Surrey Local Government Association

S L G A

Voice for Surrey

Surrey Design

A strategic guide for quality built environments

Technical Appendix

SHAPING SURREY'S FUTURE

TECHNICAL APPENDIX

First published January 2002

Contents

Contents

Introduction

Introduction

1. This is the *Technical Appendix* to *Surrey Design: A strategic guide to quality built environments.* It expands upon Chapter 6 – Movement and elements of Chapter 4 – Resources and Chapter 2 - Quality, of the main guide. This *Technical Appendix* has been adopted by Surrey County Council as supplementary planning guidance.

2. Surrey Design advocates a new approach to design which considers neighbourhoods comprehensively; highways and transportation are just one element. The designer should be aware that the main principles of *Surrey Design* will always apply and that the resolution of any potential conflict should be based on the principles of good design contained in the main document. Designers should exploit the minimum appropriate technical solution for any given location. There is no standard formula for designing layouts and much will depend on local context.

3. Access to development should be considered in the following order:

- Pedestrians and the mobility impaired
- Cyclists
- Public Transport
- Service Vehicles
- Cars

4. Pedestrians and cyclists should have as direct a route as possible to local facilities in order to encourage local journeys without a car. The road system should be appropriate to each individual location but should be broadly based on a lattice to maximise permeability, especially for pedestrians, cyclists and public transport.

5. Roads should be designed so that the speed of traffic is 20 mph or less. Within neighbourhoods, in larger developments there may be the need to provide for 30mph local distributor roads which perform a more important movement role.

6. This document avoids reproducing information from elsewhere and refers to the relevant publications where appropriate. The principles contained within the DTLR advice *Design Bulletin 32, Places, Streets and Movement*, and *By Design* are incorporated within this Appendix, as are relevant elements of the former volumes 1 to 4 of *Roads and Footpaths – a Design Guide for Surrey.* This Appendix reinforces a move away from overly prescriptive standards and takes the arrangement of buildings and enclosure as the starting point for layout design, rather than highway engineering requirements. It is important, however, that this is not at the expense of safety.

7. This Appendix is arranged into a number of Chapters and reflects the Objectives and Principles contained within Surrey Design. There are also Chapters relating to Highway Landscaping, Engineering Specification and Highway Adoption and Procedures. There is a section within the Engineering Specification Chapter relating to sustainable development which developers should take particular account of.

8. This Appendix replaces Volumes 1 to 4 of *Roads and Footpaths – A Design Guide for Surrey* as Supplementary Planning Guidance. It should not be read in isolation but in conjunction with *Surrey Design* and other DTLR guidance. Only then can it be seen in the proper context.

9. Previous guidance has relied on the concept of 'Design Value' to determine the highway requirements of residential developments. In order to simplify matters and to bring Surrey in line with 'Places, Streets and Movement', this has now been replaced with the more straightforward concept of number of dwellings served. With the inter-connectivity of streets now emphasised there will often be more than one route to any one dwelling. This will require a pragmatic approach to calculating future vehicle movements. As such any reference to the number of dwellings served should be understood to also refer to the equivalent vehicle movements generated by this number of dwellings. Non-residential and mixed use developments should continue to be assessed on the basis of the traffic generation of the proposal under consideration.

General References

Surrey Local Government Association; **Surrey Design** January 2002

DETR; **Design Bulletin 32: Residential Roads and Footpaths – Layout Considerations;** Second Edition; HMSO; London; April 1992

Department of the Environment, Transport and the Regions (DETR); **Places, Streets and Movement – A Companion Guide to Design Guide Bulletin 32: Residential Roads and Footpaths;** HMSO; London; September 1998

DETR; **By Design – Urban Design in the Planning System: Towards Better Practice;** DETR; London; 2000

DTLR & CABE; **Better Places to Live** – A companion guide to PPG3, Llewelyn-Davies and Alan Baxter & Associates; 2001

CHAPTER 1

Surrey Design – Movement Objectives and Principles

1.1 *Surrey Design* has been written in order to promote good design in Surrey. It is a strategic document and as such it focuses on design principles that have countywide relevance. There are a number of themes which run through the guide:

- The need for a coherent and integrated design process for new development based on local participation
- Creating attractive places with buildings and plants defining streets and public spaces
- Making efficient use of the available land by promoting well designed, higher density and mixed use development.
- Designing for low energy and resource use
- Protecting and enhancing existing habitats to maintain biodiversity
- Creating places and streets for people rather than the motorcar
- Creating integrated developments that are safe and feel safe
- Providing variety in terms of uses, buildings and tenure

1.2 These themes are developed into the following key objectives:

Process: To promote good design through the development process
Quality: To create attractive and accessible places
Character: To ensure that all development contributes to local distinctiveness and character
Resources: To conserve energy and water, maintain biodiversity and reduce waste and pollution.
People: To encourage vibrant and mixed communities where people feel safe
Movement: To create places for people that are safe and easy to move through and are accessible to all
Land: To make best use of the available land

1.3 The objective of Chapter 6 – Movement is to create places for people that are safe and easy to move through and are accessible to all is expanded upon with 4 principles:

1 The emphasis in design will be on pedestrians, people with mobility impairments, cyclists and public transport

2 The layout of the highway is only one design consideration

3 Speed restraint should be incorporated into design

4 Car parking should not dominate or overly influence urban form

1.4 *Places, Streets and Movement:* A companion guide to Design Bulletin 32, Residential Roads and Footpaths, was published by the DTLR in 1997 and encourages a greater emphasis on place, community and context. It promotes:

- A flexible interpretation of DB32, involving more responsiveness to site and setting in the layout of new development to achieve a better balance between highway requirements and other factors.
- Developments designed to emphasise a sense of place and community, with movement networks to enhance those qualities.
- The reduction of car use through the provision of local facilities and public transport within walking distance of housing.
- The detailed design of roads, footpaths and cycle routes to avoid dominance by the car
- A move away from overly prescriptive standards.

These elements are reflected in both Surrey Design and this Technical Appendix, as well as in more recent DTLR guidance in *By Design*.

1.5 It is considered that the result of residential development which has been focused on the movement and parking of vehicles has been the creation of places which badly relate to their locality and are indistinguishable from one another. This is largely due to the planning of residential layouts being dictated by the road hierarchy and the Highway Authority's road design geometry and adoption criteria. A better approach would be to consider the arrangement of the buildings and enclosure first and then to fit the roads around the buildings, rather than vice versa. That is not to say that the highway engineering requirements should be ignored, but that they should be applied flexibly and with more regard to other considerations.

1.6 All layouts must be designed with regard to the Disability Discrimination Act 1995, which requires that facilities are suitable for the mobility impaired. This is in accordance with the latest design standards of the DTLR Mobility Unit. Throughout this guidance, where reference is made to 'pedestrians', please note that this includes the mobility impaired.

CHAPTER 2

Access by Non-Car Modes

MOVEMENT PRINCIPLE 1: The emphasis in design will be on pedestrians, people with mobility impairments, cyclists and public transport

2.1 Introduction

2.1.1 The over-riding objective of this Appendix is to create places that are safe and easy to move through and are accessible to all. In order to ensure that streets are safe, they should be designed so that traffic speeds cannot exceed 20 miles per hour. In order to make places that are easy to move through, the street pattern should generally resemble a lattice which maximises opportunities for movement through a site, especially for cyclists and pedestrians. Through-use by cars can be discouraged in order to create places where people can congregate and children can play. This can be achieved by a range of measures including landscaping features, physical barriers and the built form. Culs-de sac will not be the predominant layout feature, although they will still play a role.

2.1.2 Previous guidance was written with the primary aim of accommodating the car. The emphasis is now on designing neighbourhoods and creating spaces for people. The car will no longer take priority, although it is important to ensure that road safety is not compromised. Access to development should be considered in the order of User Access Hierarchy.

User Access Hierarchy

1 Pedestrians and the mobility impaired
2 Cyclists
3 Public transport
4 Service and delivery vehicles
5 Private cars

2.1.3 This hierarchy can only fully apply to larger scale development. Smaller developments may not be able to accommodate public transport, but precedence in all cases should be given to pedestrians and cyclists. Pedestrian and cycle links to existing bus stops, schools, shops, health centres and other facilities are essential for all sizes of development.

2.2 Pedestrians, the Mobility Impaired and Cyclists

2.2.1 It is essential that facilities for pedestrians, the mobility impaired and cyclists are fully integrated into the main street pattern of a development. It is important that all routes are overlooked and have active frontages, to maximise visibility and supervision both for users and residents. The street system will still provide for the greater part of pedestrian and cycle movement, although there is also a role for dedicated, sometimes combined, pedestrian and cycle links.

2.2.2 With the requirements of the Disability Discrimination Act and the Human Rights Act, it is imperative that full consideration is given to the mobility impaired not only during the design of highway schemes but in all matters. Surrey County Council is mindful of its responsibility in this area and supports the principle of 'access for all'. Work has commenced on producing a Mobility Chapter for inclusion in the County's manual of policies and standards (MaPS) and reference must be made to this document when it is in place. In the interim, designers must not only meet the requirements of the latest guidance from the DTLR Mobility Unit but provide evidence of having taken into consideration the views of the relevant access group(s) for that area.

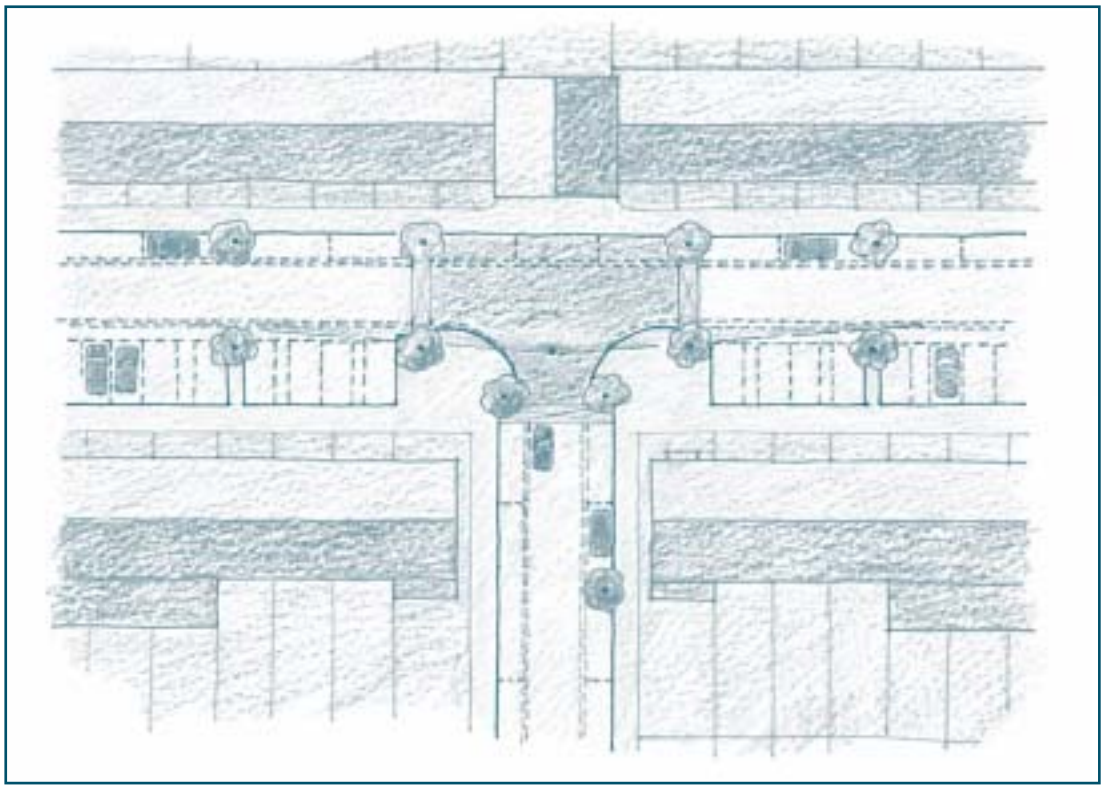
Footways and Shared Surfaces

2.2.3 Footways run adjacent to the road and are a general requirement on all roads serving more than 50 dwellings (or equivalent). Roads serving fewer than 50 dwellings can be designed as shared surfaces or with footways, depending on the design solution for each site. Shared surfaces are preferred where vehicle speeds are low, pedestrians are few and where design/layout considerations allow. Shared surfaces can require a lower land-take than roads with footways and can be used in situations where land is restricted or it is necessary to use land more efficiently. When a shared surface is not used, footways should provide for all pedestrian movement along a road.

2.2.4 Footways are usually separated from the carriageway by a change in level of at least 125 mm, taking the form of raised edge detailing such as kerbs, setts or concrete blocks. Dropped crossing points are essential for vehicular cross-overs. Pram/wheelchair crossing points are necessary for use by people with wheelchairs or pushchairs but these can also aid car drivers mounting the pavement to park, to the detriment of pedestrians. All pedestrian crossing points should be indicated by the use of tactile paving.

2.2.5 Footways should follow pedestrian desire lines and can be incorporated into visibility zones. They should avoid sudden changes in direction unless there are physical obstructions (such as dense planting, walls or fences) to prevent pedestrians walking in the carriageway, especially on roads serving 100 dwellings or more.

2.2.6 Safe crossing points should be provided for pedestrians at appropriate locations. Raised tables at junctions can be used to give pedestrians priority and a safe place to cross.



Raised tables at junctions can provide suitable places for pedestrians to cross

2.2.7 Footways can be separated from the carriageway by verges, bollards or posts. Bollards can generally be used on roads serving less than 100 dwellings and can be used when the carriageway and the footway are at the same level. Special attention needs to be paid to the needs of people with disabilities.

2.2.8 The mobility impaired are restricted in the distances that they can walk or travel without a rest. In order to maximise the accessibility of a development to all, it is recommended that resting points, such as benches, are provided at regular intervals. Different mobility impairments have different requirements with the visually impaired and wheelchair users able to travel approximately 150m without a rest, those walking without an aid able to travel approximately 100m and stick users only able to travel about 50m without a rest. This will need to be taken into account when planning resting points.

Footway Fundamentals

Width

Footways should generally be 2.0m wide although they can be reduced to 1.2m for short distances to avoid existing obstructions such as trees or buildings. Footways serving non-residential uses may need to be widened within the immediate vicinity of the development to accommodate increased pedestrian flow and waiting pedestrians and prams. This is especially the case at primary schools where parents often wait at the school to collect their children. The required widths are as follows:

Development	Roads serving up to 300 dwellings (or equivalent)	Roads serving over 300 dwellings (or equivalent)
Non public offices, hotels, motels, nursing homes and similar	2.00 m	2.00m
Public offices, pubs, halls, theatres, clubs, sports centres, hospitals, places of worship	2.00m	2.50m
Town centre shops	3.00m	4.00m
Small groups or single shops outside town centre (not exceeding 200 sq. m shop floor space in total)	2.50m	3.00m
Small groups or single shops outside town centre (in excess of 200sq m shop floor space in total)	3.00m	3.50m
Junior, Primary and preparatory schools	3.00m	3.50m
Secondary schools (11 years and above)	2.50m	3.00m
Technical and Further education colleges	2.50m	3.00m

Bollards/posts

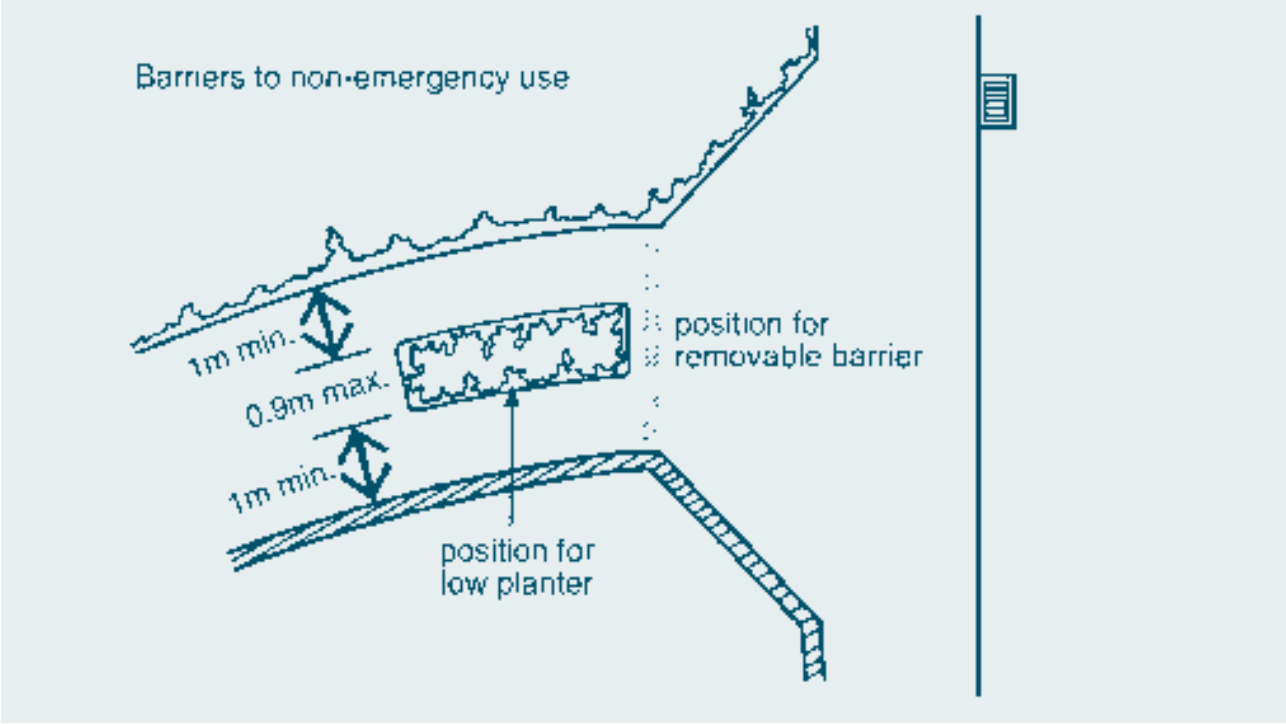
These should be situated 500mm clear of the carriageway edge and should be a maximum of 4.5m apart, although they may be more closely spaced if it is necessary to avoid vehicle movement between them.

Footpaths and Cyclepaths

2.2.9 These are dedicated links provided separately from the road system but integrated into the main street pattern. They may provide separate facilities for pedestrians and cyclists or they may be combined. Tactile paving shall be used in shared facilities in accordance with national guidance. Occasionally they may be merged with a private driveway. They should generally provide a more convenient route for pedestrians and cyclists than the road system. In order for them to be used efficiently, they should follow pedestrian and cyclist desire lines.

2.2.10 It is important to ensure that footpaths and cyclepaths are designed to ensure safety and security for users and residents. Routes should ideally be a continuation of the street pattern and always have active frontages and be overlooked. Places of concealment, such as corners and dense planting, should be avoided. Lighting should be provided to assist security at night.

2.2.11 It may be necessary for a footpath or cyclepath to double as an emergency route for vehicles, especially for developments of 100 dwellings or more that have only one point of road access. In such cases the route should be protected against non-emergency use and should be a minimum of 3 metres wide.



Barrier to non-emergency use

2.2.12 Footpaths and cyclepaths that link elements of the road system and link the road system to public facilities, such as bus stops, shops, schools and health centres, will be adoptable by the Highway Authority. It is a general requirement that all footpaths and cyclepaths should be appropriately signed, including surface markings, although this may be relaxed in conservation area after discussions with the Highway Authority.

2.2.13 Footpaths and cycle paths that cross roads serving 100 or more dwellings may need special arrangements to protect the safety of pedestrians and cyclists, such as the staggering of footpath ends or the provision of barrier rails. Crossing points on roads serving 300 or more dwellings may require a central refuge and barrier rails but the safety requirement for this needs to be balanced against the overall design concept for the development.

Footpath and Cyclepath Fundamentals

Width

Separate cyclepaths and footpaths: Minimum of 1.5 m wide with 1.8 m wide passing places for wheelchairs/pushchairs every 25m. Local narrowing to 1.2m is acceptable for short distances in order to retain existing features.

Combined cyclepath/footpath: Minimum of 2m wide. Where flanked on both sides by walls or fences more than 900mm high, width should be at least 2.5m. Any exceptions should be discussed with the County Highway Authority at the earliest opportunity.

Maintenance

Adopted cyclepaths and footpaths need to be accessible for maintenance and should be within 25m carry distance of a maintenance vehicle. If this is not possible, the footpath must be within a 2.5m wide corridor and free of obstructions to allow a maintenance vehicle to follow its route.

Height

Footpaths and cyclepaths passing under structures should have a headroom of 2.5m.

Gradient

The gradient for footpaths and combined cyclepaths/footpaths should not exceed 5% (1:20), although 12.5% (1:8) may be acceptable where there is an alternative for wheelchairs and pushchairs, provided that this alternative is not significantly longer.

Crossfalls

The following are recommended on footpaths:

Preformed paving units or insitu concrete	2.5-3.5% (1:40-1:30)
Bituminous or flexible surface	3.0-4.0% (1:33-1:25)

Steps

Steps are permitted where there is a short alternative route for wheelchairs and pushchairs. Flights should not exceed 10 risers with no more than 6 risers preferred. Landings between flights should be 1.5m long. Outdoor steps should have a shallower pitch than indoor steps because forward movement is generally faster.

2.3 Passenger Transport

2.3.1 Buses play an essential transport role. They have large carrying capacities and make effective use of limited road space. Bus priority measures, good interchange, comprehensive public transport information and cheaper, more convenient fares will make buses a practical and desirable alternative for many journeys both to and from developments.

2.3.2 Rail also has a role to play in widening travel choices in Surrey because the county has an excellent heavy rail network that serves all of the significant towns. Providing links between developments and the rail network by all modes is therefore important.

2.3.3 The Department for Transport, Local Government and Regions (DTLR) suggests that no property should be more than 400m walking distance from the nearest bus stop. Developers must therefore ensure that a good bus corridor is provided which affords an efficient passage for buses to and through a development. A balance has to be struck between the desire for the penetration of buses into a development to generate the best possible access for public transport, set against the need to minimise bus and passenger journey times.

2.3.4 The physical design of the highway within development must facilitate the unhindered movement of buses along bus routes. This relates not only to the geometry of the highway but also the location of bus stops, the control of parking and so forth. In particular, any speed management measures should be bus friendly and be designed with the co-operation of the local bus companies to ensure acceptance. In addition, where a school forms part of a development, there will be a need to design access to the school and provide facilities at the destination for coaches as well as local bus services.

2.3.5 Where appropriate, developments should provide priority movement for buses. This can be through the provision of bus only movements, priority at traffic signals, bus only links and so forth. For example, a dedicated bus only link has been provided at a development in Brookwood. Electronically rising and falling bollards activated by coded 'tags' issued to the bus company control the link. This initiative facilitates a more direct and thus quicker access to a residential development and superstore. Engineering measures must always be designed sympathetically to the overall nature of the development.

2.3.6 The trip to the bus stop and the facilities provided at the bus stop must be considered as part of the overall journey. It is vital therefore that high quality, overlooked and accessible routes to and from bus stops are provided within development. This must be considered both during daylight hours and during darkness as an un-lit or poorly lit route to a bus stop or at the stop itself will not encourage the use of public transport and may give rise to a perceived or real security risk.

2.3.7 Certain bus stops within a development will offer access to and from key destinations. This may include schools, a post office, sports centre, local shops etc. Bus stops should be located as close to these key destinations as possible, taking into account other factors such as safety and efficient bus routing. The clustering of local facilities will aid the delivery of this and is particularly important in the move to create public transport opportunities for school journeys. Similarly, bus stops should be located adjacent to focal points on the pedestrian network.

2.3.8 A bus stop does not merely consist of a pole with a bus stop flag. The stops must be easily accessible to passengers, provide shelter and protection from the elements, have seating within a paved area, afford easy access to the increasing number of low floor buses and be a source of information for the journey options available. The shelters themselves can be designed sympathetically to the surrounding environment and may also reflect the individual or distinctive characteristics of an area. They should also be designed with personal safety in mind.

2.3.9 Partnership work with bus operators and the local community has created popular and successful services, which has upgraded the image of bus travel and attracted new custom. For example, in the Goldsworth Park area of Woking, a partnership between the County Council, Borough Council and operator has seen both improvements in access, waiting environment, information and service provision. This initiative has seen the introduction of raised kerbs at bus stops to facilitate easier access onto and off buses. The road surface has also been treated with a coloured surface dressing to highlight the existence of the bus stop to car drivers, with the aim of stopping parking at bus stops and enabling buses to pull up adjacent to the raised boarding point. This is a particularly important issue for the elderly or disabled people, or those encumbered by luggage, shopping or children. This sort of initiative should be advanced as part of new developments or improvements to existing development.

2.3.10 Allowing the bus to stop close to the kerb minimises any obstruction to the flow of other traffic. Sufficient space should be kept free to accommodate front or rear loading buses as appropriate. Front loading buses are the norm in Surrey; thus kerbs should be located so as not to obstruct the swept path of buses with lowered front steps. Where more than one stop is required, sufficient road space should be kept clear for all the bus services involved.

2.3.11 Bus lay-bys can offer protection of road space at bus stops, but this is an inefficient use of space and can create difficulties for buses seeking to rejoin traffic on the main carriageway. Where lay-bys are provided they should be designed to discourage parking or loading by other vehicles with the appropriate legal restrictions, coloured surfacing and road markings.

2.3.12 It is important to recognise that under the Transport Act 1985 bus services in Surrey are provided on a deregulated basis. The County Council secures the provision of a large number of bus services each year through contracts with local operators. These services, be they local bus, education or community transport services, are in addition to the commercial network. The County Council is therefore in the best position to advise on the level of service provision appropriate for a development and the facilities to support the services and encourage as wide a use as possible.

2.3.13 Developers, local authorities and local bus operators must work together to find the optimum level of bus service provision for a development by making the best use of existing services. Enhancements may take the form of bus service diversions, increases in service frequency, increases in the days or hours of operation, the provision of entirely new routes, or even the establishment of dedicated development bus services. Other complimentary initiatives such as ticketing or fare offers can also generate patronage.

2.3.14 For public transport to be an attractive option to residents within a new development, services should be in place soon after the first occupants move in. This will ensure that public transport is available as an option for travel when journey patterns are first established, rather than the latter when it is often much more difficult to wean motorists away from their car. However, a balance has to be struck between providing bus services when the first occupant moves in, set against the realisation that the economic viability of services will increase as occupancy rises.

2.3.15 The long-term support of bus services and the maintenance of any infrastructure are key issues. It is important that as part of the design of a development infrastructure is protected. For example, ensuring that there is informal surveillance in place to reduce the risk of vandalism. Overall, maintenance and a long-term financial commitment to infrastructure and services should be in place before a development goes ahead.

2.3.16 The development of a higher density of dwellings will increase the viability of public transport. At the same time increasing densities where public transport is poor will increase car dependency. It is important therefore that the potential of public transport is assessed with respect to the proposed development.

2.3.17 In addition to bus services, all developments should take into account the need to access the rail network. It is recognised that larger developments may be better placed to facilitate infrastructure improvements due to the higher capital costs involved. Many developments can, however, facilitate various initiatives to enhance access to the rail network. Examples include: CCTV; improved pedestrian links and signing; improved infrastructure; provision of bus information at rail stations; better lighting and security enhancements; secure cycle storage; encouragement of the integration of bus and rail services; accessibility improvements and so on.

2.3.18 Such initiatives have a positive impact upon many thousands of rail passengers. The key organisations for the creation of improvements are the Strategic Rail Authority, the train operating companies, Office of the Rail Regulator and Railtrack or its successor.

2.3.19 In conclusion, there is a clear need to consider the requirements for efficient and effective public transport provision both in terms of services and infrastructure. This should be undertaken at the initial planning stage of any development proposal. When carried through properly, this should maximise the modal share of public transport.

2.4 Safe Routes to Schools

Objectives

2.4.1 The objectives of safe routes to schools in Surrey are to:

1. Help people who already make journeys by foot, cycle, bus or train by making their journey more convenient and safer.
2. Encourage more people to use alternatives to the car.

Wherever development will impact upon these objectives, either directly by generating new school trips from housing developments or indirectly by impacting on existing school journeys, appropriate action should be taken.

Activities

2.4.2 Safe routes to schools are achieved through a combination of:

- Infrastructure improvements
- Participation with pupils and parents
- Education and Training
- Publicity and Events

These activities complement each other to obtain maximum effect. Infrastructure improvements should be designed to meet the criteria outlined elsewhere in this document.

2.4.3 The key to successful safe routes to schools is usually in the process of how measures are decided. They need to be relevant and useful to parents and pupils. Increasingly, the process is being set out and agreed through the use of School Travel Plans.

Development with an Impact on School Journeys

2.4.4 This will depend on the nature of individual developments and their proximity to school routes. Each individual application will need to be assessed on its own merits. Whilst residential developments will obviously have impact, commercial or retail developments can also have an impact as they generate significant additional traffic movements within the vicinity of a school.

2.4.5 An expanding programme of safe routes to schools exists across the whole of Surrey and this is managed through a series of district working parties. When considering a proposed development's impact on a school, a number of different scenarios are possible:

- There is an existing school travel plan containing a full set of actions;
- There is no current activity at the school;
- There are some preliminary actions being taken as part of formulating a school travel plan;
- There are known issues but no associated activity to resolve them.

2.4.6 The state of progress at any one school and the degree of impact of the development will influence what action is appropriate in relation to the proposal. The first step therefore should be to liase with the County Council's Safe Routes to Schools Co-ordinator and the Transportation Development Control Division in order to determine current issues and programme. Further information on safe routes to school, including a school-by-school summary of progress, can be found at: http://www.surreycc.gov.uk/safe-routes/.

New Schools

2.4.7 The aim at all new schools, be they state or private, should be to create a first-class environment for journeys by foot, cycle, bus and train. It is expected that any proposed new school will produce a comprehensive school travel plan prior to opening with:

1. Measures in place before the opening to ensure that car dependence is minimised from the first day;
2. A programme set out to ensure continuing participation by students, staff and parents.

References

Surrey Cycle Design Guide - SCC

Guidance on the Use of Tactile Paving Surfaces – DTLR

Design Bulletin 32 – DTLR

Providing for Journeys by Foot – Institute of Highways and Transportation

Disability Discrimination Act 1995 – HMSO

Manual of Policies and Standards (MaPS) – SCC

Guidelines for Planning for Public Transport in Developments – Institution of Highways and Transportation

School Travel Plans – Everything You Need to know – SCC

CHAPTER 3

Design for Movement

MOVEMENT PRINCIPLE 2: The layout of the highway is only one of the elements to be considered in the design of the built environment

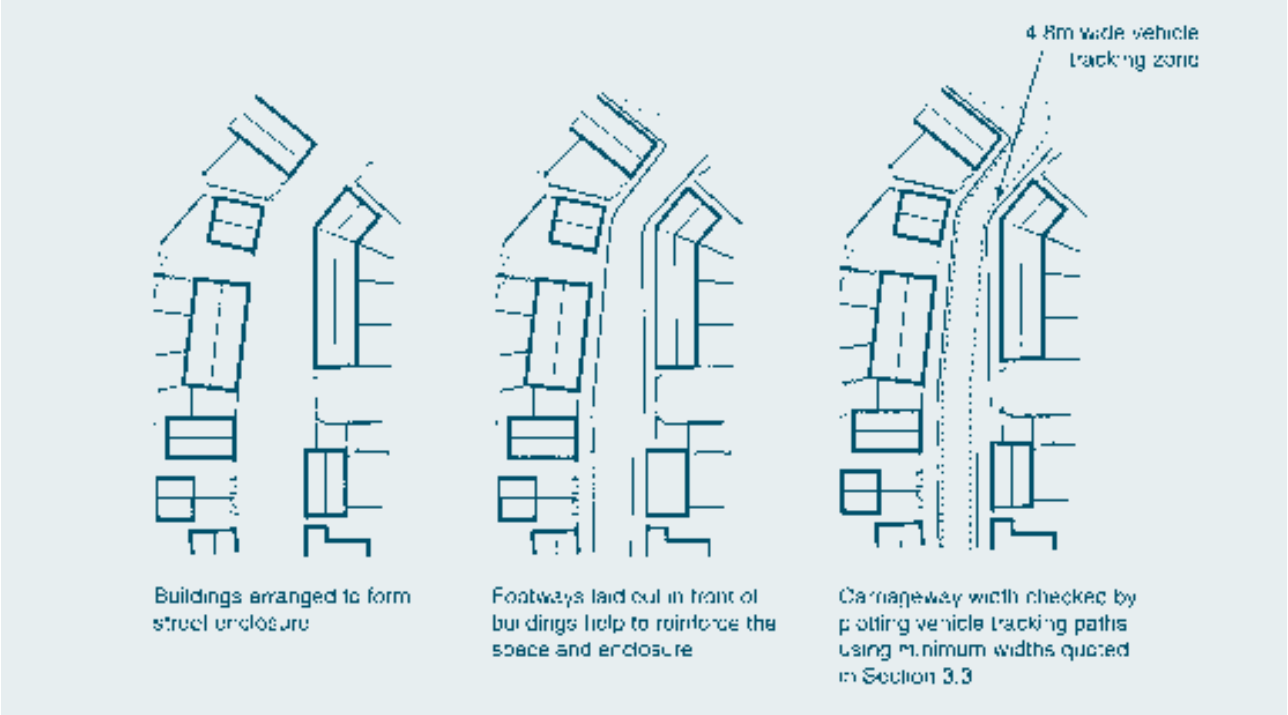
MOVEMENT PRINCIPLE 3: New developments should, wherever possible, enhance movement choice

3.1 Introduction

3.1.1 Although this guide aims to give priority to movement by non-car modes, it is still necessary to make provision for the car. However, that provision should not be to the detriment of other design considerations. Previous developments have been highly hierarchical and, whilst it is important that the type of road is appropriate to the nature and the scale of the development concerned, any hierarchy should not dictate the form of development. It is sufficient that roads are designed to be of adequate width to accommodate the level of development concerned.

3.2 Road Layout

3.2.1 Fundamental to the approach being promoted in Surrey Design and this Technical Appendix is the concept of arranging the buildings to fit the local context and to create better urban form and character, and then fitting the roads and visibility splays in the spaces created. Clearly there will need to be some flexibility and buildings may need to be adjusted slightly to accommodate the highway, and conform with minimum safe forward visibility. With this approach, buildings can be positioned to reflect the local context and the width of the road will vary as a result.



The process of fitting the roads in the spaces created by the buildings

3.2.2 The design of schemes needs to take into account the potential redevelopment of adjoining land so that future development is not prejudiced.

3.2.3 The aim of this Appendix is to ensure a high standard of design in line with the objectives of Surrey Design. Schemes with road layouts that meet this standard of design will also be adoptable by the Highway Authority. Even if it is not the intention of the developer to have the roads adopted, the design requirements will still apply. The following areas will normally be adoptable:

- Roads and on-street parking bays
- Footways
- Footpaths linking roads or linking roads to local facilities
- Road margins
- Visibility zones (except at private accesses)
- Cycle routes
- Bus-only links

3.2.4 Garages and/or parking courts with no highway function will not be adopted. Areas of landscaping will not be adopted unless performing a structural design function (such as street trees). Structures overhanging adoptable areas and windows and doors opening over the adoptable area must be indicated on the road layout drawing. A road will not be adopted if suitable arrangements for the adoption of the services, foul and the highway drainage are not in place. This and their location should be considered from the outset. Underground services should be located in verges (minimum 2m wide) or footways in order to avoid excavating the carriageway.

3.2.5 Generally, sites serving in excess of 100 dwellings should have more than one point of access to the existing highway network and this is desirable for all sites serving in excess of 50 dwellings. This is to ensure that there is a route for the emergency services, even if one access becomes blocked, and also to distribute traffic through the development. Emergency access may be provided via an emergency route from a point in the existing road network where normal access would be unacceptable. Such an emergency route can be treated as a public footpath or cyclepath. Permeability for non-car modes should be maximised with a number of access points. Buses may need to be accommodated within the site or good footpath links to existing bus stops created.

3.3 Carriageways

3.3.1 Carriageway widths are partly determined by traffic flow. The widths referred to for dwelling numbers in the box below are the minimum necessary for the free movement of traffic but the greater widths will be required to accommodate on-street parking, buses and other functions of the street. There is no difference in the width requirements of a shared surface and a carriageway (excluding the footways) to serve the same number of dwellings. All carriageway widths allow for reasonable access by service vehicles, although some delay from two such vehicles meeting is considered acceptable.

3.3.2 Falls on verges should be towards paved highway surfaces and low spots should be avoided. Mounding of verges is acceptable where there is sufficient width but side slopes on grass verges should not exceed 20% (1:5). Steeper slopes may be acceptable if they are suitably planted with densely rooting plants.

3.3.3 A range of materials acceptable for carriageway surfacing and edging can be found in Chapter 9 – Specification. Carriageways and parking bays within adoptable areas must be properly restrained at their edge.

Shared Surfaces

3.3.4 Streets may be designed without footways (as Shared Surfaces) were serving up to 50 dwellings or the equivalent. In these situations, where traffic speed is less than 20mph, a segregated facility for pedestrians is unnecessary.

3.3.5 Shared surfaces should be separated from roads with footways by a rumble strip. This is a strip of raised contrasting paving which warns pedestrians and drivers that they are entering or leaving a shared surface area. A contrast of the colour and texture of shared surfaces with the surface finishing of adjoining roads also indicates that these areas are different. Bituminous and surface dressing materials are not acceptable in shared surface areas but products showing the same characteristics as block paving will be considered. Rumble strips can also be used to warn of a junction or other speed control feature (see Chapter Four). Footways should extend beyond both ends of a rumble strip and join the shared surface at the same level. This is to ensure that wheelchair users and those with pushchairs can pass comfortably.

3.3.6 Shared surfaces flanked by planted or grassed areas are usually adoptable to a line 2m from the edge of the carriageway. There is no need to mark this on the ground except possibly on paved surfaces. Shared surfaces enclosed by buildings or walls are adoptable between the faces of the structures. Opening doors and windows should not obstruct pedestrian, cycle and vehicular movement. Steps, canopies and porches are usually excluded from the adoptable area. Access roads serving 6 dwellings or less may be treated as a private drive.

Carriageway Geometry Fundamentals

Minimum Carriageway Widths

0-25 dwellings	4.1 metres
26-50 dwellings	4.8 metres
51-300 dwellings	5.5 metres
Roads with on street parking	5.5 metres
Roads with parking on both sides of the road	7.0 metres
Roads used by buses	6.75 metres
Roads with schools	5.5 metres

Non-residential roads are designed in accordance with other guidance.

Residential roads may be narrowed to 3m at a point in order to provide speed control or to solve a specific site problem, such as to preserve an existing tree.

Passing places may be necessary on roads of less than 5.5m wide to accommodate the passage of two heavy goods vehicles.

Vertical curves

To ensure reasonable standards of comfort, to prevent vehicles grounding and to provide appropriate visibility at changes in gradients, vertical curves should be provided. These should not be shorter than:

(a) indicated by the formula L = KA, where L is the curve length in metres, A is the algebraic difference in gradients (expressed as a percentage) and K has a value selected in the table below; or

(b) shown in the third column of the table below if longer than (a)

Curves designed using the K values given will ensure acceptable sight stopping distances at summits and a reasonable ride at both summits and valleys.

Minimum vertical curve lengths:

Design speed Mph (km/h)	Minimum K value for stopping and comfort	Minimum vertical curve length (m)
30 (50)	6	30
20 (30)	1	20

Widening on bends

Carriageway widening on bends should be provided in accordance with advice in DB32 in order to allow for the wider path of vehicles when turning.

Carriageway Gradient Fundamentals

The maximum gradients normally acceptable on carriageways are as follows:

Shared surfaces	5%	(1:20)
Single carriageways	10%	(1:10)
Roads serving 0-25 dwellings with footways	12.5%	(1:8)
Roads serving 25-50 dwellings with footways	10%	(1:10)
Roads serving 50-300 dwellings with footways	7%	(1:14)

Lengths of road close to the maximum gradient should be kept as short as possible. Where different gradients meet there should be a smooth transition between them with adequate forward visibility.

The minimum gradient in residential roads is 0.67% (1:150). Where centre line drainage is used the channel shall have a gradient between 7% (1:14) and 2% (1:50).

Carriageway Crossfall Fundamentals

The following crossfalls are recommended on carriageways:

Mechanically laid surface	2-3%	(1:50-1:33)
Hand laid bituminous surfacing	2.5-3.5%	(1:40-1:30)
Paviors	2.5-3.5%	(1:40-1:30
In situ concrete	2.5-3.5%	(1:40-1:30)

The steeper crossfall in each case should be used before the carriageway exceeds 5% (1:20).

Carriageway Forward Visibility Fundamentals

Forward visibility zones around bends and curves are necessary in order to protect all road users, especially vulnerable pedestrians and cyclists. The extent of the visibility zone depends on the stopping distance of the vehicle, which is dependant on the speed.

The following distances indicate the absolute minimum required forward visibility:

Design speed Mph (km/h)	Absolute Minimum Forward Visibility Distances
30 (50)	60
20 (30)	33

Further guidance is available in DB32. Relaxations of these requirements will be considered on a site by site basis if it can be demonstrated that road safety will not be prejudiced.

Utilities

3.3.7 Public utility mains should generally be located under verges or footways and only under the carriageway when crossing from margin to margin. In such circumstances, they should be ducted and runs co-ordinated beneath a ‘service crossing strip’.

3.3.8 The Highway Authority will normally adopt a 2m wide service margin, although exceptions will be considered. A narrower margin may be adopted where adequate provision for underground services has been agreed with the Statutory Undertakers. Wherever the margin is not exactly 2m wide, the highway limit shall be marked. The margin may need to exceed 2m where it contains a manhole or surface water sewer, soakaways or other form of sustainable urban drainage (SUDS).

3.3.9 Where no margin is required for footway or underground services, a minimum margin of 0.5m is required to ensure maintenance of the carriageway edge and adequate clearance for vehicles. Where the outer edge of such a margin is marked by a wall, the carriageway surface can extend to the wall. Private adjoining structures should not be used to form a drainage channel.

3.3.10 Developers should contact the relevant utilities at the earliest opportunity in order to co-ordinate works. This is extremely important where mains or services cross carriageways of structural concrete or surfaced with concrete blocks. Details of existing and proposed mains and services are required by the Engineer before work starts on site.

Drainage

3.3.11 Surface water drainage on shared surfaces can be collected in channels at one edge, both edges or along the centre line of the carriageway. Centre line drainage is only acceptable on shared surface roads.

3.3.12 Public sewers and highway drains can be located under any part of the highway but manholes should be located in footways and verges, not the carriageway or parking areas.

3.3.13 Surface water from private drives, paths, accesses etc must be prevented from reaching the highway or the highway drainage system.

3.4 Junctions

3.4.1 Junctions are the points at which a road is joined by another vehicular route. Junctions can be of a 'T' form, with the stem of the T being the non-priority road, a staggered crossroad or a roundabout. Priority 'T' junctions will always provide speed control for non-priority roads. Staggered crossroads also provide speed control if their kerb radii do not overlap. Further guidance can be found in the appropriate national standards, advice notes and traffic advisory leaflets. Junctions will often provide turning places and should normally have branches at least 4.8m wide.

3.4.2 There is a tendency for drivers to stop in a position that obstructs vehicles turning right into the non-priority road at 'T' junctions which are not formed at right angles. At priority junctions therefore, roads should meet nearly at right angles (within 10° of 90°) unless the non-priority road serves more than 100 dwellings in which case the roads should meet at 90°. In such circumstances, the non-priority road should be straight for twice the length of the junction radius.

3.4.3 Junction spacing is not restricted where traffic speed is less than 20mph and roads serve less than 100 dwellings subject to adequate visibility to maintain safety. Roads serving between 100 and 300 dwellings should have a junction spacing of at least 30 metres, on either side of the priority road.

3.4.4 Junctions should be designed on the basis of the number of dwellings being served. Junctions between residential access roads may be used by heavy goods vehicles for turning. The junction should always be designed on the basis of the higher number of dwellings being served (i.e. 1-50, 50-100 or 100-300). In order to prevent high speeds for traffic entering the non-priority road, mountable shoulders can be constructed. These form part of the carriageway. Junction layout must clearly establish traffic priority when the junction serves more than 50 dwellings.

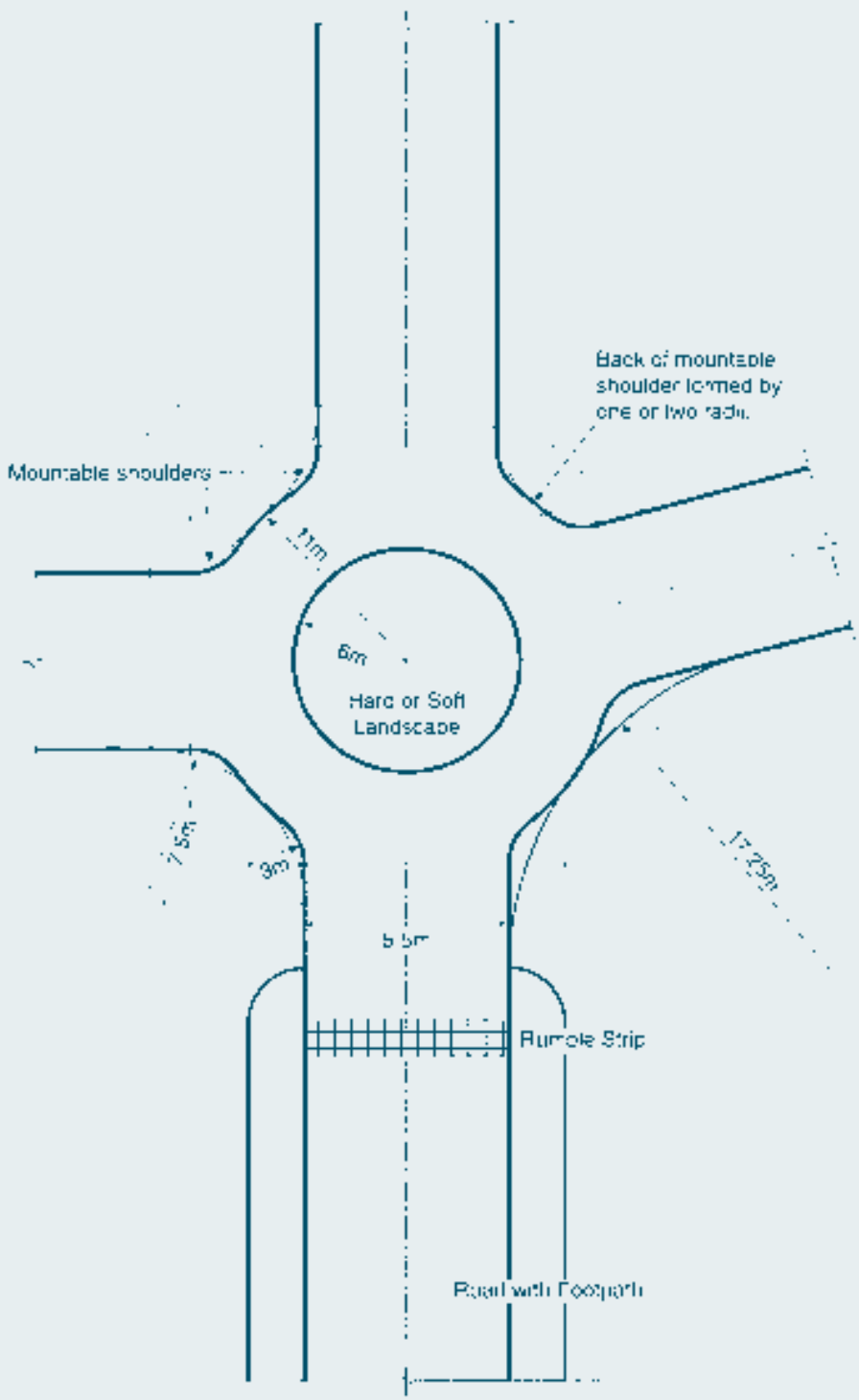
Roundabout Junctions

3.4.5 When a roundabout is included within a layout it should be designed to the current national standards except in shared surfaces, where special circumstances apply. Roundabouts in residential access roads should have unmountable centre islands.

3.4.6 A shared surface roundabout may be acceptable provided that:

- Only one of the branches leads to the distributor network
- The main branch should be 5.5m wide and the minor branches 4.8m wide within a 20m radius from the centre of the island

- There should be no vehicular or pedestrian access (except public footpaths) to any branch within a 20m radius of the centre of the island
- The main branch does not serve more than 100 dwellings
- One of the minor branches serves more than 50 dwellings
- The centre lines of all the branches intersect at the centre of the island
- The angle between two adjacent branches is at least 80°
- The roundabout is not relied on for turning heavy goods vehicles
- Visibility is available across the island between 0.6 and 2m above the surrounding carriageway
- The island is not mountable by vehicles



A Shared Surface Roundabout

Kerb Radii

3.4.7 In general, tighter bellmouth radii have a better traffic calming effect and reduce the impact of road geometry on the quality of space (see *Places, Streets and Movement* page 57). However, in order to accommodate the movement of larger vehicles minimum radii may need to be associated with wider carriageways or mountable shoulders. Priority junctions within residential layouts, serving 300 dwellings or less, should generally have kerb radii as follows:

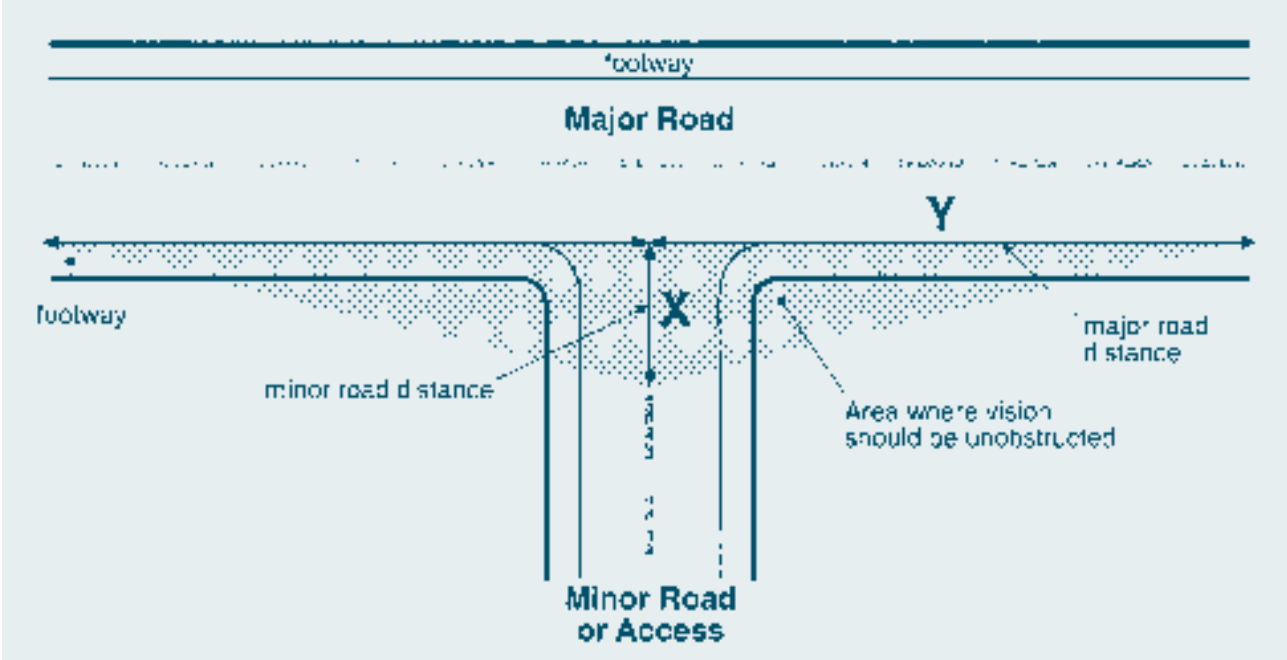
Number of dwellings served by junction	Bellmouth Radius	Minimum width of carriageway *Priority Road*	*Non-Priority*	Other requirements
Less than 50	4.5m	4.8m	4.1m	a) 7.5m radius mountable shoulder b) both roads must be shared surfaces
Less than 50	4.5m	5.5m	5.5m	unmountable edge detail
Less than 100	4.5m	5.5m	5.5m	unmountable edge detail
Less than 100	6.0m	4.8m	4.8m	unmountable edge detail
100-300	6.0m	5.5m	4.8m	unmountable edge detail
100-300	7.5m			unmountable edge detail

3.4.8 Mountable shoulders at junctions can only be used in shared surfaces. If either carriageway is less than 5.5m wide as it approaches a junction with a 4.5m kerb radius, then a mountable shoulder with 7.5m internal radius should be provided.

3.4.9 New road junctions and access to the existing road network will be determined by the engineer in accordance with current national standards.

Visibility

3.4.10 Visibility zones are required at all junctions. The provision of adequate visibility is essential in order to provide a safe stopping distance for all traffic. Stopping distances are sufficient to allow a driver to stop a vehicle at a comfortable rate of deceleration in wet weather conditions. Visibility zones for traffic turning out of non-priority roads are defined by 'x' distance and 'y' distance. Please see the following illustration.



'x' and 'y' distances

Junction Visibility Fundamentals

For residential roads, 'x' distances are:

For single dwellings or groups of up to a maximum of six dwellings	2.0m
The minimum necessary for junctions within a development to enable a driver who has stopped at a junction to see down the major road without encroaching onto it	2.4m
Preferred distance	4.5m

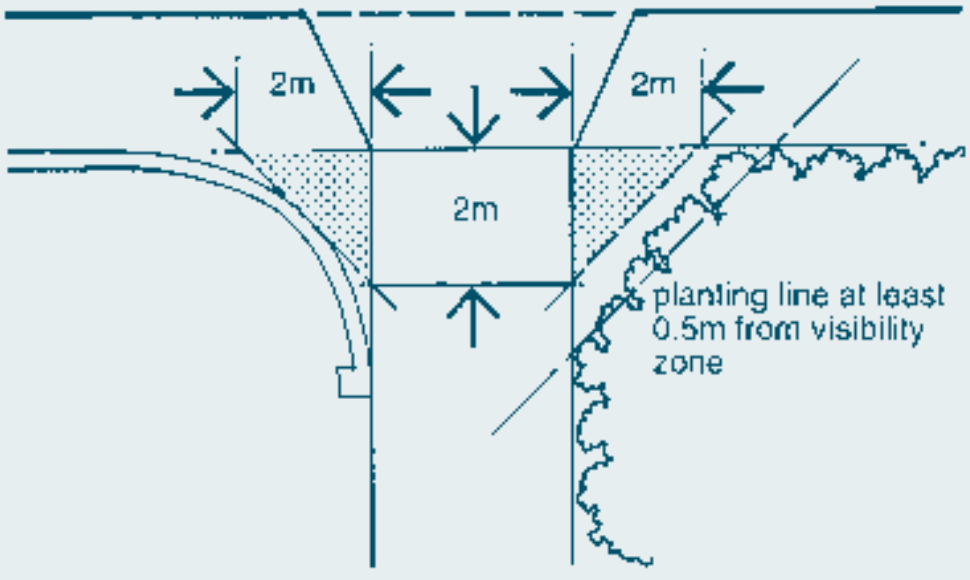
'y' distances are:

All purpose distributor with 40mph speed limit	120m
District or local distributor with 30 mph speed limit	90m
Residential access road with 30 mph speed limit	90m (60m if actual speed is constrained to 30 mph)
Residential access road with 20 mph speed limit	45m (33m if actual speed is constrained to 20 mph)

It is also necessary to provide visibility zones at junctions of footpaths and cyclepaths with carriageways. An 'x' distance of 1 m should be provided for residential roads serving up to 300 dwellings and an 'x' distance of 1.5 m elsewhere.

At footway crossings (whether vehicular or cycle), a 2 m x 2 m visibility zone should be provided. At the junction of a driveway and a carriageway, visibility to the same standard as a road junction should be provided. Vertical sightlines are required between a height of 0.6m and 2m in all cases.

3.4.11 Visibility at existing junctions should not be inhibited by new development and potential improvements to junctions with substandard visibility should not be compromised by new development. The Highway Authority may require land needed for visibility improvements to be dedicated or transferred as highway land.



Visibility At Footpaths, Cyclepaths And Footway Crossings

3.4.12 In the interests of safety it is important that adequate forward visibility is provided on all bends and curves, especially shared surfaces where pedestrians will be in the carriageway. Please see Chapter Three.

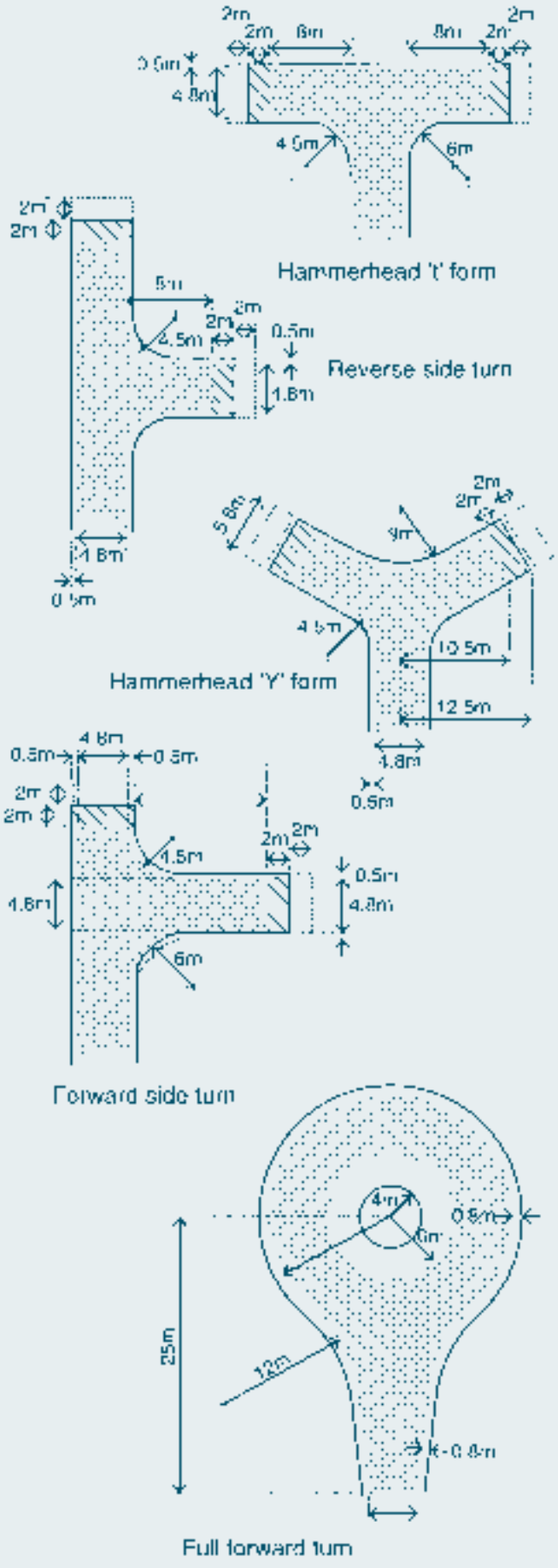
3.5 Turning Places

3.5.1 It will be necessary within a road layout to make provision for vehicles to turn. To some degree, the lattice layout will facilitate change of direction without needing to physically turn a vehicle round but it is still an important issue to consider.

3.5.2 Vehicles can turn at junctions or using specifically designed turning heads, usually located at the end of culs-de-sac. Goods vehicles should not have to reverse more than 40 metres to turn round and certainly no more than 60m.

3.5.3 The design of parking in a layout should minimise the risk of obstruction by parked vehicles at turning places.

3.5.4 The following illustrations represent the minimum requirements for turning. They can be applied to junctions and specifically designed turning heads and can be adapted if necessary. The shaded zones indicate the minimum paved area required for a service vehicle. The broken line indicates the limit of the vehicle overhang and obstacles in excess of 150mm tall should not be placed in this area. The hatched zones indicate the additional paved area required for the largest rigid heavy goods vehicles and an extension of the broken line indicates overhang.



Minimum Turning Requirements

3.6 Fire and Rescue Access

3.6.1 Plans for development may be rejected unless there is adequate means of access for fire appliances. The following information is not exhaustive and is intended to give only general guidance on fire service access to residential development in Surrey. Further details on this and other forms of development may be obtained from:

The County Fire Officer
Surrey Fire and Rescue Service
St. David's
70 Wray Park Road
Reigate
Surrey
RH2 0EJ

3.6.2 Surrey Fire and Rescue Service requires the following standards for access:

- A corridor for access not less than 3.7m wide extending to within 45m of each dwelling with clear working space at that limit.
- At gateways and any similar 'point' restrictions a minimum clearance of 3m between vertical obstructions including any projections (e.g. hinges) from pillars or walls.
- At archways or other height restrictions (including boughs of mature trees) 4m vertical clearance for a minimum width of 3m.
- Provision of turning based upon a 17m full lock forward turning circle.
- An access gradient generally not exceeding 10% (1:10).
- On access routes beyond adoptable highways, all inspection covers, services and drains should be protected or located where fire appliances will not track over them.
- Garage drives, garden paths and other paved surfaces should, as far as practicable, provide hardstanding for ladders. Ideally, paving will extend to include a zone between 2 and 4m from any wall with high level window openings.
- Blocks of flats and back-to-back housing should be provided with hardstandings giving ladder access to individual dwellings.

Road layouts designed to meet the guidance in this Technical Appendix should give adequate access for the passage of fire appliances.

References

Advice Note TD16/93: Geometric Design of Roundabouts - DTLR

Advice Note TD42/95: Geometric Design of Priority Junctions – DTLR

Traffic Advisory Leaflets

Design Bulletin 32 – DTLR

New Roads and Streetworks Act 1991 – HMSO

Provision of Mains and Services by Public Utilities on Residential Estates – National Joint Utilities Group

Manual of Policies and Standards (MaPS) - SCC

CHAPTER 4

Speed Restraint

MOVEMENT PRINCIPLE 4: Speed restraint for vehicles should be incorporated as part of an overall design

4.1 Introduction

4.1.1 Speed control should be considered at the earliest stages in the design process, not added as an afterthought. The method of speed control will be dictated by the form of the development and should be appropriate to the overall design solution for the development.

4.1.2 Speed is constrained by the use of speed controls which can include the urban form itself, landscaping, priority junctions, staggered crossroads, speed regulating curves, islands, carriageway deflections, localised narrowing and the ends of the roads. Wherever possible, traffic speeds should be managed by the arrangement of buildings and spaces with physical traffic calming measures used to supplement this. It is unlikely that formal 20 mph zones will be acceptable or required in new residential developments, the design should ensure that such a zone is unnecessary.

Speed Control Fundamentals

Traffic speeds should generally not exceed 20 mph. Designers will be expected to justify layouts on this basis. Roads which serve a wider traffic distribution can be designed to constrain vehicle speeds to 30mph or less.

It would not be acceptable for a design to incorporate long straight stretches of road without any form of speed control as this is likely to result in speeds in excess of 20 mph. Speed regulating curves and speed control features can be used to overcome this.

As a general rule, the distance between speed controls should not exceed 75m.

4.2 Speed Control Features

4.2.1 The lattice-based road system itself will have inbuilt speed control through priority junctions and staggered crossroads. The need for other features will therefore be reduced. It is important that speed control features are incorporated into the overall design of a scheme and are integrated with the urban form. The following methods of speed control should be considered:

- Smaller corner radii at junctions force slower and more careful vehicular movement than wide sweeping curves but should allow for the turning/swept path of larger vehicles.
- More frequent junctions reduce the speed of movement through a development.
- The changing alignment of buildings, walls, hedges and fences and changing road shape influences the drivers perception of a street. The width and forward visibility can appear to be narrowed which influences the speed at which the driver feels comfortable.
- Localised narrowing can be used as a way of preserving existing trees and features or as informal spaces and areas for planting where it is part of the overall design.
- The use of raised junctions where appropriate to enhance the opportunity for pedestrians to cross but care needs to be taken to ensure that they don't appear to be part of the footway to children and the visually impaired.

4.2.2 Vertical traffic calming, such as humps and tables, as a means of controlling speed is generally to be avoided. It can lead to increased traffic noise and a reduction in local air quality. Possible exceptions to this are the re-use of existing roads on brown-field sites and the provision of raised junctions.

4.2.3 On bus routes and in mixed-use areas with residential and business uses, it should be possible to drive from a dwelling to the existing road system without negotiating more than six speed controls.

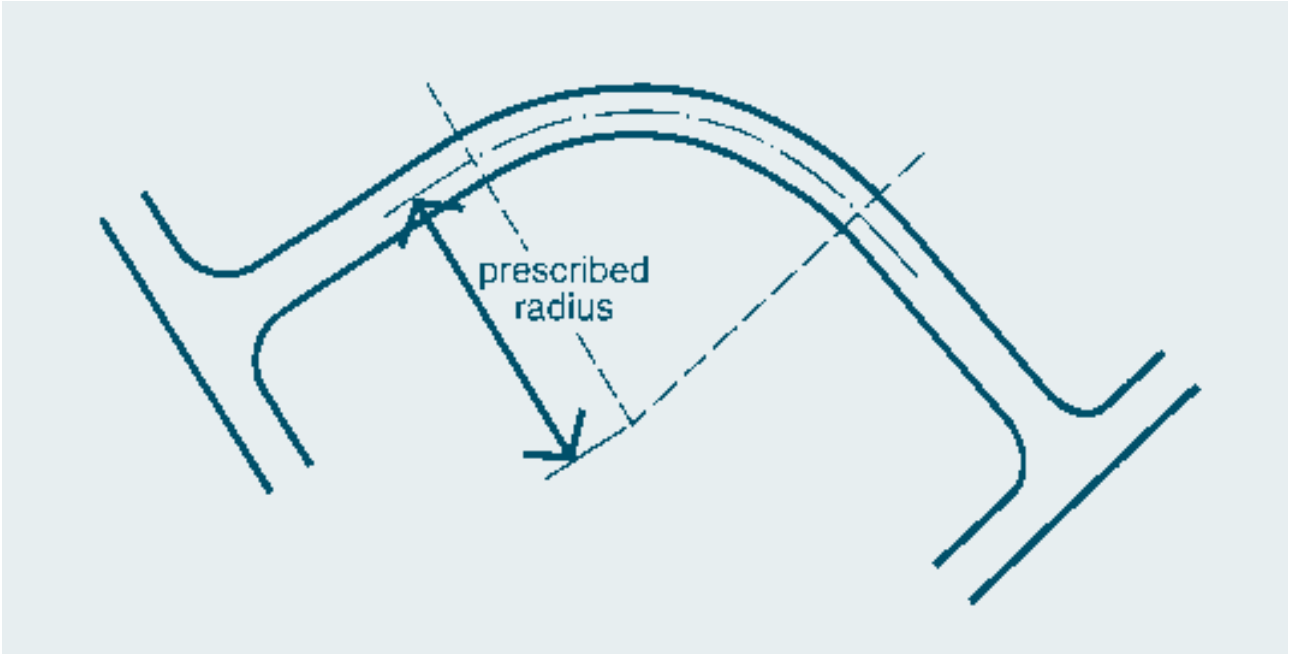
4.2.4 Ultimately it is the combination of features that generate a low-speed environment, but the prime influences are the arrangement of the buildings and the design of junctions. The rigid application of standard solutions should be avoided.

4.3 Speed Regulating Curves

4.3.1 Speed regulating curves can be used within a layout to restrain traffic speeds either between junctions or between speed controls. They can be used individually or in a sequence of up to 3. Forward visibility through curves should comply with the requirements set out in Chapter 3.

4.3.2 Speed regulating curves consist of a specific radius which should be between a minimum of 20 m and a maximum of the following:

Number of dwellings served	1 to 50	51 to 100	100 to 300
Maximum radius	25 m	30 m	40 m



Speed Regulating Curves

Speed Regulating Curve Fundamentals

Speed regulating curves should generally turn through at least 80°.

Only one radius should be used in a sequence of speed regulating curves.

In order to keep traffic speeds to 20 mph, the distance between a speed regulating curve and a speed control should be as follows:

Speed regulating curve radius	maximum distance
20m	30m
25m	42.5m
30m	57.5m
40m	82.5m

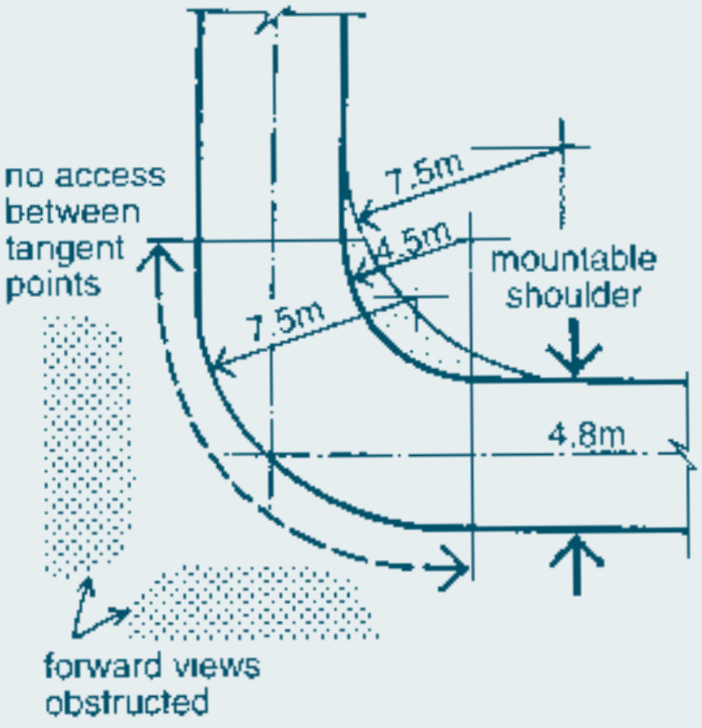
But where the speed control is a junction, the distances should be reduced by 5m within developments and by 10m for 9m junction radii, 15m for 10.5m junction radii and 20m for 12m junction radii.

A sequence of reverse speed control curves should be separated by a straight as follows:

Speed control curve radius	separating straight
20m	12m
25m	14m
30m	16m
40m	20m

4.4 Speed Control Bends

4.4.1 Occasionally it may be necessary to control speed with a more severe engineering solution. Speed control bends should only be used where there are no alternative solutions.



Speed Control Bends May Only Turn Through An Angle of Between 80° and 100°

4.5 Home Zones

4.5.1 Home zones are streets where road space is shared by vehicles, pedestrians, cyclists and children. The aim is to improve the quality of life in residential streets by making them places for people, not just for traffic. Home zones can, for example, include areas for children to play or provide environmental improvements and facilities such as seats for older residents and parents to meet.

4.5.2 Home zones will be considered as a way of encouraging an attractive and safe on-street residential environment predominantly in redevelopment areas where the existing road layout is to be retained. However the principles can also be incorporated into the design for new streets.

4.5.3 There do not appear to be specific criteria in respect of home zones, but generally the following rules apply:

- Traffic speeds are below 10 mph.
- Pedestrians and cyclists have priority over the car and other motorised vehicles.
- Roads have low flows of traffic once the home zone is created (less than 200 vehicles during peak hour).
- There need to be signs at the entrance to the home zone to show that pedestrians and cyclists have priority over the car.
- Children's play and other activities in the street are encouraged.
- The lawful use of the road cannot be obstructed nor can reasonable access to premises be denied.

4.5.4 Legal recognition was given to home zones in the Transport Act 2000, which came into force on 1 February 2001. Highway Authorities now have the specific power to formally designate home zones. In due course Highway Authorities will have the power to make orders about how the roads in a home zone can be used and how low traffic speeds will be achieved.

References

Design Bulletin 32 – DTLR

Places, Streets and Movement – DTLR

Traffic Advisory Leaflets – DTLR

Urban Safety Management – Institution of Highways and Transportation

Rural Safety Management – Institution of Highways and Transportation

Manual of Policies and Standards (MaPS) - SCC

CHAPTER 5

Parking

MOVEMENT PRINCIPLE 5: Car parking should not dominate or overly influence urban form and should be designed for efficient and flexible use.

5.1.1 The parking of cars is an important issue that can influence whether or not residential developments are successful. There is a general expectation that drivers are able to park their cars as close as possible to their destination, preferably within view. This desire has to be balanced against the need to maintain the overall design concept for an area. Parking should not dictate urban form.

5.2 Parking Places

5.2.1 Parking is either assigned or unassigned. Assigned parking is within the control, although not necessarily within the curtilage, of an individual property. Unassigned parking is open to allcomers and is a more efficient use of land as it can be used by different users throughout the day. On-street parking can be counted towards the parking provision of dwellings, provided that the carriageway is of sufficient width (see Chapter 3) and is designed specifically to accommodate parking and prevent obstruction. Parking areas within the adoptable highway should have a construction, related both to constituent materials and design thicknesses, equal to that of the adjoining adoptable carriageway. For more detail on types of parking provision please see Principle 6.4 from Chapter 6 'Movement' in 'Surrey Design'. Parking for disabled drivers needs special consideration and should be incorporated into all designs.

5.2.2 Secure and convenient cycle storage should be provided in all developments.

Parking Fundamentals

Parking spaces should generally conform to the dimensional requirements of this Appendix. This is important both for the size of the space and the room needed to manoeuvre into and out of it.

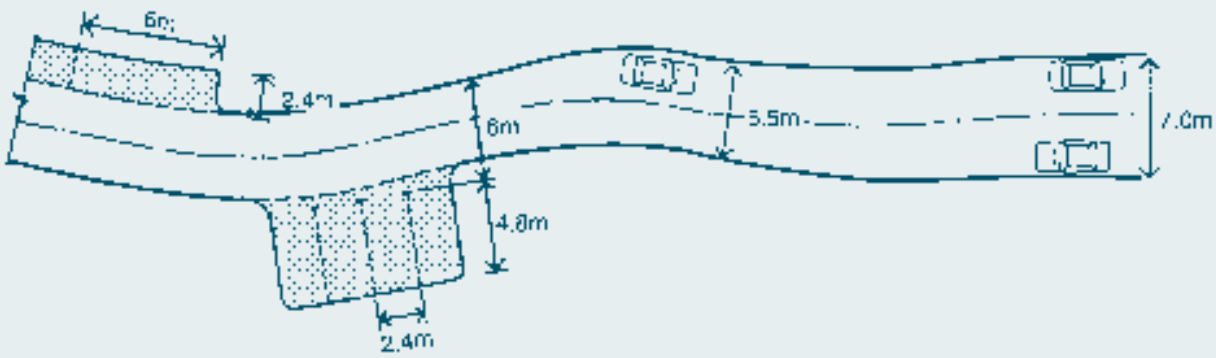
Minimum size for a car parking space:	
Access from the end	2.4m x 4.8m
Access from the side	2.4m x 6m
Disabled parking bay	at least 3m x 4.8m

Parking spaces at right angles to the carriageway should have an 800 mm clearance between the parking space and the footway in order to accommodate any overhang. This can be surfaced or planted in order to deter pedestrian use, although pedestrian crossing points should be provided. A 6m paved surface is required to manoeuvre into and out of these spaces, such as in parking squares and courts. The gradient should not be steeper than 5% (1:20).

Parking spaces provided in lay-bys parallel to the carriageway should be 6m long with crossfalls between 2% (1:50) and 3% (1:33).

Delineate parking spaces at right angles or parallel to the carriageway by permanent changes in texture or materials or the use of granite setts or concrete blocks set intermittently in the surface.

Covered parking areas (such as carriage arches) should have a clear headroom of 2.5m throughout. Covered areas that will be accessed by service vehicles should have a clear headroom of 4m, provided the entry is flat.



On Street Parking Provision

5.3 Driveways

5.3.1 For the purposes of this document, driveways are private vehicular accesses, without public right of way and not adopted by the Highway Authority. A driveway may serve up to 6 dwellings. It may also serve a garage court, provided its ends are intervisible. Driveways can join residential roads serving up to 300 dwellings and may require provision for vehicles to turn when located on roads serving in excess of 100 dwellings with traffic speeds in excess of 20 mph.

Driveway Fundamentals

Width

The minimum width of a domestic driveway is 2.75m but where driveways are likely to be used by service vehicles or serve parking courts they should be a minimum of 3 m wide. Where dwellings are more than 45 metres from the highway, the design of the driveway should provide a 3.7m wide corridor free of obstacles to fire appliance access. Driveways should be widened to 4.1m where parking may regularly occur or where they regularly provide pedestrian access. Single driveways should not exceed a width of 3.2m at the highway boundary.

Access

Driveway access is generally not permitted at speed control features, at junction bellmouths and within 2m of a rumble strip.

Length

In roads serving more than 50 dwellings, driveways leading to garages should be at least 6m long to allow for parking in front of the garage, clear of the carriageway. Where roads serve less than 50 dwellings, driveways leading to garages can be between 1m and 3m in length.

Carry distances

The design of driveways should take account of the following maximum carry distances:

Refuse Collection Vehicle to Dustbin Chamber	25m
Oil Tanker to Fuel Inlet	30m
Other service vehicle to dwelling	60m
Fire Appliance to front & back door of 1 & 2 storey dwellings	45m

Gradients

Driveway gradients are restricted as follows:

Driveways not used by service vehicles -	10% (1:10) for the first 6m
Driveways used by service vehicles -	
Residential roads	10% (1:10) for the first 10m
Other roads	5% (1:20) for the first 10m

Where possible driveway gradients should be kept to below 12.5% (1:8)

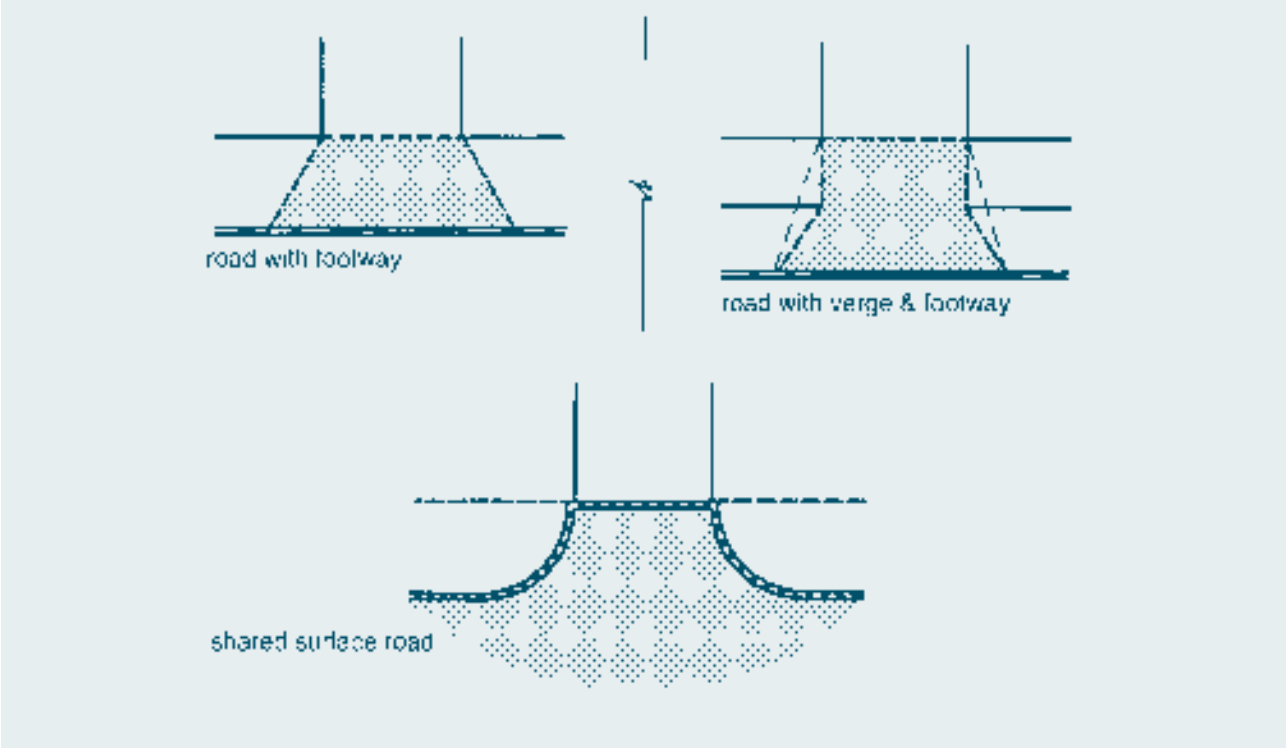
Surfacing

Driveways continuing the line of the carriageway should have a contrasting surface finish to the carriageway. It is not acceptable for loose surface materials such as gravel to be used adjacent to the highway. Where the entry of service vehicles is expected, driveways shall be appropriately constructed and surfaced. A shared surface finish should be carried to the limit of the highway at driveways and the boundary marked by a string course of setts, bricks or blocks.

Drainage

No water shall be discharged from a driveway onto the adopted highway, or vice versa.

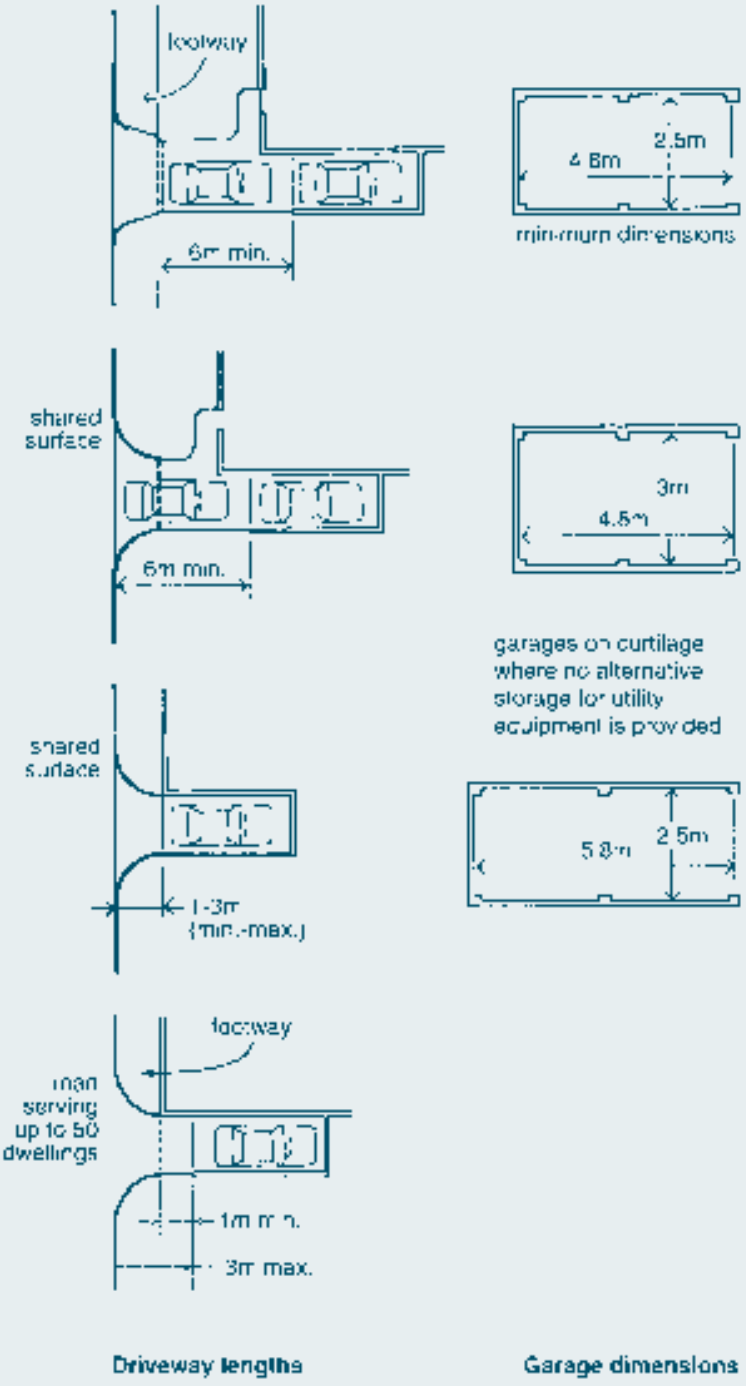
5.3.2 Driveways should cross the footway by way of a ramped vehicle crossing as shown below:



Driveway Vehicle Crossings

5.3.3 Footway crossings shall be of a similar width to the access being served, and they should be splayed or radiused for a distance of 2m from the carriageway edge. Crossfalls on the footway should be maintained as far as possible and the crossfall gradient of a footway crossing should not exceed 5% (1:20) over the width, although lesser gradients are preferred.

5.3.4 Driveway vehicle crossings will require an enhanced base construction in addition to the standard footway construction to include a roadbase layer. Consideration should be given, when constructing ramped vehicle crossings to dropped kerb access, to the location and installation depth of pipes, culverts and cables. Where conflicts of level exist, the services should be protected by way of a buried concrete slab construction. See Chapter 9 for guidance on the use of carriageway materials and pavement design.



Driveway Lengths And Garage Dimensions

References

Planning Policy Guidance Note (PPG) 13 : Transportation - DTLR
Planning Policy Guidance Note (PPG) 3: Housing - DTLR
A Parking Strategy for Surrey – SCC
Design Bulletin 32 – DTLR
Places, Streets and Movement – DTLR
Manual of Policies and Standards (MaPS) - SCC

CHAPTER 6

Soft Landscape within the Highway

6.1 Benefits of Planting

6.1.1 The benefits of planting in urban areas and along roadsides are widely recognised. Planting within the highway can be especially valuable for enhancing visual amenity, defining footways, footpaths and cycle paths, in speed control measures and to improve the appearance of visibility zones. Any planting within the highway should be part of the overall landscape design for a development. The aim should be to provide environments along roadsides where trees can be accommodated specifically. This will require good design and precautionary measures to protect against root encroachment.[1]

6.2 Adoption of Planting

6.2.1 Planting outside of the adoptable highway margins will not normally be adopted, however there may be exceptions where existing trees close to the carriageway are retained. Tree planting in verges will normally be adoptable, even though the combined width of the footway and tree planting will produce a margin in excess of 2m. Where the verge is not exactly 2m wide, the highway limit should be marked.

6.2.2 All planting schemes in the potentially adoptable highway should be prepared by a qualified landscape architect who certifies that the proposal conforms with the context of this chapter. The package should include a detailed and viable maintenance management plan and will be subject to approval by the Highway Authority.

6.3 Maintenance requirements

6.3.1 It is important to have the long-term management implications in mind when considering planting along roadsides. No planting, however low maintenance can survive without any form of management. Inappropriate planting can also cause maintenance problems on the highway. The need for maintenance can be reduced through careful design and selection of species. For example, avoiding planting awkwardly shaped and narrow spaces that would be difficult to maintain and ensuring that trees are not planted too close to pavements and underground services, to avoid damaging them. Provision should be made for five years comprehensive aftercare for the establishment of trees. This should be followed by a management plan for new planting and a commuted sum or ongoing maintenance regime put in place for at least a further 20 years (See paragraph 6.11.1 for information on commuted sums).

6.3.2 Species with dense foliage may cause localised leaf fall problems (gutter and drain blockages). Species with invasive surface rooting and/or suckering can cause damage to private as well as highway structures and should not be used.

1. The following legislation and procedures should also be observed: Highways Act 1959 (Section 134), amended by the Highways Act 1980 (Section 141); British Standards and guidance prepared by BALI, Landscape Institute, and Horticultural Association (see list at end of chapter).

6.4 Planning application requirements

6.4.1 Applications for planning consent should include

- An accurate site plan indicating the proposed siting of built structures
- An indication of existing ground contours and proposed alteration to ground levels
- Details of all existing trees, including crown spread and height and those trees to be retained or felled. This should include details of protective fencing (see paragraph 6.10.4)
- Details of all other significant blocks of vegetation including mature shrubs and hedges including those to be retained
- Details of the planting scheme. This should not just be an indicative species list, but should include information on density, size and general layout of species
- Outline specification covering implementation and maintenance operations for the scheme

6.5 Choice of species

6.5.1 Plants will adapt according to the characteristics of each site in response to aspect, soil conditions, and drainage. Prescriptive plant lists are therefore not included in this document, however the following criteria should be taken into account when selecting species.

- **local character** – where possible planting should reflect local character and native species are encouraged in appropriate locations (e.g. larger areas of structural planting)
- **nature of the development and function of the planting** – e.g. use species with light foliage where there is a need to restrict shading
- **maintenance implications** (see paragraph 6.3)
- **safety implications** – (see paragraph 6.7)
- **ability to tolerate adverse environmental conditions** – e.g. restricted area for roots to establish; pollution from run-off; salt damage (see paragraphs 6.5, 6.6 & 6.8)
- **ultimate size of the tree and root spread** – trees planted on development sites or alongside roads will not usually attain the sort of size that can be expected in ideal growing conditions found in parks and gardens.
- **Soil types, aspect, site drainage**

6.6 Services

6.6.1 Consideration should be given to the layout of services near trees. It is possible for services to be damaged as trees establish, where services are not properly laid or are installed in close proximity to the bole of the tree. Badly laid drains with leaking joints encourage root development and the eventual penetration by roots of certain tree species. Potential problems can also occur as a result of excavation needed to route services. Rarely is disturbed planting restored satisfactorily. Consideration should be given to techniques designed to avoid this (i.e. routing services through common ducting or gravel strips or other easily excavated services).

6.6.2 Underground services will be protected by barriers blocking root growth or by ducting between adjacent service access points when there are existing or proposed trees closeby. Services within 2m of small trees, 3.5m of medium trees and 5m of large trees should be protected in this way. Expert advice should be sought when existing trees may be affected.

6.7 Location and planting distances of trees from pavements and carriageways

6.7.1 Particularly in roadside locations, trees are placed in a restricted area of soil, and in time roots will want to penetrate beyond the narrow space in which they initially develop. The anticipated size and rooting habit must therefore influence where trees and shrubs are planted in relation to pavements and highways, in order to allow sufficient space for canopy development and root spread away from the immediate road edge. One solution is to plant in a 'back verge' (verges between carriageway and footway), which would provide space to include larger tree species as part of a structural landscape. Where planting is on an embankment, the choice of species and distance of planting from the road will be influenced by the gradient (when in excess of 33%, 1:3) available soil cover, maintenance implications and exposure to wind.

6.8 Safety Implications

6.8.1 Planting within visibility zones needs to be chosen and located so as not to obstruct visibility, with a zone of 0.6m to 2m above ground level, left free of obstruction. Ground cover species and trees can be planted, although trees should not have any branches or foliage below a height of 2.5m. Ongoing maintenance of planting is vital to ensure that visibility is retained.

6.8.2 Trees that are especially attractive to children should not be planted near to carriageways e.g. Horse Chestnut and Sweet Chestnut. Species should also be avoided that are brittle and are liable to shed branches.

6.9 Plant Damage

6.9.1 If plants are to establish and survive it is important to take steps to reduce potential plant damage. This will be dependent on making sure that species are selected for the particular conditions of the site, there is good ground preparation, the trees and shrubs are properly handled prior to planting to prevent damage to roots and there is long term maintenance provision in place. Plastic guards should be fitted around young trees to avoid damage from mowing and strimming. Many of the potential causes of damage can be prevented or allowed for in a good design layout.

6.9.2 Continued use of salt as a de-icing agent is a particular cause of damage alongside roads, footpaths and other pedestrian areas and can cause irreversible harm to soil quality and plant communities. Implications of salt induced damage should be given serious consideration. The effect of salt on vegetation patterns is generally detrimental, and can lead to the establishment and colonisation of salt tolerant species (particularly herbaceous) that may well result in serious management problems (weeds).

6.9.3 The following measures could help to reduce damage:

- salt bins and salt dumps away from trees and shrub beds
- shape ground surfaces to encourage rapid and efficient run-off into a good drainage system
- select plants that are tolerant to salt. Even tolerant species will be affected by long-term use of salt and planting should always be associated with other remedial measures mentioned in this list, in order to diminish potential long-term salt damage. The potential for greatest damage occurs in evergreen species and in particular conifers. This needs to be borne in mind when planting low ground cover as a surface finish. Grass can be affected in the same way
- provide good drainage in footpaths, footways and other pedestrian areas to remove salt laden water efficiently.
- regular checking of calibration on salt spreading equipment to ensure against over application
- provide information to other parties who are likely to use salt (i.e. house owners and shop owners), use of alternative less damaging materials such as CMA, urea, and salt/grit mixes in pedestrian areas,
- provision of slush disposal zones adjacent to planted areas with efficient drainage to remove salt laden water
- ensure soil cover in planting areas is of good quality and free draining
- use of raised kerbs to protect planting

6.10 Retention and protection of trees

6.10.1 Existing healthy and well-formed trees should generally be retained (see Principle 4.3 Surrey Design). Established trees next to road carriageways can provide an attractive feature in a new development. The presence of such trees needs to be recorded early on in the development process to avoid poor siting of structures, services and surfaces and to ensure against damage during the site clearance and construction phase. Tree retention should be reflected in the location and construction of roads, footways, footpaths, sewers, services, drains and other hard surfaces. Successful retention of trees on development sites can be achieved by working to British Standard 5837 - Guide for Trees in Relation to Construction.

6.10.2 Development proposals should be accompanied by a full vegetation survey, including location of all trees, shrubs, and hedges and a record of other relevant features (structures/streams/ditches/services). This should be coupled with an accurate survey of ground levels to indicate how ground surfaces relate to boles of trees and rooting zones. A qualified arboriculturalist should carry out tree surveys. Tree Preservation Orders, Planning Conditions and Conservation Area designations affecting the site, as well as any legal obligations that relate to tree retention and replacement, should also be recorded.

6.10.3 In deciding whether or not to retain trees, the following issues need to be considered:

- Are they healthy, attractive and the right species for the location?
- The likelihood of the tree being able to adapt to its new environment. New development often represents a dramatic change in the environment for an established tree that may affect its ability to survive. This can often be prevented by protecting the roots during construction and through careful design and layout of the development (see BS 5837 'Guide for Trees in Relation to Construction' and paragraphs 6.10.4 & 6.10.5 below). Whilst retention should always be the first consideration, it may be more beneficial in the longer term to replace an existing mature tree with a semi-mature tree of a more appropriate species
- How to integrate the design of the new development around the tree rather than vice versa – consider, for example, adopting a flexible approach to carriageway design to maximise space for incorporating trees, retaining the tree as a focus or as part of speed control measures
- The location of underground services, structures and surfaces to avoid damage to the tree.

6.10.4 A Protected Area should be defined for all trees that are to be retained. This is the area around the tree that is to be kept free from disturbance and is the minimal radial distance at which protective fencing should be installed prior to and during development. The line of protective fencing should be to the edge of the canopy (branch spread) or a radius at least equivalent to half the height of the tree, whichever is greater (see BS 5837). No building or storage of materials or equipment should be allowed within fenced areas and special techniques should be applied to the installation of services within fenced areas including use of 'no dig' methods where appropriate.

6.10.5 The aim should be to keep as much construction activity as possible outside fenced designated Protected Areas. Provided care is taken certain activities can be facilitated within these areas, but there should be a detailed method statement in place to guide implementation.

6.11 Calculating Handover Commuted Sums for Management of Landscaped Areas

The costs indicated below are for typical landscape maintenance operations anticipated following handover from a developer. Handover arrangements assume that the items identified on the **Checklist for Handover of Landscaped Areas** have been implemented satisfactorily and that landscape areas are handed over in a condition which is acceptable to the new Management body.

Operation	Frequency	Unit	Sum
Existing Trees and Shrubs			
Minor work to existing mature trees - Provisional amount	one-off	per tree	100.00
Attending to major structural defects - Provisional amount	one-off	per tree	500.00
Pollarding - Future Allowance for work	up to 12 years	per tree	50.00
Coppicing - Future Allowance for work	up to 8 years	per item	30.00
Decompaction around trees to improve aeration and water penetration or drainage	as required	per tree	10.00
New Trees (up to 15 years age)			
Watering	as required	per visit	5.00
Replacement of steel strimmer / mower guards	as required	per item	6.00
Replacement of plastic strimmer guards	as required	per item	2.00
Replacement of 1.8 height steel tree guards	as required	per item	30.00
Formative pruning	as required	per tree	22.00
Weeding			
Granular soil active chemical treatment to shrub borders	once annually	m2	0.15
Granular soil active chemical treatment to tree bases	once annually	per tree	0.18
Granular soil active chemical treatment along hedges	once annually	lin m	0.15
Selective weed control of perennials/noxious weeds	per visit	m2	0.20
Handweeding ground cover areas - quarterly	per visit	m2	0.50
Handweeding shrub borders - 2 x annually	per visit	m2	0.60
Strimming interspaces within planted areas - 2 x annually	per visit	m2	0.12
Mulching			
Replenishment of shrub borders with coarse bark	bi-annually	m2	3.60
Replenishment of shrub borders with wood chip	bi-annually	m2	2.50
Litter			
Collection and disposal of litter from open grass areas	per visit	100m2	3.00
Collection and disposal of litter from shrub borders	per visit	100m2	6.00
Leaf collection from grassed and paved areas	per visit	100m2	5.00

Operation	Frequency	Unit	Sum
Grass Cutting			
Cutting grass open areas with slopes less than 30 degrees to 50mm height and removing arisings	per visit	1000m2	25.00
Cutting open grass areas with slopes less than 30 degrees to 75mm height and leaving arisings in-situ	per visit	1000m2	15.00
Cutting grass areas obstructed by trees and other planted areas to 50mm height and removing arisings	per visit	100m2	3.00
Cutting grass areas obstructed by trees and other planted areas to 75mm height and leaving arisings in-situ	per visit	100m2	2.00
Renovation of damaged areas with topsoil and seeding (allow for 5% of total grassed area)	as required	m2	1.50
Renovation of damaged areas with topsoil and turfing (allow for 5% of total grassed area)	as required	m2	3.50
Aeration of grassed areas with spiked aerator to improve grass cover and drainage (allow for 15% of grassed area)	annual visit	100m2	1.00
Strimming rough grass areas on slopes less than 30 degrees	per visit	m2	0.10
Strimming rough grass areas on slopes in excess of 30 degrees	per visit	m2	0.12
Cutting wildflower areas and removing arisings	annual visit	m2	0.20
Trimming Hedges			
Trimming formal hedges to 1.8m and removing arisings 3 x annually	per visit	lin metre	1.00
Trimming informal hedges and removing arisings	annual visit	lin metre	1.25
Replanting Trees			
RB = Root balled *BR = Bare root* *Costs indicated include for cost of tree, excavation of tree pit, planting, staking, strimmer guard, and watering (4 times) in accordance with SCC Standard Specification. Does not include for steel guards.*			
Replacement of Advanced nursery stock trees (RB)	as required	per item	100.00
Replacement of damaged selected standard tree (RB)	as required	per item	45.00
Replacement of damaged standard trees (BR)	as required	per item	35.00
Replanting Shrubs and Hedging			
Costs indicated include for cost of plants, excavation of pits / trenches, planting, mulching and watering (4 times)			
Replacement of damaged hedging	as required	lin metre	12.50
Replacement of damaged shrubs	as required	per item	4.50
Replacement of damaged ground cover	as required	m2	18.00
Fencing			
Replacement chestnut pale fencing 1200 height	as required	lin metre	5.50
Replacement low level timber trip rail 450 height	as required	lin metre	18.00
Replacement rabbit proof fencing 900 height	as required	lin metre	3.50

Note: The costs were calculated in March 2000, and will be updated periodically. The sums will be checked for adequacy when each scheme is submitted.

Checklist for Handover of Landscaped Areas

Checklist Items	Question	Yes	No	Remedial Action Required
Existing Trees Note: *Ignore trees classified as 'Ancient trees'*				
General	Has a Schedule of Works been provided for cross check			Obtain a copy to facilitate checking procedures
	If not, request a copy of an arboricultural assessment			Obtain a copy to facilitate checking procedures
	Has local authority tree officer been consulted			Consult as necessary
Structural defects	Have identified defects been attended to fully			Request works to be carried out as itemised
	Are there signs of other defects which are not listed (weak forks, pruning wounds, die back)			Secure a new assessment/work schedule and monitor works are carried out to requirements specified
Decay and Cavities	Have implications been assessed by arboriculturalist			Secure works schedule from Arboriculturalist
	Has recommended treatment been carried out			Monitor works are carried out to requirements specified
Soil Condition	Are there signs of ground compaction			Request decompaction by pneumatic means / or by hand
	Are there signs of soil disturbance			Verify extent and source of impact. Action as appropriate.
	Have service installations been carried out close to trunk			Verify extent and source of impact. Action as appropriate.
	Are soil levels in relation to base of tree acceptable			Secure sensitive adjustment to soil levels
	Are there signs of pollution from spillages (i.e.oil / cement)			Request removal and replacement of contaminated soil
	Are there signs of waterlogging / localised ponding			Request adequate drainage provision
Root disturbance	Are there signs of exposed roots / root severance			Request soil cover to appropriate depth and root pruning
Broken branches	Have broken/crossing branches been neatly removed			Request removal
General Health	Are there obvious signs of lack of vigour / poor health			Check impact with arboriculturalist / remove or treat tree
	Are there signs of fungal development or cancers.			Check impact with arboriculturalist / remove or treat tree
	Are there signs of peeling, loose bark, or die back			Check impact with arboriculturalist / remove or treat tree
	Has there been good bud formation, fruiting or leafing out			Check impact with arboriculturalist / remove or treat tree
General Appearance	Are there signs of windblow			Check impact with arboriculturalist / remove or treat tree
	Are there signs of trunk or canopy damage			Check impact with arboriculturalist / remove or treat tree
	Has the tree been shaped up according to specification			Secure appropriate treatment in accordance with Spec

Checklist Items	Question	Yes	No	Remedial Action Required
Special Works	Have old pollards been re-worked satisfactorily			Secure appropriate treatment in accordance with Spec
	Have coppiced trees been re-worked satisfactorily			Secure appropriate treatment in accordance with Spec
Miscellaneous	Has protective fencing been removed			Request removal and making good
	If being retained, is fencing stable and in good repair			Secure repairs
	Have all tree work arisings been cleared from site			Request removal

Semi-Mature and Standard Trees

Objective: *to produce a well balanced shape according to species, free of any defects, with a well defined canopy raised to minimum of 1.8 m above ground*

Weed Control	Has a weed/grass free zone been maintained around base			Request treatment - 2 m min circle with selected herbicide
	Has pre-emergent herbicide been applied prior to handover			Request treatment if appropriate during late winter
	Are there signs of soil disturbance likely to activate weeds			Request reconsolidation, chemical treatment and mulch.
Mulch	If used, has mulch cover been maintained at 100mm depth			Request 100 mm depth min of coarse bark / wood chip
Appearance	Have broken / damaged branches / shoots been pruned			Request pruning to be carried out
	Has formative pruning been carried out to lower branches			Request pruning to be carried out
	Has a defined central leader been encouraged / maintained			Request replacement tree if fault cannot be corrected
	Are there signs of weak forks / split junctions			Request corrective surgery or remove tree
Growth	Are there obvious signs of lack of vigour / poor health			Decide whether tree should be replaced
	Has tree attained a size consistent with species			Decide whether tree should be replaced
Soil Condition	Are there signs of ground compaction			Request decompaction by pneumatic means / or by hand
	Are there signs of soil disturbance			Verify extent of impact on roots. Action as appropriate.
	Are soil levels in relation to base of tree acceptable			Request sensitive adjustment to soil levels
	Are there signs of waterlogging / localised ponding			Request adequate drainage provision
Damage / Health	Are there signs of strimmer / mower damage			Request repair work if possible and protection with guards If damage cannot be repaired request replacement tree
	Are there signs of physical damage to canopy			Request pruning to be carried out
	Are there signs of pests / disease			Seek arboricultural advice / Request corrective work.
	Have broken/crossing branches been neatly removed			Request removal

Checklist Items	Question	Yes	No	Remedial Action Required
Shelters	Are any welded mesh steel tree guards intact and upright			Request replacement or adjustment as appropriate
	Are any strimmer / mower guards intact			Request replacement as appropriate or removal
Stakes / Ties of holes.	Have stakes / ties been removed.			Request removal and disposal, and filling
	Are earth anchors and guy cables for semi-mature trees properly adjusted and intact			Request adjustment or replacement of defective elements
Spacings	Have individual trees sufficient space to develop canopies			Request thinning if appropriate to at least 5 m spacings
	For grouped trees are interlinked canopies causing damage			Request thinning out as appropriate.
Location	Are any trees impacted / deformed by shading			Request selective removal or coppicing
	Are any trees causing obstruction or shading			Request removal.
Vandalism	Have any trees been badly vandalised			Request replacement or coppicing if appropriate species
Watering replaced	Have trees been provided with integral watering system			Request installation if tree being

Whip, Transplant and Feathered Sized Stock

Objective: *to produce a young healthy upright growing specimen, properly pruned to form eventual standard with a clear stem ranging between 1.25-1.50 m from ground, or where applicable a multi-stemmed specimen with no more than 5 separate stems.*

Weed Control	Has a weed/grass free zone been maintained around base			Request treatment - 1 m min circle with selected herbicide
	Has pre-emergent herbicide been applied prior to handover			Request treatment if appropriate during late winter
	Are there signs of soil disturbance likely to activate weeds			Request reconsolidation, chemical treatment and mulch.
Mulch	If used, has mulch cover been maintained at 100mm depth			Request 75 mm depth min of coarse bark / wood chip
Fertilizer	Has a well balanced fertilizer been applied			Request application of agreed fertilizer
Appearance	Have broken / damaged branches / shoots been pruned			Request pruning to be carried out
	Has formative pruning been carried out to lower branches			Request pruning to be carried out
	Has a defined central leader been encouraged / maintained			Secure development of new leader or replace tree
Firming	Have any trees been loosened by wind action			Request trees to be firmed
Damage	Are there signs of strimmer / mower damage			If extensive, request removal and replacement of tree
	Are there signs of physical damage to canopy			Request pruning to be carried out

Checklist Items	Question	Yes	No	Remedial Action Required
Shelters	Have shelters / guards been removed, or			Request removal and disposal, and filling of holes.
	If retained are they intact, fully adjusted and stable			Request replacements or adjustments to be carried out
Stakes / Ties of holes. filling	Have any stakes / ties been removed.			Request removal and disposal, and
Thinning	Have overcrowded trees been thinned to at least 2m apart			Request thinning
Location	Are any trees impacted / deformed by shading			Request removal or coppicing
	Are any trees causing obstruction			Request removal or pruning back
Vandalism	Have any trees been badly vandalised			Request replacement or coppicing if appropriate species

Shrubs

Objective: *to produce a dense canopy of healthy growth and form appropriate to species, neatly pruned back from any adjacent roads or footpaths to remove obstruction. Ground cover should form a continuous weed free cover of ground surface.*

Weed Control	Has weed control been maintained throughout the border			Request treatment of ground area with selected herbicide
	Are there signs of noxious weeds (I.e. docks / thistle)			Request treatment with selective herbicide
	Are there signs of couch grass colonisation			Request specialist treatment and / or replanting
	Has pre-emergent herbicide been applied prior to handover			Request treatment if appropriate during late winter
	Are there signs of soil disturbance likely to activate weeds			Request reconsolidation, chemical treatment and mulch.
Mulch	Has mulch cover been provided			If not, request 75 mm minimum depth of coarse bark
	If mulch cover has been provided, is it intact / full coverage			Request restoration to full depth and cover
	Are any mulch mats intact and in place			Request adjustment, replacement or removal
Litter	Have shrub areas been cleared of litter and surface debris			Request removal and disposal from site
Firming shrubs	Have any shrubs been loosened by wind action / vandalism			Request firming or replacement of
Shelters	Have shelters / guards been removed			Request removal and disposal, and filling of holes.
Replacements	Have dead / missing / badly damaged plants been replaced			Request replacement with appropriate species
Coverage	Has ground cover planting achieved full carpet coverage			Request provision of gap filling planting
	Has shrub planting got obvious gaps			Request provision of gap filling planting

Checklist Items	Question	Yes	No	Remedial Action Required
Fertilizer	Has a well balanced fertilizer been applied			Request application with agreed fertilizer
Pruning	Are there outgrowths over edge of carriageway or footpath			Request pruning of shrubs back to agreed line
	Have broken / damaged branches / shoots been pruned			Request pruning
Vandalism	Have any shrubs been badly vandalised			Request replacement or coppicing if appropriate species
Services	Have service installation trenches been properly restored			Request soil restoration and new planting

Hedges

Objective: *to produce a dense matrix of healthy growth , neatly trimmed to appropriate shape, preferable 'A' shape, allowing for removal of obstructive outgrowths adjacent to carriageways and footpaths. Generally, heights of hedges should not be greater than 2 metres.*

Weed Control	Has weed control been maintained throughout the hedge			Request treatment of ground area with selected herbicide
	Are there signs of noxious weeds (I.e. docks / thistle)			Request treatment with selective herbicide
	Are there signs of couch grass colonisation			Request specialist treatment
	Has pre-emergent herbicide been applied prior to handover			Request treatment if appropriate during late winter
Mulch	Has mulch cover been provided			If not, request 75 mm minimum depth of coarse bark
	If mulch cover has been provided, is it intact / full coverage			Request restoration to full depth and cover
Litter	Have hedges been cleared of litter and surface debris			Request removal and disposal from site
Replacements	Have dead / missing / badly damaged plants been replaced			Request replacement with appropriate species
Density	Has density of planting produced continuous hedge			Request reinforcement if appropriate
	Have two rows of hedge planting been provided (5 per m)			Request provision of adequate planting
	Have hedges got obvious gaps			Request provision of gap filling planting
Fertilizer	Has a well balanced fertilizer been applied			Request application with agreed fertilizer
Trimming	Have hedges been neatly trimmed back to agreed height			Request trimming of hedges back to agreed height
Vandalism	Have any shrubs been badly vandalised			Request replacement or coppicing if appropriate species
Services	Have service installation trenches been properly restored			Request soil restoration and new planting

Grassed Areas

Objective: *to produce a dense level mat cover, neatly cut according to grade or use of area.*

Weeds	Are there signs of noxious weeds within sward			Request use of selective herbicide
	Is weed colonisation above 15% of sward composition			Request recultivation and reseeding / turfing

Checklist Items	Question	Yes	No	Remedial Action Required
Soil Condition	Are there signs of ground compaction			Request decompaction / deep cultivation
	Are there signs of erosion			Request complete recultivation and reseeding / returfing
	Are there signs of localised waterlogging / ponding			Request provision of adequate drainage
	Are there signs of partially buried debris			Request removal and reseeding
Grass Cover	Has 85% minimum cover of healthy sward been achieved			Request for recultivation and reseeding / turfing of gaps
	Is sward cover patchy and less than 85% cover			Request complete recultivation and reseeding / turfing
Soil Levels	Are soil levels more than 50mm above the level of adjacent kerbs or footpaths			Request soil regrading and reseeding / turfing
	Are soil levels less than 25mm above the level of adjacent kerbs or footpaths			Request that soil levels are built up to a minimum of 25mm above adjacent kerb or footpath level
	Are soil levels below the level of adjacent kerbs or footpaths			As above
	Are levels across grassed area uniform without abrupt changes in level or rises / depressions			Request regrading to levels suitable for efficient mowing and reseeding / turfing
	Have hollows been formed at the base of banked areas adjacent to kerbs or footpaths and walls to intercept water			Request installation of gravel strip soakaway
Stones	Has stone picking been carried out			Request removal of all surface stones
Awkward Areas	Are there grassed areas that could prove difficult to mow			Request suitable planting or hard landscape
Grass Species	Have the correct grass mixes been used to suit proposed cutting regimes			Request evidence of grass seed / turf mix used. If appropriate request reseeding / turfing
Wild Flowers	Have wild flowers been used in the grass mixes			Request wild flower areas to be marked clearly
	Is there evidence of wild flower content in grass matrix			If appropriate request replanting with plugs
	Is there evidence of grass arisings lying on surface			Request raking off and disposal of arisings
Bulbs	Has bulb planting been included within grassed areas			Request bulb planted areas to be marked clearly
	Will bulb planted areas conflict with mowing regimes			Request removal of bulbs and reseeding of area
Trees	Have rings of bare ground been formed around trees			Request herbicide treatment to form mowing margins
Cutting	Have grass areas been freshly cut and arisings removed			Request that cutting to a height of 25mm is carried out

References

British Standard BS 5837:- Trees in Relation to Construction 1991
ISBN 0 580 20245 3

Trees on Development Sites, D.R. Helliwell, Arboricultural Association.
ISBN 0 900978 11 2

Guidelines for the Planning, Installation and Maintenance of Utility Services in Proximity to Trees. National Joint Utilities Group, 30, Millbank, London, SW1P 4RD

NHBC Standards, Chapter 4.2, Building near Trees. ISBN 0 907257 208

DOE Circular 11/95 ISBN 0 11 753130 8

Arboricultural Practice Notes

APN1 Driveways Close to Trees – this deals with the implications of constructing access routes, driveways and parking areas close to trees.

APN3 Trees in Dispute – this is a concise guide to the law relating to trees

Arboricultural Research and Information Notes

ARN36 Tree Roots and Underground Pipes – concise guidelines on minimising risk of damage to pipes

ARN134 Forces Exerted by Tree Roots – discusses the forces tree roots can exert and situations where damage may occur.

Other Reading

National House-Building Council (192) Standards, Chapter 4.2 (NHBC, Amersham)

CHAPTER 7

Lighting

7.1 General Requirements

7.1.1 Lighting should be planned as an integral part of a housing or mixed lay out. Adequate and an even distribution of light is required to help prevent night-time accidents and personal attacks, protect property, discourage crime and vandalism.

7.1.2 Lighting columns, brackets and luminaries must be chosen for appearance, efficiency, running costs and maintenance requirements.

7.1.3 Only lighting which fulfils a highway function will be adopted.

7.1.4 Road lighting should be designed to emphasise the essential distinction between leading to places and roads as places. Most highway lighting will be designed using light sources mounted at 5 metres above ground level, and to light the highway uniformly. Where required, such as Section 278 schemes at entrances to the development site, the new lighting is to match, or compliment, any existing lighting. This may require columns of a different height because of design needs. In exceptional circumstances columns with a mounting height of less than 5 metres but meeting BS 5489 requirements, or subsequently revised standard may be considered.

7.1.5 Developers may submit their own proposal for approval of the Highway Authority. The scheme shall include all illuminated traffic signs and bollards. Alternatively the Authority will prepare a lighting scheme at fully detailed specification for lighting that is to be adopted, for which the Authority will make a charge. Where the Authority is approving the Developer's proposed scheme and the time spent on this approval is excessive, the Authority will reserve the right to charge.

7.1.6 Whichever course is chosen the lighting scheme must be presented as an integral part of the planning application. The column, bracket, luminaries and light source must be in accordance with the Highway Authority's approved equipment list and general policy, as well as complying with BS5489 (or subsequent standard) requirements.

7.1.7 The Developer is to show all lighting, signing, bollards etc., on all construction/layout plans (including sales and legal/conveyancing literature) in order that the prospective residents are aware that there may be street furniture placed adjacent to any given plot. The County Council will not be a party to any disagreement between the developer and a prospective resident over the siting of street furniture.

7.2 Design

7.2.1 Street furniture, especially lighting columns and the associated brackets (if required) and luminaries, has a significant impact on the environment. An application for the approval of details for a residential or mixed development road lighting system shall include all column positions and a description of the equipment proposed. A copy of the calculations detailing the performance of the lighting system is to accompany the drawings. Full details of the calculations required can be obtained from the Engineer. The details are to include the positioning of new illuminated signs and bollards. Existing lighting on the adjoining roads shall be shown on the drawings. The new lighting scheme is to integrate with the existing, leaving no unlit or dark areas. Existing lighting, which is to be removed or re-sited, shall be included in the details of the proposed works.

7.2.2 Wall mounted brackets or lighting fittings may be fixed to structures under the developer's control, subject to an agreement and a licence being issued, (and a clause inserted in the Section 38 agreement). The licence shall be worded so that it passes to successors in Title and does not have to be re-issued whenever the structure's ownership changes. Generally highway lighting columns and brackets are to be painted in accordance with the Authority's painting specification. All highway lighting units are to be vandal resistant.

7.2.3 All roads and footpaths, intended for adoption, should normally be provided with a lighting system. Exceptionally a new road in a conservation area, or an area of special amenity value, may be permitted without highway lighting. This situation may only occur if the roads in the vicinity have no highway lighting. Before a final decision on this is made, consideration is required of the record of crime or night-time accidents in the area, and following consultation with the Parish Council. A road is automatically un-restricted if there is not a system of highway lights, a traffic order is required to vary the speed limit.[1]

7.2.4 The Highway Authority will design highway lighting for distributor roads. A Developer may design a road lighting scheme for a residential or mixed-use access road or may request the Highway Authority to produce it. Two copies of a plan showing the proposed site layout and the extent of the works are to accompany such a request. The County Council's Highway Lighting engineer will respond with an estimate of the cost of design etc., and a confirmation (CI) of his understanding of the developer's requirements. Design, etc. of the work will start on receipt of the developer's, or their consulting engineer's official order. The Engineer will indicate the layout of the scheme required and will issue a specification of the equipment to be used. Details of any lit traffic signs or bollards required will be included with any private cable network requirements. One copy of the plan will be returned to the developer together with the specification. The developer is to incorporate the details into the drawings to be submitted in the Section 38, and/or Section 278 agreement.

7.3 Light Source

7.3.1 High pressure sodium (SON-T Plus) lamps using modern optical control to utilise most of the light output from the lamp are to be used to light all roads and footpaths. The use of CDM T, CDM TT and compact fluorescent lamps will be considered in some circumstances. The control of the lamp output is also used to ensure that light pollution in the form of waste light into the sky and the surrounding area is reduced and meets the criteria laid down in ILE's 'Guidance Notes for Reduction of Light Pollution', or subsequent revised guidance. In Conservation Areas, consideration may be given to the use of a whiter light source. Generally a 50 watt SON-T Plus lamp in any road serving less than 300 dwellings, but under some circumstances a 70 watt SON-T Plus lamp would be required. See the table below for suggested lighting categories, mounting heights and light sources.

Number of Dwellings served	Lantern Type	Mounting Height	Light Source	BS 5489 Part 3 Lighting Categories
Roads serving 0 to 20 dwellings	Side Entry	5.0 metre	50 watt SON-T Plus	3/3
Roads serving 20 to 50 dwellings	Side Entry	5.0 metre	50 watt SON-T Plus	3/2
Roads serving 50 to 300 dwellings	Side Entry	5.0 metre	50 watt SON-T Plus	3/1
	Side Entry	6.0 metre	70 watt SON-T Plus	3/1

7.3.2 Side entry lanterns giving an asymmetric distribution are generally preferred to Post Top lanterns for the lighting of predominantly linear spaces. In certain circumstances, however, the use of Post Top lanterns will be considered. Generally, more expensive Post Top lanterns are used where the aesthetics of the area requires additional consideration.

1. A system of street lighting for the purposes of the interpretation of Section 82 of The Road Traffic Regulation Act 1984 shall, within Surrey, be taken to mean a system comprising a minimum of 3 lamps placed not more than 183 metres (200 yards) apart except in the following circumstances: In computing the number of lamps on a road no account shall be taken of any lamps placed at or adjacent to any form of junction, including roundabout, of the road with another road or roads unless the road has, apart from the lamps placed at or adjacent to the junction, a minimum of 3 lamps placed not more than 183 metres (200 yards) apart and the lamps placed at or adjacent to the junction form a continuous part of the system of street lighting so formed.

7.4 Location

7.4.1 Lighting units should be located to provide maximum lighting where it is most needed. Therefore they should normally be provided at junctions, roundabouts, speed controls and areas where pedestrians and other users meet with moving vehicles. The Surrey County Council's Code of Practice (ILE Code of Practice is awaited) for the lighting of traffic calming schemes is to be adhered to. Shared surfaces must be adequately lit to ensure the safety of the pedestrians. Care must be taken that any buildings and trees do not produce dangerous shadows. It is usual to design a staggered layout where able, but where the road is curved lights should be provided on the outside of the curve. At curves in shared surfaces, lights should be placed so that vehicles and pedestrians are visible but the column does not form an obstruction to moving vehicles.

7.4.2 A lighting column set 0.5 metres clear of the channel line would obstruct a footway directly abutting a carriageway. Accordingly a column should be located at the rear of the footway which is not separated from the carriageway by a verge or margin.

7.4.3 Columns shall generally be located on the outside of a curve in the carriageway alignment. Wherever possible, positions should be selected away from established or newly planted trees and tall shrubs, where the shadows cast would interfere with the aims of the lighting design. Care should be taken in designing a layout to avoid annoyance being caused by stray light. (See the Guidance Notes issued by the Institution of Lighting Engineers). Locating a column in line with a party boundary, combined with use of modern optics, may reduce or prevent nuisance from stray light. Ease of access for maintenance vehicles should also be taken into consideration when deciding on column locations.

7.5 Spacing

7.5.1 Highway lights should be generally spaced to achieve the lighting categories indicated in Table 1. All the relevant parts of BS 5489 (or subsequent standard) are to be observed. Where shorter distances are required to light critical points, see 5.1 above, the design is to be able to accommodate this requirement.

7.5.2 Columns shall be positioned to minimise the risk of impact by vehicles. The minimum requirements for horizontal clearances are as indicated in BS 5489, Part 1, table 1, or subsequently revised standard.

References

BS 5489, Parts 1 to 9, as required.

Institute of Lighting Engineers (ILE) Guidance Notes for Reduction of Light Pollution. www.ile.org.uk

SCC Code of Practice for the Lighting of Traffic Calming Schemes. (An ILE Technical Committee is currently considering the production of a Technical Report on the subject, to produce a Code of Practice. Once this is published and its content assessed, its adoption by SCC will be considered).

BS 5649 (1978)

BS EN IOS 1461: 1999

BS 4533 (1981)

Ingress Protection Rating (IP).

BS 33767 (IEC 662)

BS 88. HRC Fuses.

BS 7671 16th Edition Regulations for Electrical Installations.

Detailed Specification for Lighting

Columns and Brackets

1 A reputable manufacturer shall produce all street furniture and the Developer shall satisfy the Engineer that replacements are readily available. In general standard items of street furniture will only be accepted, as the cost of replacement may be otherwise unreasonable.

2 Columns and any necessary brackets shall be chosen to give the required mounting height and position for the lanterns provided. Generally, the bracket projection for either column or wall mounted unit should be 0.3m, but should not exceed 0.5m. Where the bracket is inclined, this should not exceed 5 degrees unless the circumstances are exceptional.

3 Steel lighting columns shall be manufactured to BS 5649 (1978), or subsequently revised standard, and shall be protected against corrosion by means of a shot blasted and metal sprayed external finish with galvanised internal finish, applied at the works, or a hot dipped galvanised finish complete. The columns with external metal-sprayed and galvanised internal finish shall have a sealant or similar protective coating applied both externally and internally at the works. The root section of all columns shall be painted with black bituminous paint.

4 Hot dipped galvanised columns shall be galvanised in accordance with BS EN IOS 1461: 1999, or subsequently revised standard.

5 Where non standard or unusual columns, brackets or lanterns may be accepted by the County Council. If so a commuted sum will be required because of the increased cost of replacement and maintenance.

6 Each column shall have a weatherproof access door to the base compartment, which shall be fitted with a tri-headed, lock at the top and retaining, lug at the base of the door.

7 The base compartment shall be fitted with a baseboard on which is mounted the REC's cut out, the double pole switched fused secondary disconnector and the photo electric cell electronic base unit. The baseboard shall be manufactured from a material which will not be adversely affected by moisture and will accept normal fixings.

Lanterns

8 Lanterns should be mounted at 5 metres mounting height in residential access roads. This should allow for a 5.1 metres vertical clearance where the lantern overhangs a vehicle surface

9 Lanterns shall be manufactured to BS 4533 (1981) or subsequent revision of the standard. Lanterns shall have integral control gear and 'preferable' will be fitted with an automatic disconnection arrangement within the lantern, which operates when the canopy is opened. Generally side entry style lanterns are preferred with suitable optics to provide the control of the light from the lamp to meet the lighting level requirements set out in Table 1, (BS 5489 Part 3) or subsequent revision of that standard. The lanterns shall generally employ a deep bowl but shallow curved bowl or flat glass style can be employed, as required by the project. Where Post Top style lanterns are considered, the optics and distribution are to produce results meeting the levels set in Table 1.

10 The preferred Ingress Protection rating (IP) is to be IP66 for the lamp and optical section of the lantern and IP45 for the gear compartment where this is separate from the lamp compartment. IP 65 is acceptable for the lamp and optical section until IP66 becomes more available and the choice of lanterns is increased.

Wall Mounting

11 Where a wall-mounted unit is specified a suitable bracket shall be provided and fixed to the adjoining structure. Such brackets should ensure that the lantern is secured in the appropriate position with the necessary clearance given in Section 7.5. An agreement and a signed licence are to be obtained from the owners of the structure where a lighting unit is mounted, to include an easement for access to any conduit or ducting and for maintenance and the provision for the electrical supply and all relevant control gear. The method of connection for energy supply must comply with the requirements of the local Regional Electricity Company (REC).

Control Gear

12 The control gear for lamps shall be designed to operate off of 230 volts AC +10%, -6%, 1995, to change to 230volts + or – 10% January 2003. All terminals are to be shrouded so that live metal parts cannot be touched. The capacitor shall correct the power factor to not less than 0.85 lagging.

13 The Photoelectric controls shall be two part electronic, on highway lighting units, with the detector mounted on the top of the lantern, secured by a locking nut. One part electronic negative ratio cell will be considered in special cases. The photocell is to be secured by means of a locking nut. The manufacturer shall provide a mounting hole in a suitable place in the lanterns before they arrive on site. The electronic base unit is to be mounted in the base compartment of the column and shall be of the plug in type capable of switching a discharge load of 3 x 400W HPS. The switching differential is to be 1:0.5 negative. The power consumption is 0.25 watts continuous. The photocell shall be calibrated to switch on at 70 LUX. Where illuminated signs are installed, the photocell unit shall be similar to the above, but will be a one-piece miniature unit installed into the sign light. All illuminated bollards are lit continuously.

Wiring

14 Lantern and column wiring cable shall be polyvinyl chloride insulated and sheathed cables of 300/500 grade flat twin and earth (6242Y). Cables shall be correctly colour coded and have a copper conductor size of 2.5 sq. mm and shall be provided with the correct coloured double insulated tails for connection into the REC's cut out from the secondary isolation unit. Unsupported lengths of cable shall be kept to a minimum and not allowed to come into contact with components by their freedom of movement. Photoelectric cell wiring shall be 1.5mm sq, type (6192Y) flat twin.

15 All wiring shall comply with BS 7671 : 1992. IEE Wiring Regulations, 16th Edition, Requirements for Electrical Installations, or subsequently revised standard.

Secondary means of isolation

16 A double pole switched disconnector unit complete with a BS 88 HRC fuse is to be provided in the base of the column, above the REC's cutout. The fuse is to be rated so as to protect the lamp circuit. The disconnector unit is to have a 32 amp rated double pole switch, marked ON/OFF with green/red mechanical indication giving a positive indication of the state of the unit. It is to have a transparent cover so that the switch position can be clearly seen and fitted with a device to prevent the fuse being withdrawn without the operation of the switch, thus making it safe to withdraw the fuse. The transparent cover is also to have a facility so that it can be secured by means of a padlock to prevent operation of the switch.

Earthing

17 All metal work (other than current carrying parts) shall be earthed on to a fixed 4 way terminal block. A final main 6mm sq earth conductor (colour coded) for the PME termination shall be taken from the block and a minimum of 600mm left to enable this connection to be made by the Regional Electricity Company.

Identification Numbering

18 Columns and signs are to be identified by means of a number in accordance with a schedule agreed by the Engineer. Either the numbers shall be the Charles EN plate system or of a stick on plastic type approved by the Engineer. The letters/numbers shall not be less than 50mm in height and located 1.83 metres above ground level. Where necessary speak to the local engineer to determine the style and source of supply of numbers.

CHAPTER 8

Traffic Signs

8.1 Introduction

8.1.1 The County Council has fully adopted the latest versions of "Specification for Highway Works" and "BS 873" in its requirements for temporary and permanent signing. It is a requirement of the above specification that an "Appendix 12/1" (schedule of signs) be provided to include all details of the signs and associated equipment.

8.2 General Requirements

8.2.1 All signs will be mounted on posts specifically designed for that purpose. On no account should lamp columns be used without the permission of the County Council. Similarly, using items such as telegraph poles will not be allowed. All posts and the extent of the signs will be erected only within the Public Highway. If it becomes clear that a post or part of a sign will be required to be situated in, or overhanging, or attached to private property, the County Council must be contacted for approval.

8.2.2 If the sign is to be lit and there is danger of light spill to opposing traffic a grey integral blanking screen will be provided either at the top or the bottom of the sign. The dimension of this screen should be determined from the light source used.

8.2.3 If it is a requirement that the sign is to be illuminated, separate root boxes to house the electrical gear will not be permitted. Large base posts will be utilised. For all posts with an overall diameter of 168mm and above, the door will be formed in the post itself. In the case of lit signs supported by more than one post, the post housing the electrical gear shall be the furthest from the carriageway. If erected on one post the entry door shall be on the side facing the traffic flow.

8.2.4 The County Council have determined that all signs apart from some temporary signs and waiting restriction plates, should be reflectorised (class 1). This could be in addition to some signing requiring direct illumination.

8.2.5 All signs that are required to be lit shall have external lighting units. Internal lighting may be used on the central reserve of very narrow dual carriageways and in some urban areas where there is extraneous ambient lighting. In both cases the units will operate via a miniature photo electric cell. See lighting specification section, 7.6, for details.

8.2.6 Certain regulatory signs and some roadmarkings require the authority of a Traffic Regulation Order before they can be erected or laid.

8.2.7 The legend layout and size of directional or informatory sign faces shall be in accordance with the Sign Face Details Drawings. Before commencement of fabrication of any directional or informatory signs the Contractor shall submit for the County Engineers approval fabrication drawings, which shall conform with the following:

i) The Traffic Signs Regulations and General Directions

ii) The Traffic Signs Manual

iii) Local Transport Note 1/94

iv) Working Drawings for Traffic Design and Manufacture

8.2.8 Any departure from the above shall be brought to the attention of the County's Engineer for approval before fabrication of the signs.

8.2.9 Warning and Regulatory signs shall be in accordance with the Diagram No. in the Schedule of Signs, the relevant Diagram No. in the Traffic Signs Regulations and General Directions and the Working Drawings for Traffic Sign Design and Manufacture.

8.2.10 All signs shall be produced by a manufacturer who has achieved or is in the process of achieving accreditation under an approved Quality Assurance Scheme.

8.2.11 The Contractor shall repair or replace and where necessary, dismantle and re-erect any sign which fails to meet the requirements of the Specification. Such repair or replacement shall be completed within a reasonable time.

Foundations for permanent traffic signs

8.2.12 All temporary signs exceeding 1m^2, semi-permanent and permanent signs will be erected with a concrete foundation. The size and shape of the foundation will be structurally calculated and the calculations will be available for the County Council to inspect. Pockets shall be formed in the foundations for all posts over 114mm diameter.

8.2.13 The foundations for permanent traffic signs shall be constructed in accordance with the relevant details shown on Standard Detail Drawing No. 1000/450. The concrete mix, size and number of cable ducts for each sign shall be in accordance with that shown on the Schedule of Signs.

8.2.14 Any additional excavation carried out beyond that specified shall be filled with concrete to Grade ST1.

8.2.15 Where any sign has an area exceeding 10m^2 or has posts having a diameter in excess of 140mm the excavation shall be inspected and approved by the County's Engineer before placing of concrete and backfilling.

Posts for permanent traffic signs

8.2.16 The posts for permanent traffic signs shall be in accordance with BS 873: Part 7. The number, type and size shall be in accordance with the Schedule of Signs. The abbreviations used in the Schedule of Signs for post type and material is as follows:

Type	Description
STR	Straight post
LB	Large base post with compartment for electrical equipment
UB	Universal beam

Material	Description
EXT	Extension to existing post
PCS	Plastic coated steel
GAL	Galvanised steel

8.2.17 All plastic coated posts shall be coloured Aircraft Grey to BS 381C No. 693 unless otherwise instructed by the Engineer.

8.2.18 Extensions to existing posts shall have a spigot that fits internally into the existing post. The design and fixing shall be agreed with the Engineer

References

(1) Manual of Contract Documents for Highway Works, Specification for Highway Works

(2) The Traffic Signs Regulations & General Directions 1994 (as amended)

(3) Traffic Signs Manual (as amended)

(4) The Design and use of Directional Informatory Signs - Local Transport Note 1/94

(5) Working Drawings for Traffic Sign Design and Manufacture

(6) Surrey County Council – Standard Detail Drawings

(7) Surrey County Council Manual of Policies and Standards (MaPS)

(8) BS 873, BS 381C, BS 3262, BS 6044 and BS 6088

Detailed Specification for Traffic Signs

Sign Plate Construction

1 All permanent sign plates shall be manufactured in accordance with BS 873: Part 6. Sign plates shall be manufactured from either sheet aluminium or extruded aluminium plank sections only. Plank sections shall not be used on signs with an area less than $10m^2$. Where more than one sheet is used to make a sign, the number of sheets shall be kept to a minimum. Each sheet shall be cut rectangular and be approximately the same size. The sign plate shall be constructed in such a manner so that no light is visible at any joint in the plate. All joints in the sign plate shall be shown on the Contractors fabrications drawings and approved prior to commencement of fabrication.

2 Sign plates shall be stiffened to meet the requirements of BS 873: Part 6: Section 6 using extruded aluminium sections with a section modulus greater than $1500mm^3$. The sections shall be fixed at every point where it crosses a post using stainless steel clips. All fixings used shall take into account any specialist instructions given by the manufacturer or supplier and be compatible so as not to cause failure or deterioration of any other part of the sign assembly. Stiffening shall be achieved in such a manner that the sign face sheeting material is not punctured or otherwise damaged to accommodate the stiffening.

3 Finished signs shall be marked on the reverse with the sign site reference number and permanently marked with the name or code of the manufacturer and the month and year of manufacture.

Retroreflective Road Traffic Signs

General

4 All sign face sheeting materials, edge sealants, clear coat lacquers and silk screen inks shall conform to BS 873: Part 6 and shall be supplied by the same manufacturer or approved supplier. All materials must be mutually compatible and be processed and applied in strict accordance with the manufacturers or approved suppliers instruction.

5 All sheeting materials including letters, numerals, symbols, borders and panels shall be fully adhered to the substrate. The sign face shall be free of bubbles, creases or cracks and remain free after erection and when subjected to normal weather conditions.

6 Wherever practicable sign faces shall be formed from a single piece of sheeting, all joints in the sheeting should be kept to a minimum and be either horizontal or vertical. Butt joints shall not be used unless otherwise recommended by the manufacturer and all overlaps shall not be less than 6mm and not more than 10mm and in the case of horizontal joints the uppermost sheet shall overlap the one below. All backgrounds, symbols, borders and cut out letters and numerals, adjacent or otherwise, adjoining sections of panels, borders, symbols and background of both retroreflective sheeting and non-reflective film must be carefully matched for colour at the time of fabrication to provide a uniform appearance by day and, in the case of reflective signs, by night. The sheeting manufacturers or approved suppliers recommendations on colour matching must be observed.

7 Clear coating and edge sealing of signs shall be in accordance with the sheeting and film manufacturers recommendations.

8 Signs made by silk screen printing colours, legends, symbols etc, onto retroreflective sheeting non-reflective film, shall be processed in accordance with the instructions of the manufacturer. Only the silk screen printing pastes and inks supplied by the sheeting material manufacturer as compatible with the specific grade of material may be used.

Protection Against Damage

9 If signs are to be stored prior to erection, the following recommendations must be followed:

- If stored indoors, the packaging (provided it is dry) need not be removed unless storage is to be for an extended period of time (more than 4 weeks). If packaging is removed, the manufacturers/suppliers approved slip sheeting should remain in situ to protect the sign face. In either case, the sign must be supported on wooden battens in the upright position so that they do not touch.
- If it is necessary to store signs outdoors, all packaging must be removed and the signs placed on wooden battens in the upright position with plenty of space for free air circulation. Signs must not come into contact with treated wooden posts and must not be allowed to stand in water at any time. Snow should be removed by brushing off with a soft hand brush
- Sharp or heavy objects must not be placed on or against signs during storage.
- During sign erection, measures must be taken to ensure that signs are not abraded, impacted, or otherwise marked.

Photometric performance

10 The reflectivity of each sign shall be in accordance with the Schedule of Signs. The abbreviations used in the Schedule of Signs are as follows:

Class	Description
NR	Non-reflective sheeting
1	Class 1 retroreflective sheeting
2	Class 2 retroreflective sheeting
WA	Wide angle retroreflective sheeting

i) Non-Reflective Sheeting

A permanent road traffic sign made with non-reflective sheeting when illuminated in accordance with the Traffic Sign Regulations and General Directions will for seven years provide satisfactory performance by day and night for drivers of motor vehicles under normal driving conditions.

ii) Class 1 Retroreflective Sheeting

The coefficient of retroreflection for Class 1 retroreflective sheeting shall not be less than the value specified in BS 873: Part 6: Table 1. The sheeting shall have an effective performance life of 10 years and during this period shall provide satisfactory performance night and day for drivers of motor vehicles under normal driving conditions. The retroreflective sheeting will adhere to the substrate and the average coefficient of retroreflection shall not fall over the 10 years period below the following values expressed in candelas per lux per m^2:

At an entrance angle of -5 Degrees:

Observation Angle	White	Red	Yellow	Blue	Worbouys Green
12°	200	36	136	16	16
20°	144	28	96	11	11

N.B. The average coefficient of retroreflection for white Class 1 sheeting where silk screen printed with transparent colours red and blue will not be less than 60% of the above values, for red and blue sheeting.

iii) Class 2 Retroreflective Sheeting

The coefficient of retroreflection for Class 2 sheeting shall not be less than the values specified in BS 873: Part 6: Table 2. The sheeting shall have an effective performance life of 7 years and during this period shall provide satisfactory performance night and day for drivers of motor vehicles under normal driving conditions. The retroreflective sheeting will adhere to the substrate and the average coefficient of retroreflection shall not fall over the 7 year period below the following values expressed in candelas per lux per square metre.

At an entrance angle of -5 Degrees:

Observation Angle	White	Red	Yellow	Blue
12°	38	6	25	2
20°	25	5	18	1.5

N.B. The average coefficient of retroreflection for white Class 2 sheeting where silk screen printed with transparent colours red and blue will not be less than 70% of the above values, for red and blue sheeting.

iv) Wide Angle Retroreflective Sheeting

The coefficient of retroreflection for wide angle retroreflective sheeting shall not be less than the following values expressed in candelas per lux per square metre:

		Entrance Angle		
Observation Angle	Colour	-5°	15°	40°
20°	White	300	250	30
	Yellow	250	200	25
	Red	75	60	7
	Blue	15	12	1.7
	Green	30	20	2.5
30°	White	250	220	35
	Yellow	200	175	30
	Red	57	50	9
	Blue	10	8	2
	Green	25	18	3
1°	White	80	60	15
	Yellow	65	45	13
	Red	20	14	5
	Blue	4	3.5	0.8
	Green	8	6	1.2

11 The sheeting shall have an effective performance life of 7 years and during this period shall provide satisfactory performance night and day for drivers of motor vehicles under normal conditions. The retroreflective sheeting will adhere to the substrate and the average coefficient of retroreflection over the 7 year period shall not fall below 50% of the value specified in the above table.

Illumination of Permanent Road Signs

12 Lighting units for permanent road signs shall be of external type and in accordance with BS 873: Part 5. The type and number shall be in accordance with the Schedule of Signs. The construction and location of lighting units shall be in accordance with Standard Detail Drawing No. 1000/453 and the lighting unit manufacturers recommendations. Electrical installation shall be in accordance with Standard Detail Drawing No. 1000/452.

Permanent Internally Illuminated Bollards

13 All permanent internally illuminated bollards shall be of the base lit type as shown in Standard Detail Drawing No. 1000/452 and in accordance with BS 873: Part 3. The head shall either be blank or show the sign specified in the Schedule of Signs.

Location of Permanent Traffic Signs

14 The approximate position that each permanent traffic sign shall occupy shall be ascertained by reference to the Drawings and the Schedule of Signs. The exact location shall be set out by the Contractor in the presence of the engineer before commencement of associated groundwork

CHAPTER 9

Highway Specification

9.1 Introduction

9.1.1 The concept of "Pavement Design" set out in this Technical Appendix is based upon the standard set by the Highways Agency in the Design Manual for Roads and Bridges (DMRB), Volume 7: Pavement Design and Maintenance, current editions (1), except where stated.

9.1.2 Highway materials, pavement construction and the overall quality of work requirements shall comply with the edition current, at the time of the development design submission and contract, of the Manual of Contract Documents for Highway Works, Volume 1: Specification for Highway Works (SHW) and Volume 2 : Notes for Guidance on the SHW, except where stated.

9.1.3 Where Local Plan policy requires, or where the development is within an existing conservation area specific materials, surfacing types, and/or finishes other than those set out may be used with the agreement of the Local Planning Authority and County Highway Authority.

9.1.4 The DMRB requires knowledge or an estimation of Design Traffic flow in terms of number of standard axles passing over the pavement in a specified design life. This Technical Appendix relies on the number of dwellings served and it will be assumed that 1 dwelling unit corresponds to a cumulative traffic flow of 1000 standard axles in one direction at the time of opening. Feeder roads and improvements to the existing highway network must recognise both traffic at opening and within the design life and hence take into account the traffic assessment, growth rates set out in DMRB and / or the specific requirements of the local highway network for which Surrey CC is the highway authority.

9.1.5 The design of surfacing for bituminous roads serving less than 1000 dwellings is based on TRL LR 1132 (2). All other designs for roads serving more than 1000 dwellings equivalent to 1.0 million standard axles (1 msa) should be based on traffic calculations set out currently in HD 24/96 Traffic Assessment (3) and pavement design principles set out currently in HD 26/94 Design Criteria (4), future revisions should be taken in to account and amended Technical Appendices will be issued where relevant.

9.1.6 All pavement designs related to a length of adoptable carriageway shall be based on a 40 year design life. The pavement design and construction parts of this Appendix will be periodically updated as materials and design specifications change.

9.1.7 It is also brought to the notice of the designer at this stage that, in order to maintain consistency of construction with maintenance processes, the choice of pavement design materials has been restricted to those used/allowed in the County Council term tenders and maintenance contracts. Additionally, models of the most commonly used Appendices to the SHW, App 7/1 and 11/1 (5), have been included for use by the designer in order to standardise the approval mechanisms.

9.1.8 The Specification for Highway Works and the Highway Authority require that where a material, group of materials or process is covered by a National Quality Management Sector Scheme (QMSS) or a Product Certification (Marked or Non-Marked) Scheme or a BBA certification scheme or Statutory Type Approval or Highways Agency Type Approval then only materials, processes or installations or contractors holding such certification shall be used in the works. A full list of such schemes is maintained as a further set of Appendices within the Specification for Highway Works or can be obtained from the Authority.

9.1.9 Developer's submissions should include all pavement design assumptions or calculations, traffic volumes and growths, 2 copies of the soils report for the site, 2 copies of the drainage report with supporting calculations and permissions together with any other supporting documentation for the design submission.

9.1.10 The developers attention is also drawn to Surrey County Council, Manual of Policies and Standards, (MaPS) (11) when preparing design submissions.

References

(1) Design Manual for Roads and Bridges (DMRB), Volume 7: Pavement Design and Maintenance HD 23/99 General Information

(2) Transport Research Laboratory LR 1132 The Structural Design of Bituminous Roads

(3) Design Manual for Roads and Bridges (DMRB), Volume 7: Pavement Design and Maintenance HD 24/96 Traffic Assessment

(4) Design Manual for Roads and Bridges (DMRB), Volume 7: Pavement Design and Maintenance HD 26/96 Pavement Design

(5) Specification for Highway Works Volume 2 Notes for Guidance - Appendix 7/1 Permitted Pavement Options and Appendix 11/1 Kerbs, Footways and Paved Areas

(6) National Quality Management Sector Schemes - Sector 14, Production of Asphalt Mixes

(7) British Standards Institution BS 7533 Guide for Structural Design of Pavements constructed with Clay or Concrete Block Pavers

(8) Design Manual for Roads and Bridges (DMRB), Volume 7: Pavement Design and Maintenance HD 28/94 Skidding Resistance

(9) British Board of Agrément. Highway Authorities Product Approval Scheme

(10) Construction Industry Research and Information Association (CIRIA) Report C522 Sustainable Urban Drainage Systems – design manual for England and Wales

(11) Surrey County Council, Manual of Policies and Standards, (MaPS),
Volume 1: Highway Maintenance
Volume 2: Development Planning
Volume 3: Transportation Planning
Volume 4: Traffic Management
Volume 5: Highway Safety

9.2 Sustainable Development

9.2.1 Developers are expected to support sustainable approaches to development by the consideration and the use of alternative construction materials and methods which satisfy the principles of sustainability, as shown below, while retaining similar performance to more conventional approaches. Techniques to conserve resources and use recycled materials are developing rapidly and these should be employed where practicable. Each site will have its own individual characteristics, which will need to be evaluated accordingly. Evidence of this evaluation will be requested and the developer is required to complete the 'Sustainability Awareness Questionnaire' in Chapter 10.

Principles of Sustainability

9.2.2 In engineering terms sustainability is concerned with designs and approaches that result in the more efficient use of resources, that make use of recycled materials and allow those materials to be recycled when they are replaced.

9.2.3 This could be achieved in the following ways:-

- Minimising the use of materials;
  use only the minimum materials necessary for the development.
- Reduction of Waste;
  the wastage of materials can be reduced effectively by introducing regular audits to monitor and control site activity more closely, e.g. materials ordering and site practices.
- Recovery of materials for re-use;
  where any site clearance or demolition is involved, the developer should initially maximise the recovery and re-use of any materials within the confines of the site. Only if this is not practicable should this be carried out off-site.
- Re-use and Recycling of Materials;
  there are many materials that can be effectively re-used and recycled. Advice about individual materials can be obtained from the Building Research Establishment *Centre for Waste & Recycling* (www.bre.co.uk/recycle/index.html), telephone 01923-664000).

9.2.4 Surrey County Council's *Waste Wise Business manual* (www.surreycc.gov.uk/wwbm) or the Waste Policy Group, telephone 020-8541-9781, can also provide advice about local facilities.

9.2.5 The DTLR paper "Building a Better Quality of Life: A Strategy for More Sustainable Construction" also contains a great deal of helpful advice on how to make construction more sustainable. The paper can be found on the DTLR website at www.construction.detr.gov.uk/cirm/sustainable/bql/index.htm.

Sustainability Action Plans

9.2.6 It is generally easier and more beneficial to take positive action at the planning stage to consider how much waste might be produced on site and what happens to it. One approach to achieving more sustainable developments, is to adopt a sustainability action plan for the development which details intentions for the re-use, recycling and waste minimisation of materials. The plan should focus on materials used in high volumes, irrespective of cost, and materials of high value, irrespective of quantity. It is these categories of materials that are likely to show the maximum benefits from being targeted for waste minimisation and recycling.

9.2.7 The action plan may include:-

- Who in the organisation is responsible for managing sustainability in the contract;
- details of training he or she has received;
- how information about sustainability is conveyed to staff working on the contract;
- how sub-contractors are to participate in the sustainability action plan;
- what systems are in place to control and minimise transportation, energy and water costs;
- how packaging is to be recovered;
- what percentage of recycled materials will be used;
- which recycling centres will be used for processing the materials that are recovered. Are these the nearest to the site? If not, explain why not;
- who is responsible for carrying out waste audits during construction
- who is responsible for taking action as a result of the waste audits.

9.2.8 In order to assist the process, developer's should complete the awareness questionnaire in Chapter 10. A similar questionnaire for house building and fitting out would also assist developers.

9.2.9 Waste can be generated at all stages of the process, including:

- Over ordering; this can result from past experience of contamination, inaccurate tolerances, fear of under-ordering, errors in bills of quantities or drawings, mis-ordering;
- delivery problems, excess packaging, damage during off-loading or storage, wrong storage location;
- storage contamination or moisture change, physical damage to brittle materials, materials that need to be kept dry;
- construction processes, poor installation practices can lead to product/material damage or an excess of expensive material being used;
- segregation of waste, Waste materials may not be accepted at the recycling centre if they are contaminated. This can increase disposal costs, as well as losing recyclable material.

9.2.10 The waste audit can identify both environmental and financial benefits as well as helping to develop staff commitment. It should identify materials used in large quantities or of high value. It should record the:-

- Amount required (taken from the contract documentation);
- amount ordered;
- amount used (from as-constructed drawings or remeasure). Excess material used to correct poor tolerance control or bad workmanship is effectively waste;
- volume of inert waste taken to landfill;
- volume of inert waste taken to recycling centre;
- volume of non-inert waste taken to landfill;
- number of pallets delivered and number returned.

Useful Contacts

Sustainable Construction Building a Better Quality of Life: A Strategy for More Sustainable Construction, DTLR August 2000.

Available from: DTLR Free Literature
PO Box 236
Wetherby LS23 7NB
Tel: 0870-1226236
Fax: 0870-1226237
e-mail: detr@twoten.press.net

It can also be downloaded from the DTLR website at www.dtlr.gov.uk.

General Environmental Management and Best Practice Contacts SuPERB, The Surrey Programme for Environmentally Responsible Businesses is a local organisation to help Surrey businesses with environmental management.
Tel: 07071-780263
e-mail: steven.dulmage@businesslinksurrey.co.uk

The Environmental Technology Best Practice Programme gives advice to businesses on reducing waste and energy use. Publications on a variety of themes are available in print or on their website.
Freephone: 0800-585794
Website: www.envirowise.gov.uk
e-mail: etbppenvhelp@aeat.co.uk

The Environment Agency can provide advice on enforcement of environmental legislation and produce guidance on Best Practice.
Tel: 0645-333111
Website: www.environment-agency.gov.uk

Waste Management and Recycling, The Aggregates Advisory Service provides guidance on the reuse and recycling of aggregates for construction.
Freephone : 0800-374279

The Building Research Establishment Centre for Waste and Recycling can provide advice about a wide range of individual materials.
Website: www.bre.co.uk/recycle/index.html
Tel: 01923-664000

Surrey County Council's Waste Wise Business Manual provides information on waste materials and lists companies who can offer collection services for potentially reusable or recyclable materials.
Website: www.surreycc.gov.uk/wwbm

9.3 Determination of Subgrade Support

California Bearing Ratio (CBR)

9.3.1 For the purpose of pavement design the CBR is to be used as a measure of the strength of the subgrade. The insitu CBR of the subgrade determined at the time of a site investigation is likely to differ from the equilibrium value which will obtain once the pavement has been constructed; many fine soils lose strength, whilst loose coarse soils may be improved by compaction. For definitions of 'fine' and 'coarse' soils, refer to Section 6 of BS5930 (1). For these reasons, measurement of in situ CBR by expensive direct or indirect tests (e.g. in situ CBR test, plate bearing test) is seldom worthwhile. Such methods would be most appropriately used after preparation of formation or sub-formation on coarse soils to confirm design values, also on completed capping layers to confirm performance.

9.3.2 A number of rapid assessment techniques are available for direct or indirect estimation of CBR in the field. These are listed below with comments on their applicability.

- "MEXE" cone penetrometer (2): Direct reading. Fine soils, coarse soils with few particles >20mm.
- "Clegg" Hammer (3): Correlation with Impact Value. Most applicable to coarse soils, for which it was developed.
- "TRL" dynamic cone penetrometer (4): Correlation with publications (quoted in equipment manual). Most soils. Gives profile with depth. Very useful for checking CBR under existing pavements via core holes.
- "Pilcon" Hand Vane (5): Correlation with shear strength. Fine soils.
- Laboratory CBR on "undisturbed" samples: same drawbacks as in situ CBR plus effects of sample disturbance, cannot be taken in gravelly soils.
- Laboratory CBR on re-compacted samples: with fine soils, remoulding and re-compaction simulates trafficking in the field, but does not take into account moisture content changes which may occur after a pavement is constructed. Best to test over a range of moisture contents. With coarse soils, confinement may give rise to artificially high values.
- Plasticity properties: fine soils, also coarse soils with a plastic fine fraction. Essential for determining equilibrium CBR by correlation with Plasticity Index (PI). See TRRL LR1132 (6). May be somewhat pessimistic.
- Particle size distribution: coarse soils. Essential for determining CBR by correlation/classification.
- Essential information to be provided for pavement foundation design:
- For all soils - site investigation comprising sufficient trial pits to determine the site geology and any variations to a depth of at least one metre below proposed road formation or sub-formation level. Any seepage of groundwater to be noted and the information used for pavement and drainage designs. Materials to be described in accordance with the current edition of BS5930
- For coarse soils - particle size distribution. Moisture content
- For fine soils - Plasticity Index. Moisture content.
- For coarse soils with a plastic fine fraction - all of the above.
- For all soils - CBR value estimated or measured using appropriate in situ tests, particle size distribution and/or Plasticity Index.

Problem Soils at Formation or Sub-Formation.

9.3.3 **Chalk:** generally has high CBR value, even when placed as fill, if given time to recover. It is however frost susceptible, requiring a minimum 450mm depth of construction above it to prevent frost heave.

9.3.4 **Coarse soils with a plastic fine fraction:** Moisture content measured on representative samples cannot be compared to Liquid and Plastic Limits, which are determined on material passing the 0.425mm sieve only.

9.3.5 **Interbedded Soils:** In Surrey, most notably the Bracklesham Beds, parts of the Bagshot Beds and Barton Sand, the Lambeth Group, the Claygate Beds and some drift deposits comprise clay thinly interlaminated to thinly interbedded with silt or sand. The coarser grained beds frequently contain free water, which, on reworking, very rapidly softens the clay bands. Classification tests may be meaningless in such materials since the results are like to represent the mixed material rather than the natural state. In situ testing using simple methods is likely to give the most useful results but a very cautious estimate for the design CBR value is required.

9.3.6 **Clay-with-flints:** Widespread superficial deposit overlying chalk, typically a highly plastic clay with a variable proportion of gravel, but can vary over short distances to a gravelly sand. Design CBR should be based on the worst case.

9.3.7 **CBR Values for Pavement Design**

The following table is based on TRRL LR1132 (6) and DMRB Volume 7 (HD 25/94) (7).

Type of Soil	Plasticity Index	CBR %
Clay of very high or extremely high plasticity	45 or greater	Just greater than 2%
Clay of high plasticity	30 to 44	3%
Clay of intermediate plasticity	20 to 29	4%
Clay of low plasticity	Up to 19	5%
Silt (assumes material may saturate)	N/A	1%

The following table is based on local experience of specific soils.

Type of Soil	CBR %
Interbedded clay/silt/sand	Less than 2%
Soft alluvial clay and significantly organic soils	Less than 2%
Silty fine sand (e.g. Class 1B fill of SHW) (8)	5%
Silty gravelly sand (e.g. Class 1A fill of SHW)	10%
Well graded sandy gravel (equivalent to Class 6F2 of SHW)	15%
Chalk (soft, weathered - or chalk fill) requires frost protection of at least 450 mm construction	7%
Chalk (hard, insitu) requires frost protection of at least 450 mm construction	15%

References

(1) British Standards Institution BS 5930 – Code of practice for Site Investigations

(2) Soil Assessment Cone Penetrometer (MEXE cone penetrometer) Croney, D. and Croney, P.:1991 – The design and performance of Road Pavements. 2nd Edition Manufactures Handbook – SACP Model 244, CNS Farnell & Co, Ltd.

(3) Clegg Hammer Clegg, B. : 1976: an Impact testing device for in-situ base course evaluation. Proceeding 8th ARRB Conference, Perth Western Australia Suppliers Handbook – Clegg Impact Soil Tester. Trevor Deakin Consultants Ltd.

(4) TRL dynamic cone penetrometer

a) Kleyn, EG & Van Heerden : 1983: Using DCP soundings to optimise pavement rehabilation. Report LS/83, Materials Branch, Transvaal Roads Dept. Pretoria, South Africa

b) Manufactures Handbook – DCP Model A2465. CNS Farnell & Co. Ltd.

(5) Pilcon / Geonor Hand Vane.

a) BS 1377:1990: Methods of test for soils for civil engineering purposes. Part 9: In-situ tests – "The hand vane is a miniature version to that described in Section 4.4

b) Serota, A & Jangle, A: 1972: A direct reading pocket shear vane. Civil Engineering - ASCE

(6) Transport Research Laboratory LR 1132 The Structural Design of Bituminous Roads

(7) Design Manual for Roads and Bridges (DMRB), Volume 7: Pavement Design and Maintenance HD 25/94 - Foundations

(8) Manual of Contract Documents for Highway Works, Volume 1: Specification for Highway Works (SHW) and Volume 2 : Notes for Guidance on the SHW

9.4 Foundation Design Considerations

9.4.1 Based on DMRB, Volume 7 : HD 25/94 (1), the capping and sub-base layer requirements shall be selected from one of the following materials:

9.4.2 Capping

- Granular material to Clause 600 Series Class 6F2 of the SHW (2), except that chalk shall not be permitted (Class 6F1 is not permitted unless 15% CBR is achieved and is demonstrated by insitu testing of the material as placed and compacted on site).
- Bituminous planings to Clause 600 Series Class 6F3 of the SHW.
- Stabilised materials to Clause 600 Series Class 9 of the SHW constructed using site arising material stabilised with lime, cement or both, in accordance with the relevant clauses of the SHW.

CBR ≤ 1%	Consider stabilisation of weak material or min 600mm capping on geotextile + 150mm sub base.
CBR ≤ 2%	600mm capping, 150mm sub-base. Geotextile beneficial.
2% < CBR ≤ 2.5%	450mm capping, 150mm sub base.
2.5% < CBR ≤ 5%	350mm capping, 150mm sub- base OR 350mm sub base.
5% < CBR ≤ 15%	225mm sub base.
CBR > 15%	150mm sub base.

9.4.3 **Frost susceptible subgrades:** The combined thickness of bound courses (including block paving), sub-base and capping shall not be less than 450mm.

9.4.4 **Frost susceptible materials**: No frost susceptible material shall be used in construction within 450mm of the finished surface.

9.4.5 **Pavement Foundation Drainage:** shall be provided on the low side of the carriageway (or both sides of a crowned carriageway or on the centre line of a dished shared surface) in the form of fin drains or narrow filter drains as per Standard Highway Details (MCDHW Vol. 3) (3) to a depth of at least 600mm below formation level,

OR

A full width drainage blanket shall be provided comprising 150mm to 220mm thickness of granular fill Class 6C, laid on a geotextile separator fabric. The thickness of such a drainage layer shall be included in the capping layer for pavement foundation design purposes. The geotextile shall comply with the requirements of clause 609 in all respects and shall be of sufficient grade to meet the ground conditions, (design calculations must be submitted.)

9.4.6 These drainage provisions may only be omitted where the sub grade, and any capping if used, are together, more permeable than the sub-base AND where the water table will not rise to within 600mm* of formation level.
(*Author's note: This is an increased requirement compared to DMRB Vol. 7).

Sub-base and capping materials

9.4.7 Sub-base shall be a granular sub-base Type 1 complying with Clause 803. Sub-base Type 2 to Clause 804 shall not ordinarily be permitted however the re-use of crushed concrete complying with Type 1 or Type 2 grading envelopes is acceptable provided the material is not frost susceptible, provides adequate support and does not contain any contamination of other building material waste.

9.4.8 The use of Capping class 6F3, asphalt planings, is acceptable for use as a sub-base material in footway construction. It may not be used to replace bound layers unless as part of an asphalt recycling process.

9.4.9 The following restrictions with respect to certain classes of fill shall be observed.

- **Class 6 Special Granular Fills** - the use of chalk as a constituent of Class 6 fills shall not be permitted.
- **Class 6F1** capping is not permitted unless it provides a demonstrated 15% CBR support as placed and compacted.
- **Recycled materials,** e.g. crushed concrete, are in most cases acceptable as special granular fills, provided that they meet the specification requirements for that class of fill. Contamination by lesser materials must be avoided at source and by control during processing, crushing and in the stockpile. Approval of any recycled material should normally be restricted to stockpile approval.
- **Bituminous planings** are acceptable as capping (Class 6F3), or as sub-base in footway construction but shall not be used elsewhere in the works. Bituminous (asphalt) planings may also be recycled as part of the "Foamix"® (4) plant mix process or any in-situ recycling process to provide a bituminous base material.
- **Chalk** - unless exceptionally hard and stable, when it may be classified as Class 1A or 1C granular fill, chalk should always be treated separately from other earthworks materials as Class 3 material. Chalk or chalk blended material is not acceptable as capping material and cannot in any event be placed within 450 mm of the finished road level.
- **Geotextile** – separation between soft subgrade materials and the sub-base shall be achieved by a geotextile fabric complying with clause 609 of SHW. It is essential that a 300mm lap is achieved during installation and that the fabric material has a life expectancy of 40 years. Certificates of compliance with the minimum performance requirements set out in clause 609 must be provided. Additional performance required over and above those set out in clause 609 by a pavement foundation, earthworks stability design or drainage detail shall be specified in the contract appendices.

9.4.10 The developer is reminded of Surrey CC policy to promote sustainability wherever possible and the use of insitu materials and the re-use of construction materials is actively encouraged. Alternative materials and their use should be submitted for approval.

References

(1) Design Manual for Roads and Bridges (DMRB), Volume 7: Pavement Design and Maintenance HD 25/94 – Foundations

(2) Manual of Contract Documents for Highway Works, Volume 1: Specification for Highway Works (SHW) and Volume 2 : Notes for Guidance on the SHW

(3) Manual of Contract Documents for Highway Works, Volume 3 Highway Construction Details

(4) "Foamix"® A proprietary recycled plant-mixed bituminous material produced and marketed by Foster Yeoman Ltd.

9.5 Earthworks and Side Slopes

9.5.1 Earthworks shall comprise all operations necessary for the re-grading of a site, including the formation of cuttings and embankments for roads, the construction of drainage ponds and related works, the formation of landscaping areas, screening bunds and the like. In the case of roads, earthworks conventionally include any capping layer, so that the top of earthworks coincides with formation level.

9.5.2 For the purposes of this Guide, earthworks shall also include all material arising from excavations on the site (such as for foundations, drainage and service trenches and the like) which requires disposal. All Earthwork operations shall be undertaken in accordance with Clause 600 series of SHW unless otherwise specified herein.

Reuse of Site Arising Materials

9.5.3 As far as reasonably practicable, development sites shall be designed so as to avoid or minimise the import and export of earthworks materials. It is, however, recognised that the scope for this to be achieved is highly dependent on the size and degree of confinement of a development. It is important that the developer seeks to minimise construction vehicular movements to and from the site. Where possible, excavated material should be incorporated by careful choice of finished site levels, by re-use in embankments and by the formation of landscape features, screening bunds etc. Processing of site arising materials to render them acceptable for use in construction is strongly encouraged, for example stabilisation of soils with lime and/or cement for use as capping layers.

9.5.4 Any inert soil which has to be removed from site shall be kept separate from and uncontaminated by, waste materials, fuel and oil etc. Inert soil is in demand for land restoration and capping of landfills. If contaminated it cannot be so used, and has to be disposed of as waste, most probably to a controlled landfill location. The reclassification of materials within the site is encouraged and the use of insitu recycling, lime stabilisation, cement stabilisation, stockpiling, drying out and blending with other materials should all be considered before removal to tip.

Brownfield Sites

9.5.5 Additionally, in brownfield locations and / or where contamination of natural soils by industrial waste, chemicals, hydrocarbons, has occurred, a full detailed investigation and classification of soils and contaminants must be undertaken. A copy of the full report must be submitted with the design submission.

9.5.6 The contaminants should be identified and a planned removal or treatment regime put in place. It is essential that movement of such materials within the site should be minimised and controlled. Deposits of contaminated soils should be isolated from all drainage works and from any contact with surface or ground water movement through to a water course or aquifer.

9.5.7 The use of geotextile fabrics, separators or impermeable membranes may be considered, however, their effectiveness in the long term and possible damage by future excavations must be taken into account.

Importation of Earthworks Material.

9.5.8 If the importation of fill material cannot be avoided, this should, where possible, comprise suitably processed recycled waste material (e.g. crushed concrete for capping, drainage aggregates etc.) or soils of negligible value as minerals. The use of lime or cement stabilised material for capping and/or at sub-formation is advocated in lieu of disposal or unnecessary importation of fill material. In any event all materials shall comply with the requirements of the 600 series of SHW and their use in the works substantiated by the design.

Design considerations

9.5.9 Earthworks shall be designed, classified and executed in accordance with the SHW Series 600, the Design Manual for Roads and Bridges Volume 4 (1) and Part 3 of this document. For the purposes of earthworks on site, materials shall be classified according to 600 series Table 6/1 of the SHW. It should be made clear in the scheme specification which classes are expected to be used and, where site-specific acceptability limits are required in Table 6/1, these shall be included in Appendix 6/1. Any special materials not included in the SHW, for example clay linings to ponds, shall be fully specified and supported in the submission by calculations and any other technical documentation.

9.5.10 Compaction of earthworks shall also be in accordance with SHW Series 600 and Tables 6/1 and 6/4. The use of compaction plant other than that described in SHW must be accompanied by a compaction trial at which time the compactive effort and layer thickness of the alternative must be demonstrated.

Reinforced Earthworks

9.5.11 Strengthened embankments and / or earthworks for reinforced soil and anchored earth structures, ground anchors or crib walling may be used but only when full supporting documentation and calculations have been submitted and approved by the authority. Where such structures would be classified as 'highway structures' the proposal shall be subject to the authority's Technical Approval Procedure. The designer must consider the implications of maintenance, access for maintenance and of any Health and Safety issues of accessibility during the normal in-service life of the structure.

Earthworks side slopes

9.5.12 The slope values set out below are applicable to slopes generally not exceeding 3m in height, where (in cuttings) the water table is sufficiently below the base of the slope or appropriate drainage is provided. Slopes steeper than the values below will not be permitted unless additional strengthening or supporting measures are included. Higher slopes may require to be flatter and will require detailed investigation and design, as will all slopes in areas which have a history of landslipping. Where possible, very flat slopes should be adopted which may be incorporated into open spaces or amenity areas.

Stratum	Cutting Slope V:h	Embankment Slope v:h
Most over consolidated clays(e.g. London, Lambeth Group, Atherfield & Weald Clays)	1:3	1:3
Except Gault (special case)	1:4	1:3
Other fine soils (e.g. Clay-with-flints, Head Deposits) and interbedded fine/coarse soil (e.g. Bracklesham Beds)	1:2.5	1:2.5
Coarse soils (e.g. Lower Greensand, Bagshot Formation, Barton Sand, Plateau and Terrace Gravels) and chalk	1:2	1:2

9.5.13 Reinforced, anchored or nailed slopes may be used to achieve stable slopes within restricted spaces but the following conditions will apply:

- Design shall be in accordance with BS8006 (2).
- Slopes steeper than 1 in 1 (45°) AND exceeding 1.37m height will constitute a highway structure.*
- Slopes which are to be vegetated shall not be steeper than 60° to the horizontal (approximately 1.75 to 1).
- Where a slope steeper than 60° is required, a hard face shall be provided which may be sloped or stepped to give the required profile.
- Plastic reinforcing elements or fabrics shall not be exposed at a slope face where there is a significant risk of damage by fire. They shall also have a proven longevity and shall not be susceptible to damage by light
- Metal wire or mesh reinforcement shall not be exposed at a slope or wall face where it could be damaged or vandalised presenting a risk to pedestrians or cyclists.

9.5.14 Hard facing elements (including crib walls, gabions and proprietary interlocking walls) shall be constructed in such a way as to prevent the theft of, or vandalism to such elements, gabion stone etc. Crib walling shall be constructed in accordance with HA Standard BD 68 (3) and further detailed by an Appendix 6/10 in the contract. Similarly gabion walling shall be constructed in accordance with wire manufactured and complying with BS 1052 (4). Alternatives must be specified in an Appendix 6/10 in the contract.

9.5.15 Reinforced soil and anchored earth structures are “special structures”* and the related earthworks and reinforcing elements shall comply with HA Standard BD 70 (5). Equally corrugated steel buried structures and the related earthworks shall comply with the special requirements of clause 2501 and clause 623

* Where earth retaining structures are incorporated in the design full design submissions shall be forwarded to the Authority for a full design check approval by both the Geotechnical Engineer and Structural Engineer of the Authority. (see also Structures requirements and check list.)

References

(1) Design Manual for Roads and Bridges – Volume 4

(2) British Standards Institution BS 8006 – Code of Practice for Strengthened Soils and other Fills.

(3) Highways Agency, Bridges Standard BD 68 – Crib Retaining Walls.

(4) British Standards Institution BS 1052 – Specification for Mild Steel Wire for general engineering purposes.

(5) Highways Agency, Bridges Standard BD 70 – Strengthening / Reinforced Soils for Retaining Walls

9.6 Pavement Design

Introduction

9.6.1 This section explores the concept behind the Surrey CC approach to Pavement Design and use of Pavement Construction Materials in general. It sets out the design process, the recommended materials and combinations of materials used for the carriageway construction. All pavement designs for adoptable carriageway shall be based on a 40 year design value.

9.6.2 Although the design philosophy is based on the properties and stiffness of a combined surfacing construction of a 50 pen bitumen rolled asphalt wearing course and a 100 pen bitumen macadam base course, other bituminous materials, or combinations of bituminous materials, may be used, provided that overall a bitumen binder equivalence factor is applied to the overall design thickness, (i.e. the use of a 100 pen bitumen in the wearing course and / or a 200 pen bitumen macadam base course would require additional thickness in order to achieve equivalence).

9.6.3 Examples of pavement design based on DMRB HD26/94 incorporating specific bituminous materials taken from the SCC term tender lists, are shown together with chapters on aggregate selection, surface texture and compaction . It should be noted that all suppliers of bituminous materials must comply with the requirements of the National, Sector 14, Quality Assurance scheme (6).

9.6.4 The use of wet mix as a roadbase layer is not permitted as a standard design, however, for larger schemes where wet mix may be viable, specific design consultations between the developer and the authority may be possible.

9.6.5 Although the use of the flexible composite construction is permitted by both LR1132 for less than 1 msa and by DMRB HD26/94 for design volumes greater than 1 msa, it should be noted that a minimum thickness of bituminous material of 100 mm has been applied throughout. This is based on experience of the in-service maintenance of thin section pavement constructions. All flexible and flexible composite construction must be carried out in accordance with the requirements of SHW 700, 800 and 900 series.

9.6.6 Surrey CC is committed to the use, wherever possible or practicable, of quieter surfacing materials and the minimisation of traffic noise in both low and high traffic speed situations. Priority should always be given to the use of a quiet running surfacing material.

Pavement Design Tables

9.6.7 The design for any flexible or flexible composite pavement construction shall be based on the design tables reproduced in LR 1132 (1) and DMRB HD 26/94 (2) or their subsequent equivalents. Pavement designs must be based on a 40 year design life calculated in accordance with predicted traffic models for the development and / or DMRB.

9.6.8 The basis of the pavement design for all carriageway construction shall be that 1 Dwelling Unit is equivalent to 1000 standard axles (sa) as defined in DMRB and shall be carried out in accordance with HD 26/94. For adoptable lengths serving less than 1000 dwellings, equivalent to 1.0 msa, the design shall be in accordance with LR 1132.

9.6.9 The following tables set out typical design thickness related to traffic. The developer may interpolate between examples or preferably refer to the design tables in each document.

Flexible Construction

Cumulative traffic	Roadbase & Basecourse (100pen)	Surfacing (*)
0.1msa	100mm	20mm Minimum
0.5msa	150mm	20mm Minimum
1.0msa	160mm	30mm Minimum

*surfacing may be 6mm Dense Bitumen Wearing Course Macadam (DBWC), 10mm Close Graded Wearing Course Macadam (CGWC) complying with BS 4987 (3)or a Proprietary thin surfacing system to clause 942 of SHW or Stone Mastic Asphalt (SMA). Adjustment for macadam and binder equivalence must be made.

Cumulative traffic	Roadbase & Basecourse (100pen)	Surfacing (**)
2.0msa	180mm	40mm Minimum
5.0msa	210mm	40mm Minimum
10.0msa	240mm	40mm Minimum

** surfacing may be Hot Rolled Asphalt Wearing Course (HRA WC) Design Mix complying with BS 594 (4) to suit location or proprietary thin surface or SMA.

Cumulative traffic	DBM 50 (50 pen)	Surfacing (**)
20.0msa	240mm	40mm Minimum
30.0msa	260mm	40mm Minimum

Designs for greater than 30 msa should be by consultation between developer and the authority.

Flexible Composite Construction

Cumulative traffic	CBM3G+	Bituminous Surfacing (***)
0.1msa	120mm	100mm (2 layers)
0.5msa	120mm	100mm (2)
1msa	120mm	100mm (2)
4msa	150mm	100mm (2)
5msa	160mm	110mm (2)
10msa	200mm	130mm (2or3)
20msa	250mm	150mm (3 layers)
30msa	250mm	200mm (3)

+ CBM3 Cement Bound Material category 3 clause 1000 series SHW

*** The current preferred surfacing option is a polymer or fibre modified SMA together with a rolled asphalt base course for designs of up to 5msa and together with a two layer DBM 100 pen base course/roadbase laid in two layers for designs of greater than 10msa cumulative traffic.

Supply of Bituminous Material

9.6.10 The National Quality Assurance scheme (Sector 14) (5) shall apply to the manufacture of all bituminous products. The developer, contractor or laying sub-contractor shall provide certification of compliance with the appropriate specification of the supplied material. Only vehicles specifically designed for the transportation of bituminous materials incorporating insulation and adequate sheeting shall be used for the delivery of bituminous materials.

Bituminous Roadbase

9.6.11 The permitted roadbase materials are based on term contract specifications.
Dense Bitumen Macadam (DBM 100 pen) - BS 4987
Hot Rolled Asphalt (HRA 50 pen) - BS 594
Dense Bitumen Macadam, 50 penetration bitumen (DBM 50)* - BS 4987

9.6.12 The aggregate size for all bituminous roadbase material shall be restricted to 28 mm nominal size laid in layers compatible with the aggregate in the range 70 to 110 mm. The use of gravel aggregate is not permitted and aggregate in the roadbase layer shall be restricted to crushed rock or slag.

The use of 200 pen bitumen (DBM 200) is permitted for use in footway construction and areas of adopted carriageway serving less than 500 dwellings (0.5 msa). When used in the carriageway an equivalence value of 0.7 shall be applied

i.e.	200 pen	215 mm	155 mm	85 mm
	100 pen	150 mm	110 mm	60 mm

9.6.13 The use of HDM or particularly HMB (heavy duty or high modulus base materials), is not envisaged for development related works. Should larger high traffic density construction be required for a specific scheme then design consultation between the developer and the authority may consider these options.

Bituminous Base Course

9.6.14 The permitted base course materials are based on term contract specifications.

Dense Bitumen Macadam (DBM 100) - BS 4987
Hot Rolled Asphalt (HRA 50 pen) - BS 594
Dense Bitumen Macadam, 50 pen bitumen (DBM 50)* - BS 4987

The aggregate size for all bituminous base course material shall be restricted to 20 mm nominal size laid as either a 50 mm or 60 mm layer.

9.6.15 The use of gravel aggregate is not permitted and aggregate in the base course layer shall be restricted to crushed rock or slag. Additionally where the base course is to be trafficked during the construction stage and the area is available to public vehicles the aggregate shall have a minimum polished stone value (PSV)of at least 55.

9.6.16 The use of 200 penetration bitumen (DBM 200) is permitted for use in footway construction and areas of adopted carriageway serving less than 500 dwellings (0.5 msa).

When used in the carriageway an equivalence value of 0.7 shall be applied.

i.e.	200 pen	85 mm	70 mm
	100 pen	60 mm	50 mm

Note 1
* Dense Bitumen Macadam, 50 penetration bitumen (DBM 50) may be substituted for all pavement designs in accordance with DMRB HD 26/94 to achieve a reduction in overall thickness.

9.6.17 Additionally for all areas of anticipated channelised heavy traffic, particularly approaches to traffic lights, and in all instances for designs of greater than 20 msa traffic, the base course shall be DBM 50.

Wearing Course Material

9.6.18 The permitted wearing course materials are also based on term contract specifications and national specifications. The National quality assurance scheme (Sector 14) shall apply to all manufacture and any proprietary thin surfacing systems shall have BBA/HAPAS (6)certification.

9.6.19 The design requirements shall be based on LR 1132 and DMRB HD 26/94 incorporating a **40 mm minimum** layer thickness of Hot Rolled Asphalt wearing course or Stone Mastic Asphalt. Other thicknesses compatible with either material selection or binder equivalence shall have the thickness shortfall made up in either the base course or roadbase layers.

9.6.20 Only Rolled Asphalt Design Mixes shall be used where asphalt is the selected surface for the development or scheme. These are designated for current SCC Term Tender contracts as SCC mix 'A', 'B', 'E', 'R', 'S' and allow for the whole range of anticipated traffic loadings. Alternatively design mix asphalt wearing courses complying with BS 594 and clause 943 may be used. See the following summary of SCC design mixes and model Appendix 7/1 for mix details.

9.6.21 **Lay** bys and bus bays may be constructed using flexible, flexible composite or proprietary construction systems provided fuel resistant binders are incorporated in the wearing course layer. Fuel resistant bitumen is available as a straight substitution. Combined systems of bituminous aggregate skeleton and cement/resin matrix are also available.

9.6.22 The use of Surface Dressing as a new wearing course surface treatment or finish is not acceptable for adoptable roads within a development related submission.

9.6.23 Additionally it should be noted that for "Shared Surfaces" the construction and surfacing material must comply with the greater requirements of vehicular traffic.

9.6.24 Permitted surfacing systems and wearing course materials are as follows:-

BS 594layer thickness	
HRA wearing course SCC Mix A - light weight use -	40 mm
HRA wearing course SCC Mix B - general use -	40 mm
HRA wearing course SCC Mix E – high stone content	40 mm
HRA wearing course SCC Mix R - heavy channelised traffic -	40 mm
HRA wearing course SCC Mix S - very heavy channelised traffic -	50 mm

BS 4987	**layer thickness**
10 mm Close Graded wearing course (CGWC) -	30 mm
6 mm Dense bitumen macadam (DBWC) -	20 mm
6 mm Medium textured macadam (MBWC) -	20 mm

SHW clause 942, BBA / HAPAS	**layer thickness**
6 mm Thin surfacing / SMA	15 to 25 mm
10 mm Thin surfacing / SMA	25 to 35 mm
14 mm Thin surfacing / SMA	35 to 40 mm

Note: The bitumen binder equivalence of clause 942, thin surfacing system / SMA may be assumed as 1.0 hence the shortfall in layer thickness should be made up in base course or road base material.

10 mm Close graded and 6 mm macadam have a material equivalence of 0.9 based on 100 pen bitumen which should be taken into account when relating the additional thickness required for the total pavement design.

9.6.25 Hence when using the above wearing course material options the following additional construction is required based on the national 100 mm of surfacing (w/c + bc) thickness.

Material Wearing Course			**Factor Base Course**
HRA WC 50 pen	factor 1.0	40 mm layer	= 60 mm b/c
HRA WC 50 pen	factor 1.0	50 mm layer	= 50 mm b/c
6 mm Thin surfacing /SMA	factor 1.0	20 mm layer(15-25)	= 80 mm (75/85)
10 mm Thin surfacing/SMA	factor 1.0	30 mm(25-35)	= 70 mm (65/85)
14 mm Thin surfacing/SMA	factor 1.0	40 mm layer (35-45)	= 60 mm (55/65)
10 mm CGWC 100 pen	factor 0.9	30 mm layer	= 85 mm
10 mm CGWC 200 pen	factor 0.9+0.7	30 mm layer	= 90 mm
6 mm DBM 200 pen	factor 0.9+0.7	20 mm layer	= 95 mm

(where 0.9 and 0.7 are factors for macadam and binder equivalence respectively.)

9.6.26 The following pavement design examples highlight the above philosophy.

Example 1

Design traffic 1000 dwellings served(1 msa)
Design thickness 190 mm flexible
Options:

a) 40 mm (minimum) HRA WC Mix B
60 mm DBM 100, 20 mm base course
90 mm DBM 100, 28 mm roadbase

b) 30 mm (minimum) SMA (-10 mm)
60 mm DBM 50 - (channelised traffic) -
100 mm DBM 100 - 28 mm roadbase (+ 10 mm)

c) 30 mm CGWC 200 pen (-15 mm)
60 mm DBM 200 pen, 20 mm bc (-25 mm)
180 mm DBM 200 pen 28 mm roadbase [(-40 mm)(+ 80 mm)]

Example 2

Design traffic 20,000 dwellings served or 20 msa county network road
Design thickness 320 mm flexible
Options:

a) 50 mm HRA WC Mix S - clause 943
50 mm DBM 50, 20 mm base course – (channelised traffic)
220 mm DBM 100 28 mm roadbase

b) 40 mm SMA
60 mm DBM 50 – (channelised traffic)
180 mm DBM 50 - 28 mm roadbase

Example 3

Design traffic 500 dwellings served (0.5 msa)
Design thickness 170 mm flexible
Options:

a) 40 mm HRA w/c Mix B
60 mm DBM 100 20 mm base course
70 mm DBM 100 28 mm roadbase

b) 20 mm DBM 100 6 mm w/c (-20 mm)
60 mm DBM 100 20 mm base course
90 mm DBM 100 28 mm roadbase (+ 20mm)

c) 20 mm DBM 200 6 mm w/c (-25 mm)
60 mm DBM 200 20 mm bc (-25 mm)
120 mm HRA 50 28m roadbase [(+25) (+25)]

Flexible Composite Construction

9.6.27 The pavement design shall also be based on DMRB Volume 7 - HD 26/94 and / or LR 1132.

9.6.28 For roads serving more than 1000 dwellings (1 msa) a determinate design based on CBM3G shall be used to provide a minimum layer thickness of 150 mm laid on clause 803 granular sub-base or Cement Bound Material category 1 or 2 (CBM1 or CBM2) stabilised sub-base.

9.6.29 For roads with less traffic serving between 100 dwellings (0.1 msa) to 1000 dwellings (1.0 msa) the design curve in LR 1132 may be used except that a two layer 100 mm bituminous construction shall be applied.

9.6.30 A minimum 120 mm thick layer of CBM 3G* shall be maintained for all roads serving up uo 1000 dwellings (1.0 msa).

*The use of CBM3G (Roadbase containing gravel aggregate or roadbase that has a coefficient of thermal expansion more than 10 x 10-6 per ∞C containing crushed rock aggregate) is preferred as a locally sourced aggregate. The nominal size of the aggregate may be 20 mm for layer thickness less than 150 mm and 20 or 40 mm nominal size for a layer thickness greater than 150 mm.

9.6.31 Although the use of any bituminous base material and wearing course surfacing described previously can be used in conjunction with the CBM3 layer the following combinations are the preferred options.

CBM3 120 mm layer - up to 1000 dwellings served (1.0 msa)
30 mm wearing course - Clause 942 polymer/fibre modified SMA or Thin Surfacing
70 mm Rolled Asphalt 20 mm base course or 20 mm DBM 100 base course

CBM3 150 mm to 250 mm layer / 1 msa to 20 msa
30 mm wearing course - Clause 942 polymer/fibre modified SMA or Thin Surfacing
70 to 120 mm of 20 mm DBM 100 base course in 1 or 2 layers.

9.6.32 The 20 mm or 40 mm nominal aggregate size CBM3 layer shall be fully compacted in accordance with SHW clauses 1035/8. The layer shall be sprayed with a bitumen emulsion curing compound and the layer shall not be trafficked until the material has gained strength equal to the 7 day requirement measured by concrete cubes compacted to site density and cured alongside the slab.

9.6.33 Alternatively, for small areas, the CBM3 layer may be covered immediately [i.e. within 2 hours of batching] with the next bituminous layer although this is only envisaged for areas of restricted width, at tie-ins, and where immediate trafficking is not envisaged.

Aggregate Selection

9.6.34 Aggregates in Wearing Course Mixtures.

The polished stone value (PSV) and aggregate abrasion value (AAV) of any applied Pre-Coated Chippings, the Aggregate in the mix of any Close Graded Wearing Course (CGWC), Proprietary Thin Surfacing or Stone Mastic Asphalt shall be in accordance with DMRB HD 36/99 (7) except that the minimum PSV in any site definition, including all carriageway, footway or vehicular crossing construction , shall be 55.

The PSV and AAV of the surfacing aggregate shall be in the range set out below.

Polished Stone Value (PSV)

Site definition	traffic/design category cv/day/dir 0-250	251-750	751-2000
Single & dual c/ways non event, minor junctions	55	60	65+
Gradients >50m long .10% & roundabouts	60	65+	70+
Bends <100m	60	65+	68+
Approach to roundabouts, traffic signals, pedestrian crossings & railway crossings	68+	70+	70+

Aggregate Abrasion Value (AAV)

	cv/day/dir			
traffic	**0 to 250**	**251 to 1000**	**1001 to 1750**	**1751 to 2500**
max AAV for pre coated chippings for asphalt	14	12	12	10
max AAV for aggregate in thin surfacing or macadam	16	16	14	14

9.6.35 A list of approved aggregates and effective PSV ratings is maintained by Surrey CC, Materials Laboratory. Aggregates from any other or new source must be approved by Surrey CC, Materials Laboratory prior to any works commencing. Certificates from ten (10 no.) individual PSV tests carried out during the previous 12 months undertaken by at least 3 different UKAS (8) accredited test laboratories must be submitted.

9.6.36 The stock of high quality road stone nationally is restrictive and a balance between acceptable specifications and ease of supply must be maintained. Designers and specifying engineers should not over specify the aggregate for simplification and a true skidding resistance assessment in accordance with DMRB should be carried out whenever possible.

9.6.37 Effective PSV - Surrey CC Approved List

All references to Polished Stone Value in this document shall be to the Surrey CC Effective PSV as set out below:

Aggregate Source SCC Effective PSV Group	Aggregate Type
72 plus	
Calcined Bauxite Guyanan	
70 plus	
Calcined Bauxite - Chinese	
65 to 69	
Bristol Pennant	Pennant Sandstone
Callow Hill	Gritstone
Craig -yr Hesq	Gritstone
Cwm Nant Leici	Gritstone
Gelligaer	Gritstone
Gilfach	Gritstone
Ghyll Scaur Gritstone	
60 to 64	
Ballynahinch	Gritstone
Bantry Bay	Gritstone
Bayston Hill	Gritstone
Brindister	Gritstone
Cashel	Gritstone
Comber - White Mountain	Gritstone
Cromhall - Wickwar	Quartzitic Sandstone
Cruicks	Basalt
Dolyhir - Nash	Gritstone
Dry Rigg	Gritstone
Gore	Gritstone
Templestone	Gritstone
Triscombe	Gritstone
55 to 59	
Ballybarnes	Gritstone
Bardon Hill	Porphritic Andesite
Boulogne Slag	Manganese Slag
Cliffe Hill	Granite (Augite-Diorite)
Craigantlet	Gritstone
Croft	Granite
Llanwern Slag	Blast Furnace Slag
Moonshill	Basalt
Rhayader	Greywacke
Tuttle Hill	Quartzite
Whitwick	Porphyritic Dacite
50 to 54	
Arklow	Basalt
Coleraine	Basalt
Dean	Gabbro
Glensanda	Granite
Mountsorrel	Granite

9.6.38 It is anticipated that SCC will update the above schedule on a regular basis. It will be re-issued to successful term tender contractors, suppliers and developers.

9.6.39 Prior to any works commencing Surrey CC, Materials Laboratory, must approve aggregate from any other source.

9.6.40 Details of the proposed material, the source, shipping and storage details, together with a sample, must be supplied to the Surrey CC, Materials Laboratory, at least 28 days before work commences.

9.6.41 Certificates from ten (10 no) individual PSV tests carried out during the previous year (12 months) undertaken by at least 3 different UKAS accredited test laboratories must be submitted to Surrey CC, Infrastructure Group, Materials, Merrow.

9.6.42 It is possible that trials of new aggregates sources will be carried out for monitoring purposes, albeit with the aggregate used and placed in a lower risk category than that required by design standards.

Aggregates in Base Course and Roadbase Mixtures

9.6.43 The choice of aggregate for all base materials is restricted to crushed rock or slag complying with the requirements of SHW(9) and the appropriate BS specification.

9.6.44 Exceptionally when the base course layer is to be trafficked with unrestricted public access, the PSV of the base course aggregate must be 55 minimum.

9.6.45 The use of gravel aggregate is not permitted in any plant mixed bituminous bound material other than when incorporated as Insitu recycling as part of the “Foamstab” (10) or “Cement stab” (11) process.

9.6.46 The use of plant recycled material is encouraged. Should gravel aggregate (otherwise prohibited) be introduced from a recycled source approval from Surrey CC Materials Laboratory is to be sought. Equally, alternative aggregate sources such as incinerator bottom ash, and recycled glass may be incorporated in the mix with conventional aggregate, provided full scale trails have been completed by the industry, local authority, TRL or other official body, and full approval gained.

Performance of Bituminous Material

9.6.47 The suitability, and ultimate performance, of any bituminous layer is a function of the correct choice of material for the in service use, the adequacy of laying and compaction operations.

9.6.48 The correct surface texture of a wearing course layer may be dependant on several variables such as rolling temperature, surfacing type, aggregate size and layer thickness. The ability for the bituminous material to maintain the required characteristics during in service life can be dependant on the correct binder type and adequate levels of compaction of both the surfacing and base layers. Additional advice, to that included in this appendix, on how this can be achieved can be found in DMRB HD 37/99 (12)

Surface Texture

9.6.49 Surface texture shall be measured by the sand patch method described in clause 921 of SHW.

A minimum surface texture of 1.5 mm (sand patch) shall be achieved for all materials used in a high speed location (greater than 40 mph).

For all low speed roads with a speed limit of less than 40 mph (includes all estate roads except cul-de-sacs) a surface texture of 1.2 mm average (sand patch) shall be achieved.

For any non thoroughfare (i.e. cul de sac), a surface texture is of less importance than adequate aggregate PSV and an average surface texture of 0.7 mm is acceptable for medium textured or close graded macadam.

Compaction of Bituminous Layer

9.6.50 Adequacy of compaction of wearing course performance related design mix shall be determined as required by clause 943 (in particular paragraphs 11, 12, 15 to 17, 21 to 27, 30 to 33 & 36) of SHW.

9.6.51 Adequacy of compaction of all dense bitumen macadam base course and roadbase materials (DBM100, DBM50, HDM, HMB35) laid in the carriageway shall be in accordance with clause 929 of SHW and shall have a void content of less than 8% .

9.6.52 Adequacy of compaction for all materials laid generally within the carriageway, either by hand or machine, shall be measured by void content (clause 901):

The void content of the mix, when placed and compacted, to be in the following range:

- 2% - 6% for HRA wearing course with no individual result to be greater than 7%,
- less than 6% for rolled asphalt base and roadbase,
- less than 8% for dense or close graded bitumen macadam wearing course and
- within the range recommended by the proprietary system for thin surfacing systems or stone mastic asphalt.

9.6.53 The contractor will be expected to demonstrate an adequate level of compaction with the use of a calibrated nuclear density meter (NDM) or other measurement devices during the works and to supply, when required, certificates of density and void content test results. Where low density or high void contents are achieved indicating possible poor levels of compaction the contractor will be required to demonstrate adequate levels of compaction of the layer (s) in question by core sampling and testing of the bituminous material in the Surrey CC, Materials Group Laboratory.

Footway, Cycleway and Vehicular Crossing Construction

9.6.54 It should be noted that for “Shared Surfaces” (those with both vehicular, cycle and pedestrian traffic) the construction design and surfacing material must comply with the greater requirements of vehicular traffic and in any event the construction should be based on the design for roads serving up to 100 dwellings (0.1 msa).

9.6.55 Flexible footway, cycleway and vehicular crossing design and construction shall follow the concept set out previously for carriageway works.

9.6.56 The foundation design, earthworks, formation requirements and flexible construction for any footway, cycleway or vehicular crossing shall be the same as those for carriageway works set out previously excepting the following:

Sub-base shall comply with SHW, clause 803 and have a layer thickness of at least 100 mm. Alternatively asphalt planings complying with clause 600 series, class 6F3 capping may be used. An increased thickness of sub-base up to 250 mm in lieu of capping may be required in areas of soft formation.

Lengths of heavy duty construction for crossings, particularly to commercial properties should be treated as carriageway for construction design. It is acceptable to incorporate CBM3G as a combined / substitute sub-base / roadbase to suit both traffic loading and geometry with an appropriate layer thickness in the range 150 mm to 250 mm.

A 50 mm compacted layer of 20 mm nominal size crushed rock, DBM 200pen base course shall be incorporated at all locations. This may be hand laid but consideration should always be given to laying through a mini-paver for larger areas and longer lengths.

The surfacing shall be a 20 mm layer of 6 mm DBM 200pen wearing course complying with clause 7.5 of BS 4987. Where the material is required to be machine laid over larger areas the use of 6 mm medium textured macadam wearing course may be used. In any event the aggregate must be crushed rock or slag with a minimum PSV of 55 and a maximum AAV of 14.

The use of a high stone content asphalt wearing course or a SMA surfacing may be beneficial in heavy duty crossing construction.

Particular attention must be paid to lengths of dropped kerbs for vehicular access where the reduced levels may be in conflict with Utility and Cable company plant. Thickening of construction and / or replacement with a stronger material, including concrete roadbase should be considered.

References

(1) Transport Research Laboratory LR 1132 The Structural Design of Bituminous Roads

(2) Design Manual for Roads and Bridges (DMRB), Volume 7: Pavement Design and Maintenance HD 25/94 – Foundations

(3) British Standards Institution BS 4987 – Coated Macadam for Roads and Other Paved Areas.

(4) British Standards Institution BS 594 – Hot Rolled Asphalt for Roads and Other Paved Areas.

(5) National Quality Assurance scheme - Sector 14, Production of Asphalt Mixes.

(6) British Board of Agrément. Highway Authorities Product Approval Scheme.

(7) Design Manual for Roads and Bridges (DMRB), Volume 7: Pavement Design and Maintenance HD 36/99 Surfacing Materials for New and Maintenance Construction .

(8) UKAS – United Kingdom Accreditation Service.

(9) Manual of Contract Documents for Highway Works, Volume 1: Specification for Highway Works (SHW) and Volume 2 : Notes for Guidance on the SHW.

(10) Foamstab – Industry System (several Contractors) for the In-Situ recycling of existing pavement construction using “Foamed Bitumen” as the introduced binder.

(11) “Cementstab” – Industry System (several Contractors) for the In-Situ recycling of existing pavement construction using “Portland Cement” as the introduced binder.

(12) Design Manual for Roads and Bridges (DMRB), Volume 7: Pavement Design and Maintenance HD 37/99. Bituminous Surfacing Materials and Techniques

9.7 Concrete Block, Natural Stone and Clay Paving

Introduction

9.7.1 This section provides additional guidelines for the use of block paving in areas of highway. The design is however, based upon a minimum value of 0.5 msa (500 dwellings) in accordance with BS 7533 (7) and requires a bound roadbase layer beneath the blocks and bedding layer for any trafficked carriageway. This is derived from experience gained from the maintenance requirements of a lesser construction thickness.

9.7.2 The use of an unbound roadbase beneath block work or clay paver construction will not be permitted in any area of carriageway construction or highway put forward for adoption. This includes all carriageways, parking areas, bus stops and any other paved area within the adoption envelope.

Pre-Cast Concrete Kerbs, Channels, Edgings and Flags

9.7.3 Concrete block pavers shall comply with the requirements of BS 6717, Part 1 (1)

9.7.4 Clay pavers shall comply with the requirements of BS 6677, Part 1 (2)

9.7.5 Precast concrete kerbs, channels, edgings, quadrants and flags shall comply with the requirements of BS 7263 Part 1 (3)

9.7.6 Additionally, "Natural Stone Surfacing" may be used, particularly, in conservation areas where matching of aggregate and or coloured natural stone may be a requirement. Although, the selection of the natural stone element will be based on a locally based decision, attention is drawn to the document "Natural Stone Surfacing – Good Practice Guide" (4). Where footways or pavements are constructed, in part, with natural stone setts then this shall be carried out in accordance with BS 7533 Part 7 (5)

9.7.7 The design of pavements surfaced with concrete or clay pavers and concrete flags or natural stone slabs shall be in accordance with the procedures and recommendations set out in BS 7533, Parts 1(6)and 2(7) amended as follows for pavements taking vehicular traffic of any kind:

- The minimum number of dwellings served from 0 to 500 (0 to 0.5 msa recommended in BS 7533) shall be amended to include a bituminous bound roadbase, hence all areas of adopted highway paving shall be laid with a bituminous or cementitious roadbase.
- A minimum bituminous roadbase layer of 70 mm, comprising 28 mm nominal size DBM 100pen roadbase in conjunction with a 30 mm laying course of sand shall be used in the design category 0 to 0.5 msa where no special case conditions prevail (see paragraph 3.2 of BS 7533). In all other instances the paving shall be designed in accordance with a minimum 130 mm of bituminous (DBM100) or cementitious (CBM3) roadbase construction.
- Unless specifically agreed with the authority only rectangular blocks manufactured with nominal dimensions of 200 mm length, 100 mm width and 65 mm thickness for clay and 80 mm thickness for concrete pavers shall be used.

9.7.8 All concrete block or clay pavers shall be laid in accordance with the procedures and recommendations set out in BS 7533 Part 3 (8). Unless otherwise agreed in writing by Surrey CC, Materials Group a standard laying pattern of 450 Herringbone with a proprietary starter block system used in conjunction with either a single or double stretcher course should be adopted.

9.7.9 The laying course sand and jointing sand shall comply with BS 7533. The use of a sealant to deter jointing sand wash out is encouraged for areas that may be scoured or have large surface water movement. Drainage channels and details for around ironwork shall be set in wet concrete in order to isolate the units from the sand laying course.

9.7.10 All pavements constructed with small element concrete flags, natural stone slabs should be in accordance with BS 7533 Part 4 (9)and unless otherwise agreed to a design in accordance with the recommendations of BS 7533 Part 8 (10).

9.7.11 Overall the design of any footway shall consider the implications of future maintenance set out as the recommendations in TRL Application Guide 26 (11) and the positioning of utilities, mains and plant in accordance with the recommendations of NJUG (1986) Publication Number 7 (12).

References

(1) British Standards Institution BS6717, Part 1: "Precast concrete paving blocks".

(2) British Standards Institution BS 6677, Part 1: "Clay or calcium silicate pavers for flexible pavements".

(3) British Standards Institution BS 7263 Part 1: "Precast concrete flags, kerbs, channels, edgings and quadrants".

(4) SCOTS. Society of Chief Officers of Transportation in Scotland - "Natural Stone Surfacing – Good Practice Guide".

(5) British Standards Institution BS 7533, Part 7 - "Code of Practice for the construction of Pavements of natural stone setts"

(6) British Standards Institution BS 7533, Part 1 "Guide for the structural design of heavy duty pavements constructed of clay pavers or pre-cast concrete paving blocks"

(7) British Standards Institution BS 7533, Part 2 "Guide for the structural design of lightly trafficked pavements constructed of clay pavers or pre-cast concrete paving blocks"

(8) British Standards Institution BS 7533, Part 3, "Code of practice for laying pre-cast concrete paving blocks and clay pavers for flexible pavements".

(9) British Standards Institution BS 7533, Part 4: Code of Practice for the construction of Pavements of Precast concrete flags or natural stone slabs

(10) British Standards Institution BS 7533, Part 8 "Guide for the design of lightly trafficked pavements of natural stone setts".

(11) Transport Research Laboratory TRL Guide 26 – Footway Design and Maintenance Guide

(12) NJUG (1986) Publication No. 7 " Recommended positioning of Utilities, Mains and Plant for New Works".

9.8 Rigid and Rigid Composite Construction

9.8.1 Although not specifically discouraged the use generally of concrete as a final carriageway surface is acknowledged to entail considerable difficulties in both construction techniques, management and in-service maintenance.

9.8.2 Any concrete carriageway proposals will therefore take construction, maintenance and specific environmental considerations such as noise generation and joint details into account when considering development related proposals. It is unlikely that a striated concrete surface texture will receive approval where traffic noise will create an environmental problem for residents. Where the use of a rigid construction is required for engineering reasons then a rigid composite construction incorporating a quiet running bituminous surfacing system would be the preferred option.

9.8.3 It is therefore not anticipated that the use of a rigid pavement will be acceptable for development related carriageway construction due to these considerations.

9.8.4 Exceptionally where there is a **genuine engineering need** for a concrete pavement the following shall apply:

The design thickness for a rigid pavement shall be in accordance with DMRB

Volume 7: HD 26/94 (1) and shall be based on an overall 40 year design.

All concrete and other construction materials and construction methods shall comply with the requirements of SHW Clause 1000 series (2).

The foundation design of any concrete pavement shall follow the concepts put forward in the previous Parts 1 to 4.

Additionally in accordance with DMRB HD 26/94 for pavements with a design value of up to 12 msa the sub-base must be Cement Bound Material CBM2 or C10 wet lean concrete. Cement Bound Material CBM3 or C15 wet lean concrete must be used for pavements with a design value of greater than 12 msa.

An overall minimum slab thickness of 150 mm shall be applied for all design values of less than 8 msa and shall be increased pro rata in accordance with DMRB Volume 7: HD 26/94 for greater design values.

An impermeable membrane is required above the sub-base to prevent moisture suction downwards from the concrete slab and also to act as a slip layer. The membrane should therefore be plastic sheeting or the like of at least 500 grade.

The maximum transverse contraction joint spacing for un-reinforced slabs (URC) shall be 4 m for slabs up to 230 mm thickness, equivalent to a 50 msa design.

For a slab thickness of greater than 230 mm the joint spacing should be increased to 5m intervals.

Only Air Entrained concrete shall be used in concrete pavement surface layer and the concrete in both the surface and base layers of the rigid pavement shall be designed, mixed and transported in accordance with BS 5328 (3) and any additional requirements of clause 1000 series of SHW.

Concrete carriageway construction drawings are available in Highway Construction Details Volume 3 (4). The use of a concrete pavement construction for lay-bys and or bus bays is acceptable and the design requirements or assistance may be sought from Surrey CC, Environment, Projects Design team for acceptable designs for lay-bys and bus bays. It should be noted however that modern fuel resistant bitumen binders are now available and hence a flexible or flexible composite construction is an acceptable alternative to a concrete bus-bay.

Concrete pavements and / or any ad hoc slabs shall be cured and have an applied surface texture in accordance with SHW 1000 series.

References

(1) Design Manual for Roads and Bridges (DMRB), Volume 7: Pavement Design and Maintenance HD 26/94 Pavement Design

(2) Manual of Contract Documents for Highway Works, Volume 1: Specification for Highway Works (SHW) and Volume 2 : Notes for Guidance on the SHW. Clause 1000 series

(3) British Standards Institution BS 5328 Concrete Parts 1, 2, 3 and 4.

(4) Manual of Contract Documents for Highway Works, Volume 3 – Highway Construction Details, Section C

9.9 Surface Treatments

High Friction Surfaces

9.9.1 The incorporation of a high friction surface may be required at the approaches to controlled, or in some cases uncontrolled, pedestrian crossings and approaches to traffic lights, roundabouts or railway level crossings depending on the speed of approach, geometry and site risk rating.

9.9.2 High skid resistant material incorporating bauxite aggregate as the surface aggregate, with a PSV 70+ and complying with clause 924 of SHW (1) must be used for all high speed approaches (greater than 40mph) at any of the above locations. This is set out in DMRB HD 28/94 (2) that schedules the site categories, the risk ratings, traffic bands and lists the aggregate PSV requirements. Low speed sites that carry high traffic volumes and / or site with high risk rating, where the risk of skidding accidents cannot be eased by engineering methods, may also require a clause 924 compliant surfacing system.

9.9.3 Further advice on the use, suitability, application and installation of clause 924 high friction surfacing systems is given in DMRB HD 36/99 (3) and DMRB HD 39/99 (4).

9.9.4 All High Friction Surfacing systems shall have BBA/HAPAS (5) certification and shall be installed by a contractor approved by BBA and the certificate holder as an approved installer for that particular system. Only systems holding BBA/HAPAS certification for the particular road type classification shall be used, however, it is acceptable for a higher classification to be used.

9.9.5 High friction surfacing systems for Road Types 1 and 2 from the BBA classification must be machine applied. For Type 3 roads either machine or hand applied systems can be used.

9.9.6 The contractor shall, under the BBA/HAPAS scheme, guarantee the high friction surfacing system, materials and workmanship for a period of 24 months from the date of application.

9.9.7 Care should be taken regarding the compatibility of the selected clause 924 high friction surfacing material with that of the newly laid or existing carriageway construction. An existing carriageway construction shall have a structural life (residue life) of at least 10 years. A newly laid wearing course may need to be trafficked to remove bitumen bloom, the texture depth of the surface to be treated may need adjustment or the material change to ensure compatibility.

9.9.8 The use of other surface dressing treatments incorporating a natural aggregate (i.e. other than the artificial calcined bauxite complying with clause 924), as a surface treatment is not an accepted treatment in this situation for a development submission.

Coloured Surface Treatments

9.9.9 The use of a coloured surfacing and surface treatments is not encouraged except where specifically necessary for the safety aspects of the layout or to provide the required contrast in terms of traffic calming or management. The incorporation of a colour pigment within a conventional surfacing material can achieve the required colour contrast however the maintenance of such surfacing has caused problems in colour matching over a period of time and their use generally is not encouraged.

9.9.10 Where necessary the following concepts should be taken in to account for surface applied treatments:

Cycle Lanes

9.9.11 The use of a Green surface treatment shall be associated with cycle ways and cycle way reservoirs at stop lines.

The colour green shall be restricted to a **muted shade** in the following range:
BS381C, (6) “Deep Chrome Green, Grass Green, Bold Green” are currently included in SCC term tender specifications.

Bus Lanes & Traffic Calming

9.9.12 Similarly the use of a muted Red surface treatment shall be restricted to bus lanes and areas of traffic calming.

The colour red shall be restricted to a **muted shade** in the following range:
BS 381C, "Venetian Red, Cherry Red, Bold Red" are currently included in SCC term tender specifications.

9.9.13 Exceptionally, for an interim period, matching to other colours used previously, may be required where the scheme abuts existing coloured treatments. Where this is the case the Developer should consult with Surrey CC to either match the existing colour or extend the "new colour regime" to overlay / replace the existing.

Colour Contrasts

9.9.14 Exceptionally, the use of Buff aggregate, Chinese bauxite, may be used to produce a lighter colour contrast. This can be used satisfactorily to produce a contrast with "Grey Guyanan bauxite" in conservation areas in lieu of "red or green"

9.9.15 The use of naturally coloured aggregates such as Harden Red, Criggion Green, Cromhall Quartzite etc may be considered to colour conventional or proprietary surfaces or surface treatments. The overall requirement to maintain the minimum PSV for the appropriate traffic category and location shall be achieved and hence the use of gravel may not achieve this requirement.

9.9.16 The use of coloured surface treatments and colour contrasts may be restricted in conservation areas or where a local plan exists.

Surface Texture

9.9.17 The surface texture provided by the surfacing material and surfacing layer is a function of both the material and process. Surrey CC, Materials Group, will provide advice if required on what level of surface texture is required at any site plus how it can be best achieved.

9.9.18 The following extract from Appendix 7/1 summarises the overall requirements:

Surface Texture shall be measured by the Sand Patch method described in clause 921 of SHW.

For roads subject to a speed limit of 40 mph or less a minimum average texture depth of 1.2 mm shall be achieved with individual values greater than 0.9 mm.

For high speed roads where the speed limit exceeds 40 mph a minimum average texture depth of 1.5 mm shall be achieved with individual values greater than 1.2 mm.

Existing Carriageway.

9.9.19 Re-texturing may be specified where the existing carriageway surfacing has deteriorated by loss of micro-texture and / or macro-texture. Where the development related works on the highway change the risk rating of the carriageway by virtue of physical alignment or traffic movements, and as described in DMRB HD 28/94, retexturing may be used as a temporary expedient. There may be a need to review the carriageway skid resistance adjacent to the works and / or approaching the works where a temporary increase in skid resistance is required because of the increase in risk rating due to traffic movements. In this instance the use of re-texturing to raise the skid resistance is a viable alternative.

9.9.20 Acceptable re-texturing techniques, their suitability and effectiveness are described in DMRB HD 37/99.

9.9.21 It must be recognised however that for adoption purposes the structural integrity of the development related carriageway works and design life will have more weighting than surface texture in the short term. Hence a need to resurface because of structural need will have a higher weighting than re-texturing a possibly structurally deficient pavement structure.

References

(1) Manual of Contract Documents for Highway Works, Volume 1: Specification for Highway Works

(2) Design Manual for Roads and Bridges, Volume 7, Pavement Design and Maintenance, HD 28/94 - Skidding Resistance

(3) Design Manual for Roads and Bridges, Volume 7, Pavement Design and Maintenance HD 36/99 – Surfacing Materials for New and Maintenance Construction

(4) Design Manual for Roads and Bridges, Volume 7, Pavement Design and Maintenance HD 37/99 – Bituminous Surfacing Materials and Techniques

(5) British Board of Agrément / Highway Authorities Product Approval Scheme

(6) British Standards Institution, BS381C – Specification for Colours for Identification, Coding and Special Purposes

Highway Drainage Systems

9.10.1 Approval of the Environment Agency, Water Authority, or the Drainage Authority must be obtained to determine the allowable return period, rate of discharge, the need for any attenuation, and agree any pollution control measures, construction details and suitability for SUDS, for all drainage schemes.

9.10.2 The Highway Authority must also be consulted concerning the location of any drainage proposed to be constructed in any new or existing roads. With the appropriate approvals surface water run-off from new roads may be collected and piped to a public surface water sewer system if one is available or to a natural water course, again with approval being achieved or to an infiltration system.

9.10.3 Drainage will not be considered for adoption unless it accepts inflow only from the highway. Where private paved areas fall towards the highway, surface water run-off will be interrupted to prevent it reaching the adopted highway and highway drain by means of check courses, reverse gradients, or channels with gullies piped to public surface water sewers, or to private soakaways.

9.10.4 All carriageways shall either be cambered or side hung to collection by gullies in or adjacent to the carriageway. Shared surfaces may also have a centre-line collection facility , these systems must also satisfy a structural appraisal to satisfy the design / allowable traffic loading.

9.10.5 ALL DRAINAGE DESIGNS MUST BE IN ACCORDANCE WITH NATIONAL STANDARDS INCLUDING THE CURRENT WALLINGFORD PROCEDURE AND SEWERS FOR ADOPTION AND BE APPROVED BY THE HIGHWAY AUTHORITY. EACH SUBMISSION MUST BE ACCOMPANIED BY FULL CALCULATIONS AND ASSUMPTIONS. Gully spacings should also be designed to National Standards. Flow widths for gully design shall generally be 0.5m. Any changes to this should be agreed with the Highway Authority.

9.10.6 Normally all highway drains will be located within the limits of the highway. Exceptionally an outfall may have to cross private land, by permanent easement, where no reasonable alternative exists within the proposed or existing highway limits.

Sustainable Urban Drainage Systems (SUDS)

9.10.7 At present, not all Sustainable Urban Drainage Systems (SUDS) set out in CIRIA Report C522(1) are permitted in highway construction and the designer should seek clarification from the highway authority, before commencing design of these evolving techniques.

9.10.8 Before producing an acceptable SUDS design and submission, the designer should ensure that the design conforms to the regional drainage master plan and that a full assessment which will include hydrological / hydro-geological / environmental elements has been carried out (a full list of the required data is given in CIRIA Report C522) and that all the relevant authorities have been consulted and approval granted.

Soakaway systems

9.10.9 All soakaway systems offered for adoption must be located entirely within the limits of the highway, but not within the carriageway. As far as practicable, the cover of the soakaway should be located in the paved area to facilitate access and minimise disturbance when maintenance is carried out. The diameter of a soakaway should not be less than 1.8m, nor exceed 2.5m diameter and an interceptor / silt trap capable of being cleaned by a conventional gully pot gulper / emptier must be installed immediately upstream of it. An oil trap shall always be installed within the system where geological conditions indicate and / or the soakaway penetrates Chalk.

9.10.10 If there is no reasonable alternative means of drainage from conventional drainage systems or a “Sustainable Urban Drainage System” (SUDS) (1), a “conventional soakaway” drainage system will be considered acceptable if designed and constructed in accordance with the SCC “Design Procedure for Soakaways for Highway Drainage” (2) and provided that the location and geology are acceptable. The developer must always submit calculations for the design of any soakaway / infiltration / source control system

Drainage Works

9.10.11 All drainage operations within the development related works must be carried out in accordance with SHW clause 500 series (3). All pipes for drainage, ducts for services, chambers, gullies and pipe junctions must comply with clause 500 series, scheduled in Tables 5/1, 5/2, 5/6, and with the relevant British Standard. Drainage aggregates required for bedding, laying, surrounding pipes and granular material used for the reinstatement of drainage trench operations shall comply with clause 500 series and the relevant British Standard.

9.10.12 Where trench excavation and reinstatement operations are required in the adoptable carriageway all trench arisings / encountered insitu material shall be discarded (used elsewhere in the site) and the reinstatement back fill shall be an acceptable Class A graded granular material or granular sub-base, GSB1, both supplied, placed and compacted in accordance with NRSWA specification. (4). All bound material used in the reinstatement shall comply with the relevant British Standard (see also this document Appendix D) and to the construction requirements set out in NRSWA Specification Appendices A1 to A11.

9.10.13 The developer is reminded that before entering or breaking into an existing sewer or drain the contractor shall give notice to the authority responsible for the pipeline to which the connection is to be made.

All drains shall be inspected, cleaned where required and water-tight joints tested in accordance with clause 509 of SHW.

9.10.14 All manhole covers and frames, gully gratings and frames, stop valve covers etc. located within the adoptable carriageway must comply with SHW and with BS EN 124 (5). All products must be kitemarked to ensure product certification, to be fine cast with no coating and preferably manufactured of ductile cast iron. The class of all units shall be D400 except where trafficking by commercial vehicles will be minimal and / or where the adoptable roads do not form a bus route. In these exceptional and low traffic loading locations class C250 may be used.

References

(1) Construction Industry Research and Information Association (CIRIA) Report C522 Sustainable Urban Drainage Systems – design manual for England and Wales

(2) Surrey CC Manual of Policies Standards Volume 1, Appendix E - “Design Procedure for Soakaways for Highway Drainage”

(3) Manual of Contract Documents for Highway Works, Volume 1: Specification for Highway Works

(4) New Roads and Street works Act 1991, Specification for the reinstatement of openings in Highways.

(5) British Standards Institution BS EN 124: Gully tops and manhole tops for vehicular and pedestrian areas. – Design requirements, type testing, marking, quality control.

(6) British Standards Institution BS 8005 – Sewage.

(7) Water Industry Act 1991.

(8) Environment Agency’s ‘Policy and Practice for the Protection of Groundwater’.

(9) DTLR Advice Note HA/02/00 – Spacing of Road Gullies.

(10) The Wallingford Procedure.

(11) British Standards Institution BS 6367 – Code of Practice for Drainage of Roofs and Paved Areas.

(12) Sewers for Adoption

(13) DTLR Highway Construction Details

(14) DTLR Advice Note HA40

(15) SCC Standard Detail Drawings

9.11 Highway Structures

Introduction

9.11.1 When a development requires the provision or alteration of a highway structure, the design proposals for that structure shall be submitted to the County Council for Technical Approval in accordance with the procedure detailed below. Structures that are classified as 'highway structures' are;

(a) Bridges, culverts, chambers or subways over or under the highway that have a composite span of 1 metre or more.

(b) Retaining walls where the height of retained fill measured between lower and upper ground levels is 1.37 metres or more, and

(c) Miscellaneous structures

- Reinforced earth embankments 1.37 metres or more in height, where the angle of the side slopes is greater than the angle of internal friction of the embankment material.
- High mast lighting columns 20 metres or more in height
- Structural aspects of sign and signal gantries as defined by the Highways Agency
- Structural aspects of traffic signal mast arm assemblies as defined by the Highways Agency

9.11.2 The granting of Technical Approval for a design does not imply permission to build the structure, as a licence or consent under either the Highways Act 1980 or Surrey Act 1985 may be required. Neither does it imply consent under any other Act of Parliament, Regulation or Bylaw unless expressly stated.

Structural Adequacy

9.11.3 Highway structures, whether they support or protect the highway, shall be capable of safely supporting the load effects derived from current highway loading standards and, with appropriate inspection and maintenance, have a design life of 120 years. The primary design standards to be used shall be BS 5400 'Steel, concrete and composite bridges' and the appropriate Technical Memoranda contained in the Highways Agency's 'Design Manual for Roads and Bridges' (DMRB), together with those standards listed in the Technical Approval Schedule. Compliance with these standards will normally ensure that the design, whether for new or alterations to existing highway structures, is acceptable to the County Council as Technical Approval Authority.

9.11.4 To reduce future maintenance costs to a minimum all new design proposals will be assessed for compliance with the principles of 'design for durability', as detailed in the Highways Agency's DMRB. Essentially this means that designs for bridges that have a span of less than 60 metres, with the exception of footbridges, shall be based on integral bridge concepts.

Materials

9.11.5 The choice of materials for highway structures shall be appropriate for the use and function of the structure, whilst being sympathetic to the location and environment as far as possible. The specification to be used shall be the Highways Agency's 'Manual of Contract Documents for Highway Works, Volume 1, Specification for Highway Works'.

9.11.6 It should be noted that for timber structures that are being offered for adoption, both the type of wood and its source shall comply with County Council policy, and this stipulation may be a condition of the Planning Consent.

9.11.7 Materials should be chosen for low maintenance throughout the required 120-year design life. When the actual life of a structure may be less than this, e.g. timber footbridges, the replacement costs to achieve the 120-year design life will increase the commuted sum required for adoption. The designer should therefore give consideration to these factors when developing a design and specifying materials.

Aesthetics

9.11.8 The form and appearance of a structure should, as far as possible, both complement the environment in which it is located whilst at the same time provide a solution that complies with the following criteria.

9.11.9 Subways, whether for pedestrians only or for combined use with cyclists, should always be designed to appear light, airy and spacious. The geometry should be such that a view through the subway is available before it is entered, the entrances are splayed, and there are no places of concealment. Security can be further increased if the subway and its approaches are overlooked by adjacent properties and a well designed overhead lighting scheme is provided for night time use.

9.11.10 For walls, very often the only aesthetic consideration is the material finish. If the location or background to the wall permit it, then an applied facing such as brick, stone or flint may be appropriate. A formed concrete finish may be acceptable in some circumstances, but the following basic rules must be observed,

- an F3 finish (as described in SHW, series 1700) shall not be used for large areas
- course textured surfaces are acceptable only when they will be viewed from a distance
- fine textured surfaces shall be used when the wall can be viewed from close proximity, but sharp edges should be avoided.

9.11.11 When specifying the finishes to a structure they should be considered in terms of durability, low maintenance, ease of cleaning and appropriate texture to deter the application of graffiti.

9.11.12 For structures that are adjacent to or cross natural watercourses the designer should consult with both the Environment Agency and Surrey Wildlife Trust to ensure adequate provision is made for wildlife and their needs. This is in addition to the requirements contained within the DMRB.

Technical Approval Procedure

9.11.13 Definitions

Technical Approval
The submission of design proposals for acceptance by the Technical Approval Authority and the subsequent provision and acceptance of appropriate Certificates, confirming that the design complies with the standards listed in the agreed Technical Approval Schedule.

Technical Approval Authority (TAA)
The County Council is the Technical Approval Authority for all highway structures within Surrey, with the exception of those owned by either Railtrack or the Highways Agency (i.e. those associated with motorways and trunk roads).

Technical Approval Schedule (TAS)
A schedule of documents that are relevant to the design of the highway structure. It is included within the Approval in Principle as an appendix.

Approval in Principle (AIP)
A proforma that records the standards to be used for the design, together with other pertinent details. Blank versions of an AIP are supplied by the TAA for completion by the designer, who shall return the completed form to the TAA for acceptance.

9.11.14 The County requires the procedures described below to be applied to the design of all new, or alterations to existing, highway structures as defined in the Introduction of this section, all alternative designs and to temporary structures that support or protect the public highway.

9.11.15 Technical Approval is a continuing process and the period required for consideration will vary according to the size and complexity of the structure, and if any aspects of the design are a departure from current design standards. Designers should therefore liase as early as possible with the TAA prior to making a formal submission on the appropriate AIP and TAS, blank versions of which are available from the TAA.

9.11.16 A formal AIP submission shall include a location plan, two copies of a General Arrangement drawing, relevant parts of the soil investigation factual and interpretation reports, and one completed copy of the TAS and AIP with original signature. The submission is to be sent to:

Principal Engineer (Structures),
Surrey County Council,
Highway House,
21 Chessington Road,
West Ewell
Surrey KT17 1TT

9.11.17 On acceptance, the AIP will be signed by the Principal Engineer (Structures), and a copy of the endorsed AIP returned to the designer to confirm its acceptance.

9.11.18 On completion of the design and independent check the appropriate Design and Check Certificates or Design/Check Certificate shall be completed, signed by the designer and/or checker and forwarded to the TAA for acceptance. This certificate confirms that the design complies with the agreed standards recorded in the AIP.

9.11.19 On completion of the works the designer shall sign a Construction Certificate to confirm that the works have been completed in accordance with the approved design and drawings. If any aspect of the works deviates from the approved design this shall be stated on the certificate and recorded on a set of As-Built drawings to accompany the certificate.

9.11.20 Notes

1. The signatories of the AIP form, Design, Check and Construction certificates shall be Chartered Civil or Structural Engineers.
2. Should a licence or consent be required for the works it will not be issued until both the AIP and Design Certificate have been accepted by the TAA.
3. The TAA will retain the originals of all AIP's, TAS's and certificates. Photocopies of the signed AIP or certificate will be returned to the designer to confirm the TAA's acceptance of the document.

Adoption of Highway Structures (refer also to Chapter 10, 'Adoption and Procedures')

9.11.21 When roads and their associated structures are offered to the County for adoption as public highway, the County will require to take a freehold transfer of at least the minimum plan area of land containing such structures, together with easements over adjoining land to permit access for inspection and maintenance. In addition to compliance with the AIP procedure, the County will also require

- submission of two sets of detailed drawings for comment and subsequent approval by the County. This is in addition to the General Arrangement drawings required for AIP approval
- payment of the County's reasonable costs incurred in inspecting, commenting on and approving drawings
- payment of the County's reasonable costs incurred in inspecting the works in progress
- payment to the County of a commuted sum to cover the cost of inspection and maintenance of the structure during its life, and its eventual renewal
- provision of a bond to insure completion of the structure in the event of default by the developer
- submission of the appropriate documents as required by the Construction (Design and Management) Regulations 1994, or such other legislation that may from time to time become relevant
- originals of all approvals required for construction of the highway structure, e.g. Conservation Area Consent, Listed Building Consent, Ancient Monument Consent, Drainage Consent etc.

Licences

9.11.22 Where the proposed works are subject to the provisions of either section 167, 169, or 176 to 181 inclusive of the Highways Act 1980, or section 13 of the Surrey Act 1985, a licence or consent as appropriate will be required prior to works starting. The developer will be advised of the need for a licence or consent during the AIP approval process.

Model Appendices – Highway Specification

Note:

1 The following Appendices to Specification for Highway Works (SHW), Volume 1, 600 series, 700 series and 1100 series are EXAMPLES only and do not necessarily include all materials available or required.

2 Appendix 7/1 refers to materials and processes included in the 700, 800 and 900 Series of SHW. Similarly Appendix 6/1 refers to the 600 series materials and Appendix 11/1 includes materials used for footways and the like.

3 It is however preferable that the format of the Appendices is followed for ALL DESIGN SUBMISSIONS in order to assist and speed up the approval system.

Permitted Pavement Options – Flexible Construction

1. **Project:** **XXXXX**

2. **Grid for Checking Surface Levels of Pavement Courses** (Clause 702 Para. 4)
   Longitudinal dimensions: 5m
   Transverse dimensions: 2m

3. **Surface Regularity** (Clause 702 Para. 5)
   Category of road: A / B

4. **Compaction of Bituminous Materials**
   Adequacy of compaction of wearing course performance related design mix shall be determined as required by cl 943AR (in particular paragraphs 11, 12, 15 to 17, 21 to 27, 30 to 33 & 36). Adequacy of compaction of dense bitumen macadam base course and roadbase shall be in accordance with clause 929 and shall have a void content of less than 8%.
   OR
   "Compaction of Bituminous Materials. - Void content required (cl 901): void content when placed and compacted to be in range 2 - 6% for HRA wearing course with no individual result to be greater than 7%, less than 6% for rolled asphalt base and roadbase, less than 8% for dense bitumen macadam base course and roadbase and within the range recommended by the proprietary system for thin surfacing."

5. **Pre-Coated Chippings (Clause 915)**
   a) Nominal Size : 20mm
   b) Minimum PSV : 60 or 65
   c) Maximum AAV : 12

6. **Surface Texture**
   The method to check compliance of surface texture shall be by the Sand Patch Clause 921.

7. **Traffic Category**
   For the purposes of the scheme as a whole all reinstatements / excavations in the carriageway for utility cables, ducts, pipes or other Utility company plant shall be classified as Road Category Type x in accordance with NRSW Act 1991
   When required material complying with Clause 912 / 914 shall be category A of Clause 1.2.5 in BS 4987.

8. **Minimum Rolling Temperature -** (Clause 901 Para 14)

Asphalt Wearing Course	110 degrees centigrade
DBM Base Course	95 degrees centigrade
DBM Roadbase	95 degrees centigrade
Clause 942 Surfacing	80 degrees centigrade

9. **Joints in Wearing Course**
   Transverse and longitudinal joints shall be cut by one of the following methods:
   i) cutting wheel fitted to a roller when the wearing course is warm.
   ii) saw cutting when the wearing course is cold.

10. **Treatment of Joints**
    All vertical joint faces formed in all surfacing, between new works and any original or remaining construction and all kerbs or iron work upstands shall be completely coated with hot applied 70pen bitumen for HRA, SMA, Thin Surfacing Systems and with 200pen for coated macadam. The use of polymer modified bitumen adhesive strip at least 2mm thick is acceptable and may be preferable on bridge deck surfacing.
    Alternatively, cold applied thixotropic proprietary joint sealant may be used for all macadam
    All joints in the existing wearing course to be formed by a sawn cut.

11. **Areas to be kept free of coated chippings**
    All carriageway whether superelevated or cambered and whether kerbed or not shall have a strip 200mm wide free of coated chippings on both channels / edges. Additionally a 75mm strip shall be kept free of coated chippings around all gully gratings.

12. **Heating and Re-rolling any Wearing course**
    In the event of any remedial work being required on any wearing course material / layer, heating and re-rolling will not be permitted. The correct remedial procedures are as described in Clause 702, paragraph 10(iv).

13. Rolled asphalt wearing course shall not be laid on a surface with a temperature of less than 5 degrees centigrade or when the air temperature falls below 8 degrees

14. **Coloured Surfacing and surface Treatments.**
    Where required red or green coloured surfacings or surface treatments shall be colour compatible and in the muted Red or Green colour range of BS 381C:1996 incorporating aggregate from the Red or Green colour family approved by the Engineer.

15. **Wearing Course**
    The finished compacted thickness of the wearing course shall not be less than that stated in Appendix 7/1.
    All wearing course materials should exclude the use of gravel or limestone aggregate.

16. **Quality Assurance**
    All rolled asphalt and coated macadam shall be supplied from a manufacturing plant approved and certificated under the "Sector Scheme No. 14".
    The application and supply of Road Markings shall be comply with "Sector Scheme No. 7" and Surface Dressing operations with" Sector Scheme No. 13".

17. Regulating

No provision shall be made for regulating between 0mm and 15mm. To eliminate regulating in this range additional planing shall be carried out

18. Effective PSV - Surrey CC Approved List

All references to Polished Stone Value in this document shall be to the Surrey CC Effective PSV as set out below:

Aggregate Source SCC Effective PSV Group	Aggregate Type
72 plus	Calcined Bauxite Guyanan
70 plus	Calcined Bauxite - Chinese
65 to 69	
Bristol Pennant	Pennant Sandstone
Callow Hill	Gritstone
Craig -yr Hesq	Gritstone
Cwm Nant Leici	Gritstone
Gelligaer	Gritstone
Gilfach	Gritstone
Ghyll Scaur Gritstone	
60 to 64	
Ballynahinch	Gritstone
Bantry Bay	Gritstone
Bayston Hill	Gritstone
Brindister	Gritstone
Cashel	Gritstone
Comber - White Mountain	Gritstone
Cromhall - Wickwar	Quartzitic Sandstone
Cruicks	Basalt
Dolyhir - Nash	Gritstone
Dry Rigg	Gritstone
Gore	Gritstone
Templestone	Gritstone
Triscombe	Gritstone
55 to 59	
Ballybarnes	Gritstone
Bardon Hill	Porphritic Andesite
Boulogne Slag	Manganese Slag
Cliffe Hill	Granite (Augite-Diorite)
Craigantlet	Gritstone
Croft	Granite
Llanwern Slag	Blast Furnace Slag
Moonshill	Basalt
Rhayader	Greywacke
Tuttle Hill	Quartzite
Whitwick	Porphyritic Dacite
50 to 54	
Arklow	Basalt
Coleraine	Basalt
Dean	Gabbro
Glensanda	Granite
Mountsorrel	Granite

It is anticipated that SCC will update the above schedule on a regular basis.

It will be re-issued to successful term tender contractors, suppliers and developers.

Prior to any works commencing Surrey CC, Materials Laboratory, must approve aggregate from any other source.

Details of the proposed material, the source, shipping and storage details, together with a sample, must be supplied to the Surrey CC, Materials Laboratory, at least 28 days before work commences.

Certificates from ten (10 no) individual PSV tests carried out during the previous year (12 months) undertaken by at least 3 different UKAS accredited test laboratories must be submitted to Surrey CC, Infrastructure Group, Materials, Merrow.

It is possible that trials of new aggregates sources will be carried out for monitoring purposes, albeit with the aggregate used and placed in a lower risk category than that required by design standards.

Appendix 7/1

	Clause	Material	Grade of Binder	Thickness (mm)	Special Requirements
Surfacing					
Wearing Course	943	Rolled Asphalt Design Mix 30/14 (45mm layer) OR 35/14 (50 mm layer)	50 pen A Polymer Modified Bitumen may be required to meet the "special requirements listed	45 OR 50	Generally from BS 594: Part 1: 1993 Table 3 Column 3/2 but to meet the requirements of clause 943, classification of the site is class 1or 2. The wheel tracking requirements for the Job Mixture Trials are: Test Temperature 45 or 600C Maximum rutting rate 2.0 or 5.0 mm/h Maximum rut depth 4.0 or 7.0 mm Binder to be a bitumen to BS 3690 – Polymer Modified Coarse aggregate to be crushed rock or slag only. PSV 55 min AAV 12 max. Fine aggregate to clause 2.3.1 a), b) or c). Weather conditions applicable to laying shall be submitted with the details of the binder under cl 943 paragraph 5 and shall include information on early trafficking. Unless otherwise stated the wearing course shall not be trafficked until the as laid material has reached ambient temperature.
Pre-coated Chippings	915	20mm nom size	–	–	PSV 65 min AAV 10 max
High Skid Resistance Surfacing	924	Bauxite	Epoxy Resin	–	PSV 72 minimum AAV 5 maximum Process shall be HAPAS / BBA certificated and shall be machine applied as soon as practicable following the asphalt wearing course.
Surface Texture	921	–	–		1.5 mm texture as per BS 598: Part 105 for high speed sections and 1.2 mm elsewhere.
Coloured Surface	924	Bauxite Red ** Coloured Green **	"Clear" binder		Aggregate to have PSV 72 minimum AAV 5 maximum Binder shall be a light coloured bitumen, acrylic, polyurethane, resin or thermoplastic. Process shall be machine applied as soon as practicable following the asphalt wearing course.
***Selection of colour shall be from the Red / Green colour family of BS381C:1996 and be compatible with the Red /Green colour required elsewhere for "Red / Green coloured surfacings"*					
Base Course	934 and 929 (906) (933)	20mm DBM50 or (DBM100) or (HDM)	50 pen 100 pen 50 pen	55	BS 4987: 1993 clause 6.5 crushed rock only.
Asphalt Reinforcement		Reinforcement grid & fabric	Bitumen adhesive		Glasgrid CG100 Heavy Duty or similar approved laid in accordance with manufacturers requirements
Regulating Base Course	901	20 mm DBM 50 (DBM100) (HDM)	50 pen (100pen) (50pen)	50-80	BS 4987 : 1993 Clause 6.5 Coarse aggregate to be Crushed rock only
		50/10 HRA Base course	50 pen	15-50	BS 594 : 1992 Table 2 Col 2/1 Crushed rock only
Regulating Base Course	901	20 mm DBM 50 (DBM100) (HDM)	50 pen (100pen) (50pen)	50-80	BS 4987: 1993 Clause 6.5 Coarse aggregate to be Crushed rock only
		50/10 HRA Base course	50 pen	15-50	BS 594: 1992 Table 2 Col 2/1 Crushed rock only

	Clause	Material	Grade of Binder	Thickness (mm)	Special Requirements
Surfacing					
Wearing Course	911	Rolled Asphalt Design Mix		40 minimum	BS 594: Part 1: 1992 Table 3 Column 3/2 Marshall Stability of the mix to be in the range:
		SCC Mix A 30/14	100 pen		Stability 2 to 4kN Flow 2.0mm minimum99 Quotient 0.6 to 1.1 Kn/mm minimum
		SCC Mix "B"	50 pen		Stability 4.0 to 6.5kN Flow 2.5mm Min Quotient 1.1 kN/mm min Binder to be a bitumen to BS 3690 excepting 35 pen or 40 pen. Minimum target binder content to be as BS 594 Table 3 plus 0.5%. Coarse aggregate to be crushed rock or slag only. PSV 55 min AAV 12 max. Fine aggregate to clause 2.3.1 a), b) or c). Material shall not be laid when the air temperature falls below that specified in Clause708 Table7/1. (Wind speed measured at 2m height)
Surfacing					
Wearing Course	911	Rolled Asphalt Design Mix		40 minimum	BS 594: Part 1: 1992 Table 3 Column 3/5 Marshall Stability of the mix to be in the range:
		SCC Mix E 55/14	50 pen		Coarse aggregate to be crushed rock to clause 2.2.1(a) or blast furnace slag to clause 2.2.1(c) PSV 60 min AAV 10 max. Fine aggregate to clause 2.3.
		SCC Mix "F" 30/14	Blend of Lake asphalt and bitumen		Stability 4.0 to 6.5kN Flow 2.5mm Min Quotient 1.1 kN/mm min As SCC Mix B with binder substitution
	911 and 943	SCC Mix "R" and Clause 943	A polymer modified bitumen may be needed to meet the special requirements	50	Generally from BS 594 Part 1 Table 3 column 3/3 Classification of all sites as Class 2. The wheel track rutting requirements for the job mixture approval trials are
		Rolled Asphalt 35% / 14mm Performance related design mix			Test Temperature 60 0C Max. Rutting Rate 5.0 mm / hr Max Rut depth 7.0 mm Coarse aggregate to be crushed rock or slag PSV 55 minimum AAV 10 maximum Fine aggregate to Clause 2.3.1 a),b) or c)
	911 and 943	SCC Mix "S" and Clause 943	A polymer modified bitumen may be needed to meet the special requirements	40 minimum	Generally from BS 594 Part 1 Table 3 column 3/2 Classification of all sites as Class 2. The wheel track rutting requirements for the job mixture approval trials are
		Rolled Asphalt 30% / 14mm Performance related design mix			Test Temperature 45 0C Max. Rutting Rate 2.0 mm / hr Max Rut depth 4.0 mm Coarse aggregate to be crushed rock or slag PSV 55 minimum AAV 10 maximum Fine aggregate to Clause 2.3.1 a),b) or c)
Pre-coated Chipping for wearing course	915	Coated Chippings	50 pen (Table 1 No 3) Bitumen		BS 594 Part :1992 Section 4 20 mm nominal size PSV of the aggregate to be in the range 60 to 64 or 65 minimum as specified Maximum AAV 12

	Clause	Material	Grade of Binder	Thickness (mm)	Special Requirements
Wearing Course	912	Close Graded Macadam 10 mm	100 pen	30	BS 4987 part 1 Clause 7.4 Aggregate to be crushed rock or blast furnace slag PSV to be in the range PSV 55 to 59 or PSV 60 to 64 AAV 14 maximum
Wearing Course	912	Dense Macadam	100 pen	20 to 30	BS 4987 part 1 Clause 7.5 Aggregate to be crushed rock or blast furnace slag PSV to be in the range PSV 55 minimum AAV 14 maximum
Wearing Course	912	Medium Graded Macadam	200 pen	20 to 25	BS 4987 part 1 Clause 7.6 Aggregate to be crushed rock or blast furnace slag PSV to be in the range PSV 55 minimum AAV 14 maximum
Wearing Course	912	Fine Graded Macadam	200 pen	15 to 25	BS 4987 part 1 Clause 7.7 Aggregate to be crushed rock or blast furnace slag PSV to be in the range PSV 55 minimum AAV 14 maximum
Note: All wearing course material shall exclude limestone aggregate					
Thin Surfacing System	942	Proprietary Thin Wearing Course System with BBA / HAPAS or HA Type Approval	Polymer or Fibre Modified Bitumen	20 minimum OR 25 minimum OR 30 minimum OR 35 minimum OR 40 minimum	Material shall comply with clause 942. Aggregate to be crushed rock 6 mm nom size or 10 mm nom size or 14 mm nom size grading to Table 9/7 PSV to be in the range PSV 55 to 59 PSV 60 to 64 PSV 65 minimum AAV 12 maximum
Note 1. All the above materials shall be supplied and laid in accordance with the overall requirements of Clause 942. The contractor shall name the supplier / product before commencement of the works. A change of supplier or product during the works is not permitted. *Note 2. The surface texture requirement will be specified by the engineer and the 2 year guarantee requirements in clause 942 sub-clause 26 will apply.* *Note 3. A tack coat or bond coat is to be applied in accordance with the proprietary system .* *Note 4. Innovative proprietary materials under development without BBA / HAPAS accreditation can only be used under trial conditions with the specific written approval of Surrey CC Materials Laboratory.*					
Stone Mastic Asphalt	942	Proprietary Thin Wearing Course System with BBA / HAPAS or HA Type Approval	Polymer or Fibre Modified Bitumen	25 minimum OR 30 minimum OR 35 minimum OR 40 minimum	Material shall comply generally with clause 942. Aggregate to be crushed rock 6 mm nom size or 10 mm nom size or 14 mm nom size grading to Table 9/7 PSV to be in the range PSV 55 to 59 PSV 60 to 64 PSV 65 minimum AAV 12 maximum
See notes 1 to 4 above					
Base Course	934 (906) (933)	20mm DBM50 or (DBM100) or (HDM)	50 pen 100 pen 50 pen	55	BS 4987: 1993 clause 6.5 crushed rock only.
Bituminous Roadbase	932 (903) (930)	28mm DBM50 (DBM100) (HDM)	50 pen (100pen) (50pen)	xxx or xxx xxx	BS 4987: 1993 Clause 5.2 Crushed Rock only Material to be laid in 2 (xx)layers
Cement Roadbase & Sub-base	1001 Table 10/1	Grade C20	OPC	Varies	To be used where carriageway widening is less than 600 mm wide as shown on the drawings.

	Clause	Material	Grade of Binder	Thickness (mm)	Special Requirements
Crack Sealant	901	Proprietary Stress Absorbing Inlay / Recessed Treatment System	Rubberised, Polymer modified or Filled Bitumen	Width 150 Depth 30	Where an existing surface is to be overlaid and exhibits reflective cracks these are to be treated with one of the Stress Absorbing Inlay / Recessed Proprietary systems. Colas Fibrescreed. AA Asphaflex ESS Armourscreed Roadtechs Roadflex Permanite Permatrac
	901	Proprietary Stress Absorbing Treatment System	Material shall comprise a polymer modified binder, a mesh reinforcer and a 6 mm lightly coated surface	Self Adhesive Or Hot Melt system	Crack / Joint shall be cleaned out using hot compressed air prior to fixing. Pre-formed SAM shall be centred over crack or joint. Surface shall be primed with a polymer modified primer at a rate of at least 0.2 l/m2
Sub Base	803	Type 1	–	150 or 225 up to 350	Material shall be crushed rock, slag or recycled crushed concrete

Appendix 7/2 Reinstatement of Paved Areas

	Clause	Material	Grade of Binder	Thickness (mm)	Special Requirements
Carriageway	**706**				The requirements of Clause 706 and NRSWA Specification for the Reinstatement of Openings in Highways apply except
Wearing Course	943	Rolled Asphalt Design	As App. 7/1	45	As App. 7/1
Base Course	934 & 929	20 mm DBM50	As App. 7/1	55	As App. 7/1
Roadbase Sub-base & Replacement Backfill	706	Foam Concrete	OPC	to match existing or that specified in drawings	A Foam Concrete mixture shall be laid in accordance with NRSWA specification sub-clause S6, S7.2, and A9. All trench arisings not to be reused
Existing Concrete Slabs		C40	OPC	to match existing	Attention is drawn to NRSWA sub-clause S7 1 to 7.7. High early strength concrete may be used by mutual agreement
Footway & Cycleways	706				
Bituminous Material	1105	As per App.11/1		As per App11/1	
Sub-base & Backfill	803				Foam concrete may be used as per NRSWA sub-clause S8.2

Appendix 7/4

	Clause	Material	Grade of Binder	Thickness (mm)	Special Requirements
Bituminous Sprays	920	Bitumen Emulsion	K1-40		Shall be applied to all existing bituminous and cementitious surface to receive bituminous overlays and to all new surfaces that have been trafficked or remained uncovered for more than 3 days. Applied at a rate of 0.3 to 0.5 l/m2
Bond Coat	920 and 942	Bitumen, Bitumen Emulsion or Polymer	As required by System		Shall be applied to all base course layers or existing surfaces prior to laying a Thin Surfacing System or Proprietary SMA Applied at a rate specified by supplier – not to be less than 0.4 l/m2

Appendix 6/7

	Clause	Material	Grade of Binder	Thickness (mm)	Special Requirements
Capping	613	Class 6F2	N/A	xxx or 600	Chalk is excluded Asphalt Planings complying with the Draft clause 6F3 may be used with the approval of the Engineer.
		Class 6F3			

Appendix 11/1 Footway, Cycleway and Vehicular Crossing Construction

Construction Materials	Clause	Material	Grade of Binder	Thickness (mm)	Special Requirements
Wearing Course	1105	6 mm Dense Graded Macadam	200 pen	20	BS 4987:(1993) Clause 7.6 Crushed Rock or Slag Only Limestone excluded
Wearing Course Red / Green Coloured	1105	6 mm Dense Graded Macadam	200 pen compatible with a Red or Green ** pigment	20	BS 4987:(1993) Clause 7.6 Aggregate to be 0 to 6 mm Crushed Rock from the Red / Green colour family Limestone excluded
***Selection of colour shall be from the red / Green colour family of BS381C:1996 and be compatible with the Red / Green colour required elsewhere for "Red / Green coloured surfacings"*					
Base Course	1105	20mm Dense Macadam	200 pen	50 / 65	BS 4987 : 1993 clause 6.5 crushed rock only.
Roadbase Where required	1038	CBM3	Cement	150 to 250	
Sub Base	803	Type 1	–	100 minimum or 150 or 225	Material shall be crushed rock, slag or recycled crushed concrete. Asphalt Planings may be used with the approval of the Engineer. If this material is submitted it shall conform to the requirements of class 6F3 (draft clause)
Wearing Course Red or Green Coloured to Existing Paved Areas	1105	Slurry Seal Red ** or Green Pigment	Polymer Modified Bitumen Emulsion	6 or 10 nominal layer thickness	Material shall be supplied and laid by a member of the Slurry Surfacing Contractors Association (SSCA) Aggregate to be 0 to 3 mm Crushed Rock from the Red or Green colour family. Limestone excluded
***Selection of colour shall be from the Red / Green colour family of BS381C:1996 and be compatible with the Red /Green colour required elsewhere for "Red / Green coloured surfacings"*					
Block Paving	1107	Concrete Paving Blocks		Type R 60 or 80	Concrete Paving Blocks shall comply with BS 6717:part1:1993 Type R (200 mm x 100 mm) and shall be 60 mm or 80 mm thick as shown on the drawings. All Concrete Block Paving shall be laid in accordance with the requirements of BS 7533 Part 3: 1997 to a layout and crossfalls shown on the drawings.
Bedding Sand	1107			30 or 50	Sharp Sand shall comply with BS 7533 Part 3 Table D2
Jointing sand	1107			–	Sand shall comply with BS 7533 Part 3 Table D3

CHAPTER 10

Adoption and Procedures

10.1 Adoption

10.1.1 Surrey County Council, as Highway Authority, is responsible for the adoption and maintenance of public highways. Consultation will start prior to planning approval to agree those roads and footpaths that will be adopted and maintained at public expense. It is intended that all roads and footways, footpaths and margins which are necessary for public access should be designed to allow for adoption.

10.1.2 Only those areas having public highway utility will be eligible for adoption by the Highway Authority. District and Parish Councils have their own powers to accept dedication of non-highway land. Most are inclined to do so if the land in question serves a public need for drainage, recreation or communal amenity but may require a commuted sum to be deposited for or towards the cost of its future maintenance. The Water Authority and Regional/District Drainage Councils may also accept the dedication of non-highway land, for the purpose of Sustainable Urban Drainage Systems.

Eligibility for Adoption as Highway

10.1.3 With the exception of footpaths, land will only be adopted as public highway if it is contiguous with, and has all purpose access to, an existing publicly maintained highway, comprising at least a carriageway.

10.1.4 The following are eligible for adoption if designed and constructed to the recommendations of this guide:

a) Carriageways, their containing edge restraint and associated footways if any;

b) unassigned parking spaces when contiguous with the carriageway surface provided they are not mixed with assigned spaces;

c) highway margins in shared surfaces and elsewhere;

d) verges between footways and carriageways;

e) street furniture (which is not the property of statutory undertakers) including lighting columns, traffic signs, bins, seats, planters etc.;

f) footpaths & cyclepaths which link with public highway at both ends & as described in Chapter 3;

g) visibility zones at junctions & bends;

h) highway structures associated with the support or protection of the highway;

i) highway drainage.

10.1.5 The Highway Authority will require the option of title to the adoptable area. Before any works start on site developers will secure an agreement with the Highway Authority under section 38 of the Highways Act, 1980. This means that roads & footpaths can be automatically adopted as public highway following their satisfactory completion.

10.1.6 For clarity the following are among areas considered to have no general highway utility and accordingly will not be eligible for adoption:

a) Entrance roads to garage or parking courts;

b) paved areas within such courts;

c) drives to flats and apartments;

d) amenity areas designed as such within a development;

e) footpaths serving only groups of dwellings and not serving as a through pedestrian route;

f) roads and drives serving solely business and industrial areas.

Carriageways (See also Chapter 3)

10.1.7 Carriageways will be eligible for adoption if they are constructed in accordance with the requirements of Chapter 9 and provided they are contained by adequate edge restraint. Edge restraint must be included for adoption with any carriageway except when the carriageway is contained for a given length by a permanent private structure (particularly in a housing court) eg.

a) walls of buildings;

b) boundary walls not less than 225mm thick and either less than 200mm high or more than 600mm high (the former height should not obstruct an opening car door while the latter is high enough to be suitably visible to a driver manoeuvring a vehicle).

10.1.8 In housing courts, special circumstances arise particularly where the highway surface, paved or unpaved, abuts the structures served by the court. The Highway Authority will usually be willing to adopt the paved surface up to the face of any permanent structure (e.g. boundary wall, building, brick planter etc) or up to a private area adjacent to the highway if it provides support equivalent to any specified carriageway edge restraint. Such private paved areas may however finish flush with the adjoining surface to be adopted.

10.1.9 It is possible for land to be dedicated to the highway with a deemed right to obstruct that highway. The Highway Authority will not usually accept such dedication unless the obstruction is a permanent structure as, for example:

a) rainwater gutters or down-pipes or soil pipes on the face of buildings abutting the highway;

b) Windowsills, window boxes, doorsteps or thresholds projecting not more than 300mm into the highway;

c) Shutters incapable of opening over the highway;

d) Structures overhanging the highway (e.g. porches or balconies) which must be licensed.

10.1.10 The maintenance and protection of any such structure shall remain the responsibility of the owner after adoption of the highway.

Parking Places (See also Chapter 5)

10.1.11 Only unassigned parking areas provided directly adjacent to the carriageway surface will be eligible for adoption. Unassigned parking places that are located on the carriageway will be adopted with it. Generally the edge restraint for parking areas must be included for adoption.

10.1.12 Unassigned spaces contiguous with the carriageway will usually be adopted. For example parking in a Housing Court or Housing Square will be adopted, subject to suitable design. Assigned spaces will not be adopted, except that spaces in front of garages (classified as assigned because they are not generally used by the public as parking places) may be adopted where they are clearly of general highway utility, i.e. of use for manoeuvring, for casual parking, for pedestrian movement or the accommodation of statutory undertakers mains and plant.

Footways (See also Chapter 2)

10.1.13 Footways, laid out to the requirements of Chapter 2, will be eligible if constructed to standards laid down in this Guide. Adoption will normally be to the back edge of a footway and will include its edge restraint. This may be provided by private structures such as walls or the ends of paths and drives.

Footpaths & Cyclepaths (See also Chapter 2)

10.1.14 Separate footpaths &/or cyclepaths will usually only be adopted where they connect with a public highway at each end, but there may be exceptions to this rule where a footpath or cyclepath connected with a public highway at one end and community facilities such as shops, schools, health centres at the other.

10.1.15 Footpaths & cyclepaths will be eligible for adoption if laid out and constructed to the requirements of this Guide. The Highway Authority normally adopts only the paved surfaces of footpaths and their edge restraint. If there is a 2.5m maintenance corridor which is not vested in the District or Parish council then the Highway Authority will adopt the land falling within the corridor. If the land forms part of a larger area remaining in private control the adopted 2.5m corridor must be clearly defined throughout on both sides. A boundary fence or wall may be suitable for that purpose and one edge of the paved footpath (including the edge restraint) could serve to identify the limit of adoption.

Margins

10.1.16 Generally margins should be 2m wide. Exceptions should be discussed with the Highway Authority. Margins contained by paved highway surfaces (except footpaths) will normally be eligible for adoption. Pedestrian routes which diverge by more than 5m from another paved highway area may be treated as a footpath and not a footway for purposes of adoption.

10.1.17 A constant adoption width of 2m is generally required for verges adjacent to the carriageway. This is to facilitate repair or maintenance work and to accommodate statutory undertakers mains and plant. The back edge of this verge shall be marked where it crosses paved surfaces. For example the adoption boundary may be identified by a row of granite setts or brick paviors across private drives and paths. Where a building or wall projects into the normal adoption width, the limit of adoption at that point will then be the face of such a structure. In the case of shared surfaces enclosed by buildings or walls the paved surface will be adoptable between the faces of the enclosing structures.

10.1.18 There may be problems relating to adopted verges contiguous with private gardens. The rights of the Highway Authority and the statutory undertakers must be fully understood by the purchaser of the adjacent dwelling. Normally, the owner of the adjacent dwelling would be encouraged to maintain to the kerb edge of the shared-surface. In some circumstances, this may be achieved through licence or legal agreements. Whatever is done, the purchaser must be made aware by the developer in the title and other documents of the prohibition of buildings, walls or fences and planting of hedges or trees on the verge and that statutory undertakers may excavate their services at any time and reinstate the area only as a grass verge.

10.1.19 Verges will be adopted as part of the highway whether adjacent to private gardens or between the footway and carriageway. Highway verges should not be more extensive than is justified by the overall design. Verges that are a design feature of a layout and can be considered to have a highway function may also be adopted. In such exceptional cases, suitable landscaping will be necessary to avoid costly maintenance.

Highway Drainage (See also Chapter 9)

10.1.20 The Highway Authority will adopt only those drains, gullies and gully connections which carry surface water exclusively from the highway. The developer should make enquiries of the Water Authority regarding the adoption of any sewer which carries or is constructed to carry effluent other than, or in addition to, surface water from the highway.

10.1.21 In all cases the engineer will require written evidence of the Water Authority's satisfaction with the design of surface water sewers and of their agreement to adopt them. Proof of an agreement under Section 104 of the Water Industry Act 1991 is needed.

10.1.22 Drainage outfalls to any water course must be negotiated with the owners or conservators of that water course and must be approved by them and the Environment Agency. The Highway Authority will require to be satisfied that the developer holds all necessary easements in this regard before completion of the Section 38 Agreement. No gully connection or surface water drain, connecting to a sewer will be eligible for adoption by the Highway Authority unless that sewer is maintained by the Water Authority.

10.1.23 Highway drainage should lie within the area for adoption as far as practicable. In exceptional cases where the drainage is not within the highway all necessary rights to enter upon other land for the purposes of inspecting or maintaining the drain must be expected and reserved out of the transfers of such land.

10.1.24 Where drainage of highway surface water is permitted into soakaways, these must be sited entirely within the area offered for adoption. A minimum of 1m. beyond the chamber is needed for adoption and is to be defined on site.

Lighting (See also Chapter 7)

10.1.25 Street lighting located within the highway, and street lighting units which are fixed to private structures adjoining or overhanging the public highway, will be eligible for adoption if their primary purpose is to illuminate it. The adoption of such lighting units will be simultaneous with the adoption of the areas they illuminate.

10.1.26 When the engineer is satisfied that lighting units and/or illuminated traffic signs included in a Section 38 agreement are satisfactorily completed and working, the Highway Authority will accept responsibility for payment to the Electricity Board for energy consumed. The developer will nevertheless remain otherwise responsible for maintaining the signs or units as described by the terms of the agreement until the maintenance period ends. This includes replacement of faulty parts or gear, but not life expired lamps which are included in routine maintenance.

10.1.27 Prior to the pre-maintenance period inspection, the Developer shall carry out all pre-inspection testing in compliance with the current IEE Regulations (Section 7) and produce at the site inspection the tabulated results and a signed completion and inspection certificate, e.g. IEE (Appendix 6) or NICEIC form, and hand over a copy of the same to the representative from the Authority.

Amenity Landscaping (See also Chapter 6)

10.1.28 Apart from structural Planting (see below) areas of amenity landscaping that have no highway function will not normally be adopted by the Highway Authority. Adoption of Sustainable Urban Drainage Systems should be discussed at the earliest opportunity with all interested parties. They may be adopted by the Water Authority, Environment Agency or Regional/District Drainage Councils. Developers should discuss with the appropriate local authority the safeguarding and maintenance of such areas. In some suitable circumstances, the District or Parish Council may wish to adopt them. On certain roads landscaping may relate to an essential highway feature. Subject to satisfactory design such landscaping may be eligible for adoption.

Structural Planting (See also Chapter 6)

10.1.29 The planting of street trees is often desirable as part of an overall design concept. Where such trees are best located within the adoptable highway then adoption will be subject to the payment of an appropriate commuted maintenance sum (see paragraph 10.2.11)

10.2 Agreement under s.38 of the Highways Act, 1980

10.2.1 Developers should discuss the details of a S.38 Agreement with the Highway Authority's engineer before planning permission is obtained. The Highway Authority will need evidence of an agreement under s.104 of the Water Industry Act 1991 before completing a s.38 agreement. A s.104 Agreement secures the adoption of non-highway drains and sewers (other than private connections) by the Water Authority. The Highway Authority will only adopt a road in which the drainage and other services are vested in public or statutory authorities.

10.2.2 Generally the Highway Authority will require that contemporaneously with adoption the developer completes a transfer or conveyance of all the land edged in red on the s.38 drawings. An exception is made wherever a footpath passes under a building. In this circumstance the freehold title shall remain with the developer or their successors and the Highway Authority will accept formal dedication of the covered area to the public highway.

10.2.3 Failure to enter into an agreement before the works are commenced may mean that the Highway Authority rejects a subsequent application or will result in a need for an independent report being provided to establish to the Highway Authority's satisfaction whether or not the works comply with this guide. The Highway Authority would not be responsible for any part of the costs involved in obtaining such a report nor for any necessary remedial works and would make the current charge for the engineering administration fees.

10.2.4 Off-site, infrastructure works or transportation contributions to be provided or funded by the developer will be secured by agreement under s.278 of the Highways Act, 1980.

Application

10.2.5 Before making a formal application the developer wishing to enter into an agreement with the Highway Authority should initially apply in writing enclosing two sets of the proposed layout drawings (the plan geometry at least having been agreed in anticipation of planning permission). The area which the developer wishes to be adopted is to be shown by red edging on one of the layouts. Where logical this must extend to the site boundary to avoid the creation of narrow ransom strips & the frustration of sound planning. The submission will also include any engineering detail not previously needed for the purposes of obtaining planning permission, including longitudinal and cross-sections. One set of the drawings will be returned to the developer with the engineer's observations. These will include confirmation of the potential area for adoption. When details of the Section 38 works have been agreed between the engineer and the developer the latter shall provide at least 6 copies of the approved drawings with the area which is to be the subject of adoption edged in red on the plan. The drawings will be coloured as indicated in the Developer's Guidance Notes. The developer must maintain on the site throughout the period of the works at least one complete set of the coloured drawings, for any caller, including prospective purchasers, to see. The developer will also maintain on the site the Safety File required under the Construction (Design & Management) Regulations 1994.

10.2.6 The whole of the works comprising the development must be shown on the drawings whether or not they lie within the area to be adopted. This will include land already forming part of the existing highway where alteration to its fabric is required to accommodate the new road (e.g. the forming of a bellmouth across the footway, relocation of existing street lighting, etc.). Works on private land which will not ultimately form part of the public highway (e.g. alterations to existing garage drives, steps, gardens etc) will be shown on the drawings but not coloured, nor included in the area edged red. Details of standards for drawings follow.

10.2.7 The developer must enquire of the local authority & statutory undertakers regarding the position of existing drains, sewers, pipes, mains, cables, services, etc. and must consult with the engineer as well as the relevant authority concerning siting of surface boxes, cable markers, telephone and electricity poles etc. The developer is responsible for the service of any notices or obtaining authority from any statutory body before, during or after the completion of the works. Private T.V. relay lines and any private apparatus in the area edged in red on the Section 38 drawings shall be the subject of a special licence and must be clearly and accurately shown on the drawings submitted on completion.

10.2.8 Where the proposal involves culverts, soakaways, other SUDS features, retaining walls, bridges, landscaping & innovative speed control, etc., the developer will pay a commuted sum to the Highway Authority for their maintenance & eventual replacement.

Bond

10.2.9 In every case where an agreement under Section 38 of the Highways Act 1980 is to be entered into the developer must provide a Bond or a deposit in lieu of a Bond in the sum estimated by the engineer to be the full cost of providing all materials and constructing all works which are the subject of the agreement. In assessing the value of the Bond regard will be had to the likely increase in costs during the period of the agreement. The value of the Bond or the money deposited may be reduced periodically at the discretion of the engineer.

Administrative Charge

10.2.10 The Highway Authority will require a developer to pay a fee in respect of administration and site inspection equal to 10% of the engineer's estimate of the total cost of the works to which the Section 38 Agreement relates. The Highway Authority reserves the right to vary the rate, or method of applying the fee for administration and site inspection. The developer must include with the application all of the information sought in the Developer's Guidance Notes.

Commuted Sums

10.2.11 The County Council is pleased to consider new and innovative forms of construction and features, as well as those such as structures which may be an integral part of engineering design on some schemes. Commuted sums are paid by the developer for the increased cost of maintenance and replacement of the following:-

- Soakaways and other forms of Sustainable Urban Drainage Systems;
- Structures and culverts;
- Non-standard, but acceptable, road lighting;
- Landscaping;
- Innovative vehicle speed control and traffic management measures with potentially higher maintenance costs;
- Infiltration pavement system.

Start of Works

10.2.12 At least 7 days written notice must be given to the engineer before any work is begun on site. At least three days written notice shall be given before any of the following operations are started:-

a) laying pipes for highway drains or gully connections;

b) construction of manholes or soakaways;

c) placing concrete surround to pipework, manholes or soakaways:

d) backfilling trenches or other excavations whether or not the pipework or mains are to be adopted by the Highway Authority;

e) laying kerbing (or other edge restraint),

f) laying sub-base;

g) laying or placing the road base,

h) laying base course or wearing course surfacing in a carriageway, footway, footpath or cyclepath;

i) works involving existing public highways or highway drains;

j) clearing away from site.

10.2.13 The developer is responsible for all setting out and supervision & must allow access to the site at all reasonable times for the engineer to inspect the works and be satisfied that the Highway Authority's requirements in respect of materials and workmanship are complied with. Every agreement with the Highway Authority under Section 38 will include for all materials and workmanship to conform at least to the requirements of the full standard specification contained in chapters 6 to 9 of this Guide.

Site Inspections

10.2.14 Any inspections made of the works on behalf of the Highway Authority are made solely for the purposes of that Authority who will not accept any liability for defects in the construction works due to the standard of workmanship or materials used, howsoever arising. No supervision of the works is offered by the Highway Authority.

Period for Completion

10.2.15 The period for completion of the works stated in the agreement will be agreed between the developer and the engineer. The Highway Authority will not normally accept a completion period of less than 18 months nor greater than three years.

Phasing of Agreements

10.2.16 There is no objection in principle to works under a section 38 Agreement being organised for completion and adoption by stages. Before agreeing to such a course or before recommending that any particular stage of the works should be adopted, the engineer will require to be satisfied that construction traffic engaged on completing other phases of the development will not pass over that to be adopted.

Drawings on Completion of Works

10.2.17 As soon as practicable after the work is complete, but before the expiration of the maintenance period, the developer shall supply to the Highway Authority, 6 copies of a drawing showing all the agreement works as completed. The drawings shall be to the standards explained later.

Completion

10.2.18 When the works have reached practical completion (subject to any arrangements about phasing) the developer may apply to the inspecting engineer for a Provisional Certificate (of Completion). The maintenance period shall run from the date of the Provisional Certificate of Completion. A developer may apply at the same time for a reduction in the Bond to not less than 10% of the engineer's valuation of the total works at the time of completion. The retention will not be released until the engineer is satisfied that any defects have been properly remedied and all works and apparatus are ready to be taken over in a sound condition.

Maintenance

10.2.19 The s.38 Agreement will require that the works be maintained by the developer for a period of 12 months from the date of practical completion. The developer shall remain responsible during the maintenance period for all structural defects and damage whatsoever and howsoever arising, but from the date of practical completion of the works the Highway Authority may be willing to undertake grass cutting and gully emptying [see also chapter 7 – Lighting]. The Highway Authority's undertaking of these functions shall be without prejudice to the developer performing any of them if they require that they be carried out more frequently than the Highway Authority will.

Reduction in Bond

10.2.20 In addition to the reduction in the value of the Bond at the commencement of the maintenance period, the developer may apply to the engineer for the value of the Bond (or the money deposited in lieu thereof) to be reduced periodically during the course of the works. Such reductions would be for at least 25% of the value of the original Bond. The value of the remainder of the Bond (or money deposited in lieu) must be sufficient to cover all outstanding works and materials irrespective of the unit rates for works or materials on which the original estimate was based. Developers should note particularly that a reduction will not necessarily be agreed in respect of works already carried out or materials delivered prior to the developer entering into an agreement. A reduction will not normally be entertained within the first third of the agreed period for completion.

Adoption

10.2.21 Eleven months from the date of practical completion & when the As-Built drawings have been received, the inspecting engineer will visit the site to ensure that they are accurate (& include any approved alterations covered in a Deed of Variation). The developer will pass the contractor's Safety File to the inspecting engineer in accord with the Construction (Design & Management) Regulations 1994. Provided the works remain satisfactory, the inspecting engineer will issue a letter to the developer – referred to in the Agreement as the Final Certificate. This explains that the road was suitable for adoption from that date (generally 12 months from the date of the Provisional Certificate), that adoption formalities will be concluded shortly & that they may present the Final Certificate to the Surety to secure release of the remaining 10% of the Bond. The road is formally adopted from the date stated in the Final Certificate.

10.2.22 If the works are not satisfactory at the end of the maintenance period, the inspecting engineer will write to the developer itemising the works needed to conclude. When this work is done, the inspecting engineer issues the Final Certificate with the date of adoption.

10.2.23 If remedials at the end of the maintenance are extensive, they may be subject to a further maintenance period. The developer will be told in advance by the inspecting engineer if this is to apply.

Documents for s.38 Agreements

10.2.24 The Highway Authority will not execute an agreement under s.38 of the Highways Act 1980 until the developer has provided all necessary documents and details, as described in the Developers checklist. These shall be complete and accurate for the purposes of the Highway Authority.

Drawings

10.2.25 Location drawings will be based on the Ordnance Survey 1/2500 or 1/1250 series. Layouts will be based on an accurate survey drawn to 1/500 or 1/200 scale. Enlarged details may be drawn to any convenient scale compatible with the metric system. Drawings will be coloured and annotated in accordance with the schedule.

10.2.26 A complete set of drawings will include:

a) a location plan clearly indicating the whole area of the development, at least one existing road junction and the names of the roads which form it;

b) a site survey showing all relevant details of the site including levels, trees, buildings or positions of recently demolished structures, drainage etc.,

c) a layout plan;

d) a setting out drawing, sufficiently detailed to allow the works to be accurately set out on the site.

10.2.27 A layout plan will show:

a) typical cross sections sufficient to identify the materials used;

b) the position, size and gradient of all sewers and drains within the area to be adopted whether forming part of the Section 38 works or not and the positions of all manholes and inspection chambers in that area;

c) the position, size and gradient of all sewers and drains and any manholes, inspection chambers etc. (other than private domestic connections) which are not within the area to be adopted but which are to form part of the s.38 works i.e. in existing adopted highway or subject of an Easement across private land;

d) the position and size of all gully pots, gully pits, gully connections and soakaways;

e) details of the lighting scheme with locations of lighting units clearly marked on the plan and numbered;

f) the intersection of two national grid lines and their values or a north point and the Ordnance Survey Grid reference numbers for the 1km square/s which contain/s the site;

g) garage floor levels

h) bay layout for concrete roads [where these may, rarely, be used];

i) overhangs, projections and obstructions;

j) tree positions and types of treatment proposed in areas to be soft landscaped;

k) a level datum related to Ordnance Survey at Newlyn;

l) the main elements of road & footway geometry (i.e. radii, widths, etc.), & each road numbered or lettered.

10.2.28 Wherever a highway boundary is not to be physically delineated on site (including standard 2m wide margins) it shall be clearly dimensioned on the layout plan from the channel line. Such dimensions should be shown on the plan at points which are easily identifiable on the site. Sufficient dimensions should be provided to allow clear identification of the highway limit on site by reference to the section 38 agreement drawings.

Schedules

10.2.29 Detailed schedules will be provided for:

a) street lighting, including details of lamps and lanterns, whether they are post top or side entry mounted, the type of column or wall mounting, mounting heights etc.;

b) highway drainage including depths and sizes of manholes and soakaways, cover types, pipe runs, pipe sizes and gradients.

c) a copy of the Environment Agency's approval where soakaways or other, more innovative, forms of Sustainable Urban Drainage Systems for the prospective highway (or which affect it), are proposed;

d) landscaping, giving details of plants and their spacing, trees etc;

e) public and private sewers and drains within the area to be adopted;

f) any features for which a commuted sum is payable.

Additional Information

10.2.30 To facilitate preparation and execution of an agreement the developer will provide the information sought in the following Developer's Guidance Notes. They must also acquaint themselves with, & act on, the whole of Chapter 10.

10.2.31 The Highway Authority will enter into an agreement under section 38 of the Highways Act 1980 only if the developer secures an assurance from the Water Authority that they intend to enter into an agreement under section 104 of the Water Industry Act 1991 securing the adoption by them of any non-highway sewers (foul or surface water) lying within the area to be adopted by the Highway Authority.

10.2.32 The inspecting engineer will require a programme for all the works included in the s.38 Agreement at least 21 days before any highway works are commenced on the site.

SECTION 38 DEVELOPER'S GUIDANCE NOTES

Surrey County Council
Planning & Development
Transport Development Control Division

Room 412, County Hall
Penrhyn Road
Kingston KT1 2DY
January 2002

DEVELOPER'S GUIDANCE NOTES

BASIC INFORMATION REQUIRED FOR SECTION 38 AGREEMENTS, HIGHWAYS ACT 1980

Reference must also be made to Chapter 10 of the Technical Appendix to Surrey Design for a comprehensive list of requirements.

1. Full title of the firm entering into the Section 38 Agreement, plus their registered office address, contact name and telephone number. They must own all of the land within the red edging and state this in their initial request. The County Council may exercise its option to take title of the land, comprising the highway, at adoption.
2. Name, address and telephone number of the Developer's Solicitor, plus name of individual for contact.
3. Company name and Registered Office of the Surety for the Bond (a Clearing or Merchant Bank, Insurance Company or any other person or organisation considered by the County Council to have sufficient financial standing). The Bond figure will be determined accurately from the estimated cost of the works, by the Developer's consulting engineer. If, after execution of the agreement, it is determined that the cost of the work is greater than the estimate, the Bond figure will be increased to accord.
4. Name and address of the Developer's Consulting Engineer, plus contact name and telephone number. The practice is to be competent in traffic and highway design. The Transport Development Control Division will deal only with the developer or one agent throughout. The Transport Development Control Division will not deal with both or accept a change from one to the other.
5. Start and completion dates of the works.
6. An estimate of the cost of the works. An agreement fee of 10% of the agreed cost of works will be levied, with a minimum of £2,000. At least half of this fee will be paid at the outset and the balance of the 10% by completion of the Agreement. If the actual cost of the works exceeds the estimate used for 3 above an additional engineering fee will be paid.
7. The Developer will write at the outset to confirm that they understand and will comply with the terms of these Guidance Notes and Chapter 10 of the Technical Appendix.
8. A separate charge will be made by the County Council's Solicitor for preparation of the Agreement etc. Written confirmation is required from the Developer at the outset that they will pay all County Council costs incurred to date should, for any reason, the Agreement not be signed.
9. A 1:500 scale layout plan showing carriageways, footways, service strips, drainage, lighting etc. Red edging around the area to be adopted, all must be within the Developer's Title. The highway to be adopted will extend to the boundary of the site. In the unlikely event of a third party 's land being involved (and acceptable to the CHA), they are to be cosignatories of the Agreement. If, after conclusion of the Agreement, it is found necessary to extend or delete any land it contains, this will be covered by a Deed of Variation. The engineering and legal costs incurred by SCC will be paid in full by the developer.
10. Longitudinal section along the centre line of carriageways.
11. Typical cross sections showing road construction, camber etc are required at 10 or 20 metre intervals. Spot levels of existing and proposed should be shown on the centre line at 20 metre minimum intervals and at the edge of road to enable accurate setting out.
12. Items 9, 10 and 11 are to be accompanied by a completed Quality Assurance checklist of submissions. The Quality Assurance checklist will be undertaken by the County Council subject to instruction and prior payment by the developer. It is formulated to assist the developer and Surrey County Council in providing a comprehensive and acceptable design which can be rapidly checked for compliance.
13. A list of standard notes is attached to be incorporated on the layout plan. The Sustainability Awareness Questionnaire is to be completed and returned at the outset.
14. At least 6 copies of the suitably coloured layout plans will be required. If third party land is acceptable, it is to be clearly identified on the layout drawings by green hatching. Three copies of all other drawings will be required - includes 10 and 11 above.
15. 6 copies of a location plan at 1:1250 showing the site and surrounding area. (Preferably incorporated into the layout plan).
16. The determination of subgrade support (CBR) shall be undertaken in accordance with Chapter 9, section 9.3, by an independent laboratory. Foundation design of capping and sub-base thicknesses and pavement foundation drainage shall be in accordance with Chapter 9, section 9.4. Both will be required at the outset.
17. The Developer will show from the outset that a Section 104 Agreement (or other suitable legal agreement) is being entered into with the Water Authority for any surface water drainage which highway drains connect to (which are not already adopted) and for all foul or surface water sewers laying within the area to be adopted by the Highway Authority.
18. The use of SUDS, including soakaways, to drain adoptable highway may be acceptable subject to strict criteria. Where acceptable, four other basic criteria must be satisfied. These are in MaPS Vol.12 and may be obtained from TDCD on request. Commuted sums for maintenance (£4000 per soakaway in 2001) and approved soakage tests will be required
19. The Developer will state at the outset if any highway structures or earth retaining walls, strengthened embankments and the like are involved and initially indicate them on the layout drawing stating their maximum height. If their use is considered necessary and acceptable, approval of the detailed design must be obtained from the County Council for which a separate fee is paid by the Developer. A commuted sum will also be paid through a clause in the Agreement.

20. The Developer will be responsible for funding any additional works which may be reasonably required by the Engineer resulting from any inadequacies in the Agreement drawings or arising from unforeseen circumstances up to an agreed maximum of 5% of the total cost of the works or £10,000, whichever is the greater.
21. The Developer will be responsible for the full cost of alteration to, or provision of new, Traffic Regulation Orders as may be required (to include advertising, processing orders, staff admin costs, signs, road markings etc).
22. The Developer will obtain a licence, where necessary, from the Engineer for landscaping proposals which affect the public highway.
23. The developer will indemnify the County Council against third party claims on all areas of work which are on the existing highway.
24. Highway lighting design can be undertaken by the County Council subject to instruction and prior payment by the developer. Approved schemes involving non-standard, but acceptable columns and lanterns will attract a commuted sum in the agreement, to cover the increased cost of maintenance and replacement.
25. Commuted sums are paid by the developer for the increased cost of maintenance and replacement of the following:-
    - Soakaways and other forms of Sustainable Urban Drainage Systems;
    - Structures and culverts;
    - Non-standard, but acceptable, road lighting;
    - Landscaping;
    - Innovative vehicle speed control and traffic management;
    - Infiltration pavement system.

SECTION 38 DRAWING NOTES TO BE PART OF AGREEMENT LAYOUT DRAWING

1. All estate roads to be constructed in accordance with Highways Agency Specification of Highway Works and Surrey County Council requirements.
2. Visibility zones to be incorporated into Section 38 areas and defined at their extremities.
3. Junctions and other locations are to be provided with pram crossings in accordance with Engineer's instructions. These will include specified tactile paving.
4. All foul and surface water sewers to have bedding factors agreed by Drainage Authority and all in accordance with the latest National Guidance (currently: Simplified Tables of External Loads on Buried Pipe Lines).
5. Wearing courses to roads and footways to be omitted until building work has been completed.
6. All highway land to be extended to and including site boundaries.
7. No private drive to have gradient of greater than 10% for minimum distance of 6m as measured from back of footway (highway). The gradient is to be straight.
8. Channels: 0.67% (1:150) absolute minimum; 0.67% to 1.0% (1:100) p.c. concrete channel blocks; not less than 1.0%, bituminous surfacing.
9. Service strips to contain no planting or obstructions other than permitted by Surrey Design – Streets Ahead.
10. Cut-off drainage to be installed at road sub-base as directed by SCC Engineer and connected to road gullies or to catchpits and thence to s.w. drainage system or SUDS outfall.
11. If parking is approved in advance of a garage the front of the garage is to be a minimum of 6m from the back of the footway or front of service strip.
12. Access drives etc. that fall towards the road are to have gullies so positioned as to prevent the discharge of surface water onto the highway.
13. Whether in conventional roads or shared surfaces the back of all vehicle crossings to serve access drive etc., shall be defined by continuous 150mm x 50mm pre-cast concrete edging or similar approved. On shared surfaces this will then be the only definition required of the highway limits.
14. On-street parking bays are to have individual spaces defined by setts, contrasting block paving colour, etc.
15. Where appropriate all culs-de-sac are to have the conventional coloured symbol incorporated in the street name plates and be named ….. CLOSE.
16. Street lighting is to conform to SCC general specification and specific scheme approval.

10.3 Agreement Under s.278 of the Highways Act, 1980

10.3.1 It becomes evident at an early stage of considering a planning application that works to the existing highway are necessary in order to access the development safely and/or a transportation contribution or funding are needed in order that the proposals accord with Planning Policy Guidance Note 13. These are secured by a s.278 agreement between the developer and Surrey County Council.

10.3.2 Other agreements which may be used to secure Development Related Highway Works, transportation contributions and funding, include s.111 of the Local Government Act 1972 and s.33 of the Local Government (Miscellaneous Provisions) Act 1982.

10.3.3 It is imperative that the legal agreement between the developer and the County Council is secured before planning permission is issued.

10.3.4 A legal agreement between the developer and the County Council is also needed for dedication of private land to the highway and/or financial contributions.

10.3.5 To facilitate the preparation and execution of an agreement the developer will provide the information sought in the following Developer's Guidance Notes. They must also acquaint themselves with, and act on, the whole of Chapter 10.

SECTION 278 GUIDANCE NOTES FOR DEVELOPERS

Surrey County Council
Planning & Development
Transport Development Control Division

Room 412, County Hall
Penrhyn Road
Kingston KT1 2DY
January 2002

DEVELOPER'S GUIDANCE NOTES

BASIC INFORMATION REQUIRED FOR A
HIGHWAY WORKS AGREEMENT UNDER
Section 111 Local Government Act 1972
and Section 278 of the Highways Act 1980.

1. The name and address (or Company name and Registered Office) of the developer (i.e. the applicant for planning permission), plus contact name and telephone number.
2. A description of the proposed development, planning application number and date of submission and a copy of the District Council Planning Committee report.
3. A description of the required highway works. This should be broad, as complete as is possible at this stage, and avoid jargon words if possible. Detailed engineering specifications are not required for this description.
4. 10 copies (8 for the County Solicitor, 2 for Engineer) of a 1/500 scale surveyed plan indicating the general highway layout to at least Stage 1 Safety Audit certification and showing the planning application site edged in red, existing highway land upon which works are to be carried out coloured green. Any private land (which must be in the legal ownership of the developer) on which works are to be carried out and which will be dedicated to become part of the public highway, is to be shown coloured pink. The County Council will take title of the land on which the highway is to be built, at adoption. Third party land is to be shown in contrasting colour(s).
5. 10 copies of an Ordnance Survey location plan, preferably incorporated on the above layout drawing.
6. The estimated total cost of the works, with a breakdown of highway and statutory undertakers' costs. An agreement fee of 10% of the estimated total cost of the works will be levied with a minimum of £2,000. At least half of this fee will be paid at the outset, with all paid prior to completion of the Agreement. A separate charge will be made by the County Council's Solicitor for preparation of the Agreement etc. Written confirmation is required from the developer at the outset that they will pay all County Council costs incurred to date should, for any reason, the Agreement not be signed. If the actual cost of the works exceeds the estimate used for 7, below, an additional engineering fee will be paid and any Bond reductions will be affected.
7. Company name and Registered Office of the Surety for the Bond (a Clearing Bank, reputable Merchant Bank, reputable Insurance Company or any other person or organisation considered by the County Council to have sufficient financial standing).
8. Estimated length of time for the completion of the highway works, plus start date.
9. Name and address of the developer's Solicitor, plus contact name and telephone number.
10. Name and address of the developer's Consulting Engineer, plus contact name and telephone number.
11. The developer is to deduce title to show that they are the owner of all the private land involved in the works agreement so that they can dedicate it as part of the public highway. Third parties have to be co-signatories of the Agreement and their land identified on the drawings (see item 4 above). The highway to be adopted will extend at least to the boundary of the site.
12. The Developer will be responsible for funding any additional works which may be reasonably required by the Engineer resulting from any inadequacies in the Agreement drawings or arising from unforeseen circumstances, up to an agreed maximum of 5% of the total cost of the works or £10,000, whichever is the greater.
13. Confirmation that the Developer understands that they are responsible for the full cost of alteration to, or provision of new, Traffic Regulation Orders as may be required, (to include advertising, processing Orders, staff admin cost, signs, road markings etc.).
14. Confirmation that the Developer will obtain a licence, from the Engineer for landscaping proposals which affect the public highway.
15. Once the above information has been received, processed and a Works Agreement issued, under Clause 3 of the Agreement, the following will be required:
Working drawings, detailed layout design, construction of road and highway drainage works, longitudinal and cross sections (the above to include details of road markings and studs, road signs, street lighting, Statutory Authorities mains and services), Q.A. checklist of submissions all of which are to be prepared by a Consulting Engineer and approved by the Engineer and achieve Stage 2 Safety Audit Certification. **Each issue of a layout drawing from inception to Stage 2 Safety Audit is to be sent by the Consulting Engineer direct to the Local Planning Authority.** The Quality Assurance checklist is intended to assist both the Consulting Engineer and SCC in providing a comprehensive and acceptable scheme that can rapidly be checked for compliance. The sustainability Awareness Questionnaire is also to be completed and returned at the outset.
16. The Engineer may be consulted as to which contractors are approved by this Authority to carry out works once the Consulting Engineer's estimated value of work is known. The latter may also offer advice on suitable firms subject to the Engineer's agreement.
17. It will be for the developer to satisfy themselves that all necessary Noise surveys have been competently undertaken in the existing circumstances of a site (i.e. former uses, if any) and following completion when traffic patterns have settled and after consultation with the Highway Authority. These tests can be carried out by the CHA's Noise Section upon prior arrangement and payment.

18. The Developer will state at the outset if any retaining structures are involved and initially indicate them on the layout drawing stating their maximum height. If their use is considered necessary and acceptable, approval of the detailed design must be obtained from the County Council for which a separate fee is paid by the Developer. A commuted sum will also be paid through a clause in the Agreement.

19. Highway lighting design may be undertaken by the County Council, subject to instruction and prior payment by the developer.

20. The use of soakaways to drain adoptable highway may be acceptable, subject to satisfactory soakage tests, SUDS and other strict criteria. Where permitted, a commuted sum of £4000 per soakaway (at 2002 prices) will be paid by the developer.

21. If, after conclusion of the Agreement, it is found necessary to extend or delete an area of originally private land, this will be covered by a Deed of Variation. The engineering and legal costs incurred by SCC will be paid in full by the developer.

22. The developer will write at the outset to confirm that they understand and will comply with the terms of these Guidance Notes and Chapter 10 of this Appendix.

23. Commuted sums are paid by the developer for the increased cost of maintenance and replacement of the following:-
    - Soakaways and other forms of Sustainable Urban Drainage Systems;
    - Structures and culverts
    - Non-standard, but acceptable, road lighting;
    - Landscaping;
    - Innovative vehicle speed control and traffic management.

Sustainability Awareness Questionnaire

The developer is asked to complete this at the outset in order to conform with the Developer's Guidance Notes, help facilitate technical approval and enhance the development.

Highway Materials

Site Name :

1 What percentage of recycled and/or re-used material do we buy?

a. Concrete for Kerbing.

b. Capping Layer

c. Sub-base | Footway % | Carriageway %

1 How much of the material required for highway construction can come from the job itself?

a. Capping Layer %

b. Sub-base | Footway % | Carriageway %

1 How much material arising from the earthworks is removed from site/

Topsoil % | Suitable Fill % | Other Fill %

2 What method is being used to make existing sub-grade material suitable as a capping layer?

3 Will planings be created as part of the works? If yes; what will you do with them?

Take to asphalt plant | Recycling centre | Reuse on site | Dump

4 Where is the nearest inert waste recycling centre for arisings?

5 What percentage of product suppliers take back pallets and packaging?

a. Paving blocks | b. Kerbs & Channels | c. Ironwork

d. Street furniture | e. Others

6 Have you identified storage areas for materials to prevent contamination/damage?

Topsoil | Sub-base | Drainage Material

Street Furniture | Paving Blocks | Ironwork

Housebuilding Materials | Kerbs and Channels

7 Who is responsible for managing sustainability on the job?

Job Title | Resident on Site | Training received

10.4 General Requirements

10.4.1 Developers should note the following general requirements and ensure that contractors working for them know of and comply with them. A list of the Local Authorities is given at the back of this document.

Programming of Works

10.4.2 All work within the area of the existing highway will be completed before new road construction is commenced, including drainage and sewerage works, installation of statutory undertakers mains and any service connections, ducts and manholes for future cabling and street-lighting connections. Highway construction will then proceed with formation, preparation, kerbing, sub-base, roadbase, and base-course together with gullies. All pipe, duct and cable connections are to be marked by paint on the adjacent kerb, then when the majority of the houses are complete any settlement or faults shall be made good. Then, street-lighting will be installed, footways and paths constructed. Finally, wearing courses will be applied to ensure a good appearance.

Existing Services

10.4.3 It is the developer's responsibility to be satisfied as to the accuracy of any information which may be made available to them.

10.4.4 Drawings purporting to show the position of existing water, gas, electricity, and telecommunications mains, ICT cabling & service connections, must be checked. No mains and services shall be altered or interfered with unless with the approval of the relevant statutory authority. The developer shall take all precautions necessary to prevent damage or distortion to such services. No scaffolding, props, staging, ropes, supports other than required for temporary support of mains shall be fixed or attached to them.

10.4.5 The developer shall take all risks and be responsible for all claims arising from any failure to comply with these requirements. Any damage to services equipment caused by the developer or sub-contractors, in the course of or in consequence of the operations will be made good at the developer's expense.

10.4.6 Wherever considered necessary by the inspecting engineer the developer will, at their expense, excavate by hand any trial holes, etc. required to locate the position of important mains or services prior to the commencement of work in the vicinity of such mains or services. Failure or omission of the engineer to require exploratory work to be carried out will not absolve the developer from their liabilities.

10.4.7 The developer will be responsible for arranging for any alterations of the existing mains and services of the statutory authorities and make allowance for the effect on the phasing of works of alterations to existing mains and services. The developer will need to ensure that existing mains and services are not interrupted without the written consent of the authority concerned.

Protection of Water Courses

10.4.8 The developer will be responsible for keeping existing water-courses clear and unrestricted where operations interfere with them in any way, and shall be held responsible for flooding and any damage caused by failure to carry out these requirements. The developer shall take all necessary precautions to prevent tar, oil, cement or other polluting substances entering any water-course or surface water sewer. No surface or subsoil water shall be pumped or allowed to drain into any existing foul sewer.

Control of Noise

10.4.9 The best practicable means to prevent or reduce noise during the execution of work shall be taken including the use of effective silencers and enclosures on power-operated plant and equipment and the use of a purpose-made muffler on any pneumatic breaker or drill.

Protection of Trees

10.4.10 The developer will take measures to ensure that trees which are to be preserved shall not be damaged by the Works. In particular the following will be observed:

a) great care will be taken when excavating in the vicinity of trees not to cause damage with the jibs or tracks of excavating plant, and not to sever roots. Where the inspecting engineer so directs, excavations will be carried out by hand;

b) no oil, tar, bitumen, cement or other materials likely to be injurious to a tree will be stacked within 6m of the bole;

c) no fires will be lit beneath or in close proximity to the canopy of a tree;

d) where so directed by the inspecting engineer the developer will erect temporary fencing for the protection of trees or shrubs,

e) trees to be preserved will not be used as anchorages for removing stumps, roots or other trees.

Temporary Works

10.4.11 The developer will provide, maintain and remove on completion all temporary works required in the execution of the development. Temporary works will be constructed to the satisfaction of the inspecting engineer, but the developer will still be responsible for damage done to, or caused by, these works, including the reinstatement of any lands or property disturbed or damaged by them.

Existing Highways

10.4.12 The developer will at all times take precautions and adopt measures considered necessary by the inspecting engineer to ensure the safety and convenience of the public and the owners and occupiers of affected properties. The developer will also reduce to a minimum interference with the use of the highway and private property. The passage of vehicles and pedestrians will be maintained at all times throughout the construction period unless the highway is closed by the order of the Highway Authority.

Mud, Debris and Dust

10.4.13 It is an offence to allow mud, debris or other materials to be deposited on the highway so as to damage it, obstruct it or create a nuisance or danger. The developer will ensure that highways in the vicinity of the works are kept free from mud, debris and dust falling from vehicles or the wheels of vehicles connected with the works or spreading from the works. Where the deposit of mud, debris or dust is unavoidable, warning signs must be exhibited whilst work is in progress. Carriageways and footways affected must be swept every two hours or otherwise to the satisfaction of the inspecting engineer.

10.4.14 Public highways must not be used as sites for stock piling or storing plant, vehicles, materials or equipment. Where special loads can only be off-loaded on the Highway, the written authority of the inspecting engineer must be obtained no less than seven days before the delivery is proposed.

Traffic Safety and Control

10.4.15 The developer will comply with the recommendations in Chapter 8 of the current edition of the Traffic Signs Manual published by the DTLR.

Openings in Public Roads

10.4.16 The developer will give the requisite notices under the New Roads & Street Works Act, 1991 to the Highway Authority, etc. in respect of openings in public roads. The developers will comply with all conditions the inspecting engineer may make regarding the reinstatement of the highway surface.

10.4.17 When completed, all surfaces will properly join up to the existing road surfaces, conform with the camber of the road, and be left in a condition to the approval of the inspecting engineer. The developer remains responsible for any subsidence of the excavations that may occur during the period of maintenance after final reinstatement and will pay for any further final reinstatment that the inspecting engineer may require.

Developer's Quality Assurance Checklist for both Section 38 and Section 278 Works

When submitting proposals to Surrey County Council for technical approval or adoption purposes the Developer must submit sufficient information to allow the details to be checked and approved. Use of this form will ensure that proposals are dealt with most efficiently and designs can be easily checked.

Checklist

Development Details

ITEM	DETAILS
Developers Name	
Address	
Contact Name	
Date of Submission	
Scheme Name	
Developer's Scheme Reference	
Scheme Location	
A set of photographs to adequately show the site, its approach road condition and signing	

Design Details

Any departures from standards must be stated and the reason given before Surrey County Council will consider approval. All Section 38 and Section 278 works shall comply with current Department for Transport, Local Government and Regions standards.

ITEM	Y/N N/A	O.K.	AMENDMENT NEEDED	AMENDED DATE
(a) A Design Statement including the following.... 1. Length of each section of road (to be numbered or lettered) 2. Number of dwellings served, or equivalent traffic loading relating to each length of road 3. Other Design Standards Used 4. How does development for the mobility impaired meet the requirements of current legislation *(i.e. DDA 1995)*				
(b) A full set of calculations including.... 1. Hydraulic calculations to support any proposed drainage design, where applicable. Details of contributing catchment areas, crossfalls/gradients, existing drainage system to be connected into including depths, pipe sizes etc. Details of gully design calculations. 2. Street Lighting calculations 3. Traffic figures for road construction and traffic capacity design. Including, where appropriate, calculations for proposed junctions using the current accepted software e.g. ARCADY, PICADY, OSCADY & TRANSYT				
(c) Drawings A complete set of drawings to enable the horizontal and vertical design to be checked, (including visibility zones where applicable). Plans to be provided at a scale of 1/500 or larger and include the following: 1. Existing levels 2. Proposed levels 3. Contour plots of junctions at 25mm intervals 4. Cross sections at 10 or 20 m intervals to a natural scale 5. Longitudinal sections of channel and crownlines				
(d) Road, drainage, housing layout Drg Nos.... Geometry (alignment, radii, length etc)				
Widths carriageway footway verge				
Visibility Zones (& road name plate location)				
Parking and Turning Details (swept path plots of HGVs/buses if applicable, i.e. when tighter bellmouth radii and narrow streets used)				
Drainage S.W. sewers adopted Gullies – location & run off area Sewer locations Manholes - any in carriageway Soakaways (at least 0.5m to limit and not under carriageway) Soak Report Cut-off drains Gullies at drives				

ITEM	Y/N N/A	O.K.	AMENDMENT NEEDED	AMENDED DATE
(e) Drainage details/spec. Drg Nos....				
Calculations (pipes and gullies)				
Pipes				
Bedding and surround				
Manholes				
Gullies				
Ironware				
(f) Carriageway, footway cross sections Drg Nos....				
Calculations				
Materials and Thicknesses				
Speed restraint				
Crossfall/cambers				
(g) Longitudinal Sections, Drg Nos....				
Gradients-roads & highway drains				
Transitions (vertical curves)				
Cover to sewers / Sewer size/capacity to include calcs.				
Summits/valleys				
(h) Street Lighting Details and Drg Nos....				
Calculations				
Column Type/Height				
Lantern Type				
Amenity/Conservation Needs (if any)				
(i) Specification Details and Appendices....				
(j) Schedules including the following....				
1. Road Signs 2. Drainage 3. Lighting 4. Landscaping				
(k) Details of Consultations....				
Statutory Undertakers				
Emergency Services				
SCC Materials Lab date / / reply / /				
Traffic date / / reply / /				
Structures date / / reply / /				
Landscaping date / / reply / /				
Other date / / reply / /				
(l) Other Information Provided....				

Planning Authorities

ELMBRIDGE BC
Civic Centre
High Street
Esher
Surrey KT10 9SD
Tel: (01372) 474474
Fax: (01372) 474910

EPSOM & EWELL BC
Town Hall
The Parade
Epsom
Surrey KT18 5BY
Tel: (01372) 734000
Fax: (01372) 732337

GUILDFORD BC
Millmead House
Millmead
Guildford
Surrey GU2 5BB
Tel: (01483) 505050
Fax: (01483) 444444

MOLE VALLEY DC
Council Offices
Pippbrook
Dorking
Surrey RH4 1SJ
Tel: (01306) 885001
Fax: (01306) 876821

REIGATE & BANSTEAD BC
Town Hall
Castlefield Road
Reigate,
Surrey RH2 0SH
Tel: (01737) 276000
Fax: (01737) 222135

RUNNYMEDE BC
Civic Offices
Station Road
Addlestone,
Surrey KT15 2AH
Tel: (01932) 838383
Fax: (01932) 855135

SPELTHORNE BC
Council Offices
Knowle Green
Staines
Surrey TW18 1XB
Tel: (01784) 451499
Fax: (01784) 463356

SURREY HEATH BC
Surrey Heath House
Knoll Road
Camberley
Surrey GU15 3HD
Tel: (01276) 707100
Fax: (01276) 707177

TANDRIDGE DC
Council Offices
Station Road East
Oxted
Surrey RH8 0BT
Tel: (01883) 722000
Fax: (01883) 722015

WAVERLEY BC
Council Offices
The Burys
Godalming
Surrey GU7 1HR
Tel: (01483) 86111
Fax: (01483) 869118

WOKING BC
Civic Offices
Gloucester Square
Woking
Surrey GU21 1YL
Tel: (01483) 755855
Fax: (01483) 768746

Highway Authority/Agent

HEAD OF ENGINEERING
Elmbridge Borough Council
Civic Centre
High Street
Esher KT10 9SD
Tel: 01372 474474

CHIEF ENGINEER
Epsom & Ewell Borough Council
Town Hall
The Parade
Epsom KT18 5BY
Tel: 01372 732000

DISTRICT ENGINEER - GUILDFORD
South West Area Office
Grosvenor House
Guildford
GU1 1FA
Tel: 01483 517900-1

DISTRICT ENGINEER
Mole Valley County Highway Service
Pippbrook
Dorking
RH4 1SJ
Tel: 01306 885001

ENGINEERING MANAGER
Streetcare Services
Reigate & Banstead Borough Council
Town Hall
Castlefield Road
Reigate RH2 0SH
Tel: 01737 276000

ENGINEERING
Runnymede Borough Council
Civic Offices
Station Road
Addlestone KT15 2AH
Tel: 01932 838383

TECHNICAL SERVICES – CLIENT MANAGER
Spelthorne Borough Council
Council Offices
Knowle Green
Staines TW18 1XB
Tel: 01784 451499

DISTRICT ENGINEER – SURREY HEATH
Bagshot Highway Depot
London Road
Bagshot GU19 5HN
Tel: 01276 453564

DISTRICT ENGINEER
Tandridge County Highway Service
Station Road East
Oxted
RH8 0BT
Tel: 01883 722000

DISTRICT ENGINEER – WAVERLEY
South West Area Office
Grosvenor House
Guildford
GU1 1FA
Tel: 01483 517900-1

HEAD OF ENGINEERING AND STREETCARE SERVICES
Woking Borough Council
Civic Offices
Gloucester Square
Woking
GU21 1YL
Tel: 01483 743450

SURREY COUNTY COUNCIL
Planning & Development
Transportation Development
Control Division
Room 412
County Hall
Kingston upon Thames
KT1 2DY
Tel: 020 8541 9320
Fax: 020 8541 9335

01/02/500/icdesign/scc003069