## Contents

### 1. PROCESS
- 1.1 Technical Assessment And Safety Audit................................................................. 10
- 1.1.1 Introduction and Summary of Process ................................................................. 10
- 1.1.2 Outline Design Technical Assessment and Safety Audit - Stage 1 .................. 11
- 1.1.3 Detail Design Technical Assessment and Safety Audit - Stage 2 ..................... 11
- 1.1.4 Phase 3 of the Technical Assessment and Safety Audit Process .................... 12
- 1.1.5 Highway Structures ............................................................................................ 12
- 1.2 Adoption.................................................................................................................. 13
- 1.2.1 Process................................................................................................................. 13
- 1.2.2 Adoption Policy.................................................................................................. 15
- 1.2.3 Advance Payments Code (apc) Procedure ....................................................... 16
- 1.2.4 Section 38 Agreement of the Highways Act 1980 ............................................. 16
- 1.3 A Sustainable Approach To Highways Construction ........................................... 18
- 1.3.1 Introduction ........................................................................................................ 18
- 1.3.2 Sustainability Action Plans ................................................................................ 19
- 1.3.3 Waste Audits ...................................................................................................... 19
- 1.3.4 Reasons for Waste Being Generated ................................................................. 21
- 1.3.5 Information Contained in a Waste Audit ........................................................... 21
- 1.3.6 Enabling Specification Clauses ......................................................................... 21
- 1.3.7 References for Implementing Sustainability ...................................................... 22

### 2. DESIGN
- 2.1 Highway Standards for Residential Roads ............................................................... 24
- 2.1.1 Highway Layout Design Guidance .................................................................. 24
- 2.1.2 Town Centre Scenario 1 ..................................................................................... 25
- 2.1.3 Town Centre Scenario 2 ..................................................................................... 25
- 2.1.4 Town Edge Scenario 1 ....................................................................................... 26
- 2.1.5 Town Edge Scenario 2 ....................................................................................... 26
- 2.2 Geometric Requirements for Residential Roads ................................................... 27
- 2.2.1 Turning Facilities................................................................................................. 27
- 2.2.2 Gradients ............................................................................................................ 27
- 2.2.3 Junctions............................................................................................................. 28
- 2.3 Highway Standards for Industrial and Commercial Roads .................................. 29
- 2.3.1 General ............................................................................................................... 29
- 2.3.2 Types .................................................................................................................. 29
- 2.3.3 Geometric Requirements ................................................................................. 30
- 2.3.4 Additional Requirements for Industrial and Commercial Roads .................... 31
- 2.4 Cycleway Design ................................................................................................... 31
- 2.4.1 Cycleway Standards ......................................................................................... 32
- 2.5 Summary of the Highway Standards .................................................................. 32
3.7.1 General ...................................................................................................................................................................................56
3.7 Kerbing, Channels and Edge Restraint ..........................................................................................................................................55
3.7.1 General ...................................................................................................................................................................................55
3.7.6 Sub-base ................................................................................................................................................................................57
3.7.7 Surfacing - Structural Layer ..................................................................................................................................................57
3.7.8 Surfacing - Surface Layer .........................................................................................................................................................57
3.7.9 Handrails ..................................................................................................................................................................................57
3.7.10 Pedestrian Guardrails and Barriers ..............................................................................................................................57
3.7.11 Emergency Access .................................................................................................................................................................57
3.7.12 Signing ..................................................................................................................................................................................57
3.7.13 Markings ..................................................................................................................................................................................57
3.7.14 Traffic Regulation Orders ......................................................................................................................................................57
4. MISCELLANEOUS ..............................................................................................................................................................59
5. DEFINITIONS .............................................................................................................................................................................61
6. REFERENCES ...........................................................................................................................................................................63
Once the principle of the scheme has been agreed, then unless otherwise stated by the Area Office/HU, the next part of the process will be to produce an acceptable outline design and this will be subject to various technical checks and a safety audit report. In the case of schemes requiring planning permissions or associated with planning applications, this should be prior to or as soon as practical after the granting of planning permission. It is recommended that the Scheme Promoter has informal discussions with the HU or KCC Area Office at the preliminary stages in order to ensure that the proposals will result in the safest and most appropriate layout for that site.

The Scheme Promoter must submit the appropriate documentation for the outline design technical assessment and safety audit within 24 months of the principle of the scheme being accepted. The Area Office/HU should within 6 working days of receipt, provide a contact name and acknowledge receipt of the submission or return unsuitable submissions. Provided an acceptable submission is received by the Area Office/HU, then the Scheme Promoter should receive a response and assessment from the Area Office/HU no later than six weeks after receiving written acknowledgement of receipt of the scheme at the Area Office/HU. Where this target cannot be met, the Scheme Promoter will be informed of the circumstances. The Scheme Promoter will then either be given guidance as to whether the scheme needs to be resubmitted at the outline stage, or guidance on producing a submission for the detailed design technical assessment and safety audit part of the procedure. This may be subject to various conditions. Any approvals given at this stage of the process must not be considered as approval to construct the scheme.

**Detail Design Technical Assessment and Safety Audit (Stage 2) of the overall process -** The Scheme Promoter will have received guidance from the Area Office/HU on how to proceed to the detail design technical assessment and safety audit part of the overall scheme process. It may be possible in the case of some small schemes to submit Stages 1 and 2 combined. Advice on this must be sought from the relevant authority. On receipt of the detailed design submission, the Area Office/HU should, within 6 working days provide a contact name and acknowledge receipt of the submission, or return unsuitable submissions. The designated contact in liaison with the Area Office/HU will discuss and agree the time scale to assess the scheme. Any requirements as a result of a preliminary assessment of the detail design may be discussed. Once an acceptable detail design has been agreed, and subject to other legal and technical issues the Scheme Promoter will receive written approval to start construction from the Area Office/HU (or designated representative), which may be subject to various conditions. Guidance regarding site supervision, inspections and an as-built safety audit may also be provided.

**As Built (Stage 3) of the overall process -** Once the scheme is substantially completed an inspection may be required as well as an as-built safety audit. The Scheme Promoter (or designated representative) will need to inform the Area Office/HU in writing when the Scheme is ready to be inspected and safety audited. It should be noted that the safety audit will normally be carried out separately from other inspections. At this stage of the process it is envisaged that major changes will take place. It does provide an opportunity to identify potential safety issues not previously detected in the design process, for whatever reason. Liability for rectifying any potential hazards as identified and requested by the Area Office/HU or authorised representative is the responsibility of the Scheme Promoter.
1.1.2 Outline design technical assessment and safety audit - Stage 1

Requirements for Stage 1

The outline design assessment and safety audit (stage 1) involves assessments and independent checks, of the appropriateness of the scheme; traffic conditions; sustainable transport issues; environmental aspects; geometric design; street lighting; signing, traffic signal systems and scheme safety. It will take the form of a technical assessment and a safety audit. It will be carried out on the basis of the information submitted. If the scheme is satisfactory, it will be given Stage 1 Outline Design Scheme Approval.

Prior to submitting a scheme for Stage 1 outline technical assessment and safety audit the Scheme Promoter should have had discussions regarding the feasibility of the scheme and any conditions that need to be complied with and received written confirmation from the KCC Area Office/HU that the scheme concept is acceptable in principle.

For a clear understanding of the scheme and to expedite the process for outline design technical assessment and safety audit (stage 1), the following documentation should be sent to the KCC Area Office/HU:

- Three copies of plans
- Submission Check List form
- Confirmation of acceptance of scheme in principle from KCC Area Office/HU and any Area Office/HU requirements, with verification that they have been addressed
- Background Information Report (KCC Area Office schemes only) and Summary Sheet Form
- Cycle facilities Appraisal Form.

(Note: the appropriate forms are supplied by KCC Area Office or the HU as appropriate).

The KCC Area Office/HU on receipt of the submission will carry out an administrative check on the documentation and if the documentation is complete send written confirmation of receipt of the scheme and the contact name and location of individual processing the scheme. If the documentation is incomplete or unsatisfactory, it is returned to the scheme promoter advising them of the required information to process the scheme. (KCC target time for this part of the procedure is 6 working days).

Within six weeks of receipt of the scheme, the KCC Area Office/HU should send the Scheme Promoter confirmation of outline design (stage 1) scheme approval and associated requirements; or where it has not been possible to give approval, reasons for this and suggested action to achieve a satisfactory scheme. Where approval has been given, a guidance note and check list will be included for the second part of the submission, the detail design technical assessment and safety audit (stage 2).

If additional information is required or problems develop which would affect the six weeks target time, then the KCC Area Office/HU would be in contact with the Scheme Promoter updating him/her on the situation. If the Scheme Promoter has any problems or points to raise related to the particular scheme he/she should liaise direct with the contact person noted in the letter of receipt.

Outline Design (Stage 1) approval for works associated with planning applications should be obtained prior to outline planning permission being sought, unless access arrangements are a reserved matter.

1.1.3 Detail design technical assessment and safety audit - Stage 2

Requirements for Stage 2

A scheme submitted for detailed design technical assessment and safety audit, should have received written confirmation of it’s acceptability from the KCC Area Office/HU to be assessed and safety audited at the detail design (stage 2) of the overall scheme assessment process. Construction works must not be started until written confirmation has been received from the Area Office/HU that such works may proceed. It is envisaged that this process will be concurrent with other legal and technical processes related to the scheme, including detailed planning consent if applicable.

The detail design technical assessment and safety audit involves detailed and independent checks, of the scheme design, standard details, construction details, signing and road marking schedules, street lighting calculations, signal design details and scheme safety. Checks on contracts and specifications and legal aspects will be carried out alongside this process. If the scheme is satisfactory, it will be given detail design approval by the KCC Area Office/HU.

To expedite the process for detail design technical assessment and safety audit at stage 2 of the process, the following documentation should be provided and sent to the Area Office or HU.

Confirmation of approval of scheme at outline design (or acceptance of combined stage 1 and 2 submission) by KCC Area Office/HU and any Area Office/HU requirements, with proof that they have been addressed.

- Three copies of detail design drawings (i.e. suitable for tender issue)
- Detail Design Checklist Form
- Detail Design Information based on ‘KCC Scheme Design Package Guidelines’ and ‘Check List of Documents to be submitted for ‘Technical Audit’ (HU determined schemes will supply their own checklist).
- Cycle Design Form

KCC Area Office/HU (or designated representative as directed) on receipt of the submission will carry out an administrative check on the documentation and if acceptable send written confirmation of receipt of the scheme and the contact name and location of the individual processing the scheme. If the documentation is incomplete or unsatisfactory it is returned to the scheme promoter advising them of the required information to process the scheme. The target time for this part of the procedure is 6 working days.

Where the scheme is acceptable to be processed, the Scheme Promoter should be contacted by the person responsible for processing the detail design technical assessment and safety audit of the scheme. This should occur within 6 working days of confirmation of receipt of the scheme from the Area Office/HU. This officer will have carried out a preliminary check on the documents prior to it being submitted for a detail design check and safety audit. Following this initial assessment he/she will inform the Scheme Promoter of any requirements and agree a time scale to complete the detail design technical assessment and safety audit. The time scale will be dependent on the complexity of the scheme, and the information provided by The Scheme Promoter and will be agreed in liaison with the Area Office/HU. If there is sufficient information the detail design technical assessment and safety audit should generally be completed within 25 working days. If information required for this part of the process is missing it is unlikely that the technical assessment and safety will proceed further until it is provided.
Once the scheme has received its detail design technical assessment and safety audit, the Scheme promoter will receive from the KCC Area Office/HU written confirmation of detail design, stage 2 scheme approval and associated requirements. Where it has not been possible to give approval, the reasons for this and the suggested action needed to achieve a satisfactory scheme will be provided. If schemes are not approved, the scheme promoter will be advised whether construction should not be started or whether certain aspects of construction may begin subject to conditions.

Where approval has been given, a guidance note may be included regarding site supervision, Clients Inspection and an as-built safety audit.

The Scheme Promoter should liaise with the contact person noted in the letter of receipt regarding any issues related to the particular scheme.

1.1.4 Phase 3 of the Technical Assessment and Safety Audit Process

Once the scheme is substantially completed an inspection may be required as well as an as-built safety audit. The Scheme Promoter (or designated representative) will need to inform the Area Office/HU (or stated contact), in writing when the Scheme is ready to be inspected and safety audited. It should be noted that the safety audit will normally be carried out separately from other inspections. Stage 3 provides an opportunity to identify minor technical and potential safety issues not previously detected in the design process, for whatever reason. Liability for rectifying any potential hazards as identified and requested by the Area Office/HU or authorised representative is the responsibility of the Scheme Promoter. Phase 3 should be carried out during the maintenance period, i.e. before the road is adopted.

NB. For a full copy of the Technical Assessment and Safety Audit Procedures, please contact the appropriate KCC Area Office.

1.1.5 Highway Structures

1.1.5.1 General

All highway structures will be required to be designed in accordance with the latest relevant Standards, Codes of Practice, and DETR Technical Memoranda.

Because of the important design, safety, inspection and maintenance considerations involved it is required that a technical approval procedure must be adhered to for highway structures. Full details of the approval procedure including a schedule of all the relevant design documents is available on request from: The Project Manager (Structures), Babtie Group, Sandling Block (S2), Springfield, Maidstone, Kent, ME14 2LQ.

1.1.5.2 Definition of a Highway Structure

The definition for a highway structure can fall into one of two types, either:

• any structure built in, under, or over, the highway where the aggregate span dimension at any point is equal to, or exceeds 0.9m. This includes amongst others, bridges, footbridges, pipe gantries, culverts, pipes, tunnels, chambers, cellars, shafts, soakaways, manholes and storm water balancing tanks etc. or,

• any structure built in, or within 3.66m of, the highway which supports the highway, or ground above it, and where the retained height either above or below the highway is 1.4m, or more. This includes amongst others, retaining walls, headwalls, basements and cellars etc. .

The definition of ‘highway’ used above includes the carriageway, footway and all verges. Approval to structures that fall below the above classification (i.e. <0.9m span and <1.4m retained height) is a matter for the local Highway Unit, although technical advice on these is available from Babtie Group, Highway Structures Office if required.

1.1.5.3 The Approval Procedure

The technical approval procedure which Kent County Council (KCC) has adopted is based on the Department of Transport’s Departmental Standard BD 2/89 ‘Technical Approval of Highway Structures on Motorways and Other Trunk Roads’ and is outlined below.

This approval procedure is to be followed for the construction or alteration of any highway structure, whether to be adopted or not, for which KCC is acting as the Technical Approval Authority (TAA). Where a structure is to be adopted by the Highway Authority this must be specifically written into the Section 30, 38 or 278 Agreement together with the agreed commuted sum figure for future maintenance which the Developer is to pay to the Highway Authority. Where the structure is not to be adopted and does not belong to a Statutory Undertaker, a Maintenance Agreement is required. Before being allowed to enter into a Maintenance Agreement the Developer must demonstrate that they can meet the following criteria:

• have a long term vested interest in the site (i.e. would not be accepted for a speculative housing development).

• have an income stream sufficient to meet the maintenance obligations (i.e. a charge is levied for the use of the development).

• be of sufficient financial standing (full audited accounts are to be supplied signed by the accountants and including profit and loss accounts, balance sheets and associated notes, for the last three years).

The function of the Technical Approval Authority will be carried out by the Bridge Manager through his agents, who are currently Babtie Group, Highway Structures Office, who will also provide a copy of the full procedure guidance and proformas on request. All correspondence should be addressed to:

Babtie Group, Highway Structures Office,
Sandling Block (S2), Springfield,
Maidstone,
Kent ME14 2LQ,
and marked for the attention of the Technical Approval Authority (Structures).

1.1.5.4 Technical Approval of Design Endorsement

The Developer must first complete and sign an endorsement, and submit it to the TAA. No part of the approval process will be commenced until this has been received and accepted by the TAA. If the developer fails to comply with this requirement or any of the other terms and conditions KCC reserves the right to either reject the works or upgrade the works to the standard required by KCC and to reclaim all the costs incurred in connection therewith from the Developer.

The Developer’s Consultant is to be a Chartered Civil or Structural Engineer, competent in bridge works and approved by the TAA. If the Consultant is not approved, the TAA will not approve the design or any subsequent construction.

Approval in Principle (AIP)

For all highway structures the Approval in Principle document and the Technical Approval Schedule (TAS) will be issued by the TAA to
Upon completion of the works a Certificate of Construction Compliance will be returned to the Supervising Consultant upon endorsement.

Approval for adoption WILL NOT be given by the TAA until the Certificate of Construction Compliance and the As-Constructed records have been received and approved by the TAA.

*Documents may be photocopied to produce duplicates, but both copies must be signed in ink or biro.

** 1.2 ADOPTION

** 1.2.1 PROCESS

Developers and Authorities involved in the process of adoption should take a holistic approach to the process to ensure ALL spaces in the public realm are maintained for the lifetime of the development.

If not all the spaces can be formally adopted then alternative arrangements must be put in place for the spaces to be maintained for the lifetime of the development, or they should be designed out.

In order to determine how all the areas are to be maintained, every space within the public realm should be given a defined primary function.

Once the primary function for each of the spaces has been defined, then steps can be taken to decide how the space is to be maintained for the lifetime of the development through adoption or alternative arrangements.

This outlined policy approach will be underpinned by detailed adoption criteria for both open space and highway elements of a proposal.

Alternative provision for maintenance for the lifetime of the development may take many forms ranging from the setting up of management companies to dedicating land to Parish Councils.

Committed sums are likely to be required for the long term maintenance of open space, landscape/amenity areas including verges and all structures including public art. These will be dependant on the specific adoption criteria of each authority.

The flowchart demonstrates a process which if followed, would ensure all spaces have a function and that no spaces are left without a maintenance provision put in place.

The nature of the flowchart encourages a development team approach to the issue of adoption and long term maintenance.

Specific open space adoption criteria are to be defined by individual local authorities but general principles might include: safety considerations; standard of work; ease of maintenance.

** 1.1.5.5 TECHNICAL APPROVAL OF CONSTRUCTION

The construction work may not commence until any legal agreements are signed, if appropriate, the Consultant is in receipt of the Design and Check Certificates endorsed by the TAA and the Developer’s site supervision arrangements are agreed by the TAA. The Developer must notify the TAA of the programmed start and completion dates, prior to any works commencing on site.

Supervision of the works shall be the responsibility of the Developer but must be carried out by a competent consultant approved by the TAA. In addition the TAA is to be permitted access to the works at any time during construction for audit supervision checking. This will be undertaken at intervals dependent upon construction and will include important aspects of the construction work. The TAA shall be advised in advance and be regularly updated of key operations and their dates in the construction programme. The full cost of the audit supervision and associated reporting is to be met by the Developer.

** AS-BUILT REQUIREMENTS

Upon completion of the works a Certificate of Construction Compliance, certifying that the structure has been built in accordance with the approved drawings and specification is to be prepared by the Supervising Consultant. Two signed copies* must be submitted to the TAA for endorsement. Included with this must be the As-Constructed Records comprising the As-Built Records (as specified by the TAA), Maintenance Manual and the Health & Safety File (in accordance with the Construction (Design and Management) Regulations 1994. The As-built drawings are to be negatives, not paper prints. One copy of the Certificate of Construction Compliance will be returned to the Supervising Consultant upon endorsement.

The construction work may not commence until any legal agreements are signed, if appropriate, the Consultant is in receipt of the Design and Check Certificates endorsed by the TAA, in duplicate*. When approved by the TAA the AIP with attached TAS will be endorsed by the Bridge Manager or his appointed delegate on behalf of the TAA and one copy returned to the Developer/Consultant. The AIP must be endorsed before the design may begin.

** 1.1.5 STRUCTURE DESIGN

Following the receipt of the endorsed AIP document the design of the structure may commence. On completion of the design the structure details shall be submitted to the independent checker identified in the AIP.

** DESIGN CERTIFICATE

Following the design check the Developer’s Consultant is to complete and issue a Design Certificate certifying that the structure has been designed in accordance with the AIP. Two signed copies* of the certificate must be submitted to the TAA for endorsement. Two copies of all the construction drawings and reinforcement schedules listed on the certificate are to be enclosed with the Design Certificates for approval. One copy of the Certificate will be returned to the Consultant upon endorsement.

** CHECK CERTIFICATE

All structures must be checked by an independent checker approved by the TAA. Upon completion of the check the checker shall issue a Check Certificate. Two signed copies* of the Certificate are to be submitted to the TAA for endorsement. One endorsed copy of the certificate will then be returned to the Consultant.

** MAINTENANCE AUDIT

Once the signed copies of the design and check certificates have been submitted, a Maintenance Audit is carried out by the TAA. This is to ensure that aspects affecting the on going inspection and maintenance of the structure are to the TAA’s approval.

If the procedures in this section have not been followed and endorsed by the TAA, construction WILL NOT be permitted, nor will approval for adoption be given in cases where the road is proposed to be adopted.

** 1.1.5.5 TECHNICAL APPROVAL OF CONSTRUCTION

The construction work may not commence until any legal agreements are signed, if appropriate, the Consultant is in receipt of the Design and Check Certificates endorsed by the TAA and the Developer’s site supervision arrangements are agreed by the TAA. The Developer must notify the TAA of the programmed start and completion dates, prior to any works commencing on site.

Supervision of the works shall be the responsibility of the Developer but must be carried out by a competent consultant approved by the TAA. In addition the TAA is to be permitted access to the works at any time during construction for audit supervision checking. This will be undertaken at intervals dependent upon construction and will include important aspects of the construction work. The TAA shall be advised in advance and be regularly updated of key operations and their dates in the construction programme. The full cost of the audit supervision and associated reporting is to be met by the Developer.

** AS-BUILT REQUIREMENTS

Upon completion of the works a Certificate of Construction Compliance, certifying that the structure has been built in accordance with the approved drawings and specification is to be prepared by the Supervising Consultant. Two signed copies* must be submitted to the TAA for endorsement. Included with this must be the As-Constructed Records comprising the As-Built Records (as specified by the TAA), Maintenance Manual and the Health & Safety File (in accordance with the Construction (Design and Management) Regulations 1994. The As-built drawings are to be negatives, not paper prints. One copy of the Certificate of Construction Compliance will be returned to the Supervising Consultant upon endorsement.

Approval for adoption WILL NOT be given by the TAA until the Certificate of Construction Compliance and the As-Constructed records have been received and approved by the TAA.

*Documents may be photocopied to produce duplicates, but both copies must be signed in ink or biro.
DETERMINE OPEN SPACES/OTHER REQUIREMENTS IN ACCORDANCE WITH THE LOCAL PLAN AND DEVELOPMENT BRIEF (WHERE APPLICABLE)

DESIGN LAYOUT WITH REFERENCE TO KENT DESIGN GUIDE & LOCAL PLAN

DEFINE THE PRIMARY FUNCTION OF EVERY SPACE WITHIN THE PUBLIC REALM AS EITHER:

- HIGHWAY
- VISUAL AMENITY
- SOCIAL AMENITY eg TOWN SQUARES
- SCREENING FROM VISUAL/NOISE OBTRUSION
- RECREATIONAL, PARKS, PLAYING FIELDS, EQUIPPED PLAY AREA, ECOLOGICAL

DOES THE SPACE MEET ITS REQUIRED PURPOSE HAVING REGARD TO LOCAL PLAN DEVELOPMENT BRIEF AND KENT DESIGN?

IS THE SPACE PART OF THE OPEN SPACE CALCULATION? i.e. QUANTITY OF PROVISION

DOES THE SPACE MEET OPEN SPACE ADOPTION CRITERIA?

HAS THE SPACE BEEN MAINTAINED INTO PERPETUITY BY STATUTORY BODY e.g. KTNC

DOES THE SPACE MEET ITS REQUIRED PURPOSE HAVING REGARD TO LOCAL PLAN DEVELOPMENT BRIEF AND KENT DESIGN?

IS SPACE PROVIDED FOR RECREATION, PARK, EQUIPPED PLAY AREA OR PLAYING FIELD?

LA TO ADVISE ON WHETHER THERE IS JUSTIFICATION TO RELAX CRITERIA

IS SPACE PROVIDED FOR ECOLOGICAL PURPOSES?

SPACE MAINTAINED INTO PERPETUITY BY STATUTORY BODY eg KTNC

ADAPT BY HIGHWAY AUTHORITY UNDER SECTION 38 AGREEMENT

CAN THEY BE REDEFINED?

IS THE DEFINITION NOW VISUAL AMENITY?

DETERMINE THE PRIMARY FUNCTION OF EVERY SPACE WITHIN THE PUBLIC REALM AS EITHER:

- HIGHWAY
- VISUAL AMENITY
- SOCIAL AMENITY eg TOWN SQUARES
- SCREENING FROM VISUAL/NOISE OBTRUSION
- RECREATIONAL, PARKS, PLAYING FIELDS, EQUIPPED PLAY AREA, ECOLOGICAL

DOES THE SPACE MEET ITS REQUIRED PURPOSE HAVING REGARD TO LOCAL PLAN DEVELOPMENT BRIEF AND KENT DESIGN?

IS THE SPACE PART OF THE OPEN SPACE CALCULATION? i.e. QUANTITY OF PROVISION

DOES THE SPACE MEET OPEN SPACE ADOPTION CRITERIA?

HAS THE SPACE BEEN MAINTAINED INTO PERPETUITY BY STATUTORY BODY e.g. KTNC

DOES THE SPACE MEET ITS REQUIRED PURPOSE HAVING REGARD TO LOCAL PLAN DEVELOPMENT BRIEF AND KENT DESIGN?

IS SPACE PROVIDED FOR RECREATION, PARK, EQUIPPED PLAY AREA OR PLAYING FIELD?

LA TO ADVISE ON WHETHER THERE IS JUSTIFICATION TO RELAX CRITERIA

IS SPACE PROVIDED FOR ECOLOGICAL PURPOSES?

SPACE MAINTAINED INTO PERPETUITY BY STATUTORY BODY eg KTNC

ADAPT BY LOCAL AUTHORITY UNDER SECTION 9 AGREEMENT

WOULD THE HA OR LA BE PREPARED TO ADOPT ANYWAY? DECIDES AFTER CONSULTATION

CAN ALTERNATIVE PROVISION FOR MAINTENANCE INTO PERPETUITY BE ARRANGED?

DEVELOPER TO MAKE NECESSARY ARRANGEMENT

FIGURE 1 - ADOPTION FLOWCHART
1.2.2 ADOPTION POLICY

HIGHWAYS

The Highway Authority will adopt areas that are required for the use and maintenance of the highway, and will consider other associated areas for adoption in consultation with individual local authorities, which may require the payment of commuted sums.

The Highway Authority will only adopt Commercial and Industrial Roads where there is clear benefit to the general public and where units are in individual ownership.

Adopted carriageways, footways, footpaths and cycleways must connect to another highway maintained at the public expense.

All accesses serving more than 5 dwellings should be laid out to adoption standards.

Developers must prove ownership of all land to be transferred prior to adoption by the Highway Authority. In situations where land is in “unknown ownership” the Highway Authority will require Developers to provide a Defective Title Indemnity Insurance which must be in place prior to the Section 38 Agreement being signed.

Footways, Footpaths and Cycleways will be adopted where they provide the primary means of pedestrian access to buildings or are an essential part of the highway system in so far as it relates to the movement of pedestrians and cyclists.

If the number of dwellings served by a cul-de-sac exceeds 50 or where a major access road is designed as a circuit road, then an alternative means of access for cyclists and pedestrians, which could also be used for vehicular access in the event of an emergency, may be required. Alternative means of access will be adopted by the Highway Authority.

All adoptable areas and structures will, as a minimum, meet the standards of Kent Design and current highway design standards as adopted by KCC.

All adoptable areas will be clearly identifiable on site and any delineation will be sympathetic to the locality.

Means of access for future inspection and maintenance must be determined prior to agreeing adoptable areas.

1.2.2.2 SERVICES

Private services (excluding service connections) will not be located in adoptable areas, except in exceptional circumstances when they must be covered by a licence under Section 50 of the New Roads and Streetworks Act 1991.

The Developer is to ensure that all new roads are pre-ducted to accept cable television by direct liaison with the Cable Franchise Company. The Highway Authority will not adopt a road which has not been pre-ducted unless it is confirmed in writing by the Cable Franchise Company that they do not intend to supply the cable network to the development.

1.2.2.3 LANDSCAPING

The Highway Authority will adopt landscaped areas and verges that are required for highway purposes, such as visibility splay areas and service strips.

Areas between a carriageway and a footway or cycleway will be adopted if they are required for highway purposes. If these areas are not required for highway purposes they will be adopted if a commuted sum is paid to the highway authority based on maintaining the area for the lifetime of the development.

If an area is not offered up for highway adoption with a commuted sum, then developers must provide or arrange for the long term management of all unadopted landscape areas and verges through a management company or similar. Section 9 of the Open Spaces Act 1906 enables amenity areas to be maintained by the District Council.

1.2.2.4 PARKING AREAS AND LAYBYS

Only lay-bys and parking areas provided as an integral part of the highway for casual parking will be adopted.

Private parking areas must be located outside the adoptable highway limits.

1.2.2.5 STREET LIGHTING

The Highway Authority will only adopt road lighting situated within adoptable areas, except where specific alternative arrangements have been approved and these must be covered by a Deed of Grant.

The local Parish or Town Council must be consulted over whether the provision of street lighting in a development is acceptable, particularly if the location has no street lighting.

1.2.2.6 HIGHWAY DRAINAGE

The Highway Authority will adopt drains (pipework, gullies, manholes, catchpits and soakaways - but excluding pumping stations) laid for the sole purpose of the discharge of surface water from the highway.

Highway drainage will be laid within adoptable areas with the possible exception of soakaways which must be subject to a deed of grant to enable access for future maintenance.

Combined sewers, draining foul and surface water, and surface water sewers draining rainwater from building, yards etc, should be adopted by the Drainage Undertaker.

Where a sewer is laid within the proposed highway, or where a sewer accepts water from a proposed highway, and that sewer is the subject of a Section 104 Agreement under the Water Industry Act 1991, then the Part II certificate will not be issued until a provisional certificate has been issued by the Drainage Undertaker for the works which are the subject of the 104 Agreement.

Soakaways that require licences for ‘consent to discharge’ under the EA’s “Policy and Practice for the Protection of Ground Water” will not be adopted until the developer has paid to the County Council all commuted sums necessary to cover annual charges incurred by the Highway Authority.

All Soakaways, including those that require ‘consent to discharge’ licences from the EA, will not be adopted until the developer has paid to the Highway Authority all commuted sums which are necessary to cover future maintenance. These sums will vary depending on the environmental circumstances and location of each Soakaway together with the actual type of Soakaway constructed.

1.2.2.7 HIGHWAY STRUCTURES

The Highway Authority will only consider adopting those Structures defined in clause 1.1.5.2 that either carry the highway or support it.

Any structure spanning over a highway will not be adopted unless that structure itself carries a highway or forms an integral part of the highway such as a traffic sign gantry.

The Highway Authority will not adopt walls constructed to support the highway, except in agreed exceptional circumstances, as it is the Authority’s preference for the highway to be supported by banking.

Walls supporting private land adjacent to the highway will not be adopted and such walls must be totally founded on private land.

All structures situated within 3.6m of a highway, or which otherwise may structurally affect the highway or its support, whether adopted or not, will be subject to full approval procedure as determined by the Highway Authority.
Any unadopted protrusions over the highway will need the approval of and be licensed by the highway authority.

Highway structures will not be adopted until the developer has paid all relevant commuted sums and associated fees to the highway authority.

1.2.3 ADVANCE PAYMENTS CODE (APC) PROCEDURE

1.2.3.1 GENERAL

The creation of more private streets is to be avoided and this can be achieved by the correct application of the APC procedure (as detailed in the Highways Act 1980). This is a statutory tool which provides for the future making up of private streets. The required practice is for the rigorous application of the APC procedure.

Application of the APC procedure together with the administration and operational activities of Section 38 Agreement schemes, including adoptions, are carried out by the Highway Units on behalf of the Highways Authority.

All of this activity will be exercised in accordance with this document, Statute and the Highways Authority’s current KENT MODEL form of Section 38 Agreement. No variations to the model agreement will be permitted without the permission of the Area Manager.

1.2.3.2 HIGHWAYS ACT 1980 SECTION 219 - PAYMENT TO BE MADE BY OWNERS OF NEW BUILDINGS IN RESPECT OF STREET WORKS.

The following extract from Section 219 of the Highways Act 1980 is reproduced for information:-

219 (1) Subject to the provisions of this section, where:

• it is proposed to erect a building for which plans are required to be deposited with the local authority in accordance with building regulations, and

• the building will have a frontage on a private street in which the street works authority have power under the private street works code to require works to be executed or to execute works.

(1) No work shall be done in or for the purpose of erecting the building unless the owner of the land on which it is to be erected or a previous owner thereof has paid to the street works authority, or secured to the satisfaction of that authority the payment to them of, such sum as may be required under section 220 below in respect of the cost of street works in that street.

(2) If work is done in contravention of sub-section (1) above, the owner of the land on which the building is to be erected and, if he is a different person, the person undertaking the erection of the building, is guilty of an offence and liable to a fine not exceeding level 3 on the standard scale and any further contravention in respect of the same building constitutes a new offence and may be punished accordingly.

(3) Where the person undertaking the erection of the building is not the owner of the land on which it is to be erected and is charged with an offence under sub section (2) above, it shall be a defence for him to prove that he had reasonable grounds for believing that the sum required under section 220 below had been paid or secured by the owner of the land in accordance with sub section (1) above.

1.2.3.3 PROCEEDINGS IN RESPECT OF OFFENCES COMMITTED

Proceedings under sub-section (2) above shall not be taken by any person other than the street works authority.

1.2.3.4 DEFINITION OF ‘PRIVATE STREET’

Section 203 of the Highways Act 1980 defines a private street. Briefly, this is a street not being a highway maintainable at the public expense and includes, for the purpose of the APC procedure, any land shown as a proposed street on plans deposited with the District Council seeking either building regulation approval or planning permission.

1.2.3.5 APC PROCEDURE

Within six weeks of either Building Regulation approval being granted or an Initial Notice (issued by the NHBC) being received by the District or Medway Council, the Highways Authority shall serve a notice under Section 220 of the Highways Act 1980 specifying the amount to be deposited or secured in respect of the street works charges for those dwellings for which approval has been granted.

Notices served, payment made or security given are registrable as a local land charge with the local District Council.

If the Highways Authority has served a Section 220 notice, no work may be performed to erect the dwelling (including foundations) until the sum specified in the Section 220 notice has been deposited or otherwise secured to the satisfaction of the Highways Authority. Any building works commenced before the advance payment is made will result in enforcement by way of prosecution.

It is usual for Estate Developers to discharge their obligations under the APC by completing an Agreement with the Highways Authority under Section 38 of the Highways Act 1980. Even though it is proposed to complete such an Agreement, it is still an offence to commence building works (including foundations) before the Agreement is executed.

A Developer who wishes to start building before the Agreement is executed should either make a deposit, or provide the necessary security, in accordance with the Section 220 notice. This amount may be broken down, on request, to cover individual dwellings. Deposits made in this way will, upon completion of the Agreement, be refunded to the Developer together with all accrued interest.

1.2.3.6 FORM OF SECURITY

The Highways Act 1980 does not specify the form of security to be given and it is for the street works authority to decide what form the security should take. The Highways Authority has decided that the following securities are acceptable in lieu of a cash deposit:

• Mortgage or second mortgage on the development land.

• Completed Section 38 Agreement.

• A temporary bond. The bond must be in the standard form acceptable to the Highways Authority.

1.2.4 SECTION 38 AGREEMENT OF THE HIGHWAYS ACT 1980

1.2.4.1 PROCEDURE

Where an Estate Developer wishes to complete an Agreement for the development site under Section 38 of the Highways Act 1980, and when detailed planning consent has been granted, applications should be made to the appropriate Highway Unit.

The Developer will need to prove title to the land which will be the subject of a Section 38 Agreement, or provide Defective Title Indemnity Insurance and demonstrate a right to discharge surface water from the highway to either a water course, existing or proposed public sewer. Where it is proposed to drain the new highway into a sewer which is to be the subject of a Section 104 Agreement of the Water Industry Act 1991, then that Agreement must be completed with the Drainage Undertaker prior to the completion of the Section 38 Agreement.

In the development of some sites, it will be necessary to alter the existing public highway and these works may be the subject of a separate Agreement under the provisions of Section 278 of the Highways Act 1980. A standard form of such an Agreement is available from either the County Councils Legal Secretariat or the Area Manager.
The time taken to enter into such an Agreement is likely to be lengthy and the developer should take account of this when programming the works.

The Section 38 Agreement will cover neither foul sewers or any landscape areas which are outside the highway limits to be adopted by the Highway Authority.

The Highway Authority’s current KENT MODEL form of Section 38 Agreement shall be used in all cases. NO variations to the model agreement will be permitted without the permission of the Area Manager.

1.2.4.2 DRAWINGS REQUIRED

Initially, the following drawings should be submitted in duplicate for approval:

- A layout plan at 1:500 scale showing proposed adoption limits.
- A layout plan at 1:500 scale showing proposed street lighting together with calculations and data sheets.
- A plan to at least 1:500 scale showing the junction between the proposed highway and the existing public highway for Stage I safety audit.

In addition, the following drawings will be required in duplicate:

- A location plan, scale 1:1250 or 1:2500, clearly identifying the position and extent of the development site.
- A layout plan, scale 1:500, or to a larger scale as may be required, showing positions of carriageways (including carriageway widening), footways, footpaths, service margin strips, verges, traffic calming features, highway structures, visibility splays, surface water drainage details, positions of dwellings, parking spaces, garages and vehicle crossings, street lighting, street nameplates, trees and planting etc., and defining by spot levels the falls in turning spaces and on private drives.
- A typical cross-section, showing carriageway and footway specifications, camber or crossfall gradient, kerb type, bedding and upstand, etc.
- A typical detail of a vehicle crossing and pedestrian crossing.
- Longitudinal sections, showing existing and proposed levels, gradients, vertical curves, transitions, surface water and foul drainage, manholes, etc. Pipe and pipe bedding classifications should also be included on these drawings.
- Cross sections as may be necessary to indicate proposals for dealing with areas of cut or fill.
- Other drawings as necessary to detail surface water manholes, outfall structures, interceptors, soakaways, retaining walls and other highway structures, etc.

All the layout drawings submitted for inclusion in a Section 38 Agreement must be coloured as follows:-

- The new works (colour-washed pink).
- Any works which are situated within an adopted publicly maintainable highway (colour-washed pink and hatched red).
- All highway surface water drainage items (coloured blue).
- All highway surface water drainage items lying outside the limit of the proposed highway (colour-washed blue).

The area of land colour-washed pink will be transferred into the ownership of Kent County Council or Medway Council.

Areas of land colour-washed blue must be covered by a drainage easement.

There will be a need to ensure that all parties are fully conversant with the boundary of the existing adopted public highway in the area. The Highway Authority’s Highway Information Centre should be consulted, particularly if the development will be located outside of the urban nuclei, for clarification of such highway limits.

After approval, a total of ten copies of the layout plan and six prints of all other drawings will be required to support the Agreement. Additional copies may be required.

For large developments, it is recommended that the layout be divided into stages and that separate Agreements be completed for each stage.

1.2.4.3 SEALING OF AGREEMENT

When the detailed proposals have been approved, the drawings will be passed to the appropriate Legal Officer who will prepare a draft Agreement which will be passed to the Developer’s solicitor for approval. Once the draft has been approved the engrossment will be prepared and despatched for execution by the parties to the Agreement.

Only when a Developer and his Surety have executed and returned the engrossment to the appropriate Legal Officer may building works commence on the dwellings unless a deposit or security has been made. The Agreement will not be revealed on Local Searches until it has been executed by all parties and completed. Developers are advised to ensure that any road works undertaken comply with the plan/s approved by the appropriate Highway Unit and that they are inspected by the Unit’s representative.

A schedule attached to the Road Agreement will detail the roadworks in two parts.

1.2.4.4 COMPLETION CERTIFICATES, SURETY AND INSPECTION CHARGES

Three Certificates will be issued under the Agreement.

The Part I Certificate On completion of all works comprised in Part I of the Schedule to the Agreement.

The Part II Certificate On completion of all remaining works comprised in Part II of the Schedule to the Agreement.

The Final Certificate On completion of any remedial works at the end of the Maintenance period specified in the Section 38 Agreement.

The extent of the Sureties obligations under the Agreement will be The Engineer’s total estimated cost of all Works comprised in the Agreement. The sureties obligations will be reduced by 50% of the original surety value upon the issue of the Part I Certificate and reduced by a further 25% of the original surety value upon the issue of the Part II Certificate. The sureties obligations will reduce to nil upon the issue of the Final Certificate. On the issue of the Part II Certificate the road(s) will become highways, open to public use, but maintained at the developer’s expense. On the issue of the Final Certificate the road(s) will become maintainable by the Highway Authority at the public expense.

If the site is also the subject of a Section 104 Agreement under the Water Industry Act 1991 and the sewer is situated within the highway or is an integral part of the highway drainage system, then the Part II Certificate will only be issued after a ‘Provisional Certificate’ has been issued by the Drainage Undertaker for the works which are the subject of the 104 Agreement.

Lanscaping areas to be adopted under the Section 38 Agreement must be fully established before the Part II Certificate is issued and the areas shall be maintained weed free by the Developer during the maintenance period and until the Final Certificate is issued.
The Final Certificate will only be issued when:

- The transfer of the ‘highway’ land has been completed - that is, the area of land colour-washed pink on the approved Section 38 drawings.
- All necessary Deeds of Grant for drainage or street lighting situated outside the highway limits have been completed.
- Landscaping areas that are to be adopted are fully established and planted in accordance with the specification. If the Developer defaults on the maintenance aspect and there is a need to re-plant, adoption will be delayed until the landscaping is fully established or alternatively the developer pays a commuted sum to the Highway Authority so that adequate maintenance can be given in the early years. If more than 20% of planting has to be replaced before final adoption, then the developer will be required to extend his liability for maintenance for a further period to be agreed with the Area Manager.
- A Health and Safety File, as required by the Construction (Design and Management) Regulations 1994, has been delivered to the Area Manager. The H&S File should include two sets of ‘as constructed’ drawings and appropriate data for Highway Inventory and Structures Database input.
- All other requirements of the Section 38 Agreement have been fully complied with.

The Agreement will provide for the payment to the Highway Authority of costs associated with the works and these will be detailed in the Agreement. Additional commuted sums will be necessary for the future maintenance of adopted highway structures.

The Agreement will contain a clause stating that no dwelling shall be occupied until all works specified in Part I of the schedule to the Agreement up to and including the frontage of the property in question and connecting it to a highway maintainable at public expense have been completed and approved. In some circumstances, the connecting road may itself be subject to a Section 38 Agreement.

1.3 A SUSTAINABLE APPROACH TO HIGHWAYS CONSTRUCTION

1.3.1 INTRODUCTION

Developers should be aware that the Highway Authority is committed to the implementation of sustainable solutions wherever it is possible to include them economically and viably, without compromising unduly the quality of the finished works.

The standards for the pavement thicknesses and the choice of materials detailed in Kent Design are indicative of the minimum standards that will be acceptable to the Highway Authority.

Developers should demonstrate their commitment towards sustainability by considering alternative construction materials, which satisfy the principles of sustainability shown below, but retain similar performances to those of more traditional materials. Each site will have its own individual characteristics which will need to be evaluated accordingly. Evidence of this evaluation should be provided.

Techniques to conserve resources and the use of recycled materials are developing rapidly as they become more competitive. Consequently more and more public authorities are demanding that sustainability issues are addressed positively and constructively.

Kent County Council now has a committed approach to sustainable solutions and can provide an approval process that includes a technical assessment of the re-used or recycled product and the method of recycling, together with laboratory appraisals and field trials where necessary.

The approval process and any relevant specification required will only be provided at the developer’s expense. Specifications can be produced where required for specific development needs and contract control purposes.

There are a number of Kent specific clauses denoted by the suffix AK. These are additional to those within Volume 1 of the Highways Agency’s Manual of Control Documents for the Highway Works, and can be obtained from Kent County Council.

1.3.1.1 PRINCIPLES OF SUSTAINABILITY

Sustainability is concerned with conservation of resources. In engineering terms this could be achieved in the following ways:-

- Minimising of Materials.
- Reduction of Waste.
- Recovery of Materials for re-use.
- Re-use and Recycling of Materials.

### TABLE 1: PRINCIPLES OF SUSTAINABILITY

<table>
<thead>
<tr>
<th>Principle</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimising of Materials</td>
<td>Use only the minimum materials necessary for the development and, where practicable, the thinnest pavement design of the available permitted options. (see notes a)</td>
</tr>
<tr>
<td>Reduction of Waste</td>
<td>Developers can effectively reduce the wastage of materials by introducing regular audits to monitor and control site activity more closely, e.g. materials ordering and site practices. (see clause 1.3.3)</td>
</tr>
<tr>
<td>Recovery of Materials for Re-Use</td>
<td>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 or alternatively off-site. (see note d)</td>
</tr>
<tr>
<td>Re-Use and Recycling of Materials</td>
<td>Acceptable methods of recycling include:- cold processing on or off-site and hot processing off-site. (see notes e - i)</td>
</tr>
</tbody>
</table>

Notes on Table 1

(a) Kent Pavement Design Guide includes ‘Asphalt Substitution’ which may be used to reduce the sub-base thickness.

(b) Kent County Council’s Standard Specification which augments the Specification contains additional or revised clauses to assist contractors to implement sustainable alternatives as described in Para 1.3.6.

(c) Pozzolanic (hydraulic bound) materials e.g. Phosphoric Slag in accordance with Clause 886 AK, consist of re-used industrial waste products or incorporate binders such as slag or Pulverised Fuel Ash (PFA) which are industrial waste products. Benefits resulting from their use include the reduction of the total quantities of materials needed on site and savings on transportation costs.

(d) Acceptable materials for re-use include kerbs, channels, gully grates and pots, manholes and inspection covers, which are of equivalent specification, in good order and appropriate for the location. Other street furniture may also be considered acceptable by the Engineer.

(e) In-situ processing techniques are considered more environmentally friendly. They can also increase operational speeds on site, reduce local traffic congestion and transportation costs. Services to carry this out are widely available from specialist contractors. Consideration shall be given for the potential effects of noise and dust produced by the processes.

(f) Cold processing on site, in accordance with Clauses 614, 615 and 994 AK may be used to improve the road foundation and reduce or even eliminate the need for imported granular material.

(g) Cold processing on site methods, in accordance with Clause 994 AK and Clause 1086 AK, can be carried out on existing materials or on demolition materials, planings or other imported materials to produce structural pavement layers. They can be used in a wide range of carriageway and footway locations.

(h) Cold processing off-site produces materials which, when combined with bitumen, bitumen emulsion and other binders, can be used as road base layers on most residential access roads and distributor roads, in accordance with Clause 996 AK.

(i) Hot processing off-site, in accordance with Clause 902 or a modified clause subject to the Engineer’s approval, produces new bitumen bound materials which can be used in place of materials with no recycled materials content.
1.3.2 Sustainability Action Plans

Developers may plan to re-use materials by detailing their intentions for waste minimisation and re-use in sustainability action plans. This should cover all the materials used in the construction of the development including that used for construction of roads and footways, buildings and especially their fitting out.

Sustainability Action Plans in particular should identify materials used in high volumes irrespective of cost and materials of high value irrespective of quantity. These categories of materials are likely to show the maximum benefit from being targeted for waste minimisation and recycling.

The subjects to be covered in Sustainability Action Plans may include:

- Who in the organisation is responsible for managing sustainability in the contract
- Details of the training he or she has received
- How information on sustainability is to be conveyed to staff working on the contract
- How sub-contractors are made aware of, and encouraged to participate in, the sustainability plan.
- What systems are used to control and minimise transportation, water and energy costs.
- How product suppliers’ packaging e.g. pallets, are recovered.
- What percentage of recycled materials are contained in the products you propose to incorporate into the works.
- Which recycling centres will be used for processing materials recovered. Are these the nearest centres to the site. If not, explain.
- Who will carry out waste audits during construction.
- Who is responsible for taking action as a result of the waste audit.

Studies have shown that it is very beneficial to take positive action and to give consideration at the planning stage as to how much waste might be produced on site and what happens to it. In order to assist with the process developers are encouraged to complete a Sustainability Action Plan. A typical questionnaire is shown overleaf for typical highway materials. Developers may like to prepare one to cover house building and fitting out materials, assistance with this may be provided.

1.3.3 Waste Audits

Developers are also recommended to continue to monitor waste produced by a site, especially the two categories of materials identified in the Sustainability Action Plan (clause 1.3.2) by carrying out a waste audit as the work proceeds. This has been found to be enlightening both environmentally and financially and helps to develop a strong commitment by site staff to minimising waste and recycling that waste which is unavoidable.

The kind of information to be collected is described in the Sustainability Awareness Questionnaire.

A system will need to be developed which is site specific but does not generate excessive bureaucracy. Assistance with this could be provided.

Waste may be generated on site for the reasons given below. In order to provide developers and the Engineer with data on which to base future requirements and operations and in support of the Sustainability Action Plan, the developer is strongly recommended to supply the results of the waste audit of highway construction materials to the Engineer before adoption of the roads takes place.

The construction of dwellings will potentially generate far more valuable waste than the construction of carriageways and footways. The principles of sustainability and waste audit are even more applicable for this activity.
# SUSTAINABILITY AWARENESS QUESTIONNAIRE

1. What percentage of recycled material is contained in the products we buy?
   - a. Concrete for Kerbing
   - b. Capping Layer
   - c. Sub-base

2. How much of the material required for highway construction can come from the job itself?
   - a. Capping Layer %
   - b. Sub-base

3. How much material arising from the earthworks is removed from site?
   - Topsoil %
   - Suitable Fill %
   - Other Fill %

4. What method is being used to make existing sub-grade suitable as a capping layer?

5. 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

6. Where is the nearest inert waste recycling centre for arisings?

7. What percentage of product suppliers take back pallets and packaging?
   - a. Paving blocks
   - b. Kerbs and Channels
   - c. Ironwork
   - d. Street Furniture
   - e. Others

8. 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

9. Who is responsible for managing sustainability on the job?
   - Job Title
   - Resident on Site
   - Training received
I.3.4 REASONS FOR WASTE BEING GENERATED

1.3.4.1 ORDERING TOO MUCH MATERIAL

This may be because of past experience with contamination, inaccurate tolerances on construction layers, risk consequent on having too little material and having to order more at higher cost, error in bills of quantities or drawings, mis-ordering.

1.3.4.2 DELIVERY

Products may arrive on site with excess packaging or they may be damaged during off-loading or storage. Materials may be off-loaded at the wrong location so that during uplifting and moving, some is damaged, contaminated or wasted.

1.3.4.3 STORAGE

Granular materials; drainage material, sub base, sand bedding and the like should be stored on a hard base to avoid contamination and waste. They also benefit from being sheeted to prevent significant moisture change.

Palletised products need a hard base and ready access for transport to minimise damage.

Brittle products like clay/concrete pipes should be protected from damage by machinery. Specials and ancillary products need to be stored safely. Electrical equipment and materials that need to be kept dry e.g. cement should be kept under cover.

1.3.4.4 USE AT THE JOBSITE

If a surfeit of materials are laid out at the job site, it is necessary to retrieve the excess and return to store, this is particularly applicable to kerbs and channels and pavers.

1.3.4.5 SEGREGATION OF WASTE

Inert waste may be taken to a recycling centre by skip. It may not be acceptable if it is contaminated with topsoil, plastic, wood, paper, plasterboard and the like. After discussion with the recycling centre, separate skips for recyclable inert waste and the other material could be provided.

1.3.4.6 DURING INSTALLATION

Poor installation practices can lead to product/materials damage which is unnecessary and could be avoided. It can also lead to an excess of expensive materials being used. An example is poor preparation of the sub-base leading to excessive surfacing materials being used. Poor planning can make machine laying of surfacing difficult, hand laying commonly leads to waste as materials go cold.

1.3.5 INFORMATION CONTAINED IN A WASTE AUDIT

The waste audit should identify those materials that it is worthwhile monitoring because they are used in large quantities or are of high value.

For each product or material identified the following information could be collected. It may be prudent to provide this information regularly to ensure accuracy:

- Amount required (No, lin.m, cu.m, tonnes) taken from contract documentation
- Amount ordered (From orders placed)
- Amount used (From as-constructed drawings or re-measure if appropriate). This should only be different from bullet point 1 above if a variation has been made to the works. Excess material e.g. kerb backing, used to facilitate installation or correct poor tolerance control on the previous layer is effectively waste
- Volume of inert material taken to tip
- Volume of non-inert waste taken to tip
- Number of pallets delivered, and number returned

1.3.6 ENABLING SPECIFICATION CLAUSES

Specification Clauses which encourage sustainability in carriageway and footway construction are as follows. Where the Suffix RK is used this means that the Clause is published by Kent County Council as an additional Clause to the Specification. Where the Suffix AK is used this means that the Clause is published by Kent County Council as a revision to the Clause in the Specification.

1.3.6.1 CEMENT STABILISATION TO FORM CAPPING AND LIME STABILISATION TO FORM CAPPING

Clause 614 and 615

Commentary: These clauses are used to control the operations of the specialist stabilising sub-contractor who will bring to site a large rotavator/pulverisor to mix in the chosen binder. The quantity of binder will depend upon the moisture content, plasticity and grading of the existing soils. Since a large part of the cost is in the mobilisation of the plant it is prudent to plan the roadworks to maximise the work at any one visit.

1.3.6.2 EARTHWORKS ENVIRONMENTAL BUNDS AND LANDSCAPE AREAS

Clause 619 and 620

Commentary: These clauses provide a mechanism for disposing on site of materials not suitable for road construction, or surplus to requirements. It is usually necessary for the material below the topsoil and above formation to be removed, this may and should be used within the site wherever possible. The steepness of the sideslopes on landscaping features such as mounds or bunds will determine the properties required of the material. The design should attempt to allow all the material excavated to be re-used within the site and the required parameters set accordingly.

1.3.6.3 GRANULAR SUB-BASE TYPE 3

Clause 885AK

Commentary: These clauses are used to control the operations of the specialist stabilising sub-contractor who will bring to site a large rotavator/pulverisor to mix in the chosen binder. The quantity of binder will depend upon the moisture content, plasticity and grading of the existing soils. Since a large part of the cost is in the mobilisation of the plant it is prudent to plan the roadworks to maximise the work at any one visit.

1.3.6.4 PHOSPHORIC SLAG (PERFORMANCE-RELATED MIX)

Clause 886AK

Commentary: This clause has been developed in Kent to permit the contractor to use the output from local recycling centres for inert waste. It permits small quantities of contaminants such as wood and plastic to be used in footways, cycleways and carriageways on lightly trafficked roads such as Homezones and Minor Access Ways. All materials used must be from a source approved by the Engineer and shall not be frost susceptible when used in the carriageway.

1.3.6.5 RECLAIMED BITUMINOUS MATERIALS

Clause 902RK

Commentary: The Specification limits the amount of recycled asphalt that can be used in new asphalt. This revision increases the...
percentage of the maximum practicable through a hot mix plant. There is no evidence that quality is degraded provided that the plant is designed to include this percentage.

1.3.6.6 PERMANENT COLD LAY BASE (PCLB) MATERIAL

Clause 996AK

Commentary: This material is manufactured and may be identical to material which has a Highway Authorities and Utilities Committee (Highway Authorities’ Product Approval Scheme) Certificate for reinstatement material. It is made with a cold bitumen binder and up to 100% recycled aggregates. There is likely to be less waste or deterioration with material when laying slowly by hand or in confined areas.

1.3.6.7 GENERAL REQUIREMENTS FOR CEMENT BOUND MATERIALS

Clause 1035

Commentary: Cement Bound Materials are particularly suited to laying beneath block paving as the inevitable cracks do not cause maintenance problems. However quality control of strength and particularly compaction in accordance with this clause is vital for performance.

1.3.6.8 OTHER MATERIALS (IN PARTICULAR THE USE OF HYDRAULIC BINDERS FOR SOIL STABILISATION AND PRODUCTION OF SUB-BASE AND ROADBASE ARE AVAILABLE ON DEMAND).

Commentary: This is new field for the UK though these materials have been widely used in France and elsewhere in Europe. They use the by-products from power generation or metal production to produce a binder which is cheap and effective with some advantages over Portland Cement. Specifications are still evolving and contractors are advised to work with the Engineer using the advice of reputable consultants and manufacturers when submitting proposals.

1.3.7 REFERENCES FOR IMPLEMENTING SUSTAINABILITY

Environmental assessment - A guide to the identification, evaluation and mitigation of environmental issues in construction schemes SP96 CIRIA

Environmental handbook for building and Civil engineering projects SP 97-Design and Specification SP98 Construction phase CIRIA

Waste minimisation in construction - SP 134 Design Manual: SP 133 Site Guide CIRIA 6 Storeys Gate London WSW1P 3AU 0171 222 0445

Digests from the DETR Aggregates Advisory Service on a very wide range of materials and specifications and other sources of information (AAS Freephone 0800 374 279)
2.1 HIGHWAY STANDARDS FOR RESIDENTIAL ROADS

When designing new highway infrastructure consideration must be given to the requirement for greater access to persons with a mobility impairment. The term ‘mobility impaired’ encompasses a wide range of people, from wheelchair users and the visually impaired with guides/dogs to parents with pushchairs and shoppers with heavy shopping bags. Improving the highway for these road users will improve it for all road users.

It is necessary to take into account the aids people use to get around when designing or improving the highway. A person walking can cope with a narrow footway or a pinch point en route. However, a wheelchair user or a visually impaired pedestrian guided by a dog cannot.

Kent County Council has produced a code entitled ‘Highways Suitable for the Mobility Impaired’ and reference must be made to this guide in designing highway layouts to ensure the needs of the mobility impaired are catered for.

2.1.1 HIGHWAY LAYOUT DESIGN GUIDANCE

The document entitled ‘Housing Estates - Lifting the Quality’ produced jointly by the DETR, House Builders Federation and Planning Officers Society describes the need to reintroduce a variety of spacial types in highway layout design in order to create appropriate variety and add to a sense of place.

This guide encourages the need for appropriate variety in layout design and considers how the variety of spacial types promoted in ‘Lifting the Quality’ can be related to the various road types detailed in table 2. It is considered that the various spacial types can be represented by differing road types to offer a considerable array of options to the highway layout designer who should be working closely with Architects and Urban Designers to produce a ‘place’.

The table below indicates how this guide promotes the use of a variety of spacial types in relation to various road types.

The following illustrations are provided to stimulate a variety of solutions appropriate for a particular location rather than representing a set of prescriptive standards. The illustrations deliberately do not show standardised layouts but attempt to indicate how a highway can be use to create a space and become an integral part of the overall design for the area.

<table>
<thead>
<tr>
<th>TABLE 2: STANDARD ROAD AND SPATIAL TYPES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>STANDARD ROAD TYPES</strong></td>
</tr>
<tr>
<td><strong>STREET</strong></td>
</tr>
<tr>
<td><strong>AVENUE</strong></td>
</tr>
<tr>
<td><strong>CRESCEENT</strong></td>
</tr>
<tr>
<td><strong>SQUARE</strong></td>
</tr>
<tr>
<td><strong>GREEN</strong></td>
</tr>
<tr>
<td><strong>LANE</strong></td>
</tr>
<tr>
<td><strong>MEWS</strong></td>
</tr>
<tr>
<td><strong>COURTYARD</strong></td>
</tr>
<tr>
<td><strong>CULS-DE-SAC</strong></td>
</tr>
<tr>
<td><strong>HOME - ZONE</strong></td>
</tr>
<tr>
<td><strong>DISTRICT DISTRIBUTOR 7.3m</strong></td>
</tr>
<tr>
<td><strong>LOCAL DISTRIBUTOR 6.75m</strong></td>
</tr>
<tr>
<td><strong>MAJOR ACCESS RD 5.5m</strong></td>
</tr>
<tr>
<td><strong>MINOR ACCESS RD 4.8m</strong></td>
</tr>
<tr>
<td><strong>MINOR ACCESS WAY 4.1m</strong></td>
</tr>
<tr>
<td><strong>MINOR ACCESS WAY 3m</strong></td>
</tr>
<tr>
<td><strong>HOME - ZONE</strong></td>
</tr>
</tbody>
</table>
2.1.2 Town Centre Scenario 1

This illustration combines the spatial types of an avenue, a crescent, a square and a street. In this case the illustration indicates the avenue is designed to a local distributor standard, whilst the crescent is designed to both major access road and minor access way standards, varying along its length. The street is designed to major access road standards whilst the square is designed to a minor access way standard. The street shows a trackway running through it, allowing casual on street parking outside the trackway.

2.1.3 Town Centre Scenario 2

This alternative town centre scenario indicates how the basic spatial type of a street is designed to a combination of major and minor access road and minor access way standards. The illustration shows how a junction can be used to meet more than one objective. The raised junction creates a bus, pedestrian and cycle interchange serving houses within a 400m radius. The raised junction also provides a means of traffic calming at this multi-modal interchange.
2.1.4 Town Edge Scenario 1

This example shows a village green incorporating a combination of streets and lanes responding to their location and interaction with routes and buildings. The different types of lanes are designed to minor access way, minor access road and homezone standards as appropriate to situation. The street acting as the main traffic access is designed to a major access road standard due to linking the village to the town centre.

2.1.5 Town Edge Scenario 2

The second town edge scenario combines a street, courtyard and square homezone. The street is designed to a major access road standard with the courtyard access directly off designed to minor access way standards. This convergence reacts to the location of the junction, using it as natural traffic calming by developing the junction as a multi-purpose node.

These four examples begin to show how a variety of spacial types can be designed using differing highway standards depending upon the number, type and disposition of dwellings the highway is serving and the appropriate target speed required.

The ability to design a variety of spacial types to differing highway standards should enable the design team to introduce variety and appropriateness into highway layouts. These should be integral to the whole scheme’s concept and therefore increase the opportunities for the individual designers to respond positively and collectively to the locality in enhancing a sense of place.
2.2 GEOMETRIC REQUIREMENTS FOR RESIDENTIAL ROADS

2.2.1 TURNING FACILITIES

2.2.1.1 GENERAL

Turning facilities shall be provided wherever vehicles would otherwise have to reverse over long distances or whenever they might turn in locations which could cause damage to adjacent verges or footways. Depending upon the degree of inconvenience which could be caused, turning areas may be provided as parts of junctions.

The spacing, layout and dimensions of turning areas should be designed to cater for the category and size of vehicle normally expected to use them. The following criteria however, needs to be taken into account when designing turning areas:

- Refuse and large service vehicles should not be expected to reverse more than 40m.
- Pantechnicons should not be expected to reverse more than 60m
- Cars and smaller service vehicles should not be expected to reverse more than 25m

The siting of turning areas should aim to minimise the likelihood of vehicles using them for parking. Indiscriminate parking can be discouraged if the turning area provides direct access into the curtilage or parking areas of adjacent dwellings. However where casual parking is permitted outside the area required for turning, spaces shall be located carefully between driveways as shown in fig 6.

![Figure 6 - Casual Parking](image)

2.2.1.2 TURNING CONFIGURATIONS

Manoeuvring requirements can be checked by using standard templates based on vehicle types expected to visit and use the site. A wide variety of turning movements for various vehicle types are given in Appendix 1 of Design Bulletin 32 ‘Residential Roads and Footpaths - Layout Considerations’ 2nd Edition 1992. Designers should use this data to construct the form and size of the turning area best suited to a particular road type. The diagrams give the minimum envelope required to contain the movement. Nevertheless, consideration shall be given to the tolerances which may be necessary, the layout of the road type and the possibility of kerb overrun and how the area would be swept by mechanical sweepers.

Manoeuvring requirements can also be checked using one of the widely available computer software packages currently on the market. These packages enable designers to generate sweep paths for particular vehicle types and to superimpose them onto pre-drafted layout drawings.

2.2.2 GRADIENTS

2.2.2.1 GENERAL

When designing roads there is a tendency to use steep gradients to avoid excessive cut and fill of the natural landscape. However, in order to minimise the dangers of icy conditions and improve road safety on bends and at junctions, there is a need to restrict the maximum acceptable gradients. Similarly to assist in draining the road and preventing ponding areas, there is a need to restrict the minimum acceptable gradients.

Where changes in gradient occur, vertical curves are required at summits and sags both for ease and comfort of driving, and at summits in particular to ensure adequate forward visibility along the carriageway.

2.2.2.2 LONGITUDINAL GRADIENTS

The maximum and minimum longitudinal gradients for residential roads should be restricted in line with the following recommendations.

**Maximum Longitudinal Gradients**

- All vehicle, pedestrian and cycle dominated environments, except shared surface environments 6% (1 in 16.7)
- Shared surface environments 7% (1 in 14.3)

**Minimum Longitudinal Gradients**

- All environments (flexible surfacing) 0.8% (1 in 125)
- All environments (block paving surfacing) 1.25% (1 in 80)

Industrial and Commercial Road gradients shall be in accordance with section 2.3.

Shared and individual private drives shall normally have a longitudinal gradient no steeper than of 10% (1 in 10), however access gradients may be increased to a maximum of 12.5% (1 in 8) on sites where the level differences make it impractical to use less steep gradients. To avoid vehicles grounding the gradient should be maintained at 10% (1 in 10) maximum for at least 1.5m from the back of the highway boundary or include a roll-over detail as shown in Fig 7.

![Figure 7 - Gradients and Roll-over details](image)
2.2.2.3 CROSS-SECTIONAL GRADIENT

The carriageway cross-section shall have a profile which is either cross-fall or cambered, generally at a gradient of 2.5% (1 in 40).

Changes in cross-sectional gradient from cross-fall to cambered should be avoided where the longitudinal gradient is flat.

2.2.2.4 VERTICAL CURVES

Vertical curves shall be provided at all changes of longitudinal gradient as indicated in fig 8.

![Vertical Curve Diagram](image)

To ensure reasonable standards of comfort and appearance and to secure appropriate visibility at summits, vertical curves should be provided using the following criteria.

The length of curves shall be derived using the formula: \( L = KA \); where \( L \) is the curve length in metres, \( A \) is the algebraic difference in gradient (expressed as a percentage) and \( K \) has a value as indicated in table 3.

<table>
<thead>
<tr>
<th>Vehicle or Pedestrian and Cycle Environment Type</th>
<th>Target Speed</th>
<th>Minimum K value for stopping and adequate comfort</th>
</tr>
</thead>
<tbody>
<tr>
<td>District Distributor Road</td>
<td>30</td>
<td>11</td>
</tr>
<tr>
<td>Local Distributor Road</td>
<td>25</td>
<td>7</td>
</tr>
<tr>
<td>Industrial Local Distributor Road</td>
<td>20</td>
<td>5</td>
</tr>
<tr>
<td>Industrial Access Road</td>
<td>15</td>
<td>3</td>
</tr>
<tr>
<td>Major Access Road</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>Minor Access Road/Way</td>
<td>20</td>
<td>5</td>
</tr>
<tr>
<td>Shared Surface Areas</td>
<td>15</td>
<td>3</td>
</tr>
<tr>
<td>Homezones</td>
<td>10</td>
<td>1</td>
</tr>
</tbody>
</table>

2.2.3 JUNCTIONS

2.2.3.1 GENERAL

Junctions are generally required at the intersection points where roads meet each other. The majority of junction arrangements take the form of some type of priority junction, (either 'T' types, staggered types or crossroads) which is normally appropriate where traffic flows, particularly to and from minor roads, are relatively light. Where flows are heavier or layouts are complex, other types of layout or control are required to reduce the accident risks and to balance or improve capacity.

Where a residential road joins a distributor road, a 5.5m width shall be maintained for 20m from the junction and footways provided on both sides of the non-priority road. No other road junctions shall be permitted within this 20m distance including all driveways and accesses.

Junction arrangements involving alterations to the existing highway will require the developer to enter into a separate agreement under the provisions of Section 278 of the Highways Act 1980.

2.2.3.2 TYPES

Junctions involving district distributor or residential local distributor roads shall be designed in accordance with the Design Manual for Roads and Bridges, published by the Department of Transport, Volume 6 Section 2, TD42/95 or TD16/93 (roundabouts), depending on the traffic flow and turning characteristics. Junctions involving industrial and commercial roads shall be designed in accordance with section 2.3.

Junctions involving all other road types shall be simple 'T' type arrangements. Staggered junctions shall be designed in accordance with the spacing criteria detailed in table 5. Where traffic flows are very low, for example within minor access ways, consideration may be given to crossroad type arrangements.

Where non-priority roads, including all connecting roads, serve more than 100 dwellings the junction with the priority road shall be at an angle of 90° and shall be straight for a length of at least twice the kerb radius.

Non-priority roads, including all connecting roads, serving less than 100 dwellings may require specific entry treatment arrangements in accordance with section 3.5.

It is recommended that early discussion regarding the junction type, design and location should be held with the Engineer.

2.2.3.3 RADII

Junction radii shall be provided in accordance with table 5. All dimensions shown in table 5 apply to the priority road.

At junctions where the corner radii is less than 6m the footway shall be strengthened in accordance with tables 19 and 21.

2.2.3.4 VISIBILITY

To enable drivers emerging from the non-priority road to see and be seen by drivers proceeding along the priority road unobstructed visibility is required within the shaded area shown in fig 9, with inter-visibility being provided between heights of 0.6 and 2m. Sags and summits may affect visibility requirements.

![Visibility Diagram](image)

All junctions will require adequate visibility in accordance with table 5. Street lighting columns, sign posts and some trees can be located within the visibility splays, but larger obstructions shall be avoided as they could reduce safety levels.

Visibility splays at junctions shall be contained within the adoptable highway. It is generally desirable for a footway to be set back behind the visibility splay.

2.2.3.5 GRADIENTS

Gradients should not exceed 5% when rising, or 4% when falling towards the priority road for a distance of twice the junction radii measured from the channel line of the priority road.

2.2.3.6 RIGHT TURN LANE FACILITIES

Some junctions will require the right turning movements of vehicles from the priority road to be controlled by various methods, which can include amongst other things ghost islands, roundabouts and signal controls.

RTL facilities for local distributors and industrial roads shall be in accordance with section 2.3.
All other residential roads will require RTL facilities where the priority road is a primary or district distributor or where the non-priority road, including all connecting roads, will generate in excess of 500 vehicle movements a day.

It is recommended that early discussion regarding the RTL facility type, design and location be held with the Engineer.

2.2.3.7 Pedestrian and Cycling Provision at Junctions

All road junctions need to be designed with the safe interests of cyclists and pedestrians in mind. At busy junctions there may well be a need to provide separate cycling lanes together with appropriate road markings and signing where space permits, however detailed facilities at the junction will depend on location circumstances. If necessary consideration should be given to signalling the whole junction.

Pedestrian facilities at junctions may include uncontrolled pedestrian crossing points, refuge islands, zebra or signal controlled crossings. The degree of pedestrian facilities required will depend on the nature and volume of the vehicular and pedestrian movements at the junction.

Defined at-grade zebra or signal controlled pedestrian crossings on minor roads shall normally be set back 1.5m from the give-way line of the junction and should be sited to minimise crossing widths.

Separation islands are normally situated at the mouth of the non-priority road. Dropped kerbs and tactile surfacing (at locations along and across distributor roads and where pedestrian flows are likely to be high) shall be used at all crossing points for the blind and partially sighted.

Guardrails shall be used where significant pedestrian activity makes it necessary to channel pedestrians to the appropriate crossing point. Care should be taken to ensure that guardrails do not interrupt visibility and consideration shall be given to the type of barrier used.

2.2.3.8 Entry Treatments

Entrances to some pedestrian and cycle dominated environments, in particular shared surfaces, should have visual characteristics that define them from conventional access entrances.

This can be achieved by using design features including granite sets, closely spaced buildings, traffic calming features, ground cover planting or contrasting paving materials.

It is very important to emphasize to drivers entering shared surface environments that there is no separate provision for pedestrians. In the interests of safety, therefore, it is essential that vehicle speeds are restrained to 15mph maximum.

2.2.3.9 Traffic Signs and Road Markings

Traffic signs and road markings shall be considered as an integral part of the design process. Advanced direction and warning signs may be required and will depend on the junction layout.

All traffic signs and road markings shall be in accordance with the latest The Traffic Signs Regulations and General Directions 1994, published by HMSO.

It is recommended that early discussion with the Engineer be held regarding the need and type of traffic signs and road markings.

2.2.3.10 Landscaping Details

Landscaping can help define the outline of junctions to provide reference points and to establish a background for signs. Sensitive use of textured surfaces, choice of street furniture and planting shall be used to enhance the general appearance. Landscaping should not compromise visibility and good long time maintenance of landscaping must be taken into consideration.

All landscaping features must be in accordance with the requirements of section 2.9.
2.3.3 Geometric Requirements

2.3.3.1 Speed Restraint

Vehicle speeds on industrial and commercial roads should be restrained to the design target speeds by the use of horizontal deflection. This can be achieved using the following criteria:

- distances between speed restraint devices shall not be greater than 150m.
- centre line radii for speed attenuation curves shall be no greater than 40m.
- the length of the separating straight between attenuation curves of opposite hand shall be no greater than 24m.

2.3.3.2 Junctions

Junction arrangements involving industrial and commercial local distributor and access roads shall be designed in accordance with the following criteria:

- layout configurations between industrial and commercial local distributor roads and primary distributor roads will depend on traffic flow and turning proportions. Details shall be in accordance with the requirements of the Design Manual for Roads and Bridges, published by the DETR Volume 6 TD42/95 or TD 16/93 (roundabouts).
- layout configurations between industrial and commercial access roads and local distributor roads or other vehicle dominated environments shall be simple 'T' junctions.
- minimum spacing between road centre-lines at junctions will be as follows:
  - 90m - for side roads which join the priority road on the same side
  - 15m - for side roads which join the priority road on opposite sides where there is a right-left stagger
  - 40m - for side roads which join the priority road on opposite sides where there is a left-right stagger
- It is recommended that right-left stagger junction arrangements be used instead of left-right arrangements in order to reduce vehicle conflict.

2.3.3.3 Radii

Radii for junction arrangements involving both industrial and commercial local distributor and access roads shall be in accordance with the following criteria:

- 15m - minimum required for all corners and access entrances.
- tapered kerb lengths equal to 1 in 10 (10%) are required immediately after the tangent points of the radii:
  - along the near side of the non-priority road for vehicles exiting the priority road
  - along the near side of the priority road for vehicles exiting the non-priority road
- footway construction around corners shall be strengthened in accordance with tables 19 and 21 in section 3.7.

2.3.3.4 Right Turn Facilities

A right turning facility is required where the non-priority road type is:

- an industrial or commercial local distributor
- an industrial or commercial access road which serves more than 15,000m² of gross floor space, and the priority road is either a primary distributor or industrial distributor.

2.3.3.5 Visibility

To ensure that drivers of vehicles can both see and been seen by other drivers at junctions, around bends and at entrances to premises, unobstructed visibility is required as follows:

- Inter-visibility must be provided between 1.05 and 2m.
- Junction visibility shall be provided in accordance with the following requirements:
  - 'X' distance - 4.5m
  - 'Y' distance - 70m

Where traffic flows are expected to exceed 300 vehicle movements per hour the 'x' distance should be increased to 9m.

Where the priority road is an existing road the 'Y' distance shall relate to the existing measured 85 percentile wet weather speed on the priority road. Advice relating to wet weather speeds and visibility is set out in Planning Policy Guidance PPG 13 and Design Bulletin 32. All 'Y' distances relating to existing roads shall not be less than 70m.

Visibility around bends is related to vehicle stopping distances and shall be determined in accordance with the criteria set out in Design Bulletin 32.

Visibility at all vehicular accesses shall be provided in accordance with the following requirements:

- 'X' distance - 2m
- 'Y' distance - 70m

Where speed restraint measures are introduced along the road the "Y" distance can be reduced to 60m.

2.3.3.6 Carriageway Widths

A carriageway width of 7.3m is required for both industrial and commercial local distributor and access roads. Widening around bends shall be in accordance with criteria set out in 'Designing for Deliveries' published by the Freight Transport Association.

2.3.3.7 Centre Line Radii

A minimum centre line radius of 40m is required for both industrial and commercial local distributor and access roads.

2.3.3.8 Gradients

- Longitudinal Gradients

Both industrial and commercial local distributor and access roads shall have a maximum longitudinal gradient of 6% (1 in 16.7) and a minimum longitudinal gradient of 1.25% (1 in 80), except at junctions.

- Junction Gradients

At junctions the gradient shall not exceed 5% (1 in 20) when rising and 4% (1 in 25) when falling towards the priority road for a distance equal to twice the junction radii measured from the line of the priority road.

- Cross-Sectional Gradient

Both industrial and commercial local distributor and access roads shall have a cross-sectional gradient of 2.5% (1 in 40). Changes in cross-sectional gradient from crossfall to cambered should be avoided where the longitudinal gradient is flat.

- Vertical Curves

Vertical curves should be provided at summit and sag points for all changes of gradient in accordance with section 2.2.2.4.
2.3.3.9 Turning Facilities

The manoeuvrability of large goods vehicles depends on their size, on whether they are rigid bodied or articulated, on the number of axles and on the skill and judgement of the driver.

Some industrial and commercial estates may have to cater for a whole range of vehicle types and sizes, however in terms of sustainability it is both impractical and uneconomical to provide turning facilities to cope with the worst of all possible operating conditions, such as high numbers of the largest vehicles all requiring to visit a site in the same short space of time.

Nevertheless, designs should take into account commonly occurring movements, recognising that a small number of larger vehicles will occasionally experience some difficulty in manoeuvring and that individual vehicle performance varies greatly with axle configuration and spacing.

Manoeuvring requirements can be checked using two methods. The first is to use standard templates, based on vehicle types expected to visit and use the site together with design techniques originally developed by the Freight Transport Association. The templates are included in the Freight Transport Association document entitled ‘Designing for Deliveries’. A second method is to use one of the computer software packages available, either to generate the swept path for a particular vehicle type or to superimpose it on a pre-drafted layout drawing. Additional information regarding the characteristics of turning manoeuvres are described in Design Bulletin 32.

Industrial and commercial local distributor and access roads that are not through roads or exceed 200m in length without a junction must always include a suitable turning facility.

2.3.4 Additional Requirements for Industrial and Commercial Roads

2.3.4.1 Footways

Where there is a demonstrable need to provide access for pedestrians, 2m wide footways shall be provided on each side of the road for both industrial and commercial local distributor and access roads. If no development is planned for one side of the road the footway may be replaced by a 1m wide safety margin planted in accordance with section 2.9.

If public transport is expected to use the roads the footway adjacent to bus stops and shelters should be widened to 3m.

Footway construction shall be in accordance with tables 19 and 21 in section 3.7 except that an additional 100mm of roadbase shall be provided.

Longitudinal gradients shall be no steeper than 6% (1 in 16.7). Steps should be avoided as much as possible but where it is impossible due to the topography of the site details should be in accordance with guidance given in the County Council’s Code of Practice "Highways Suitable for the Mobility Impaired". Cross-sectional gradients should be 2.5% (1 in 40) and shall fall towards the carriageway.

2.3.4.2 Vehicular Crossing Points

Direct vehicular access is only permitted off industrial and commercial access roads. No direct access shall be permitted from industrial and commercial local distributor roads.

Vehicular access to units and premises shall not be permitted within 20m of the junction of a priority road.

The layout design needs to take into account the necessary widths of the vehicular accesses which should be able to accommodate all operating conditions. Any large individual premises, say larger than 25,000m² of gross floor space, should have its own access at least 6.1m wide.

All vehicular crossings shall be constructed in accordance with table 22 in section 3.7.

2.3.4.3 Verge Details

Verges are required to provide safety barriers for pedestrians where footways are provided along industrial and commercial local distributor and access roads.

Verges shall be 2m wide and provided between the footway and the carriageway. They shall be planted in accordance with section 2.9.

Verges can be extended to form part of the visibility areas if necessary.

2.3.4.4 Parking Details

Parking in industrial and commercial developments shall be in accordance with Kent County Council’s ‘Vehicle Parking Standards’ published in February 1999 and/or the Planning Authority’s local plan requirements.

Security and convenience are important factors for any firm where vehicles or trailers are likely to be left for long periods, therefore each individual unit will require to have sufficient curtilage parking and loading areas in order to prevent vehicles and trailers being left on the highway.

Special facilities shall be provided for disabled persons or other special needs such as parents with young children, to minimise travel distances. Parking bay widths shall be designed to accommodate irregular access and ramps or dropped kerbs provided as required.

2.3.4.5 Street Lighting Details

Road lighting shall be provided along all industrial and commercial local distributor and access roads in accordance with section 2.8.

2.3.4.6 Headroom

Minimum headroom over the highway for industrial and commercial local distributor and access roads shall be in accordance with the criteria set out in ’Designing for Deliveries’ published by the Freight Transport Association.

2.3.4.7 Vehicular Access to Premises

All private loading and parking areas shall be designed to allow vehicles to enter and leave in a forward direction. Reversing of large vehicles onto the highway shall be avoided in all circumstances. All security or gate arrangements shall be sited at least 20m from the highway boundary in order that parking and administration formalities can be conducted without disturbing other highway users.

2.3.4.8 Surface Water from Adjoining Accesses

All private loading and parking areas shall be designed to prevent surface water from adjoining accesses draining onto the highway.

2.4 Cycleway Design

Cyclists need sufficient lateral space to cycle safely and comfortably. Adequate width needs to be provided for the cyclist to progress at their chosen speed, to overtake other cyclists, to deviate around road defects, debris and other hazards near the kerb and to be passed safely by motor vehicles. Cycle lanes should be free from obstructions to allow free passage for cyclists. This includes all types of street furniture. If any street furniture is in the cycle lanes, enough width must be available to remain at minimum width.

On-carriageway facilities may either be marked as:

Mandatory - a solid white line (Dia 1049) and with flow cycle lane signs (Dia 958.1 & 959.1). Cycle logo (Dia 1057) can be used where upright signing is provided.

Advisory - a broken white line (Dia 1004) and sign (Dia 967). Cycle logo (Dia 1057) can also be used. An advisory lane should only be used where a mandatory cycle lane is unsuitable, such as when occasional encroachment by motor vehicles is essential.
2.4.1 CYCLEWAY STANDARDS

Widths can be reduced from these desirable levels, only in exceptional circumstances. The need to reduce from these levels must be discussed with the Safety/Cycle Auditor along with supporting information on traffic levels, traffic types and cyclist numbers.

If a route is to be segregated, for the safety and comfort of pedestrians and cyclists all the following must be provided:

- a white delineation line;
- bar tactile markings at the beginning and end;
- blister tactile markings if the route crosses any other roads;
- signs indicating the use of the route.

In order to reduce the possibility of cyclists being squeezed at pinch points, it is essential that widths between the kerb and refuge/central island are carefully considered:

- Mandatory - 4.5m (1.5m cycleway, 3.0m vehicle running lane)
- Advisory - 4.0m in general (1.2m cycleway)

Where it is expected that cyclists will travel contra-flow with the adjacent traffic flows, segregation shall be provided by means of a verge 0.5m wide between the cycleway and the carriageway.

A minimum verge width of 0.5m shall be provided between cycleways and adjacent buildings.

Cycle parking (preferably covered) shall be provided at key locations and parking areas where cycles are expected to be left unattended.

Additional guidance for cycleway design is provided in the KCC document ‘A Cycling Strategy for Kent’.

2.5 SUMMARY OF THE HIGHWAY STANDARDS

The dimensional standards required in designing a highway layout are dependant upon the nature of the highway and the traffic it is designed to carry. Standards that apply to all highway types are shown in table 5.
A GUIDE TO SUSTAINABLE DEVELOPMENT

### TABLE 5: CYCLEWAY STANDARDS - HIGHWAY STANDARDS

<table>
<thead>
<tr>
<th>Road Type</th>
<th>Vehicle Dominated Environment</th>
<th>Pedestrian and Cycle Dominated Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>District Distributor</td>
<td>Local Distributor</td>
</tr>
<tr>
<td>Type of Traffic</td>
<td>All Vehicles</td>
<td>Low HGVs, Buses</td>
</tr>
<tr>
<td>Max No of Dwellings</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Minimum Width</td>
<td>7.3m</td>
<td>6.75m</td>
</tr>
<tr>
<td>Trackway Width</td>
<td>4.8m</td>
<td></td>
</tr>
</tbody>
</table>

#### Determining Highway Requirements

- **Speed Restraint Required**: Yes, Yes, Yes, Possibly, Possibly, Possibly, Possibly, Possibly, Possibly
- **Max Road Length Without Devices**: N/A, N/A, 80-120, 60, 40, 60, 40, 60, 40
- **Max Distance Between Devices**: 150, 150, 100, 60, 40, 60, 40, 60, 40
- **CL Rad for Speed Attenuation Curves**: 40, 40, 30, 20, 15, 20, 15, 20, 15
- **Max Distance Between Act. Curves**: 24, 24, 20, 16, 12, 16, 12, 16, 12
- **Max Dist. from end of cul-de-sac and Attenuation Curve**: Device N/A, N/A, 100, 60(h)-40(v), 60(h)-40(v), 60(h)-40(v)
- **Junctions**: “X” Distance, 4.5, 4.5, 2, 2, 2, 2, 2, 2, 2
- **Y Distance**: 70, 70, 60, 33, 23, 33, 23, 33, 23
- **Forward Visibility Speed Cont. Bends**: 60, 60, 45, 33, 23, 33, 23, 33, 23
- **Junction Spacing**: Adjacent, 60, 60, 30
- **Opposite R/L, Opposite L/R**: 15, 15, 15
- **Radius**: 30, 30, 30

- **Right Turn Facility**: Yes, Yes, Yes, No, No, No, No, No, No
- **Cycleways**: Yes - Off Cwy (Shared/Segregated), Yes - On Cwy (Mandatory), Consider shared use with Footway, No, No, No, No, No, No
- **Fwy Width**: 2, 1.8, 1.8, 1.8, 1.8, 1.8, 1.8, 1.8, 1.8
- **Verge Width**: 2, 2, 2, 2, 2, 2, 2, 2, 2
- **Margin Width**: 1.5, 1.5, 1.5, 1.5, 1.5, 1.5, 1.5, 1.5, 1.5
- **Casual Parking**: No, No, Yes, No, No, Yes, Yes, Yes, Yes
- **Frontager Access**: No, Yes, Yes, Yes, Yes, Yes, Yes, Yes, Yes
- **Street Lighting**: Yes, Yes, Yes, Yes, Yes, Yes, Yes, Yes, Yes

#### Geometric Standards

- **lane Width**: 4.8m, 4.1m (max 3.0m (with passing places) 3.0m)
- **Width of KL Rad for Speed Attenuation Curves**: 4.1m (max road length 60m) 4.1m (max road length 60m) 3.0m (with passing places) 3.0m
- **Width of X Distance**: 4.5, 4.5, 2, 2, 2, 2, 2, 2, 2
- **Width of Y Distance**: 70, 70, 60, 33, 23, 33, 23, 33, 23
- **Width of Cycleways**: 2, 1.8, 1.8, 1.8, 1.8, 1.8, 1.8, 1.8, 1.8
- **Width of Cycleways**: 2, 2, 2, 2, 2, 2, 2, 2, 2
- **Width of Margins**: 1.5, 1.5, 1.5, 1.5, 1.5, 1.5, 1.5, 1.5, 1.5
- **Width of Casual Parking**: No, No, Yes, No, No, Yes, Yes, Yes, Yes
- **Width of Frontager Access**: No, Yes, Yes, Yes, Yes, Yes, Yes, Yes, Yes
- **Width of Street Lighting**: Yes, Yes, Yes, Yes, Yes, Yes, Yes, Yes, Yes
2.5.1 GUIDANCE FOR THE TABLE OF STANDARDS

The table combines the minimum acceptable standards necessary for highway layout design and reflects standards that are published in Residential Roads and Footpaths - Layout Considerations - Design Bulletin 32 (Second Edition), published by the DETR.

Interpretation of the standards will rest with the Area Office or District Development Control Officer.

The table differentiates between environments that are dominated by vehicles and environments where the intention is for them to be dominated by pedestrians and cyclists.

Safety for pedestrians, cyclists and vehicle users is paramount in layout design and advice must be sought for appropriate level of signs and lines in low speed, pedestrian and cycle friendly environments.

The table describes the type of traffic that is likely to use the particular road type. The table is split into three sections:

Section 1 determines the basic highway requirements for the particular road type and the traffic it carries, namely the road width and target speed;

Section 2 details the geometric standards necessary to achieve the target speed and create a safe environment;

Section 3 describes the additional requirements or allowances for the particular road type.

The Target Speed concept is the context for the geometric standards and therefore standards are based on road speed not road type.

Lower target speeds of 10 or 15 mph could be used in certain road types and target speeds for certain sites may well be specified in the local plan.

Road widths are given for the carriageway in vehicle dominated environments, but are given as the ‘trackway’ width in pedestrian and cycle dominated environments.

Trackways are described in ‘Places, Streets and Movement’, Companion Guide to Design Bulletin 32, Residential Roads and Footpaths, published by the DETR and are the widths that are to be kept clear for traffic within an overall, variable highway width that could allow for on-street casual parking or community areas through which slow moving traffic might pass.

There is the need to maintain access for service vehicles to properties although provision for them should not be the overriding factor in layout design.

There may be a need to allow access for buses into or adjacent to developments although this should not be an overriding factor in layout design. Narrow widths could be maintained by putting buses on looped routes to avoid them passing each other.

Access for utilities’ works and highways maintenance needs to be considered in the layout design.

Major Access Roads can be single carriageway circuit roads (with one point of access) or alternatively loop roads (with two points of access). Circuit roads shall have a short connecting length between the circuit and the point of access together with an alternative means of access.

The needs of the emergency services must be taken into account in layout design. If the number of dwellings served by a cul-de-sac exceeds 50 or where a major access road is designed as a circuit road, then an alternative means of access for cyclists and pedestrians, which could also be used for vehicular access in the event of an emergency, may be required. 3m wide access widths must open out to a 3.7m wide envelope to allow for fire appliance doors to fully open.

In narrow roads provided with passing places, care needs to be taken in differentiating them from parking places.

Generally, the developer should be able to demonstrate how a layout can work without relying on a prescribed standard for every detail.

In environments where overall highway width varies but a trackway provides for movement, casual parking could be allowed in the spaces outside the trackway.

The need for casual parking should be assessed and provided for in the layout. The provision for casual parking would need to be designed in a way that prevents abuse of the space provided for parking.

Maximum road lengths are introduced as a way of ensuring that speeds do not exceed the target speed of the road without the need for speed restraint. These maximum road lengths would enable a layout to be designed that achieves target speeds without the need for speed restraint devices.

If road lengths are longer than those stated for the target speed, then speed restraint devices would have to be introduced in order to achieve the target speeds.

The table includes standards for junction ‘x’ and ‘y’ distances, junction spacings and radii.

In the third section of the table, footway widths should be based on their usage in accordance with the type of road, rather than a standard, but must always remain of sufficient width to accommodate the mobility impaired and services, as the highway authority will not allow services to be provided beneath the carriageway. Footway widths could be reduced to 1.5m in rural areas, for example, in keeping with the surrounding location.

Verges are required to separate pedestrians and vehicles in district and local distributor roads. Margins are only required in shared surfaces to accommodate services where a footway is not provided, and for vehicle overhangs where a footway is not provided. The minimum margin width is 1.5m but this may need to be widened where necessary to accommodate services.

Frontager access is allowed on all road types except for the district distributors.

Streetlighting is mandatory on district, local distributor roads and shared surface environments.

2.6 DRAINAGE

2.6.1 DESIGN OF SURFACE WATER DRAINAGE SYSTEMS

2.6.1.1 GENERAL

Surface water from the highway shall be collected by means of gullies and gully connections, channel and grating systems or combined drainage and kerb systems and shall be discharged through pipes of not less than 150mm diameter to an adequate sewer, highway drain, ditch or watercourse or, where sufficient permeability is obtainable, to soakaways. Where a ditch or watercourse may become overloaded by additional run-off, regulation of the discharge by means of a balancing container or pond may be required. The EA should be consulted regarding outfall and discharge criteria.

Where it is proposed to connect to an existing or proposed public sewer, the consent of the appropriate Drainage Undertaker will be required, and the Engineer will require evidence that such consent has been obtained prior to approving the drainage design.

2.6.1.2 DESIGN OF HIGHWAY DRAINAGE SYSTEM

The ‘Rational (Lloyd-Davies)’ method shall be used for the design of highway drainage as set out in Road Note 35 ‘A guide for engineers to the design of storm sewer systems’, published by HMSO and used in conjunction with the ‘Tables for the hydraulic design of pipes and sewers (5th Edition)’, published for Hydraulics Research by Thomas Telford Ltd, except for small developments with less than 1000m² run-off, where a 150mm...
diameter pipe at a minimum gradient of 1/150 will be adequate.

The following parameters shall be used:-

- The system must be capable of accepting without surcharge a storm frequency of once every 2 years except for sites where consequences of flooding are severe, for example: existing basement properties adjacent to new development, where a frequency of once every 5 years will apply.
- Time of entry - normally 2 minutes.
- Minimum self cleansing velocity - 0.76 m/sec.
- Full bore velocity should generally be limited to 3 m/sec. by the use of back drop manholes or cascades where necessary.
- Impermeability factor - 1.0 over whole width of highway (including footways and verges).
- Roughness coefficient of pipes - 0.6mm.
- The following formula shall be used in calculating the rate of flow:
  \[ Q(\text{litres/sec}) = 2.78 \times R \times \text{Ap} \]  
  where R is the rainfall in mm/hr and Ap is the cumulative impermeable area in hectares.

To assist in the checking of drainage calculations a design sheet based on Table 1 of Road Note 35 should be used, and should be submitted on 'A4' size paper.

Highway drains shall be laid in straight lengths, and within the existing or proposed highway, unless it is impracticable to do so. Under no circumstances shall chambers be located within carriageway junctions or roundabouts. The edge of the excavation should not normally be closer than 600mm to the proposed kerb line or edge of carriageway. Chambers shall be provided at all changes of direction and grade and also at the head of all drains and branches, at every junction of two or more drains, except gully connections, and where there is a change of size of pipe. The spacing of chambers should not in any case exceed 100 metres. Chambers should not be sited at or near the centre of the carriageway. A minimum clearance of 150mm should be maintained where the pipes cross any other piped or ducted service and care should be taken to avoid differential settlement. Where it is necessary to lay pipes through areas of fill, special precautions shall be taken.

If it should be necessary to lay two pipes, drains or sewers in the same trench the clear horizontal distance between the barrels shall be 450mm and the proposed chamber details must be submitted for approval by the Highway Authority and the appropriate Drainage Undertaker.

The basis for design of highway drains up to and including 900mm diameter, including gully connections and sewers shall be BS 8005. The type and class of both pipe and bedding, which shall be determined by the ground conditions, the proposed cover to the pipe, the design loading and the trench width, must be shown on the drawings. Calculation of design loads and bedding factors shall be in accordance with the Simplified Table of External Loads on Buried Pipelines, issued by the Building Research Station and published by HMSO. All calculations for design loads shall be submitted for the Engineer's approval.

Highway drains and sewers greater than 900mm diameter are classified as highway structures and are dealt with under clause 1.1.5.

As far as possible, the pipe cover shall be at least 1.2 metres within the highway or wherever it may be subject to heavy wheel loads. Elsewhere the minimum cover shall be 0.9 metres. If, at any place, it should be impossible to provide the cover specified above, the pipe shall be super strength if a clay pipe or heavy strength if a precast concrete pipe and surrounded by 150mm thick concrete mix ST2 and provided with flexible joints at no more than 5 metre centres.

Gullies should preferably connect directly into chambers, but if this is not possible they shall be connected to the main pipe by means of 45º oblique angled junctions or be saddled at an oblique angle and surrounded by concrete mix ST2. Gully connections shall not be longer than 20 metres and there shall be a separate connection for each gully. Alternatively carrier drains may run directly between each gully with gully connections serving no more than two gullies.

Each gully shall not drain more than 200m² of catchment area and gullies shall not be spaced at intervals greater than 45 metres except at summits where the first gully should not be more than 45 metres from the high point. Double gullies shall always be provided at sag points and low points each with its individual connection to the main sewer.

When calculating areas drained, allowance must be made for all footways, footpaths, paved areas and verges which fall towards the carriageway.

In footpaths separated from carriageways, gullies or channels connected to the highway drainage system must be provided where surface water would otherwise discharge into adjacent property or down a flight of stairs.

Gullies should be sited upstream of the tangent point at road junctions so that surface water in the channel does not flow across the junction. Care should be taken to avoid ponding in the vicinity of the mid-point of the radius kerbs. Where super-elevation is provided, a gully should be sited just short of the point where adverse camber is removed to prevent water in the upstream channel flowing across the carriageway. Care should be taken to avoid ponding in the transition length when the longitudinal gradient is flat or where there are traffic islands, central reserves or traffic calming measures. Gullies must not be sited directly at pedestrian crossing points, but wherever practically possible, located directly upstream of the crossing point.

2.6.2 CATCHPITS AND OIL INTERCEPTORS

Catchpits, shall be provided before each soakaway or outfall, in accordance with drawings referred to in clause 2.5.5. The EA may also require the inclusion of oil interceptors and they must be consulted in all cases concerning such requirements.

2.6.3 PIPES, PIPE TRENCHES, LAYING AND JOINTING PIPES

Vitrified clay pipes and pipeline fittings for highway drains shall comply with the relevant requirements of BS 65 and be of 'normal' type with flexible mechanical joints. Extra chemically resistant pipes and fittings shall comply with the relevant provision of BS 65.

Unreinforced and reinforced concrete pipes and fittings with flexible joints shall comply with the relevant provisions of BS 5911: Part 100. Ductile iron pipes, fittings and joints shall comply with the relevant provisions of BS EN 545.

Unplasticized PVC pipes, joints and fittings shall comply with the relevant provisions of BS 4660 or BS 5481. Solid wall concentric external rib-reinforced unplasticized PVC sewer pipe shall comply with the relevant provisions of Water Industry Specification No. 4-31-05 (published by the Water Research Council).

Pipes shall be spigot and socket, Ogee joints shall not be used. Where necessitated by sulphates in the soil, sulphate resistant pipes and concrete shall be used, the concrete to be compacted to give a dense mix, using vibration for all concrete in surrounds to gullies, chambers and the like and in all other cases where practicable. The type and class of both the pipe and bedding are to be stated on the drawings.

The open end of the last pipe shall be sealed whenever work is suspended using an approved plug to prevent the entry of harmful material. The end of any pipe to receive a future connection or extension shall be fitted with an approved stopper or seal. Its position
shall be recorded on a drawing, clearly dimensioned, to be handed to the Engineer and wherever possible the position shall be suitably marked on the ground.

The pipe shall not be covered or backfilled until approved by the Engineer. All drains and gully leads shall pass an air test in accordance with Clause 509 of the Specification.

In addition to the requirements of Clause 509 all highway drains, gully connections, and road gullies shall be completely cleaned of all detritus and foreign matter both at the beginning and end of the maintenance period. If any extraneous matter from the development site enters an existing road drain or public sewer the Developer shall be responsible for its removal.

2.6.4 GULLIES

Gully pots shall be in accordance with Clause 508 of the Specification and the following:-

- Gully pots shall be 450mm internal diameter and 900mm deep with 150mm diameter outlet and manufactured in accordance with BS 5911 Part 230 or BS EN 295. The outlet shall be fitted with an appropriate trap and rodding eye unless agreed otherwise by the Engineer. Alternatively plastic gully pots of approved manufacture, or brick or precast concrete sectional catchpits may be used subject to the approval of the Engineer. Gully pots and sectional catchpits shall be bedded on concrete mix ST4 and surrounded with 150mm thickness of concrete mix ST2 and shall be connected to the main sewer by means of 150mm dia. clay, concrete or UPVC pipes as specified in clause 2.5.3, bedded and surrounded by 150mm thick concrete mix ST2 when the cover to the pipe is less than 1.2 metres, and provided with flexible joints at no more than 5 metre centres.

- All gully gratings and frames shall be non-rocking, cast iron, to BS EN 124, Class D400 with a 900 cm² minimum area of waterway, and a minimum frame depth of 150mm. The gratings shall not have longitudinal slots capable of arresting a cycle wheel.

- Gully frames shall be set on a minimum of 2 and maximum of 4 courses of Class B Engineering bricks. Engineering bricks to be to BS 3921.

- Gratings and frames to gully pots shall be fixed so that the top of the frame is set, initially, slightly below the basecourse surfacing of the carriageway. They shall be re-set 6mm below the level of the final surface, other ironwork flush with the final surface. Tile slips and the like shall not be used for adjustment of levels. Gully gratings and frames shall be raised on epoxy mortar.

- Typical gully details are shown on KCC Drawing Nos KCC/500/016 to 022 inclusive.

2.6.5 CHAMBERS

Chambers shall be either Manholes, Catchpits or Inspection Chambers and shall be in accordance with Clause 507 of the Specification and the DTP Highway Construction Details Drawing Nos F3 and F12, or KCC Drawing Nos KCC/500/006-015 inclusive or Sewers for Adoption fig 1-7 and the following:-

- All chamber, taper and shaft sections are to be surrounded with 150mm of concrete mix ST2.

- All covers and frames shall be cast iron, non rocking, to BS EN 124, Class D400 with a 600mm diameter clear opening and a minimum frame depth of 150mm.

- In some urban areas and in areas liable to flooding the Engineer may require a larger opening and may have a preference for a different type of cover. In such situations the Engineer should be consulted.

- As far as possible, the necessity for backdrop connections should be avoided by lowering the pipe approaching the chamber, but where this is impractical or where it would result in a velocity of flow exceeding 3.0 m/sec., either a properly constructed backdrop connection or some suitable arrangement to reduce the velocity will be required. In cases of difficulty the Engineer should be consulted.

- In a chamber at a change of size of pipe, the soffit or crown levels of the two pipes, where conditions permit, should be the same. The soffit level of a smaller pipe shall not be below that of a larger pipe.

- Chambers in fields shall be to the general requirements of the landowner. Although buried chambers are not normally acceptable, where these are necessary, approved location marker posts must be provided in agreed positions.

- Chamber covers, frames and other ironwork shall be fixed so that the top of the frame is set at the level of the basecourse surfacing of the carriageway. They shall be set or re-set to the final level prior to the laying of the uppermost surfacing course.

- For Structural Approval of chambers see Section 1.1.5.

2.6.6 SOAKAWAYS

- Soakaways for road drainage should not be used if surface water can be disposed by connecting the road drains to an existing system or watercourse. Soakaways must not be sited in carriageways. For Structural Approval of Soakaways see Section 1.1.5.

Considerable care must be taken when siting soakaways and the following matters must be taken into consideration:-

- Distance from dwellings, current and future tree planting, carriageways, services, sensitive aquifers, adjacent landfills/ contaminated land etc,

- Possible future flooding problems,

- Possible future maintenance problems, including current and future access,

- Need for easements,

- Geological factors including risks of washouts, activation of adjacent solution features and activation of adjacent landslips.

Highway soakaways shall be situated the following minimum distances from dwellings, (measured from the outside edge of a soakaway):-

- 5 metres for conventional perforated soakaway,

- 10 metres for deep bore soakaway.

- Adjacent soakaways should be spaced a minimum of 10 metres apart, otherwise the combined capacity must be reduced to allow for interaction between the soakaways.

Catchpits shall be provided before the connection to a soakaway. In addition, the EA may require the inclusion of oil interceptors. In all cases the EA must be consulted. The drainage system shall be jetted and catchpits cleaned out prior to adoption to remove silt generated during the construction phase.

The EA’s ‘Policy and Practice for the Protection of Ground Water’ includes policy statements on discharges to underground
strata and should therefore be utilised when considering discharge to soakaways. Highway drainage to soakaways may be opposed in aquifer protection zones around public water supply boreholes.

An EA 'consent to discharge' is required to discharge effluent (which includes surface water from highways) to controlled waters, which are defined as inland, coastal and underground waters. It is therefore a requirement of the EA to obtain a 'consent to discharge' licence when constructing a soakaway which drains into an aquifer protected by the aquifer protection policy. The EA should be contacted at the design stage of a development if it is proposed to construct highway soakaways, to establish whether there is a need for a licence. If the EA requires a licence, then the Highway Authority will require the Developer to pay to the Highway Authority prior to the adoption of the works, a commuted sum to cover the future costs likely to be incurred by the Highway Authority in paying annual charges to the EA.

The minimum depth of soakaways shall be as to penetrate 2.0 metres into a suitably permeable stratum for a conventional chamber and 3.0 metres for a deep bored soakaway as detailed in Kent County Council’s ‘The Soakaway Design Guide’. Additional depth may be necessary to give the requisite capacity determined by a comparison of percolation with storm inflow. Soakage tests shall be carried out as required by the Engineer.

Soakaways shall be designed and installed in accordance with Kent County Council’s 'The Soakaway Design Guide', including such revisions as may be issued at the time of signing the Agreement. Catchment areas shall not exceed 3500m² for an individual chamber or bank of interconnected chambers.

It may be necessary to link soakaways with at least 150mm overflow pipes when soakage is poor, and at low points overflow pipes should be provided whenever possible. Alternatively, deep borehole type soakaways may be considered suitable, subject to EA approval.

The requirements for site investigation for soakaway approvals are detailed in section 3.2 and in Kent County Council’s ‘The Soakaway Design Guide’. Falling head soakage tests require approval from the EA and approval in principle by the Highway Authority will be required prior to the commencement of the construction phase.

Additional site investigation, ground improvement and special design requirements must be considered where solution features or ‘made ground’ are encountered local to soakaway chambers and inlet pipes. Under these geological conditions design requirements for inlet pipes include increased pipe flexibility and increased gradients to allow for future differential settlements.

Committed sums will also be required for future maintenance of each soakaway in the soakaway system and will vary dependant upon the type of soakaway.

2.6.7 Ditches and Watercourses

The EA, Inland Drainage Boards and riparian land owners should be consulted as to whether or not ditches or watercourses on development sites are to be piped or culverted. Such works require the approval of the Local Authority under Section 263 of the Public Health Act 1936.

Where roads or footpaths are to cross a watercourse or where the piping of an existing ditch is required, the size of the bridge or culvert must be agreed with the EA, Inland Drainage Boards and riparian land owners and the Babtie Group (Highways Structures Office).

In the case of a new footbridge over a watercourse the constructional details should be agreed with the Babtie Group (Highways Structures Office). Persons contemplating any development involving highway structures are advised to discuss their proposals initially with the Engineer.

2.6.8 Connection to Sewers and Drains

A new highway drain may be connected to an existing surface water or combined public sewer, or a sewer which is the subject of a Section 104 Agreement under the Water Industry Act 1991, subject to the approval of the Drainage Undertaker, who may wish to make the connection to the existing public sewer. A new highway drain may also be connected to an existing highway drain or land drain, subject to the approval of the Highway Authority and other relevant Authorities. In all cases, existing sewers or drains shall be properly extended, connected and jointed to new sewers, drains or chambers in accordance with Clause 506 of the Specification.

In some cases reinstatement of land drains may be required but, where they are to be connected to a sewer, a catchpit shall be provided before the connection, having a silt trap 600mm below the lowest pipe invert. In the case of all other drains they shall be connected in such a way that normal access for the rodding and maintenance is achieved.

Before entering or breaking into an existing sewer or drain, notice shall be given to the Drainage Undertaker responsible for the pipe to which the connection is to be made and appropriate permission obtained.

Where a new highway drainage system is connected to an existing piped system a temporary catchpit may be required while the site is being developed, the catchpit to be removed on completion of all works and the chamber to be made good with the necessary channels and benching.

The removal of detritus from chambers, repairs to defects or re-cleaning of the whole or part of a section will be instructed by the Engineer as additional works where necessary.

2.6.9 Outfalls and Headwalls

Where a piped system discharges into an existing ditch or watercourse the pipe invert shall not be lower than the level of the average flow in the ditch or watercourse and under no circumstances less than 150mm above the ditch or watercourse invert. In all cases the EA shall be consulted and any of its requirements shall be complied with.

The end of the pipe shall be directed so as to discharge at an angle not greater than 60° to the direction of flow in the ditch or watercourse. The end of the pipe shall be provided with a headwall and apron of a design to support the bank above and adjacent to the pipe and to prevent scouring underneath the pipe. The banks of the ditch or watercourse shall be protected from scouring. In all cases the EA shall be consulted and any of its requirements shall be complied with.

Furthermore, the construction details shall be agreed by either:-

- The Engineer if the height of the construction is less than 1.4 metres, or
- The Babtie Group (Highways Structures Office) if the retained height of the construction is equal to or greater than 1.4 metres. (see Section 1.1.5)

2.6.10 Drainage Structures Approval

Any drainage chamber which has a circular shaft internal diameter more than 1.5m, or a shaft any shape more than 0.9m in width (other than circular) together with all pipes greater than 900mm diameter and headwalls greater than 1.4m retained height, will require Technical Approval in accordance with the Technical Approval Procedure defined in Section 1.1.5.

Approval to any other structure which does not require Technical Approval shall be obtained from the Highway Unit, although technical advice is available from the Babtie Group (Highways Structures Office) if required.
2.6.11 TRENCH REINSTATEMENTS IN EXISTING HIGHWAYS
It may be necessary to install a new drain within the existing adopted carriageway construction. The bed and surround shall be as detailed in Section 2.6.1 and the trench reinstatement shall be in accordance with KCC drawings KCC/700/001-020 inclusive.

2.6.12 CHANNEL AND GRATING SYSTEMS AND COMBINED DRAINAGE AND KERB SYSTEMS
In some situations it may be more appropriate to provide channel and grating systems or combined drainage and kerb systems such as Beany blocks or similar. Such systems may be preferable where the longitudinal gradient is flat and/or at locations where apparatus from several statutory undertakers is situated.

Such systems shall be designed in accordance with the manufacturer’s recommendations as well as the criterion set out in Section 2.6.1. The discharge shall be determined so that it can be established that the outfall drain has sufficient capacity.

2.7 VEHICLE PARKING GUIDANCE FOR KENT
Vehicle Parking Standards are a crucial element in transport policy, directly affecting the transport operational characteristics of new development. The first County Council vehicle parking standards were produced in 1968 and reviewed in 1978 and 1993. Since the last review land use characteristics and Government policy have changed and, in February 1998, a revised set of standards were approved for consultation. These still reflect the need for development to provide parking in accordance with predicted demand.

Subsequent to the commencement of this consultation, in November 1998, the Government Office for the South East (GOSE) together with the Department of the Environment Transport and the Regions (DETR) published a report, for comment, on Parking Standards in the South East outside London. This document fundamentally changes the context of standards by introducing substantial restrictions. Standards now proposed by GOSE are much lower than the County Council’s.

The February 1998 standards were not adopted. However, the County Council and the District Councils appreciate the need for a new approach and propose to assess vehicle parking standards in a manner which will ensure that any new proposals are appropriate:

a) to local circumstances,
b) in seeking the efficient use of land within our urban areas, and
c) to making a contribution in reducing costs and environmentally polluting congestion.

As a consequence of the GOSE report the County Council is now undertaking further research on the implications of the lower standards with a view to producing, with the assistance of the 12 District Councils in Kent and in combination with Medway Council, new vehicle parking guidance. This research is also likely to benefit from an approach currently being worked on by the South East Regional Planning Conference (SERPLAN) which seeks to develop a parking assessment framework aimed at providing regional consistency whilst delivering local flexibility.

As an interim measure, pending the outcome of the new research, an updated Vehicle Parking Standards document was approved in February 1999 by the County Council. In the document the previous parking standards have been adopted as maximum guidance, rather than minimum standards, and there are no amendments to the actual numerical requirements. The guidance also stresses that all developers should consider the move towards acceptable restraint in parking standards and are advised to enter into discussion with Local Planning Authorities at an early stage in their deliberations.

The SERPLAN approach states that with the adoption of maximum guidance in place of minimum standards, the use of commuted payments (in lieu of parking places) will no longer be a viable tool for raising revenue for funding alternatives. An alternative is that developers should be expected to contribute towards securing adequate accessibility by all modes of transport, particularly in areas where accessibility by non car modes is not adequate.

All references to parking in Kent Design must be read with this evolving policy context in mind.

2.7.1 STANDARDS
Each dwelling shall have car parking provision provided in accordance with table 6.

The vehicle parking standards given are maximum guidance rather than minimum standards and developers will be expected to consider any opportunities to adopt an acceptable level of restraint in parking provision.

Parking standards should be appropriate to local circumstances. They should reflect the need to make efficient use of land, particularly within congested urban areas and should be consistent with local and county transport policies.

Developers are advised to enter into discussion with Local Planning Authorities at an early stage.

For other Land Use Classes, refer to the Kent County Councils adopted car parking standards, or Local Plan standards if appropriate.

<table>
<thead>
<tr>
<th>TABLE 6: GUIDANCE FOR PARKING IN RESIDENTIAL DEVELOPMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Bedrooms per Dwelling</td>
</tr>
<tr>
<td>---------------------------------</td>
</tr>
<tr>
<td>One</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Two or Three</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Four or more</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Sheltered Housing</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

Parking Provision in Industrial and Commercial developments shall be in accordance with the Kent County Council’s adopted car parking standards, or Local Plan standards if appropriate.

2.7.2 PARKING PROVISION

2.7.2.1 GENERAL
It will normally be expected that car parking for dwellings will be provided within the curtilage of each dwelling. However communal parking is acceptable within courts and parking squares.

Car parking provision for individual dwellings shall be provided as described above. For other land use classes, provision shall be in accordance with KCC’s ‘Vehicle Parking Standards’ or the Planning Authority’s Local Plan standards if appropriate.

Where parking is within the curtilage, end to end garage or parking spaces shall be restricted to a maximum of two spaces.
Communal parking within Courts and Parking Squares may be allocated within the highway limits, but outside the ‘Trackway’ width necessary for the movement of vehicles. Spaces may be allocated parallel, angled or perpendicular within the court or parking square but must be well defined so that adequate access to properties is provided and indiscriminate parking is avoided.

In Pedestrian and Cycle Dominated Environments communal parking can be provided parallel to the kerb by partially widening the road. The trackway width for the road category shall be maintained. The footway must be widened by 0.5m adjacent to the parking spaces so that there is sufficient room for pedestrians to manoeuvre past alighting passengers. This type of parking arrangement can be used as an effective type of traffic calming feature when well designed.

Parking spaces and facilities for disabled and mobility handicapped persons shall be provided in accordance with the provisions described in KCC’s Vehicle Parking Standards’.

2.7.2.2 Curtilege Parking

The design standards for parking spaces within the curtilage shall be in accordance with KCC’s Vehicle Parking Standards.

Residents’ spaces or garages may be located on or near the frontage but in such a way as not to dominate the street scene. They may also be located at the rear of dwellings, either approached between the properties or from a separate access or drive at the back. All rear parking shall be in secure garages or in areas that are overlooked by the dwellings to reduce car-related crime.

Disabled and wheelchair users should be able to reach all dwellings without the need to negotiate steep ramps and steps.

2.7.2.3 Garage and Forecourt Parking

The design of garages shall take into consideration relevant parking requirements, however experience has shown that garages are not likely to be used for the parking of vehicles unless sufficient space is also incorporated within the garage for storage. Minimum standards which allow for an average vehicle and storage space within the garage are given in KCC’s Vehicle Parking Standards.

Driveways serving garages shall be long enough to accommodate vehicles parked in front of the garage and shall allow sufficient room for the garage door to be opened without the vehicle having to project beyond the curtilage of the property and onto the highway. This length shall preferably be 6m but shall not be less than 5.5m.

Garages that are situated parallel to the carriageway shall be situated in such a way that vehicles can manoeuvre in and out of the garage adequately from the highway. A minimum distance of 7m between the side of the garage and the carriageway is considered sufficient to allow for all vehicle movements.

2.7.2.4 Communal Parking

The design standards for communal parking spaces shall be in accordance with KCC’s Vehicle Parking Standards.

Where appropriate spaces can be provided on a communal basis. In Homezones and Parking Squares all spaces are likely to be provided in this way. If such spaces are provided then the distance from the dwelling curtilage to the nearest parking space should be 20m or less. Where communal spaces are provided off-street then no more than 10 spaces shall normally be grouped together.

All communal parking areas shall be overlooked by the kitchen or living room windows of at least some dwellings, or footways in regular use to discourage car-related crime.

Where spaces are provided at right angles to the highway the depth of bay shall include a 0.8m planted buffer strip or bollard to prevent interference with highway users as indicated in figs 10 and 11.

2.8 STREET LIGHTING

2.8.1 Road Lighting

Road lighting designed to BS 5489 will be provided on all new roads and footpaths, cycleways and alternative means of access, except those residential access roads in villages and hamlets where the Parish or Town Council wish to see it excluded. Alternatively the Parish or Town Council may wish to have ‘footway lighting’ installed to their requirements. Such lighting will not be adopted by the Highway Authority but will revert to the ownership of the Parish/Town Council.

This exemption will not be allowed on residential shared surfaces, traffic calming devices or shared cycleway/footpath facilities and accordingly where the Parish or Town Council resist road lighting, then residential shared surfaces, traffic calming devices, and shared cycleway/footpath facilities shall not be permitted on the development.

2.8.2 Procedure

It is necessary at the road design stage for the Developer to enquire of the local Highway Unit for its requirements.

The Developer shall provide scale plans of the highway, indicating any existing lighting in the vicinity, the height of these columns and the light source used, together with the location of the proposed new columns. The plan shall include, or be accompanied by, a schedule of the equipment proposed. In the case of columns this shall include mounting height, material, bracket details and protective finish. Lantern details shall include IP rating, lamps type and wattage, type and location of control gear, HBC fuse rating and type of photocell control. Where specific manufacturers’ equipment is proposed this should be indicated with relevant catalogue numbers.

2.8.3 Lighting Design Parameters

2.8.3.1 Inter-urban Primary or Secondary Routes, Urban Primary or District Local Distributor Roads and Industrial and Commercial Roads

Where new road lighting is provided on the above roads it shall be designed in accordance with BS 5489 Part 2 to the parameters listed in Table 7.
This lighting shall be achieved by use of high pressure sodium lamps (SON-ST)

The choice of system shall be made on the basis of total installation, maintenance and energy costs for thirty years, discounted as appropriate to the current year. Environmental issues should also be considered.

### TABLE 7: LIGHTING DESIGN PARAMETERS

<table>
<thead>
<tr>
<th>ROAD TYPE</th>
<th>AVERAGE LUMINANCE L (cd/m²)</th>
<th>OVERALL UNIFORMITY RATIO Uo</th>
<th>LONGITUDINAL UNIFORMITY RATIO UL</th>
<th>THRESHOLD INCREMENT T.I.</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Speed Roads</td>
<td>1.5 min</td>
<td>0.4 min</td>
<td>0.7 min</td>
<td>15% max</td>
</tr>
<tr>
<td>Dual Carriageway Roads</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Important Rural and Urban Traffic Routes, Radial Routes, District Distributor Roads, Industrial Roads (through road or loop road)</td>
<td>1.0 min</td>
<td>0.4 min</td>
<td>0.5 min</td>
<td>15% max</td>
</tr>
<tr>
<td>Connecting Roads, Local Distributor Roads, Industrial Roads (cul-de-sac)</td>
<td>0.5 min</td>
<td>0.4 min</td>
<td>0.5 min</td>
<td>30% max</td>
</tr>
</tbody>
</table>

The preferred light sources shall be high pressure sodium although the use of other light sources may be considered for special applications, but only used with the specific approval of the Area Manager. The existence of other light sources in an area where a new system is installed does not preclude the use of high pressure sodium lighting.

Where, for environmental or other reasons, a Developer wishes to use illuminance levels significantly different from those specified in Tables 7 and 8 these will only be permitted if the Area Manager is satisfied that the standard of lighting proposed is adequate and has given it specific approval.

Lighting columns, wherever practicable, shall be sited at the back of footways or verges. New columns shall not be sited less than 0.8 metres from the edge of a Carriageway or hardened edge strip. Where columns are erected in service strips or verges, all planting shall be kept clear to prevent obstruction of access for maintenance purposes.

If a Developer wishes to use non standard equipment, departure from this standard will be permitted provided the Area Manager is satisfied that it is justified and gives it specific approval.

Where a road is traffic calmed the Developer shall make reference to the KCC Code of Practice for Traffic Calming.

### TABLE 8: LIGHTING DESIGN PARAMETERS

<table>
<thead>
<tr>
<th>REQUIREMENTS FOR ROAD, VERGE AND FOOTWAY OR FOOTPATH</th>
</tr>
</thead>
<tbody>
<tr>
<td>CATEGORY OF ROAD</td>
</tr>
<tr>
<td>Residential Local Distributor Roads and Major Access Roads</td>
</tr>
<tr>
<td>Residential Minor Access Roads, Shared Surfaces and Alternative Means of Access</td>
</tr>
</tbody>
</table>

2.8.4 APPROVAL OF LIGHTING DESIGN

The Developer shall submit for approval to the Highway Unit, two copies of the layout plan accurately indicating column locations including the set back distance of the column from the kerb/carriageway edge and the bracket outreach, together with all necessary calculations.

Upon approval of the street lighting design, the Developer shall provide the Highway Unit with three copies of the approved drawing/s.

The exact positions of all lamp columns shall be agreed on site with the Engineer and these will normally be within the highway boundary set at the back of the footway, service strip or verge. If it is necessary for lanterns to be mounted on buildings or other structures, the Developer will be responsible for arranging permanent wayleaves at no cost to the Highway Authority and shall inform the Area Manager accordingly.

2.8.5 RESPONSIBILITY FOR MAINTENANCE AND ADOPTION

Before any dwelling or industrial unit is occupied on a new estate, the street lighting must be erected and in lighting. The lighting authority will accept charges for electricity as soon as the system is approved and energised.

The Electricity Undertaker will not enter into an agreement with a Developer for the supply of energy. The Developer remains responsible for the electrical and structural integrity of the street lighting installation until formal adoption of the lighting system by the Highway Authority or Parish/Town Council.

2.8.6 GENERAL SPECIFICATION

2.8.6.1 DIVERSION AND PROTECTION OF SERVICES

The Developer shall take any and all measures reasonably required by any Public Authority or Undertaker for the support and full protection of its mains, pipes, cables and other apparatus during the progress of the works and shall construct and provide to the satisfaction of the Authority or Undertaker concerned, all works necessary for the prevention of damage and interruption of services.

If, in the execution of the works, any damage to any apparatus or any interruption of or delay to the provision of any service is caused, the
Developer shall bear and pay the cost reasonably incurred by any Authority or Undertaker in making good such damage and shall make full compensation to such Authority or Undertaker for any loss sustained by reason of such interruption or delay. The Developer shall immediately notify the owner of the services or property concerned and shall afford every facility to the owner in effecting the necessary repairs.

When working in the vicinity of overhead lines the clearances required by the Electricity Undertaker shall be maintained at all times, and fourteen days notice in writing shall be given by the Developer to such Authority or Undertaker before commencement.

The Developer shall, at all times during the progress of works, afford facilities to properly accredited agents of any Public Authority or Undertaker for access to all or any of their apparatus situated in, over or under the site as may be necessary for inspecting, reporting, maintaining, removing, renewing or altering such apparatus in connection with the construction of the works or for any other purpose whatsoever.

The positions of Undertakers mains and services, drains and sewers which may be shown on the drawings have been based on information extracted from the records of the various bodies and must be regarded as approximate only. The Developer shall not be relieved of his responsibilities and shall proceed with due caution when excavating in the vicinity of Undertaker’s mains and services, drains and sewers.

2.8.6.2 INTERFERENCE WITH TRAFFIC AND ADJOINING PROPERTIES

The Developer shall comply with all statutory regulations and local bye-laws relating to work on highways and shall not unnecessarily or improperly interfere with access to, or the use, or occupation of, publicly maintainable highways, footpaths, cycleways and private dwellings.

2.8.6.3 EQUIPMENT AND STORAGE

All equipment shall be supplied in new and unused condition except in so far as it has been tested in the course of manufacture and, where deemed necessary by the Engineer, shall be stored in weatherproof accommodation.

The Developer shall ensure that the equipment supplied is compatible with all other equipment with which it is associated.

2.8.6.4 ELECTRICITY SERVICES

The Developer shall be responsible for all wiring other than electricity services which will be provided by the Electricity Undertaker unless otherwise specified. It shall be the responsibility of the Developer to notify the Electricity Undertaker and the Engineer of the earliest date when the installation will be ready for the Undertaker to make the service connection.

2.8.6.5 SWITCHING OFF LIGHTING

No existing lighting shall be switched off, dismantled, reset or removed without the prior approval of the Engineer and necessary arrangements having been made with the relevant Undertaker.

2.8.6.6 REGULATIONS, CODES AND SPECIFICATION

All equipment and materials supplied and work done shall comply with Statutory and other Regulations, Codes of Practice, Memoranda and British Standard Specifications current at the date of signing the agreement.

2.8.6.7 IDENTIFICATION NUMBERING

Columns shall be identified using an alpha/numeric combination of up to seven digits in accordance with a schedule which will be provided by the Engineer.

The digits shall be shown in black paint not less than 50mm in height and located in a position 1.8 metres above ground level on a yellow background. They shall face in a direction towards the carriageway.

Double arm columns shall have sets of digits on both sides of the column.

2.8.6.8 LANTERNS

Lanterns shall be:

- a type agreed with the Engineer.
- to BS EN 60598 - 2.3, International Protection Category I.P 65, fitted with vandal resistant bowls and shall be of a uniform pattern from a single manufacturer.
- suitable for the lamp type offered and shall be of the side entry type unless otherwise required. All lanterns shall be compatible with the columns on which they are to be mounted.
- designed for integral or remote control gear as agreed with the Engineer. With integral gear, if the control gear compartment is provided with its own cover the latter shall be adequately hinged.
- If a separate cover is not fitted to the control gear compartment the terminal block shall be shielded with suitable insulating material to prevent contact during lamp replacement and routine maintenance. The shield is to be captive in that it shall not be necessary to completely detach it from the lantern in order to maintain integral control gear.
- An earth connection is to be provided in the control gear compartment. When access to this compartment has been attained the earth connection shall be visible and easily accessible without removing any components.
- suitable for use with high pressure sodium vapour discharge lamps unless otherwise agreed with the Engineer.
- When fixed to brackets providing an uplift, continue the line of the bracket or be mounted horizontally.
- supplied complete with suitable lamp holders ready wired to a connector block with flexible cord with no less than 0.75mm² conductors insulated with non-hygroscopic heat resisting materials.
- have the canopy suitably drilled prior to delivery to receive the two piece photo-electric control cell unit which shall be wired to a terminal block secured to the underside of the lantern canopy.
- wired between the socket or control unit and the terminal block with colour coded cable.
- not fitted to brackets until after the brackets have been fitted to the columns and the columns erected at the correct vertical alignment unless otherwise agreed by the Engineer.
- snugly attached to the bracket without any gap between the bracket and the root end of the lantern.
- be supplied and protected with packing material to enable reasonable stacking.

2.8.6.9 LAMPS

High pressure sodium vapour lamps shall comply with BS EN 60662. Lamps shall be suitable for use with the lanterns offered and shall give the required lumen output at 2000 hours.

High pressure sodium lamps shall have external igniters and shall be of the tubular type unless otherwise specified.

All discharge lamps shall be guaranteed by the manufacturer for a minimum of 4000 hours of life.

Lamps shall not be fitted until the luminaire has been installed on the column.
2.8.6.10 Photo-Electric Controls

Photo-electric control units (PECU’s) shall comply with BS 5972. They shall be designed to switch on when the ambient dusk lighting has reached 70 lux and have a differential of 1:05. They shall be designed so that in the event of a fault occurring in the unit they shall fail safe in the ‘ON’ position.

Photo-electric controls shall be of the two piece unit type as specified by the Engineer and set to 70 lux.

2.8.6.11 Control Gear

- Ballasts

Ballasts shall comply with BS EN 60920, BS EN 60921, BS EN 60922 or BS EN 60923 as appropriate.

Terminals for lamp and supply connections on ballasts shall be shrouded and indelibly marked to permanently indicate their function.

- Capacitors

Capacitors shall comply with BS EN 61048 and BS EN 61049 and be supplied complete with fixing clips, discharge resistors and either sealed-in cable tails or shrouded terminals.

Capacitors shall correct the lamp circuit power factor to not less than 0.85 lagging.

- Igniters

Igniters shall be provided where required and shall be suitable for the equipment offered and have shrouded terminals.

- General

Control gear shall be suitable for 230 (+10% or -6%) volt operation unless otherwise specified and be compatible with other equipment in the circuit, all in accordance with the manufacturer’s instructions for the lamp used.

All terminals shall be shrouded to IP2X.

Remote mounted components shall be arranged so that the terminals are facing downwards and all such components shall be fitted with an earth stud or terminals.

2.8.6.12 Fuses in Base Compartment

Each lamp circuit shall be protected by one of the following methods.

- For secondary isolation on an Electricity Company supply an isolator unit incorporating a disconnector and a high breaking capacity type fuse to BS88 rated in accordance with the lamp manufacturer’s recommendations, shall be supplied. This unit which shall be capable of being locked in the ‘off’ position shall have shrouding or other barrier provided to prevent contact with live parts affording a degree of protection of at least IP2X and removable only by the use of a tool. If there is need to provide a second circuit, for example: to a sign, a unit having a disconnector and 2 x BS88 fuses shall be provided.

- Cut-outs, provided for private cabling networks owned by the Highway Authority shall consist of a substantial moulded plastic, drip proof enclosure designed primarily for use in street lighting columns. They shall provide switched, double pole isolation by a disconnector and incorporate a high breaking capacity fuse to BS88 rated in accordance with the lamp manufacturer’s recommendations. They shall be capable of providing one, two or three separately fused upward circuits or one upward circuit and two dedicated double pole outgoing circuit to sign etc. Terminals shall be large enough to take the steel wire armoured cable specified in straight connections or looped services and have integral brass cable glands.

2.8.6.13 Fixing Control Gear

All control gear shall be securely fixed at all fixing points.

2.8.6.14 Wiring

Wiring between the terminal block in the lantern and the components in the base of the column shall be polyvinyl chloride insulated and sheathed cable of 300/500 volt grade to BS 6004 having a copper conductor size of not less than 2.5 mm². All cables shall be correctly colour coded. Unsupported lengths of wiring shall be kept to a minimum and not be allowed to come into contact with components by their freedom of movement.

Double insulated 6mm² tails with inner and outer sheaths of correct colour coding and sufficient length to reach from the secondary isolator unit to the service cut-out, must be provided.

2.8.6.15 Earthing of Component Parts

All metal work other than that intended to carry current shall be earthed using PVC insulated copper cable colour coded green and yellow.

A 2.5mm² circuit protective conductor shall connect the earth terminal in each luminaire to the earth terminal associated with the service cut-out unit.

A separate 2.5mm² circuit protective conductor shall connect all metal enclosures of all electrical components to the main earth terminal.

All extraneous conductive parts, as described in BS 7671 and including column doors, shall be bonded to the main earth terminal using an equipotential bonding conductor of 6mm².

All earth connections shall be made by means of a crimped lug type termination.

All terminals are to be shrouded to a value of IP2X.

2.8.6.16 Electrical Inspection and Testing

- Testing Of New Installations.

The testing and inspection of new installations shall comply fully with clauses 712 and 713 of the 16th Edition of the Wiring Regulations (BS.7671).

A Test and Inspection Certificate in the form set out in Table 9 shall be completed and submitted to the Engineer.

- Fixed Equipment.

Fixed equipment includes lighting columns, illuminated traffic signs, bollards, feeder pillars and any similar electrical equipment on the highway, described as street furniture and other street located equipment in section 611 of BS.7671.

Tests for equipment shall be in line with the following list and carried out in the sequence shown:

- Safety Check, Polarity Test and Isolation on Incoming supply.
- Visual Inspection.
- Insulation resistance test.
- Earth Loop Impedance Test.
- Operation of Residual Current Devices.
- Earth Electrode Resistance.

The tests shall be carried out in accordance with the Testing
Procedures for Fixed Equipment as detailed below.

- **Testing Procedures for Fixed Equipment.**
  - Safety Check, Polarity Test and Isolation Test on Incoming Supply.
    Visually check that it is safe to carry out the tests.
    Isolate the internal circuit by removing the fuse carrier/operating isolator.
    Test the internal circuit to ensure that it has been isolated from all sources of electrical energy.
    Carry out Polarity Test at the incoming terminals to confirm that the incoming supply is energised and the Phase, Neutral and Earth conductors are correctly connected.

- **Visual Inspection and Fixed Equipment.**
  The electrical installation shall be visually checked to verify that:
  - An isolating/protective device is fitted and that any single pole devices are connected to the phase pole of the circuit only. (For a simple installation the isolating/protective device may be the electricity company fused cut-out).
  - Fuses and MCBs are the correct rating.
  - Conductors are correctly identified and sleeved accordingly.
  - Equipment is visually undamaged.
  - Terminations, including earth connections and bonding, are correctly made and secure.
  - Power factor correction capacitors are fitted.
  - Shrouds, enclosures and doors are securely fitted.
  - Labels and danger notices are fitted.
  - Insulation Resistance of Internal Wiring
    An instrument providing a DC test voltage of 500 volts shall be used for this test and a minimum value of 0.5 Megohms is required.
    Before any test is carried out it should be confirmed that the circuit is isolated from all sources of electrical energy.

- **Integral Gear Lanterns:**
  The neutral should be disconnected from the incoming supply termination unit/cut-out.
  The test shall be carried out between L - E and N - E, at the base compartment of the unit.
  Poor readings may necessitate the disconnection of the lantern and further test.

- **Remote Gear Lanterns:**
  The neutral should be disconnected from the incoming supply termination unit/cut-out.
  The test shall be carried out between L - E and N - E, at the base compartment of the unit on the tails to the cut-out.
  Poor readings may necessitate the disconnection of all connections to the ballast and individual testing of each wiring cable within the column or post.

- **Earth Loop Impedance Test - REC Supplies.**
  This test is to be carried out at the terminals of the incoming electricity company supply to each item of fixed equipment.
  The purpose of this test is to ensure that the fuse will operate within its required disconnection time in the event of a fault.

---

**TABLE 9: TEST AND INSPECTION CERTIFICATE**

<table>
<thead>
<tr>
<th>Column/Sign/ Bollard Gazetteer ref</th>
<th>Visual Inspection</th>
<th>System</th>
<th>Circuit Type</th>
<th>Circuit Protection</th>
<th>Insulations Resistance (M.Ohms)</th>
<th>Polarity Satisfactory</th>
<th>Line/Earth Fault Loop Impedance (Ohms)</th>
<th>Satisfactory Unsatisfactory Any other Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name (s) of Road (s)..................</td>
<td>------------------</td>
<td>--------</td>
<td>--------------</td>
<td>--------------------</td>
<td>-------------------------------</td>
<td>----------------------</td>
<td>----------------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Bollard</td>
<td>System</td>
<td>Circuit</td>
<td>Conduct or Size mm</td>
<td>Fuse Bs No MCB Class</td>
<td>Rating (Amps)</td>
<td>Line to Earth</td>
<td>Neutral to Earth</td>
<td>Line to Neutral</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The test should be carried out using a test instrument specifically designed for this purpose.

- Operation of Residual Current Devices
  This test should be carried out on any such device using a test instrument specifically designed for this purpose.
  A test should be applied at the rated tripping current of the device and the operating time shall not exceed 40ms at a residual current of 150 mA.
- Earth Electrode Resistance.
  This test is to be carried out in accordance with BS 7430.
- Test Equipment
  All test equipment shall be tested and calibrated at regular planned intervals and no item of equipment shall be used for testing if test and calibration of the instrument is overdue.
  The instrument to be used for polarity and isolation testing should always be checked before use against a known 240 volt supply.

2.8.6.17 As built drawings

A set of “as built” drawings shall be provided by the Developer for the Engineer upon completion of the street lighting installation. All column positions and private underground cables installed or realigned for the works must be accurately recorded on these plans.

2.8.7 Equipment specification and installation

2.8.7.1 Columns and brackets

The lighting column manufacturer shall be registered with and certified by either BSI Quality Assurance Services, Lloyds Registered Quality Assurance Ltd, or SGS Yardsley, for the manufacture, supply and verification of lighting columns under their Quality Assessment Schedule to BS EN ISO 9000.

Lighting columns and brackets shall be manufactured in compliance with BS EN 40 Part 1 and BS 5649 parts 2, 3, 5, 6, 7, 8 and 9.

Standard steel columns and bracket arms shall be galvanised and suitable for the lanterns offered and of a design acceptable to the Design Council and the Engineer. Columns and brackets shall be supplied by the same manufacturer.

Columns and bracket arms shall together provide a vertical mounting height measured from the centre of the light source to the Carriageway of 5, 6, 8 or 10 metres, or as agreed with the Engineer.

Columns and bracket arms shall have no sharp or jagged edges which would foul or chafe internal wiring.

The compartment in the base of each column shall be designed to accommodate control equipment of the lamp or lamps and the opening(s) in it shall afford easy access to the equipment. The compartment shall be fitted with weatherproof access door(s) having tamperproof lock(s) of the same pattern for all columns. A total of six keys to this lock shall be supplied to the Engineer. Doors shall be fitted with an earth stud to allow bonding to the main earth terminal. Each base compartment shall have a base board manufactured from material which is substantially non-hygroscopic not less than 15mm thick and of suitable size to accommodate the control equipment with adequate space at the bottom to accommodate cable terminations and service cut-outs. The baseboard shall be firmly fixed.

Where agreed with the Engineer columns shall be fitted with a flange plate. The Developer shall ensure that the spacing of the flange plate holes and the position of the fixing bolts are compatible.

If manufactured from tubular steel or circular section circumferential joints shall be of the sleeve type and restricted to points where the column is designed with reduced diameters. Joints will not be allowed between designed points of reduced diameter.

2.8.7.2 Wall/ Pole brackets and control gear boxes

Wall brackets shall be constructed from steel tube and shall provide a mounting height of lantern above the carriageway and projections as specified. “Projection” is the distance measured horizontally from the wall to the end of the bracket. Brackets shall be provided with a back plate of adequate size and strength to permit secure attachment to buildings and to support the lamp and lantern required and shall be secure by rag bolts or other approved fixings. The brackets shall be designed to accept mineral insulated cable glands, when required.

Control Gear Boxes shall be constructed of steel or corrosion resistant alloy and shall be large enough to afford easy access to the control equipment. Doors are to be fitted with tamper-proof locks of the same patterns as used for the columns if possible.

A backboard of hardwood or other substantial non-hygroscopic material shall be fitted into each control box and shall be of sufficient size to accommodate all of the control equipment, service cable and cut-outs.

Steel wall brackets and control gear boxes shall be hot dipped galvanised and shall be treated in every respect the same as for the steel columns, with regard to further protection from corrosion.

The wall brackets and control gear boxes shall be provided with an earth terminal.

2.8.7.3 Excavation for columns

Excavation for columns shall not be by mechanical means unless agreed by the Engineer.

The sides of the pits and trenches shall where necessary be supported adequately at all times and shall be kept free of water.

All excavated materials from such excavations not required for refilling shall be disposed of in tips provided by the Contractor.

The Developer shall make good with suitable material or concrete ST2 mix as directed by the Engineer:-

- Any excavation greater than that normally required for the installation of a column or cable.
- Any additional excavation at or below the bottom of foundations to remove material which the Developer allows to become unsuitable.

2.8.7.4 Erection of columns and brackets

The Developer shall take any necessary measures to minimise any disturbance and damage to any trees encountered during erection. The Developer shall obtain prior approval from the Engineer before felling, trimming and cutting roots of trees affected by the installation.

Brackets shall be fitted to, and correctly aligned in relation to, columns before the columns are erected.

The columns shall be carefully aligned and set vertically with doors facing away from on-coming traffic except where the columns are mounted behind parapets where the bottom of the door shall be above the parapet and the door shall be hinged or captive and face towards the carriageway, or unless otherwise directed by the Engineer. Columns without flanges shall be erected in a hole with sides as steep as soil conditions allow and with a clearance of 100mm at the butt end of the column. The depth shall be in accordance with the manufacturer's instructions unless otherwise agreed with the Engineer. Concrete ST2 mix shall be placed and compacted in 150mm layers to a depth of 600mm above the butt end of the column or to the underside of the cable entry slot whichever is the greater. The cable entry slots shall be
Decorative cast iron columns shall be surface protected in the following manner:

- The columns shall be supplied with a zinc chromate finish from the manufacturer.
- All surfaces shall be degreased and cleaned down before painting which shall be carried out strictly in accordance with the paint manufacturer's instructions.
- All external surfaces.
  - 1st Coat Zinc Phosphate Epoxy Primer (2 pack) mdft 30 micron.
  - Ground section additional coat.
  - Pitch Epoxy (2 pack) mdft 100 micron.
- Additional Coats for Upper Section Only (all areas except those shown separately).
  - 1st Coat Zinc Phosphate Epoxy Ester Undercoat mdft 40 micron
  - 2nd Coat Silicone Alkyd Undercoat mdft 50 micron
  - 3rd Coat Silicone Alkyd Gloss Finish mdft 50 micron

**Application Instructions**

All shop paint coats on external surfaces and site paint coats where access permits shall be returned on to edges at ends, at door and other openings and 25mm under base flange.

The Epoxy Primer shall be overcoated within 96 hours.

The Pitch Epoxy shall be applied over the Epoxy Primer from the bottom to 150mm above ground level.

The undercoats shall be applied down to 100mm below ground level overlapping the pitch epoxy.

The gloss finish coat shall be applied down to ground level.

All facilities shall be provided for the Engineer or his appointed representatives to inspect the lighting columns at any time during the finishing process.

Painting shall not be carried out in wet or foggy conditions.

### 2.9 PLANTED AREAS

#### 2.9.1 VERRGES

Verges, which are accepted for adoption as part of the highway shall be either grassed, planted with ground cover or low growth shrubs or paved. The Highway Authority must be consulted as regards its specific requirements.

Where it is agreed that areas of verge are to be planted with trees, such planting shall be agreed with the Engineer and shall conform with Section 2.9.4.

The highway boundary associated with a verge shall be defined by continuous 50mm x 150mm edging type EF to BS7263, wherever possible, otherwise by markers such as setts set at 2m intervals.

#### 2.9.2 VISIBILITY SPLAYS

Visibility splays shall be grassed, planted with ground cover or low growth shrubs with ultimate heights below 600mm, or paved. Where it is agreed trees can be planted within the visibility splay area, such planting shall be agreed with the Engineer and conform with Section 2.9.4.

The highway boundary associated with a visibility splay shall be defined by continuous 50mm x 150mm edging type EF to BS7263.

#### 2.9.3 SERVICE STRIPS

Given that the minimum width of a service strip is 1 metre, the minimum area acceptable shall be 6m².

**Application Instructions**

All shop paint coats on external surfaces and site paint coats where access permits shall be returned onto edges at ends, at door and other openings and 25mm under base flange.

The Epoxy Primer shall be overcoated within 96 hours.

The Pitch Epoxy shall be applied over the Epoxy Primer from the bottom to 150mm above ground level.

The undercoats shall be applied down to 100mm below ground level overlapping the pitch epoxy.

The gloss finish coat shall be applied down to ground level.

All facilities shall be provided for the Engineer or his appointed representatives to inspect the lighting columns at any time during the finishing process.

Painting shall not be carried out in wet or foggy conditions.

### 2.8.7.5 PROTECTION AGAINST CORROSION

Steel columns shall be hot dipped galvanised to give a coating not less than 0.1 mm thick.

They shall be painted in accordance with the requirements of the Specification.

### 2.8.7.6 FINAL FINISH

After erection the columns, bracket arms and doors shall be cleaned.

Components having damaged galvanising may be rejected by the Engineer and shall then be replaced at the Developer's expense. Slight damage may be rectified by cold galvanising but only with the approval and in accordance with the instructions of the Engineer.

Before the lighting is handed over lanterns shall be thoroughly cleaned.

Galvanised lighting columns are to be further protected in the following manner:

- The columns, bracket arms and all external metal parts shall be carefully degreased and washed in solvents.

- All External Surfaces
  - 1st Coat "T" Wash
  - 2nd Coat Zinc Phosphate Epoxy Primer (2 pack) mdft 30 micron

- Ground Section Additional Coat
  - Pitch Epoxy (2 pack) mdft 100 micron

- Additional Coats for Upper Section only (all areas except those shown separately)
  - 1st Coat Silicone Alkyd Undercoat mdft 50 micron
  - 2nd Coat Silicone Alkyd Gloss Finish mdft 50 micron

**Application Instructions**

'T' wash, all shop paint coats on external surfaces and site paint coats where access permits shall be returned on to edges and 25mm inside at ends, at door and other openings and under base flange.

All paint coats except the gloss finish shall be applied in the shops (factory).

The zinc phosphate epoxy primer shall be overcoated within 96 hours.

The pitch epoxy shall be applied over the epoxy primer from the bottom to 150mm above ground level.

Undercoat shall be applied down to 100mm below ground level overlapping the pitch epoxy.

When the gloss coat is applied on site it shall be applied down to ground level.

Decorative cast iron columns shall be surface protected in the following manner:
In Residential Shared Surfaces ground cover planting will usually be required in service strips.

Where a lay-by is provided on a Residential Shared Surface, the adjacent service strip shall be hard paved, so as to provide a paved surface for persons alighting from vehicles.

Where it is agreed trees can be planted within a service strip, such planting shall be agreed with the Engineer and conform with Section 2.9.4.

The highway boundary associated with a service strip shall be defined by continuous 50mm x 150mm edging type EF to BS7263.

2.9.4 TREES

When siting new trees within a verge, visibility splay or service strip, considerable care needs to be taken regarding:-

- Obstruction of visibility.
- Lighting
- Possible root damage to paved surfaces, pipes, services etc.
- Proximity to carriageway.

No new trees shall be planted within the 2.0 metre 'x' distance by 'y' distance visibility splay area at a junction. Behind this splay but within the general junction visibility splay area the limited planting of suitable species of trees may be acceptable after careful consideration of the affect of the trees on junction visibility.

In forward visibility splays, the limited planting of suitable species of trees may be acceptable after careful consideration of the affect of the presence of the trees on forward visibility.

Where it is agreed that trees are acceptable within visibility splays, they shall be clear stemmed for up to 2.0 metres above ground level.

Trees within verges and service strips shall be set back at least 1.5 metres from the carriageway adjacent to Local Distributor Roads and Industrial and Commercial Roads, and at least 1.0 metre from the carriageway adjacent to Residential Access Roads.

Trees can be underplanted with low shrubs if within the highway area.

Those trees which are known to be surface rooting i.e. cherries should not be used near services or footways. Trees with large slow decomposing leaves should also be avoided at sensitive locations. The eventual branch-spread should allow for a 5.3 metres clearance between the carriageway and the lowest branches. Upright growing trees should be used where there are space problems.

It is essential that tree species conform to the very vigorous requirements of the Highway Authority. Such requirements include the following:

- **Root Systems** - Must not be surface rooting.
- **Stability** - Must have good stability and not be prone to branch drop.
- **Fruits** - Must not have large or messy fruits, or be copious seeders. Species that encourage aphids i.e. limes should also be avoided.
- **Leaf Problems** - Should not have large leaves that are slow to rot.
- **Growth Characteristics** - Need to be compatible with the highway location. Light or dappled shade is preferable.
- **Robust** - Tolerant of disturbed ground conditions and road salt.
- **In Keeping** - With the local character of the area, and appropriate for the soil type

2.9.5 SOIL PREPARATION

Subsoil in the base of tree pits shall be thoroughly broken up to a minimum depth of 150mm below the base of the pit. In tree pits trees shall be planted in an open and friable soil complying with BS 3882 Premium Grade. If this is not available topsoil to BS 3882 General Purpose Grade, improved by addition three parts of non-peat based tree compost to seven parts of topsoil. Approximately 200g of slow release fertiliser per tree shall be worked into the backfill mixture.

The tree pit shall be excavated to allow adequate clearance between the root ends (when fully spread) or the perimeter of the ball and the side of the pit. The size of the pit must be such as to allow for the provision of not less than 0.5m² of good topsoil for planting. The depth must be at least 75mm greater than the depth of the root system.

In shrub areas, Premium quality topsoil to BS3882 must be spread in planting areas to a minimum depth, after settlement, of 300mm over a minimum depth of 150mm of previously loosened subsoil. This will necessitate restricting concrete haunching to kerb edgings in order that the soil space is not unnecessarily reduced.

In grass seeding and turfing areas, topsoil to BS3882 shall be spread to a thickness of 100mm. The subsoil layer must be loosened to a further 150mm depth prior to the spreading of topsoil. Topsoil shall be spread to give a finished level after light consolidation 25mm above adjacent edges, hard surfaces or manhole covers.

2.9.6 SHRUBS

For the successful establishment of ground cover shrubs in service strips and visibility splays it is essential that the species selected conforms to the very vigorous requirements of the Highway Authority. Such requirements include the following:

- **Availability** - Readily available in the trade to allow for planting in bulk and for replacements following disturbance by Statutory Undertakers or the Highway Authority.
- **Establishment** - Quick establishment to provide immediate effect and reduce maintenance costs.
- **Root Systems** - That does not interfere with underground services or adjoining surfaces.
- **Restricted Growth** - Growth characteristics which restrict themselves to the planted area and below a height of 600mm, and with minimal pruning needs.
- **Wear Resistance** - Tolerant of the occasional trampling.
- **Hardiness** - Resistant to frost damage, diseases and pests and long lived.
- **Chemical Tolerance** - To avoid damage from common chemicals used in the initial stages of establishment to control weed growth.
- **Non Injurious** - No toxic fruit or sap, no thorns.
- **Visual Qualities** - Neat appearance and providing an all year round effect, preferably with seasonal variations.

2.9.7 SUSTAINABILITY ISSUES

These should be considered when specifying planting schemes. In particular:

- **Tree stakes** should be from local renewable resources. Sweet Chestnut is ideal, as it lasts long enough to do its job with minimal preservative treatment and is also a traditional Kent product.
- **Soil Ameliorants** must be peat free.

Where native species are used, stock of local provenance is desirable.
### 3.1 GENERAL

#### 3.1.1 GENERAL SPECIFICATION

All materials and workmanship shall be in accordance with the appropriate British Standard Specification and Volume 1 of the Highways Agency’s Manual of Contract Documents for Highway Works, current at the time of completion of the appropriate Road Agreement and where available all materials shall be kitemarked. Amendments and additions to the Specification are included in this Part but it will be necessary for the Developer to prepare certain appendices relating to the particular site for approval by the Highway Authority and incorporation into the Section 38 Agreement.

#### 3.1.2 MATERIAL TYPES

Carriageways shall generally be constructed in hydraulic or bitumen bound materials or block paving. Concrete construction with Portland Cement binder will only be accepted where conditions preclude these types of construction.

Footways shall generally be constructed in bituminous bound materials, block paving or small element pavings. Paving slabs shall only be used with the approval of the Engineer.

Materials specified herein are those commonly available locally. However, alternative materials and techniques for road construction not included within this Specification may become available. When the developer wishes to use such a material or technique, he should make a detailed proposal to the Engineer in good time to permit its evaluation and approval prior to the relevant work proceeding.

Similarly, in areas of distinctive character, such as in close proximity to a listed building or its setting, an Ancient Monument, (whether scheduled or not), within a conservation area or its setting or adjacent to any historically or architecturally interesting structure, where the use of special materials will enhance the setting, these shall be discussed with the local Planning Officer and agreed with the Engineer.

#### 3.1.3 TESTS

Developers are advised to arrange with a laboratory approved by the Highways Authority for such site tests and investigations as may be required in advance of the design - for example:- CBR tests or stiffness modulation for sub-grade and percolation tests for soakaways.

Developers shall ensure that the test results, materials source approval and any necessary manufacturers’ certificates are provided for the Engineer. Information on approved suppliers and materials is available from the Highways Authority.

Developers shall also make available, during the construction of the highways such samples of materials as may be required for testing, and where necessary, permit the Engineer to carry out in situ tests of road materials and checks on finished construction to verify compliance with the Specification.

They shall also provide such assistance and equipment as the Engineer may require - such as chainmen, labourers, instruments or tools. The cost of all such tests and assistance shall be borne by the Developer.

Any works considered suspect by the Engineer may require the Developer to open up the works, take cores or dig up trial holes and carry out tests at his own expense to determine the quality of the works to the Engineer’s satisfaction.

#### 3.1.4 DEVELOPERS OFFICES, PARKING AREAS, ETC.

On larger sites the provision of an office together with toilet facilities for the Highways Authority’s inspection staff may be required at the Developer’s expense. The Developer shall provide adequate parking within the development site to prevent obstruction of the public highway by the vehicles of site employees and visitors.

#### 3.1.5 TEMPORARY ACCESS TO THE SITE

No access to the site, other than that shown on the approved drawing shall be provided without the Highways Authority’s previous written approval.

#### 3.1.6 NOTICE BOARDS AND SIGNING

Notice Boards must not be erected within visibility splays or affixed to retained trees. Advertisement consent may be required from the Planning Authority in some circumstances.

If the residential development involves the erection of over 30 bedrooms, the Highways Authority may consider there is a demonstrable need to provide local direction signs to the Site. The Developer must consult the Highway Unit concerning the provision of local direction signs on the Highway.

#### 3.1.7 INSPECTION AND SETTING OUT

The Engineer shall have freedom of access to the works, but his presence or absence in no way absolves the Developer from his responsibility of ensuring that the works are carried out in accordance with the Specification. The Developer shall employ a competent agent or foreman in charge of the work to ensure that directions given from time to time by the Engineer are interpreted properly and the appropriate action taken.

The Developer shall set out, mark and maintain until it is no longer required, all reference information necessary for the setting out and checking of the development.

Where setting out markers are likely to be disturbed during the development, the Developer shall transfer such markers to an adjacent point.

The setting out of the works may be checked by the Engineer before construction proceeds. The Developer shall provide such assistance as the Engineer may require, such as chainman, instruments, etc.

When the Developer requires an inspection for approval of any part of the works, the Engineer shall be given at least 24 hours notice of such requirements.

The Developer shall obtain the consent of the Engineer to all Saturday and Sunday work which may be required in order that arrangements may be made to inspect the work.

Any works carried out and/or covered up without approval will be considered suspect and the Developer may be required to open up the works, take cores or dig up trial holes at his own expense to determine the quality of the work to the Engineer’s satisfaction.

#### 3.1.8 MATERIALS WITHIN THE HIGHWAY

The Developer will not be permitted to store materials, at any stage of construction, within the highway limits or where the integrity of the highway may be affected or over highway surface water drainage systems. Also carriageways or footways needed for access to occupied dwellings must not be obstructed.

#### 3.1.9 PROTECTION OF EXISTING AND PROVISION OF NEW SERVICES

The Developer shall take all measures reasonably required by an
The Developer shall conform to the requirements set out in Clause 109 of the Specification and the following:-

3.1.1.10 Cleaning of Vehicles Leaving the Site and Site Maintenance

The Developer shall ensure that vehicles leaving the site do so in a forward direction and with clean wheels so that mud or debris is not carried out and deposited on highways and shall provide such materials and labour as are necessary to ensure compliance with this requirement. Prior to the issue of the Part II Certificate highways used by the public within the site of the development on which snow has fallen or on which ice has formed shall be treated in such a manner as the Engineer may require.

3.1.1.11 Noise and Smoke Nuisance

The Developer shall be responsible for any charges incurred in respect of the making good of all damage and disturbance to Undertaker’s plant occasioned by negligence on the part of the Developer or his Contractor.

The Developer shall ensure the whole of the works so that no liability falls upon the Highway Authority. The Developer shall be fully responsible for Undertaker’s work in adoptable areas.

The Developer shall be responsible for any charges incurred in connection with the maintenance of the facilities by the Undertakers and all ancillary pneumatic percussive tools shall be fitted with properly lined and sealed acoustic covers which shall be kept closed whenever the machines are in use and all ancillary pneumatic percussive tools shall be fitted with mufflers or silencers of the type recommended by the manufacturer.

• Machines in intermittent use shall be shut down when not in use or throttled down to a minimum as necessary.

The Developer shall furnish such information as may be requested by the Engineer or the District Council Environmental Health Officer in relation to noise levels emitted by constructional plant installed on the site, or which it is intended to install on the site, and shall afford all reasonable facilities to enable them to carry out such site investigations as may be necessary.

Special consideration shall be given when the site is near a school or hospital and all equipment used on such a site must be to the approval of the Engineer.

When burning on site, consideration must be given to the clear air Acts and their regulations and the Environmental Protection Act 1990. Waste must not be burnt within 100m of residential properties.

3.1.1.12 Public Highways

The Developer will be held responsible for any damage caused to public highways by construction traffic proceeding to or from the site. For the purpose of Section 59 of the Highways Act 1980, construction traffic will be classed as ‘extra-ordinary traffic’ on public highways.

Photographs shall be taken by the Developer in the presence of the Engineer showing the condition of the existing public highways adjacent to the site, and a schedule of defects agreed prior to works commencing on site.

3.1.1.13 Public Liability Insurance

Any contractor or other individual etc., working either under, on, above or adjacent to the highway must indemnify the County Council against all losses and claims for injuries or damage to any person or property whatsoever which may arise out of or in consequence of the works in question.

All persons wishing to undertake such work must demonstrate to the Highway Unit that adequate Public Liability Insurance, with a minimum level of cover of £5m, is in force.

3.1.1.14 Openings and Reinstatements

The permission of the Highway Authority is necessary before any work or erection is commenced under, on, or over an adopted highway.

For all highways maintainable at the public expense, the requirements of the Highway Authority for road openings and reinstatement of trenches shall apply. The Engineer shall be consulted regarding requirements.

The Developer will be held responsible for reinstating all openings carried out as a consequence of the works in the proposed highway until such time as the estate roads are adopted. The Developer of a prospectively maintainable highway shall notify the various Undertakers of their intention to elect to do the permanent reinstatement of the street which shall be carried out in accordance with the New Roads and Street Works Act 1991 ‘Specification for the Reinstatement of Openings in Highways’.

Any road markings which are disturbed or obliterated as a result of road openings shall be restored immediately on completion of the reinstatement.

3.1.1.15 Use of Explosives

Explosives may only be used on the site if the prior written consent of the Engineer has been obtained.

3.1.1.16 Traffic Safety, Management, and Temporary Diversions of Traffic

The Developer is responsible for the traffic safety, management and associated work as described in Clauses 117 and 118 of the Specification and in this paragraph. Furthermore, the Developer will be charged the
total cost incurred for any temporary traffic diversion order.

The Developer shall take particular care with the siting of all hoardings, huts, plant, equipment, materials, stacks or heaps within the site, in order that no danger or obstruction of visibility splay will be caused.

The Developer’s agent and deputy shall be direct employees and shall be entirely responsible for all liaison with the Engineer and where specified, with the Police and local residents, in connection with any traffic management system.

The Developer shall supply to the Engineer and the Police, the name and telephone number of the Agent and a responsible person to act as Deputy, one of whom must be available at all times in case of emergency.

The Developer shall allow for the installation and removal of any traffic system involving restrictions or diversions to be carried out under the direction of the Police.

The Developer shall not alter the layout of any traffic system without the prior approval or direction of the Engineer.

3.2 CARRIAGEWAY PRELIMINARIES

3.2.1.1 GENERAL

The road/s shall be designed and constructed in accordance with the approved plan/s and the requirements of this document.

Wherever possible the carriageway designs submitted should include alternative construction thicknesses which make the maximum use of the material available on the site for capping layer, sub-base or roadbase by using permitted binders as described in this Section. In addition the use of construction materials from sources which maximise the amount of recycled materials is strongly encouraged, the information to be supplied is stated in Section 1.3.

A pavement construction may need to satisfy 4 structural functions

• to provide a construction access route for the building works
• to provide a layer of sufficient stiffness so that subsequent layers can be compacted properly
• to ensure that the traffic loads during the life of the carriageway do not exceed the capability of the construction to resist them without rutting or cracking.
• to provide adequate protection to frost susceptible soils where necessary.

Alternatives are provided to assist the designer to select the appropriate construction to satisfy all these requirements - see clause 3.3 (long and short term conditions).

Where the road is to be used as a short term construction access route for the carriageway construction itself and/or the dwellings on the site, the construction shall be organised to ensure that the subgrade and paving materials are not overloaded, this will be evidenced by surface rutting. This will require knowledge of the strength of the existing subgrade (road foundation) at the time of construction.

Long term strength of the subgrade may be considerably different from that pertaining at the time of construction. In summer it is likely to be higher, at other times possibly lower. The long term strength of the subgrade is evaluated using the equilibrium CBR or Stiffness modulus. This is estimated in the Laboratory from the properties of the subgrade soils.

It will be necessary to carry out carriageway designs for the construction phase and for the long term condition and choose the more conservative thickness of carriageway construction materials to be provided.

3.2.1.2 SOIL INVESTIGATION

Before any proposals are submitted a geotechnical investigation should be carried out in order to assess a number of design issues including the following:

Disposal of Surface Water Run-off

• depth to water table/perched water tables
• chemical contamination risk assessment
• suitability of strata for soakaway discharges in accordance with Kent County Council’s ‘The Soakaway Design Guide’
• consultation with the EA
• impact on adjacent developments, landslips, slopes etc

Sub-soil Drainage

• depth to water table/perched water table
• chemical attack on concrete pipes
• control of piping of fined grained soils
• treatment of solution features below drainage runs
• impact on adjacent developments, landslips, slopes etc

Earthworks

• cutting/embankment fill sideslopes
• frequency and treatment of solution features in cutting slopes
• limits for earthworks acceptability/recycling on-site materials
• chemical contamination risk assessment
• need for ground improvement of foundation soils
• impact on adjacent developments
• geotechnical certification for strengthened embankments/reinforced structures

Road Pavement Thickness

• short term/construction subgrade strength (see Kent Pavement Design Guide)
• long term/equilibrium subgrade strength (see Kent Pavement Design Guide)
• frost susceptibility of subgrade
• frequency and treatment of subgrade/soft spots features underground/caves etc
• differential settlement risks/need for ground improvement
• suitability of subgrade soils for in-situ lime/cement stabilisation (if required)
• shrinkage/swelling potential of over consolidated clays (particularly when trees are removed)

The site investigation shall be carried out in accordance with the Association of Geotechnical Specialists (AGS) Guidelines for Good Practice in Site Investigation. The scale of the investigation will be dependent upon the scale of the project but should typically comprise a Desk Study followed by a ground investigation.

A Desk Study is beneficial for even small schemes with valuable data readily available from Well Records, published records, geological maps and memoirs, aerial photographs, local libraries, local authority landfill databases, Speleological Society records and aquifer protection maps. This literature search will help to optimise and accelerate the planning of the ground investigation and the subsequent design and construction process.

Kent Design
A separate chemical contamination risk assessment should also be undertaken for the whole development.

### 3.2.1.3 SUB-SOIL DRAINAGE

Every endeavour should be made to prevent the water table from rising to within 600mm of formation level. Methods of preventing this should be discussed with the Engineer at time of designing the works.

### 3.2.1.4 EARTHWORKS

All turf and topsoil shall be removed from the formation of the new road. It shall be stored carefully on site up to a maximum of 2m in height to prevent deterioration and contamination with sub-soil etc and shall wherever possible be reused within the site. Only with the agreement of the Engineer may surplus material be removed from the site.

If in-situ stabilisation of the existing soil is to be used instead of imported granular capping layer there will be considerably less material to be removed.

Other organic materials within the site of the new road shall be identified, removed and disposed agreed with the Engineer. Wherever possible they shall be reused within the site by the construction of appropriate mounds/landscaping features.

The area of the carriageway shall be excavated or filled to produce the formation level.

Where local areas are uncovered which are softer than the general sub-grade they shall be excavated out to a depth appropriate for the surrounding formation. Where soft areas exceed 25% of the total area of carriageway in which they occur; the whole area shall be reduced in level and suitable material substituted. All other unsuitable material, other than organic material, shall be considered for treatment to make it suitable for use in the carriageway works, footways, verges or other parts of the site. Only with the agreement of the Engineer may surplus material be removed from the site.

Fill material shall comply with ‘suitable material’ as defined in the Specification.

### 3.2.1.5 SERVICE DUCTS AND PIPERWORK

Ducts and pipework shall wherever possible not be located in the carriageway. Where service crossings make this unavoidable, they shall be installed prior to carriageway construction and protected from damage by subsequent construction.

### 3.3 CARRIAGEWAY- SUB-BASE AND CAPPING LAYER

#### 3.3.1.1 SUB-BASE AND CAPPING LAYER DESIGN THICKNESS

For District Distributor roads and Industrial Access Roads, the thickness of sub-base shall be determined in accordance with the Design Manual for Road and Bridge Works Volume 7 Section 2 Chapter 3 HD25 for the estimated volume of traffic as agreed with the Engineer. Only ‘Flexible pavements’ are permitted. Where the capping layer option is preferred, the reasons for not improving the CBR of the sub-grade by stabilisation shall be discussed with the Engineer.

For Local Distributor, Major Access Roads, Minor Access Roads, Minor Access Ways and Homezones the design process shall be as follows:

1. Carry out four thickness designs using the equilibrium CBR of the formation for the long term condition and the anticipated CBR at the time of construction for the short term condition. The latter will need to be rechecked at time of construction.
2. Select the thickness for sub-base alone and for Capping layer options which are the more conservative.
3. Determine on economic practicality or sustainability grounds whether to use the sub-base option or capping layer option.

It is not intended that the sub-base be used as a access for the construction of buildings. Access should be provided separately or by using the surface of the basecourse prior to laying the blacktop or block surfacing.

The thickness design below is based on the works being carried out by a company quality assured for this activity. Records of the CBR at the time of construction, the thickness of the placed materials and the compaction plant used shall be made available to the Engineer. Where the works are not carried out by a company quality assured for this activity, the thickness of sub-base and capping shall each be increased by 20%.

For the purposes of this design guide the following traffic figures in table 10 have been assumed. For the purpose of structural pavement design the roads should be designated as shown in the table irrespective of descriptions used for other purposes.

#### Table 10: Assumed Traffic for Design Purposes

<table>
<thead>
<tr>
<th>Road Type</th>
<th>Length of Road constructed (lin. meters)</th>
<th>Construction Traffic standard axles</th>
<th>Commercial Vehicles per day</th>
<th>Standard axles over the design life (millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local Distributor</td>
<td>250</td>
<td>1000</td>
<td>125</td>
<td>1.2</td>
</tr>
<tr>
<td>Major Access Road</td>
<td>250</td>
<td>1000</td>
<td>50</td>
<td>0.5</td>
</tr>
<tr>
<td>Minor Access Road</td>
<td>150</td>
<td>500</td>
<td>10</td>
<td>0.3</td>
</tr>
<tr>
<td>Minor Access Way</td>
<td>50</td>
<td>200</td>
<td>1</td>
<td>0.05</td>
</tr>
<tr>
<td>Homezone</td>
<td>0</td>
<td>50</td>
<td>0.3</td>
<td>0.01</td>
</tr>
</tbody>
</table>

#### Sub-base Thickness - Sub-base Only Option - Short Term Condition

(The design is based on that necessary for construction of the road and the construction of dwellings using the top of bituminous basecourse as a site access)

#### Table 11: Sub Base Thickness - Short Term

<table>
<thead>
<tr>
<th>CBR (%) at time of construction</th>
<th>&lt; 2</th>
<th>2 to 3</th>
<th>&gt; 3to&lt;5</th>
<th>5to&lt;10</th>
<th>10to&lt;15</th>
<th>15+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road Type</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local Distributor, Major Access Road</td>
<td>n/a</td>
<td>400</td>
<td>310</td>
<td>225</td>
<td>180</td>
<td>150</td>
</tr>
<tr>
<td>Minor Access Road</td>
<td>n/a</td>
<td>350</td>
<td>275</td>
<td>200</td>
<td>160</td>
<td>150</td>
</tr>
<tr>
<td>Minor Access Way</td>
<td>410*</td>
<td>310*</td>
<td>240</td>
<td>180</td>
<td>150</td>
<td>120</td>
</tr>
<tr>
<td>Homezone</td>
<td>350*</td>
<td>250*</td>
<td>190</td>
<td>160</td>
<td>150</td>
<td>120</td>
</tr>
</tbody>
</table>

#### Table 12: Sub Base Thickness - Long Term

<table>
<thead>
<tr>
<th>Equilibrium CBR (%)</th>
<th>&lt; 2</th>
<th>2 to 3</th>
<th>&gt; 3to&lt;5</th>
<th>5to&lt;10</th>
<th>10to&lt;15</th>
<th>15+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road Type</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local Distributor, Major Access Road</td>
<td>n/a</td>
<td>170</td>
<td>150</td>
<td>150</td>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td>Minor Access Road</td>
<td>n/a</td>
<td>170</td>
<td>150</td>
<td>150</td>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td>Minor Access Way</td>
<td>375*</td>
<td>170</td>
<td>150</td>
<td>140</td>
<td>130</td>
<td>120</td>
</tr>
<tr>
<td>Homezone</td>
<td>300</td>
<td>170</td>
<td>150</td>
<td>140</td>
<td>130</td>
<td>120</td>
</tr>
</tbody>
</table>

**Note 1** - On Frost susceptible soils a minimum thickness of carriageway construction of 450mm is required. The sub-base thickness may need to be increased or the sub-grade made non-frost susceptible by stabilisation.

**Note 2** - * denotes that a non-woven geotextile is required as a separation layer between the sub-base and the sub-grade.
Capping layer thickness - sub-base and capping layer option - short term condition

(The design is based on that necessary for construction of the road and the construction of dwellings using the top of bituminous basecourse as a site access)

Table 13: Capping layer thickness - short term

<table>
<thead>
<tr>
<th>Road Type</th>
<th>Sub base thickness</th>
<th>150mm sub base shall be laid on the capping layer thickness below</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local Distributor</td>
<td>600 450 350 250 180 0</td>
<td></td>
</tr>
<tr>
<td>Major Access Road</td>
<td>450 315 240 200 150 0</td>
<td></td>
</tr>
<tr>
<td>Minor Access Way</td>
<td>330 210 150 150 0 0</td>
<td></td>
</tr>
<tr>
<td>Homezone</td>
<td>160* 150* 150 0 0</td>
<td></td>
</tr>
</tbody>
</table>

Capping layer thickness - sub-base and capping layer option - long term condition

(The design is based on the long term requirements for use of the road by traffic)

Table 14: Capping layer thickness - long term

<table>
<thead>
<tr>
<th>Equilibrium CBR (%)</th>
<th>Sub base thickness</th>
<th>150mm sub base shall be laid on the capping layer thickness below</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 2</td>
<td>2 to 3</td>
<td>&gt; 3 to &lt; 5</td>
</tr>
<tr>
<td>5 to &lt; 10</td>
<td>10 to &lt; 15</td>
<td>15+</td>
</tr>
</tbody>
</table>

Note 1 - On frost susceptible soils a minimum thickness of carriageway construction of 450mm is required, the sub-base thickness may need to be increased or the sub-base made non-frost susceptible by stabilisation.

Note 2 - * denotes that a non-woven geotextile is required as a separation layer between the sub-base and the sub-grade.

3.3.2 Materials for capping layer

Capping layer materials shall comply with Clause 613 of the Specification together with Kent County Council amendment Clause 613 K.

Wherever possible the capping layer should be constructed using the existing soil improved by the addition of a suitable binder additive rather than forming a capping layer using imported granular material.

Selected granular materials include recycled aggregates and Type 3 sub-base, for example: crushed concrete, demolition waste and asphalt planings but excluding unburnt colliery spoil.

In addition to selected granular material Clause 613 includes cement stabilised materials and lime stabilised cohesive material. Lime stabilised cohesive material is frost susceptible and if less than 450mm below the surface should be further treated with cement pending approval from the Engineer.

For this purpose ‘cement’ includes portland cement and cementitious (hydraulic) binders including PFA and ground granulated blast furnace slag.

Stabilisation to form capping shall be carried out in accordance with Clauses 614 and 615 of the Specification.

Material shall achieve a minimum CBR of 30% when tested in the laboratory in accordance with BS 1377 test 16 when compacted to 95% of the maximum achieved by BS 1377 Test 14 and at a saturation moisture content using 3 annular surcharge rings.

Chalk shall have a saturation moisture content not exceeding 20% and shall be compacted in homogeneous layers not exceeding 225mm to achieve a maximum air voids of 5%.

Capping layer materials shall be compacted with vibrating rollers so that when tested they achieve an in-situ Stiffness Modulus measured by Portable Dynamic Plate, of 60MPa maintained until carriageway construction is complete. Tests shall be carried out every 10m of carriageway which may be reduced in frequency if there is no result less than 100MPa after 5 tests at least 10m apart. If this Stiffness Modulus cannot be achieved, the capping layer stiffness may be inadequate or an inadequate thickness has been laid. It may be possible to reduce capping layer thickness where material which achieves a higher stiffness is supplied.

The Environment Agency shall be consulted over the use of any material which may contain contaminants which could generate an unacceptable leachate.

At least 2 weeks before the laying of material is to commence, details shall be submitted to the Engineer of the sources of material and the methods intended to be used. Site trials may be required.

3.3.3 Materials for sub-base

Sub-base materials shall be one of the following:

- Granular materials complying with Clause 803 of the Specification (Type 1 sub-base), Type 1G sub base, or for Minor Access Ways and Homezones Type 3 material. Type 1G and Type 3 materials shall be in accordance with the Kent County Council Specification additional Clauses 887 AK and 885 AK respectively.

- Hydraulically bound (pozzolanic) materials (HBM) on which evidence has been provided that they are equivalent in strength at 56 days to a cement bound material complying with the Specification for CBM 3. Phosphoric Slag to Clause 886 AK satisfies this requirement.

Hydraulic binders include PFA, Blast furnace and Air cooled Slag. They may need to be combined with Phosphorus Slag or activators such as lime or gypsum to produce the required strength. Aggregate interlock is also essential to enable the surface of Hydraulically bound materials to resist rutting. When tested they shall achieve an in-situ Stiffness Modulus measured by Portable Dynamic Plate, of 140MPa measured at a rate of 1 tests per 50 linear metres of carriageway.

Materials shall be compacted with vibrating rollers without drying out or segregation so that when tested they achieve 95% of the density when compacted in accordance with BS 1377 Part 14. This shall be measured in-situ using a calibrated nuclear density meter at a rate of 1 tests per 50 linear metres of carriageway.

Prior to laying the bituminous material the surface of the sub-base shall not have a rut exceeding 10mm measured using a 3m straight edge.

The Environment Agency shall be consulted over the use of any material which may contain contaminants which could generate an unacceptable leachate.

At least 2 weeks before laying of material is to commence, details shall be submitted to the Engineer of the sources of material and the methods intended to be used.
3.4 CARRIAGeway CONSTRUCTION

3.4.1 General

Flexible pavements consist of wearing courses, basecourses, roadbases and sub-base layers.

3.4.2 Sub-base and Capping Layer

Sub-base and capping layer shall be in accordance with Section 3.3 of this document.

3.4.3 Construction Thickness - Flexible Pavements

For District Distributor Roads and Industrial Access Roads the thickness of carriageway construction shall be determined in accordance with the Design Manual for Road and Bridge Works Volume 7 Section 2 Chapter 3. For the estimated volume of traffic as agreed with the Engineer. Only 'Flexible pavements' are permitted.

For other roads the thickness of bituminous pavement materials shall be determined from Table 15.

3.4.4 Construction Thickness - Concrete Blocks or Clay Pavers

For District Distributor Roads and Industrial Access Roads the thickness of carriageway construction shall be determined in accordance with the Design Manual for Road and Bridge Works Volume 7 Section 2 Chapter 3 HD26 for the estimated volume of traffic as agreed with the Engineer. Only 'Flexible pavements' are permitted.

3.4.5 Roadbase and Basecourse

Road base shall comprise one of the following subject to the restrictions shown in Note 2 above:

- Hot Rolled Asphalt to BS 594 and Clause 904, except that 60% of the material may be recycled bitumen bound material. The material shall comply with Clause 902 of the Specification
- Dense Bitumen Macadam to Specification Clause 929 except that 60% of the material may be recycled bitumen bound material. The material shall comply with Clause 902 of the Specification
- Permanent cold lay base material in accordance with Kent County Council's Specification
- CBM 3 to the Specification Clause 1035 and 1038.
- Hydraulic bound materials HBM in accordance with Kent County Council's Specification

Bitumin Bound materials shall satisfy the requirements detailed in Table 15.

3.4.6 Surfacing

Surfacing material shall comprise one of the following subject to the restrictions in Note 1 above:

- Thin Surfacing: A material with a Certificate of compliance with HAPAS (Highway Authority Product Approval Scheme)
- Close Graded Macadam to BS 4987
- Concrete block paving to BS 6717. Blocks shall be rectangular, normally 200mm by 100mm. Secondary treatment of corners and edges may be permitted if this is appropriate to the development.
- Clay Pavers to BS 6677. Pavers shall be rectangular, normally 200mm by 100mm.

The colour of blocks and if applicable the shape and finish shall be approved by the Engineer in consultation with the Planning Officer and a sample of 0.5m² of blocks shall be provided to determine the consistency of the colour, which shall be consistent throughout the scheme. The colour of the blocks in shared surface environments shall always contrast with other road types and shall be generally brown / red.

Bituminous Bound materials and surface dressing shall satisfy the requirements detailed in Table 15. Coloured Bituminous Bound materials and Slurry Surfacing shall have both the binder pigmented and the aggregate appropriately coloured. The colour of the material and if applicable the finish shall be approved by the Engineer in consultation with the Planning Officer by viewing a sample of the surface laid elsewhere. The colour shall be consistent throughout the scheme.

The colour of surfacing materials and surfacing materials types shall be chosen in a consistent way to designate the role of the relevant piece of road in the hierarchy and agreed with the Engineer in consultation with the Planning Officer.

3.4.7 Construction of Road Pavements - Flexible

The Grid for checking surface levels of pavement courses (Clause 702) shall be as follows:

- Transverse dimension 1metre
- Longitudinal dimension 5metres

Where no kerbs are laid prior to surfacing the datums for level control shall remain in place to permit checks.
Traffic Category shall be to \textit{BS 4987} Category B.

All material shall comply with Clause 901 and this Section.

Basecourses should wherever possible be laid in conjunction with roadbases and may be used by traffic. Any damage to the surface should be made good with basecourse or surfacing material.

Dense Bitumen Macadam develops its strength largely as a consequence of good compaction whilst the material is adequately hot. The air voids in dense macadam and hot rolled asphalt shall be checked using a calibrated nuclear density meter at a rate of 1 test per 25 linear metres of carriageway.

The mean total air voids in Dense Bitumen Macadam shall comply with the requirements of Clause 929 except that for routine purposes a calibrated nuclear density gauge may be used.

The mean total in-situ air voids of six consecutive determinations on Hot Rolled Asphalt shall not exceed 5%, with the air voids in any individual determination not exceeding 8%. The Air Voids content shall be calculated to ±0.1% as follows:

\[
\text{Air Voids content} = (1 - \rho/\rho_{\text{max}}) \times 100\%
\]

where \(\rho\) is the initial dry bulk density determined in accordance with BS 598 Part 104 and \(\rho_{\text{max}}\) is the maximum density of the Hot Rolled Asphalt determined in accordance with BS DD 228:1996.

Where there is uncertainty 150 mm diameter cores shall be taken at the same frequency as stated above and the Air Voids content determined. They shall comply with the requirements above.

The satisfactory performance of thin surfacing depends upon a good bond between the surfacing material and the basecourse. Before the wearing course is laid all loose material or other material adhering to the surface shall be removed by mechanical broom and if necessary water jetting.

The surface texture shall comply with the requirements of Kent County Council’s Specification for Low texture, initially and retained for 2 years.

The surfacing provides the impermeable and skid resistant surface to the road, it is constantly visible to the public and defines their view of the quality of construction.

3.4.8 \textbf{CONSTRUCTION OF ROAD PAVEMENTS - BLOCK PAVED SURFACE}

In the case of Local Distributor Roads, Industrial Access Roads, Major Access Roads and Minor Access Roads block paving shall be laid in 45\(^\circ\) herringbone pattern.

Minor Access Ways and Home-zone block paving may be laid either in 45\(^\circ\) herringbone pattern or in stretcher bond at 90\(^\circ\) to the kerb.

There shall be two stretcher courses adjacent to kerbs and a single stretcher course round ironwork.

Block paving shall be laid in accordance with \textit{BS 7533 Part 3. (Clay and Concrete pavers: Code of practice for construction of pavements)}.

The structural strength of a road with a block paved surface depend upon the thickness of laying sand not exceeding the permitted tolerances. Any low areas in the roadbase must be made good with well rammed hot dense bitumen macadam prior to surfacing taking place. Significant areas outside the permitted tolerances will require the roadbase to be removed and reinstated to the correct tolerances.

Block Paving shall have a minimum Polished Paver Value of 45.

3.4.9 \textbf{JUNCTION WITH CONCRETE CARRIAGEWAY}

Where flexible construction meets a rigid concrete road, a double row of granite setts bedded on at least 150mm of ST2 mix concrete and jointed fully with strong cement mortar, shall be laid across the full width of the joint.

The full depth of construction shall be maintained beneath the sett paving.

\begin{table}[h]
\centering
\begin{tabular}{|c|c|c|c|c|c|}
\hline
\textbf{Clause} & \textbf{Material} & \textbf{Thickness (mm)} & \multicolumn{2}{c|}{\textbf{BS594 Coarse aggregate}} & \textbf{Binder PEN} & \textbf{Remarks} \\
\hline
\multirow{2}{*}{904} & Roadbase & 90, 80, 70 & 2 & 2/5 & 60 & 28 & 50 & Up to 60\% recycled asphalt may be used in accordance with Clause 902 \\
\multirow{2}{*}{905} & Basecourse & & & & & & \\
\hline
\multirow{2}{*}{905} & Basecourse & 60 & 2 & 2/4 & 60 & 20 & 50 & \\
\hline
\multirow{2}{*}{905} & Basecourse & 40 & 2 & 2/2 & 50 & 14 & 50 & \\
\hline
\end{tabular}
\end{table}

\begin{table}[h]
\centering
\begin{tabular}{|c|c|c|c|c|c|c|}
\hline
\textbf{Clause} & \textbf{Material} & \textbf{Thickness (mm)} & \textbf{Mix} & \textbf{Coarse aggregate} & \textbf{Binder PEN} & \textbf{Remarks} \\
\hline
\multirow{2}{*}{932} & Roadbase/ basecourse & 90, 80, 70 & Clause 929 & 28 & n/a & n/a & 50 & Clause 929 material shall have the approval of the Engineer following an on-site or off-site approval trial. \\
\multirow{2}{*}{934} & & 60, 50, 45 & Clause 929 & 20 & n/a & n/a & 50 & \\
\hline
\multirow{2}{*}{906} & Basecourse & 40 & BS 4987 Clause 7.3 & 14 & n/a & n/a & 100 & Up to 60\% recycled asphalt maybe used in roadbase or basecourse in accordance with Clause 902 \\
\hline
\multirow{2}{*}{906} & Basecourse & 25 & BS 4987 Clause 7.4 & 10 & n/a & n/a & 100 & \\
\hline
\multirow{2}{*}{912} & Wearing course & 35 & BS 4987 Clause 7.4 & 10 & 50 & 12 & 100 & Traffic category B \\
\hline
\multirow{2}{*}{912} & Wearing course & 20, 15 & BS 4987 Clause 7.5 & 6 & 45 & 12 & 100 & Traffic category B \\
\hline
\end{tabular}
\end{table}

Notes: a) Gravel aggregate is not permitted

b) Where it is necessary to use the Hot Rolled Asphalt Basecourse as the running surface for traffic of any kind for more than 7days, the percentage of materials passing the 75micron BS sieve shall be not less than 5%

c) The delivery temperature at any point in the load shall be in the range 165\(^\circ\)C to 120\(^\circ\)C (50Pen) 155\(^\circ\)C to 120\(^\circ\)C (100Pen)
3.5 ENTRY RAMPS AND SPEED RESTRAINTS

In all the following cases reference should also be made to the KCC’s Traffic Calming Code of Practice.

3.5.1 DEMARCATION RAMP AT ENTRY TO RESIDENTIAL SHARED SURFACE

Demarcation ramps at the commencement of shared surface environments shall have a 1:15 (6.7%) gradient. If the material chosen for the ramp is granite setts, the construction of the ramp should be 100mm x 100mm x 100mm deep granite setts, bedded on at least 150mm of ST4 mix concrete on a full construction thickness of sub-base and jointed with cement mortar.

Joints between granite setts are to be pointed flush within 1.0 metre of kerbline in the interests of cyclists safety.

At the commencement of the ramp there should be an upstand of not more than 6mm.

The detail of the demarcation ramp may change if it forms part of a speed restraint device.

3.5.2 TABLE JUNCTIONS AND SPEED TABLES

The plateau of a table junction or speed table shall be constructed using full construction thickness as detailed in Sections 3.4 to match the adjacent carriageway construction or full block paving construction.

Ramps at the commencement of table junctions and speed tables shall be 1.125 metres long, laid at a gradient of 1 in 15 (6.7%). The maximum height of any vertical deflection in Kent is 75mm.

3.5.3 MINI ROUNDABOUTS

The central dome may be up to 4 metres in diameter and raised to a maximum of 100mm in the centre. The dome height should be in proportion to the roundabout diameter, i.e. for a 2m roundabout the dome should be raised to a maximum of 50mm in the centre. This should be lowered if buses or frequent H.G.V.s need to cross it. The edge should be flush within a tolerance of 6mm above the adjacent road surface and the dome must be finished in white.

3.5.4 SMALL ROUNDABOUTS

Small roundabouts with solid central islands may feature an outer ring of overrunnable materials, usually block paving. The profile may have a cross-fall of up to 1 in 15 (6.7%) with the outer edge flush with a tolerance of up to 6mm above adjoining road surface. The overrun area should be in a conspicuous contrasting colour or black and white chevrons.

3.6 KERBING, CHANNELS AND EDGE RESTRAINT

3.6.1 GENERAL

Kerbing is required to designate the carriageway edge clearly, protect pedestrian footways, service margins and verges from vehicle overrun and provide a channel against which water can run to the gullies. It should be provided wherever necessary and in addition to define the inside edge on bends and at other locations where inadvertent vehicle over-run could damage the verge.

Kerbing shall be selected to satisfy the aesthetic requirements of the development. The use of special kerbs, such as granite effect, exposed aggregate or granite setts may be acceptable or may be required by the Engineer in conservation areas or where the use of these materials would reinforce the character and identity of the locality, and where the use of normal kerbs would conflict with it.

Channels not only provide a means of taking water to gullies they also provide linear features in the construction. They shall be constructed of granite setts, proprietary channel and grating sections or small precast concrete or clay units set rigidly in concrete. Precast concrete channels of length greater than 300mm shall not be used where heavy vehicle over-run may occur.

Where kerbs or channels are removed they should wherever possible be removed in such way as to minimise damage and be reused within the site.

3.6.2 KERBS, CHANNEL AND EDGING

Precast concrete kerbs, channels and edgings shall comply with the requirements of Clause 1101 of the Specification and BS7263 (Parts 1 & 2). Precast concrete kerbs and channels shall be hydraulically pressed. Clay paver kerbs shall comply with the requirements of BS 6677.

Precast concrete kerbs, channels and edgings shall be laid in accordance with BS 7533 Part 6.

The kerb type for Local Distributor, Industrial Access and Major Access Roads shall be generally 125mm x 255mm half battered kerb type HB2.

The kerb type for Minor Access Roads, Minor Access Ways and Homezones shall be either small unit block kerbs or 125mm x 225mm half battered kerb type HB2. Alternatively the use of special kerbs and channels, manufactured in-situ from granite setts bedded on concrete ST2 mix, may be used. The layout and location of these shall be agreed with the Engineer at the planning stage.

Concrete channel blocks type CSI or other proprietary channel units must be provided if the longitudinal gradient is flatter than 0.8% (1 in 125), unless on short lengths over vertical curves.

The edging type shall generally be 50mm x 150mm type EF bedded and surrounded with concrete ST2 mix.

3.6.3 KERB FACE

In Local Distributor, Industrial Access and Major Access Roads, kerbs shall normally show a 125mm face above the finished road surface, (except through certain traffic calming devices if required and through vehicular crossings and pedestrian crossings), but where it is necessary to vary the kerb face to facilitate drainage of the Carriageway the limits shall be between 75mm and 150mm.

On Minor Access Roads, Minor Access Ways and Homezones kerbs shall show 100mm face above the finished road, (except through the entry ramp, through certain traffic calming devices if required and through vehicular crossings and pedestrian crossings). However, where small unit block kerbs are used, this height may be reduced to a minimum of 75mm.

3.6.4 VEHICULAR CROSSINGS

At vehicular crossings the kerbing shall be lowered for the full width of the crossings and in any case for not less than four kerbs length (3.66metres). When using precast concrete kerbs, bullnosed kerbs (125mm x 150mm) Type BN, shall be laid to show a 25mm face above the finished road surface. Tapered kerbs type DL1 and DR1 are required at either side when using precast concrete kerbing. In other cases small unit block kerbs shall be used.

Where the vehicular crossing is also a pedestrian crossing, the kerb face shall be between zero and 6mm. At each side of the crossing taper kerbs type DL1 and DR1 shall be used.

A minimum of three raised kerbs between vehicle or pedestrian crossings is preferred but where less than two raised kerbs could occur they shall be laid as one continuous crossing.

In block paved construction, temporary arrangements must be made for vehicular access if occupation of dwellings occurs before the blocks are laid.

Construction details of vehicular crossings are described in Section 3.7.
3.6.5 Pedestrian Crossings

At junctions or points where pedestrians require to cross a side road, pedestrian crossing ramps shall be formed by using a minimum of two 125mm x 150mm bullnosed kerbs (125mm x 150mm) Type BN, laid to show a 0-6mm face above the finished road surface. Precast concrete tapered kerbs type DL1 and DR1 are required on either side of the crossing.

In other cases small unit block kerbs shall be used.

3.6.6 Tactile Markings

At all pedestrian crossing points along Local Distributor and Industrial Roads and other places where pedestrian flows are likely to be high such as approaches to shops, pedestrian crossing ramps shall be provided with tactile surfacing in accordance with Guidance on the use of Tactile Paving Surfaces published by the DETR.

3.7 Footways, Footpaths, Vehicular Crossings and Cycleways

3.7.1 General

The layout of footways, footpaths, vehicle crossings and cycleways shall be as agreed with the Engineer when the development is planned.

A footpath is a footway not located adjacent to a carriageway. Whilst individual developments may have their own requirements in general a footway will be required on both sides of a Local Distributor and Major Access Road and on one side, normally the low side, of a Minor Access way and Minor Access Road. Footways are not required in Homezones.

The provision of footways and footpaths for Industrial Roads shall be in accordance with section 2.3.

Whilst the roadway may have deviations introduced to reduce speeds, pedestrians will walk in straight lines between two points if they can. The layout of footpaths and footways should recognise this by the insertion of planting or a verge between the footway and the carriageway and where grassed areas exist at junctions by careful consideration of the layout of footpaths.

Footway and footpath cross-fall gradients shall be 2.5% (1in 40) falling towards the carriageway. Longitudinal gradients shall not normally be steeper than 5% (1in 20). Where this is unobtainable steeper gradients maybe used subject to provisions being provided as detailed in Kent County Council’s Code of Practice ‘Highways Suitable for the Mobility Impaired’.

The Developer shall ensure that all services are installed in accordance with the New Roads and Streetworks Act 1991 prior to the surfacing of the footway being laid, or planting of the grassed area being carried out.

A cycleway shall be distinguished from a footway by an appropriate selection of surfacing material or colour and appropriate marking of the surface. Cycleways may abut a footway or be separate from it.

The provision of cycleways shall be in accordance with section 2.4.

The construction of footways, footpaths, vehicle crossings and cycleways shall be in accordance with this section.

3.7.2 Preparation of Formation

Earthworks will normally be carried out in conjunction with carriageway works. Additional filling and shaping of the footway formation may be required after kerblaying and this should be carried out to the requirements of the Specification without damage to any kerbing or services laid beneath the footway.

3.7.3 Edging

Where the footpath or cycleway does not abut a kerb or channel or a boundary wall, edge restraint shall be provided.

Edge restraint will normally be a precast concrete edging as described in clause 3.6.2. Alternatively engineering bricks, clay pavers, concrete blocks or stone setts rigidly laid in concrete may be used where appropriate with the approval of the Engineer. They shall have no upstand.

3.7.4 Drainage

Where necessary surface water drainage shall be provided to footways, footpaths and cycleways, which do not abut a carriageway, using the principles described in Section 2.6. Alternatively the vertical alignment should be adjusted to ensure no puddles can form, making due allowance for the laying tolerance on surfacing materials. Suitable gully types include linear drainage designed for pedestrian areas.

3.7.5 Construction Thickness

The construction of footways and cycleways shall be in accordance with Table 19 and 21.

---

TABLE 19: CONSTRUCTION THICKNESS - FLEXIBLE CONSTRUCTION FOOTWAYS AND CYCLEWAYS

<table>
<thead>
<tr>
<th>Location</th>
<th>Local Distributor/ Major Access Road</th>
<th>Minor Access Road</th>
<th>Remote from carriageway</th>
<th>Corners where overrun possible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sub-base</td>
<td>150</td>
<td>100</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>Roadbase</td>
<td>40</td>
<td>40</td>
<td>140 (in 2 layers)</td>
<td></td>
</tr>
<tr>
<td>Surfacing</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>

TABLE 20: CONSTRUCTION THICKNESS - FLEXIBLE CONSTRUCTION VEHICLE CROSSOVER

<table>
<thead>
<tr>
<th>Location</th>
<th>Residential Vehicle Crossover</th>
<th>Commercial Vehicle Crossover</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sub-base</td>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td>Roadbase</td>
<td>40</td>
<td>140 (in 2 layers)</td>
</tr>
<tr>
<td>Surfacing</td>
<td>20</td>
<td>20</td>
</tr>
</tbody>
</table>

TABLE 21: CONSTRUCTION THICKNESS - BLOCK PAVING & SLAB CONSTRUCTION FOOTWAYS AND CYCLEWAYS

<table>
<thead>
<tr>
<th>Location</th>
<th>Local distributor/ Major access road</th>
<th>Minor access way</th>
<th>Remote from carriageway</th>
<th>Corners where overrun possible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sub-base on formation</td>
<td>CBR 2%</td>
<td>250</td>
<td>100</td>
<td>150</td>
</tr>
<tr>
<td></td>
<td>CBR 3% to 5%</td>
<td>200</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CBR &gt;5%</td>
<td>150</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roadbase CBM3/HBM or macadam</td>
<td>n/a</td>
<td>n/a</td>
<td>nil</td>
<td>120</td>
</tr>
<tr>
<td>Surfacing: Blocks as for adjacent carriageway on</td>
<td>50mm sand</td>
<td>50mm sand</td>
<td>30mm sand</td>
<td></td>
</tr>
<tr>
<td>or slabs on</td>
<td>25mm sand</td>
<td>25mm sand</td>
<td>25mm sand</td>
<td></td>
</tr>
</tbody>
</table>
3.7.6 **SUB-BASE**

Footway sub-base shall be Type 1, Type 1G or Type 3 material as described in Paragraph 3.3. Type 1 material should not be used unless the other materials are not available economically.

Where the CBR of the formation is under 3%, i.e. there is a likelihood of the sub-base being forced into the subgrade during compaction, a non-woven geotextile separation layer shall be used.

3.7.7 **SURFACING - STRUCTURAL LAYER**

Footway and Cycleway Roadbase shall comprise one of the following - subject to the restrictions above:

- Dense basecourse macadam to BS4987, Clause 6.5, nominal size of coarse aggregate 20mm, binder 100pen,
- Permanent Cold lay base material to Kent County Council Clause 997AK, nominal size of coarse aggregate 20mm.
- CBM3 to Clause 1035
- Hydraulic Bound materials HBM to Clause 886AK

3.7.8 **SURFACING - SURFACE LAYER**

Surfacing material shall comprise one of the following - subject to the restrictions above:

- Close Graded Macadam to BS 4987
- Amenity Surface dressing to the Specification Clause 919
- Slurry Surfacing to the Specification Clause 918
- Concrete block paving to BS 6717. Blocks shall be rectangular, normally 200mm by 100mm. Secondary treatment of corners and edges may be permitted if this is appropriate to the development. They may be 50mm thick or greater
- Clay Pavers to BS 6677. Pavers shall be rectangular, normally 200mm by 100mm. They may be 50mm thick or greater
- Modular type slabs to BS 7263 Part 2

The colour of blocks and if applicable the shape and finish shall be approved by the Engineer in consultation with the Planning Officer by viewing a sample of the surface laid elsewhere. The colour shall be consistent throughout the scheme.

3.7.9 **HANDRAILS**

Handrails shall be provided on both sides of steps and on footways and footpaths whenever the gradient exceeds 8%.

Handrails are recommended to be round sections between 45mm and 50mm in diameter and there should be a gap of 45mm between the rail and any wall.

Handrails should be set 900mm above a ramp and 850mm above the nose of a step. The end of any handrail should extend at least 300mm horizontally beyond the top and bottom of the steps or ramps. There should be a positive end to the handrail or it shall return into a wall.

3.7.10 **PEDESTRIAN GUARDRAILS AND BARRIERS**

Pedestrian Guardrails and Barriers shall be provided where ever it is necessary to protect pedestrians from inadvertently moving into the carriageway and protect them from traffic. Future guidance can be sought from the Engineer regarding types of guardrail especially in regard to visibility issues.

3.7.11 **EMERGENCY ACCESS**

Where a footpath is designed to be used as an emergency access for vehicles it shall be constructed in accordance with the requirements of tables 20 and 22 for commercial vehicle crossovers.

3.7.12 **SIGNING**

The signing of footpaths and cycleways shall be in accordance with Kent County Council’s requirements. Signs shall be located a minimum of 0.5 meters from the edge of the way.

3.7.13 **MARKINGS**

Road markings shall be provided on cycleways and footways where required as described in A Cycling Strategy for Kent.

3.7.14 **TRAFFIC REGULATION ORDERS**

Traffic Regulation Orders are required for cycleways and may be required for footpaths, to prohibit use by motor vehicles. The costs incurred by the Highway Authority in making such orders will be borne by the Developer.

---

**TABLE 22: CONSTRUCTION THICKNESS - BLOCK PAVING & SLAB CONSTRUCTION VEHICLE CROSSOVER**

<table>
<thead>
<tr>
<th>Location</th>
<th>Residential Vehicle Crossover</th>
<th>Commercial Vehicle Crossover</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sub-base on formation</td>
<td></td>
<td>150</td>
</tr>
<tr>
<td>CBR 2%</td>
<td>250</td>
<td></td>
</tr>
<tr>
<td>CBR 3% to 5%</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>CBR &gt;5%</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>Roadbase CBM3/HBM or macadam</td>
<td></td>
<td>120</td>
</tr>
<tr>
<td></td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>Surfacing: Blocks as for adjacent carriageway on</td>
<td>50mm sand</td>
<td>30mm sand</td>
</tr>
<tr>
<td>or slabs on</td>
<td>25mm sand</td>
<td>25mm sand</td>
</tr>
</tbody>
</table>

---

highways specification and construction
4. MISCELLANEOUS

PEDESTRIAN CROSSING POINTS
Pedestrian crossing ramps shall be provided, with tactile paving, where pedestrians need to cross the road and where no suitable alternative exists, such as a vehicular crossing point.

Pedestrian crossing ramps shall be provided at all junctions and other appropriate locations.

HIGHWAY STRUCTURES
All highway structures, whether to be adopted or not shall be designed in accordance with the latest relevant standards, codes of practice and DETR Technical Memoranda and will require technical approval in accordance with section 1.1.

HIGHWAY BOUNDARY
At all vehicular accesses and pedestrian entrances to private premises the highway boundary shall be defined. This can be achieved by using granite setts, continuous precast concrete edging or by contrasting the colour of the block paving surfacing materials.

ROAD MARKINGS
Road markings shall be provided at junctions and other locations as required by the Engineer. All road markings shall be laid in reflectorised thermoplastic materials or block paving in accordance with the relevant British Standards and DETR directives.

All traffic signs and road markings shall be in accordance with the latest The Traffic Signs Regulations and General Directions 1994, published by HMSO.

OBSTRUCTION OF THE HIGHWAY
Buildings, doors, windows, gates, gutters and pipes shall not encroach upon the highway as defined in the Highways Act 1980.

SURFACE WATER FROM ADJOINING ROADS AND ACCESSES
Arrangements must be made to deal with surface water from adjoining roads or accesses by the appropriate siting of gullies off the highway and surface water drains. Where resiting gullies or the provision of additional gullies in an existing road is necessary, for example, where the new junction is proposed, these works shall be agreed with the Engineer.

PUBLIC SAFETY
From the time when the first dwelling is occupied to the final completion of the works, all excavations, obstructions and hazards of any kind within the roads and footpaths shall be suitably protected at all times and lit at night.

CLEARANCE OF SITE
On completion of the works, and before the issue of the Part II Certificate, the roads shall be cleared of all surplus materials and left in a clean and tidy condition. Road gullies, soakaways, road drains and any sewers within the highway shall be cleared of any accumulated silt and debris. Such cleansing shall be repeated at the end of the maintenance period, before the issue of the Final Certificate.

UNDERTAKERS
As far as possible, Developers should arrange with the Undertakers to lay their services underground but where poles have to be erected in the highway they should be sited at the back of the footway. Covers and inspection chambers and service boxes shall be set flush with the new surface levels.

STREET NAMEPLATES
Street naming will need to be agreed with the District Council. Street and Footpath name plates are to be provided and erected to the requirements of the District Council before any dwellings are occupied. They will usually be required on both sides of the junction and facing the exit from the connecting road. The name plates are to be set so that the top of the plate is not less than 600mm nor more than 1 metre above the footway level. They shall not obstruct vision at visibility splays, and should be reflective.

TRAFFIC SIGNS
Where it is necessary, for the safety of road users, to provide traffic signs or illuminated bollards, these shall be reflective and provided and installed by the Developer to the Engineer’s requirements and in accordance with the relevant British Standards and Department of Transport directives. A greater use of ‘No Through Road’ symbols where appropriate and cycleway signs are recommended.

FIRE SERVICE REQUIREMENTS
For further guidance on water flow rates that the fire service require, refer to Appendix 5 of the ‘National Guidance Document on the provisions of water for firefighting.'
5. Definitions

Carriageways
Are those parts of a highway which are intended primarily for use by vehicles.

Cycleways
Are those parts of a highway which are intended primarily for the use of cyclists.

District Council
The Council (whether District, City or Borough Council) of the administrative district in which the development is situated.

Drainage Undertaker
Southern Water Services Limited or Thames Water Utilities Limited according to location of the development within the County of Kent.

Footpaths
Are those pedestrian routes which are located away from carriageways.

Footways
Are those parts of a highway which are intended for use by pedestrians and which generally are parallel with the carriageways and separated by a kerb or verge.

Highway Authority
The Kent County Council, The Medway Council.

Engineer
The person appointed as representative of the Highway Authority.

Highway Drainage
Drain laid for the sole purpose of draining the adopted highway.

Highway Unit (HU)
The Management Unit for all highway matters within a particular geographical area of Kent. Highway Manager - Such person as shall be appointed to manage the highway.

Highway Structure(s).
Any bridge, culvert, subway, retaining wall or other structure whether publicly or privately owned, which carries, spans over, or abuts a public highway, or one to be adopted, as defined in the Schedule of Structure Categories given in Paragraph 1.1.5.

EA
Environment Agency.

Planning Authority
The District Council.

Specification
Is the Highways Agency’s Specification.

Street Works Authority
The Kent County Council, The Medway Council.
REFERENCES

**KCC Documents**
- Kent Model Form of Section 38 Agreement
- Kent Pavement Design Guide
- Technical Assessment and Safety Audit Procedures
- Notes on Structure Form and Detail
- Highways Suitable for the Mobility Impaired
- A Cycling Strategy for Kent
- Vehicle Parking Standards February 1999
- KCC Drawings
- Kent Soakaway Design Guide
- Code of Practice for Traffic Calming
- Appendix 1/9 - Control of Noise and Vibration

**NB** There will be other local strategies within each District Council and these may be obtained from the appropriate District Council.

**EXTERNAL DOCUMENTS**
- Department of Transport BD 2/89 Technical Approval of Highway Structures on Trunk Roads (including Motorways)
- Construction (Design and Management) Regulations 1994
- Water Industry Act 1991
- Environment Agency’s ‘Policy and Practice for the Protection of Ground Water’
- New Road and Streetworks Act 1991
- Open Spaces Act 1906
- Highways Act 1980
- Department of Transport Specification for Highway Works
- Places, Streets and Movement (A Companion Guide to DB32)
- Housing Estates - Lifting the Quality
- Design Manual for Roads and Bridges
- Traffic Signs and General Directions
- Traffic Signs Manual
- Planning Policy Guidance 13
- The Freight Transport Association's ‘Designing for Deliveries’
- Road Note 35 ‘A Guide for Engineers to the Design of Storm Sewer Systems’ - HMSO
- Tables for the Hydraulic Design of Pipes and Sewers (5th Edition) - published for Hydraulics Research by Thomas Telford
- Water Industry Specification No. 4-31-05 - published by the Water Research Council
- Public Health Act 1936
- BS7671 - 16th Edition of the Wiring Regulations
- Environmental Protection Act 1990
- Control of Pollution Act 1974
- BS5228 - Code of Practice for Noise Control on Construction and Demolition Sites
- BS7533 Pt 3 - Clay and Concrete Pavers: Code of Practice for Construction of Pavements
- Guidance on the use of Tactile Paving Surfaces - DETR