TORBAY COUNCIL

Part 2A Technical Specification

Contract Reference

TPL1721

Contract Title

Structural Maintenance for Highways, Parks and Open Spaces

SPECIFICATION

Preamble to the Specification

1 The Specification referred to in the Schedule shall be the 'Specification for Highway Works', published by The Stationery Office (formerly HMSO) as Volume 1 of the Manual of Contract Documents for Highway Works, as modified and extended by the following:

(i) Appendix 0/1: Additional, Substitute and Cancelled Clauses, Tables and Figures;

(ii) Appendix 0/2: minor alterations to existing Clauses, Tables and Figures;

(iii) The Numbered Appendices listed in Appendix 0/3;

(iv) Appendix 0/5: Special national alterations of the Overseeing Organisation of Scotland, Wales or Northern Ireland.

Appendix 0/4 contains a list of the Drawings.

2 The relevant publication date of each page of the Specification for Highway Works is given in the Schedule of Pages and Relevant Publication Dates.

3 An Additional Clause as indicated by a suffix 'A' in Appendix 0/5 is an alteration originating from the Overseeing Organisation of Scotland, Wales or Northern Ireland. An Additional Clause as indicated by a suffix 'AR' in Appendix 0/1 is a Contract-specific alteration.

4 A Substitute Clause, as indicated by the suffix 'S' in Appendix 0/5 is an alteration originating from the Overseeing Organisation of Scotland, Wales or Northern Ireland. A Substitute Clause as indicated by a suffix 'SR' in Appendix 0/1 is a Contract-specific alteration.

5 A Cancelled Clause, as indicated by the suffix 'S' in Appendix 0/5 is an alteration originating from the Overseeing Organisation of Scotland, Wales or Northern Ireland. A Substitute Clause number or Appendix listed in Appendix 0/1, 0/2 or 0/5.

6 Insofar as any of the Numbered Appendices may conflict or be inconsistent with any provision of the Specification for Highway Works the Numbered Appendices shall always prevail. Additionally, Numbered Appendices 01 and 02 shall take precedence over Numbered Appendix 0/5.

7 Any reference in the Contract to a Clause number or Appendix shall be deemed to refer to the corresponding Substitute Clause number or Appendix listed in Appendix 0/1, 0/2 or 0/5.

8 Where a Clause is altered any original Table/Figure referred to in the Clause shall apply unless the Table/Figure is also altered. Where a Table/Figure is altered any reference in a Clause to the original Table/Figure shall apply to the altered Table/Figure.

9 Where a Clause in the Specification relates to work goods or materials which are not required for the Works it shall be deemed not to apply.

10 Any Appendix referred to in the Specification which is not used shall be deemed not to apply.

11 Where a Clause in the Specification is prefixed by an # this indicates that this particular Clause has a

substitute National Alteration for one or more of the Overseeing Organisations of Scotland, Wales or Northern Ireland. Substitute or additional National Clauses shall be used within countries to which they specifically apply and they are deemed to replace corresponding Clauses in the main text of the Specification as appropriate. The substitute National Clauses are located at the end of the relevant Series together with the additional National Clauses of the Overseeing Organisations.

12 Other than where references to the Overseeing Organisations are made in the context of the Overseeing Organisation granting statutory or type approvals, the roles and functions of the Overseeing Organisation shall be undertaken by…….†.

13 If the Specification is used in conjunction with a Contract under which the Contractor is responsible for the design of any part of the Permanent Works, the delegation of the roles and functions of the Overseeing Organisation as stated in paragraph 12 above shall be amended as follows:

(i) If any agreement, consent or approval required to be obtained from the Overseeing Organisation impacts on the health and safety of the general public, the environment or any property or equipment not owned or operated by the Contractor or the Design Build Finance and Operate concessionaire, such agreement, consent, approval shall be obtained from……..*

(ii) Where the Specification provides for the Overseeing Organisation to require a test, waive the requirement for a test or alter testing frequency, the party to whom the Overseeing Organisation's roles and functions have been ascribed by paragraph 12 above shall exercise such decisions in accordance with the Secretary of State's requirements stated in the Contract. **

(iii) Contractor as stated in this specification shall mean JV Co.

† Authority: Project Manager: Designer etc as drawn from the Conditions of Contract.

* Authority Officer: Employer's Representative: Department's Agent etc as drawn from the Conditions of Contract.

** Construction Requirements/Employer's Requirements. *[Note to compiler: Where applicable the Preamble to the specification and the Schedule of Pages and Relevant Publication Dates should be reproduced unaltered and bound in the Specification with the Numbered Appendices. A revised Schedule of Pages and Relevant Publication Dates will be included in each published national alteration to the Specification for Highway Work*

Specification for Highway Works
Schedule of Pages and Relevant Publication Dates

Series/Appendix	Page Number	Publication Date
000	1 to 3F	January 2003 and all subsequent updates:-
100	1 to 13F, W1F, N1 to N5F	
200	1 to 3F	
300	1 to 4F	
400	1 to 3	
	4	
	5 to 10	
	11	
	12F	
500	1 to 20F, N1 to N3F	
600	1 to 29	
	30	
	31 to 57F, S1F, N1 to N3F	
	1 to 9F, N1 to N7F	
700	1 to 5F, S1F, N1 to N2F	
800	1 to 48	
900	49 to 51F	
	1 to 38F	
1000	1 to 4F, N1 to N2F	
1100	1 to 15F, W1F, N1 to N3F	
1200	1 to 9F, N1F	
1300	1 to 8F, N1F	
1400	1 to 16F	
1500	1 to 49F	
1600	1 to 23F	
1700	1 to 8F	
1800	1 to 15F, S1F	
1900	1 to 4F	
2000	1 to 4F	
2100	1 to 6F	
2200	1 to 3F	
2300	1 to 4F	
2400	1 to 9F	
2500	1 to 7F	
2600	1 to 8F	
Appendix A	1 to 5F	
Appendix B	1 to 2F	
Appendix C	1F	
Appendix D	1F	
Appendix D (NI)	1F	
Appendix E	1 to 39F	
Appendix F	1F	
Appendix G		

APPENDIX 0/1: Additional, substitute and Cancelled Clauses, Tables and figures

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text
109.SR	Control of Noise and Vibration
110.SR	Information Boards
116.6AR & 116.7AR	Privately and Publicly owned Services or Suppliers
117.33AR	Traffic Safety and Management – Ensuring site is clear of parked cars
117.34AR	Maintain Access to Properties
117.35AR	Temporary Traffic Signs to be Externally Illuminated
119.SR	Routing of Vehicles
126.AR	Use of Mains Water
170.AR	Returns to be submitted by the Contractor
171.AR	Approval of the Authority
172.AR	Advertisements and Nameboards
173.AR	Emergency Contact and Site Safety Supervisor
174.AR	Materials and Workmanship
177.AR	Communications with the Contractor
178.AR	Maintenance Categories of Highways
179.AR	Protection of the Environment and Other Road Users
180.AR	Damage to Highway
201.1SR	Clearing General
201.5SR	Third Party Apparatus
501.9AR	Pipes for Service Ducts
504.8AR	Jointing of Pipes
506.4AR	Connection to Existing Pipes
519.AR	Rising or Lowering Covers and Gratings on Existing Chambers and Gullies
601.1SR	General Classification of Earth Work Material

APPENDIX 0/1: Additional, substitute and Cancelled Clauses, Tables and figures

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text
602.5SR	General Requirements – Disposal of Surplus Material
670AR	Tipping of Surplus Material
704.10AR	Use of Sub-Surface Course Surfaces by Traffic during Resurfacing and Reconstruction
708AR	Reconstruction
716AR	Formation of Joints
771AR	Sealing of Cracks in Existing Pavements (overbanding)
772AR	Formation of Joints
901	Bituminous Pavement Materials
902	Reclaimed Bituminous Materials
903	Dense Asphalt Concrete Base (Design Mixtures)
906	Dense Asphalt Concrete Base and Binder Course with Paving Grade Bitumen (Recipe Mixtures)
907	Regulating Course
909	Dense Asphalt Concrete Surface Court (6mm) (Recipe Mixtures)
910	Rolled Asphalt Surface Course (Recipe Mixture)
911	Rolled Asphalt Surface Course (Design Mixture)
912	Close Graded Asphalt Concrete Surface Course (Recipe Mixture)
915	Coated Chippings for Application to Pre-mixed Surfacing
919	Surface Dressing: Recipe Specification
920	Bond Coats, Tack Coats and other Bituminous Sprays
921	Surface Macrotexture of Bituminous Surface Courses on High Speed Roads
923	Binder Recovery using the Rapid Recovery Test (RRT) and Accelerated Ageing using the Modified Ageing Rolling Thin Film Oven Test (RTFOT)
924	High Friction Surfaces
928	Determination of the Complex Shear (Stiffness) Modulus (G*) and Phase Angle (□) of Bituminous Binders using a Dynamic Shear Rheometer (DSR)

APPENDIX 0/1: Additional, substitute and Cancelled Clauses, Tables and figures

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text
929	Dense Bitumen Asphalt concrete Base and Binder Course (Design Mixtures)
931	Heavy Duty Asphalt concrete Base and Binder Course Asphalt concretes with Paving Grade Bitumen (Recipe Mixtures)
937	Stone Mastic Asphalt (SMA) Binder Course and Regulating Course
938	Porous Asphalt Surface Course
939	Determination of Cohesion of Bitumen and Bituminous Binders
941	Modified Binder Storage Stability Test
943	Hot Rolled Asphalt Surface Course and Binder Course (Performance Related Design Mix)
944	Design, Testing and Compliance of Performance Specified Base and Binder Course
945	Weather Conditions for Laying of Bituminous Materials
946	China Clay Sand Asphalt Base
947	Slate Asphalt Concrete Base
948	Cold Recycled Bitumen Bound Material
949	Repairs to Potholes
952	Deformation Resistance for Binder Course and Base
953	Durability of Bituminous Materials – Saturation Ageing Tensile Stiffness (SATS) Test
970	Adequacy of Compaction – Attained Air Voids
971	Stone Mastic Asphalt Surface Course
1107.2SR	Footway and Paved Areas (Concrete Block Paving)
1108.2SR	Footway and Paved Areas (Clay Pavers)
1111AR	Footway Treatment – Weed-killing
1112AR	Reinstatement to Footways and Kerbing
1171AR	Bedding Sand for Paving, Flags and Blocks
1212.1SR	Road Markings

APPENDIX 0/1: Additional, substitute and Cancelled Clauses, Tables and figures

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	**Title and/or written text**
1212.17AR	Road Markings – Amendment to BS 3262
2417.AR	Finish of Joints in Brickwork and Blockwork
2418.AR	Finish of Joints in Stonework
2419.AR	Brick and Stone on Existing Structures
2420.AR	Taking Down Existing Brickwork and Stonework
2700.AR	Additional Series: Pointing, Easipointing and Grouting
2701.AR	Preparation of Pointing and Easipointing and Grouting
2702.AR	Pointing
2703.AR	Hand Pointing
2704.AR	Pressure Pointing
2705.AR	Easipointing
2706.AR	Trial Panels
2707.AR	Grouting
2708.AR	Pointing Below Water Level
	SERIES 100 – PRELIMINARIES
109SR	**Existing Clause 109 is deleted and replaced by the following:** "109SR Control of Noise and Vibration 1 The contractor shall employ the best practical means to minimise noise and vibration produced by his operations and shall comply with the recommendation set out in BS 5228 "Code of Practice for Noise Control on construction and Demolition Sites" together with the specific requirements contained in this clause. 2 The Contractor shall, when applicable, obtain consents under Section 61 of the Control of Pollution Act 1974. 3 Equipment that is required to be run continuously throughout the night shall be required to have additional acoustic screening if so deemed necessary by the Authority.

APPENDIX 0/1: Additional, substitute and Cancelled Clauses, Tables and figures

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text
	4 Compliance with any section of this Clause shall not relieve the Contractor of any of his obligations and liabilities under the Contract or the Control of Pollution Act 1974, the Noise at Work Regulations 1989 or any other statute." **Existing Clause 110 is deleted and replaced by the following:**
110SR	"110SR Information Boards 1. The Contractor shall provide and erect information boards at the location and to the specification given in Appendix 1/21. The information boards shall be erected prior to or at the time of commencement of Works for the duration of the Works unless otherwise stated in Appendix 1/21. The Contractor shall ensure that the information boards are kept clean and maintained in a safe and legible condition and remove or return them on completion of the Works. Placed 2 weeks in advance.
116.6AR and 116.7AR	**Privately and Publicly Owned Services or Supplies** If in the executing of works, by reason of any subsidence caused by or any act of neglect or default of the Contractor, any damage to any apparatus or any interruption of or delay to the provision of any service is caused, the Contractor shall bear and pay the cost reasonably incurred by the Authority concerned in making good such damage and shall make full compensation to the Authority for any loss sustained by reason or such interruption or delay. The Contractor shall, at all times during the progress of the Works, afford facilities to properly accredited agents of any public or Statutory Authority for access to all or any of their apparatus situated on or under the Site, as may be necessary for inspecting, reporting, maintaining, removing, renewing or altering such apparatus in connection with the construction of the works or for any other purpose whatsoever.
117.33AR	**Add new sub-Clause 117.20AR as follows:** "Traffic Safety and Management – Ensuring site is Clear of Parked Cars". The Contractor will be responsible for ensuring that all sites are free from parked vehicles or other obstacles that may hinder his works. He is to obtain the agreement of the Authority before implementing any system to ensure this."
117.34AR	**Add new sub-Clause 117.21AR as follows:** "Traffic Safety and Management – Maintain Access to Properties The Contractor is to liaise with occupiers of all properties adjacent to the works to ensure that, where required, adequate access to these properties is maintained." The Contractor will communicate with affected residents and properties in accordance with the councils Communication Policy.

APPENDIX 0/1: Additional, substitute and Cancelled Clauses, Tables and figures

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text
117.35AR	**Add new sub-Clause 117.22AR as follows:** "Traffic Safety and Management – Temporary Traffic Signs to be Externally Illuminated Where sited within 50 metres of a system of street lighting, all temporary traffic signs, so required by the Traffic Sign Regulations and General Directions 2002 or other subsequent revisions, shall be externally illuminated during the hours of darkness or in circumstances of poor visibility and fog."
119SR	**"119SR Routing of Vehicles** 1. Existing roads, accesses to adjacent house, buildings, etc., and any new roads, whether part of this work or not and which are being used by construction traffic shall be kept clean and clear of all dirt, mud and material dropped from vehicles or from tyres. The Contractor shall provide, maintain and use, as directed by the Authority, suitable equipment including mechanical road sweepers solely for this purpose throughout the course of the Works. 2. All highway drains, ditches and grips shall be kept clear of any spoil, mud, slurry or material brought onto the road as a result of the carrying out of the Works.
126AR	**Add new Clause 126AR as follows:** "126AR use of Mains Water 1. The Contractor shall be responsible for making his own arrangements with the Water Authority for obtaining mains water for the Works and he shall comply with all the local conditions regarding the use of water. The Contractor shall agree with the Water Authority the location of all hydrants from which mains water can be abstracted for the Works, together with abstraction methods, receiving apparatus, draw off rates and times, and the Contractor shall provide constant attendance when water is being drawn off any hydrant. 2. Water shall not be abstracted from rivers, stream or watercourses, unless the appropriate licence has been obtained by the Contractor from the "Environment Agency".
170AR	**Returns to be Submitted by the Contractor** **Labour** 1. Returns in respect of Labour will be required only for works paid for under dayworks or at cost.

APPENDIX 0/1: Additional, substitute and Cancelled Clauses, Tables and figures

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text
	Plant **2.** Returns in respect of plant will only be required for works carried out under dayworks or at cost. **Daily Whereabouts Sheets** 3. The Contractor will be required to inform the Authority each working day before 09:00 hours via fax/email of the location where each of his gangs will be working during the day. The sheets must indicate the sequence of locations to which the gangs will visit and probable arrival time (i.e. am or pm). The Contractor must also inform the Authority Officer of any significant alterations to this planned sequence which may occur during the day. **Inclement Weather Delays** 4. The Contractor shall notify the Authority at the end of any day when the Works have been delayed by inclement weather, of the extent of the delay and shall submit to the Authority each week a record of Inclement Weather Delays. Nil returns shall be submitted and in the event of doubt existing as to whether or not delays occurred and the Contractor not having complied with this Clause it shall be deemed that such delays did not occur.
171AR	**Approval of the Authority** 1. The Contractor when requested by the Authority shall give adequate notice to him in writing. Where no period of notice is stated, such notice shall be not less than 4 hours of normal working time before the work is ready for final inspection. Forms shall be used where these have been especially provided for the purpose by the Authority. No further work on the item being inspected shall commence until the Authority's written approval has been given. 2. The Authority will require reasonable time during normal working hours to carry out his inspection. 3. When the Contractor gives the Authority details of the source of supply of materials or other supplies to be incorporated into the Works as required by Clause 105, the Authority will then require reasonable time to carry out any tests and enquiries that he may deem appropriate before giving his approval.
172AR	**Advertisements and Nameboards** 1. The Contractor shall erect nameboards giving the Contractor's name and out of hours contact number at locations that are clearly visible on each site. 2. All advertisements, contractor's and sub-contractor's nameboards to be erected within the site shall be approved by the Authority. Advertisements and nameboards will not be allowed in the vicinity of traffic lanes where in the opinion of the Authority such would distract drivers or conflict with statutory traffic signs. All advertisements and nameboards within the Site shall be removed on Completion of the work executed under any works order.

APPENDIX 0/1: Additional, substitute and Cancelled Clauses, Tables and figures

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text

173AR **Emergency Contact**

Emergency Contact shall be provided through the Contractor's 24hr Control Centre.

174AR **Materials and Workmanship**

The appropriate British and European Standards and Codes of Practice will be adopted, where applicable, for all materials and workmanship, subject to any variations and amendments given in the Specification or indicated in the Contract Drawings. The omission of any such reference will not relieve the Contractor of his obligations to conform to the appropriate Standard or Code of Practice.

175AR **Road to be kept Clean**

Roads and accesses being used by construction traffic shall at all times be kept clean and clear of all dirt, mud, and material dropped from vehicles or from tyres. The Contractor shall provide, maintain and use suitable equipment for this purpose.

177AR **Communications with the Contractor**

The contractor shall supply his site supervisor with a telephone, mobile phone with answer phone facility, or radio, so that there can be communication between him and the Authority. This may be via the Contractor's Control Centre.

178AR **Maintenance Categories of Highways**

Where reference is made to the maintenance category of a highway anywhere in this contract, the following table shall apply.

TABLE 178/1 MAINTENANCE CATEGORIES OF HIGHWAYS

Maintenance Category	Function
1. Motorway	
2. Strategic Route	Trunk and some Principal A roads
3a. Main Distributor	Main urban networks and inter primary links
3b. Secondary Distributor	Classified B and C class roads and bus routes
4a Link Road	Roads linking main and secondary distributor
4b. Local Access Road	Roads serving limited number of properties
5. Track	Not used by normal vehicular traffic

APPENDIX 0/1: Additional, substitute and Cancelled Clauses, Tables and figures

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text
	SERIES 200 – SITE CLEARANCE
201.1SR	**Existing sub-Clause 201.1 is deleted and replaced by the following:** **"Clearing – General** 1. The Contractor shall demolish, break up and remove buildings, structures and superficial obstructions on the site and carry out other Site clearance as described in Appendix 2/1. He shall clear each part of the Site at all times and to the extent required or approved by the Authority. The Contractor shall ensure that individual trees, shrubs and other features and areas stated on drawings to be preserved, are suitably identified and protected."
201.5SR	**Existing sub-Clause 201.5 is deleted and replaced by the following:** **"Clearing – Third Party Apparatus** (i) The Contractor, subject to any instruction or contrary direction by the Authority, shall take all measures required by any Statutory Undertaker, the management of other publicity owned services, or owners of privately owned services or suppliers, for disconnection and proper sealing off of all redundant drains, services and suppliers. (ii) All Statutory Authorities apparatus which becomes redundant shall, unless the Authority shall notify the Contractor to the contrary, remain the property of the respective Authorities and shall not under any circumstances become the property of the Contractor or of any of his workmen or sub-contractors".
	SERIES 500 – DRAINAGE AND SERVICE DUCTS
501.9AR	**Add new sub-Clause 501.9AR as follows:** "501.9AR Pipes for Service Ducts All traffic signal UTC and CCTV ducting is to be orange polyethylene medium density ducting inscribed with the words 'TRAFFIC SIGNALS'."
504.8AR	**Add new sub-Clause 504.8AR as follows:** "504.8AR Jointing of Pipes Unless otherwise specified in the Appendix 5/1 all concrete pipes to surface water and filter drains shall have ogee joints."

APPENDIX 0/1: Additional, substitute and Cancelled Clauses, Tables and figures

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	**Title and/or written text**
506.4AR	**Add new sub-Clause 506.4AR as follows:** "506.4AR Connection to Existing Pipes Unless otherwise specified in Appendix 5/1, all connections to existing drains shall be made using proprietary saddle or sleeve fittings of the respective pipe sizes."
519.AR	**Add new Clause 519AR as follows:** "519AR Raising or Lowering Covers and Gratings on Existing Chambers and Gullies 1 The Contractor shall raise or lower covers and gratings on the existing chambers and gullies specified in the works instruction or included in Appendix 5/70. 2 When the raising or lowering of covers and gratings is undertaken in conjunction with surfacing works, the adjustment of the cover or grating level is to be carried out in advance of the surfacing operation otherwise approved by the Authority prior to the commencement of the surfacing works. 3 All covers and frames shall be set flush to the finished surface level except gully gratings and frames which shall be set 6mm below the finished surface level. 4 All covers, gratings and frames shall be cleaned of all adhering mortar and material before resetting at the adjusted level. The frames shall be bedded on Envirobed with additional Engineering brickwork as necessary. Gully frames set against kerbs shall have the space between kerb and frame sealed with Envirobed. Other bedding materials may be approved by the Authority prior to commencement of the works. 5 Before any surfaces (including footways) can be trafficked, any projections of covers gratings and frames greater than 10mm shall be made safe by temporary ramps constructed of a material suitable for the purpose to a slope not steeper than 1:5. 6 British Telecom covers and frames are to be raised or lowered in accordance with their current specifications which the Contractor shall ascertain from British Telecommunications plc prior to commencement of the works." 7 With the exception of small covers to stop cocks and the like, covers and frames shall be supported by a temporary support device until the bedding material has reached sufficient strength to support the cover and frame. Where packing pieces are used they shall be of a proprietary type. The cover and frame shall not be exposed to any load or disturbance until the bedding material has reached a minimum strength of 10N/mm^2.

APPENDIX 0/1: Additional, substitute and Cancelled Clauses, Tables and figures

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	**Title and/or written text**
	8 Covers and frames shall be kept clear of traffic for the following times: 9 When covers are raised or lowered in areas of paving slabs or block paving they shall be rotated to correspond with the direction of paving unless physical constraints restrict this.

APPENDIX 0/1: Additional, substitute and Cancelled Clauses, Tables and figures

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	**Title and/or written text**

	BEDDING MATERIAL	**PERIOD TO BE KEPT CLEAR OF TRAFFIC**
	Ordinary Portland Cement Mortar	7 Days
	Rapid Hardening Cement Mortar	4 Days
	Proprietary Materials (Approved by the Authority)	As the Manufacturer's Instructions

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text
	SERIES 600 – EARTHWORKS
601.1SR	**Existing sub-Clause 601.1 is deleted and replaced by the following:** "General Classification of Earthworks Material 1 Earthworks materials shall fall into one of the following general classifications:- (i) acceptable material: (a) material excavated from within the Site or imported onto the Site which meets the requirements of table 6/1 and Appendix 6/1 for acceptability for use in the Permanent Works; (ii) unacceptable material: (a) Class U1 – as defined in sub-Clause 2 of the Clause: material excavated from within the Site which, unless processed so that it meets the requirements of Table 6/1 and Appendix 6/1, shall not be used in the Permanent Works; (b) Class U2 – as defined in sub-Clause 3 of this Clause: material excavated from within the Site which shall not be used in the Permanent Works; (iii) hard material: (a) Class H1 – rock: any hard natural or artificial material, but excluding those in (b), (c) or (d) below, which requires the use of blasting or approved pneumatic tools for its removal; (b) Class H2 – bituminous material excavated from any layer of an existing flexible carriageway down to and including sub-base level; (c) Class H3 – concrete; (d) Class H4 – reinforced concrete."
602.5SR	**Existing sub-Clause 602.5 is deleted and replaced by the following:** "General Requirements – Disposal of Surplus Material 5 (i) Acceptable material (other than Class 5A or any Class 5B material replacing Class 5A material in accordance with sub-Clause 3 of this Clause) surplus to the total requirements of the Permanent Works and all unacceptable material Class U2 and Class U1 not required to be processed shall, unless the Authority permits otherwise, be run to spoil in tips provided by the Contractor. In the case of unacceptable material Class U2 the Contractor shall comply with any specific requirements for disposal described in appendix 6/2. (ii) Excavated hard material Class H2 to be disposed of, shall be disposed of to a tip provided by the Contractor, unless otherwise described in appendix 2/3 when it will also remain the property of the Authority. (iii)Contractor's tips off site shall have the appropriate Planning Permission for the purpose of tipping and/or landfill and be licenced by the Waste Management Authority for the disposal of the surplus material."

APPENDIX 0/1: Additional, substitute and Cancelled Clauses, Tables and figures

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	**Title and/or written text**
670.AR	**Tipping of Surplus Material** 1. All materials to be tipped off site shall be removed and disposed of in a manner fully acceptable to the appropriate Planning Authority. The tipping of excavated material and other industrial waste and the tipping of waste classified as household waste shall be carried out in consultation with and to the satisfaction of the Waste Regulation Authority (The Environment Agency) and any necessary licences under the Control of Pollution Act 1974 or the environmental protection Act 1990 must be obtained. 2. The Contractor must check with the appropriate Planning Officer that the proposed site for tipping has a current Planning Permission for that use. No tipping of such materials will be permitted until the Contractor has demonstrated that all permissions and licences have been obtained. Industrial and domestic waste found on the sites shall, unless the Authority otherwise directs, be removed and disposed of as above. **<u>SERIES 700 – ROAD PAVEMENTS – GENERAL</u>**
702.5SR	**Existing sub-Clause 702.5 is deleted and replaced by the following:** "Surface Regularity of Pavement Courses 5 For all categories of roads the longitudinal regularity of the surface course, binder courses, upper base in pavements without base and concrete slabs shall be within the relevant limits stated in Table 7/2 and Category A. An irregularity is a variation of not less than 4mm or 7mm of the profile of the Road surface as measured by the rolling straight edge, of a type designed by the Transport and Road Research Laboratory set at 4mm or 7mm as appropriate, or equivalent apparatus capable of measuring over a 3 metre length. No irregularity exceeding 10mm shall be permitted."
704.10AR	**Add new sub-Clause 704.10AR as follows:** "704.10AR use of Sub-Surface Course Surfaces by Traffic during Resurfacing and Reconstruction 10(I) Unless otherwise agreed with the Authority, the Contractor shall not allow any pavement surface which has been excavated, milled, regulated or overlaid with a layer which is not the finished surface course, to be trafficked. Traffic will only be permitted to travel on incomplete areas of reconstruction for 72 hours from the initial excavation. (iii)Before trafficking any sub-surface course surface, the Contractor shall install and maintain temporary lighting, and road works and ramp warning signs in accordance with Chapter 8 of the Traffic Signs manual. (iv) During the period of trafficking, the Contractor shall keep the surface swept, clean and clear of all mud, detritus, loose material and standing water."

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text
	(v) All footpaths must be constructed up to a minimum of binder course level before pedestrian use is allowed. All boxes and trip hazards must be ramped and left in a safe condition at all times. Use of a granular sub-base for pedestrian use is not permitted. (vi) On all roads with a Maintenance Category between 1 and 4a inclusive (see Appendix 1/7), any individual patch shall be completed on the same day as its initial excavation and shall not be trafficked until completed. On other roads, any individual patch shall be completed within 48 hours of its initial excavation. Before being trafficked, any projecting ironwork shall be made safe in a suitable coated material sloping not steeper than 1:5.
708.AR	**"708AR Reconstruction** 1 Reconstruction to existing carriageways shall be undertaken using the construction and at the locations specified in Appendix 7/1 in accordance with Series 200, 600, 700, 800 and 900 and the provision of this Clause. 2 The Contractor shall carry out reconstruction works to those areas marked on the existing carriageway surface by the Authority to design levels in accordance with Clause 702.2 3 The Contractor shall record the position of all road markings and/or road studs which are affected by these works. 4 Unless otherwise specified in Appendix 7/1 the extent and depth to which the existing construction is to be excavated shall be ascertained by excavating the whole area of each construction layer before proceeding to the next. When the excavation of each layer of surfacing, binder course and base is complete the contractor shall afford an opportunity to the Authority to inspect the next layer so that he may specify the appropriate action or subsequent area to be excavated. 5 Immediately prior to the laying of sub-base or each bituminous layer, the edges and surfaces of bituminous material to be overlaid shall be tack coated in accordance with Clause 944AR 6 And joints made in accordance with Clause 714AR. The milled and excavated material shall be disposed of in accordance with Clause 602.5SR."

APPENDIX 0/1: Additional, substitute and Cancelled Clauses, Tables and figures

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text

717AR	**Add new clause 717AR as follows:** "717AR Formation of Joints 1. Unless otherwise directed by the Authority all joints of new bituminous construction courses to existing pavements undertaken in conjunction with reconstruction, resurfacing, patching or reinstatement works shall be in accordance with the provision of this Clause. 2. Before the laying of either binder course or surface course, the existing material shall be cut back to form a step 100mm wide to the full depth of the course. A tack coat shall be applied to the joint in accordance with the Clause 920. 3. Where specified in Appendix 7/1 or 7/2, the joint line is to be overbanded in accordance with Clause 920 immediately after the compaction of the surface course. 4. Where joints in concrete slabs are affected by an excavation, the slab shall be reinstated by cutting back to at least 0.5 metres on each side of a transverse joint and forming an expansion joint on one side of the excavation and a construction joint on the other and provide longitudinal joints where necessary in the same line before reinstatement in compliance with the 1000 Series to match the existing construction."
771AR	**Sealing of Cracks in Existing Pavements (Overbanding)** 1 The sealing of cracks in existing pavements shall be in accordance with the provisions of this clause. 2 The Contractor shall seal those cracks marked in the carriageway surface by the Authority. 3 The marked crack lengths shall be lightly scarified to a width of approximately 20mm either side of the crack using a powered rotating bar machine. The crack shall be cleared of weeds, detritus and loose material to a minimum depth of 25mm. 4 Cracks in existing pavements shall be sealed with an overbanding material as low as extension type A^2 unless otherwise specified.
772AR	**Formation of Joints** 1 Unless otherwise directed by the Authority all joints of new bituminous construction courses to existing pavements undertaken in conjunction with reconstruction, resurfacing, patching or reinstatement works shall be in accordance with the provisions of this Clause. 2 Before the laying of either binder course or surface course, the existing material shall be cut back to form a step 100mm wide to the full depth of the

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text
	course. A tack coat shall be applied to the joint in accordance with Clause 920AR. 3 Where specified in Appendix 7/1 or 7/2, the joint line is to be overbanded in accordance with Clause 920AR immediately after the compaction of the surface course. The carriageway on completion shall have a clean and regular surface. The maximum depression under a 3 metre long straight edged placed longitudinally, or a 3 metre long straight edge at right angles to the centre line of the Road, shall not exceed 13mm when the surface is to consist of two-course work, or 6mm when the surface is to be a single surface course, unless otherwise directed by or agreed with the Authority. **SERIES 900 – ROAD PAVEMENTS – BITUMINOUS BOUND MATERIALS**
901	**Bituminous Pavement Materials**
	General
901.1	Bituminous pavement courses shall be made using the materials described in Table 9/23 and shall be laid in compliance with the Sector Scheme Document for the Laying of Asphalt Mixes, Sector Scheme 16, described in appendix A. Prior to commencement of the Works the contractor shall inform the Authority of the sources of the constituent materials used in bituminous mixes and of any changes of material source during the Works. The OCL level A, B, or C, as per EN 13108-21 shall be declared weekly followed by the maximum number of non compliant samples in any running 32 up to the time of declaration. The Contractor shall only use material supplied by coating plants that have a current OCL (as defined in the National Sector Scheme 14 for the Production of Asphalt Mixes) equating to no worse than 4 non-complying samples out of 32 provided that the plant has maintained a compliance level of 3 or less non complying samples in two of the previous four weeks. Notwithstanding the above where non compliance with the Mean Deviation from Target, as defined in EN 13108-21 occurs, the type, i.e. grading, filler content or binder content, of the Mean Deviation non compliance along with the Product Group(s) in which it has occurred shall be declared along with the OCL level as defined above. Where the non compliance with the Mean Deviation from the target occurs with regard to the Soluble Binder Content for the Group(s) <16mm this will count as the equivalent of 2 non-complying samples. Where it occurs on the Group(s) ≥ 16mm, it will count as 1 non-complying sample. For filler or grading Mean Deviation non-compliance, for any Group, will count as 1 non-complying sample.

APPENDIX 0/1: Additional, substitute and Cancelled Clauses, Tables and figures

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text

901.2	**Aggregates for Bituminous Materials** Natural, recovered unbound and artificial aggregates shall be clean, hard and durable and shall comply with BS EN 13043. Where recycled coarse aggregate or recycled concrete aggregate is used in this Series, it shall have been tested in accordance with Clause 710 and the content of all foreign materials (including wood, plastic and metal) shall not exceed 1% by volume or by mass whichever is the greater. The use of limestone shall not be permitted in bituminous materials to be used as a surface course. If the aggregate for surface courses is obtained from more than one source or consists of crushed rock of more than one type, then the minimum PSV for the aggregate from each source and of each type shall be as described in Table 9/23. Blending of aggregates to achieve the PSV level or the Effective PSV (ePSV) in asphalt surface courses or temporary running surfaces may be permitted with the approval of the Authority. Details shall be submitted for approval prior to use. **Resistance to Fragmentation (Hardness)** Irrespective of source, coarse aggregates for bituminous materials shall be considered suitable, unless otherwise stated in the Instruction, if: (i) the resistance to fragmentation of the coarse aggregate in accordance with clause 4.2.2 of BS EN 13043 has an LA_{30} or less for natural crushed and uncrushed aggregates and not more than LA_{50} for blast furnace slag; or (ii) crushed rock aggregate has a Los Angeles Value greater than 30 but less than 35, where evidence can be presented to the Authority of previous satisfactory use of the source in asphalt; (iii) Recovered, unbound aggregates shall be natural and artificial aggregates recovered from a previous use in an unbound form and which meet the requirements of this Clause. **Resistance to Freezing and Thawing (Durability)** The resistance to freezing and thawing (soundness) of the coarse aggregate shall comply with BS EN 13043, clause 4.2.9.2, and shall have a value not greater than MS_{25}, or such higher value as may be required in the Instruction. Thereafter, except for blast furnace slag aggregate, the water absorption value of the coarse aggregate shall be determined in accordance with BS EN 13043, clause 4.2.9.1. If the water absorption value of the coarse aggregate is greater than $WA_{24}2$, the soundness test shall be carried out on the material delivered to site.

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text
	Cleanness The fraction of material passing 0.063mm, for coarse and fine aggregates for bituminous materials, shall not exceed the limits stated in BSI PD 6691 Annex B, Annex C and Annex D, when tested in accordance with the washing and sieving method of BS EN 933-1. **Chemical Requirements** **Dicalcium Silicate Disintegration** Air-cooled blast furnace slag aggregates shall be free from iron dicalcium silicate disintegration when tested in accordance with BS EN 13043, clause 4.3.4.1. **Iron Disintegration** Air-cooled blast furnace slag aggregates shall be free from iron disintegration when tested in accordance with BS EN 13043, clause 4.4.4.2. **Volume Stability** The volume expansion of steel slag shall not exceed V_{10} when tested in accordance with BS EN 13043, clause 4.3.4.3. **Transporting**
901.3	Hot bituminous materials shall be transported in clean fully insulated vehicles, unless otherwise agreed by the Authority, and shall be covered while in transit or awaiting tipping by double sheeting or “Easy Sheet”-type system. To facilitate discharge of the mixed materials, dust, coated dust, water or the minimum of liquid soap, vegetable oil, or other non-solvent solutions may be used on the interior of the vehicles. When a fluid coating is used then, prior to loading, the body shall be tipped to its fullest extent with the tailboard open to ensure drainage of any excess. The floor of the vehicle shall be free from adherent bituminous materials or other contaminants. Under no circumstances shall diesel or other bitumen solvent be used. Delivery vehicles shall not deposit any residual material (e.g. tailboard scrapings) on site, except in approved, clearly marked areas. Material for machine lay works shall be fully used within 4 hours of mixing at the coating plant. Material for hand lay works that is not likely to be fully used within two hours of mixing at the coating plant shall be transported in and used directly from a “hot box” type system. Not withstanding this the temperature limits stated in BS 594987 shall be adhered to. The maximum time the material shall be allowed to stay in a “hot box” is 12 hours after which it shall be discarded. Prior to loading the “hot box” all unused material from previous loading shall be removed. On dual box systems care shall be taken to prevent cross contamination or

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text
	intermixing of different materials. Thermostats on "hot box" type systems shall be fitted, set and maintained so as to ensure that the temperature shall not exceed 160°C.
	Laying
901.4	On each day, and at each location where hot bituminous material is laid, at least 100 tonnes from a plant approved by the Authority shall be placed before material from another approved plant is used. If the Contractor demonstrates that the materials from different plants are of equivalent quality, performance potential and possess equivalent laying and compaction characteristics and the colour differences are not significant this requirement can be waived.
901.5	Wherever practicable, bituminous materials shall be spread, levelled and tamped by a self-propelled paving machine, which may be equipped with an averaging beam. 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 whenever practicable.
901.6	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.
901.7	Hot bituminous materials shall be laid in accordance with the requirements and recommendations for laying in BS 594987. Where there is no British or European standard for the particular material it shall be laid in accordance with the requirements and recommendations of BS 594987, subject also to the requirements of sub-Clauses 8 to 31 of this Clause. The minimum thickness of material laid in each paver pass shall be in accordance with BS 594987 or the full course thickness, where this is less than the specified minimum in BS 594987.
901.8	When laying binder course or surface course the paver shall be taken out of use when approaching an expansion joint of a structure. In laying the remainder of the pavement up to the joint, and the corresponding area beyond it by hand, the joint or joint cavity shall be kept clear of surfacing material.
901.9	With the exception of sand asphalt carpet, bituminous materials with a temperature greater than 125°C shall not be deposited on a bridge deck waterproofing system unless adequate precautions are taken to avoid heat damage in accordance with a good industry practice. A maximum temperature of 145°C is permitted for sand asphalt carpet.
901.10	Hand placing of bituminous materials shall only be permitted in the following circumstances: (i) For laying regulating courses or irregular shape and varying thickness. (ii) In confined spaces where it is impracticable for a paver to operate.

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text
	(iii) For footways. (iv) At the approaches to expansion joints at bridges, viaducts or other structures. (v) For laying mastic asphalt in accordance with BS 1447 (vi) In individual areas not exceeding 30 square metres in area and not exceeding 1 metre in width, or with the approval of the Authority in individual areas not exceeding 50 square metres in area and not exceeding 2 metres in width.
901.11	Hand-raking of surface course material or the addition of such material by hand-spreading to the paved area, for adjustment of level, shall only be permitted in the following circumstances. (i) At the edges of the layers of material and at gullies, manholes and other ironwork. (ii) At the approaches to expansion joints at bridges, viaducts or other structures.
901.12	Hand laid work shall conform with the requirements of this Clause except those relating to pavers. All work will be carried out so as to minimise segregation and cooling of the material
	Compaction
901.13	Bituminous materials shall be laid and compacted in layers which enable the specified thickness, surface level, regularity requirements and compaction to be achieved.
901.14	Compaction of bituminous materials shall commence as soon as the uncompacted material will near the effects of the rollers without undue displacement or surface cracking. Compaction should be substantially completed before the temperature falls below the minimum rolling temperatures stated in BS 594987. Rolling shall continue until all roller marks have been removed from the surface.
901.15	Except where otherwise specified compaction should be carried out using 8-10 tonnes deadweight smooth wheeled rollers having a width of roll not less than 450mm, or by multi-wheeled pneumatic-tyred rollers of equivalent mass, or by vibratory rollers or a combination of these rollers. Surface course and binder course material shall be surface finished with a smooth-wheeled roller which may be a deadweight roller or a vibratory roller in non-vibrating mode. Vibratory rollers shall not be used in vibrating mode on bridge decks or Stone Mastic Asphalt materials other than single drum rollers used for footway works although the contractor must ensure flushing of the binder is not present in the finished mat.
901.16	Vibratory rollers may be used if they are capable of achieving at least the standard of compaction of an 8-tonnes deadweight roller. They shall be equipped with devices, indicating the frequency at which the mechanism is operating and the travel speed. The performance of vibratory rollers proposed

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text
	for use shall be assessed as follows: (i) by means of site trials in accordance with PD 6692; or (ii) by the Contractor producing evidence of independent trials demonstrating that, under comparable conditions, a state of compaction at least equivalent to that obtained using an 8-tonnes deadweight roller is achieved by the make and model of vibratory roller proposed for use. The paver speed used in the above trials shall not be exceeded in the Works. Where compaction is to be determined in accordance with Clause 929, the requirements to prove the performance of rollers shall not apply. In such case the Contractor may use any plant to achieve the specified level of compaction and finish at temperatures above the minimum specified rolling temperature.
901.17	Bituminous materials shall be rolled in a longitudinal direction, with the driven rolls nearest the paver. The roller shall first compact material adjacent to joints and then work from the lower to the upper side of the layer, overlapping on successive passes by at least half the width of the rear roll or, in the case of a pneumatic-tyred roller, at least the nominal width of one tyre.
901.18	Rollers shall not be permitted to park or stand on warm compacted materials.
901.19	Unless stated otherwise in the Instruction, the adequacy of compaction of bituminous materials shall be determined from the attained air void content of the laid material in accordance with Clause 970. Where specified in the Instruction, the design and compliance requirements for base and binder course asphalt concretes shall be in accordance with Clause 929. Vibratory rollers should be used with caution on surface materials that are prone to close up or density, e.g. some SMAs. For works carried out at night or in other noise-sensitive situations the use of oscillating rollers or those with similar low noise characteristics shall be used. The maximum noise level emitted by the equipment shall be no more than 85dba. **Chippings**
901.20	The application of coated chippings to areas of surface course shall be by a mechanical spreader capable of distributing chippings to an even rate of spread. Addition of chippings by hand operation shall only be permitted in the following circumstances: (i) In confined spaces, where it is impracticable for a chipping spreader to operate. (ii) As a temporary expedient, when adjustments have to be made to the spreader distribution mechanism.

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text
	(iii) When hand laying of the surface course is permitted. (iv) To correct uneven distribution of chippings.
901.21	Chippings shall be applied uniformly and rolled into the surface so they are effectively held and provide the specified macrotexture depth.
	Joints
901.22	Except where otherwise specified in this Series, where longitudinal joints are made in surface courses, the material shall be fully compacted and the joint made flush in one of the following ways; only method (ii) shall be used for tranverse joints: (i) By using two or more pavers operating in echelon, where this is practicable, and in sufficient proximity for adjacent widths to be fully compacted by continuous rolling. (ii) By cutting back the exposed joint, for a distance equal to at least the specified layer thickness, to a vertical face, free of segregated material. All loosened material shall be fully removed and discarded. The exposed vertical face shall be completely and evenly coated with a suitable hot bitumen, or cold-applied polymer modified intermediate or premium grade bitumen emulsion, or polymer modified adhesive bitumen strip with a minimum thickness of 2mm, before the adjacent width is laid. Only method (ii) is permitted on materials exhibiting segregation at the extremeties of the width laid.
901.23	All joints shall be offset at least 300mm from parallel joints in the layer beneath. Joints in the surface course or porous asphalt shall coincide with either the lane edge or the lane marking, whichever is appropriate. No joints shall be formed between a hardstrip and the edge of the carriageway, nor within a hardstrip. Longitudinal joints in materials subject to density testing procedures, e.g. air voids, shall not be situated in wheel-track zones.
	General
901.24	All surfaces shall be treated with either a tack coat or a bond coat prior to overlay in accordance with Clause 920.
901.25	Bituminous material shall be kept clean and uncontaminated. Unless otherwise provided in sub-Clause 901.28 or otherwise agreed with the Authority the only traffic permitted to run on bituminous material to be overlaid shall be that engaged in laying and compacting the next course or, where a binder course is to be blinded or surface dressed, that engaged on such surface treatment. If the binder film on a bituminous surface onto which a bituminous course is to be laid becomes visibly worn or impregnated with dust as a result of additional trafficking, then the rate of application of tack or bond coat spray complying with Clause 920 shall be adjusted accordingly. Should any bituminous material become contaminated the Contractor shall make it good by cleaning it and, if this proves impracticable, by rectification in compliance with Clause 702.

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text
901.26	Upper base material, in pavements without binder course, and binder course material shall not remain uncovered by either the surface course or surface treatment, whichever is specified in the Works Instruction, for more than three consecutive days after being laid. With prior agreement with the Authority this period may be extended by the minimum amount of time necessary to allow for adverse weather conditions or for other reasons.
	Regulating Course
901.27	Regulating course material shall be made and laid in accordance with the requirements of Clause 907. For filling defective areas material shall be made and laid in accordance with the requirements of clause 946/26
	Use of Surfaces by Traffic and Construction Plant
901.28	Where a bituminous layer, other than the surface course, is to be opened to highway traffic as a temporary running surface it shall either: (i) be surface dressed in accordance with Clause 919 using chippings being of category of not less than PSV, unless otherwise specified in the Instruction, or (ii) Contain a coarse aggregate being of category of not less than PSV_{50} unless otherwise specified in the Instruction. In all cases "Slippery Road" warning signs shall also be used. Where an instruction is given by the Authority to traffic a bituminous layer, other than the surface course, due to the Contractor's failure to perform then the Contractor will not be reimbursed any additional costs.
901.29	All temporary running surfaces shall be thoroughly cleaned and a tack or bond coat applied immediately prior to laying the succeeding course.
901.30	Tack coat or bond coat in accordance with Clause 920 shall be bitumen emulsion and shall be applied at a uniform rate of spread. The bitumen emulsion shall not be permitted to collect in any hollows and shall be allowed to break before the next layer is placed.
901.31	Construction plant and traffic used on pavements under construction shall be suitable in relation to the material, condition and thickness of the courses it traverses so that damage is not caused to the sub-grade or the pavement courses already constructed. The wheels or tracks of plant moving over the various pavement courses shall be kept free from deleterious materials.
	Bitumen
901.32	For the purpose of this Series, bitumen shall be specified as penetration reference, the target penetration of the grade is shown in Table 9/1.

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text
902	**Reclaimed Bituminous Materials**
902.1	In the production of bituminous base and binder courses, including regulating courses, at least 10% of reclaimed bituminous materials shall be used. The maximum amount of reclaimed bituminous material permitted in hot mix materials shall be 50% in all layers other than the surface course. Larger quantities can be used in foam mix or emulsion mix materials subject to approval by the Authority and design in accordance with Clause 948. Up to 10% of reclaimed materials may be used in surface course mixes provided that the aggregate component is identified as being of equal or greater PSV as required in Table 9/23 and the Instruction. Other materials for recycling in bituminous mixtures shall only be used with the approval of the Authority. The mixed material shall comply with the requirements of this Series.
902.2	Reclaimed bituminous materials may be used in the production of bituminous surface course, binder course including binder and regulating course, and base. The maximum amount of reclaimed bituminous material permitted shall be 50% in all other layers other than the surface course. Up to 10% of reclaimed materials may be used in surface course mixes provided that the aggregate component is identified as being of equal or greater PSV as required in Table 9/23 and the Instruction. Other materials for recycling in bituminous mixtures shall only be used with the approval of the Authority. The mixed material shall comply with the requirements of this Series.
902.3	When the amount of reclaimed bituminous material comprises 10% by mass or less of the base or binder course, compliance with this Clause is not required. However, when it exceeds 10% by mass, the Contractor shall carry out trials to demonstrate that the mixed materials comply with the requirements of this Clause.
	Reclaimed Feedstock
902.4	All reclaimed material shall be pre-treated before use such that it is homogeneously mixed and the maximum particle size does not exceed 32mm.
	Properties of Recovered Binder
902.5	For hot mix materials the binder shall be recovered from the mixture in accordance with the requirements of BS 2000-397 and tested in accordance with BS EN 1426 and BS EN 1427. The penetration value of the binder recovered from trials shall not be less than the minimum value specified in Table 9/2 nor greater than the upper limit of the specified grade in BS EN 12591 for the product being manufactured. The penetration index of the recovered binder shall be in the range –1.5 to +0.7, as defined in Annex B of BS EN 12591.

APPENDIX 0/1: Additional, substitute and Cancelled Clauses, Tables and figures

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text

	Asphalt Concrete Binder Course and Base
902.6	Trials shall be carried out in accordance with Clause 929. When the amount of reclaimed material in an asphalt concrete exceeds 25% by mass, the stiffness modulus of cores extracted from the compacted mixture shall not be less than the minimum value specified in Table 9/2.

TABLE 9/2: Minimum Penetration Value of Recovered Binder after Mixing and Minimum Stiffness Modulus of Asphalt concretes

Specified Grade of Binder[1] (Penetration Reference)	Minimum Penetration Value of Recovered Binder after Mixing (x 0.1mm)	Minimum Stiffness Modulus of Asphalt concretes (GPa)
35	20	3.7
50	25	2.5
85	35	1.5
125	50	0.7

Note 1. The added binder shall not have a penetration value greater than 220 x 0.1mm and shall not be more than 2 grades softer than the target grade.

	Compliance and Frequency of Testing
902.7	Compliance shall be monitored either: (i) by sampling and testing from the permanent works at a frequency approved by the Authority or (ii) by periodic trials at a frequency approved by the Authority Trial areas in which the mixed material complies with the requirements of this Series may form part of the permanent works.
903	**Dense Asphalt concrete Base (Design Mixtures)**
903.1	Unless otherwise specified in the Instruction, designed dense asphalt concrete base shall comply with Clause 929. Dense asphalt concrete base shall be produced in plants that are registered to the BS EN ISO 9001 'Sector Scheme for the Production of Asphalt Mixes' (Sector Scheme 14) described in Appendix A. It shall comply with PD 6691 for dense base mixtures, and with sub-Clauses 2 and 3 of this Clause and the requirements of Table 9/23.
	Filler
903.2	When either the coarse or fine aggregate is quartzite or other aggregate requiring anti-strip measures at least 1.0% of hydrated lime shall be added. The optimum amount shall be determined by trials. When the coarse aggregate is gravel, 2% by mass of total aggregate of Portland cement or hydrated lime shall be added. The percentage of fine aggregate shall be reduced accordingly. Cement or lime is not required when limestone gravel is used as the coarse aggregate.

APPENDIX 0/1: Additional, substitute and Cancelled Clauses, Tables and figures

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text
	Binder
903.3	Bitumen shall comply with BS EN 12591 and shall be produced in plants that are registered to BS EN ISO 9001 'Sector Scheme for the Supply of Paving Grade Binders', described in Appendix A. The penetration reference of the bitumen shall be 125pen or as described in the Instruction.
906	**Dense Asphalt Concrete Base and Binder Course with Paving Grade Bitumen (Recipe Mixtures)**
906.1	The dense base and binder course asphalt concretes shall be one of the materials given in Table 9/3. They shall comply with PD 6691 for the appropriate material and with this Clause and shall be as specified in Table 9/23.
906.2	All materials shall be produced in plants that are registered to the BS EN ISO 9001 "Sector Scheme for the Production of Asphalt Mixes" (Sector Scheme 14), described in Appendix A.
	Filler
906**.3**	When either the coarse or fine aggregate is quartzite or other aggregate requiring anti-strip measures at least 1.0% of hydrated lime shall be added. The optimum amount shall be determined by trials. When the coarse aggregate is gravel, 2% by mass of total aggregate of Portland cement or hydrated lime shall be added and the percentage of fine aggregate reduced accordingly. Cement or hydrated lime is not required when limestone gravel is used as the coarse aggregate.
	Binder
906.4	Bitumen shall comply with BS EN 12591 and shall be produced in plants that are registered to BS EN ISO 9001 "Section Scheme for the Supply of Paving Grade Binders", described in Appendix A. The penetration reference of the bitumen shall be as stated in Table 9/3.
907	**Regulating Course**
907.1	Regulating courses shall be produced in plants that are registered to the BS EN ISO 9001 "Sector Scheme for the Production of Asphalt Mixes" (Sector Scheme 14), described in Appendix A. They shall be in accordance with sub-Clauses 2, 3, 4 and 5 of this Clause and the requirements of Table 9/23.
907.2	Regulating courses, which may consist of one or more layers of a bituminous material, shall have their finished surfaces laid to achieve the appropriate tolerances for horizontal alignments, surface levels and surface regularity, for pavement layers, in accordance with Clause 702.

APPENDIX 0/1: Additional, substitute and Cancelled Clauses, Tables and figures

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	**Title and/or written text**

TABLE 9/3: Summary of Recipe Dense Base and Binder Course Asphalt concretes

Brief Title	**Course**	**Full Name**	**Grading Range (mm)**	**Binder Penetration Reference**
AC 32 dense base 40/60	Base	asphalt concrete 32 dense base 40/60 EN13108-1	32	40/60
AC 32 dense base 70/100	Base	asphalt concrete 32 dense base 70/100 EN13108-1	32	70/100
AC 32 dense base 100/150	Base	asphalt concrete 32 dense base 100/150 EN13108-1	32	100/150
AC 32 dense bin 40/60*	Binder	asphalt concrete 32 dense binder course 40/60 EN13108-1*	32	40/60*
AC 20 dense bin 40/60	Binder	asphalt concrete 20 dense binder course 40/60 EN13108-1	20	40/60
AC 20 dense bin 70/100	Binder	asphalt concrete 20 dense binder course 70/100 EN13108-1	20	70/100
AC 20 dense bin 100/150	Binder	asphalt concrete 20 dense binder course 100/150 EN13108-1	20	100/150

* May also be made with bitumen of penetration grade 70/100 & 100/150 and these large nominal size mixes should only be used on advice from the Materials Laboratory.

907.3	Unless otherwise described in the Instruction, stone mastic asphalt complying with Clause 937, or base or binder course asphalt concrete complying with Clause 929 or hot rolled asphalt complying with Clause 943, shall be used for regulating courses immediately below surface courses. Bituminous materials for regulating courses shall meet the requirements for the appropriate material, as specified above.
907.4	Where the total depth of a regulating course exceeds 150mm then the course shall be laid so that each regulating layer has a compacted thickness of between 75mm and 150mm. For thicknesses in excess of 45mm dense bitumen asphalt concrete shall be used. The nominal size shall be chosen so as to meet the recommendations in BS 594987.
	Binder
907.5	Bitumen shall comply with BS EN 12591 and shall be produced in plants that are registered to BS EN ISO 9001 “Sector Scheme for the Supply of Paving Grade Binders”, described in Appendix A.

APPENDIX 0/1: Additional, substitute and Cancelled Clauses, Tables and figures

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text
909	**Dense Asphalt Concrete Surface Course (6mm) (Recipe Mixtures)**
909.1	Dense asphalt concrete surface course shall be produced in plants that are registered to the BS EN ISO 9001 "Sector Scheme for the Production of Asphalt Mixes" (Sector Scheme 14), described in Appendix A. It shall comply with PD 6691 for dense surface course mixtures, and with this Clause and the requirements of Table 9/23.
909.2	The traffic category shall be "A" unless otherwise stated in the Instruction.
	Coarse Aggregate
909.3	The resistance to polishing of coarse aggregate shall have the minimum declared PSV category specified in the Instruction in accordance with BS EN 13043, clause 4.2.3. The resistance to abrasion of coarse aggregate shall have maximum AAV specified in Table 9/23 in accordance with BS EN 13043, clause 4.2.4.
	Binder
909.4	Bitumen shall comply with BS EN 12591 and shall be produced in plants that are registered to the BS EN ISO 9001 "Sector Scheme for the Supply of Paving Grade Binders", described in Appendix A. The penetration reference of the bitumen shall comply with PD 6691 and shall be as specified in Table 9/23 and the Instruction.
	Filler
909.5	When either the coarse or fine aggregate is quartzite or other aggregate requiring anti-strip measures at least 1.0% of hydrated lime shall be added. The optimum amount shall be determined by trials. When the coarse aggregate is gravel, 2% by mass of total aggregate of Portland cement or hydrated lime shall be added and the percentage of fine aggregate reduced accordingly.
910	**Rolled Asphalt Surface Course (Recipe Mixture)**
910.1	Rolled asphalt surface course shall be produced in plants that are registered to the BS EN ISO 9001 "Sector Scheme for the Production of Asphalt Mixes" (Sector Scheme 14), described in Appendix A. It shall comply with PD 6691 for surface course recipe mixtures, and with sub-Clauses 2, 3 and 4 of this Clause, and the requirements of Table 9/23.
	Binder
910.2	Bitumen shall comply with the requirements of BS EN 12591 or BS 3690-3, and shall be produced in plants that are registered to the BS EN ISO 9001 "Sector Scheme for the Supply of Paving Grade Binders", described in Appendix A. The penetration reference of the bitumen shall comply with Table 9/1 and shall be as specified in the Instruction.

APPENDIX 0/1: Additional, substitute and Cancelled Clauses, Tables and figures

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text
	Coarse Aggregate
910.3	The resistance to polishing of coarse aggregate shall be category PSV_{45} as defined in BS EN 13043, clause 4.2.3. Coarse aggregate content by mass of the total mix shall be as described in Table 9/23.
	Coated Chippings
910.4	Coated chippings size and grading category shall be 14/20mm G_c85/20 or, if so instructed in the Instruction, 8/14mm G_c85/15 size in BS EN 13043 as described in Table 9/23 and shall comply with Clause 915.
911	**Rolled Asphalt Surface Course (Design Mixture)**
911.1	Rolled asphalt surface course shall be produced in plants that are registered to the BS EN ISO 9001 "Sector Scheme for the Production of Asphalt Mixes" (Sector Scheme 14), described in Appendix A. It shall be designed in accordance with the procedures of PD 6692 and shall comply with PD 6691-1 for surface course design mixtures, and with sub-Clauses 2 to 8 of this Clause, and the requirements of Table 9/23. The design mixture selected by the Contractor shall be notified to the Authority prior to its use in the Works.
	Binder
911.2	Bitumen shall comply with the requirements of BS EN 12591 or BS 3690-1 and shall be produced in plants that are registered to the BS EN ISO 9001 "Sector Scheme for the Supply of Paving Grade Binders", described in Appendix A. The penetration reference of the bitumen shall comply with Table 9/1 and shall be as specified in Table 9/23. The binder data required in Table 9/23 shall be provided to the Authority.
	Coarse Aggregate
911.3	The resistance to polishing of the coarse aggregate shall be category PSV_{45} as defined in BS EN 13043, clause 4.2.3. Coarse aggregate content by mass of the total mix shall be as described in Table 9/23.
	Marshall Stability and Flow
911.4	The Marshall stability and flow for the complete mixture at the target binder content, determined in accordance with the procedures of PD 6692, shall be as described in Table 9/23.
	Verification
911.5	Verification of the design proposal shall be carried out using materials obtained from the plant before manufacture of the surface course commences. Stability and flow values shall be determined at the proposed target binder content.

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text
911.6	The results of design verification for stability shall fall within 2kN of the design proposal. Additionally, the stability shall be not more than 0.5kN below the lower range value described in Table 9/23. The flow value obtained shall not exceed that stated in PD 6691-1. The target binder content determined on verification shall be not less than the specified minimum value given in PD 6691-1.
	Composition
911.7	When determined in accordance with the procedures of PD 6692, the composition of the plant mixture shall comply with the requirements for the surface course design mix. The nature and source of the coarse and fine aggregate may be changed only if the mix is redesigned and agreed by the Authority prior to its use in the Works. With the agreement of the Authority the source of the filler may be varied provided its characteristics remain essentially the same.
	Coated Chippings
911.8	Coated chippings size shall be either 14/20mm G_c85/20 or, if so instructed in the Instruction, 8/14mm G_c85/15 size in BS EN 13043 as described in Table 9/23, the Instruction and shall comply with Clause 915.
912	**Close Graded Asphalt Concrete Surface Course (Recipe Mixture)**
912.1	Close graded asphalt concrete surface course shall be produced in plants that are registered to the BS EN ISO 9001 "Sector Scheme for the Production of Asphalt Mixes" (Sector Scheme 14), described in Appendix A. It shall comply with PD 6691, and the requirements of Table 9/23.
912.2	The traffic category shall be "A" unless otherwise stated in the Instruction.
	Coarse Aggregate
912.3	The resistance to polishing of the coarse aggregate shall have a minimum declared PSV category specified in Instruction in accordance with BS EN 13043, clause 4.2.3. The resistance to abrasion of coarse aggregate shall have a maximum AAV specified in Table 9/23 in accordance with BS EN 13043, clause 4.2.4.
	Binder
912.4	Bitumen shall comply with BS EN 12591 and shall be produced in plants that are registered to BS EN ISO 9001 "Sector Scheme for the Supply of Paving Grade Binders", described in Appendix A. The penetration reference of the bitumen shall comply with PD 6691 and shall be as specified in Table 9/23 and Instruction.
	Filler
912.5	When either the coarse or fine aggregate is quartzite or other aggregate requiring anti-strip measures at least 1.0% of hydrated lime shall be added. The

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text
	optimum amount shall be determined by trials. When the coarse aggregate is gravel, 2% by mass of total aggregate of Portland cement or hydrated lime shall be added and the percentage of fine aggregate reduced accordingly.
915	**Coated Chippings for Application to Pre-mixed Surfacing**
915.1	The chippings and the manner of coating, when used for rolling into the surface of rolled asphalt shall be in accordance with PD 6691-1, except size and grading shall be in accordance with sub-Clause 2 of this Clause.
915.2	The size of the chippings shall be 14/20mm G_c85/20, or 8/14mm G_c85/15, or 6.3/10mm G_c85/20 in BS EN 13043. The chipping size selected shall be as described in Table 9/23 and Instruction.
915.3	The resistance to polishing of coarse aggregate shall have the minimum declared PSV category specified in Table 9/23 and Instruction in accordance with BS EN 13043, clause 4.2.3. The resistance to abrasion of coarse aggregate shall have maximum AAV specified in Table 9/23 in accordance with BS EN 13043, clause 4.2.4. The shape of the chippings shall comply with category FI_{20} as defined in BS EN 13043, clause 4.1.6.
915.4	The aggregate shall be deemed to comply if the mean of the 3 most recent consecutive results from tests relating to the material to be supplied, carried out within the previous 6 months by testing by an appropriate organisation accredited in accordance with sub-Clauses 105.3 and 105.4 for those tests, within 6 weeks of sampling, complies with the declared categories specified in Table 9/23.
920	**Bond Coats, Tack Coats and other Bituminous Sprays**
920.1	The bond or tack coats required for thin surfacing systems and their application shall be in accordance with the British Board of Agrément HAPAS Roads and Bridges Certificate for each system. All other bond coats, tack coats and bituminous sprays shall comply with sub-Clauses 2 to 12 of this Clause.
	Bond Coats
920.2	Bond coats shall be applied to all surfaces to be overlaid with SMA surface course. The bond coat shall be premium grade and have proven low tack properties, e.g. Nynas' Gripclean, so as to not adhere to the tyres of the paver, delivery vehicles, etc. Bond coats shall have a British Board of Agrément HAPAS Roads and Bridges Certificate. In the event that no such certificates have been issued, they shall not be used without the approval of the Authority.
	Tack Coats
920.3	Tack coats shall be applied between base and binder course layers and between binder course and coated asphalt concrete (asphaltic concrete) surface course and shall be bitumen emulsions complying with BS 434-1. Tack coats for

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text
	hot rolled asphalt and coated asphalt concrete shall be in accordance with PD 6691-2 and BS 594987 respectively.
	Bituminous Sprays
920.4	Bituminous sprays used to facilitate sealing and curing shall consist of either bitumen emulsion to BS 434-1; cutback bitumen to BS 3691-1 to BS EN 12591 and shall be produced in plants that are registered to BS EN ISO 9001 "Sector Scheme for the Supply of Paving Grade Binders", described in Appendix A; or modified bituminous products with a British Board of Agrément HAPAS Roads and bridges Certificate. In the event that no such certificates have been issued, modified bituminous products shall not be used without the approval of the Authority.
	Manufacture and Product Data
920.5	Bond coats, tack coats and bituminous sprays shall be manufactured in plants operating under a system conforming to the requirements of BS EN ISO 9001. The Contractor shall complete the binder data sheet specified in Appendix 9/2 (following this Series) and supply a copy to the Authority prior to the first application of the product for each type or whenever the details change.
	Preparation
920.6	Any limitations on area availability and timing or other constraints for the work shall be as specified in the Instruction. Before spraying is commenced, the surface shall be clean free of all loose material and standing water. Surface preparation shall be carried out in accordance with PD 6691-2, or BS 594987 as appropriate, or for certified products, in accordance with the BBS/HAPAS Certificate. Unless otherwise instructed in the Instruction , street furniture, ironwork and drop-kerbs shall be masked using self-adhesive masking material before application starts and removed prior to the completion of the works.
	Application
920.7	Application shall be by metered mechanical spraying equipment, spray tanker or spraying device integral with the paving machine. The spraying equipment used shall not cause permanent deformation in the surface. Bond coats and tack coats shall be sprayed onto an existing surface prior to overlay in accordance with Clause 901. For small or inaccessible areas, application may be by hand held sprayer with the agreement of the Authority. Areas treated with tack or bind coat shall not be opened to traffic without the permission of the Authority.
	Rate of Spread
920.8	The target rates of spread of bond coats or tack coats below hot rolled asphalt and coated asphalt concrete shall be as recommended in Tables 1 to 5 in PD 6691-2 and BS 594987 respectively, unless otherwise agreed with the Authority. For other applications, unmodified bitumen emulsions shall be sprayed at the rate of spread specified in BS 434-2 or as otherwise stated in the Instruction.

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text
	Proprietary materials shall be sprayed at the rate set out in the British Board of Agrément HAPAS Roads and bridges Certificate for each product.
	Accuracy of Application
920.9	Spray application shall be uniform. Before spraying begins, the Contractor shall provide the Authority with a test certificate showing the results for rate of spread and accuracy of spread. These tests shall be carried out in accordance with BS EN 12272-1 either by an appropriate organisation, accredited in accordance with sub-Clauses 105.3 and 105.4 for those tests, or by the Contractor where this forms part of his Quality Plan. The certificate shall demonstrate that the spraying device has been tested, using the product to be used in the Contract, not more than six months before commencement of the work. The tolerance on the specified rate of spread shall not exceed ±10% and the coefficient of variation of the transverse distribution shall not exceed 15%. During the works the Contractor shall repeat the tests for rate of spread and accuracy of application at a minimum frequency of 6 monthly or when problems are noted on site or when instructed by the Authority. The results shall be reported verbally to the Authority within 24 hours of carrying out a test and in writing within 7 days. Where application is by hand held sprayer, the rate of spread shall be measured by calculating the volume applied per square metre and evenness shall be visually assessed.
	Joints
920.10	There shall be no bare strips or areas having less than the minimum permitted rate of spread. Transverse joints shall have an overlap not wider than 300mm. Longitudinal joints shall have an overlap to ensure that the minimum permitted rate of spread is achieved across the joint. For quartering (using part of the spray bar) the longitudinal joint overlap width may be extended to a maximum of 300mm. Paver integral sprayers shall provide a wet edge to ensure spray overlap under adjacent overlays such that the minimum permitted rate of spread is achieved across the longitudinal joint. Where the longitudinal spray overlap causes the effective rate of spread to be increased by more than 50% of the specified rate then the width of overlap shall not be greater than 100mm and shall be outside the location of the wheel tracks for the lane.
	Overlaying Bituminous Surfaces
920.11	All bituminous surfaces shall be treated with either a tack coat or a bond coat prior to overlay. The use of tack coat or bond coat beneath all bituminous layers shall be as stated in the Instruction.
	Overlaying Concrete Surfaces
920.12	The Contractor shall submit evidence of the suitability of the bond or tack coats he intends to use when overlaying concrete surfaces to the Authority prior to the commencement of the work.

APPENDIX 0/1: Additional, substitute and Cancelled Clauses, Tables and figures

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text
	Blinding Material
920.13	Where required, blinding material shall consist of hard clean crushed fine aggregate or slag, fine aggregate or sand containing not more than 15% retained on a 6.3mm sieve. It shall be broadcast over the sprayed areas and left unrolled. Blinding used on cementitious materials shall be light in colour to minimise solar gain. All loose material on a sprayed surface including non-adhered blinding material shall be removed prior to the application of an overlay.
	Prevention of Binder Pickup
920.14	Where required, chippings to prevent bond coat binder pickup on vehicle tyres shall consist of hard clean aggregate 2/4mm or 2/6mm G_C 85/35. The rate of application of aggregate shall be the minimum necessary and shall be distributed by metered mechanical means. Bond coat shall be visible after aggregate application to ensure bond is achieved.
921	**Surface Macrotexture of Bituminous Surface Courses on High Speed Roads**
921.1	The average depth of pavement surface macrotexture of bituminous surface course shall be measured using a volumetric patch technique described in BS EN 13036-1
921.2	If a macrotexture depth is required, it shall be requested in the Instruction and the average macrotexture depth of each 1,000 metres section of carriageway lane, or the complete carriageway lane where this is less than 1,000 metres, shall not be less than 1.5mm. The average of each set of 10 individual measurements shall not be less than 1.2mm.
923	**Binder Recovery using the Rapid Recovery Test (RRT) and Accelerated Ageing using the Modified Ageing Rolling Thin Film Oven Test (RTFOT)**
923.1	This Clause specifies the procedure for obtaining a quantity of "Recovered Binder" from modified or unmodified cutback or emulsion binder (Rapid Recovery Test – RRT) and an extended procedure for obtaining a quantity of "Aged Binder" (Modified Ageing Rolling thin Film Oven Test). "Aged Binder" may be prepared directly from "Recovered Binder" or from other binder samples. Binders used to manufacture hot mix asphalt are first subjected to a "short term ageing test" (RTFOT) to stimulate the effects of manufacture, transport and laying. The Modified Ageing RTFOT is suitable for all bituminous binders and rapidly provides homogeneous samples at different ages so that a plot of a relevant characteristic with ageing may be generated. For details of the requirements of this Clause, reference must be made to the corresponding Clause in the Manual of Contract Documents for Highway Works, Volume 1 – Specification for Highway Works as published by the Highways Agency.

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text
924	**High Friction Surfaces**
924.1	High friction surfacing systems shall have current British Board of Agrément HAPAS Roads and Bridges Certificates.
924.2	A high friction surfacing system with a current British Board of Agrément HAPAS Roads and Bridges Certificate shall only be installed by a Contractor approved by the BBA and the Certificate Holder as an Approved Installer for that system.
924.3	The high friction surfacing system BBA/HAPAS Type Classification required for each location shall be Type 1 comprising a two-component epoxy binder and a graded (1mm to 3mm) calcined bauxite aggregate. If so instructed in the Instruction the binder shall be a two-component bitumen extended epoxy binder.
	Aggregate
924.4	Aggregate used in high friction surfacing systems shall have a minimum declared PSV category of 70 in accordance with BS EN 13043, clause 4.2.3. The Contractor shall provide, before work commences, test certificates, issued by an appropriate organisation accredited in accordance with sub-clauses 105.3 and 105.4 for those tests, not more than six months previously, showing conformity with the requirements.
	Installation and Quality Control Procedures
924.5	The installation and quality control procedures shall be in accordance with the British Board of Agrément HAPAS Roads and Bridges Certificate for each system and the current method statement agreed by the BBA. The results of all quality control checks carried out on site by the Contractor and quality assurance information compiled in accordance with the requirements of the Certificate, including results from BBA surveillance visits, shall be made available to the Authority on request.
	System Coverage
924.6	For each location where high friction surfacing is applied, the total quantities of each system component used, the measured area of the surface treated and the calculated coverage rate in kg/m² shall be reported to the Authority within three days of completion at that location. For systems in which aggregate is broadcast over a film of binder applied to the surface, the calculated coverage rate shall be that of the binder film and shall not include the mass of the aggregate.
	Guarantee
924.7	The Contractor shall guarantee the high friction surfacing materials and workmanship for a period of two years from the date of opening the surfacing to traffic. This guarantee shall exclude defects arising from damage caused by settlement, subsidence or failure of the carriageway on which the surfacing has been applied, but shall cover failure to meet the minimum requirements set out in Table 4 of the BBA/HAPAS "Guidelines Document for the Assessment and Certification of High Friction Surfaces for Highways".

APPENDIX 0/1: Additional, substitute and Cancelled Clauses, Tables and figures

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text

928	**Determination of the Complex Shear (Stiffness) Modulus (G*) and Phase Angle (δ) of Bituminous Binders using a Dynamic Shear Rheometer (DSR)**
928.1	This Clause describes the test method for the determination of the Complex Shear (Stiffness) Modulus (G*) and Phase Angle (δ) of a bituminous binder over a range of temperatures and frequencies when tested in harmonic, sinusoidal oscillatory shear mode using a dynamic shear rheometer (DSR) with parallel plate test geometry and where both plates are controlled at the same temperature. For details of the requirements of this Clause, reference must be made to the corresponding Clause in the Manual of Contract Documents for Highway Works, Volume 1 – Specification for Highway Works as published by the Highways Agency.
929	**Dense Bitumen Asphalt concrete Base and Binder Course (Design Mixtures)**
929.1	The designed dense base and binder course asphalt concretes shall be one of the materials given in Table 9/8. They shall comply with PD 6691 for the appropriate material and with this Clause and shall be as specified in Table 9/23.
929.2	All materials shall be produced in plants that are registered to the BS EN ISO 9001 “Sector Scheme for the Production of Asphalt Mixes” (Sector Scheme 14), described in Appendix A. Where the contractor can demonstrate that a previous Job Mixture Approval Trial is relevant to the proposed material then details shall be forwarded to the Authority at least 7 days prior to the intended use date of the material.

TABLE 9/8: Summary of Design Mix for Dense Base and Binder Course Asphalt concretes

Brief Title	Course	Full Name	Grading Range mm	Binder Penetration Reference
HDM50	Base	Heavy duty asphalt concrete base	0/32	50
DBM50	Base	Dense bitumen asphalt concrete base	0/32	50
HMB35	Base	High modulus base	0/32	35
HDM50	Binder	Heavy duty asphalt concrete binder course	0/20 or 0/32	50
DBM50	Binder	Dense bitumen asphalt concrete binder course	0/20 or 0/32	50
HMb35	Binder	High modulus binder course	0/20 or 0/32	35

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text
	Filler
929.3	When either the coarse or fine aggregate is quartzite or other aggregate requiring anti-strip measures at least 1.0% of hydrated lime shall be added. The optimum amount shall be determined by trials. When the coarse aggregate is gravel, 2% by mass of total aggregate of Portland cement or hydrated lime shall be added and the percentage of fine aggregate reduced accordingly. Cement or hydrated lime is not required when limestone gravel is used as the coarse aggregate.
	Binder
929.4	Bitumen shall comply with BS EN 12591 and shall be produced in plants that are registered to BS EN ISO 9001 "Sector Scheme for the Supply of Paving Grade Binders", described in appendix A. The penetration reference of the bitumen shall be as stated in Table 9/8. The binder data required by Table 9/23 shall be supplied to the Authority.
929.5	The Contractor shall nominate a target aggregate grading and target binder content for his proposed mixture which shall fall within the limits of the appropriate table within PD 6691, for Group one or for Group two dense mixtures and comply with the appropriate Clause within this Specification. Additionally, for HDM mixtures, the target percentage of aggregate passing the 0.063mm sieve shall not be less than 7.0%. For compliance purposes the binder content and aggregate grading limits shall be those obtained by applying the tolerances stated in Table 9/9 to the target binder content and target aggregate grading. The aggregate grading curve shall be smooth and continuous and shall not vary from the low limit on one size of sieve to the high limit on the adjacent sieve size or vice-versa.
929.6	The compaction of base and binder course asphalt concretes during the approval stage shall be assessed by measurement of: (i) in situ and refusal air void contents of cores subjected to the Percentage Refusal Density (PRD) test procedure carried out in accordance with PD 6692; and (ii) in situ density using a nuclear density gauge. Once a mix is approved compaction compliance shall be assessed by the in-situ air voids test.
	Job Mixture Approval Trial
929.7	At least three days before a designed material from each source of asphalt concrete is first laid, the Contractor shall carry out a trial to demonstrate compaction plant and rolling procedures. Subject to the agreement of the Authority the trial may be carried out off site. The trial area shall be not less than 30 metres or more than 60 metres long and of a width and thickness required in the Contract. If the trial is carried out on site and complies with this specification

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text

	then it may form part of the Permanent Works. The materials, mixing and laying plant proposed for the Works shall be used for the trial.
929.8	During the laying of the trial area, two samples of loose mixture shall be taken at three evenly spaces locations along the trial length, in accordance with BS 598-100, six samples in total. The maximum density of one sample of mixture from each location shall be determined in accordance with BS EN 12697-5. The average value of maximum density ρ_{Max} expressed in MG/m³ shall then be used for subsequent calculation of the air void content of the compacted mixture. The remaining samples shall be analysed to determine their composition in accordance with PD 6692.
929.9	At three locations, four nominal 150mm diameter cores shall be taken using a suitable coring machine, in accordance with BS 598-100, twelve cores in total. Two of the locations shall be from the wheel-track zones of the completed traffic lane, the third location shall be agreed by the Authority. For the purposes of this Clause the wheel-track zone shall be taken to be between 0.5 metres and 1.1 metres and between 2.55 metres and 3.15 metres from the centre of the nearside lane markings for each traffic lane. Two cores from each location shall be tested using the PRD test procedure in accordance with sub-clause 2 of this Clause.
929.10	At or adjacent to the location of the cores, the density of the asphalt concrete shall be measured using a nuclear density gauge and the results correlated with the in situ air void contents determined in accordance with sub-Clause 11 of this Clause.
929.11	The air void contents of each core subjected to the PRD test procedure shall be determined, as follows: (i) the in situ air void content shall be calculated using as the bulk density ρ, the initial dried bulk density determined in accordance with PD 6692, and expressed in Mg/m³; (ii) The refusal air void content shall be calculated using as the bulk density ρ, the refusal density determined in accordance with PD 6692, and expressed in MG/m³. The air void contents shall be calculated to ± 0.1 per cent as follows: Air voids content = $\left(1-\frac{\rho}{\rho_{Max}}\right)\times 100\,\%$ where: ρ is the bulk density in accordance with PD 6692 (Mg/m³); And ρ_{Max} is the maximum density in accordance with BS EN 12697-5 (MG/m³).
929.12	The percentage binder volume B_{vol} shall be calculated for each location in accordance with the following expression: $B_{Vol} = B_{Mass} \times (\rho/\rho_b)$

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text

	Where: B_{Mass} is the target binder content by mass added at the mixer expressed as a percentage of the total mixture. ρ is the average initial dried bulk density of asphalt concrete at each location determined from the pair of cores subjected to the PRD test procedure. ρ_b is the density of the binder at 25°C.
929.13	The remaining pair of cores from each location shall be used for the measurement of Stiffness Modulus and Deformation Resistance, as follows: (i) The in situ air void content of each core shall be calculated from the equation given in sub-Clause 929.11, using the dried bulk density ρ determined in accordance with PD 6692 and the maximum density ρ_{Max} determined in accordance with sub-Clause 929.8. (ii) Each core shall be tested for Stiffness Modulus in accordance with DD 213 : 1993. (iii) Following the determination of Stiffness Modulus, one core from each location shall be tested for Deformation Resistance in accordance with DD 226 : 1996, and the other core shall be tested similarly except that the DD 226 : 1996 test procedure shall be modified in accordance with TRL Paper PA 3287/97. Within 28 days copies of the test sheets and results for stiffness modulus and deformation resistance measured for each core shall be supplied to the Authority. Additionally if the trial area is on site, the exact location of the cores, their dried bulk densities, in situ air contents, the composition of the mixture determined using the methods specified in PD 6692 and the percentage binder volume determined in accordance with sub-Clause 929.11 shall be reported. No limits are specified for the Stiffness Modulus, except for materials complying with Clause 902, or 944; nor for Deformation Resistance.

TABLE 9/9: Tolerances for Aggregate Grading and Binder content to be Applied to the Agreed Grading and Binder Content

Test Sieve (mm)	Tolerance for aggregate grading in percent by mass of aggregate passing test sieve	
	32mm base/binder course	20mm binder course
63	±0	
10	±0	
31.5	±10*	±0
20	±12	±5
14	±12	±10
10	-	±10
6.3	±8	±8
2	±7	±7
0.25	±6	±6
0.063	±3.5	±3.5

APPENDIX 0/1: Additional, substitute and Cancelled Clauses, Tables and figures

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	**Title and/or written text**

0.063 (HDM) Binder Content	±2 ±0.6	±2 ±0.6

Note: Application of the above tolerances to the agreed aggregate grading and binder content may result in limits outside those permitted by the appropriate table in PD 6691. Provided the target grading and target binder content of the mixture proposed for use, and agreed after trials, are within the limits contained in PD 6691, then the limits obtained by applying the above table shall prevail over those implied in PD 6691.

*The upper limit may be less than +5% (or +10%), depending on the agreed aggregate grading.

929.14	The trial area shall be acceptable if the mixture complies with sub-Clause 15 of this Clause. If the trial area fails to comply with the requirements of sub-Clause 15 and was intended to form part of the Permanent works, it shall be removed. In the event that the trial area fails to comply, the Contractor may nominate an alternative target aggregate grading and target binder content and the trial shall be repeated until compliance has been demonstrated. The target aggregate grading and target binder content of the complying mixture shall be used in the Permanent Works.
929.15	**Compliance Requirements** (i) The average value of in situ air void content of the pair of core samples from each location to be subjected to the PRD testing procedure shall not exceed 7%; (ii) The average air void content at refusal density of the core samples subjected to the PRD testing procedure shall be not less than 0.5%; and (iii) The minimum binder volume at each location shall be as stated in Table 9/10. When the void content determined in (i) exceeds 6.0% the binder aggregate combination shall be tested in accordance with Clause 953 and the results reported to the Authority for information. (iv) The compositional analysis of aggregate grading and binder content carried out in accordance with PD 6692 shall demonstrate compliance with the requirements set out in sub-Clauses 929.1 and 929.5. (v) The horizontal alignments, surface levels and surface regularity of the finished surface shall comply with Clause 702.

TABLE 9/10: Aggregate Size and Minimum Binder Volume	
Mixture Size/Designation Size (mm)	**Minimum Binder Volume (%) of the Total Volume of the Mixture**
0/32	8
0/20	9.4

APPENDIX 0/1: Additional, substitute and Cancelled Clauses, Tables and figures

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text

	Sampling and Testing from the Permanent Works
929.16	The compaction of asphalt concretes laid in the Permanent Works shall be assessed by determination of: (i) in situ air void content calculated from in situ density measured using a nuclear density gauge; and (ii) in situ and refusal air void contents of pairs of cores taken every 500 lane metres and subjected to the Percentage Refusal Density (PRD) test procedure carried out in accordance with PD 6692.
929.17	The compaction of base and binder course asphalt concretes shall be continuously assessed using the nuclear density gauge with readings taken at 20 metre intervals in alternate wheel-tracks, commencing with readings at a location from which a pair of cores is to be extracted. Additional readings shall be taken 300mm from the edge of the mat adjacent to each core location. The Contractor shall take corrective action as is necessary whilst the material is still above the minimum rolling temperature specified in BS 594987 if low densities are indicated at the time of laying.
929.18	Initially the calibrations of the nuclear density gauges established in accordance with sub-clause 10 of this Clause shall be used. When results are available from loose samples and pairs of cores taken every 500 lane metres, each gauge shall be re-calibrated if the density measured by that gauge and the density of the cores show a different bias. Each gauge used shall be individually calibrated.
929.19	For material from each mixing plant, a pair of nominal 150mm diameter cores shall be taken every 500 lane metres laid, one core from each wheel-track zone of the completed carriageway as defined in sub-Clause 929.9. Cores shall be extracted using a suitable coring machine, in accordance with BS 598-100. Each core shall be subjected to the PRD test procedure carried out in accordance with PD 6692, and the air void contents shall be determined in accordance with sub-Clause 929.11 using the maximum density ρ_{Max} expressed in Mg/m³ determined in accordance with sub-clause 929.20.
929.20	Samples of uncompacted material shall be taken from the paver augers in accordance with BS 598-100, clause 6.3, as near to each location from which cores are to be taken as is practicable and: (i) The maximum density of a sample of the mixture shall be measured in accordance with BS EN 12697-5. The value of maximum density so determined, ρ_{Max} expressed in Mg/m³, shall be used for the subsequent calculation of the air void contents of the compacted mixture at that location. (ii) The compositional analysis of a sample shall be carried out to determine the aggregate grading and binder content in accordance with PD 6692.
929.21	Each core extracted shall be examined for evidence of excessive voidage below the depth to which the nuclear density gauge penetrates. If excessive voidage is observed, further cores shall be taken to determine its extent.

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text
929.22	Each layer of asphalt concrete shall be sampled and tested separately. Where Separate coring of each layer would unreasonably delay placing a second layer, subject to the approval of the Authority, both layers may be cored together and the resulting core split prior to testing.
929.23	Cores shall be extracted without the use of excessive force. Cores shall not be taken until the material has cooled to a temperature of 40°C or less at mid-depth of the course to be cored. The walls and base of all holes from which core samples have been cut shall be dried and painted with hot bituminous binder or cold applied polymer modified intermediate or premium grade bitumen emulsion immediately prior to making good. Core holes shall be backfilled with dense bitumen asphalt concrete in accordance with PD 6691, or with approved cold-lay dense bitumen asphalt concrete. Dense bitumen asphalt concrete incorporating fluxed binder shall not be used. The backfill material shall be compacted to refusal with a circular headed vibrating hammer, in layers not exceeding 75mm. Where cores have been cut through the surface course, the last layer of backfill material shall comply with the specification for the surface course unless otherwise agreed with the Authority.
929.24	Two copies of the final nuclear density test results obtained and their correlation with in situ air void contents shall be passed to the Authority within 24 hours.
	Compliance Requirements for the Permanent Works
929.25	For material from each mixing plant: (i) The average in situ air void content calculated from any six consecutive nuclear density 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 in situ air void content of the pair of cores also exceeds 7%, then 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 Authority. (ii) The average in situ air void content of each pair of cores taken every 500 lane-metres shall not exceed 7% in binder course or base. If the average in situ air void content of a pair of cores exceeds the limit specified, then density readings with the nuclear gauge and if necessary further cores, shall be taken to determine the extent of the defective area to be removed. Lengths of not less than 15 linear metres shall be removed and replaced unless otherwise agreed by the Authority. (iii) The average values of air void content at refusal density of pairs of cores taken every 500 lane-metres and subjected to the PRD testing procedure shall be reported. If the average air void content at refusal of any three consecutive pairs of cores falls below 0.5% the Contractor shall cease laying. The Contractor shall nominated an alternative target aggregate grading and target binder content and a further Job Mixture Approval trial shall be carried out in accordance with this Clause. Laying shall not recommence in the Permanent Works until compliance has been demonstrated.

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text

	(iv) The compositional analyses of aggregate grading and binder content carried out in accordance with PD 6692 shall demonstrate compliance with the requirements set out in sub-Clauses 929.1 and 929.5. (v) The horizontal alignments, surface levels and surface regularity of the finished surface shall comply with Clause 702. When the void content determined in (i) and (ii) exceeds 6.0% the binder aggregate combination shall be tested in accordance with Clause 953 and the result reported to the Authority for information. **Binder Course Asphalt concretes Below Porous Asphalt Surface Course**
929.26	Binder course asphalt concretes below porous asphalt shall comply with sub-Clauses 1 to 25 of this Clause except that every third pair of cores from the Permanent Works shall be taken across a longitudinal or transverse joint as agreed by the Authority.
931	**Heavy Duty Asphalt concrete Base and Binder Course Asphalt concretes with Paving Grade Bitumen (Recipe Mixtures)**
931.1	The heavy duty asphalt concrete base and binder course asphalt concretes shall be one of the materials given in Table 9/11. They shall comply with PD 6691 for the appropriate material and with this Clause and shall be as specified in the Instruction.
931.2	All materials shall be produced in plants that are registered to the BS EN ISO 9001 “Sector Scheme for the Production of Asphalt Mixes” (Sector Scheme 14), described in Appendix A.

TABLE 9/11: Summary of Recipe Heavy Duty Asphalt concrete Base and Binder Course Asphalt concretes

Brief Title	Course	Full Name	Grading Range mm	Binder Penetration Reference
HDM50	Base	Heavy duty asphalt concrete base	0/32	50
HDM50	Binder	Heavy duty asphalt concrete binder course	0/20 or 0/32	50

	Filler
931.3	When either the coarse or fine aggregate is quartzite or other aggregate requiring anti-strip measures at least 1.0% of hydrated lime shall be added. The optimum amount shall be determined by trials. When the coarse aggregate is gravel, 2% by mass of total aggregate of Portland cement or hydrated lime shall be added and the percentage of fine aggregate reduced accordingly. Cement or hydrated lime is not required when limestone gravel is used as the coarse aggregate.

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text
	Binder
931.4	Bitumen shall comply with BS EN 12591 and shall be produced in plants that are registered to BS EN ISO 9001 "Sector Scheme for the Supply of Paving Grade Binders", described in Appendix A. The penetration reference of the bitumen shall be as stated in Table 9/11.
937	**Stone Mastic Asphalt (SMA) Binder Course and Regulation Course**
	General
937.1	Stone mastic asphalt shall comply with the general requirements of BS EN 13108 Part 5, Series 700 and 900 and the specific requirements of sub-Clauses 2 to 44 of this Clause and Table 9/23.
937.2	Stone mastic asphalt shall be produced in plants that are registered to the BS EN ISO 9001 "Sector scheme for the Production of Asphalt Mixes" (Sector Scheme 14), described in Appendix A.
	Aggregates
937.3	Coarse aggregate shall be crushed rock or crushed slag complying with Clause 901. The shape of the coarse aggregate shall comply with a maximum flakiness index of Category FI_{25} as defined in BS EN 13043, clause 4.1.6.
937.4	Fine aggregate shall comply with Clause 901 and shall comprise crushed fine aggregate derived from rock, slag or gravel. With the prior approval of the Authority the fine aggregate may be blended with not more than 50% of natural sand.
	Filler
937.6	When either the coarse or fine aggregate is quartzite or other aggregate requiring anti-strip measures at least 1.0% of hydrated lime shall be added. The optimum amount shall be determined by trials. Added filler aggregate shall be hydrated lime, crushed limestone or Portland Cement, in accordance with the requirements of PD 6691-1 and shall be not less than 2% by mass of total aggregate.
	Binder
937.7	Bitumen shall comply with BS EN 12591 or BS 3690 and shall be produced in plants that are registered to BS EN ISO 9001 "Sector Scheme for the Supply of Paving Grade Binders", described in Appendix A. The binder shall not be harder than penetration reference 50 (paving grade 40/60). If the deformation resistance requirement in sub-Clause 38 of this Clause is not required, then the binder penetration shall be 70/100 pen or as specified in Table 9/23 and the Instruction.

APPENDIX 0/1: Additional, substitute and Cancelled Clauses, Tables and figures

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text
	Binder Modifiers
937.8	Binder modifiers pre-blended with bitumen or binder modifiers, including natural or man-made fibres, which are added or blended with base bitumen complying with BS EN 12591 of the stated penetration range at the mixing plant shall have a British Board of Agrément HAPAS Roads and Bridges Certificate. In the event that no such Certificates have been issued, binder modifiers, pre-blended modified binders or additives shall not be used without the approval of the Authority.
937.9	In the event that no British Board of Agrément HAPAS Roads and Bridges Certificates have been issued, the Contractor shall provide with his design a data sheet giving details of the properties of the modified binders or additives proposed including those specified in Table 9/23. The Contractor shall provide the rheological product identification data for pre-blended modified binders in accordance with Clause 928 and cohesion in accordance with Clause 939.
	Mixture
937.10	The target aggregate grading and target binder content proposed by the Contractor shall fall within the envelope formed by the limits given in Table 9/12.
937.11	When slag aggregates are used, adjustments will be required to the binder content ranges in Table 9/12 to account for the varying density of the slag aggregates.
937.12	The binder drainage of the loose mixture at the target composition at a temperature of 175°C in accordance with DD 232 : 1996 shall not be more than 0.3% by total mass of mixture.
937.13	The agreed aggregate grading for the mixture shall be that obtained by applying the tolerances given in Table 9/13 to the target aggregate grading. The grading curve of the aggregates shall be broadly parallel to the limits of the envelope and shall not vary from the low limit on one size of sieve to the high limit on the adjacent size of sieve or vice-versa.
937.14	The agreed binder content for the mixture shall be the target binder content ±0.6%.

APPENDIX 0/1: Additional, substitute and Cancelled Clauses, Tables and figures

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	**Title and/or written text**

TABLE 9/12: Target Aggregate Grading and Target Binder Content				
Sieve Size (mm)	**Per cent by mass of total aggregate passing**			
	Maximum Nominal Size			
	20mm	**14mm**	**10mm**	**6mm**
31.5	100			
20	90 – 100	100		
14	30 – 60	90 – 100	100	
10	24 – 40	35 – 60	90 – 100	100
6.3	21 – 32	23 – 35	30 – 50	90 – 100
4	-	-	-	25 – 42
2	15 – 26	17 – 29	21 – 31	21 – 33
0.063	7 - 12	8 - 13	8 - 13	8 - 15
Binder % by mass	5.2 – 6.2	5.5 – 6.5	5.7 – 6.7	6.3 – 7.3

TABLE 9/13: Tolerances around Target Aggregate Grading				
Test Sieve (mm)	**Tolerances for aggregate grading in per cent by mass of aggregate passing the test sieve**			
	Nominal Size			
	20mm	**14mm**	**10mm**	**6mm**
20	±5			
14	±10	±5		
10	±8	±10	±5	
6.3	±8	±8	±10	±5
4	-	-	-	±10
2	±7	±7	±7	±8
0.063	±2	±2	±2	±2.5
Note: Application of the above tolerances to the target grading may result in limits outside those permitted by the appropriate envelope in the Table 9/12. This is acceptable.				

	Job Mixture Approval
937.15	Details of the proposed mixture design from each asphalt mixing plant shall be submitted to the Authority. The information may be obtained from either a job mixture trial or from the use of the mixture on a previous contract carried out in accordance with this Clause, and shall include all the following particulars: (i) bitumen penetration reference; (ii) quantities of binder and aggregate; (iii) aggregate source and grading; (iv) proprietary name and generic type of binder modifier; (v) quantity of any binder modifier, including natural or man-made fibres added at the mixer; (vi) modified binder and mixture data requirements specified in Table 9/23.
937.16	If a modified binder, including any proportion of the modifier, is not fully recovered on analysis for determination of binder content, details of alterations

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text
	to the test method and/or the correction necessary to the results together with supporting data shall be submitted to the Authority with the proposed mixture design for the approval to implement them.
937.17	The mixture shall be approved by the Authority as the Job Standard Mixture provided that: (i) the mixture design proposed complies with sub-Clause 1 of this Clause; (ii) information has been submitted in accordance with sub-Clauses 9 and 10 of this Clause; (iii) information submitted in accordance with sub-Clause 16 of this Clause has been approved by the Authority; (iv) test results submitted establish the correlation between the air voids content, as measured from cores in accordance with sub-Clause 33 of this Clause, and nuclear density gauges (v) test results submitted demonstrate compliance with sub-Clauses 37, 38 and 39 of this Clause.
937.18	If the mix design or constituent materials of a Job Standard Mixture are changed, details of the revised mixture shall be submitted for approval in accordance with sub-Clause 17 of this Clause. Job Mixture trials may be carried out on or off site, however material laid for a Job Mixture trial on site which complies with this specification may form part of the appropriate course in the Permanent Works. If carried out off site trials may be arranged independently or in conjunction with other Works.
	Mixing
937.19	Unless otherwise specified by the supplier of the modified binder, stone mastic asphalt shall be mixed at a temperature in accordance with the requirements of PD 6691 for the penetration reference of the bitumen. This shall be done in such a manner that a homogeneous mixture of aggregate, filler, bitumen and additive is produced. At the time of mixing, the coarse aggregate shall be in a surface dry condition.
	Transportation
937.20	The transportation of stone mastic asphalt shall be in accordance with sub-Clause 901.3.
	Permanent Works
937.21	Sampling and testing shall be carried out to establish compliance of material laid in the Permanent Works.
	Sampling from the Laid Material
937.22	Samples of uncompacted material shall be taken from the paver as near to where the cores are to be taken as is practicable, in accordance with BS 598-100, clause 6.3.

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text
937.23	Six 200mm diameter cores shall be cut, where practical from the centre of the lane, out of material from each mixing plant; (i) from material laid specially in a Job Mixture Approval Trial; (ii) from the first 1km length of stone mastic asphalt from a mixing plant laid in the Permanent Works; or (iii) within 3 days of laying stone mastic asphalt from a mixing plant in the Permanent Works, where less than 1km length has been laid, whichever occurs first.
937.24	The 200mm diameter cores shall be cut within 3 days of laying the material unless they have been cut under the requirements of sub-Clause 35 of this Clause. The cores shall be transported as soon as possible to the laboratory. If the storage period is less than 4 days, the storage temperature shall be within the range 0°C to 5°C. Cores shall be stored on a flat face on a horizontal surface, and shall not be stacked. Site storage of cores where unavoidable, and conditions of transportation shall be as close as it practicable to the laboratory conditions. The storage temperature and times, including whilst cores are on site, shall be recorded.
937.25	Three pairs of 150mm diameter cores shall be cut at the same chainage's as the 200mm diameter core. One core of each pair shall be taken from the centre of the lane, adjacent to the 200mm diameter core and one whose centre is between 500mm and 1000mm from the edge of the mat.
937.26	Cores shall be taken after the stone mastic asphalt has cooled to ambient temperature and not less than 12 hours after laying, and before trafficking, unless otherwise specified in the Instruction. The walls and base of all holes from which core samples have been cut shall be painted with hot bitumen or cold applied polymer modified intermediate or premium grade bitumen emulsion containing normally 60% binder immediately prior to making good. Core holes shall be backfilled with materials compacted to refusal with a circular headed vibrating hammer in layers not exceeding 75mm thick. Hot base material shall be similar to existing pavement.
937.27	In the Permanent Works, after the first 6 cores and where the required thickness of the material exceeds 25mm, for material from each mixing plant, not less than one pair of 200mm diameter cores shall be cut from the centre of the lane every 1 lane-kilometre laid in a day's production or if less than 1 lane-kilometre is laid.
	Tests and Calculations
937.28	Where possible, density readings using the nuclear density gauge calibrated as described in sub-Clause 17 of this Clause shall be taken at not more than 50 metre centres along each lane, including areas immediately adjacent to where each core is taken.
937.29	Initially, the calibration of the nuclear density gauge for the mixture being laid which has been submitted in accordance with sub-Clause 17 of this Clause shall be used. Once results are available, the gauge shall be re-calibrated using the results for bulk density and air voids content from the first six pairs of cores.

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text
	Thereafter, the gauge shall be re-calibrated if the density from the nuclear density gauge and from cores show any significant bias.
937.30	For each uncompacted sample, the compositional analysis shall be carried out in accordance with PD 6692, corrected by any correction factor approved under sub-Clause 16 of this Clause.
937.31	Each six consecutive 200mm diameter cores of material from the same mixing plant shall form a set of cores on a running basis. For each set, the wheel-tracking rate and rut depth shall be determined in accordance with the procedure in BS 598-110 at the test temperature of 60˚C.
937.32	For each 150mm diameter core, the bulk density shall be determined in accordance with the procedure in PD 6692, clause 4. The bulk density at a chainage shall be the mean from the two cores taken at a chainage. Subsequent to determining the bulk density, the maximum density shall be determined from the pair of the cores in accordance with BS EN 12697-5.
937.33	The air void content of each pair of 150mm diameter cores shall be calculated to ±0.1% as follows: Air voids content = $\left(1-\frac{\rho}{\rho_{Max}}\right)\times 100\,\%$ where: ρ is the bulk density in accordance with PD 6692 (Mg/m³); and ρ_{Max} is the maximum density in accordance with BS EN 12697-5 (MG/m³).
937.34	Where the thickness of material will exceed 40mm, prior to testing for air voids, the indirect tensile stiffness modulus (ITSM) of the 150mm diameter cores taken during the Job Mixture Approval Trial shall be measured in accordance with DD 213 : 1993.
	Additional Sampling and Testing
937.35	If the density readings taken with the nuclear density gauge indicate that the air voids content may be less than 2% when using the calibration relationship derived from sub-Clause 29 of this Clause, one 200mm diameter core shall be cut at that chainage and the wheel-tracking rate and rut depth determined in accordance with sub-clause 31 of this Clause.
937.36	If the density readings taken with the nuclear density gauge indicate that the air voids content may not comply with the requirements for a pair of cores set out in sub-Clause 39 of this Clause when using the calibration relationship derived from sub-Clause 29 of this Clause, two 150mm diameter cores shall be cut at the chainage and the air voids content determined in accordance with sub-Clauses 32 and 33 of this Clause.

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text
	Compliance Requirements
937.37	When determined in accordance with PD 6692, the compositional analysis shall demonstrate compliance with following: (i) the binder content on analysis shall not differ from the target binder content declared by the Contractor by more than ± 0.6%; and (ii) the target aggregate grading declared by the Contractor shall not differ from that given in Table 9/12 and Table 9/13.
937.38	Deformation resistance shall be determined in accordance with the requirements of Clause 952 and the deformation values specified in Table 9/23.
937.39	The air voids content shall be not more than 6% for a pair of cores at a chainage and shall be not more than 4% for the mean of any six consecutive determinations from pairs of cores from material from the same mixing plant. When the SMA is being used as a regulating course at thicknesses below 30mm, the appropriate limiting void contents shall be 8% and 6% respectively.
	Reporting Results
937.40	For Job Mixture Approval Trials the Contractor is responsible for testing, the individual determinations, including location of samples, and results from all tests shall be given to the Authority in writing within two weeks of the material being laid.
	Surface Preparation
937.41	Existing surfaces shall be prepared in accordance with the requirements of BS 594987 and Series 700 Clauses. Bond coats shall be in accordance with Clause 920, except that where the thickness of the stone mastic asphalt is less than 20mm, only premium polymer modified bond coats shall be used.
	Laying
937.42	Unless required otherwise in the Instruction, stone mastic asphalt shall be laid and compacted in accordance with the requirements of Clause 901, to the thickness stated in the Instruction.
	Weather Conditions
937.45	The weather conditions specified in Clause 945 shall not apply to stone mastic asphalt laid as a binder course in accordance with this Clause. The manufacturer's recommendations for the use of modified binders in various weather conditions for laying, and compaction temperatures of the modified stone mastic asphalt shall be submitted to the Authority with details of the modified binder required under sub-Clause 9 of this Clause and shall include information on early trafficking, particularly in hot weather.

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text
	Temporary Trafficking
937.46	The Contractor shall ensure the pavement material has adequately cooled and hardened before it it subjected to temporary traffic. Unless otherwise agreed by the Authority, the material shall not be trafficked if its surface temperature exceeds 25°C unless the maximum temperature within the mat has fallen below 35°C.
938	**Porous Asphalt Surface Course**
938.1	For details of the requirements of this Clause, reference must be made to the corresponding Clause in the Manual of Contract Documents for Highway Works, Volume 1 – Specification for Highway Works as published by the Highways Agency.
939	**Determination of Cohesion of Bitumen and Bituminous Binders**
	Scope
939.1	This Clause specified the Vialit Pendulum Test method for the measurement of the cohesion of bitumen and bituminous binders at temperatures in the range -10°C to +80°C, and determines the relationship between cohesion and temperature. For details of the requirements of this Clause, reference must be made to the corresponding Clause in the Manual of Contract Documents for Highway Works, Volume 1 – Specification for Highway Works as published by the Highways Agency.
941	**Modified Binder Storage Stability Test**
	Scope
941.1	This test determines the susceptibility of a pre-blended modified binder to separation or instability during prolonged storage at high temperature. For details of the requirements of this Clause, reference must be made to the corresponding Clause in the Manual of Contract Documents for Highway Works, Volume 1 – Specification for Highway Works as published by the Highways Agency.
943	**Hot Rolled Asphalt Surface Course and Binder Course (Performance-Related Design Mix)**
943.1	For details of the requirements of this Clause, reference must be made to the corresponding Clause in the Manual of Contract Documents for Highway Works, Volume 1 – Specification for Highway Works as published by the Highways Agency.

List of Additional and Substitute Clauses, Tables and Figures

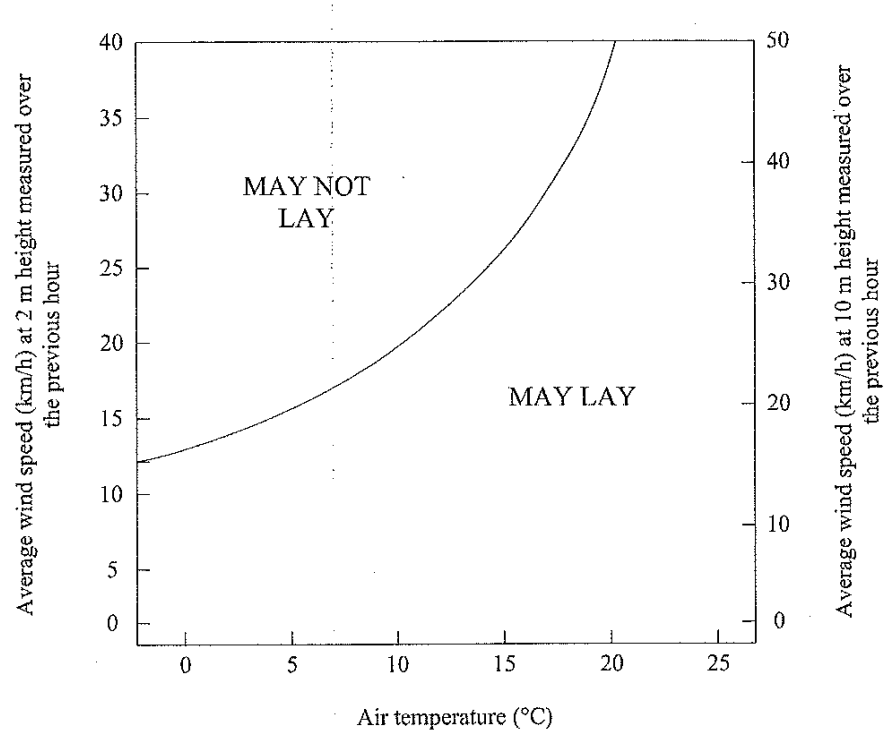
Clause or Table No. (etc.)	Title and/or written text
944	**Design, Testing and Compliance of Performance-Specified Base and Binder Course**
944.1	For details of the requirements of this Clause, reference must be made to the corresponding Clause in the Manual of Contract Documents for Highway Works, Volume 1 – Specification for Highway Works as published by the Highways Agency Binder.
945	**Weather Conditions for Laying of Bituminous Materials**
945.1	Laying of road pavement materials containing bitumen binders may proceed during light precipitation provided that both the surface to be covered and the air temperature are above 0°C, except where otherwise specified in this Clause. Responsibility for working methods shall remain with the Contractor including all necessary adjustments to suit changes in weather conditions.
945.2	Laying of road pavement materials containing bitumen binders may proceed provided that the temperature of the surface to be covered if 0°C or more, the air temperature is at or above -1°C and rising and the surface to be covered is dry, unfrozen and free from ice, snow, salt and grit, except where otherwise specified in this Clause.
	Hot Rolled Asphalt
945.3	Unless otherwise specified in the Instruction, hot rolled asphalt surface course materials incorporating 30% coarse aggregate shall have a minimum delivery temperature of 155°C and shall be laid 45mm thick, within the constraints of wind speed and temperature given in Figure 9/7. When an anemometer is not available hot rolled asphalt surface course materials incorporating 30% coarse aggregate shall have a minimum delivery temperature of 165°C and shall be laid 45mm thick. It shall not be laid when the air temperature falls below 5°C unless the temperature of the surface to be covered is 3°C or more.
945.4	Alternatively, unless otherwise specified in the Instruction, hot rolled asphalt surface course materials incorporating 35% coarse aggregate shall be laid 50mm thick, within the following constraints of delivery temperature, wind speed and air temperature. Air temperature (minimum): 0°C Wind speed (maximum at any air temperature): 40km/hr (at 2 metres height) or 50km/hr (at 10 metres height) Minimum delivery temperature of materials: 155°C
945.5	Unless otherwise specified in the Instruction, hot rolled asphalt binder course and base materials shall be laid in accordance with the requirements of sub-Clause 4 above, except the minimum delivery temperature shall be 135°C.
	Dense and Heavy Duty Asphalt concretes
945.6	Unless otherwise specified in the Instruction, and excluding end performance specified materials, dense and heavy duty asphalt concretes shall be laid in

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text

	accordance with the requirements of sub-Clauses 1 and 2 above, and shall be at least 50mm thick.
945.7	Dense asphalt concrete surface course and dense or heavy duty binder course layers shall be laid and compacted within the constriants of wind speed and temperature given in Figure 9/8, and the requirements of sub-Clauses 1 and 2 above, unless their compaction is assessed in accordance with Clause 929.
	Wind Speed
945.8	Wind speed shall be measured by anemometer positioned near the laying site to accurately reflect conditions at the laying site. The anemometer shall be fitted with a digital accumulative device.

Figure 9/7: Wind Speed and Air Temperature Laying Restrictions for 45mm Thickness Rolled Asphalt Surface Course

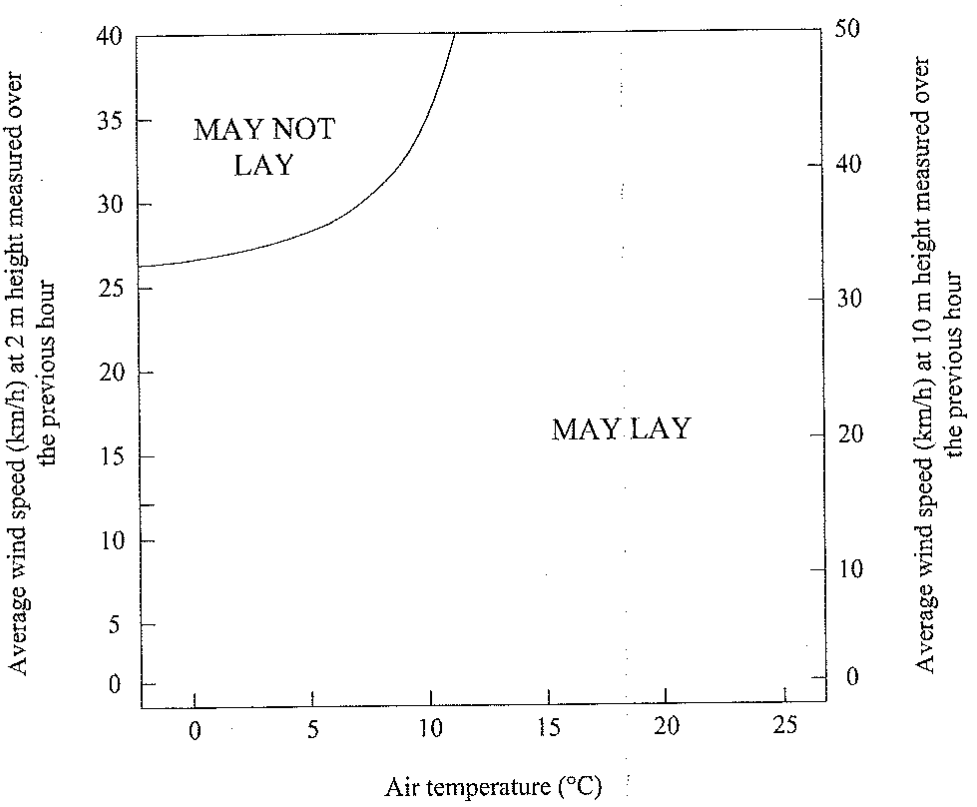


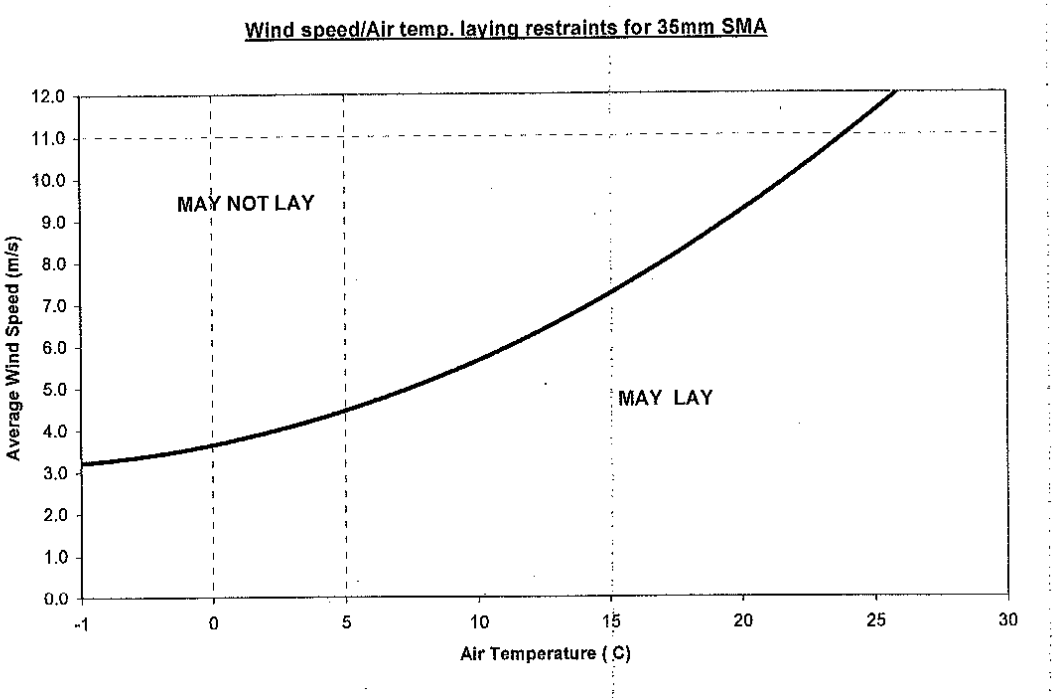
APPENDIX 0/1: Additional, substitute and Cancelled Clauses, Tables and figures

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text

FIGURE 9/8: Wind Speed and Air Temperature Laying Restrictions for Dense Bitumen Asphalt concrete Surface Course or Binder Course, or Heavy Duty Asphalt concrete, or High Modulus Base Binder Course Layers





List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text
946	**China Clay Sand Asphalt Base**
946.1	For details of the requirements of this Clause, refernce must be made to the corresponding Clause in the Manaul of Contract Documents for Highway Works, Volume 1 – Specification for Highway Works as published by the Highways Agency.
947	**Slate Asphalt concrete Base**
947.1	For details of the requirements of this Clause, reference must be made to the corresponding Clause in the Manual of Contract Documents for Highway Works, Volume 1 – Specification for Highway Works as published by the Highways Agency.
948	**Cold Recycled Bitumen Bound Material** **Scope**
948.1	Cold recycled bitumen bound material shall be designed and produced in accordance with the guidelines set out in TRL Report TRL611.
948.2	Prior to commencing the pulverisation and stabilisation works, the Contractor shall demonstrate, to the satisfaction of the Authority, that the existing pavement materials in the sections of the works defined in the Instruction are capable of being recycled by pulverisation to form the primary aggregate component of a cold recycled bitumen bound material which can meet the appropriate end-product performance requirements.
949	**Repairs to Potholes**
949.1	A pothole is defined as an area in a carriageway requiring repair and not exceeding 0.25 square metres. Repairs shall either be temporary or permanent, as described in the following sub-Clauses.
949.2	Temporary repairs to potholes shall be carried out using a proprietary deferred set bituminous material approved by the Authority (6mm or 10mm “Bitucrete” or similar). It shall be laid in accordance with the manufacturer’s instructions in layer not exceeding 40mm thick. Each layer shall be compacted using a mechanical rammer or approved hand rammer.
949.3	Permanent repair to potholes shall be carried out in accordance with the following and to the requirements specified in the Instruction:- (i) Where a temporary repair has been previously made to the pothole, the Contractor shall remove all the temporary material and dispose of to the Contractor’s tip off site in accordance with Clause 605. (ii) The pothole will be stabilised by cutting back the edges to sound material to form a regular shape with vertical sides. (iii) The surface course shall be cut to a minimum depth of 35mm using a disc cutter.

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text
	(iv) Remaining course may be cut back using a pneumatic or electric road breaker. (v) All loose material shall be removed from the pothole and disposed of to the Contractor's tip off site in accordance with Clause 605. (vi) The bottom and sides of the pothole shall be coated completely with: (a) for roads with a Maintenance Category of 3 to 6 an approved cold applied thixotropic bitumen emulsion ("Bitukold" or similar) (b) for roads with a Maintenance Category of 7 to 12 spray applied K1-40 bitumen emulsion applied at the rate of 0.5 litres per square metre. (vii) Filling shall be carried out using the 6mm SMA pothole mix with a PSV of 60 for roads with a Maintenance Category of 3 to 6 and a PSV o 55 for roads with a Maintenance Category of 7 to 12, and meeting the requirements of Table 9/23 unless otherwise specified in the Instruction. It shall be laid by hand in layers not exceeding 40mm thick in accordance with the appropriate Clauses. (viii) Where any dimension of the pothole is greater than 300mm then the surface shall be gritted in accordance with sub-Clause 937.43 (ix) The repair shall be finished level with the adjacent pavement surface and when completed the filled area and adjacent pavement shall be swept and cleared of all detritus and loose material.
949.4	Alternatively patching may be carried out using proprietary in-situ recycling repair systems incorporating indirect infra red heating having an appropriate British Board of Agrément HAPAS Roads and Bridges Certificate.
952	**Deformation Resistance for Binder Course and Base**
952.1	For details of the requirements of this Clause, reference must be made to the corresponding Clause in the Manual of Contract Documents for Highway Works, Volume 1 – Specification for Highway Works as published by the Highways Agency.
953	**Durability of Bituminous Materials – Saturation Ageing Tensile Stiffness (SATS) Test**
	Scope
953.1	This Clause specifies a test method to assess the durability of dense bituminous materials using the Saturation Ageing Tensile Stiffness (SATS) test. For details of the requirements of this Clause, reference must be made to the corresponding Clause in the Manual of Contract Documents for Highway Works, Volume 1 – Specification for Highway Works as published by the Highways Agency.
970	**Adequacy of Compaction – Attained Air Voids**
970.1	The adequacy of compaction of bituminous materials shall be determined from the attained air void content of the laid material using the method specified in BS 598 : Part 104, and as provided in this Clause.

APPENDIX 0/1: Additional, substitute and Cancelled Clauses, Tables and figures

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text

970.2	The Authority shall take samples in accordance with the following principles:- (i) Three 100mm core pairs shall be taken when the new material has attained ambient temperature. (ii) For sites exceeding 1,000 square metres in area three core pairs for every 1,000 square metres. (iii) For sites of less than 1,000 square metres in area, three core pairs for every 1,000 square metres of the aggregated area of the multiple sites completed each day or successive days thereafter. (iv) When the newly laid mat is either half or full carriageway width, at least two of the core pairs shall be taken from the wheel track zones as determined by the Authority. Where the laid width is less than half the carriageway width, the core pairs shall be taken where chose by the Authority.

TABLE 9/20: Limits for Air Void Content for Surfacing and Major Reconstruction Works

	Mean of 6 Cores		Mean of any Pair	
Material	Minimum %	Maximum %	Minimum %	Maximum %
Dense asphalt concrete base	2	7	1.5	8
Dense asphalt concrete binder course	2	6	1.5	7
All hot rolled asphalt materials i.e. base, binder course and surface course	2	6	1.5	7
Dense asphalt concrete and close graded asphalt concrete surface courses	2	9	1.5	10
Stone mastic asphalt surface course 14mm nominal size aggregate	2	6	1.5	7
Stone mastic asphalt surface course 10mm nominal size aggregate	2	8	1.5	9
Stone mastic asphalt surface course 6mm nominal size aggregate	2	10	1.5	11

NOTES:

1. Air voids results will be rounded to the nearest whole number for the purpose of assessing compliance over a core pair and to the nearest 0.5% for single core pair compliance.

2. The measured mix density will be used in the calculation. This figure is based on data from laboratory analysis of the mix density in accordance with ASTM D2041. The figure used will be:
   (a) for sites of 1000m² or greater, based on a sample of the material used on that site.
   (b) for sites of less than 1000m² the most recent mix density measured for the same material type from the supplying quarry.
   (c) For referee purposes a 200mm diameter core may be extracted for subsequent analysis of mix density.

3. An additional 1% tolerance on the maximum voidage shall be applied for hand laid material where permitted by the Authority.

4. For footpath works an additional 1% tolerance on the maximum voidage shall be applied as for hand laid material.

APPENDIX 0/1: Additional, substitute and Cancelled Clauses, Tables and figures

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text

970.3	The Authority will ensure that each sample is marked with information that denotes the location from where and at what time and date the sample was taken and that it is delivered to the Devon County Council Laboratory, Exeter where it will be tested in accordance with the following principles:- (i) The air void content shall be determined for each layer of material and calculated to the nearest 0.1%. (ii) When the material contains surface applied chippings the air void content shall be calculated for the asphalt material only. The mass and volume of chippings shall be subtracted from the mass and volume of the core. The mass of the chippings shall be calculated assuming that the mean rate of spread of chippings specified or agreed upon has been achieved. The volume shall then be determined using the relative density of the chippings as delivered including binder.
970.4	(i) The air void content of each layer shall not exceed the limits given in Table 9/20 and Table 9/21. (ii) The results will be rounded to the nearest whole number for the purpose of assessing compliance with the mean of 6 cores and to the nearest 0.5% for the purpose of assessing compliance with the mean of any pair of cores.

TABLE 9/21: Limits for Air Void Content for Patching and Minor Reinstatements which are Hand Laid

	Mean of 6 Cores		Mean of any Pair	
Material	Minimum %	Maximum %	Minimum %	Maximum %
Dense asphalt concrete base (excluding Clause 929 mixes)	2	9	1.5	10
Dense asphalt concrete binder course (excluding Clause 929 mixes)	2	8	1.5	9
All hot rolled asphalt materials i.e. base, binder course and surface course	2	8	1.5	9
Dense asphalt concrete and close graded asphalt concrete surface courses	2	10	1.5	12
Stone mastic asphalt surface course 14mm nominal size aggregate	2	8	1.5	9
Stone mastic asphalt surface course 10mm nominal size aggregate	2	10	1.5	10
Stone mastic asphalt surface course 6mm nominal size aggregate	2	11	1.5	12

NOTES:

1. Air voids results will be rounded to the nearest whole number for the purpose of assessing compliance over a core pair and to the nearest 0.5% for single core pair compliance.

2. The measured mix density will be used in the calculation. This figure is based on data from laboratory analysis of the mix density in accordance with ASTM D2041. The figure

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text

used will be the most recent mix density measured for the same material type from the supplying quarry (for referee purposes a 200mm diameter core may be extracted for subsequent analysis of mix density).

970.5	The Authority shall make good the core holes in accordance with the following and undertake all necessary traffic safety and management required for that operation: (i) The walls and base of holes from which core samples have been cut shall be dried, painted with thixotropic bitumen emulsion edge sealant pr hot bituminous binder, and filled to the underside of the surface course with an approved cold mix dense asphalt concrete or the same material used in the ongoing works, and be well rammed in layers not exceeding 50mm. (ii) Where cores have been cut through the surface course, the last layer of fill material shall comply with the specification for the surface course unless otherwise agreed with the Authority.
970.6	Where the requirement for air void content is not met the Contractor shall determine the full extent of the area of the defective material to the satisfaction of the Authority. For failure to meet the required maximum air voids payment reduction will be applied in accordance with the following table:

Voidage in excess of the specified maximum (%)	Reduction in payment (%) – Base, Binder & Regulating courses*	Reduction in payment (%) – Surface courses*	Other action
≤0.5	5	5	
≤1.0	10	10	
≤1.5	25	25	
≤2.0	33	50	
>2.0	50	-	Replace
>2.5	-	-	Replace

Notes:
* Where the excess voidage is restricted to one or more core pairs the reduction (R) shall be calculated from:

$$R = r \times (n / 3)$$

n = number of core pairs per 1000m² or per section (where less than 1000m²) where voidage exceeds maximum tolerance for a single core pair.

R = percentage reduction from table for the layer.

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text
971	**Stone Mastic Asphalt Surface Course**
	General
971.1	Stone Mastic asphalt shall comply with the general requirements of BS EN 13108 Part 5 and the following clauses.
	Materials – Aggregates and Filler
971.2	Coarse aggregate shall comply with Clause 901 and shall be as specified in Table 9/13.
971.3	When tested in accordance with the procedures of BS 812, the coarse aggregate shall additionally have the following properties: (i) Polished Stone Value – as specified in the Works Order; (ii) Ten Percent Fines Value – not less than 180kN when tested in a dry condition, or as spcified in the Works Order (iii) Maximum Aggregate Abrasion Value as specified in Table 9/13; (iv) Maximum Flakiness Index – for the coarse aggregate only, 30 percent, or as specified in the Works Order.
971.4	Fine aggregate shall comply with Clause 901 and shall be as specified in Table 9/13.
971.5	Added filler shall be as specified in Table 9/13 and in accordance with the requirements of PD 6691: part 1 and shall be at least 2 percent by mass of total aggregate. When either the coarse or fine aggregate is quartzite or other aggregate requiring anti-strip measures at least 1.2% of hydrated lime shall be added. The optimum amount shall be determined by trials.
	Binder
971.6	Unless specified otherwise in the Works Order, either a modified binder or bitumen with stabilising additive shall be used, at the choice of the Contractor. Modifiers are deemed to include any material added to or blended with the base bitumen.
971.7	The binder shall comply with BS EN 12591. The bitumen shall be grade 70/100 (referred to as 70/100 pen) unless instructed otherwise on the Works Order when it shall be either grade 40/60 (referred to as 40/60 pen) or, for handlay works specifically approved by the Authority 100/150 (referred to as 125 pen).
971.8	If a modified binder is used the base bitumen, before modification, shall comply with BS EN 12591 and shall have a nominal grade of 70/100 (70/100 pen), unless specified otherwise in the Works Order when grade 40/60 (40/60 pen) shall be used.

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text

971.9	The choice of type or modified binder shall be notified to the Authority before the commencement of work.
	Stabilising Additive or Modified Binders
971.10	When bitumen complying with BS EN 12591 is used as the binder, at least 0.3% by mass of total mixture of stabilising additive shall be used to ensure binder drainage does not occur during transport and handling. Stabilising additives shall be as specified in the Works Order.
971.11	Proposals to use a bitumen and stabilising additive or a modified binder shall be submitted to the Authority, complete with all details including binder drainage test results, manufacturer's recommendations for addition or means of incorporating any stabilising additives or modifiers homogeneously, without sgregation, into the mix.
971.12	Before agreeing the use of additive or modified bitumen, the Authority shall be satisfied that it has proved satisfactory in use elsewhere under circumstances similar to the Contract, or that it has undergone appropriate performance trials. For the purpose of this sub-Clause, documented evidence of use and trials of the additive or modifier, in any member state of the European Economic Area, will be acceptable.
971.13	Where information on use or trials is inadequate or lacking, in the opinion of the Authority, trials by the Contractor may be required to be undertaken before any agreement by the Authority to the use of the additive or modifier.
	Mixture
971.14	The target aggregate grading and target bind content proposed by the Contractor shall fall within the envelope formed by the limits given in Table 9/2, unless agreed otherwise by the Authority before the commencement of work.
971.15	Adjustments may be required to the binder content ranges in Table 9/2 to account for the varying density of slag aggregates should these be used.

TABLE 9/22: Aggregate Grading and Binder Content

Percentage by mass of total aggregate passing BS test sieve:	Nominal size of aggregate		
	14mm	10mm	6mm
20mm	100	100	Mix approved by the Authority
14mm	90 to 100	100	
10mm	35 to 60	90 to 100	
6.3mm	23 to 35	30 to 50	
2.36mm	18 to 30	22 to 32	
63μm	8 to 13	8 to 13	
Binder content (%)	6.5 to 7.5	6.5 to 7	

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text
971.16	The Contractor shall demonstrate the properties of the proposed mixture at the target composition by preparing loose mixture and compacted specimens in accordance with the general requirements of BS EN 13108. The loose mixture and compacted specimens shall comply with the requirements of sub-Clauses 971.17 and 971.19 below.
971.17	When tested at the target composition, the loose mixture shall demonstrate no more than 0.3% binder drainage, by total mass of mixture, at a temperature of 175°C. The test shall be carried out using the apparatus and general principles stated in BS DD 232. The drainage shall be calculated as: Binder drainage = [(W2 – W1)/(1100 + B)] x 100% where B us the initial mass of binder in the mixture, W1 and W2 are respectively the mass of tray and foil before testing and the mass of tray and foil and drained binder after testing, and the mass of combined aggregate before addition of binder was 1100 grammes, al as stated in BS DD 232.
971.18	Three compacted specimens shall be manufactured at the target composition and the air void contents of these shall be measured by the procedure described in ASTM D 3203 (or DD XYZ – Methods for determination of maximum density of bituminous mixtures), using: (i) the maximum density of the mixture, obtained using the theoretical maximum specific gravity of the loose mixture, determined in accordance with ASTM D 2041 and converted to relative density using the appropriate correction factor. (ii) The bulk desnity of the speciment, determineed in accordance with BS 598: Part 104: Clause 4, as the bulk density required by ASTM D 3203, except the specimen shall not be coated in wax.
971.19	At the target composition, the air void content of the mixture shall be within the range 2 – 4% for 14mm aggregate and as agreed with the Authority for 10mm and 6mm aggregate.
	Mixing
971.20	Stone mastic asphalt shall be mixed in accordance with the requirements of BS EN 13108 Part 5, such that an homogenous mixture of aggregate, filler, bitumen and additive (when used) is produced at a temperature of between 150°C and 185°C for 70/100 pen bitumen and between 150°C and 195°C for 40/60 pen bitumen. At the time of mixing, the coarse aggregate shall be in a surface dry condition.
	Transportation
971.21	Stone mastic asphalt shall be transported to site in double sheeted or tented and sealed ridge sheeted insulated vehicles (e.g. – “Easysheet” type system).

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text

971.22	To facilitate discharge of stone mastic asphalt, a small amount of water may be used. When so used then, prior to loading, the body shall be tipped to its fullest extent, with the tailboard open, to ensure drainage of any excess. The floor of the vehicle shall be free froma dherent bituminous materials or other contaminents.
	Compaction
971.27	Stone mastic asphalt shall be compacted immediately to practical refusal, using at least two steel wheeled rollers with minimum mass of 8 tonnes per roller. One roller shall be a tandem drum roller.
971.28	The tandem drum roller shall operate directly behind the paver while the other roller shall be used for completion of rolling and the removal of all roller marks.
	Surface Texture
971.29	When stated in the Works Order, the texture depth of the surfacing shall be in accordance with the requirements of Clause 921 after compaction.
	Surface Treatment
971.30	Clean, dry, crushed, angular quartzite aggregate (grit) to the grading shown in Table 9/14 or an approved alternative shall be applied evenly to the surface during the initial rolloing, i.e., after 5 passes of the primary roller. The rate of application shall be a minimum of 1 kilogramme per square metre for 14mm SMA and 700g per square metre for 10mm and 6mm SMA. After the final rolling care shall be taken to ensure that any surplus aggregate is removed prior to the application of roadmarkings and before the road is opened to traffic.

TABLE 9/14: Fine Aggregate Grading

Sieve (mm):	Cumulative % passing
6.30	100
4.00	80 – 95
2.80	38 – 68
2.00	10 – 35
1.00	0 – 12
0.50	0 – 5
0.063	0 – 1
To be quartzite aggregate or similar approved aggregate. Particle shape to be predominantly angular.	

971.31	The aggregate is to be applied by a calibrated roller-mounted spreader. The full calibration procedure is to be carried out at least 3 monthly and when there is a change in the source of the aggregate. The calibration procedure is in accordance with BS EN 12272-1:2002. A grid marked onto the test surface is a suibale alternative to the picking grid provided that the dimensions are the same and that care is taken in collecting the aggregate for weighing. Records of the calibration shall be available on site. The calibration record shall confirm the

APPENDIX 0/1: Additional, substitute and Cancelled Clauses, Tables and figures

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text

	effective width of spread and that the spreader is capable of applying the grit evenly across the full width of its spread subject to a tolerance of -100/+100 grammes and over the range of 0.5 – 1.5 kilogrammes per square metre. Daily checks on the evenness and rate of spread shall be carried out using a carpet tile test or any other method approved by the Authority. A record of all such checks shall be maintained.

TABLE 9/2329/23: Bituminous Pavement Course Materials

Designation	Spec. Clause	Material	Grade of Binder	Thickness	Special Requirements
<u>Base (Recipe Mixture)</u> Dense bitumen asphalt concrete base with 32mm aggregate and 100/150 pen binder: AC 32 HDM base 100/150 EN13108-1	906	Dense bitumen asphalt concrete	100/150 pen bitumen See Note A	70mm to 150mm	Aggregate Type – Crushed rock
Heavy duty asphalt concrete base with 32mm aggregate and 40/60 pen binder: AC 32 HDM base 40/60 EN13108-1	931	Heavy duty asphalt concrete	40/60 pen	70mm to 150mm	Aggregate Type – Crushed rock
<u>Base (Design Mixture)</u> Dense bitumen asphalt concrete base with 20mm aggregate and 40/60 pen binder: AC 20 HDM base 40/60 des EN13108-1	929	Dense bitumen asphalt concrete	40/60 pen	50mm to 100mm	None
Heavy duty asphalt concrete base with 32mm aggregate and 40/60 pen binder: AC 32 HDM base 40/60 des EN13108-1	919	Heavy duty asphalt concrete	40/60 pen	70mm to 150mm	None

APPENDIX 0/1: Additional, substitute and Cancelled Clauses, Tables and figures

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	**Title and/or written text**

<u>Binder course (Recipe Mixture)</u> Dense bitumen asphalt concrete with 20mm aggregate and 100/150 pen binder: AC 20 HDM bin 100/150 EN13108-1	906	Dense bitumen asphalt concrete	100/150 pen bitumen See Note A	50mm to 100mm	Aggregate Type – Crushed rock
Note A: Where instructed in the Instruction the Contractor shall use 40/60 pen or 70/100 pen bitumen.					
<u>Binder course (Recipe Mixture)</u> Dense bitumen asphalt concrete with 32mm aggregate and 100/150 pen binder AC 32 HDM bin 100/150 EN13108-1	906	Dense bitumen asphalt concrete	100/150 pen bitumen See Note A	70mm to 150mm	Aggregate Type – Crushed rock
Heavy duty asphalt concrete with 20mm aggregate and 40/60 pen binder:	931	Heavy duty asphalt concrete	40/60 pen bitumen	50mm to 100mm	Aggregate Type – Crushed rock
Heavy duty asphalt concrete with 32mm aggregate and 40/60 pen binder: AC 32 HDM bin 40/60 EN13108-1	931	Heavy duty asphalt concrete	40/60 pen	70mm to 150mm	Aggregate Type – Crushed rock
<u>Binder course (Design Mixture)</u> Dense bitumen asphalt concrete design mix binder course with 20mm aggregate and 40/60 pen binder:	929	Dense bitumen asphalt concrete	40/60 pen	50mm to 100mm	None
AC 20 dense bin 40/60 des EN13108-1					

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text

Dense bitumen asphalt concrete binder course with 32mm aggregate and 40/60 pen binder: AC 32 dense bin 40/60 EN13108-1	929	Dense bitumen asphalt concrete	40/60 pen	70mm to 150mm	None
Heavy duty asphalt concrete design mix binder course with 20mm aggregate and 40/60 pen binder Ac 20 HDM bin 40/60 des EN13108-1	929	Heavy duty asphalt concrete	40/60 pen	50mm to 100mm	None
Heavy duty asphalt concrete design mix binder course with 32mm aggregate and 40/60 pen binder: AC 32 HDM bin 40/60 des EN13108-1	929	Heavy duty asphalt concrete	40/60 pen	70mm to 150mm	None
<u>Binder course (SMA)</u> Stone mastic asphalt binder course with 14mm aggregate and 70/100 pen binder: SMA 14 bin 70/100 BS EN 13108-5	937	Stone mastic asphalt	70/100 pen bitumen See Note B	35mm to 75mm	None
Stone mastic asphalt binder course with 20mm aggregate and 70/100 pen binder: SMA 20 bin 70/100 BS EN 13108-5	937	Stone mastic asphalt	70/100 pen bitumen See Note B	50mm to 100mm	None

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text

<u>Surface course (Recipe Mixture)</u> Dense asphalt concrete with 6mm aggregate and 100/150 pen binder:	909	Dense asphalt concrete	100/150 pen bitumen See Note C	20mm to 30mm	Aggregate Type – Crushed rock Minimum PSV: See Note D Maximum AAV: 12
Note B: Where instructed in the Instruction the Contractor shall use 40/60 pen or 100/150 pen bitumen.					
<u>Surface course (Recipe Mixture)</u> continued Close graded asphalt concrete with 10mm aggregate and 100/150 pen binder:	912	Close graded asphalt concrete	100/150 pen bitumen See Note C	30mm to 40mm	Aggregate Type – Crushed rock Minimum PSV: See Note D Maximum AAV: 12
Close graded asphalt concrete with 14mm aggregate and 100/150 pen binder: AC 14 close surf 100/150 EN13108-1	912	Close graded asphalt concrete	100/150 pen bitumen See Note C	40mm to 55mm	Aggregate Type – Crushed rock Minimum PSV: See Note D Maximum AAV: 12
Rolled asphalt recipe Type F designation 30% with 14mm aggregate, 40/60 pen binder and 14/20mm coated chippings: HRA 30/14F surf 40/60 EN13108-4	910	Rolled asphalt	40/60 pen See Note C	40mm	Aggregate Type – Crushed rock Minimum PSV: See Note D Maximum AAV: 12
Rolled asphalt recipe Type F designation 35% with 14mm aggregate, 40/60 pen binder and 14/20mm coated chippings.	910	Rolled asphalt	40/60 pen See Note C	45mm or 50mm	Aggregate Type – Crushed rock Minimum PSV: See Note D Maximum AAV: 12

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text

HRA 35/14F surf 40/60 EN13108-4					
Note B: Where instructed by the Instruction the Contractor shall use 40/60 pen or 100/150 pen bitumen. Note C: Where instructed by the Instruction the Contractor shall use 70/100 pen bitumen. Note D: Minimum PSV to be 53, 57, 60, 65 or 68 as instructed on the Instruction.					
<u>Surface course (Design Mixture)</u> Rolled asphalt design Type F designation 55/10 with 10mm aggregate and 40/60 pen binder: HRA 55/10F surf 40/60 des EN13108-4	911	Rolled asphalt	40/60 pen See Note C	40mm	Aggregate Type – Crushed rock Minimum PSV:- Coarse aggregate: See Note D Maximum AAV:- 12 Marshall Stability Range:- 6kN to 8kN Marshall Flow: 5mm max.
Rolled asphalt design Type F designation 55/14 with 14mm aggregate and 40/60 pen binder: HRA 55/14F surf 40/60 des EN13108-4	911	Rolled asphalt	40/60 pen See Note C	45mm	Aggregate Type – Crushed rock Minimum PSV:- Coarse aggregate: See Note D Maximum AAV:- 12 Marshall Stability Range:- 6kN to 8kN Marshall Flow: 5mm max.
Rolled Asphalt design Type C designation 55/10 with 10mm aggregate and 40/60 pen binder: HRA 55/10C surf 40/60 des EN13108-4	911	Rolled asphalt	40/60 pen See Note C	40mm	Aggregate Type – Crushed rock Minimum PSV:- Coarse aggregate: See Note D Maximum AAV:- 12 Marshall Stability Range:- 6kN to 8kN Marshall Flow: 5mm max.
Rolled Asphalt design Type C designation 55/14 with 14mm aggregate and 40/60 pen binder: HRA 55/14C surf 40/60 des EN13108-4	911	Rolled asphalt	40/60 pen See Note C	45mm	Aggregate Type – Crushed rock Minimum PSV:- Coarse aggregate: See Note D Maximum AAV:- 12 Marshall Stability Range:- 6kN to 8kN Marshall Flow: 5mm max.

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text

Note C: Where instructed by the Instruction the Contractor shall use 70/100 pen bitumen. Note D: Minimum PSV to be 53, 57, 60, 65 or 68 as instructed on the Instruction.					
<u>Surface Course (SMA)</u> Stone mastic asphalt with 6mm aggregate and 70/100 pen binder: SMA 6 surf 70/100 BS EN 13108-5	937	Stone mastic asphalt	70/100 pen bitumen See Notes E and F	20mm to 30mm	Minimum PSV:- Coarse aggregate: See Note D Fine aggregate: See Note D Fibres: Cellulose (from an approved source) Maximum Void Content: 6%
Stone mastic asphalt with 10mm aggregate and 70/100 pen binder: SMA 10 surf 70/100 BS EN 13108-5	937	Stone mastic asphalt	70/100 pen bitumen See Note E	25mm to 35mm	Minimum PSV:- Coarse aggregate: See Note D Fine aggregate: See Note D Maximum AAV: 12 Fibres: Cellulose (from an approved source) Maximum Void Content: 6%
Stone mastic asphalt with 14mm aggregate and 40/60 pen binder: SMA 14 surf 40/60 BS EN 13108-5	937	Stone mastic asphalt	40/60 pen bitumen See Note C	35mm to 45mm	Minimum PSV:- Coarse aggregate: See Note D Fine aggregate: See Note D Maximum AAV: 12 Fibres: Cellulose (from an approved source) Maximum Void Content: 6%
Note C: Where instructed by the Instruction the Contractor shall use 70/100 pen bitumen. Note D: Minimum PSV to be 53, 57, 60, 65 or 68 as instructed on the Instruction Note E: Where instructed by the Instruction the Contractor shall use 40/60 pen bitumen. Note F: For footways and potholes the Contractor shall use 125 pen.					

APPENDIX 0/1: Additional, substitute and Cancelled Clauses, Tables and figures

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	**Title and/or written text**

APPENDIX 9/1 – Surface Dressing – Information Required from the Contractor.

The Contractor shall be required to complete the following Schedules in accordance with Clause 912.26

SCHEDULE 9/1: Binder Schedule				
Binder – the Contractor shall state there the sources they propose to use				
Material	**Name of Supplier**	**Source**	**Viscosity**	**Minimum Residue at 163˚C**
Bitumen Emulsion Polymer Enriched Bitumen Emulsion Proprietary Binder (Premium 80 or similar)				

SCHEDULE 9/2: Chipping Schedule					
Chippings – the Contractor shall state here the sources they proposed to use					
Clean chipping	**Name of Supplier**	**Source**	**Aggregate Type**	**Actual PSV**	**Specific Gravity**
8/14mm 6/10mm 3/6mm 0/3mm					

APPENDIX 0/1: Additional, substitute and Cancelled Clauses, Tables and figures

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	**Title and/or written text**

SCHEDULE 9/3: Plant Schedule				
Plant – the Contractor shall state here details of the plant they propose to use				
Item	**Team No 1**	**Team No 2**	**Team No 3**	**Team No 4**
Binder Distributor Vehicle Registration No. Make of Spraybar Spraybar Type (fixed/extensible/expandable) Minimum Spraying Width (metres) Capacity of Binder Tank (litres) Capacity of Pumping System (litres/minute)				
Sweepers For Preparatory Work – Type For Surplus Chippings – Type				
Rollers Type Weight (tonnes) Tyre Pressure (bar)				
Chipping Spreaders Maintenance Category 2-6 Highway Maintenance Category 7-12 Highway				

APPENDIX 0/1: Additional, substitute and Cancelled Clauses, Tables and figures

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	**Title and/or written text**

SCHEDULE 9/4: Schedule of Allowances for Laps			
The Contractor is to insert the allowance for longitudinal joints used, as sub-Clause 912.4(ii)(e)			
	Increase in Site width for Joint Types		
Distributor	**Lap to Lap mm**	**Lap to Butt mm**	**Butt to Butt mm**

APPENDIX 0/1: Additional, substitute and Cancelled Clauses, Tables and figures

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	**Title and/or written text**

APPENDIX 9/2 – Bond Coats, Tack Coats and other Bituminous sprays – Information Required from the Contractor.

The Contractor shall be required to complete the following Schedules in accordance with Clause 920.5

Appendix 9/2: Data Sheet for Bond Coats, Tack Coats and other Bituminous Sprays																			
Manufacturer of Binder:																Product name:			
Binder																Batch No:			
Binder Grade (tick as required)																			
Conventional		Intermediate		Premium		Super-premium		Non-tack		Other									

Binder **Source**	**Recovered Binder**	**Recovered Binder after Ageing Test**
Test	Recovered in accordance with clause 923	Aged in accordance with Clause 923
Penetration at 25°C 0.1mm (100g and 5 secs)		
Penetration at 25°C 0.1mm (200g and 60 secs)		
Vialit pendulum cohesion see Clause 939 maximum peak value J/cm²	The contractor shall attach a Report and graphical output to this schedule as specified in Clause 939.	The contractor shall attach a report and graphical output to this Schedule as specified in Clause 939.
Product Identification Test. **The provision of data for identification and ageing is optional for unmodified bitumen emulsions to BS 434 and for bitumen to BS EN 12591 and cutback bitumen to BS 3690.** Complex shear (stiffness) modulus (G*) and phase angle (δ) data. See Clause 928	The Contractor shall attach a Report and graphical output to this schedule as specified in Clause 928.	The contractor shall attach a Report and graphical output to this schedule as specified in Clause 928.
Other Properties the Contractor considers useful: Minimum Binder Content: Binder temperature range for spray application: Emulsion Properties and Viscosity: Break time: Breaking Agent type: Weather limits – information from binder manufacture; road or air temperature; humidity; wind chill adjustment; tolerance of surface dampness; etc. Temperature max: Temperature min: Torque bind: Other:		

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text
1107.2SR	**Footways and Paved Areas (Concrete Block Paving)** Precast paving blocks shall be laid in accordance with BS 6717:Part 3 except that the bedding (laying) and jointing sand shall comply with Clause 1171 AR.
1108.2SR	**Footways and Paved Areas (Clay Pavers)** Clay pavers shall be laid in accordance with BS 6677: Part 3 except that the bedding (laying) and jointing sand shall comply with Clause 1171 AR.
1111AR	**SERIES 1100 – KERBS, FOOTWAY AND PAVED AREAS** **Add new Clause 1110AR as follows:** "1110AR Footway Treatment – Weed-killing 1 The Contractor shall apply a total residual weed-killer to either the existing footway surface, the milled footway surface or the footway formation immediately before any new surfacing is laid. 2 The use of weed-killers shall be restricted to areas directed by the Authority. 3 Where the new footway surfacing is to be a single course of flexible surfacing Material, then the weed-killer shall be Diuron. In all other cases it shall be Dichlobenil, or if weed are present, dalapon and dichlobenil. 4 The weed-killer shall be non-corrosive, of low toxicity to humans, animals, fish and bees, and non-flammable. The Contractor shall state in Appendix 11/70, the product trade name, manufacture, active ingredients and MAFF number of the weed-killer(s) he proposes to use, for the Authority's approval. The Contractor shall also submit full details and specifications of the product, including Health and Safety Data sheets with the returned tender. The Contractor shall state whether 'full' or 'provisional' approval has been given to the product under the Control of Pesticides Regulation. 5 The use of weed-killers containing any of the following shall not be permitted: (i) 2-4-5T (ii) 2-4-D (iii) Aldrin (iv) Substances from the triazine group 6 The weed-killer shall be used strictly in accordance with the manufacturers recommendations and The Control of Pesticides Regulations 1986, and any amendments thereof. It shall also be used in accordance with the recommendations issued by The Ministry of Agriculture, Fisheries and Food.

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text
	7 Weed-killer shall be applied using purpose built plant or applicators. The Contractor shall ensure that a good treatment technique is adopted and the contamination of surrounding areas, planting, grass, watercourses and drainage systems shall be avoided 8 A copy of the relevant operators Certificate of Competence must be available for inspection at the request of the Authority's. 9 Chemical weed-killer shall not be applied during or before weather conditions that would render their use ineffective or result in the contamination of surrounding areas."
1112AR	**Add new Clause 1112AR as follows:-** 1 The Contractor is to reinstate existing carriageways and footways following the laying of new or raised kerbing as shown on the Standards Details, reinstatement Types R1, R2, or R4 as appropriate. 2 If instructed to do so by the Authority, the Contractor shall reinstate the Edge of the carriageway using reinstatement Type R5, as shown on the Standard Details. 3 If the Contractor damages the edge of the existing carriageway while carrying out kerbing works, it must be reinstated in accordance with reinstatement Type R5 at the Contractors own expense."
1171 AR	**Bedding Sand for Paving Flags and Blocks** 1. Bedding (or laying) sand should be a naturally occurring silica sand, free of deleterious salts and contaminants, with particles of a rounded or sub-rounded shape and comply with the grading required of Table 11/1. **Table 11/1 Grading Requirements for Bedding Sand** Sieve mm to μm 10 6.3 5 2.36 1.18 600 300 150 75 Percentage by mass 1 100 90-100 75-100 55-90 35-70 8-35 0-10 0-05 passing Sieve
1212.1SR	**SERIES 1200 TRAFFIC SIGNS AND ROAD MARKINGS** **<u>Road Markings</u>** Road markings shall be either new marks or overmarks and shall have dimensions and be located as specified in Appendix 12/3 in conformity with:- (i) Schedule 6 of the Traffic signs Regulations 2002

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text
	(ii) Zebra, Pelican and Puffin pedestrian Crossing Regulations and General Directions (SI 1997 No 2400) and any subsequent amendment thereto. Road markings shall be white, yellow (lemon) complying with BS 381 No 355 or primrose complying with BS 381 No 310 as appropriate except where an alternative shade has been specified in Appendix 12/3. They shall consist of solid areas, continuous, intermittent, raised rib and ancillary lines, triangles and arrows, mini roundabouts, kerb markings, letters and numerals and symbols and shall comply with sub-clauses 2 to 16 of this Clause and the Statutory requirements controlling road markings which are contained in the Traffic Signs Regulations and General Directions (Statutory Instrument No 859 1981) and subsequent amending Regulations.
1212.17AR	**Road Markings – Amendment** The specification for road markings is supplemented by the specification outlined in Appendix 12/3
1213.5SR	**Permanent Reflecting Road Studs** Permanent reflecting road studs shall be installed in the locations and to any other requirements as described in Appendix 12/3. (i) Where inlaid self cleaning permanent reflecting road studs are required installation shall be carried out in the following manner:- Cavities to receive the studs are to be excavated in the asphalt, tarmacadam, asphalt concrete, or reinforced concrete road surface, by power drilling profiling equipment and these cavities shall be kept to the minimum practical size and the sides shall be straight or undercut. Stud recesses are to be filled with concrete of the following specifications by volume, 3 parts chippings, 2 parts sand, 1 part cement and 1 part water. The studs are to be correctly bedded on bituminous grit, as specified below, and the studs set to the correct height of 14mm above the carriageway surface using the paving gauge supplied by the manufacturers. The sides of the excavation, the metal frame and concrete infill of the studs are to be coated with a tack coat of approved cold bitumen emulsion immediately prior to bedding the studs in position. After the studs have been correctly positioned the side grout consisting of hot filled bitumen as specified below shall be poured around them to finish at carriageway level. The bituminous grit used for bedding shall consist of granite graded 5mm down, shot mixed with a minimum of 6.5% cut back bitumen. Proprietary makes of bituminous grit may be employed with the prior approval of the Authority.

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text
	The filled bitumen shall consist of 75% filler and 25% bitumen 60-80 penetration.
	All surplus excavation is to be disposed of in a tip to be provided by the Contractor off site and the area of carriageway around the road stud is to be left clean and tidy. Where studs are to be fixed over bridge decks the Contractor shall ensure that the waterproof membrane is not damaged. (ii) Bonded roadstuds shall be installed in accordance with BS 873 Part 4 Appendix J. The adhesive shall be an epoxy material recommended by the stud manufacturer.
1222AR	**<u>Street Nameplates</u>** Street nameplates shall be constructed and fixed on site in accordance with this series except for the following unless otherwise stated: 1. Sign face material to be aluminium alloy 115WG 2. Sign to be black legend and border on white background 3. Legend to be 60mm height, all capital letters, transport medium lettering 4. Background to be class 2 reflective material 5. Finished sign face to be covered by 3m or similar, clear self-adhesive film. 6. Nameplates shall be fixed to a metal stand or wall mounted as instructed. 7. Where sign is to be erected using a stand, sign plate to be 250mm deep and border to be 12mm from edge. 8. Where sign to be mounted on a wall, sign plate to be 225mm deep and border to be edge of plate. 9. Metal stand to be manufactured in accordance with standard detail S54. 10. Nameplates to be fixed to stand by rivets at appropriate centres. Rivets to be placed within border areas. 11. Wall mounted sign plates to be fixed using 75mm hammer screw fixings at 300mm centres. 12. Metal stand to be fixed 385mm into the ground and backfilled with C20 concrete with flout finish where existing surface is paving slabs or concrete. Where surface is asphalt concrete, top off with 100mm thick dense asphalt concrete at 6mm aggregate to BS594987. Where existing surface is grass, top off with 100mm thick topsoil.
	Series 2400 Brickwork, Blockwork and Stonework
2417AR	**Finish of Joints in Brickwork and Blockwork** 1. Joints in brickwork and blockwork shall be pointed, struck flush and brushed unless otherwise instructed by the Authority. 2. On completion the face of bricks and blocks shall be clean and free from mortar and staining of any kind.

APPENDIX 0/1: Additional, substitute and Cancelled Clauses, Tables and figures

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text
	Finish of Joints in Stonework
2418AR	1. Joints between stones shall be kept to a minimum consistent with Clause 2413(5). 2. Unless otherwise instructed by the Authority, the joint shall be recessed sufficiently to provide a clear outline of each stone. The depth of the recess shall be between 8mm and 15mm depending on the average size of the stone; the smaller the stone the shallower the recess. The profile of the finished pointing within the recess shall have a flat surface to give a clearly defined line between the stone and the pointing. 3. After the mortar has reached its initial set it shall be brushed to remove the laitance and expose the aggregate. 4. On completion the face of the stone shall be clean and free from mortar and staining of any kind.
	Brick and Stone on Existing Structures
2419AR	1. Where required on existing structures, brick and stone shall be of a type and appearance to match the original construction and shall require the approval of the Authority before work commences.
	Taking Down Existing Brickwork and Stonework
2420AR	1. In taking down existing brickwork and stonework, every care shall be taken to preserve the arisings. 2. Bricks and stones suitable for re-use shall be cleaned of existing mortar and carefully stored. 3. The method employed in taking down the brickwork or stonework shall not in any way affect the structural integrity of the structure.
	Additional Series 2700: Pointing, Easipointing, Grouting
	Preparation of Pointing and Easipointing, Grouting
2701AR	1. Surfaces to be pointed shall be thoroughly cleaned and all vegetation removed to the satisfaction of the Authority. The method used shall be capable of dislodging mortar, heavy encrustations, dirt, organic matter and vegetation. 2. Unless otherwise directed by the Authority, joints in masonry to be pointed which are not already devoid of mortar shall be taken out to a depth of 30mm below the face of the masonry adjacent to the joint by mechanically powered tools, mortar picks and/or power discs or similar approved tools. Care shall be taken not to damage the stone and brickwork. Masonry repairs, which are then to be pointed to give a uniform overall appearance, shall have the joint recessed 30mm during building. In the case of easipointing the joint shall be taken out to a depth of 20mm.

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text
	3. All material removed during cleaning processes shall be collected and removed from the work area when working adjacent to watercourses. Precautions shall be taken to ensure that the flow of water is not impeded and that debris is not conveyed in the flow and discharged downstream of the works. 4. Where in the opinion of the Authority masonry requires restoration before pointing is carried out, masonry shall be cut out, replaced and/or repaired as directed by the Authority. 5. Adequate notice shall be given to the Authority to enable prepared surfaces to be inspected. No renovation works shall proceed until such surfaces have been approved by the Authority. 6. The sequence of working shall be such that the integrity of the Structure is maintained at all times.
2702AR	**Pointing** Pointing of joints in stonework or brickwork shall be carried out in the following manner:- (1) Joints taken out to 30mm depth in accordance with Clause 2701 shall be filled by hand pointing to Clause 2703 using the mix specified in Clause 2404SR. (2) Joints taken out to a depth greater than 30mm in accordance with Clause 2701 shall be filled to within 30mm of the face of the masonry using an approved pressure pointing mix and equipment and then finished by hand pointing to clause 2703 using the mix specified in Clause 2404SR. (3) Where directed by the Authority the joints shall be filled by Easipointing in accordance with Clause 2705.
2703AR	**Handpointing** 1. Handpointing shall be carried out where the depth of the joint is 30mm. It shall also be used to finish deeper joints which have previously been pressure pointed as described in Clauses 2702(b) and 2704. 2. Handpointing shall obtain total penetration into and completely fill the joint to be pointed. 3. Care shall be taken to ensure that mortar is not placed upon or spread onto adjoining masonry surfaces. 4. The finish of handpointing in brickwork and stonework shall be in accordance with Clauses 2417 and 2418. The mix to be used in handpointing shall comply with Clause 2404.

APPENDIX 0/1: Additional, substitute and Cancelled Clauses, Tables and figures

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text
2704AR	**Pressure Pointing** 1. Pressure pointing shall be executed by the use of equipment designed specifically for the purpose and intended pressure. The use of or adaptation of other equipment, such as grouting equipment will not be permitted. 2. Pressure pointing shall obtain total penetration into and shall fill to within 30mm of surrounding stone, clean excavated masonry joints, and other deeper joints and interstices. 3. The quantities of pointing mix used on each individual section of renovation work shall be recorded and submitted to the Authority on a daily basis. 4. Care shall be taken to ensure that mortar is not placed upon or spread on to the adjoining masonry surfaces. 5. The mix used in pressure pointing shall be of Pozament Mix C, manufactured by Pozament Ltd., or equally approved.
2705AR	**Easipointing** 1. Easipointing shall be carried out using Easipoint equipment and materials as supplied by "Thoro, Yorks and Humber Ltd". 2. Easipointing is to be carried out strictly in accordance with the manufacturers recommendations 3. The colour of easipoint mortar is to be as instructed in the contract and agreed with the Authority. 4. Finished joints shall be struck flush and brushed.
2706AR	**Trial Panels** Before pointing or easipointing any structure the Contractor shall carry out trials by pointing an area not less than 1 square metre to enable the Authority to approve this mix and standard of finish.
2707AR	**Grouting** 1. Grouting may only be carried out in any particular section of the structure when pointing in that same section has been completed. Grouting shall be carried out via holes drilled through the full thickness of masonry. The position of the grout holes shall be agreed with the Authority. The size of grout holes and sequence of grouting is to be agreed with the Authority. 2. The grouting plant used for void grouting shall be capable of grouting pressures up to 0.7 N/mm^2.

APPENDIX 0/1: Additional, substitute and Cancelled Clauses, Tables and figures

List of Additional and Substitute Clauses, Tables and Figures

Clause or Table No. (etc.)	Title and/or written text
	3. Temporary hardwood plugs shall be inserted into grout holes after grouting until such time it is evident to the Authority that grouting has been effective. Grout holes shall be finished by pointing with mortar to Clause 2404 or otherwise suitably finished to be compatible with the surrounding mortar. 4. The quantities of grout pumped on each individual section of renovation work shall be recorded and submitted to the Authority on a daily basis. 5. Unless otherwise agreed by the Authority, the mix to be used in grouting shall be a PFA/Portland cement mix with a minimum 28 day compressive strength of 5N/mm².
2708AR	**<u>Pointing Below Water Level</u>** Where permitted by the Authority pointing below water level may be carried out by hand using an approved quick set mortar. The finished attained shall be that specified in clauses 2417AR and 2418AR.
	Appendix A – Quality Management Schemes Existing Clause 14 is deleted and replaced by the following: Description: Manufacture and Supply of Bituminous Materials
A14SR	Certification Body: UKAS Sector Scheme 16 Phone: (01404) 821031 SPECIFICATION: The supply of all bituminous materials shall be in accordance with the relevant clauses of the 900 series of the Specification for Road Pavements – Bituminous Bound Materials.

APPENDIX 0/3: List of Numbered Appendices referred to in the Specification and included in the Contract

Appendix 0/3 is comprised of two lists, A and B, of Numbered Appendices as follows:

List "A" is a complete list of the Numbered Appendices referred to in the Specification for Highway Works with those not adopted marked "Not Used".
Those identified by the letters T or C shall be completed by the Tender or Contractor respectively.

List "A": List of the Numbered Appendices referred to in the Specification for Highway Works.

Volume No.	Completed By	Appendix No.	Title
		0/1	Contract-specific Additional, Substitute and Cancelled Clauses and Tables included in the Contract
		0/2	Not used
		0/3	List of Numbered Appendices Referred to in the Specification and included in the Contract
		0/4	List of Drawings included in the Contract
		0/5	Not used
			PRELIMINARIES
		1/1 to 1/4	Not used
		1/5	Testing to be carried out by the Contractor
		1/6	Not used
		1/7	Site Extent and Limitations on use
		1/8	Not used
		1/9	Control of Noise & Vibration
		1/10	Not used
		1/11	Not used
		1/12	Setting Out and Existing Ground levels
		1/13	Programme of Works
		1/14	Not used
		1/15	Not used
		1/16	Privately & Public Owned Services and Supplies
		1/17	Traffic Safety and management
		1/18 to 1/20	Not used
		1/21	Information Boards
		1/22 to 1/27	Not used
		1/70	Environment
		1/71	Network
			SITE CLEARANCE
		2/1	Not used
		2/2	Filling of Trenches and Pipes
		2/3	Not used
		2/4	Not used
		2/5	Not used
			HEDGES, FENCING AND NOISE BARRIERS
		3/1	Not used
		3/2	Not used
			SAFETY FENCES
		4/1	Not used
		4/2	Pedestrian Guard Rails

APPENDIX 0/3: List of Numbered Appendices referred to in the Specification and included in the Contract

Appendix 0/3 is comprised of two lists, A and B, of Numbered Appendices as follows:

List "A" is a complete list of the Numbered Appendices referred to in the Specification for Highway Works with those not adopted marked "Not Used".
Those identified by the letters T or C shall be completed by the Tender or Contractor respectively.

List "A": List of the Numbered Appendices referred to in the Specification for Highway Works.

Volume No.	Completed By	Appendix No.	Title
			DRAINAGE AND SERVICE DUCTS
		5/1	Drainage Requirements
		5/2 to 5/7	Not used
			EARTHWORKS
		6/1	Requirements for Acceptability and Testing of Earthworks Materials
		6/2	Not used
		6/3	Requirements for Excavation, Deposition Compaction
		6/4 to 6/7	Not used
		6/8	Topsoiling, Grassing & Seeding
		6/9	Not used
		6/10	Ground Anchors, Crib Walling & Gabions
		6/11 to 6/13	Not used
			ROAD PAVEMENTS GENERAL
		7/1	Permitted pavement Options
		7/2	Excavation & Reinstatement of Existing Surfaces
		7/3	Not used
		7/4	Bituminous Sprays
		7/5	Not used
		7/6 to 7/21	Not used
		7/22	Repairs to Potholes
			ROAD PAVEMENTS - CONCRETE
		10/1	Not used
			KERBS, FOOTWAYS AND PAVED AREAS
		11/1	Kerbs, Footways & Paved Areas
			TRAFFIC SIGNS
		12/1	Traffic Signs General
		12/2	Marker Posts
		12/3	Road Markings and Studs
		12/4 to 12/6	Not used
			ROAD LIGHTING COLUMNS AND BRACKETS
		13/1 to 13/6	Not used
			ELECTRICAL WORK FOR ROAD LIGHTING AND TRAFFIC SIGNS
		14/1 to 14/5	Not used
			MOTORWAY COMMUNICATIONS
		15/1/2	Not used
			PILING AND DIAPHRAGM WALLING
		16/1 to 16/18	Not used

APPENDIX 0/3: List of Numbered Appendices referred to in the Specification and included in the Contract

Appendix 0/3 is comprised of two lists, A and B, of Numbered Appendices as follows:

List "A" is a complete list of the Numbered Appendices referred to in the Specification for Highway Works with those not adopted marked "Not Used".
Those identified by the letters T or C shall be completed by the Tender or Contractor respectively.

List "A": List of the Numbered Appendices referred to in the Specification for Highway Works.

Volume No.	Completed By	Appendix No.	Title
		17/1	Concrete – Classification of Mixes
		17/2 to 17/6	Not used
			STRUCTURAL STEELWORK
		18/1	Not used
			PROTECTION OF STEEL WORK AGAINST CORROSION
		19/1 to 19/5	Not used
			WATERPROOFING FOR STRUCTURES
		20/1	Not used
		20/2	Not used
			BRIDGE BEARINGS
		21/1	Not used
			PARAPETS
		22/1	Not used
			BRIDGE EXPANSION JOINTS AND SEALING OF GAPS
		23/1	Not used
		23/2	Not used
			BRICKWORK, BLOCKWORK AND STONEWORK
		24/1	Brickwork, Blockwork and Stonework
			SPECIAL STRUCTURES
		25/1 to 25/3	Not used
			MISCELLANEOUS
		26/1	Not used
		26/2	Not used

APPENDIX 0/3: List of Numbered Appendices referred to in the Specification and included in the Contract

Appendix 0/3 is comprised of two lists, A and B, of Numbered Appendices as follows:

List “B” gives a list of contract-specific Numbered appendices devised for the Contract

Volume No.	Appendix No.	Title
	1/70	Environment
	1/71	Network
		KERBS, FOOTWAYS AND PAVED AREAS
	11/70	Residual Weed-killer for use Footways

APPENDIX 0/4 List of Drawings included in the Contract

Contract – specific drawings supplied to each Tenderer

Plan No.	
	None

1. Standard Drawings

2(i) Supplied to Contractor

Drawing No.	Title	Volume No.
HEDGES, FENCES AND ENVIRONMENTAL BARRIERS		
SD1	Wooden post and single rail birdsmouth fence Type WP/2	
SD2	Timber post and tubular rail fence Type SR/W1	
SD3	Wade hedgebank Type HB/W1	
SD4	Stoned faced hedgebank Type HB/1	
SAFETY FENCES, SAFETY BARRIERS AND PEDESTRIAN GUARDRAILS		
SD5	Lapped terminal Type LDT1	
SD6	Sockets for setting in concrete except at central reserve crossing points Type SK1	
SD7	Socketed foundations to posts Type SP5, SP6 and SP7	
SD8	Socketed foundations to posts Type FD3, FD4 and CS	
SD9	Pedestrian guardrail Type PG/1	
SD10	Pedestrian guardrail base plate details Type PG/1A	
SD11	Pedestrian guardrail Type Visirail	
SD12	Pedestrian guardrail foundation details Type PG/2A	
SD13	Handrail Type HR/2	
SD14	Central Handrail	
SD15	Safety barrier with base plate & sight gap (Visirail)	
SD16	Safety barrier with base plate	
DRAINAGE		
SD17	Pedestrian Gully (Precast Trapped)	
SD18	Gully Type AC12	
SD19	Replacement Carriageway Grating	
SD20	Drainage Pipe Type VCC & DI 150mm	
SD21	PCC Trapped Gully	
SD22	ACO Channel Type M100D	
SD23	Small Pedestrian Catchpit Gully Type SG	
SD24	In-situ Concrete footway catchpit gully	
SD25	Precast Concrete Soakaway	
SD26	Gully and Manhole cover, adjust cover detail.	
SD27	Standard Brickwork Catchpit Gully	
SD28	Large Brickwork Catchpit Gully	
SD29	Side-inlet Catchpit Gully	

APPENDIX 0/4 List of Drawings included in the Contract

PAVEMENTS

SD30	New construction in existing carriageway Type NCEC/1, 2
SD31	New construction in existing carriageway Type NCEC/3, 4
SD32	New construction in widening Type NCW/1, 2
SD33	Details of tie-in of overlay Type TO
SD34	Permanent trench reinstatement in existing carriageway Types PR/5, 6, 7, 8
SD35	Trench reinstatement in existing footway Type TR1
SD36	Reinstatement to kerbing in footway/verge/carriageway Types K1, K2, K3 K4 and K5
SD37	Pavement – Trench reinstatement
SD38	Pavement – Tie-in Transverse joint
SD39	Pavement – Tie-in Longtidudinal joint
SD40	Imprint rumble strip
SD41	Concrete carriageway Expansion joint
SD42	Concrete carriageway Contraction joint
SD43	Imprint speed table
SD44	Kerb joint sealing
SD45	Carriageway Construction (Narrow)
SD46	Round Topped Speed hump
SD47	Flat Topped Speed Hump (Speed Table)
SD48	Speed Cushions
SD49	Speed Cushion template

KERBS, FOOTWAYS AND PAVED AREAS

SD50	Dropper kerb to match kerbs type HB2 to BN Type DL2 and DR2
SD51	Dropper kerb to match type SP to BN Type DL1 and DR1
SD52	Devon concrete haunch Type DH1
SD53	Turf edging Type E13
SD54	Turf edging Type E14
SD55	Precast concrete small element paving flag Type PS/A, B, C
SD56	Block paving Type BP/1
SD57	Pedestrian deterrent paving Type PD1
SD58	Kerbs – PC, HB and N
SD59	Footway construction details F1 – V1
SD60	Footway construction details F9 & F10
SD61	Timber Edging
SD62	Steps
SD63	Channel types
SD64	Edging Kerbs
SD65	Tactile paving (uncontrolled)
SD66	Tactile paving (controlled)
SD67	Pedestrian refuge (Torpedo)
SD68	Limestone kerbs
SD69	Replacement of individual slabs
SD70	New slabs
SD71	Devontex paving slabs
SD72	Footway Bands
SD73	Carriageway Bands
SD74	Mistral Paving

SD75	Pedestrian Refuge (Round)
SD76	HB Kerbs laid flat
SD77	Granite Set Paving

TRAFFIC SIGNS, ROAD MARKINGS & STREET FURNITURE

SD78	Baltimore Seat Details
SD79	White raised rib edge lines
SD80	Non-reflecting road stud Type RS/N1
SD81	Cored thermoplastic road marker
SD82	Traffic sign foundation
SD83	Remote pole housing
SD84	Street name plate frame
SD85	Sleeved sign post foundation
SD86	Dragons Teeth – Carriageway Markings
SD87	Installation of bollard
SD88	Manchester bollard
SD89	Slow with Rumble Strips – Road markings
SD90	Speed Camera Carriageway Markings
SD91	Bristol Bollard
SD92	Removable Bollard Footing

DUCTING & TRAFFIC SIGNALS APPARATUS

SD93	Duct types
SD94	Signal pole box
SD95	Intermediate chamber Type LD1
SD96	BT Haldo Pillar
SD97	Controller Base
SD98	Intermediate chamber type D1-D3
SD99	Brick access chamber
SD100	Duct Chambers NAL1 – NAL5
SD101	Traffic signal socket type NAL115DF

RETAINING WALLS

SD102	Wall Expansion joint
SD103	Wall type W9
SD104	Wall types W1, W2 & W3
SD105	Wall types W4, W5 & W6
SD106	Coping details

APPENDIX 1/5: TESTING TO BE CARRIED OUT BY THE CONTRACTOR

The following testing is required by the Contractor as part of the Contract and should be included within the costs identified within the Schedule of Rates:

Clause	Work, Goods or materials	Test	Frequency of Testing	Test Certificate	Comments
509	Pipework joints	Air Tests	All Pipelines with watertight joints		
1004	Concrete strength	Cube tests	Areas greater than 10m2.	Required	

Notes:

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

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

3. 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.

4. Site testing shall be carried out by staff suitably qualified for the task, using calibrated equipment, and the Contractor shall supply confirmatory evidence in writing.

5. Off-site testing shall be carried out by laboratories qualified to do so by compliance with NAMAS requirements for the test.

APPENDIX 1/7: SITE EXTENT AND LIMITATIONS ON USE

1. The extent of the site is the ‘Network’ of the Highway System in Torbay.

2. Limitations on use are as defined by the Torbay Traffic Sensitive Streets Document and as instructed by the Authority or agreed with the network co-ordination officer.

APPENDIX 1/9: CONTROL OF NOISE AND VIBRATION

Noise

1. When applicable the Contractor shall obtain consents under Section 61 of the Control of Pollution Act 1974.

2. (a) The Local Authority has informally agreed that the following measures would be acceptable and these are given as a guide; however, it is for the contractor to decide whether to seek the local Authority's formal consent to his proposed methods of work and to the steps he proposes in order to minimise noise.

   (b) The definition of day time and night time hours within the Site shall be:

Day time	Weekdays	0700-1900
	Saturdays	0700-1900
Night time	Weekdays	1900-0700
	Saturdays	1900-0700

   Work may be carried out at night time only where specifically ordered by the Authority.

   (c) The noise levels permissible during night time working hours are schedule below.

   (d) The ambient noise level Leq, (see Note (ii) below) from all sources when measured 2.0m above the ground at noise control stations shall either not exceed the appropriate level given in the Schedule or not exceed by more than 3 dB(A) the existing ambient noise level, Leq (see Note (iii) below) at the control station measured over the same period, whichever level is the greater. The maximum sound level at any noise control station shall not exceed the level given in the schedule.

   (e) Exceptionally, the Contractor may be given permission to carry out works which exceed the noise levels in the schedule, provided 14 days notice of the date and timing of these works is given to the Authority and the Contractor demonstrates that he intends to take all reasonable measures to mitigate the noise nuisance. After consultations with the Local Authority and any other interested bodies a decision will be given within 14 days of receipt of the notice.

Schedule Total Noise Levels at Control Stations

Period	**Hours**	**Ambient Noise Leq measured at Control Station: dB(A)**	**Period of Hours over which Leq is applicable**	**Maximum Sound Level (see Note(iv) below) measured at Control Station B(A)**
Monday to Friday	0700-1900 1900-2000	72 62	Any 1 hour Any 1 hour	85 70
Saturdays	0700-1300 1300-2100	72 62	Any 1 hour Any 1 hour	85 70

Sundays and Public Holidays	0700-0900 0900-1700 1700-2100	47 62 47	Any 1 hour Any 1 hour Any 1 hour	55 70 55
Monday to Sunday	2100-0700	47	Any 1 hour	55
All unattended plant out-side normal working hours		47	Any 1 hour	55

Notes:-

(i) Noise levels relate to free field conditions. Where noise Control Stations are located 1m from facades of buildings, the permitted noise levels can be increased by 3dB(a).

(ii) The ambient noise level, Leq, at a noise Control Station is the total Leq from all the noise sources in the vicinity over the specified period.

(iii) The existing ambient noise level, leq, at a Control Station is the total Leq from all the noise sources in the vicinity over the specified period prior to the commencement of Site Works.

(iv) Maximum sound level is the highest value indicated on a sound level meter which meets the requirements of BS EN 60651 - 1994 type 1 to 2 set to SLOW response and frequency weighting A.

(f) Without prejudice to the generality of the Contractor's obligation under BS 5228 the Contractor shall comply in particular the following requirements:-

(i) All compressors shall be "sound reduced" models fitted with properly lined and sealed acoustic covers which shall be kept closed whenever the machines are in use, and all ancillary pneumatic percussive tools shall be fitted with mufflers or silencers of the type recommended by the manufacturers.

(ii) All machines in intermittent use shall be shut down in the intervening period between work or throttled down to a minimum.

(iii) All vehicles and plant used for the purpose of the works shall be fitted with effective exhaust silencing system which shall be maintained in good working order.

(g) Equipment that is required to be run continuously throughout the night shall be required to have additional acoustic screening if so deemed necessary by the Authority.

(h) Blasting shall only be carried out, if permitted by the contract, with the written approval of the Authority and in any event will be restricted to Monday to Friday between the hours of 0900 and 1600.

(i) Where night time working is permitted all noisy operations, such as planing, the use of pneumatic tools and compressors, excavating etc. shall not be carried out between 2300 hrs and 0630 hrs.

Vibration

1. **Locations where vibration limits are to be compiled with**
   Not required

2. **Limits of vibrational amplitude and resultant peak particle velocity**
   Not applicable

3. **Requirements for instrumentation and monitoring**
   None

4. **Authority's arrangements for Contractor to monitor vibration in property off site**
   None

APPENDIX 1/12: SETTING OUT AND EXISTING GROUND LEVELS

1. Vertical profile and crossfalls shall be as instructed by the Authority or determined in accordance with Clause 720.2SR.

2. Line and level pegs shall be set out at intervals not exceeding 10m. They shall, where necessary, incorporate profile boards and be of a type which will not be disturbed during the laying of the kerbs, edge lines or channels. Where directed by the Authority, kerb and edge lines shall be set out independently and shall not be based on off-sets from the centre line.

3. Where the precise information as to line and level of drainage works is not indicated on Drawings accompanying a Works Order the position of the centre line and levels of such work must be agreed on Site with the Authority before such works are commenced.

APPENDIX 1/13: PROGRAMME OF WORKS

1.0 Programmes:

When required by the Authority, the Contractor shall provide a Programme of Works for each Works Order, which shall be in the form of a bar chart produced as a result of the Critical Path Analysis. It must abide by the schedule of constraints detailed in the Works Order, which will be extracted from the following constraints:

1.1 Some sites will have restricted working hours or restricted periods imposed on them to avoid work during sensitive times. These restrictions will generally be to comply with:

(a) The special requirements in relation to Torbay Council (as Highway Authority) as given in the Conditions of Contract.

1.2 Noise levels as described in Appendix 1/9.

1.3 Traffic Safety and Management as set out in Appendix 1/17.

2.0 Working Hours:

The Contractor may programme his normal working week at any time between 0700 and 1900 Monday to Friday (Saturdays with the agreement of the Authority), excluding Public Holidays – New Year's Day, Good Friday, Easter Monday, May Day, Spring Bank Holiday, Summer Bank Holiday, Christmas Day and Boxing Day.

2.1 The Contractor will not be permitted to work outside of the hours defined in 2.0 above except for emergencies or as otherwise approved or ordered by the Authority in writing.

3.0 Response Time

Routine planned works shall be completed within 28 days following the date of issue of the site instruction.

3.1 For Emergency Works: 1 hour from receipt of instruction
Urgent: 24 hours from receipt of instruction

3.2 For work in relation to which a road closure has been or has to be made, the commencement of work shall be coincident with the date of the road closure.

3.3 Winter maintenance shall be carried out in accordance with the detailed times contained in the Specification.

3.4 Urgent works on carriageway markings will be required within 7 days subject to weather conditions.

APPENDIX 1/16: PRIVATELY AND PUBLICLY OWNED SERVICES AND SUPPLIES

1. Details of any preliminary arrangements that have been made with Statutory Undertakers and others for the alteration of services affected by each Works Order will be listed in Table 1 to this Appendix.

2. The Contractor shall make arrangements with the Statutory Undertakers and others concerned, for the co-ordination of his work with all work which needs to be done by them or their contractors concurrently with the works. Compliance with the periods of notice given in Table 1 does not relieve the Contractor of his obligations.

3. The Contractor shall make arrangements with the Statutory Undertakers and others concerned for the phasing of all necessary disconnection's and diversions of private services affected by the Works.

4. Disconnected apparatus shall be removed by the Contractor only with the prior consent of the Authority concerned.

5. The names, addresses and telephone numbers of the authorities serving in the locality are listed below:

Names	Address	Contact Tel No.
Western Power Distribution	Devon Area Osprey Road Sowton Industrial Estate EXETER Devon EX2 7HZ	Tel: Exeter (01392) 444111
South West Water Services	South and West Devon Divisions Windsor House The Plymouth Business Park Tavistock Road PLYMOUTH PL6 5UF	Tel: Plymouth (01752) 768888 0800 37 89 37 (Out of Hours)
Environment Agency	South West Region Manley House Kestrel Way EXETER EX2 7LQ	Tel: 0800 807060 Tel: Exeter (01392) 444000 Linkline 0800 3785 00 (emergencies)

Names	Address	Contact Tel No.
British Telecom		Tel: FREEFONE “DIAL BEFORE YOU DIG” 0800 917 3993
Wales & West	Wales & West Utilities Plant Protection Spooner Close Celtic Springs Newport NP1 0FZ	Tel: 02920 278912 Fax: 0870 0600238
Energies	C/o Western Power Distribution Osprey Road Sowton Industrial Estate EXETER EX2 7HE	Tel: Exeter (01392) 444111)
Virgin Media	Cablephone House Small heath Business Park Talbot Way Small Heath BIRMINGHAM B10 0HJ	Tel: Exeter (01392) 445549
South West Water Services Ltd	Peninsula House Rydon Lane Exeter	0800 1691 144

APPENDIX 1/17: TRAFFIC SAFETY AND MANAGEMENT

Traffic management shall be in accordance with Clause 117

Additional requirements for each location will be identified on the site instructions.

The likely traffic management measures for each works order will be listed in the site instruction as shown below. This does not however relieve the Contractor of his responsibility to carry out traffic safety and management measures in accordance with the Contract. Any amendments proposed by the Contractor to the methodology contained in the works order are to be agreed with the Authority representative in the relevant works centre.

Traffic management arrangements to be agreed with each Site Instruction

Site Number	Traffic Management Measures Required	Comments/Drawings Required

APPENDIX 1/21: INFORMATION BOARDS

1 Prior Warning Signs

The Contractor will be required to provide and maintain "Prior Warning" signs for a period of 7 days prior to commencement of work at each site or 14 days if instructed. Signs to be approved by Authority.

2 Information Signs

The Contractor will be required to provide and maintain these signs at each site while works are being carried out. Signs to be approved by Authority. Typical sign illustrated below.

ENVIRONMENT SERVICES COMMISSION
Community & Customer Services

CARRIAGEWAY
RECONSTRUCTION & RESURFACING
2021/24

Torbay Council apologies for the inconvenience caused during these essential improvement works

In the event of an emergency please telephone (01803) 701318

CARRIAGEWAY
RECONSTRUCTION &
RESURFACING 2021/24

SORRY FOR ANY
INCONVENIENCE

EMERGENCY TELEPHONE

01803 701318

APPENDIX 1/70: ENVIRONMENT

1. The Contractor's attention is drawn to the following Environmental Acts:

   a) Wildlife and Countryside Act 1991
   b) The Badgers Act 1991
   c) The Protection of Badgers Act 1992

2. Within 2 weeks of the commencement of the Contract the contractor shall notify the Authority's representative in writing of the name of a responsible person to act as the Environmental Officer for the contract whose principal duty is to ensure implementation of measures to comply with Environmental Statutes.

3. The Contractor should cease all work at any site where roosting bats are discovered and immediately contact the Authority and English Nature (the latter being a legal requirement) and await further instructions.

APPENDIX 2/2: FILLING OF TRENCHES AND PIPES

1. **Backfilling of Trenches**

1.1 Unless otherwise instructed by the Authority voids below the formation level of carriageways caused by the removal of pipes, ducts, gullies, manholes etc., shall be backfilled with sub-base material to clause 803 compacted to clause 802. Where these compaction requirements cannot be met the void shall be filled with concrete mix STI to clause 2602 up to a level 150mm below formation level and thereafter with sub-base material to clause 803 compacted to clause 802 up to formation level.

APPENDIX 4/2: PEDESTRIAN GUARD RAILS

1. The location and details of pedestrian guard rails and hand rails for each Works Order will be shown in Table 1 to this Appendix and Standard Details…..

2. The dimensions for Pedestrian guard rails and hand rails are to be confirmed on site prior to fabrication.

TABLE 1 Appendix 4/2 Schedule of Pedestrian Guard Rails (To be completed by the Authority with each Site Instruction)

Site No.	**Guard Rail/Hand Rail Type**	**Location**	**Other Comments**

APPENDIX 5/1: DRAINAGE REQUIREMENTS

1. **General**

a) The location and details of drainage for each Works Order will be shown in Table 1 of this Appendix and HCD Drawing Numbers F1, F2, F3, F5, F11, F13, F18 and Standard Details……

b) The drainage system has been designed assuming roughness coefficients (Ks) of 0.15mm for surface water drains and 1.5mm for filter drains.

If the Contractor proposes the use of any pipes where the relevant coefficients exceed these values, then a revised design for the system must be submitted no less than four weeks prior to the start of the drainage works.

2. **Permitted Pipe Options:**

Pipe Type	**Usage (unless shown otherwise in Table 1)**
Vitrified Clay "Normal" pipes as defined in BS 65	Foul and surface water carrier drains or sewers.
Vitrified Clay "Normal" or surface water pipes as defined in BS 65	Filter drains.
Concrete	Foul and surface water carrier drains or sewers filter drains.
UPVC	Filter drains. Foul and surface water drains or sewers only where specified in Table 1.
Continuous Plastic (Coilable)	Only where specified in Table 1.

APPENDIX 5/1: DRAINAGE REQUIREMENTS

3. **Permitted Trench Options in Relation to Specified Design Group:**

a) **Carrier drains**

Pipe Diameter	Specified Design Group Number	Vitrified Clay			Precast Concrete		
		S	ES	SS	L	M	H
150	6	ASBF	ASBF	ASBFN	ASBF	ASBFN	-
225	6	ASB	ASB	ASBF	ASB	ASBF	-
300	6	AS	ASB	ASBF	AS	ASB	-
375	6	ASB	ASB	-	A	ASB	ASBF
450	6	AS	ASB	-	-	ASB	ASB
525	6	-	-	-	-	ASB	ASB
600	6	-	ASB	ASBF	-	ASB	ASB

b) **Carrier drains with bed type Z:** Trench types with a concrete bed to be used for determining the pipe type for the specified design group.

c) **Filter Drains**

Pipe Diameter	Trench Option	Specified design Group Number	Vitrified Clay			Precast Concrete			uPVC
				ES	SS	S/L	ES	M	SDR=41
100	Narrow filter drain Type 8	3	/	/	/				/
150	HG	3	/	/	/	/		/	/
225	HG	3	/	/	/	/		/	/
300	HG	3	/	/	/	/		/	/

/ = permitted pipe types

APPENDIX 5/1: DRAINAGE REQUIREMENTS

4. **Pipe Stiffness and Impact Resistance**

a) Ultimate pipe stiffness (STES) shall be in excess of 1400 N/m2 when tested in accordance with BS 4962.

b) Resistance to impact shall comply with BS 4962 except that the striker used in the test shall have a mass of 1kg and a 25mm hemispherical radius.

5. **Pipe Joints**

Pipe joints for surface water drains must be watertight.

Concrete pipes shall have ogee joints unless otherwise specified in Table 1.

6. **Filter Material**

Filter drains shall be backfilled with the material type as shown on HCD Drawing Number F2. For drain Types J and K only Type C filter material shall be used. The finished level of the filter material shall be the finished surface level of the adjacent verge.

All Type B filter material used in filter drains shall crushed rock.

Type C filter material shall be Porous No Fines Concrete to Clause 2603.

7. **Access to Property**

Where inspecting, cleaning or testing of drains requires entry on to non-highway land, the Contractor is to make arrangements with the landowner for access to carry out the work. The Contractor is to give a minimum of 48 hours notice to the landowner and the Authority of his intention to enter the land.

8. **Treatment of Existing Filter Drains**

Filter material of existing filter drains where shown on the Edge Treatment Drawings or listed below shall be treated in accordance with Clause 571.1.

9. **Covers to New Chambers**

a) Covers to manholes shall be double triangular Class D400 to BS EN 124 unless stated otherwise in Table 1.

b) Gully gratings and frames shall be class D400 to BS EN 124 unless stated otherwise in Table 1.

10. **Connections to Existing drains, chambers and channels**

a) Unless otherwise specified in Table 1 all connections to existing drains shall be proprietary saddle, or sleeve fittings of the respective pipe sizes.

b) Connections of 100 dia. UPVC pipe to 150 and 225 dia pipe shall be junction fittings except where the receiving pipe is 300 dia and over when the connection shall be proprietary saddle fittings of the respective pipe sizes. All connections shall be haunched in 150mm concrete mix ST2.

TABLE 1: Appendix 5/1 Schedule of Drainage (To be completed by the Authority with each Site Instruction).

Site No	Location	Description	Length (m)/No	Reinstatement Type	Other Comments

APPENDIX 6/1: REQUIREMENT FOR ACCEPTABILITY AND TESTING OF EARTHWORKS MATERIALS

1. The classification and confirmation of acceptability of the earthworks materials excavated on the site shall be carried out by the Authority.

2. The permitted constituents and required properties for the various classes of earthworks materials to be used in each Site Instruction will be as indicated in Table 6/1 of the Specification and Table 1 to this Appendix read in conjunction.

Table 1 – Appendix 6/1 Schedule of Earthworks Materials (To be completed by the Authority with each Site Instruction).

Material Class	**Property**	**Acceptability**		**Refer to:**
		Lower	**Upper**	

Note (i) Optimum moisture contents shall be determined in accordance with BS1377: Part 4: 1990 using a 2.5 Kg rammer. Material with coarse gravel-sized particles shall be tested in accordance with Paragraph 3.4 of that document; if necessary, coarse particles shall be broken up prior to testing to ensure that the test sample contains not more than 30% by mass of material retained on the 20mm test sieve, in accordance with the requirements of BS1377.

Note (ii) Imported acceptable material shall be Class 1A and provide a minimum CBR of 6% when placed in the works.

Note (iii) Class 6R material shall be the same classification as 6N but exclude waste products from the china clay industry.

Table 1 – Appendix 6/10 Location of Gabion Walling (to be completed by the Authority with each Works Order)

Site No	**Location**	**Requirements**

APPENDIX 6/1: REQUIREMENT FOR ACCEPTABILITY AND TESTING OF EARTHWORKS MATERIALS

3. **Frost Heave**

No material within 450mm of the designed final road surface shall be frost susceptible as defined in TRRL Supplementary Report SR 829, whether pavement, capping, fill material in embankments or insitu material in cuttings.

4. **Moisture Content Tests**

Moisture content of materials shall be determined and tested in accordance with BS1377 Part 2.

5. **Permeability Test (Clause 640)**

The permeability test referred to in Clause 640 shall be the constant head permeability test as described in Chapter 10.6 of the Manual of Soil Laboratory Testing, Volume 2, by K H Head.

APPENDIX 6/3: REQUIREMENT FOR EXCAVATION, DEPOSITION, COMPACTION

1. **Blasting for Excavation** (Clauses 603 and 607) not permitted.

2. **Compaction of Fills** (Clause 612)

   a) **Filter drain material Type B**
   Shall be deposited and compacted in accordance with Clause 505.

   b) **Class 5A fill (topsoil)**
   In addition to the requirements of Clause 618, prior to harrowing, topsoiled areas shall be lightly compacted to the thickness stated in the contract.

APPENDIX 6/8: TOPSOILING, GRASSING AND SEEDING

1. The requirement and location of topsoiling and grass seeding and turfing for each Site Inspection will be shown in Table 1 to this Appendix.

2. Topsoiling thickness shall be 100mm. All topsoiling shall be lightly compacted. The thickness shall be the compacted thickness.

3. In accordance with Clause 618.3 topsoil shall not be excavated from stockpiles which have been exposed to accumulative rainfall exceeding 100mm over the preceding 28 days.

4. All areas to be grassed shall receive Treatment 1. Note application by hydraulic mulch will not be permitted.

5. All grassed areas shall be mown in accordance with Clause 618.10 up to the end of the Maintenance period. Notwithstanding the requirements of Clause 618.10 all grassed areas shall be mown whenever the grass reaches a height of 150mm up to the end of the Maintenance Period subject to a maximum number of 4 mowings.

6. The seed mix detailed in Table 6/5 is not to be used. This shall be replaced by a grass seed mix similar to Johnsons J8 mix at a sowing rate of 28g/m2 unless shown otherwise in Table 1 when the Devon Moorland grass seed mix at 5g/m2 should be used.

Johnson J8 grass seed mix		**Cultivar**
Browntop Bent	10%	Highland
Slender Creeping Red Fescue	15%	Dawson
Slender Creeping Red Fescue	15%	MERLIN
Strong Creeping Red Fescue	25%	RUBY
Hard Fescue	20%	SCALDIS
Smooth Stalked Meadow Grass	15%	BARON

Devon Moorland Grass Seed Mix	
Browntop Bent	10%
Creeping Red Fescue	40%
Hard Fescue	35%
Smooth Stalked Meadow Grass	15%

APPENDIX 6/8: TOPSOILING, GRASSING AND SEEDING

TABLE 1 – Appendix 6/8 Schedule of Topsoiling Grassing and Turfing (To be completed by the Authority with each Works Order).

Site No	Area to be treated M2	Location	Topsoiling	Grass Seeding	Turfing	Notes

APPENDIX 6/10: GROUND ANCHORS, CRIB WALLING AND GABIONS

1. **Gabions**

(i) The locations and requirements for Gabion walling for each Work Order will be shown in Table 1 to this appendix.

(ii) (a) In general, reference to gabions shall be taken to include Reno mattresses.

(b) Gabions shall consist of woven sheet wire boxes of approved module size.

(c) Particular care shall be exercised throughout construction to ensure tightness of mess, well packed filled with minimum voids, and secure lacing. The exposed faces of completed work shall present a neat face and line with vertical sides free from excessive bulges or depressions.

(iii) Mesh wire shall be in accordance with BS1502/1980 heavily galvanised with a zinc coating to BS EN 10244-2:2001 prior to weaving the mesh. Mesh openings shall be hexagonal in shape; nominally 80 x 100mm for gabions and 60 x 80 for Mattresses.

Minimum wire core diameter shall be 2.7mm (Gabions) and 2.2mm (Reno Mattress).

(iv) The wires shall be additionally coated with PVC sheathening grey in colour, of mean wall thickness 0.50mm, giving an average overall diameter 1.0mm greater than the size coated core wire. The PVC shall be capable of resisting the deleterious effects of exposure to ultra violet light, immersion in sea water, normally occurring pollutants and abrasion, when tested for a period not less than 3000 hours in accordance with ASTM Test No. G23-69.

(v) (a) All edges of the mesh shall be reinforced with a 'selvage' wire which shall be not less than 3.4m diameter plus PVC coating.

(b) A lacing or binding wire minimum 2.2mm diameter, plus PVC coating, shall be used to assemble.

(vi) The construction, assembly, and filling of the gabion boxes shall be in accordance with the manufacture/suppliers instructions using stone infill as described in Clause 626(5).

APPENDIX 7/1: PERMITTED PAVEMENT OPTIONS – SHEET 1

1. The locations and pavement requirements for each Site Instruction will be shown in Table 1 to this Appendix.

2. Grid for checking surface levels of pavement courses (Clause 702.4)

Longitudinal dimension:	10 metres
Transverse dimension	Road centre line & channels

3. Surface regularity (Clause 702.7) – Category of road: A

4. Requirements for determination of compaction level (Clause 901.19 and 927.1): By the attained air voids content method as Clause 901.19.AR.

5. Whether measurement of surface texture is required (Clause 921):-

   See Table 1.

6. Whether overbanding to joints is required (Clause 972 AR):-

   See Table 1.

7. BS 594987 (Clause 909, 912, 914, 933, 934):-A.

8. Requirements for hardness, durability and cleanliness of aggregates if different from the requirements of sub-Clause 901.2. — No change

9. Regulating course (Clause 907): — as for pavement courses and materials shown in the following tables.

APPENDIX 7/2: EXCAVATION AND REINSTATEMENT OF EXISTING SURFACES

1. Potholing shall be carried out in accordance with Clause 770AR.

2. The location of potholes to be repaired for each Site Instruction will be shown in Table 1 to this Appendix.

TABLE 1 – Schedule of Potholing Schedule

POTHOLING		
Site No.	**Location of Pothole**	**No of Potholes**

3. Crack sealing shall be carried out in accordance with Clause 771 AR.

4. The location and requirements for crack sealing (overbanding) for each works order will be shown in Table 2 to this Appendix.

TABLE 2 – Appendix 7/2 Crack Sealing Schedule (To be completed by the Authority for each Site Instruction)

Site No.	**Location of Cracks to be Sealed**	**Length**	**SRV of Overband Material**	**Width of Overbanding**

APPENDIX 7/22: REPAIRS TO POTHOLES

General

1 Using a pneumatic or electric Road breaker, the Contractor shall trim the sides of the pothole to form vertical edges. All loose material shall be removed from the pothole and disposed of to the Contractor's tip off site.

2 A tack coat to Clause 944AR shall be applied to all surfaces, which are to receive the fill material.

3 Potholes shall be filled with close graded Asphalt Concrete surface course of 6mm nominal size aggregate approved by the Authority. It shall be laid in accordance with the manufacturer's instructions and with layer thickness that allow it to be fully compacted. Each layer shall be compacted using a mechanical rammer or approved hand rammer.

4. The repair shall be finished level with the adjacent pavement surface and when completed the filled area and adjacent pavement shall be swept and cleared of all detritus and loose material.

APPENDIX 11/1: KERBS, FOOTWAYS AND PAVED AREAS

1. **General**

1.1 Requirements for locations and details of kerbs, footways and paved areas for each Site
Instruction will be shown in Tables 1 and 2 to this Appendix and Standard Details …..

2. **Kerbs, Channels, Edgings**

2.1 **Measurement**

2.1.1 Excavation and disposal shall be deemed to be included in relevant kerb, channel or edging item.

2.1.2 Excavation in Hard Material shall be measured in Series 600.

2.1.3 Any additional depth of concrete bed greater than:

(i) 100mm for kerbs laid on new bed;
(ii) 50mm for kerbs laid on existing bed;
shall be measured as additional concrete for kerbs, channels, edgings.

2.2 **Construction**

2.2.1 Where kerbs or channels are to be constructed against existing footway or carriageway that is not to be reinstated or resurfaced, a hot bitumen joint seal is to be formed. Where directed the edge of the joint is to be saw-cut. Joint and cutting to be included in relevant kerbing item.

2.2.2 Over break in excavation is to be reinstated with insitu concrete mix ST2.

2.2.3 Kerbs, edgings and channels to be relaid shall have bed and backing as appropriate Standard Detail for new kerbs, edgings or channels.

3. **Footways and Paved Area**

3.1 **Insitu Concrete**

3.1.1 The minimum cover to Reinforcement shall be 50mm.

3.1.2 Movement joints shall be formed at 8m intervals or as directed. Joints shall comprise 20mm thick joint filler board to Clause 1015 sealed to a depth of 50mm with semi-dry 4:1 sand/cement mix.

APPENDIX 11/1: KERBS, FOOTWAYS AND PAVED AREAS

3.2 **Paving Flags**

3.2.1 Colour of precast concrete slabs shall be Natural (grey) unless specified otherwise.

3.2.2 Joints shall be kiln dried sand filled unless specified otherwise.

3.3 **Paving Blocks**

3.3.1 Colour of Blocks is to be as specified in Table 2.

3.3.2 The Polished Paver Value (PPV) shall be minimum of 40 for Clay Pavers.

TABLE 1 – Appendix 11/1 Schedule of Kerbing, edging and channel (to be completed by the Authority for each Site Instruction)

Site No	Location	Type of Unit	Straight or Curve	Bed New or Exist	Length or No.	Reinstate-ment Type	Remarks

TABLE 2 – Appendix 11/1 Schedule of Footways and Paved areas (to be completed by the Authority for each Site Instruction)

Site No	Location	Description	Application of Weedkiller	Remarks

APPENDIX 11/70: RESIDUAL WEED-KILLER FOR USE ON FOOTWAYS

NOTE – See Specification Clause 1110AR, residual weedkillers shall be Diuron, dichlobenil or dalapon and dichlobenil.

TO BE COMPLETED BY THE CONTRACTOR for each type of weedkiller he proposes to use (please continue on blank paper if more than three types are proposed).

1.

Trade Name:	
Type:	
Manufacturer:	
Active Ingredients:	
MAFF No:	

2.

Trade Name:	
Type:	
Manufacturer:	
Active Ingredients:	
MAFF No:	

3.

Trade Name:	
Type:	
Manufacturer:	
Active Ingredients:	
MAFF No:	

APPENDIX 12/1: TRAFFIC SIGNS: GENERAL

Requirements for Traffic Signs for each Site Instruction will be shown in Table 1 to this Appendix and as detailed below.

(i) **Details of Foundations**

The tops of new foundations shall be finished flush with the finished ground level.

(ii) **Sign Posts**

Sign posts to be hot dipped galvanised steel, grey plastic coated to BS EN 12899-1:2001.

All posts to be provided with a suitable baseplate and top cover.

(iii) **Fabrication Drawing Requirements and Details Required for Warning and Regulatory Signs**

Details to be supplied to the Authority for approval at least 4 weeks prior to the commencement of fabrication.

(iv) **Requirements for Filling Pockets in Concrete Foundations**

No change.

(v) **Illuminated Signs**

Maintenance of illuminated signs and bollards and remote sign illumination units is not covered by this contract.

APPENDIX 12/1: TRAFFIC SIGNS: GENERAL

TABLE 1 – Appendix 12/1 Requirements for Traffic Signs (To be completed by the Authority for each Works Order).

	Traffic Signs									**Verge Marker Posts**		**Bollards**	
Site No	Location verge/footway carriageway	Sign Diag No	Reflective Class ½ or non reflective	Size/ Shape	Description	No and Dimensions of Posts/On existing	Mounting Height	Size of Foundation per Post	Concrete Mix	Verge Marker Post Std Detail No	No of Marker Posts	Bollards Left/right/ pass both sides	Identification marking

APPENDIX 12/2: TRAFFIC SIGNS: MARKER POSTS

Requirements for verge marker posts for each Site Instruction will be shown in Table 1 to Appendix 12/1.

APPENDIX 12/3: ROAD MARKINGS AND STUDS

Road Markings

Minimum skid resistance value (Clause 1212.5)

Additional Specification:

1. The specification for Road markings shall be the Stanspec 2009 as produced by the Road Safety Markings association, or any subsequent amended versions.

APPENDIX 17/1: CONCRETE – CLASSIFICATION OF MIXES

	MIX REFERENCE 1	2	3	4
Ordinary or Special Concrete (O or S)	O	O	O	O
Class of Concrete (Grade/Max. Agg. Size)	50/20	40/20	30/20	20/20
Minimum Cement Content (kg/m3)	325	325	325	325
Max. Free Water/Cement Ratio	0.45	0.45	0.45	0.45
Required Workability	-	-	-	-
Max. Cement Content (kg/m3)	-	-	-	-
Required Type and Class of Cement	Class 1702.1			
Required Source/Type of Aggregate	-	-	-	-
Required Admixture	-	-	-	-
Air Entrainment Required (Yes/No)	No	No	No	No
Min or Max Temp of Fresh Concrete °C	-	-	-	-
Sampling and Testing	Clause 105 and Note (i) below			
Other requirements	-	-	-	-

Note (i) But not less than 1 sample per pour for strength testing.
(ii) Uniformity of colour is required on the exposed concrete on each structure.
(iii) The Maximum free water/cement ratio shall apply across the full workability range.

APPENDIX 24/1: BRICKWORK, BLOCKWORK AND STONEWORK

1. Particular requirements for Brickwork, Blockwork and Stonework will be submitted to the Contractor with the Site Instruction.

   This will include the extent to which existing materials are to be reused and/or new materials with appropriate sources of supply.

2. Except where otherwise ordered, mortar for brickwork, blockwork and stonework in bridges and structures shall be in accordance with Clause 2404 but particular mixed sources shall be as follows:

   a) Cement mortar shall be a masonry cement: sand mix in the proportions 1:4.

   b) Sand shall comply with BS882: 1992 Table 4, Grade M and obtained from Kingston Minerals, Heathfield, Devon or equal approved source.

   c) Masonry cement shall be “Wallcrete” as manufactured by Blue Circle Cement Co, or equal approved material.