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Foreword

This document supersedes the Peterborough City Council, “Estate Road Construction Specification 2004”. It should be read in conjunction with Manual for Streets (MfS), Manual for Streets 2 and the Design Manual for Roads and Bridges (DMRB) produced by the Department for Transport. MfS sets out the main design objectives for the creation of high quality and accessible residential environments, whilst the DMRB sets out the wider context of highway design and construction.

Peterborough City Council is committed to the adoption of all residential estate roads that have been constructed in accordance with this Construction Specification. For all developers requesting Peterborough City Council to adopt their roads, it is incumbent on them to fully co-operate with Peterborough City Council staff. Failure to comply with the construction specification will result in the road not being adopted.

It should be noted that sections within this Construction Specification have been underlined in order to stress important critical points such as legal obligations.
Definitions:

**Bond Coat:** proprietary polymer modified bitumen emulsion used to promote adhesion between layers in the placement of asphalt in a paved area

**California Bearing Ratio Test (CBR):** A value derived from a standard test for comparing strengths of soils; the ratio being the resistance of the soil by comparison to the corresponding resistance of a standard crushed rock

**Carriageway:** The surfaced part of the highway, mainly for use by vehicles

**Case Officer:** The officer within the Highway Control Team designated to undertake technical review of all drawings in respect to a particular development

**CDM Co-ordinator:** The person identified under this title in accordance with the Construction Design and Management Regulations 2007

**Cycleway:** Part of the highway over which the public have a right of way by foot or bicycle but not motorised vehicle

**Designer:** Usually an agent employed by the applicant to fulfil all design responsibilities

**Distributor Road:** Distributor roads link the residential streets to the District and Primary distributor road network (such as the Parkway system). Streets within a local residential area that are not classed as Housing Estate Roads. Distributor Roads are often used as bus routes and generally with frontage access and frequent junctions. See Housing Estate Road definition

**DMRB:** Design Manual for Roads and Bridges, sets out design standards applicable to the design and construction of highway works

**Engineer:** Head of Planning, Transport and Engineering Services or the designated representative

**Footpath:** A highway over which the public have a right of way on foot only, which is remote from the carriageway, not being a footway

**Footway:** That part of the highway adjacent to the carriageway, being a way over which the public have a right of way on foot only

**Formation:** The level at which carriageway construction meets natural ground surface or the completed earthworks

**Gully:** A trapped pot usually constructed in the carriageway edge to drain water from the carriageway. The aperture is covered with a metal grate usually surface mounted.

**HAUC:** Highway Authorities and Utilities Committee (UK)

**HAPAS:** The Highways Authorities Product Approval Scheme

**Highway:** A route where traffic has the right to pass and repass; this right may be restricted to specific classes of traffic. A highway may be of conventional layout
comprising a carriageway footways and verges or be a footpath or a cycleway or a shared surface street

**Highway Works**: Works within the existing public highway necessitated by the design and construction of new estate road works and identified as such within the Road Adoption Agreement

**Housing Estate Road**: (Including Shared Surface Streets) these are roads designed to take light traffic (bus routes are not permitted), directly serving residential properties only. Also see definition for Distributor Roads

**Maintenance Period**: The period, usually expressed in the Road Adoption Agreement as a minimum of 12 months, following the issue of the Provisional Certificate of Completion and remaining in force until the issue of the Final Certificate signifying formal adoption of the new estate roads as highway maintainable at public expense

**Manhole**: A chamber and shaft constructed at intervals along highway drainage and other service runs extending down to the sewer or duct to enable access for cleaning and inspection

**Manual for Streets**: National guidance setting out the main considerations to be taken into account in the design of new residential developments ([www.dft.gov.uk](http://www.dft.gov.uk))

**Public Highway Maintainable at Private Expense**: The status of a new estate road and after formal dedication by the owner as public highway but prior to formal adoption as highway maintainable at the public expense. The instrument of dedication is contained within the Road Adoption Agreement and is effective from the date of that agreement. For the duration of this status the developer bears the full duties and responsibilities of a Street Manager, in particular those relating to freedom of passage, maintenance and safety, as defined in Section 49 of NRSWA 1991

**Road Adoption Agreement**: An agreement completed between Peterborough City Council as Local Highway Authority and the Developer under appropriate sections of the Highways Act 1980 and other relevant legislation

**Shared Surface Streets**: A highway designed as a low-speed environment without formal vehicle/pedestrian segregation but within which the pedestrian has priority

**Site**: The land subject to the planning permission for the development that includes the new estate road works

**Specification for Highway Works**: A section of the current national “Manual of Contract Documents for Highway Works” relating to materials and workmanship ([www.standardsforhighways.co.uk/home/index.htm](http://www.standardsforhighways.co.uk/home/index.htm))

**Street Work Licence**: In accordance with Section 50 of the New Roads and Streetworks Act 1991, (NRSWA) anyone, other than a statutory authority, who needs to excavate, place, maintain equipment, pipe work or cables within the highway must be in possession of a section 50 licence

**Section 184 Licence**: A legal requirement (in accordance with the Highways Act 1980) pertaining to the construction, improvement and/or alteration of vehicle crossings over footways and verges in the highway whether temporary or permanent
1. Pre-Design Considerations

1.1. Application Process

1.1.1. To facilitate efficient progress of road adoption proposals, the Council operates a formal “Road Adoption Agreement” application process in respect of new estate road works. The current Road Adoption Agreement Application Form and Guidance Notes for Developers are available from the Highway Control Team, refer to Chapter 25.

1.1.2. The construction of any new estate road involves “engineering operations” which are classed as “development” by the Town and Country Planning Act 1990. It is therefore necessary for such works to have the benefit of Planning Permission.

1.1.3. Planning permissions for developments that include new roads frequently incorporate pre-commencement conditions in respect of particular aspects of that development. Such conditions must be complied with before any development is commenced. If such a condition is breached, it may render the whole development unlawful i.e. without the benefit of planning permission (See cases including; Reprotech Pebsham Ltd v. East Sussex County Council, Henry Boot Homes Ltd v. Bassetlaw District Council, Sage v. Secretary of State for the Environment, Transport and the Regions).

Examples of conditions precedent include those worded to the effect that:

“…development shall not commence before full details of the road construction, drainage and lighting, have been submitted to and approved in writing by the Local Planning Authority.” or,

“…development shall not commence before details of a Construction Phase Plan in respect of the implementation of the development have been submitted to and approved in writing by the Local Planning Authority.” or,

“…development shall not commence before details of a system of vehicle wheel and chassis cleansing have been submitted to and approved in writing by the Local Planning Authority and that the system so approved is operational.”

1.1.4. Technical vetting and legal work in respect of new estate roads will not commence before any relevant pre-commencement conditions have been discharged by the Local Planning Authority and evidence of such discharge has been provided to the Engineer.

1.1.5. Due to the risk of abortive work Planning, Transport and Engineering Services, in its role as Local Highway Authority (LHA), will not normally process an application for a Road Adoption Agreement (RAA) before Full Planning Approval or Approval of Reserved Matters has been issued by Planning, Transport and Engineering Services in its role as Local Planning Authority (LPA) and in particular, that all conditions precedent that have potential to render the development unlawful have been fully discharged. Evidence of such approval/discharges must accompany the RAA application (see Road Adoption Agreement Application Form Sections A and F (a), (b) and (c). So that the design and construction of new estate roads proceeds in an orderly manner and compliments the statutory planning process, developers are required to ensure that the engineering details are approved before work starts on site. This requires sufficient time to be allowed by the developer from the granting of planning permission to the proposed start date. Failure to comply with this requirement may jeopardise the future adoption of the road.
1.1.7. The developer is required by the Road Adoption Agreement application process to provide various items of information relevant to the design and implementation of new estate road works. If the information is not fully provided, neither technical vetting nor legal work will commence and hence no progress will be made towards the completion of a Road Adoption Agreement.

1.1.8. There is an absolute prohibition on the commencement of Highway Works within the existing public highway, before a Road Adoption Agreement is legally completed.

1.1.9. To properly construct the new estate road, the developer may have to work within the existing publicly maintainable highway. Usually such work will be included in the scope of the works covered by the Road Adoption Agreement under Section 278 of the Highways Act 1980. However, if it is essential that utility or sewerage work within the public highway is carried out in advance of the completion of the Road Adoption Agreement, those works must be the subject of a separate street works licence under the New Roads and Street Works Act 1991, for which a separate application procedure and fee structure applies.

1.1.10. Street Works Licences are obtained from the Street Works Co-ordinator. (See Chapter 25 Contacts). The appropriate authority/licence must be issued before any work commences. It is the responsibility of the developer to apply for any licences in advance, as requests to start without the licences will be refused. A Street Works licence will take approximately one month from application for the licence to be issued. If the Engineer or their representative is not satisfied with the quality of the work or the safety of the public, they will stop the work and not allow any more work within the highway until the Engineer or their representative is satisfied that the matters of concern have been rectified.

1.1.11. The developer will ensure that a copy of this Construction Specification and all Approved Drawings are placed in the Site Record File and are thus available on site at all times. This obligation will be the subject of a specific clause in the appropriate Road Adoption Agreement for the works.

1.2. Commuted Sums

1.2.1. Commuted sums cover the future costs that are required in respect of highway infrastructure that results in additional costs to this authority including but not limited to adoptable structures, traffic signals, SuDS, street furniture and non-standard lighting equipment. The precise requirements will be determined on a site-specific basis a schedule of such items is included in Appendix H in accordance with the requirements as defined in the Highways Act 1980.

1.2.2. The items identified in Appendix H are by no means exhaustive. Developers will be informed at technical approval stage by the case officer whether a commuted sum is required, and the value of the sum to be included.
2. **General Requirements**

2.1. **Design Considerations**

2.1.1. This Construction Specification should be read in conjunction with Manual for Streets (MfS) produced by the Department for Transport. MfS sets out the main design objectives for the creation of high quality and accessible residential environments. In the wider context Manual for Streets 2 will also to be referred to, with consideration also given to the standards defined within the DMRB.

2.1.2. Where a site may be liable to flood no finished carriageway level shall be lower than the adjacent minimum floor level of the dwelling approved by the relevant Authority. In addition it shall be no lower than the existing highway or otherwise from which access to the estate is gained, whichever is the lower.

2.1.3. Provision shall be made within the design to prevent water from privately owned areas being collected by highway drainage. The Highways Act 1980 requires that neither water nor detritus shall be discharged or deposited on the highway.

2.1.4. Work shall not start on site until the Case Officer has formally approved the Road Adoption Agreement drawings in writing.

2.1.5. Section 153 of the Highways Act 1980 requires that doors or gates shall not open outwards over the public highway. Care must be taken in the design to ensure that such situations do not arise including such gates/doors serving utility installations. Any breach of S153 in respect of new estate roads will be an obstacle to eventual adoption by the Local Highway Authority.

2.1.6. The design of all aspects of the works must be site specific.

2.1.7. All works are to be completed in accordance with this Construction Specification. Any discrepancies between the approved drawings and the specification are to be raised with the Engineer.

2.2. **Design of Construction Thickness**

2.2.1. Carriageway construction alternatives are shown in Chapter 6 and typical estate road cross-section details are provided in Appendices A1, A2 and A3. All roads which are liable to use for industrial traffic or in association with Industrial Estate Development are to be constructed as per Table 6 (E). The million standard axle (MSA) figures will be required to determine what type of Asphalt Concrete (A.C) base material is used.

Note: Where implementation of the development involves the use of partly constructed roads as construction access/haul routes it is essential that a thicker subbase is provided to prevent premature failure. In such circumstances the minimum subbase thickness required shall be agreed with the Engineer.

2.2.2. A ground investigation covering the line of the road shall be provided. The minimum information for road design purposes must include soil classifications and testing in accordance to clause 6.2.2, taken from the logs of bore holes or trial pits taken along the centre line of the proposed carriageway at 50m intervals, subject to a minimum of 3 trial holes for roads less than 100m in length. Should the proposed layout result in the outer edge of the highway exceeding 5m from the road centre line then additional...
trial pits will be required to cater for these areas, such as housing squares. Refer to Chapter Six and DMRB Interim Advice Note 73/06, 2009.

2.2.3. For all works within the existing Public Highway a Highway Assessment will be submitted including details of the full depth of carriageway make up from the subgrade level (achieved through the taking of core samples and appropriate laboratory testing). This report will allow the Designer in consultation with the Case Officer to evaluate the existing carriageway to determine if it is appropriate to accommodate the proposed development. For instance if a new junction is formed the existing carriageway may require improvement to withstand the additional loading and stresses that will be transferred through turning movements, additional volume of commercial vehicles, and the introduction of new breaking and acceleration zones. All off site highway works must be designed to accommodate the additional traffic generated, considering both the construction phases and the design life of the carriageway. All associated utility connections and other disruptions to the carriageway must be considered as these will have an adverse effect on the integrity of the carriageway. The case officer will require all of the above to be determined prior to issuing technical approval of any scheme.

2.2.4. The pavement thickness is dependent on the equilibrium CBR values derived from the Plasticity Index Values from table 6 (A) at proposed formation level on the line of the road. The developer shall determine these values and produce the required evidence with the preliminary plans submitted for approval.

2.2.5. The developer or their agent must give sufficient notice (a minimum of 2 working days) and provide adequate facility for the Engineer to inspect and certify the works at every stage of construction. Should the developer fail to provide such notice the Engineer will require retrospective testing to be carried out at the developer’s expense. Retrospective testing may result in the removal of all works and materials to the lowest stage of construction that has been certificated to allow subsequent inspection to take place in accordance with this Construction Specification.

2.2.6. Where derelict sites, landfill areas, soft ground, buried structures are a feature of the development area, special design measures may be necessary and the Engineer’s approval for the detailed design must be obtained by the developer prior to starting the Highway works. Such design measures may also need prior approval by the Local Planning Authority if they fall within the scope of the planning permission and conditions attached thereto.

2.2.7. All sampling and testing shall be performed in accordance with relevant current British Standards, or equivalent. Where appropriate, all laboratory results shall be reported on United Kingdom Accreditation Service (UKAS) certificates. Non UKAS testing shall only be performed with the prior agreement of the Engineer.

2.3. **Junction Design - Requirement for Safety Audit**

2.3.1. Junction designs other than simple T-junctions will be subject to Road Safety Audits. These shall be carried out by an independent safety audit team on a submitted detailed design and specification in accordance with DMRB HD19/03.

2.3.2. Applications for Road Adoption Agreements for new roads incorporating anything other than simple priority junctions must be accompanied by an appropriate Stage 2 Safety Audit.
2.4. Health and Safety Requirements

2.4.1. Prior to construction, a pre-start meeting is required at which The Construction Phase Plan will be provided for information and comment. The developer will notify the Engineer of the name of the CDM Co-ordinator appointed for the site before the works commence. Where the project is not notifiable to the HSE the applicant is to inform the Engineer at the above meeting.

2.4.2. At all stages prior to the issue of the Final Certificate the developer is responsible for all maintenance and safety aspects of the site including but not restricted to temporary plating, barriers and ramping. It is noted that all ironwork must be raised to each layer as road construction progresses. Highways must not be obstructed by plant or materials and any temporary scaffolding within the highway shall be appropriately guarded; highway surfaces shall be kept free from ice and snow.

2.4.3. The developer shall be responsible for compliance with the Construction (Design and Management) Regulations 2007 in relation to the site and any work within the public highway associated with the site. The developer must also ensure that any Handling and Installation operations are carried out in accordance with the Health and Safety at Work Act 1974, Manual Handling Operations Regulations 1992 and any amendments thereof.

2.4.4. A copy of the Health and Safety file in relation to the road and highway drainage system must be made available to the Engineer or the Engineer’s representative at any time during construction. A copy of the final Health and Safety file must be supplied prior to the Final Certificate of Completion being issued.

2.4.5. The developer will also be responsible for all aspects of the Health and Safety at Work Act in relation to the site, its operatives, subcontractors, inspecting council officers and the public who may from time to time access the site. Once the road is dedicated as highway under a Road Adoption Agreement the development is deemed a public highway maintainable at private expense. As the street manager the developer is responsible for all matters arising from the highway including public safety and maintenance until which time Peterborough City Council formally adopts the new highways within the Site.

2.5. Mud, Slurry and Detritus on the Highway

2.5.1. Effective measures must be taken by the Developer to prevent any undesirable material from being deposited on the highway from a vehicle. This may include sufficient lengths of hardened areas provided within the site to help ensure construction vehicle tyres are kept clean so stopping undesirable material from being deposited on the highway, also the installation of sufficient wheel washing facilities, pressure washing including manual means. Failure to comply will result in enforcement action being taken by the Local Authority.

2.5.2. If any undesirable material has fallen or been deposited on a highway from a vehicle it shall be removed from the highway as soon as is reasonably practicable. The attention of the Developer and any contractor/subcontractor is drawn to Sections 148 and 149 of the Highways Act 1980. Dust should also be kept to a minimum by the use of water spray tankers if required.

2.5.3. Appropriate and approved traffic signs in accordance with the Traffic Signs Manual giving warning of the condition of the highway and/or any potential hazard must be exhibited.
2.5.4. The Developer/Contractor shall ensure that all existing highway drains, gullies and ditches, roadside and other, in the vicinity of the Site are kept clear of any undesirable material likely to impede the free flow of water therein. Similarly, all highway drainage systems provided as part of the new adoptable estate road works shall be kept free from any undesirable material likely to impede the free flow of water therein.

2.5.5. Failure to comply with any of the above will result in closure of access from the site to the public highway and recovery of associated cost incurred by the local authority for remedial measures.

2.6. Prohibition of use of the Highway: Including Road Adoption Agreement Sites

2.6.1. The existing public highway and any highway dedicated under a Road Adoption Agreement shall not be used as sites for stockpiling and storing plant, materials or equipment. The use of the existing publicly maintainable highway by plant and machinery is likely to result in extraordinary damage and the Developer/Contractor shall be liable for the cost of reinstatement, under Section 59 of the Highways Act 1980 if any damage has been caused to the highway.

2.7. Notification of Emergency Contact Telephone Numbers

The developer/contractor shall erect and maintain for the duration of the construction of the estate roads, a board or sign, within the site boundary, but clearly visible from the adopted highway, indicating the name and contact telephone number of a responsible person for the site. The named person and contact telephone number shall be available 24 hours a day, 7 days a week, should the Engineer need to advise the developer and/or contractor of a serious or dangerous situation.

2.8. Temporary Traffic Management

2.8.1. Whenever the safe execution of the works requires it, the developer shall be responsible for the provision and maintenance of Temporary Traffic Management measures in accordance with Chapter 8 of the Traffic Signs Manual.

2.8.2. Where such Temporary Traffic Management affects directly or indirectly the existing highway maintainable at the public expense, the proposed scheme of Temporary Traffic Management shall be submitted to and approved by the Engineer before it is implemented.

2.8.3. The use of temporary direction signs serving the site is subject to prior approval from Peterborough City Council and all signs must meet the requirements of the Traffic Signs Regulations and General Directions 2002 (Schedule 7, Part VIII). Enforcement action, which may result in legal proceedings, will be taken against the developer for all unauthorised signs erected.

2.9. Preliminary Site Works

2.9.1. Developers should be aware that temporary access works required as part of the construction phase may require planning permission and that it should not be assumed such works will be covered by the Road Adoption Agreement.

2.9.2. Digital photographs in jpeg format (minimum 1024 x 768mm resolution) are to be taken by the developer before construction showing the complete frontage and surface of the existing public highway including the entrance to the site and any areas affected by future visibility splays at the junction(s) of the new estate road(s) with the
existing public highway network. Such photographs will be used as evidence in circumstances where damage to or encroachment upon the public highway has occurred in connection with the works.

2.9.3. A licence under Section 184 of the Highways Act 1980 may be required for new, temporary or amendments to an access if not covered by an Agreement under Section 278 of the Highway Act 1980.

2.9.4. In accordance with Section 50 of the New Roads and Streetworks Act 1991, (NRSWA) anyone, other than a statutory authority who needs to excavate, place or maintain equipment or pipe work/ cables within the highway must be in possession of a section 50 licence.

2.9.5. Following issue of a Section 184 Licence and/or a Street Works Licence the Engineer must be given at least one week's notice of the start of the relevant works and must be kept informed of the construction programme thereafter. Notwithstanding the above Road Space Booking will be required when working in the public highway with at least 28 days notice before works may commence on site.

2.9.6. The work shall be carried out to the satisfaction of the Engineer, who shall have free access to any part of the works during site hours. In the event that the integrity of the workmanship is brought into question, the Engineer may request testing at the expense of the developer, also refer to Chapter 24.

2.9.7. The estate roads and visibility splays shall be laid and set out in accordance with the approved plan and maintained in this form until the relevant physical works are complete. All visibility splays shall be kept clear of obstructions.

2.9.8. Construction of any preliminary works should be in accordance with this Specification. Any works to be trafficked by pedestrians must be free from trip hazards. Particular attention must be paid to raised iron work.

2.9.9. Ensure all water courses which are affected by the development works are cleared out and maintained to the satisfaction of the Engineer.

2.10. Developers Obligations

2.10.1. The developer, the main contractor and any subcontractor shall take full responsibility for the stability and safety of all site operations and methods of construction. They shall be responsible for the care of the works throughout the period from commencement of works to final adoption.

2.10.2. The developer is responsible for the reinstatement of any damage caused to the existing public highway, as a result of work carried out to the development. This will include damaged kerbing, any surface degradation of the carriageway, and permanent reinstatement of utility trenches associated with the works. Where the integrity of the carriageway has been affected or shared trenches have not be utilised it will be a requirement to reinstate the full length and width of the carriageway, attention is also drawn to clause 2.2.3 and 6.2.6.

2.10.3. The developer and their contractor shall conform to the provisions of any general or local Act of Parliament and the regulations and bylaws of any local or statutory authority during the construction of the estate roads.

2.10.4. The developer and agents shall conform to the Wildlife and Countryside Act 1981.
2.10.5. The developer shall submit to the Engineer and have approved a method statement in relation to the construction of the road, footways, adoptable highway drainage, street lighting operations and any work within the highway before work starts on site.

2.10.6. An experienced supervisor employed by the developer, with a competency in roadworks and trench reinstatement and to whom instructions can be given, shall be present on the site during the construction phases of the estate road. All supervisors and operatives including those of contractors and subcontractors employed on any stages of the construction of the new estate roads shall be HAUC accredited, under the New Roads and Street Works Act 1991 and CSCS (CITB) certificated.

2.10.7. The Road Adoption Agreement requires the Developer to notify the Engineer of occupations (handover of keys) of new properties at specific thresholds.

2.10.8. The developer shall be fully responsible for Undertaker’s work completed in adoptable areas including liaison, co-ordination, quality and safety of works. It should be noted that under the New Roads and Streetworks Act 1991, the Developer assumes responsibility of the ‘Street Manager’ for all prospectively adoptable highway until the Final Certificate is issued.

2.11. Third Party Insurance

2.11.1. It is the responsibility of the developer to ensure that they and their contractor and any subcontractor are fully indemnified against third party liability whilst working in the highway and they must be able to demonstrate the possession of valid insurance for the value of £5,000,000 upon demand. Copies of the relevant Certificates of Insurance shall be placed on the “Site Record File”. Peterborough City Council will not be held liable where damage to person, property or apparatus occurs as a consequence actions of the developers or its agents/contractors associated with the estate road works or any works within the existing highway.

2.12. General Construction Requirements

2.12.1. All materials shall be kite marked and workmanship shall be in accordance with the appropriate British Standard Specification, this Construction Specification and Volume 1 of the Highway Agency’s Manual of Contract Documents for Highway Works, current at the time of the appropriate Road Adoption Agreement.

2.12.2. Kerbs, kerb beams and channel blocks or other means of edge restraint where required shall be installed prior to laying Base layers.

2.12.3. Gully gratings, manhole covers and any other carriageway and footway or cycleway ironwork shall not be installed to their finished level until the carriageway binder course is laid.

2.12.4. Gully gratings in shared surface streets shall be of a ‘pedestrian friendly’ design and meet the strength requirements set out in Clause 13.1.

2.12.5. Wherever possible the final surface course shall be installed after all construction works have been completed on site e.g. the use of the binder course during building operations. Prior to the occupation of every dwelling all adjoining streets must be surfaced to the satisfaction of the Engineer. Note that in the case of block paved streets, the occupation of dwellings must not take place before the final surface course is laid.
2.12.6. Any bituminous layer shall be kept clean and uncontaminated for so long as it remains uncovered by succeeding layers or surface treatment. All bituminous surfaces shall be thoroughly cleaned and treated with a bond coat in accordance with BS5949: 2010. Should the layer become contaminated, the contractor shall make good by thoroughly cleaning it to the satisfaction of the Engineer or, if this proves impracticable, the developer will replace it with material to the appropriate Specification. Should the layer be damaged it shall be removed and replaced with the appropriate material. In the case of the surface course being a proprietary HAPAS thin surfacing system, the bond coat should be applied totally in accordance with the system requirements, i.e. applied by tanker spray bar.

2.12.7. No patches or small reinstatements will be accepted in the surface course. Any resurfacing required will be the full length and width of the pavement, as required to the satisfaction of the Engineer.

2.12.8. All road, cycleway and footway bituminous layers shall be laid by machine, unless prior permission has been given for manual installation. The carriageway will be laid with a maximum of two rips with the joint being in the centre line of the carriageway. No laying of bituminous materials shall commence prior to any service installation being completed within the carriageway.

2.12.9. All blockwork shall be protected from site traffic to the satisfaction of the Engineer.

2.12.10. A sustainable approach to highway construction and the use of recycled products is encouraged. All recycled materials are to be produced in accordance with the relevant British Standards and Manual of Contract Documents for Highway Works (MCHW). Production must also be in accordance with the Waste and Resources Action Programme (WRAP) including compliance with Quality Protocols of which a robust Quality Management System must form part. The testing regime advocated within the WRAP Quality Protocol includes, but is not limited to, ‘Testing for Constituent Materials in Recycled Aggregate and Recycled Concrete Aggregate’ as detailed in Clause 710 of MCHW1. In the event of any dispute in respect of compliance with WRAP or protocols the decision of the Engineer shall be final.

2.12.11. Recycled products should be utilised wherever it is possible to include them without compromising the quality of the finished works. Evidence of suitability for all recycled materials shall be provided to the Engineer prior to use. This appraisal process and any expansion of this Specification will only be provided at the developer’s expense.

2.12.12. Waste Audit: It is recommended that developers monitor the waste produced by the site as the scheme is constructed. This has been found to establish a strong commitment by site staff to minimise waste. Experiences are enlightening both environmentally and commercially. Any system should be site specific and should avoid excessive bureaucracy. It is accepted that the construction of the overall project will potentially generate far more valuable waste than the construction of the adoptable element of the works. The principles of sustainability and waste audit are even more applicable to the general building activities.

2.12.13. Copies of waste monitoring data shall be made available to the Engineer upon request.

2.12.14. Where in exceptional circumstances trees have been permitted within the public highway a suitable root director must be installed to ensure that roots spread out and are guided downwards and outwards to deflect away from the adjoining carriageway construction.
2.12.15. All pavements that may be at risk of damage from existing trees/vegetation are to have a protective barrier installed as necessary. The use of a suitably located linear root barrier system will help to prevent the roots causing damage to the adjoining carriageway materials.

2.12.16. There are many implications to be considered that apply to trees. These include but are not restricted to the following parts of the Highways Act 1980, Sections 64, 79, 96, 132, 136, 138, 141, 142 and 154.

2.12.17. When trees are being included within the design of an estate road the following must be considered:

- Semi-mature/mature height.
- Crown spread (root spread for all intents and purposes is linked to this).
- Shade characteristics.
- Structural integrity of species i.e. Poplars or Willows.
- Species that produce suckers such as the Tree of Heaven.
- Fruit bearing species.
- Choice of disease-resistant species.
- Choice of pollution-resistant species – particularly those that can cope with high levels of road salts and heavy metals flushed from highways onto verges.
- Ground preparation where the planting is to take place i.e. non-toxic soils/available rooting medium and space/irrigation/weed control.
- Compaction, pedestrian and vehicular, therefore poor water and air percolation.
- Surface capping, therefore poor water and air percolation.
- Impermeable surface coverings leading to reduced soil quality.
- Lack of topsoil – limited rooting depth.
- Low levels of nutrients, or excesses of certain nutrients.
- Presence of toxins on some reclaimed industrial sites e.g. arsenic or roadsides
- Low inorganic matter, and living organisms.
- Poor texture / structure – inability to ‘hold’ water.
- Extremes of pH – e.g. high, due to excessive amounts of cement rubble.
- Poor drainage - water logging – reduced oxygen - anaerobic respiration.
- Lack of mycorrhizae because trees not present on site before.
- Excessive weed growth / competition – conditions favouring deep rooted perennials.
- Leak of toxic substances at or below ground level.
- Root damage during installation / maintenance works.
- Stem and branch damage through careless impact by machinery.
- Stem damaged by leaning materials / securing plant / machinery overnight.
- Larger services acting as root barriers – restriction of available rooting area.
- Services installed within the top 600mm – direct competition for space.
- Overhead services contacting aerial parts of tree.
- Arcing from electricity cables.
- Absorption of residual herbicide by neighbouring trees through their excessive or inappropriate use, to keep areas such as sub-stations clear of weed growth.
- ‘Unprofessional’ pruning of trees to clear overhead services i.e. not in accordance with industry best practice, BS 3998.
- Safe access for maintenance pruning of trees and for their removal.
2.12.18. When trees are included within the highway the following engineering methods can be employed to allow trees to grow in proximity to the carriageway construction:

- Root barriers.
- Root trainers.
- Irrigation systems.
- Below/above ground “containers”.
- Bracing/guy rope techniques for support.
- Geo-textile surfacing.
- Permeable paving systems.
- Polymer gravel.
- Integrated tree root and storm water systems.
- Efficient maintenance of services.
- Use of flexible / seamless pipes / ducts.
- Compliance with BS 5837 and NJUG Vol. 4 – i.e. measures to minimise root damage within the Precautionary Area – for instance through hand digging or thrust boring.
- Trenching along radii of roots if unavoidable, to minimise damage.
- Adherence to the recommendations of BS 5837 with regard to service installation on development sites.
- Separation of trees and underground services i.e. service strips and dedicated tree planting areas elsewhere.
- All services installed below the depth of most root activity i.e. below 600mm.
- Phasing out of overhead services.
- Avoid interaction of trees and overhead services by either not planting or using only low growing species.

2.13. **Surface Regularity and Tolerances**

2.13.1. Surface Regularity - The regularity of the completed surfaces of estate road carriageways, cycleways and footways shall comply with the requirements of Table 2 (A) that states the maximum deviation permitted under the appropriate straight edge.

**Table 2 (A) - Transverse and Longitudinal Straight Edge Measure**

<table>
<thead>
<tr>
<th>Surface Course</th>
<th>Transverse</th>
<th>Longitudinal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asphalt</td>
<td>Max 5mm under a 3m straight edge</td>
<td></td>
</tr>
<tr>
<td>Blockwork</td>
<td>Max 2mm difference in level between adjacent Blocks and max 6mm under a 3m straight edge</td>
<td></td>
</tr>
<tr>
<td>Footways and Cycleway</td>
<td>Max 3mm under a 1m straight edge</td>
<td></td>
</tr>
</tbody>
</table>

2.13.2. In addition, for estate road carriageways exceeding 40m in length and for lengths of cycleway, footway, footpath and shared surfaces exceeding 40m continuous length, without dropped kerbs intervening, then Table 2 (B) shall also apply.

**Table 2 (B) - Longitudinal Rolling Straight Edge Measure**

<table>
<thead>
<tr>
<th>Irregularity</th>
<th>4mm (4 – 6mm)</th>
<th>7mm (7 – 10mm)</th>
<th>&gt;10 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permitted max number of irregularities per 40m length</td>
<td>10</td>
<td>1</td>
<td>Nil</td>
</tr>
<tr>
<td>Permitted max number of irregularities per 75m length</td>
<td>18</td>
<td>2</td>
<td>Nil</td>
</tr>
</tbody>
</table>
2.13.3. Cross trenches which are cut through any carriageway surface must be restored to coincide with the mean level of the immediately adjacent surface. Attention is drawn to the requirements of Appendix C.

2.13.4. The developer shall set all fixed surface features, boxes and ironwork in the footway, cycleway or carriageway to coincide with the mean level of the immediately adjacent surface. Such fixing shall be done prior to the final surface course.

2.13.5. Tolerances - The difference in level of a fixed surface feature and the immediately adjacent surface shall not exceed a tolerance of + or - 3mm except for those contained in Table 2 (C).

Table 2 (C) - Tolerance for other fixed Surface features

<table>
<thead>
<tr>
<th>Kerb upstand</th>
<th>125mm upstand with +/- 5mm</th>
<th>Ref 12.2.2 and 12.2.3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicular Crossing kerb upstand</td>
<td>25mm upstand with +/- 3mm</td>
<td>Ref. 19.1</td>
</tr>
<tr>
<td>Pedestrian and Cycleway Crossing kerb upstand</td>
<td>3mm upstand with +3 and -2mm</td>
<td>Ref. 19.2.2 and 19.3.2</td>
</tr>
<tr>
<td>Surface Adjacent to:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gullies</td>
<td>+5mm to +10mm</td>
<td>Ref: BS7533 Part 3</td>
</tr>
<tr>
<td>PCC Channels</td>
<td>+3mm to +6mm</td>
<td></td>
</tr>
</tbody>
</table>

2.13.6. For a Diagram of the Stepped Construction Detail, refer to Appendix C

2.13.7. Any utility cover that does not sit flush with the cycleway surface, are damaged or that prevent the minimum of 60mm depth of surfacing surrounding its frame is to be replaced with an appropriate alternative cover/frame prior to the surface course being applied, a depth of 100mm is required in block paved pavements, refer to clause 13.3.

2.14. **Maximum permitted Carriageway Longitudinal Gradients**

2.14.1. The maximum gradient that will be accepted for all primary junctions shall be 1:50 (2%) for a distance of 15m.

2.14.2. The maximum permitted gradient with housing estate roads shall be 1:20, which shall be considered in conjunction with all other attributing design factors.
3. Construction and Earthwork Materials

3.1. General Considerations:

3.1.1. All materials used in the works shall comply with the appropriate British Standard/ EN Specification, and / or the current edition of the Department of Environment, Transport and the Regions, Specification for Highway Works and any supplements, except where otherwise specified herein, and in force at the time of the Road Adoption Agreement. Note: This requirement also applies to installation and workmanship.

3.1.2. The materials shall be subject to the approval of the Engineer and samples and testing certificates shall be submitted for approval where necessary.

3.1.3. Free access shall be granted to the Engineer and their representatives for sampling and testing throughout the course of the works.

3.2. Earthworks: Materials and Compaction

3.2.1. Definition, Classification and General Use of Earthworks Materials

The stated definitions of earthworks materials apply to this and the other Clauses of the Specification in which reference is made to the following defined materials:

**Topsoil** - shall mean the top layer of soil that can support vegetation

**Suitable Material** - to be in accordance with the approved Specification

**Unsuitable Material** - shall comprise:

- Material from swamps, marshes and bogs, peat, logs, stumps and perishable material. Materials susceptible to spontaneous combustion. Material in a frozen condition. Clay of liquid limit exceeding 90 and/or plasticity index exceeding 65, materials giving a moisture content greater than the maximum permitted.

Materials in a frozen condition if otherwise suitable maybe suitable when unfrozen.

3.2.2. Definition, Classification and General Use of Subbase Materials

Materials for use as subbase shall comply with the requirements of Chapter 9 of this Specification.

The compaction of all subbase materials shall meet the requirements set out in Table 3 (B).

3.2.3. Definition, classification and general use of trench reinstatement material.

For the purposes of Table 3 (C), entitled Trench Reinstatement Compaction, materials are grouped as follows:

- **Cohesive materials**,  **Granular materials**,  **Bituminous materials**

The materials and overall thickness shall be in accordance with this Specification.

The compaction of the trench reinstatement materials shall meet the requirements of Table 3 (C).

3.2.4. Any fill material used within 500mm of concrete structures or cement bound materials shall have a soluble sulphate content not exceeding 1.9g per litre when tested in
accordance with Test 10 of BS 1377, unless special precautions to the approval of the Engineer's Representative are taken to protect the concrete or cement bound materials.

3.2.5. Where the excavation reveals a combination of suitable and unsuitable materials the Developer is advised to carry out the excavation in such a manner that the suitable materials are excavated separately for use in the Works without contamination by the unsuitable materials.

3.3.  **Capping Material**

3.3.1. All capping materials must comply with and be laid in accordance with Series 600 (SHW).

3.4.  **Compaction Plant**

3.4.1. The developer shall only employ that plant which is appropriate to the soils that are to be handled. Care shall be taken to maintain the nature of the material so that when it is placed and compacted it remains in accordance with the Specification.

3.4.2. Details of suitable compaction plant are given overleaf within four tables:

- Table 3 (A) entitled Earthworks Compaction
- Table 3 (B) entitled Subbase Compaction
- Table 3 (C) entitled Trench Reinstatement Compaction
- Table 3 (D) entitled Compaction Plant and its effective Application

Earthworks Compaction Table 3 (A), the materials are grouped as follows:

1) 'cohesive soil' includes clays and marls with up to 20 percent of gravel or rock and having a moisture content not less than the level of the plastic limit (determined in accordance with BS 1377 test No 3) minus 4; also chalk having a saturation moisture content of 20 percent or greater.*

2) 'well graded granular and dry cohesive soils' includes clays and marls with up to 20 percent of gravel * or rock and having a moisture content not less than the level of the plastic limit, (determined in accordance with BS 1377 test No 3), minus 4, well graded sands and gravels with a uniformity coefficient exceeding 10 and chalk having a saturation moisture content of 15 – 20 per cent.

3) 'uniformly graded material' includes sand and gravels with a uniformity coefficient of 10 or less and all silts and pulverised fuel ashes. Any soil containing 80 per cent or more of material in the particle size range 0.06 - 0.002mm will be regarded as silt for this purpose.
Table 3 (A) Earthworks Compaction

<table>
<thead>
<tr>
<th>Type of Compaction Plant</th>
<th>Category</th>
<th>Cohesive soils</th>
<th>Well graded Granular and Dry Cohesive Soils</th>
<th>Uniformly Graded material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smooth Wheeled Roller</td>
<td>Mass per width of roll kg/m</td>
<td>D  N</td>
<td>D  N</td>
<td>D  N</td>
</tr>
<tr>
<td>Over 2100kg up to 2700kg</td>
<td>125 8</td>
<td>125 10</td>
<td>125 10</td>
<td></td>
</tr>
<tr>
<td>Over 2700kg up to 5400kg</td>
<td>125 6</td>
<td>125 8</td>
<td>125 8</td>
<td></td>
</tr>
<tr>
<td>Over 5400kg</td>
<td>150 4</td>
<td>150 8</td>
<td>Unsuitable</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vibrating Roller</th>
<th>Mass per metre width of roll on a vibrating roller kg/m</th>
<th>D  N</th>
<th>D  N</th>
<th>D  N</th>
<th>D  N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over 270kg up to 450kg</td>
<td>Unsuitable</td>
<td>75</td>
<td>16</td>
<td>150</td>
<td>16</td>
</tr>
<tr>
<td>Over 450kg up to 700kg</td>
<td>Unsuitable</td>
<td>75</td>
<td>12</td>
<td>150</td>
<td>12</td>
</tr>
<tr>
<td>Over 700kg up to 1300kg</td>
<td>100 12</td>
<td>125</td>
<td>10</td>
<td>150</td>
<td>6</td>
</tr>
<tr>
<td>Over 1300kg up to 1800kg</td>
<td>125 8</td>
<td>150</td>
<td>8</td>
<td>200</td>
<td>10</td>
</tr>
<tr>
<td>Over 1800kg up to 2300kg</td>
<td>150 4</td>
<td>150</td>
<td>4</td>
<td>225</td>
<td>12</td>
</tr>
<tr>
<td>Over 2300kg up to 2900kg</td>
<td>175 4</td>
<td>175</td>
<td>4</td>
<td>250</td>
<td>10</td>
</tr>
<tr>
<td>Over 2900kg up to 3600kg</td>
<td>200 4</td>
<td>200</td>
<td>4</td>
<td>275</td>
<td>8</td>
</tr>
<tr>
<td>Over 3600kg up to 4300kg</td>
<td>225 4</td>
<td>225</td>
<td>4</td>
<td>300</td>
<td>8</td>
</tr>
<tr>
<td>Over 4300kg up to 5000kg</td>
<td>250 4</td>
<td>250</td>
<td>4</td>
<td>300</td>
<td>6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vibrating Plate compactor</th>
<th>Mass per unit area of base kg/sq.m</th>
<th>D  N</th>
<th>D  N</th>
<th>D  N</th>
<th>D  N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over 880kg up to 1000kg</td>
<td>Unsuitable</td>
<td>75</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over 1100kg up to 1200kg</td>
<td>Unsuitable</td>
<td>75</td>
<td>10</td>
<td>100</td>
<td>6</td>
</tr>
<tr>
<td>Over 1200kg up to 1400kg</td>
<td>Unsuitable</td>
<td>75</td>
<td>6</td>
<td>150</td>
<td>6</td>
</tr>
<tr>
<td>Over 1400kg up to 1800kg</td>
<td>100 6</td>
<td>125</td>
<td>6</td>
<td>150</td>
<td>4</td>
</tr>
<tr>
<td>Over 1800kg up to 2100kg</td>
<td>150 6</td>
<td>150</td>
<td>5</td>
<td>200</td>
<td>4</td>
</tr>
<tr>
<td>Over 2100kg</td>
<td>200 6</td>
<td>200</td>
<td>5</td>
<td>250</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vibro-Tamper</th>
<th>Mass</th>
<th>D  N</th>
<th>D  N</th>
<th>D  N</th>
<th>D  N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over 50kg up to 65kg</td>
<td>100 3</td>
<td>100</td>
<td>3</td>
<td>150</td>
<td>3</td>
</tr>
<tr>
<td>Over 65kg up to 75kg</td>
<td>125 3</td>
<td>125</td>
<td>3</td>
<td>200</td>
<td>3</td>
</tr>
<tr>
<td>Over 75kg up to 100kg</td>
<td>150 3</td>
<td>150</td>
<td>3</td>
<td>225</td>
<td>3</td>
</tr>
<tr>
<td>Over 100kg</td>
<td>225 3</td>
<td>200</td>
<td>3</td>
<td>225</td>
<td>3</td>
</tr>
</tbody>
</table>

D = Maximum depth of compacted layer  
N = Minimum number of passes

NOTES: * for twin-drum machines with both drums vibrating, halve the number of passes.

Specialist compaction plant may be required such as pad foot rollers or trench roller as approved by the Engineer.

If in doubt concerning machine rating or for chalk material contact the Engineer. The majority of small vibrating plate compactors do not comply with the minimum requirements of this table and are therefore not suitable for subbase compaction. Manufacturers’ plant should be checked against the Type and Category columns to determine their suitability and performance for a given material and layer thickness.
Table 3 (B) Subbase Compaction

<table>
<thead>
<tr>
<th>Type of Compaction Plant</th>
<th>Category</th>
<th>Number of passes for layers not greater than:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smooth Wheeled Roller</td>
<td>Mass per metre width of roll Kg/m</td>
<td>110mm</td>
</tr>
<tr>
<td></td>
<td>Mass per metre width of roll Kg/m</td>
<td>150mm</td>
</tr>
<tr>
<td></td>
<td>Over 2700kg up to 5400kg</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Over 5400kg</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unsuitable</td>
</tr>
<tr>
<td>Vibrating Roller</td>
<td>Mass per metre width of roll on a vibrating roller Kg/m</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Mass per metre width of roll on a vibrating roller Kg/m</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Mass per metre width of roll on a vibrating roller Kg/m</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Mass per metre width of roll on a vibrating roller Kg/m</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Mass per metre width of roll on a vibrating roller Kg/m</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Mass per metre width of roll on a vibrating roller Kg/m</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Mass per metre width of roll on a vibrating roller Kg/m</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Mass per metre width of roll on a vibrating roller Kg/m</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>Mass per metre width of roll on a vibrating roller Kg/m</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>Over 700kg up to 1300kg</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Over 1300kg up to 1800kg</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Over 1800kg up to 2300kg</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Over 2300kg up to 2900kg</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Over 2900kg up to 3600kg</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Over 3600kg up to 4300kg</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Over 4300kg up to 5000kg</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Over 5000kg</td>
<td></td>
</tr>
<tr>
<td>Vibrating plate compactor</td>
<td>Mass per unit area of baseplate Kg/sq. m</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mass per unit area of baseplate Kg/sq. m</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Over 1400kg up to 1800kg</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Over 1800kg up to 2100kg</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Over 2100kg</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Mass kg</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mass kg</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Over 50kg up to 65kg</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Over 65kg up to 75kg</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Over 75kg</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Mass kg</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mass kg</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Over 50kg up to 65kg</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Over 65kg up to 75kg</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Over 75kg</td>
<td>4</td>
</tr>
</tbody>
</table>

NOTES: * For twin-drum machines with both drums vibrating, halve the number of passes.

If in doubt concerning machine rating contact the Engineer's Representative.

The majority of small vibrating plate compactors do not comply with the minimum requirements of this table and are therefore not suitable for subbase compaction.

Manufacturers’ plant should be checked against the Type and Category columns to determine their suitability and performance for a given material and layer thickness.
<table>
<thead>
<tr>
<th>Compaction Plant and weight category</th>
<th>Cohesive Materials (less than 20% granular content)</th>
<th>Granular Materials (Greater than 20% granular content)</th>
<th>Bituminous Materials (all bituminous materials and asphalts)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Compaction passes required / Layers of compacted thickness up to:</td>
<td>Compaction passes required / Layers of compacted thickness up to:</td>
<td>Compaction passes required / Layers of compacted thickness up to:</td>
</tr>
<tr>
<td></td>
<td>100mm</td>
<td>150mm</td>
<td>200mm</td>
</tr>
<tr>
<td>Vibro-tamper 50kg minimum</td>
<td>4</td>
<td>8</td>
<td>Unsuitable</td>
</tr>
<tr>
<td>Vibrating Roller</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>600 – 100kg/m twin drum</td>
<td>Unsuitable</td>
<td>Unsuitable</td>
<td>Unsuitable</td>
</tr>
<tr>
<td>1000 – 2000 kg/m single drum</td>
<td>8</td>
<td>Unsuitable</td>
<td>Unsuitable</td>
</tr>
<tr>
<td>1000 – 2000 kg/m twin drum</td>
<td>4</td>
<td>8</td>
<td>Unsuitable</td>
</tr>
<tr>
<td>2000 – 3500 kg/m single drum</td>
<td>3</td>
<td>6</td>
<td>Unsuitable</td>
</tr>
<tr>
<td>over 2000 kg/m twin drum</td>
<td>2</td>
<td>3</td>
<td>5*</td>
</tr>
<tr>
<td>over 3500 kg/m single drum</td>
<td>2</td>
<td>2</td>
<td>6*</td>
</tr>
<tr>
<td>Vibrating Plates</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1400 - 1800 kg/sq m</td>
<td>Unsuitable</td>
<td>Unsuitable</td>
<td>Unsuitable</td>
</tr>
<tr>
<td>over 1800 kg/sq m</td>
<td>3</td>
<td>6</td>
<td>Unsuitable</td>
</tr>
<tr>
<td>Notes:</td>
<td>Minimum layer thickness of 75mm</td>
<td>Minimum layer thickness of 75mm</td>
<td>Compaction should be discontinued if any distress to the materials is noticed.</td>
</tr>
<tr>
<td>1). Single drum indicates vibration on one drum only.</td>
<td></td>
<td></td>
<td>** A Vibro-tamper shall not be permitted for the compaction of the permanent surface course applied to trenches of greater than 500mm width.</td>
</tr>
<tr>
<td>2). Twin drum requires vibration on both drums.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3). Twin drum rollers are preferred for bituminous materials.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Alternative plant for trenches less than 200 mm width, small excavations and other areas of restricted access

<table>
<thead>
<tr>
<th>Compaction Plant and weight category</th>
<th>Cohesive Materials (less than 20% granular content)</th>
<th>Granular Materials (Greater than 20% granular content)</th>
<th>Bituminous Materials (all bituminous materials and asphalts)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Compaction passes required / Layers of compacted thickness up to:</td>
<td>Compaction passes required / Layers of compacted thickness up to:</td>
<td>Compaction passes required / Layers of compacted thickness up to:</td>
</tr>
<tr>
<td></td>
<td>100mm</td>
<td>150mm</td>
<td>200mm</td>
</tr>
<tr>
<td>Vibro-tamper 25 kg minimum</td>
<td>6 passes minimum</td>
<td>6 passes minimum</td>
<td>6 passes minimum</td>
</tr>
<tr>
<td>Percussive Rammer 10 kg minimum</td>
<td>Maximum layer thickness 100 mm</td>
<td>Maximum layer thickness 100 mm</td>
<td>Maximum layer thickness 75 mm</td>
</tr>
</tbody>
</table>
VIBRATORY ROLLER

MASS PER METRE WIDTH OF VIBRATING ROLL

MASS

W x No of ROLLS
Half number of passes for Double drum rollers

VIBRATORY PLATE COMPACTOR

MASS PER SQ M OF BASE PLATE

DIVIDE WEIGHT OF MACHINE by CONTACT SURFACE AREA OF BASE PLATE

MASS

$\frac{W x Y}{X x Y} = \text{MASS PER SQ M OF CONTACT AREA}$

VIBRO-TAMPER

VIBRATING RAMMER
THE OPERATING WEIGHT OF THE MACHINE TO DECIDE WHICH ONE OF THE FOUR CATEGORIES THE MACHINE MEETS

MASS WEIGHT
3.4.3. **General Compaction Requirements:**

It is important that subbase materials are not segregated and are adequately compacted at the optimum moisture content. Adequate compaction can be proven carrying out in-situ density checks, (by sand replacement method) and any associated laboratory testing. Compliance is deemed acceptable if the average compacted density is at least 95% of the maximum dry density achieved when tested in accordance with, BS1377- 4.1990, (vibrating hammer).

The depth of compacted layer is the height by which the embankment is raised by each successive compacted layer.

The number of passes is the number of times that each point on the surface of the layer being compacted has been traversed by the item of compaction plant.

The compactive effort of each compactor is a function of the mass of the machine and the compaction plant in Table 3 (A), 3 (B) and 3 (C) are listed in terms of their masses.

This is calculated taking the mass per metre of the roll divided by the total width of the roll width. Where a smooth-wheeled roller has more than one axle the machine shall be assessed on the basis of the axle giving the lowest value of mass per metre width, see Table 3 (D).

3.4.4. **Vibrating rollers:**

Are self-propelled or towed smooth-wheeled rollers having a means of applying mechanical vibration to one or more rolls.

Are based on the use of the lowest gear on a self-propelled machine with mechanical transmission and a speed of 1.5 - 2.5 km/h for a towed machine or a self propelled machine with a hydrostatic transmission. If higher gears or speeds are used an increased number of passes shall be provided in proportion to the increase in speed of travel.

Operating without vibration will be classified as smooth- wheeled rollers.

Shall be operated with their vibratory mechanism operating only at the frequency of vibration recommended by the manufacturers. All such rollers shall be equipped with a device automatically indicating the frequency at which the mechanism is operating.

Where a mechanical vibration is applied to two rolls in tandem, the minimum number of passes shall be half the number given in the compaction Tables: 3(A), 3(B) and 3(C) for the appropriate mass per metre width of one vibrating roll. If one roll differs in mass per metre width from the other, the number of passes shall be calculated as for the roll of the lower value. Alternatively the machine may be treated as having a single vibrating roll with a mass per metre equal to that of the roll with the higher value.

3.4.5. **Vibrating-plate compactors:**

Are machines having a base-plate to which is attached a source of vibration consisting of one or two eccentrically weighted shafts.

The mass per unit area of base-plate vibrating-plate compactor is calculated by dividing the total mass of the machine in its working condition by the area of the plate on contact with the surface of the layer being compacted.
They shall be operated at the frequency of vibration recommended by the manufacturers. They shall nominally be operated at traveling speeds of less than 1 km/h but if higher speeds are necessary the number of passes shall be increased in proportion to the increase in speed of travel.

*Note: Only the very heavy versions are acceptable, the small machine commonly seen as suitable only for vibrating blocks. Push roll compactor is acceptable.*

3.5. **Vibro-tampers**

These are machines in which an engine-driven reciprocating mechanism acts on a spring system through the oscillations set up in a base-plate.

Where combinations of different types of categories of plant are used, the compaction requirements shall be:

The depth of layer shall be that for the types of plant required least depth of layer and

The number of passes shall be that for the type of plant requiring the greatest number of passes.

Where the contractor uses a lighter type of plant to provide some preliminary compaction only to assist the use of heavier plant, this shall be disregarded in assessing the requirements of Table 3 (A).

Where materials of widely divergent characteristics are used in embankments and fill areas they shall be spread and compacted in separate clearly defined areas in such a manner as to comply with the requirements of Table 3 (A).

If more than one class of material is being used in such a way that it is not practicable to define the areas in which each class occurs, compaction plant shall be operated as if only the material which requires the greater compactive effort is required.

If in doubt regarding appropriate plant, the Developer should contact the Engineer.

3.6. **Concrete for Ancillary Purposes**

Concrete and Mortar Specifications: These materials shall conform to the Specification for Highway Works under Clause 2602, unless specified in the developer’s agreed proposals, and the details stated below.

**Table 3 (E) – Concrete Strength Classes**

<table>
<thead>
<tr>
<th>Standardised Prescribed Mixes</th>
<th>Designated Concrete Mixes</th>
</tr>
</thead>
<tbody>
<tr>
<td>ST1</td>
<td>GEN 0</td>
</tr>
<tr>
<td>ST2</td>
<td>GEN 1</td>
</tr>
<tr>
<td>ST3</td>
<td>GEN 2</td>
</tr>
<tr>
<td>ST4</td>
<td>GEN 3</td>
</tr>
</tbody>
</table>

**Concrete**

The requirements for the concrete grades shown in the Specification are for Class DS-1 conditions in accordance with Table 2 of the BRE Digest 363 (2001). Where other than Class DS-1 conditions are encountered then the mix shall reflect the requirements of Table 2 of the above Digest. All concrete references relate to BS8500.
Aggregates shall comply with BS EN 12620 including the option to utilise all in aggregates. The stated size shall be 20mm unless otherwise stated.

The ratio of the combined or all-in aggregate to the cement for the most part basic mixes shall be not more than 1:8 by volume or 1:10 by mass. No account needs to be taken of bulking of materials.

The concrete shall be mixed by machine or by hand, to a uniform colour and consistency before placing. The concrete shall be compacted within two hours of the introduction of the cement to the aggregate with no additional water being added after discharge from the mixer. The consistency of the concrete shall be defined by its consistency class, (slump), and be within either consistence class S1 or S2 of BS EN 206 and BS8500 as appropriate to the purpose.

The as-placed concrete shall be compacted by hand or mechanical vibration means.

The surface finish of the installed material shall comply with Clause 2602 Ss9 of the Specification for Highway Works – Volume 1 (2007).

Compressive Strength engineering of Standard and Prescribed mixes shall not normally be required unless directed by the Engineer or his representative. Where testing is required, the strength target shall be as signified by the grade of concrete being assessed. In such circumstances all testing shall be in accordance with the relevant sections BS1881.

3.7. Mortar

Mortar used in below ground applications shall be composed of Sulphate Resisting Portland Cement or equivalent cement blend to BS4027 and naturally occurring sand complying with the requirements of BS EN 13139: 2002.

The ratio of cement to sand shall be 1:3 by volume. The incorporation of lime to form a mix 1:3:0.25 is optional (cement : sand : lime). Allowance shall be made for bulking of the sand in mortars.

The mortar shall be mixed by machine or by hand to a uniform colour and consistency, with the constituent materials being accurately gauged. Premixed retarded mortar may be used with the approval of the Engineer.

Mortar shall be made in small quantities only as and when required. Mortar which has begun to set or which has been mixed for more than two hours shall be discarded. The aforementioned time limit shall not apply to retarded mortar. No addition of water is permitted for any material after discharge from the mixer.

Where pointing is required the material used and the application of will be subject to the approval of the Engineer.
4. Excavation and Filling

4.1. Top Soil Strip

4.1.1. Prior to the placement of turf or topsoil, any other organic and unsuitable material shall be stripped where directed to a minimum depth of 150mm. This applies to all adoptable areas, (see Clause 20.2)

4.1.2. Topsoil material shall be stacked to a maximum height of 2m and kept separately from other excavated or imported materials.

4.1.3. No material whatsoever shall be deposited within 5m of any tree or as directed by the Engineer if a Tree Preservation Order (T.P.O.) is in place.

4.2. Excavation to Formation

4.2.1. The area of the proposed works shall be excavated to formation level and any unsuitable material exposed shall be removed and replaced with approved suitable granular material to Clause 4.5. These soft areas are referred to in Clause 7.1.2.

4.2.2. Where an existing ditch lies beneath the proposed works it shall be thoroughly cleared of all vegetable matter, topsoil and other unsuitable material. The treatment of such a ditch will be considered on a site by site basis, this may require a separating membrane with properties set out in Clause 7.3.

4.2.3. Drainage of the subgrade needs to be considered for all estate road designs - refer to Chapter 8.

4.3. Subgrade

4.3.1. Areas below formation level after removal of turf, topsoil and other organic and unsuitable materials shall be made up with approved suitable fill material. For specification of suitable fill material and method of compaction see Chapter 3.

4.3.2. Approved suitable granular material (see Clause 3.3 and 4.5) shall be used to backfill any existing ditches beneath the line of the proposed works. The line of ditch should be piped if flow is to be maintained following consultation with and approval by the appropriate Peterborough City Council department, Internal Drainage Board or the Environment Agency.

4.3.3. Approved suitable granular backfill material (see Clause 3.3 and 4.5) shall also be used for infill of isolated deep pockets such as old sumps, basement voids, and any vertical walls that shall be broken out to below formation level and disposed of outside the limits of the adoptable Highway, subject to Clause 4.3.4 below.

4.3.4. In areas with potential to flood approved granular fill shall be used in accordance with clause 4.7.

4.4. Forming Areas of Fill

4.4.1. All materials for replacement or making up to formation level in accordance with the above requirements shall be deposited in layers and each layer thoroughly compacted in accordance with Table 3 (A).
4.4.2. Material used in forming embankments shall be approved suitable material in accordance with Chapter 3 of this Specification.

4.4.3. For widening to existing carriageways on embankments, clay fill shall not be used below the new carriageway and/or footway or cycleway and approved granular fill shall be benched in and thoroughly compacted to the requirements of Table 3 (A) to reduce differential settlement.

4.5. **Suitable Granular Backfill Material**

4.5.1. Approved suitable granular material shall include the following characteristics, in accordance with series 600 of SHW:

- 10% fines value must exceed 40kN tested on a soaked basis in accordance with BS812.
- Maximum particle size not to exceed 63mm.
- Generally well graded (coefficient of uniformity >10) with not more than 9% passing 63um sieve
- The material shall not contain any clay lumps or any other foreign matter.
- NB: Alternatively Type 1, HER subbase or Type 2 granular subbase may be used.

4.5.2. Approved suitable granular backfill material shall be used to backfill service and other trenches within the Highway (including verges and footways / cycleways) on all new estate roads. The backfill material shall be placed in layers not exceeding 150mm compacted thickness, in accordance with Table 3 (C).

4.6. **Construction Depths**

4.6.1. Full construction including subbase is required above the backfill with materials and thicknesses appropriate to the location in the Highway. Refer to Chapter 6 and to access, footway and cycleway clauses. In the carriageway a minimum 450mm overall construction depth, (inclusive of subbase), will be required.

- The only exception to this full construction depth is for concrete pipe surround where constructed in accordance with Clause 15.3.

4.6.2. Where any “bituminous” layer is disturbed due to trenching works the carriageway is to be reinstated to the satisfaction of the Engineer. It shall generally be required that the full length and full width of the area will be reconstructed to minimise joints in the overall construction / finished surface.

4.7. **Areas with Potential to Flood and Suitable Granular Material**

4.7.1. Fill material in areas liable to flood, in ditch backfill and in soft areas shall be approved suitable granular material, shall include the following characteristics:

- 10% fines value must exceed 60kN tested on a soaked basis in accordance with BS812.
- Maximum particle size not to exceed 63mm.
- Generally well graded (coefficient of uniformity >10) with not more than 9% passing 63um sieve
- The material shall not contain any clay lumps or any other foreign matter and be non moisture susceptible.
- NB: Alternatively Type 1 or Type 2 granular subbase may be used.
4.8. **Geotextiles**

4.8.1. Where fill is placed below formation an approved geotextile will be incorporated to facilitate construction.

4.8.2. The use of geotextile membranes must comply with Clause 7.3 of this Specification.
5. **Weather Conditions**

5.1. **Earthworks Operations**

5.1.1. Where necessary, subgrade drainage shall be incorporated by the designer/case officer.

5.1.2. It is not good practice to continue to work in wet conditions that will adversely affect the subgrade and subbase. If wet weather working is undertaken then protective measures must be considered and all necessary action taken. If either the subbase or subgrade materials have deteriorated due to trafficking or to ingress of water, they shall be removed and replaced as necessary with new Type 1 subbase or materials to Clause 9.2.

5.1.3. No material in frozen condition shall be incorporated in the works but may be retained on the site for use if suitable when unfrozen.

5.2. **Construction**

5.2.1. Material for use in construction shall not be laid on any surface, which is frozen or covered with ice or frost.

5.2.2. Materials containing bitumen binders should not be laid if the temperature of the surface to be covered is frozen or covered with ice or snow or the temperature is at or below 2°C. Where however, the surface is dry, unfrozen and free of ice, laying may proceed at air temperatures in the shade at or above -1°C provided the temperature is rising.

5.2.3. Laying shall not be carried out if standing water is present on the surface to be covered. Because thicker layers cool more slowly, binder and base layers provide time for compaction under most weather conditions. Surface course systems should preferably be applied between the months of April and October as within this period the laying criteria given in the SHW are more likely to be met or exceeded, refer to IAN 157/11 of HD37/99, DMRB.

5.2.4. On occasions where HRA is used extra care shall be taken when applying coated chippings to the asphalt in cold weather conditions. The chill factor of wind in exposed places can reduce the temperature of laid material very quickly and attention is drawn to minimum rolling temperatures in Appendix B.

5.2.5. Roadwork materials containing cement shall not be laid when the descending air temperature in the shade falls below 3°C and laying shall not be resumed until the rising air temperature in the shade reaches 5°C.

5.2.6. Where fresh concrete or mortar containing Portland cement CEM 1, has been placed in the works and the temperature falls or is likely to fall below freezing within a period of up to 48 hours after placing, suitable insulation blankets shall be employed and held in place for at least 3 days and until the air temperature is above 1°C and rising. Insulation blankets shall be closed cell polyethylene foam sheets minimum 10mm thick with a “U” value of 4 watts/m°C or suitable material with an equivalent or better thermal capacity. The developer must be aware that the incorporation of additives or cement replacements may retard early strength development. Where this is the case care must be taken to ensure damage does not occur after the initial 48 hour period.
5.2.7. In adverse weather conditions the use of HER subbase must be approved by the Engineer, (Refer to Table 9A in Clause 9.2).
6. Design of Carriageway Construction

6.1. Construction Thickness

6.1.1. Tables 6(B) to 6(E), detail the acceptable standard construction thickness for the permitted range of alternative road base types and show the subbase depth required for subgrades of various Design CBR's, (California Bearing Ratio).

6.2. California Bearing Ratio (CBR) Values

6.2.1. CBR values to be used for design are to be derived from Plasticity Index Testing using samples from agreed appropriate depths and positions on site. Full test results including moisture content at test plasticity indices and materials classification must be submitted to support the claimed design CBR value, which shall be derived from the table below. The plasticity index (PI) is a measure of the plasticity of the soil. The PI is the size of the range of water contents where the soil exhibits plastic properties. The PI is the difference between the liquid limit and the plastic limit (PI = Liquid Limit minus Plastic Limit). Soils with a high PI tend to be clay, those with a lower PI tend to be silt. A PI of 0 is therefore non-plastic, and a material of between 20-40 demonstrates a high plasticity.

Table 6 (A) – Design CBR Values

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Plasticity Index From Soil Survey</th>
<th>Design CBR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plastic clay</td>
<td>50 or greater</td>
<td>&lt;2</td>
</tr>
<tr>
<td>Silty Clay</td>
<td>40 – 49</td>
<td>2</td>
</tr>
<tr>
<td>Silty Clay</td>
<td>30 – 39</td>
<td>3</td>
</tr>
<tr>
<td>Sandy Clay</td>
<td>20 – 29</td>
<td>3</td>
</tr>
<tr>
<td>Very Sandy Clay</td>
<td>10 - 19</td>
<td>4</td>
</tr>
<tr>
<td>Very Silty Clay</td>
<td>10 - 19</td>
<td>&lt;2</td>
</tr>
<tr>
<td>Silt</td>
<td>-</td>
<td>&lt;2</td>
</tr>
<tr>
<td>Sand: poorly graded</td>
<td>-</td>
<td>7</td>
</tr>
<tr>
<td>Sand: well graded</td>
<td>-</td>
<td>10</td>
</tr>
<tr>
<td>Sand Gravel: well graded</td>
<td>-</td>
<td>15</td>
</tr>
</tbody>
</table>

6.2.2. If Plasticity Index Values are not available from soil survey and test data for the proposed site, a CBR of less than 2% must be assumed for the design and the subgrade must be tested once exposed. All subgrade with a CBR of <2% must be subject to appropriate improvement measures to enhance the bearing capacity of the subgrade material at formation. For design solutions on carriageways <2% reference will be made to DMRB Interim Advice Note 73/06, 2009, clauses 5.16 onwards.

6.2.3. A soil assessment cone penetrometer, (MEXE probe), may be used for on-site checks for soft areas to Clause 7.1.2. Alternatively, if available vehicle mounted in-situ CBR testing equipment may be used. Developers should note that the MEXE probe and other in-situ methods will not be acceptable for establishing the Design CBR values, only for locating areas where the in-situ values may be lower than the agreed design CBR value.
6.2.4. A ground investigation at formation level covering the line of the road shall be provided. The minimum information for road design purposes must include soil classifications and in-situ moisture contents produced from the logs of bore holes or trial pits taken along the centre line of the proposed carriageway at 50m intervals subject to a minimum of 3 trial holes for roads less than 100m in length. Should the proposed layout result in the outer edge of the highway exceeding 25m from the road centre line then additional trial pits will be required to cater for these areas such as housing squares.

6.2.5. If an assumed CBR value of less than 2% is adopted, a ground investigation at subbase level covering the line of the road must be provided as detailed above. Where deemed necessary the designer may need to incorporate a capping layer in accordance with Series 600 (SHW), and suitable subgrade drainage to provide a suitable carriageway foundation. Reference must also be made to DMRB Interim Advice Note 73/06, 2009, clauses 5.16 onwards.

6.2.6. For all works within the existing Public Highway a Highway Assessment will be submitted including details of the full depth of carriageway make up from the subgrade level (achieved through the taking of core samples and appropriate laboratory testing). This report will allow the Designer in consultation with the Case Officer to evaluate the appropriateness of the existing carriageway to accommodate the proposed development. For instance if a new junction is formed the existing carriageway may require improvement to withstand the additional loading and stresses that will be transferred through turning movements, additional volume of commercial vehicles, and the introduction of new breaking and acceleration zones. All off site highway works must be designed to accommodate the additional traffic generated, considering both the construction phases and the design life of the carriageway. All associated utility connections and other disruptions to the carriageway must be considered as these will have an adverse effect on the integrity of the carriageway. The case officer will require all of the above to be determined prior to issuing technical approval of any scheme. Also see clause 2.10.2 that must also be considered.
Figure 6 (B) Shared Surface Streets, Minimum Carriageway Construction:

- Concrete Block Paver
- Inc. Application of appropriate sealant (see chapter 11)
- Minimum Subbase Thickness
- Type 1 or HER
  - CBR >5%: 240mm
  - CBR 4%: 270mm
  - CBR 3%: 305mm
  - CBR 2%: 370mm
  - CBR <2%: 520mm (min)

Figure 6 (C) Housing Estate Roads, Minimum Carriageway Construction:

- Surface Course (see chapter 11)
- Binder Course (see chapter 10)
- Base Course (see chapter 10)
- Must be laid in 2 layers

- Minimum Subbase Thickness
- Type 1 or HER
  - CBR >5%: 240mm
  - CBR 4%: 270mm
  - CBR 3%: 305mm
  - CBR 2%: 370mm
  - CBR <2%: 520mm (min)
Figure 6 (D) Distributor Road, Minimum Carriageway Construction:

40mm
Surface Course (see Chapter 11)

60mm
Binder Course (see Chapter 10)

120mm
Base Course (see Chapter 10)
Must be laid in 2 layers

Minimum Subbase Thickness
Type 1 Only

<table>
<thead>
<tr>
<th>CBR</th>
<th>Thickness (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;5%</td>
<td>240</td>
</tr>
<tr>
<td>4%</td>
<td>280</td>
</tr>
<tr>
<td>3%</td>
<td>360</td>
</tr>
<tr>
<td>2%</td>
<td>440</td>
</tr>
<tr>
<td>&lt;2%</td>
<td>590 (min)</td>
</tr>
</tbody>
</table>

Note: The use of HER subbase is not permissible- see Clause 9.2.3. If the 40 year life design traffic exceeds 1.0 msa a special design shall be submitted for the Engineers approval.
**Figure 6 (E) Industrial Estate Road, Minimum Carriageway Construction:**

- **Surface Course (see Chapter 11)**
- **Binder Course (see Chapter 10)**
- **Base Course (see Chapter 10)**
  - Must be laid in 2 layers

<table>
<thead>
<tr>
<th>Base Course Options (BS 5949-07: 2007)</th>
<th>Design Traffic Flow/Commercial Vehicles Per Day at Opening</th>
</tr>
</thead>
<tbody>
<tr>
<td>DBM</td>
<td>5 msa or &lt;230 cv/d</td>
</tr>
<tr>
<td>AC DENSE HDM 40/60 PEN</td>
<td>10 msa or 230 - 450 cv/d</td>
</tr>
<tr>
<td>AC DENSE HDM 40/60 PEN Increased base thickness by 20mm to 170mm</td>
<td>16 msa or &gt; 720 cv/d</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Minimum Subbase Thickness Type 1 Only</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBR &gt;5%</td>
</tr>
<tr>
<td>CBR 3.5%</td>
</tr>
<tr>
<td>CBR 2%</td>
</tr>
<tr>
<td>CBR &lt;2%</td>
</tr>
</tbody>
</table>

**Note:** If the 40 year design traffic exceeds 16 million standard axles (msa) or 720 commercial vehicles per day (cv/d) a special design shall be submitted for the Engineers approval in accordance with HD 26/06, DMRB.

6.2.7. Attention is drawn to the requirements of Appendix C- Stepped Construction Detail illustrating a typical cross section utilising a Stress Absorbing Membrane.

6.3. **Use of Stress Absorbing Membrane (SAM) within Carriageway- Appendix C**

6.3.1. A stress absorbing membrane/ asphalt reinforcement is a requirement in accordance with Appendix C. It is to be applied at all interfaces to the existing carriageway to mitigate against cracking due to differential settlement caused by shear and bending forces.

6.3.2. The proposed material intended for use must be approved by the Inspecting Engineer following the submission of supporting evidence to demonstrate it is fit for the intended purpose. This will be dependant upon the category and condition of the adjoining carriageway.
6.3.3. The products generally found applicable to local application at transverse and longitudinal joints are: Glasgrid Type 8502 (Type 8501 for full width carriageway reinforcement). Tensar AR-G or Tensar Glasstex. A tensile strength to a minimum of 100Kn/m along its length is required.

6.3.4. The installation of a levelling course is a requirement as the rough planned surface of the existing base course is not suitable to apply a SAM. A smooth newly laid pavement mat provides the optimum conditions prior to installation.

6.3.5. Attention is drawn to the need to fully saturate the carriageway base course prior to laying the SAM with a suitable bitumen bond coat. This provides a sealing function and ensures enhanced bonding between the base, binder course and SAM. Please refer to Clause 10.2 for further clarification of suitable bond coats.
7. Preparation of Carriageway Formation

7.1. Shaping and Compaction

7.1.1. After reinstatement of any defective areas, ditches and isolated deep pockets (as described within Clause 4.3.3.), the formation shall be cleansed of any unsuitable material prior to being compacted with a roller of an appropriate type and weight. The resulting profile shall be properly shaped, with an even uniform surface to a level appropriate to the approved design thickness in accordance with the tables contained within Chapter 6.

7.1.2. At this preparation stage, the developer shall obtain the Engineer’s approval before further work proceeds. This may involve local checks for soft areas and verification of CBR values, refer to Chapter 6. For treatment of soft areas refer to Chapter 4.

7.2. Weather Protection

7.2.1. The formation shall be adequately protected from the weather and shall not be used by construction traffic. It shall be covered as quickly as possible with subbase, see Chapter 5.

7.2.2. The subgrade shall be drained as necessary in accordance with Chapter 8.

7.3. Geotextile Requirement

7.3.1. A separating membrane with the properties set out below shall be laid on the prepared formation in accordance with the manufactures’ instructions. This applies to carriageways, footways and cycleways.

7.3.2. The separating membrane shall extend 300mm further than the limits of the kerb beam and comply with the following requirements, in general accordance with SHW Specification Clause 609 subject to:

a) The $\theta_{90}$ shall be greater than 50 and less than 200 (BS 6906 Pt 2:1989)
b) The minimum tensile strength in each direction shall be 6kN/m (EN ISO 10319:1996)
c) The minimum tensile strength in each direction shall be 6kN/m (EN ISO 10319:1996)

7.3.3. All joints are to be overlapped a minimum of 300mm. The cutting of the geotextile after placement should be kept to a minimum, however if cutting is unavoidable all the underlying sub-formation must be fully covered with any joints being overlapped by at least 300mm.

7.4. Ground Reinforcement and Stabilisation

7.4.1. Where deemed necessary by the ground investigation or for other reasons a reinforced geogrid may be suited for inclusion within the carriageway formation/subbase layers. This may be deemed necessary to provide the benefit of both ground stabilisation and soil reinforcement. The use of Triax Geogrid by Tensar Limited or similar may be the appropriate application. This is particularly applicable to sites where a CBR value of 2% can not be achieved, attention is drawn to Section 4 Subgrade Requirements within IAN 73/06, Revision 1 (2009).
8. **Drainage of Subgrade**

8.1. **General- Natural ground at and below the formation level**

8.1.1. On all sites, adequate subgrade drainage shall be provided to ensure, that at all times the water level is maintained at more than 300mm below formation level. The subgrade drain pipes must run to an approved outfall. Where the subsoil is gravel, blocky chalk or sand the drainage is not normally necessary. Where other subsoil materials are encountered it shall be assumed that subsoil drainage will be required.

8.1.2. Where the water table is high and especially where the subgrade is moisture sensitive with a plasticity index value of <25 sub grade drainage is beneficial and must be considered. These would be placed below the bottom of the subbase, (or capping if utilised).

8.1.3. It is of vital importance to keep water out of the subbase, capping and subgrade, both during construction and during the service life of the pavement. Attention is drawn to Section 6 Drainage and Frost within IAN 73/06 Revision 1 (2009).

8.1.4. The requirement for subgrade drainage may only be waived after ground investigations have been undertaken which can prove to the Engineer that it is not necessary.

8.1.5. Subgrade drainage may not be required when the formation is not rutted and is maintained free of standing water during construction and when:

a) site investigation has demonstrated that the highest annual ground water level is more than 300mm (see above) below formation level.

Or

b) free-draining continuous sand and gravel layers or blocky chalk occur at and below formation level.

8.1.6. Where subgrade drainage is found to be necessary, but impractical, an additional 150mm depth of Type 1 subbase material shall be placed with a separating geotextile membrane placed both above and below.
9. Carriageway Foundation

9.1. General

9.1.1. Refer to Chapter 6 for design depths of construction.

9.1.2. CBR testing must be carried out in accordance with Chapter 6 of this specification prior to work commencing.

9.1.3. Subbase materials shall be spread evenly on the formation in layers of a depth of not more than 150mm compacted thickness and compacted in accordance with the requirements of the compaction table 3 (B) entitled subbase compaction table at a moisture content in the range optimum minus 2% or plus 1% and without segregation. If the subbase is to be trafficked during the site construction, then a protective sacrificial layer of 150mm thick should be placed on the surface. This layer shall be removed and the newly exposed formation shall be levelled and re-rolled for inspection prior to placing the bituminous base.

9.1.4. The full thickness of the subbase shall be continued for a minimum distance of 300mm beyond the limits of the kerb beam, the developer should refer to the typical cross-section details in Appendix A1.

9.1.5. Acceptance of the foundation layer (sub-base) will be based upon an end product performance testing regime. The developer is required to undertake lightweight deflectometer testing (LWD) to ensure a minimum foundation surface modulus stiffness value is achieved prior to the placement of any subsequent asphalt layers. In order to achieve these minimum surface modulus stiffness values the sub base material will have to be supplied, installed and compacted at somewhere near the optimum moisture content value in accordance with para. 9.1.3 above. It is also worth noting that any segregation may result in failures. Please note that once the sub-base has been delivered to site the control of the moisture content becomes the responsibility of the civil engineering contractor.

Foundation Layers: Dynamic Plate Testing Methodology

a) The main function of the foundation layers within a highway design is to distribute applied vehicle loads to the underlying sub-grade, without causing distress in the foundation layers or in the overlaying layers. This function is required for the full life of the pavement.

b) In order to demonstrate that the foundation layer have been correctly installed as per this specification, the Highway Authority will require that prior to the laying of any bound materials that a series of Dynamic Plate Tests be undertaken, to ascertain the Foundation Surface Modulus. The Testing protocol shall conform to the requirements of Advice Note 73/06 Rev.1 (2009) Design Guidance for Road Pavement Foundations or its successor document.

c) The tests must be carried out using the following procedure:

i. The testing must be undertaken 24hrs or less before the laying of the bound layers. If adverse weather conditions prevail, the sub-grade is trafficked or other actions that may affect the performance of the material occur between the taking of
the tests and the laying of the bound layers the Highway Authority reserves the right to instruct that the tests be carried out again.

ii. The spacing of the tests shall be as follows:
   a. On lengths of less than 100m tests shall be taken every 5m
   b. On lengths of 100m and above tests shall be taken every 10m
   c. Tests shall be taken between these lengths when reasonably requested by the Highway Authority’s representative

iii. Testing shall take the form of three test points, one 1m from the kerbface one at the centreline of the carriageway and one at 1m from the opposite kerbface. (see Appendix J).

iv. The contractor must carefully record the location of all plastic ducts etc., as these may adversely affect the testing regime.

d) In order to comply with the requirements of the Highway Authority the test results for the Foundation Surface Modulus shall be the rolling mean of six results and must be greater than 80MPa. For the avoidance of doubt: 80MPa is the lowest limit that the Highway Authority will accept and any measurement below this figure will have failed the test. No individual result is to be less than 50MPa.

e) Testing will also be required in accordance with 3 c) iii above, where trenches are retrospectively constructed for services across the carriageway.

f) For ease of reference a list of companies that are able to undertake the Dynamic Plate Tests can be provided by the Engineer upon request.

9.1.6. The developer shall consult the Environment Agency over the use of any material that may contain contaminants and which could generate an unacceptable leachate. Evidence of any subsequent approval shall be issued to the Case Officer for our records.
9.2. **Subbase Materials**

Table 9 (A) – Housing Estate Road Subbase (HER)

<table>
<thead>
<tr>
<th>BS sieve size</th>
<th>Range of grading % by mass passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>63 mm</td>
<td>100</td>
</tr>
<tr>
<td>31.5 mm</td>
<td>74 – 100</td>
</tr>
<tr>
<td>16 mm</td>
<td>44 – 80</td>
</tr>
<tr>
<td>8 mm</td>
<td>30 – 65</td>
</tr>
<tr>
<td>4 mm</td>
<td>18 – 42</td>
</tr>
<tr>
<td>2 mm</td>
<td>13 – 35</td>
</tr>
<tr>
<td>1 mm</td>
<td>8 – 28</td>
</tr>
<tr>
<td>0.250 mm</td>
<td>0 – 18</td>
</tr>
<tr>
<td>0.063 mm</td>
<td>0 – 9</td>
</tr>
</tbody>
</table>

9.2.1. Material shall be from a source approved by the engineer prior to application, and shall be crushed rock, slag, crushed concrete or other approved material. It shall be well graded and lie within the grading envelope in table 9(A).

The use of secondary and recycled aggregates is positively encouraged to be the first enquiry point when sourcing subbase, however these will only be used following the submission of all necessary documentation and the subsequent approval of the Engineer.

All materials shall be well graded and lie within the grading envelope in Table 9(A).

In the above Table:

a) Under wet conditions HER material must not be used unless approved by the Engineer

b) The particle size shall be determined by the washing and sieving method of BS EN 933: Part 1: 1997

c) The material passing the 425 um BS sieve when tested in accordance with BS 1377 shall be non-plastic

d) 10% fines value must exceed 40kN tested on a soaked basis in accordance with BS812.

**Type 1 Subbase**

Alternatively, SHW Clause 803 Granular Subbase Material Type 1 may be used. The material shall comply with the full requirements of SHW Clause 803 Granular Subbase Material Type 1.

9.2.2. The total carriageway thickness must be at least 450mm of non frost susceptible materials (inclusive of the subbase material).

9.2.3. The use of HER subbase is limited to Housing Estate Roads and is not permitted for use on Distributor or Industrial category roads.
10. **Carriageway Base and Binder Course**

10.1. **General**

10.1.1. Refer to Chapter 6 for the specific carriageway construction alternatives for the following: Shared Surface Streets, Housing Estate Roads, Distributor Roads and Industrial Estate Roads.

10.1.2. Bituminous materials shall be machine-laid. At the discretion of the Engineer it may be agreed to hand lay materials, but this shall be restricted to small areas. Hand application shall only be permitted when site conditions make machine laying impractical. The use of AC14 dense bin 40/60 must be utilised when hand laying is employed, this will be to a maximum depth of 45mm.

10.1.3. Asphalt shall be taken directly from a suitably insulated delivery vehicle. Double handling of material is not permitted. If a method of double handling is agreed with the Engineer it shall be limited to small areas of work and only stored for short periods. Temperatures must be maintained in accordance with Appendix B, Bituminous Materials- Temperature Guidelines.

10.1.4. Where damage occurs as a result of trafficking of bituminous layers, appropriate remedial treatment shall be carried out which shall comply with the requirements of 2.12.6.

10.1.5. The combined thickness of all bound layers shall be regarded as the minimum thickness acceptable. Refer to Chapter 6.

10.1.6. The only materials permitted on housing estate and distributor roads are Bituminous based, consisting of either Dense Asphalitic Concrete or where appropriate Hot Rolled Asphalt as specified in Clause 10.4 and 10.5.


10.1.8. If gravel is to be used proof shall be provided to show that the mixture has been subject to the SHW, Series 900, Clause 929 design process and that it has been successfully laid and trafficked elsewhere.

10.1.9. Where any layer is to be trafficked all open textured areas should be protected against the ingress of dirt and water by applying a coat of sealing grit with suitable aggregate or by surface dressing.

10.1.10. For heavily trafficked streets and distributor roads Table 6 (D) shall apply for the overall design. Only Dense Asphalt Concrete to Clause 10.4 using a 40/60 pen binder shall be used, unless the laying contractor is able to prove through site testing that adequate standards are in-built with the use of any alternative materials. Such testing should be proposed and agreed by the Engineer prior to the commencement of the works. All testing to be at the developers cost.

10.1.11. A minimum of 160mm thickness of bituminous material (and applicable subbase) must be placed prior to pavement being trafficked by construction vehicles.
10.2. **Specific Laying Operations for Bond Coating (including Vertical Faces)**

10.2.1. Must be applied in accordance with BS 594987: 2010 or the rate set out in the BBA/HAPAS certificate for proprietary materials (the rate of spread for bond coats shall be 0.35kg/m² of residual binder). The application requirements of Clauses 903, 920 and 942 of Volume 1 of the SHW must also be applied. Bond coats shall have a suitable BBA/HAPAS certificate detailing the performance claims made for them. For certificates see the BBA website: www.bbacerts.co.uk.

10.2.2. All bituminous layers to be surfaced over, once cleansed appropriately must be sprayed with a suitable bituminous bond coat. This will be completed immediately prior to the laying of the base, the binder and the surface course materials. For all laying works a bond coat shall be applied at a uniform rate by calibrated metered mechanical spraying equipment, by spray bar tanker. Hand held sprayers shall only be used for very small scale works and inaccessible areas and with the approval of the Engineer. This will enhance the adhesion between layers and provides enhanced water proofing capability.

10.2.3. The use of tack coat (conventional bitumen emulsion) is no longer permitted within carriageways. Suitable polymer modified bond coats must be applied as above. Appropriate products approved for use include Colbond 50 produced by Colas Limited and Aquagrip 60P (product code KE91) produced by Ayton Products. Bond coats with “fast breaking” properties are recommended for use to ensure efficient application for continuous laying operations.

10.2.4. All vertical faces such as kerbs, channel blocks, iron work, covers and cut joints to which bituminous material will be laid up against shall have either a hot bitumen or cold thixotropic bitumen compound applied to the satisfaction of the Engineer. Alternatively a polymer modified bond coat can be used given the requirements of 10.2.2 above.

10.3. **Materials**

10.3.1. The base layer materials shall be Dense Asphalt Concrete (AC) to Clause 10.4 or where appropriate Hot Rolled Asphalt to Clause 10.5, as stated below. The materials formulation and compaction standards shall be such as to ensure individual insitu air voids are more than 2% but less than 8%. For the purpose of overall compliance, the following void levels shall be deemed acceptable.

   - AC materials - as per Specification for Highway Works Clause 929
   - HRA materials - Average of six core measurements to be $\leq 5\%$ with no individual value being $> 8\%$

10.3.2. Consideration will be given to any Developer/Contractor wishing to use material containing recycled and secondary products, subject to the conditions within Clause 2.12.10 and 2.12.11.

10.4. **Base Layer - Dense Asphalt Concrete (AC)**

10.4.1. The material shall be AC 20 dense bin 40/60. in accordance with BS EN 13108-1. (see PD 6691: 2007, Annex B). It shall be placed in two layers and thoroughly compacted all in accordance with BS 594987, 2010.
10.4.2. Where the aggregate is gravel, 2% of Ordinary Portland Cement (OPC) or 2% hydrated lime shall be included in the material passing the 75μm sieve or an approved type and quantity of adhesion agent may be substituted for the OPC/ Hydrated Lime.

10.5. Base Layer - Hot Rolled Asphalt (HRA) – Where Applicable

10.5.1. The material shall be HRA bin/base 60/20 in accordance with BS EN 13108-4 (see PD 6691: 2007, Annex C) It shall be placed in two layers and thoroughly compacted, all in accordance with BS 594987: 2010, binder to be 40/60 pen.

10.5.2. Where the aggregate is gravel, 2% of Ordinary Portland Cement (OPC) or 2% hydrated lime must be included in the material passing the 63μm sieve or an approved type and quantity of adhesion agent may be substituted for the OPC/ Hydrated Lime. Testing data must provide adequate satisfaction to the longevity of the material and hold current approval by the Local Highway Authority.

10.6. Base Layer - Shared Surface Streets

10.6.1. Where construction traffic will not use the base course before the commencement of the installation of block paving the thickness of the base maybe reduced from 160mm to 110mm, see Table 6 (B).

10.7. Base Layer - Distributor Roads and Industrial Estate Roads

If the 40 year life design traffic exceeds 1.0msa a special design shall be submitted for the Engineers approval.

10.8. Binder Layer

10.9. Binder Course Layer – Dense Asphalt Concrete (AC)

10.9.1. The material shall be AC 20 dense bin 40/60 in accordance with BS EN 13108-1 (see PD 6691: 2007, Annex B) and laid 60mm (Distributor roads) or 65mm thick (Estate roads). It shall be laid and thoroughly compacted all in accordance with BS 594987: 2010.

10.10. Binder Course Layer – Hot Rolled Asphalt (HRA)

10.10.1. The material shall be HRA 60/20 bin/base in accordance with BS EN 13108-4 (see PD 6691:2007, Annex C). Coarse aggregates shall be crushed rock only. The material shall be laid and thoroughly compacted all in accordance with BS 594987: 2010 Binder to be 40/60 pen.

10.11. Permitted Variations

10.11.1. For Housing Estate Roads and Distributor Roads only where the Binder and Base layers are to comprise of the same material i.e. Dense Asphalt Concrete to Clause 10.4 or where appropriate Hot Rolled Asphalt to Clause 10.5, the layers may be combined and laid in two lifts.

10.11.2. Consideration will be given to any Developer/ Contractor wishing to use material containing recycled and secondary products, subject to the conditions within Clause 2.12.10.
10.12. **Substitution of Material**

10.12.1. Where the overall design pavement thickness exceeds the 450mm minimum required in Chapter 6. The depth of subbase material may to the discretion of the Engineer be reduced by increasing the bituminous Base thickness in the proportion of 1 part bituminous to 3 parts granular, subject to:

The overall construction thickness not being less than 450mm of non frost susceptible material and subbase thickness not to be less than 200mm. Inclusive of a geotextile separating membrane at formation level and providing that the reduced subbase layer can support construction loadings without causing any deformation.
11. Carriageway Surface Course

11.1. General

11.1.1. Bituminous material options A, B and C must all be machine-laid.

A - Housing Estate Roads - the material shall be one of the following:
Stone Mastic Asphalt (SMA 6 surf) to BS EN 13108-5 (see PD 6691:2007 Annex D) with 6mm nominal size aggregate and a 40/60 pen binder. Stating a nominal thickness of 35mm. Clause 11.3 refers.
Or
Concrete Block Paving. Clause 11.5 refers.
Or
High Stone Content HRA surface course type F 55/10 to BS EN 13108-4 (see PD 6691:2007 Annex C) 100/150 pen binder. Clause 11.6 refers.
Or
HRA surface course type F 30/14 to BS EN 13108-4 (see PD 6691:2007 Annex C) 40/60 pen binder. Clause 11.4 refers.

B - Distributor Roads - the material shall be one of the following:
Stone Mastic Asphalt (SMA 10 surf) to BS EN 13108-5 (see PD 6691:2007 Annex D) with 10mm nominal size aggregate and a 40/60 pen binder. Stating a minimum thickness of 40mm. Clause 11.3 refers.
Or
HRA surface course type F 30/14 to BS EN 13108-4 (see PD 6691:2007 Annex C) 40/60 pen binder. Clause 11.4 refers.

C - Industrial Estate Road - the material shall be as shown in Figure 6 (E).
SHW Clause 924, Thin Surface Course with 10mm nominal size aggregate, Clause 11.3 refers.

“Ind” Specification Stone Mastic Asphalt ("Ind" SMA 10 surf). A proprietary system providing a reduced texture depth of 0.7 - 1.1mm. Used as the material is less susceptible to failure from heavy vehicle stresses and loading particularly turning. It should be noted this material should only be used in slow speed situations of 30 mph or less.

11.1.2. Coated chippings for HRA Surface Course Type F 30/14, or the coarse aggregate for SMA shall conform to the requirements of DMRB, Volume 7, Chapter 5, HD36/06. Reference should also be made to the requirements of SHW, Series 900 clause 924. Generally the following minimum Polished Stone Values must be achieved.
Table 11 (A): General minimum Polished Stone Value (PSV) requirements

<table>
<thead>
<tr>
<th>Site Description</th>
<th>PSV</th>
</tr>
</thead>
<tbody>
<tr>
<td>For Housing Estate Roads and Distributor Roads</td>
<td>55</td>
</tr>
<tr>
<td>On or within 60m of junctions of Principle, Non-Principle, Classified roads of Class A, B or C</td>
<td>60</td>
</tr>
<tr>
<td>On or within 60m of roundabouts</td>
<td>65</td>
</tr>
</tbody>
</table>

Note: Consideration must be given to the requirements of the DMRB within HD28 and HD36, these must be adhered to for streets of high traffic intensity.

11.2. **Application of High Friction Surfacing material (HFS)**

11.2.1 HFS materials where deemed necessary are only to be laid above a suitable surface course material. Prior to commencing any works the developer is to prove to the Engineer the suitability of the carriageway through an appropriate investigation of the carriageway. The material is to a HAPAS approved cold epoxy bound application. The use of hot applied materials are not recommended for use as they are not as robust (less susceptible to early fatigue) as the cold applied materials available.

11.2.2 It may be not be deemed necessary to apply HFS if the carriageway has or can be reinstated to an acceptable PSV, refer to DMRB, HD36/06. The case officer will require evidence to determine if HFS is required at the given location. HFS is regarded as a maintenance liability and where alternative surface materials can be utilised this is encouraged, as per the requirements of HD36/06.

11.3. **Stone Mastic Asphalt (SMA)/ Thin Surface Course (TSC)**

11.3.1. Stone Mastic Asphalt (SMA) must comply with requirements of BS EN 13108-5 (see PD 6691:2007, Annex D). Where a TSC has been approved for use this should must be proprietary mixtures with a British Board of Agreement HAPAS Roads and Bridges certificate.

11.3.2. It should be noted that if either the 6mm or 10mm Stone Mastic Asphalt/ approved BBA HAPAS Thin Surface Course (TSC) surface course option is laid this must be to a minimum thickness of 35mm for the 6mm material and 40mm for the 10mm material.

11.3.3. Binder shall be 40/60 pen or as per proprietary registration.

11.3.4. Coarse aggregate shall be of appropriate PSV as per Table 11 (A).

11.3.5. 6mm and 10mm nominal size material (SMA 6 surf or SMA 10 surf)/ TSC, shall be used for Housing Estate and Distributor Roads respectively. 10mm nominal size TSC or a proprietary 10mm Industrial SMA must only be used on industrial estate roads within which conventional SMA to BSEN 13085 is not permitted.

11.3.6. The material shall be compacted to produce in situ air voids content of between 2% and 6%. This may be checked by coring and assessed using the test method as per BS EN 12697 - 5 Procedure A, BS EN 12697-9 Procedure B and the SHW Clause 937 subsection 33 procedure. The material producer's installation recommendations shall be carefully followed to ensure such criteria are achieved.
11.3.7. The following texture depth is to be achieved: For SMA 10 surf, at least 0.8mm with maximum of 1.3mm. For SMA 6 surf at least 0.7mm with a maximum of 1.1mm. Where the above minimum criteria is not achieved, a retexturing operation involving either high pressure water jetting or grit blasting may be required or material replacement, which ever the Engineer deems appropriate.

11.3.8. SMA or TSC is not appropriate for carriageway surface course application where hand-lay work is necessary other than localised areas, since most of its compaction and thus density (durability) is obtained through the paver screed. This is further applicable due to the low fine aggregate content of the materials which are binder rich and ‘sticky’ and with it being thin the material loses heat rapidly making it challenging to hand lay and compact satisfactorily.

11.4. **Hot Rolled Asphalt Surface Course**

11.4.1. The material shall be HRA surface course type F 30/14 to BS EN 13108-4 (see PD 6691:2007 Annex C) laid at a nominal 40mm thick layer of 40/60 pen binder. The coarse aggregate to be of crushed rock excluding limestone with a minimum PSV of 45, complete with 20mm coated chippings of appropriate PSV (refer to Clause 11.1.2 above).

11.4.2. The material shall be laid and compacted in accordance with BS 594987, 2010.

11.4.3. Texture depths as set out below shall be achieved (sand patch method in accordance with BS EN 13036-1) and the chippings shall be adequately embedded and evenly spread.

a) For normal housing estate roads at least 1.0mm.

b) On or within 60m of junctions with Principle, non-principle and classified roads of Class A, B and C, or on or within 60m of roundabouts, at least 1.2mm.

11.5. **Concrete Block Paving**

11.5.1. Concrete block paving shall be used in respect of "shared surface" streets and may be permitted as an alternative to asphalt surfacing for roads other than Local Distributor Roads, major Access Roads or Industrial Roads. Where concrete block paving is used it must be installed over one of the base layer options as defined in Chapter 10. Where permeable paving is being considered, technical guidance needs to be obtained from the manufacturer as to the specification required. The Drainage Team/ SAB (SuDS Approval Body) at the Council can advise further on the suitability of permeable paving for your particular development.

11.5.2. Clay block paving shall not be permitted.

11.5.3. Block paving in the form of precast concrete rectangular blocks of dimensions 200 x 100 x 80 mm laid on a laying course may be considered as a substitute for the normal Binder and Surface course layers only as described in clause 11.5.8. The use of Tegular block paving (a mix of 240mm, 160mm and 120mm sizes), is encouraged to provide a contrast if large areas of block paving are being laid, especially for features squares and junctions.

11.5.4. Blocks shall comply with BS EN 1338: 2003 (In accordance with Table 7(B)) and the approved colours are found to be:
Brindle is predominantly selected with Grey, Charcoal, Burnt Ochre and Traditional used for features such as ramps, squares or raised tables to provide contrast, utilising Tegular style blocks as per clause 11.5.3.

11.5.5. Blocks shall be laid on a 30mm compacted thickness of category II laying course (sharp) sand in accordance with the requirements in BS7533 Part 3, 2005 + A1:2009. The method detailed in 4.3.3.a) of that document shall be adopted for installing the laying course.

11.5.6. Surface regularity for Blockwork is defined in Table 2(A).

11.5.7. Blocks must be laid to a pattern as specified in BS 7533 Part 3, 2005 + A1:2009, Annex E and approved by the Engineer prior to installation. The approved laying pattern should not only be for appearance, but also as a means of resisting the effects of vehicular traffic, whether travelling in straight lines or turning. All block paved areas shall be laid in accordance with BS 7533 part 3, 2005 + A1:2009. All block work to be supported by a suitable edge restraint.

11.5.8. A carriageway base layer placed in accordance with the requirements of Chapter 10, over subbase to Chapter 9 is required below the block paving. The developer should refer to Chapter 6 for construction thicknesses for the base and subbase layers.

11.5.9. In situations where the base layer is below the required level/ tolerance, core samples will be taken to determine if the combined thickness of the bound layers conform to the minimum required, see Clause 10.4 and 10.5.

In these cases where it has been determined that the combined thickness of bound layers is unacceptable remediation must be agreed with the Engineer.

11.5.10. The developer shall use specifically designed ironwork which permits the blockwork and its laying course to be laid up to the frame of the gully grate or manhole cover, mortar fill is not acceptable. No trimming of blocks shall be permitted other than those vertical cuts necessary to achieve the laying pattern shown in Appendix A2 and to accommodate the horizontal alignment of the road.

11.5.11. Kiln dried joint filling sand is to be applied to refusal in accordance with BS7533 part 3 + A1:2009.

11.5.12. Block paving sealant may be requested by the engineer on completion, by use of a proprietary sand stabilisation material, (Pavseal or equivalent approved by the Engineer). All sealant shall be applied to the manufacturer’s recommendations.

11.5.13. Every effort will be made to arrange ironwork in block paved areas so that its framing aligns with the laying pattern of the adjoining blockwork surfacing and the cutting of blocks is minimised i.e. no ironwork shall be skewed relative to the laying pattern of the blockwork surrounding it. No trimming of blocks shall be permitted other than those vertical cuts necessary to achieve the laying pattern shown in Appendix A2 and to accommodate the horizontal alignment of the road.

11.6. **High Stone Content Surface Course Asphalt (HSC)**

11.6.1. The material shall be Hot Rolled Asphalt Surface Course type F 55/10 (HRA 55/10 surf) to BS EN 13108-4 (see PD 6691: 2007 Annex C) for use on Housing Estate Roads in accordance with Figure 6 (C) only.
11.6.2. For HSC surface course material as above the binder shall be 100/150 pen and the coarse aggregate to be of crushed rock excluding limestone with a minimum PSV of 50.

11.6.3. HSC HRA 55/10 surf material shall be laid to 40mm compacted thickness as shown in Table 6 (C). It is not a permitted material for Distributor roads; see Table 6 (D).

11.6.4. The material shall be laid and thoroughly compacted all in accordance with BS 594987: 2010, with care taken to achieve a consistent even-textured finish particularly in areas of hand-lay.

11.6.5. As high stone content surface courses are intended to be self-texturing there is no requirement to lay and roll coated chippings into the material.

11.6.6. The minimum permissible texture depth for 55% 0/10 material, (sand patch), of at least 0.3mm at time of laying.

Where the above criteria are not achieved, a surface dressing with 6mm crushed rock or slag chippings of PSV exceeding 50 may be required.

11.7. Specific Laying Operations for Bond Coating (including Vertical Faces)

11.7.1. Must be applied in accordance with BS 594987: 2010 or the rate set out in the BBA/HAPAS certificate for proprietary materials, (the rate of spread for bond coats shall be 0.35kg/m² of residual binder). The application requirements of Clauses 903, 920 and 942 of Volume 1 of the SHW must also be applied. Bond coats shall have a suitable BBA/HAPAS certificate detailing the performance claims made for them. For certificates see the BBA website: www.bbacerts.co.uk.

11.7.2. All bituminous layers to be surfaced over, once cleansed appropriately must be sprayed with a suitable bituminous bond coat. This will be completed immediately prior to the laying of the base, the binder and the surface course materials. For all laying works a bond coat shall be applied at a uniform rate by calibrated metered mechanical spraying equipment, by spray bar tanker. Hand held sprayers shall only be used for very small scale works and inaccessible areas and with the approval of the Engineer. This will enhance the adhesion between layers and provides enhanced water proofing capability.

11.7.3. All vertical faces such as kerbs, channel blocks, iron work, covers and cut joints to which bituminous material will be laid up against shall have either a hot bitumen or cold thixotropic bitumen compound applied to the satisfaction of the Engineer. Alternatively a polymer modified bond coat can be used given the requirements of 10.2.2 above.

11.7.4. The use of tack coat (conventional bitumen emulsion) is no longer permitted within carriageways. Suitable polymer modified bond coats must be applied as above. Appropriate products approved for use include Colbond 50 produced by Colas Limited and Aquagrip 60P (product code KE91) produced by Ayton Products. Bond coats with “fast breaking” properties are recommended for use to ensure efficient application for continuous laying operations.

11.8. Surface course joints

11.8.1. All joints are to be cut back to a vertical compacted face that exposes the full thickness of the layer and must be painted completely with a thin uniform coating of hot bitumen or cold thixotropic bitumen compound, (see clause 11.7.3), before the
adjacent width is laid, including all adjoining surfaces both transverse and longitudinal joints.
12. Edge restraint and channels

12.1. Kerb Beams and Backing (edge restraint)

12.1.1. Kerb beams and channel beams shall be installed prior to laying Base materials.

12.1.2. Kerb beams shall be constructed of ST2 concrete to SHW Clause 2602 not less than 150 mm thick and 425mm wide at the profile shown in Appendix A5, shuttered both sides. Including 10mm diameter mild steel “U” bars 500mm long to be inserted at 1000mm centres as shown in Appendix A5. The kerbs shall be backed with ST2 concrete. For channel blocks, the kerb beam width shall be increased to 680mm, refer to Appendix A7.

12.1.3. Kerb beams around the inside of speed control bends and for 5.0m beyond the tangent points of such bends shall be increased in depth to 250mm.

12.1.4. Kerbing should be laid in a single continuous operation ensuring the concrete haunching is laid above the concrete beam and the exposed steel U bars, reference is drawn to appendix A7.

12.2. Kerb – General Requirements

12.2.1. Kerbs shall be laid to general regularity and upstands shown in Clause 2.13 of this Specification and otherwise to the construction requirements of BS7533-6, 1999. Special provisions for kerbs at vehicular, cycle and pedestrian footway crossings are detailed in Chapter 19 of this Specification. Manual handling of precast concrete units shall be taken into account both during the design and construction stages of the development. It is expected that full risk assessments will be adhered to for all processes and mechanised placement is viewed as essential to minimise manual handling.

12.2.2. Where a bituminous surface course is employed, precast concrete kerbs shall be used, unless agreed with the Engineer. Such kerbs shall be 125 mm x 255mm hydraulically pressed, granite aggregate Type HB2, half batter to BS EN 1340: 2003 and laid upright. Kerbs are to be bedded on mortar within 50mm of the face of the concrete beam, laid with dry joints and backed with ST2 concrete to a minimum thickness of 150mm, to within 50mm of the top of the kerb.

12.2.3. All kerbing shall be laid with the inclusion of a suitable joint; the units should not be butt jointed. The joint gap between them should be 2mm.

12.2.4. No cut kerb shall be less than 300mm in length.

12.2.5. Slipform kerbs shall not be permitted.

12.2.6. The surface level of units of kerb, channel, edging and quadrant shall not deviate from the design level of +/- 6mm, nor shall the longitudinal surface regularity deviate more than 5mm in 3m when checked with a 3m straight edge.

12.2.7. The Developer must ensure that any kerb or channel handling and laying operations are carried out in accordance with the Health and Safety at Work Act 1974, Manual Handling Operations Regulations 1992.
12.3. **Radius Kerb Lines**

12.3.1. For curves of radius 12m or tighter, the appropriate radius kerb shall be used.

*Note: Developers should be aware that difficulties in obtaining kerbs of the correct radius sometimes occur and sufficient lead-time must be given to continuity of supply.*

12.3.2. The permission of the Engineer shall be sought in all cases where it is proposed to use cut kerbs to achieve a smooth line on curves in excess of 12m. Cut kerbs shall be of equal lengths between 450mm and 600mm and shall have suitably tapered cuts free of spalling to achieve a smooth front face to the kerb line.

12.4. **Channels**

12.4.1. Carriageway channels shall be formed in bituminous surfacing material to a true and even gradient not flatter than 1 in 150. Where this minimum longitudinal fall cannot be obtained, precast, concrete channels 150mm x 150mm, Type CS to BS EN 1340: 2003 shall be provided up to a gradient of not flatter than 1 in 200 and additional gullies placed where required in accordance with Clause 13.2 Table 13 (A). Such PCC channels shall be installed in accordance with the requirements of BS7533 Part 6 1999.

12.4.2. Where a gradient steeper than 1 in 200 cannot be obtained, combined kerb drainage units will be required.

12.4.3. Shared surface streets may require special consideration for drainage channels and edge restraint. Approval of the design shall be at the discretion of the Case Officer whose decision will be final.
13. Gully Grates and Frames

13.1. General Requirements

13.1.1. Gully gratings and frames shall be Kite-marked to BS EN 124:1994. Either Cast Steel or Ductile Iron may be used. The frame shall be bedded on a gauged Class 1 (3:1) sand/cement mortar with 2 - 4 courses of Engineering Brickwork Class ‘B’ or equivalent pre-cast riser sections in accordance to BS EN 771-1. 2003.

13.1.2. Units complying with BS EN 124 Class D400 shall be used for all estate roads. These shall be hinged and must be of the “captive” type and shall be installed on the side facing oncoming traffic. Minimum waterway area 1000cm² with frame at least 100mm deep.

13.1.3. When gratings are located remote from kerb line special consideration is required and agreement will be at the Engineers discretion.

13.1.4. Gully grates to be set 3mm lower than the adjacent surface course.

13.2. Spacing of Gullies

13.2.1. The area of bituminous surface (including footways, footpaths and cycleways) draining into each gully will vary in proportion to the longitudinal gradient of the pavement as indicated in the following Table 13 (A):

<table>
<thead>
<tr>
<th>Longitudinal Gradient</th>
<th>Maximum Drain Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>From 1 in 200 to 1 in 250</td>
<td>90 sq.m</td>
</tr>
<tr>
<td>From 1 in 150 to 1 in 200</td>
<td>110 sq.m</td>
</tr>
<tr>
<td>From 1 in 120 to 1 in 150</td>
<td>130 sq.m</td>
</tr>
<tr>
<td>From 1 in 80 to 1 in 120</td>
<td>150 sq.m</td>
</tr>
<tr>
<td>From 1 in 40 to 1 in 80</td>
<td>130 sq.m</td>
</tr>
<tr>
<td>Steeper than 1 in 40</td>
<td>100 sq.m</td>
</tr>
</tbody>
</table>

Table 13 (A) – Maximum Drained Areas for Bituminous Surfaces

13.2.2. The area of block paving up to the highway boundary draining into each gully will vary in relation to the longitudinal gradient of the pavement as indicated in the following Table 13 (B):

<table>
<thead>
<tr>
<th>Longitudinal Gradient</th>
<th>Maximum Drain Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>From 1 in 40 to steeper than 1 in 80</td>
<td>110 sq.m</td>
</tr>
<tr>
<td>Steeper than 1 in 40</td>
<td>90 sq.m</td>
</tr>
</tbody>
</table>

Table 13 (B) – Maximum Drained Areas for Block Paved Surfaces

13.2.3. Gullies shall be spaced to ensure that the drained areas do not exceed the maximum values given in tables 13 (A) and 13 (B). Preferably twin gullies should always be placed at the bottom of sag curves, details to be submitted for the approval of the case officer.
13.2.4. Gully positions shall be set out to ensure they are clear of vehicular accesses and pedestrian crossing points. Where a new access (either dropped kerbs or new bell mouth) is formed consideration must be taken to the relocation of existing gullies and any requirement for additional highway drainage.

13.2.5. 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 must be taken to avoid ponding near the mid-point of radius kerbs. Where the road is super-elevated, you should site a gully just before the point where the adverse camber is removed to prevent water in the upstream channel flowing across the carriageway.

13.2.6. A minimum space of 200mm must be allowed between the gully pot and any other concrete material to ensure the gully frame and brickwork does not obstruct the placement of adjoining materials. An example of this is speedcheck units at the bottom of a ramp, shown in appendix A13- Table Top Construction Detail.

13.3. **Ironwork Surrounds in Block Paving**

13.3.1. The Developer shall use specifically designed ironwork which permits blockwork and its laying course to be laid up to the frame of the gully grate or manhole cover. No trimming of blocks shall be permitted other than those vertical cuts necessary to achieve the laying pattern shown in Appendix A4 and to accommodate the horizontal alignment of the road, refer to Clause 11.5.13.

13.4. **Ironworks within Cycleways, Footways and Shared Surface Streets**

13.4.1. All gully gratings situated within cycleways/footways and shared surface streets shall be ‘pedestrian/ cycle friendly’ as approved by the case officer.
14. **Gully Pots**

14.1. **General Requirements – Type, Size and Location**

14.1.1. Gully pots used for carriageway gullies shall normally be of precast concrete using Sulphate Resisting Cement (SRC) or an equivalent sulphate resisting – cement / GGBS or PFA combination in accordance with BS 5911-6. 2004.

14.1.2. Gully pots shall have internal dimensions 450mm diameter by 900mm deep and shall be of the trapped type unless otherwise directed by the Engineer shown in Appendix D3.

14.1.3. PVCu Plastic gully pots (BBA Approved) of the above dimensions will only be specified at the design stage with the written consent of the Engineer, this being in exceptional circumstances only. The Typical Detail drawing of this type of gully installation shall incorporate suitable provisions to prevent the pots floating and distorting when the concrete surround is placed and compacted. The installations shall be entirely in accordance with the BBA approval certificate requirements. The Engineer would expect the BBA Requirement to at least be equivalent to a concrete base slab provided below the pot bed and surround and which may take the form of a paving slab set on 100mm of ST2 concrete to SHW Clause 2602.

14.1.4. Care should be taken during installing to ensure that when the grate and frame is fitted it is centrally positioned over the gully pot, (with a maximum tolerance of 150mm off centre).

14.1.5. Units and connections are to be cleansed through the use of mechanical jetting equipment and checked to ensure the integral gully stoppers are in place with retainer chain attached. Where damaged or missing these must be replaced.

14.1.6. Appropriate protection is to be given to all gullies and chambers from the ingress of debris.

14.2. **Bedding and Surround**

14.2.1. Concrete gully pots shall be installed in accordance with BBA approval requirements. The Engineer would expect the pots to be set on and surrounded by 150mm of ST2 concrete using sulphate resistant cement or an equivalent sulphate resisting cement / GGBS or PFA combination to SHW Clause 2602.

14.2.2. PVCu Plastic pots shall be set on and surrounded by ST4 concrete. The surround shall be 200mm thick with a 100mm bed above the base slab in 14.1.3. Alternatively, a 150mm surround of ST4 concrete using Sulphate - resisting cement or an equivalent sulphate resisting- cement / GGBS or PFA combination and 20mm nominal size aggregate may be used with bed as above.
15. **Highway Surface Water Drainage**

15.1. **General Requirements**

Note: Local Agreements with Environmental Agency (EA) and Anglian Water must be adhered to. An Anglian Water Section 104 License/Certificate shall be required if private roof or surface water discharges into any highway surface water Drainage system. Peterborough City Council will adopt only highway Section 38 gullies and connections in these instances.

15.1.1. The highway surface water drainage layout shall be in accordance with the Lloyd Davis Rational Method or the modified rational method may be used for manual design calculations. The design shall ensure that the velocity of water flowing in the pipes falls within the self-cleansing range with a minimum of 1.0m/s.

15.1.2. Highway surface water drains shall be laid in straight lines at uniform gradients between manholes.

15.1.3. Where an outfall drain or pipe unavoidably passes through land which will ultimately be conveyed to a house purchaser or which will otherwise remain undedicated as highway an Easement will be required giving the Highway Authority right of access at all times for repair and maintenance purposes. In the case of land conveyed by the developer to a house purchaser, acknowledgement of the presence of such a drain under each affected property must be safeguarded by the incorporation of a suitable Easement within the Conveyance of that property by the developer. In the case of land owned by a third party, e.g. a parcel of land adjoining the development site but not a part of it, the developer must negotiate a highway drainage easement with the owner of that land. In all cases the developer is required to submit a draft of any such conveyance or easement to the Engineer for approval prior to the sale of any affective property or the legal completion of any easement with a third party. One of the principal elements of such easements is that they become automatically assigned to the Local Highway Authority upon formal adoption of the streets.

15.1.4. Where an outfall, drain, ditch or pipe will discharge into an existing drain or pipe or watercourse not maintainable by the Local Highway Authority written evidence of the consent of the authority or owner responsible for the existing drain, to such discharge shall be provided to the Engineer by the developer as part of any application for a Road Adoption Agreement and before the commencement of the works.

15.1.5. Provision may be required to filter any drainage water prior to discharge into an existing drain, pipe or watercourse where pollution of the drain, pipe or watercourse may occur, or at those sites deemed especially sensitive by the Engineer.

15.1.6. No highway surface water outfall drain shall pass below any building.

15.1.7. Backfill to pipe runs shall be in accordance with Chapter 4.0.

15.1.8. All adoptable highway surface water drainage systems shall be surveyed using closed circuit television with viewing and video recording facilities, subject to the discretion of the Engineer. The developer shall provide suitable carriage equipment for the video camera such that the camera may be propelled or drawn from one end of a drain, duct or culvert, whilst the camera is in operation, without damage to the drainage system.
15.2. **Surface Water Pipes**

15.2.1. The following types of pipe from approved manufacturers may be used for highway surface water drains, including gully connections:
   a) Concrete pipes made with sulphate resisting cement or an equivalent sulphate resisting – cement / GGBS or PFA combination to BS 5911-1: 2002,
   b) "plastic" pipes (PVCu) twin wall with a smooth internal and ribbed external walls, with current BBA Certification,
   c) or other types approved by the Engineer.

15.2.2. Jointing and installation shall be to the manufacturers' specification.

15.3. **Concrete Surround to Pipes**

15.3.1. Where the depth of cover to top of pipe below either the carriageway, cycleway or footway is 1.2m or less, all pipes and ducts, including plastic, shall have a bed and surround of 150mm ST1 concrete with sulphate resistant cement to SHW Clause 2602. The level of the upper surface of the cover shall in no case be less than 350mm below finished surface level. For cycleways, footways and accesses this shall be below the subbase layer.

15.3.2. In the case of plastic pipes measures must be taken to ensure that they do not float when the concrete is poured.

15.3.3. To maintain a degree of flexibility, 13mm thick fibreboard (flexcel) or otherwise approved to be inserted at the pipe joints to the full width of the concrete surround.

15.3.4. For porous pipes the surround shall comprise of at least 200mm of no fines concrete to SHW clause 2603 or as agreed with the Engineer.

15.4. **Sustainable Drainage Systems (SuDS)**

Please liaise with the Section 38 Case Officer to obtain the Peterborough City Council SuDS specification pertinent to the development and subsequent approval by the case officer/ SuDS (Sustainable Drainage Systems) approval body (SAB).

15.4.1. A commuted sum will be required in respect of any highway drainage system that relies upon sustainable drainage features.

15.5. **Surface Water Catchpit Manholes**

15.5.1. Catchpit Manholes shall be provided at the head of highway drains, at changes of direction, pipe size or gradient and at the junction of main drains. Spacing shall not exceed 100m.

15.5.2. Upstream of the manhole at the head of a highway drain run each gully must be connected directly into the manhole and the length of gully connection must not exceed 22m.

15.5.3. Manholes shall conform in all respects with the requirements below and the drawings in Appendix D1 or D2.

15.5.4. Precast Concrete - Rings complying with BS 5911-3.2002. The concrete cover slab must be Heavy Duty Reinforced Concrete to BS 5911-3.2002, Table 6 and Figure 2. – see Appendix D1.
15.5.5. Rocker Pipes: A flexible joint shall be provided as close as is feasible to the outside face of any manhole into which a pipe is built. The design of the joints shall be compatible with any subsequent movement.

15.5.6. The recommended length of the next pipe (rocker pipe) away from the manhole should be as follows:

<table>
<thead>
<tr>
<th>Nominal Diameter (mm)</th>
<th>Effective Length (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>150 to 600</td>
<td>0.6</td>
</tr>
<tr>
<td>675 to 750</td>
<td>1.0</td>
</tr>
<tr>
<td>Over 750</td>
<td>1.25</td>
</tr>
</tbody>
</table>
16. Manhole Covers and Frames

16.1. General Requirements

16.1.1. All manhole covers and frames intended for incorporation within the highway shall be kite-marked products to BSEN124, 1994 and badged S.W. (surface water) and F.W. (foul water).

16.1.2. The following additional requirements are to be met:

   a) In Carriageways and trafficked Footways / Cycleways - Heavy Duty: BSEN124 reference D400 with a clear opening of 600mm and minimum frame depth of 150mm.

   b) In Footways / Cycleways and Verges - Medium Duty: BSEN124 reference C250 with a clear opening of 600mm and minimum frame depth of 100mm.

16.1.3. Trafficked means being subject to occasional use by wheeled vehicles.

16.1.4. Manhole covers in Footways / Cycleways adjacent to Industrial Estate Roads shall comply with the requirements of covers in carriageways as 16.1.2a above unless otherwise agreed in writing, with the Engineer.

16.2. Bedding

16.2.1. The frames shall be bedded on a gauged Class 1 sand/cement mortar above two to four courses of engineering brickwork Class B to BS EN 771-1.2003. The use of any accelerating admixtures to be agreed with the Engineer prior to use.

16.2.2. Alternative bedding materials may be permitted but will require the approval of the Engineer prior to commencement.

16.2.3. All bedding materials are to meet the requirements of Volume 4 Section 2 of HA104/09 within the DMRB. Requiring a compressive strength of 30N/mm² in 3 hours and a tensile strength not exceeding 5N/ mm² in 3 hours.

16.3. Manhole Surrounds in Block Paving

16.3.1. The developer shall use specifically designed ironwork which permits the blockwork and its laying course to be laid up to the frame of the gully grate or manhole cover. No trimming of blocks shall be permitted other than those vertical cuts necessary to achieve the laying pattern shown in Appendix A2 and to accommodate the horizontal alignment of the road.

16.3.2. Every effort will be made to arrange ironwork in block paved areas so that its framing aligns with the laying pattern of the adjoining blockwork surfacing and the cutting of blocks is minimised i.e. no ironwork shall be skewed relative to the laying pattern of the blockwork surrounding it. As shown in Appendix A2.
17. Headwalls

17.1. General Requirements

17.1.1. All pipe inlets or outlets to or from open watercourses must be provided with a headwall incorporating any necessary apron, scour baffle, handrails or other works. Suitable site specific designs must be submitted to the Engineer for consideration and approval.

17.1.2. In certain locations, and with the approval of the Environment Agency, flap valves may be required. Flap valves should be made of heavy-duty plastic (low maintenance type), unless consent is obtained from the Engineer to use alternative materials.

17.1.3. The invert level of the outlet pipe through the headwall shall be subject to scrutiny and approval of the Engineer to ensure satisfactory flow through the drainage system.

17.1.4. Where headwalls are located within 6.0m of the footway, cycleway or carriageway they shall be provided with pedestrian safety railings to the requirements of the Engineer.

17.1.5. All headwall designs are to be submitted for approval and must be site specific.
18. Footways, Footpaths and Cycleways

18.1. Preparation

18.1.1. The formation shall be levelled and compacted with a vibrating roller or other approved plant of suitable type to a properly shaped, even and uniform surface, in accordance with Chapter 3.

18.1.2. A separating membrane will be required to be laid on the prepared formation, once deemed acceptable by the Engineer.

18.1.3. Subbase materials shall be spread evenly on the formation in layers of a depth of not more than 150mm compacted thickness, in accordance with the requirements of the compaction Table 3(C) entitled subbase compaction table. This will be achieved at a moisture content in the range optimum of minus 2% or plus 1% and without segregation.

18.1.4. If the subbase is to be trafficked during the site construction, then a protective sacrificial layer of 150mm thickness of material should be placed on the surface. This layer shall be removed and the newly exposed formation shall be levelled and re-rolled for inspection prior to placing the bituminous base.

18.1.5. The formation shall be treated with an appropriate residual weed killer before construction commences. Appropriate Health and Safety requirements in respect of operatives and the general public must be complied with when using weed killers. Only trained and certificated operatives shall be permitted to use weed killers.

18.1.6. All pavements that may be at risk of damage from existing trees/vegetation are to have a protective barrier installed as necessary. The use of a suitably located linear root barrier system will help to prevent the roots causing damage to the adjoining carriageway materials. Refer to Chapter 2 from clause 2.12.14.

18.1.7. Where in exceptional circumstances trees have been permitted within the public highway a suitable root director must be installed to ensure that roots spread out and are guided downwards and outwards to deflect away from the adjoining carriageway construction. Refer to Chapter 2 from clause 2.12.14.

18.2. General

18.2.1. Bituminous materials shall be machine-laid. Where agreed with the Engineer, hand laid materials may be used but shall be restricted to small areas, also refer to Chapter 10 and 11. All workmanship shall be in accordance with BS594987: 2010.

18.2.2. Where footpaths pass between walls, private land or other features that prevent the run off of highway surface water, then positive drainage will be required.

18.2.3. Special provisions for vehicular, cycle and pedestrian footway crossings are detailed in Chapter 19 of this Specification.

18.2.4. Note: The combined thickness of the bound layers shall be regarded as the minimum overall thickness of the bound materials.
18.3. **Subbase**

18.3.1. The material used shall be granular subbase material Type 1 SHW Clause 803 or an equivalent Type 1 subbase consisting of recycled secondary aggregate produced in accordance with the WRAP protocol, thoroughly compacted to Table 3(B) to a finished thickness shown in the following table.

<table>
<thead>
<tr>
<th>Design CBR Values</th>
<th>Table 18 (A) – Subbase Thickness- See Figure 18 (C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBR of less than 2.5%</td>
<td>350mm Minimum See clause 6.2.2</td>
</tr>
<tr>
<td>CBR greater than 2.5% to 5%</td>
<td>250mm</td>
</tr>
<tr>
<td>CBR greater than 5%</td>
<td>150mm</td>
</tr>
</tbody>
</table>

18.3.2. This thickness shall be increased if soft areas are encountered. Any areas devoid of fines shall be blinded and rolled to achieve a ‘closed’ surface finish.

18.3.3. Footways on the inside of speed control bends shall be increased in strength by increasing the subbase thickness to a minimum depth of 350mm of subbase material. This strengthening shall extend 5.0m beyond the tangent points of the bend. Where the design already stipulates a 350mm depth of subbase the base course material should be installed to match that of the adjoining carriageway.

18.4. **Binder Course**

18.4.1. The footway and cycleway binder course shall be 90mm compacted thickness of AC 14 close surf in accordance with BS EN 13108-1:2006 with a 100/150 pen binder, see Table 18(B). This shall be laid in 2 layers of 45mm. Consideration will be given to Developers / Contractors wishing to use material containing recycled products, subject to the conditions of Clause 2.11.10.

18.4.2. Alternatively, the use of AC 20 dense bin to BS EN 13108-1:2006 with a 100/150 pen binder shall be permitted to be laid in a single layer, providing that the material is machine laid and compacted in accordance with BS 594987:2010.

18.4.3. The footpath binder course shall be 60mm compacted thickness of AC 14 close surf to BS EN 13108-1:2006 with a 100/150 pen binder. Consideration will be given to Developers/ Contractors wishing to use material containing recycled products, subject to the conditions of Clause 2.11.10.

18.4.4. Where adjacent to Industrial Estate Roads the footway/cycleway shall be designed in accordance with Table 6(E). The Binder Course, Base and subbase must match the adjoining carriageway construction. The Surface Course, however, remains unchanged at a minimum thickness of 30mm.

18.5. **Surface Course: Stone Mastic Asphalt**

18.5.1. The surface course shall be 30mm compacted thickness of close graded proprietary mixture of modified 6mm Stone Mastic Asphalt (generally referred to as proprietary driveway/industrial mixes). The coarse aggregate shall be either crushed rock or slag supported by a 100/150 pen binder.
18.5.2. The Proprietary 6mm SMA mixtures currently produced include the modified PCC specification Pro-Drive by Aggregate Industries, Tuffdrive by Hanson and Masterdrive by Tarmac. Alternatively proprietary mixes from other suppliers may exist and can be used subject to approval from the Engineer.

18.5.3. The material producer's installation recommendations shall be carefully followed to achieve thorough compaction. In the event of a conventional SMA being approved for use with the prior agreement of the Engineer the material must accord to BS EN 13108-5.2006, this will only be permitted where machine laid.

18.5.4. Hand application of SMA is not appropriate, due to the low fine aggregate content the material is binder rich and ‘sticky’ and being thin the material loses heat rapidly making it challenging to hand lay and compact satisfactorily.

18.5.5. A thorough examination will be undertaken prior to adoption and any areas that show sign of any damage or deterioration shall be replaced the full width and length to the satisfaction of the Engineer.

18.5.6. Guidelines for delivery and rolling temperatures are given in Appendix B.

18.6. **Figure 18(B) – Footway and Cycleway Construction** – See Appendix 10

<table>
<thead>
<tr>
<th>Standard Footway Cycleway</th>
</tr>
</thead>
<tbody>
<tr>
<td>30mm</td>
</tr>
<tr>
<td>Surface Course - 6mm SMA</td>
</tr>
<tr>
<td>90mm</td>
</tr>
<tr>
<td>Binder Course - AC 14 close surf (laid in 2 layers)</td>
</tr>
<tr>
<td>Minimum Sub Base Thickness</td>
</tr>
<tr>
<td>Type 1 or equivalent recycled material</td>
</tr>
<tr>
<td>CBR less than or equal to 2%</td>
</tr>
<tr>
<td>CBR less than or equal to 5%</td>
</tr>
<tr>
<td>CBR greater than 5%</td>
</tr>
<tr>
<td>Geotextile membrane</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Adjacent to Industrial Road Only</th>
</tr>
</thead>
<tbody>
<tr>
<td>30mm</td>
</tr>
<tr>
<td>Surface Course - 6mm SMA</td>
</tr>
<tr>
<td>Binder Course - As adjacent carriageway</td>
</tr>
<tr>
<td>Base Course - As adjacent carriageway</td>
</tr>
<tr>
<td>Sub-base - As adjacent carriageway</td>
</tr>
<tr>
<td>Geotextile membrane</td>
</tr>
</tbody>
</table>
18.7. **Figure 18(C) – Footpath Construction** - See Appendix A11

<table>
<thead>
<tr>
<th>Standard Footpath Construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>30mm</td>
</tr>
<tr>
<td>Surface Course - 6mm SMA</td>
</tr>
<tr>
<td>60mm</td>
</tr>
<tr>
<td>Binder Course - AC 14 close surf</td>
</tr>
<tr>
<td>Minimum Sub Base Thickness</td>
</tr>
<tr>
<td>Type 1 or equivalent recycled material</td>
</tr>
<tr>
<td>CBR less than or equal to 2%</td>
</tr>
<tr>
<td>CBR less than or equal to 5%</td>
</tr>
<tr>
<td>CBR greater than 5%</td>
</tr>
<tr>
<td>Geotextile membrane</td>
</tr>
</tbody>
</table>

18.8. **Crossfall**

18.8.1. The final surface shall have a crossfall of 1 in 40 towards the carriageway. For footpaths (remote from carriageway) a crossfall of 1 in 40 is required to a suitable drainage system, as approved by the Engineer. As shown in the typical cross-sections in Appendix A10, A11 and 12.

18.8.2. No crossfall shall allow Highway water to be discharged on to private land.

18.8.3. Where routes pass between walls, private land or other features that prevent the run off of highway surface water, then a positive drainage system is required.

18.9. **Edge Support / Restraint**

18.9.1. Where construction is not restrained by a kerb or boundary wall a 50mm x 150mm hydraulically-pressed, precast, flat-topped, concrete edging to BS EN 1340:2003 Type EF shall be provided. For situations where the area will be subjected to vehicle loading a 150mm x 150mm hydraulically-pressed, flat-topped, concrete channel to BS EN 1340:2003 Type CS shall be provided.

18.9.2. The precast edging must be securely bedded on a foundation of ST2 concrete to SHW Clause 2602 – a minimum of 100 mm deep and 200 mm wide. It shall be backed with ST2 concrete from the back of the bedding to within 100mm (minimum 90mm) from the top of the edging, refer to detail C of appendix A3.

18.10. **Substitution of Material**

18.10.1. The depth of subbase material may to the discretion of the Engineer be reduced by increasing the bituminous Base thickness in the proportion of 1 part bituminous to 3 parts granular, subject to:

The overall construction thickness not being less than 450mm and subbase thickness not to be less than 200mm and inclusive of a geotextile membrane at formation level and providing that the subbase layer can support construction loadings.

A reduced depth of 90mm in the subbase will result in an increased base course thickness of 30mm.
18.11. **Specific Laying Operations for Bond Coating (including Vertical Faces)**

18.11.1. All bituminous layers to be surfaced over, once cleansed appropriately must be sprayed with a suitable bond or tack coat. This will be completed immediately prior to the laying of the surface course materials. For all laying works a bond or tack coat shall be applied by the using appropriate mechanical spraying equipment. The use of a CB40B4 or C60B3 bitumen emulsion is a suitable grade for this purpose to enhance the adhesion between layers and provides enhanced water proofing capability.

18.11.2. All vertical faces such as kerbs, channel blocks, iron work, covers and cut joints to which bituminous material will be laid up against shall have either a hot bitumen or cold thixotropic bitumen compound applied to the satisfaction of the Engineer.
19. Vehicular, Pedestrian and Cycle Crossings

19.1. Vehicular Crossings

19.1.1. Vehicular crossings must be provided at the entrance to all industrial premises, garages and residential properties with sufficient width to accommodate the end user.

19.1.2. A minimum of four precast concrete kerbs 125 mm x 150 mm to BS EN 1340:2003 Type BN shall be installed to provide a vehicular crossing with a minimum width of 3.6 m. These dropped kerbs shall be set to show an upstand of 25mm.

19.1.3. Private driveways served directly from the public highway shall not be steeper than 1:20 for a distance of 4m from that of the highway boundary.

19.2. Pedestrian Crossings

19.2.1. Where pedestrian routes cross carriageways and footways at junctions, two dropped kerbs with tapers shall be provided on each side of the carriageway or junction. Examples of tactile arrangements are shown in Appendix A8 and A9.

19.2.2. The dropped kerbs shall be set +3mm with the carriageway channel level to the tolerances given in Clause 2.13.5.

19.3. Cycle Crossings

19.3.1. As per 19.2.1 with the additional requirement to widen the tactile paving, the design of which must be site specific.

19.3.2. The dropped kerbs shall be set +3mm with the carriageway channel level to the tolerances given in Clause 2.12.6.

19.4. Construction Depths

19.4.1. Pedestrian Access - subbase and surfacing shall be constructed to the depths and using the same materials as the adjoining footway.

19.4.2. Light Duty Vehicular Crossing – suitable for cars and vans up to 1.5 tonnes unladen weight. The construction must be the same as the adjacent footway at the discretion of the engineer. Refer to Appendix G.

19.4.3. Heavy Duty Vehicular Crossing – for vehicles in excess of 1.5 tonnes unladen weight and where more than 4 car parking spaces are served from one crossing, the construction shall be the same as the adjacent carriageway. Refer to Appendix G.

19.4.4. For situations where the area will be subjected to heavy vehicle loading a 150mm x 150mm hydraulically-pressed, flat-topped, concrete channel to BS EN 1340:2003 Type CS shall be provided, see appendix A6.

19.5. Dropped Kerbs and Alignment

19.5.1. Dropped kerbs and tapers shall comply with the requirements of BS EN 1340: 2003.
19.5.2. Kerbs shall be laid to a flowing alignment and to the construction requirements of Chapter 12 of this Specification.

19.5.3. Where the interval between adjoining vehicular crossings is such that less than two kerbs show the full face of 125mm the intervening kerbs between these crossings shall also be 125 mm x 150 mm laid to show an upstand of 25mm. In this case the concrete edgings at the back of the footway/cycleway may also be lowered to maintain the crossfall of 1 in 40 towards the carriageway.

19.5.4. In exceptional circumstances and with the agreement of the Case Officer the edgings at the back footway/cycleway at standard vehicular crossings may also be lowered to allow for easier access to properties, as determined through the technical vetting process.

19.6. **Application of Tactile Paving Surfaces**

19.6.1. Red Tactile paving units are required for use at all controlled crossing points.

19.6.2. Buff Tactile paving units are required within all main distributor routes, including both vehicular, pedestrian and cycle routes. Refer to Appendix A8 and A9.

19.6.3. Tactile paving is not a requirement throughout all housing estate roads, uncontrolled crossing points within estate roads do not require tactile units, generally tactile paving is only required as stated in clause 19.6.2 above.

19.6.4. Beyond this other units maybe required for use within dual use footways/ cycleways-for instance corduroy (Footways), ‘ladder and tramline’ paving (Dual use cycle tracks) as necessary.

19.6.5. Please refer to ‘Guidance on the use of Tactile Paving Surfaces’, DETR 1999 and other associated literature.
20. **Verges**

Note: The inclusion of grass within a street is not acceptable as it is a maintenance liability for both parties. Grass is a challenge to maintain as it is often found disturbed/ rutted by overrunning vehicles. This is coupled with its failure to establish in what is often limited free space, (sandwiched between the kerb haunching and other adjoining structures).

20.1. **General Design Parameters**

20.1.1. Any verge area should be no narrower than 1.2m.

20.1.2. In exceptional circumstances where verges have been permitted these will be separated from the carriageway through the use of kerbing with a minimum upstand of 125mm. Other control measures may also be deemed necessary such as bollards to deter/prevent vehicle over run or parking.

20.1.3. The topsoil shall be cultivated to a depth of 150mm avoiding the disturbance of the subsoil, by suitable and approved mechanical means or by hand cultivation on banks or confined areas. All stones over 25mm in any dimension, weeds, roots and other deleterious material which are brought to the surface shall be removed and disposed of at an approved Refuse Disposal Site.

Below the minimum of 125mm top soil must be installed a suitable subsoil. The type and depth of this material is dependant upon prevailing site conditions. The subsoil must not be compacted to ensure adequate drainage conditions are achieved.

The inclusion of a suitably graded drainage media within the design must be considered below the subsoil material- dependant upon prevailing site conditions and the nature of the works being undertaken.

Soil shall be brought to a friable tilth by treading, firming and raking. Where applicable the degree of accuracy in determining a level profile shall be determined by boning rods, or other approved means, after firming in accordance with BS 7370, or a standard recognised by a member state of the EU or an equivalent international standard.

Operations shall not be carried out during periods of inclement weather, i.e. when the ground is wet, frosty or waterlogged. Timing of operations shall generally be confined to the Spring and Autumn periods.

20.2. **Seeding and Turfing – General**

20.2.1. The Contractor shall carry out all work in the specification in accordance with BS 7370 General Landscape Operations or a standard recognised by a member state of the EU or an equivalent international standard.

20.2.2. The location of adjoining structures and materials must be considered when considering the inclusion of verges within a street. Verges can only be situated where adequate space is available for suitable depths of sub and top soil material.
20.3. **Fertilizer Application**

20.3.1. After final grading all areas to be seeded or turfed shall have a base dressing of an approved granular pre-seeding fertilizer applied at the rate of 50g per sq.m. The dressing shall be applied by means of approval fertilizer distributor machinery or by hand in small or confined areas, and then lightly worked into the surface with a harrow or rake.

Final Cultivation: Prior to seeding or turfing the area shall be brought to a fine tilth by approved mechanical means or by hand raking and if necessary regarding of the surface will be out to conform to the prescribed finished levels. The Contractor shall remove all stones and other debris over 25mm in any dimension which shall be removed from the location and disposed of at an approved Refuse Disposal Site. The final level for seeding shall be 50mm above any adjacent hard surface area and shall be flush with any adjacent hard surface for turfing.

20.4. **Seeding**

20.4.1. After cultivation operations have been carried out, the areas shall be sown with grass seed which has been stored off the ground in a clean, dry place free from vermin. The Contractor shall be required to submit certificates for all grass seed stating the source, mixture, percentage, percentage purity and percentage germination rate and date of purchase.

20.4.2. The Engineer will be entitled to take samples of the grass seed mixture for testing. The seed mixture shall meet the requirements for germination and purity laid down in BS 7370 or a standard recognised by a member state of the EU or an equivalent international standard.

20.4.3. Following an even distribution of seed, the Contractor shall carry out a light raking or light harrowing of the area and ensure consolidation of the seed with the soil by the use of a light roller.

20.4.4. All reasonable precautions shall be taken to ensure that pedestrian and other traffic does not cross areas during cultivation or until the grass is established.

20.4.5. Seeded areas will only be accepted by the Engineer as established when the seed has germinated.

20.4.6. Where in the opinion of the Engineer excessive subsidence of seeded areas arises, such subsidence shall be made good, raising all depressions with good quality topsoil, carrying out the necessary cultivations, fertilising and seeding as previously specified and as required by the Engineer. The Contractor shall allow for re-seeding any bare patches with the previously specified mixture. In instances where reseeding will not be successful, the Engineer will require the area to be turfed with turf with a similar mix of grass cultivars.

20.5. **Turfing**

20.5.1. After cultivation operations have been carried out, the areas shall be laid to turf, a sample of which will have previously been approved by the Engineer.

20.5.2. Turf shall be to a uniform size and thickness from an approved supplier. It shall be laid with the use of boards in order that the Contractor does not tread on the previously prepared turf bed. All turf laid down shall be firmed with a wooden turfing
hammer to give a uniform even area finishing 25 mm above the edge of any adjacent hard area. Turf shall be laid to broken joints in a half band pattern.

20.5.3. All turf shall be laid within 24 hours of delivery from the supplier and shall not be damaged or yellowed.

20.5.4. Following turf laying an approved top dressing shall be spread and brushed over the turfed area ensuring all joints are adequately filled. To prevent scorching and shrinkage the turf shall not be allowed to dry out during establishment.

20.5.5. All reasonable precautions shall be taken to ensure that pedestrians and other traffic does not cross areas during cultivation or until the grass is established.

20.5.6. Turfed areas will only be 'accepted' by the Engineer as established when the turf has rooted and is ready for incorporation into regular maintenance schedules.

20.5.7. Where in the opinion of the Engineer excessive subsidence of turfed areas arises, such subsidence shall be made good at the Contractors expense, raising all depressions with good quality topsoil, carrying out the necessary cultivations, fertilising and returfing as required by the Engineer. In instances where turfing has not been successful, then the Engineer will require the area to be returfed.

20.6. Maintenance of Seeded Areas

20.6.1. The Contractor shall establish a good sward of the specified grass mixture free from pernicious weeds. If directed by the Engineer, the Contractor shall apply an approved selective weed killer, mixed and applied in accordance with the manufacturer's instructions, and in accordance with Appendix D of the Specification relating to 'Pesticides'.

20.6.2. During the spring following seeding, and before the application of any selective weed killer, the grassed areas shall be dressed with an approved granular post-seeding fertiliser applied at the rate of 50g per sq.m.

20.6.3. During the period of establishment, all newly grassed areas shall be cut twice, each cut reducing the growth height by one third. The first and second cuts shall take place when the growth height reaches 75 mm. Seeded areas shall be lightly rolled to consolidate the surface one week prior to the first cut.

20.6.4. Cutting shall be undertaken using approved mowing machinery when conditions are not excessively wet or damp. The Contractor will avoid any root pulling and prevent grass cuttings collecting in rows or other ways likely to adversely affect grass growth. The Contractor shall remove all stones and other deleterious matter from the Location prior to grass cutting operations, which shall be removed to an approved Refuse Disposal Site.

20.6.5. Cutting shall be continued at appropriate intervals during the season to achieve a finished maximum height of 25mm.

20.7. Maintenance of Turfed Areas

20.7.1. The Contractor shall establish a good sward free from pernicious weeds. If directed by the Engineer, the Contractor shall apply an approved selective weed killer mixed and applied in accordance with the manufacturer's instructions.
20.7.2. During the Spring following turfing, and before the application of any selective weed killer, the grassed areas shall be dressed with an approved granular post seeding fertiliser applied at the rate of 50g per sq.m or in accordance with the manufacturers instructions.

20.7.3. During the period of establishment, all newly grassed areas shall be cut twice, each cut reducing the growth height by one third. The first and second cuts shall take place when the growth height reaches 75 mm.

20.7.4. Cutting shall be undertaken using an approved mowing machine when conditions are not excessively wet or damp. The Contractor shall avoid any root pulling and prevent grass cuttings collecting in rows or other ways likely to adversely affect grass growth. The Contractor shall remove all stones and other deleterious matter from the Location prior to grass cutting operations which shall be removed to an approved Refuse Disposal Site.

20.7.5. Cutting shall be continued at appropriate intervals during the season to achieve a finished maximum height of 25mm.

20.7.6. During the period of establishment the Contractor shall water the turf as often as necessary to ensure it does not dry out prior to establishment.

20.7.7. The Contractor shall maintain small fine turf areas close to any fine turf provision, which can be cut and utilised for small repairs and reinstatements. The Contractor shall agree the size and location of such areas with the Engineer.

20.8. Overseeding

20.8.1. When instructed by the Engineer, the Contractor shall overseed sparse or `thin' areas of turf. The turf shall be overseeded using suitable and appropriate cultivars of grass seed approved by the Engineer at the rate of 35g per sq.m. The surface shall be graded or top soiled as necessary to provide even running levels and a surface suitable for seeding.

20.8.2. Small areas shall be overseeded by lightly pricking, forking or raking or otherwise cultivating by hand.

20.8.3. Large areas shall be overseeded by a contravator or other suitable and appropriate equipment.

20.9. Edge Support Delineation

20.9.1. Edge support delineation is not required through highway verge areas.

20.9.2. Edge support delineation through vehicular, pedestrian crossing points and around street light columns, shall be provided by the installation of 50mm x 150mm hydraulically pressed, precast, flat topped, concrete edgings to BS7263, Part 3: 2001 Type EF, Figure K3b.
21. Street Lighting

21.1. General Design Considerations

21.1.1. Please liaise with the Section 38 Case Officer to obtain the current Peterborough City Council Street Lighting Specification pertinent to the development.

21.2. Requirements prior to issue of the Provisional Certificate of Completion.

21.2.1. Summary of the requirements are as follows:

- All works to be completed in accordance with Section 38 Agreement and associated documentation.
- All works to be in accordance with PCC Street Lighting Specification
- Comprehensive data, information and schedules for all electrical installations must be submitted. Ask the Engineer for a copy of the latest data collection schedule.
- Upon submission of the above data our Street Lighting Engineer will produce a report detailing any remedial works to be undertaken; all these works must be completed prior to the issuing of the Provisional Certificate of Completion.
- A numbered installation drawing must be provided showing the final scheme identifying the route of all cabling and associated infrastructure from source.
- It is required prior to inspection of the works that all installations are given a bulk lamp change, each column’s location is verified, that the orientation of the lamp and lantern is checked and all lanterns are cleansed free of dust and dirt both internally and externally.

21.3. Numbering of Columns (In accordance with Appendix F2)

21.3.1. All new street lighting columns are to be numbered as detailed in Appendix F2 prior to Final Adoption/ Issuing of Final Certificate of Completion. Numbering the columns with the PCC detail gives the impression that the installations are maintained by PCC, which is not the case until the Final Certificate is issued. Prior to this temporary numbers must be installed prior to first occupation.

21.4. Location of Lighting Columns within Shared Surfaced Streets

21.4.1. Consideration must be given to the location of every lighting column to ensure that they are no in vulnerable positions. Appendix F1 illustrates the requirement for a build out/ hard standing to ensure that the column is a minimum of 1m from the kerb/edge of carriageway.
22. Services

22.1. General Requirements

22.1.1. The provision of plant in the carriageway is costly to install and to maintain. Therefore, it is undesirable from the viewpoint of residents, street managers and the statutory undertakers for mains and services to be located within the carriageway.

22.1.2. The developer is required to determine the position of all existing services and connections and shall ensure that adequate precautions are taken to protect them during construction.

22.1.3. All services shall be laid at such times and in such a manner as to ensure that no disturbance is caused to road foundations already laid. The preferred layout for mains utilising common trenching techniques is shown at Appendix E1 and E2.

22.1.4. All work related to street lighting and illuminated street furniture (column installation, cabling and energising) should be completed prior to final surfacing.

22.1.5. Backfill and compaction in trenches (including around manholes in footways) shall comply with the requirements of Chapter 3 and 4 of this Specification.

22.1.6. Where service trenches cut through subsoil drains, these must be replaced with equivalent materials installed to appropriate levels.

22.1.7. No patches or small reinstatements will be accepted in the surface course, full length / full width reinstatement will be required to the satisfaction of the Engineer. Please note that this surfacing/construction may go beyond the original scope of the works.

22.2. Additional Service Ducts

22.2.1. At least four empty 150mm diameter service ducts with stoppered ends shall be laid beneath the carriageway at each priority junction in the layout. The positions of these shall be marked on site using approved non-degradable markings and identified on the plans.

22.2.2. The developer shall ensure adequate provision for all services to the estate including possible future requirements.

22.2.3. Spur ducts shall be provided from all services to terminate within individual curtilages.

22.3. Telecommunication Ducts and Cabinets

22.3.1. The developer shall agree with the service provider, the number of cabinets required and install ducts including spurs/tees for Telecommunications in all new adoptable highways.

22.4. Covers for Access to Utility Plant

22.4.1. In trafficked areas they should either comply with the requirements of Clause 16.1.2 or be certified capable of standing appropriate Heavy Duty loading.
22.4.2. In non-trafficked footways and verges they should either comply with the requirements of Clause 16.1.2 or be certified capable of standing appropriate Medium Duty loading.

22.4.3. Plastic covers will only be permitted in non-trafficked footways and verges and must be black with an impressed patterned surface, of a fire-resistant thermo-setting variety and certified capable of standing Medium Duty loading equivalent to that required for Ductile Iron or Cast Steel products. Such covers shall be of a lockable variety.

22.4.4. All covers for access to utility plant shall be kept clear of cycleways.

22.4.5. Service covers are not permitted within areas of tactile paving.

22.4.6. Existing covers must be in good order, broken, worn and smooth covers should be renewed and Section 81 of the New Roads and Street Works Act can be quoted to the relevant private utility company to arrange for a free replacement.

22.4.7. Section 153 of the Highways Act 1980 requires that doors or gates shall not open outwards over the public highway. Care must be taken in the design to ensure that such situations do not arise including such gates/doors serving utility installations. Any breach of S153 in respect of new estate roads will be an obstacle to eventual adoption by the Local Highway Authority.

22.4.8. Any utility cover that does not sit flush with the surface, are damaged or that prevent the minimum of 60mm depth of surfacing surrounding its frame is to be replaced with an appropriate alternative cover/frame prior to the surface course being applied.
23. **Completion of Works**

23.1. **General Requirements**

23.1.1. The whole of the works shall be carried out in a sequential and professional manner and on completion the works shall be left in a clean and tidy condition. A joint inspection will be performed on completion and any defects found shall be rectified to the satisfaction of the Engineer. It is not acceptable that any defects in the finished surface course can be rectified by multiple patching – in this instance the surface course will be reinstated to the Engineers satisfaction.

23.1.2. A written detailed list of defects will be recorded by the developer and agreed with the Engineer in writing. Following which both parties will have an agreed list of remedial works. This list of works shall be valid for a maximum of 6 months. Please note that further defects are still the responsibility of the developer for rectification until formal highway adoption.

23.1.3. All gully grates and manhole covers shall be lifted to check for damage. All highway chambers and gully pots will be suction cleansed removing all detritus before then recharging.

23.1.4. Surface water drains are to be pressure jetted and cleaned in the presence of the Engineer's representative.

23.1.5. The contractor shall provide one copy of a closed circuit television video recording of each drainage run, accompanied by a detailed report showing the location, chainage, prevailing weather conditions, date and time of survey.

23.1.6. Two hard copies and an electronic version of the Health and Safety file (where necessary) must be provided before the development can be formally adopted.

23.1.7. A copy of Anglian Waters Section 104 of the Water Industry Act 1991 vesting certificate, for the surface water and foul water sewers will be required before the highway can be formally placed on maintenance/adopted.

23.1.8. Numbering of street lighting columns in accordance with Appendix F2 immediately before formal adoption. Prior to this the columns can be numbered without the inclusion of PCC, as this leads to confusion regarding maintenance responsibilities for residents and the general public.

23.2. **Sweeping**

23.2.1. As a minimum channels to the carriageway shall be swept in accordance with the following schedule;
   a) before the maintenance period - full sweep
   b) following a regular sweeping every six months
   c) at proposed adoption date - full sweep

23.2.2. Sweeping shall be carried out using a mechanical sweeper to remove detritus, grass and other materials to the satisfaction of the Engineer.
23.3. **Grass Maintenance**

23.3.1. Grassed areas provided in accordance with section 23 of this Specification shall be maintained from the date of turf laying and/ or grass seed germinating until final adoption, including all necessary treatment with weed killers and fertilisers.

23.3.2. Grass cutting shall be carried out in accordance with the following schedule;

   a) before the maintenance period - full cut
   b) during the maintenance period - cutting to 25mm maximum
   c) at proposed adoption date - full cut

23.3.3. Grass shall be cut to achieve a finished maximum height of 25mm before adoption. All weeds and other detritus shall be removed from grassed areas to the satisfaction of the Engineer. See also Clause 23.1.

23.4. **Production of As-Built Information**

23.4.1. Prior to the issuing of the Provisional Certificate of Completion an as built drawing must be produced (hard scale copies), with accurate information including the following: gully positions, street lighting column positions, street lighting numbering, street signs, bollards, street nameplates and also all variations as agreed with the Engineer that are not in accordance with the approval drawings. All information to be referenced clearly on the drawing key and must be coloured to the following general requirements, to the Engineers discretion:

<table>
<thead>
<tr>
<th>Feature</th>
<th>Colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Footways, Footpaths and cycleways</td>
<td>Yellow</td>
</tr>
<tr>
<td>Bituminous Carriageway</td>
<td>Grey</td>
</tr>
<tr>
<td>Blockpaved Carriageway</td>
<td>Brown</td>
</tr>
<tr>
<td>Verges (where Permitted)</td>
<td>Green</td>
</tr>
<tr>
<td>Street Lighting Column locations including as built numbering</td>
<td>Half Black/ Half White circle</td>
</tr>
<tr>
<td>Kerbline thin solid line</td>
<td>Black</td>
</tr>
<tr>
<td>Highway Surface Water Drainage and Gully Connections</td>
<td>Blue</td>
</tr>
<tr>
<td>Foul and Surface water sewers to be shown with broken red line for each run and with solid circles for foul manholes and clear red circles for surface water manholes</td>
<td>Broken Red line with solid and clear red circles</td>
</tr>
<tr>
<td>Pedestrian Crossing Points</td>
<td>Marked PC</td>
</tr>
<tr>
<td>Highway Boundary as thin solid line</td>
<td>Red</td>
</tr>
<tr>
<td>Section 278 works boundary as solid line</td>
<td>Purple</td>
</tr>
<tr>
<td>Developers Site ownership boundary as thin solid line</td>
<td>Brown</td>
</tr>
<tr>
<td>Visibility Splays both vehicle to vehicle and vehicle to pedestrian – with dimensions shown as broken line</td>
<td>Black</td>
</tr>
<tr>
<td>Street names to be shown in solid text</td>
<td>Black</td>
</tr>
</tbody>
</table>
23.5. **Changes to the Limits of Adoption- Legal Addendum to Agreements**

23.5.1. Any changes to the limit of adoption *can not be authorised by the Engineer*. Approval must be granted by the Engineer to the proposal however, it is necessary for all amendments to be approved through our Legal Department (in collaboration with the applicants' legal representative). This will be in the form of an addendum to the Section 38 Agreement. This is the case for any change to the limits of adoption, be it an increases or decrease in the area intended for highway dedication. The minimum information required to instruct our legal department is a revised Section 38 Layout plan clearly identifying all amendments, evidence of title, payment of our fees and a letter of consent to pay our legal departments fees.

23.6. **Street Naming and Numbering**

23.6.1. The developer must contact the Street Naming and Numbering Custodian at the council to instigate the naming and numbering process prior to any properties becoming occupied.

23.6.2. Governed under the Public Health Act 1925 and the Towns Improvement Clauses Act 1847 there is a duty to erect and maintain street nameplates for all officially named thoroughfares.

23.6.3. The responsibility for the initial provision of street nameplates for a new development is devolved to the developer as instructed by Peterborough City Council to the standard street nameplate specification.

23.6.4. Official addresses are only allocated when planning permission has been granted, construction work has commenced and prior to any occupation. New road names require the consultation and agreement of various official bodies including the Emergency Services and Royal Mail. When proposing road names they must not duplicate or be similar to existing road names in the area. They should have a historical connection.

23.6.5. Official addresses are required before the premises are occupied but wait until construction has started, apply for this by contacting llpg@peterborough.gov.uk
24. Sampling of Materials

24.1. General

24.1.1. Sampling and testing of mixtures and materials shall be carried out in full compliance with the current British Standards. Samples shall be provided as frequently as the Engineer may deem necessary to satisfy himself that the mixtures and materials comply with the appropriate Specification.

24.1.2. The Engineer has the option to require the developer at the developer's own expense to core holes up to 200mm diameter through the carriageway construction before the surface course is laid to determine the layer thickness, materials used, construction type and standard of installation. Alternatively the developer may be required to excavate and reinstate trial trenches at his own expense in the presence of the Engineer. Where layers are not correct in thickness or material, the road will not be adopted until the works have been corrected.

24.1.3. Where material or structural thickness are found to be out of tolerance, the adoption will not take place before the defective layer(s) or material(s) have been replaced. The cost of such testing and coring shall be met in full by the developer.

24.1.4. Where the developer fails to notify the engineer of works, or does not give adequate notice, all covered works will be re-inspected to the satisfaction of the Engineer.
25. **List of contacts for further information**

25.1. **Highway Control Team**, for advice about development-related issues

Peterborough Highway Services
Highway Control Team
Dodson House
Fengate
Peterborough
PE1 5XG
Tel: 01733 453421
Email: Highwaysdevelopmentteam@peterborough.gov.uk

25.2. **Street Works**, for details including Road Space Bookings, Section 50 Licences, hoarding license, road closures and diversions.

Peterborough Highway Services
Traffic Management Team
Dodson House
Fengate
Peterborough
PE1 5XG
Tel: 01733 453578
Email: streetworks@peterborough.gov.uk

25.3. **Street Lighting**, for information regarding the design of electrical installations

Peterborough Highway Services
Street Lighting Team
Dodson House
Fengate
Peterborough
PE1 5XG
Tel: 01733 453525
Email: streetlighting@peterborough.gov.uk

25.4. **Other Contacts**

The developer should ensure that they have satisfied the requirements of all other bodies including but not restricted to the Internal Drainage Boards, Environment Agency, Anglian Water, Waste Regulatory Authority, Oil Pipelines Agency and Telecommunication Companies.
26. Appendices
NOTES

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
2. COMBINED FOOTWAY/CYLEWAY MINIMUM 3 METRES WIDTH.

Peterborough City Council
Peterborough Highway Services
Doddson House
FenGate
PEI SXG
Peterborough
Tel: 01753 747474

Project
Standard Detail

Drawing Title
Typical Cross Section for Estate Road

Drawn
VD

Checked
RB

Date
April 2016

Scale
1:20

Drawing No.
Appendix AI

Revision

Revision Date
NOTES

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
2. KERB UPSATND TO BE AGREED (3, 25 OR 125MM)

PROJECT
STANDARD DETAIL

DRAWING TITLE
TYPICAL CROSS SECTION FOR SHARED SURFACE STREETS

DRAWN
VD

CHECKED
RB

DATE
APRIL 2016

SCALE
1:20

DRAWING No.
APPENDIX A2

REVISION
REVISION DATE
2 ROWS OF STRETCHER

4 ROWS OF STRETCHERS

1:40 FALL

BLOCK PAVING

30mm COMPACTED SHARP SAND

160mm BASE COURSE

SUBBASE

APPROVED GEOTEXTILE MEMBRANE

KERB DETAIL AS APPENDIX A5

1 IN 40

1 IN 40

KERB DETAIL AS APPENDIX A5

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.

PETERBOROUGH CITY COUNCIL
PETERBOROUGH HIGHWAY SERVICES
DOODSON HOUSE
FENGATE
PEI SG
PETERBOROUGH
TEL: 01753 747474

PROJECT
STANDARD DETAIL

DRAWING TITLE
TYPICAL CROSS SECTION FOR SHARED SURFACE WITH CENTRAL DRAINAGE

DRAWN CHECKED DATE
VD RB APRIL 2016

SCALE 1:25

DRAWING No.
APPENDIX A3

REVISION REVISION DATE
NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.

2. THE MINIMUM ALLOWABLE BLOCK SIZE IS 1/3 OF A BLOCK. FOR FURTHER INFORMATION REFER TO CHAPTER 13.0.

3. GULLY GRATES AND FRAMES TO BE SET 3MM LOWER THAN SURROUNDING SURFACE COURSE.
NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE
2. BEAM DEPTH TO BE INCREASED TO 250MM AROUND SPEED CONTROL BENDS. SEE CLAUSE 12.1.3

---

**PETERBOROUGH CITY COUNCIL**

**PROJECT**

**STANDARD DETAIL**

**TITLE**

**KERBING DETAIL**

**DRAWN**

**CHECKED**

**DATE**

**DRAWING NO.**

**SCALE**

**REVISION**

**REVISION DATE**

---

**APPENDIX A5**
NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
2. THIS DETAIL IS TO BE USED IN BITUMINOUS CARRIAGEWAYS ONLY.
NOTES:
1. All dimensions are in millimetres unless stated otherwise.
2. 10mm mild steel, 500mm long U-bars to be inserted at 1000mm centres.
UNCONTROLLED PEDESTRIAN CROSSING

35mm MORTAR BED (SEE NOTE 4)
BASE COURSE AS FOOTWAY CONSTRUCTION
PREFERRED GRADIENT OF TACTILE RAMPS 1:20
FOOTWAY CONSTRUCTION AS APPENDIX A10
CARRIAGEWAY CONSTRUCTION

SECTION A-A

IMPORTANT:
TACTILE PAVING AT OPPOSITE SIDES OF CROSSING MUST BE IN A STRAIGHT ALIGNMENT

NOTES
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
2. REFER TO CHAPTER 19.
4. BEDDING FOR TACTILE PAVING TO CONSIST OF 35mm ULTRACRETE M90 MORTAR OR EQUIVALENT LAID ON TOP OF FOOTWAY CONSTRUCTION (EXCLUDING SURFACE COURSE REFER TO APPENDIX A10).
5. RED TACTILE PAVING UNITS ARE REQUIRED FOR USE AT ALL CONTROLLED CROSSING POINTS.
6. MAXIMUM GRADIENT OF TACTILE RAMPS IS 1:12.
UNCONTROLLED CROSSING POINT

IMPORTANT - TACTILE PAVING AT OPPOSITE SIDES OF CROSSING MUST BE IN A STRAIGHT ALIGNMENT

NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
2. BULLNOSED KERBS AT CROSSING POINTS ARE TO BE LAID WITH 3mm OF UPSTAND.
3. MAXIMUM GRADIENT OF TACTILE RAMPS IS 1 IN 12.
5. BEDDING FOR TACTILE PAVING TO CONSIST OF 35 MM ULTRACRETE M90 MORTAR OR EQUIVALENT LAID ON TOP OF FOOTWAY CONSTRUCTION (EXCLUDING SURFACE COURSE REFER TO APPENDIX A10).
NOTES:

1. FOR CONSTRUCTION SPECIFICATION REFER TO CHAPTER 18.
2. CONSTRUCTION OF FOOTWAY ADJACENT TO INDUSTRIAL ROAD TO BE AS ADJACENT CARRIAGEWAY.

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PETERBOROUGH
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PROJECT
STANDARD DETAIL

TITLE
FOOTWAY CONSTRUCTION
ADJACENT TO CARRIAGEWAY

DRAWN
VD
CHECKED
RB
DATE
APRIL 2016
DRAWING NO.
APPENDIX A10

SCALE
1:20
REVISION

REVISION DATE
______
NOTES:
1. FOR CONSTRUCTION SPECIFICATION REFER TO CHAPTER 18.
2. CONSIDERATION MUST BE GIVEN TO THE NEED TO INCORPORATE A SUITABLE DRAINAGE SYSTEM TO DISCHARGE THE SURFACE WATER FROM THE PATH.
3. MINIMUM WIDTH OF FOOTPATH TO BE 2m, MINIMUM WIDTH OF CYCLEWAY TO BE 3m.
4. BINDER COURSE THICKNESS AS PER TABLE 18(B) FOR CYCLEWAY OR 18(C) FOR FOOTPATH.

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PROJECT
STANDARD DETAIL

TITLE
FOOTPATH AND CYCLEWAY
REMOTE FROM CARRIAGeway

DRAWN
VD
CHECKED
RB
DATE
APRIL 2016
DRAWING NO.

SCALE
1 : 20

APPENDIX AII

REVISION

REVISION DATE


NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
2. LENGTH OF PANEL TO BE AGREED THROUGH TECHNICAL VETTING.
NOTES

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
2. 200 x 100 x 80 CONCRETE BLOCK PAVERS TO BE LAIRED IN 45° HERRINGBONE PATTERN ON 30MM OF WELL COMPACTED SHARP SAND.
4. FOR 30MPH AND ABOVE ROADS TWO TRIANGULAR MARKS, TO DIAGRAM 1062 OF THE TSRGD 2002, SHOULD BE USED ON THE APPROACH RAMP IN EACH LANE.
5. RAMP TO BE NO STEEPER THAN 1:15.
6. KERB FACE TO BE 25MM (OR 3MM AT PEDESTRIAN CROSSING).
7. MINIMUM 200MM MUST BE ALLOWED BETWEEN GULLY POT AND ANY OTHER CONCRETE MATERIAL.
NOTES
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
2. FOR RAMP DETAIL SEE APPENDIX A13.
3. 5000MM MINIMUM DISTANCE FROM TOP OF RAMP TO GULLY.

SCALE 1:200

SECTION A-A
SCALE 1:50

KEY
- FOOTWAY
- RAMP
- SHARED SURFACE

CARRIAGEWAY CONSTRUCTION

125MM KERB UPSTAND

ROAD GULLY

2000

5500

SEE NOTE 3

2000

5000

RAMP

SHARED SURFACE TRANSITION TO 25MM UPSTAND

SHARED SURFACE 3MM UPSTAND FOR 2000

RAMP AS APPENDIX A13

CARRIAGEWAY 125 KERB UPSTAND

1 IN 80 MIN. FALL FOR BLOCK PAVING
NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE
2. TYPE AND SIZE OF THE BUS SHELTER TO BE SPECIFIED BY TRANSPORT PLANNING OR VETTING OFFICER. THE BUS SHELTER SHOULD BE RTPI READY, COMPLETE WITH ELECTRICAL BOXES, CABLES, ETC. THE DEVELOPER SHOULD PROVIDE THE POWER SUPPLY, FEEDER PILLAR AND DUCTING.
## Job Title: Bituminous Materials – Temperature Guidelines

<table>
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<tr>
<th></th>
<th>Thin Surface Course/ SMA Surface Course</th>
<th>Hot Rolled Asphalt</th>
<th>Asphalt Concrete</th>
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<td><strong>Type</strong></td>
<td><strong>Temperature (Centigrade)</strong></td>
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<td>40/ 60 pen bitumen</td>
<td>100/ 150 pen bitumen</td>
<td>170</td>
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<tr>
<td><strong>(Maximum Temp at any stage)</strong></td>
<td>Surface Course</td>
<td>40/ 60 pen bitumen</td>
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<td></td>
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<td>All Courses</td>
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<td>40/60 pen bitumen</td>
<td>100/ 150 pen bitumen</td>
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<td><strong>(On Arrival)</strong></td>
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<td>Surface Course only</td>
<td>asphalt Concrete</td>
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<td></td>
<td></td>
<td>100/ 150 pen bitumen</td>
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<tr>
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<td>Binder &amp; Base (40/60 pen)</td>
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<tr>
<td><strong>Minimum Rolling</strong></td>
<td>40/ 60 pen bitumen</td>
<td>40/60 pen Surface Course</td>
<td>100/ 150 pen AC Binder &amp; Base</td>
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<td><strong>(Immediately Prior to Rolling)</strong></td>
<td>All courses</td>
<td>40/60 pen Base &amp; Binder</td>
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<td>85</td>
<td>40 / 60 pen AC Binder &amp; Base</td>
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APPENDIX B
NOTES
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
2. APPLY BOND COAT TO ALL VERTICAL FACES.

KEY
- - - - - - SAM (APPROVED STRESS ABSORBING MEMBRANE)
- - - - - - BOUNDARY BETWEEN NEW AND EXISTING CONSTRUCTION
- - - - - - LEVELING COURSE AS REQUIRED

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PROJECT
STANDARD DETAIL

DRAWING TITLE
STEPPED CARRIAGEWAY CONSTRUCTION DETAIL

DRAWN
VD
CHECKED
RB
DATE
APRIL 2016

SCALE
1:10

DRAWING No.
APPENDIX CI

REVISION

REVISION DATE
SECTION A - A
SCALE 1:10

EDGINGS

NEW SURFACE COURSE
NEW BINDER COURSE

300
300

EXISTING SURFACE COURSE
EXISTING BINDER COURSE

NEW SUBBASE
EXISTING SUBBASE

SUBBASE BENCHED AT 300MM INTERVALS

NEW SURFACE COURSE
NEW TRANSVERSE JOINT

EXISTING SURFACE COURSE

KERBLINE

SCALE 1:25

NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
2. ALL EDGES TO BE SAW CUT.
3. BOND COAT TO BE APPLIED TO ALL VERTICAL FACES, EXISTING SURFACES AND IRONWORK.

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PROJECT
STANDARD DETAIL

FOOTWAY TIE-IN

TITLE

drawn
CHECKED
DATE

VD
RB
JUNE 2016

DRAWING NO.

APPENDIX C2

SCALE

AS SHOWN

REVISION

REVISION DATE
NOTES
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
2. FULL WIDTH OF FOOTWAY/CYCLEWAY TO BE RESURFACED.
3. NEW BINDER COURSE TO OVERLAP EXISTING SUBBASE BY 300MM.
4. ALL EDGES TO BE SAW CUT.
5. BOND COAT TO BE APPLIED TO ALL VERTICAL FACES, EXISTING SURFACES AND IRONWORK.

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PE1 5XG
PETERBOROUGH
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PROJECT
STANDARD DETAIL

DRAWING TITLE
FOOTWAY/CYCLEWAY WIDENING

DRAWN
VD
CHECKED
RB
DATE
APRIL 2016

SCALE
AS SHOWN

DRAWING No.
APPENDIX C3

REVISION

REVISION DATE
NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
2. FOR FURTHER DETAILS REFER TO CHAPTER 16.
NOTES
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.

INTERNAL DIA. OF OUTLET PIPE (mm) | MIN. INTERNAL WIDTH OF BRICK CATCHPIT (mm)
--- | ---
150 | 790
225 | 900
300 | 900
375 | 1010
450 | 1125
525 | 1125
600 | 1240
675 | 1350
750 | 1350
825 | 1450
900 | 1575
975 | 1575
1050 | 1690

SECTION A-A
SECTION B-B
MANHOLE STEPS AT 300 C/C VERTICALLY, WHERE DEPTH TO INVERT EXCEEDS 1000MM
225MM ENGINEERING BRICKWORK
50MM MORTAR FILLET
790 MIN. SEE TABLE
225MM ENGINEERING BRICKWORK
50MM MIN. PROTRUSION THOROUGHLY PACKED AND SEALED WITH MORTAR
IN-SITU CONCRETE GRADE ST4

SECTION C-C
NOTE:
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
2. REFER TO CHAPTER 14.
3. THE FLEXIBLE BOARD JOINT MUST EXTEND BEYOND THE CONCRETE SURROUND.
4. GULLY GRATE AND FRAME TO BE SET 50MM LOWER THAN SURROUNDING SURFACE COURSE.
5. GULLY CONNECTION GRADIENT TO BE NO FLATTER THAN 1:50.
6. GULLY GRATE TO BE FACING ONCOMING TRAFFIC.
INDICATIVE LAYOUT OF SERVICE MAINS WITHIN FOOTWAY

NOTES
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
2. ALL SERVICES MUST BE LAID BELOW FORMATION, EVEN WHEN THE CONSTRUCTION DEPTH EXCEEDS 470MM.
3. REFER TO SECTION 22.0 OF THE SPECIFICATION.
4. THE DEVELOPER’S ATTENTION IS DRAWN TO THE ECONOMIC ADVANTAGES OF UTILISING ‘COMMON TRENCHING’ TECHNIQUES FOR INSTALLATION OF SERVICES IN FOOTWAYS WHEREVER PRACTICABLE.

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PE1 5XG
PETERBOROUGH
TEL: 01733 747474

PROJECT
STANDARD DETAIL

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NOTES

1. All dimensions are in millimetres unless stated otherwise.
2. Refer to section 22.0 of the specification.
3. The developer’s attention is drawn to the economic advantages of utilising ‘common-trenching’ techniques for installation of services whenever practicable.
4. All services must be laid below formation.
NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
2. ALL LAMP COLUMNS MUST BE LOCATED ON A HARD SURFACED AREA.
3. LAMP COLUMN ACCESS DOOR TO FACE TOWARDS THE ONCOMING TRAFFIC.
NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
2. 1.5m MINIMUM MOUNTING HEIGHT.
3. SELF-ADHESIVE LABELS MUST BE PRINTED IN ONE PIECE ON ENGINEERING GRADE REFLECTIVE VINYL.
4. ALL ILLUMINATED SIGNS TO BE NUMBERED - S1, S2 etc.
5. ALL HINGED COLUMNS TO BE NUMBERED - FPI, FP2, etc.
6. FONT TO BE ARIAL.
7. BLACK TEXT ON WHITE BACKGROUND.
8. LABEL LENGTH TO BE EXTENDED AS REQUIRED WHEN ACCOMMODATING ADDITIONAL NUMBERS.
PCC
29
Tel: 01733 74 74 74

NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
2. 1.5M MINIMUM MOUNTING HEIGHT.
3. SELF-ADHESIVE LABELS MUST BE PRINTED IN ONE PIECE ON ENGINEERING GRADE REFLECTIVE VINYL.
4. ALL ILLUMINATED SIGNS TO BE NUMBERED - SI, S2 ETC.
5. ALL HINGED COLUMNS TO BE NUMBERED - FPI, FP2, ETC.
6. FONT TO BE ARIAL.
7. BLACK TEXT ON WHITE BACKGROUND.
8. LABEL LENGTH TO BE EXTENDED AS REQUIRED WHEN ACCOMMODATING ADDITIONAL NUMBERS.

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PETERBOROUGH
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PROJECT
STANDARD DETAIL

STREET LIGHTING NUMBERING

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REVISION | REVISION DATE | Dec 2017 |
NOTES
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
2. NO. NAME PLATES ARE REQUIRED FOR EVERY JUNCTION, REFERENCE SHOULD BE MADE TO DFT CIRCULAR 3/93.
4. THE PLATE SHALL BE 2MM THICK WHITE REFLECTIVE POLYCARBONATE PLATE WITH REVERSE APPLIED BLACK VINYL LETTERING AND BACKING.
5. ABBREVIATION I.E. Rd, Ave ETC. ARE NOT NORMALLY ACCEPTED EXCEPT IN THE CASE OF VERY LONG NAMES BY APPROVAL OF THE ENGINEER.
6. THE BACKING BOARDS ARE TO BE MADE FROM HEAVY DUTY HOLLOW PLANKS WHICH ARE THEN MORTICED INTO POSTS.
7. WHERE SPECIFICALLY REQUESTED A REFLECTIVE 'NO THROUGH ROAD SYMBOL' SHALL BE INCLUDED ON ALL CUL-DE-SAC STREETS. REFER TO DFT DRAWING P816/1.

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PROJECT
STANDARD DETAIL

TITLE
STREET NAME PLATE

<table>
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<td>APRIL 2016</td>
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SCALE 1:20

APPENDIX F3

REVISION
REVISION DATE
NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
**Appendix H - Commuted sums in respect of additional highway maintenance costs**

<table>
<thead>
<tr>
<th>Apparatus</th>
<th>Provision</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Street Furniture</td>
<td>A sum equal to the replacement cost of the equipment and the periodic maintenance over a 15 year period</td>
<td>All infrastructure that are installed only as a direct result of the need to accommodate the needs of the development, including for instance bollards, acoustic barriers, guard railings, bus shelters, tree grills</td>
</tr>
<tr>
<td>Non- Standard Street Lighting equipment</td>
<td>A sum equal to the extra cost per column for both purchase and maintenance. Plus the cost of repainting every five years over a 15 year period (if painted)</td>
<td>All developers proposing to install columns that do not conform to our latest lighting specification are required to make this contribution towards the long term increased maintenance costs.</td>
</tr>
<tr>
<td>Traffic Signals</td>
<td>A sum equal to the replacement cost of the equipment and the periodic maintenance over a 15 year period</td>
<td>Refers to any form of traffic signals that are installed to mitigate the effects of the development</td>
</tr>
<tr>
<td>Illuminated Traffic Signage</td>
<td>Energy consumption and maintenance over a 15 year period</td>
<td>All traffic signage installed to mitigate the effects of the development</td>
</tr>
<tr>
<td>Highway Drainage &amp; SuDS</td>
<td>A sum applicable, as required on a case by case basis</td>
<td>Approval will need to be sought and consideration of the maintenance costs made by the case officer and/or the SAB (SuDS approval body)</td>
</tr>
<tr>
<td>Additional areas of carriageway within the existing public highway</td>
<td>£25 per m² (Calculated based on current PCC Highway Maintenance Plan costs)</td>
<td>New lengths of adopted highway affect the Standard Spending Assement (SSA). New Works within the existing highway do not affect SSA yet add to maintenance costs. For instance, widening for a right turn facility on an existing highway could result in 300-600 m² of additional carriageway to maintain without altering the length of the highway</td>
</tr>
<tr>
<td>High Friction Surfacing, Anti-Skid</td>
<td>A sum applicable, as required on a case by case basis to cover the replacement cost and other associated maintenance</td>
<td>Refer to clause 11.2 for our requirements.</td>
</tr>
<tr>
<td>Highway Structures</td>
<td>A sum equal to 25% of the construction cost of the structure</td>
<td>Highway Structures have to be technically approved (AIP) prior to construction and periodically inspected and maintained. Including but not limited to bridges, culverts, retaining walls</td>
</tr>
<tr>
<td>Highways Trees</td>
<td>A sum applicable, as required on a case by case basis</td>
<td>Approval will need to be sought and consideration of the maintenance costs made by the case officer and/or PCC’s tree officer</td>
</tr>
</tbody>
</table>

**Note:** These provisions are continually reviewed and are correct at the time of print. Always contact the Case Officer to check the latest applicable sums.
NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.

LENGTH OF ROAD

LESS THAN 100M  5M
MORE THAN 100M  10M

CARRIAGEWAY