**6Cs DESIGN GUIDE SPECIFICATION FOR HIGHWAY WORKS FOR NEW DEVELOPMENTS**

**A companion document to 'The 6Cs Design Guide'**

**CONTENTS** **PAGE**


APPLICABILITY ..... 3
GENERAL SPECIFICATION ..... 3
DEFINITIONS ..... 3
STANDARD DRAWINGS ..... 3
Appendix 1/5: Testing to be carried out by the Developer's Contractor ..... 4
Appendix 1/6: Supply & delivery of samples to the Engineer ..... 17
Appendix 1/9: Control of noise and vibration ..... 17
Appendix 1/12: Setting out ..... 18
Appendix 1/13: Programme of works ..... 18
Appendix 1/17: Traffic safety and management ..... 18
Appendix 1/17: Annex B - Code of Practice for a Contractors Haul Route Crossing a Public Highway ..... 2
SERIES 200 - SITE CLEARANCE ..... 24
Appendix 2/3: Retention of materials and equipment arising from site clearance ..... 24
Appendix 2/4: Explosives and blasting ..... 24
Appendix 2/5: Hazardous materials ..... 24
SERIES 300: FENCING ..... 25
Appendix 3/1: Fencing, gates and stiles ..... 25
SERIES 400 – SAFETY FENCES, SAFETY BARRIERS AND PEDESTRIAN GUARDRAILS ..... 26
Appendix 4/1: Safety fences and safety barriers ..... 26
Appendix 4/2: Pedestrian guardrails ..... 26
SERIES 500 - DRAINAGE ..... 27
Appendix 5/1: Drainage requirements ..... 27
Appendix 5/2: Service ducts ..... 28
SERIES 600 - EARTHWORKS ..... 29
Clause 601 Classification, definitions and uses of earthworks materials ..... 29
Appendix 6/1: Requirements for acceptability, testing and compaction etc. of earthwork materials ..... 30
Appendix 6/2: Requirements for dealing with class U2 unacceptable material (hazardous material) ..... 31
Appendix 6/5: Geotextiles used to separate earthworks materials ..... 31
Appendix 6/7: Sub-formation & capping & surface treatment of formation ..... 33
Appendix 6/8: Topsoiling ..... 33
CARRIAGEWAY CONSTRUCTION ..... 35
Road categories ..... 35
SERIES 700: ROAD PAVEMENTS - GENERAL ..... 36
Clause 701 Pavement Construction ..... 36
Clause 702 Horizontal alignments, surface levels and surface regularity of pavement courses ..... 36
Appendix 7/1: Permitted pavement options ..... 36
Appendix 7/2: Excavation, trimming and reinstatement of existing surfaces ..... 42
Appendix 7/3: Surface dressing specification ..... 43
SERIES 800: ROAD PAVEMENTS - UNBOUND MATERIALS ..... 54
Clause 801 General requirements for unbound mixtures for subbase. ..... 54
SERIES 900: ROAD PAVEMENTS – BITUMINOUS BOUND MATERIALS ..... 54

Clause 901 Bituminous Pavement Mixtures ..... 54
SERIES 1100: KERBS, FOOTWAYS AND PAVED AREAS ..... 62
Appendix 11/1: Kerbs, footways and paved areas ..... 62
SERIES 1200: TRAFFIC SIGNS ..... 65
Appendix 12/1: Traffic signs – general ..... 65
Appendix 12/3: Traffic signs - road markings and studs ..... 72
Appendix 12/4: Traffic signs – cones, cylinders flat traffic delineators and other traffic delineators ..... 74
SERIES 1300: ROAD LIGHTING COLUMNS AND BRACKETS ..... 76
Appendix 13/1: Provision of street lighting installation, including design and specification ..... 76
SERIES 1400: ELECTRICAL WORK FOR ROAD LIGHTING AND TRAFFIC SIGNS ..... 77
Appendix 14/3 – Temporary lighting ..... 77
Appendix 14/4 – Electrical equipment for road lighting ..... 77
Appendix 14/5 - Electrical equipment for traffic signs ..... 77
SERIES 2400: BRICKWORK, BLOCKWORK AND STONEWORK ..... 79
Appendix 24/1 – Brickwork, blockwork and stonework ..... 79
SERIES 2600: MISCELLANEOUS ..... 80
Appendix 26/1: Ancillary concrete ..... 80
SERIES 3000: LANDSCAPE AND ECOLOGY ..... 81
Appendix 30/1: General ..... 81
Appendix 30/2: Weed control ..... 81
Appendix 30/4: Ground preparation ..... 84
Appendix 30/5 Grass seeding, and turfing ..... 86
Appendix 30/6: Planting ..... 87
Appendix 30/7: Grass maintenance ..... 97
Appendix 30/8: Watering ..... 97
Appendix 30/9: Establishment maintenance for planting ..... 98
Appendix 30/10: Maintenance of existing established trees and shrubs ..... 99

## APPLICABILITY

**1.** This Specification shall apply to the construction of highway works for new developments, including internal development access roads and access ways and the construction and improvement of new and existing higher category roads.

## GENERAL SPECIFICATION

**1.** Unless otherwise stated, all highway works shall be in accordance with the 'Specification for Highway Works' (SHW), Volume 1 of the Highways Agency's Manual of Contract Documents for Highway Works (ISBN 0 11 552586 6), current at the time of completion of the S38, S278, or similar Agreement. Some of the Clauses and Appendices included in our Specification for Highway Works for New Developments contain additions and amendments to the SHW. Where such Clauses and Appendices depart from the SHW, these departures shall apply.

**2.** Some of the Clauses and Appendices included in our Specification for Highway Works for New Developments contain sub-Clauses and Tables taken direct from the SHW and have been included for convenience.

## DEFINITIONS

**1.** The term Overseeing Organisation as referred to in clause 002 of the Specification means the relevant6Cs Design Guide authority.

**2.** The term Engineer as referred to in the Specification shall mean the relevant 6Cs Design Guide authority or his nominated representative.

**3.** Where the terms Contractor and Developer's Contractor are used within the Specification they shall be deemed to refer to the contractor engaged by the Developer and acting on his behalf. Under the terms of the Agreement covering the works, responsibility for ensuring compliance with the Specification rests with the Developer.

## STANDARD DRAWINGS

**1.** All works shall be in accordance with the 6Cs Design Guide Standard Drawings. These are available on the 6Cs Design Guide website at www.leics.gov.uk/standard_drawings.htm. Developers are advised to check to ensure that they are using current drawings.

**2.** It should be noted that the Standard Drawings include extensive notes, including notes relating to construction, which supplement the drawings and Specification and must be read in conjunction with them.

**3.** Safety Fences and Barriers shall be in accordance with Section 2 of 'Highway Construction Details' published by Her Majesty's Stationery Office as Volume 3 of the Highways Agency's Manual of Contract Documents for Highway Works.

**4.** Any works not covered by the 6Cs Design Guide Standard Drawings shall require the submission and approval of scheme specific drawings.

**SERIES 100 - PRELIMINARIES**

## Appendix 1/5: Testing to be carried out by the Developer's Contractor

**1.** The Developer is responsible for arranging and bearing the cost of carrying out the tests detailed in this Appendix.

**2.** Table NG 1/1 following gives the frequency of particular tests.

**3.** Routine tests carried out by manufacturers and suppliers in compliance with British Standard or other standard or specification are not included, but where a standard or specification makes provision for a test certificate this is indicated.

**4.** The following additional notes are to be read in conjunction with Table NG 1/1.

**Notes:**

1. Unless otherwise stated above, all sampling and testing in this Appendix shall be arranged by the Developer.

2. Tests comparable to those specified in this Appendix will be necessary for any equivalent work, goods or materials proposed by the Developer.

3. (N) indicates that a UKAS test report or certificate is required, where UKAS stands for United Kingdom Accreditation Service.

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

5. Unless otherwise shown in this Appendix test certificates for work, goods or materials as scheduled under any one Clause are required for all such work, goods or materials in the Works.

6. Where the stated frequency is marked *, and the materials are known from experience of the source to have good compliance, the Engineer may agree to reduction of the stated frequency of testing.

## APPENDIX 1/5: TESTING TO BE CARRIED OUT BY THE DEVELOPER'S CONTRACTOR

## TABLE NG 1/1: Testing Details

| Clause | Work, Goods or Material | Test | Frequency of Testing | Test Certificate | Comments |
|---|---|---|---|---|---|
| **Series 300 Fencing** | | | | | |
| 306 | Permanent fencing | | | | Quality management Scheme applies |
| | Concrete components | Cover to reinforce-ment | 1 per consign-ment (maximum 1 per 100 components) (BS 1722) | | (Tests/samples should not normally be required) |
| 308 | Gates and stiles | | | | Quality management scheme applies |
| | Reinforced concrete posts | Cover to reinforce-ment | 1 per consign-ment (maximum 1 per 100 components) (BS 3470) | | (Tests/samples should not normally be required) |
| 311 | Preservation of timber | Moisture content (using the oven drying method) | As required in sub-Clause 311.2(v) | Required for each batch | Quality management scheme applies (Tests/samples should not normally be required) |
| **Series 400 Vehicle restraint systems** | | | | | |
| 403 | Anchorages and attachment systems for use in drilled holes | Ultimate tensile load (Manu-facturer's tests) | | Required | To provide well attested and documented evidence (See NG 403.5) |
| 404 | Anchorages in drilled holes | Loading test on site | As required by the Engineer | | † |
| | Post foundations | | | | (See NG 404.3) |
| **Series 500 Drainage and service ducts** | | | | | |
| 501 | Pipes for drainage and service ducts | | | | Product certification scheme applies |
| | Vitrified clay | | | | |
| | Concrete-PC/SRC (Not > 900mm diameter) | | | | |
| | Concrete-Pre-Stressed (Not > 900mm diameter) | | | | |
| | Iron-cast | | | | |
| | Iron-ductile | | | | |
| | UPVC | | | | |
| | GRP | | | | |
| | Plastics, see table 5/1 | | | | |
| 501 | Corrugated steel | (Manu-facturer's tests) | | Required (AASHTO) | |

**APPENDIX 1/5: TESTING TO BE CARRIED OUT BY THE DEVELOPER'CONTRACTOR cont.**
**TABLE NG 1/1: Testing Details cont.**

| Clause | Work, Goods or Material | Test | Frequency of Testing | Test Certificate | Comments |
|---|---|---|---|---|---|
| **Series 500 (continued).** | | | | | |
| 501 cont. | Corrugated steel bitumen protection Not > 900mm dia | | | Required (ASSHTO) | Product certification scheme applies |
| | Concrete PC/SRC exceeding 900 mm dia | Proof load<br>Maximum load<br>Chloride ion<br>Cube strength<br>(Manu-facturer's tests) | Sub-Clause 509.9 | Required (ASSHTO) | |
| | Other materials | | | Required | BBA certification (or equivalent) applies |
| 503 | Pipe bedding | Grading | 1 per 500* tonnes (min of 3*) | Required | |
| | | Soluble sulphate | 1 per source | | |
| | | Los Angeles coefficient (N) | | | |
| 505 | Filter medium backfill | Plastic index (N) | 1 per source* | Required | |
| | | Los Angeles coefficient (N) | | | |
| | | Soluble sulphate content (N) | | | |
| | | Grading | 1 per 500 tonnes | | Washing and sieving method to be used |
| | | Permeability (N) | 1 per source* | | |
| 506 | Sealing existing drains | | | Required | Product to comply with Cl. 506.3 |
| | Concrete | | | | |
| | Grout | | | | |
| 507 | Chambers | | | | |
| | Precast concrete | | | | Product certification scheme applies |
| | Corrugated galvanised steel | (Manu-facturer's tests) | | Required | Product certification scheme applies |
| | Manhole steps | | | | |
| | Steel fitments | | | | |
| | Covers, grates and frames | | | | Product certification scheme applies |
| | Cover bolts | | | | Quality management scheme applies |

**APPENDIX 1/5: TESTING TO BE CARRIED OUT BY THE DEVELOPER'S CONTRACTOR cont.**
**TABLE NG 1/1: Testing Details cont.**

| Clause | Work, Goods or Material | Test | Frequency of Testing | Test Certificate | Comments |
|---|---|---|---|---|---|
| **Series 500 (continued)** | | | | | |
| 508 | Gullies and pipe junction | | | | Product certification scheme applies |
| | Precast concrete | | | | |
| | Clay | | | | Product certification scheme applies |
| | Cast iron and steel | | | | |
| 509 | Watertightness of joints and general pipe condition | Water test | All pipelines with watertight joints | Required | |
| | | CCTV survey (in place of mandrel test) | All surface water sewer pipes on completion of the Works and again before issue of the Final Certificate | | Videos and reports including gradient profiles to be submitted. Cross reference should be made to any requirements in Appendix 5/1. |
| 512 | Backfill to pipe bays | Grading | 1 per 50 tonnes* (min of 3) | Required | |
| | | Sol.sulphate content (N) | 1 per source* | | |
| 516 | Combined drainage/kerbs | Load test | 1 per 1000m | Required | Cert. to Cl. 516 reqd. |
| **Series 600 Earthworks** | | | | | |
| `601<br>631 to 637<br>640 | Acceptable material | | | Required | Cross reference should be made to any requirements in Appendix 6/1. |
| | Class: 1 — General granular fill | Grading/ Uniformity coefficient | Twice a week* | | |
| | | mc/MCV (N) | 2 per 1000 m³ up to max of 5 per day* | | |
| | | SMC of chalk (N) | Twice a week* | | |
| | IC Only | Los Angeles Coefficient(( N) | Weekly* | | |
| | Class: 2 — General cohesive fill | Grading | Twice a week* | | |
| | | mc/MCV/PL Undrained shear strength (N) | 2 per 1000 m³ up to max of 5 per day | | |
| | | SMC of chalk (N) | Twice a week | | |
| | | Bulk density (PFA) (N) | 2 per 1000 m³ up to max of 5 per day* | | |
| | Class: 3 — General chalk fill | mc (N) | 2 per 1000 m³ up to max of 5 per day* | | |
| | | SMC (N) | Daily* | | |
| | Class: 4 — Landscape fill | Grading/mc/ MCV (N) | Daily* | | |

**APPENDIX 1/5: TESTING TO BE CARRIED OUT BY THE DEVELOPER'S CONTRACTOR cont.**
**TABLE NG 1/1: Testing Details cont.**

| Clause | Work, Goods or Material | | Test | Frequency of Testing | Test Certificate | Comments |
|---|---|---|---|---|---|---|
| **Series 600 (continued)** | | | | | | |
| 601<br>631 to<br>637<br>640<br>cont. | Class | General description | | | Required | |
| | 5 | Topsoil | Grading | Daily* | | |
| | 6 | Selected granular fill | Grading/ uniformity coefficient | 1 per 400 tonnes* | | |
| | | | PI/LL (N) | Daily* | | |
| | | | Los Angeles Coefficient (N) | Weekly* | | |
| | | | Omc/mc, mc or MCV (N) | 1 per 400 tonnes* | | |
| | | | Organic matter/water soluble or total sulphate content (N) | Weekly* | | |
| | | | PH/chloride ion content (N) | Weekly* | | |
| | | | Resistivity (N) | (As required) | | |
| | | | Undrained and drained shear parameters (N) | (As required) | | |
| | 7 | Selected cohesive fill | Grading/mc/ MCV/bulk density (N) | 1 per 400 tonnes* | | |
| | | | SMC of chalk (N) | Twice a week* | | |
| | | | PI/LL (N) | Daily* | | |
| | | | Organic matter/ Total or water soluble sulphate content (N) | Twice a week* | | |
| | | | Total sulphate content | Twice a week* | | |
| | | | PH/chloride ion content (N) | Weekly* | | |
| | | | Resistivity (N) | (As required) | | |
| | | | Undrained and drained shear parameters (N) | (As required) | | |
| | | | Permeability (N) | (As required) | | |

**APPENDIX 1/5: TESTING TO BE CARRIED OUT BY THE DEVELOPER'S CONTRACTOR cont.**
**TABLE NG 1/1: Testing Details cont.**

| Clause | Work, Goods or Material | | Test | Frequency of Testing | Test Certificate | Comments |
|---|---|---|---|---|---|---|
| **Series 600 (continued)** | | | | | | |
| | Class | General Description | | | Required | Cross reference should be made to any requirements in Appendix 6/1. |
| | 7A | Selective cohesive material | Grading<br>MCV<br>Liquid Limit<br>Plasticity Index | 1 per 400 tonnes* | | |
| | 8 | Miscellaneous fill | mc/MCV (N) | Daily* | | |
| | | Fill adjacent to cementitious material or metallic items | Soluble sulphate content (N) | 1 per 400 tonnes or per location if less than 400 tonnes* | | |
| 602 | Earthworks material beneath surface of a road or paved central reserve<br><br>(i) Off site source<br><br>(ii) On site source | | Frost heave (N) | <br><br><br><br>1 every four months*<br>As required | | |
| 609<br>621 | Geotextiles | | Tensile load | 1 per 400 square metres* | | |
| | | | Permeability | | | |
| | | | Pore size | | | |
| 612 | Compaction of fills | | | | Required | See Table 6/1 |
| | | Method compaction | Field dry density (N) | (As required) | | |
| | | End product compaction | Optimum mc (2.5 kg rammer/ vibrating hammer method) (N) | Each class or sub class of material | | |
| | | | Field dry density (N) | 1 per 400 tonnes* | | |
| 614 | Cement stabilisation to form capping | | Rate of spread of cement | 1 per 500 square metres of cement spread | Required | |
| 615<br>641 | Lime stabilisation to form capping | | Rate of spread of lime | 1 per 500 square metres of lime spread | Required | |
| | | | Available lime content | Each source of lime weekly during stabilisation operation | | |

**APPENDIX 1/5: TESTING TO BE CARRIED OUT BY THE DEVELOPER'S CONTRACTOR cont.**
**TABLE NG 1/1: Testing Details cont.**

| Clause | Work, Goods or Material | Test | Frequency of Testing | Test Certificate | Comments |
|---|---|---|---|---|---|
| **Series 700 Road pavements - general** | | | | | |
| 702 | Surface levels of pavement courses. | As specified in Clause 702 | As specified in Clause 702 | Required | National quality management sector schemes apply |
| | Surface regularity | As specified in Clause 702 | As specified in Clause 702 | Required | |
| 710 | Constituent materials in recycled aggregate | Quality control | Checks are to be carried out by the Contractor in accordance with the procedure set down in 'Quality Control – Production of Recycled Aggregates' and with those in this clause | Required | The procedure set down in 'Quality Control – Production of Recycled Aggregates' published by Waste and Resources Action Programme is available from WRAP website, http:www.wrap.org.uk |
| 711 | Overbanding and inlaid crack sealing systems | | | Required | BBA certification (or equivalent) applies |
| **Series 800 Road pavements – unbound, hydraulically bound and other materials** | | | | | |
| 801 | Unbound sub-base material (other than slag) adjacent to cement bound materials, concrete pavements, structures or products | Soluble sulphate content (N) | 1 per 400 tonnes or per location if less than 400 tonnes* | Required | |
| | Sub-base materials beneath surface of a road or paved central reserve | Frost heave (N) | 1 per source plus 1 every four months* | Required | |
| | Blastfurnace slag | Bulk density (N) | 1 per 500 tonnes* | | |
| | | Stability (N) | | | |
| | | Sulphate content (N) | | | |
| | Steel slag | Bulk density | 1 per 500 tonnes* | | |
| 803 | Granular sub-base material Type 1 | Grading Plastic Index (N) | 1 per 200 tonnes* | Required | |
| | | Los Angeles Coefficient (N) | 1 per source and then monthly* | | |
| | | Soundness (N) | 1 per source* | | |
| | | Water absorption (N) | (As required) | | |

**APPENDIX 1/5: TESTING TO BE CARRIED OUT BY THE DEVELOPER'S CONTRACTOR cont.**
**TABLE NG 1/1: Testing Details cont.**

| Clause | Work, Goods or Material | | Test | Frequency of Testing | Test Certificate | Comments |
|---|---|---|---|---|---|---|
| **Series 900 Road pavements – bituminous bound materials** | | | | | | |
| 901<br>925 | Aggregates for bituminous Materials | | | | | National quality management sector schemes apply |
| | | Hardness | Los Angeles coefficient (N) | Monthly* | | |
| | | | Impact value (N) | Monthly* | | |
| | | Durability | Soundness (N) | 1 per source* | | |
| | | | Water absorption (N) | (As required) | | |
| | | Cleanness | Sieve test (mass passing 75 micron sieve) (N) | Monthly* | | Washing and sieving method to be used |
| | | Shape | Flakiness index (N) | Monthly* | | |
| | | Blastfurnace slag | Bulk density (N) | 1 per 500 tonnes* | | |
| | | | Stability (N) | | | |
| | | | Sulphate content (N) | | | |
| | | Steel slag | Bulk density | 1 per 500 tonnes* | | |
| | | Coarse aggregate for surface courses | PSV (N) | 1 per source* | | |
| | | | AAV (N) | 1 per source* | | |
| | Binders for bituminous materials | | Penetration (N) | 1 per 750 tonnes* | | National quality management sector schemes apply (More frequent tests/ samples should be scheduled for modified binders) |
| | | | Softening point (N) | 1 per 750 tonnes* | | |
| | | | (Other BS EN tests) | (As required) | | |

**APPENDIX 1/5: TESTING TO BE CARRIED OUT BY THE DEVELOPER'S CONTRACTOR cont.**
**TABLE NG 1/1: Testing Details cont.**

| Clause | Work, Goods or Material | Test | Frequency of Testing | Test Certificate | Comments |
|---|---|---|---|---|---|
| **Series 900 (continued)** | | | | | |
| 903 to 914, 971AR | Bituminous mixtures | Grading (N) | 1 per 100 tonnes (min 2 per day) | Required | National quality management sector schemes apply. Change to 1 per 200 tonnes if quality is well within specified tolerances |
| | | Binder content (N) | | | |
| | | Delivery temperature<br><br>Rolling temperature | Every load<br><br>15m intervals | | Record of delivery temperature, location where laid and rolling temperature to be provided on daily basis |
| 903<br>906 | Base (roadbase) and binder course Asphalt Concrete | In situ air void content (N) | When required by Engineer. Three pairs of 150mm diameter cores per 1,000m2 or part thereof laid in any one day) | Required | National quality management sector schemes apply. Indirect density gauge tests will be acceptable only after establishing correlation with core tests. Core testing will be used to verify correlation from time to time. |
| 903<br>971AR | Stone Mastic Asphalt surface course | In situ air void content | As for materials to Cl. 903 & 906 above | Required | National quality management sector schemes apply |
| 921 | Surface macrotexture | BS EN 13036-1 | 10 measurements at 5m spacing on diag. Line across lane width. Repeated on not less than one third of area of surfacing | Required | Average of each set of 10 measurements shall not be less than min. texture specified in Appendix 7/1 |
| 924 | High friction Surfaces | Quality control checks<br>1 per source | Required | BBA/HAPAS Certificate Required | |
| 911 | Rolled asphalt surface course (design mix) | Stability value (N) | 1 per source | Required | National quality management sector schemes apply |
| | | Flow value (N) | | | |
| | | Density (N) | | | |

**APPENDIX 1/5: TESTING TO BE CARRIED OUT BY THE DEVELOPER'S CONTRACTOR cont.**
**TABLE NG 1/1: Testing Details cont.**

| Clause | Work, Goods or Material | Test | Frequency of Testing | Test Certificate | Comments |
|---|---|---|---|---|---|
| **Series 900 (continued)** | | | | | |
| 915<br>925 | Coated chippings | Grading (N) | 1 per stockpile* | Required | |
| | | Binder content (N) | 1 per stockpile* | | |
| | | Flakiness index (N) | 1 per source* | | |
| | | PSV (N) | 1 per source* | | |
| | | AAV (N) | 1 per source* | | |
| | | Hot sand test (N) | 1 per source* | | |
| | | Rate of spread (N) | (As required) | | |
| Appendix 7/3 | Surface dressing | As required in Appendix 7/3 – surface dressing specification | As required in Appendix 7/3 – surface dressing specification | Required | |
| 1043 | Foamed Concrete | Cube strength (N) | 2 cubes per 12 $m^3$ | Required | |
| **Series 1100 Kerbs, footways and paved areas** | | | | | |
| 1101 | Precast concrete kerbs, channels, edgings and quadrants | Transverse strength | Minimum of 3 per 1000 units of each product (BS 7263: Part 1) | Required | |
| | | Water absorption | | | |
| | | Binder content | | | |
| | | Water absorption | | | |
| 1107 | Concrete block paving | Compressive strength | 16 per 5000 blocks (BS 6677: Pt 1) | Required | |
| **Series 1200 Traffic signs** | | | | | |
| 1202 | Permanent traffic signs | | | Required (where considered appro-priate) | Quality management scheme applies. Certification that the traffic sign is capable of passing the tests in BS 873: Part 1 is required |
| 1207 | Anchorage in drilled holes to supports of traffic signs | Loading test on site | (As required) | Required | |
| 1210 | Holding down bolts and anchorages to bases of permanent bollards | | | Required (where considered appropriate) | Certification that the holding down bolts and anchorages are capable of complying with the performance requirements of BS 873: Part 3 is required |

**APPENDIX 1/5: TESTING TO BE CARRIED OUT BY THE DEVELOPER'S CONTRACTOR cont.**
**TABLE NG 1/1: Testing Details (continued)**

| Clause | Work, Goods or Material | Test | Frequency of Testing | Test Certificate | Comments |
|---|---|---|---|---|---|
| **Series 1200 (continued)** | | | | | |
| 1212 | Thermoplastic road marking materials | Retro-reflectivity, Luminance, Skid Resistance as specified in BS EN 1436 & BS 1824 | Specified tests for each visit. Minimum of 1 test per 500m of road or part thereof for retro-reflectivity | Required | National quality management sector scheme applies. Procedures are given in BS EN 1824. Performance values specified in Appendix 12/3. |
| | Pavement marking paints | | | Required (BS 6044) | Quality management and product certification schemes apply |
| 1214 | Permanent traffic cones and cylinders | | | Required | Certification that permanent traffic cones and cylinders have been tested and comply with BS 873: Part 8 is required |
| | | Tests specified in BS 873: Part 8 | 2 of each size and category/type | | *† [Where required]* |
| 1214 | Flat traffic delineators | | | Required | Certification that FTDs have been tested and comply with Clause 1214 is required |
| | | Tests specified in Clause 1214 | (As required) | | *† [Where required]* |
| | Other traffic delineators | | | Required | Certification that the delineators have been tested and comply with Clause 1214 is required |
| | | Tests specified in Appendix 12/4 | (As required) | | *† [Where required]* |
| | Temporary cones, cylinders, FTDs and other delineators | | | Required | Certification that at least 1 in 500 of any batch of cones, cylinders, FTDs and other delineators to be used in the Temporary Works have passed the tests in Clause 1214 as appropriate is required |

**APPENDIX 1/5: TESTING TO BE CARRIED OUT BY THE DEVELOPER'S CONTRACTOR cont.**
**TABLE NG 1/1: Testing Details (continued)**

| Clause | Work, Goods or Material | Test | Frequency of Testing | Test Certificate | Comments |
|---|---|---|---|---|---|
| **Series 1400 Electrical work for road lighting and traffic signs** | | | | | |
| 1421 | Cable | | | | Product certification scheme applies |
| 1424 | Lighting Units | Tests specified in Clause 1424 | Each unit | Required | † Product certification scheme applies<br>Certification that the installation complies with BS 7671 (the IEE Wiring Regulations) is required |
| | Networks | Tests specified in Clause 1424 | Each network | Required | † Certification that the installation complies with BS 7671 (the IEE Wiring Regulations) is required |
| **Series 1700 Structural concrete** | | | | | |
| 1707 | Concrete | Cube strength (N) | Reinforced concrete – three cubes from 20m3 or 20 batches whichever represents the lesser volume | Required | |
| | | | Prestressed concrete – three cubes from 10m3 or 10 batches whichever represents the lesser volume | | Contractor to cast and test sufficient additional cubes to demonstrate cube strength before transfer |
| | | | Mass concrete – three cubes from 50m3 or 50 batches whichever represents the lesser volume | | |
| | Fresh Concrete | Workability (slump or compacting factor or vebe) (N) | Each batch | | |

**APPENDIX 1/5: TESTING TO BE CARRIED OUT BY THE DEVELOPER'S CONTRACTOR cont.**
**TABLE NG 1/1: Testing Details (continued)**

| Clause | Work, Goods or Material | | Test | Frequency of Testing | Test Certificate | Comments |
|---|---|---|---|---|---|---|
| **Series 1700 (continued)** | | | | | | |
| 1712 | Reinforcement | | | | | |
| | | Steel bars | | | Required (BS 4449) | Product specification scheme applies – CARES Certificate required |
| | | Steel wire | | | Required (BS 4482) | |
| | | Steel fabric | | | Required (BS 4483) | Product specification scheme applies |
| 1718 | Prestressing Tendons | | | | | |
| | | Steel wire | | | Required (BS 5896) | Product specification scheme applies |
| | | Steel bar | | | Required (BS 4486) | |
| | | Seven-wire strand | | | Required (BS 5896) | |
| **Series 2000 Waterproofing for concrete structures** | | | | | | |
| 2003 | Permitted Waterproofing Systems | | As required see NG2003 Test specified in App. 20/1 | | | Registration and BBA Roads Agrément certification apply |
| 2004 | Proprietary Materials | | As required see NG2003 Test specified in App. 20/1 | | | Registration and BBA Roads Agrément certification apply |
| **Series 2100 Bridge bearings** | | | | | | |
| 2101 | Bridge Bearings | | | | | |
| | | Elastomeric bearings<br><br>Uniguide bearings<br><br>Fixed bearings | | | Required (BS 5400 Sect. 9.2) | Certificate of compliance with standards |
| **Series 2400 Brickwork, blockwork and stonework** | | | | | | |
| 2406 | Clay bricks | | (Soluble salt content<br>Efflorescence<br>Compressive strength<br>Water absorption<br>Initial rate of suction<br>(BS 3921/TRL Report 447)) | | Required | |
| 2407 | Clay blocks | | (Soluble salt content<br>Efflorescence<br>Compressive strength<br>Water absorption<br>Initial rate of suction<br>(BS 3921/TRL Report 447)) | | Required | |
| | Concrete blocks | | | | Required (BS 6073 : Pt. 1) | |

**APPENDIX 1/5: TESTING TO BE CARRIED OUT BY THE DEVELOPER'S CONTRACTOR cont.**
**TABLE NG 1/1: Testing Details (continued)**

| Clause | Work, Goods or Material | Test | Frequency of Testing | Test Certificate | Comments |
|---|---|---|---|---|---|
| **Series 2600 Miscellaneous** | | | | | |
| 2601 | Bedding mortar materials | | | Required for each batch | Certification in accordance with Clause 2601 is required |
| **Series 3000 Landscape and ecology** | | | | | |
| 3005 | Grass seeding, wildflower seeding and turfing | Rate of spread of fertiliser | 1 per 1000 square metres* | | |
| | | Rate of spread of seeding | 1 per 1000 square metres* | | |
| | | Chemical analysis of fertiliser | 1 per source* | | |
| | | Grass seed germination and purity (Official Seed Testing Station tests) | 1 per source and mix variety* | Required prior to sowing | |

**Key**: (N) indicates that a UKAS or equivalent accredited laboratory sampling and test report is required.

## Appendix 1/6: Supply & delivery of samples to the Engineer

**1.** Samples of materials and products for testing by the Engineer to establish compliance with the following Clauses shall be supplied as the Engineer may reasonably require.

CLAUSES 503, 505, 512.

SERIES 600, 700, 800, 900, 1100, 1700, 2400, 2600, 3000.

CLAUSES 2003, 2004

## Appendix 1/9: Control of noise and vibration

**1.** The Contractor shall comply with the noise requirements of the Local Authority in respect of permissible noise emissions from construction and demolition sites.

**2.** The Contractors attention is drawn to the provisions of Section 60 and 61 of the Control of Pollution Act, 1974, which relates to the control of noise from construction sites.

**3.** The Contractor must use the best practicable means, as defined in Section 72 of the Control of Pollution Act, 1974, to reduce noise to a minimum at all times.

**4.** The Contractor shall comply with the recommendations on practical measures to reduce noise on construction sites set out in BS 5228; 1984 'Noise Control on Construction and Open Sites'.

## Appendix 1/12: Setting out

**1.** It is the responsibility of the Developer to set out the roadworks without assistance from the relevant 6Cs Design Guide authority. The right is reserved not to adopt incorrectly aligned works.

**2.** The visibility splays at the entrance(s) to the development must be set out prior to commencement of work on site.

**3.** The highway boundary fronting any properties must be set out and clearly established on the ground prior to occupation.

**4.** The setting out of the works may be checked by the Engineer before or during construction. The Developer shall provide such assistance as the Engineer may require.

## Appendix 1/13: Programme of works

**1.** No programme of works will be required by the Engineer other than where works are to be carried out to the existing highway.

**2.** The Developer or his contractor shall give at least 48 hours notice (i.e. 2 working days) of the commencement of the various stages of construction as listed below. Such notice is to be repeated subsequent to any period when work has been temporarily suspended. No further work covering up these stages may be undertaken until approval has been obtained:

- commencement of works
- the sub-grade to footways, footpaths, cycleways and carriageways
- the sub-base (and capping layer, where necessary) to footways, footpaths, cycleways and carriageways
- each section of drainage (see below)
- each section of kerbing or back edging
- street lighting and signs (see below)
- laying of base (roadbase)
- laying of binder course
- laying of surface course
- landscaping

**3.** Each section of drainage means all surface water and sub-soil drainage, manholes, gullies and connections prior to the placing of concrete surrounds and any backfilling to trenches.

**4.** Each operation concerning street lighting and signs means laying of cables, ducts, column and sign erection and electrical equipment.

## Appendix 1/17: Traffic safety and management

### General

**1.** The current version of Chapter 8 of the Traffic Signs Manual shall be used. Any departures from these recommendations shall be notified to the Engineer's

Representative in writing and discussed with him/her before they are implemented.

**2.** The recommendations contained in the joint Department of Transport/County Surveyors' Society document *"Notes for Guidance on Safety at Roadworks" - Third Edition 1994* shall be considered. Any departures from these recommendations shall be notified to the Engineer's Representative in writing and discussed with him/her before they are implemented.

**3.** Mobile Lane Closures shall comply with the requirements of TD 49/97 'The Mobile Lane Closure Technique', which is contained in Section 4 of Volume 8 of the Highways Agency's Design Manual for Roads and Bridges, or subsequent revisions.

**4.** The cost of the provision of all temporary traffic management including road signs, temporary traffic signals, temporary orders etc. shall be borne solely by the Developer.

## Appendix 1/17: Annex B - Code of Practice for a Contractors Haul Route Crossing a Public Highway

### 6Cs DESIGN GUIDE

### *CODE OF PRACTICE FOR A CONTRACTORS HAUL ROUTE CROSSING A PUBLIC HIGHWAY* (Revised July 2001)

This Document is issued for the guidance to Contractors, Providers or individuals who intend to construct a Haul Route Crossing on a road under the control of the relevant 6Cs Design Guide authority.

### 1. Preamble

I. The primary use of a Haul Route crossing is to enable a Contractor to use non-road use vehicles (i.e. do not conform to the 'Construction and Use Regulations or are not taxed and insured for highway use) to cross the public highway. However, such a crossing will be deemed necessary if road vehicles are used to move people or materials across the public highway on a regular basis.

II. A Haul Route crossing shall NOT be used as a Site Access. Turning traffic from or to the Haul Route crossing WILL NOT BE PERMITTED.

III. Any Contractor or Provider MUST read Topic 4.5 (Haul Route Crossings) from the DLTR Publication Chapter 8 of the Traffic Signs Manual (Traffic Safety Measures and Signs for Road Works and Temporary Situations) before embarking on any design works.

IV. The layout and mode of operation of temporary traffic signals at the haul route crossing shall comply with the following:-

- All relevant DLTR Publications.
- Current Traffic Signs Regulations and General Directions.
- Chapter 8 of the current Traffic Signs Manual
- DLTR Specifications:

TR 0137 issue A June 1991 "Traffic Signal Equipment for use at Haul Route Crossings"
MCE 0114 "Microwave Vehicle Detecting Equipment" (if appropriate).
MCE 0100 'Inductive Loop detection equipment" (if appropriate)
MCE 0108(B) "Siting of inductive loop detection equipment'
(v) B5505: 1971 Road Traffic Signals
Current IBE Regulations

### 2. 6Cs Design Guide (Highway Authority) Authorisation

I. It is a Statutory Requirement for the crossing, signal equipment and associated traffic management to be approved by the Highway Authority prior to works commencing. Although haul route signals tend to be temporary or short term systems, the standard of installation shall generally be the same as for permanent traffic signals.

II. It will be necessary for the Contractor to seek prior written approval from the Highway Authority, and the appropriate advice for the crossing will be given. A minimum of 5 working weeks written notice prior to commencement of the crossing will be required. The Contractors proposals shall be shown on a plan at least 1:500 scale with the following details:-

- location and duration of the crossing(s),

- location of signals and stop boards/stop lines,
- phasing and timing of the signals
- any alterations of existing road markings and/or additional traffic management measures

**3. Signal Controller**

I. The signal controller shall be to DLTR Specification TR 0137.
II. The signal controller shall normally be set in the vehicle actuated (V/A) mode at all times; fixed time mode will not be permitted unless it has been authorised in writing by the Highway Authority. Manual mode of operation may only be permitted at a site when instructed by the Highway Authority.
III. In the absence of traffic on the haul route, the green signal should revert to the public highway.
IV. The minimum intergreen time shall be 6 seconds. The Highway Authority will advise other timings.
V. If the Contractor chooses to switch the signals out when the site is not operating, then the appropriate "Part Time Signals" or "Signals Not Working" boards are to be erected.

**4. Vehicle Detection**

I. Each site is assessed on its merits and microwave detection may be acceptable on the 'main road if traffic speeds are low. However, at most sites inductive loops at 12, 25 and 39 metres from the stop line will be required to operate the signals on the public highway. In addition, if traffic approach speeds exceed 35 mph on the public highway then speed discrimination/speed assessment inductive loops at 79 meters from the stop line.
II. Overhead (either microwave 'X' band or infrared) detection will be authorised for most haul route approaches. However, in some circumstances manual presence detection by an appropriate push button unit may be required.

**5. Site Layout, General Signing and Signal Requirements**

I. All signal heads are to be to the current Department of Transport high intensity type *and* provided with reflective backing boards.
All traffic signal heads are to be fitted with primary signal hoods
The primary signal head shall be located on the near side to traffic on the approach to the crossing(s).
The Secondary signal head shall be located on the offside to approaching traffic, normally on the same pole as the opposite primary head
The minimum height of the signal head (measured from existing carriageway level to the centre of. the amber aspect) shall be 2.3 metres and the maximum shall be 2.7 metres.
VI. Any signal pole shall be at least 114mm diameter, painted grey. All *efforts* shall be made to take cables though the centre of the pole.
VII. If cables are not being carried overhead, then all cables shall be buried in suitable ducts. Road crossing ducts should be 2 x 100mm, and placed at 750mm cover. Footway/verge ducts should be I x 50mm, and placed at an average of 250mm cover Jointing chambers in footway/verge may be required for the inductive loops.
VIII. Where stop lines are not being used, signs to Diagram 563.3 of "The Traffic Sign Regulations and General Directions 198, ("when red light shows - wait here") shall be located not less than 2m. and not more than 5m. in advance of the primary signal head.
IX. Any traffic sign mentioned in this specification, or additional signs installed at the direction of the Highway Authority, shall be in addition to those signs required by Chapter 8 of the current Traffic Signs Manual."

X. Until the signals are officially switched on the Contractor shall ensure that all signal heads are 'sacked off' (e.g. with heavy-duty polythene bags) such that the Signal Contractor can fully test the aspects without displaying any illuminated signals to vehicles.

## 6. Faults

I. All equipment shall display the name of the hirer/owner and emergencies call out telephone number. (In the case of traffic signs this shall be on the rear face and not on the front face).
II. The Signal Contractor shall ensure that all faults to the signal equipment are corrected and/or replaced within two hours of the fault being reported to them,
III. The Highway Authority or their Agents reserve the right to call out the hirer and/or owner, of the signal equipment in the event of a fault being detected/reported, to enable appropriate action to be taken whilst the Contractor/Statutory Undertaker is absent from site, or make other arrangements to ensure safety of road users-

## 7. Traffic Management

I. Additional traffic management measures may need to be taken at the direction of the Highway Authority, and at the expense of the Contractor. At such sites, all signs and signals may be required to be mounted on permanent posts.

## 8. Sign Definition

I. All signs erected shall be of the size colour and type prescribed or authorised by DETR and as indicated in the Traffic Sign Regulations and General Directions 1981 (S.T. 859), the Traffic Signs "Speed Limits" Regulations and General Directions 1969 (S.I.1487).
II. All signs erected shall also conform to the requirements of the current Traffic Sign Manual (as amended by Circular Roads No. 7/75).
III. Any current DETR circular relating to design rules, any dimensional drawings issued by the Department and sections of B.S. 783, and shall also be capable of passing the appropriate tests as laid down in Appendices to B.S. 783.
IV. Unless the Contractor is directed by the Highway Authority to use permanent signs on permanent posts, portable *traffic* signs will be permitted. The signs shall be covered over the whole front face with the appropriate reflective plastic sheeting to the specified colours. The plastic sheeting shall be Class 2 reflective as defined by the DETR
V. Where the haul route crossing is likely to be in operation for a period longer than four weeks, then Class I faced signs on permanent posts, with an approved method of fixing must be used
VI. All signs shall be maintained and cleaned regularly, kept in good order and remain legible to the public and to the specifications listed above or any subsequent Regulations or Specification

## 9. Carriageway Markings

I. At the direction of the Highway Authority, amendments to the existing carriageway markings may be required.
II. Carriageway marking material shall be of a suitable temporary nature approved by the Department of Transport to the satisfaction of the Highway Authority and agreed prior to the commencement of works on site.
III. Carriageway markings shall conform to Chapters 5 and 9 of the current edition of the

"Traffic Signs Manual" and prescribed by the "Traffic Sign Regulations and General Directions, 1981", or any subsequent document.

IV. Unless directed by the Highway Authority no existing carriageway markings shall be permanently removed.

## SERIES 200 - SITE CLEARANCE

### Appendix 2/3: Retention of materials and equipment arising from site clearance

**1.** Any materials and equipment within the existing highway arising from site clearance shall be carefully dismantled, taken up or taken down, cleaned and retained for re-use, stacked, labelled and protected or loaded, and transported to the relevant 6Cs Design Guide authority store. Items damaged in this operation shall be replaced. All replacements shall be of equivalent quality to the original materials and equipment.

### Appendix 2/4: Explosives and blasting

**1.** Blasting for site clearance shall not be used unless agreed by the Engineer.

### Appendix 2/5: Hazardous materials

**1.** The following measures for the handling and disposal of hazardous material found in site clearance are given here as a guide.

(i) Compliance with the Environmental Protection Act 1990, Section 34.

See also the booklet entitled 'Waste Management, THE DUTY OF CARE, a Code of Practice' published by HMSO.

(ii) Compliance with the Control of Pollution Act 1974 Section 17.

## SERIES 300: FENCING

## Appendix 3/1: Fencing, gates and stiles

### General

**1.** Temporary and permanent fences, gates and stiles shall be in accordance with the 6Cs Design Guide Standard Drawings.

### Bird's Mouth Fencing

**2.** Timber for 'Bird's Mouth' fencing shall be home grown sawn softwood complying with BS 1722:Part 2:1989, and preserved in accordance with the recommendations for fencing timber in BS 5589, performance category A.

**3.** Timber dimensions shall be as follows:-

(a) Posts950mm long
100 depth x 140mm width

(b) Rails
100 x 100mm width/depth

**4.** Rails shall be supported by posts set at 2000mm centres and shall be fixed using 500 x 30 x 3mm racecourse straps, clout nails and coach screws. All metal fittings shall be galvanised.

**5.** Posts shall be set in 150mm C/5 type concrete laid in situ on a 150mm well-compacted sub-base.

**6.** Where jointing is necessary, joints shall be in the centre of posts and shall be completely covered by the racecourse straps.

**7.** At right-angle corners, rails shall be supported by two posts and can be cut square with a gap between or mitred to form a flush joint. Where rails do not meet at 90degrees, they shall be supported by two posts and can be cut square with a gap between (overhangs from posts to be between 150 and 300mm for all corners).

## SERIES 400 – SAFETY FENCES, SAFETY BARRIERS AND PEDESTRIAN GUARDRAILS

### Appendix 4/1: Safety fences and safety barriers

**1.** Safety Fences and Barriers shall be in accordance with Section 2 of 'Highway Construction Details' published by Her Majesty's Stationery Office as Volume 3 of the Highways Agency's Manual of Contract Documents for Highway Works.

### Appendix 4/2: Pedestrian guardrails

**1.** Pedestrian guardrails shall be in accordance with the 6Cs Design Guide Standard Drawings. Where provided adjacent to the carriageway they shall be high visibility guardrail unless otherwise agreed.

## SERIES 500 - DRAINAGE

## Appendix 5/1: Drainage requirements

### Pipes for drainage

**1.** Permitted alternative pipe/bed/backfill options are shown in the 6Cs Design Guide Standard Drawings.

### Backfill of drainage, utility and other trenches in carriageway

**2.** All drainage, utility and other trenches in and under carriageway pavements and the vehicular accesses to industrial and commercial premises shall be backfilled up to formation level with type 1 granular sub-base material.

### Catchpits

**3.** Catchpits shall be in accordance with the 6Cs Design Guide Standard Drawings.

### Gullies

**4.** Gullies shall be in accordance with the 6Cs Design Guide Standard Drawings.

**5.** On new construction the brickwork shall be completed after the road base (roadbase) layer(s) have been laid. The Contractor must allow for fixing suitable temporary formwork over the gully prior to laying the road base layer(s).

### Fixing and adjustment of ironwork

**6.** All covers and frames must be raised to finished levels prior to the surface course (wearing course) being laid.

**7.** Where it is necessary to subject the cover, frame and brickwork to early loading then the mortar and bedding material shall be in accordance with the requirements specified in the Standard Drawings.

**8.** Where it is proposed to run traffic on existing surfaces or on binder course (base course) material where ironwork has been set to finished levels ready for the surface course to be laid, then edges should be protected with temporary ramps formed of compacted 6mm dense macadam. The ramps should not exceed 1 in 30 parallel to the flow of traffic or 1 in 15 perpendicular to the flow of traffic. The temporary ramps should be removed immediately prior to surfacing.

### Water test for highway drains

**9.** The test pressure for highway drains shall not be less than 1.2m head of water above the pipe soffit or ground water level, whichever is the higher, at the highest point and not greater than 6m head at the lowest point of the section. Steeply graded drains shall be tested in stages in cases where the maximum head, as stated above, would be exceeded if the whole section were tested in one length.

**10.** The drain shall be filled with water and a minimum period of 2 hours shall be allowed for absorption, after which water shall be added from a measuring vessel at intervals of 5 minutes and the quantity required to maintain the original water level noted. The length of drain shall be accepted if the quantity of water added over a 30 minute period is less than 0.5 litre per linear metre of nominal diameter.

**11.** Notwithstanding the satisfactory completion of the above test, if there is any discernible leakage of water from any pipe or joint, the pipe shall be replaced and/or the joint remade, as appropriate, and the test repeated until leakage is stopped.

**Cleansing and Survey of drainage systems adoptable by the highway authority**

**12.** Drains shall be tested and cleaned, including the cleansing of gullies, on completion of the Works, and at other times at the direction of the highway authority.

**13.** Jetting and a CCTV survey of the system with the exception of gully connections shall be carried out on completion of the Works and again before the end of the maintenance period. A copy of the video tapes and survey reports including gradient profile shall be supplied, free of charge, to the highway authority.

**14.** The drainage system, including gullies, shall also be cleaned at the end of the maintenance period prior to the inspection for adoption.

## Appendix 5/2: Service ducts

**1.** Details for service ducts are as shown on the 6Cs Design Guide Standard Drawings. This shall include the provision of concrete marker blocks and draw ropes as detailed.

## SERIES 600 - EARTHWORKS

### Clause 601 Classification, definitions and uses of earthworks materials

**1** Embankments and other areas of fill shall be formed of acceptable material excavated from within the site or imported on to the site which meets the requirements of Table 6/1 and Appendix 6/1 for acceptability for use in the permanent works and has the approval of the Engineer to be used in that particular location.

**2** Recycled materials may be used for filling below sub-base level including as capping with the approval of the Engineer.

**3** Unacceptable material Class U1 shall be:

(i) material which does not comply with the permitted constituents and material properties of Table 6/1 and Appendix 6/1 for acceptable material;

(ii) material, or constituents of materials, composed of the following:

(a) peat, materials from swamps, marshes and bogs;

(b) logs, stumps and perishable material,

(c) materials in a frozen condition;

(d) clay having a liquid limit determined in accordance with BS 1377 : Part 2, exceeding 90 or plasticity index determined in accordance with BS 1377 : Part 2, exceeding 65;

(e) material susceptible to spontaneous combustion;

**4** Unacceptable material Class U2 shall be:

(i) material having hazardous chemical or physical properties requiring special measures for its excavation, handling, storing, transportation, deposition and disposal.

**5.** Material shall not be deposited within 500mm of concrete, cement bound materials, other cementitious materials or stabilised capping forming part of the Permanent Works if, when tested in accordance with TRL Report 447 either:

(i). The water-soluble sulfate (WS) content exceeds 1500mg of sulfate (as $SO_4$) per litre (Test No.1); or

(ii). The oxidisable sulfides (OS) content exceeds 0.3% of sulfate (as $SO_4$) (Test Nos. 2 and 4);

**6.** Material shall not be deposited within 500mm of metallic items forming part of the Permanent Works if, when tested in accordance with TRL Report 447 either:

(i). The water-soluble sulfate (WS) content exceeds 300mg of sulfate (as $SO_4$) per litre (Test No.1); or

(ii). The oxidisable sulfides (OS) content exceeds 0.06% of sulfate (as $SO_4$) (Test Nos. 2 and 4.

## Appendix 6/1: Requirements for acceptability, testing and compaction etc. of earthwork materials

### Permitted classes and material properties for acceptability.

**1.** Permitted classes of earthwork materials for use in the works are listed, together with material properties required for acceptability, in Table 6/1 included in this Appendix. Table 6/2/1 (included in this Appendix) supplements Table 6/2 (also included in this appendix for convenience).

**2.** Slake Durability Index where specified in Table 6/1 shall be determined in accordance with the test method described by FRANKLIN, J.A. and CHANDRA, R. “The Slake Durability Test”. J. Rock Mech. Min. Sci. 1972, 9 325-341. The result of the test shall be that obtained after two standard cycles of drying and wetting (ID2).

**3.** Point Load Strength Index Is where specified in Table 6/1 shall be determined in accordance with the irregular lump test method described by BROCH, E. and FRANKLIN, J.A. “The test shall be carried out on the size fraction of the material in excess of 50mm”.

**4.** Landscape areas are to be constructed using Class 4 fill material.

**On site classification and sampling.**

**5.** The classification of the earthworks materials shall be carried out by the Contractor at excavation for on-site materials, and at the point of deposition for imported materials (see Appendix 1/5: Testing to be carried out by the Contractor). The Engineer shall provide confirmation of acceptability of materials. If in the opinion of the Engineer the material has altered it's classification or become unacceptable for whatever reason, he may request the repeat of the classification and acceptability tests given in Table 6/1 and this Appendix 6/1.

**6.** The classification and confirmation of acceptability of imported earthworks materials will require source approval. For the source of fill to be considered for approval the source shall be visited by a geotechnical engineering representative agreed or nominated by the Engineer at least seven days prior to the material being brought to site. The purpose of the visit will be to compare the source with the following information that shall be provided by the Contractor prior to the visit:-

i) Location of fill source and method of extraction of fill.
ii) Classification of fill.
iii) Data to show material meets specification criteria for acceptable fill.
iv) Amount of fill to be extracted.
v) Evidence indicating consistency of source.

**7.** Where considered necessary by the Engineer, samples of the material will be taken by the Engineer to verify classification and specification criteria. The Contractor shall allow sufficient time for the testing and approval of any samples of material taken by the Engineer, taking into account the programme for the works.

**Compaction of fills**

**8.** Compaction shall be in accordance with Clause 612 and tables 6/1, 6/2, 6/2/1 and 6/4 included in this Appendix.

**9.**

**Appendix 6/2: Requirements for dealing with class U2 unacceptable material (hazardous material)**

**1.** Where materials on the site have been designated as Class 2 hazardous material or where hazardous materials are encountered during the progress of the works, the Contractor shall make all necessary arrangements for their safe handling and disposal as Class U2 material after consultation with the appropriate District Council's Environmental Health Officer and, if necessary, the Health and Safety Executive.

**Appendix 6/5: Geotextiles used to separate earthworks materials**

**General**

**1.** The grade and extent of use of geotextile membranes as part of the permanent works shall be determined in specific cases where their use is deemed to be appropriate and agreed by the Engineer. Where excavation takes place after the geotextile has been laid the affected area must be excavated, the geotextile exposed and a new piece of geotextile laid and lapped over the damaged area.

**Specification**

**2.** Geotextile Terram Type 2000 or similar shall be used.

**Minimum life expectancy**

**3.** The minimum guaranteed life shall be 20 years.

**Number of samples for subsequent testing**

**4.** Every 400$m^2$ of geotextile used in works.

**Testing criteria**

**5.** The geotextile shall satisfy the criteria as specified in Clauses 609.4 (ii) and 609.4 (iii) of the Manual of Contract Documents for Highway Works Volume 1. The testing procedure shall generally comply with that specified in Clause 609 of the Manual of Contract Documents for Highway Works Volume 1 (Refer to Table 6/5/1 below).

**Table 6/5/1: Geotextile properties**

| Property | Units | Value | Suggested Test Procedure |
|---|---|---|---|
| Mass per unit area | $g/m^2$ | 230 | Draft ISO (Document 1987/9863) |
| Nominal thickness/dimensions | mm | 1.0 | Draft ISO (Document 1987/9863) |
| Apparent opening size ($O_{90}$) | micro-m | 50 | See Clause 609.10 |
| Tensile strength and strain (wide strip) | kN/m<br>% | 3<br>30 | See Clause 609.8 |
| Tear strength Trapezoidal 75mm | N | 600 | ASTM D 1117 |
| Burst Strength | $N/mm^2$ | 2.8 | ASTM D 3786 |
| Permeability | $1/m^2/s$ | 33 | See Clause 609(9) |

**Details of laying and lapping**

**6.** The geotextile shall be laid and lapped in accordance with Clauses 609.5 and 609.6 of the Manual of Contract Documents for Highway Works Volume 1. The minimum lap shall be 300mm.

## Appendix 6/7: Sub-formation & capping & surface treatment of formation

**Permitted classes of capping**

**1.** Permitted material for capping shall be Class 6F2 or recycled material to Class 6F3 complying with Table 6/1 and 6/2.

**2.** Where specifically permitted by the Engineer, material stabilised by the use of cement or lime or both shall comply with clauses 614, 615 and 643 of the Specification for Highway Works.

**Treatment of soft areas below sub-formation levels**

**3.** The Engineer shall be notified of the identification of soft areas below sub-formation or formation. The Engineer will agree one of the following remedies:-

i) Excavate the soft area to a depth determined by the Engineer and refill the resulting excavation with acceptable filling materials having the same characteristics and strengths of the surrounding material. Material generated from the excavation shall be dealt with as unacceptable Class U1.

ii) Selected granular fill Class 6F2 shall be spread and levelled in horizontal layers not exceeding 1.5 times the maximum particle size across the soft area. Each layer shall be subjected to vibratory compaction by a roller of mass per unit width not less than 2700kg until the fill penetrates the substrata layer or until refusal. Refusal shall be taken as no discernible change in level of the top layer following 4 passes of the roller.

## Appendix 6/8: Topsoiling

**1.** Topsoiling shall be carried out using Class 5 material complying with Table 6/1.

**2.** The topsoil depth shall be 150mm.

**3.** Imported topsoil shall comply with BS 3882:1994, General Purpose Grade.

**4.** No topsoil shall be supplied from any source until a sample of the topsoil from each source has been inspected and approved by the Engineer. All topsoil supplied must be of the same quality as the approved sample(s).

**5.** Topsoil shall be spread, graded and consolidated by hand or mechanical means.

**6.** Any materials deemed unsuitable by the Engineer, that are brought to the surface by the spreading, grading and consolidation of topsoil shall be collected up disposed of off site.

**7.** Topsoiled areas shall not be traversed by machinery or used for storage purposes.

**8.** The top 50mm of topsoil shall be reduced to a fine tilth and graded to final levels (after consolidation) 20mm (less the turf thickness where turf used) above top of kerbs, edgings, manhole covers and hard surfaces etc. Any weed growth, rubbish and stones larger than 25mm in any dimension are to be removed and disposed of off site. If seeding or turfing does not follow topsoiling directly the areas to be seeded or turfed must be kept weed free by herbicide treatment.

## CARRIAGEWAY CONSTRUCTION

### Road categories

**1.** This Specification covers different categories of road. Listed below are the most common categories, the construction specification of which varies according to the road category (type). It is essential that the road category is clearly marked on the plans submitted for approval. Definitions of the road types are included in part 3 of the '6Cs Design Guide', dealing with layout.

| **Road Category** | **Abbreviation** |
|---|---|
| Residential access road | RAR |
| Residential access way | RAW |
| Major industrial access road | Maj IAR |
| Minor industrial access road | Min IAR |
| | |

**2.** This Specification also applies to the construction and improvement of new and existing higher category roads for new developments.

### Road pavements

**3.** Details of materials and layer thicknesses for the road categories included in Clause 1 above are included in Part 4 Section MC10: Road Pavements, of the '6Cs Design Guide'. Full details of the permitted standard materials are included in Appendix 7/1 of this Specification.

**4.** The design of road pavements for higher category roads shall be on a site-by site basis to the Design Manual for Roads and Bridges, Volume 7. Materials for higher category roads shall be in accordance with Appendix 7/1 of this Specification unless agreed otherwise.

## SERIES 700: ROAD PAVEMENTS - GENERAL

### Clause 701 Pavement Construction

**1.** Pavement construction thickness will vary according to road category as set out in Part 4 of the '6Cs Design Guide'.

**2.** For carriageway construction thicknesses see Part 4 of the '6Cs Design Guide'.

**3.** Road pavements shall be constructed from the permitted materials options included in Part 4 of the '6Cs Design Guide' and as specified in detail in Appendix 7/1 of this Specification.

### Clause 702 Horizontal alignments, surface levels and surface regularity of pavement courses

### Horizontal alignments

**1.** Horizontal alignments shall be determined from the approved drawings and setting out information. The edge of the pavement as constructed and all other parallel alignments shall be correct within a tolerance of 25mm there from, except for kerbs, channel blocks and edging kerbs which shall be laid with a smooth alignment within a tolerance of ±13mm.

## Appendix 7/1: Permitted pavement options

### Sub-base

### General

**1.** Sub-base shall be Type 1 to Clauses 801, 802, and 803 of the Specification for Highway Works. Material shall be non frost susceptible if it is used within 450mm of designed final surface of a road or paved central reserve.

## Appendix 7/1 continued REQUIREMENTS FOR CONSTRUCTION MATERIALS

| Material Ref. | Clause Ref | Material | Special Requirements |
|---|---|---|---|
| SC1 | 971AR | SMA 14 surf 40/60 | Clause 971AR<br>Course Aggregate: crushed rock and steel slag only<br>Minimum PSV: see Package Order<br>Maximum AAV: see Package Order<br>Grit (SG1/G1) to be applied in accordance with Clause 972AR where required by Package Order |
| SC2 | 971AR | SMA 10 surf 40/60 | Clause 971AR<br>Course Aggregate: crushed rock and steel slag only<br>Minimum PSV: see Package Order<br>Maximum AAV: see Package Order<br>Grit (SG1/G1) to be applied in accordance with Clause 972AR where required by Package Order |
| SC3 | 971AR | SMA 6 surf 100/150<br><br>Footway Surfacing | Clause 971AR<br>Course Aggregate: crushed rock and steel slag only<br>Minimum PSV: N/A<br>Maximum AAV: N/A |
| SC4 | 971AR | SMA 20 surf 40/60 | Clause 971AR<br>Course Aggregate: crushed rock and steel slag only<br>Minimum PSV: see Package Order<br>Maximum AAV: see Package Order<br>Sealing Grit (SG1/G1) to be applied in accordance with Clause 972AR |
| SC5 | 910<br><br>&<br><br>915 | HRA 35/14 F surf 40/60 rec<br><br><br><br>14/20 Pre-coated chippings | EN13108-4 and PD 6691 Table C.2A col 10. Limiting wheel track values PD 6691 Table C.3<br>Course aggregate: crushed rock, blast furnace slag and steel slag only<br>Minimum PSV: 50<br>Maximum AAV: 10<br>PD6691 Annex C<br>Minimum PSV: see Package Order<br>Maximum AAV: see Package Order<br>Flakiness category: $FI_{20}$ |
| SC6 | 911<br><br>&<br><br>915 | HRA 35/14 F surf 40/60 des<br><br><br><br>14/20 Pre-coated chippings | EN13108-4 and PD 6691 Table C.2A col 10. Limiting wheel track values PD 6691 Table C.3<br>Course aggregate: crushed rock, blast furnace slag and steel slag only<br>Minimum PSV: 45<br>Maximum AAV: 12<br>PD6691 Annex C<br>Minimum PSV: see Package Order<br>Maximum AAV: see Package Order<br>Flakiness Category: $FI_{20}$ |
| SC7 | 911 | HRA 55/10 F surf 40/60 des | PD 6691 Annex C Table C2.A col 6<br>Course aggregate: crushed rock, blast furnace slag and steel slag only<br>Minimum PSV: see Package Order |
| SC8 | 911 | HRA 55/10 F surf 100/150 des | PD 6691 Annex C Table C2.A col 6<br>Course aggregate: crushed rock only excluding limestone.<br>Minimum PSV: see Package Order |

| Material Ref. | Clause Ref | Material | Special Requirements |
|---|---|---|---|
| SC9 | 911 | HRA 55/14 F surf 40/60 des | PD 6691 Annex C Table C2.A col 12<br>Course aggregate: crushed rock, blast furnace slag and steel slag only.<br>Minimum PSV: see Package Order |
| SC10 | 912 | AC 14 close surf 100/150 | PD6691 Table B.14<br>Minimum PSV: see Package Order<br>Maximum AAV: see Package Order |
| SC11 | 912 | AC10 close surf 100/150 | PD6691 Table B.14<br>Minimum PSV: see Package Order<br>Maximum AAV: see Package Order |
| SC12 | 909 | AC 6 dense surf 100/150<br><br>Footway surfacing | PD6691 Table B.16<br>Minimum PSV: 55 |
| SC13 | 909 | AC 6 dense surf 160/220<br><br>Footway Surfacing | PD6691 Table B.16<br>Minimum PSV: 55 |
| SC14 | 942 | Thin Surface Course Systems | Traffic Count: see Package Order<br>Site definition and Stress Level: see Package Order<br>Course Aggregate Min PSV: 68+<br>Max AAV for systems based on surface dressing and slurry seal techniques: see Package Order<br>Max AAV for systems not based on surface dressing and slurry seal techniques: see Package Order<br>Minimum wheel tracking level required on BBA HAPAS Roads and Bridges Certificate: 3<br>Road/tyre noise level required on BBE HAPAS Certificate: 2<br>Average texture depth: Clause 942.13<br>Guarantee period: 5 years<br>Surface Texture performance requirements: Clause 942.16 |
| SC15 | 942 | Thin Surface Course Systems | Traffic Count: see Package Order<br>Site definition and Stress Level: see Package Order<br>Course Aggregate Min PSV: 65<br>Max AAV for systems based on surface dressing and slurry seal techniques: see Package Order<br>Max AAV for systems not based on surface dressing and slurry seal techniques: see Package Order<br>Minimum wheel tracking level required on BBA HAPAS Roads and Bridges Certificate: 3<br>Road/tyre noise level required on BBE HAPAS Certificate: 2<br>Average texture depth: Clause 942.13<br>Guarantee period: 5 years<br>Surface Texture performance requirements: Clause 942.16 |
| SC16 | 942 | Thin Surface Course Systems | Traffic Count: see Package Order<br>Site definition and Stress Level: see Package Order<br>Course Aggregate Min PSV: 60<br>Max AAV for systems based on surface dressing and slurry seal techniques: see Package Order<br>Max AAV for systems not based on surface dressing and slurry seal techniques: see Package Order<br>Minimum wheel tracking level required on BBA HAPAS Roads and Bridges Certificate: 3 |

| | | | |
|---|---|---|---|
| | | | Road/tyre noise level required on BBE HAPAS Certificate: 2<br>Average texture depth: Clause 942.13<br>Guarantee period: 5 years<br>Surface Texture performance requirements: Clause 942 |
| **Material Ref.** | **Clause Ref** | **Material** | **Special Requirements** |
| SC17 | 943 | Hot Rolled Asphalt Surface Course (Performance Related Design Mix) | Thickness: see Package Order<br>Minimum PSV: See Package Order<br>Maximum AAV: See Package Order<br>Minimum delivery temperature: Clause 945.4<br>Maximum wind speed and minimum air temperature: Clause 945.4<br>Provision of data: information on the properties of modified binder shall be provided either in the form of BBA certificate or as described in Item 7 of this Appendix.<br>Cores shall be obtained in accordance with Clause 943.17<br>Site Classification: 2<br>Test temperature for wheel tracking and rut depth tests shall be $60^{o}$ C<br>Wheel tracking rate: 5.0mm/hr<br>Wheel tracking rut depth: 7.0mm<br>Coated chippings nominal size 20mm |

| **Material Ref.** | **Clause Ref** | **Material** | **Special Requirements** |
|---|---|---|---|
| BC1 | 906 | AC 20 dense bin 40/60 rec | PD6691 Annex B Table B.11<br>Course aggregate: crushed rock, crushed gravel, blast furnace slag and steel slag only.<br>Layer thickness: 60mm |
| BC2 | 906 | AC 20 dense bin 100/150 rec | PD6691 Annex B Table B.11<br>Course Aggregate: crushed rock and blast furnace slag and steel slag only.<br>Layer thickness: 60mm |
| BC3 | 906 | AC 20 dense bin 160/220 rec | PD6691 Annex B Table B.11<br>Course Aggregate: crushed rock and blast furnace slag and steel slag only.<br>For use in footways only |
| BC4 | 929 | AC 20 HDM bin 40/60 des | PD6691 Annex B Tables B.6 and B.7<br>Course Aggregate: crushed rock, crushed gravel, blast furnace slag and steel slag only.<br>Layer thickness: 60mm |
| BC5 | 929 | AC 32 HDM bin 40/60 des | PD6691 Annex B Tables B.5and B.7<br>Course Aggregate: crushed rock, crushed gravel, blast furnace slag and steel slag only. |
| BC6 | 905 | HRA 50/20 bin 40/60 rec | PD6691 Annex C Table C.1<br>Course Aggregate: crushed rock, crushed gravel, blast furnace slag and steel slag only. |
| BC7 | 905 | HRA 60/20 bin 40/60 rec | PD6691 Annex C Table C.1<br>Course Aggregate: crushed rock, crushed gravel, blast furnace slag and steel slag only. |

| | | | |
|---|---|---|---|
| REG1 | 971AR | SMA 6 surf 40/60<br><br>Carriageway Regulating | Clause 971AR<br>Course Aggregate: crushed rock and steel slag only<br>Minimum PSV: N/A<br>Maximum AAV: N/A |
| REG2 | 907 | HRA 50/10 bin 40/60 rec<br><br>Regulating | PD6691 Annex C Table C.1<br>Course Aggregate: crushed rock, crushed gravel, blast furnace slag and steel slag only.<br>Minimum thickness: 30mm |
| REG3 | 907 | HRA 50/14 bin 40/60 rec<br><br>Regulating | PD6691 Annex C Table C.1<br>Course Aggregate: crushed rock, crushed gravel, blast furnace slag and steel slag only.<br>Minimum thickness: 35mm |

| | | | |
|---|---|---|---|
| REG3 | 907 | HRA 50/14 bin 40/60 rec<br><br>Regulating | PD6691 Annex C Table C.1<br>Course Aggregate: crushed rock, crushed gravel, blast furnace slag and steel slag only.<br>Minimum thickness: 35mm |
| REG4 | 907 | HRA 50/20 bin 40/60 rec | PD6691 Annex C Table C.1<br>Course Aggregate: crushed rock, crushed gravel, blast furnace slag and steel slag only.<br>Minimum thickness: 50mm |
| **Material Ref.** | **Clause Ref** | **Material** | **Special Requirements** |
| B1 | 906 | AC 32 dense base 40/60 rec | PD6691 Annex B Table B.11<br>Course Aggregate: crushed rock, crushed gravel, blast furnace slag and steel slag only.<br>Minimum thickness: 100mm assuming 100mm total in layers above |
| B2 | 906 | AC 32 dense base 100/150 rec | PD6691 Annex B Table B.11<br>Course Aggregate: crushed rock, blast furnace slag and steel slag only. Use of crushed gravel permitted provided the binder grade is reduced to 40/60 and material thickness maintained for 100/150 pen option.<br>Minimum thickness: 100mm assuming 100mm total in layers above |
| B3 | 906 | AC 32 dense base 160/220 rec | PD6691 Annex B Table B.11<br>Course Aggregate: crushed rock, crushed gravel, blast furnace slag and steel slag only.<br>Minimum thickness: 100mm assuming 100mm total in layers above |
| B4 | 929 | AC 32 HDM base 40/60 des | PD 6691 Tables B.5 and B.7.<br>Course aggregate: crushed rock, crushed gravel, blast furnace slag and steel slag only.<br>Minimum thickness: 100mm assuming 100mm total in layers above |
| B5 | 904 | HRA 60//32 base 40/60 rec | PD6691 Annex C Table C.1<br>Course Aggregate: crushed rock, crushed gravel, blast furnace slag and steel slag only.<br>Minimum thickness: 100mm assuming 100mm total in layers |

| | | | |
|---|---|---|---|
| | | | above. |

| Material Ref. | Clause Ref | Material | Special Requirements |
|---|---|---|---|
| B5 | 904 | HRA 60//32 base 40/60 rec | PD6691 Annex C Table C.1<br>Course Aggregate: crushed rock, crushed gravel, blast furnace slag and steel slag only.<br>Minimum thickness: 100mm assuming 100mm total in layers above. |
| FABM-1 | 890AR | FABM-1 | Clause 890AR<br>Mechanical Performance Level $C_{6/8}$ |
| SB1 | 803 | Granular Type 1 | Minimum equivalent CBR requirement 30% |
| SB2 | 804 | Granular Type 2 | Trafficking trial is required – for use on Highways Agency Schemes only. |
| SG1 | 972AR | Coated Grit | Clause 972AR Method A as required by the Package Order |
| G1 | 972AR | Grit | Clause 972 AR Method B as required by the Package Order |
| HFS1 | 924 | High Friction Surfacing | Type Classification: 1<br>Minimum PSV: 70<br>Colour: see Package Order<br>The material shall not contain:<br>- Lead Chromate<br>- Cadmium<br>- Barium<br><br>Where thin wearing course is to be covered by High Friction Surfacing (HFS) the contractor shall reduce the texture of the area of the thin wearing course system to between 1 and 2 mm as measured by the sand patch test. This may be achieved by any suitable means, as detailed Nhd 37/99. Where the surfacing is to be trafficked prior to the application of HFS, 3mm grit shall be applied and rolled in to provide enhanced short-term skid resistance, as detailed in HD 37/99.<br><br>If wearing course is opened to traffic before High Friction Surfacing is laid, the Contractor shall erect temporary road signs as approved by the Overseeing Organisation. |
| TC1 | 920 | Tack/Bond Coat | BS 594987 clause 5 unless otherwise described in the Package Order |

## Appendix 7/2: Excavation, trimming and reinstatement of existing surfaces

**1.** Reinstatements of all openings shall comply with the 'Specification for the Reinstatement of Openings in Highways' issued by the Highway Authorities and Utilities Committee. Distributor Roads and Industrial Access Roads shall be reinstated as Type 3 roads. Lower category roads shall be reinstated as Type 4 roads.

## Appendix 7/3: Surface dressing specification

### CARRIAGEWAY DRESSING SPECIFICATION

1. This is an end-product specification

2. The Contractor is entirely responsible for the design, execution and aftercare of the Works. The Contractor is also responsible for all control of the work on site.

3. The specification, design and method of working will generally be in accordance with the documents listed in Appendix A. The agreement of the Engineer, or his delegated representative, must be sought before the Contractor departs from the procedures given in those documents.

4. A copy of the Design and Daily Work Sheets shall be submitted to the Engineer's Representative at the end of the work.

5. Traffic management and speed limits through work sites shall comply with the recommendations of the documents listed in Appendix A. The following type of procedure will be required for Group 2 Roads (as defined in clause 14 below):-

   (a) Cone off one traffic lane for a distance of approximately 250 metres.

   (b) Apply binder and chippings on the traffic lane.

   (c) Roll.

   (d) Open traffic lane to slow moving traffic (10mph gradually increasing to 20mph). Reposition cones as necessary so that all parts of the lane are compacted.

   (e) Sweep traffic lane to remove surplus chippings. Closing lane as necessary.

   (f) Centre line coning and/or convoying of traffic using a Contractor's vehicle may be required.

Standards

6. All plant and materials shall comply with current Standards, where they exist.

Chippings

7. (a) Polished stone value (PSV) and aggregate abrasion value (AAV) for all roads shall be in accordance with Department of Transport Design Manual for Roads and Bridges, Vol.7 "Pavement Design and Maintenance" – HD36/99 Surfacing Materials for New and Maintenance Construction. Chippings used shall have a minimum PSV of 55 and a maximum flakiness index of 25 unless agreed otherwise.

(b) The Contractor shall spread chippings using a purpose-built, self-propelled, controlled metering chipping spreader designed to give an accurate spread of chippings irrespective of road speed and variable width of spread controlled by the operator during progress. The chipping spreading plant shall incorporate a speed linked mechanical device controlling the rate of spread of chippings. Lorry-mounted tailgate chipping spreaders shall only be used with the written approval of the Engineer. The maximum dust contact shall be limited to the following percentage passing a 75 micron test sieve based on Wet Sieving.

| Size | Maximum Dust Content (%) |
|---|---|
| 14 | 0.5 |
| 10 | 0.8 |
| 6 | 1.0 |

Sampling and Testing

8. (a) The Engineer shall be given the opportunity to attend all plant or material sampling and testing. The Contractor shall give the Engineer reasonable notice of all sampling and testing.

(b) Sampling procedures shall comply with the appropriate B.S. These will include BS812:Part 102:1989 and BS434:Part 1:1984.

(c) Contractors plant shall be tested regularly, in accordance with the relevant B.S. to verify that it is operating correctly. These standards will include BS1707:1970 (1980). Hot binder distributors for road surface dressing.

(d) A list of tests and frequencies is given in Appendix B.

(e) All off-site tests shall be carried out in a laboratory with NAMAS approval.

(f) Copies of all tests (including re-tests) complete with results shall be supplied to the Engineer directly.

Defects

9. (a) Where defects occur, Supplementary Report No. 627 by the Transport and Road Research Laboratory and Design Manual for Roads and Bridges: Vol 7 Bituminous Surfacing Materials and Techniques HD 37/97 shall be used, where appropriate, to assess the probable cause and the remedial action, which shall be agreed with the Engineer.

(b) Defects which result from the surface dressing process shall be rectified promptly by the Contractor at his cost.

Unsuitable Weather

10. Work shall stop in any of the following conditions:-

(i) during periods of rain or drizzle or when there is standing water on the carriageway.

(ii) When the road temperature is below the following values:-

| Type of Binder | Uncoated Chippings | Coated Chippings |
|---|---|---|
| Bitumen emulsions | 10 Deg.C | - |
| Other Binders | 15 Deg.C | 13 Deg.C |

(iii) when the road surface temperature exceeds 35 Deg.C on Groups 1 and 2 roads or 40 Deg. C on Group 3 roads.

Surplus Chippings

11. (a) The Contractor shall maintain the carriageway and adjacent footways free from loose and surplus chippings for a period of 28 days after completion of rolling the dressing. At the end of 28 days the Contractor shall meet the Engineer on site to agree acceptance of the site.

(b) Any site which is reported to have loose or surplus chippings shall be swept by the Contractor within 24 hours of the receipt of such report.

(c) Once the Engineer has accepted the site any further sweeping, which he shall order, shall be done within 24 hours of the receipt of the instruction. This requirement stands for the duration of the Maintenance Period.

Advanced Notification of Works

12. The Contractor shall notify residents and local businesses about the impending works not more than 48 hours in advance of the start of the works. In the case of streets due to be treated on a Monday the leaflet should be posted the preceding Friday or Saturday. The notice card shall be delivered by the Contractor to all properties affected by the works. The notice card shall contain a contact telephone number, a layman's description of the work and advise when the works will start. It shall be approved by the Engineer's Representative.

Parked Vehicles

13. The Contractor shall be responsible for clearing parked vehicles.

Road Groups

14. For the purpose of this Specification:-

Group 2 roads shall be trunk and principal roads and other roads listed by the Engineer.

Group 3 roads shall be roads other than groups 1 and 2.

Information Signs

15. The Contractor shall erect and maintain information signs to Diagram 7008 at the ends of each site. They shall be removed when the surface dressing operation is complete.

Overhead Cables

16. The Contractor shall erect and maintain warning signs beneath all overhead cables. The signs shall be double sided, highly conspicuous, minimum size 450mm high and bear the legend "DANGEROUS OVERHEAD CABLES". Signs shall be provided on both sides of the carriageway.

    The Contractor shall warn all persons engaged on the works of the risks associated with working under overhead cables.

    The Contractor should consider fitting warning lights in the cabs of tipping vehicles. The light would indicate when the tipping body is not fully lowered.

Road Markings

17. The Contractor shall record the location and type of all road markings prior to commencing work.

    The Contractor shall be responsible for reinstating all road markings removed or covered by the works. The markings shall be applied within the following time periods:-

    Immediately – temporary reinstatement of all "Give Ways" and "Stop Lines" (Diag 1002.1) with white spray paint, and the installation of tapers in shoulder to shoulder coning to guide road users away from solid features such as pedestrian refuges and kerbing extensions. A taper shall contain a minimum of 10 number 1 metre high cones

    7 days – application of white double centre line systems, junction, any lines guiding road users away from solid features such as pedestrian refuges, kerbing extensions, any other markings designated essential by the Engineer and yellow mandatory road markings.

    28 days – application of all other road markings.

    At junctions where all, or any part, of the STOP or GIVE WAY markings have been removed, or covered and temporary markings cannot be provided a sign bearing the legend 'STOP MARKINGS ERASED' or 'GIVE WAY MARKINGS ERASED' shall be displayed near the junction, preferably between 5 and 10 metres from the edge of the main road carriageway.

    On lengths of road where lane lines or centre of carriageway lines have been removed, or covered signs bearing the legend 'NO ROAD MARKINGS FOR X MILES' shall be provided with the appropriate distances displayed.
    Where "School Keep Clear" markings are covered the contractor shall place 750mm cones at 3 metre spacing until the markings are replaced.

## FOOTWAY SURFACE DRESSING SPECIFICATION

1 This is a method-product specification.

2. The Contractor is entirely responsible for the execution and aftercare of the Works. The Contractor is also responsible for all control of the work on site.
3. The method of working will be in accordance with this document, and further within the general requirements of the documents listed in Appendix A. The agreement of the Engineer, or his delegated representatives, must be sought before the Contractor departs from the procedures given in the stated documents.
4. The Design and Daily Work Sheets shall be submitted to the Engineer's Representative at the end of each week.
5. Traffic management and speed limits through work sites shall comply with the recommendations of the documents listed in Appendix A.

Standards 6. All plant and materials shall comply with current Standards, where they exist.

Chippings 7. The polished stone value (PSV) of the aggregate shall be a minimum of 45.

The aggregate abrasion value (AAV) shall be a maximum of 14.

The grading of the chippings shall be in accordance Table 1 on a WET SIEVING:-

Table 1

| Sieve Size | Percentage by mass passing |
|---|---|
| 6mm | 100 |
| 5mm | 90/100 |
| 3.35mm | 35/55 |
| 2.36mm | 5/25 |
| 1.18mm | 0/5 |
| 600 micron | 0/2 |
| 150 micron | 0/1 |
| 75 micron | 0/1 |

| | | | |
|---|---|---|---|
| Binder | 8 | (a) | The binder shall be a K1 – 70 bitumen emulsion in accordance with BS 434: Bitumen road emulsions (anionic and cationic). |
| | | (b) | The bitumen used for the manufacture of the emulsion shall have a viscosity of 200 pen binder and comply with BS 3690 : Bitumens for building and civil engineering. The base binder may be modified in accordance with BS 434 : Part 1 : Clause 4, to extend the surface dressing season. |
| | | (c) | The rate of spread of binder shall be 1.6l/$m^2$ (1.6mm. depth) +/- 10% according to the surface condition of the footway. |
| Contractors Plant | 9 | (a) | The Contractors shall spread chippings using a purpose-built, self propelled, controlled metering chipping spreader designed to give an accurate spread of chippings irrespective of vehicle speed and variable width of spread controlled by the operator during progress. The chipping spreading plant shall incorporate a speed linked mechanical device controlling the rate of spread of chippings.<br>Lorry-mounted tailgate chipping spreaders shall only be used with the written approval of the Engineer. |
| | | (b) | Wherever possible the Contractor shall spray the bitumen emulsion using a purpose-built, self-propelled, binder sprayer designed to give a uniform of discharge of bitumen emulsion.<br>The sprayer shall have a certificate validating its compliance relating to the even transverse distribution of bitumen emulsion in accordance with BS 1707.<br>The sprayer shall also possess an accurate 'Speed Chart' indicating appropriate speed of the sprayer to deliver particular depths of bitumen emulsion. |
| | | (c) | In areas where obstructions do not permit the use of a binder sprayer as described in 8(b), and only in these areas, the use of a hand spray-lance is permitted. The contractor, by using a simple tray test, shall be able to demonstrate to the Engineers Representative that the spray lance operator is able to consistently gauge a binder film thickness of 1.6mm. +/- 10%. |
| Site Preparation | 10 | (a) | Immediately before surface dressing the full width of the paved footway shall be exposed, by edging back if necessary and cleaned. Vegetation, topsoil, loose material and dust shall be removed from the surface to be dressed and from voids in the footway. |
| | | (b) | Anticipated cleaning methods are pressure washing, ambient or hot air lines, sweeping and vacuuming. Other methods are not precluded, but should be discussed with the Engineer's Representative before they are implemented.<br>Arisings shall be removed from site and disposed of in a licensed waste disposal site. |
| | | (c) | The use of an approved weedkiller is permitted at the Contractor's discretion. The Engineers Representative must be supplied with BASIS registration details prior to the application. |
| | | ~~(d)~~ | Where the Contractor considers that he needs to trim back overhanging hedges, plants, or shrubs, he should advise the Engineer's Representative before starting to ensure that the frontage owner is consulted. |

Sampling and Testing

11 (a) The Engineer shall be given the opportunity to attend all plant or material sampling and testing. The contractor shall give the Engineer reasonable notice of all sampling and testing.

(b) Sampling procedures shall comply with the appropriate British Standard. These will include BS812:Part 102:1989and BS434:Part 1:1984.

(c) Contractors plant shall be tested regularly, in accordance with the relevant British Standard to verify that it is operating correctly.
These standards will include BS1707:1970 (1980). Hot binder distributors for road surface dressing.

(d) A list of tests and frequencies is given in Appendix B.

(e) All off-site tests shall be carried out in a laboratory with NAMAS approval.

(f) Copies of all tests (including re-tests) complete with results shall be supplied to the Engineer directly.

Defects

12 (a) Where defects occur, Supplementary Report No. 627 by the Transport and Road Research Laboratory and Design Manual for Roads and Bridges: Vol. 7 Bituminous Surfacing Materials and Techniques HD 37/97 shall be used, where appropriate, to assess the probable cause and the remedial action, which shall be agreed with the Engineer.

(b) Defects which result from the surface dressing process shall be rectified promptly by the Contractor at his cost.

Unsuitable Weather

13 Work shall stop in any of the following conditions:-

(i) during periods of rain or drizzle or when there is standing water on the footway,

(ii) when the footway temperature is below the following values:-

| Type of Binder | Uncoated Chippings | Coated Chippings |
|---|---|---|
| Bitumen emulsions | 10 Deg.C | |
| Other binders | 15 Deg.C | 13 Deg.C |

(iii) when the footway surface temperature exceeds 40 Deg.C.

Surplus Chippings

14 (a) The Contractor shall ‘Lightly sweep’ the surface dressed footway to remove any excess of loose chippings within 24 hours of laying. This may be delayed with the agreement of the Engineer. Thereafter he shall maintain the footways and

| | | | |
|---|---|---|---|
| | | | adjacent carriageways free from loose and surplus chippings for a period of 28 days after completion of rolling the dressing. At the end of 28 days the Contractor shall meet the Engineer on site to agree acceptance of the site. |
| | | (b) | Any site which is reported to have loose or surplus chippings shall be swept by the Contractor within 24 hours of the receipt of such report. |
| | | (c) | Once the Engineer has accepted the site any further sweeping which he shall order, shall be done within 24 hours of the receipt of the instruction. This requirement stands for the duration of the maintenance period. |
| Advanced Notification of Works | 15 | | The Contractor shall notify residents and local businesses about the impending works not more than 48 hours in advance of the start of the works. In the case of streets due to be treated on a Monday the leaflet should be posted the preceding Friday or Saturday. The notice card shall be delivered by the Contractor to all properties affected by the works. The notice card shall contain a contact telephone number, a layman's description of the work and advise when the works will start. It shall be approved by the Engineer's Representative. |
| Parked Vehicles | 16 | | The Contractor shall be responsible for clearing parked vehicles. |
| Informatio n Signs | 17 | | The Contractor shall erect and maintain information signs to Diagram 7008 at the ends of each site. They shall be removed when the surface dressing operation is complete. |
| Overhead Cables | 18 | (a) | The Contractor shall erect and maintain warning signs beneath all overhead cables. The signs shall be double sided, highly conspicuous, minimum size 450mm high and bear the legend "DANGER OVERHEAD CABLES". Signs shall be provided on both sides of the carriageway. |
| | | (b) | The Contractor shall warn all persons engaged on the works of the risks associated with working under overhead cables. |
| | | (c) | The Contractor should consider fitting warning lights in the cabs of tipping vehicles. The light would indicate when the tipping body is not fully lowered. |
| Road Markings | 19 | (a) | The Contractor shall record the location and type of all footway markings prior to commencing work. |
| | | (b) | The Contractor shall be responsible for reinstating all footway markings removed or covered by the works. The |

markings shall be applied within the following time periods.

- Immediately – temporary reinstatement of all “Give Ways” and “Stop Lines” with white spray paint.

- 7 days – application of any lines guiding footway users away from solid features on areas of potential danger, any other markings designated essential by the Engineer and yellow mandatory road markings.

- 28 days – application of all other footway markings.

## APPENDIX A

1 Road Note 39 (4th Edition), Revised 1997.
Design Guide for Road Surface Dressing.
Manual of Contract Documents for Highway Works Vol 1, Specification for Highway Works, Road Pavements – Bituminous Bound Materials (August 1994).

2 Chapter 8 of the Traffic Signs Manual.
Traffic Safety Measures and Signs for Road Works and Temporary Situations and amendments. Department of Transport 1991.

3 A Guide to Road Surface Dressing Practice.
TRRL Report SR 627.
Department of the Environment, Transport and Road Research Laboratory 1981

4 Department of Transport Highways Advice Note H.A.33/86.
Guidance on the use of modified surface dressing binders (Please note parts of this document are now included in Design Manual for Roads and Bridges, Vol.7 'Pavement Design and Maintenance' – HD31/94 Maintenance of Bituminous Roads).

5 Design Manual for Roads and Bridges, Vol. 7 'Pavement Design and Maintenance' – HD 36/99, Surfacing Materials for New and Maintenance Construction, Chapter 3 – Texture and Aggregate Properties.

6 Design Manual for Roads and Bridges, Vol. 7 Bituminous Surfacing Materials and Techniques HD 37/97.

7 CSS ENV/5-93: Code of Practice for traffic Control of Surface Dressing Operations.

# APPENDIX B

## Plant/Materials Tests and Frequencies

1. Stockpiles

Chipping stockpiles shall be tested:-

(a) Before use

(b) Once every four weeks

(c) Whenever fresh material is added from any source.

2. Chipping Tray Tests

Chipping tray tests shall be carried out:-

(a) Once a day

(b) On every site

(c) Whenever chipping size changes

3 Spray Bar Tests

(a) Cone test shall be carried out daily

(b) Tray test shall be carried out daily

(c) Depot bar test shall be carried out:-

(i) Immediately before commencing work in the County

(ii) Every four weeks

(iii) Whenever major repairs are made i.e. replacement of a spray nozzle

(iv) When the type of binder is changed.

4 Tanker Speedometer

The tanker speedometer shall be checked against a stopwatch and a measuring wheel daily.

## SERIES 800: ROAD PAVEMENTS - UNBOUND MATERIALS

### Clause 801 General requirements for unbound mixtures for subbase.

### General

**1.** Subbase shall be made and constructed using unbound mixtures complying with BS EN 13285 and in accordance with Clause 801 of the Specification for Highway Works.

## SERIES 900: ROAD PAVEMENTS – BITUMINOUS BOUND MATERIALS

### Clause 901 Bituminous Pavement Mixtures

### General

**2**. Only bituminous materials from approved sources shall be used in the works. Source approval will be granted automatically where the plant satisfies the National Highways Sector Scheme 14 for the Production of Asphalt Mixes.

**3.** Unless otherwise agreed by the Engineer, the laying of all bituminous materials shall be by contractors that are registered to the National Highway Sector Scheme 16 for laying of Asphalt Mixes. Preliminary work at the laying site, transporting and laying bituminous materials shall be in accordance with BS 594987.

**4.** The results of testing of bituminous materials and their laying, as required under National Sector Schemes 14 and 16, including all relevant tests included in Appendix 1/5, shall be provided to the Engineer.

**5.** Bituminous pavement courses shall be from the permitted materials options included in Part 4 of the '6Cs Design Guide' and as specified in detail in Appendix 7/1 of this specification.

### Transporting

**6.** Hot bituminous materials shall be transported in clean, insulated vehicles, unless otherwise agreed by the Engineer.

### Laying

**7.** Wherever practicable, bituminous materials shall be spread, levelled and tamped by a self-propelled paving machine. As soon as possible after arrival at site the materials shall be supplied continuously to the paver and laid without delay. The rate of delivery of material to the paver shall be regulated to enable the paver to operate continuously and it shall be so operated wherever practicable. The travel rate of the paver, and its method of operation, shall be adjusted to ensure an even and uniform flow of

bituminous material across the screed, so that the material is free from dragging, tearing and segregation of the material.

**8.** Hot bituminous materials shall be laid in accordance with the requirements and recommendations for laying in BS 594987. Where there is no British Standard for the particular material it shall be laid in accordance with the requirements and recommendations of BS 594987 or as otherwise stated in Appendix 7/1.

**9.** Hand laying of bituminous materials shall only be permitted in the following circumstances:

- For laying regulating courses of irregular shape and varying thickness.
- In confined spaces where it is impractical for a paver to operate.
- For footways.

**Compaction**

The choice of materials, design of mix and method of laying shall be consistent with obtaining mechanical key and physical adhesion between all new layers and obtaining cohesion throughout. Cohesion /adhesion shall be assessed from 150mm diameter cores cut into the material when cold and shall be deemed to exist when detachment does not occur with the core suspended vertically for one minute. Compliance with this requirement must be obtained at all times after laying and will be deemed to occur when no more than 1 in 10 cores taken from any area fail the above test.

The material shall be uniformly compacted by an appropriate roller capable of meeting the air void requirements across the full width of the material. 8 to 10 tonne smooth wheel rollers, multi-wheeled pneumatic tyred rollers or double driven vibrating rollers (2 tonnes minimum dead weight) may be used provided that the surface level of pavement courses meet the requirements of Clause 7.1.

The compaction process of Binder Course shall be controlled on site by the use of an Indirect Density Gauge (IDG). The use of a IDG on Surface Courses is optional. It is essential the surfacing contractor knows the target density for the particular material being laid and through this information he should be able to demonstrate **potential** compliance with the specification requirements. **The Indirect Density Gauge will not measure the absolute density of the material being laid; this can only be determined by the taking of cores.** It is however, good at indicating the maximum gauge density that can be achieved on site for the particular conditions prevailing at the time. That density will be influenced by temperature, climatic conditions and whether the roller type selected is operating in accordance with the manufacturer's recommendations both for frequency and operating speed. The layer thickness and the actual composition of the material can also influence the ultimate density and thereby air voids reported from the cores tests.

Calibration of the IDG shall be carried out in general agreement with **Clauses 2.5.5.3.2 and 2.5.5.3.3 of BS1377: Part 9.** Compliance with the specification, in the case of bituminous materials, will be assessed from waxed cores in accordance with BS EN 12697-6.

Attention is particularly drawn to the mixing temperatures given in BS EN 13108-1 and BS EN 13108-4, the temperatures given in BS 594987.

| **Material** | **AIR VOIDS %** | | |
|---|---|---|---|
| | **Normal Range** [1] | **1 in 10 Max** [2] | **Absolute Max** [3] |
| Footway Dense Binder Course | 2 - 10 | 10 | 12 |
| Footway Dense Surface Course | 2 – 10 | 10 | 12 |
| Carriageway Dense Binder Course | 2 – 8 | 8 | 10 |
| Carriageway Close Graded Surface Course | 2 – 10 | 10 | 12 |
| Carriageway Hot Rolled Asphalt Surface Course | 2 – 6 | 6 | 8 |
| Thin Surface Course Systems (Note 4) | Note 4 | Note 4 | Note 4 |

Notes

1 No results are permitted with air voids below 2%.
2 Not more than 1 in 10 results permitted above this value.
3 No values permitted above this value. This includes any for cores extracted wholly within 25mm or less from a joint.
4 When, exceptionally, a Thin Surface Course system is used the air void requirements are as detailed in the agreed specification for the particular Thin Surface Course system.

**Use of surface by constructional plant**

Constructional plant shall be suitable in relation to the thickness of the pavement course to be traversed so that damage to the pavement course of the carriageway or the sub-grade material is no caused. The wheels or tracks of plant moving over the various pavement courses must be kept free from harmful deleterious materials such as mud, clay etc.

**Base and binder course asphalt concretes**

**15.** Unless agreed otherwise with the Engineer due to the limited nature of the work, end result compaction in accordance with sub-clauses 15 to18 of this clause is required for asphalt concrete base and binder course.

**16.** The compaction of asphalt concrete shall be assessed by determination of in-situ air void content calculated from in-situ density measured using an indirect density gauge. The compaction of base and binder course asphalt concrete shall be continuously assessed using the indirect density gauge readings taken at 20m intervals in alternate wheel tracks. The Contractor shall take corrective action as is necessary whilst the material is still above the minimum rolling temperature specified in BS 594987, Table 9 if low densities are indicated at the time of laying.

**17.** For material from each mixing plant the average in-situ air void content calculated from any six consecutive indirect density gauge readings shall not exceed 7%. If the in-situ air void content exceeds the limit specified, then a pair of cores shall be taken at that location and the in-situ air void contents determined. If the average air void content of the pair of cores also exceeds 7%, the defective length shall be removed and replaced such that compliance is re-established. Lengths of not less than 15 linear metres shall be removed and replaced, unless otherwise agreed by the Overseeing Organisation.

**18.** The maximum density of each mixture shall be measured in accordance with BS EN 12697-5:2002, Procedure B: Hydrostatic procedure.

**19.** The in-situ density of the material shall be found using indirect density gauge readings corrected in line with gauge/core density correlations. If required, the in-situ density of the material shall be found by taking cores and testing in accordance with BS EN 12697-6 2003, Procedure C: Bulk density - sealed specimen. The air void content shall be determined in accordance with BS EN 12697-8: 2003 Clause 4.

**Stone Mastic Asphalt and Hot Rolled Asphalt**

**20.** Unless agreed otherwise with the Engineer due to the limited nature of the work, end result compaction in accordance with sub-clauses 20 of this clause is required for Stone Mastic Asphalt and Hot Rolled Asphalt.

**21.** The compaction of Stone Mastic Asphalt and Hot Rolled Asphalt shall be assessed by determination of the in-situ air void content, found from taking 6 number randomly spaced 150mm diameter cores for material from each mixing plant (at a frequency of 6 cores per 1000$m^2$ laid). The maximum density of each mixture shall be measured in accordance with BS EN 12697-5: 2002, Procedure B: Hydrostatic procedure. The density of the cores shall be measured in accordance with BS EN 12697-6: 2003, Procedure C: Bulk density - sealed specimen. The air void content shall be determined in accordance with BS EN 12697-8: 2003 Clause 4. The mean air void content of the 6 cores shall not exceed 6%.

**Surface Levels and Regularity**

**22.** This shall be in accordance with clause 702 of the specification.

## Clause 971AR Stone Mastic Asphalt Surface Course

Unless specified otherwise in the Package Order the following shall apply:

## 1 GENERAL

1.1 Stone Mastic Asphalt shall comply with the requirements of BS EN 13108 Bituminous mixtures - Material specifications Part 5, and PD 6691 Guidance on the use of BS EN 13108. Stone Mastic Asphalt shall be designed and manufactured to comply with the requirements of PD 6691 annex D unless otherwise varied by this clause and shall be transported handled and laid in accordance with the requirements of BS 594987.

## 2 MATERIALS

### 2.1 Aggregate

2.1.1 Polished Stone Value – Course aggregates shall have a minimum PSV of 60 unless otherwise specified in Appendix 7/1 for carriageway surface course after reference to HD36/06 table 3.1.
Minimum PSV for all footway surface course material shall be 45.

2.1.2 Resistance to Fragmentation – Category LA30, or as specified in Appendix 7/1.
Aggregate abrasion Value – for carriageway material, not more than 12, or as specified in
Appendix 7/1 after reference to HD36/06 table 3.2

2.1.3 Durability (Water Absorption) – Category WA24 2 or as specified in Appendix 7/1.

2.1.4 When tested in accordance with the procedures in BSEN 13043, the fine aggregate shall comprise crushed rock or crushed slag fines, which may be blended with not more than 50 percent natural sand.

2.1.5 The use of limestone and any other material that does not comply with the minimum PSV requirements specified in the Package Order (Appendix 7/1) shall not be permitted as course and fine aggregates in SMA surface courses.

### 2.2 Filler

2.2.1 Added filler shall only be crushed limestone or other approved material in accordance with the requirements of BS EN 13043, 5.2.1.

### 2.3 Binder Grades

2.3.1 As alternatives to the standard material references SC1 and SC2 listed in Appendix 7/1, consideration will be given to the use of these materials with

substituted paving grades of 70/100 and 100/150 for areas of hand lay only. The Overseeing Organisation's approval to use these alternative materials needs to be sought on a scheme by scheme basis and should not be assumed.

**3 MIXTURE**

3.1 The target grading for the mixture shall fall within the limits given in PD 6691 table D1, unless agreed otherwise by the Overseeing Organisation.

3.2 The manufacturer shall carry out initial type testing in accordance with EN 13108 – 20 in order to demonstrate conformity with EN 13108 – 5 and PD 6691, as amended below.

3.3 Minimum binder contents shall be (but see paragraph 3.4):
20mm Bmin5.8
14mm Bmin6.0
10mm Bmin6.4
6mm Bmin7.0

3.4 Mixtures containing polymer modified bitumen conforming to BS EN 14023 may be permitted .

3.5 Void content shall be Vmin1.5 and Vmax4 When tested in accordance with PD 6691 table 4 but with the amendment that BS EN 12697-6 procedure C, sealed specimen shall be used to determine specimen bulk density.

**4 COMPACTION**

4.1 Stone mastic asphalt shall be compacted to practical refusal following the general requirements of BS 594987 clause 9.

4.2 The degree of compaction shall be assessed in accordance with Clause 901.20 of this specification.

4.3 Testing shall be carried out by a laboratory approved by the Overseeing Organisation.

4.4 Test cores shall be extracted by a laboratory approved by the Overseeing Organisation.

**5 SURFACE TEXTURE**

5.1 Texture depth as specified in Appendix 7/1 but shall generally be 1.3mm for high speed roads and 1.0mm for all other roads

5.2 Texture depth measurement shall be carried out in accordance with clause 921.

5.3 Grit shall be applied as specified in the Package Order (Appendix 7/1) and/or Clause 972AR.

## 6 NOMINAL LAYER THICKNESS

6.1 Unless otherwise stated in Appendix 7/1 nominal compacted thickness shall be:
20mm 50 - 75mm
14mm 40mm
10mm 40mm.
6mm 25mm when used as footway surface course and 15 - 35mm when used as regulating layer.

## 7 RECLAIMED ASPHALT

7.1 Unless otherwise permitted in the Package Order Reclaimed Asphalt shall not be permitted for use in Stone Mastic Asphalt surfacing course.

## 972 AR SURFACE TREATMENTS - APPLICATION OF GRIT TO ENHANCE EARLY LIFE SKIDDING RESISTANCE

Unless specified otherwise in the Package Order the following shall apply:

### General

1. Where stated in the Package Order (Appendix 7/1) newly laid Stone Mastic Asphalt surface courses shall be treated using one of the following methods.

### Method A (Material SG1)

2. Method A: Application of the sealing grit is required to any section of surfacing comprising material references SC1 and SC2 and any other scheme specific surfacing material identified in the Package Order (Appendix 7/1) requiring so to be treated. Material and method particulars are provided below.

3. The aggregate shall comprise of 0/4mm bitumen coated grit and shall be supplied from a source approved by the Overseeing Organisation. The aggregate grading shall fall within the appropriate envelope given in Table 972AR/1. The grit shall be mechanically applied at
a rate between 0.5 and 0.7 kg/m² during compaction.

**Table 972AR/1 – Aggregate Grading for Sealing Grit (SG1)**

| **Test sieve aperture size** mm | **% by mass passing** |
|---|---|
| 6,3 | 100 |
| 3,35 | 85 – 100 |
| 0,60 | 30 – 55 |
| 0,212 | 14 – 32 |
| 0,075 | 5 – 17 |

Note: Up to 25% by mass of the fine aggregate passing the 3,35mm sieve may be sand.

4. The soluble binder content of the sealing grit for all aggregates shall be 3 + 0.5%.

5. The bitumen coated grit shall be free flowing.

**8.** The Grade of binder shall be in accordance with Table 972AR/2.

**9. Table 972AR/2 – Grade of Binder for Coated Grit (SG1)**

**Grade of binder for bitumen**

| **Period** | **Category A Traffic** | **Category B Traffic** |
|---|---|---|
| Winter (Oct-Mar) | 100 s to 300 pen | 100 s to 300 pen |
| Summer (April –Sept) | 200 s to 200 pen | 200 s to 300 pen |

**Application of Aggregate**

7. The application of grit to areas of surface courses shall be by mechanical calibrated roller mounted spreader capable of distributing grit to an even rate of spread. Application of grit by hand operations shall only be permitted in the following circumstances:

(i) In confined spaces, where it is impractical for a mechanical spreader to operate.
(ii) As a temporary expedient, when adjustments have to be made to the spreader distribution mechanism.
(iii) When hand laying of the surface course is permitted.
(iv) To correct uneven distribution of grit.

8. The coated grit shall be uniformly applied and then rolled on to the surface after an initial roll by the primary roller. The surface shall then be rolled and compacted in accordance with the requirements of Clause 901.

9. Prior to the opening of the lane to traffic the excess coated grit shall be swept off the surface using a mechanical sweeper .

**Method B (Material G1)**

1. Method B: Application of the grit is restricted to those sections of newly laid surfacing material identified in the Package Order (Appendix 7/1) that are to be used by equestrian traffic.
Material and method particulars are provided below.

**Aggregate**

2. The aggregate (grit) shall comprise of 3mm crushed quartzite grit and shall be supplied from a source approved by the Overseeing Organisation. The aggregate grading shall fall within the appropriate envelope given in Table 972AR/3. Other similar types of aggregates and grading may be equally effective but the Contractor shall undertake trials and provide a report confirming the effectiveness of any alternative. The quartzite grit shall be applied at a rate between 0.7 and 1.0 kg/m$^2$.

**Table 972AR/3 – Aggregate Grading for Quartzite Grit (G1)**

| **Test sieve aperture size** | **% by mass passing** |
|---|---|

| mm | |
|---|---|
| 6,3 | 100 |
| 5,0 | 95 – 100 |
| 3,35 | 66 – 90 |
| 1,18 | 0 – 20 |
| 0,60 | 0 – 8 |
| 0,075 | 0 - 1.5 |

**Application of Aggregate**

3. The application of grit to areas of surface courses shall be by mechanical calibrated roller mounted spreader capable of distributing grit to an even rate of spread. Application of grit by hand operations shall only be permitted in the following circumstances:
(i) In confined spaces, where it is impractical for a mechanical spreader to operate.
(ii) As a temporary expedient, when adjustments have to be made to the spreader distribution mechanism.
(iii) When hand laying of the surface course is permitted.
(iv) To correct uneven distribution of grit.

4. The grit shall be uniformly applied and then rolled on to the surface after an initial roll by the primary roller. The surface shall then be rolled and compacted in accordance with the requirements of Clause 901.

5. Prior to the opening of the lane to traffic the excess grit shall be swept off the surface using a mechanical sweeper .

## SERIES 1100: KERBS, FOOTWAYS AND PAVED AREAS

### Appendix 11/1: Kerbs, footways and paved areas

### Kerbing

**1.** Except where otherwise specified precast concrete kerbs, channels, edgings and quadrants shall comply with BS 7263: Part 1

**2.** Reference should be made to the 6Cs Design Guide Standard Drawings.

**3.** Precast concrete kerbs laid between 12m and 21m radius shall either be the exact radius or straight kerbs of 600mm length.

**4.** No single kerb unit shall be less than 450mm in length unless specified otherwise.

**5.** Where straight kerbs are to be used at a change of direction of the kerbline, the kerbs are to be cut to produce a butt joint.

**6.** Haunching concrete to kerbs and channels shall be in place for a minimum of 24 hours prior to laying pavement materials.

**7.** New kerbs on existing carriageway surfaces shall be laid after cutting the chase. The front cut shall be made with a clean saw cut.

**8.** All kerbs and edging shall be delivered to site without paper backing. If any kerbs/edgings have paper on the back, then this shall be removed completely prior to laying and disposed off site.

**9.** The kerbing for flush dropper pedestrian and cyclist crossing points shall be as shown in standard drawing SD/11/8 (type B) unless agreed otherwise.

### Footways, cycleways and paved areas

**10.** All surface course material for cycleways and combined footway/cycleway shall be machine laid.

**11.** The formation of footways and cycleways shall be treated with approved long-term residual soil-contact granular weedkiller, to the manufacturer's instructions, prior to the laying of the sub-base. If bituminous material is not laid on the top of the sub-base, within two weeks of the treatment of the formation, then the sub-base shall also be treated with weedkiller one day prior to the laying of the surfacing material. The application of weedkiller shall be in accordance with Appendix 30/2.

**12.** All covers, frames to chambers, valves and stopcocks shall be adjusted to the correct levels at least 48 hours prior to laying of the surrounding surfacing.

**Tactile paving**

**13.** Tactile paving shall be laid in accordance the government publication 'Guidance on the use of Tactile Paving Surfaces' and the 6Cs Design Guide Standard Drawings.

**14.** The free edges of tactile paving shall be restrained by EF-150 edgings unless agreed otherwise.

**Concrete block paving to carriageways, shared surfaces, footways and other paved areas**

**15.** Block paving shall be in accordance with the 6Cs Design Guide Standard Drawings.

**16.** Paving blocks shall comply with the relevant requirements of BS 6717: Part 1: 1986.

**17.** Concrete block paving shall be laid to a herringbone pattern in accordance with BS 6717: Part 3: 1986 normally 90 degrees herringbone for footways and 45 degrees herringbone in carriageways.

**18.** In carriageways concrete paving blocks shall be not less than 80mm thick.

**19.** In footways and other areas not subject to vehicular traffic concrete paving blocks shall be not less than 60mm thick.

**20.** Blocks shall be rectangular in plan, 200mm long by 100mm wide, BS type R with chamfered edge and full-height spacer nibs unless agreed otherwise.

**21.** The colour of the concrete blocks in carriageways and shared surfaces shall be brindle unless otherwise agreed, except for entry ramps to shared surfaces which shall be in an agreed contrasting colour. Blocks to footways shall be grey, charcoal, buff or brindle unless otherwise approved by the Engineer.

**22.** Paving blocks shall be laid in accordance with the Code of Practice for Laying Precast Concrete Block Pavements, published by INTERPAVE – The Precast Concrete Paving & Kerb Association.

**23.** Paving blocks shall be bedded on sharp sand to BS 6717: Part 3. The material is to be a naturally occurring silica sand, free of deleterious salts and contaminants with particles of a rounded or sub-rounded shape.

**24.** The maximum and minimum thicknesses of bedding sand are as indicated in the table below. Any discrepancy in surface level of the underlying layer which would result in the maximum and minimum thicknesses being exceeded must be rectified in accordance with Clause 702 of the Specification.

| **Surface** | **Maximum** | **Minimum** |
|---|---|---|

| | | |
|---|---|---|
| In carriageways and shared surfaces. Blocks laid on bituminous base. | 30mm | 25mm |
| Footways, footpaths and other areas not subject to vehicular traffic. Blocks laid direct onto sub-base. | 50mm | 25mm |

**25.** Fine, kiln dried free flowing silica sand shall be used for joint filling.

## SERIES 1200: TRAFFIC SIGNS

### Appendix 12/1: Traffic signs – general

### Permanent traffic signs

**1.** The fabrication and erection details of individual traffic signs shall be shown on Traffic Sign Schedule sheets included at the end of this appendix and in accordance with the 6Cs Design Guide Standard Drawings.

**2.** The final position of each traffic sign shall be agreed with the Engineer on site before the erection is started.

**3.** The type of lock on lit traffic sign housings shall be identical to that fitted on standard street lighting columns.

**4.** All completed sign plates including those with a grey screen surround shall have rounded corners, as Traffic Signs Manual Chapter 7.

**5.** All signs less than 2 square metres in area shall be manufactured in HP200 coated steel (substrate).

**6.** Sign plates as composite signs shall have a minimum 50mm grey screen border on each side of individual signs which usually shall be centred vertically.

**7.** In the construction and assembly of permanent traffic signs the framing stiffener shall extend to the edge of the sign.

**8.** The manufacturer's sign fabrication drawings shall be submitted to the Engineer for checking. Manufacture may not commence until the Engineer's approval has been received. The Engineer will require two weeks to check the drawings, from the date of receipt.

**9.** Notwithstanding the requirements of Clause 1202.8, the Contractor shall store the signs as described below:-

Wherever possible signs shall be stored indoors. The following procedures must be followed:

i) If stored indoors, the packaging (provided it is dry) need not be removed unless storage is to be for an extended period of time (more than 4 weeks). If packaging is removed, the SCW82 slip sheeting shall remain insitu to protect the sign face. In either case, the signs must be supported on wooden battens in the upright position so that they do not touch.

ii) If stored outdoors, all packing shall be removed and the signs placed on wooden battens in the upright position with plenty of space for free air circulation. Signs shall not be allowed to come into contact with

treated wooden posts and shall not be allowed to stand in water at any time.

iii) Sharp or heavy objects shall not be placed on or against signs during storage.

**10.** The required durability of all sign plates and faces shall be as follows:-

i) 10 years for signs manufactured with class 1 face material.

ii) 7 years for signs manufactured with class 2 or 3 face material.

**Posts for permanent traffic signs**

**11.** Posts for permanent traffic signs shall be tubular steel posts unless otherwise specified by the Engineer.

**12.** Tubular steel posts shall comply with BS 1775 and shall be manufactured from steel complying with the requirements of BS 5360 Grade 43A. They shall also comply with the requirements of BS 873 Part 7, Section 2. Large based posts shall also be to this specification. The minimum base section diameter for a large based post is 114mm.

**13.** Each sign post shall be indelibly marked with the name or trade mark of the manufacturer, together with the sign schedule number given in the schedule sheets. Identification marking shall be Black Numbering on a white background self adhesive stickers will not be acceptable.

**14.** Base plates shall be welded to each embedded tubular post, as shown on the Standard Drawings.

**15.** Plastic post caps of the appropriate size shall be fitted to the exposed ends of all tubular steel posts. Finials shall be used in the case of finger post signs.

**16.** Types of lock to traffic sign housings shall be agreed by the Engineer and shall be supplied with six (6 No.) keys of any one type.

**17.** Prior to galvanising posts shall be cleansed of grease, scale, rust and shot blasted.

**18.** Galvanising shall be by an approved hot-dip process at the rate of 610g per $m^2$ and in accordance with BS729. When finished the galvanising shall be smooth, reasonably bright, continuous and free from imperfections such as flux, ash, and dross inclusions. If bare patches or spots due to inefficient pickling or persistent types of scale etc. are apparent, the work shall be completely stripped and regalvanised.

**19.** Foundations for posts shall be constructed as detailed on the Standard Drawings. All large foundations shall be sleeved for the sign posts as per LCC SD/12/14. The sleeves shall be made of a material which is

acceptable to the Engineer. The sleeves shall be filled with sand around the post to 50mm from the top of the sleeve. The top 50mm of the sleeve shall be filled with cement grout.

**20.** The sign plates or planks shall not be fixed until three days after concreting of the posts.

**21.** Where signs are illuminated provision shall be made for cable entry through the concrete base by means of a 76mm diameter flexible PVC duct.

**Electrical equipment for traffic signs**

**22.** Illumination of sign plates shall be external and overhead mounted unless agreed otherwise by the Engineer. Only one piece light units with integral brackets as shown on the 6Cs Design Guide standard drawing No SD/12/21 shall be used when compliance with BS873 Pt 5 category 1 sign luminance assured.

**23.** Light units shall be mounted directly on the sign posts and/or on luminaire support posts or as directed by the Engineer. The support posts and fittings shall comply with the requirements for sign posts and shall be fixed directly to the sign plate stiffening members. An electrical pvc rigid conduit shall be provided and installed to link the straight posts/support posts with the integral base housing.

**24.** Switching shall be by a miniature photocell complying with Clause 1409 and fitted to each luminaire by the manufacturer of the luminaire.

**25.** Only cut outs are located within the base compartments of posts and these shall be positioned on the upper half of the backboard. Compartments for electrical equipment contained within integral base housings shall comply with BS5649 Pt 5. The wiring of the assembly shall be in accordance with Appendix 14/5.

**Installation of permanent traffic signs**

**26.** During sign erection, measures shall be taken to ensure that signs are not abraded, impacted or otherwise marked.

**27.** Tape shall not be applied to sign faces.

**28.** Where an existing sign face is to be replaced with a new sign face of greater height, additional lengths of post are specified. These additional posts shall be fixed to planks which have already been fixed to the existing posts such that the additional planks can in turn be fixed to the projected lengths of the additional posts. Each plank, which is in contact with the additional posts, shall be fixed to each post by at least two clips.

**Chevron signs**

**29.** Where chevron signs are to be used they shall be positioned so as to face the oncoming traffic and shall be staggered (in plan) to achieve the appearance of continuity.

**Temporary covering of signs (including temporary signs)**

**30.** The Contractor shall cover to the approval of the Engineer the areas of the signs, in whole or in part, as required and shall maintain such covering until the Engineer instructs its removal. The material used for this purpose shall be optically opaque and the method of its fixing shall be such that the sign manufacturers warranty is not invalidated.

**Cleaning of signs**

**31.** Signs shall be cleaned immediately prior to commissioning.

**32.** The cleaning shall be carried out in the manner described in Chapter 12(3) of the Traffic Signs Manual. The type of detergent used shall be to the approval of the Engineer.

**33.** The inside of translucent panels of all internally illuminated signs shall be polished using anti-static fluid.

**Erection of bollards**

**34.** Bollards shall be Deformable Base Illuminated Bollards as shown on the 6Cs Design Guide standard drawing No SD/12/19.

**Location of identity marks**

**35.** All sign plates shall be clearly and durably marked on the back (not exceeding 100mm x 150mm) with the following information, self-adhesive stickers will not be accepted,

i) Sign manufacturer's name or trade mark ;

ii) Allocated sign number in the order or schedule;

iii) Date of erection;

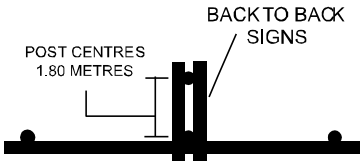
iv) Where "Diamond" grade is used, the rear of the signplate should clearly be marked "Diam".

**36.** Location identifying marks shall be in accordance with Appendix 13/1 for lighting columns. One set of numerals shall be fixed to each sign post carrying/adjacent to a luminaire below the lower edge of the sign. The numerals shall be prefixed by the letter S. Eg S22 commencing at the post most adjacent to the carriageway.

**37.** Location identifying marks for deformable bollards shall be in accordance with Appendix 13/1 for lighting columns. The kerb directly in front of the bollard shall be painted with white masonry paint. One set of Black painted numerals shall be applied to the white background when dry. The numerals shall be prefixed by the letters S, e.g., S22.

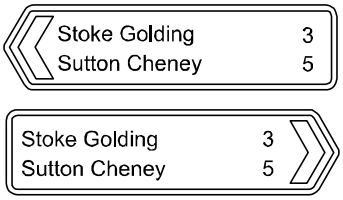
## TRAFFIC SIGN SHEET – EXAMPLE

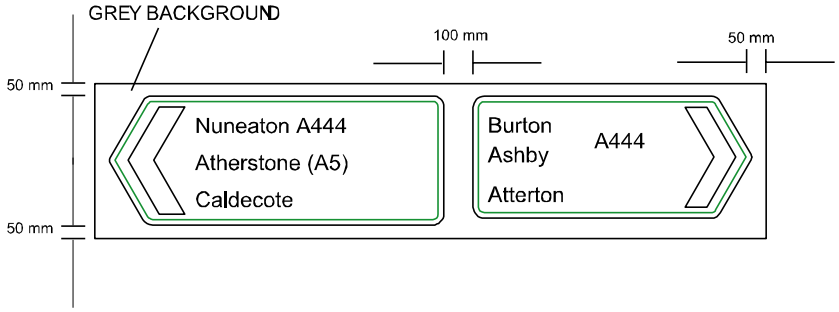
| LOCATION: | TRAFFIC SIGN SCHEDULE SHEET | | SIGN No. |
|---|---|---|---|
| **A444/Fenn Lanes junction at Fenny Drayton** | Date: **12/08/2003** | Job No: **12345** | |
| | Amended: **/ /2003** | Bill No: **2** | |
| | Technician: **An Other** | | |
| **SCHEME DETAILS: Direction signs at junction - viewed from Old Forge Road** | Drawing No: **ABC/12/1234/1A** | | |
| | Reference: **DES/AO/5678** | | |
| | Section: **TRAFFIC SIGNS** | | |




2 SIGNS REQUIRED
1 RIGHT FACING AND
1 LEFT FACING

INSTALL BACK TO BACK
ABOVE MAIN SIGN




| LEFT | | RIGHT | | BACK TO BACKS | | Overall size of backing board (for sign combination) | |
|---|---|---|---|---|---|---|---|
| **DIAGRAM** | 2026 | **DIAGRAM** | 2026 | **DIAGRAM** | 2125 | Height (Metres) | 0.75 |
| 'x' height (mm) | 75 | 'x' height (mm) | 75 | 'x' height (mm) | 100 | Width (Metres) | 3.31 |
| Height (Metres) | 0.655 | Height (Metres) | 0.620 | Height (Metres) | 0.575 | Material/ Finish | |
| Width (Metres) | 1.695 | Width (Metres) | 1.415 | Width (Metres) | 2,250 | Colour | GREY |
| Material/Finish | CLASS | Material/Finish | CLASS 1 | Material/Finish | CLASS 1 | **TOTAL AREA (Sq Metres)** | 2.48 |
| Area (Sq M) | 1.11 | Area (Sq M) | 0.88 | Area (Sq M) | 1.29 x 2 | | |
| **COLOUR** | | **COLOUR** | | **COLOUR** | | | |
| Legend | WHITE | Legend | WHITE | Legend | BLACK | | |
| Background | GREEN | Background | GREEN | Background | WHITE | | |
| Border | WHITE | Border | WHITE | Border | BLACK | | |
| Route Number | YELLOW | Route Number | YELLOW | Route Number | N/A | | |
| Panel/Patch | N/A | Panel/Patch | N/A | Panel/Patch | N/A | | |

| **POST DETAILS** **Note:** Posts are numbered from right to left when looking at sign face | **Total No:** **4** | | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|
| | | Dia. or Section (mm) | *** | *** | 76 | 76 x 2 | 76 |
| | | Length (Metres) | *** | *** | 3.0 | 3.6 x 2 | 3.0 |
| | | Type | *** | *** | STRAIGHT | STRAIGHT | STRAIGHT |

| INSTALLATION DETAILS | | | |
|---|---|---|---|
| Foundation Type | 3 | Mounting height (Metres) | 1.6 Lower sign |
| Depth (Metres) | 0.600 | Lateral clearance (Metres) | 0.7 |
| Width (Metres) | 0.350 | Post centres (Metres) | 1.8 Lower sign |
| Length (Metres) | 0.600 | | |

| LIGHTING DETAILS | |
|---|---|
| No. of Units | *** |
| Type | *** |
| Unit Centres (mm) | *** |

| LOCATION: | TRAFFIC SIGN SCHEDULE SHEET | | SIGN No. |
|---|---|---|---|
| | Date: / /2003 | Job No: | |
| | Amended: / /2003 | Bill No: | |
| | Technician: | | |

| SCHEME DE TAILS: | Drawing No: |
|---|---|
| | Reference: |
| | Section: |

| DIAGRAM | |
|---|---|
| 'x' height (mm) | |
| Height (Metres) | |
| Width (Metres) | |
| Material/Finish | |
| Area (Sq M) | |
| COLOUR | |
| Legend | |
| Background | |
| Border | |
| Route Number | |
| Panel/Patch | |

| DIAGRAM | |
|---|---|
| 'x' height (mm) | |
| Height (Metres) | |
| Width (Metres) | |
| Material/Finish | |
| Area (Sq M) | |
| COLOUR | |
| Legend | |
| Background | |
| Border | |
| Route Number | |
| Panel/Patch | |

| DIAGRAM | |
|---|---|
| 'x' height (mm) | |
| Height (Metres) | |
| Width (Metres) | |
| Material/Finish | |
| Area (Sq M) | |
| COLOUR | |
| Legend | |
| Background | |
| Border | |
| Route Number | |
| Panel/Patch | |

| Overall size of backing board (for sign combination) | |
|---|---|
| Height (Metres) | |
| Width (Metres) | |
| Material/ Finish | |
| Colour | |
| TOTAL AREA (Sq Metres) | |

| POST DE TAILS<br>**Note:** Posts are numbered from right to left when looking at sign face | Total No: | | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|
| | | Dia. or Section (mm) | | | | | |
| | | Length (Metres) | | | | | |
| | | Type | | | | | |

| INSTALLATION DE TAILS | | | |
|---|---|---|---|
| FoundationType | | Mounting height (Metres) | |
| Depth (Metres) | | Lateral clearance (Metres) | |
| Width (Metres) | | Post centres (Metres) | |
| Length (Metres) | | | |

| LIGHTING DE TAILS | |
|---|---|
| No. of Units | |
| Type | |
| Unit Centres (mm) | |

## Appendix 12/3: Traffic signs - road markings and studs

**1.** The location, colour and type of permanent road markings shall be shown on the drawings.

**2.** Permanent road markings shall be one of the following materials:

(i) thermoplastic road marking material or paint in accordance with BS EN 1871;

(ii) permanent preformed road markings in accordance with BS EN 1871.

**3.** Prefabricated temporary road markings shall only be allowed for use with temporary traffic management after approval from the Engineer.

### Durability

**4.** The line marking shall be firmly adhered to the underlying surface. The minimum thickness of a new marking shall be 3mm.

**5.** The Wear Index at any position in the works shall not exceed 1.6 when assessed in accordance with Annex G of BS EN 1824.

### Performance

**6.** Road marking shall have the following minimum standard of performance as defined in BS EN 1436 for a period of **1** year from the date of application.

| Property | BSEN 1436 Reference | Requirement | Value |
|---|---|---|---|
| **Colour** | **Table 6** | **White** | **x,y co-ordinates given** |
| **Luminance** | **Table 5** | **Class B3** | **0.40** |
| **Skid Resistance** | **Table 7** | **Class S2** | **45** |
| **Retro-reflectivity** | **Table 2 Classes of $R_L$ for dry markings** | **Class R4** | **200** |
| **Retro-reflectivity** | **Table 3 Classes of $R_L$ for wet markings** | **Class RW1** | **25** |

### Dimensional tolerances

**7.** The width tolerances and thickness for screed, spray, pre-formed and extrusion white or yellow lines shall be in accordance with the current Traffic Signs Regulations and General Directions. With the exception of Raised Rib edge-line markings, in no case shall any materials be laid more than 6mm thick.

**Reflectorisation**

**8.** Unless specified all white markings shall be reflectorized with solid glass beads in accordance with **BS 6088** by incorporation (except for pre-formed markings) into the road marking mixture and to the wet surface of the marking.

**Retro-reflectivity**

**9.** Retro-reflectivity shall be measured by means of an approved retrometer such as the LTL 2000 Retrometer.

**Yellow material**

**10.** Yellow material shall comply with Table 5 and Table 6 of BSEN 1436.

**Quality Assurance schemes**

**11.** All materials and solid glass beads shall be obtained from manufacturers who operate Third Party QA Schemes under ISO 9002, EN 29002

**12.** The Contractor shall operate a Quality System complying with Scheme No. 7 of the Sector Schemes for Quality Management in Highway Construction – "Application of Road Marking Materials".

**Permanent removal of existing road markings**

**13.** Where existing road markings are to be permanently removed from bituminous running surfaces this shall be by mechanical means or forced air abrasive (shot blasting). Hot compressed air (HCA) lance shall not be used on concrete pavements and not on other surfaces without the consent of the Engineer. Obliteration of road markings using bituminous, resinous paint or prefabricated materials will not be permitted.

**Temporary obliteration of road markings**

**14.** Where existing road markings on bituminous pavements are to be temporarily obliterated for traffic management or any other purpose the markings shall be completely covered by black tape or covering which shall be able to withstand the traffic load upon it for the required period. Upon removal of the black tape or covering the original markings are to be upgraded to the standard apparent before the temporary obliteration. Temporary covering of road markings on concrete pavements shall not be permitted.

**Reflecting road studs**

**15.** The cutting of the wearing course for installation of reflecting road studs shall be by milling or diamond cutting methods only.

**16.** Road studs shall be depressible rubber inserts let into a cast iron base with reflex lenses which are cleansed by the passage of a vehicle wheel

under the squeegee action of the depressible rubber. The cast iron base shall be capable of securing a traffic cylinder to BS 873.

**17.** Where existing road studs are to be re-used the Contractor shall provide new reflecting inserts.

**Non-reflective road studs**

**18.** Non-reflecting road studs shall comply with B.S. 837 Part 4. The studs shall be made from stainless steel, not to be 'stick-on' type. Each stud shall be 100 millimetres square in shape.

## Appendix 12/4: Traffic signs – cones, cylinders flat traffic delineators and other traffic delineators

**Traffic cones and cylinders**

**1.** Traffic cones and cylinders shall comply with the requirements of BS 873 : Part 8 : 1985, Category A, designation 1. Designation 1 means that the retro-reflective portions shall comply with Table 1 of BS 873 : Part 6 : 1983.

**Testing of traffic cones, cylinders and flat traffic delineators**

**2.** All testing shall comply with Clause 1214. The frequency and certification of testing shall be as Clause 1214.21.

**Marking of traffic cones**

**3.** Traffic cones and cylinders shall be clearly and durably marked with:-

(i) the name, trade mark or other means of identification of the manufacturer or vendor;

(ii) the number and date of the British Standard i.e. BS 873 : Part 8 : 1985;

(iii) the category of the traffic cone and

(iv) the designation of photometric performance.

**4.** Traffic cones and cylinders that are not so marked do not comply with the British Standard and shall not be accepted.

**Traffic lane separators**

**5.** Separators are to be

(i) sand filled.

(ii) fixed together with bolt fixing or by an incorporated interlocking system

(iii) 400mm high, 330mm wide.

(iv) fitted with reflective material to comply with BS 873.

**6.** Locations of separators are to be shown on the Traffic Management drawings.

**7.** Separators should be laid out in alternative red and white colours.

## SERIES 1300: ROAD LIGHTING COLUMNS AND BRACKETS

### Appendix 13/1: Provision of street lighting installation, including design and specification

**1.** The Developer is to provide, in working condition, an approved street lighting installation in accordance with the Specification for Highway Works, Series 1300 and 1400 and the general specification of equipment in accordance with the data sheet issued for each lighting scheme design.

**2.** After technical approval has been issued the highway authority will provide a street lighting design in accordance with BS5489. The street lighting section is informed directly by development control and there is no requirement for the developer to approach street lighting independently.

**3.** In addition to providing a layout plan the street lighting section will provide the specification of the equipment to be installed and a designers risk assessment.

## SERIES 1400: ELECTRICAL WORK FOR ROAD LIGHTING AND TRAFFIC SIGNS

### Appendix 14/3 – Temporary lighting

**1.** The requirements to which the Contractor must adhere if he requires temporary lighting in the execution of the Works are to be in accordance with BS 5489.

**2.** The Contractor shall provide and maintain temporary lighting to a standard not less than the existing designed road lighting standard at those locations where road lighting units remain inoperative due to outstanding repairs within his control after the due date for completion.

### Appendix 14/4 – Electrical equipment for road lighting

**1.** The street lighting equipment shall be in accordance with the Specification for Highway Works, Series 1300 and 1400 and the general specification of equipment in accordance with the data sheet issued by the Highway Authority for each lighting scheme design.

### Appendix 14/5 - Electrical equipment for traffic signs

**1.** Electrical equipment for traffic signs shall be in accordance with the 6Cs Design Guide Standard Drawings.

**2.** The positioning of equipment described in Clauses 1411-1416 within the base compartment of posts applies only to the service cut-out. In the case of network services, the cut-out shall be positioned on the lower half of the base board.

**3.** Requirements for wiring and installation of components within posts and Lit Sign Units shall be:-

(i) Wiring between luminaires and the service cut-out shall be in multicore cable as described in Clause 1419. Separate wiring shall be provided for each luminaire of the Lit Sign Unit.

A connector block to the approval of the Engineer shall be positioned above the service cut out for terminating more than one multicore cable. The final connection to the cut-out shall be in accordance with Clause 1419(3).

(ii) The holes to be drilled in posts for cable entries, shall be tapped for conduit fittings. Protection against corrosion measures for the threaded section of the posts shall be provided to the satisfaction of the Engineer.

(iii) Conduits for carrying wiring cables between posts shall be “high impact PVC” and terminated at the posts in ISO-stuffing glands.

The glands shall be screwed into the threaded posts with a suitable mastic seal to prevent the ingress of any moisture.

(iv) Earthing arrangements for lighting units shall include a 6mm$^2$ cross sectional area conductor bonding steel columns/integral base compartment posts/housings to the main earthing terminal associated with the service cut-out. A flexible conductor of the same cross sectional area shall be used to bond the doors of such compartments and shall be of sufficient length to allow placement of door on ground without tension.

## SERIES 2400: BRICKWORK, BLOCKWORK AND STONEWORK

### Appendix 24/1 – Brickwork, blockwork and stonework

### General

**1.** Brickwork, blockwork and stonework shall be in accordance with the 6Cs Design Guide Standard Drawings.

### Concrete block paving to carriageways, shared surfaces, footways and other paved areas

**2.** Concrete block paving to carriageways, shared surfaces, footways and other paved areas shall be in accordance with Appendix 11/1.

## SERIES 2600: MISCELLANEOUS

### Appendix 26/1: Ancillary concrete

| Location | Grade | Special Requirements |
|---|---|---|
| Foundations for manholes, insitu gullies, Type A bed to drains and benching and surround to manholes | Various | See the appropriate 6Cs Design Guide Standard Drawings |
| Bedding and backing to precast kerbs, edgings and channels | Various | See the appropriate 6Cs Design Guide Standard Drawings |
| Concrete protection to existing drains sewers and service ducts | Various | See the appropriate 6Cs Design Guide Standard Drawings |
| Bed Types G and Z to drains and bedding and surround to precast gullies | Various | See the appropriate 6Cs Design Guise Standard Drawings |

## SERIES 3000: LANDSCAPE AND ECOLOGY

### Appendix 30/1: General

**General**

**1.** All landscape operations shall be carried out in accordance with the relevant provisions of BS4428: 1989: Code of practice for general landscape operations (excluding hard surfaces) unless specified otherwise.

**Notice and liaison**

**2.** At least 48 hours notice (i.e. 2 working days) shall be given of the intention to commence the following operations. This notice must be repeated subsequent to any period when the operation has been temporarily suspended.

- Subsoil treatment
- Topsoil cultivations
- Grass seeding or turfing
- Planting
- Tree felling
- Arboricultural works
- Application of pesticides

**Damage and reinstatement**

**3.** Such measures as may be necessary shall be taken to protect road structures, footpaths, existing grassed areas and other ground surfaces from damage by personnel, machinery and materials during the works.

### Appendix 30/2: Weed control

**General**

**1.** A record of all pesticide use shall be maintained. It shall contain such information as the date of application, pesticide used, names and qualifications of operatives, location of site and weather conditions and details of any incidents. A copy of the records shall be provided to the Engineer when requested.

**2.** Only pesticides approved under the Control of Pesticides Regulations 1986 and present in the latest edition of approved products shall be used on the site and then only with the Engineer’s prior approval. Any pesticides approved for use shall be applied strictly in accordance with the manufacturer's instructions.

**3.** All pesticides must be used under the direct control of qualified staff. Certificates of Competence shall be produced to the Engineer of all employees, and contractors who will be using pesticides in advance of any use of pesticides.

4. The application of pesticides shall only proceed if the weather and site conditions on the day are suitable in every respect and show every indication of remaining so for the period necessary for proper application to be completed. The Engineer may postpone, suspend or cancel the works at any time should he consider that conditions are unsuitable or that the application is not being carried out in a proper manner.

5. Should the use or application of any pesticide result in any damage whatsoever to any turf, plants, trees or soil other than those intended specifically to be controlled by the product or to any other flora or fauna within or outside the area to be treated or the site then the Developer shall be held fully liable and shall fully indemnify the relevant 6Cs Design Guide authority accordingly.

**Injurious weeds**

6. Weed control shall be required for infestations of injurious weeds as follows:
    - Broad leafed dock
    - Curled dock
    - Common ragwort
    - Creeping thistle
    - Spear thistle
    - Himalayan Balsam
    - Giant hogweed
    - Japanese knotweed

**Hard surfaces**

**7.** On carriageways, footways, footpaths, cycleways and all other hard paved areas and around street furniture, contact, translocated, non-residual herbicide approved for total weed control shall be applied in accordance with the manufacturer's instructions, to keep such areas weed free until the issue of the Final Certificate.

**Grassed areas**

**8.** An approved translocated, non-residual herbicide shall be applied for total weed control to areas to be grass seeded or turfed at least 7 days before initial cultivation works.

**Cutting down long grass and weed growth and application of herbicide**

**9.** Before any works commence any long grass and weed growth shall be cut down from all the proposed planting areas to a maximum height of 50mm. Arisings shall be collected up and disposed of off site. This shall be followed by the application of herbicide, in accordance with Appendix 30/2.

**Preparation of planting areas**

**10.** Following the cutting down of long grass and weed growth an approved translocated non-residual herbicide shall be applied to the planting areas and the individual tree positions and the hedgelines to the following dimensions at least 7 days before initial cultivation works:

(i) a 0.5m diameter circle centred on each shrub planting station

(ii) a 1.0 m diameter circle centred on each heavy standard, container grown tree and feathered tree planting station

(iii) a 1.3m wide strip along each section of hedge

(iv) to the whole of each shrub bed area.

**11.** Alternatively, upon agreement with the Engineer, shrub beds and hedgelines may be cleared by hand weeding. Hand weeding shall consist of the removal by hand of all weed growth including the weed's entire rooting systems. Rubbish produced by hand weeding operations shall be disposed of off the site.

**Weed Control during the maintenance period**

**12.** The areas defined in Clause 9 of this Appendix shall receive weed control treatment four times per year during the growing season throughout the maintenance period by hand weeding and/or the use of approved herbicides.

**13.** Hand weeding shall consist of the removal by hand of all weed growth including the weed's entire rooting systems. Any loosened shrubs/trees shall be immediately firmed-in again. Rubbish produced by hand weeding operations shall be disposed of off the site.

## Appendix 30/4: Ground preparation

### Rubbish clearance

**1.** All rubbish, garden waste, litter and other debris shall be collected up from the whole area and disposed of off site.

### Contaminated and unsuitable soil in tree, hedge, shrub, and ground cover planting areas

**2.** Where the ground has been contaminated with cement slurry, oil, tar, or any material harmful to plant life, soil shall be excavated to a depth of 1.0 m and removed off site.

**3.** Where the soil is unsuitable to achieve and sustain satisfactory growth of hedges, shrubs and ground-cover planting it shall be excavated to a width of 600mm and depth of 450mm in the case of hedges and a depth of 300mm over the full planting area in the case of shrub and ground-cover planting. Excavated material shall be used in areas of fill where acceptable for this purpose or disposed of off site.

**4.** The bases of the excavated areas shall be well broken up to a further depth of at least 150mm prior to backfilling.

**5.** Excavated areas shall be temporarily fenced off. Temporary fencing shall be maintained until backfilling is complete.

**6.** Uncontaminated acceptable topsoil in accordance with Appendix 6/8 of the Specification shall be used for backfilling to hedge, shrub and ground cover planting areas, to the finished profiles required.

### Initial cultivation and grading of planting areas

**7.** All areas to be planted shall be initially cultivated, by hand or mechanical means, to form a coarse tilth to 300mm minimum depth. The whole of each shrub and ground cover bed area shall be cultivated and a 1.30m wide strip along each hedgeline.

**8.** Any grass sod, roots, construction materials, stones with any dimension greater than 50mm and any other material deemed unsuitable by the Engineer uncovered as a result of cultivation works shall be collected up and disposed of off site.

### Supply and spreading of planting compost to planting areas

**9.** Planting compost shall be ‘County Compost’, or an approved equivalent organic compost derived from green waste.

**10.** 'County Compost' is available from Leicestershire County Council's Lount Recycling and Household Waste Site, run by SITA (GB), which is on the B587, 2 miles north of Ashby-de-la-Zouch. Tel. 01530 413546.

**11.** Planting compost shall be spread over the whole of the planting areas to form an even layer of 50mm minimum depth before secondary cultivation and grading.

**Secondary cultivation and grading of planting areas**

**12.** After the planting compost has been spread, the planting areas shall be cultivated again by hand or mechanical means, to a minimum depth of 200mm to form a fine tilth.

**13.** Secondary grading works by hand shall be carried out upon completion of the secondary cultivation works.

**14.** Any material brought to the ground surface by the secondary cultivation and grading works, which is deemed unsuitable by the Engineer, shall be collected up and disposed of off site.

**15.** Where planting areas join grassed areas a clear edge shall be formed with a depth of at least 50mm.

**Excavation of tree planting pits**

**16.** Existing topsoil and subsoil shall be separately stripped from each tree planting pit. Topsoil shall be stockpiled alongside each pit for re-use. Subsoil shall be used in areas of fill or disposed of off site. Grass sod and any other unsuitable material excavated from tree planting pits shall be disposed of off site.

**17.** Tree planting pits shall be excavated to the following minimum dimensions:

- Heavy Standard Trees – 1200mm x 1200mm x 700mm depth
- Feathered Trees – 750mm x 750mm x 500mm depth
- Container Grown Trees – 750mm x 750mm x 500mm depth

**18.** In addition all tree planting pits shall be excavated **at least 150mm wider** and **at least 100mm deeper** than the tree root system.

**19.** The bases of all tree planting pits shall once excavated be broken up for a further 200mm depth to assist drainage, and the sides of all tree planting pits thoroughly loosened with a fork for a further 100mm to assist root penetration.

**20.** Excavated tree pits shall be securely fenced off with temporary fencing until backfilling is complete.

**21.** Any obstruction projecting into a tree planting pit in excess of 50mm in length or in such a position as to prevent the tree from being planted

and/or staked shall either be entirely removed or broken-out back to the edge or base of the pit. Such obstructions shall be disposed of off site.

**22.** Any additional topsoil that has to be imported to make up the topsoil levels and thickness within the tree pits shall be in accordance with Appendix 6/8 of the Specification.

**23.** Excavated tree planting pits must be inspected and approved by the Engineer prior to backfilling in advance of planting.

**24.** Precautions shall be taken to protect areas of hard surfacing around all tree planting pits from damage and contamination during the excavation of the pits.

**Backfilling of tree planting pits**

**25.** Backfill for tree planting pits shall consist of previously excavated topsoil and where necessary imported topsoil and the following quantities of imported planting compost. The completed operation shall bring the compacted backfill up to 25mm above finished ground levels:-

(i) Heavy Standard Trees – 130 litres of planting compost per pit.

(ii) Feathered Trees and Container Grown Trees – 40 litres of planting compost per pit.

**26.** Mixing of excavated topsoil, and, where required, imported topsoil and planting compost, shall take place before the backfill is placed in the pits. Mixed backfill material shall be placed in the pits and consolidated in layers not exceeding 150mm thick. Backfilled pits shall be compacted by foot firming.

## Appendix 30/5 Grass seeding, and turfing

**Weed treatment**

**1.** If seeding does not follow topsoiling the areas to be seeded must be kept weed free by herbicide treatment in accordance with Clause 8 of Appendix 30/2.

**Season**

**2.** Grass seed shall be sown during the period 1st March to 31st May or 1st September to 31st October unless agreed otherwise.

**Pre-seeding fertiliser**

**3.** A pre-seeding application of NPK fertiliser, ratio 2:3:2, at 100 g/$m^2$ shall be applied 7-10 days before sowing and thoroughly worked into the upper 50mm of soil. If a period of 30 days or more elapses before seeding then all areas will require a second application of fertiliser.

**Seed mixture**

**4.** The following mixture of seed shall be used to produce a low maintenance verge grass:-

30% Chewing Fescue
30% Slender Creeping Red Fescue
20% Smooth Stalked Meadow Grass
10% Hard Fescue
10% Browntop Bent

**5.** The seed shall comply with BS 4428.

**Sowing**

**6.** The seed to be sown and raked in at a rate of 30g/m2.

**Turfing**

**7.** Where turf is to be used it shall contain the grass mixture stated in this appendix.

**8.** Turf shall be supplied to BS 3969 and shall be close textured with uniform density and colour and sufficient fibre to hold each turf together during handling, transportation and laying. All turves shall be weed and disease free and shall be supplied in a mown condition. They shall have an even thickness of 32mm and shall have been established on a stone free loam type soil.

**9.** Turves shall be laid flat with broken joints (stretcher bond) and shall be butted tightly up to adjoining turves/grass. Any local adjustments needed to produce a level surface shall be made by adding or removing soil below the turf. High spots shall not be eliminated by over compaction/treading down. All turfing shall be carried out using planks to gain access to the working area thus protecting the prepared bed and newly laid turf.

**Establishment**

**10.** Newly sown or turfed grass shall be watered as necessary and in accordance with Appendix 3/8 to ensure establishment. Any areas of sown or turfed grass that fail to establish shall be resown or returfed.

**11.** The seeding or turfing shall be repeated as necessary until an evenly distributed dense sward is established over the seeded or turfed area.

## Appendix 30/6: Planting

**Materials**

**1.** All nursery stock shall comply with the relevant British Standard i.e. BS 3936: Part 1:1992 or Part 4:1984.

2. All nursery stock shall have been grown for its entire life in British nurseries, or if imported shall have been growing in a British nursery for at least one full calendar year. All plants shall be properly hardened-off. Native species shall be grown from local provenance seed wherever possible.

3. For any one item specified the size, form and quality of the stock in the batch supplied shall be reasonably consistent and shall not in any event drop below the standards specified in Tables 1 to 5 of this Appendix.

**Workmanship**

4. All landscape operations shall be carried out in accordance with the relevant provisions of BS 4428:1989.

5. No planting shall take place when the ground is waterlogged, excessively wet or during excessively windy conditions, or in any other conditions when in the Landscape Officer's opinion the successful establishment of plant material could be adversely affected. This applies even if planting has to cease during a working day, due to sudden unfavourable changes in weather or ground conditions.

6. During transportation to and around the site, all parts of all transplants and shrubs shall be fully protected either inside a vehicle or, if carried on a trailer, by tarpaulins, polythene sheeting or other approved wind and waterproof covering. Transplant and shrub rooting systems must remain moist at all times and their leaves/buds not exposed to drying winds.

7. Any broken or damaged branches/shoots shall be carefully pruned back to the nearest healthy bud at the time of planting.

**Staking heavy standard trees**

8. Double tree stakes shall be installed before the trees are planted.

9. Tree stakes and crossbars shall be fully peeled softwood. Stakes shall be round section, straight and without any sudden changes in diameter and pointed for driving.

10. Crossbars shall be half round section. Stakes shall have a top diameter of 100mm and shall be of sufficient length so that when driven at least 600mm below the base of the tree pit each stake projects 600mm of the way up the tree's clear stem. Each stake is to be driven in 100mm clear of the rootball on either side of the tree. Crossbars shall be fixed by nailing 50mm below the top of the stakes and cut as necessary such that they protrude 100mm beyond the outer face of the stakes.

11. After driving the stakes shall be reduced as necessary to leave 600mm above finished ground level.

12. Tree ties for selected standard trees shall be Tom's rubber tree ties with Big Block moulded rubber pads (ref. L3) and Tom's nylon reinforced

rubber belt 50mm wide (ref. L4) or approved equivalent. They are available from:

J. Toms Ltd.
Grigg Lane
Headcorn
Ashford
Kent TN27 9XT.

Telephone. 01622 891111

**13.** Nails for securing cross bars to stakes and tree pads and tree belts to cross bars shall all be galvanised. The nails securing the tree ties to the tree stakes must be driven fully home so as not to stand proud of the rubber.

**Staking feathered trees and container grown trees**

**14.** Tree stakes shall be fully peeled softwood, round section, straight and without any sudden changes in diameter and pointed for driving. Stakes shall have a top diameter of 75mm and shall be of sufficient length so that when driven at least 600mm below the base of the tree pit each stake projects at least one third of the way up the tree's clear stem.

**15.** Tree ties shall be Tom's rubber tree ties, with belt type B1 and pads, or equivalent approved. Nails for securing tree ties shall be galvanised.

**16.** Tree stakes shall be installed before the trees are planted. After driving, the stakes shall be reduced as necessary to achieve the correct height. The nails securing the tree ties to the tree stakes must be driven fully home so as not to stand proud of the rubber.

**Tree planting**

**17.** All trees shall comply with appropriate parts of BS 3936: Part 1 1992

**18.** **Heavy standard trees** shall be within the height range 3.5m-4.0m with a girth of 12-14cm. They shall be root balled and have a minimum clear stem of 2.0m and comply with Table 1 of this specification.

**19.** **Feathered trees** shall be bare root stock and shall be in the height range of 1.75m-2.0m with an untrimmed stem and comply with Table 2 of this Specification.

**20.** **Container grown trees** shall be within the height range of 1.75m-2.5m and shall be supplied in a 10L pot and comply with Table 3 of this specification.

**21.** For **Heavy standard rootballed stock**, the bottom of each prepared tree planting pit shall be covered with a sufficiently thick layer of pre-mixed backfill so that when the tree's rootball is placed within the pit the nursery soil mark is 25mm below the surrounding ground level. The tree shall be

placed centrally and vertically within the planting pit and all voids between the rootball and pit side filled with the backfill material. During the backfilling the tree shall be gently rocked to allow the mixture to settle closely around its rootball. The backfill shall be consolidated in layers not exceeding 150mm thick.

**22.** For **all other trees**, plant containers shall be removed prior to planting and disposed of off site. The trees shall be placed into the hole so as the top of the growing medium is at ground level.

**23.** The roots shall be spread out evenly in the planting hole. Finely broken backfill material shall be carefully spread around the roots and the tree given a light shake to ensure all gaps are filled with soil which shall then be consolidated by heeling. This filling and heeling shall continue in layers of 150mm maximum. On completion the tree shall be firm in the ground and in an upright vertical position.

**24.** Any broken or damaged branches/shoots shall be carefully pruned back to the nearest healthy bud at the time of planting.

**25.** All crown wrappings and fastenings used to tie in the branches for transport shall be removed immediately and disposed of off site.

**Planting of bare root transplants**

**26.** Bare root transplants shall comply with the appropriate requirements specified in BS 3936:Part 1:1992 and Part 4: 1984 and the following sub-clauses:-

**27.** Minimum dimensions for open ground stock in Table 2 of BS.3936: Part 4: 1984 are substituted by the specification given for minimum transplant sizes in Table 4 of this Appendix. Bare root transplants shall have a good fibrous root system in proportion to the size of the plant, and shall be of reasonably natural shape and growth.

**28.** Bare root transplants shall be notch planted in hedgelines and pit planted in all other planting areas in accordance with BS.4428: 1989. Transplants shall be pruned at the time of planting as specified or as required by the Engineer. Prunings shall be collected up and disposed of off site.

**Planting of container grown shrubs**

**29.** Container grown shrubs shall comply with appropriate parts of BS 3936: Part 1: 1992 and Part 4:1984 and Table 5 of this Specification.

**30.** Planting pits for container grown shrubs shall be excavated by hand. Pits shall be excavated at least 75mm deeper than the rootball and at least 150mm wider. The backfill shall be firmed by hand, ensuring that the soil surface after firming will be at or slightly above the nursery soil level.

**Mulching**

**31.** Bark mulch shall be composed of conifer bark with an average particle size of 50mm.

**32.** The bark shall have been composted for a minimum period of 8 weeks before delivery to site.

**33.** A sample of bark mulch must be submitted to the Engineer for approval prior to its use on site. Any bark failing to meet this standard shall be removed from site.

**34.** Bark mulch shall be applied to the complete area of all shrub and ground cover planting beds once they have been prepared and planted. Before applying the mulch the areas shall be cleared of any litter and weeds, which shall be disposed of off site. Mulch shall not be applied if the ground is frozen or frosted.

**35.** The bark mulch shall be spread to a minimum depth of 75mm.

**Rabbit protection**

**36.** **Heavy standard trees** shall be provided with 600mm high x 250mm diameter, green polyethylene mesh guards. Pre-cut pieces of mesh shall be assembled on site by forming a tube around the stem of the tree, supported by a 32mm x 32mm x 750mm long stake driven firmly into the ground and attached with two ties and a small ratchet tie to close the rim. The top of the stake shall correspond with the upper rim of the mesh guard and the entire base of the guard shall be in firm contact with the ground.

**37.** **Feathered trees and container grown trees** shall be fitted with spiral rabbit guards made of perforated transparent plastic, fitted around the tree with the base of the spiral being in contact with the ground, forming a cylindrical guard of at least 600mm in height.

**38.** **Bare root shrubs/transplants** shall be provided with a 600mm high spiral rabbit guard made of perforated transparent plastic and supported by a 14-16mm diameter x 900mm high stout bamboo cane.

**39.** The rabbit spiral shall be wound around the stem of the plant to the full height of the guard, ensuring that the gaps are kept to a minimum around branched stems.

**40.** **Container grown shrubs** shall be provided with a green coloured translucent polypropylene shrub shelter, 600mm high x 158mm-200mm diameter. Each shelter shall be supported by a 32mm x 32mm x 750mm long sawn softwood stake treated with preservative and pointed at one end.

**41.** The shelter shall be carefully placed over the plant and the entire base pushed a minimum of 25mm into the ground. The stakes shall be positioned at the place recommended by the manufacturer and shall be

driven firmly into the ground to the windward side of each planting station. The stakes shall not protrude above the rim of the shelter but shall extend at least 75mm above the top tie.

**42.** The shelter shall be attached to the stake by two biodegradable ties; one positioned at or within 75mm of ground level ant the other within 100mm of the top of the shelter.

**43.** Mesh guards, spiral guards and shrub shelters are available from :-

Tubex Ltd
Aberaman Park
Aberdare
CF44 6DA

Telephone : 01685 888000

**Watering**

**44.** Watering in at planting and during establishment shall be carried out in accordance with Appendix 30/8 to ensure satisfactory establishment.

**Tree planting in hard paved areas in grilles with guards**

**45.** The work shall be carried out in accordance with the relevant 6Cs Design Guide authorities latest drawing (i.e Leicestershire County Council's Community Services Department Drawing No.4/23/87b) – Detail of Planting in Grilles with Guard and the following instructions:

**46.** Protective fencing shall be provided around all excavation and construction works for the duration of the works.

**47.** All surplus materials from the construction/excavation works, rubbish, and unacceptable excavated material shall be removed off site.

**48.** Set out and excavate tree pits a minimum 1200mm x 1200mm x 900mm deep. Loosen base of tree pit to aid drainage by forking to a depth of 300mm. All necessary precautions shall be taken to keep the tree pits free from water.

**49.** Any obstruction projecting into a tree pit in excess of 50mm in length or in such a position as to prevent the tree from being planted and/or guyed shall either be entirely removed or broken out back to the edge or base of the pit. Such obstructions shall be disposed of off site.

**50.** Install Greenleaf Re-Root 600 root barrier supplied by Greenleaf, Haywood Way, Hastings, East Sussex TN35 4PI (tel no. 01424 717797) around the edge of each tree pit as indicated on drawing no.4/23/87b.

**51.** The guying system should be installed before tree pit is backfilled.

**52.** Backfill tree pits using BSI Metro-Sand, BSI Service International Ltd, 4 Leylands Business Park, Colden Common, Southampton, SO2 1TH (tel no.02380 696957) as indicated on drawing no.4/23/87b.

**53. Edging to tree grilles.** The 1:2:4 concrete haunching shall be 350mm wide and 100mm deep. When forming the concrete lip, on which the tree grille will 'sit', ensure that void, is left to accommodate lugs on tree grille frame which shall be fixed in concrete at a later stage as indicated on drawing no.4/23/87b.

**54.** Construct the edging to tree grilles. This brickwork/blockwork shall be laid as a soldier course with the bricks/blocks set on a 1:3 cement and sand mortar bed.

**55.** The tree planting operations shall be completed prior to fitting of the tree grilles and tree guards.

**56. Fitting of tree grilles.** Care shall be exercised when installing the tree grilles and guards to avoid any damage to the newly planted trees.

**57.** Fit 2 piece Broxap 'Sunburst' (ref BX14 431 4b M) medium tree grille frame supplied by Broxap Limited, Rowhurst Industrial Estate, Chesterton, Newcastle-under-Lyme, Staffordshire, ST5 6BD (Tel no. 01782 564411) *(or other approved)* on formed edging placing lugs in voids, fastening 2 pieces together and concreting lugs in place.

**58.** Locate 2-piece Broxap 'Sunburst' (Ref BX431-4b) 1200mm x 1200mm square tree grille finished in black with 610mm circular aperture *(or other approved)* in frame and secure with fixings.

**59. Fitting of tree guards.** Install 2-piece Broxap 'Rural' (Ref BX14 1276) 1.8m high mild steel circular tree guard around tree finished in black *(or other approved)*, fixing by bolting guard to tree grille frame.

**60. Backfilling tree grille aperture.** Backfill around tree, flush with top of tree grille using a minimum 50mm depth of bark nuggets. Bark nuggets shall be predominantly matured European Pine bark with an even nominal particle size distribution of 15-65mm with 0% dust and less than 5% wood content. The product shall have been tested in accordance with the requirements of BS4790: 1987, for fire resistance. This product is available from Melcourt Industries Ltd, Boldridge Brake, Long Newton, Tetbury, Gloucestershire, GL8 8RT (Tel no. 01666 502711)

**61.** On completion of all works, any damage to existing features shall be made good and the site shall be left tidy with all rubbish removed off site.

## TABLE 1 : SPECIFICATION FOR HEAVY STANDARD TREES

| Species/variety | Size | Girth | Clear Stem | Notes |
|---|---|---|---|---|
| | 3.5-4.0m | 12-14cm | 2.0m | |
| | 3.5-4.0m | 12-14cm | 2.0m | |
| | 3.5-4.0m | 12-14cm | 2.0m | |
| | 3.5-4.0m | 12-14cm | 2.0m | |
| | 3.5-4.0m | 12-14cm | 2.0m | |
| | 3.5-4.0m | 12-14cm | 2.0m | |
| | 3.5-4.0m | 12-14cm | 2.0m | |

## TABLE 2 : SPECIFICATION FOR FEATHERED TREES

| Species/variety | Size | Girth | Clear Stem | Notes |
|---|---|---|---|---|
| | 1.75-2.0m | | Stem untrimmed | Strong central leader |
| | 1.75-2.0m | | Stem untrimmed | Strong central leader |

## TABLE 3 : SPECIFICATION FOR CONTAINER GROWN TREES

| Species/variety | Size | Container Size | Clear Stem | Notes |
|---|---|---|---|---|
| | 1.75-2.5m | 10L | Stem untrimmed | Strong central leader |

## TABLE 4 : SPECIFICATION FOR BARE ROOT PLANTS

| Species/variety | | | | |
|---|---|---|---|---|
| **Bare root transplants** | Age | Size | Min root collar diam. | Habit |
| | 1+1 | 40-60cms | 7mm | Stout feathered transplant |
| | 1+1 | 60-80cms | 9mm | Stout bushy transplant – min 3 stems |
| | 1+1 | 40-60cms | 8mm | Stout bushy transplant – min 3 stems |
| | 1+1 | 40-60cms | 8mm | Stout feathered transplant |
| | 1+1 | 60-80cms | 9mm | Stout bushy transplant – min 3 stems |
| | 1+1 | 40-60cms | 8mm | Stout feathered transplant |
| | 1+1 | 40-60cms | 8mm | Stout bushy transplant – min 3 stems |
| | 1+1 | 40-60cms | 8mm | Stout bushy transplant – min 3 stems |
| | 0+1 | 60-80cms | 9mm | Stout bushy transplant – min 3 stems |
| | 1+1 | 40-60cms | 8mm | Stout bushy transplant – min 3 stems |
| | 1+1 | 60-80cms | 9mm | Stout bushy transplant – min 3 stems |

**TABLE 5 : SPECIFICATION FOR CONTAINER GROWN PLANTS**

| Species/variety | Pot size | Size (cms) | Min breaks in lower third | Notes |
|---|---|---|---|---|
| | 2L | | | Strong plant, well-established in pot |
| | 3L | 40-60 | 3 | |
| | 3L | 40-60 | 3 | |
| | 3L | 40-60 | 3 | |
| | 3L | 40-60 | 3 | |
| | 3L | 40-60 | 3 | |
| | 3L | 30-40 | 3 | |
| | 3L | 30-40 | 2 | |
| | 2L | 30-40 | 2 | |
| | 3L | 40-60 | 2 | |
| | 2L | 30-40 | 3 | |
| | 3L | 40-60 | 3 | |

## Appendix 30/7: Grass maintenance

### Mowing

**1.** All grassed areas are to be kept mown until issue of the Final Certificate.

**2.** All mowing shall be carried out in accordance with Clause 3007 of the Specification

**3.** The contractor must ensure that the grass cutting operation finely chops the grass, and deposits the grass on the area cut at the time of cutting and not onto the carriageway, footway or other paved areas.

**4.** All areas of seeding shall be mown a minimum of 3 times.

**5.** On rural verges the initial cut shall be made to reduce growth to 50mm in height prior to weed species setting seed. Subsequent cuts shall be carried out when growth has reached 100mm in height.

**6.** On urban high amenity verges mowing shall continue throughout the growing season to ensure that the grass does not exceed 75mm in height. Immediately after cutting, the grass and other vegetation shall not be longer than 40mm nor less than 25mm.

## Appendix 30/8: Watering

### General

**1.** All necessary licences and permissions shall be obtained from water companies for the efficient execution of watering and ascertaining the availability of second class water from sewage works or other approved sources in the event of a Hose Pipe Ban.

**2.** Watering shall be temporarily suspended in areas where ponding occurs or where there is a risk of surface run-off. Once the surface water has soaked away, repeated applications shall be applied until the watering operation has been completed.

**3.** Water to individual trees shall be applied either by low pressure hose or through irrigation hoses to the base of the plants. Where necessary a depression shall be formed around the stem base of the plant to ensure that water reaches the root zone and does not run off the surface onto the surrounding ground.

**4.** Any damage resulting from watering operations shall be reinstated including the replacement of any soil or mulch washed off. Following watering all plants shall be left firm and roots not exposed.

### Establishment watering

**5.** Watering of all planting and grassed areas shall be undertaken as necessary to ensure establishment and survival.

### Additional watering

**6.** Additional watering shall be undertaken as necessary during periods of abnormally dry weather to ensure survival.

## Appendix 30/9: Establishment maintenance for planting

#### General

**1.** All planting shall be maintained until issue of the Final Certificate. Any plants that are missing, badly damaged, or have died, for whatever reason, or which in the opinion of the Engineer are failing to make satisfactory extension growth within the maintenance period shall be replaced.

**2.** The Contractor shall, within 5 working days of completing each maintenance visit, send the Engineer written notification of such completion.

### Firming

**3.** Plants shall be inspected during each visit to undertake maintenance operations and any which have been subject to frost heave or wind rock shall be straightened to an upright position and the ground re-firmed.

### Stakes, tubes, guards and their ties

**4.** Stakes, tubes, guards and their ties shall be inspected twice per year in October and March, and adjusted to allow for the growth of each plant. Any damaged items shall be removed off Site and replaced with new items.

### Routine planting maintenance and pruning

**5.** Routine planting maintenance and pruning shall be carried out in accordance with the guidance in BS 7370. Any infected (diseased or pest) prunings or timber arisings shall be removed off site and disposed of in accordance with Clause 3010 of the Specification. Healthy arisings shall be dealt with in accordance with Clause 3010.

### Weed control

**6.** Weed control during the maintenance period shall be in accordance with Appendix 30/2.

**Litter collection**

**7.** Whilst on the Site for any other maintenance operation all litter from the shrub beds and hedgelines shall be collected up and disposed of off the Site.

**Watering**

**8.** Watering shall be undertaken in accordance with Appendix 30/8.

**Joint inspections**

**9.** During the maintenance period the Engineer shall be contacted to arrange a joint inspection during the growing season to review the planting and identify any works or replacements required.

## Appendix 30/10: Maintenance of existing established trees and shrubs

**1.** All existing trees and shrubs shall be maintained until issue of the Final Certificate.

**2.** Where any existing tree or shrub suffers damage, distress or die back during the works or the following maintenance period the cause of this shall be investigated and any remedial works as agreed with the Engineer shall be undertaken. This shall include the replacement of badly damaged trees and those suffering significant die back with semi-mature specimens where required by the Engineer.

**3.** All tree surgery and other maintenance work required shall be as agreed in advance with the Engineer.

**4.** All work shall be undertaken in accordance with BS 3998, except that cuts and wounds shall not be treated with a fungicidal sealant, bitumen or latex paint.

**5.** The necessary notice shall be served in connection with any work to be undertaken on trees covered by a Tree Preservation Order of in a Conservation Area.

**6.** All aspects of the arboricultural works shall comply with the current Forestry and Arboriculture Safety & Training Council (FASTCO) recommendations.

**7.** If any defect is found within a tree during the course of carrying out work which would render the specified work inappropriate or inadequate, the work must cease and the Engineer notified to agree any appropriate action which is to be taken.

**8.** Except in an emergency incident, tree surgery shall only be undertaken within the dormant season and outside the bird nesting season.

**9.** All mature trees shall be checked for bat roosts in any cavities, before arboricultural works are carried out. The inspection for bat roosts and any subsequent action must be carried out by appropriate licensed personnel.

**10.** Regulative pruning shall be carried out in accordance with the Arborical Research Note 48/83/PATH and Arborical Research Note 116/93 as issued by the Arborical Advisory and Information Service.

**11.** During the Maintenance Period as part of tree pruning operations any of the following works as are necessary shall be carried out:

(i) Removal of basal sucker growths and epicormic growth from the trunk at ground level up to the base of the tree's natural crown.

(ii) Repair of minor bark wounds on the trunk and main branches by the removal of any dead, damaged or loose bark back to undamaged tissue or to the line of newly forming callus growth. In either case the size of wound shall be kept to a minimum.

(iii) Removal of any foreign objects from the tree where this can be done without inflicting any undue damage to the tree.

(iv) Removal of reverted branches from cultivars of tree species.

(v) Severance of undesirable climbing plants at base of trunk.

**12.** During the maintenance period the Engineer shall be contacted to arrange a joint inspection during the growing season to review the condition of the trees and identify any works or replacements required.