

PART III

CONSTRUCTION DETAILS

21. PAVEMENT CONSTRUCTION

21.1 Specification

The specification for the construction of road pavements and associated structures is detailed in the Manual of Contract Documents for Highway Works Volume 1: Specification for Highway Works (<http://www.standardsforhighways.co.uk/mchw/index.htm>). Clause numbers in the following text refer to clauses in that document. The Council also has its own set of Standard Detail drawings which should be used. Early discussion with the Roads Authority regarding the materials to be used is recommended.

21.2 Carriageway Construction

Carriageways are to be designed as flexible pavements in accordance with **Table 14** subject to the following qualifications:

- (a) No frost susceptible material shall be permitted within 450 mm of the final running surface.
- (b) Minimum Surface Course thickness shall be 40 mm (CI 901). A typical cross section of carriageway construction is shown in **Figure 16**.

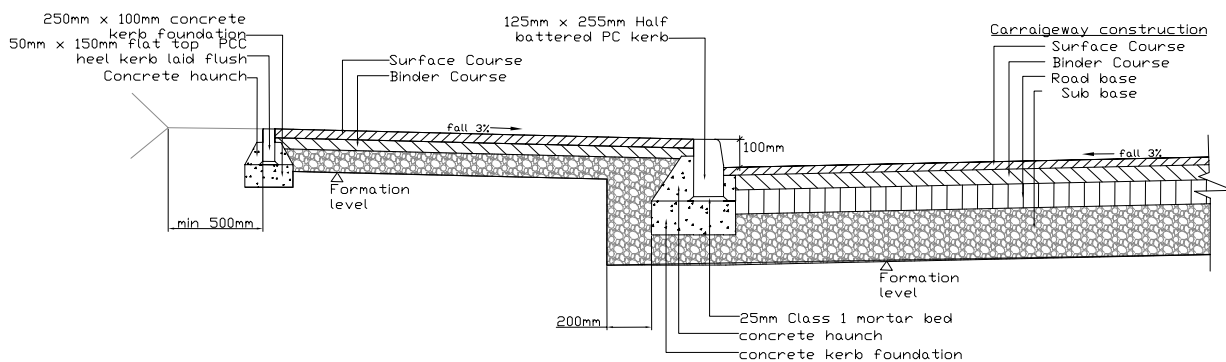


Figure 16 - Typical Carriageway and Footway Construction

21.3 CBR Values

Table 14 details the specification required for the various categories of road depending upon the CBR value of the road formation. These are the minimum standards required, additional requirements may be necessary where especially adverse ground conditions exist. The design is to be based on CBR results obtained from site investigations. Any lay-bys or other parking areas, which are to be adopted, must be constructed to the same specification as the adjacent carriageway. Any District or Main Distributor Roads would normally be the subject of one-off designs based on site investigation results. CBR to be in situ tested.

21.4 Two Stage Construction

Where, owing to the continued use of the road by construction traffic, it is necessary (in order to avoid damage to the surfacing course) to adopt a two-stage construction, the road should initially be constructed up to Binder Course level. Consideration must be given to the temporary drainage of the first stage (i.e. Binder Course), to minimise ponding caused by the projection of gully gratings above the temporary surface, either by adjustment of gully frames or other approved method. This applies particularly in large projects where the construction period may be long and the Surface Course not laid before a winter work period. Any settlement which may occur in the Binder Course should be taken up with a Regulating Course before the laying of the Surface Course and early reinstatement of openings or failed areas is essential. Before the Regulating Course or Surface Course is laid, the top surface of the Binder Course must be well cleaned and tack coat applied at the rate of 0.6 litre per square metre.

The kerbs will normally be omitted during the first stage construction and the 'L' shaped kerb foundation (**Figure 17**) shall be used.

ROAD TYPE	CBR %	CAPPING LAYER	SUB BASE	ROAD BASE	BINDER COURSE	SURFACE COURSE
1. LOCAL DISTRIBUTOR	> 5 2-5 < 2	- 350mm 600mm	250mm 150mm 150mm	170mm	60mm	40mm
2. GENERAL ACCESS STREET	> 5 2-5 < 2	- 350mm 600mm	250mm 150mm 150mm	100mm	60mm	40mm
3. NON-RESIDENTIAL ACCESS STREET	> 5 2-5 < 2	- 350mm 600mm	250mm 150mm 150mm	150mm	60mm	40mm
4. GENERAL ACCESS STREET UP TO 50 DWELLINGS	> 5	-	275mm			
5. HOME ZONE	2-5	350mm	150mm	100mm	60mm	40mm
6. SHORT CUL-DE-SAC UP TO 25 DWELLINGS	< 2	600mm	150mm			
7. MINOR NON-RESIDENTIAL ACCESS STREET/ UP TO 2,000 SQ M COMMERCIAL PROPERTY	> 5 2-5 < 2	- 350mm 600mm	250mm 150mm 150mm	100mm	60mm	40mm
		ALL TYPE 1	ALL TYPE 1	APPENDIX 7/1* Clause 901 DBM	APPENDIX 7/1* Clause 906 DBM	APPENDIX 7/1* Clause 911 HRA

TABLE 14
Carriageway Construction Specifications

Note: Block paving is a permitted alternative in Road Types 5, 6, 7 and shared surfaces where 80 mm blocks with 30 mm sharp sand bedding will be equivalenced with binder course and surface course. All Hot Rolled Asphalt Surface Courses to have 20 mm pre-coated chippings with PSV. (range as from specs)

* Note: Appendix 7/1 is contained with the Specifications for Highway Works

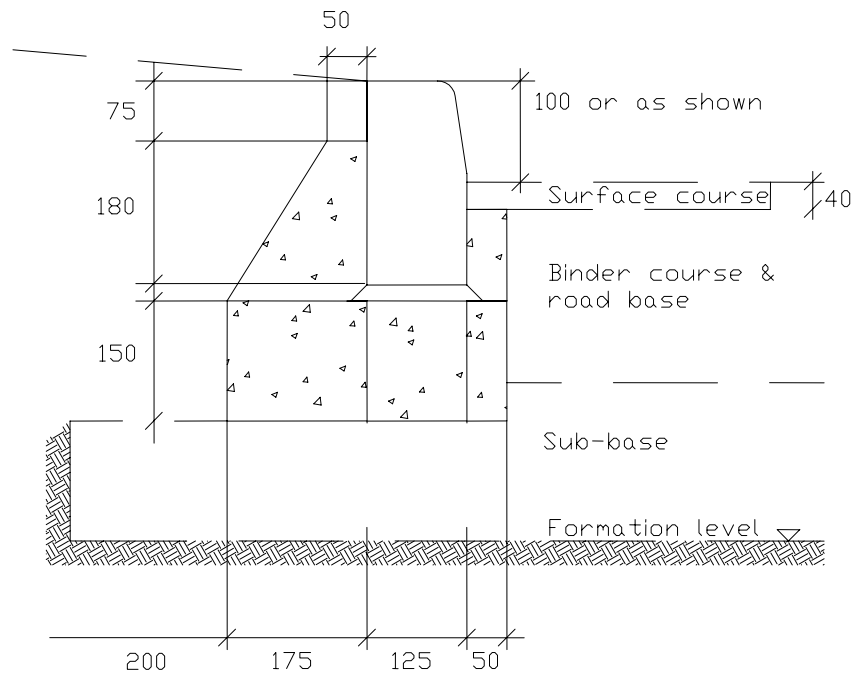


Figure 17 - Kerb Foundation for Two-Stage Construction

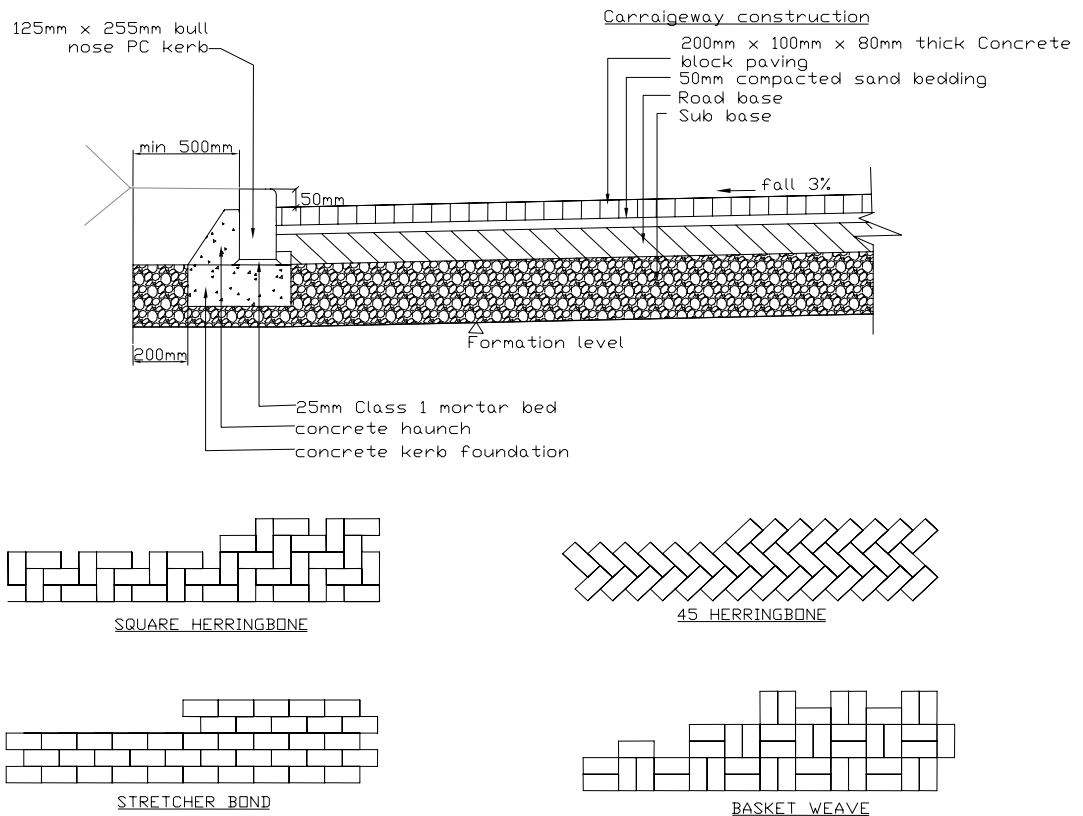
21.5 Concrete Carriageway

Rigid pavement construction will not normally be accepted.

21.6 Concrete Block Paving

Concrete block paving (CI 1107) is particularly suitable for:

- (a) pedestrian/vehicle shared surfaces (**Figure 18**) where a change of material is required to emphasise the different character of the thoroughfare;
- (b) bus termini or other locations at risk from diesel spillage;
- (c) commercial or industrial accesses. Block pavements should be designed in accordance with **paragraph 21.4**, but with the block paving and bedding layer replacing the Binder Course and Surface Course. A minimum 100mm black road-base will be required. It is particularly important that the design incorporates adequate provision for the drainage of unbound sub base and sub-grade materials (**paragraph 21.9**).



LAYING PATTERNS

Figure 18 - Typical Shared Surface Construction

Type	Sub-Base***	Binder Course	Surface Course
Flexible Construction	150 mm	50 mm Dense Bitumen Macadam (CI 905)	30 mm Hot Rolled Asphalt*
Slabbed Construction**	150 mm	25 mm 7:1 sand/lime mortar	600 mm & 900 mm x 600 mm x 65 mm thick paving slabs (CI 1104S)
Slabbed Construction****		(b) 150 mm Class concrete (CL 1111)	450 mm x 450 mm x 65 mm thick paving slabs (CI 1110)
Block Paving	150 mm	30 mm bedding layer of clean sharp sand	200 mm x 100 mm x 65 mm thick rectangular block paving (CI 1108)

TABLE 15
Footway Construction Specifications

- * 6 mm white limestone chippings at the rate of 750 sq m /tonne to be rolled in.
- ** Slabbed paved footways are only acceptable with the specific approval of the Network Manager.
- *** Formation to be sprayed with an approved type of all-in non-toxic weedkiller.
- **** Small element slabbing to be used in locations where abnormal loading is likely to occur and with the specific approval of the Network Manager.

Slabs are to be laid in accordance with manufacturers recommendations.

21.7 Footway and Footpath Construction

Footways and footpaths should be constructed in accordance with **Table 15** as detailed in **Figures 16** and **19**.

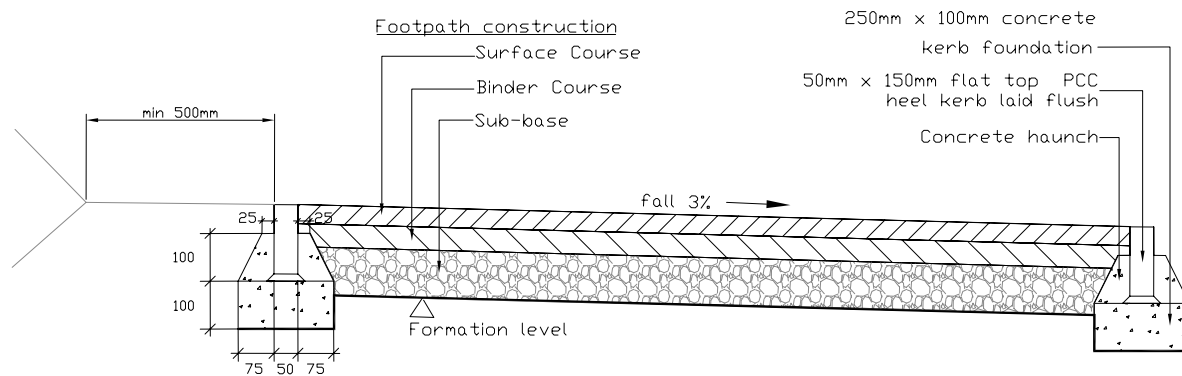


Figure 19 - Typical Footpath Construction

21.8 Sub-grade Drainage

It is important to provide efficient permanent drainage of the sub-grade and any other permeable layer of the road. Ideally, the water table should be prevented from rising to within 0.6 metre of the formation level. This requirement is additional to those of the surface water drainage detailed in **Section 22**.

21.9 Camber, Crossfall and Gradients

Carriageways should be cambered with a fall of 2.5% from the centreline to the channel except on curves where, to eliminate adverse camber, a crossfall of 2.5% between upper channel and centre line should be formed with increased crossfall between centre line and lower channel to allow for a 25 mm centre line increase when boned channel to channel. For roads surfaced with block paving, 2.5% crossfall should be provided throughout. At a junction, the carriageway of the minor road should be graded into the channel of the major road. Footways and footpaths should be constructed with a crossfall towards the road channel. Channel gradients should not be flatter than 0.8% (1 in 125).

21.10 Kerbs and Edging

All carriageways, footways and footpaths should be provided with precast concrete kerb or edging as detailed in **Figures 16** and **19**. On conventional roads, kerbs should be set 100 mm above finished carriageway channel level. At pedestrian and vehicular crossings this dimension is reduced to 0-10 mm. Edging at the heel of footways and footpaths should be set flush with the walking surface.

On shared surfaces an upstand of 50 mm should normally be provided (**Figure 19**).

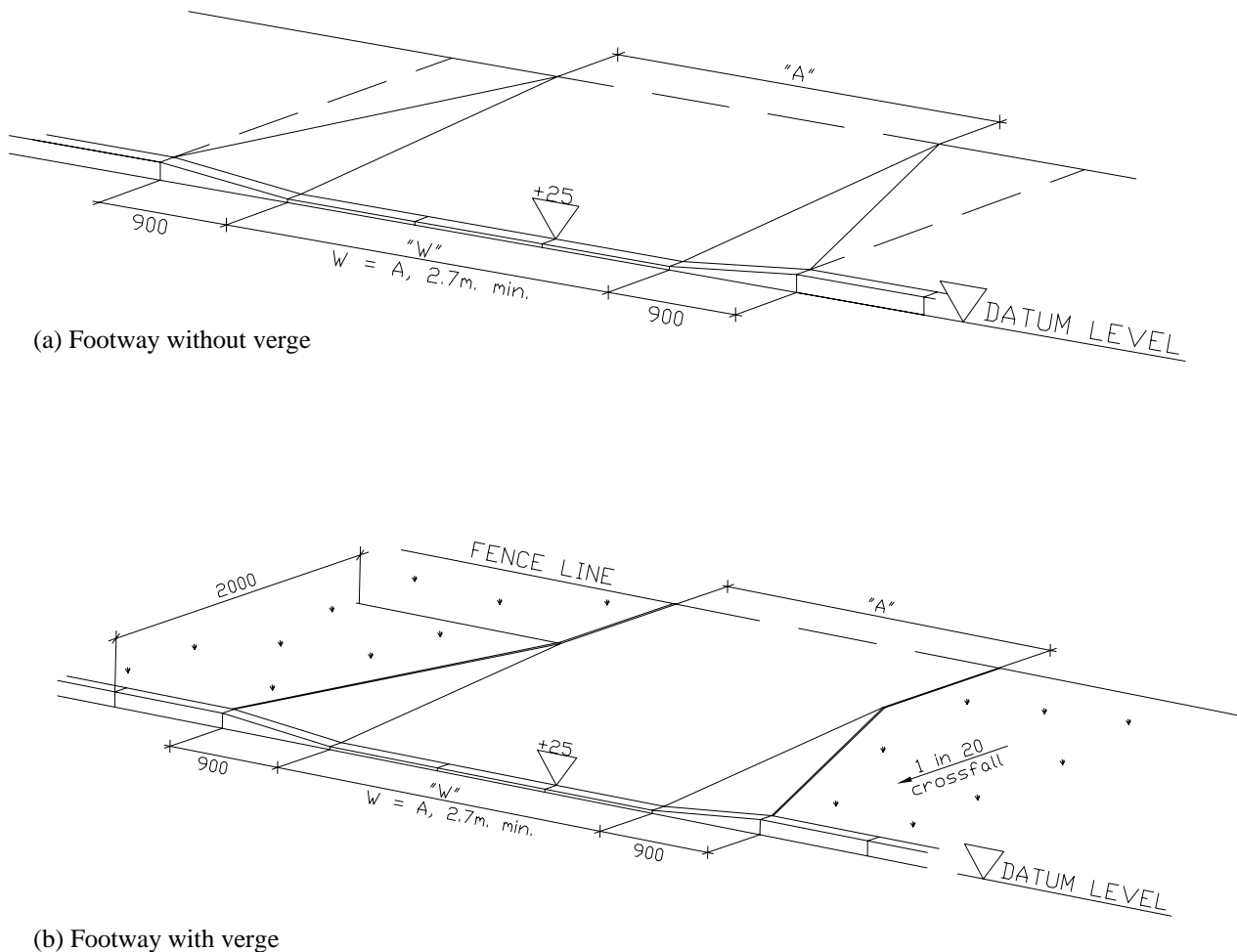


Figure 20 - Footway Crossings

21.11 Minor Commercial Accesses

Where a vehicular access, other than to individual dwellings, is taken over a footway, a crossing as detailed in **Figure 20** should be constructed to the specification for a residential road carriageway. The length of dropped kerb should be 2 metres.

21.12 Residential Accesses

Vehicular access crossings of the footway for individual dwellings should comply with **Figure 20** and be constructed to the footway specification.

21.13 Pedestrian Crossings

Figure 21 details the requirement for dropped kerbs where pedestrian routes cross the carriageway from adjacent footways (e.g. at T-junctions and pelican crossings). Pedestrian crossings of a carriageway with an adjacent grass verge should comply with **Figure 21** except that the dropped kerb should be set 5 mm above the carriageway and extend for a minimum length of 2 metres.

Tactile paving will be required and should be agreed with the Roads Authority.

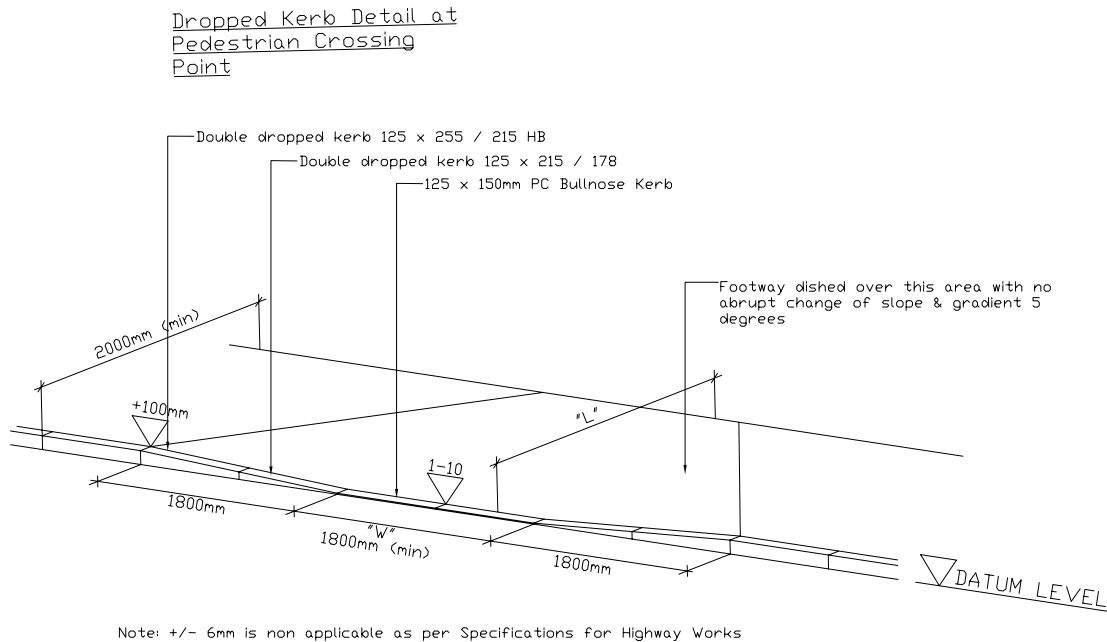


Figure 21 - Dropped Kerb Detail at Designated Pedestrian Crossing Point

21.14 Paving Materials in Existing Roads

Materials in roads which are being stopped-up or reconstructed remain the property of the Council and unless the Roads Authority agrees that such materials can be re-used in the proposed new roads they are to be transported at the Developer's expense to the appropriate Councils Depot. Any materials judged by the Roads Authority to be of no further value are to be disposed of at the Developer's expense.

21.15 Demarcation of Public Area

In all cases the extent of prospectively public areas must be clearly and permanently defined on the ground by some form of physical demarcation, e.g. flush back margin in setts to the approval of the Roads Authority.

21.16 Regulating Course

Any regulating of carriageway Binder Course prior to final surfacing must receive the prior approval of the Roads Authority.

21.17 Upfill Material

Material used for upfill below sub-grade must receive the approval of the Roads Authority.

21.18 Service Strips

These areas are to be available to undertakers as part of the road for the location of their apparatus and the areas will be subject to control by the Roads Authority in the usual way as part of the road. The Developer is held to have agreed the Plan positions and widths of the strips with all relevant undertakers as being suitable for their service. Any alteration to the strips must be made the subject of an Application for Construction Consent Deviation.

The areas must be permanently defined on the ground by an approved heel kerb and in view of their purpose, must be kept clear of surface or underground obstruction e.g. existing trees and manholes. Landscaping or planting, other than grass seeding or turfing, is only to be carried out after consultation

with the Roads Authority and, on satisfactory completion of all the roadworks the areas will be taken over by the Council as part of the road and will be maintained as part of the road.

The Developer is to ensure that a Clause is inserted in the formal Deeds of Conveyance of the lands on which the strip lies or fronts, making it clear that the Roads Authority and undertakers have a right of access to the strip at all times without notice and restraining all respective owners and their successors from erecting buildings, walls and fences, or planting trees or hedges, or altering surface levels, or doing anything within the strip, which would be likely to damage pipes, ducts, cables or other apparatus laid or to be laid within the strip or which would be likely to make access thereto more difficult.

21.19 Provision of Traffic Signs and Road Markings

The developer is to be responsible, at his expense for the provision of all traffic signs, lamps, cable ducts and other apparatus required for the illuminated signing and marking of the new roadworks, or made necessary by the construction of the new roadworks. At the entrance to shared surfaces signs to diagram 544.1 (Traffic Signs Regulations & General Directions 2002) must be provided.

22 ROAD DRAINAGE

22.1 Specification

The specification for the construction of road drainage is detailed in the Manual of Contract Documents for Highway Works Volume 1: Specification for Highway Works. Clause numbers refer to that section. Where discharging into an existing watercourse or public sewer, road drainage should additionally meet the requirements of the appropriate drainage authority and Scottish Environmental Protection Agency (SEPA).

22.2 Design

Road drainage design should be in accordance with the current specification subject to the qualification that the minimum pipe diameter permitted will be 150 mm. Land drainage or other appropriate measures must be taken to prevent water flowing onto the road from adjacent properties.

22.3 Gully Spacing

Table 16 details the acceptable channel distance between gullies for a road comprising carriageway and two 2 metres wide footways. The spacing may require to be altered according to the road layout (e.g. at junctions) and special measures will be required where the grade is necessarily flatter than 0.8 per cent (sags, crests, etc.). Advice on these matters should be sought from the Roads Authority who should be consulted at an early stage by any developer wishing to carry out a full drainage design. Irrespective of design spacings, a gully should be positioned:-

- (a) Just upstream of the tangent point at road junctions;
- (b) short of the point where adverse camber is removed when applying super elevation; and
- (c) at any local low point.

Gradient		Flatter than 1/150 (0.66%)	1/150 0.66%	1/100 1.00%	1/80 1.25%	1/60 1.66%	1/40 2.5%	1/30 3.33%	1/20 5.00%
		Gully Spacing (metres)							
Cross Section	C/Way width								
1 in 40 (2.5%) Camber	5.5 m	20	30	35	40	45	55	60	75
	6.0 m	20	25	30	35	40	50	60	70
	7.3 m	15	20	25	30	35	40	45	55
1 in 40 (2.5%) Crossfall	3.5 m	10	15	17	20	22	27	30	37
	5.5 m	10	15	17	20	22	27	30	35
	6.0 m	10	12	15	17	20	25	22	27
	7.3	7	10	12	15	17	20		

Table 16
Gully Spacing for Carriageways

22.4 Lay-by Drainage

Lay-bys should be drained by means of gullies located along the road channel. It should not, therefore, be necessary to provide gullies at the rear of lay-by parking areas.

22.5 Gullies

Gullies should be trapped and constructed in accordance with Clause 508 of the Specification and as detailed in HCD drawing F13. Gully gratings and frames must be positioned with grating bars running at right angles to the kerb and where required by the Roads Authority, be of the captive variety. The gully cover must be as per Appendix 5/1.

22.6 Connections

Connections should be constructed in accordance with Clause 508 of the Specification. They must be formed with junction pipes unless the Roads Authority has specifically approved the use of saddles.

22.7 Chambers

Chambers should be constructed in accordance with Clause 507 of the Specification and as detailed in HCD drawings F3 to F12 as appropriate to that type.

22.8 Outfall Connection

The connection of Road drainage systems to the public network should be undertaken only on the authority and to the requirements of the Scottish Water. Similarly, when connecting to an existing watercourse, approval should be sought from the Scottish Environmental Protection Agency (SEPA).