	Welding	Welder qualification (manufacturer's tests)	Every two years		Quality management scheme applies
1310	Welding	Production testing (manufacturer's tests)	Clause 1310 (7.1.4)		Quality management scheme applies
1310	Welded joints	Destructive testing			Quality management scheme applies

GFRP laminates**Clause 1313**

Work, Goods or Materials	Test	Frequency of Testing	Test Certificate	Comments
GFRP laminates	Loss of ignition	1 per 200 production columns		
GFRP laminates	Colour fastness	1 per batch		
GFRP laminates	Electric strength	1 per batch		
GFRP laminates	Water absorption	1 per batch		
GFRP laminates	Impact strength	1 per batch		

Brackets for laminated GFRP lighting columns**Clause 1314**

Work, Goods or Materials	Test	Frequency of Testing	Test Certificate	Comments
Polyurethane foam	Bulk density	1 per batch		
Polyurethane foam	Surface hardness	1 per batch		
Polyurethane foam	Apparent bulk density	2 per batch		
Polyurethane foam	Impact strength	2 per batch		
Polyurethane foam	Flexural stress	2 per batch		

Series 1400 Testing to be carried out by the Scheme Promoter

Clause	Work, Goods or Materials	Test	Frequency of Testing	Test Certificate	Comments
1421	Cable				Product certification scheme applies
1424	Lighting Units	Tests specified in Clause 1424	Each unit	Required	Product certification scheme applies Certification that the installation complies with BS7671 (the IEE Wiring Regulations) is required
1424	Networks	Tests specified in Clause 1424	Each network	Required	Certification that the installation complies with BS7671 (the IEE Wiring Regulations) is required

Series 1700 Testing to be carried out by the Scheme Promoter

Clause	Work, Goods or Materials	Test	Frequency of Testing	Test Certificate	Comments
1702 1703 1704	Cement			Required	Certificate to be provided monthly for each type of cement. Quality management and product certification schemes apply
1702 1703 1704	Portland			(BS-EN 197-1, 2000)	
1702 1703 1704	Portland – blast furnace			Required (BS EN 197-1, 2000)	
1702 1703 1704	Sulphate resisting Portland			Required (BS 4027)	
1702 1703 1704	Portland pulverised fuel ash			Required (BS EN 197-1, 2000)	
1702 1703 1704	Low heat Portland			Required (BS EN 197-1, 2000)	

Clause	Work, Goods or Materials	Test	Frequency of Testing	Test Certificate	Comments
1702 1703 1704	High Slag blast furnace			Required (BS EN197-1, 2000)	
1702 1703 1704	Pulverised-fuel ash	Colour index	Monthly	Required	Certificate to be provided monthly Product certification scheme applies
1702 1703 1704	Ground granulated blast furnace slag			Required (BS-EN 15167-1, 2006)	Certificate to be provided monthly. Product certification scheme applies
1702 1703 1704	Cements (all types)	Chloride content	Monthly		Tests to be carried out by the manufacturer and results included on the test certificates required above
1702 1703 1704	Pulverised-fuel ash (PFA)	Sulphate content	Monthly		
1702 1703 1704	Ground granulated blast furnace slag (GGBS)	Acid-soluble alkali content	Daily (PC) Weekly (PFA GGBS)		

Clause	Work, Goods or Materials	Test	Frequency of Testing	Test Certificate	Comments
1702 1703 1704	Aggregates	Grading	Weekly	Required	Results of routine control tests by the manufacturer / supplier to be provided Product certification scheme applies
1702 1703 1704	Aggregates	Shell content (N)	Source		
1702 1703 1704	Aggregates	Flakiness index (N)	Source		
1702 1703 1704	Aggregates	Los Angeles Abrasion (N)	Source		
1702 1703 1704	Aggregates	Drying shrinkage (N)	Source		
1702 1703 1704	Aggregates	Chloride content (N)	Source		
1702 1703 1704	Aggregates	Sulphate content (N)	Source		

Clause	Work, Goods or Materials	Test	Frequency of Testing	Test Certificate	Comments
1702 1703 1704	Water	Tests specified in BS EN 1008:2002			
1702 1703 1704	Water	Chloride content	Source		
1702 1703 1704	Water	Sulphate content	Source		
1702 1703 1704	Water	Acid-soluble alkali content	Source		
1702 1703 1704	Admixtures	Chloride content	1 per consignment	Required (BSEN 480-1 :1998)	Product certification scheme applies
1702 1703 1704	Admixtures	Sulphate content	1 per consignment		
1702 1703 1704	Admixtures	Acid-soluble alkali content	1 per consignment		

Clause	Work, Goods or Materials	Test	Frequency of Testing	Test Certificate	Comments
1702 1703 1704	Concrete	Cube strength (N)	Reinforced concrete – two cubes from 20 cubic m or 20 batches		
1702 1703 1704	Concrete	Cube strength (N)	whichever represents the lesser volume – min 2 per day		
1702 1703 1704	Concrete	Cube strength (N)	Mass concrete – two cubes from 50 cubic m or 50 batches whichever represents the lesser volume – min 2 per day		
1702 1703 1704	Concrete	Cube strength (N)	Additional cubes for special purposes		
1707	Fresh concrete	Workability (slump or compacting factor or Vebe)			
1707	Fresh concrete	Air content	Each batch		
1707	Fresh concrete	Cement content			
1707	Fresh concrete	Water / cement ratio			

Clause	Work, Goods or Materials	Test	Frequency of Testing	Test Certificate	Comments
1707	Precast concrete manufactured off-site	Manufacturer's tests			Contractor to make available records of tests by the manufacturer
1707	Fresh concrete	Workability (slump or compacting factor or Vebe)			
1707	Fresh concrete	Air content	Each batch		
1707	Fresh concrete	Cement content			
1707	Fresh concrete	Water / cement ratio			
1707	Precast concrete manufactured off-site	Manufacturer's tests			Contractor to make available records of tests by the manufacturer
1710	Precast concrete manufactured off-site	Manufacturer's tests			Contractor to make available records of tests by the manufacturer
1711	Grout	Bleeding	1 per mix		
1711	Grout	Free expansion	1 per mix		Only applicable if an expanding agent is used
1711	Grout	Cube strength	3 cubes from each batch		
1711	Admixtures			Required (BSEN 480-1)	

Reinforcement

Clause	Work, Goods or Materials	Test	Frequency of Testing	Test Certificate	Comments
1712	Steel bars			Required (BS4449)	Product certification scheme applies
1712	Steel wire			Required (BS4482)	
1712	Steel			Required	
1712	Fabric			(BS4483)	
1713	Fabricated reinforcement			Required	Certification that fabricated reinforcement complies with the routine inspection / testing requirements of BS 4466 is required if the fabrication is not covered by a product certification scheme listed in Appendix B

Clause	Work, Goods or Materials	Test	Frequency of Testing	Test Certificate	Comments
1716	Reinforcement jointing systems	Permanent elongation characteristic strength (manufacturer's tests)		Required for each type of connection	
1717	Reinforcement metal arc welding	Welding procedure approval (BS EN 17660-1:2006)	As required in (BS EN 176601:2006)		
1717	Reinforcement metal arc welding	Welder approval (BS EN 176601:2006)			

Series 1900: Protection against Corrosion

See Part 4 Chapter 13 sub-section 5

Series 2400 Testing to be carried out by the Scheme Promoter

Clause	Work, Goods or Materials	Test	Frequency of Testing	Test Certificate	Comments
2401	Masonry cement	Chloride content	Monthly	Required (BS EN413-1:2004)	Quality management scheme applies Test to be carried out by the manufacturer and results included on the test certificate
2402	Sand	Chloride content	Monthly	Required per consignment (BS EN 13139:2002)	Test to be carried out by the manufacturer and results included on the test certificate
2403	Water	Tests specified in BS EN 1008:2002			
2404	Mortar admixtures			Required (BSEN 480-1)	Product certification scheme applies
2405	Lime			Required (BS EN 459-1)	

Bricks

Clause	Work, Goods or Materials	Test	Frequency of Testing	Test Certificate	Comments
2406	Clay	Soluble salt content Efflorescence Compressive strength Water absorption Initial rate of suction) (BS3921)			
2406	Calcium silicate			Required (BS EN 771-2, 2003)	
2406	Concrete			Required (BS6073: Part 3)	

Blocks

Clause	Work, Goods or Materials	Test	Frequency of Testing	Test Certificate	Comments
2407	Concrete			Required (BS6073: Part 1)	

Series 2600 Testing to be carried out by the Scheme Promoter

Bedding mortar materials

Clause 2601

Work, Goods or Materials	Test	Frequency of Testing	Test Certificate	Comments
Bedding Mortar	Flow cone test	Each batch		
Bedding Mortar	Flow between glass plates	Each batch		
Bedding Mortar	Compressive strength	Each batch		
Bedding Mortar	Expansion test	Each batch		
Bedding Mortar	Water absorption	Each batch		
Bedding Mortar	Elastic stability	1 per source		
Bedding Mortar	Flow cone test Compressive strength	Each load		

Notes:

- Tests comparable to those specified in this chapter will be necessary for any equivalent work, goods or materials proposed by the Contractor;
- (N) Indicates that a UKAS sampling and test report or certificate is required;
- Unless otherwise shown in this chapter, tests for work, goods or materials as scheduled under any one Clause are required for all such work, goods or materials in the Works;
- Cube strength tests are not required for concrete complying with Clause 2602;
- Unless otherwise shown in this chapter, test certificates for works, goods or materials as scheduled under any one Clause are required for all such work, goods or materials in the Works.

Appendix 1/7: Site Extent and Limitations on Use

The Scheme Promoter shall obtain the written approval of HCC to the siting of all huts, equipment, stacks or heaps within the highway boundary. On completion of the works, the huts, equipment etc. shall be removed and the sites made good to the satisfaction of the HCC.

The Scheme Promoter shall always keep all roads, streets, private entrances, verges, cycle tracks, paths, footways, drains and sewers around the works in a safe, clean, and passable state. All waste or superfluous material on the site shall be cleared away by the Contractor as the works progress.

The Scheme Promoter shall not light bonfires within the confines of the site boundary.

All works and storage areas are to be fenced off whilst works are proceeding and the fencing removed only when the works are finished, and the area is suitable for use by the public.

In all operations the Scheme Promoter shall have regard to factors that may affect the environment and shall seek to carry out all operations in a manner that will have minimal adverse impact on the environment.

Appendix 1/9: Control of Noise and Vibration

The Scheme Promoter should obtain the noise control requirements from the Local Planning Authority.

The Scheme Promoter shall comply with the general requirements of BS5228. All noise assessments shall be made in accordance with Annex E (Noise Monitoring) of BS5228: Part 1. Note that Annex E includes the specification for the noise monitoring equipment to be used. All measurements of Leq (Equivalent Continuous Sound Pressure Level) shall be taken over a minimum period of fifteen minutes.

All compressors shall be sound reduced models fitted with properly lined and sealed acoustic covers which shall be kept closed when the machines are in use. All ancillary pneumatic percussive tools shall be fitted with mufflers or silencers of the type recommended by the manufacturers.

All vehicles and mechanical plant used for the purpose of the works shall be fitted with effective exhaust silencers and shall be maintained in good and efficient working order so that extraneous noise from mechanical vibrations, squeaking, hissing etc. shall be reduced to a minimum. Machines in intermittent use shall be throttled down to a minimum or shut down during the periods between work.

The Scheme Promoter shall take all steps necessary to limit vibration caused by plant and machinery used on the site. No machine which uses a system of dropping a heavy weight, whether power assisted or by gravity, on the surface of paving or foundation will be permitted for the purpose of breaking up.

Appendix 1/12: Setting Out and Existing Ground Levels

Prior to the commencement of the Works, the Contractor shall ensure that suitable setting out stations, including level datum benchmarks, are established and agreed with HCC.

The Contractor must maintain the above setting out reference points throughout the duration of the Works.

Appendix 1/17: Traffic Safety and Management

Where work is carried out on the highway the Scheme Promoter shall obtain the approval of HCC for their traffic management proposals and the times when traffic management will be allowed. This will be done in consultation with the police.

The traffic management proposals shall allow for the requirements of active travel modes and motor traffic. The developer should establish whether their traffic management will affect any bus routes and make adequate provision for buses if required.

Temporary bus stops shall be provided where access to an existing stop is restricted by the works. The need for and location of temporary bus stops shall be agreed with HCC.

The HCC Network Management Group may direct the times at which the Contractor can work on the highway. Work may not be allowed during peak traffic hours, at weekends, bank holidays or at night. However, there are some locations where the HCC may require works to be carried out at night only.

Traffic management shall be in accordance with Chapter 8 of the [TSM and the Code of Practice](#); [Safety at Street Works and Road Works](#).

Where traffic management equipment remains on the carriageway during the hours of darkness, signs must be illuminated as per the requirements of Chapter 8 of the TSM. All works shall be carried out in accordance with [TSRGD](#), [Road Traffic Regulation Act](#) and the [Highways Act](#).

Compliance with Clause 117 and Appendix 1/17 shall not relieve the Scheme Promoter of the obligations and liabilities under any provisions of the Highways Act or any other relevant legislation.

The Scheme Promoter must maintain access to all properties during the Works unless expressly agreed with HCC.

Access for emergency vehicles shall be maintained through all phases of the Scheme Promoter's traffic management proposals.

"No Road Marking" signs must be provided on every approach to areas where the road markings have been removed.

Traffic shall not run on planed surfaces without the prior agreement of HCC.

Temporary 'Give Way' signs are to be erected where the road markings indicating a Give Way have been removed.

HCC shall have the unqualified right to instruct work, persons and / or sub-contractors on any matter relating to traffic safety and management including their immediate removal from site.

A safety zone, preferably 1.2m wide, should be provided between the works and any pedestrian or vehicular traffic. The safety zone shall not be entered or encroached on by materials, plant or anything else being used in connection with the work except for:

- Traffic management related operations and equipment;
- Vehicles entering or leaving the area.

The Scheme Promoter shall allow for the occasional use of the safety zone by broken down vehicles, which would otherwise impede the flow of traffic past the works, or in an emergency when required by HCC or the police to divert traffic past an obstruction in a trafficked lane.

Vehicles shall only enter or leave coned-off areas at approved access points. Non-essential vehicles, particularly private cars, shall not enter a coned off area (except when such areas are designated as residents parking areas and cars are displaying appropriate authorisation).

All warning signs, used in connection with the works, shall be a minimum of 750mm high, unless agreed otherwise with HCC.

Unless agreed by HCC, all warning and mandatory signs shall have a mounting height of 1.2m. This will be increased to the relevant height when over footway / footpath, cycle track or bridleway. The Scheme Promoter shall forward details of his proposed method

of mounting signs to HCC for approval. The sign position shall be visible to traffic and not obstructed by street furniture, structures and traffic management equipment.

All traffic cones in connection with the works shall be at least 750mm high.

Before opening any traffic lane or lanes the following conditions shall be met:

- Temporary ramping to longitudinal joints shall be at 1 in 20 or flatter relative to the transverse plane of the road surface;
- Temporary ramping to transverse joints shall be at 1 in 20 or flatter relative to the longitudinal plane of the road surface;
- The maximum drop in levels within 3m of a trafficked lane shall be 400mm unless protected by a safety fence or barrier;
- All personnel, plant, items of equipment and materials must have been cleared from traffic lane(s) and the safety zone;
- Those areas to be trafficked shall be hand or suction swept where the Scheme Promoter's activities have made it necessary in the opinion of HCC.

The Scheme Promoter shall provide HCC on a weekly basis with the name, address and telephone number of a member (or members) of staff who can be always contacted outside normal working hours by HCC and the police and used in any emergency affecting the Works.

They shall be competent and have authority to take any necessary action.

If temporary traffic control signals are to be used, then they shall not be powered by a generator between 19:00 and 08:00 hours. During this period the power supply shall be by suitable batteries capable of providing a continuous 24-hour operation. Alternatively, by connection to a mains source of supply in which case it is the responsibility of the Scheme Promoter to arrange with the appropriate authority for the connection to be made. Supply cables shall not conduct currents more than 110V AC and these cables shall be suitably protected where they are laid on the highway. If the power source for temporary traffic signals is taken from the existing street lighting supply, then temporary traffic signs, Diagram Nos.543 and 517 of the [TSRGD](#), are to be illuminated by an independent power source during the hours of darkness. This power source shall not be from a generator.

The Scheme Promoter shall be responsible for ensuring that any traffic management system is inspected and maintained. Diversion routes are to be inspected every 4 hours and any damaged or displaced traffic management equipment replaced immediately.

The Scheme Promoter shall take all necessary steps to avoid creating a dust nuisance. If in the opinion of HCC, the Scheme Promoter is not dealing adequately with the control of dust, the

Scheme Promoter may be instructed to carry out such additional measures as HCC considers necessary, at the Scheme Promoter's expense.

HCC has the authority to close crossings and accesses, if they become hazardous or the Scheme Promoter does not promptly remove any detritus. Any losses and expenses incurred as a result shall be borne by the Contractor.

Any existing signing that conflicts with any signs for a diversion route are to be partially covered up or adjusted to suit. These shall be agreed by HCC

Appendix 1/18: Temporary Diversions for Traffic

The Scheme Promoter shall obtain the approval for any diversion of traffic from HCC. This will be done in consultation with the police.

Appendix 1/19: Routeing of Vehicles

HCC may specify the routes used by traffic travelling to and from the site. Routes should avoid residential areas if possible.

Appendix 1/21: Information Boards

HCC may require the Scheme Promoter to provide information boards warning motorists of the Works and the likely duration. Such boards should be erected two weeks prior to the Works and be maintained throughout the duration of the Works.

HCC may require the Scheme Promoter to provide and deliver works publicity letters or leaflets which include their contact details to affected parties to inform stakeholders and members of the public of the details of the intended works and disruption that may be caused.

Appendix 1/23: Risks to Health and Safety from Materials or Substances

The Scheme Promoter shall not use any substances hazardous to health when conditions such as wind speed and direction prevail which in the opinion of HCC constitute a hazard.

The Scheme Promoter shall take all additional measures such as screening and signing necessary in the opinion of HCC to protect members of the public whilst using substances hazardous to health. The Scheme Promoter's attention is drawn to [COSHH](#) and [CDM](#).

SHW Site Clearance (Series 200)

Amendment to Clause No. 202

Title: Existing Trees, Bushes and Hedges

202.1

At the start of the Clause insert the sentence “The removal of trees, bushes and hedges shall only take place with the prior consent of the Local Planning Authority”.

202.2

Delete the words “or blasted”.

Appendix 2/2: Filling of Trenches and Pipes

Trenches or ditches under the carriageway must be filled with well-graded granular fill and the ditch must be piped under the carriageway if flow is to be maintained.

Well-graded granular material must also be used for the infill of isolated pockets such as old sumps or basement voids.

Redundant pipes or ducts under the carriageway must be removed if they lie within a depth of 1m below the formation, or they show evidence of collapse.

Appendix 2/4: Explosives and Blasting

The Contractor shall not use explosives on site without the permission of the Highway Authority. Permission will not normally be granted.

Appendix 5/1: Drainage

See Part 4 Chapter 15; Paragraph 21

Appendix 5/2: Service ducts

See Part 4 Chapter 15; Paragraph 22

Appendix 5/4: Fin Drains and Narrow Filter Drains

See Part 4 Chapter 15; Paragraph 23

Chapter 8

Speed Management Features

Contents

Introduction

- 1.1** This chapter provides guidance on the design of speed management features, predominantly for application to existing highways. A variety of legislation guides to the management and maintenance of highways, In particular the [Traffic Management Act 2004](#) places a Network Management Duty on the Highway Authority to ensure the expeditious movement of traffic balancing the needs of all highway users'
- 1.2** Master planning for new highways should have laid the foundations for creating an environment in which vehicle speeds will be managed naturally within the resulting development or scheme thereby avoiding the need for supplementary traffic calming features in new highways.
- 1.3** The emerging planning application or the general arrangement for permitted development schemes, as discussed in Part 3, Chapter 2: Planning the Public Realm, should have applied the principles of speed management by design and identified the nature of complementary measures, such as landscaping, to reduce or restrain speed which are in keeping with the local character.
- 1.4** In an urban situation, shorter, straight lengths of road with features such as junction treatments should have been designed to be in keeping with the existing road layouts in the vicinity. In rural villages, elements such as sharper bends, increased use of planting or verge areas, will have been introduced.
- 1.5** The selection of speed management features and the principles of changing speed limits on existing roads is contained within [HCC's Speed Management Strategy \(SMS\)](#).
- 1.6** The SMS contains Key Criteria (KCs) which guide the appropriate selection of speed management features. This chapter references to those KCs.

Flat Top Road Humps [SMS KC34 & 35]

- 2.1** Even though the [Highways \(Road Hump\) Regulations 1999](#) allow for a maximum height of 100mm, Hertfordshire has adopted a standard nominal height of 75mm for a road hump, which can be a raised crossing feature or a junction table.
- 2.2** It is acceptable to reduce this design height to 65mm on routes used by buses, or on strategic emergency services routes, or those heavily trafficked by heavy goods vehicles HGV.
- 2.3** The standard approach gradient of 1 in 10 should be used, except on bus, emergency service or HGV routes, when 1 in 20 should be adopted wherever possible.
- 2.4** If the HCC Integrated Transport team and bus operator agree then the approach gradient can be steepened to 1 in 15 in locations nearby where 1 in 20 tables have not provided enough calming effect.

- 2.5** Plateau lengths should be a minimum of 6m on bus routes.

Standard

Nominal height	75 mm
Ramp gradient:	Ramp length:
	10% (1:10) 750mm
	6.7% (1:15) 1125mm
	5% (1:20) 1500mm

Bus Routes

Nominal height	65 mm
Ramp gradient:	Ramp length:
	10% (1:10) 650mm
	6.7% (1:15) 975mm
	5% (1:20) 1300mm

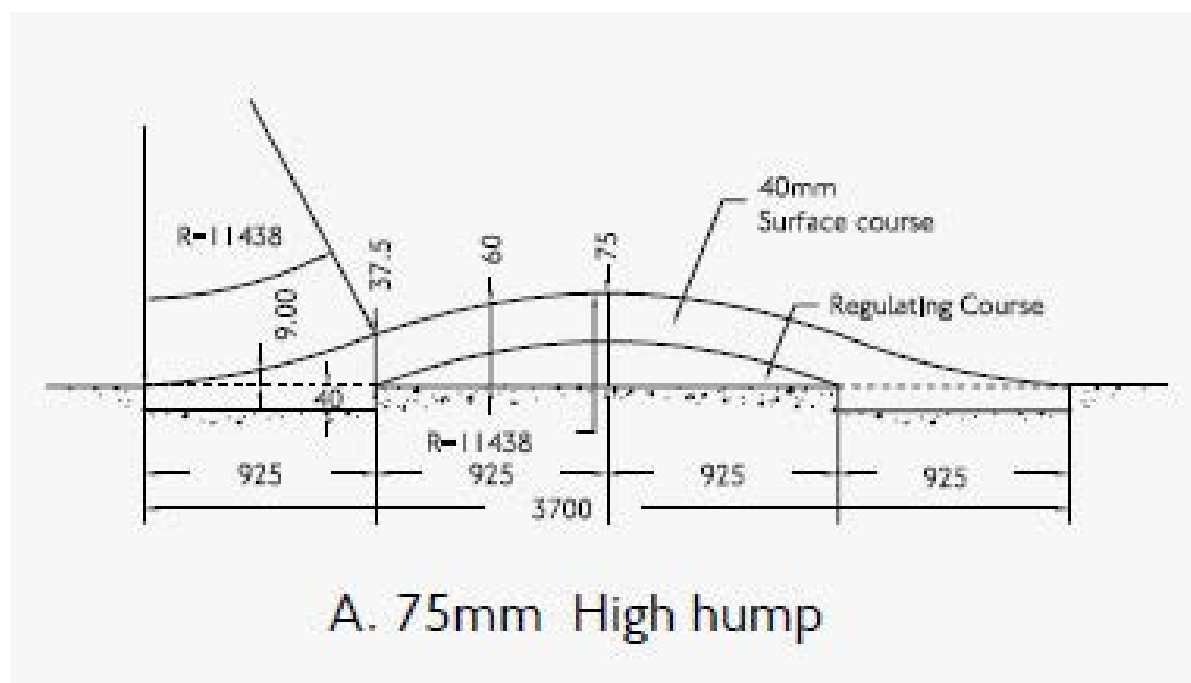
Summary of Road Hump Profiles

- 2.6** Flat top road humps can be used as crossing point for pedestrians. If a crossing point is intended, then tactile paving shall be provided, and kerbs laid flush with the top of the hump. The kerbs and footway should be dropped to meet the top of the hump rather than the hump made taller.

- 2.7** If the road humps are not intended to a crossing point, then a minimum kerb upstand of 25mm shall be used. In practice this will be 50mm or greater depending on the height of the existing kerb face. It is important to retain kerb faces to aid orientation through streetscape by visual impaired persons.
- 2.8** For drainage purposes a gap no larger than 200mm may be left if the hump is not to be used as a crossing point. If this not the case, gullies shall be placed on both sides of the road in cambered situations and a single gully shall be used at crossfall situations. Channel drains shall not be used as an alternative to gullies because channel drains are difficult to maintain.
- 2.9** A standard detail drawing HST/1100/039 is available on request.

Sinusoidal Humps

- 3.1 Sinusoidal humps can be used in situations where flat top humps have shown not to reduce vehicle speed sufficiently.
- 3.2 Sinusoidal humps shall not be used on bus routes or on the A-road network unless agreed as a Departure from Standards.
- 3.3 Sinusoidal profiles can be considered as shown below:



Source: [London Cycle Design Standards \(LCDS\)](#)

- 3.4 The use of round-top humps details will need to be agreed by a Design Review Panel on a case-by-case basis.

Cushions [SMS KC36 & 37]

- 4.1** General guidance on the use of cushions is given in Local Transport Note [\(LTN\) 01/07](#), the [SMS](#), [Traffic Advisory Leaflet \(TAL\) 1/98](#) and [TAL 4/94](#).
- 4.2** Hertfordshire has adopted standard cushion dimensions for where a substantial lowering of speed on 30 mph is required:
- 75mm height
 - 1.8m maximum width
 - 2m or 3m length depending on the road alignment and the nature of the traffic.
- 4.3** If the route is a strategic emergency vehicle route or bus route the following alternative dimensions can be used:
- 65mm height
 - 1.6m width.
 - 2m or 3m length depending on the road alignment and the nature of the traffic.
- 4.4** The recommended gap between the kerb and a cushion to allow cyclists to pass is 1.5m, albeit providing the correct number of cushions across the road to achieve speed reduction is the primary consideration in cushion spacing.
- 4.5** Parking near cushions causes issues for cyclists and buses. Waiting restrictions should be installed if parking is likely to happen close to cushions. Waiting restrictions shall be installed of a minimum length of 10m either side of the cushions (KC36).
- 4.6** The white triangular marking on the approach ramps should be laid as soon as possible after completion. A 100mm white line rectangular border shall laid around each cushion.
- 4.7** The standard detail HST/1100/048 is available for speed cushions.
- 4.8** Hertfordshire County Council no longer specifies preformed recycled rubber cushions on its network.
- 4.9** The whole life cost of the units outweighed the benefit of installation. Over time individual sections work loose and are lost then infilled with asphalt leading to an unacceptable performance.
- 4.10** All new and replacement cushions are to be constructed in asphalt unless a fully costed justification for preformed cushions is made to and agreed through the Departures from Standards process.

General Principles for Narrowing

- 5.1** Narrowing can be achieved using various methods, including road markings, physical measures, reallocation of road space or a combination of features.
- 5.2** Care should be taken when proposing the use of edge lines to visually narrow a carriageway, particularly in areas of high cycle use, where edge lines can be mistaken for cycle lanes. To avoid confusion an edge line should be no more than 500mm from the edge of carriageway where there is evidence of cyclists' use.
- 5.3** The general use of coloured surfacing is being discontinued due to the high whole life cost but will be considered on a case-by-case basis by HCC and will attract a committed sum to cover future maintenance.
- 5.4** Narrowing can cause problems for on road cyclists and cycle bypasses should be used wherever the effective carriageway width is reduced by traffic calming features i.e. pinch points and chicanes.
- 5.5** The recommended width of a cycle bypass is 2m with an acceptable minimum width of 1.5m. Additional compensatory width should be provided at each kerb as required by Part 3 Chapter 4 Section 8.
- 5.6** Care is needed to ensure that the exit alignment from a cycle bypass does not require cyclists to merge abruptly with motor vehicles. Waiting/loading restrictions may be needed to prevent parked vehicles from blocking or obstructing the bypass.
- 5.7** The design of a cycle bypass shall enable self-cleansing and/or allow access by street cleaners to prevent tyre-puncturing detritus from gathering. If this is not considered, then the bypass is unlikely to be used by cyclists.

Kerb Buildouts [SMS KC29 & 30]

- 6.1** A kerb buildout on one side of the carriageway can be used to narrow junctions, provide footway extensions and areas for planting.
- 6.2** Care must be taken in the design of buildouts to ensure that approaching drivers are aware of the buildout and that cyclists will need to move out to avoid nearside buildouts. This is particularly important if the carriageway narrowing is on the nearside and there is a central obstruction ahead.
- 6.3** This photograph illustrates the point. A car using the central hatching overtaking a cyclist in advance of this point would be forced to move left to avoid the central island just as cyclist would be moving right to miss the carriageway narrowing. This type of arrangement should be avoided.



Sheltered Parking

- 7.1** Sheltered parking can be created by any of the preceding measures in this chapter to formalise parking arrangements.
- 7.2** The footway projections can increase visibility for pedestrians thereby improving crossing conditions.

Chicanes [SMS KC29 & 30]

- 8.1** Chicanes can be used as effective gateway features.
- 8.2** Signing is an important element of successful chicane systems and shall be installed. Parking around chicanes may need to be controlled by means of TROs.
- 8.3** Chicanes can only be used on roads with a 40mph speed limit or lower. Cycle bypasses need to be incorporated where single-way working is used.
- 8.4** Overrun areas may be incorporated into the chicane design to accommodate large vehicles such as combine harvesters if sited in rural areas.
- 8.5** HCC standard detail drawings KC29 and KC30 are available on request.

Pinch Points [SMS KC31 & 32]

- 9.1** Pinch-points are used to narrow the carriageway from both sides at the same position for a distance of 5 to 10m. The effective carriageway width should be suitable for the type of vehicles expected and cycle bypasses should be considered. If the carriageway drops below 4.1m then a priority system should be implemented
- 9.2** HCC standard detail drawings KC31 and KC32 are available on request.

Islands [SMS KC33]

- 10.1** The term 'island' is used to mean both traffic islands and pedestrian refuges. Islands can be effective speed reduction measures on wide carriageways when use in conjunction with centre line hatching.
- 10.2** They should only be used as part of a package of measures and are more appropriate on roads with a speed limit of 40mph or more.
- 10.3** To avoid issues with cyclists being squeezed at an island, the gaps between kerb and island should avoid the critical range (3.2m to 3.9m). But note that large gaps greater than 4m are unlikely to reduce traffic speeds.
- 10.4** HCC standard detail drawing KC33 is available on request.

Gateway and Entry Treatments [SMS KC27 & 28]

- 11.1** These are used to signify the entry into a traffic calmed area or different environment such as a village.
- 11.2** They commonly incorporate a change in road surface (colour or material), signage (change in speed limit or village name) and 'dragon's teeth'.
- 11.3** Care needs to be taken to ensure that the feature is not visually intrusive and that it suits its environment. Future maintenance of the chosen features also needs to be considered.
- 11.4** Entry treatments are usually used in more urban areas at side roads signalling to motorists that they are leaving their present environment and entering one that is different such as a traffic calmed area or 20mph zone. They may incorporate a raised crossing area.
- 11.5** HCC standard detail drawings KC27 and KC28 are available on request.

Rumble Devices [SMS KC38-41]

- 12.1** Rumble devices are useful in providing an audible and visual warning used to highlight a particular hazard, such as the approach to a junction or bend and they can be combined with a gateway feature to signify the beginning of a traffic calming scheme.
- 12.2** They must be located at least 200m from any residential property due to noise considerations.
- 12.3** Single areas of rumble devices have minimal effect on speed reduction so they should only be considered as part of a package of measures.
- 12.4** When used they should cover the full width of the carriageway to discourage drivers from crossing the centreline to avoid them.
- 12.5** Proprietary traffic calming measures, such as Rumblewave surfacing, shall be approved by HCC prior to installation due to their high whole life cost and limited effect on vehicle speeds. A committed sum is required where proposed by developers or district/borough councils.
- 12.6** HCC standard detail drawings KC38 and KC41 are available on request.

Over-Run Areas

- 13.1** These are used to visually narrow the road whilst maintaining effective width for larger vehicles at roundabouts, narrowing and chicanes. The maximum height of overrun areas is defined by Regulation 5 of [The Highways \(Traffic Calming\) Regulation 1999](#). Further advice is given in Traffic Advisory Leaflet (TAL) 12/93.

Mini Roundabouts [SMS KC42]

- 14.1** These have a thermoplastic central island, with a diameter up to 4m and are appropriate where the speed limit is 30mph or less.
- 14.2** Mini roundabouts shall not be used to create new junctions rather convert existing priority junctions. If a new junction is required, then designers should consider compact roundabouts.
- 14.3** Pedestrians and cyclists should be considered throughout the design development to ensure they can safely negotiate the junction.
- 14.4** The central island should be smooth and white and can be flush or domed. Where a mini roundabout is being considered on a route used by buses, HCC recommends that the central island should be less than 75mm in height with slope gradients of less than 1:20.
- 14.5** They can be considered as part of a traffic calming scheme but not traffic calming features in their own right.
- 14.6** Designers are directed to [CD116 Geometric Design of Roundabouts](#).
- 14.7** HCC standard detail drawing KC42 is available on request.

Roundels

- 15.1** Speed limit roundels, painted road markings displaying the speed limit, have a limited effect on driver speed and a reduction of mean speeds of up to 1mph can be expected.
- 15.2** For avoidance of doubt 30mph signs or roundels are not permitted in areas with street lighting as REPEATER signs as defined by the [Traffic Signs Regulations and General Direction \(TSRGD\) 2016](#).

Repeater signs and roundels

- 16.1** There is a requirement to sign speed limits so they are understood and, in general, this means conforming to the requirements of [TSM Chapter 3](#) and in every case the legal requirements of [TSRGD](#).
- 16.2** Spacing of repeater signs is at the discretion of Hertfordshire County Council and Table D1 in the [SMS](#) sets out Hertfordshire's requirements
- 16.3** In 20mph areas Hertfordshire has adopted a specific requirement that repeater signs (or roundels) are placed at least every 200m to ensure their appearance is the same and the public understand what speed limit is applicable whether they are in a zone or limit.
- 16.4** In a limited number of cases there, such as in historic areas, departures on repeater spacing can be agreed with HCC's Speed Management Group.

Vehicle Activated Devices

17.1 The following vehicle activated devices are described in further detail in the [SMS](#).

- Vehicle Activated Signs (VAS)
- Speed Indicator Device (SID)
- Safety Cameras
- Speed Cameras

17.2 In general, they are not seen by HCC as traffic calming devices. As either they have a limited or temporary impact or HCC do not have specific powers to install them, they are not to be proposed as part of an area-wide traffic calming scheme.

Appendix 1: Road Hump Construction

General Process

- 1.1** An assessment of the condition of the carriageway shall be carried out between the designer and the contractor to agree if there is a requirement to cold mill and inlay sections of road in advance of the humps.
- 1.2** This will be triggered when the carriageway needs to be resurfaced for more than 3m in any direction or in areas with PSV68+ is to be used.

Construction of Raised Humps

- 2.1** The preferred material to be used for the plateau table and ramps is Hot Rolled Asphalt (HRA), 55/10 aggregate sizes with 40/60 PEN bitumen, to be used in both base and surfacing layers.
- 2.2** Stage 1 is to construct the flat table area of the plateau by:
 - I. Machine laying in two layers (can be hand lay if less than 3m in length) in order to achieve full compaction. Humps are to follow the existing camber unless specified otherwise.
 - II. Placing a suitable spacer, e.g. a 50mm thick pc edging for a 75mm plateau, behind the paver and lay off this level through the length of the plateau and beyond to produce a lower layer of asphalt over the length of the plateau and beyond, including temporary ramps if trafficking in this unfinished state is to be allowed.
 - III. Removing the spacer guide, roll and compact through the plateau, forming the lower level of the temporary end ramps. Initially, tack coat only under the plateau area.
 - IV. Bringing paver onto binder course, place thinner spacer, e.g. 40mm timber baulk to complete a 75mm plateau,

behind the paver and lay, off this level, an upper layer of surface course.

- V. Rolling as required, forming a temporary ramp up to the full height of the plateau.

2.3 Stage 2 is to construct the approach ramps by:

- I. Cutting back the temporary approach ramps, which will be released from the existing surface if no tack coat has been used. The vertical face thus formed should then be measured (dipped) to check the finished height of the plateau. See Tolerances and Checking, below, which covers the quality control of the process.
- II. Cutting keys into the road surface at ramp ends, and lay remainder of tack coat.
- III. Laying permanent approach ramp material, in two layers, rolling in both directions, longitudinally and transversely, to create a correct linear profile for the ramp. Ideally a whacker compacting plate should be used to compact the base layer, and a small vibrating roller for the surface layer. Rolling can be in both directions but pushing the material inwards should be limited as it will bulge while still hot, or create a sag, and the correct profile will not be achieved. Neither should the roller be allowed to bridge over the ramp when rolled transversely as full compaction will not be achieved, leading to sagging in the future.

Construction of Cushions

3.1 The preferred methodology for constructing cushions is as follows:

- I. Set out the cushion, ensuring the alignment is parallel to the centreline of the road. Place the rectangular former (the template), using the correct height of 65mm or 75mm, and infill with HRA 55/10 asphalt, with 50 PEN bitumen, in two layers, compacting each layer with a whacker plate. The work should be arranged so that the material has cooled sufficiently before removing the formers and constructing the ramps. If the centre material is still workable, the whacker will push up the cushion and the levels will be out of tolerance.
- II. The road may need to be closed overnight as traffic shall be kept away from this former.
- III. Once the formers are removed, a check is made of the exposed vertical faces to record if the height of the cushion is in tolerance. See Tolerances and Checking, below, which covers the quality control of the process.
- IV. Keys are cut into the road surface at the ramp ends around the cushion. Then, lay the ramp material, in two layers, using HRA 55/10 asphalt, with 50 PEN bitumen, to create a correct shape for the ramp. The opposing sides of

each cushion should be constructed first (ramps tagged as '2' in diagram) and compacted. The remaining two sides (tagged as item '3' in diagram) are then laid. This ensures the cushion profile and corners are created properly.

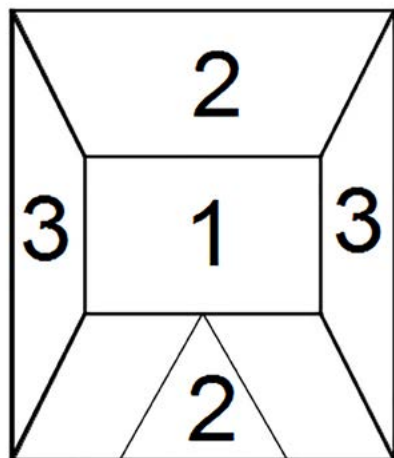


Figure 1 Cushion construction sequence

- V. A whacker compacting plate should be used to compact the base layer, and a small vibrating roller for the surface layer. Rolling can be in both directions but pushing the material inwards should be avoided as it will bulge while still hot, or create a sag, and the correct profile will not be achieved. As with plateaux, the roller should not be allowed to bridge over the ramp by running along the edge of the centre material.

- VI. Material properties are to be checked with reference to the Daily Laying Statement, which is available from the contractor

Setting Out

- 4.1 Designers should specify road hump setting out using relative gradients. Using ramp length (measure along the existing surface) and height of hump above the existing surface. For example, a road hump with 1 in 20 relative gradient would have a ramp length of 1.5m (along the existing road) and be 75mm high.
- 4.2 The difference between relative and absolute gradients is discussed later in this Appendix.

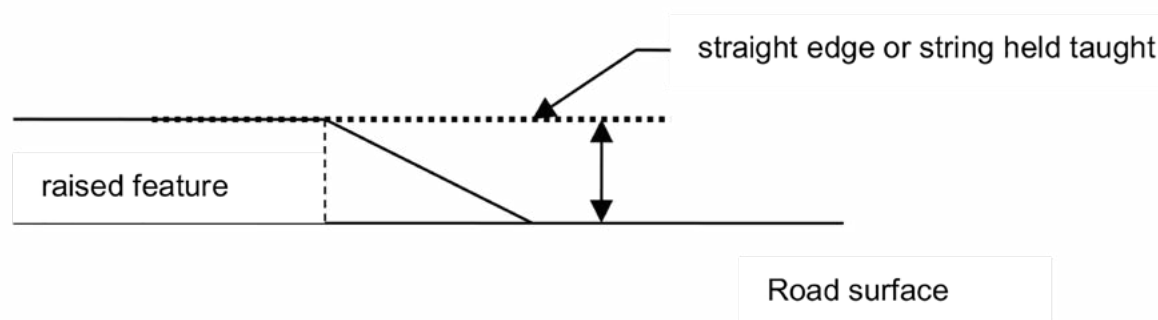
Tolerances and Checking

- 5.1** Out of tolerance workmanship can lead to disputes between the Scheme Promoter, HCC, the public, bus companies and the emergency services and can lead to formal complaints about poor or excessive performance of the vertical features.
- 5.2** The contractor will follow the above best practice and must aim to achieve these design dimensions, but has a tolerance of +/- 6mm, prescribed in the Specification for Highway Works clause 701 series for general road surfaces when machine laid, and +/- 10mm when hand laid.
- 5.3** These tolerances need to be allowed for when creating the road hump notice, a public document, stating the intention of the County Council to construct the vertical feature to certain dimensions. The corresponding hump notice will describe the feature as built 'to a height of approximately 75mm and to a gradient of approximately 1 in 10', thereby allowing the finished product to be deemed acceptable and meeting the requirements of the legal notice.
- 5.4** The problems associated with the discovery of an out of specification hump are much greater if the error is not spotted until the work is complete and checks shall be undertaken as the work progresses.
- 5.5** As with any work shown to be out of specification, the defects will follow the process laid out in the contract or as laid out in the Section 38/278 agreement. Solutions to overcome defects will depend on the degree by which the feature is out of specification and can involve partial or complete reconstruction, or localised treatment or repair.
- 5.6** Contract supervisors and design staff should be aware that a road hump that is not constructed in accordance with its legal road hump notice is, by definition, illegal and an obstruction on the public highway and therefore defects shall not be accepted.
- 5.7** The construction sequence of the plateau involves the cutting back of the temporary material to the top of the ramp. This is the opportunity to dip the vertical exposed face, photograph the dip reading on the measure and jointly, between the client's representative and the contractor, agree the as-built height. If this is in specification and the ramp is then built correctly then the hump will be in tolerance and can be shown to be so. Care must be taken to measure down to areas of undisturbed existing road surface.

5.8 Cushions can be dipped by using “block ups” a common practice in setting out. Here a standard block up is used on either side of the element to be checked i.e. the cushion and a string line pulled tight between the two. If a 100mm block up is used the dip to a hump of 75mm height would be difference between the block and the measure dip. i.e. 25mm measured dip would confirm a 75mm hump. Items of exactly the same height can be used instead of 3 tape measures which can be in practical to do. Two. 65mm deep engineering bricks stacked would be sufficient to replace one side with the measurements adjusted accordingly.

5.9 [The Highways \(Road Humps\) Regulations 1999](#) attempt to define the way in which hump heights will be measured but this is not very practical when considering different types of hump, road tables or uneven road surfaces. To achieve this measurement correctly it requires a taught string line to run along the plateau and just touch its surface and therefore reflect a true projection. It is very easy to introduce bias into this measurement and requires skilled execution so that the string line just touches the top of the plateau to reflect the actual slope of the element. The tendency given this difficulty would be to use a spirit level. This can lead to incorrect results if used at the wrong location or by trying to measure tables with long ramps. If a spirit level is used the bubble must be ignored and the level only used as a long straight edge placed on the cushion to reflect its gradient effectively rather than a spirit level.

Figure 2 The theory of ‘dipping’



Relative and Absolute Gradients

- 6.1** Roads are rarely laid flat and as such will have some amount of longitudinal fall that will vary between sites and needs to be taken into consideration when installing humps and cushions.
- 6.2** Gradients can be expressed as 'Relative' or 'Absolute' and it is important that designers specify which they are using when providing their design information.
- The Relative gradient is the change in level between two points / distance between two points measured as close to horizontal as practical and is measured as the difference in level between top and bottom of ramp (dipped or measured in relation to kerbs on another fixed object) by the length of the ramp measured along the road. A horizontal spirit level should not be used as it will lead to inappropriate calculations.
 - The Absolute gradient is the vertical distance/horizontal distance of the actual slope and can be measured with the assistance of a horizontal spirit level.
- 6.3** In general designers should **specify gradients relative to the existing road gradient**.

- 6.4** Advice and further guidance on the use of raised humps in hilly (exceeding 5% longitudinal grade) areas should be sought from a Design Review Panel as they are unlikely to be as effective as speed reducing measures.

Construction Programming & Sequencing

- 7.1** The legislation surrounding raised humps and cushions is quite specific about the manner they are laid out, signed and lit.
- 7.2** Road humps built to conform with the regulations must be fully constructed and laid out as per the design drawings before the road is fully open to traffic. If they are left partially built without sufficient warning signs, they constitute an obstruction to the public highway leading to potential claims from the general public as a result of them not being adequately signed or guarded.

- 7.3** Once raised humps or cushions have been installed the following items shall also be in place if the temporary traffic management is removed and the public allowed to traffic the humps
- Street Lighting - to the enhanced standard set by the regulations.
 - Advance Warning Signs – humps ahead
 - Road Markings – retroreflective
- 7.4** This does not apply in 20mph zones where 20mph zone terminal signs are the minimum legal requirements if traffic management is removed.
- 7.5** The use of a ramp ahead and ramp signs could be used in lieu of the above and would be subject to the contractors own site-specific risk assessment.
- 7.6** It is recommended the construction sequence proceed as:
1. Street lighting upgrades (including road taken off part-night lighting)
 2. Advance warning signs or 20mph zone terminal signs. (installed and temporarily bagged)
 3. Humps installed. (sign bags removed)
 4. Road markings installed
- 7.7** If there is a time lag (more than 24 hours) between steps 3 and 4 then temporary ramp warning signs shall be erected.
- 7.8** The use of temporary white triangles on the road humps or cushions is not advisable as they are not retroreflective. This is particularly important as this can create potential hazards for both powered two wheelers or cyclists during night-time conditions. By the same token the maintenance of these road markings is important.

Chapter 9

Designing for Landscape

Contents

Introduction

- 1.1** This Chapter provides guidance on the detailed design and specification of highways related soft and hard landscape including street furniture and the requirements for the submission of an Ecology & Landscape section for inclusion within the 'Whole Life Management Plan'.
- 1.2** The 'Ecology & Landscape Strategy,' 'Local Character & Heritage Plan' and the first draft of the 'Whole Life Management Plan,' should have been submitted to accompany the Planning Application or the general arrangement (in the case of permitted development schemes).

General requirements for Trees, Hedges, Shrubs & Verges

- 2.1** Tree diversity increases overall resilience in the face of various environmental stress-inducing factors. A more diverse treescape is better able to deal with possible changes in climate or pest and disease impacts. With more diverse tree populations, the likelihood that they all will be vulnerable to a particular threat is lower and therefore a smaller proportion detrimentally affected.
- 2.2** The tree population within Highways' stewardship represents a rich community of trees given that many of these are trees lining transportation networks, with 295 species identified. Tree species from around the world are represented in Hertfordshire's tree inventory. Most of the species are native to Europe and Asia. The most common tree species is Ash (*Fraxinus excelsior*), followed by Hawthorn (*Crataegus monogyna*), Sycamore (*Acer pseudoplatanus*), and Oak (*Quercus robur*) respectively.

- 2.3** The planning, design, procurement, planting and maintenance of street trees should follow the principles set out in [BS 8545:2014 Trees: from nursery to independence in the landscape](#) – Recommendations. It should be carried out under the supervision of a landscape architect or arboriculturalist.
- 2.4** It is important to choose the most appropriate species of plants to minimise future maintenance liability, benefit wildlife and maintain the character of the local landscape. These are set out below.
- 2.5** Plant species shall be hardy, sourced from home grown stock and avoiding where possible, directly imported stock to prevent introduction of alien pests and diseases. Where home grown stock is not available, stock should be secured from a nursery which is certified under the Plant Health Management Standard.
- 2.6** Plants should be of varieties that quickly establish themselves to discourage pedestrian short cuts where a desire line is not going to be formalised and weed growth.
- 2.7** A suitable weed-free growing medium will need to be prepared prior to planting. Mulching around the base of trees can suppress weed growth whilst at the same time improving the growing condition of the tree
- 2.8** When trees or other vegetation taller than 600 mm at maturity is proposed within 5m of the public highway, buildings or other structures, root barrier or director of 1mm minimum thickness must be installed to a depth of 1 m.
- 2.9** Where a perforated pipe is used in a design, planting should be located more than 5 m away, and behind root barrier to the depth of the base of the pipe plus 1 metre.

Requirements for New Trees and Hedges

3.1 New trees planted within the highway should conform to the following requirements:

- Be large enough, or otherwise suitable, to withstand vandalism
- Have good stability and not be prone to branch drop
- Do not produce large or messy fruits which might compromise the safety of those walking or cycling
- Should not be copious seeders or produce large basal growth (e.g. Limes) unless required to maintain street scene
- Species, such as Limes, that encourage aphids or other insects, should be avoided where vehicles are regularly parked
- Robust enough to cope with the range of soil types likely to be encountered, drought conditions and road salt
- Should not have large leaves that are slow to rot where blockage of drainage could be a significant hazard
- Use of silver birch/white birch can reflect headlights. Planting of these species on roundabouts/junctions can help drivers see these features more easily at night.

3.2 HCC's list of preferred species is set out in paragraph 5.3 below.

3.3 New trees, as opposed to replacement trees, attract a Commuted Sums for future maintenance. More information on this is given in Part 1 Chapter 15.

Requirements for Ground Cover Shrubs

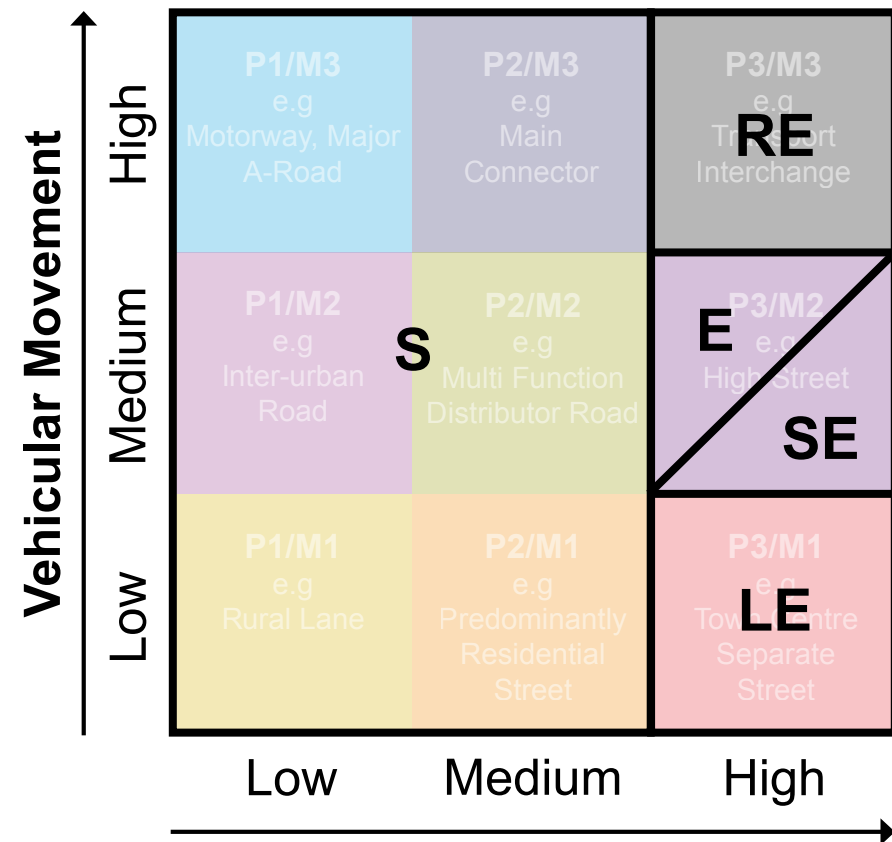
- 4.1** New ground cover shrubs planted within the highway should conform to the following requirements:
- Readily available for bulk planting and replacement if damaged in the future
 - Not exceed 600 mm in height when mature and require minimal pruning and be tolerant of heavy pruning when required
 - Root system or suckering habit shall not interfere with underground services or other property
 - Tolerant of occasional trampling
 - Robust enough to cope with the range of soil types likely to be encountered, drought conditions, frost and road salt
 - Resistant to disease and pests
 - Do not produce toxic fruits or thorns
 - Provide ground cover all year round
 - Are in keeping with the local landscape character and benefit wildlife.

Selection of Tree, Hedge & Shrubs Species

- 5.1** The site-specific factors together with the allocated Place & Movement category shall influence the selection of appropriate tree species.
- 5.2** The factors that need to be considered when choosing an appropriate species include:
- Form, and ultimate natural size.
 - Preferred soil type vs. existing soil type.
 - Existing surrounding vegetation and habitats.
 - Whether the species is prone to epicormic growth.
 - Species specific pruning or maintenance requirements.
 - Resilience to urban stressors such as drought, salt, soil compaction, heat etc.
 - Tolerance of light or shade.
 - Likelihood of flowers, fruit and foliage causing nuisance.
 - Honeydew from aphids.
 - Proximity to overground and underground structures I.e., potential for direct and indirect damage from root growth.

- Biodiversity net gain for highways land.
- Historic or landscape significance.
- Life expectancy.
- Prevalent tree pests and diseases.
- Resilience to climate change - species that can tolerate drought or require less water in summer. There will also be locations where flood tolerant species are needed.
- Community preferences
- Tolerance of water for trees and shrubs planted within SuDS
- Whether there is space to accommodate the trees and shrubs mature canopy size
- Amount of space available to provide enough soil volume to support healthy plant growth

5.3 The selection of species shall also be related to the Place & Movement category in accordance with the diagram and tables shown.



Palettes

S Standard
SE Semi Enhanced
RE Resilient Enhanced

LE Local Enhanced
E Enhanced

Palette Requirements

Standard

Standard specification trees, no need for enhancement

Local Enhanced

Heavy standard, compact crown, not prone to basal suckering

Semi Enhanced

Compact crown, in keeping with local character/ townscape, tolerant to urban pollution

Enhanced

Specimen tree, compact crown, in keeping with local character/ townscape, tolerant to urban pollution

Resilient Enhanced

Tolerant to the high quantities of road salt, pollution, compaction and heavy pruning

Preferred Species

Specification

S	Standard
LE	Local Enhanced
SE	Semi Enhanced
E	Enhanced
RE	Resilient Enhanced

Suitable Purpose

ST	Street Tree
BH	Boundary Hedge
SWC	Structural & Wildlife Corridor

Size

Small	(3-6.99m height)
Medium	(7-11.99m height)
Large	(12-20m+)

Acer griseum – paperbark maple

S / LE / SE

Street Tree

Small (3-7m height)

Acer campestre – dwarf or pleached varieties e.g. Nanum

S / LE / SE / E / RE

Street Tree / Boundary Hedge / Structural & Wildlife Corridor

Small (3-7m height)

Acer campestre - Native or compact cultivars such as “Elsrijk”

S / LE / SE / E

Street Tree / Structural & Wildlife Corridor

Medium (7-12m)

Acer negundo - Box Elder and cultivars

S / LE / SE / E / RE Street Tree / Structural & Wildlife Corridor

Large (12–20m+)

Acer platanoides “Deborah”

S / LE / SE / E

Street Tree / Structural & Wildlife Corridor

Large (12–20m+)

Betula pendula

S / LE / SE

Street Tree / Structural & Wildlife Corridor (Unsuitable in areas which regularly dry out)

Large (12–20m+)

Celtis australis

S / LE / SE / E

Street Tree

Large (12–20m+)

Clerodendrum trichotomum

S / LE / SE / E

Street Tree / Boundary Hedge / Structural & Wildlife Corridor

Small (3-7m height)

Cornus sanguinea

S / LE / SE / E

Boundary Hedge / Structural and Wildlife Corridor

Small (3-7m height)

Corylus avellana

S / LE / SE

Boundary Hedge / Structural and Wildlife Corridor

Small (3-7m height)

Crataegus laevigata “Paul’s Scarlet”

S / LE / SE / E / RE Street Tree / Boundary Hedge / Structural & Wildlife Corridor

Small (3-7m height)

Crataegus x lavalleyi

S / LE / SE / E / RE

Street Tree / Boundary Hedge / Structural & Wildlife Corridor

Small (3-7m height)

Crataegus monogyna

S / LE / SE / E / RE

Street Tree / Boundary Hedge / Structural & Wildlife Corridor

Small (3-7m height)

Crataegus monogyna “Stricta”

S / LE / SE / E / RE

Street Tree / Boundary Hedge / Structural & Wildlife Corridor

Small (3-7m height)

Crataegus x prunifolia “Splendens”

S / LE / SE / E / RE

Street Tree / Boundary Hedge / Structural & Wildlife Corridor

Small (3-7m height)

Euonymus europaeus - Spindle

S / LE / SE

Boundary Hedge / Structural and Wildlife Corridor

Small (3-7m height)

Fagus sylvatica

S

Structural & Wildlife Corridor

Large (12–20m+)

Fagus sylvatica (Planted and maintained as Hedging)

S / LE

Boundary Hedge / Structural and Wildlife Corridor

Small (3-7m height)

Ginkgo biloba

S / LE / SE / E

Street Tree

Large (12–20m+)

Hibiscus x Resi

S / LE / SE / E

Boundary Hedge / Structural and Wildlife Corridor

Small (3-7m height)

Ilex aquifolium

S / LE / SE / E / RE

Boundary Hedge / Structural and Wildlife Corridor

Small (3-7m height)

Koeleruteria paniculata

S / LE / SE / E / RE

Street Tree

Small (3-7m height)

Ligustrum ovalifolium

S / LE / SE / E / RE

Boundary Hedge

Small (3-7m height)

Liquidambar styraciflua “Palo Alto”

S / LE / SE

Street Tree

Large (12–20m+)

Liquidambar styraciflua “Slender Silhouette”

S / LE / SE / E

Street Tree

Medium (7-12m)

Liquidambar styraciflua “Worplesdon”

S / LE / SE

Street Tree

Large (12–20m+)

Liriodendron tulipifera

S / LE

Street Tree

Large (12–20m+)

Magnolia kobus

S / LE

Street Tree

Medium (7-12m)

Malus baccata “Street parade”

S / LE / SE

Street Tree / Structural & Wildlife Corridor

Small (3-7m height)

Malus sylvestris

S / LE / SE

Street Tree / Structural & Wildlife Corridor

Small (3-7m height)

Malus trilobata

S / LE / SE

Street Tree / Structural & Wildlife Corridor

Small (3-7m height)

Platanus orientalis “Digitata”

S / LE / SE

Street Tree

Large (12–20m+)

Prunus maackii “Amber Beauty”

S / LE / SE / E

Street Tree / Structural & Wildlife Corridor

Small (3-7m height)

Prunus padus

S / LE / SE

Street Tree / Structural & Wildlife Corridor

Medium (7-12m)

Prunus x subhirtella “Autumnalis”

S / LE / SE

Street Tree / Structural & Wildlife Corridor

Small (3-7m height)

Pyrus calleryana “Chanticleer”

S / LE / SE / E

Street Tree / Structural & Wildlife Corridor

Medium (7-12m)

Quercus petraea

S / LE

Street Tree / Structural & Wildlife Corridor

Large (12 – 20m+)

Quercus robur

S / LE

Street Tree / Structural & Wildlife Corridor

Large (12–20m+)

Quercus rubra

S / LE

Street Tree / Structural & Wildlife Corridor

Large (12–20m+)

Rosa canina

S / LE / SE / E / RE

Boundary Hedge / Structural and Wildlife Corridor

Small (3-7m height)

Rhamnus cathartica

S / LE / SE / E / RE

Boundary Hedge / Structural and Wildlife Corridor

Small (3-7m height)

Sophora japonica “Regent”

S / LE / SE

Street Tree / Structural & Wildlife Corridor
Medium (7-12m)

Sorbus aria

S / LE / SE / E

Street Tree / Structural & Wildlife Corridor
Medium (7-12m)

Sorbus aria “Magnifica”

S / LE / SE / E

Street Tree / Structural & Wildlife Corridor
Medium (7-12m)

Sorbus aucuparia “Golden Wonder”

S / LE / SE / E

Street Tree / Structural & Wildlife Corridor
Medium (7-12m)

Sorbus aucuparia “Joseph Rock”

S / LE / SE

Street Tree / Structural & Wildlife Corridor
Small (3-7m height)

Sorbus commixta “Embley”

S / LE / SE

Street Tree / Structural & Wildlife Corridor
Small (3-7m height)

Tilia cordata

S

Street Tree / Structural & Wildlife Corridor
Large (12–20m+)

Tilia platyphyllos

S

Street Tree / Structural & Wildlife Corridor
Large (12–20m+)

Ulmus lutece

S / LE / SE

Street Tree / Structural & Wildlife Corridor
Large (12–20m+)

Viburnum opulus

S / LE / SE / E / RE

Boundary Hedge / Structural and Wildlife Corridor
Small (3-7m height)

- 5.4** Where there is more room such as on rear boundaries, within open spaces or close to pedestrian routes, larger species can be used to form a permanent landscape structure within the development.
- 5.5** HCC will consider proposals for tree species outside of the list of Preferred Species as a request for a Departure from Standards.
- 5.6** Further useful context and guidance on tree selection can be found in [‘Tree Species Selection for Green Infrastructure – A Guide for Specifiers’](#).

Tree Planting Location

- 6.1** When undertaking tree planting it is essential that the location is appropriate as trees are not readily moved once established. Additionally, planting trees in unsustainable locations can result in them having drastically shorter lifespans, which can increase rather than reduce atmospheric carbon and pollution.
- 6.2** Factors that need to be considered when determining whether a location is appropriate include:
 - Potential tree size at maturity.
 - Sightlines for pedestrians and road-users.
 - Proximity to streetlights, street signs, and other highway assets.
 - CCTV sightlines.
 - Existing vehicle crossovers, pedestrian crossings, and desire-lines.
 - Accessible parking.
 - Bus routes.
 - Proximity to the carriageway.
 - Building frontages and fenestration.
 - Amount of space available for roots and the quality of substrate for growth.
 - Known hotspots for subsidence.
 - Potential highway improvements

Urban Tree Planting

- 7.1** Tree pits in paved areas are a useful way of planting trees in otherwise built-up areas but require careful consideration to ensure the ground conditions are suitable for tree establishment. The size and surfaces of tree pits Hertfordshire Highways installs are in line with [BS 8545:2014](#) and reflect the site-specific constraints.
- 7.2** Where a tree planting location is particularly prominent and amid hard landscape, underground cellular structures may be considered. These can reduce soil compaction and therefore improve rooting conditions. Installation of these is undertaken at planting stage to improve the development of the young tree. Mature trees can require a significant volume of soil and providing rooting conditions beyond a traditional tree pit size is promoted where practicable.

Grassed Areas

- 8.1** Scheme Promoters shall consult HCC and LPAs as to whether non-standard specifications are required as there may be location-specific seed mix requirements depending on soil type and setting. In some chalk and gravel areas it may also be appropriate to omit a topsoil layer, for example.
- 8.2** The rate of sowing should be greater than 20g/sqm and the sown area watered regularly until the growth is substantial.
- 8.3** Grass seed shall be a tested mixture from an approved source and certificates of purity and germination made available, when requested by HCC.
- 8.4** In most urban locations the grass seed mixture should be Type A or B below. Type A is used generally except where the topsoil or sub-soil is clayey when Type B should be used instead.

Seed	Type A	Type B
Smooth Stalk Meadow Grass (<i>Poa pratensis</i>)	28%	57%
Creeping red fescue (<i>Festuca rubra rubra</i>)	28%	33%
Chewings fescue (<i>Festuca rubra commutata</i>)	28%	0%
Browntop (<i>Agrostis tenuis</i>)	9%	4%
White clover (S.100)	7%	6%

- 8.5** Where grassed areas are adjacent to walls, fences or other vertical structures, a mowing stone should be provided.
- 8.6** The upper surface of the mowing stone should be smooth, to avoid damaging mower blades. The stone may be made of pre-cast units or cast from ST4 concrete. The stone should be at least 150 mm wide and 50 mm deep. It should be laid on 50mm of sharp sand and the upper surface should be 12 mm below ground level.

Hard Landscape

- 9.1** The materials and construction to be employed in areas of hard landscape shall be in accordance with Part 4 Chapter 11: Designing for Carriageway, Footway and Cycleway Construction. 'Reference should be made to any local streetscape design guidance for features and materials to provide specific character.
- 9.2** Acceptable materials in permissible areas include:
- Granite setts complying with [BS EN 435](#);
 - Concrete block paving complying with [BS 6717/BS 7533](#); and
 - Clay engineering bricks complying with [BS 3921](#).
- 9.3** Other materials may be used with the approval of HCC such as porous resin bound gravel, which allows water and nutrients to permeate into the ground.
- 9.4** Street furniture should be designed to be robust, high quality, sustainable and inclusive. Features such as seating should be designed to provide resting and socialising opportunities, without encouraging unsociable congregation and vandalism.

Street Furniture



South Oxhey Market area

10.1 Detailed requirements for railings, lighting and signage street furniture are included in Part 4 Chapters 14,16 and 17 respectively.

10.2 Other street furniture including seating, litter bins, shelters, bollards, notice boards and planters should be of a suitable design, quantity and located appropriately to improve the street scene and assist users. Where the Local Planning Authority of equivalent has produced a Design Code, Conservation Area Appraisal, pattern book or master plan, then the street furniture, signage and road markings should follow the requirements they contain.

10.3 The style, material, size, colour and installation of street furniture within a scheme will depend on the location, its intended usage and any local guidance.

10.4 Guidance on the role of street furniture in making public areas accessible to those with disabilities is given in Approved Document M of the Building Regulations which is known as [Access to and Use of Buildings](#).

10.5 In areas, such as town centres where there is likely to be a specific type of street furniture that is already in use, it is usually appropriate to match the existing furniture to provide a consistent visual appearance and to allow bulk replacements. In some cases a contemporary design which contrasts with a traditional environment can work well.

- 10.6** The Scheme Promoter must receive the approval of the Local Planning Authority (LPA) and HCC for the street furniture to be used. The LPA may already have a streetscape guide or Supplementary Planning Document (SPD) covering the type of furniture to be used in the area. If this is the case schemes in the area must follow this guidance where the guide or SPD has been agreed with HCC.
- 10.7** Containers provided for plants should generally have a clearance from the carriageway of 500 mm if they are higher than 150 mm above the carriageway surface. Reduced clearances can be allowed by Departure from Standard.
- 10.8** Street name plates should be fixed to permanent structures adjacent to the highway, in preference to erecting them on posts. New street names must be agreed with the Local Planning Authority.
- 10.9** Where possible all street furniture should be located to ensure the maximum available footway width is maintained for walking. This can be achieved by providing a consistent zone for street furniture away from the pedestrian movement zone. The designer should ensure that enough room is left for maintenance, such as painting, litter picking and gardening.
- 10.10** If there is sufficient footway width to allow street furniture to be located at the front of the footway then the clearance to the kerb face should be as follows:
- National Speed Limit**
Clearance 1.2 m
- 40mph and 50mph**
Clearance 0.6 m
- 30mph and below**
Clearance 0.5 m
- 10.11** Street furniture should, where possible, be grouped into lines or corridors to provide clear areas for partially sighted users to navigate between.
- 10.12** Where bell bollards are required to prevent overrun of the footway by large vehicles, these shall incorporate a standard height bollard. This follows recommendations in Inclusive Mobility surrounding the difficulty that partially sighted users have with low level street furniture. Bell bollards will not be set back at the recommended distances as they need to be close to the kerb to deflect the vehicle back onto the carriageway.

10.13 It is recommended that seating should be provided every 50m in busy pedestrian areas. It should be sheltered from strong winds, and perhaps under the shelter of trees to provide respite from rain and heat.

10.14 It is recommended that the opening for litter to be deposited should be at 1 m above ground level. Where possible these should be aligned with other street furniture to keep the widest uncluttered corridor available for pedestrians. The position of litter bins shall be agreed with the district or borough council as they are responsible for emptying them. This is particularly important where new bins are proposed as the other authority may not have funds or resources to empty them.

10.15 The outer edge of notice boards and other low-level signs supported by two posts should be no more than 150 mm beyond the posts and a tapping rail should be fitted 300 - 400 mm above ground level.

Documents for Approval

11.1 Scheme Promoters shall submit the plans and supporting narrative within the approvals process and capture within the section agreements showing the following:

- The (baseline) value of biodiversity within the proposed planning red line boundary, using [Defra's Biodiversity Metric](#) and the final target biodiversity value of the final scheme.
- Proposals for wildlife species protection and translocation
- Status of routes (permissive, statutory), constraints of visibility/sight lines, and needs of disabled persons
- A plan showing the Latin names, plant densities, numbers, locations, species, variety, form, size (height, spread, girth, pot size) for trees, shrubs and hedges within the proposed highway and within 5m of the highway boundary.
- Topsoil/planting medium (depth and specification and finished level adjacent paving etc). Evidence to show imported subsoil/topsoil is free from contamination (including from pernicious weeds) may be required.
- Planting specification (e.g. [NBS Landscape](#)) including site preparation, water points/irrigation and plant establishment maintenance, mulch (depth and specification) and supports for trees/shrubs/climbers

- Services (above and below ground) including existing, proposed and zones of restriction imposed by statutory undertakers affecting planting, land use and inspection chambers)
- Doors, windows, cellars, overhanging eaves, balconies and fire escapes fronting onto highway
- Protection of existing and proposed planting (temporary/permanent – to new and existing features or planting)
- Grass/seeded areas (mowing edges, seed mixes)
- Remedial surgery to existing trees, hedges and shrub)
- All details necessary to construct walls, fences, gates, rails, surfaces (soft, hard, step, ramps, drainage falls), play equipment (liaison with relevant authority is essential), seating, litter bins, bollards, tree pits and other planting details, cycle parking, lighting, signing, kiosks, post boxes, bus stops and other street furniture
- Street art, sculptures, water features or advertising
- Highway boundary treatments

Whole Life Management Plan

- 12.1** Scheme Promoters shall prepare the detailed Ecology & Landscape section for inclusion within the Whole Life Management Plan setting out in detail the proposed responsibilities for creating, owning, maintaining and funding each of the landscape and habitat elements within, or adjacent to the adoptable highway.
- 12.2** Scheme Promoters shall prepare for the Sections approvals process an enhanced set of the submitted landscape plans with supporting schedules clearly identifying those responsibilities together with the proposed maintenance regimes (frequency and types of operation for hard and soft landscape areas including grass, ornamental planting, naturalistic planting, woodland, watercourses, paving and structures)
- 12.3** The Whole Life Management Plan shall be reviewed by the Scheme Promoter prior to Adoption to ensure that it reflects the As-built and the stewardship arrangements put in place and adjust accordingly for submission alongside the highways inventory data.

- 12.4** It is recommended that Scheme Promoters arrange for the Whole Life Management Plan to be made available to prospective property purchasers to help their understanding of stewardship arrangements.
- 12.5** HCC shall make the Whole Life Management Plan available to local councillors.

LTP4 Policy Compliance

- 13.1** The landscape design shall be LTP4 Compliance tested at the Approvals stage to ensure that the proposed Ecology & Landscape Strategy submitted at the full planning application stage has been followed.

Ecology & Landscape Strategy

LTP4 Compliance Test: Approvals

The landscape proposals reflect the Ecology & Landscape Strategy and, in doing so the submitted plans conserve and enhance the functionality and sense of place, to improve and create enhanced connectivity for all users and habitats, ensuring the inter-relationships between related sustainability themes are addressed and promoted.

The Ecology & Landscape section of the Whole Life Management Plan demonstrates long term sustainability.

Construction Management Plan

- 14.1** The Construction Management plan shall include the temporary wildlife and landscape mitigation and protection measures
- 14.2** Tree roots usually extend beyond the drip line of tree canopies and being below ground they are often overlooked. Tree roots provide stability for the tree and ensure health by taking moisture and nutrients from the soil. Damage to any tree root can allow infection of otherwise healthy trees.
- 14.3** Roots closest to the tree are essential as conduits of nutrients from smaller roots but they are also critical for ensuring the tree stays upright. Further away from the tree, roots are less important for tree stability but are still essential for the tree to get nutrients.
- 14.4** Excavations within the highway can damage tree roots. [British Standard BS 5837](#) sets out a process for design, demolition and construction near trees. To ensure that tree roots are properly protected an arboriculturist must be engaged with root protection areas and special construction measures.

- 14.5** Utility operators working in the highway shall follow the [Safety at Street Works and Road Works – A Code of Practice](#) which requires [National Joint Utilities Group \(NJUG\) 4](#) to be followed. Non-compliance can be an offence under the [New Roads and Streetworks Act \(1991\)](#).
- 14.6** All retained trees need to be adequately protected during works. Measures to protect these trees should follow the best practice principles set out in both [BS 5837: Trees in Relation to Construction Recommendations \(2012\)](#), and [NJUG Guidelines for the Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees \(2007\)](#). These are broadly summarised below:
- Only hand excavation is to take place within the Root Protection Area (RPA) of retained trees unless supervised by a qualified arboriculturist.
 - Vehicles and other operations that could result in soil compaction are to be excluded from the RPA.
 - Roots above 25mm diameter will not be severed, pruned, or shaved without prior approval from a qualified arboriculturist.
 - No materials or soils are to be stored within the RPA of the retained trees.

- Oil, bitumen, cement or other material that is potentially injurious to trees will not be stacked or discharged within 10m of a tree stem.
- Allowance will be made for the slope of ground to prevent materials running towards the tree.
- Wide or tall loads etc. should not come into contact with retained trees. Banksman should supervise transit of vehicles where they are in close proximity to retained trees.
- No fires will be lit where flames are anticipated to extend to within 5m of tree foliage, branches or trunk, taking into consideration wind direction and size of fire.
- Notice boards, telephone cables or other services will not be attached to any part of a retained tree.
- No roots will be left uncovered if exposed during the removal of existing surface materials. They will be covered over as soon as possible to minimise the risk of drying out and dying.

14.7 In the event that retained trees are terminally damaged due to non-compliance with the above, or removed without prior authorisation, HCC will pursue replacement planting equal to the CAVAT value of the affected trees.

14.8 New trees need physical support and protection from harm e.g. animals or vandals. Highways trees should be planted with wooden stakes and wire mesh cages or plastic tubes depending on their size and location.

14.9 The creation or protection of Active Travel Link Grass Margins shall be as follows:

- Ground Preparation: Where species-rich soil has been removed:
 - I. Store soil away from other topsoil and in such a way as the soil fauna survives
 - II. Re-lay soil
 - III. Cultivate the soil to sufficient depth to alleviate compaction
 - IV. Rake and roll to produce a fine, firm, level surface
 - V. No need to add seed
- Ground Preparation: Where the ground has been disturbed and nutrient-rich topsoil removed:
 - I. In most cases seed can be sown directly into well-prepared sub-soil, or a 20 mm layer of retained topsoil can be cultivated in where appropriate.

- II. Cultivate the sub-soil to create a level seed bed of 20mm depth to alleviate compaction.
- Where the ground is undisturbed:
 - I. Cut and remove the vegetation from the area to be seeded.
 - II. Mechanically scarify the ground so that two thirds of the topsoil is exposed.
- Sowing
 - I. Introduce a site-appropriate native meadow seed mix either through direct seeding (from the Emorsgate meadow and grassland range or equivalent
 - II. Sow the seed at the rate specified for the mix between August-September or March-April according to ground conditions.
 - III. Roll the surface.

Tree Aftercare and Maintenance

- 15.1** Post planting aftercare and maintenance is essential to ensure successful verge and tree establishment.
- 15.2** A critical part of the care of newly planted trees is regular and copious watering to promote growth of a robust root system to carry them into maturity. This often takes several growing seasons. Highways trees require a watering programme for their first two years of growth after planting.
- 15.3** The physical tree support and protection should be removed in their third year.

Active Travel Link Grass Margin Aftercare and Maintenance

16.1 The aftercare for Active Travel Link Grass Margins shall be as follows:

- First Year Management: Cut and collect 4 times at a height of 50 mm to encourage establishment and good root growth whilst removing some of the competition from the grasses.
- Subsequent Management: Mow as local conditions dictate, but at a minimum of once a year through the growing season.

Chapter 10

Designing for Highway Boundaries

Contents

Introduction

- 1.1** Chapter 11 in Part 3 highlighted the requirements for a coordinated boundaries and fencing strategy at the planning application stage. This Chapter sets out detailed design requirements.
- 1.2** The highway boundary shall be marked on the ground for future reference.

Highway Boundary Markers

- 2.1** In urban areas or at the entrance to a private road, it may be necessary to mark the boundary using a feature, such as brass studs, laid into the surfacing or contrasting paving.
- 2.2** Boundary markers in grassed areas should be pre-cast concrete or stone. The marker, which should have a surface area of 75 square cm, should be set in the ground to a depth of 600mm. The top should be flush with the surface of the ground and must not interfere with grass mowing.
- 2.3** Boundary markers in planted areas should be made of oak. They should be set in the ground to a depth of 600mm and extend to a height that is hidden by the planting, but easily found. Boundary markers should set at a spacing of approximately 2m. This may need to be reduced on tight radii.

Permanent Fencing

- 3.1** The provision of permanent fencing shall be in accordance with [DMRB](#), with due consideration of materials sustainability, resilience, maintainability and accessibility. In addition it should recognise the character of the surrounding area as set out in Part 3 Chapter 11. In some cases runs of highly visible permanent fencing can appear intrusive and should be mitigated with hedgerow planting.
- 3.2** The specific details of fence type, style and foundation shall be submitted for approval by HCC.
- 3.3** In some cases fencing proposals may also need the specific written approval of the Local Planning Authority.
- 3.4** The use of barbed wire on fences adjacent to the highway is not normally permitted, as this may cause injury to persons legally using the highway.
- 3.5** Guidance on fencing to prevent incursion by deer is given in Part 4 Chapter 14.

Temporary Fencing

- 4.1** Health and safety legislation places a duty on the client, designer and contractor to protect third parties from possible injury resulting from construction work.
- 4.2** All construction sites must be separated from adjacent highway land with a suitable temporary fence to a height of 1.8m minimum. The type of fence will form part of the scheme promoter's traffic management proposals, which must be approved by the HCC
- 4.3** Such fence shall be maintained in place and in good repair until such time as the construction works on the site are completed or that HCC's consent is given for its removal.
- 4.4** Where such fencing is on highway land, the scheme promoter must obtain a licence from HCC.
- 4.5** In certain circumstances, people may retain a right of access through construction sites by way of public footpaths, etc. Such corridors of access will also need to be protected by temporary fencing.

Planting

- 5.1** Species of hedges and trees that are prone to heavy bushy growth and thus creating encroachment which impedes movement and blocks sight lines should be avoided.

Chapter 11

Designing for Earthworks

Contents

Introduction

- 1.1** This chapter provides guidance on the detailed design and specification of highways earthworks.



- 1.2** Scheme promoters should have already prepared an earthworks strategy demonstrating that a safe, durable and sustainable design and construction, compatible with SuDS provision, is achievable when developing the planning application for the scheme.

Site Investigation

- 2.1** The scheme designer or promoter must assess the nature of the proposed works and determine the appropriate scope of site investigation and design requirements.
- 2.2** A desktop study at least should have been undertaken as part of the planning application process.
- 2.3** The scope and nature of the on-site investigations required for detailed design should be informed by the desk top study and site-specific answers to questions, such as:
- Is the highway in cutting or embankment?
 - Is fill material needed for structural and / or landscape purposes?
 - Are there any particular formation requirements for structures or pavements?
 - What are the groundwater conditions and what is the possibility of flooding?
 - What are the soil characteristics of the site?
 - Is there a possibility that the site contains contaminated materials (see Paragraph 7 below)?

- 2.4** Site investigations in ground that is un-contaminated, for the purposes of earthworks and carriageway design, shall be carried out to the requirements of [BS5930 \(2015\)](#), [BS EN 1997-1:2004](#) and [BS EN 1997-2:2007](#).
- 2.5** The methods used for the testing of soils shall conform to [BS1377-1:2016](#).
- 2.6** The scheme promoter must receive the approval of HCC for their earthworks proposals. HCC may require the scheme promoter to carry out specific site investigation or design works, as necessary for the approval process.

Earthworks Design

- 3.1** The earthworks design shall be LTP4 Compliance tested at the Approvals stage to ensure that the proposed Earthworks Strategy submitted at the full planning application stage has been followed.

Earthworks Design

LTP4 Compliance: Approvals

The Earthworks design demonstrates that sustainable resource management action has been taken to eliminate or practicably reduce waste, keep materials in high value applications, and (where appropriate) encourage the 'sharing' of materials between projects and organisations. Where materials are not being shared, the quantity of excavated material retained within the site are maximised and the importing and exporting of material kept to a minimum, whilst maintaining, or creating a sympathetic local landscape.

- 3.2** Earthworks for highways shall be designed and constructed to the requirements of the [DMRB](#).
- 3.3** In general, earthworks material should have a water-soluble sulphate content less than 0.25 grams of sulphate per litre when tested in accordance with [BS1377](#): Part 3.
- 3.4** Where the sub-grade underneath carriageway is frost susceptible, such as chalk or silt or lime/cement stabilised soil, the overall depth of construction shall be at least 450mm. This can be achieved by increasing the depth of sub-base or providing a capping layer.

Use of Class 3 Chalk

- 4.1** When chalk is used in bulk earthworks it shall not be worked during the months of October to March, unless otherwise agreed with HCC.



Embankments and Cuttings

- 5.1** In general the side slopes should be no steeper than 26.5° , i.e. 1:2 (vertical: horizontal).
- 5.2** Where the side slopes are designed at greater than 26.5° , the scheme promoter or contractor shall provide HCC with sufficient information for an assessment of the slope stability together with any proposals for stabilisation, if considered necessary.

Geosynthetics

- 6.1** Geosynthetics is a general term used to include geotextiles, geogrids, geo-meshes and other related products.
- 6.2** Geosynthetics have a wide range of applications in earthworks design. These can be grouped into four main functions:
- Separation
 - Reinforcement and retention
 - Drainage and filtration
 - Impermeable barrier
- 6.3** HCC may require the scheme designer, promoter or contractor use geosynthetics for any particular purpose deemed necessary for the successful construction or future function of the works.
- 6.4** Guidance on the use of geosynthetics can be obtained from the [DMRB](#) and, pending its replacement, [Special Publication 123, Soil Reinforcement with Geotextiles](#).(CIRIA)

Remediation of Contaminated Land

- 7.1** Contaminated land is ground that contains substances which, when present in sufficient quantities or concentrations, are likely to cause harm, directly or indirectly, to people, to the environment, or on occasion to other targets.
- 7.2** The site investigation of contaminated land should be carried out in accordance with Highways Agency (now National Highways) [CD225 Design For New Pavement Foundations](#) and CIRIA publication '[Remedial Treatment of Contaminated Land, Volumes 1 to 12](#)'.
- 7.3** The scheme designer or promoter should seek the advice of a land contamination specialist who will assess the scope of the site investigation required, establish the level of contamination, identify the hazards posed to human health and the environment, and recommend appropriate remediation measures.
- 7.4** The site investigation and remedial action should be carried out on a risk assessment and risk management basis Guidance, and a procedure for risk management is given in Contaminated Land Guidance published by ICE, and [CIRIA C552](#), Contaminated Land Risk Assessment.

- 7.5** Further guidance on means of treating contaminated land can be obtained from CIRIA publication '[Remedial Treatment of Contaminated Land, Volumes 1 to 12](#)'.
- 7.6** HCC and utility companies carry out works in areas of adopted highway and areas with wayleaves, as part of their maintenance and other duties.
- 7.7** The degree of remediation of contaminated land must allow these duties to be carried out, such that the relevant organisation can comply with the [Health and Safety at Work Act](#) and [NRSWA](#), without the need for special precautions or working methods.
- 7.8** The Scheme Promoter must provide HCC with a risk assessment and proposals for remedial actions, and must liaise with any relevant statutory bodies, such as the Environment Agency or Health and Safety Executive.

Stabilisation

- 8.1** Other ground improvements may be required to stabilise the ground before construction can take place.
- 8.2** Techniques include: grouting, dynamic compaction, lime stabilisation, cement stabilisation and surcharging.



- 8.3** The application of these techniques requires the input of specialists that have experience of the particular methods proposed.
- 8.4** HCC may request that the scheme promoter employs a specialist to validate their proposals, as part of the earthworks' approval procedure.

Formation

- 9.1** The formation level of the road is at the top of the sub-grade (or capping layer if laid) and is the base on which the structural elements of the carriageway are laid.
- 9.2** The formation should be protected from deterioration caused by weather and vehicle tracking. Where the CBR of the sub-grade is low, a capping layer may be necessary to improve its performance.

Capping Layer

- 10.1** A capping layer, minimum thickness 600mm, should be required when the CBR of the sub-grade is less than 2.5%. In this instance, the capping layer replaces the weak sub-grade and is considered as a subgrade improvement, rather than part of the structural layer of the road.
- 10.2** Where the CBR of the sub-grade is between 2.5% and 5% a minimum 300mm capping layer will enable the sub base to be reduced from a minimum 350mm thickness to 150mm
- 10.3** Scheme Promoters may request alternative formation treatments and capping layer thicknesses based on the metrics of [CD225](#) as a departure from standards but should note that the additional administration and quality control costs during design and construction may outweigh the savings that can be achieved.
- 10.4** Capping material should be Class 6F1, 6F2, 6F3 or 6F4, as defined in the SHW.
- 10.5** The CBR of the compacted capping layer shall be at least 15%. Wherever possible, recycled and/or locally available materials should be used for capping material.

Excavation, Deposition, Compaction (other than dynamic compaction)

11.1 In general, 'End-product Compaction' of earthworks materials will be required.

11.2 A nuclear density gauge may be used to measure the field dry density.



11.3 Where embankments are required in areas that may be subject to flooding, they shall be constructed from approved granular material.

11.4 Where embankments are used for the foundation of widened carriageways or footways, they should be constructed from approved granular material. The material should be laid and compacted in layers, with benches constructed into the existing embankment. For embankment slope steeper than 26.5o a geotextile should be used in conjunction with the above granular material and benches.

Topsoil

- 12.1** In most circumstances, a minimum of 150mm thick layer of topsoil should be laid on areas of highway verge.
- 12.2** In some circumstances, particularly in rural locations, it may be more appropriate to not provide a topsoil layer. This helps encourage the growth of indigenous species. Advice should be sought from HCC and the Local Planning Authority.
- 12.3** All existing turf and topsoil shall be stripped over the area of any carriageway, footway, footpath, cycle track, cycle lane, embankments or bunds.
- 12.4** Stripped soils are a valuable resource and should be stored and handled in accordance with best practice guidance.
- 12.5** Unless a local, sustainable sharing arrangement has been set up, the topsoil stripped from the site should be reused within the site as far as practicable and the quantity of exported or imported topsoil should be minimised.
- 12.6** Areas of topsoil should be rolled with a hand roller and then lightly raked to a fine tilth in readiness for seeding or planting.

Chapter 12

Designing for Carriageway, Footway, Footpath and Cycleway Construction

Contents

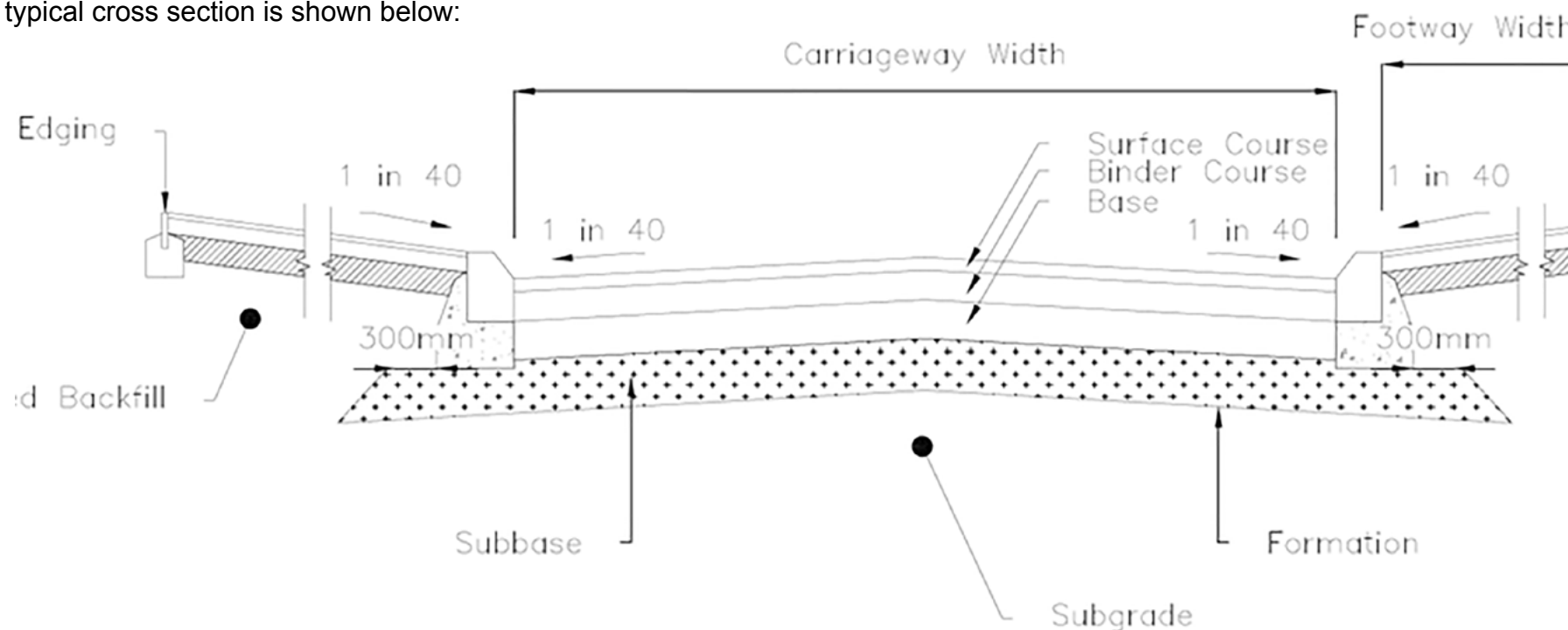
Introduction

- 1.1** This chapter provides guidance on the detailed design and specification for paved carriageway, footway and cycleway construction together with unsealed construction for Active Travel Links.

Road Pavement Construction

- 2.1** New roads should be of a flexible bituminous construction. Alternative materials and construction methods will be considered as departures from standard except in Place & Movement category P3 (high Place function) routes. When laid as part of development they may attract commuted sums.
- 2.2** Where the sub-grade underneath the carriageway is frost susceptible, such as chalk or silt, the overall depth of construction shall be at least 450mm. This can be achieved by increasing the depth of sub-base or providing a capping layer.
- 2.3** The elements of typical road pavement construction are:
- Sub-grade (or capping if laid) - the foundation on which the road construction is built.
 - Sub-base - a layer of granular material that is laid on the formation (the surface of finished earthworks on which a road pavement is constructed);
 - Base- a layer of bituminous material laid on the sub-base.
 - Binder Course - laid on the base. With certain materials it is possible to combine the binder course and base layers; Subject to the approval of HCC
 - Surface course - provides the running surface of the carriageway or footway.

2.4 A typical cross section is shown below:



2.5 The road pavement shall be designed and constructed in accordance with [CD 226](#) and as described in this chapter. Construction shall be in compliance with these DMRB Series'

- [CD224](#) Traffic loading/Traffic Assessment Ref 5.11 minimum thickness of material
- [700](#): Road Pavements General

- [800](#): Road Pavements - Unbound, Cement and Other Hydraulically Bound Mixtures
- [900](#): Road Pavements - Bituminous Bound Materials
- Detailed requirement for formation design Ref 4.4

2.6 All materials shall be manufactured and laid in accordance with the relevant British Standard and [Specification for Highway Works](#).

Use of Recycled Materials

- 3.1** The advantages of using recycled materials are not limited to just saving on excavating new aggregate, they can also reduce the number of vehicle movements on a site by reducing the amount of new material being imported and reducing the amount of waste material being taken away.
- 3.2** Recycled aggregate can also be incorporated in “new” materials without any measurable drop in performance, reclaimed asphalt pavement (RAP) is already incorporated in standard surfacing materials. Other recycled materials are also available for example recycled glass can be crushed to form a similar aggregate to sand and fine fillers.
- 3.3** The use of recycled materials should always be the first choice. Assistance will be provided by HCC for determining the suitability of materials with non-standard content that includes recycled materials.
- 3.4** Standard surfacing materials often contain recycled aggregate and some are particularly marketed due to the recycled content such as Glassphalt and Enviropalt.
- 3.5** Crushed glass can have the same size grading as sand, but the actual surface of each grain of crushed glass is smoother and less absorbent than crushed rock, therefore binder will not coat the aggregate as easily. Additional chemical agents or changes to the aggregate-binder mix need to be taken into account. This can result in the creation of a proprietary product rather than the introduction of a simple substitute ingredient within a generic product already in common use.
- 3.6** Crushed concrete from demolition works, aggregates arising from steel, waste incineration or pottery manufacturing can all be used in road construction materials, sometimes more cost effective if the source of the product is close to the intended site for use and they can be easily processed to remove contaminants that will impact on long term performance.
- 3.7** Material technology is evolving with the introduction of Biogenic binders, incorporation of waste plastic and tyre rubber and we are encouraging this advancing technology, ideally leading to a wider choice of preferred materials in the future.
- 3.8** Scheme promoters are encouraged to investigate and consider the use of recycled materials but to aid their widespread use these shall be considered as a departure from standards in order to ensure that HCC can fully satisfy itself as to their suitability and a controlled application agreed.

Subbase

4.1 The thickness of sub-base required depends on the CBR value of the sub-grade and whether a capping layer has been provided.

4.2 Details are given below:

CBR Less than 2.5%

Minimum Capping Thickness 600 mm

Minimum Subbase Thickness 150 mm

CBR 2.5 – 5.0%

Minimum Capping Thickness -

Minimum Subbase Thickness 350mm

CBR 2.5 – 5.0%

Minimum Capping Thickness 350mm

Minimum Subbase Thickness 150mm

CBR 5.0 – 15.0%

Minimum Capping Thickness -

Minimum Subbase Thickness 225mm

CBR 15.0 – 30.0%

Minimum Capping Thickness -

Minimum Subbase Thickness 150mm

CBR Greater than 30%

Minimum Capping Thickness -

Minimum Subbase Thickness -

4.3 Wherever possible, recycled and locally available materials should be used for subbase material.

4.4 Detailed requirements for formation and capping are found in Part 4 Chapter 11: Earthworks.

General Requirements for Bituminous Layers

- 5.1** The total thickness of bituminous material, laid on top of the sub-base, is related to the number of goods vehicles likely to use the different categories of road. The road pavement shall be designed and constructed in accordance with paragraph 2.5 above.
- 5.2** In cases where there are likely to be large numbers of HGV's, HCC may require that the thickness of any pavement layer be increased to take account of the additional loading.
- 5.3** The bituminous material will usually consist of a base, binder course and surfacing layers. In some cases, the base and binder course can be combined.
- 5.4** Where practical the Contractor should use reclaimed bituminous materials in the production of base and binder course materials.
- 5.5** Consideration should be given to the longevity of the proposed surface material with particular attention given to its suitability with respect to road type end use.
- 5.6** Gravel aggregates are not permitted in any bituminous carriageway construction.
- 5.7** Different grades of binder are used to make the materials more suitable for laying in colder temperatures, machine laying, hand laying small areas and maintaining flexibility.
- 5.8** Stiffer binders require more heat to make them flexible but become very stable when set.
- 5.9** Soft binders need less heat and retain some workability when cool but are prone to deformation.
- 5.10** BS preferred grades shall be used unless the Scheme Promoter seeks advice from HCC

5.11 The minimum total thickness of bituminous material for different categories of roads are as follows:

Secondary Distributor and above

P&M Category

P1/M3, P2/M2 (Main & Secondary), P2/M3

Minimum Thickness of Bituminous Materials

As per [DMRB](#)

Local Distributor

P&M Category

P1/M2, P2/M2 (local), P3/M2

Minimum Thickness of Bituminous Materials

250 mm

Access Road

P&M Category

P1/M1, P2/M1, P3/M1, P3/M3

Minimum Thickness of Bituminous Materials

190 mm

Base Layers

- 6.1** Base material with an aggregate size greater than 28mm is not acceptable.
- 6.2** The determination of compaction on dense base and binder course asphaltic concrete shall be determined in accordance with Clause 903.
- 6.3** The scheme promoter may propose in-situ nuclear density testing in the Backscatter mode for compliance testing. BS Standard
- 6.4** HCC will reserve the right to instruct either form of testing.

Surface Course

7.1 The following table sets out the selection of acceptable surface course materials. The recommended material is Hot Rolled Asphalt (HRA).

A Roads

Speed Limit Range (mph) 30 +

Material Description (*BS EN 13108, BS594987 & PD6691*)

HRA 30/14 +20mm PCC's (40mm depth)

HRA 35/14 +20mm PCC's (45-50mm depth)* Clause 943

Urban cul de sac

Speed Limit Range (mph) 30 or less

Material Description (*BS EN 13108, BS594987 & PD6691*)

AC 6 Dense / Close (20-30mm depth)

AC 10 Dense / Close

(30-40mm depth) HRA 55/10 (40mm depth)

Urban minor access road

Speed Limit Range (mph) 30 or less

Material Description (*BS EN 13108, BS594987 & PD6691*)

HRA 55/10 (40mm depth)

Urban major access road

Speed Limit Range (mph) 30 or less

Material Description (*BS EN 13108, BS594987 & PD6691*)

AC10 Dense / Close (30-40mm depth)

HRA 30/14 +20mm PCC's (40mm depth)

Urban Local Distributor

Speed Limit Range (mph) 30 +

Material Description (*BS EN 13108, BS594987 & PD6691*)

HRA 30/14 +20mm PCC's (40mm depth)

HRA 35/14 +20mm PCC's (45-50mm)

Rural, quiet single track road

Speed Limit Range (mph) 30 +

Material Description (*BS EN 13108, BS594987 & PD6691*)

AC 6 Dense / Close (20-30mm depth)

AC 10 Dense / Close (30-40mm depth)

Rural, single track road, with low HGV use. Unrestrained edges. Typically C or U classification.

Speed Limit Range (mph) 30 +

Material Description (BS EN 13108, BS594987 & PD6691)

AC 10 Dense / Close (30-40mm depth)

AC 14 Dense / Close (40mm depth)

Rural, two-lane road, moderate to heavy traffic, restrained edges. Typically B classification.

Speed Limit Range (mph) 30 +

Material Description (BS EN 13108, BS594987 & PD6691)

HRA 30/14 +20mm PCC's (40-45mm depth)

Industrial access road.

Speed Limit Range (mph) 30 +

Material Description (BS EN 13108, BS594987 & PD6691)

HRA 35/14 +20mm PCC's (45-50mm depth) Clause 943

HRA 30/14 +20mm PCC's (40mm depth)

****Note:** Advice from HCC will be required as inclusion of Polymer Modified Binders in high stress sites (HGV volumes, gradients, alignment) is required.*

- 7.2 The use of alternative materials not shown in the above table from HCC's Pavement Management Strategy, such as Stone Mastic Asphalts and Thin Surfacing Course Systems shall be considered as a departure from standards.
- 7.3 Skid resistance of all new surfaces must be achieved as specified in [Hertfordshire's Skid Resistance Strategy](#).
- 7.4 When using HRA and PCC, a chip-free drainage channel, 250mm wide, should be provided at the edge of the carriageway.
- 7.5 The surface texture is to be measured using the Sand Patch Method described in [BS598](#).
- 7.6 The texture depth should be either 1.2mm or 1.5mm depending on traffic speeds.
- 7.7 The measurement of the texture depth must be completed prior to the section of road being opened to traffic.
- 7.8 All ironwork that requires resetting shall be set to new levels prior to the surface course being laid.

- 7.9** When pre-coated chippings are required to be rolled into the surface course, these should be 20mm nominal size with a Polished Stone Value (PSV) greater than 55.
- 7.10** On the approach to junctions or other areas of vehicle braking the PSV should be increased to 65.

Block Paved Surfacing

- 8.1** Minor Access roads may also be constructed with a block paved surface in certain locations. Block paving is likely to attract payment of commuted sums for future maintenance.
- 8.2** The construction, above sub-base shall consist of at least 90mm of base, 50mm of compacted sharp sand and 80mm thick block pavers.
- 8.3** If a blocked paved area is proposed to be used as part of SuDS an alternative construction detail will be required. This approach will be treated as a departure from standard.
- 8.4** Block paved areas are to be laid/designed in compliance with [Series 1100 of the Specification for Highway Works \(SHW\) and BS7533](#).

Surface Regularity Testing

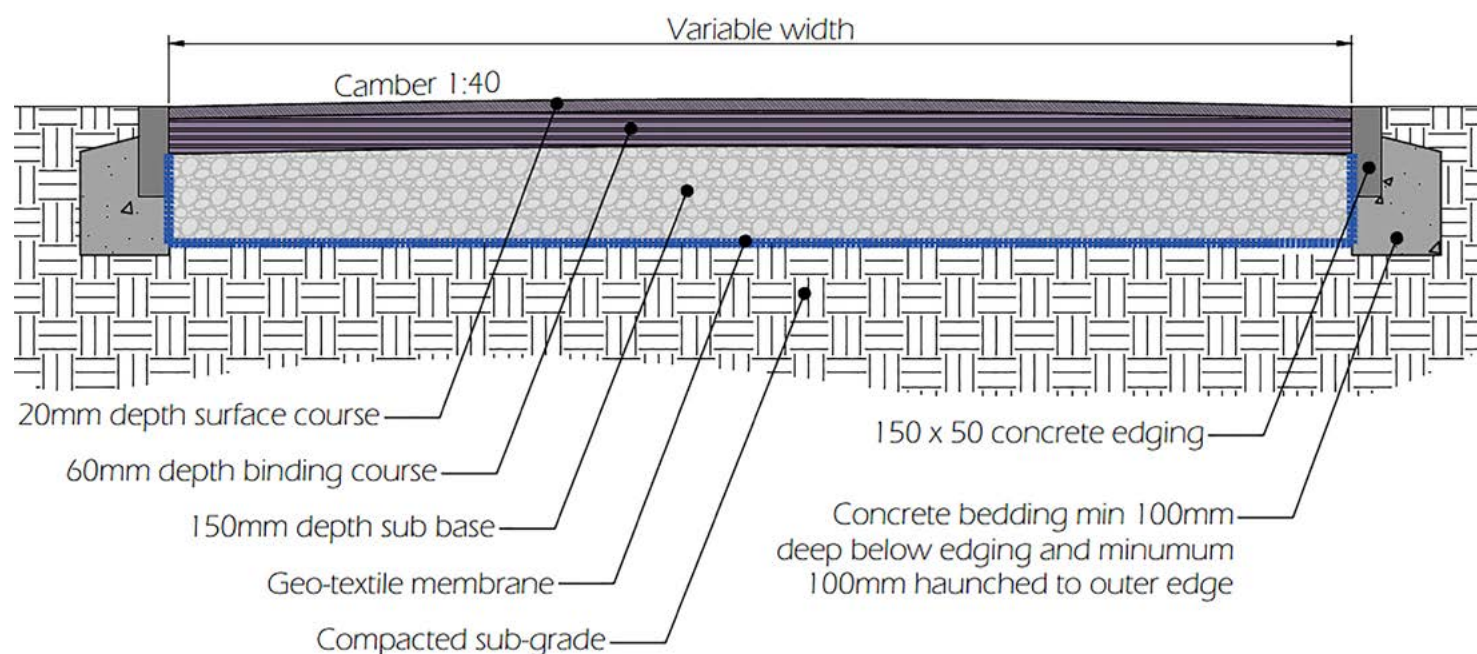
- 9.1** When requested levels and dips shall be taken by the Contractor and information provided to HCC.
- 9.2** The grid for checking surface levels of pavement courses shall be:
 - Longitudinal dimension: 10m
 - Transverse dimension: 2m
- 9.3** A 3m long rolling straight edge should be used to measure longitudinal surface regularity in accordance with [Specification for Highway Works](#) Clause 702. For Local Distributor or higher category roads the surface regularity shall be that for Category A Roads. Other roads shall have a Category B Road surface regularity.
- 9.4** The transverse surface regularity shall be measured using a 3m straight edge in up to 50 locations or as required as directed by HCC. In accordance with the specification.
- 9.5** All certificates to be supplied by the developer for record of testing.

General Requirements for Active Travel Link, Footway & Footpath & Cycleway & Cycle Track Construction

- 10.1** Sealed surfacing should generally be bituminous. It can be in block paving subject to approval by HCC. Concrete surfacing shall be considered as a departure from standards.
- 10.2** Prior to laying sub-base material the formation shall be sprayed with an approved weed killer.
- 10.3** Surfacing shall be laid to true levels and crossfalls. The tolerances in surface levels of lower pavement courses should be:
 - Sub-base: $\pm 10\text{mm}$
 - Binder course: $\pm 3\text{mm}$
- 10.4** Paved areas shall be restrained by kerbs, edgings or setts.
- 10.5** The type of kerb, in terms of material and profile, should be in keeping with the local character of the area surrounding the scheme. The Scheme Promoter shall obtain the approval of the Local Planning Authority and HCC for the kerbs they propose to use.

- 10.6** Where a cycle/footway is adjacent to the carriageway, the kerb upstand should generally be 125mm.
- 10.7** At dropped kerb vehicular crossings, the upstand should be 25mm, to provide a physical indication of a change.
- 10.8** At dropped kerb crossings used by pedestrians or cyclists the upstand should be zero. A flush transition must be provided. Care must be taken to avoid the ponding of water adjacent to flush dropped kerbs.
- 10.9** A higher kerb upstand may be required by the HCC in certain circumstances, such as at bus stops. These are set out in the table in paragraph 6.1 of Part 4 Chapter 2.
- 10.10** To provide a more continuous level surface the number of crossovers should be kept to a minimum and where practicable, at entrances to driveways, a minimum width of 900mm carried through at footway level should be provided to enable footway and cycle path users to avoid the ramps to dropped kerbs.
- 10.11** Special attention is required to vehicle crossover kerbs, where properties fall away from the highway to stop surface water flowing off the highway into private properties.

Bituminous Active Travel Link, Footway / Footpath & Cycleway / Track Construction



Note: Where heavy vehicle use is expected sub-base 200mm, bituminous binder course 100mm, bituminous surfacing 45mm. Incorporate geo-textile synthetics where ground requires stabilisation.

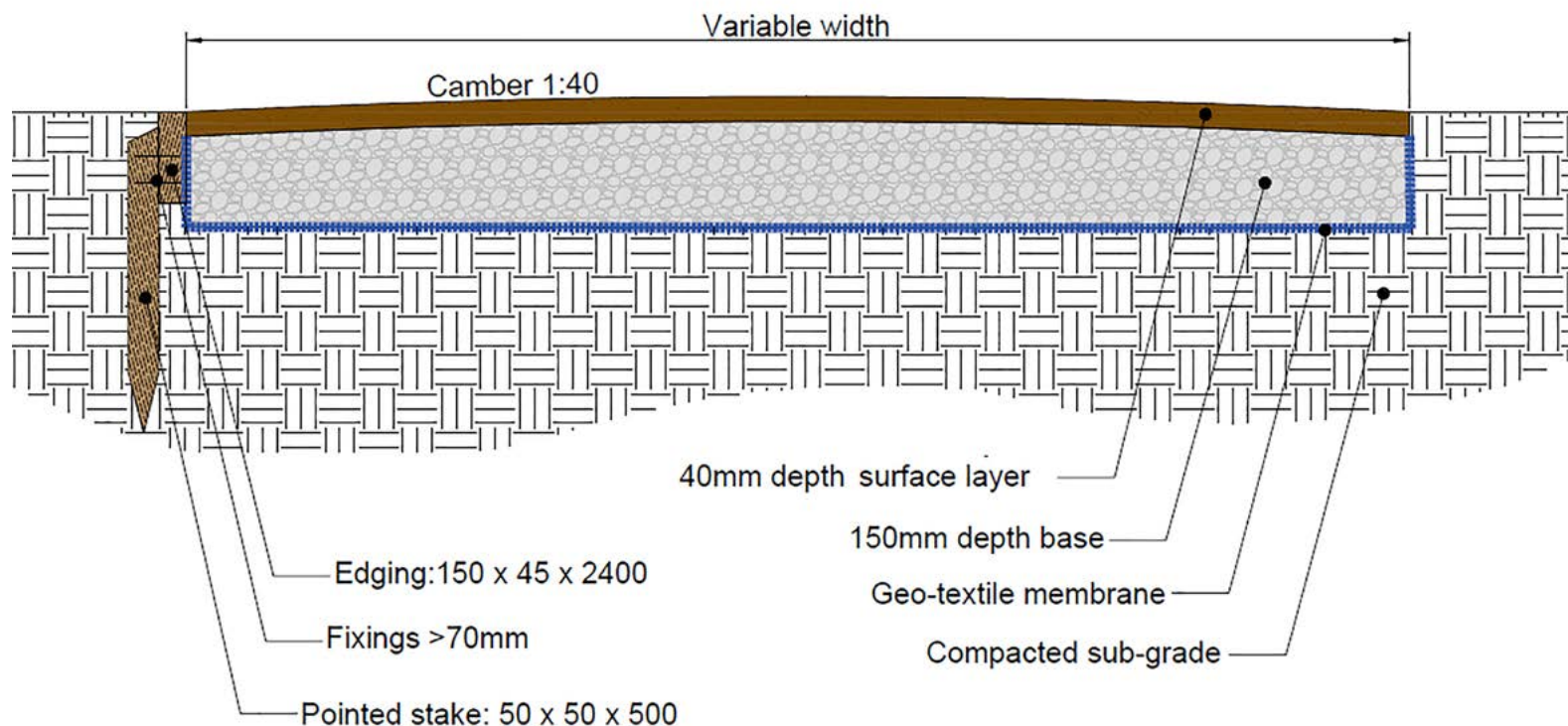
- 11.1** Standard bituminous construction should consist of 150mm granular sub-base, 60mm bituminous binder course, and 20mm of bituminous surfacing, machine-laid to ensure smoothness.
- 11.2** Where the footway or cycleway is likely to be overrun by heavy vehicles, such as at non-domestic crossovers or adjacent to industrial roads, the construction should be 200mm granular sub-base, 100mm bituminous binder course and 45mm surfacing.
- 11.3** The sub-grade should be well compacted, with any soft spots excavated back to firm ground and built up with type 1 granular sub-base.
- 11.4** Where a footway does not abut a kerb or boundary wall, a 50mm x 150mm hydraulically-pressed, precast, flat-topped, concrete edging to [BS EN 1340:2003](#) Type EF shall be provided:
- I. Precast concrete edgings shall be laid level and aligned, running smoothly when viewed in section and in plan on a 100mm deep 200mm wide bed of compacted concrete
 - II. Curves and corners shall sweep smoothly without kinks, flat sections or abrupt changes
 - III. 100mm width of haunching concrete shall be laid on both sides of the edging. Compact and smooth to ensure edging is held firm. Smooth off 50mm below top of the stone edging/ground level
 - IV. The concrete shall be allowed to set before continuing further construction or back filling
 - V. Trenches shall be backfilled, ensuring again that sub-grade is well compacted
 - VI. Finished edgings shall be flush with ground level
- 11.5** Metal edging, where proposed for a Public Right of Way, will be considered acceptable where a path is bordered by vegetation which can be considered to naturalise the edge but should not be considered to separate surfaces for dual use paths (i.e. where a bitumen and natural surface is specified). Use of metal edging for footway and carriageway settings would require prior agreement from HCC as not usually used.
- I. The metal edging should be of minimum 2.5mm thickness, with a face of minimum 75mm depth.
 - II. The manufacturer's guidance for installation should be followed (concreted or driven in and secured with fixings into the sub-base).
 - III. Finished edgings shall be flush with ground level

- 11.6** Each of the Type 1 granular sub-base and 20mm Dense Bitumen Macadam binding course layers shall be machine-compacted, finished to a 1:40 camber to allow surface water to drain either side on flat ground, or cross-fall to the downward side.
- 11.7** The surface course material will vary according to the proposed user type. [CD239](#) provides 3 options, AC6mm, AC10mm and HRA 55/10. The surface should be laid and machine rolled, finished to a 1:40 camber to allow surface water to drain either side on flat ground, or cross-fall to the downward side.
- 11.8** Junctions with other paths, surfaces and ironwork (for utility access) shall be flush, with changes in direction made gradually and with curved flares.

Active Travel Link Footway / Footpath & Cycle Track Block Paved Construction

- 12.1** Where approved by HCC, standard block paved construction should consist of 60mm thick block paving laid on 50mm of compacted sharp sand and 150mm granular sub-base.
- 12.2** Where the footway or cycleway is likely to be overrun by heavy vehicles, such as at non-domestic crossovers or adjacent to industrial roads, the construction should be 200mm granular sub-base, 100mm bituminous base, 50mm of compacted sharp sand and 80mm thick block paving.
- 12.3** If a blocked paved area is to be used as part of a Sustainable Drainage Systems (SuDS), an alternative construction detail will be required.
- 12.4** Block paving should be laid in herringbone pattern, unless otherwise agreed by HCC.

Unsealed Active Travel Link, Footway / Footpath & Cycle Track Construction



Note: Where heavy vehicle use is expected sub-base 200mm, surface layer 60mm. Incorporate geo-textile synthetics where ground requires stabilisation.

13.1 The path footprint should be excavated to a depth of 190mm and the sub-grade be well compacted, with any soft spots excavated back to firm ground and built up with type 1 granular subbase.

13.2 Base and surface layer material for most paths will be type 1 recycled aggregate but in ecologically sensitive areas a pH neutral material, such as granite may be required.

13.3 The sub-grade should be well compacted, with any soft spots excavated back to firm ground and built up with type 1 granular subbase.

13.4 Timber or recycled plastic edging may be appropriate in some locations particularly where the ground falls away and material needs to be held in place. All timber used should be locally sourced from renewable woodland. Details of materials and proposed method of installation will require approval by HCC

13.5 To facilitate large vehicle crossing points, the dimensions of timber shown above can be scaled up, typical dimensions 100mm x 200mm x 2.4m.

13.6 In ecologically sensitive areas untreated hardwood may be required.

13.7 The path shall be constructed as follows:

- I. The edging timber should be installed 50mm proud of existing level ground level, but greater where the ground is lower and revetting is required.
- II. The boards shall be secured in place with pointed pegs 50mm x 50mm x 500mm at each end and in the centre. The peg length will increase where more than one depth of edging timber is required on sloping ground.
- III. The pegs shall be fixed to the edging timber with 2 screws per section and the peg tops cut at a sloping angle away from the path 20mm below top of edging timber.
- IV. The geotextile membrane is required to suppress weed growth and should not be visible above ground when laid.
- V. Each of the 150mm depth of type 1 granular sub-base and the 40mm depth of well-graded recycled aggregate (6mm to dust) as surface layer shall be machine compacted and finished to a 1:40 camber to allow surface water to drain either side on flat ground, or cross-fall to the downward side.
- VI. Junctions with other paths, surfaces and ironwork (for utility access) shall be flush, with changes in direction made gradually and with curved flares.

Flag Paving and Other Materials

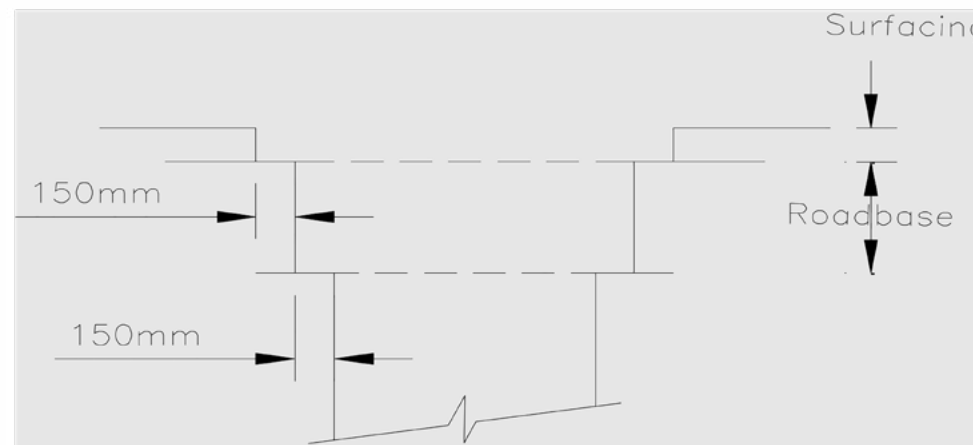
- 14.1** The use of flag paving for footways or urban footpaths shall be avoided outside of areas of High Place Importance, which are P3 Category highways, [Conservation Areas and the Chilterns Area of Outstanding Natural Beauty \(AONB\)](#).
- 14.2** Flag paving should not be used for cycle tracks and other Public Rights of Way.
- 14.3** Concrete flags and other paving units, when larger than 450mm x 450mm, should be laid on a 25mm to 40mm thick bed of cement mortar. This replaces the layer of sharp sand used underneath block paving described above. Other layers should be as per block paving.
- 14.4** In certain locations other types of paving units or materials may be used. This may be the case where an existing character is continued within the scheme or for aesthetic purposes; in all cases advice from the Local Planning Authority should be sought and, in the case of development, agreement reached with HCC over commuted sums to cover future maintenance.

Tactile paving

- 15.1** Tactile paving shall be provided in accordance with legislation and the DfT's [Guidance on the use of Tactile Paving Surfaces](#).
- 15.2** On segregated shared facilities at locations where it is necessary to provide a 2.4 m long Section of ladder and tramline paving, the designer shall ensure that cyclists can negotiate the paving in a straight line. In order to accommodate the turning radii of the cycle design vehicle it should be positioned before the point at which cycles need to turn.
- 15.3** The national guidance on tactile paving is not comprehensive when it comes to the use of tactile paving for shared unsegregated routes. Designers shall not fill in gaps or depart from the national guidance without first discussing the proposals with HCC and local disability groups.

Excavation, Repair and Reinstatement of Existing Surfaces

- 16.1** Where a trench is required in an existing bituminous pavement, the thickness of bituminous material required in the reinstatement will be as per the requirements for new carriageway.
- 16.2** Where a trench is required within a Public Right of Way the need for a Temporary closure under S14 of the [Road Traffic Regulation Act 1984](#), excavation and reinstatement of requirements must be discussed with the HCC Countryside & Rights of Way team.
- 16.3** Below the bituminous layers the trench should be reinstated with 300mm of capping material and 150mm of subbase material, both fully compacted.
- 16.4** A cross section of a typical trench reinstatement in bituminous material is shown (right).



Trench reinstatement in existing carriageway

- 16.5** The same overlap of materials should also be used where any new carriageway, cycle track or footway/footpath construction meets any existing construction.
- 16.6** There should not be a need to dig a trench in any new pavement provided as part of the development. Where a trench is necessary, it should be dug prior to the laying of the binder course and surface course layers of the pavement.
- 16.7** Reinstatements and repairs shall also comply with the requirements of [DMRB Series 700](#) and [DMRB Series 1000](#).

Bituminous Bond Coat

- 17.1** Prior to laying bituminous material, the existing surface shall be coated with a bond coat to promote adhesion between and/or sealing of layers in the construction and maintenance of roads and paved areas.
- 17.2** Bond coats are polymer modified binders classified in accordance with [BS EN 13808](#), [BS EN 15322](#) or [BS EN 14023](#). Laid to comply with Clause 920 of [DMRB Series 900](#)

Chapter 13

Designing and Constructing Structures

Contents

Introduction

- 1.1 This chapter sets out the detailed, technical requirements for structures to support final design, contract preparation and implementation.
- 1.2 A planning application will have identified the proposed structures and Approvals in Principle will have been secured as described in Part 1 Chapter Part 10: Technical Approval for Structures



- 1.3 The chapter concludes with some practical tips for good design practice.

Design & Specification Requirements

- 2.1 Selection of structural form, materials and details shall be based on consideration of Whole Life Cost, Performance, and Sustainability taking account of construction, operation and maintenance including inspection, replacement and demolition



- 2.2 All structural designs shall be undertaken in accordance with [DMRB](#) and appropriate Eurocodes. Further advice on the implementation of structural Eurocodes for highways structures is available from National Highways – Design Manual for Roads and Bridges (DMRB).

- 2.3 All structures are to be designed by suitably qualified engineers with a working knowledge and experience of current UK highway design standards.
- 2.4 Some structures may be subject to Building Regulation approval. The scheme promoter must seek Building Regulation approval directly from the relevant authority.
- 2.5 The design methods for highways structures are laid down in the [DMRB](#) and amendments as published by National Highways.
- 2.6 All structures that require Technical Approval by the Highway Authority shall be constructed in accordance with the [Manual of Contract Documents for Highway Works \(MCHW\)](#), published by National Highways, including associated notes for guidance and amendments.
- 2.7 All documentation and data presented to HCC should be Building Information Modelling (BIM) compatible.

Retaining Walls

- 3.1 Where retaining walls are to be adopted, they shall in general be of reinforced concrete construction and clad with brickwork.
- 3.2 Gabion walls, reinforced clay brickwork retaining walls of pocket type, grouted-cavity type construction or king-post walls should generally not be used for supporting highways, footways or verges.
- 3.3 Where their use is agreed by HCC (potentially within landscape areas or for Rights of Way) then all gabions shall use a minimum of 3.5mm thick wire and shall be PVC and zinc coated. Gabions should be hand packed with care and not machine filled.

Designing for Durability and Maintenance

- 4.1** Structures shall be designed with appropriate access for inspection including for example:
- Installation of gates within boundary fencing
 - Provision of steps on embankment or cutting slopes steeper than 1:3
 - Provision of parking areas for inspector vehicles
- 4.2** Parapets shall be aluminium unless otherwise agree with HCC.
- 4.3** Anti-theft holding down bolts shall be provided at all vehicular and pedestrian parapet post locations. An antitheft fixing shall be provided for each rail section
- 4.4** Concrete Impregnation shall be applied to areas vulnerable to the effects of de-icing salts including concrete within 3m of the kerb line.
- 4.5** Hydrophobic impregnation should be used for concrete in exposure class XD3
- 4.6** Anti-graffiti coatings shall be applied to vulnerable areas of structures to a specification agreed by HCC.

Protection against Corrosion (Specification for Highway Works Series 1900 and 5000)

- 5.1** Paint systems shall be in accordance with the [DMRB](#) and shall incorporate a zinc rich primer.
- 5.2** The scheme promoter or designer may propose other protective finishes for approval by HCC. Alternatives will only be considered if sufficient evidence is supplied of durability and protective properties of the finish.
- 5.3** The durability requirements will be determined by the exposure condition and accessibility of the steelwork on an individual basis. The minimum durability requirement of applied paint systems is maintenance free for 12 years, only requires minor maintenance from 12 years and major maintenance is only needed after 20 years.
- 5.4** Colours will be chosen from available colours specified in [BS4800](#) and will be agreed as part of the technical approval process. The final colour and finish will be determined on an individual basis and will be suitable for the type of structure and location.

Construction Phase



6.1 Construction work must not begin until all approvals and legal agreements are in place including Technical Approval Authority (TAA) acceptance of Design and Check Certificates

6.2 In addition the scheme promoter must gain approval from HCC to the following before construction starts:

- A detailed programme showing key deliverables, durations, milestones and dependencies of the activities involved;
- The level of supervision to be provided during the works to ensure the structure will be built in accordance with the design, specification and Construction Management Plan. For more on CMPs see Part 1 Chapter 3.

6.3 Progress photographs shall be provided to HCC showing the methods of construction at all stages, so that details of any hidden elements are recorded

6.4 HCC may audit the supervision to ensure the agreed standard of supervision has been met.

Tips for Good Design Practice

- Provide movement joints with a secondary drainage system
- Provide minimum 1.5m headroom under bridges to allow inspection
- Provide jacking points adjacent to bearings
- Services should be ducted across bridge becks
- Use long-life sealants in movement joints rather than the standard grey polysulphide type. Minimise use of all sealants
- Comply fully with CD 350
- Design movement joints across footways to avoid creating trip hazards or recesses that trap narrow heels
- Back of wall drainage should have a piped outfall to a drainage system rather than soaking away into fill
- Ensure parapet mesh has secure attachments to avoid snagging of pedestrians and cyclists
- Provide adequate pre-camber and crossfall on footbridge decks to avoid ponding

7.1 Structures shall generally be designed, specified and constructed fully in accordance with the requirements of the Design Manual for Roads and Bridges and the Specification for Highway Works, both published by National Highways. Particular attention is drawn to [CD 350 Design of Highway Structures](#). However, it is recognised that these documents can be slow to be updated to take account of innovations within the industry. Alternative proposals should be discussed with the Technical Approval Authority.

Chapter 14

Designing Road Restraint Systems

Contents

Introduction

- 1.1** This chapter sets out the design requirements for Road Restraint Systems (RRS) which include vehicle restraint systems and pedestrian restraint systems used on the highway to reduce safety risks by controlling errant movements. It is a two-stage process that involves carrying risk assessment (refer to 7.6) and hazard mitigation prior to detailed RRS design .
- 1.2** As Part 3 Chapter 15 highlights, Scheme Promoters should have identified the needs for RRS at the planning application stage and indicated the nature of the RRS, given that RRS can impact on the setting of the optimum planning ‘red line.’ Moreover, primary consideration should have been given to the inherent creation of safe environments for active travel modes that avoid the unnecessary provision of pedestrian guard railing.
- 1.3** HCC requires developers to submit their proposals for approval of all new RRS installations at Technical Approvals Stage 1. The submission shall include the specification (Appendices 4/1 and 4/2) and drawings. No VRS shall be installed without prior approval in writing by HCC.
- 1.4** Where a development is adjacent to an existing highway, the developer shall include as part of their Health and Safety risk assessment (under [CDM](#)) to detail whether VRS installation or upgrading is required to protect the development. HCC reserves the right to make their own independent assessment.
- 1.5** In certain circumstances the decision to provide a RRS may be influenced by the potential visual impact. Reducing this impact by careful specification, especially in areas of outstanding natural beauty, may make provision of a system possible. Wooden clad N2 barrier compliant with [BS EN 1317](#) is available with various working widths and could be particularly useful in rural situations. Some authorities have installed steel safety barrier and specified a protective system to minimise its visual impact, predominately in rural areas. Where this is proposed the designer must discuss the appropriate type of coating to be used with the contractor and proposed product supplier. It will be necessary to include specific requirements to ensure that the RRS provided is suitable for such treatment and acceptable to HCC.

Vehicle Restraint Systems (VRS)

- 2.1** HCC requires all new VRS to match existing recent installations commonly found in Hertfordshire. Flex Beam is the most commonly found type of recent installation. HCC will not accept any tensioned VRS or Non-Proprietary VRS (except for maintenance). All new VRS components shall conform to requirements of SHW Clause 401.9.
- 2.2** Detailed requirements for VRS are set out in [DMRB's CD377: Requirements for Road Restraint Systems](#) and SHW Series 400.
- 2.3** Post foundations shall be concrete with sockets.
- 2.4** Road furniture must not be positioned in front of a new or existing VRS and, in general, it should not be placed immediately in advance of nor within the available working width of a new or existing VRS unless the road furniture has been designed to be passively safe, and if hit, will not be displaced into the adjacent carriageway or give rise to a secondary event.
- 2.5** Where the requirements of [CD377](#) cannot be met the Scheme Promoter shall follow the Departures from Standards process set out in Part 1, Chapter 12
- 2.6** Road Safety Audits must be undertaken on all highway schemes involving removal, provision or improvement of VRS.
- 2.7** Where a contractor needs to use a VRS as part of Temporary Traffic Management, then it shall conform to the requirements' given in [CD377](#).

Pedestrian Restraint Systems (PRS) – Guard Rails

- 3.1 Pedestrian guard rails can be used to prevent pedestrians crossing at dangerous places (for example where filtering traffic may be moving at times unexpected by pedestrians) however this should only be done as a last resort if the potential conflict cannot be mitigated by other means.
- 3.2 Pedestrian guard rails should not be provided as a deterrent to kerbside vehicle parking.
- 3.3 Pedestrian guard railing at traffic signal-controlled crossings should start at the signal post but not encroach beyond the push button position.
- 3.4 It is desirable in some cases to restrict the crossing of pedestrians to certain approaches. This may be the case at a traffic signal-controlled junction or where a change in direction is required across an island such as a roundabout.
- 3.5 The effectiveness of guard railing is lessened if gaps have to be left for access for vehicles and the loading and unloading of goods. Where possible, crossings should be sited to avoid the necessity for such gaps.



Fence next to shared use footway near carriageway in Hatfield

3.6 Where a guard rail or fence is provided it should be a higher than a cyclist's centre of gravity such that if a cyclist were to strike it they would not be thrown over it. In the example shown in the photo above, a cyclist travelling downhill and losing control might hit the further posts and could have their centre of gravity above the fence causing them to be thrown into the road. Consideration should be given to making the fence taller.

3.7 The minimum heights of guardrail or parapet shall be as follows:

Walking	1m
Cycling	1.4m
Equestrian	1.8m

3.8 High Inter Visibility pedestrian guard railing may be required to give motorists a clear view of waiting pedestrians. The appropriate type guard railing will depend on the geometric layout of the crossing facility, (See manufacturer's details for the various types of guard railing to be used in different scenarios, be it on a straight road or on a bend).

3.9 Further guidance on Pedestrian Guard Rails can be found in [CD377](#).

Pedestrian Restraint Systems (PRS) – Pedestrian Parapets

4.1 All footbridges and bridleway bridges must be provided with pedestrian parapets conforming to the requirements of [BS7818:1995](#).

4.2 Pedestrian parapets on bridges over railways are subject to special design requirements with respect to infill panels, as detailed in [BS7818](#) and the design and material must be approved by Network Rail or London Underground Ltd as appropriate.

4.3 On cycleway bridges or accommodation bridges frequently used by equestrians a 600mm high solid infill panel must be provided at the bottom of the parapet in order to obstruct the animal's view of the road below.

Pedestrian Restraint and Protection at Head Walls, Wing Walls and Retaining Walls

- 5.1** Where any pedestrian movement may occur within the highway from use or maintenance of the highway and there is a risk to health and safety from a fall from a height, suitable protective measures must be provided in accordance with the requirements detailed below.
- 5.2** Where a structure, such as a retaining wall, head wall or wing wall, presents a vertical or near vertical face 1.5m or more in height and it would be possible for a person to gain access to the upper edge of the structure, a pedestrian restraint system such as a protective barrier or guard rail must be installed close to, or on top of the structure.
- 5.3** A pedestrian protective barrier or guard rail must also be installed at walls less than 1.5m in height if a particular hazard, such as a watercourse, or road, is near the wall.
- 5.4** The type of pedestrian protective measure to be used will need to be determined locally and be in keeping with any structural, drainage, environmental and aesthetic considerations. The protective measures could include pedestrian guard railing, pedestrian parapet or appropriate types of boundary fencing.

Restraints on Active Travel Links and Rights of Way

- 6.1** Physical barriers should be avoided on non-motorised routes. This guidance is specifically targeted to the use of bollards, as the only acceptable form of physical barrier on a multi-user route. In the rare circumstance where the use of more restrictive furniture cannot be avoided, HCC and local users should be consulted.
- 6.2** Bollards may be appropriate in certain locations where illegal use or fly-tipping is an issue for path users. For speed reduction or safety purposes, signs including surface markings should be considered first.
- 6.3** Bollard positioning will be location specific and dependent on the reason for installation:
- Where authorised access is required use removable bollards.
 - Use rounded bollards without edges and with a reflective strip, visible to path users.
 - Place at a location where the path is wide enough or can be widened to accommodate the extra width taken by the bollard(s).
 - Set back from the highway by 5m, extend to 6m on Public Restricted Byways.
 - Bollard height should normally be 600mm above ground.
 - Width between bollards is recommended at 1800mm, with a minimum of 1500mm for walkers and cyclists and 1525mm for bridleways or where horse riders use the path.
 - Two bollards providing a gap in the centre of the path, often the most well-defined and least overgrown section is preferable. One bollard in the centre of the path only to be used where the two-bollard option is not possible. There must still be the required gap width on one or both sides.

Approvals

- 7.1** Where the Scheme Promoter wishes to use safety fencing or barriers as part of temporary or permanent works, approval must be obtained from HCC for the type and location of the barrier to be used.
- 7.2** It is in the interest of the Scheme Promoter to involve a Road Restraint Systems (RRS) contractor early to avoid problems before construction and to help process any departures from standards that may be required.
- 7.3** All RRS, as defined in the [BS EN 1317](#), shall conform to [DRMB's CD377](#), and [Specification for Highway Works \(SHW\) Series 400](#).
- 7.4** The Scheme Promoter shall submit drawings showing details of proposed RRS for approval by HCC clearly indicating:
- Containment Level
 - Working Width Class
 - Setback
 - Terminals Performance Class
- 7.5** Where different types of RRS are proposed in one length, they shall be connected by transitions as detailed [CD377](#).
- 7.6** The Scheme Promoter shall also submit together with the drawings, copies of the Road Restraints Risk Assessment Process (RRRAP) (or similar for roads with speed limit less than 50mph such as Provision of Road Restraint Systems on Local Authority Roads using Method C) and Push Tests results for post foundations proposed.
- 7.7** The Scheme Promoter shall specify new RRS conforming to the requirements of [CD377](#) where proposals to alter, replace or connect into existing RRS is required. If a transition is required to connect into the existing RRS, the details shall be as described above.
- 7.8** Construction shall not start until approval has been given by HCC.

Chapter 15

Designing for Drainage and Flood Prevention

Contents

Introduction

- 1.1** This chapter sets out Hertfordshire County Council's (HCC's) detailed requirements for the final design, approval and construction of drainage and flood prevention measures.
- 1.2** In following the guidance set out in Part 3 Chapter 16: Planning for Drainage & Flood Prevention the planning application (or the general arrangement prepared for the permitted development of highway schemes) will have set out the strategy and gained statutory consents to deliver a practical, low maintenance solution that will prevent floods, given the nuisance, inconvenience, damage or health and safety hazards they can create.
- 1.3** It should be noted that a range of drainage assets attract the levy of commuted sums in accordance with the scheme set out in Part 1 Chapter 15.

Design Standards & Principles

- 2.1** As set out in Part 3 Chapter 16: Planning for Drainage & Flood Prevention:
 - Drainage systems for P1/M3 categories should be designed in accordance with the [DMRB](#) Drainage standards, with the Annual Exceedance Probability (AEP) should be taken from this guide.
 - All other highways, drainage systems are to be designed in accordance with this design guide unless otherwise agreed with HCC. Where this design guide does not provide appropriate guidance, the DMRB Drainage standards should be consulted with the acceptance of HCC
- 2.2** Reference to the latest design manuals and guidance notes published by [The Construction Industry Research and Information Association \(CIRIA\)](#) and [Water UK's Sewer Sector Guidance](#) should also be made.
- 2.3** Construction details should conform to [Volume 3: Highway Construction Details in the Manual of Contract Documents for Highway Works \(MCHW HCDs\)](#), [Specification for Highway Works \(SHW\)](#), with all amendments. Unless an equivalent detail exists in Hertfordshire County Council's Highway

Construction Details (HCC HCDs appended below). If, in exceptional circumstances, there is a need to vary from these requirements the Scheme Promoter shall seek a Departure from Standards in accordance with the process set out in Part 1, Chapter 8: Standards & Departures.

- 2.4** The selection of drainage materials, products and features shall seek to minimise the maintenance burden over the design life of the scheme. Gravity drained systems, vegetated SuDS and passive flow controls are preferred as they have a lower maintenance burden.
- 2.5** Products which are difficult to access and replace such as combined kerb drains, grated channels and geo-cellular attenuation crates should not be specified and, if proposed will require an accepted Departure from Standards.
- 2.6** Suitable access for maintenance and inspection must be provided through adequate chamber spacing and/or the provision of an access or easement strip.

Sustainable Drainage Systems (SuDS)

- 3.1** Guidance should be sought from [Sustainable Drainage Systems - Design Manual for England and Wales](#).
- 3.2** [CIRIA Manual C753 Part D](#) gives detailed descriptions of different types of SuDS components, with guidance on design, construction, operation and maintenance.

Catchment Area and Run-off

- 4.1** For the purpose of highway drainage design:
 - The catchment area shall include carriageway, footway, verge and allowance for other areas of hardstandings on the highway when appropriate.
 - The area shall be modelled as 125% of the total highway catchment area.
 - The area shall be considered as 100% impermeable to allow for the worst-case scenario, such as summer flash storms.

Surface Water Design Parameters

- 5.1** The design parameters will have been set out by the Scheme Promoter in their Drainage & Flood Management Strategy in support of the planning application in accordance with Part 3 Chapter 16: Planning for Drainage & Flood Prevention.
- 5.2** The following design storm merit specific consideration at the detailed design stage:-
- 1-year return Period – Longitudinal carrier drains must accommodate a 1-year storm without surcharge (DMRB);
 - 5-year Return period – Filter drains must be checked to ensure no surcharging of chambers above formation level or sub-formation level where a capping layer is present;
 - 30-year return period – the system must be designed not to flood;
- 5.3** During extremely wet weather, the capacity of the system may be inadequate, even though it has been designed in accordance with this Specification. Under such conditions, the system may surcharge and surface water may escape from those chamber covers and gullies which lie below the hydraulic gradient. The chamber covers shall be of a design to reduce the likelihood of covers being pushed outwards.
- 5.4** Final checks should be made to ensure that an adequate level of protection against the flooding of properties' interiors is achieved and the design is adjusted where the required flooding protection is not achieved. This is particularly important on undulating or steeply sloping catchments.
- 5.5** Where flow paths go beyond the development boundary the Scheme Promoter shall continue to demonstrate them and prove they will not cause interior flooding to surrounding property. The provision of property level protection should be considered.
- 5.6** The value of minimum self-cleansing velocity, V_{min} (in m/s), ([CD 521](#)) required to prevent deposition depends on the diameter/ shape/ smoothness of the pipe, the depth of flow, and the concentration and size of sediment entering the system. This is based on guidance on sediment problems in pipes given in [CIRIA Report 141 \(Ref.15\)](#) and [CD 527](#) (DMRB).
- 5.7** The maximum velocity of drains should normally be limited to 3m/sec. Suitable pipe and bedding combinations should be based on manufacturers' recommendations for velocities greater than this.

- 5.8** Connections on acute angles are not permitted due to susceptibility to sediment build up.
- 5.9** Steeper gradients are preferred to the use of backdrops. Where steeper gradients are impractical, back drops should be constructed. Ramped backdrops should be used for chambers rather than vertical backdrops.
- 5.10** Plans showing catchment areas, catchpits, pipe reference numbers and other drainage assets, together with overland flood routes and indicated low points shall be included in all submissions.
- 5.11** Longitudinal sections shall be provided showing the proposed drainage, pipe sizes, materials, catchpit locations and bedding factors in relation to the existing ground level, road alignment and finished levels.
- 5.12** Where the design allows, any highway drain, chamber, catchpit, gully or other drainage asset should be positioned at least 5m from any structure. Where this is not possible, the design should allow access for maintenance or replacement of the drainage asset without impact on the structure.
- 5.13** In certain cases HCC may require the provision of a larger capacity highway drain than would normally be needed in order to accommodate highway drainage from future developments.
- 5.14** Evidence of design decisions relating to the following questions can be used to demonstrate how carbon reduction principles have been applied:
- Maintenance
 - Have we designed for less maintenance considering both frequency and difficulty (e.g. vegetation trimming vs draining a pond via sludge tanker)?
 - Materials
 - Have natural SuDS features been used to reduce the use of clay, concrete and plastic?
 - What innovative materials are new to the market?
 - Construction
 - Can we minimise construction through precast products and construction techniques that are automated and/or less intrusive?
 - Waste
 - How can we design out waste?
 - Have the right materials been selected based on their whole lifecycle impacts and circular economy principles?

Outfalls

- 6.1** Where the highway drain discharges into an existing ditch or watercourse, the pipe invert (bottom of the inside of the pipe) must not be lower than the level of the average flow of the ditch or watercourse and it should be at least 150mm above the ditch or watercourse invert.
- 6.2** The flow from the end of the pipe should be directed at an angle less than 60 degrees from the direction of the flow in the ditch or watercourse.
- 6.3** The end of the pipe must have a headwall and apron, which supports the bank above the pipe and prevents scouring underneath the pipe. Protection to the banks shall also be required.
- 6.4** Concrete filled sandbag headwalls are not acceptable.
- 6.5** A flap must be provided at the outfall to prevent the intrusion of vermin or flood water.
- 6.6** Outfall and headwall design should also take into consideration the requirement of [CD 529](#).

Drainage Structures

- 7.1** All pipes of 900mm internal diameter and culverts with a span of 900mm and above (including those installed as part of a Section 104 agreement) and culverted watercourses are classified as Highway Structures.
- 7.2** As such design and construction shall be subject to the technical approval processes set out in Part 1 Chapter 10.

Soakaways

- 8.1** In certain circumstances a deep bored soakaway may be required to reach a sufficiently permeable layer. The detail of the design and construction of the soakaway will need to be agreed with HCC and Environment Agency (EA).
- 8.2** Guidance on the design of soakaways is given in [BRE Digest 365](#).
- 8.3** Infiltration tests shall be conducted in accordance with either [BRE Digest 365](#) “Soakaway Design” or [CIRIA Report 156 Infiltration Drainage](#). Soakaway designs should also take into consideration the requirement of [CD 530](#).
- 8.4** In order to ensure that infiltration rates are representative of the ground that the soakaway is situated in the filtration tests should be conducted as close as possible to the actual location of the proposed soakaway, and within the same depth range. Where the tests taken are more than 15m away from the final position of the soakaway then additional tests will be required at the location of the proposed soakaway to confirm the infiltration rates. Logs for trial pits are to be provided in accordance with [BS EN 1997-2:2007](#).
- 8.5** A minimum of 3 fillings should be conducted in each pit. If it is not possible to carry out a full depth soakage test then the soil infiltration rate calculations should be based on the fall of water from 75%-25% of the actual maximum water depth achieved in the test.
- 8.6** The infiltration tests are to be carried out by an UKAS accredited laboratory.
- 8.7** The proposed soakaways should be designed using the slowest infiltration rate from one of the 3 tests in each pit and a minimum 30-year return period plus allowance for climate change should be used for design purposes.
- 8.8** Seasonal groundwater level records will also be required to confirm the invert of any feature always remains 1m above the groundwater table.
- 8.9** Soakaways are to be constructed using perforated rings (50mm minimum diameter holes) installed in accordance with the manufacturers’ instructions.

- 8.10** Any proposal to use plastic crates or filter/carrier drains will constitute a departure from standards and the processes for Departures from Standards and Design Review shall be followed as set out in Part 1 Chapter 11.
- 8.11** Whatever type of soakaway is used, it must be suitable for use in trafficked areas and certified accordingly by the manufacturer.
- 8.12** The soakaway shall be designed with a suitable access point on it and at the end of each inlet into it allowing for future cleansing of the system in the event it becomes silted.
- 8.13** On larger soakaways extra catchpits will be required to protect the soakaway from becoming contaminated with fine silt and causing a premature failure of the system.
- 8.14** No permanent structures, play equipment, steps or significant landscaping should be placed on or adjacent to the soakaway or within easements.
- 8.15** Consideration shall be given for the future maintenance of the soakaway when determining its position.
- 8.16** Provision shall be made for pedestrian and vehicular access from the adopted highway to the whole of the soakaway and associated drainage runs without significant changes in ground level.
- 8.17** Gradients within easements should not normally be steeper than 1:20 across grassed or landscaped areas without suitable reinforcement.
- 8.18** Groups of soakaways should be interconnected to optimise storage capacity.
- 8.19** When submitting a soakaway design for approval the following information must be provided to ensure the design can be promptly checked and subsequently approved: -
- Impermeable drainage areas assumed in the calculations;
 - Overland flows from other areas
 - Infiltration rate assumed for design purposes
 - Confirmation that a 30-year return storm period has been used in the calculations
 - 100-year return period plus 40% results in no property damage and any temporary flooding retained on site in appropriate locations. Calculations required
 - The design method adopted ([BRE Digest 365](#) or [CIRIA Report 156](#))
 - Confirmation of the factor of safety of 5 is to be used and 10 where damage to buildings or structures, or flooding of the road may occur

- Soakaway dimensions proposed and construction details
- Proposed Invert Levels and effective drainage depth
- Location plans indicating the final position of the filtration tests with respect to the location of the proposed soakaway
- The design submission must provide evidence that contaminated land does not exist, or that the construction of the drainage system will not harm the environment
- Where appropriate the design submission must provide evidence that the effects of past mining/quarrying activity have been considered and addressed
- Evidence of peak Ground Water levels.

8.20 Where a soakaway system is used, the proposed maintenance period will be increased by 12 months to maximise the opportunity of observing the system under storm conditions.

8.21 If at any time prior to formal adoption the system is found to be inadequate, HCC reserves the right to acquire modifications to the design and construction to overcome the problem.

Discharge to Existing Highway Drainage

- 9.1** The existing drainage system will need to be upgraded where, in the opinion of HCC, it cannot accommodate the new outfall. Such work will be carried out by the designer and contractor and form part of the adoptable works at the scheme promoters' cost.
- 9.2** Connections to existing highway drainage pipelines will be by flexi-coupling, or a saddle connection for gully connections; no pipe intrusion must enter the main carrier pipe that could restrict the flow.
- 9.3** Connections to the existing highway drainage shall only be made into an existing chamber. Where this is not practical a new chamber will need to be constructed.
- 9.4** No direct gully-to-gully pipe connections will be permitted.
- 9.5** The adoptable highway drainage system shall be designed to receive highway run-off only. Water from areas that are not adoptable highway shall not be allowed to run onto areas of adopted highway and water from the highway shall not be allowed to run onto non-highway areas.

Discharge to Regional Water Company Sewers

- 10.1** Where the Scheme Promoter proposes to connect a new highway drainage system into an existing public sewer, the consent of the Regional Water Company (Anglian or Thames Water) must be obtained. The Scheme Promoter must provide HCC with proof that such consent has been given.
- 10.2** The Highway Authority will normally postpone adoption of any highway covered by a Section 38 agreement until the Regional Water Company has confirmed adoption of all sewers under the highway and any other sewers not within the adoptable highway, but which carry water from it.

Gully Network

- 11.1** Gullies should be set below the carriageway drainage channel. Kerb inlets or set-back gullies are to be avoided. The top of the gully grating should be set 10mm below the carriageway level.
- 11.2** Gullies used to drain cycle tracks, cycleways, footways or metalled Rights of Way should be set back, so that they are not within the trafficked or effective width area.
- 11.3** Gully spacing should be calculated and designed in accordance with [CD 526 Spacing of Road Gullies](#). The channel flow width shall be limited to 0.5m on roads in urban areas or with adjacent footways.
- 11.4** The calculations should be provided as necessary on individual gullies and shall be spaced no more than 25m apart and not drain an area exceeding 170 square metres.
- 11.5** On steeper sections of road, the maximum allowable spacing between gullies may not be determined by the collection efficiency of the grating but by the flow capacity of the gully pot and exiting pipe beneath it.

11.6 Gullies shall not be placed: -

- Where edge restraints are lower for pedestrians to cross
- Where pedestrians are likely to cross or desire lines
- At vehicular access crossovers
- Within a footway, footpath, cycleway or cycle track
- Where a cycle track meets a carriageway.

11.7 To reduce standing and running surface water, gullies should be located immediately upstream of: -

- A road junction or major vehicular access
- A speed restraining feature
- Where a cycle or pedestrian route joins or crosses the carriageway. (Note: one should also be located immediately downstream of any dropped kerbs. Care should be taken to avoid this resulting in closely spaced pairs of gullies which can be difficult to maintain)
- Where the carriageway crossfall is zero, when super-elevation is being applied.

11.8 At all low points within the adoptable highway, a double gully with separate connections to the main carrier pipe or catchpit is to be provided.**11.9** Gullies should connect into chambers, however, where this is not possible, they shall be connected to the carrier drain by means of a 45° oblique angled junction pipe. The flow from the gully connection should be in the same direction as the flow in the carrier drain.**11.10** Gully connections to catchpits or chambers, carrier pipes shall be no longer than 12m and gully connections shall be at least 150mm internal diameter.**11.11** Provision shall be made to deal with surface water from adjoining roads or accesses by the appropriate siting of gullies and drains.**11.12** Where new estate roads access onto the already adopted highway the locations of the existing gullies, in the vicinity of the new junction, must be clearly plotted on the estate road layout drawing.**11.13** The relocation of any gullies within an existing road shall be subject to a Section 278 Agreement.**11.14** Gully to gully pipe connection will not be permitted.

- 11.15** Provision shall be made to prevent surface water from private drives and forecourts discharging onto the adoptable highway and similarly to prevent highway water from flowing onto private property.
- 11.16** Footpaths and cycleways not adjoining the carriageway shall be positively drained. Run-off from adoptable footpaths and cycleways that discharge onto adjacent private areas, including gardens is not acceptable.
- 11.17** Due to the problems of intercepting flows in heavy rainfall conditions any proposal to use straight gully kerb inlets constitutes a departure from standards and the processes for Departures from Standards and Design Review shall be followed as set out in Part 1 Chapter 11.
- 11.18** Gully gratings and frames shall be to [BS EN 124](#) with a minimum width of 450mm and a minimum waterway area of 1000square cm. Class D400 to be minimum strength used unless specified otherwise.

Minimum Pipe Depth & Sizes

- 12.1** Pipe bedding and surround shall be in accordance with [CD 533: Determination of Pipe Bedding Combinations for Drainage Works](#).
- 12.2** The minimum cover of pipes shall be: -
- 1.2m in the Carriageway
 - 0.9m in the footway, cycleways, Public Rights of Way, service strips or verges
 - Where it is physically impossible to meet these standards, a Departure from Standards shall be sought in accordance with the process set out in Part 1 Chapter 11. A typical departure may result in reductions to 900mm and 600mm respectively subject to the pipes being laid on a bed and surrounded by concrete.
- 12.3** The minimum pipe diameter shall be: -
- 150mm for gully connections
 - 225mm for carrier drains, including combined carrier and filter drains.

12.4 Minimum size of hydraulic controls shall be as follows: -

- Flow controls may be static (such as vortex flow controls or fixed orifice plates) or variable (such as pistons or slide valves)
- Static controls should have a minimum opening size of 100mm chamber, or equivalent
- Variable controls may have a smaller opening provided they have a self-cleansing mechanism and agreed with HCC
- A bypass should be included with a surface operated penstock or valve, and access should be provided to the upstream and downstream sections of a flow control device to allow maintenance
- 150mm for throttle pipes (to be less than 15m in length).

12.5 A tree should not be planted over drainage pipes or where future excavation onto the highway drainage pipe would require removal of the tree.

12.6 Root deflection barriers should be used where damage to the highway drain is likely in future.

Catch-Pit Positions

13.1 Catch-pits shall be provided in the following locations: -

- At every change of alignment or gradient
- At the head of all main pipelines
- At every junction of pipelines
- At every change in pipe diameter
- At a maximum spacing of 75m centre to centre
- Before the connection to a Soakaway or a Borehole chamber
- Immediately upstream of strategic drainage assets such as bore holes, pumping stations, storage crates and the like to protect and capture silt to protect them from failure.

13.2 Backdrop type chambers should not be used, unless the topography of the site makes their use unavoidable

13.3 They should be located so as to minimise the risk of damage to buildings or other critical infrastructure in the event of sewer flooding.

13.4 Designers should also design for future maintenance by avoiding access covers being positioned within wheel tracks or roundabout circulatory areas and along centrelines, which attracts additional wear and tear and, or will demand additional traffic management.

Subsoil Drainage

14.1 To maximise longevity of the pavement and its associated earthworks a system of subgrade drainage shall be introduced where there is risk of harm from groundwater.

14.2 Sufficient site investigation and calculation should be undertaken to determine the maximum level of the water table throughout the seasons of the year.

14.3 Sub-grade drainage shall be provided to the requirements of the [DMRB](#) in one or more of the following circumstances:

- The winter height of water table is within 600mm of formation level
- The subsoil is saturated
- There is a likelihood of water running from or out of adjacent ground

- Springs, land drains, ditches or other watercourses are encountered
- The subgrade is likely to be altered due to ground water.

14.4 The designer is also referred to [TRL report PPR341 Drainage of Earthworks Slopes](#).

14.5 Future maintenance of drainage systems shall be a principal factor in the design, so for this reason, fin drains shall not be used.

Flat Areas

- 15.1** New carriageways should be designed to avoid flat areas.
- 15.2** Where there are flat areas on existing roads that are affected by new development, the introduction of false falls should be considered, i.e. reshape the road and provide trapped gullies.
- 15.3** Any proposal for the use of linear channel drainage systems, flat or dished channels or combined kerb/drainage units constitutes a departure from standards and the processes for Departures from Standards and Design Review shall be followed as set out in Part 1 Chapter 11.

Oil Interceptors

- 16.1** In certain circumstances highway drainage systems may require the use of oil interceptors.
- 16.2** These should only be provided following consultation with the Water Authority and the Environment Agency, and with the approval of HCC.

Flow Control Devices

- 17.1** Flow control devices (weirs, orifice plates, hydro-brakes, etc.) are often a necessary part of drainage design.
- 17.2** Where a structure is involved for the device, for example pond with weir, then fully detailed structural engineering drawings will also be required for approval.
- 17.3** Any device or structure should be designed in a way that enables easy and safe access for inspection.
- 17.4** Flow control devices will be subject to commuted sums as per Part 1 Chapter 15.

Construction Phase

- 18.1** The Scheme Promoter shall, during the execution of the works, keep the trenches and other excavations dry and at all times free from subsoil water and surface water.
- 18.2** Suitable protection shall be given to the highway drainage system to keep it free from silt and contamination while the development is completed to adoptable standard.
- 18.3** The Scheme Promoter shall not, without the written permissions of HCC and the Environment Agency or Water Authority (as appropriate), pump or drain into any stream, sewer or highway drain, without suitable protection from silt, mud debris and contamination.
- 18.4** Where permission is granted, the Scheme Promoter shall provide means for preventing silt, soil and deleterious material from entering these streams, sewers and drains. The Scheme Promoter shall keep a SuDS feature clear from contaminated water and ensure that no water heavily laden with silts or other construction detritus enters the feature. Any surface water is to be controlled at source and should form part of the method statements for constructing SuDS features.

Inspection

- 19.1** On completion of new drains, chambers etc., the whole drainage network shall be flushed and cleansed from end to end and left clean and free from obstruction and a method of protection should be arranged to stop contamination from any continuing construction.
- 19.2** CCTV surveys and reports are to be provided by the scheme promoter for all adoptable highway drainage including all gully connections, catch-pits, chambers, soakaways, headwalls and other assets associated with drainage.
- 19.3** If the results of the CCTV and as-built surveys are found to differ significantly to the Technically Approved designs, then a full set of revised calculations reflecting all the changes are to be submitted to demonstrate that the network remains satisfactory.
- 19.4** HCC requires independent certification of the successful inspection of the following features undertaken prior to them being covered up / put into operation, confirming that they have been constructed or installed in accordance with the approved design drawings, specifications and, as relevant, manufacturer's instructions:

- Filtration features
- Attenuation chambers or tanks
- Pollution protection features
- Pumping facilities
- Those outfalls into watercourses that are not classified as structures

19.5 Independent inspection and certification shall also confirm that a pressure test has been carried out after the completion of every drainage run between chambers / catchpits up to 750mm in diameter

19.6 At the end of the Maintenance Period the adoptable highway drainage including all gully connections, catch-pits, chambers, soakaways, headwalls and other assets associated with drainage, will be inspected and cleansed of silt.

19.7 The maintenance period may identify failures to part of the drainage system, which the Scheme Promoter will inspect and resubmit drawings to rectify any issues identified to the satisfaction of HCC.

CCTV Surveys

20.1 CCTV surveys and reports are to be provided for all adoptable highway drainage including gully connections up to and including 900mm in diameter. In addition to traditional paper copies and DVDs, HCC will require copies of the survey, reports and drawing in electronic format.

20.2 Reports shall include: -

- As-built drawings identifying the runs surveyed with catchpit, gully and pipeline reference
- Size of all pipes surveyed
- Cover levels and invert levels of all pipes entering the catchpits together with size of all catchpits
- 2 copies of DVD video of all drainage runs in '.AVI' format with reports identifying all defects and their locations
- PDF copies of the report, all plans, notes and defect sheets in accordance with [Sewerage Rehabilitation Manual](#).

SHW Appendix 5/1: Drainage

21.1 General

Pipes of diameter greater than 900mm are considered to be structures. The approval procedure for structures is detailed in Part 1 Chapter 10: Technical Approval of Structures.

All concrete units and mortar shall be constructed from sulphate-resisting Portland cement to [BS EN 197-4](#).

Joint rings in sewers and drains shall be resistant to sulphate attack.

When requested, the scheme promoter or designer must provide HCC with the following information:

- Pipe size
- Pipe type and material
- Bedding detail and material
- Minimum and maximum depth of each pipe
- Minimum and maximum invert level of each pipe
- Chamber cover level and depth to invert
- The invert level of inlet and outfall pipes within each chamber
- Gully grate levels

- Trench width
- Pipe design loading
- Catchment areas and pipe size designs & calculations.

Most details would be expected to be shown on a general layout plan for drainage.

21.2 Pipe and Bedding Combinations

All drains, with the exception of those specifically designed and/or constructed of Porous, perforated or filter pipes, shall have watertight joints and shall be tested in Accordance with Clause 509.

In general carrier drains to be polyethylene to [BS EN 13476](#), vitrified Clay or Concrete unless agreed otherwise in writing. Filter drains to be fully perforated thermoplastic.

All concrete pipes shall be manufactured with sulphate resisting cement. The total chloride ion content shall not exceed 0.06%.

Carrier drains shall be watertight complying with the works specification and gravity pipelines shall be tested in accordance with [Water UK's Design & Construction Guidance](#)

The position of the internal face of any pipe, lateral drain or rising main shall be laid at a constant gradient and shall not deviate from the line and level as agreed. By more than plus or minus 20mm.

The joint displacement, being the difference in level or alignment between the adjacent ends of two adjoining pipes at a joint, shall not exceed the least of 5% of the nominal diameter of the pipe or 20mm.

The angular displacement at a joint being difference in the alignment of two adjacent pipes, shall not exceed 2 degrees except where the joint has been specifically designed and manufactured to accommodate a larger displacement.

Flexible pipes shall have a limit of 6% deformation.

The pipe network layout, pipe sizes, bed and surround details and levels are shown on the contract drawings.

Perforated filter drains should not be used under the carriageway.

21.3 Chambers/Soakaways

Chambers shall be constructed in accordance with the standard details, contract drawings and the requirements of Specification for Highways Works [CD 534](#), [BS EN 124](#) and [BS 7903](#), or [Water UK's Design & Construction Guidance](#).

The minimum class of chamber top or gully top to be installed in major carriageway locations shall be D400.

Iron works to be positioned outside the wheel paths of vehicles. Where ironwork is located in the wheel paths of major routes, carrying more than 1500 cvd (commercial vehicles per day) in each direction, then consideration should be given to specifying Class E600.

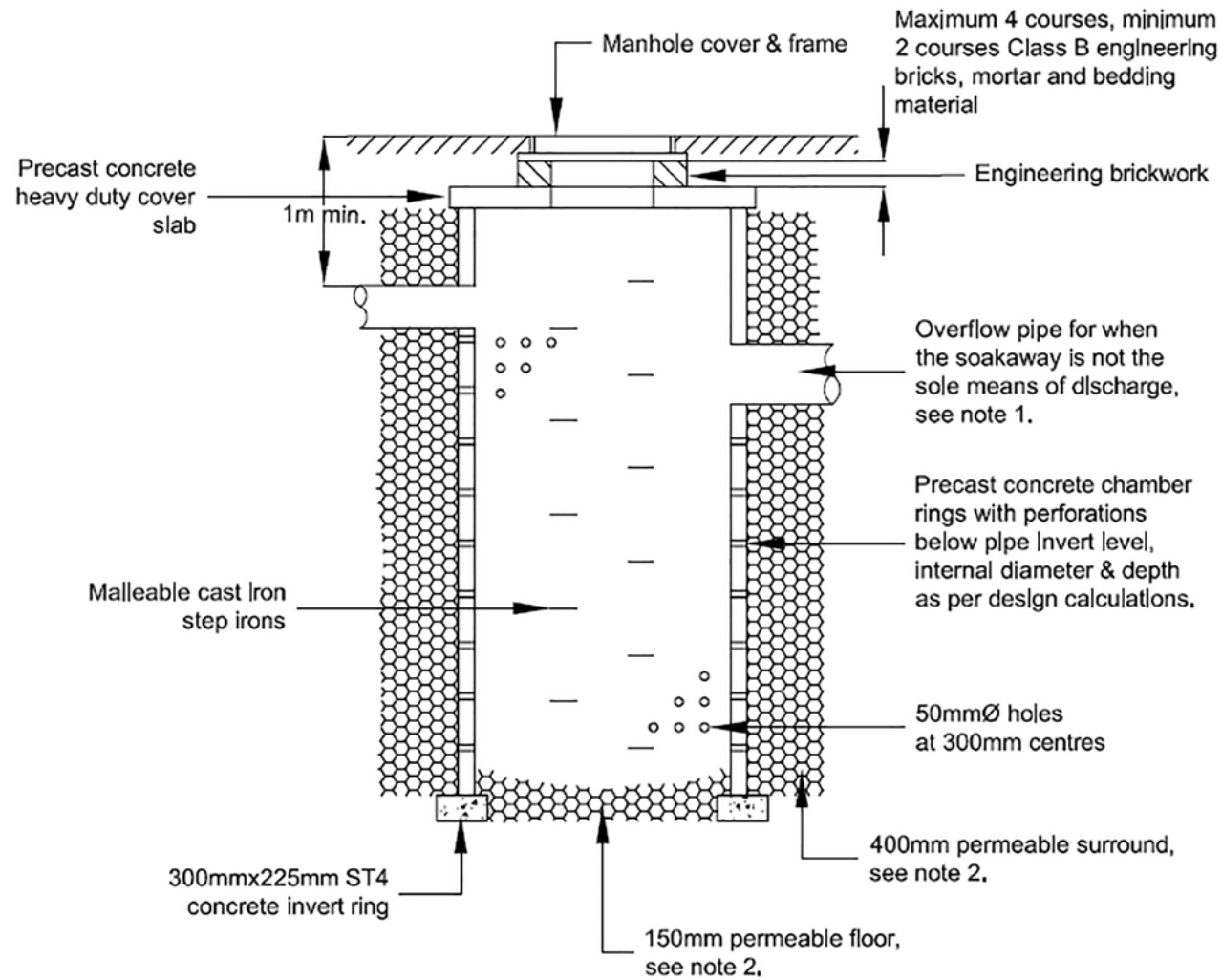
All products used shall have been assessed and certified as required by CD 534 and shall have been issued with product conformity certificates to BS EN 124.

All concrete for ancillary purposes shall conform to Specification for Highways Works Clause's 2601 and 2602. For porous "No Fines" Concrete refer to Clause 2603.

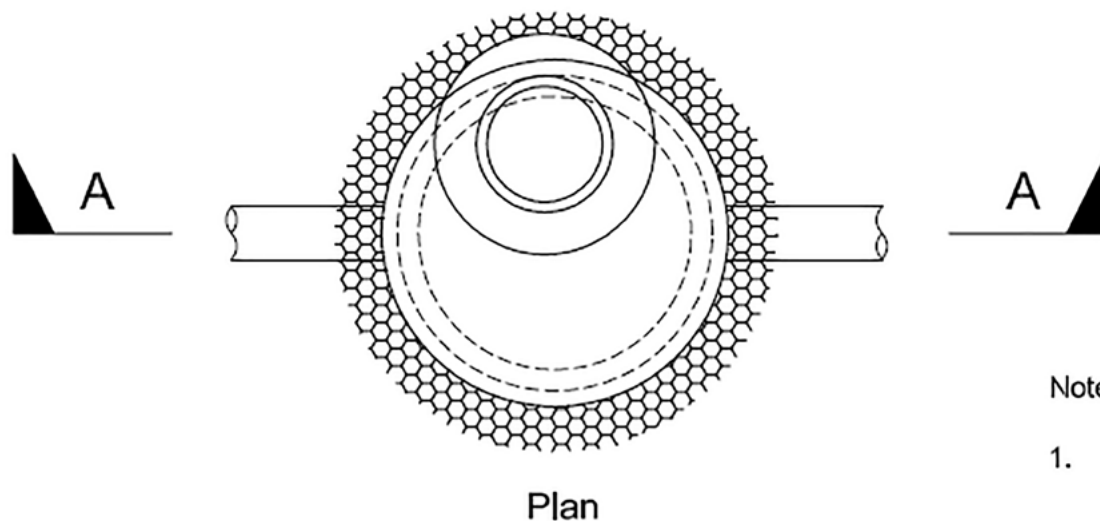
Chamber steps and other chambers shall be Type D Class 1, complying with the requirements of [BS EN 13101](#).

A risk assessment shall be taken to establish whether step irons will help or introduce risks to safe access. If used, galvanised mild steel and plastic encapsulated steps are preferred.

Chambers shall be tested for water tightness by the inspection for infiltration and weeps shall be stopped by caulking and pointing.



Section A-A



Notes:

1. A soakaway may be included in a pipe network to discharge light rainfall into the ground.
2. The permeable surround should not contain organic material and have the following characteristics:
 - 100% passing a 75mm sieve
 - 0 to 5% passing a 5mm sieve
 - A ten percent fines value of 30 or more, when wet.
 - Wherever possible recycled material should be used.

21.4 Filter Drains

Filter drains shall be constructed in accordance with the standard detail drawing and at the locations and invert levels indicated on the drawings.

Filter drains shall be as shown on the drainage contract drawings.

Any filter drains shall discharge directly into catch pit chambers prior to the flow entering the carrier drain network.

Filter drains are to be constructed with perforated or slotted pipes, to be laid with the perforations or slots upwards, and shall have the minimum strength requirement specified in the British Standards for pipes without perforations.

21.5 Working in or Around Sewers/ Surface Water drainage

Where work is required to be carried out in or around existing highway drainage networks, including chambers and catchpits, in the ownership of HCC, then the Scheme Promoter shall ensure that all operatives and supervisors under their control, including employees of subcontractors, have received appropriate training to the satisfaction of Hertfordshire County Council. The Scheme Promoter shall provide HCC with written confirmation stating that operatives and staff employed on work in and around sewers have been adequately trained for such work.

The Scheme Promoter shall ensure that all safety equipment and facilities required for working in and around existing drainage networks are supplied to their employees and to the employees of subcontractors under their control.

The Scheme Promoter shall ensure that all their employees and the employees of Subcontractors under their control shall follow safe working procedures.

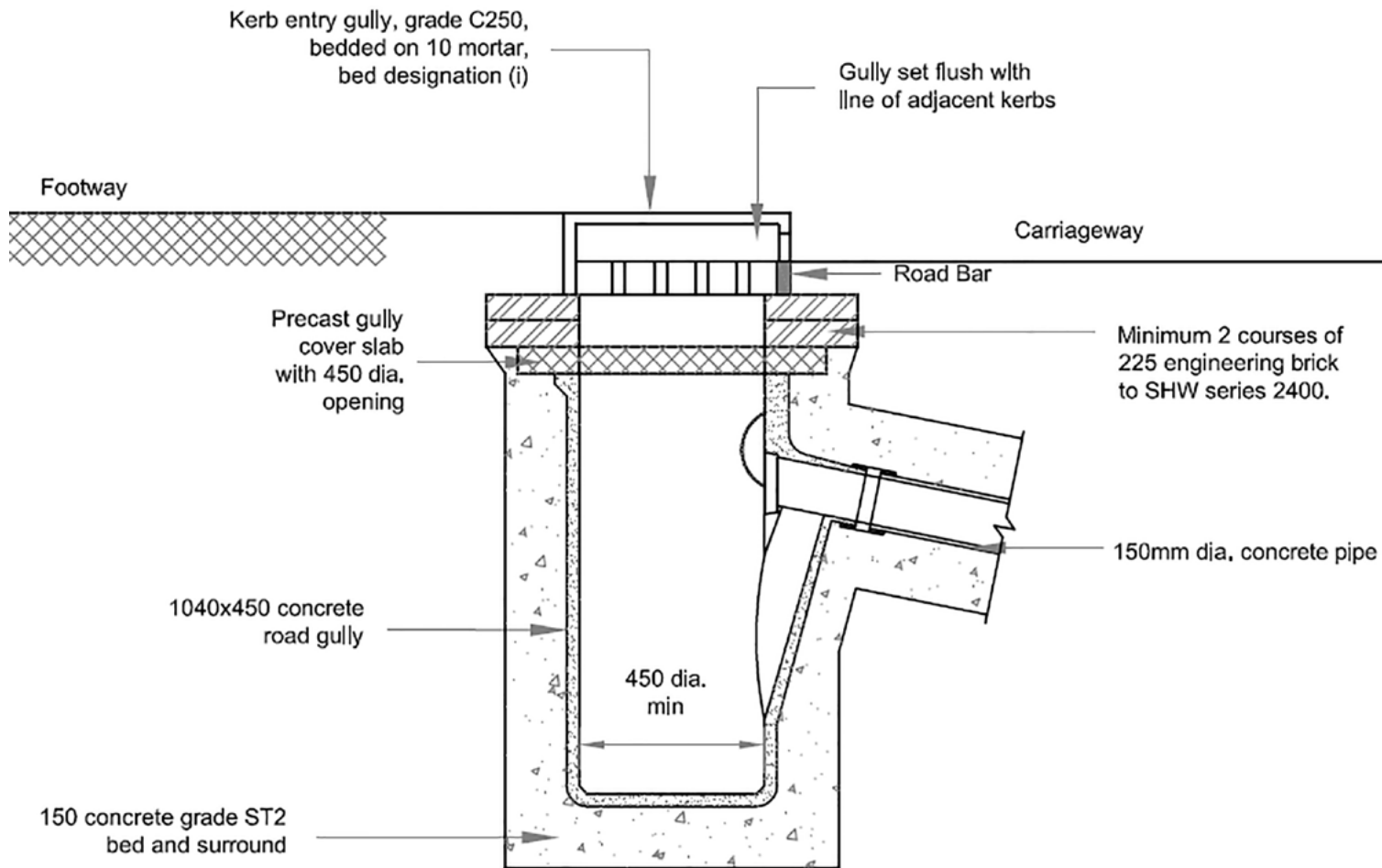
21.6 Gullies

Gullies shall be trapped and fitted with a stopper and chain.

Gully pots should be either pre-cast concrete or plastic.

Pre-cast concrete gullies should have a 150mm surround of ST2 concrete. Plastic gully pots should have a 150mm surround of ST4 concrete.

Typical gully details are shown on next page.



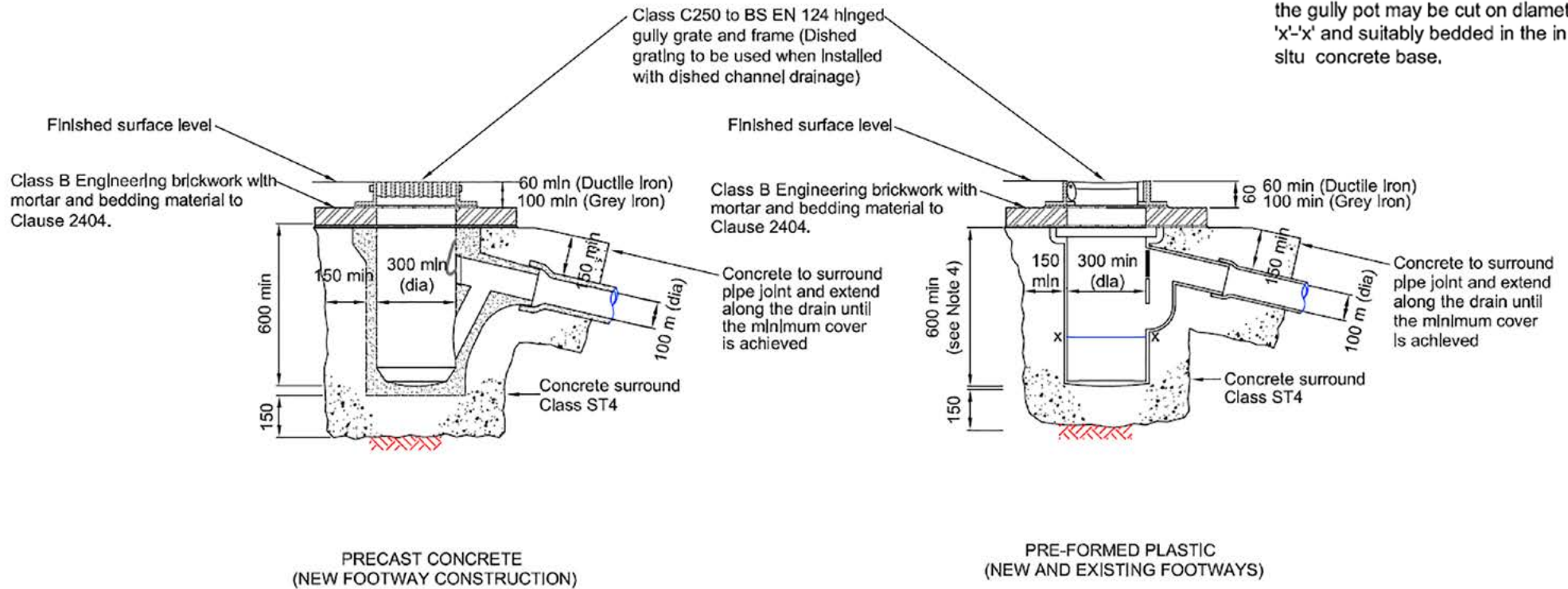
NOTES

1. All dimensions are in millimetres.
2. The minimum depth from the top of grating to the top of gully outlet is to be 750mm when the connecting pipe is under the carriageway and 600mm elsewhere.
3. Gully pots are to be of precast concrete to BS 5911: Part 2. Gully pots shall be trapped and provided with a hot dip galvanised stopper and chain with bayonet type fixing.
4. All kerb entry gullies shall be provided with a road bar.

ALL DIMENSIONS ARE IN MILLIMETRES
UNLESS OTHERWISE STATED

Notes

1. On existing footways, where shallow services are encountered on site, the brickwork may be omitted from the gully construction and alternative hinged gully cover used, subject to approval of the Project Manager. In extreme cases the bottom section of the gully pot may be cut on diameter 'x'-x' and suitably bedded in the in situ concrete base.



21.7 Chamber Covers and Gully Gratings

All chamber covers to be ductile iron to [BS EN 124](#), heavy duty, double triangular chamber cover and frame to Class D400, with minimum clear opening 675 x 675mm. Non-rock design.

The inscription on the highway drainage chamber covers to be adopted by HCC shall be as “HCC” to reaffirm ownership issues in the future.

All gully gratings to be ductile iron to BS EN 124, [BS 7903](#) and [CD 534](#) heavy duty, gully grating and frame to Class D400.

Hinged gully gratings and frames may be kerb hinged or side hinged as appropriate to the traffic flow.

The minimum waterway should be 1000square cm

21.8 Pipe Bedding

Pipe bedding requirements for drains can be determined from [CD 533](#). Where the scheme promoter or designer does not wish to use CD 533 to determine their preferred bedding detail, the following criteria will generally be acceptable for thermoplastic carrier drains:

Where bedding type B, F or N is specified the surround to bends and junctions shall be pipe bedding material for the full length of the fitting.

In addition to the requirements of Clause 504.5 (Series 500, SHW), flexible joints in bedding types A and Z shall be formed at the following locations:

- At both ends of the articulated pipe adjacent to a chamber as specified in Clause 507.17 (SHW).
- Adjacent to a headwall.
- Adjacent to a connection to an existing drain.
- At each flexible joint in the length adjacent to a gully as specified in Clause 508.7 (SHW).

All joints in surface water drains and in combined filter and surface water drains shall be watertight as specified in Clause 504.3 (SHW) and in filter drain partly watertight as specified in Clause 504.4 (SHW).

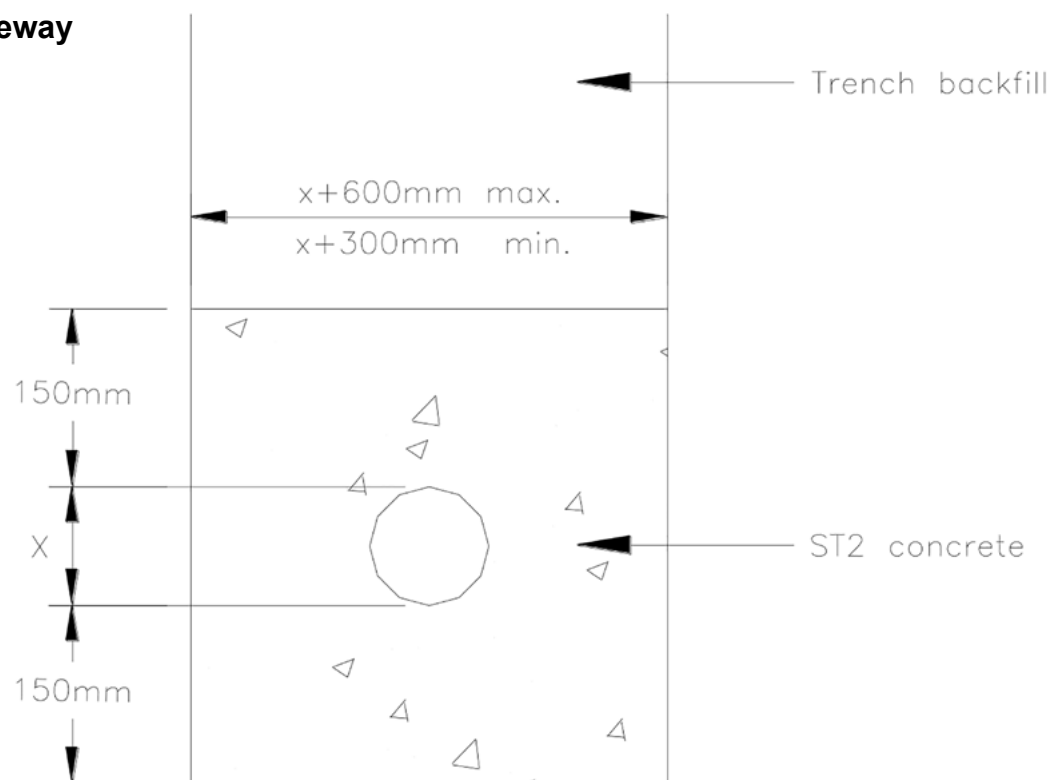
Pipes under the carriageway or areas that may be subject to vehicle loading should be surrounded by ST2 concrete as per the detail in the diagram below. Surround shall be provided to pipes having less than 1.2m cover unless otherwise agreed with the Engineer. Where the drain is laid under an existing carriageway the trench should be backfilled to formation level with sub-base material;

Existing sewers and drains within the bounds of the site, which are to be abandoned and which are less than 1m depth below Formation Level, shall, where practicable, be cut off and removed.

The excavation shall be backfilled in accordance with Clause 3.26 of [DMRB](#) and the ends of the remaining pipes sealed with concrete for a length of 0.5m.

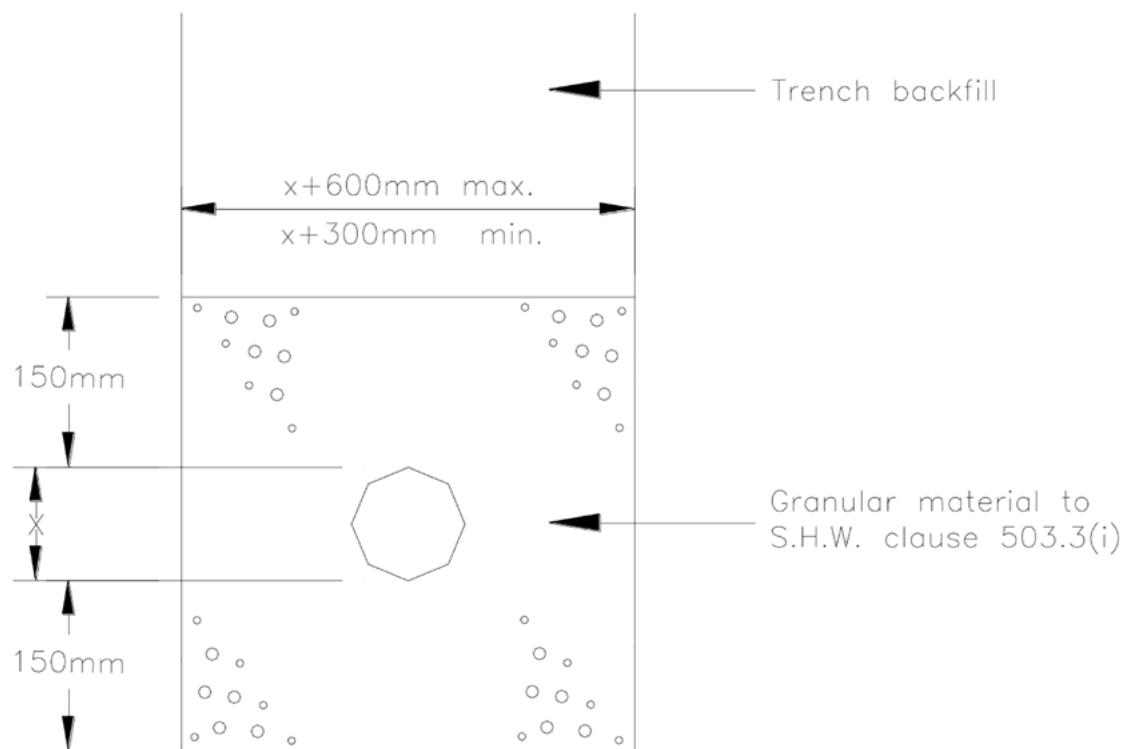
Where the abandoned soil and surface water pipes is over 1m depth below formation should be grouted with a mixture of cement and PFA in accordance with Clause 506 ([SHW](#)).

Pipe surround under carriageway



Pipes in areas that will not be subject to vehicle loading should be surrounded with granular pipe bedding material, to Clause 503.3 (SHW), as detailed in the diagram below.

Pipe surround under verge



All of the bedding types given in HCD drawing F2 are acceptable for thermoplastic perforated filter drains, laid in verge, at a depth below ground of at least 900mm.

Appendix 5/2: Service Ducts

For the details of ducts and chambers for street lighting, electrical or traffic signal installations, see Part 4, Chapter 16 Designing Street Lighting and Illuminated Signs

Installations for statutory undertakers should be in compliance with their specification.

Appendix 5/4: Fin Drains and Narrow Filter Drains

Fin drains should not be used due to the cost and complexity of future maintenance.

Chapter 16

Design and Installation of Street Lighting and Illuminated Signs

Contents

Introduction

- 1.1** This chapter sets out the detailed, technical requirements for street lighting and illuminated signs to support final design, contract preparation and implementation.
- 1.2** The planning application will have identified the proposed illumination strategy and considered the general lighting requirements, all set out in Part 3 Chapter 17: Planning Street lighting & Illuminated Signs when defining the general layout for the approved development or scheme.
- 1.3** The chapter concludes with some practical tips for good design practice.

General Design & Specification Requirements

- 2.1** The lighting design shall be LTP4 Compliance tested at the Approvals stage to ensure that the proposed Lighting Strategy submitted at the full planning application stage has been followed.

Illumination design

LTP4 Compliance Test: Approvals

The street lighting design demonstrates minimised energy consumption and carbon impact, light pollution, street clutter and operational costs, whilst maintaining safety and accessibility, continuing to support the local economy, and assisting with the prevention of crime and disorder.

- 2.2** Street Lighting design shall be in accordance with [Design Manual for Roads and Bridges \(DMRB\)](#) and this design guidance.
- 2.3** All clearances from edge of carriageway to columns and posts shall be identified on the detailed design layout drawings.
- 2.4** The provision of materials and the undertaking of installation works shall be in accordance with Series 1300 and 1400 of the [Manual of Contract Documents for Highway Works \(MCDHW\)](#) subject to the following local clause amendments and additional requirements set out within this Chapter.
- 2.5** The following Clauses are not applicable: 1408, 1410, 1411, 1412, 1413, 1414, 1415, 1419 and 1422.

Street Lighting

3.1 [MCDHW](#) Clause 1302: Replace existing paragraph 2 with:

- The aesthetic design of lighting columns, luminaires, CCTV masts and cantilever masts shall be submitted by the Scheme Promoter to HCC.
- The design of lighting columns and luminaires shall comply with the general advice given in BS 5489-1 for the appearance of lighting installations by day and by night both from the viewpoint of the road and from the surrounding neighbourhood.
- Roadway luminaires shall be installed directly onto the lighting column via a post top mounting system without the use of bracket arms with the exception of lighting columns that shall accommodate more than one luminaire, where liaison with HCC shall be carried out to establish specific requirements.

3.2 [MCDHW](#) Clause 1307: Replace existing paragraph 4 with:

- The exterior and interior surfaces of the intended planted depth of a lighting column shaft and a length of 250mm above the ground level shall be coated with a glass flake paint system in accordance with the Highways Agency (now National Highways) SG12 Guideline Document and

have a scratch resistance to [BS 3900-E2:1992](#) and impact resistance to [BS 3900-E7:1992](#).

- The painting of lighting columns shall only be considered where the proposed scheme falls within Areas of Special Importance.

3.3 Substitute existing [MCDHW](#) Clause 1407 with the following requirements relevant to Road Lighting Luminaires:

- All road luminaires shall be Class I insulation and be of Aluminium Construction Marine Grade alloy, powder coated RAL Colour 7040 or similar approved. Conservation Area columns and luminaires may require a specific colour and should be determined via the permissible equipment Place and Movement Matrix.
- All luminaires for road lighting shall have degree of protection rating of at least IP66 to [BS EN 60529](#) for luminaire, LED optics and LED Drivers. Adequate thermal management to protect electronics and LED arrays shall be incorporated into the luminaire design.
- Luminaires shall be of a totally enclosed design, of sound construction and capable of being easily dismantled for maintenance.

- Luminaires shall be fitted with integral electronic addressable LED drivers contained within a separate compartment to the LED module. The drivers are to be capable of dimming with at least five different stages and shall be fully compatible with a Telensa Limited Central Management System (CMS) system.
- The part of the luminaire providing access to the interior of the luminaire shall, when in the closed position, be firmly attached to the fixed part of the luminaire. In the open position it shall be attached so that it may not become accidentally detached or blow against the fixed part of the luminaire, the post top bracket or the column.
- The canopy, hinges, toggle catches, captive screws and nuts shall be of a cast aluminium or similar non-corroding material.
- The canopy shall be provided with 7-pin NEMA twist socket (5 wires) ANSIC136.41, sample product ref TYCO 2213362-1 or similar for CMS Node/PECU fixing.
- The luminaire shall have a tilt adjustment of -10 to +10 degrees to enable adjustment when fitting to the existing bracket arms.
- In relation to the Maintenance Factor, the LED luminaire should be provided with the following:
 - o Life of LED: L70F10
 - o LED minimum Design Life: 100,000
 - o Power Factor to be 0.95 or better
- Column fixing arrangement shall be compatible for a 76mm Post Top or 42mm Side Entry, with an adequate locking device.
- IK Rating (Impact Resistance) to be IK08 or better for the weakest part, which is the lens or glass.
- Luminaires to be EMC Test Compliant / RoHS Compliant / CE compliant / WEEE compliant. Appropriate certificate of conformity to be supplied.
- Luminaire LED modules must be capable of being simply removed and subsequently replaced to enable replacement for failure or to upgrade as improvements are made in LED technology.
- Unless in a Conservation Area, luminaires are to be provided with a neutral Corrected Colour Temperature (4000K).
- Luminaires to be supplied with approved UMSUG codes.

- LEDs shall be tested in accordance with IEC/PAS 62717(LED Modules) -62722(LED Luminaires) performance requirements. Appropriate certification shall be provided.
- Luminaires shall have an ingress protection rating of IP66 for optical compartment.
- Control gear shall be electronic addressable, compliant with the Telensa CMS and allow dimming where required.
- A suitable 5-pin node compatible with HCC's Telensa CMS system shall be fitted to all new luminaires.
- Suitable LED luminaires having a colour temperature in the range 3000°K to 4000°K shall be required depending on the location. In town centres and some Conservation Areas it is likely that a colour temperature of 3000o K may be required. In most other areas a colour temperature of 4000o K may be acceptable. Guidance shall be obtained from HCC prior to commencing the design process.
- All enclosure elements concerned with their optical performance shall have a minimum degree of ingress protection rating of IP66, as defined in BS EN 60529.
- All luminaires shall be designed to accept the manufacturers' internal or external shields.

Subway Cornice Lighting Systems

- 4.1** Substitute existing [MCDHW](#) Clause 1407 with the following requirements relevant to Subway Cornice Lighting Systems:
- All parts of the units shall be manufactured from galvanised steel in accordance with Series 1900 of the MCDHW. All visible parts shall be finished with a white stove enamelled finish. The luminaire shall have two clear polycarbonate sheets, one of 9 mm thickness and the other 1 mm thick, this sheet being at the front.
 - The luminaire shall have its maintenance number inside, as agreed with HCC.
 - The luminaire shall utilise a LED module and tray arrangement, with the driver and Telensa Node integral to the fitting.
 - The luminaires shall be interconnected by galvanised 25mm diameter conduit, which runs behind suitable infill panels to give the impression of a continuous system.
 - Where possible, the cabling of the system shall comprise of two circuits separately fused along each side. Cable terminations in the units shall be by means of crimp connections.

- The final infill panels on each cable run shall be cut to size to suit the subway and any conduit requirements.
- The joint at the infill panels to the subway wall and roof shall be sealed with mould resistant silicone of off-white colour appearance.
- All luminaires shall be designed to accept the manufacturer's internal or external shields.

Internally Illuminated Bollards

5.1 Illuminated bollards shall only be installed if absolutely necessary and the highway scheme shall be designed in such a manner that they are not prone to collision damage.

5.2 Bollards with no sign face shall never be internally illuminated and shall have retro-reflective material according to [BS12899 Part 2](#).

5.3 Substitute existing [MCDHW](#) Clause 1407 with the following requirements relevant to illuminated bollards:

- All illuminated bollards shall be rotationally moulded, one piece, passively safe, backed "white" in colour and compliant with all relevant standards.

- Where an illuminated traffic bollard has a sign face it shall be a minimum of 300mm in diameter.
- Illuminated traffic bollard base boxes shall have cable glands capable of ingress protection to a minimum of IP68
- The LED driver shall be compatible for operation with Telensa CMS nodes and/or infrared photocell where a CMS is not operational.
- Unlit traffic bollards shall have a quick release retention socket.
- The bollard shell shall feature 360-degree reflectivity. Retro-reflective materials shall be highly visible by day and by night and all reflectors have a warranted life of at least three years.
- The bollard shell shall be one-piece construction with integral fixing points to prevent twisting.
- Black-backed bollards shall not be permitted on the network.
- Be selflighting or rebound design where appropriate and may be solar powered where appropriate.

Sign Luminaires Mounted on Gantries

6.1 Substitute existing [MCDHW](#) Clause 1407 with the following requirements relevant to sign luminaires mounted on gantries:

- Luminaires shall be as described in the MCDHW.
- Luminaires shall only be mounted on the sign luminaire mounting rail provided and designed for that lantern.
- The number of luminaires on each gantry shall be determined by the required luminance levels necessary.
- The cable between the control cabinet and the sign luminaires shall be NYY-J Hituf type unless designed to comply with BS7671 and subsequently approved by HCC.
- The control cabinet shall be constructed from galvanised steel and be to IP 65 and be located on the mounting panel provided on the gantry.
- The control cabinet shall be as HCC standard drawing HST/1400/025. Copy available on request from HCC.

School Crossing Patrol Lights

7.1 The supplier shall provide a Simmons signs Pulsa unit programmed via Telensa CMS unless agreed otherwise with HCC.

Belisha Beacons

8.1 Substitute existing [MCDHW](#) Clause 1407 with the following requirements relevant to belisha beacons:

- Belisha beacon globes shall be orange and be illuminated by an LED lamp and a post top mounted luminaire suitable for the crossing (typically an Urbis Ampera with “Zebra” optic).
- The belisha beacon unit shall be IP 54 sealing for reduced maintenance.
- The gallery will be an AVG4 cast aluminium Anti-Vandal gallery, suitable for the addition of the AVG4 Halo, if required.
- The LED lamp shall have an integral flasher unit as Charles Endirect Celstar 3F or similar.
- A full shroud shall be fitted over the beacon globe unless agreed otherwise with the overseeing authority.
- The belisha beacons shall have a Telensa ‘twig’ type antenna incorporated within the column due to the shroud creating a blocking effect.

Central Refuge Beacon Globes and Galleries

- 9.1 Central refuge beacon globes and galleries shall comply with the requirements of BS 12899.
- 9.2 Galleries shall be constructed from aluminium castings complying with grade LM6-M of BS EN 1706.
- 9.3 Galleries shall be a two-part construction comprising of a base and a collar which shall be securely fixed together using captive fixings and a neoprene seal which gives a minimum degree of protection rating of IP54.
- 9.4 Galleries shall be affixed to the post by means of hidden grub screws.
- 9.5 Globes shall be 300mm diameter one-piece construction and shall be affixed to the collar of the gallery by a minimum of three internal grub screws.
- 9.6 The light source shall comply with the requirements of [BS 12899](#) and shall be continuously lit.

Illuminated Signs

- 10.1 All lit traffic signs shall comply with Class RA 2 of [BS EN 12899](#)
- 10.2 All sign and luminaire fixings shall have a guarantee of 25 years on-site life.
- 10.3 Signs shall be mounted on posts that are generally in accordance with the guidance set out in Part 4 Chapter 16: Designing Non-illuminated Signs and Road Markings and with the following additional requirements:
 - Signs shall be mounted on a wide based post of a length calculated by adding **sign height + vertical clearance + foundation depth + 150mm**
 - The housing shall have an aperture of not less than 400mm x 115mm and be fitted with a weatherproof metal door having a vandal-resistant lock with key to cl 1311.1 of the [Specification for Highway Works \(SHW\)](#).
 - The door and housing shall have the same finish as the post, both inside and out.
 - Doors should face away from oncoming traffic for the safety of operatives. A Departure from Standards should be sought if there are obstacles which prevent this.

- The interior and exterior of the housing and all holes for cables, bolts, access etc. shall have a smooth finish with no sharp edges.
- The cable entry slot shall be 75mm wide and 150mm high below ground level.
- A backboard of non-hygroscopic rot resistant wood not less than 13mm thick x 300mm x 100mm shall be securely fixed to the back of the compartment by countersunk screws. Electrical terminations and cut-outs shall be mounted on this board.
- The housing shall be earthed in accordance with IET recommendations and an earthing point with screw and shake-proof washer provided within the base housing in a location accessible from the door opening.
- For Passively Safe Sign Posts the electrical connections shall be via a pull-out plug which complies with the requirements of [BS EN 60309-1](#), [IEC 60309-1](#) and [BS EN 60309-2](#), [IEC 60309-2](#).
- Fused cut outs for the pull out plug electrical connection to the sign installation shall have a minimum Ingress Protection of IP 67 and shall be housed in a cable access chamber which is free draining.

May be solar or wind powered where appropriate.

10.4 Foundations shall generally be in accordance with the guidance set out in Part 4 Chapter 16: Designing Non-illuminated Signs and Road Markings and with the following additional requirements:

- Where signs are illuminated provision shall be made for cable entry through the concrete base by means of a 50mm diameter flexible PVC duct.
- Foundations for lit signs shall contain a preformed duct of minimum 74 mm internal diameter, capable of retaining its cross-sectional shape and position during the compaction of the concrete, secured at the cable entry of the post.
- The Contractor shall take measures to prevent ingress of concrete and soil that would impede cable installation to the ducts and post bases. The duct shall have a 300mm radius bend which shall enter the post through the cable entry slot. The other end of the duct shall extend not less than 100mm beyond the foundation.

10.5 Illumination of sign plates shall be external and overhead mounted unless agreed otherwise by HCC. One-piece light units with integral brackets should be mounted directly on the signpost and/or on luminaire support posts.

10.6 The support posts and fittings shall comply with the requirements for signposts and shall be fixed directly to the sign stiffening members.

10.7 An electrical rigid PVC conduit shall be provided and installed by the Scheme Promoter to link any straight posts/support posts to the post with the integral bare housing.

10.8 Traffic sign luminaires shall satisfy the requirements detailed in MCDHW Clause 1407 and in addition:

- Luminaires shall be fitted with a suitable Telensa CMS Node
- Circuit Power Factor shall be 0.95 or better
- Luminaires shall be provided with a minimum 10-year warranty for LEDs and Drivers
- Traffic sign luminaires shall generally be in two sizes:
 - o Size A shall be capable of illuminating signs of up to 1200 x 600mm with no light backwash
 - o Size B shall be capable of illuminating signs greater than 1200 x 600mm with no light backwash

10.9 The cable layout for centre islands shall be as HCC standard detail HST/1400/004. Copy available on request from HCC.

MCDHW Clause 1409: Nodes and Ancillary Equipment

11.1 Substitute existing MCDHW Clause 1409 with the following requirements relevant to nodes and ancillary equipment

- Nodes and ancillary equipment shall be compatible with the Hertfordshire Telensa CMS.
- For standard road lighting luminaires the node shall be the 5-pin type capable of dimming.
- For sign lighting lanterns the one-part conduit node shall be used.
- For Belisha beacons and centre-island beacons a two-part twig antenna complete with a two-part internal node shall be used.
- For school crossing patrol signs a two-part easy fit antenna complete with a two-part internal node shall be used

MCDHW Clause 1417: Base Compartment Fixing Arrangements

12.1 Substitute Paragraph 1 with the following requirements relevant to the location of electrical equipment:

- Electrical equipment installed within the base compartment of columns or posts shall be positioned and fixed in accordance with manufacturers' instructions with corrosion resistant fixing screws.
- Doors shall face away from oncoming traffic for safety of operatives unless otherwise agreed by HCC as a departure from standard.

MCDHW Clause 1418: Feeder Pillars

13.1 Replace existing Paragraph 2 with:

- The distribution MCBs or fuse boards shall be suitable for exterior applications and have sufficient spare capacity to accommodate additional ways based on 50% of the number of original ways in the distribution MCB of fuse board i.e. if the original number of ways is ten, then an additional five ways shall be provided.
- There shall be at least 25% usable spare space on the back board.

13.2 Replace existing paragraph 4 with:

- The pillar doors shall be fitted with tamperproof locks, all locks being identical in pattern and four sets of keys shall be provided.
- All hinges and locks shall be of stainless steel unless otherwise stated in Appendix 14/4.
- Hinged doors shall be fitted with a mechanism to retain the door in the open position once opened.

13.3 Additional requirements to Clause 1418 are as follows:

- Feeder pillars shall be suitable for the layouts shown on HCC standard detail drawings numbers HST/1400/019-35. Copies available on request from HCC. Labels shall be fixed with stainless steel rivets and according to standard drawing HST/1400/003. Copies available on request from HCC. Circuit details and labelling shall be provided in each feeder pillar. Laminated labels on feeder pillars, electricity supply pillars, distribution panels and group switching control panels shall:
 - o Be non-hygroscopic, fade resistant and weather resistant
 - o Be made from melamine
 - o Be engraved and have bevelled edges
- Each pillar shall contain drawings depicting the circuitry for each pillar and a schematic drawing of the network. These drawings shall be laminated, waterproof and mounted on the inside of the door. The drawings shall be submitted to HCC for approval before they are fitted into the pillars.
- Incoming and outgoing cable labels (source/destination) shall be labelled as detailed on HCC drawing number HST/1400/001. Copies available on request from HCC. All labelling shall be complete prior to the final testing at each feeder pillar cable network.

- Maintenance numbers shall be 50mm high and 40mm wide black on white background, arranged vertically from top to bottom and located on the side facing the carriageway and clearly visible to maintenance operatives.

MCDHW Clause 1420: Earthing

14.1 Additional requirements to Clause 1420 are as follows:

- Earth mats shall be installed at the beginning and end of each circuit of three or more columns/ illuminated signs, and at the point of supply. Earth mats shall be solid and not lattice type with a minimum surface area of 1square metre and shall be encased in a minimum of 50mm surround layer of Marconite or FurseCem that includes an orange dye. The required depth of cover above the earth mat shall be no less than 650mm. Earth bonding conductor terminations shall be made using suitably sized crimp type lugs and brass bolts, nuts and washers of a minimum diameter of 8mm.
- Earth rods may be used if a suitable assessment of the location has shown that these can be installed without risk to the installer.
- The earth electrode pit can either be constructed of concrete or from a high-performance polymer and shall be sited in concrete foundation.

- Earth rods shall be manufactured from copper or copper-clad steel (copper shall be bonded to the steel core) and be no less than 16 mm in diameter. Cable clamps shall have an aluminium bronze body and a phosphor bronze screw.
- Earth rods shall be located in an earth rod core and surrounding housing - for details see HCC standard detail drawing HST/1400/039. Copies available on request from HCC.
- All earth rod installations shall conform to and be tested by the approved method stated in the current edition of [BS 7671](#).
- Unless otherwise stated, earth rods shall be driven into the ground to a depth of no less than 3.6m, or to a depth so that the earth rod attains an impedance of no greater than 20Ω .
- Earth bonding conductor terminations shall be made using suitably sized crimp type lugs, brass bolts, nuts and washers of a minimum diameter of 8mm.

MCDHW Clause 1421: Underground and Ducted Cable

15.1 Replace existing paragraph 1 with:

- Cables shall have XLPE insulation and sheathing material coloured in accordance with National Joint Utilities Group publication 'Guidelines on the positioning and colour coding of utilities' apparatus'.
- The identification of the conductors by colour shall be as per [BS 7671](#) and every core shall be identifiable by colour throughout its length.
- Incoming and outgoing cable labels (source/destination) shall be labelled as detailed on HCC standard detail drawing number HST/1400/001. Copies available on request from HCC. All labelling shall be complete prior to the final testing at each feeder pillar cable network.
- The sheathing material shall be appropriate to the ground conditions in which it will be laid. In ground that is liable at any time to become waterlogged, then the sheathing material shall have an ASTM F1249-1 tested maximum permeability of 2.0 g.d-1-2, 90% R.H, 1mm.

- The cables shall be 600/1000 V grade with steel wire or aluminium strip armouring to [BS 6346](#) or [BS 5467](#) and all conductors shall be of equal cross-sectional area.
- The Scheme Promoter shall provide to HCC evidence that each cable length delivered to Site has been tested at the place of manufacture and complies with the testing requirements of BS 6346 or BS 5467 according to the cable used.

15.2 Replace existing paragraph 4 with:

- Cable trenches shall be excavated to the lines described in Appendix 14/4 and in accordance with Clause 602.
- The depth of excavation shall be such that cables laid under verges, footways or open ground shall have a minimum cover of 450mm and under carriageways of 600mm or 300mm below formation whichever is the greater depth.

MCDHW Clause 1423: Armoured Cable Terminations

16.1 Delete existing clause and replace with:

- Cables shall be individually terminated and secured at feeder pillars, isolators and other electrical apparatus by means of a brass compression type gland to [BS 6121-1: 2005](#) and brass gland plate as per HCC Standard Detail Drawing HST/1400/010. Copies available on request from HCC.
- Gland plates shall be an integral part of the Isolator and be capable of terminating a maximum of three 3-core XLPE/ PVC/SWA/PVC cables with copper conductors of up to 25square mm cross sectional area. The termination shall be as per HCC Standard Detail Drawing HST/1400/010. Copies available on request from HCC.

MCDHW Clause 1424: Inspection and Testing to be carried out by the Scheme Promoter

17.1 The following documentation shall be provided for acceptance on completion as additional requirements to Clause 1424:

- Certification that all outstanding works are complete
- CMS node ID's with bar codes
- Details applicable to entering the installation onto HCC's street lighting inventory in electronic format and grid referenced
- Maintenance Manual and Health & Safety File complying with the Construction Design & Management requirements
- Test certificates cross-referenced to the apparatus identified on the as-installed drawings
- Duct/cable records shall be determined from kerb lines or fence lines
- A schematic layout drawing of the distribution for each private cable network
- Offsets of the existing cable shall be taken at mid span intervals where cables maintain a steady line and at 5m intervals where the line of the cable varies

- As-built drawings should be issued to HCC's AutoCAD format. Details on request.

17.2 The Overseeing Organisation shall inspect the works to ascertain that all aspects of the installation meet with the requirements of this guide.

17.3 The following documentation shall be provided prior to adoption of the installed lighting and other electrical equipment as additional requirements to Clause 1424:

- Location plan
- As-built scheme drawings – electronic file and hard copy with 1:500 scale or greater
- Certification in accordance with [BS 7671](#) including designer's details where necessary
- In electronic format, a schedule of installed apparatus under headings to be agreed with Overseeing Organisation in advance
- Any other information requested by the Overseeing Organisation.

Identification Marking

- 18.1** Location marks for inspection and maintenance purposes shall be applied to each item of lighting equipment as detailed on HCC Standard Detail Drawings HST/1300/008-9. Copies available on request from HCC.
- 18.2** Sign Maintenance ID numbers shall be linked with their corresponding sign schedule number on Information Management System.
- 18.3** Location marks on all signs/bollards shall consist of a neat rectangular white background, with black gloss numbers sized as follows:
- Central reserve – 75 mm high & 40 mm wide.
 - Verge – 50 mm high & 40mm wide.
- 18.4** Location marks shall be manufactured from one-piece U.V. stabilized self-adhesive vinyl.
- 18.5** Illuminated signs located on islands and central reservations shall be fitted with two maintenance numbers as shown in HCC standard detail drawing HST/1300/009. Copies available on request from HCC.

- 18.6** Lighting columns with illuminated signs shall have the maintenance number on the back of the sign face in a visible location.

Special Design Apparatus (SDA)

- 19.1** As a matter of course, HCC is prepared to adopt and maintain matching SDA from a palette of ‘off the shelf’ heritage style columns and lanterns, which it uses within Conservation Areas and heritage town and village centres, that already have a heritage lighting regime.
- 19.2** The palette includes:

Lantern Style	Manufacturer
Street	DW Windsor
Ely	DW Windsor
Strand	DW Windsor
York	DW Windsor
Iffley	DW Windsor
Salisbury	DW Windsor
Welwyn	DW Windsor
P107	CU Phosco

Column Casting Kit	Manufacturer
Chester	DW Windsor
Cardiff	DW Windsor
Oxford	DW Windsor

19.3 Scheme Promoters shall consult HCC on the use of alternative SDA.

19.4 Festive decorations and attachments to columns such as detectors, WIFI, sensors, banners/flags, CCTV and hanging baskets are permitted by legal agreement or licence (see <https://www.hertfordshire.gov.uk/media-library/documents/highways/hcc-festive-lighting-guidance-sept17.pdf>). Columns shall be designed in accordance with BS EN-40 to carry the associated additional loading.

19.5 The contribution to Local Character and Heritage shall be LTP4 Compliance tested at Approvals stage to ensure that the proposed Lighting Strategy submitted at the full planning application stage has been followed.

Lighting in Areas of High Importance LTP4 Compliance Test: Approvals

The lighting design and use of Special Design Apparatus protects, preserves and enhances the understanding and enjoyment of both the tangible and intangible aspects of Hertfordshire's heritage and archaeology in areas of High Place Importance.

Whole Life Management Plan

20.1 The final version of the Whole Life Management Plan shall describe the detailed arrangements for to who is going to own each of the proposed street lighting assets, who is going to maintain and manage them and how they are going to be funded, such that they can be included within any Section Agreements.

Adoption Requirements

21.1 Scheme Promoters should note that design approvals and adoption shall not take place without full compliance to the requirement to submit all the documentation and certificates.

21.2 The scheme promoter should note that they shall be responsible for all energy and maintenance charges until the date of adoption.

21.3 The scheme promoter shall obtain connection, unmetered and meter supply agreements for energy supplies.

Tips for Good Design Practice

- Ensure that all proposed lighting columns can be accessed safely for future maintenance
- Lighting and landscape designers work together to ensure columns are kept clear of trees, to avoid the problems of interfering with light distribution when they mature
- Where private parking areas are included within a proposed development locate a column to provide some level of lighting to the entrance of the private parking area.
- Specify folding columns for the top of parapet walls, ramps, steps, on bridges, near to bridges, near waterways, railways or powerlines
- Install sockets or pots and pit system in central islands for quick removal and re-erection of beacon posts after damage.
- Where multiple footpaths arrive at a point, consider lanterns with 360° coverage.
- Liaise with highway designers to ensure there are drive on -drive off hardstands on centre islands for roundabouts and other awkward stopping places.
- Specify ground sockets and pots at locations where repeated sign knockdown is likely, including town centres where posts are likely to be damaged by poor parking practices and HGV deliveries.
- In the absence of pits install duct markers.
- Specify folding columns for all places with limited or no MEWP (Mobile Elevating Work Platform) vehicular access.

Chapter 17

Designing Non-illuminated Signs, Road Markings and Studs

Contents

Continued...

Introduction

- 1.1** This chapter sets out the detailed design, contract preparation and implementation requirements for non-illuminated signs and road markings based on the Signage Strategy Plan (SSP). The SSP should have been developed by the Scheme Promoter and approved by HCC, as described in Part 3 Chapter 18. This chapter should be read in conjunction with HCC's [Highway Signing Guidance](#) and Network Management Strategy.
- 1.2** The SSP will have set out:
- The existing signing and road layout following a full survey.
 - The appropriate type and approximate sizing of sign for each circumstance
 - The Route Destination proposals
 - How continuity of signing is to be achieved
 - Proposals for the reduction of environmental impact and sign clutter/proliferation
 - Proposals for how hazards are to be mitigated with signs, road markings, studs or coloured surfacing (in accordance with HCC Skid Resistance Strategy) presenting evidence demonstrating that it is not feasible to avoid or design out those hazards by other means.
- 1.3** Guidance on the treatment of existing signage and road markings as part of signage reviews is also provided. Their removal will be assessed using a risk-based approach.
- 1.4** Detailed requirements for illuminated signs is contained in Part 4 Chapter 15: Street Lighting.
- 1.5** Scheme Promoters are invited to discuss the potential for introducing experimental sites for the use of new and innovative materials. A key factor will be the agreement of a performance monitoring regime.

General Requirements for the Detailed Design, Location and Installation of Signs

- 2.1** All signing and lining in Hertfordshire shall be in accordance with the current '[The Traffic Signs Regulations and General Directions](#)' (TSRGD), [BS EN 12899-1](#), [BS EN 1436](#), [BS EN 12767:2019](#), [BS EN 1463-1:2009](#), [BS EN 1423](#), [BS EN 1424](#), [Traffic Signs Manual](#), [Specification for Highway Works](#), [the Countryside Act 1968](#) (Section 27)) and the requirements set out in this chapter.
- 2.2** Nothing shall override the statutory requirements set out in the [TSRGD](#) without special authorisation from the Department for Transport (DfT).
- 2.3** Whilst following this guidance Scheme Promoters should also familiarise themselves with the following supporting guidance:
- [Traffic Signs Manual \(TSM\)](#) (DfT)
 - [Design Manual for Roads and Bridges \(Highways Standards\)](#)
 - [DfT Circular 01/2016 The Traffic Signs Regulations and General Directions 2016](#) (DfT)
 - [Local Transport Note \(LTN\) 1/20: Cycle Infrastructure design](#) (DfT)
 - [Local Transport Note \(LTN\) 1/94: Design and Use of Directional Signs](#) (DfT)
 - [Inclusive Mobility](#) (DfT)
 - [Safety at Street Works and Road Works: A Code of Practice](#) (DfT)
 - [Speed Management Strategy](#) (HCC)
- 2.4** Detailed design, location and installation requirements shall be based on the proposals set out in the scheme's approved Signs Strategy Plan and the principles set out in paragraph 2 of Part 3, Chapter 18: Planning for Signs & Road Markings.
- 2.5** Signs shall be illuminated only if required by the current [TSRGD](#). The [TSM](#) contains information which assists in the interpretation of the TSRGD lighting requirements.
- 2.6** Where a sign is proposed that is not permitted in the [TSRGD](#) approval will be required from HCC and the DfT.

2.7 The following information shall be submitted to HCC for all new traffic signs for final approval:

- Sign reference & location;
- [TSRGD](#) Schedule ref and diagram number (where applicable);
- Sign face design;
- 'x' height (if applicable);
- Sign face dimensions;
- Illumination requirements;
- Sign plate material and construction
- Sign face material;
- Mounting requirements / method of mounting;
- Foundation details;
- [Passive safety](#);
- Post dimensions;
- Information for the subsequent maintenance and upgrading including any dismantling and re-assembly
- Additional relevant information.

Sign Location

- 3.1** Recommendations for the positioning of signs can be found in [TSM](#) Chapter 1, Section 5.
- 3.2** There should be a minimum clearance of 450mm from the kerb face to any part of the sign assembly. This should be increased to 600mm where there is a severe camber or crossfall and where signs are mounted on the central reserve of dual carriageways. On roads with a speed limit of 50mph or above, this should be increased to a minimum of 1200mm.
- 3.3** Where there is a hardened verge the nearest edge of the sign should not be less than 600mm behind the edge of the hardening.
- 3.4** The sign should be sited:
- At the correct distance before the site to which it relates. This is generally dependant on the 85th percentile speed of existing roads or the design speed for new roads, which should be adhered to wherever possible but may be relaxed if doing so would provide better visibility of the sign.
 - So that it can be seen from the adequate reading distance and not be obscured by any obstructions. See [TSM](#) Chapter 2 for details on how to work out the reading distance.

- On the left-hand side in most circumstances. Siting on the right-hand side is appropriate when there are difficulties with placement on the left or when two signs can be used on one post at, for example a T junction. This does not apply to signs that need to be placed on both sides of the road.
- To be clearly visible and unobscured by other street furniture or foliage (allowing for growth of foliage)
- Lateral placement at roundabouts should allow for circulatory visibility.
- Consideration should be given to the needs of all road users, including pedestrians, cyclists and equestrians.
- To minimise its environmental impact. Particular care needs to be taken in environmentally sensitive areas such as conservation areas.
- To minimise disruption to footway, cycleway users and vehicular traffic. Particular care is to be taken when siting signs near junctions to avoid intrusion to the sight lines of pedestrians and drivers.
- Clear of shop and house windows, areas where vehicles unload, shop canopies, garage accesses and other pavement crossings and any foliage and vegetation that may obscure the sign.
- Where it can be cleaned and sited free of foliage, which can encourage algae growth.

Sign Plates & Faces

- 4.1** Sign plates shall normally be metal with a guaranteed on-site life of not less than 25 years and a warranted life of not less than ten years. Other materials will be considered, but as a departure from standards
- 4.2** Sign size, colour and legends shall conform to the Traffic Signs Regulation and General Directions ([TSRGD](#)) and guidance on sizing can be found in the [TSM](#).
- 4.3** All sign face materials shall comply with [BS EN 12899-1:2007](#), with reflectivity as specified over page:

RA2 / R2 (RB3 as required by HCC)	NR1
• All illuminated signs • Signs in non-lit areas or with a low level of ambient lighting (i.e. villages, conservation areas) • Route directional signs on single carriageway roads with either a high level of ambient lighting and/or on single carriageway competing with an amount of commercial background signing (i.e. town centres, busy shopping thoroughfares) • Signs not in direct line of vision (i.e. mounted on the opposite side of carriageway) or where greater visibility distance is required • Gantry signs, Advance Direction Sign (ADS) or route directional signs on dual carriageways	• Neighbourhood Watch signs • Bus Stop signs • Signs to housing developments • AA and RAC signs

4.4 HCC may consider the use of R3B Microprismatic signs to [BS8408 2005](#) at locations where RA2 reflective performance is difficult to achieve by headlight illumination and direct illumination isn't provided by lanterns, such as on overhead gantries or bridges and for signs at an angle whereby reflectivity from headlights is unlikely.

4.5 R3B should not be used where illumination from headlights/ direct illumination is achieved, as it can be so bright that it blinds and distracts drivers. RA2 is perfectly suitable in these conditions.

4.6 R3B can also be useful to stand out in town centres where there is a high level of background illumination from shops, their signage and the like (if the sign isn't already directly illuminated).

4.7 Signs shall be stiffened such that post fixings may be positioned at any point across the width of the sign without the need for drilling of the stiffening to permit erection onto posts of unspecified spacing.

4.8 Plate signs not exceeding 1200mm x 2400mm shall be made of single sheet.

4.9 The whole of the back surface of the signs shall be covered with 693 Aircraft grey nonreflective plastic sheeting, powder

coating or stove enamel. For special areas such as town centres and conservation areas the local council may have specific requirements. Arrangements for future maintenance should be agreed prior to erection.

- 4.10** Signs shall be stiffened such that post fixings may be positioned at any point across the width of the sign without the need for drilling
- 4.11** Sign stiffeners shall be riveted to the sign plate and provide a flush finish without piercing or damaging the sign face material.
- 4.12** The back of each sign is to be marked with its associated drawing number, sign reference and maintenance ID number in characters not larger than 15mm in height. For more on maintenance ID numbers see sub-section 30 in this chapter.
- 4.13** Tape shall not be applied to sign faces or backs.
- 4.14** When signs are to be stored prior to erection they shall be kept dry, preferably indoors. All packaging shall be removed and the signs supported on wooden battens in the upright position with plenty of space for free air circulation. All contact with treated wooden posts and excessive water shall be avoided.
- 4.15** During sign erection, measures shall be taken to ensure that the faces of signs are not abraded, impacted or otherwise marked.

Sign Mounting

- 5.1** Signs and their posts shall be designed such that they cannot easily be rotated naturally, or by vandalism. This is particularly important for active travel mode signage.
- 5.2** Sign mounting shall be in accordance with the guidelines in [TSM](#) Chapter 1, Section 7 with the following mounting heights:

Situation	Minimum Vertical Clearance
Any part of a sign mounted over a pedestrian footway or footpath	2.3m
Any part of a sign mounted over a route where cyclists ride	2.4m
Any part of a sign mounted over a bridleway	3.7m
Any part of a sign mounted in a cutting or on an embankment with a gradient greater than 25%	0.9m
Any part of a sign mounted on a verge with a gradient of 25% or less	1.5m
Any sign mounted at a junction where visibility may be impaired by its presence	1.8m

- 5.3** Minimum post spacing on a footway or footpath should be 1.2m where it is necessary for pedestrians to pass underneath the traffic sign. Where this is not possible due to physical constraints an absolute minimum of 0.9m post spacing shall be maintained.
- 5.4** Signs mounted on one post should generally be no more than 1m in length. For larger signs, with the approval of HCC, it may be acceptable to mount the sign on two posts erected in the same foundation 200mm apart.
- 5.5** Where stub arms are used on cantilevered signs the construction shall be approved by HCC.
- 5.6** Where triangular signs and roundels are to be offset on a single post, the signs should be mounted on a grey backing board with any associated supplementary plate.
- 5.7** The maximum distance between adjacent posts should be 2m, but 1.5m is preferable.
- 5.8** There may be circumstances where the post spacing needs to be increased, for example when it is desirable to span a cycleway. In such circumstances the sign plate may need to be strengthened.
- 5.9** The typical overhang of a sign should be 300mm although the maximum unsupported overhang of a sign beyond the posts is 600mm (except for cantilevered signs mounted on one post).
- 5.10** Signs should be mounted so that the overhang is equal on both sides unless restricted by post positioning or existing obstructions.
- 5.11** If signs are to be mounted on existing posts these should be inspected to ensure that they have not corroded or otherwise deteriorated. A check should be made as to whether they are able to support the new sign.
- 5.12** Where an existing sign face is to be replaced with a new sign face of greater height, additional lengths of post are to be fitted. Foundations and post strength are to be proven adequate for the larger sign.
- 5.13** In multi post installations all posts should be the same size, the post containing the electrical equipment should be furthest from the carriageway.
- 5.14** Signs should be mounted so that the top of the sign is level with the top of the posts. Excess post should be removed and cut surfaces protected against corrosion. The only exception to this is when a sign is to be illuminated (see post details below).

Signpost Foundations

- 6.1** Sign foundations should be constructed from ST4 concrete. All new signs should be placed in sockets.
- 6.2** The concrete foundations for a sign should not be loaded for 72 hours after laying. Therefore sign plates shall be erected at least 72 hours after the foundation has been laid.
- 6.3** The top of a sign foundation should be at least 150mm below finished ground level.
- 6.4** Two types of foundation are used for signs: 'Raft' and 'Separate' foundations.
- A raft foundation made from one continuous block of concrete should be used when signposts are greater than 140mm in diameter or where separate foundations are less than 250mm apart due to limited post spacing. The length should be the same as that of the sign, the width should be at least 1.5m and the depth should be a quarter of the height to the top of the sign at the tallest post.
 - Separate foundations should be used when signposts are equal to or less than 140mm in diameter, when it is not possible to provide a raft foundation due to the proximity of utility cables and pipes or when posts are to be placed in verge or footway at different levels. Foundation sizes are given in the table in Appendix 17/1 at the end of this chapter.
- 6.5** Post pots (retention sockets) installed to the manufacturer's guidance shall be provided to allow the removal and installation of posts without affecting the foundations.
- 6.6** The post pot can be shortened on site if the Scheme Promoter is unable to obtain the required depth due to underground services (this reason shall be proven by the Scheme Promoter).
- 6.7** Foundations shall be agreed with HCC to ensure that they are to the HCC standards
- 6.8** Excavation for signs (including bollards) shall not be by mechanical means unless otherwise agreed with HCC.
- 6.9** When excavation is in grass verge, the turf shall be carefully cut, placed on one side and neatly replaced after the post or bollard has been erected.
- 6.10** Where excavation is in flagged or paved footway, the paving stones shall be carefully lifted and stacked neatly to prevent being damaged prior to being reinstated.

Signposts

- 7.1 Traffic signpost diameters should be calculated using the Standard Nomograms in Appendix 17/1 at the end of this chapter.
- 7.2 The length of post required for non-illuminated signs is calculated by adding the following:
- Sign height + vertical clearance + foundation depth**
- 7.3 The mounting height of sign is important so that information can be seen by the user.
- 7.4 Overlong posts shall be cut down at installation to avoid the following bad practice where the sign is mounted too high.
- 7.5 Posts shall offer a guaranteed on-site life of not less than 25 years.
- 7.6 Tubular steel posts shall comply with BS 6323 and shall be manufactured from steel complying with the requirements of [BS 5360](#) Grade 43A. They shall also comply with the requirements of [BS EN 12899-1](#). Large, based posts shall also be to this specification. The minimum base section diameter for a large, based post is 114mm.



- 7.7** Prior to galvanising, posts shall be cleansed of grease, scale, and rust and shot blasted.
- 7.8** Galvanising shall be by an approved hot-dip process in accordance with [EN ISO 1461](#). When finished the galvanising shall be smooth, reasonably bright, continuous and free from imperfections such as flux, ash, and dross inclusions. If bare patches or spots due to inefficient pickling or persistent types of scale etc. are apparent, the work shall be completely stripped and re-galvanised.
- 7.9** Posts shall have one coat of two pack glass flake epoxy (item 124) to the external and internal root to 250mm above ground level minimum dry film thickness 350micron colour black.
- 7.10** Where signs are on a single post and are in areas where there is a likelihood of the sign face being rotated a straight post with a groove is to be used
- 7.11** Other than in town centres and Conservation Areas, signposts should not be painted or plastic-coated.
- 7.12** If required by HCC the posts are to be protected in accordance with the relevant section in the 1900 series Appendices.
- 7.13** In special areas such as town centres and conservation areas please acquire the colour specification from the borough or district council. See too sub-section 16 on heritage signage and sub-section 17 on signs in conservation areas.
- 7.14** Galvanising shall be fettled and rasped to remove all spikes and sharp edges and leave a smooth finish prior to finishing application.
- 7.15** Posts shall be topped with an Aircraft Grey coloured watertight cap, finials shall be used in the case of Finger Post Signs.
- 7.16** All posts shall be erected plumb and where three or more posts are provided for any one sign, the faces of the posts shall be lined up.
- 7.17** Each signpost shall be indelibly marked with the name or trademark of the manufacturer.
- 7.18** Additional stub post(s) and brackets which may be required to offset sign plates shall be of the same construction and finish and be designed and manufactured for the specific requirements.
- 7.19** Requirements for stub-posts shall be determined by the Scheme Promoter in consideration of sign plate fixings, lit sign unit mountings, conduit fixings and the like, and to not project below the sign plate. Stub-posts shall be capped top and bottom.

- 7.20** Where there is a structural requirement base plates shall be welded to each embedded tubular post with a minimum area equal to the square root of five times the area of the post as shown in Appendix 17/1 at the end of this chapter
- 7.21** The base plate and internal and external surfaces of the posts to a height of 250mm above ground level shall have one coat of two pack glass flake epoxy (item 124) minimum dry film thickness 350micron colour black
- 7.22** Cranked posts shall be in accordance with HCC standard drawings HST/1200/011 & 12. Copies available on request.
- 7.23** Strimmer guards to be provided at the base of posts in grass verges when requested by HCC.

Regulatory Signs

- 8.1** Most regulatory signs are the means of putting into practical effect:
- Orders, including acts of parliament
 - Regulations
 - By-laws
 - Notices for the regulation of traffic

- 8.2** These may impose restrictions on speed, width, height, on turning traffic or waiting and, therefore, most regulatory signs are erected to give effect to Traffic Regulation Orders (TRO's)
- 8.3** Important exceptions are 'Stop' signs and markings, Give Way and Keep Left signs which do not require Orders.
- 8.4** The provision of regulatory signs shall follow the guidance contained in Chapter 3 of the TSM and the requirements of the [Speed Management Strategy](#) for speed area signs.
- 8.5** Signs giving advance warning of regulatory requirements shall be incorporated with direction signing wherever possible and shall be located so that vehicles can turn around or divert in time. This is particularly important where large vehicles may need to turn.
- 8.6** Alternative routes avoiding any prohibition will be signed where necessary but particularly where lorry movements are restricted.
- 8.7** Speed Limit Countdown Markers are not permitted as they are not prescribed signs
- 8.8** [TSRGD 2016](#) removed the requirement for installing some regulatory signs on both sides of the carriageway, such as at gateways. HCC can advise on and shall approve which signs can be installed in this manner.

Warning signs

- 9.1** The provision of warning signs shall follow the guidance contained in Chapters 1 and 4 of the [TSM](#).
- 9.2** Timely warning through the positioning of appropriate signs can greatly assist road safety by indicating that extra caution and a reduction in speed or other manoeuvre may be required.
- 9.3** They are normally bordered by a red triangle and are sometimes supplemented by a rectangular plate giving additional information.
- 9.4** To be most effective warning signs should be used sparingly. Their frequent use to warn of conditions which are readily apparent tends to bring them into disrepute and detracts from their effectiveness.
- 9.5** Warning signs shall be provided where HCC accepts that a hazard exists which is not otherwise readily apparent. Provision shall generally follow the guidance contained in Chapter 4 of the [Traffic Signs Manual](#). Guidance from a Design Review Panel should be sought in the case of doubt.
- 9.6** The need to highlight hazards with warning signs shall be considered as the last resort when designing new or improved highways. The aim shall always be to avoid or design out the hazard at the outset, as previously indicated in Part 3 Chapter 18.
- 9.7** Unjustified signing should not be used simply in response to complaints from the public, or to satisfy demands that 'something be done'.
- 9.8** Care should be taken to ensure that a route is treated consistently, especially where it crosses the boundary between two different traffic authorities. An example of this is providing warning of severe bends along a route which crosses a county boundary.
- 9.9** Warning signs shall not be erected at locations where highway users can quite clearly see and assess the hazard. For example, HCC does not erect signs advising of the presence of junctions along a road that is passing through a built-up area.
- 9.10** Yellow borders on signs should only be used in exceptional circumstances and with approval from HCC for use at:
 - Incident sites (identified under a Casualty Reduction Scheme);

- In association with school safety zones
- To enhance signs that would otherwise be difficult to pick out against their background.

9.11 Yellow backing boards can be especially environmentally intrusive, and their overuse will devalue the impact of the attention attracting benefits on other schemes.

9.12 Consideration of increasing the size of sign to the maximum permissible will have the benefit of retaining the primary recognition of the warning sign shape and improve legibility and hence reading distance while minimising the environmental impact.

9.13 If a sign is not being recognised by highway users it should be checked to ensure that it is well positioned, not obscured by foliage or other obstructions, and is of appropriate size and condition, before considering the use of a yellow backing board.

9.14 A warning sign may be mounted on a grey backing board which can provide a neater assembly, e.g. when a sign requires a supplementary plate and eliminates the risk of the plate becoming misaligned.

9.15 A yellow backing board must be rectangular in shape, but a grey board may be non-rectangular, e.g., to enable a triangular sign to be bracketed off a lamp column.

9.16 A backing board must not itself be provided with a border, nor give the impression of being an additional border.

Directional Signage for Active Travel Modes

10.1 Routes and destinations for active travel modes within the development and connectivity to the local network will have been identified in the signs Strategy Plan and its supporting principles, as required by Part 3 Chapter 18

10.2 In order to maintain continuity of information, once a destination has appeared on a sign it shall continue to appear on all subsequent signs until the destination is reached.

10.3 In Conservation Areas HCC, in association with district/ borough conservation officers where appropriate, will be consulted on the design and location of signs.

10.4 Signs in accordance with the current [TSRGD](#) shall be used as they ensure legibility for all users unless agreed by HCC.

- 10.5** The use of gold lettering on a black background, for example, has a poor contrast and makes reading difficult for people with visual impairments. High contrast combinations should be used.
- 10.6** The needs of those pedestrians with disabilities and mobility restricted shall be considered when designing and locating all types of pedestrian signing and information must be in forms that can be used by all.
- 10.7** It is particularly important to take account of the needs of the visually impaired and to make information as simple and easily understood as possible. Simplicity helps everyone but particularly people with learning disabilities.
- 10.8** The placing of signs shall be reasonably close to, but not impeding pedestrian circulation areas.
- 10.9** Additional information can be found in the DfT's [Inclusive Mobility guidance](#).
- 10.10** Detailed guidance on the use of signs most relevant to cycling, and examples of cycle-specific signing layouts can be viewed in [TSM](#).
- 10.11** A careful balance is required between providing clear directions for cyclists and creating unnecessary visual intrusion.
- 10.12** Signing shall be provided only at the start of approved cycle routes and at junctions on links greater than two miles in length where uncertainty for the cyclist may otherwise arise.
- 10.13** All signed national routes and all regional ones will be identified by a route number (white on red or blue).
- 10.14** Signing should be added to existing furniture wherever possible. This will be done in a sympathetic way which usually means the cycle sign should be of the same material and style as the other accompanying signs.
- 10.15** Where there is no existing sign (this is only likely to happen on links), signs should be erected on metal posts for durability.

Directional Signage for Rights of Way

- 11.1** Signposts and Waymarks are to be erected in accordance with the [Countryside Act 1968](#) sections 27(2) and 27(4) respectively. It is important that paths are signposted and accurately waymarked as this gives users and landowners/occupiers increased confidence in the network and its use.
- 11.2** HCC has the discretion not to locate signposts and/or waymarks where a Parish Council/Meeting agree that it is not necessary under section 27(3) of the [Countryside Act 1968](#),

however, reasons must be logged on file.

- 11.3** Signposts and Waymark posts shall be placed to minimise obstruction to the free passage of people who will be using the route. They should normally be placed at the edge of a path but remain within its boundaries.
- 11.4** Signposts/Waymarks should be visible when approached along the line of the path from any direction.
- 11.5** The exact position of each shall be decided by HCC or its authorised agent.
- 11.6** Existing structures may provide a good alternative to new posts, but the owner's permission shall be sought prior to signposting/waymarking on any private structures.
- 11.7** Trees and other vegetation should never be used for mounting signs.
- 11.8** HCC has the 'power to enter land' for the purpose of erecting signposts/waymarks as stated in the [Road Traffic Regulation Act 1984](#), section 71.
- 11.9** For further information please visit the HCC Rights of Way webpages at [Rights of way | Hertfordshire County Council](#) or contact HCC's Countryside & RoW service on row@hertfordshire.gov.uk

Directional Signs for Non-Active Travel Modes

- 12.1** Directional signing is provided as a navigational aid and it is essential to have consistency of both destination and route number if signing is to achieve its aim.
- 12.2** Routes and destinations for all modes reflecting those proposed Place & Movement functions within the development, connectivity to the local network and any proposed changes to the functions of the local highways network will have been identified in the scheme's Signs Strategy Plan as required by Part 3 Chapter 18.
- 12.3** In order to maintain continuity of information, once a destination or route number has appeared on a direction sign it shall continue to appear on all subsequent signs until the destination is reached or the route number changes. This includes flag signs on splitter islands at roundabouts but only those indicating the destinations reached by an exit.
- 12.4** The maximum number of destinations on any sign in any direction should be six.

- 12.5** Where more than six destinations need to be shown (for any one direction), consideration must be given to increasing the letter heights, providing the information on two signs or upgrading the sign face material.
- 12.6** If the existing signage is in reasonable condition, route continuation can be achieved by applying appropriate patches or plates rather than completely new signs. HCC reserve the right to require the whole sign, including posts and foundations to be replaced by the Scheme Promoter.
- 12.7** Map type signs should convey the physical layout of the junction or roundabout as much as possible and / or dedicated lane signs used at multi-lane junctions.
- 12.8** Symbols (including, Regulatory and Warning signs) should be incorporated onto route direction signs wherever practicable.
- 12.9** Distances should not be provided for destinations on any signs other than:
- Route confirmatory signs for motor vehicles.
 - Pedestrian and cycle signage (also including journey times) as agreed with HCC.
- 12.10** Where local facilities such as churches, schools and village halls are not on, or visible from, the main route through the town or village and are therefore difficult to find, they may also be signed from the nearest point on that main route ('A', 'B', 'Classified unnumbered', or 'Unclassified' roads).
- 12.11** Company names will not be permitted as local destinations.
- 12.12** HCC no longer approves signs to other individual locations except in very exceptional circumstances, where there are clear benefits for the management and safety of the network. Decisions on this will depend on local circumstances, including the number of similar signed attractions in the area. Each case will be viewed on an individual basis and is at the absolute discretion of HCC.
- 12.13** The provision of direction signs is governed by road safety which means that there may be situations where destination that would normally be eligible for signing are unsuitable due to local conditions.
- 12.14** All route directional signs should be designed to maximise the available space and minimise the amount of background necessary. This should ensure that the sign size is kept to a minimum whilst meeting the sign design criteria.

- 12.15** The 'x' height should not be compromised to save cost. However, the size may be reduced for the sign to fit into the highway verge/footway, provided that the minimum 'x' height is used.
- 12.16** Minimum 'x' heights should not be used as standard except in conservation areas.
- 12.17** Should the sign still be marginally too big for the highway verge/footway, it is possible to 'squeeze' the width of the sign by a small amount to make it fit.
- 12.18** The sign may be reduced during manufacture by a maximum of 5%; the scheme promoter or designer should convey this information on the sign schedule.
- 12.19** Exemplification of the detailed design requirements set out in [TSRGD](#) and [TSM](#) for direction signs together with practical design tips are contained within Appendix 16/2 at the end of this Chapter.

Tourist Signage

- 13.1** HCC has a statutory duty under section 122 of the [Road Traffic Regulation Act 1984](#) [9] to exercise its power to permit or provide traffic signs to secure the convenient, expeditious and safe movement of traffic while having regard to amenity.
- 13.2** Tourist signage (white writing on brown background) provides an important opportunity for both tourism businesses and local economies and shall be implemented positively and constructively in accordance with this guidance and in accordance with [DMRB](#).
- 13.3** The primary purpose of tourist signage is to safely guide those on the latter stages of their journey to their tourist destination, albeit it is recognised that there is an advertising benefit as the signing helps to generate impromptu visits. It should be recognised that many visitors to tourist spots will not be local and will not be familiar with the area. Local knowledge should therefore not be assumed in message content.
- 13.4** Road safety, traffic management and the environment are given high consideration when dealing with applications. If these are in any way compromised, then the application will be rejected.

- 13.5** Most attractions will have advertising material which should broadly direct traffic to the correct destination.
- 13.6** Promotional signs are controlled as advertisements under [Town and Country \(Control of Advertising\) Regulations](#) [10,11]. Tourist signage should not be used as a means of circumventing planning control of advertisements, nor as a substitute for good promotional material.
- 13.7** Numerous requests for tourist signage, which individually appear to be worthwhile, can result in ‘sign overload’ causing a distraction for highway users and an eyesore for residents.
- 13.8** Eligibility does not confer automatic entitlement to tourist signage. Decisions on this will depend on local circumstances, including the number of similar signed attractions in the area.
- 13.9** New requests shall be approved by HCC. It is advised that all new requests should be discussed with the district/borough council Tourist Lead, prior to referring a request to HCC.
- 13.10** The statutory definition of a tourist destination/route including which types of leisure facilities qualify as a leisure facility is contained in the current [TSRGD](#). Further guidance can be found in the [DMRB](#).
- 13.11** Current [DMRB](#) standards state that ‘Retail parks, shopping centres, garden centres and exhibition centres should not be considered for signing using white on brown signs; instead, they should be signed if necessary, for traffic management or road safety reasons using standard direction signing.
- 13.12** Signs will be provided from the nearest A or B numbered road unless, by exception, there are good traffic management reasons for more extensive signing.
- 13.13** Signs will take the form of one of the following:
- ADS type sign
 - Stack type sign
 - Flag type sign
- 13.14** A tourist symbol from [TSRGD](#) schedule 14 will be used on all signs. The choice of symbol must be determined by its appropriateness to the main function of the attraction or facility.
- 13.15** Commercial logos are unacceptable on tourist signs. Commercial names may only be used on signs where it is deemed by HCC to be essential on traffic management grounds.

13.16 The total cost of provision of tourist signage shall be met by the Scheme Promoter including all design, approval, administration and implementation costs.

13.17 Application details for tourist signs can be found in the section on the HCC website **Permanent signs on the highway** at Signs on the highway | Hertfordshire County Council

Town & Village Destination Signage

14.1 It is important that highway users are aware that they have reached their destination and as such, signing displaying the destinations name should be provided to confirm the destination has been reached.

14.2 Many town and parish councils have individually commissioned signs. These signs will remain in place being maintained by their respective town or parish council.

14.3 The provision and maintenance of new, bespoke signs shall be individually funded by the town or parish council unless provided as an integral part of a traffic calming scheme; with the signs ideally being placed at the boundary of a built-up area (rather than the administrative boundary) and recorded on the HCC Asset Register.

14.4 The local town or parish council shall be consulted on agreement of the sign positions.

Advertising on the Highway & Permitted Posters

15.1 Commercial advertising on the highway requires both the approval of the Local Planning Authority and HCC as Highway Authority.

15.2 HCC does not permit advertising or sponsorship of any nature unless there is a demonstrable highway or local public benefit

15.3 Whilst non-prescribed signs are not permitted for use within the highway, HCC may permit the display of posters in exceptional circumstances at its entire discretion.

15.4 Such posters may include:

- Posters highlighting Quiet Lanes, Home Zones and the like
- Campaign posters for road safety and the like
- Posters for Neighbourhood Watch schemes, local bylaws (e.g. no dog fouling, no drinking) and Trading Standards signage (e.g. no cold calling)

- Roundabout sponsorship signs
- A Board agreements exist in some Hertfordshire towns to allow movable advertisements on the footway

15.5 In these signing matters generally a localised, rather than standardised approach is taken. However, in order to ensure some consistency, the following should be adhered to:

- Thorough evaluation for the need for a sign.
- Evaluation of the proposed location, including possible visual obstruction of local features.
- Evaluation of the size and colour of the proposed sign in the context of the local environment.
- Evaluation of the colour of the sign in the context of the local environment.

15.6 If it is deemed that after evaluating the above points that the sign is still necessary, then it may be implemented.

15.7 HCC shall select an appropriate site on the highway and may organise installation, maintenance and removal of signs as necessary at the expense of the scheme organisers and in accordance with HCC procedures.

15.8 The duration of display shall be at the discretion of HCC

15.9 Signing in special areas such as conservation areas and in Quiet Lanes shall be kept to a minimum and will be introduced only after consultation with or advice from the Local Planning Authority

15.10 Community signs may be erected on the highway in exceptional cases, where the Chief Constable is satisfied that there is no suitable off-highway location for them.

15.11 The responsibility for detailed arrangements of roundabout sponsorship will be undertaken by the HCC or district/ borough council, whichever is responsible for the environmental maintenance of the traffic island. Where district/ borough councils are dealing with detailed arrangements there will be no financial involvement by HCC.

15.12 Further advice on sponsorship of roundabouts is contained in the Planting Licence documentation which can be obtained from Hertfordshire County Council via their website at [Planting licence | Hertfordshire County Council](#).

Heritage Signage

- 16.1** It is acceptable to use traditional finger posts at junctions of minor roads (roads other than A or B class roads) in accordance with [TSM](#) Chapter 7: Traditional Directional Signs and TAL 6/05.
- 16.2** HCC supports the conservation and repair of existing traditional direction signs (including milestones and cast iron markers) especially where they support local character, particularly if duplicate signs can be removed to reduce clutter. Many milestones are designated as Listed Buildings. Before undertaking any work to these, their listed status should be checked. If a milestone is listed, then a specification of works for any repairs should be provided in writing to the Local Planning Authority, who can advise if Listed Building Consent is required.
- 16.3** The fabrication and installation of traditional direction signs can cost more than modern conventional signs. Whilst the aesthetic qualities of the traditional posts are superior their functionality is inferior as they are not reflective, and the lettering tends to be smaller.
- 16.4** Replacement of traditional direction signs shall only be considered if there is an existing sign at that location and the

additional cost is born by a third party or by a non-core HCC highways budget.

- 16.5** The installation of new traditional-style signs shall not be considered unless part of an area wide package funded by third parties or by a non-core HCC highways budget with the aim of enhancing local character.
- 16.6** New or replacement finger posts shall replace all other directional signs at that location to reduce clutter.

Signs in Conservation Area

- 17.1** Route direction signs in Conservation Areas should be designed using the minimum recommended safe 'x'-height for the given road category as set out in Local Transport Note 1/94 and the [TSM](#) Chapter 2.
- 17.2** The backs of signs, posts, channel stiffeners and lighting units should be manufactured to colour conservation grey ([BS4800: 18B29](#)).
- 17.3** Redundant signage in Conservation Areas should be removed whenever possible to reduce clutter.

Traffic mirrors

18.1 Despite the initial attraction of traffic mirrors, there are inherent drawbacks including:

- Distortion of reflected image
- Glare from sunlight or headlamps
- Ineffectiveness during bad weather (rain, snow, frost)
- Difficult to judge speed of an approaching vehicle from a mirror image
- Maintenance issues – mirrors are prone to vandalism and may also require constant realignment to ensure effective reflection of approaching vehicle
- Reliance on the mirror's restricted image may compromise the safety of other road users (pedestrians and cyclists) whose image may not appear in the reflected image.
- Road users need time to understand convex mirrors and this is built up over a period time and potentially over multiple visits to the mirror site. As differing orientations or sizes of mirror are available, they will give differing information. Road users will not be able to apply experience learnt from other sites as every situation has the chance of being unique. Road users will need time to learn how to read a traffic mirror

18.2 The installation of a traffic mirror on the highway shall be considered a Departure from Standards and the processes set out in Part 1, Chapter 8 shall be followed to establish that all other safety measures have been considered and excluded and there remains a benefit in its installation.

18.3 The installation of any traffic mirror shall be funded in full by the Scheme Promoter.

18.4 Mirrors erected off the highway are not the responsibility of HCC; however, they must not interfere with or cause a hazard to highway users.

Roundabout Naming

19.1 Roundabouts can be signed with the name by which they are known locally, with the agreement of district/borough councils in coordination with HCC.

19.2 The following is the current list of known named roundabouts in Hertfordshire:

- | | | | |
|--------------------------|--------------------|--------------------|------------------------|
| • Amwell | • Green Lane | • Park Street | • The Sun |
| • Bennetts End | • Harper Lane | • Park Way | • Tilehouse Street |
| • Berrygrove Interchange | • Holwell | • Salisbury Hall | • Town Hall Roundabout |
| • Birds Hill | • Hunton Bridge | • Smallford | • Travellers Lane |
| • Bowmans Mill | • Interchange | • Starlings Bridge | • Two Bridges |
| • Breakspear | • Leavesden Green | • Station | • Verulamium |
| • Buncefield | • Lemsford | • Station Place | • Waterdale |
| • Chequers | • Letchworth Gate | • Stotfold Road | • Wood Oaks |
| • Coreys Mill | • Lockleys | • Studio Way | |
| • Cupid Green | • London Colney | • Swallowdale | |
| • Ebury | • Maran Avenue | • The Bell | |
| • Fishponds Road | • Maylands | • The Clock | |
| • Fourways | • New River Arms | • The Comet | |
| • French Horn Lane | • Nightingale Road | • The Dome | |
| • Friars Walsh | • Norton Way | • The Noke | |
| • Galley Hill | • Old Hatfield | • The Old Pond | |

Cancelled Route Numbers, Diversion Route Signage & Alterations To Existing Signage

- 20.1** Guidance regarding cancelled route numbers, diversion route signing and alterations to existing signing is in the [TSM](#).
- 20.2** Sign alterations should be carried out using over-stickers unless the sign construction allows for plank replacement, in which case plank replacement is preferable. The over-sticker should match the existing sign face material. Over-plating should not be used unless agreed with HCC.
- 20.3** Permanent diversion routes shall be agreed with HCC.
- 21.3** On P2/M1 roads the amount of signage used on central islands shall be kept to a minimum. See the Place & Movement grid.
- 21.4** The painting of kerbs is not necessary, introduces a maintenance liability and cannot be an effective substitute for appropriate signs.
- 21.5** Placing of reflectors or road studs on the kerbs is not permitted as they may be mistaken for carriageway studs and users may expect to be able to run over them.

Central Islands Signage and Markings

- 21.1** The use of central islands should be carefully considered as they are a maintenance liability and can cause problems for cyclists.
- 21.2** Current guidance always requires central islands to be clearly visible to approaching vehicles, which should be taken care of by providing reflective white lines alongside the island, illuminated or reflective bollards and in some circumstance's additional signs, road studs, beacons and street lighting.
- 21.6** Painted kerbs may similarly be confused with carriageway markings, but there may be circumstances where they could be of benefit such as locations without an electricity supply, sites where incidents are occurring and sites prone to poor visibility conditions, such as fog and mist. However, the long-term maintenance implications should be considered.
- 21.7** Solar powered illuminated bollards, non-illuminated bollards, additional signs and road markings could be more effectively used to improve the location.

Non-illuminated Bollards

- 22.1** Flat, self-righting and other retro reflective and other non-illuminated bollards, complying with the appropriate British Standards, may be erected by HCC under general powers, so long as they do not incorporate a traffic sign.
- 22.2** If a traffic bollard incorporates a sign the current [TSRGD](#) requires that it be illuminated in certain circumstances.
- 22.3** Prior to the use of non-illuminated bollards, the incident history needs to be investigated and any road safety issues addressed. It is likely that only sites within the urban areas will be suitable for non-illuminated bollards.
- 22.4** It is essential that the street lighting inventory is amended to reduce maintenance and energy charges.
- 22.5** HCC can advise on where it is acceptable for non-illuminated bollards to be installed and the risk assessment process that must be undertaken before this can happen.

Temporary Signing for Roadworks

- 23.1** Street works not properly safeguarded pose a hazard for people with limited mobility and particularly partially sighted pedestrians. Strict guidelines relating to this can be viewed in [DfT's document 'Inclusive Mobility'](#).
- 23.2** Signing for roadworks shall meet the guidance laid down in the [Traffic Signs Manual](#) and must meet the requirements '[Safety at Street Works and Road Works: A Code of Practice](#)' and shall be maintained during the period of works.
- 23.3** All plate signs and internally illuminated signs shall be constructed to a similar standard as a permanent sign.
- 23.4** The size and siting of roadwork signs are described in [TSM](#) Chapter 8.
- 23.5** All sign faces should be Class RA2 / R2 reflective material as a minimum, except for information signs, which should be manufactured in NR1 material.
- 23.6** Unless otherwise directed by the Overseeing Organisation all signs shall be mounted with a clearance of 600mm from the kerb and on high-speed roads (50mph+) a clearance of 1200mm is to be used.

- 23.7** All signs erected in the verge or footway shall have the minimum height clearance as stated in the [TSM](#) - Chapter 1.
- 23.8** The Scheme Promoter may propose to fix signs in 'A-frames' or fasten the signs on to posts, in which case they shall submit the post details and the fixing arrangements with his traffic management proposals.
- 23.9** Signs erected in free standing frames shall be heavily weighted down with sandbags and the potential for theft, vandalism and overturning shall be considered when choosing the mounting method and exact location.
- 23.10** Any signs fixed on temporary posts in verges or footways shall have the ground reinstated after removal.
- 23.11** When road or lane closures are not in place the Scheme Promoter shall cover, overturn (if safe to do so) or remove from site, any diversion signs.
- 23.12** The Contractor shall ensure that 'No Road Marking' signs and temporary 'Give Way' signs are erected in the appropriate areas where the road markings have been removed.
- 23.13** See also Paragraphs 33: Temporary Road Markings and 36: 'General Requirements for Reviewing And Replacing Signs or Road Markings' below for further guidance relevant to roadworks.

General Requirements for Other Temporary Signs

- 24.1** Temporary signing schemes shall only be erected with written approval of HCC and undertaken by a contractor who has public liability insurance to carry out works within the highway and who is approved by HCC.
- 24.2** A named contact will need to be provided to answer queries on the signing and have the authority to amend or remove the signs if requested by HCC.
- 24.3** Signs will only be approved from the nearest classified road.
- 24.4** Signs provided by the AA, RAC and other contractors are acceptable subject to DfT guidelines.
- 24.5** The cost of sign provision and removal will be covered by the promoter of the event or development.

Signing Events

- 25.1** Signing for special events should be in accordance with the [DfT Traffic Advisory Leaflet 04/11](#). HCC confines the wording to the location of the event and does not allow advertising of any sort, for example signing for a 'Computer Fair' at North Hertfordshire College would only use 'North Hertfordshire College' as the destination on the signs.
- 25.2** Dates of events shall not be included on temporary sign faces.
- 25.3** Erection and removal will be within five working days of the event unless there are special management reasons for this to be extended.
- 25.4** The maximum duration of signage for an event should be no longer than a period of six months.

Signing Housing Developments

- 26.1** Signing for housing developments under construction is included within the current [TSRGD](#). Further can be found under section U3.7 in [TSM Chapter 8](#).
- 26.2** All new development signs that receive authorisation will contain the name of the site only. No reference will be made to the developer, number or type of housing.
- 26.3** The lorry symbol is to be used when only construction deliveries to a new development are to be signed or where construction deliveries have a separate route from sales traffic.
- 26.4** The house symbol is to be used for sales traffic routes. Both symbols may be used on the same sign if the need for lorry symbol is recognised as above.
- 26.5** Signs will only be approved for a period of six months at a time. For developments in excess of six months, extension requests are required once the original duration has expired.
- 26.6** Temporary signs for new housing developments must be removed within 6 months of completion of the development.
- 26.7** The naming of streets on developments and numbering of dwellings on them is described below.

Street Naming & House Numbering on Developments

- 27.1** [Manual for Streets](#) gives general guidance on nameplates at paragraph 9.3.13. Key issues are that street names, dwelling or unit numbers should be taken into account when planning the layout configuration as a whole. Main dwelling entrances and numbers should be easily identifiable. The design should minimise the need for signposting to avoid sign clutter.
- 27.2** Street names and house numbering must be agreed with the local district or borough council. Street name plates must be provided and erected to the requirements of the appropriate district or borough council prior to any development being occupied.
- 27.3** Name plate signing will normally be required on both sides of a junction and facing the exit from the connecting road.
- 27.4** Name plates should be fixed to permanent structures abutting the highway wherever possible. If this is not achievable, and it is necessary to support them on posts, the back of the posts should be coincident with the highway boundary.
- 27.5** Where a road is private, the name plate should state this clearly below the street name.

- 27.6** Well thought out property naming and numbering will facilitate the effective delivery of services from both a public sector and private sector perspective and, in particular, ensure that that the emergency services are able to locate any address to which they may be summoned. All Streets are recorded in the [National Street Gazetteer](#) (NSG) and all addresses are recorded in the [National Land and Property Gazetteer](#) (NLPG).

New Road Layout Signs

- 28.1** These would be typically for signing permanent changes to road layouts or signals.
- 28.2** They shall only be installed for new schemes and for no longer than three months.
- 28.3** Signs of this nature, [TSRGD](#) ref 7014 will have a date stamp indicating the 'remove by date'. If the sign does not have this date on it shall be removed as soon as possible.

Passively Safe Signposts

29.1 The severities of incidents for vehicle occupants are affected by the performance of support structures for items of road equipment under impact. Based on safety considerations, these can be made in such a way that they detach or yield under vehicle impact.

29.2 Passively safe structures are those that are designed to yield or detach under vehicle impact to limit injury to the vehicle occupants or other road users.

29.3 Passively safe signposts should be used rather than erecting safety fence or road restraint systems, which will constitute a Departure from Standards.

29.4 Typically, passively safe signposts can be appropriate at locations such as:

Services in the verge where the safety barrier posts would be located;

- Roundabouts where there is not enough room for full safety barrier provision, or any safety fences would be vulnerable to full frontal impact;

- Locations where safety fences or signs have been hit in the past. Some types of passively safe posts, columns and traffic signal posts are much easier to replace than barriers, signs and traffic signal posts or columns cast into the foundation;
- Nosing's and splitter islands where safety fence end ramps may be a hazard or safety fences difficult to install. However, dependent on the layout and type of equipment, a post or column may be displaced into the adjacent carriageway by an impact (a formal departure from standard must be submitted to HCC before using passively safe posts or columns at such locations to enable the layout and safety case to be reviewed);
- Where verge width is inadequate for both a sign, traffic signal or column and a safety fence or barrier. If a barrier is still required for other reasons and the signpost/column cannot be located outside the working width, then a passively safe device may be used. If the signpost/column is in the verge then any type may be used, but if no hard shoulder exists and the post/column could fall into the live carriageway of a heavily trafficked road then only energy absorbing devices should be used to avoid causing a secondary incident;

- Passively safe posts to traffic signals are a suitable and often a preferred solution where impacts are likely at 90 degrees to any safety fence guarding traffic lights or where full approach safety fences cannot be provided for all the anticipated traffic movements.

29.5 Passively safe signposts should not be used in central reserves and reserves between parallel carriageways where, following an incident, the post, column, sign face, could be displaced into the adjacent carriageway and cause a secondary incident. If the central reserve is of enough width to consider that following an initial incident there is no risk of a secondary incident, appropriate passively safe devices may be used but excluding slip bases/shear bases.

29.6 In order to ensure passively safe behaviour, it is necessary to consider the whole area. This is likely to involve, for example, either moving posts and cabinets out of the possible path of errant vehicles and using passively safe equipment.

29.7 Where a sign is mounted on signposts to [BS EN 12767:2019](#), a permanent safety barrier would not normally be required to protect a vehicle from any impact with the sign.

29.8 An increasing choice of passively safe structures are available. Each one will need to be judged on its merits and cost effectiveness, not just cost of the posts but also cost of installing the posts as some require a more complex

foundation. Potential conflict with utilities' plant should also be considered.

29.9 'Design for Maintenance' will also need to be considered where the ease of replacing the structure, such as possible problems with dust if cutting is required following a collision, will need to be considered.

29.10 Tubular passively safe signposts shall be provided with a purpose made post cap, coloured to match the post, to prevent ingress of water.

29.11 Passively Safe Posts of a lattice construction are permitted provided they comply with other 1200 series requirements and are [Highway Authorities' Product Approval Scheme](#) (HAPAS) approved and shall be installed in accordance with manufacturers' recommendations.

29.12 Signposts protected by a safety barrier with a working width and layout appropriate to the safety barrier required need not be passively safe.

29.13 Tubular steel or aluminium posts of equal or less than 89 mm nominal diameter and 3.2 mm nominal wall thickness are deemed to satisfy [BS EN 12767:2007](#). Tubular posts or columns with a larger nominal diameter or a thicker wall thickness at or within 1 metre above ground level are classed as 'larger posts' in assessing the need for safety barrier.

Hazard Marker Posts

- 30.1** The colour of hazard marker posts shall be black, having a white horizontal band between 225mm to 350mm deep.
- 30.2** The posts shall be 550mm to 1000mm high above ground level and present a projected width of not less than 100mm wide, with reflectors on one or two sides.
- 30.3** Hazard marker posts shall be installed in accordance with the manufacturer's instructions and, where the option is available, sockets shall be used.
- 30.4** The hazard marker posts shall be either hollow or flexible as described below:
- Hollow hazard marker posts shall be constructed of tough, hard-wearing polymer and shall comply with the requirements of [BS EN12899-3](#)
 - Flexible hazard marker posts shall be of engineering grade, high impact-resistant thermoplastic and shall comply with the requirements of [BS EN12899-3](#). The posts shall be installed with retaining anchors both sides at the base. Following impact, the posts shall return to the upright position.

- 30.5** Reflectors shall be Class RA 2 or micro-prismatic material to comply with reflectivity standards BS EN12899.
- 30.6** Reflectors shall be the size and colour as described in the [TSRGD](#) diagram numbers 560 or 561 fixed to the post to comply with the marker post manufacturer's instructions.

Maintenance ID Numbers

- 31.1** Signs and non-illuminated bollards shall be labelled on the back face by the Scheme Promoter with a Maintenance ID Number to a numbering system agreed with HCC.
- 31.2** The labels shall consist of a neat rectangular white background, with black gloss numbers sized as follows:
- Central reserve - 75 mm high & 40 mm wide.
 - Verge – 50 mm high & 40 mm wide.
- 31.3** The labels shall be manufactured from one-piece UV stabilised self-adhesive vinyl.

Road Studs

32.1 Permanent reflective road studs are required in roads which are not in full night lighting, high speed roads and where circumstances dictate that they are required for safety reasons.

32.2 There are several additional guidance documents to the [Traffic Signs Manual](#) for specific circumstances such as mini roundabouts, pedestrian crossings, or traffic calming. Scheme Promoters shall ensure that they use the latest guidance published by the DfT and HA, which includes the [DMRB](#), [MfS](#), [Local Transport Notes](#) and [Traffic Advisory Leaflets](#).

32.3 Only studs falling into a category of [BS EN 1463](#) or that hold a current statutory approval by the Secretary of State shall be used on any adopted road.

32.4 Reflective road studs shall be:

- Circular units 100 mm maximum diameter.
- Domed toughened glass units milled into the carriageway to a maximum depth of 24 mm
- Designated with Performance Rating S1 or R3
- Coloured and spaced to the requirements of the [TSRGD](#) and [TSM](#)
- Fixed as recommended by the manufacturer.

32.5 Cavities for installation of inset road studs shall be cut by mechanical milling only.

32.6 Fixing of studs shall not proceed during adverse weather conditions without the written instructions of HCC.

32.7 When fitting new reflector pads into existing inset studs, all detritus shall be removed before fitting each new pad.

General Requirements for Road Markings

33.1 The colours of lines will be chosen in accordance with the current [TSRGD](#) and follow the guidance outlined in the [TSM](#).

33.2 Special attention should be paid to the selection of colours in conservation/environmentally sensitive areas which may differ from standard colour choices, these alternative choices can be found in the [TSM](#).

33.3 Road markings for existing surfaces shall generally be made of thermoplastic material, unless otherwise agreed with HCC.

Methyl methacrylate or similar shall be used for marking fresh road surfaces

- 33.4** Road markings should be reflectorised with solid glass beads, conforming to [BS EN 1423](#), applied to the wet surface of the material.
- 33.5** All materials and solid glass beads shall be obtained from manufacturers who operate Third Party QA Schemes under [ISO 9002](#), [EN 29002](#).
- 33.6** A copy of the manufacturer's current road trial Reports to [BS EN 1824](#) for road markings shall be submitted to the Overseeing Organisation prior to laying
- 33.7** In addition to the [Specification for Highway Works \(SHW\)](#), road markings shall also comply with the performance requirements of [BS EN 1871](#) and [BS EN 1436](#). When requested by the Highway Authority, materials shall undergo a road trial in accordance with [BS EN 1824](#) and have attained a role over class P1.
- 33.8** Where required, the Total Wear Index shall not exceed 30 when assessed in accordance with the [Road Safety Markings Association \(RSMA\)](#) procedure for determining wear/erosion of road markings.

- 33.9** The Developer is responsible for any testing required by the Highway Authority to ensure compliance with the relevant British Standards. Such testing is only likely to be requested for larger areas of lining.

- 33.10** White road markings should have the following minimum performance standard as defined in [BS EN 1436](#):

Luminance

BS ref.	Table 6
Class	B3
Value	0.4

Skid Resistance

BS ref.	Table 7
Class	S3
Value	55

Retroreflectivity

BS ref.	Table 3
Class	R3
Value	150

Retroreflectivity

BS ref.	Table 3
Class	R4
Value	200

Retroreflectivity

BS ref.	Table 4
Class	RW3
Value	50

Retroreflectivity

BS ref.	Table 4
Class	RW4
Value	75

- 33.11** Where there is a requirement for enhanced retro-reflectivity for yellow products, products complying with the following retro-reflectivity performance levels shall be used

Retroreflectivity

BS ref.	Table Class RL
Class	R1
Value	80

- 33.12** The width and thickness tolerances for screed, spray, pre-formed and extruded white or yellow lines shall be in accordance with the current [TSRGD](#).
- 33.13** Road Markings at pedestrian crossings shall comply with [TSM](#) Chapter 6.

- 33.14** Superimposed white stripes at pedestrian crossings shall be of a nominal width as directed by the Overseeing Organisation and shall conform with the requirements of [TSRGD](#) and [TSM](#) Chapter 6 and any subsequent amendments thereto.

- 33.15** The road marking shall be firmly bonded to the underlying surface.

- 33.16** Road markings shall not be laid on new concrete surfaces before 28 days curing has occurred and, for all concrete surfaces, the surface shall have a minimum 48 hours of a dry condition to ensure minimum moisture content. Temporary supplementary signage shall be erected pending the application of double white line systems (e.g. signs indicating 'no-overtaking').

- 33.17** The Contractor shall be responsible for light hand sweeping except when HCC agrees that mechanical sweeping is necessary for the removal of excessive detritus or loose chippings.

- 33.18** On completion of each day's work the road shall be left clean and free from any surplus material spilled during the progress of the work. All markings shall be uniform and free from streaks or blisters and shall be free from raggedness at the edges.

33.19 Trimming of edges, where necessary shall be undertaken as the work proceeds.

33.20 Arrows associated with solid line systems shall be replaced no later than 48 hours after the completion of the adjoining continuous white line.

33.21 Yellow Markings shall be laid to reflect the requirements of the associated Traffic Regulation Order (TRO) and the dimensions identified therein.

33.22 It should be noted that changing the road geometry through a junction improvement may change the termination points for yellow lines under the existing TRO. If this is not an acceptable outcome, then the TRO will need to be reviewed and, potentially republished.

Temporary Road Markings

34.1 When the works necessitate a reduction in carriageway width, or other temporary diversions are implemented, existing road markings shall be removed and temporary markings applied as necessary to adequately define the temporary traffic lanes.

34.2 Temporary road markings required for temporary diversions of traffic shall be prefabricated reflectorised material.

34.3 Black prefabricated material shall be used for the temporary covering of existing road markings. Black paint is not acceptable.

Painted Speed Limit Roundels On The Carriageway

35.1 The use of a speed limit roundel marking to remind highway users of the speed limit in force is prescribed in the [TSRGD](#). Further guidance on use of the marking in association with upright speed restriction signs can be found in the [TSM](#) Chapter 3.

35.2 Painted roundels shall not be used in association with an advisory speed limit.

35.3 Painted speed limit roundels are generally used for 20mph areas, but shall be considered a departure from standards for other speed limits and therefore need to be agreed by HCC, prior to implementation given there are several disadvantages and limitations in their use:

- They are not highly effective at reducing speeds, unless used with other features
- Other measures might be needed to maintain speed reduction
- Cannot be used as a 'repeater' within lit 30 mph areas
- Long term maintenance liability, particularly if coloured surfacing used as a background.

35.4 Monitoring has found that roundels can be effective at reducing speeds by around 3 mph in 40 mph limits, but no significant reductions were observed with the use of 30 mph roundels.

35.5 If 30 mph speed limit roundels are to be used it is expected that they will be limited to the following situations and as a speed reducing feature:

- As an integral part of a traffic calming or gateway feature where a persistent problem occurs with injury incidents resulting from speeding traffic.
- Only where a legally enforceable speed limit change.

35.6 Roundels will be white, without a background or simulated sign face colour. Further visual enhancement will only be allowable if carried out in conjunction with traffic calming features to provide a consistent theme throughout the scheme.

Access Protection 'H Bar' Markings

36.1 Access protection markings (APMs) are white 'H' shaped lines, sometimes called H bars, painted onto the road to draw attention to a driveway or access. These white lines are advisory markings and have no legal standing. HCC will consider the application of white H bar markings when an applicant is unable to take further action and a proven persistent problem of obstruction exists. Typical locations include:

- A high commuter area, with proven parking issues.
- Car park entrances.
- Community centres.
- Where businesses and deliveries will be significantly impacted.
- Dropped kerbs where a crossing point for pedestrians is persistently obstructed, preventing its use.
- Opposite driveways, but only in exceptional circumstances and in liaison with the police

36.2 Hertfordshire County Council does not install H bars in the following circumstances:

- Outside schools to ease pick up and drop off time.
- Within Disabled Parking Bay areas.
- When the site is not proven to have a regular and/ or significant parking problem.

36.3 The marking is not legally enforceable, however, if used sparingly it can be helpful in discouraging inconsiderate parking, particularly where a problem is isolated and a traffic regulation order could not be justified or easily enforced.

36.4 For all H bar applications, the following evidence is required:

- Dates and times that parking is an issue.
- If applicable, log numbers from the police.
- Evidence of parking issues as a regular occurrence
- Well-used shopper, pedestrianised or hospital parking zones/ areas

36.5 Hertfordshire County Council reserves the right to charge the applicant for the applicant for an H bar, including a commuted sum, where necessary. However, costing should only be passed to the applicant if the lines were painted on a bespoke basis, rather than as part of a larger scheme.

Disabled Parking Bays

37.1 HCC will consider applications to provide disabled parking bay markings close to properties where a resident's mobility is severely impaired so that they need to park their car immediately outside their home.

37.2 Any disabled parking bay provided under these circumstances is advisory only. Other motorists are not legally excluded from parking in the bay and no legal order will be created. Nevertheless, these markings are generally well respected by other road users due to the stringent criteria necessary to qualify for a disabled parking bay. These bays can be used by any blue badge holder and they are unenforceable.

37.3 A disabled parking bay will be marked on the road in white paint to accommodate a car. The word DISABLED will be written alongside the bay on the road. They will not have a restriction sign - showing the blue disabled symbol - accompanying them.

37.4 Disabled bays provided by Hertfordshire County Council are advisory only and as such non-enforceable.

37.5 Any blue badge holder may park with an advisory bay as they are not individually assigned, and their operation relies upon the goodwill of other non-disabled drivers.

37.6 Disabled bays that are controlled by a traffic management Order are usually provided near shopping centres and transport nodes and are enforced by the relevant district or borough council. Such bays will have post and blue plate allowing disabled parking only.

General Requirements for Reviewing And Replacing Signs or Road Markings

38.1 Signs and road markings shall not be replaced like for like without first checking whether they:

- Will comply with the latest [TSRGD](#) requirements to see if the replacements are compliant.
- Remain relevant for the current conditions
- Can form part of a more efficient signing regime aimed at decluttering and / or picking up other local requirements

38.2 Where a new sign is to replace an existing then the existing sign and post(s) are not to be removed until the new sign arrangement is erected, unless otherwise agreed by the Highway Authority.

38.3 Signs in good condition should be re-used where possible, subject to the approval of HCC.

38.4 Traditionally, direction has been given to small individual premises, but these are not being replaced or renewed by HCC. Subject to budget they will be removed when they fall into decay, or if new signage renders them obsolete.

38.5 There is a potential option to add such minor destinations to street name plates when these are replaced e.g. Fenn Street (leading to Fenn Street School). This type of signing is low priority and, as such, the Scheme Promoter will be asked to contribute towards costs.

38.6 Where cover plates are required over part or whole of sign plate shall be compatible with and constructed from the same material as the manufactured sign plates to which they are to be affixed.

38.7 In certain circumstances, it may be necessary to cover signs temporarily to avoid causing confusion to traffic. In such circumstances, the Scheme Promoter shall be responsible for covering the signs. This shall be agreed with HCC.

Removal of Illuminated Signs

- 39.1** Lighting units can be removed from existing illuminated signs no longer requiring illumination under the current [TSRGD](#) and replaced with reflective signs. This will need to be agreed by HCC prior to any works being carried out.
- 39.2** Signs that are currently illuminated in areas where it is deemed that this illumination is unnecessary will be removed and replaced with highly reflectorized signage.
- 39.3** Where existing illuminated traffic signs are to become non-illuminated or are due to be removed, all existing cable from the supply, terminations and sub-fuse should also be removed.
- 39.4** Where the supply is from a Local Electricity Company the Scheme Promoter shall arrange for the sign to be disconnected by that Electricity Company.

Rationalising Duplicate Warning Signs

- 40.1** Where possible, duplicates of warning signs should be removed.
- 40.2** Where signs have been installed resulting in multiple upright signs at the same location removal of the older duplicates should be carried out.
- 40.3** The exception to this is dual carriageways there can be some merit in having a duplicate each side of the carriageway.

Slippery Road Ahead Signs

- 41.1** HCC's Skid Resistance Policy is that 'Slippery Road Ahead' signs have unique reference number on the rear and should not be removed, unless instructed by HCC's Safety Team.

Removing and Relocating Road Studs

- 42.1** Where road studs are to be removed from the carriageway, any resulting void shall be filled immediately with bituminous material with a surface course material suitable to the location chosen from the options available in Part 4 Chapter 1: Carriageway, Footway and Cycleway Construction.
- 42.2** Inset studs shall be removed by cutting around the perimeter of the stud. Levering out of position shall not be permitted.
- 42.3** Inset studs set aside for reuse shall be stacked neatly in positions to cause no hazard to highway users.
- 42.4** Inset studs to be lifted and re-fixed in a new cavity only shall be thoroughly cleaned and inspected before re-fixing. Any studs found to be damaged shall be rejected and removed by the Scheme Promoter to a licensed tip.

Removing or Replacing Road Markings

- 43.1** Existing road markings that require removal shall be removed mechanically.
- 43.2** All arisings should be removed during the process.
- 43.3** Removal using hot compressed air should not be used.
- 43.4** The mechanical removal of shaped and worded road markings should create a square or rectangular patch (picture framing), such that it is impossible to detect what the original road markings depicted, in all weather conditions
- 43.5** Where a marking is required to be laid on top or partially on top of an existing marking, the combined total thickness shall not exceed 6mm as detailed in current [TSRGD](#), and any superseded marking shall be either permanently removed or totally covered by the new marking.
- 43.6** It is important that yellow lines removed for resurfacing works and the like are restored exactly to their original location (unless the TRO is changed, or the road geometry has changed as described earlier in this chapter). Accurate records should be taken prior to their removal. Marking the positions on existing kerbs is not acceptable if the kerbs are to be moved or replaced.
- 43.7** Yellow markings shall be the uppermost marking. White markings shall not be laid over yellow markings.

Electric Vehicle Charging Points

- 44.1** [Electric Vehicle \(EV\) charging point](#) signing to be in accordance with TSM Chapter 3 section (or paragraph) 13 :16. Symbols should be min 100mm ([TSRGD](#) says 75) and 200mm max and for x-height to be 30mm.

Appendix 17/1: Signpost, Post Foundation & Base Plate Sizing

Sign Foundations

- 1.1** The length and width of the foundation for each post is as follows:

	2m height to centre of sign	3m height to centre of sign	4m height to centre of sign	5m height to centre of sign
1 sq m sign	0.6m	0.6m	0.6m	0.6m
2 sq m sign	0.6m	0.6m	0.6m	0.6m
4 sq m sign	0.75m	0.75m	0.75m	0.75m
8 sq m sign	0.75m	0.75m	0.9m	0.9m
12 sq m sign	0.9m	0.9m	1.05m	1.05m
16 sq m sign	0.9m	1.05m	1.05m	1.2m

1.2 The depth of the foundation for each post is as follows:

	2m height to centre of sign	3m height to centre of sign	4m height to centre of sign	5m height to centre of sign
1 sq m sign	0.6m	0.6m	0.9m	0.9m
2 sq m sign	0.9m	0.9m	1.2m	1.2m
4 sq m sign	1.2m	1.2m	1.5m	1.5m
8 sq m sign	1.5m	1.5m	1.8m	1.8m
12 sq m sign	1.8m	1.8m	2m	2m
16 sq m sign	1.8m	2m	2m	2m

Base Plates

2.1 Base plates for straight posts, where provided, shall be to the sizes as set out below:

Post diameter (mm)	Post area (square mm)	Area x 5 (square mm)	Square root of area (mm)	Minimum plate size (mm)
76	4536	22682	150	150 x 150
89	6221	31106	176	176 x 176
114	10207	51035	225	225 x 225
140	15393	76969	277	277 x 277
168	22167	110835	333	333 x 333

2.2 For posts which have a base housing specially adapted to accommodate electrical equipment. (i.e. illuminated signs):

Post diameter (mm)	Post area (square mm)	Area x 5 (square mm)	Square root of area (mm)	Minimum plate size (mm)
168	22167	55418	235	235 x 235

Appendix 17/2: Detailed Design Requirements and Practical Design Tips for Direction Signs

Determining Sign Colour

1.1 Table 1 contains information on how to select a colour for large traffic signs.

1.2 In general, the overall colour of a sign is dictated by the classification of the route which the sign is placed on. There are a few exceptions if the sign indicates a different purpose i.e. Tourist or Lorry signage.

Category	Sign colour	Notes
Motorway (Trunk)	Blue background, white text, route numbers and border	Managed by National Highways
Primary Route Both Trunk Roads and certain important A Class roads. (less strategic than the Strategic Road Network (SRN) & new Major Road Network (MRN))	Green background, yellow route numbers, white text and border	Not all A-roads are part of PRN. HCC staff and associates can check using the WebMaps system. Third parties should enquire of the HCC Network Management team. Can be managed by either National Highways or HCC

Category	Sign colour	Notes
Non-Primary route All other routes (and including less strategic A Class roads)	White background, black text and border	The majority of HCC's network
Cycle and or pedestrian route	Blue background, white text, route numbers and border	Specific route numbers can be red panel with white text. In Hertfordshire this is only the National Cycle Network
Tourist Attractions and Points of Interest	Brown background, white text, white border	
Lorry signage	Black background, white text, white border	
Ministry of Defence signage	White background, black text, red border	

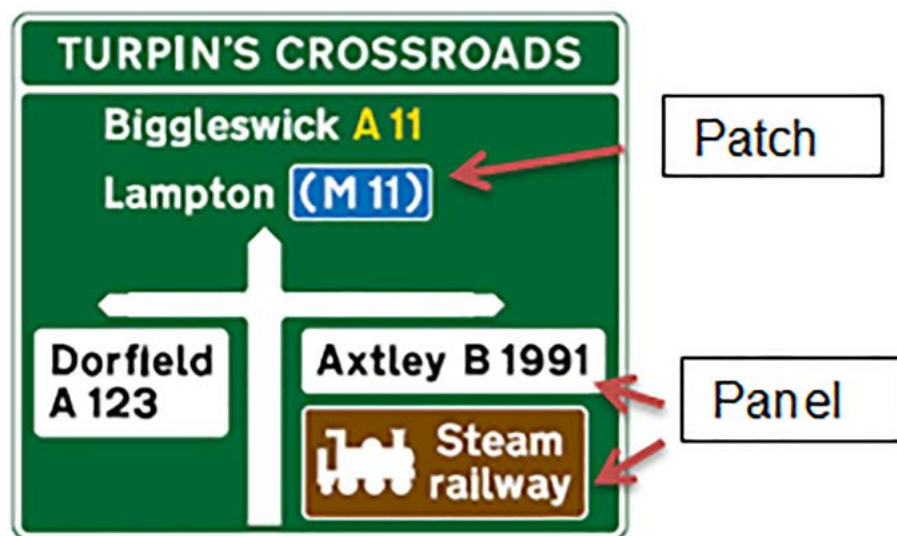
Table 1: Colour of large signs

- 1.3** A direction sign placed on the arm of a roundabout or road leading away from a junction will reflect the status of the road that is indicating or pointing at. This example shows a Direction Sign on a non-primary route



Patches and Panels on ADS

- 2.1** Panels are to indicate a route which has a different status to the one that the vehicle is travelling on, or provide specific information (e.g. Tourist, Cycle or Lorry).
- 2.2** Patches are used when the vehicle needs to follow a specific route to reach a destination of a higher category. In this example, Lampton is reached via the M11 but the A11 road ahead leads to Biggleswick.



- 2.3** Patches are not applied to panels because the route number is already included within a panel
- 2.4** A patch is only used where the route number being put in the patch is of a higher category road than the one being turned onto by following the signage. The route number will always be in brackets as this indicates the secondary route drivers should get on to reach their destination.
- 2.5** A blue patch can be on green signs and white signs; green patches can be on white signs only. There are no white patches.
- 2.6** Panels can have text (destinations), route numbers and symbols. Patches only have route numbers.
- 2.7** Direction signs are NOT permitted to have panels coloured blue, green or white. There are many instances around the County where these have been installed wrongly.

- 2.8** This sign has a green background because road is primary route. However, the destinations to the left or right are reached by a non-primary route so white panels are used. Drivers travelling straight on at the junction drivers will still be on a primary route so no panel is required.



- 2.9** This sign is on a non-primary route. Destinations to the left and right are access by travelling along a primary route and so the green panels are used. Travelling straight ahead follows a non-primary route.



- 2.10** This sign shows that the vehicle is travelling along a non-primary route. Destinations to the left are a mixture of destinations along non-primary and primary routes. The road existing to the left (B1616) is a non-primary route. To get to Milport, vehicles travelling along that route will need to follow signs for the A112 at the appropriate point.

To reach London, vehicles will need to continue ahead and follow signs leading to the M1, which is a higher category of route and requires a patch.



Brackets

- 3.1** A route that is bracketed means that to get to that destination, vehicles will need to follow the secondary route in the brackets.
- 3.2** In this example, Longchurch is accessed by travelling straight ahead along the A11, and then at some point drivers will need to use B1144 to get there. The same principle applies Axtley, as drivers would need to travel along the A123 from this junction, and then use the B1255 to reach it.



Diversionary Routes

4.1 Diversion routes are indicated using these symbols. They are associated with temporary closures of a route for when, say the M25 needs to be closed. The police or National Highways can then indicate to drivers that they can re-join the M25 at a later point by following the relevant diversion symbols along different roads to avoid the closure.



4.2 There is no specific meaning to any particular symbol and a variety is provided when diversions would intersect or cross another signed route. This is to avoid vehicles following the wrong diversion should multiple diversion routes cross. Care is needed when planning temporary diversion routes so as to not duplicate existing signed routes.

4.3 It is important to check that the sign being designed or ordered for a new diversion is not already on a permanent diversionary route used by either National Highways or HCC.

4.4 Generally a diversion symbol will already been in place on a nearby sign. If it is present, it is important to retain it. Sometimes the symbols are attached retrospectively so the position on the existing sign should be checked according to the advice in [Traffic Signs Manual \(TSM\) Chapter 7](#).

Continuity of Signage

5.1 A successful route signing strategy is based on the principal of continuity. At any point along a route a driver can get lost if the key information is missing or made overly complicated.

- 5.2 Large traffic signs are expensive to install and maintain and designers must pay due attention to the layout of the signs they are designing and/or checking. When adding single signs along a route designers **MUST** check that a continuous route is possible.
- 5.3 How far a destination should be signed from is a matter of judgement so designers should check for gaps before committing new large signs to the network. In some cases the production of a route sign strategy in plan form should be produced and agreed with a signing expert or lead within the organisation.
- 5.4 Redundant destinations must be removed when specifying new signs. Service providers have a habit of relocating services without considering the need to update road signage.
- 5.5 It is vital that the spelling of road or place names is correct.
- 5.6 If in doubt **MULTIPLE** sources of information should be sought for clarification.
- 5.7 If anomalies with the way a place or street is named across the multiple sources are found then the anomalies should be reported to both HCC and the relevant district or borough council and clarification sought.

Destination Order

- 6.1 There is a general principle with traffic signs that destinations furthest away are placed at the top of list of destinations (route confirmatory signs are an exemption). This is so that vehicles travelling to a long-distance destination can locate their route on a complex sign.
- 6.2 Therefore a driver travelling along a long-distance route will be able to locate their destination at the top of the sign with nearby places dropping off the bottom of the list as they pass them.
- 6.3 There is some subjectivity in ordering of destinations that are close to one another so in these cases be consistent and use approximations.
- 6.4 In all cases the maximum number of destinations on a large sign should be limited to six. This is to avoid drivers braking when faced with an overly complex sign.
- 6.5 Not all destinations need to be listed. As drivers could be told to follow signs to X and then Y rather than have destinations listed from far away. When faced with an overly complex signing situation seek advice from a signing expert or lead within the organisation.

- 6.6** For recognised destinations please refer to Para's 4.1.4 & 4.1.5 of [Local Transport Note \(LTN\) 1/94](#). An updated national list is available from the gov.uk website.

Distances

- 7.1** While the temptation may be to place signs with accurate distances it is rarely useful to drivers. A sign to the nearest yard will be rarely useful to a vehicle travelling at multiple yards per second. Distances on signs must follow published guidance outline in [TSM Chapter 7](#) and [LTN 1/94](#) Paras, 4.2.5, 4.3.10 & 8.1
- 7.2** The main points of [LTN 1/94](#) are summarised as
- Distances greater than 3 miles should be rounded to the nearest mile
 - Distances less than 3 miles should be to nearest ¼ mile.
 - If the destination is not a town or village yards may be used up to 800 yards and be rounded to the nearest 10 yards.
- 7.3** Check [LTN 1/94](#) for further information when designing gantry, route confirmatory of grade-separated junctions.

Replacing Signs

- 8.1** Signs and road markings must not be replaced like for like without first checking whether they:
- Will comply with the latest [TSRGD](#) requirements to see if the replacements are compliant.
 - Remain relevant for the current conditions
 - Can form part of a more efficient signing regimen aimed at decluttering and / or picking up other local requirements
- 8.2** The following show typical errors that shall not be replicated



Errors

- A414 is not a primary route through the town.
- application of Maylands White panel



Errors

- application of green panel
- A414 is not a primary route through Hemel Hempstead.
- The primary route destination should have been applied as patch.



Errors

- panel use on Flag Direction sign.
- use of a yellow backing board as patch.



Errors

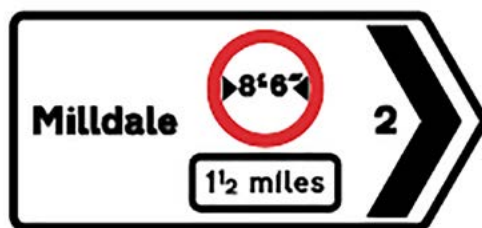
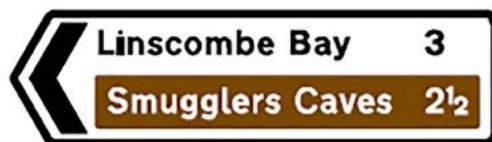
- lower sign should be green and combined as the route is a primary route.
- destinations are not ordered correctly on the lower sign, furthest destination first.



Errors

- Cricket Club and Hockey Club can be one sign (no second arrow or middle border/bar)
- Tourist information can be added to same sign plate

8.3 The following extracts from [TSM Chapter 7](#) show the correct formatting



Further Reading

- [LTN 1/94](#) The design and use of directional informatory signs. DfT 1994
- <https://www.gov.uk/government/publications/design-and-use-of-directional-informatory-signs-ltn-194> - contains an update destination link on the landing web page.
- Traffic Signs Manual Chapter 7 The Design of Traffic Signs. DfT 2019
- The Traffic Signs Regulations and General Directions 2016. SI 2016 no. 362
- [Know your Traffic Signs. DfT 2007](#)
- [Interim Advice Note 144/16 Directional signs of Motorway and All-Purpose Trunk Roads Grade Separated Junctions](#). Highways England (now National Highways) 2016
- [Interim Advice Note 145/16 Directional signs on Motorway and All-purpose Trunk Roads at Grade and Compact Grade Separated Junctions](#). Highways England (now National Highways) 2016

Chapter 18

Design and Installation of Traffic Signals & Intelligent Transport Systems (ITS)

Contents

Introduction

- 1.1 The planning application, or project's Outline Design should have identified the requirements for signaled junctions and crossings including the users that need to be provided for and their relative priorities.
- 1.2 This chapter sets out the detailed requirements for traffic signals and ITS to support final design, contract preparation and implementation.

General Design & Specification Requirements

- 2.1 ITS and signals work shall be designed and installed in accordance with the following:
 - [The Traffic Signs Regulations and General Directions \(TSRGD\)](#)
 - [BS EN ISO 9000](#) (current version) (British Standards Institution)
 - [BS 7671](#) (current version) (British Standards Institution)
 - [BS EN 12368](#) (current version) (British Standards Institution)

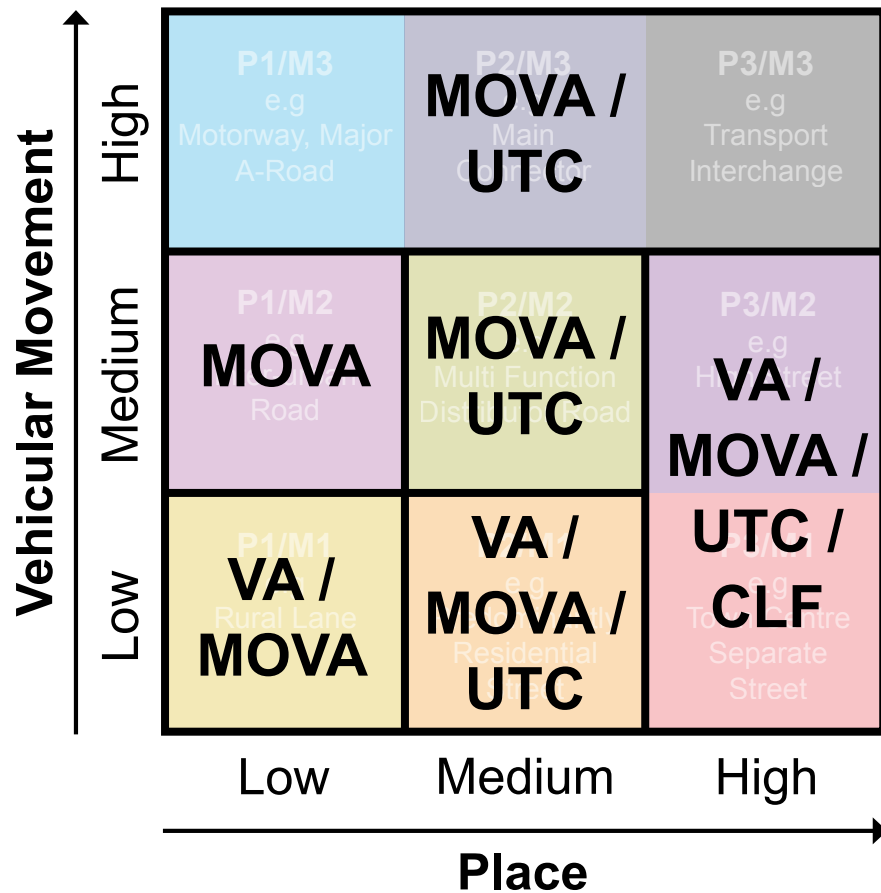
- [BS 6346](#) (not maintained but usable) (British Standards Institution)
- [BS HD 60269-2:2013 /A1:2022](#) (current version) (British Standards Institution)
- [MCE 0108 Issue C](#) (current version) (Highways Agency - now National Highways)
- [TOPAS 2505 Issue A](#) (current version) (Traffic Open Products and Specifications Ltd)
- [TOPAS 2506 Issue A](#) (current version) (Traffic Open Products and Specifications Ltd)
- [TOPAS 2507 Issue A](#) (current version) (Traffic Open Products and Specifications Ltd)
- [TOPAS 2512 Issue A](#) (current version) (Traffic Open Products and Specifications Ltd)

- 2.2 The following guidance documents should be referred to before any ITS or signals work is undertaken.
 - [Traffic Signs Manual \(DfT\)](#)
 - [Design Manual for Roads and Bridges](#) (Highways Standards)
 - [Guidance on the use of Tactile Paving Surfaces](#) (DfT)

- [Inclusive Mobility: A Guide to Best Practice on access to Pedestrian and Transport Infrastructure](#)
 - [Manual of Contract Documents for Highway Work \(MCHW\)](#) Volume 2 Series NG 1200 (Highways Standards)
 - [MOVA Application Guide 44 Issue E](#) (TRL)
 - [MOVA Application Guide 45 Issue G](#) (TRL)
 - [MCH 1542 Issue C](#) (Highways Agency - now National Highways)
 - [LTN 1/20](#) Section 10.6, which must be read in conjunction with Section 12 of [Chapter 6 of the Traffic Signs Manual](#)
- 2.3** Guidance on providing for cycle movements at signalised junctions via Toucan, Pegasus, Tiger and Sparrow crossings is given in Part 3, Chapter 4: Planning for Cycling includes a hierarchy of cycle features that may be used.
- 2.4** [LinSig](#), [TRANSYT](#) or microsimulation should be used for junction analysis using relevant traffic flows.
- 2.5** Practical reserve capacity, mean max queue, delay or equivalent will be used in the analysis process.
- 2.6** The highway geometry, signal pole and signal head positioning should be designed so as to avoid risk of 'See Through' incidents
- 2.7** All systems shall be designed to minimise energy consumption. Extra Low Voltage (ELV) systems including controller, pedestrian demand units and Central Light Source (CLS) LED type heads should be used.
- 2.8** The installation of the traffic signal equipment shall only be undertaken by a contractor certified to [BS EN ISO 9000](#) and in line with the current edition of [BS 7671 Electrical Installations](#).
- 2.9** As indicated in Part 3, Chapter 19: Planning for Intelligent Transport Systems, HCC is keen to work with industry partners or Scheme Promoters to innovate in a managed way, piloting on a small scale before mainstreaming across the county.
- 2.10** Outside such pilot initiatives signal installations shall use as much standardised equipment as possible for ease and efficiency of maintenance.
- 2.11** All designs of bus lanes and gates and sites which are eligible for camera enforcement of moving traffic contraventions shall make passive provision for enforcement apparatus. The degree of provision shall be based on the probability of need for immediate enforcement as agreed with HCC.

Methods of Signal Control

3.1 The method of control for traffic signals shall be related to the Place & Movement category in accordance with the diagram below.



Palettes

MOVA	Microprocessor Optimised Vehicle Actuation
UTC	Urban Traffic Control
VA	Vehicle Actuated
CLF	Cableless Linking Facility

Palette Specification

MOVA, UTC, VA, CLF

3.2 The methods of control shall be confirmed with HCC before design commences.

Controller Requirements

- 4.1** The controller shall be to the latest specification of the [TOPAS 2500A](#) and related appendices.
- 4.2** Provision shall be made for a 2nd and 3rd Erasable Programmable Read Only Memory (EPROM) within 6 and 12 months respectively of the original traffic signal commissioning.
- 4.3** The controller and street furniture shall be grey in colour (RAL 7023) unless the site is within a conservation area, where all equipment shall be black (RAL 9005).
- 4.4** Cabinets should be located and orientated such that opened doors do not obstruct the footway or cycleway where possible.
- 5.3** Passive provision at Puffin crossings shall be made for the potential upgrade to Toucan crossings by installing additional ducting and retention sockets for a recommended 4m (minimum 3.2m) crossing width where such future upgrade is a feasible proposition. The potential feasibility shall be agreed with HCC.
- 5.4** All traffic signal poles shall be hot dipped galvanised and plastic coated. All poles shall be grey (RAL 7023) in colour unless the site is within a Conservation Area, where all equipment shall be black (RAL 9005).
- 5.5** Fold-down poles shall be used on traffic splitter islands for ease and safety of maintenance where appropriate.

Signal Pole Requirements

- 5.1** All traffic signal poles shall be installed using retention sockets type NAL RS115DF600, RS168DF750 or RS115BD.
- 5.2** All traffic signal poles shall be positioned to ensure there is a minimum footway width as required by Part 3, Chapter 3: Planning Walking Infrastructure that all equipment has a minimum 450 mm clearance to the carriageway.
- 5.6** The latest versions of [BS EN 12767](#) and [Passive Safety UK Guidelines for Specification and Use of Passively Safe Street Furniture on the UK Road Network](#) should be adhered to when designing for Passively Safe Signal Poles.

Signal Head Requirements

- 6.1** All traffic signal heads shall be compatible with the controller in respect of lamp monitoring.
- 6.2** The lowest part of the signal head shall be 2.4 m from finished ground level for pedestrian and cycle routes.
- 6.3** Retro-reflective backing boards shall be provided on all aspect signal heads with the exception of pedestrian signal heads.
- 6.4** Regulatory box signs and green arrows shall be specified on the design drawing.

Active Travel Demand Unit Requirements

- 7.1** All pushbutton units shall include tactile devices and audible signals shall only be specified when safety reasons require their use.
- 7.2** Tactile devices shall be located on the righthand side of the pushbutton and audible signals on the left-hand side.

- 7.3** All pushbutton units shall be positioned in accordance with the orientation shown on the approved final drawings.
- 7.4** The bottom of standard height demand units shall be 1m above finished ground level.
- 7.5** The bottom of high-level repeater units where pedestrian flows are high, shall be 1.8m above finished ground level.
- 7.6** In order to achieve HCC policy aims which place cyclists, pedestrians and equestrians above drivers in the hierarchy, response times should be adjusted in favour of the crossing demand.

Vehicle Detection Requirements

- 8.1** System 'D', Stop Line, Speed Discrimination and Speed Assessment loops shall be designed in accordance with [MCE 0108 Issue C](#).
- 8.2** SCOOT (Split Cycle Optimisation Techniques) loops shall be designed in accordance with MCH 1352 Issue D.

- 8.3** [MOVA](#) loops shall be designed in accordance with [MCH 1542 Issue C](#).
- 8.4** Call Cancel, Presence, All Red, Bus Priority, Emergency Priority and Red Light Camera loops shall be detailed on the design drawing and approved by HCC.
- 8.5** MVD (Microwave Vehicle Detector) and Infra-Red detectors shall be detailed on the design drawing and shall be Type Approved and comply with [TOPAS 2505 Issue A](#).
- 8.6** Loop detector cards shall be automatic self-tuning, multi-channel, microprocessor type and shall be fully type approved in accordance with [TOPAS 2512 Issue A](#).

Pedestrian and Cyclist Detection Requirements

- 9.1** On-crossing detectors shall be detailed on the design drawing and shall be Type Approved and comply with [TOPAS 2506 Issue A](#).
- 9.2** Kerbside detectors shall be detailed on the design drawing and shall be Type Approved and comply with [TOPAS 2507 Issue A](#).

Cabling Requirements

- 10.1** All cables shall be ELV, PVC insulated, PVC bedding, galvanized steel wire armour (except twin-flex), PVC outer sheathed, orange in colour and marked with 'Traffic Signals' to [BS 6346](#).
- 10.2** Cable between the controller and signal poles shall be a minimum of 16 cores except push-button drops, which can be a minimum of 8 cores.
- 10.3** There shall be a minimum of four spare cores per signal pole and each signal head shall have two separate neutral conductors.

Ducting Requirements

- 11.1** All ducting shall be 50mm or 100mm Medium Density Polythene (MDPE), be orange in colour and marked with the legend 'Traffic Signals'.
- 11.2** Carriageway ducting shall be laid at 750mm (minimum) below finished ground level and footway/verge ducting must be 450mm (minimum) below finished ground level.

- 11.3** Inspection Chambers and duct runs under the carriageway should be kept clear of cycle lanes and pedestrian areas.

Road Markings Requirements

- 12.1** All road markings shall comply with the latest edition of [Traffic Signs Regulations and General Directions \(TSRGD\)](#) and have been laid before any slot cutting is carried out.

Tactile Paving Requirements

- 13.1** Tactile paving layouts shall comply with [DfT's Guidance on the Use of Tactile Paving Surfaces](#).

Anti-Skid Requirements

- 14.1** Skid resistance on the approaches to stop lines will be assessed in line with the [HCC Skid Resistance Strategy](#).
- 14.2** Where necessary buff anti-skid shall be provided in advance of stop lines and grey anti-skid shall be provided between stop lines and crossing studs. All road markings shall be laid on top of the skid resistant surface.

Electricity Supply Requirements

- 15.1** A single phase Distribution Network Operator (DNO) supply (230v 50Hz) shall be provided to a feeder pillar located beside the controller.
- 15.2** Fuse ratings shall be 60 amp cut-out and 25 amp fuse for traffic signal junctions and 25 amp cut-out and 16 amp fuse for pedestrian crossings in accordance with [BS HD 60269-2:2013 /A1:2022](#).
- 15.3** If DNO supply is not feasible, equipment may be fed from an existing HCC private network. This will be treated as a Departure from Standards. A separate marked and identified secondary cut-out must be provided within the existing equipment. Prior agreement with HCC is required.
- 15.4** An earth rod shall be provided and comply with the latest edition of [BS 7671](#).

Telecommunication Link Requirements

- 16.1** Remote monitoring and MOVA sites will require a 4G or 5G 5 port router capable of supporting IPsec VPN functionality along with a high gain cabinet mounted aerial. HCC will provide a SIM card for the router.
- 16.2** An Urban Traffic Control (UTC) site will require a data enabled ADSL (Asymmetric Digital Subscriber Line) BT line and router compatible with the HCC UTC system.

UTC Design Requirements

- 17.1** UTC designs should comply with HCC's UTC Design Guide which can be obtained on request from a member of the HCC Signals team.

MOVA Design Requirements

- 18.1** MOVA designs shall be comply with [TRL Application Guide 44 Issue E](#), [TRL Application Guide 45 Issue G](#), [MCH1542 Issue C](#) and all other relevant TRL documentation.
- 18.2** All MOVA designs must be accompanied by a MOVA data set.

Remote Monitoring System Requirements

- 19.1** The Outstation Monitoring Unit (OMU) equipment shall be type approved and be compatible with HCC's in-station system.

Appendix 12/5 Specification Requirements

- 20.1** The staging of the signals shall be as simple as possible to avoid confusion and to maximise flexibility of control.
- 20.2** Minimum green times for traffic phases shall be seven seconds apart from indicative right-turn green arrows and left-turn filter arrows which can be four seconds. Dummy phases shall be the minimum appropriate to their purpose.
- 20.3** Inter-greens should not be less than five seconds except for an indicative green arrow gaining right of way.

20.4 Pedestrian crossing timings shall be in accordance with [Traffic Signs Manual – Chapter 6](#). In order to achieve HCC policy aims which place cyclists and pedestrians above drivers in the hierarchy, response times should be adjusted in favour of the crossing demand.

Technical Approval Requirements

21.1 Scheme Promoters shall submit designs, specifications and supporting drawings to HCC for Stage 1 Technical Approval and for final Stage 2 Technical Approval having addressed any points raised by HCC.

21.2 All designs shall be prepared using AutoCAD and KeySIGNALS design software.

21.3 The drawings shall be 1:200 scale and use standard [BS EN12368](#) (formerly BS505) symbols.

21.4 The drawings should include, as appropriate:

- A north point
- Road names
- Signal head phases
- Pole numbers (starting at the controller and preceding clockwise)

- Cable schematic diagram
- Staging diagram
- Ducting and inspection chamber schedule
- Controller
- Feeder pillar
- Earth rod
- Poles
- Retention sockets
- Pedestrian crossing timings
- Road markings (including Stop Lines and zig zags)
- Detector loop location table
- 68 + Polished Stone Value (PSV) Surfacing
- Signal heads
- Pedestrian Demand Units
- Photoelectric cell
- All detectors
- All ducting
- Inspection chambers
- Loop pit boxes
- Crossing studs (non-slip type)
- Tactile paving
- Skid resistant wearing course
- Anti-skid or high friction surfacing

- 21.5** All detection (including Microwave Vehicle Detectors (MVD), on-crossing and kerbside detectors) shall be labelled appropriately to include phase letters.
- 21.6** Special requirements for street furniture and signalling detail (special mounting, four-in-line heads, long cowls, louvres etc) shall be detailed on the drawing.
- 21.7** A 'Key' should be provided on the drawing and should include only equipment related to the design and depict all the symbols shown on the drawings.
- 21.8** A 'Notes' section should be provided on the drawing and should include additional detailed information related to the design.
- 21.9** Specific reference shall be made to any design details that do not comply with DfT or HCC design standards etc.
- 21.10** All designs must be accompanied by an Appendix 12/5 specification in accordance with [Manual of Contract Documents for Highway Work \(MCHW\)](#) Volume 2 Series NG 1200.
- 21.11** All traffic signal designs shall be accompanied by a [TOPAS 2500A](#) controller specification.

Adoption Stage Requirements

- 22.1** On completion of the work an 'As Built' drawing shall be supplied in AutoCAD and PDF format.
- 22.2** Scheme Promoters shall furnish HCC with any spares of non-standardised ITS or traffic signals equipment for future maintenance use, as required by HCC.

Chapter 19

Designing for Utilities

Contents

Introduction

- 1.1** Part 1 Chapter 19 highlights the need for due consideration of public utility services at the planning stage of a development to ensure that adequate provision has been made for mains services within the layout and the Highway Authority will be assured that the services can be accommodated safely, without compromising the needs of all highway users.
- 1.2** This chapter provides guidance for the detailed design stage aimed at minimising risk of damage to utilities cables and plant and provides guidance for liaison with public utilities during the construction stage.
- 1.3** Consideration should be given to providing additional ducts through structures to accommodate future services.

Minimising Risk of Damage

- 2.1** All main cables and plant laid under carriageways, footways and parking areas must be ducted for ease of withdrawal and replacement in the event of damage or the need for renewal.

- 2.2** The siting of services within landscape and verges within the highway must be co-ordinated with the planting proposals to ensure that root growth will not cause damage to services. Equally, the roots of plants should not be damaged by excavation to reinstall or inspect the services.

Liaison with Public Utility Owners

- 3.1** Scheme promoters will be expected to follow the guidance set out in [Volume 2: Street Works UK Guidelines On The Positioning Of Underground Utilities Apparatus For New Development Sites \(Issue 4\)](http://streetworks.org.uk/wp-content/uploads/2016/09/V2-New-Development-Sites-Issue-4-29-10-2013.pdf) available at <http://streetworks.org.uk/wp-content/uploads/2016/09/V2-New-Development-Sites-Issue-4-29-10-2013.pdf> which sets out supply application procedures and on-site liaison a