

Area 4 Interim Construction Works Framework (CWF) Specification

Specification
CONTENTS AMENDMENT
SHEET

Amend. No.	Revision No.	Amendments	Initials	Date
00	0	Tender Issue	LP	May 2020

PREAMBLE TO SPECIFICATION

1. The Specification referred to in the Tender 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: Contract-specific Additional, Substitute and Cancelled Clauses, Tables and Figures;
 - (ii) Appendix 0/2: Contract-specific 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 a suffix 'C' in Appendix 0/5 is an alteration originating from the Overseeing Organisation of Scotland, Wales or Northern Ireland. A Cancelled Clause indicated by a suffix 'CR' in Appendix 0/1 is a Contract-specific alteration.
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 0/1 and 0/2 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 Organisation 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 the *Service Manager*.

Where the Specification requires the provision of documentation to the Overseeing Organisation for statutory or type approval such documentation shall be provided to the *Service Manager*.
13. For references to the Contractor, the roles and functions of the Contractor shall be undertaken by the *Service Provider*.
14. If the Specification is used in conjunction with a Contract under which the Contractor is responsible for the design or 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 the *Service Manager*.
 - (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. ***

* Engineer: *Project Manager*: Designer etc as drawn from the Conditions of Contract.

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

*** Construction Requirements/Employer's Requirements.

APPENDIX 0/1: CONTRACT - SPECIFIC ADDITIONAL, SUBSTITUTE AND CANCELLED CLAUSES, TABLES AND FIGURES INCLUDED IN THE CONTRACT

List of Additional Clauses, Tables and Figures

Clause No	Title	Written on Page No
170AR	Security of the Site	6
171AR	Mobile Elevating Work Platforms	6
172AR	Temporary Access Scaffolding	7
173AR	Statutory Undertakers Special Requirements	9
1770AR	General Requirements	9
1771AR	Removal of Concrete in Areas to be Repaired	9
1772AR	Surface Preparation	11
1773AR	Concrete Repairs	12
1774AR	Foamed Concrete Fill to Structures	23
1780AR	Concrete Testing – General Requirements	23
1781AR	Removal of Cores from Concrete Structures	24
1782AR	Cement Content Testing	24
1783AR	Sampling Concrete for Chlorides by Percussive Drilling	24
1784AR	Chloride Content Testing	25
1785AR	Half Cell Testing	25
1786AR	Cover meter Survey	26
1787AR	Carbonation Testing	26
1788AR	Acceptable Companies for Testing Work	26
2070AR	Replacement of Bridge Deck Waterproofing	26
2370AR	Replacement and Maintenance of Bridge Deck Expansion Joints	28
2371AR	Asphaltic Plug Joints	28
2470AR	Repointing of Brickwork	29

List of Substitute Clauses, Tables and Figures

Clause No. (etc)	Title	Written on Page No. following
None		

List of Cancelled Clauses, Tables and Figures

Clause No. (etc)	Title
None	

SERIES 100 PRELIMINARIES

170 AR Security of the Site

1. The Contractor shall take all reasonable measures to prevent trespass or unauthorised access to the works and theft from or malicious damage to the works. The Contractor shall report details of any breach of security measures to the Overseeing Organisation.

The report shall initially be oral immediately on becoming aware of an incident. Written confirmation of all such oral reports giving date, time and action taken shall be provided to the Overseeing Organisation within 24 hours after the initial oral report of any incident. The Contractor shall maintain a log of all breaches of security which shall be available to the Overseeing Organisation on request.

2. The level and modes of security provision shall be in accordance with Appendix 1/71. The security cover shall be provided 168 hours per week for the period defined in Appendix 1/71.

3. The Contractor shall maintain a register of both personnel working on the site and visitors to the site. This register shall be available to the Overseeing Organisation on request. The Contractor shall provide his personnel, including those of sub-contractors, personnel of other contractors and personnel of the Overseeing Organisation with suitable security passes which shall include photographs. Security passes shall be carried at all times while on the site and shall be made available for inspection when so requested. The Contractor shall provide visitors with temporary passes. Visitors shall only enter the site when in possession of a temporary pass and shall at all times be accompanied by a person holding a security pass.

171 AR Mobile Elevating Work Platforms

1. Where the Contractor utilises Mobile Elevating Work Platforms (MEWPs) to provide access to the Works for any purpose, he shall comply with the requirements of this Clause.

2. MEWPs shall comply with the requirements of BS EN280:2001 and with the codes of practice and other requirements listed in Appendix 1/71. Further, when required to be used on or adjacent to the highway, each MEWP shall comply with the requirements of Appendix 1/17.

3. Operators of MEWPs shall wear protective clothing and equipment in accordance with Appendix 1/17.

4. Where specified in Appendix 1/3 MEWPs shall be equipped with a means of communication for the Contractor's use which shall be fully compatible with the Overseeing Organisation's system and shall operate on the same frequency. Such equipment shall be made available to the Overseeing Organisation when so requested.

172 AR Temporary Access Scaffolding

1. All scaffolding provided shall comply with the requirements of the following:
 - (i) Common Scaffold – BS12811 – 1 :2003;
 - (ii) Suspended Scaffold – BS 5974;
 - (iii) Special Scaffold Structures – BS 12811 – 1 :2003
2. Scaffolding work shall be undertaken under the immediate supervision of a competent person with adequate experience of this type of work.
3. A method statement describing the proposed methods of access and sheeting shall be submitted by the Contractor, in writing, at least 7 days before it is programmed to be used. When the scaffold is complete, certification stating the time and date the scaffold is ready for use shall be maintained.
4. The imposed load adopted in the calculation shall be not less than 2.0kN.m². Wind loading shall also be considered.
5. Full details of the safe working load shall be attached to the scaffolding giving details of the correct distribution of personnel, plant and materials and the allowable depth of debris.
6. If suspended access scaffolding supported on the Temporary Support Steelwork has been included by the Contractor in his proposed methods for executing the Works, it shall be in accordance with sub-Clause 1870AR.10.
7. The elevation area to be used in calculating the horizontal transverse wind force on the temporary access scaffolding shall be the total length of the access scaffolding multiplied by its overall height.
8. The Contractor shall be responsible for the design of all temporary access scaffolding where it overhangs any public access and or private property and for obtaining 'Technical Approval' (TA) by completing the 'Approval In Principle' (AIP) document in accordance with 'The Department of Transport, Design Manual for Roads and Bridges, Standards – Bridges and Structures BD 2/05'. Any 'Departures from Standard' that may be required should be detailed on the standard form and attached to this AIP. Examples of a partially completed AIP and a Departure from Standard form are included in Appendix 1/72.
9. On full completion of all parts of the AIP which are shown "To be completed by the Contractor" to the agreement of the Overseeing Organisation, then the Contractor shall submit the agreed AIP and its attachments to the Overseeing Organisation. The Overseeing Organisation will then check for compliance with the Contract scheme, sign and issue the AIP to the TA Authority (TAA). The Contractor shall allow in his programme 5 full working weeks from receipt by the Overseeing Organisation of the agreed AIP and Departures from Standard for the TAA to approve and sign these documents.

If there are no 'Departures from Standard' required for the design of the temporary access scaffolding, the time period for approval may be reduced to 3 full working weeks.
10. On obtaining the approved and signed AIP document from the TAA, the Contractor shall commence the detailed design and drawings.
11. The Contractor shall only submit to his checking team (as stated within the approved AIP) a full set of detailed drawings prepared by the design team, i.e. no design calculations are to be passed to the checking team. The checking team is then to carryout a 'Category II' level of check as defined in BD 2/05Part 1. The checking team is to carry out the check independently, with only the necessary consultation and will produce their own separate design calculations.

The check team will not be required to submit the detailed drawings or their design calculations with the 'Check Certificate D' but must contain a schedule of such drawings.

12. A 'Design Certificate C' and a 'Check Certificate D' must be completed and signed by the respective team leaders in accordance with BD 2/05 Part 1. Both certificates must each be countersigned by a director of the Contractor (or a representative who has the written authority to sign on behalf of the Contractor). The certificates are to generally follow the form shown in the examples given in Appendix 1/72.

The Contractor should note that the adequacy of the whole and all parts of the structure including any foundation bases, at all stages of installation, will require being underwritten.

In the event that a scaffolding sub-contractor is employed by the Contractor and the certificates are completed by this sub-contractor, they must be countersigned by a director of the employing Contractor, as detailed above.

The design and check engineers shall be appropriately qualified, that is Chartered, or of equivalent professional status, civil or structural, and the scaffolding sub-contractor shall be a member of the National Association of Scaffolding Contractors or otherwise produce evidence of competence and experience.

13. The Contractor shall submit the original signed documents to the Overseeing Organisation, who will pass these onto the TAA, as follows:-

- (i) Design Certificate C
- (ii) Check Certificate D
- (iii) Additional Departures from Standard (if required)

14. If during the design or at the checking stage any further Departures from Standard are required, a revised AIP shall be submitted, to include these departures. The Contractor shall allow in his programme a minimum of 4 full working weeks from receipt by the Overseeing Organisation of any revised AIP and the Design and Check Certificates, for the TAA to approve and sign all these documents.

If there are no additional Departures from Standard then no revision to the AIP is required and only the two certificates are to be submitted to the Overseeing Organisation, who will issue them to the TAA. The Contractor shall allow in his programme a minimum of 2 full working weeks from receipt by the Overseeing Organisation of the Certificates for the TAA to approve and sign these documents.

15. No work on site shall commence until the TAA has approved and signed the Design and Check Certificates.

16. In addition to the above, the Contractor shall submit detailed drawings, design calculations and a fully detailed method statement for the installation and removal of all temporary access scaffolding, to the Overseeing Organisation for approval 3 full working weeks before work commences on site.

173AR Statutory Undertakers Special Requirements

1. Statutory Undertakers special requirements can be found in Annex 1 of the Specification.

SERIES 1700 STRUCTURAL CONCRETE

1770AR General Requirements

Storage of Materials

- 1 Cement and aggregates shall be stored in accordance with Clause 1706.
- 2 All proprietary materials shall be stored in a dry weather-proof lock up store free from extremes of cold or heat in accordance with the manufacturer's instructions.
- 3 The materials shall not be removed from the store for use until immediately prior to mixing.

Access to Repair Areas for Inspection

- 4 The Contractor shall allow the Overseeing Organisation a minimum period of 3 hours of unhindered access to each area before work commences to allow time to inspect and test the concrete and identify repair areas. The Contractor shall give at least 24 hours notice before inspection is required.
- 5 As repair work proceeds, the Overseeing Organisation will continue to carry out inspections and may undertake further testing to establish the limits of the concrete to be removed.

1771AR Removal of Concrete in Areas to be Repaired

Requirements for the Removal of Concrete

- 1 The Contractor shall cut out and remove concrete from areas as instructed and specifically identified following inspection and testing.
- 2 All delaminated concrete shall be removed from the area, and any additional contaminated concrete shown on drawings prepared by the Overseeing Organisation or otherwise instructed. Where corroded reinforcement is identified by the Overseeing Organisation, the area of concrete removed shall be extended to expose 100 mm of un-corroded reinforcement.
- 3 Before cutting out, the Contractor shall determine the position and depth of the reinforcement. The perimeter of the concrete to be removed shall be saw cut perpendicularly to the face of the concrete to a depth of not less than 15 mm or to within 10 mm of the reinforcement, whichever is the lesser.
- 4 At the upper limits of repairs to be made by repair concrete, sloping cuts may be used to avoid the entrapment of air when the concrete is poured.
- 5 The saw cut edges shall be abraded by grit blasting or equivalent methods.
- 6 The concrete shall be removed by the use of suitable hand or mechanical tools or high pressure water jetting.

7 Where concrete is removed by high pressure water jetting a lightweight electric demolition hammer may be used for final trimming of the area broken out.

8 Over break of concrete shall be made good using a concrete repair system selected from Clause 1773AR. Reinforcement damaged during concrete removal shall be made good. Where considered necessary by the Overseeing Organisation existing reinforcement which has corroded or is otherwise damaged shall be lapped or where permitted, welded onto existing reinforcement. Where permitted by Appendix 17/4, welding shall be in accordance with Clause 1717. All loose reinforcement shall be securely tied with stainless steel tying wire.

9 Waste material from the above operations shall be removed off Site. The Site shall be kept free of debris or standing water arising from the jetting activities.

10 On completion of removal of concrete all concrete surfaces and exposed reinforcement which will be in contact with repair materials shall be prepared in accordance with Clause 1772AR.

Special Requirements for use of High Pressure Water Jetting (HPWJ)

11 The use of high pressure water jetting plant and operators in the Works shall be subject to approval trials as detailed in Clause 1772AR. High pressure water jetting shall not be used in the Works until the Overseeing Organisation has given approval in writing.

12 Concrete removal by HPWJ shall be subject to the following requirements:

- (i) The work is to be undertaken by a reputable sub-contractor who is a member of the Water Jetting Association. All working practices and equipment shall be in accordance with the “Code of Practice for the use of HPWJ Equipment” 2008 / 2009 (Blue Code) Edition as published by the Water Jetting Association, Thames Innovation Centre, 2 Veridion Way, Erith, Kent DA18 4AL (Tel 020 8320 1090) www.waterjetting.org.uk
- (ii) In areas where concrete surface contamination may interfere with preparation for concrete removal, then prior to any preparation work, areas affected shall be cleaned to remove all dirt and other contaminants, previous coatings, latency, paint, algae, moss, lichens, plant growths etc. If the proposed method of surface cleaning is high-pressure water jetting, then a correctly filtered oil free airline shall be used. At all times, the cleaning operations shall be directed away from other persons. Where this is not practicable, tenting shall be provided to contain the operation. The drainage of the area of the cleaning shall be kept free of silt and debris which may lead to a build up of water.
- (iii) Interfaces between external existing faces and concrete to be removed by HPWJ shall be formed by disc cutting in accordance with clause 1771.3 AR.
- (iv) Following removal of concrete the surface shall be left to dry for 24 hours prior to cleaning of any remaining debris by grit and air blasting.
- (v) Enclosures are to be provided to give complete protection from flying debris and the effects of the water jet to all workers and the public above and below the deck surface level. Full details of the enclosure are to be submitted with the Contractors’ Tender. The proposed enclosure shall provide controlled safe access to the Overseeing Organisations’ staff for frequent inspection and monitoring.
- (vi) All hoses are to be adequately protected from external damage and shielded to protect personnel and the public in the event of a puncture. These details should also be included by the Contractor with his tender.
- (vii) The Contractor shall provide supervision at all times of HPWJ by appropriately experienced staff familiar with the techniques of HPWJ, in particular, its use at the pressures proposed in relation to concrete removal.
- (viii) With Contract Data Part Two from the Scheme Information the Contractor shall submit a method statement including but not limited to:

- Details demonstrating competency of sub-contractor including previous experience, references and CV's of key staff.
 - Details of the proposed cutting operation for HPWJ indicating the areas, direction and orientation of the cutting, together with measures to be taken to control the rate of concrete removal.
 - Details of the type and performance and location of the pump equipment for HPWJ, together with nozzle type, diameter, approximate power output of the jet and estimated operating force.
 - Details of all screening to hoses and HPWJ operations.
 - Details of water discharge control including any storage or drainage measures.
 - Emergency plan.
- (ix) The Contractor shall locate and obtain a potable supply of water for use in the HPWJ operations.
- (x) The Contractor shall construct dams and take all other measures necessary to prevent debris entering public and private drainage systems. During concrete removal, debris shall be removed off site daily unless otherwise agreed with the Overseeing Organisation.
- The discharge of water as a result of High Pressure Water Jetting activities shall be carefully controlled, and water shall not be allowed to outfall onto live traffic lanes.

1772AR Surface Preparation

General Requirements

- 1 Blast Cleaning** - The Contractor shall ensure that the grade and particle shape of abrasives are adequate to achieve the appropriate standard of cleanliness. Non-metallic abrasives shall not be recycled.
- 2 High Pressure Water Jetting** - The Contractor shall carry out trials over one square metre of concrete surface to show that the equipment and method proposed will achieve the appropriate standard of surface preparation.
- 3 Water for Cleaning** - Only water which is of potable use shall be used for cleaning and rinsing.

Preparation of Surfaces of Reinforcement

- 4 Standard of reinforcement cleanliness** shall be similar to SA 2 1/2 in accordance with BS EN ISO 8501-1
- 5 Method:**
 - (i) Blast cleaning using dry air/abrasive system;
or
 - (ii) Wet blast cleaning using a low pressure air/water/abrasive system. The equipment shall not allow the air/water pressure to exceed 14 bar and shall incorporate a metering device to allow the abrasive quantity introduced to be adjusted from zero to 14 bar;
 - (iii) Within an hour of cleaning the treated reinforcement shall be pressure washed with clean water.

Preparation of Surfaces of Concrete

- 6** Prior to placing new concrete in the repair areas, the concrete substrate shall be pre-soaked for a minimum period of 4 hours, or two hours if the concrete has been removed by hydro-demolition within the previous 2 hours. The maximum period allowed between completion of wetting and

placement of new repair material shall be 1 hour, and wetted surface shall be saturated surface dry with all standing water removed.

7. Bonding agents shall not be permitted.

Procedure Trials

8 The Contractor shall remove, cut back and prepare the surface of an area of one square metre of concrete to be repaired as a trial of the methods proposed for carrying out the Works. Further work shall not proceed until those methods have been approved by the Overseeing Organisation.

1773AR Concrete Repairs

General

1 Concrete repairs shall be carried out using either normal flow concrete, proprietary repair mortar, high-flow repair concrete, proprietary sprayed concrete, or a proprietary repair system proposed by the Contractor and approved by the Overseeing Organisation. Resin injection of cracks shall be carried out as specified.

Normal Flow Concrete

2 Repair concrete shall be a designed mix for special structural concrete as defined in Clauses 1701 and 1705.

3 Cement content shall be not less than 400 kg/m³.

4 Aggregate size shall be less than 10 mm and the free water/cement ratio shall not be greater than 0.4.

5 Alkali - silica reaction shall be controlled as defined in Clause 1704.

Repairs Using Proprietary Repair Mortar

6 Repair mortar shall be used where repairs are less than 1 m² in area, or repair depth is less than 30 mm, and for reinstating intrusive survey holes.

7 Materials:

(i) Pre-batched, shrinkage compensated polymer modified cementitious mortars shall be used;

(ii) The free water/cement ratio shall be not greater than 0.4;

(iii) The maximum aggregate grain size in the mortar shall be suitable for the depths of repair required;

(iv) Water required to mix repair mortars shall comply with BS EN 1008;

(v) The cement content shall be not less than 400 kg/m³;

(vi) The total chloride content of the materials shall not exceed the appropriate limit given in Table 17/1 of Clause 1704. Calcium chloride or admixtures containing chloride salts shall not be used;

(vii) The specified minimum 28 day strength of the mortar shall be 40 N/mm² determined as described in sub-Clause 18 of this Clause;

(viii) Alkali-silica reaction shall be controlled as specified in Clause 1704.

8 Delivery and Storage of Material:

(i) The Contractor shall supply with each batch of the material delivered to Site, certificates furnished by the supplier stating:

- (a) the polymer used;
- (b) evidence that the chloride contents are less than specified in sub-Clause 7 (vi) above;
- (c) the content of sodium oxide equivalent in the mortar;
- (d) maximum shelf life.

(ii) The material shall be stored in a dry environment free from extremes of cold and heat;

(iii) The materials shall not be removed from the store for use in the Works until immediately prior to mixing.

9 Placing Repair Mortar:

(i) The repair shall be built up in layers in accordance with the repair mortar manufacturer's instructions. The surface of each layer, except the final layer shall be scored to provide a key for the next layer;

(ii) The repair mortar shall be suitable for the purpose intended i.e. for soffits or vertical surfaces as appropriate;

(iii) Repair mortar shall not be applied when the temperature of the surface to be repaired falls below 5°C;

(iv) The material shall be incorporated in the Works within 1 hour of mixing or such lesser period as stated by the manufacturer;

(v) Repair mortar shall be cured in accordance with sub-Clause 1710.5 and the manufacturer's instructions. During the curing period the temperatures of the repair mortar shall be maintained at or above 5°C, by artificial means if necessary.

10 Surface Finish to Repair Mortar:

(i) Repair mortar shall be float finished to produce a dense, smooth uniform surface free from float marks to the specified line and level.

Repairs Using High-Flow Repair Concrete

11 Proprietary high-flow repair concrete shall be used for repairs greater than 1 m² in area and for repair depth greater than 30 mm, or as otherwise approved.

12 Materials:

(i) Cement shall be Portland Cement CEM-1 and shall comply with Clause 1702 and BS EN 197:2000;

(ii) Cement content shall be not less than 400 kg/m³ or more than 550 kg/m³;

(iii) Alkali-silica reaction shall be controlled as specified in Clause 1704. The concrete shall contain non-reactive aggregates with an equivalent sodium oxide content not exceeding 3 kg in any cubic metre of concrete;

(iv) The total chloride ion content of the materials shall not exceed 0.1% of the weight of cement. Any chloride or admixtures containing chloride salts shall not be used;

(v) Aggregate shall be well graded with the maximum size not exceeding 8 mm, except when pumping is to be employed when the maximum size shall not exceed 6 mm, and shall comply with sub-Clause 1702.2;

(vi) Proprietary material shall be of such composition and grading that when mixed with water a flow-able concrete is produced which will flow freely into the confined spaces to be filled and shall not be prone to segregation, bleeding or cracking in either the plastic or hardened state;

(vii) Combinations and additions may comprise pulverised fuel ash, ground granulated blast furnace slag, micro-silica, plasticizers, aggregate suspension agents and shrinkage compensating agents. Calcium chloride or admixtures containing chloride salts shall not be used;

(viii) Micro-silica content shall not exceed 5% of the mass of the cement. Micro-silica shall comply with Table 17/70.

TABLE 17/70: Micro-silica Content

Item	Limit (by mass)
Silica content (SiO ₂)	Min. 85%
Alkali content (Na ₂ O)	Max. 2%
Carbon	Max. 2%
Proportion passing 50 micron sieve	Min. 99%

13 Water shall comply with BS EN 1008.

14 The specified minimum 28 day strength of the concrete shall be 40 N/mm² and the maximum free water/cement ratio shall not exceed 0.4.

15 Delivery and Storage of Material:

- (i) Records shall be kept of each batch of material delivered to Site and shall include:
 - (a) formulator's name and address;
 - (b) formulator's agent's name and address where applicable;
 - (c) material identification;
 - (d) batch reference number, size of batch and number of containers in the delivery;
 - (e) date of manufacture;
 - (f) evidence that the chloride contents are less than specified in sub-Clause 7 (vi) of this Clause;
 - (g) details of the significant rock components contained in the aggregates;

- (h) cement content;
- (i) combinations and additions used;
- (j) the equivalent sodium oxide content.
- (ii) Containers shall be damp proof and readily emptied of their contents;
- (iii) Containers shall be marked with the following information:
 - (a) material identification;
 - (b) batch reference number;
 - (c) formulator's name;
 - (d) net weight;
 - (e) any warnings or precautions concerning the contents.
- (iv) The material shall be stored in a dry environment free from extremes of cold and heat;
- (v) Material shall not be older than 3 months or lesser period specified by the formulator, when incorporated in the Works;
- (vi) The materials shall not be removed from the store for use in the Works until immediately prior to mixing.

16 Formwork, Site Mixing, Placing and Curing:

- (i) Formwork shall be Class F3 to sub-Clause 1708.4 with the perimeter of the repair well sealed to prevent grout loss. Release agents shall be compatible with proposed surface treatments;
- (ii) Mixing in an approved forced action paddle mixer and placing shall be carried out strictly in accordance with the formulator's written instructions together with the following additional conditions:
 - (a) The free water cement ratio shall not exceed 0.4. The water content shall be determined during Approval Tests and maintained for Batch Tests, Works Tests and in the Works within $\pm 2\%$ of the agreed content;
 - (b) No extra water shall be added after the original mixing;
 - (c) The material shall be incorporated in the Works within 20 minutes of completion of mixing, or such lesser period as stated by the formulator. The concrete shall be continuously agitated after the mixing and before placing;
 - (d) The material shall not be mixed or placed in the Works at ambient temperatures lower than 5°C, or where the surface temperature of the concrete in the repair void is less than 5°C;
 - (e) The concrete when placed shall have a temperature of not less than 5°C and not more than 20°C;

(f) The surface temperature of the concrete shall be maintained at not less than 5°C until the concrete reaches a strength of 10 N/mm² as determined by tests on cubes cured under similar conditions to the structural concrete in an approved manner. Heat shall not be applied directly to any concrete;

(g) Repair concrete shall not be placed against other concrete which has been in position for more than 30 minutes unless a construction joint is formed in accordance with Clause 1710. In addition the joint surface shall be saturated for a minimum of 2 hours before concrete is placed against it. When repair concrete has been in place for 4 hours, no further concrete shall be placed against it for a further 20 hours;

(h) Vibration shall not be used. The side shutters shall be tapped lightly with a hammer to expel surface air voids;

(iii) Immediately after placing and for 14 days thereafter, concrete shall be protected against harmful effects of weather including rain, rapid temperature changes, frost and from drying out. Subject to approval, impregnation may be carried out in accordance with the manufacturers instructions and not before 7 days as described in Clause 1709. Curing membranes shall not be used;

(iv) When the mix proportions have been approved by the Overseeing Organisation no variations shall be made in the manufacture, supply, mix proportions or method of mixing of the material.

17 Approval Tests:

(i) Before work commences on the Site all properties of the proposed high-flow repair concrete shall be demonstrated by the Contractor and the formulator's representative by carrying out tests specified below in a UKAS accredited laboratory. Records shall be maintained of all tests;

(ii) The composition of the high flow concrete including the source of water, the mix proportions and the method of mixing shall be the same as that proposed for use in the Works. The composition shall not be varied throughout the course of the tests and the material shall be obtained from the same batch;

(iii) The tests fall into two categories, flow ability and compressive strength;

(iv) The Flow ability Tests shall demonstrate:

(a) flow characteristics in a trough at 5°C and 20°C, as specified in Note 1 below;

(b) flow characteristics in a simulated soffit repair at 5°C and 20°C, as specified in Note 2 below.

Note 1: The flow characteristics of the concrete in a trough shall be assessed. For each test the concrete and trough shall be at the specified temperature. The funnel of the apparatus shall be fitted with a rubber bung and charged with 6 litres of concrete. On release of the bung the concrete shall flow along the trough and the length of the flow along the trough shall be measured. A test shall consist of three readings; the flow requirements shall be deemed to be satisfied if none of the readings is below 750 mm in 30 seconds, without signs of segregation or bleeding.

Note 2: The flow characteristics of the concrete in a simulated soffit repair shall be tested in accordance with BD 27/86. For each test the concrete and apparatus shall be at the specified temperature. The concrete shall be poured in one

operation into the supply tube until the level of the concrete has reached 100 mm above the underside of the top plate. After the concrete has set the specimen shall be removed from the apparatus and sawn into two parts and the sawn concrete surfaces shall be examined. The concrete shall be homogeneous, free from excessive air holes, voids, segregation and other defects and shall completely fill the simulated repair.

18 Compressive Strength Tests:

- (i) Compressive strength tests shall be carried out to determine the compressive strength of the concrete at 5°C and 20°C;
- (ii) Test cubes shall be made in 100 mm metal moulds to BS EN 12390 -1:2000. The moulds shall be carefully filled by pouring concrete through a funnel to produce void free specimens. There shall be no compaction. The cubes shall be cured in accordance with BS EN 12390-1 2009. Testing shall be carried out in accordance with BS EN 12390-3 2009
- (iii) The specified minimum strength shall be established using a set of three cubes. The requirement shall be satisfied if none of the compressive strengths obtained is lower than the specified value, and the difference between the highest and lowest values is not more than 20% of the average.

19 Batch Acceptance Tests

Each batch of material delivered to the Site shall be tested as follows:

- (i) the material shall be taken at random from one or more containers from the same batch;
- (ii) flow trough tests shall be carried out as specified in Note 1 of sub-Clause 17 of this Clause at 20°C;
- (iii) compressive strength tests shall be carried out as specified in sub-Clause 18 of this Clause at 20°C.

20 Works Tests:

- (i) Works tests shall be carried out to monitor:
 - (a) flow ability;
 - (b) compressive strength.
- (ii) The flow ability of a sample of fresh concrete shall be determined in a trough, in accordance with sub-Clause 17 Note 1;
- (iii) The gain in strength of the repair concrete shall be monitored by testing cubes cured alongside the repaired areas at ambient temperature;
- (iv) For each days production of repair concrete six 100 mm cubes shall be made in accordance with sub-Clause 18 of this Clause. The cubes shall be cured for 24 hours in the moulds with the top surfaces covered by polythene sheets. After 24 hours the cubes shall be stripped and placed in polythene bags which shall be sealed. The cubes shall continue to be stored alongside the repaired areas throughout the curing period until required for testing. The cubes shall be crushed at times determined by the Contractor but at least 2 cubes shall be retained to be tested at 28 days.

Repairs Using Proprietary Sprayed Concrete

21 Materials:

- (i) The proprietary material shall be pre-weighed and pre-mixed at a location off Site approved by the Overseeing Organisation. Such approval will require demonstration that adequate quality control will be maintained at all times;
- (ii) Cement shall comply with Clause 1702;
- (iii) Alkali-silica reaction shall be controlled as specified in Clause 1704;
- (iv) The total chloride content of the materials shall not exceed the appropriate limit given in Table 17/1 of Clause 1704. Any chloride or admixtures containing chloride salts as defined by sub-Clause 1704.5 shall not be used;
- (v) Aggregate shall be well graded with the maximum size not exceeding 3 mm and shall comply with sub-Clause 1702.2;
- (vi) Combinations and additions may comprise pulverised fuel ash, ground granulated blast furnace slag, micro-silica and plasticizers. Calcium chloride or admixtures containing chloride salts and expansion agents shall not be used;
- (vii) The maximum sulphate content shall comply with sub-Clause 1704.5;
- (viii) Material shall be capable of being applied to a thickness of 100 mm without the requirement for additional mesh reinforcement or fibres. Once placed it shall be capable of being profiled and trowel finished (to the equivalent of formed Class F2) without detrimental effects.

22 Performance Characteristics:

The proprietary material shall have performance characteristics as detailed in Table 17/71, which are to be verified by an independent testing authority.

TABLE 17/71: Performance Characteristics

TEST	PERFORMANCE
Adhesion to concrete substrate	>2.0 N/mm ²
Characteristic strength of cores (28 days)	40 N/mm ²
Tensile splitting strength (28 days)	>2.4 N/mm ²
Static Modulus of elasticity	27000± 3000 N/mm ²
Shrinkage	<0.002 %
Coefficient of Thermal Expansion	8 to 12 x 10 ⁻⁶ /°C
Coefficient of Chloride Ion Diffusion	<700 x 10 ⁻¹⁵ m ² /S

23 Delivery and Storage of Material:

- (i) Records shall be kept of each batch of material delivered to the Site and shall include:
 - (a) formulator's name and address;

- (b) formulator's agent's name and address where applicable;
- (c) batch reference number, size of batch and number of containers in the delivery;
- (d) date of manufacture;
- (e) evidence that the chloride contents are less than specified in sub-Clause 7 (vi) of this Clause;
- (f) details of the significant rock components contained in the aggregates;
- (g) cement content;
- (h) additives used;
- (i) the sodium oxide equivalent content.
- (ii) Containers shall be damp proof and readily emptied of their contents;
- (iii) Containers shall be marked with the following information:
 - (a) material identification;
 - (b) batch reference number;
 - (c) formulator's name;
 - (d) net weight;
 - (e) any warnings or precautions concerning the contents.
- (iv) The material shall be stored in a dry environment free from extremes of cold and heat;
- (v) Material shall not be older than 3 months or lesser period specified by the formulator, when incorporated in the Works;
- (vi) The materials shall not be removed from the store for use in the Works until immediately prior to mixing.

24 Trial Mixes:

Practical tests may be required on the Site by constructing test panels to confirm the suitability of the mix for the Works. In these tests, the type of plant used for mixing and placing and the finished face to the panel shall be similar in all respects to those intended for use in the Works.

25 Surface Preparation for Sprayed Concrete:

- (i) Concrete surfaces which are to receive sprayed concrete shall be thoroughly cleaned and roughened by grit blasting or other approved means;
- (ii) Immediately prior to spray concreting all the surfaces to be sprayed shall be thoroughly cleaned and wetted with a strong blast of oil-free air and water. Details of pre-wetting are given in clause 1772.6AR.

26 Outline Definition:

- (i) The outline of the finished sprayed concrete shall be defined by screed boards, guide wires or other approved means;
- (ii) Guide wires shall be installed tight and true to line and in such a manner that they may be easily tightened.

27 Mixing Sprayed Concrete:

- (i) Sprayed concrete shall be mixed in a batch type mixer complying with the requirements of BS 1305 except that the water shall be delivered direct to the nozzle. The delivery equipment shall be capable of delivering a continuous even stream of uniformly mixed material to the nozzle. Water supply at the nozzle shall be maintained at a uniform pressure sufficient to ensure adequate hydration at all times. The delivery equipment and nozzle shall be thoroughly cleaned and inspected at the end of each day and parts replaced as required;
- (ii) The temperature of water and cement when added to the mix shall not exceed 60°C and 65°C respectively;
- (iii) Water used in sprayed concrete shall comply with sub-Clause 1702.3.

28 Reinforcement:

Welded wire mesh fabric reinforcement shall be fixed to prepared surfaces and shall be carefully bent to follow the shape of the members, and held in position by anchors spaced at not less than 2 per m². The fabric shall be spaced at not less than 25 mm from the finished surface of the concrete.

29 Transport and Placing Sprayed Concrete:

- (i) No concrete shall be sprayed in air temperatures less than 5°C or onto a surface temperature less than 5°C. Surfaces shall be free from standing water;
- (ii) Sprayed concrete shall emerge from the nozzle in a steady uninterrupted flow and an uninterrupted supply of compressed air shall be provided to maintain adequate nozzle velocity. Should the flow become intermittent the nozzle shall be directed away from the work until the flow again becomes uniform;
- (iii) Sprayed concrete shall be applied under sufficient pressure so as to give a dense and homogeneous covering to the surface in one or more layers of a thickness compatible with the mix design, constituents, position of reinforcement, and plane of application to ensure the placed concrete does not slump or sag;
- (iv) Adequate precautions shall be taken to ensure that sprayed concrete rebound is not incorporated in the finished work and that any previously deposited hardened rebound which may prevent a proper bond or encasement is removed from reinforcement.;
- (v) Adequate protection shall be given to the nozzle and application surface during high winds;
- (vi) The final coat shall be hand screeded to a Class U3 finish using a wooden float in accordance with sub-Clause 1708.4, unless otherwise indicated on the drawings or instructed by the Overseeing Organisation;
- (vii) The nozzle man shall hold a current Certificate of Competence in spray concrete, issued by the Sprayed Concrete Association. A copy of the certificate and details of their experience shall be submitted to the Project Manager for approval before commencement of the work.

30 Fibre Reinforced Sprayed Concrete:

- (i) The weight of steel and/or composite fibres shall not exceed 5% by weight of the combined weight of cement and aggregate. Fibres shall be added to the mix in such a manner that the fibres are evenly distributed and not bent. Procedure trials shall be undertaken to demonstrate that the proposed methods can achieve the requirements of this sub-Clause;
- (ii) Unless otherwise stated in the Contract a final 15 mm thick coat of un-reinforced sprayed concrete shall be applied over the whole exposed surface to cover exposed fibres;
- (iii) The gun and nozzle shall be electrically earthed.

31 Construction Joints:

Construction joints in sprayed concrete shall be tapered at approximately 30 degrees or cut back square to the reinforcement and then tapered at 30 degrees, unless otherwise specified. The construction joint shall be thoroughly cleaned, all laitance and loose material removed and the surface wetted using a strong blast of air and water, prior to the placement of adjacent sprayed concrete.

32 Curing of Sprayed Concrete:

- (i) Freshly sprayed concrete shall be protected from rain or water until the surface is sufficiently hard to resist damage;
- (ii) Immediately after placing and for 14 days thereafter sprayed concrete shall be protected against harmful effects of weather including rain, rapid temperature changes, frost and from drying out. Curing membranes shall not be used;
- (iii) Where required, impregnation in accordance with Clause 1709 may be carried out after 7 days.

33 Testing of Sprayed Concrete:

- (i) If instructed by the Overseeing Organisation, sprayed concrete test panels shall be made with dimensions 750 mm x 750 mm x 100 mm thick and formed in the same location and same plane as the Works. The test panels shall be marked, cured, cored and tested in compression in accordance with BS 1881. They shall be tested in a UKAS accredited laboratory. Records shall be maintained of all tests.
- (ii) Routine tests may also be required on the finished sprayed concrete. These will consist of taking 25 mm or 100 mm dia. cores from the finished sprayed concrete and testing them in the same manner as cores taken from the test panels, carrying out non-destructive tests by means of a 'Schmidt' hammer or 'Windsor Probe' to determine compressive strength and testing for bond by the use of a hand hammer.

Resin Injection Repairs

34 Preparation of Surfaces Around Cracks:

- (i) The concrete surface at least 50 mm either side of the crack shall be dry blast cleaned to a sound surface free from dirt, moss, salt staining and loose concrete. The full extent of the crack shall be found and the cleaned area shall extend 50 mm beyond the end of the crack or until the crack becomes too narrow to warrant resin injection;
- (ii) Where algae or other bacterial growth emanates from the crack it shall be removed by scrubbing with bactericide and rinsing with clean water. Health and safety precautions appropriate to the bactericide cleaning agent used shall be adopted, including those

recommended by the manufacturers. Measures shall be taken to ensure that any adjacent water course is not contaminated, and that run-off is collected and disposed of in a safe manner.

35 Moisture in Cracks:

- (i) Where the moisture level in the crack to be resin injected is unacceptably high, as agreed with the Overseeing Organisation, the crack shall be blown through with dry hot air starting at the top of the crack. A temporary crack sealant shall be applied immediately after blowing through and the resin shall be injected into the crack immediately the necessary preparations are complete;
- (ii) If, for whatever reason, the crack becomes damp before it is resin injected, no further work will be permitted until the temporary crack sealant is removed and the crack blown through again with dry hot air;
- (iii) The temperature of the hot air shall be sufficient to dry the full depth of the crack and shall not exceed the maximum temperature specified by the equipment manufacturer.

36 Resin Injection:

- (i) The resin to be used shall be either polyester or epoxy based and shall be mixed and injected in accordance with the manufacturer's specification. Resin shall not be injected when the air temperature or the surface temperature concrete to be repaired is less than 5°C;
- (ii) The spacing of the nozzle positions shall be equal to the depth of the crack and shall not in any case be less than 250 mm;
- (iii) Injecting shall start at the bottom of the crack and work shall proceed upwards in a continuous operation throughout. Resin must be seen extruding from the crack at the next nozzle position before the current nozzle location is locked off;
- (iv) The injected crack shall be left undisturbed for a period of at least 24 hours to allow the resin to harden;
- (v) When the resins are sufficiently cured the cracks and any resin spillages shall be cleaned from the face of the concrete. The method of cleaning shall be approved by the Overseeing Organisation.
- (vi) The specialist resin injection contractor shall prepare and submit to the Overseeing Organisation an outline method statement covering the methods and materials (including suppliers) to be employed for each item of work. Details of materials shall include viscosity ranges for various crack widths, strength characteristics, gel times, the percentage volumetric shrinkage and expansion characteristics, and water tolerance levels. Except where stated otherwise, the grouting materials shall comply with the following requirements:
 - Minimum characteristic compressive strength of resin grout of 25 N/mm² to be achieved within 10 hours of injection.
 - Maximum volumetric shrinkage of unrestrained filled resin grout must be negligible.
 - 'Gel time' of resin grout under working conditions less than 30 minutes.
 - Resin grout used shall be suitable for use in 'wet' cracks and be moisture tolerant.
 - All materials when delivered to site shall be fully labelled together with batch numbers, full mixing instructions, date of manufacture and shelf life.

37 Proving Tests:

When the resin has set, two 20 mm diameter proving cores shall be taken to the full depth of the crack. These shall be filled with either the resin used for injecting or with an approved filler of a compatible thixotropic resin.

38 Sealing of Cracks in Bridge Decks:

The preparation of surfaces around cracks and the measures to deal with algae or other growth in cracks shall be as described in sub-Clause 34 of this Clause.

39 Application of Sealer:

- (i) The sealing resin shall be a low viscosity polyester, epoxy or acrylic polymer which must be compatible with any proposed waterproofing system;
- (ii) The material shall be applied by pouring through a fine nozzle directly into the crack or into preformed dams;
- (iii) The injected crack shall be left undisturbed for a period of at least 24 hours to allow the resin to harden;
- (iv) When the resins are sufficiently cured the cracks and resin spillages shall be cleaned to the face of the concrete.

1774AR Foamed Concrete Fill to Structures

1 Foamed concrete fill to arches or bridge decks shall be of density 1400 - 1600 kg/m³. Minimum cement content shall be 350 kg/m³. The maximum free water cement ratio shall be 0.4. The minimum compressive strength shall be 8 N/mm².

1780AR Concrete Testing – General Requirements

1. Concrete testing shall be carried out as specified in the Scheme Information or as directed by the Overseeing Organisation and additionally for concrete bridge decks exposed prior to re-waterproofing or joint replacement as described below.
2. Surface half cell testing shall be carried out as soon as possible after a section of deck concrete is exposed and sufficiently clean. The results from the surface half cell testing will be used by the Overseeing Organisation to determine the locations for the further site testing required in the Contract.
3. In areas selected by the Overseeing Organisation the upper surface of concrete bridge deck shall be tested by surface half cell testing in accordance with Clause 1785AR. At the end of each day the results of the half cell testing shall be made available to the Overseeing Organisation in accordance with Clause 1785AR. Not later than 24 hours after receipt of the results from a day of surface half cell testing the Overseeing Organisation shall notify the Contractor in writing of the required locations for further testing in the area covered by that session's half cell testing.
4. The site testing that will be required following surface half cell testing shall be as follows:
 - (i) Dust sampling in accordance with Clause 1783AR
 - (ii) Cover meter survey in accordance with Clause 1786AR
 - (iii) Carbonation testing in accordance with Clause 1787AR

The contractor shall allow for carrying out the total number of tests required in the Scheme Information. The location of these tests will be determined as described in sub-Clauses 1 and 2 of this Clause.

5. Laboratory testing shall be carried out on samples selected by the Overseeing Organisation. The following laboratory tests will be required.
 - (i) Chloride testing on dust samples and cores in accordance with Clause 1784AR
 - (ii) Cement content testing in accordance with Clause 1782AR
6. The results of the chloride sampling will be supplied to the Overseeing Organisation as soon as they become available. Not later than 48 hours after receipt of the results the Overseeing Organisation shall notify the Contractor in writing of any concrete repairs that may be required in the area covered by the chloride results submitted.

1781AR Removal of Cores from Concrete Structures

- 1 The position of reinforcement near the face from which cores are to be removed shall be located by use of a cover meter prior to commencement of coring operations.
- 2 Cores shall be removed by use of a diamond tipped coring tool with an outside diameter of 50mm, 75mm or 100mm, or as specified by the Overseeing Organisation. Cores shall be positioned such that reinforcement in the structure is avoided. Orientation of the drilling shall be perpendicular to the concrete surface. The length of core to be removed shall be instructed by the Overseeing Organisation.
- 3 Cores shall be marked with a unique reference and a record shall be kept of the position on the structure from where the cores were removed. After drilling cores shall be washed clean with fresh water and surface dried with paper towels. Cores shall be wrapped in polythene.
- 4 Core holes shall be reinstated with an approved proprietary polymer modified low shrinkage cementitious repair mortar. Before reinstatement all debris, mud and standing water shall be removed to leave each core location clean.
- 5 On completion of extraction of individual cores requested by the Overseeing Organisation, the Contractor shall deliver all cores to the Overseeing Organisation at his site offices.
- 6 The location of cores required by the Overseeing Organisation are as detailed in the Scheme Information or as directed by the Overseeing Organisation.

1782AR Cement Content Testing

- 1 Cement content shall be determined from cores or dust samples removed from the structure by use of material not used in tests to determine chloride content.
- 2 Cement content shall be determined in accordance with the method described in BS 1881: Part 124: 1988.

1783AR Sampling Concrete for Chlorides by Percussive Drilling

- 1 The location of holes shall be marked on the structure. Prior to drilling a cover meter shall be used to locate the position of reinforcing steel. Some adjustment of the location may be necessary to avoid steel.
- 2 The orientation of the drilling shall be perpendicular to the concrete surface. A masonry drill bit 20mm diameter with unworn flutes is to be used.

3 The following procedure shall be adopted for collecting dust samples:

Drill into the concrete to a depth of 5mm. Blow out the dust from the hole using compressed air and also surface around and discard this surface sample, collect samples from the following depths as specified in the Scheme Information: 5mm-30mm, 30mm-55mm and 55mm-80mm and then in 25mm increments as directed by the Overseeing Organisation. Blow out the hole between each successive depth of sampling. Encourage the drilling dust to the surface by withdrawing the drill frequently. Collect the dust by brushing onto a piece of paper and funnel into a sample bag, 10g minimum is required for each sample. The sample bag shall be clearly labelled with location, depth, and structure of origin. The numbering sequence is to be agreed with the Overseeing Organisation.

4 Drill holes shall be cleaned by blowing out with compressed air and reinstatement of holes shall be carried out with an approved proprietary polymer modified cementitious repair material.

1784AR Chloride Content Testing

1 Chloride content shall be determined from the dust samples and cores removed from the structure. Cores shall be sawn into 25mm lengths and the chloride content of each 25mm length shall be determined separately in order to show the chloride gradient through the core.

2 Chloride content shall be determined in accordance with the method described in BS 1881: Part 124 1988.

3 The results of chloride content testing shall be reported in terms of total percentage chloride content by weight of cement.

1785AR Half Cell Testing

Surface Potential Measurement

1 Half Cell potential surveys shall be carried out in accordance with standard ASTM C876 – 1991. The electrical continuity in the reinforcement shall be checked prior to commencement of reading. This shall be achieved by drilling through the concrete to the surface of the reinforcement cleaning the reinforcement to bright metal and the connection made using a self tapping screw. (The drill hole may be widened using a hammer and chisel to facilitate attachment). Electrical continuity is established if a stable resistance reading of less than 1 ohm is achieved.

2 Measurements of electrode potential shall be made on a grid as identified on the Contract Drawings agreed with the Overseeing Organisation.

3 The voltages measured shall be recorded in millivolts and shall be tabulated with data as to the location of the reading. The numerical recording is to be done in duplicate and a set made available to the Overseeing Organisation at the end of each day of recording or earlier if requested by the Overseeing Organisation.

4 In addition results shall be presented in the form of an equipotential contour plot with contours at 50mv intervals.

5 Breakouts in the concrete made to facilitate electrical connection to reinforcement shall be reinstated using an approved proprietary polymer modified cementitious repair mortar.

1786AR Cover meter Survey

- 1** The concrete cover to the outermost reinforcement in each direction shall be determined using an electro magnetic cover meter. Every bar within the metre grid shall be, where possible, located, and marked on the concrete surface. Each bar will be located by a continuous movement, back and forth, of the cover meter sensor. The direction of the sensor movement will be perpendicular, generally, to the reinforcement considered. The cover shall be checked in the one metre grid intervals marked out for the half cell testing, or as agreed or directed by the Overseeing Organisation.
- 2** The cover meter shall be used in accordance with the Manufacturer's instructions and the recommendations of BS 1881: Part 204: 1988.
- 3** Calibration of the cover meter shall be carried out on Site by drilling at one location on the deck exposing the reinforcement and direct measurement of the cover. All holes formed for this purpose shall be reinstated using an approved proprietary polymer modified cementitious repair mortar.
- 4** All Site measurements shall be recorded and reported direct depth measurement in mm and a set made available to the Overseeing Organisation at the end of each session of recording. In addition results shall be reported in the form of a cover contour plot.

1787AR Carbonation Testing

- 1** Carbonation testing shall be carried out at locations marked by the Overseeing Organisation and utilizing core and percussive holes drilled by the Contractor.
- 2** All traces of drilling dust shall be cleaned from the hole using a paint brush and compressed air.
- 3** A freshly broken surface of concrete shall be produced by breaking the edge of the hole in at least two places around the circumference using a hammer and a 12mm cold chisel.
- 4** The broken samples shall be sprayed immediately with phenolphthalein solution. The perpendicular depth of the interface between the magenta colouration and the uncoloured concrete from the surface of the concrete shall be measured.
- 5** The minimum depth, the maximum depth and the mean depth from each of the two broken surfaces shall be recorded. The results shall be recorded to the nearest mm.

1788AR Acceptable Companies for Testing Work

- 1** All sampling and testing shall be carried out by a specialist testing firm or laboratory approved by UKAS for laboratory testing.

SERIES 2000 WATERPROOFING FOR CONCRETE STRUCTURES

2070AR Replacement of Bridge Deck Waterproofing

- 1** The existing surfacing shall be removed by cold-milling (planning) in accordance with Clause 709.

2 The existing bridge deck waterproofing and/or protective layer comprising the last 30 mm above the concrete substrate shall be carefully removed using hand tools, smooth bladed mechanical scrapers or similar, avoiding damage to the concrete.

In exceptional cases for particularly difficult materials, the use of mechanical scabbling, mini planers or other mechanical tools and/or liquid gas cooling may be permitted provided that method statements are submitted for approval before these techniques are used.

3 The final removal of the remaining waterproofing and/or primer to expose the concrete substrate shall be by recoverable abrasive blast cleaning systems. 'Open' blast cleaning will not be permitted except on vertical surfaces or intricate details.

4 Prior to application of the new waterproofing, the deck concrete shall be examined by the Overseeing Organisation for testing and/or concrete repairs (in accordance with the requirements of Series 1700). Typically the defects to be repaired shall include the following:

- (i) removal of chloride contaminated concrete where considered necessary by the Overseeing Organisation and/or corrosion delaminated concrete;
- (ii) removal of surface defects such as screed marks and footprints;
- (iii) removal of formwork/false work anchors from the original construction which have inadequate cover;
- (iv) sealing of cracks >0.25 mm;
- (v) repairs to, or forming of fillets, and chases to facilitate waterproofing.

5 The replacement waterproofing system shall be in accordance with Clauses 2001 to 2003, and be installed in accordance with Clause 2005.

SERIES 2300
BRIDGE EXPANSION JOINTS AND SEALING OF GAPS

2370AR Replacement and Maintenance of Bridge Deck Expansion Joints

- 1** Replacement, repair and alterations to expansion joints shall be instructed by the Overseeing Organisation. Such work shall comply with the requirements of Clauses 2301 to 2304 and Standards BD33/94 and BA26/94. It may comprise replacement of a complete joint or essential maintenance of a joint where complete or partial replacement is not considered necessary.
- 2** Existing joints (including transition strips) shall be carefully broken out or unbolted and removed. The adjacent carriageway, hard shoulder, hardened verges and central reservations shall be saw cut to provide neat vertical edges. The location of any existing services or ducts shall be determined prior to breaking out or saw cutting and measures shall be taken to protect them.
- 3** Existing flashings and sealants shall be removed. Where instructed by the Overseeing Organisation, existing intact water bars may be retained. Existing galvanised plates in buried joints shall be set aside for possible re-use.
- 4** The existing surfacing and additional protective layer adjacent to the expansion joint shall be removed to expose the waterproofing membrane. The membrane shall then be removed by scraping, scabbling and/or vacuum abrasive blast cleaning to prepare the existing concrete.
- 5** Existing holding down bolts shall be protected, if required for installation of the proposed replacement joint. If they are not required they shall be removed or ground flush with the surface of the deck concrete.
- 6** The concrete substrate shall be examined by the Overseeing Organisation for defects. Where required, testing shall be carried out and concrete repairs undertaken in accordance with Series 1700.
- 7** If the joint is not to be completely replaced, material and components shall form the same system as the existing joint.
- 8** Where instructed vertical drain holes shall be installed adjacent to expansion joints. The drain holes shall comprise a down pipe fixed into holes cored through the superstructure of minimum internal diameter 40 mm and a conical entry funnel with cap to allow water to enter the funnel but prevent blocking of the waterway by the surfacing. The cap and funnel shall be covered with a sheet of permeable membrane prior to surfacing.
- 9** All debris arising from the works shall be removed off Site.

2371AR Asphaltic Plug Joints**Installation**

- 1** All joints shall have a valid Certificate of Registration.
- 2** The joints shall be installed in accordance with the manufacturer's instructions which shall comply with the terms of the Registration.

As-built Records

- 3** The Contractor shall maintain as-built record drawings of the work carried out. They shall include the depth and width of the waterproofing and sealing system provided at each joint location and details of the sub-surface drainage system installed.
 - 4** Each batch of materials delivered to Site shall have a Certificate of Compliance.
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SERIES 2400
BRICKWORK, BLOCK WORK AND STONework

2470AR Repointing of Brickwork

- 1** Brickwork joints to be repointed shall be ground out to a depth of between 10 mm and 15 mm to give adequate key. All unsound mortar at a greater depth than this shall be removed until sound mortar is encountered. Apparatus used for grinding out shall be fitted with a depth gauge to allow control of rake out depth.
 - 2** All detritus shall be removed by low pressure water jetting.
 - 3** Mortar designation (i) (see Clause 2404) shall be used for repointing.
 - 4** Repointing for depths up to 15 mm may be carried out by trowel or injection techniques. For depths exceeding 15 mm injection techniques shall be used.
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APPENDIX 0/2: CONTRACT - SPECIFIC MINOR ALTERATIONS TO EXISTING CLAUSES, TABLES AND FIGURES INCLUDED IN THE CONTRACT

Clause No. (etc)	Alterations to be made
Appendix F	See page 28 for details of amendment.
Appendix H	See page 30 for details of amendment.

APPENDIX F ADDENDUM**PUBLICATIONS REFERRED TO IN THE SPECIFICATION**

The following list, as modified and extended by the Contract-specific minor alterations in Appendix 0/2 (if any), is an addendum list of the publications to which reference is made in the Specification:

1. BRITISH STANDARDS

(Published by The British Standards Institution)

		Specification Clause/Table/ Appendix
BS 598	Sampling and examination of bituminous mixtures for roads and other paved areas.	
BS 1305	Specification for batch type concrete mixers. (Obsolescent?)	1773
BS 1881	Testing concrete	1773
BS EN ISO 4618:2006	BS EN 12390-1:2000 Glossary of paint and related terms	1976
BS 4019	Rotary core drilling equipment	

2. DEPARTMENT OF TRANSPORT (HIGHWAYS AGENCY) PUBLICATIONS
(Published by the Highways Agency)

		Specification Clause/Table/ Appendix
Bridges - Advice Notes		
(i)	BA 26 Expansion Joints for Use in Highway Bridge Decks. (DMRB 2.3.7).	2370
Bridges – Standards		
(i)	BD 27 Materials for the Repair of Concrete Highway Structures. (DMRB 3.3.2).	1773
(ii)	BD 33 Expansion Joints for Use in Highway Bridge Decks. (DMRB 2.3.6).	2370

3. MISCELLANEOUS

		Specification Clause/Table/ Appendix
WOEM 1000	Specification for the Installation of the Inductive Loops for Vehicle Detection	Appendix 1/26
WOEM 1008	Specification for Inductive Loop Cable for Vehicle Detection	Appendix 1/26

WOEM 1009	Specification for Armoured Feeder Cable for Inductive Loop Systems	Appendix 1/26
WOEM 1010	Specification for Resin Compound for Sealing and Encapsulating Inductive Loop Cable	Appendix 1/26
PSDB 15/05	The Speedometer Handbook (Fourth Edition) issued by Police Scientific Development Branch	Appendix 1/26
IEC 60529:20 01	Degrees of Protection provided by enclosures consolidated edition incorporating Amendment No 1	Appendix 1/26
	“Code of Practice for the use of High Pressure Water Jetting Equipment” published by Water Jetting Association, Thames Innovation Centre, 2 Veridion Way, Erith, Kent DA18 4AL (Tel 020 8320 1090) www.waterjetting.org.uk	1771

APPENDIX H ADDENDUM**QUALITY RECORDS**

The following is an addendum list of the quality records required by the Specification:

STRUCTURAL CONCRETE

C	1773.15	Delivery and storage - provision of records and certificates.
C	1773.16	Delivery and storage – provision of records and certificates.
C	1773.17	Approval tests - supply test certificates.
C	1773.23	Delivery and storage - provision of records and certificates.
B	1773.29	Provision of information - submit certificates.
B	1773.33	Approval tests - supply test certificates.

BRIDGE EXPANSION JOINTS AND SEALING OF GAPS

B	2372.1	Plug joints - provide information and certificates.
C	2372.4	Materials - provide information and certificates.

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" or "N/U". For each set of Scheme Information, those identified by the letters T or C shall be completed by the Tenderer or Contractor respectively.

Additional Requirements may be included in the Scheme Information

Guide to types of Numbered Appendices - who compiles/completes

Symbol

- | | |
|-----|---|
| (T) | Tenderer completes and returns with Tender |
| (C) | Contractor completes and returns to Overseeing Organisation |
| (I) | For Contractor's Information Only |

List "B" is a list of Numbered Appendices devised for the Contract.

List 'A': List of Numbered Appendices Referred to in the Specification for Highway Works

Used / Not Used	Completed By	Appendix. No.	Title
Used	I	0/1	INTRODUCTION Contract-specific Additional, Substitute & Cancelled Clauses, Tables and Figures Included in the Contract
Used	I	0/2	Contract-specific Minor Alterations to Existing Clauses, Tables and Figures included in the Contract
Used	I	0/3	List of Numbered Appendices Referred to in the Specification and included in the Contract
Used	I/C	0/4	List of Drawings Included in the Contract
Not Used		0/5	Special National Alterations of the Overseeing Organisation of Scotland, Wales or Northern Ireland
			PRELIMINARIES
Not Used		1/1	Temporary Accommodation and Equipment for the Overseeing Organisation
Not Used		1/2	Vehicles for the Overseeing Organisation
Not Used		1/3	Communication System for the Overseeing Organisation
Not Used		1/4	Working and Fabrication Drawings
Used	I/C	1/5	Testing to be Carried out by the Contractor
Not Used		1/6	Supply and Delivery of Samples to the Overseeing Organisation
Used	I	1/7	Site Extent and Limitations on Use
Not Used		1/8	Operatives for the Overseeing Organisation
Used	I	1/9	Control of Noise and Vibration
Not Used		1/10	Structures to be Designed by the Contractor
Used	I/C	1/11	Structural Elements and Other Features to be Designed by the Contractor
Not Used		1/12	Setting Out and Existing Ground Levels
Used	I	1/13	Programme of Works
Used	I	1/14	Payment Applications
Not Used		1/15	Accommodation Works
Not Used		1/16	Privately and Publicly Owned Services and Supplies
Used	I/C	1/17	Traffic Safety and Management
Used	I/C	1/18	Temporary Diversions for Traffic
Used	I/C	1/19	Routing of Vehicles
Used	I/C	1/20	Recovery Vehicles for Breakdowns
Used	I/C	1/21	Information Boards
Not Used		1/22	Progress Photographs
Used	I/C	1/23	Risks to Health and Safety from Materials or Substances
Used	I/C	1/24	Quality Management System
Used	I	1/25	Temporary Closed Circuit Television (CCTV) System for the Monitoring of Traffic
Used	I	1/26	Temporary Automatic Speed Camera System for the Enforcement of Mandatory Speed Limits at Road Works (TASCAR)
Used	I	1/27	Temporary Automatic Speed Camera System for the Enforcement of Mandatory Speed Limits at Road Works (TASCAR) – Particular Requirements
Used	I/C	1/71	Security of Site
			SITE CLEARANCE
Not Used		2/1	List of Buildings etc to be Demolished
Not Used		2/2	Filling of Trenches and Pipes
Used	I/C	2/3	Retention of Material Arising from Site Clearance
Used	I	2/4	Explosives and Blasting
Used	C	2/5	Hazardous Materials

List 'A': List of Numbered Appendices Referred to in the Specification for Highway Works (continued)

Used / Not Used	Completed By	Appendix. No.	Title
			FENCING AND ENVIRONMENTAL BARRIERS
Used	I/C	3/1	Fencing, Gates and Stiles
			ROAD RESTRAINT SYSTEMS (VEHICLE AND PEDESTRIAN)
Used	I/C	4/1	Road Restraint Systems (Vehicle and Pedestrian)
Used	I/C	4/2	Information Required to Demonstrate Compliance of Road Restraint Systems to BS EN1317-1, BS EN 1317-2, BS EN 1317-3, and DD ENV 1317-4:2002
			DRAINAGE AND SERVICE DUCTS
Used	I/C	5/1	Drainage Requirements
Used	I/C	5/2	Service Duct Requirements
Not Used		5/3	Surface Water Channels and Drainage Channel Blocks
Used	I/C	5/4	Fin Drains and Narrow Filter Drains
Used	I/C	5/5	Combined Drainage and Kerb Systems
Not Used		5/6	Linear Drainage Channel Systems
Used	I/C	5/7	Thermoplastics Structural Wall Pipes and Fittings
			EARTHWORKS
Used	I/C	6/1	Requirements for Acceptability & Testing etc of Earthworks Materials
Not Used		6/2	Requirements for Dealing with Class U2 Unacceptable Material
Used	I/C	6/3	Requirements for Excavation, Deposition, Compaction (Other than Dynamic Compaction)
Not Used		6/4	Requirements for Class 3 Material
Not Used		6/5	Geotextiles Used to Separate Earthworks Materials
Used	I/C	6/6	Fill to Structures & Fill Above Structural Foundations
Used	I/C	6/7	Sub-formation & Capping & Preparation & Surface Treatment of Formation
Used	I/C	6/8	Top soiling
Used	I/C	6/9	Earthwork Environmental Bunds, Landscape Areas, Strengthened Embankments
Used	I/C	6/10	Ground Anchorage's, Crib Walling and Gabions
Not Used		6/11	Swallow Holes & Other Naturally Occurring Cavities & Disused Mine Workings
Not Used		6/12	Instrumentation & Monitoring
Not Used		6/13	Ground Improvement
Not Used		6/14	Limiting Values for Pollution of Controlled Waters
Not Used		6/15	Limiting Values for Harm to Human Health and the Environment
			ROAD PAVEMENTS – GENERAL
Used	I/C	7/1	Permitted Pavement Options (Sheets 1,2 & 3)
Used	I/C	7/2	Excavation, Repair and Reinstatement of Existing Surfaces
Not Used		7/3	Surface Dressing Sheets 1 & 2
Used	I/C	7/4	Bituminous Sprays
Not Used		7/5	In Situ Recycling: the Remix and Repave Processes
Not Used		7/6	Breaking Up or Perforation of Existing Pavement
Used	I/C	7/7	Slurry Surfacing Incorporating Microsurfacing (Sheets 1, 2 & 3)
Not Used		7/8	Not used
Not Used		7/9	Cold-Milling (Planning) of Bituminous Bound Flexible Pavement
Used	I/C	7/10	Worksheet Pro Forma for Results of Testing for Constituent Materials in Recycled Coarse Aggregate and Recycled Concrete
Not Used		7/11	Over banding and Inlaid Crack Sealing Systems
Not Used		7/12	Arrester Beds

List 'A': List of Numbered Appendices Referred to in the Specification for Highway Works (continued)

Used / Not Used	Completed By	Appendix. No.	Title
			ROAD PAVEMENTS – GENERAL (Continued)
Not Used		7/13	Saw-Cut and Seal Bituminous Overlays on Existing Concrete Pavements
Not Used		7/14	Preparation of Jointed Concrete Pavements Prior to Overlaying and Saw-Cut and Seal of Bituminous Overlay
Not Used		7/15	Saw-Cut, Crack and Seat Existing Jointed Reinforced Concrete Pavements
Not Used		7/16	Cracking and Sealing of Existing Jointed Un-reinforced Concrete Pavements and Hydraulically Bound Mixture (HBM) Bases
Not Used		7/17	Cracking Plant and Equipment Progress Record
Not Used		7/18	Site Specific Details and Requirements for Cold Recycled Bitumen Bound Material
Not Used		7/19	Site Specific Details and Requirements for Recycled Cement Bound Material
Not Used		7/20	NOT USED
Not Used		7/21	Surface Dressing – Recipe Specification
Not Used		7/22	Repair to Potholes
			ROAD PAVEMENTS - CONCRETE AND CEMENT BOUND MATERIALS
Not Used		10/1	Plant and Equipment for the Construction of Exposed Aggregate Concrete Surface
			KERBS, FOOTWAYS AND PAVED AREAS
Used	I/C	11/1	Kerbs, Footways and Paved Areas
Used	I/C	11/2	Access Steps
			TRAFFIC SIGNS
Used	I/C	12/1	Traffic Signs : General
Used	I/C	12/2	Traffic Signs : Marker Posts
Used	I/C	12/3	Traffic Signs : Road Markings and Studs
Not Used		12/4	Traffic Signs : Cones, Cylinders, FTD's & Other Traffic Delineators
Not Used		12/5	Traffic Signs : Traffic Signals
Not Used		12/6	Traffic Signs : Special Sign Requirements on Gantries
			ROAD LIGHTING COLUMNS AND BRACKETS
Used	I/C	13/1	Information to be Provided When Specifying Lighting Columns and Brackets
Used	I/C	13/2	Columns and Bracket Data Sheets 1 and 2
Used	I/C	13/3	Instructions for Completion of Column & Bracket Data Sheet
Not Used		13/4	Information to be Provided When Specifying CCTV Masts
Not Used		13/5	Typical CCTV Mast Data Sheet
Not Used		13/6	Instructions for Completion of CCTV Mast Sheets
Not Used		13/7	Information to be Provided When Specifying Cantilever Masts
Not Used		13/8	Typical Cantilever Masts Data Sheets 1 and 2
Not Used		13/9	Instructions for Completion of Cantilever Masts Data Sheets
			ELECTRICAL WORK FOR ROAD LIGHTING AND TRAFFIC SIGNS
Used	I/C	14/1	Site Records
Used	I/C	14/2	Location of Lighting Units & Feeder Pillars
Not Used		14/3	Temporary Lighting
Used	I/C	14/4	Electrical Equipment for Road Lighting
Used	I/C	14/5	Electrical Equipment for Traffic Signs
			MOTORWAY COMMUNICATIONS
Used	I/C	15/1	Motorway Communications
Not Used		15/2	Cable Duct Requirements

List 'A': List of Numbered Appendices Referred to in the Specification for Highway Works (continued)

Used / Not Used	Completed By	Appendix. No.	Title
			PILING AND EMBEDDED RETAINING WALLS
Used	I/C	16/1	General Requirements for Piling and Embedded Retaining Walls
Not Used		16/2	Precast Reinforced and Prestressed Concrete Piles and Precast Reinforced Concrete Segmental Piles
Used	I/C	16/3	Bored Cast-in Place Piles
Used	I/C	16/4	Bored Piles Constructed using Continuous Flight Augers and Concrete or Grout Injection through Hollow Auger Stems
Not Used		16/5	Driven Cast-in Place Piles
Used	I/C	16/6	Steel Bearing Piles
Not Used		16/7	Reduction of Friction on Piles
Used	I/C	16/8	Non-Destructive Methods for Testing Piles
Not Used		16/9	Static Load Testing of Piles
Not Used		16/10	Diaphragm Walls
Not Used		16/11	Hard/Hard Secant Pile Walls
Not Used		16/12	Hard/Soft Secant Pile Walls
Not Used		16/13	Contiguous Bored Pile Walls
Not Used		16/14	King Post Walls
Used	I/C	16/15	Steel Sheet Piles
Not Used		16/16	Integrity Testing of Wall Elements
Not Used		16/17	Instrumentation for Piles and Embedded Walls
Not Used		16/18	Support Fluid
			STRUCTURAL CONCRETE
Used	I/C	17/1	Concrete - Classification of Mixes
Used	I/C	17/2	Concrete - Impregnation Schedule
Used	I/C	17/3	Concrete - Surface Finishes
Used	I/C	17/4	Concrete - General
Not Used		17/5	Buried Concrete – Sulphate Attack
Not Used		17/6	Grouting and Duct Systems for Post-tensioned Tendons
			STRUCTURAL STEELWORK
Used	I/C	18/1	Requirements for Structural Steelwork
			PROTECTION OF STEELWORK AGAINST CORROSION
Used	I/C	19/1	Form HA/P1 (New Works) Paint System Sheet
Not Used		19/2	Requirements for Other Works
Used	I/C	19/3	Form HA/P2 Data Sheet
Used	I/C	19/4	Form HA3 Paint Sample Despatch List, sheets 1 & 2
Used	I/C	19/5	General Requirements

List 'A': List of Numbered Appendices Referred to in the Specification for Highway Works (continued)

Used/Not Used	Completed By	Appendix No.	Title
			WATERPROOFING FOR CONCRETE STRUCTURES
Used	I/C	20/1	Waterproofing for Concrete Structures
			BRIDGE BEARINGS
Not Used		21/1	Bridge Bearing Schedule
			PARAPETS
Not Used		22/1	Parapet Schedule
			BRIDGE EXPANSION JOINTS AND SEALING OF GAPS
Used	I/C	23/1	Bridge Deck Expansion Joint Schedule
Used	I/C	23/2	Sealing of Gaps Schedule (Other than in Bridge Deck Expansion Joints)
			BRICKWORK, BLOCK WORK AND STONEWORK
Used	I/C	24/1	Brickwork, Block work and Stonework
			SPECIAL STRUCTURES
Not Used		25/1	Requirements for Corrugated Steel Buried Structures
Not Used		25/2	Requirements for Reinforced Soil and Anchored Earth Structures
Not Used		25/3	Requirements for Pocket Type Reinforced Brickwork Retaining Wall Structures
Used	I/C	25/4	Environmental Barriers
Not Used		25/5	Requirements for Buried Rigid Pipes for Drainage Structures
			MISCELLANEOUS
Not Used		26/1	Ancillary Concrete
Used	I/C	26/2	Bedding Mortar
Used	I/C	26/3	Cored Thermoplastic Node Markers
			LANDSCAPE AND ECOLOGY
Used	I/C	30/1	General, sheets 1, 2 & 3
Used	I/C	30/2	Weed Control
Used	I/C	30/3	Control of Rabbits and Deer
Used	I/C	30/4	Ground Preparation
Used	I/C	30/5	Grass Seeding, Wildflower Seeding and Turfing
Used	I/C	30/6	Planting, sheets 1 & 2
Not used		30/7	Grass, Bulbs and Wildflower Maintenance
Not used		30/8	Watering
Not used		30/9	Establishment Maintenance for Planting
Not used		30/10	Maintenance of Established Trees and Shrubs
Not used		30/11	Management of Water bodies
Used	I/C	30/12	Special Ecological Measures
Used	I/C	50/1	FORM HA/P1 (MAINTENANCE) PAINT SYSTEM SHEET
Not Used		50/2	REQUIREMENTS FOR OTHER WORK
Used	I/C	50/3	FORM HA/P2 PAINT DATA SHEET
Used	I/C	50/4	FORM HA/P3 PAINT SAMPLE DESPATCH LIST: SHEET 1 and 2.
Not Used		50/5	GENERAL REQUIREMENTS

List 'B' gives the list of Contract-specific Numbered Appendices devised for the Contract

Volume No.	Appendix No.	Appendix Title
1	1/71	Security of the Site

APPENDIX 0/4: LIST OF DRAWINGS INCLUDED IN THE CONTRACT**1 Contract-specific Drawings Supplied to Each Tenderer**

Drawing Number	Title
None	

2 Brought into the Contract by Reference

Unless otherwise stated in the Scheme Information, all of the Highway Construction Details published by The Stationery Office as Volume 3 of the Manual of Contract Documents.

2 Standard Drawings
2(i) Supplied to Each Tenderer

Drawing No.	Title	Volume No.
None		

2(ii) Inspected by Tenderers

Drawing No.	Title	Aspect required if not whole Drawing
None		

2(iii) Brought Into the Contract by Reference

The current (at tender issue date) relevant Highway Construction Detail published by The Stationery Office (formerly HMSO) as Volume 3 of the Manual of Contract Documents for Highway Works are brought into the Contract by reference.

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

- 1 The Contractor shall be responsible for carrying out the testing in accordance with the tests described in Volume 1 Specification for Highway Works and its own quality plan as accepted under this contract. Detailed testing schedule can be found in Table NG1/1, Volume 2 Notes for Guidance on the Specification for Highway Works.
- 2 Results from the tests shall be made available on request to the Overseeing Organisation.

APPENDIX 1/7: SITE EXTENT AND LIMITATIONS ON USE

1. Extent of the Site.

The extent of the site is defined in the Network Information.

2. Limitations on the Use of the Site.

The Contractor's use of any area of the Site in his possession will be limited by the requirements of Clause 117 Traffic Safety and Management and the following conditions:

- (i) The safety zone specified in Chapter 8 of the Traffic Signs Manual shall be maintained between the edge of any traffic lane and the works, constructional plant or materials.
- (ii) The provision of areas to accommodate all principal offices, messes, stores, laboratories or workshops required under the Contract or otherwise by the Contractor shall be the responsibility of the Contractor. No principal offices, messes, stores or workshops shall be sited within the trunk road or other highway boundaries.
- (iii) All areas outside the limits of the Site which are used or occupied by the Contractor shall be restored to their original condition on completion of the Works. Such restoration shall include any necessary reinstatement, re-soiling, seeding or planting.
- (iv) No area of the Trunk Road shall be used for parking of vehicles used by or on behalf of the Contractor. The Contractor shall not obstruct any lane, road junction vehicular or pedestrian access which has not been closed to traffic
- v) The Contractor shall allow for any working areas within the boundaries of the highway to be used by vehicles requiring to stop in an emergency. The Contractor shall inform the Overseeing Organisation and the Police of the name(s) and telephone number(s) of a responsible person(s) who can be contacted at any time in an emergency.
- vi) The Contractor, his agents, servants or workmen shall not erect nor allow his sub-contractors their agents, servants or workmen to erect within the Site any advertisement without the prior written approval of the Overseeing Organisation. Should any advertisement be erected without such approval the Overseeing Organisation shall have power to order in writing the Contractor to remove it forthwith. If the Contractor shall fail to comply with such order within 24 hours of its delivery to him, the Employer shall be entitled to employ and pay other persons to carry out the same and all expenses consequent thereon or incidental thereto shall be borne by the Contractor and shall be recoverable from him by the Employer or may be deducted by the Employer from any monies due or which become due to the Contractor.
- vii) All advertisements, approved under the previous sub-clause, within the site shall be removed not later than the Completion Date, unless the Overseeing Organisation approves in writing any advertisement to remain for a further period.

3. The Contractor, or any agent or servant in his employ shall not give any information concerning the Works for publication in the press or radio, television or cinema screen or elsewhere without the written approval of the Employer.
4. The Contractor shall prevent trespass by his own or his sub-contractor's employees onto any property adjoining the site.
5. The Contractor shall ensure that no steps, ladders or other plant are left accessible so as to permit unauthorised access to the works.
6. The Contractor shall maintain the Site in a clean and tidy state by removing rubbish, demolished concrete and other debris arising from the works to a tip off Site. All materials and plant for the Works shall be stored neatly. On completion of the works the Contractor shall remove all surplus materials and leave the Site in a clean and tidy condition.
7. The Contractor shall note that traffic restrictions and traffic control required to carry out any necessary remedial works shall be to the standard required for the main works and all traffic control costs required for such remedial works shall be borne by the Contractor;
8. The programming of any remedial works required after the actual Completion Date shall be agreed with the Overseeing Organisation before commencement of those works;
9. Each goods vehicle used by the Contractor or his Subcontractors in connection with the contract shall display the vehicle licence disc relevant to the goods operator's licence under which the vehicle is operated or, in the absence of an operator's licence disc, shall carry documentation giving the operator's licence number, name and address.

APPENDIX 1/9: CONTROL OF NOISE AND VIBRATION**Normal Working Hours**

- 1 The normal working hours within the Site shall be specified in the Scheme Information.
- 2 The working week and bank holidays shall be as described in the Scheme Information.
- 3 Exceptionally, consent for work outside these hours may be given after any necessary consultation. 7 day's notice is required from the Contractor when seeking such consent.

Noise

- 4 The noise levels (see Note (i) below) scheduled below for periods outside the normal working hours will only be permitted when consent has been given to exceptional working.
- 5 The ambient noise level, Leq (see Note (ii) below) from all sources when measured 2.0m above the ground 1m from the facade of any occupied building shall either not exceed the appropriate level given in the Schedule or not exceed by more than 3dB(A) the existing ambient noise level, Leq (see Note (iii) below), at the building measured over the same period, whichever level is the greater. The maximum sound level at any building due to the Contractor's operations shall not exceed the level given in the Schedule. Exceptionally, the Contractor may be given permission to carry out works which exceed the noise levels in the Schedule, provided that 14 days' notice of the date and timing of these works is given to the Overseeing Organisation 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 Occupied Building		
Period	Hours	Ambient Noise Level. Leq measured 1m from the façade of any occupied building dB(A)	Period of Hours over which Leq is applicable	Maximum Sound Level (see Note (iv) below) measured at the building; dB(A)
Normal working period specified in the Scheme Information	See Scheme Information	See Scheme Information	See Scheme Information	See Scheme Information
All unattended plant outside normal working hours	See Scheme Information	See Scheme Information	See Scheme Information	See Scheme Information

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 3 dB(A).
- (ii) The ambient noise level, Leq, is the total Leq from all the noise sources in the vicinity over the specified period. (Sampling time to be minimum 5 minutes duration).
- (iii) The existing ambient noise level, Leq, is the total Leq from all the noise sources in the vicinity over the specified period prior to the commencement of the Works. (Sampling time to be minimum of 20 minutes duration).

- (iv) Maximum sound level is the highest value indicated on a sound level meter which meets the requirements of BS EN 61672 Parts 1 and 2 Type 1 or 2 set to SLOW response and frequency weighting A or on an integrating - averaging sound level meter to BS EN 61672 Parts 1 and 2
- 5 Without prejudice to the generality of the contractors' obligations under Clause 109 Noise Control, the Contractor shall comply in particular with the following requirements:
 - (i) The Contractor shall provide and use items of plant and equipment that have been specifically designed or modified to reduce the noise of normal operations. Items of plant and equipment shall be maintained in good and effective working order so that extraneous noises from mechanical vibration, creaking, squeaking etc shall be reduced to a minimum.
 - (ii) All vehicles and mechanical plant shall be fitted with effective exhaust silencers maintained in good working order.
 - (iii) All compressors shall be "sound reduced" models fitted with properly lined and sealed acoustic covers kept closed whenever the machines are in use. All ancillary pneumatic tools shall be fitted with mufflers of the type recommended by the manufacturers.
 - (iv) Machines in intermittent use shall be stopped in the periods intervening between work.
 - (v) The Sound levels shall be monitored by methods set out in Appendix B of BS 5228.
 - (vii) The Contractor shall adhere to the codes of practice for construction and piling given in BS 5228.
- 6 The Contractor shall furnish such information as may be required by the Overseeing Organisation in relation to noise levels emitted by plant or equipment used or installed on the Site or which the Contractor intends to use or install on the Site.
- 7 The Contractor shall afford all reasonable facilities to enable the Overseeing Organisation to carry out such noise monitoring as may be required, including the temporary cessation of works required for the monitoring of the "existing ambient noise level".
- 8 The responsible Authorities for Environmental matters are detailed in the Scheme Information.

Vibration

- 9 The Contractor shall comply with BS 6472: 2008 Evaluations of Human Exposure to Vibration in Buildings (1Hz-80Hz). Any vibration monitoring carried out shall also be in compliance with BS 6472: 2008.

APPENDIX 1/11: STRUCTURAL ELEMENTS AND OTHER FEATURES TO BE DESIGNED BY THE CONTRACTOR

1. Combined drainage and kerb systems.
2. Steps, pathways, landings and handrail in verge for communications equipment.
3. Environmental barriers.

APPENDIX 1/13: PROGRAMME OF WORKS

1. The Contractor shall provide the Programme of Works, in accordance with Clause 31.2 of the Conditions of Contract in a form of a bar chart produced as a result of a 'critical path analysis'. It shall show the level of detail appropriate to each stage of the Works and all activities and restraints, each of which shall be given a short title. All events shall be numbered and annotated with earliest and latest event dates.

The programme is to be supplied on paper and electronically in Adobe Acrobat format.

The Programme provided under this Appendix is additional to the programme information required under Appendix 1/17.

APPENDIX 1/14: PAYMENT APPLICATIONS

The payment applications submitted to the Overseeing Organisation shall be in accordance with the Conditions of Contract.

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

1. The Contractor shall make arrangements in accordance with the quality plan as part of this contract 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.
2. Disconnected apparatus shall be removed by the Contractor only with the prior consent of the Authority concerned.

This form to be used when working near GPU apparatus:

**Method Statement “Suggested Format” for
Working in Accordance with H&S Guidance**

Note GS6

(Avoidance of Danger from O/H Electric Lines)

Site Location _____

GPU Site Visit Date _____

GPU Report _____

Cable Voltage _____

Height Above Ground _____

Minimum Clearance _____

Maximum Working Height Restriction _____

Site Engineer in Charge _____

Foreman/Charge hand _____

Banks man _____

Machine Operator _____

Plant to be used _____

Description of Work _____

Safety Precautions to be taken _____

Signed _____

Date _____

**When complete please Fax to Severn Incident Centre on
FAX 01905 720086 ☎ 01905 613191**

APPENDIX 1/17: TRAFFIC SAFETY AND MANAGEMENT

1.0 Phasing and Traffic Management Restrictions

Any reference to the “Police” shall be read as “Police/Highways Agency Traffic Officer” as applicable.

The Contractor shall comply with the requirements and recommendations of the following publications:-

Highways Agency Asset Maintenance and Operational Requirements – Part 2 – Managing Network Occupancy Operational Requirement

Chapter 8 of the Traffic Signs Manual & Notes for Guidance on ‘Safety at Road works’

Highways Agency Speed Limit Enforcement at Road works: Guidance and Best Practice which offers advice on procedures to follow when carrying out this activity. The Service Provider [is strongly advised to take this guidance](#) into account when planning major schemes where the speed limit is to be enforced.

Highways Agency Safety Camera Partnership Guidance (Highways Agency involvement) 2006/07” provides guidance on working with partnerships operating speed cameras.

Highways Agency Interim Advice Note 115/08 Revision 1. Requirements and Guidance for Works on the Hard Shoulder and Road Side Verges on High Speed Dual Carriageways

CI 117.1 of the Specification for Highway Works

- 1.1 The Contractor shall be responsible for the design and implementation of all traffic management measures required under Clause 117 having regard to Appendix 1/17 and the following requirements.
- 1.2 The works shall be carried out in accordance with the traffic management proposals submitted by Contractor to the Overseeing Organisation for approval.
- 1.3 The Contractor's proposed method statement, prepared after consultation with any statutory police or other authority concerned, for implementation of traffic management shall be submitted to the Overseeing Organisation a minimum of 7 days before the date on which the traffic management system is to be installed. The installation of the traffic management system shall then proceed only in accordance with the approved sequence. Proposals shall include:
 - (a) Position of traffic signals, traffic signs and road markings
 - (b) Width of lanes
 - (c) Working areas
 - (d) Safety Zones
 - (e) Temporary works details
 - (f) Site access and egress layouts (standards shall be appropriate for traffic flows and speeds)
 - (g) De-restriction/speed limit signs at the end of the works as appropriate

- 1.4 The Contractor shall provide the Overseeing Organisation with a report on the traffic management at the end of each week. The report shall include:
1. details of all traffic management (including reference to which Chapter 8 layout was in use) in place during that week, including times when it was installed, removed and when changes were made
 2. a record of traffic management inspections made by the Contractor
 3. the name of the approved traffic management inspector
 4. any traffic accidents reported, and details of them
 5. a record of any damage to the traffic management, and when damage was repaired
- 1.5 The alignment of the traffic lanes and the crossovers must comply with the requirements of TD 9/93 Highway Link Design.
- 1.6 Traffic shall not be diverted until after the approval of each stage by the Overseeing Organisation. No personnel or items of plant (other than required for the signing and coning operations) shall enter a newly closed carriageway traffic lane until such time as the traffic has been satisfactorily diverted and approval to commence work given by the Overseeing Organisation. The Contractor shall not alter traffic management measures during the peak traffic periods defined in the Scheme Information.
- 1.7 The Contractor's attention is drawn to the need to assess the risks and develop and operate safe working practices when vehicles and plant are reversing on Site, whether or not they are on part of the highway. Rule 129 of The Highway Code 1993 is relevant but the Contractor's practices and procedures should take account of the different conditions, which will obtain on Site. The reversing and positioning of vehicles to a specific operation or item of plant shall only be undertaken under the direction of a designated marshall or banks man who escorts the vehicle whilst reversing. The Contractor shall erect signs at each works access to inform drivers of this requirement that all such reversing of vehicles shall be undertaken under the direction of the designated marshall. The Contractor shall supply details of his proposed sign to the Overseeing Organisation for approval. The contractor must comply with the requirements of Appendix 1/9 regarding the control of noise.
- 1.8 **Not Used**
- 1.9 Where the circumstances of any particular case are not covered by the Traffic Signs Manual, these publications and the drawings, the Contractor shall submit proposals for dealing with such situations to the Overseeing Organisation for approval. Compliance with this Clause shall not relieve the Contractor of any of his other obligations and liabilities under the Contract and under the relevant provisions of the Highways Acts.
- 1.10 The Contractor shall not commence any permanent work which affects the public highway until all traffic safety measures necessitated by the work are fully operational and have been approved by the Overseeing Organisation. In addition, before any work is carried out within the boundaries of the highway and before any vehicles or plant are parked on the Highway, other than those used for setting up traffic management systems, arrangements shall be made with the Employer's Maintenance Manager and with the Police, all of whom shall be kept informed of the programming of the Works in advance.
- 1.11 In the event of an accident occurring on the trafficked lanes, in the vicinity of the site, the Police may direct operations. The Contractor shall provide replacements for and properly reinstate to the original approved layout, as necessary, all signs, cones, cylinders, bollards, barriers and lights when directed by the Police. The Contractor shall ensure that sufficient stock of spare signs and cones etc is always available to make good all reasonably foreseeable damage to the traffic control system. The Overseeing

Organisation may also direct the Contractor to assist in the removal of debris, to restore the road surface to a serviceable condition, to reinstate safety fencing and anchorage's, for all of which a full record of plant, labour and materials shall be submitted to the Overseeing Organisation within 24 hours.

- 1.12 The Contractor should note that the highway will be open to traffic, though in restricted capacity, during the whole period that the Works are in progress. Without prejudice to the other provisions of this Contract the Contractor must ensure that no actions by him or his employees or sub-contractors or his suppliers or his haulers or their employees are executed in such a manner as to constitute hazards or safety risks to traffic or themselves.
- 1.13 The Contractor shall sluice (including the provision of clean water) any working areas affected by grit and salt, so as to avoid de-bonding between layers of flexible construction. Another Contractor will be responsible for gritting and snow ploughing of the lanes open to traffic, but the Contractor shall reset all disturbed cones, cylinders, lamps and signs and clear all snow and ice moved onto the working areas by the other Contractor's operations.
- 1.14 The Contractor shall ensure that the traffic control system of signs, cones, cylinders, bollards, barriers and lights is continuously inspected and, where necessary, immediately properly reinstated. The Contractor shall provide on site, operatives and appropriate vehicles for the exclusive purpose of carrying out continual inspection (i.e. 24 hours per day, 7 days per week) of the traffic safety and control systems from commencement to completion of works. The Contractor shall also separately provide on site during the hours of 07:00 to 16:00, seven days per week, operatives, an appropriate vehicle and suitable washing equipment for the cleaning of signs, cones, cylinders, barriers and the like.
- 1.15 Traffic Safety and Control Officer

In order that all matters of traffic safety and control in relation to the control of traffic and the works comply with the necessary requirements, the Contractor shall appoint a Traffic Safety and Control Officer and a deputy,

- One of either shall be available at all times in case of emergency.
- Their names and telephone numbers shall be supplied to the Overseeing Organisation and to the Police.
- They shall be direct employees (and not a Sub-Contractor) who shall be entirely responsible for arranging and agreeing lane closures, liaison with the Overseeing Organisation and the Police in all matters relating to traffic control, controlling traffic during periods of time when traffic restrictions are necessary. and ensuring that all traffic requirements are met.

The responsibilities of the Traffic Safety and Control Officer are to ensure that all traffic requirements are met which shall include liaison with the Overseeing Organisation and the Police concerning the following matters:

- (a) Control of entry and exit of the Works site traffic onto the carriageway in general use.
- (b) For controlling the safe working of plant, machinery and men immediately adjacent to the carriageway open to traffic.
- (c) Inspection and maintenance of all equipment described, arranging duties for watchmen so that the Site is patrolled and inspected at all times and equipment

attended to as required and for dealing with traffic in emergencies including notifying the Police immediately of any accidents and emergencies.

- (d) To notify the Contractor's Agent and of any deterioration of safety precautions, including any part of the Traffic Management Scheme, traffic signs and carriageway road surface.
- (e) The setting up and maintenance of an Emergency Traffic Route, as follows, and ensuring that the emergency services are kept aware of the current route at all times.

The *Contractor* shall provide and maintain at all times an Emergency Route of minimum width 2.4 metres as follows:

A delineated route through the entire length of the carriageway which is for use by the Police, Emergency services and maintenance vehicles;

The route shall also be available as a diversion route for traffic in the interests of road safety, e.g. during serious accidents;

d) Site vehicles may only use the emergency route as a means of access from one part of the site to another, but shall give priority to emergency vehicles;

e) Where the route follows normal carriageway lanes, cones shall be maintained at 9m intervals with road danger lamps 18m intervals at all times.

In other circumstances:-

- where the route deviates from the normal carriageway alignment, it shall be delineated with cones and road danger lamps at 3m intervals between points 50m outside the limits of the divergence, laid to a minimum radius of 50m on its inside edge;
- where excavations, stock piles, parked plant etc. are adjacent to the route, the cones and road danger lamps shall be maintained at 1.5m intervals. Where excavations, stock piles, parked plant etc. are adjacent to the route, the cones and road danger lamps shall be maintained at 1.5m intervals.

f) Monitoring, with the assistance of sufficient mobile personnel and of sufficient other suitable and appropriate aids, the flow of traffic within the area and within the period defined for the operation of the vehicle recovery service;

g) Ensuring that, within 5 minutes of the occurrence of an incident, as defined below, resulting in stationary vehicle(s) on a highway open to the public, the incident is reported to the vehicle recovery service;

h) Recording and logging all incidents and all movements of recovery vehicles and, when called, all movements of the emergency services. For the purposes of this Appendix, an "incident" is defined as a shed load, vehicle breakdown, vehicle abandonment or traffic accident, whether or not the latter involves personal injury.

The Traffic Safety and Control Officer shall be in 24 hour contact with all recovery vehicles by a radio system and in addition by land line or mobile telephone system.

- 1.16 Vehicular and Pedestrian access to side roads, accesses and to all properties shall be maintained unless otherwise directed in the Scheme Information.

- 1.17 The Contractor shall liaise with the local authority defined in the Scheme Information and provide assistance in respect of access for refuse collection to properties bounding the site (one day per week).
- 1.18 No area of carriageway shall be re-opened until a safe surface, free from debris and of sufficient skidding resistance, is available for traffic. All ironwork and steps in construction shall be ramped. The maximum amount that ironwork may be proud of the adjacent carriageway area for temporary ramping is 50mm and all ramps shall have an incline of not exceeding 10%.
- 1.19 Pedestrian walkways shall be provided where required by the Scheme Information. The contractor shall maintain pedestrian crossing points or provide and sign in accordance with chapter 8, safe alternative crossing point(s). Walkways may be existing footways or specifically barriered walkways. Temporary walkways shall be 1.5m wide or more where possible. Footways less than 1.5m wide will only be permissible for short lengths with passing places at either end, and with the agreement of the Overseeing Organisation. The footway width shall be free from obstructions, such as barrier feet, ice, mud, sand etc. or anything which may cause injury to pedestrians. The walkways shall be suitably signed to enable pedestrians to negotiate themselves past the works. The Contractor shall ensure that any pedestrians having difficulty using the walkways is suitably aided.
- 1.20 Bus stops shall be temporarily relocated to a suitable site to the approval of the Overseeing Organisation when the contractor's working restricts their use. The Contractor shall erect temporary bus stop signs and notices to bus users, when the temporary bus stops are in operation. Where a bus stop is to be closed, the contractor shall erect the appropriate signs informing bus users of the closure and provide the necessary safe unobstructed diversion route to the next bus stop. The contractor shall notify the Bus Companies listed in the Scheme Information of the dates and details of the bus lay-by closures, the position of the temporary bus stops and of the diversions that are required.
- 1.21 The contractor shall notify the Overseeing Organisation of his requirement to shut down any traffic signals a minimum of 7 days before the date on which the signals will be shut down. The contractor shall supply and erect temporary signs to TSRGD no P7019 at the locations described in the Scheme Information when the signals are not in use.
- 1.22 Traffic Management 'Convoy System'.

Where the proposed works will leave insufficient space to provide a minimum 0.5m wide Safety Zone, then a 10mph speed restriction shall be applied by a Temporary Traffic Regulation Order. In order to physically enforce the speed restriction order, the Contractor shall use a convoy system as described below to escort vehicles through the works.

The Employer will arrange for a temporary 10mph speed restriction order to allow the contractor to safely complete the works by the use of a 10mph convoy system to escort vehicles through the works. The Contractor must allow time for the implementation of the Order in accordance with paragraph 3 below.

A written 'method of work' statement that includes traffic management layouts with a programme of works must be submitted to the Overseeing Organisation for approval seven days prior to the proposed date of installation. Convoy working arrangements must comply with Chapter 8 Traffic Signs Manual: 2006

'STOP/GO' boards and operators should be available for use where directed by the Overseeing Organisation.

Failure to achieve the lane widths detailed in Chapter 8 will require the 'convoy system' to remain in operation until such time as the through lane width is achieved.

The convoy escort vehicles shall be small hatchback type cars in either white or yellow and have a tight turning circle to turn round in carriageway if required. They should have good visibility with wing mirrors on both sides, have hazard lamps and an amber roof mounted 'flashing' beacon. Class 2 retro-reflectorised signs reading 'Convoy **Vehicle**' on the front and '**Convoy Vehicle - No Overtaking**' to the rear (or mounted back-to-back below the flashing beacon). They should also have side mounted reflective transfers reading '**Convoy Vehicle**' and no other wording or markings.

2.0 Temporary Signing, Road Markings and Studs

- 2.1 The Contractor is to supply and erect/fix all the signs, cones, temporary road studs and markings required, for the Works in accordance with Chapter 8.
- 2.2 Existing permanent traffic sign faces shall be masked by an opaque material, approved by the Overseeing Organisation, when not required or when giving conflicting information to drivers or as directed by the Overseeing Organisation.
- 2.3 All signs shall be in Class 1 reflective material and shall be regularly cleaned. Signs shall be mounted 2.1m high over footways and 1.5m high elsewhere. The Contractor is to submit his proposals for the affixing of signs to the Overseeing Organisation 7 days prior to the commencement of these works. Temporary signs to be attached to existing lighting columns shall be fixed so as not cause any damage to the protective coating of the column.
- 2.5 All conflicting road markings shall be removed or obscured with black self adhesive line material or black paint whilst temporary working is in operation.
- 2.6 The contractor shall design and erect appropriate diversion and information signs in accordance with Traffic Signs Manual Chapter 8 and Traffic Signs Regulations and General Directions Manual for the closure of any roads, junctions or accesses

3.0 Notice Requirements

Notice required by the Overseeing Organisation for him to arrange for:

- (i) Amending or making temporary traffic orders12 weeks
- (ii) Authorising of non-prescribed signs.....4 weeks
- (iii) Authorising temporary traffic signals2 week

4.0 Driver Information Signs

- 4.1 Driver Information Signs to the Traffic Signs Regulations and General Directions manual as detailed below shall be erected in accordance with Clause 117.

Sign 7001.3 WORKFORCE IN ROAD SLOW to be erected before any member of the workforce crosses a live carriageway Sign 7002A shall read “MAJOR ROAD WORKS ON ”.

Sign 7003.1 shall read “WORK STARTS HERE dd mm FOR xx WEEKS”.

Sign 7004 shall read “Replacing worn out road” or similar as detailed in the Scheme Information.

Sign 7005 shall read “Delays possible until dd mm”.

Sign 7006 to be located at the end of road works in each direction.

Sign 7006.1 to be located approximately 50m after all end Datums on all Type A traffic management layouts and in appropriate locations on exit slip roads.

The dd (date), mm (month) and xx (number) are to be agreed with the Overseeing Organisation.

See Traffic Signs Manual Chapter 8, Volume 1, Table B for the sizes of these signs.

4.2 Workforce crossing carriageway

Before any member of the workforce crosses a live carriageway, “Workforce in Road Slow” signs shall be erected. The crossing of a live carriageway shall only be permitted in the following circumstances:

1. **Establish temporary traffic management signs**
2. **Removal of traffic management signs**
3. **Retrieval of debris when instructed.**

The “Workforce in Road Slow” signs shall be removed as soon as works involving people crossing the carriageway are complete.

Members of the workforce required to cross the carriageway shall be physically capable of crossing the carriageway, possibly carrying a sign or cones as necessary.

5.0 Emergency, Accident or Other Incident

In addition to the requirements set out in paragraph 1.12 of the main Framework contract the following shall apply:

- a) The contractor is to carry sufficient stocks of materials manufactured for use as a diesel lift in the event of spillages in the trafficked lanes;
- b) Removal of large debris and restoration of the road surface to a serviceable condition;
- c) The Overseeing Organisation, his representative and traffic safety nominee appointed by the Overseeing Organisation and notified to the *Contractor* shall have the unqualified right to instruct the *Contractor's* workmen and/or *Sub-Contractors* on any matters relating to traffic safety and control during an emergency, accident or other incident.

The contractor should seek the advice of the Overseeing Organisation with regard the requirements for gritting and snow ploughing operations.

6.0 Site Safety, Working Areas and Safety Zones:

- a) Working areas and safety zones shall be as defined in Chapter 8 of the Traffic Signs Manual.
- b) Vehicles may only enter or leave the working area at the designated entry or exit points and must do so in the direction of the traffic flow.
- c) Site traffic shall only be allowed to travel in either direction on a length of carriageway that has been completely closed to public traffic. In all other cases, site traffic shall comply with the Road Traffic Regulations.
- d) A method of merging Site Traffic with Public Traffic shall be agreed prior to commencement. These arrangements may only be amended with the agreement or at the direction of the Overseeing Organisation

APPENDIX 1/18: TEMPORARY DIVERSIONS FOR TRAFFIC

1. Diversion Routes

Temporary diversion routes to be agreed with the Overseeing Organisation and any other affected organisations.

2. Schedule of Prescribed and Non Prescribed Signs to be Supplied by the Contractor

The contractor shall supply, install and maintain the diversion and information signs in accordance with the Traffic Signs Manual Chapter 8 and the Traffic Signs Regulations and General Directions Manual.

APPENDIX 1/19: ROUTING OF VEHICLES

- 1** Unless otherwise stated, access to the Site shall be along the Contract network of Motorways and trunk roads.

APPENDIX 1/20: RECOVERY VEHICLES FOR BREAKDOWNS

1 Recovery vehicles to be provided

- 1.1 Recovery vehicles are required whenever specified in the Scheme Information.
- 1.2 Heavy recovery vehicles:
 - (i) 1 No. heavy recovery vehicles shall be provided in accordance with Clause 120.46 .
- 1.3 Light Recovery Vehicle:
 - (i) 1 No. light recovery vehicle shall be provided in accordance with Clause 120.47.

2 Locations For Recovery Vehicles

- 2.1 The recovery vehicles shall be positioned on site for 24 hours a day 7 days a week whenever traffic management is in operation. In principle the recovery vehicles shall be located up stream of the works in each direction.
- 2.2 Recovery vehicles and operatives private vehicles shall be stationed clear of the carriageway and/or hardstrip on a hard standing. No detritus shall be brought onto the carriageway by the recovery vehicles.
- 2.3 The Contractor shall be responsible for the provision, maintenance and removal of all necessary hardstandings and Recovery Station Cabin designated as the Vehicle Recovery Control Centre complete with toilet/washing facilities at each site.
- 2.4 Use of caravans will not be permitted at the recovery stations.
- 2.5 The Contractor shall also be responsible for the erection, maintenance and removal of all necessary traffic management at these locations.

3 Limits of Service

- 3.1 The vehicle recovery service is to be limited to those vehicles requiring assistance within the traffic management system. In most cases that is between the "500m prior to the initial taper and the "end of works" sign on each carriageway, unless instructed otherwise by the Overseeing Organisation. Any broken down or accident damaged vehicles on the operating carriageway of the trunk road or on the slip road diversion routes shall be removed immediately clear of the Works or off the trunk road at an interchange.
- 3.2 No charge shall be made to the owner or driver of a vehicle so assisted for this service. All drivers so assisted shall be informed by means of a handout leaflet supplied by the Contractor that the tow is free to a point clear of the length of the trunk road on which special traffic management arrangements are in operation and that the recovery vehicle is not able to provide a tow to a garage for repairs as it has to remain stationed on the motorway or trunk road to deal with further incidents. Copies of the leaflet are to be supplied to the Overseeing Organisation for approval prior to the Commencement of the Works.
- 3.3 Drivers should also be informed that they should make their own arrangements for further assistance. A prominent notice shall be displayed at all times on each recovery vehicle provided with this Contract to this effect, clearly stating that the service is FREE and that the recovery vehicle cannot complete the tow to any further destination.
- 3.4 If for any reason, the recovery of a vehicle is likely to take an excessive amount of time the recovery operative must inform the Traffic Safety Officer.

- 3.5 In the event of a stranded motorist failing to co-operate with the instructions of the recovery operative(s), the operative(s) should withdraw to their vehicle and contact the Traffic Safety Officer.

4 Locations for Vehicle Removal

- 4.1 Broken down, accident-damaged or abandoned vehicles shall be removed to a suitable location off the motorway, either at the next junction or another point as agreed with the Overseeing Organisation and the police. The location shall have provision for drivers to contact their own recovery or the Contractor shall provide such provision. Drivers are to be informed that they must make their own arrangements for further assistance. A prominent notice shall be displayed at all times on each recovery vehicle provided with this Contract to this effect, clearly stating that the service is FREE and that the recovery vehicle cannot complete the tow to any further destination.
- 4.2 Vulnerable motorists and their vehicle are to be dropped off at a suitable safe location with access to a telephone. Such locations are to be agreed with the Overseeing Organisation prior to Commencement of Works.
- 4.3 Disposal of abandoned or accident damaged vehicles where the owner cannot be contacted shall be arranged with the police and local authority. The Contractor is to provide the secure compound except for situations where the police advise alternative arrangements.

5 Communication System

- 5.1 The communication system shall be operational at all times that recovery vehicles are required.
- 5.2 A secondary 'back up' system shall also be provided for communications with the Police/Regional Control Centre.
- 5.3 Provision shall also be made for communication between the recovery vehicles and the recovery base station.

APPENDIX 1/21: INFORMATION BOARDS

Unless specified in appendix 1/17, contractor shall provide the scheme information boards in accordance with Traffic Signs Manual Chapter 8 part 1, D4.15.

APPENDIX 1/23: RISKS TO HEALTH AND SAFETY FROM MATERIALS OR SUBSTANCES**(i) Restrictions in relation to working practices.**

Work shall be curtailed where wind causes spreading of hazardous deposits.

Dust, Fumes and Smoke

The Contractor shall not cause excessive dust, fumes or smoke from the following operations:

- (i) Removal of Thermo-plastic white lines
- (ii) Milling bituminous surfacing
- (iii) Sweeping of pavements

The free floating dust shall be kept to a minimum and if required by the Overseeing Organisation shall be dampened with water sprays.

Plant should be sited and screened where necessary to minimise dust emission to adjoining areas.

All stockpiles should be covered to prevent the generation of dust.

The Contractor shall take all measures necessary to prevent spillage on to roads adjoining the site and in wet weather shall prevent mud from the site being carried on to the highway.

Other measures shall be detailed in the Scheme Information.

(ii) Measures to be taken to protect members of the public.

Measures to be taken to protect members of the public are scheduled below. Adequate warning signs shall be provided.

Substance	Hazard	Operation	Special Measures
Phenolic, alkyd and acrylated rubber paints	Harmful/flammable	Coating to steel	Erect signs, barriers and screens to protect from overspray. Restrict access until dry.
Bitumen joint sealing compounds		Sealing joints	Site pre heaters away from public. Restrict access during use and until set.
Cementitious mortars and grout	Irritant	Grouting, bedding concrete repair	Restrict access during application and until set
Concrete	Irritant	General construction	Restrict access during application and until set
Dust generated during cutting of concrete	Irritant	Cutting cement products	Restrict access during cutting.
Concrete curing agents	Flammable/harmful	Curing Concrete	Restrict access during use and until dry.
Silane	Harmful	Surface impregnation of concrete	Restrict access, erect screens to protect public

Dust generated during the cutting of hard woods	Harmful	Cutting/sanding	Restrict access during cutting/sanding operations
Epoxy based points	Flammable/harmful	Coatings to street lights	Erect signs, barriers and screens to protect from overspray. Restrict access until dry.
Galvanising Paints	Flammable/harmful	Coatings to parapets etc	Restrict access during application
Asphaltic materials - Coated road stone	Harmful	Highway construction	Restrict access during laying and until set.
Thermoplastic	Harmful	Line marking	Site pre-heaters well away from public, restrict access during application and until dried.
Cement	Irritant	General Construction	Restrict access during mixing and application until dried
Bitumen	Harmful	Tack coat, Bridge Deck Waterproofing	Restrict access during application and until set.
Treated timber	Low	Fencing, environmental barriers	Restrict access if timber wet and when cutting or sanding
Dust generated during the cutting of soft woods	Low	Fencing, environmental barriers	Restrict access during cutting/sanding operations
Dust generated during the cutting of macadams and asphalts	Low	Cutting	Restrict access while cutting
Siliceous material	Low	Earthworks	Damp down, control operations and site traffic
Dust generated during milling/planning	Harmful	Milling/Planning	Restrict access during milling/planning operations
Flying debris	Harmful	Excavation, milling, hydrodemolition, etc	Restrict access, erect screens
High Pressure Water	Harmful	Hydrodemolition	Restrict access, erect screens to work areas and hosing to protect public from jets. Emergency plan for equipment failures
Spray, waste water	Low	Hydrodemolition	Adequate screening, water seals on overhead gantries, etc. Emergency plan for seal failures etc
Acrylic Based Membrane	Harmful	Sprayed Waterproofing	Restrict access, erect screens to protect public

In the case of sprayed bridge deck waterproofing systems and silane impregnation effective barriers or screens are to be erected to prevent drift of material onto trafficked lanes or areas used by pedestrians. When adjacent traffic stops, such operations should cease until five minutes after traffic has started flowing again.

Additional measures to be taken to protect members of the public are scheduled in the Scheme Information.

(iii) Monitoring to be undertaken by Contractor.

The Contractor shall monitor fumes produced adjacent to public areas. All proprietary products shall be used strictly in accordance with the manufacturer's instructions.

APPENDIX 1/24: QUALITY MANAGEMENT SYSTEM

1 The Contractor shall institute and operate a quality management system complying with BS EN ISO 9001:2000 and Clause 104. The quality management system shall be described in a Quality Plan that shall be submitted to the Overseeing Organisation for acceptance.

The Quality Plan shall cover the following items:

- (i) Contractor's organisation and management
- (ii) Contractor's method statements and construction procedures
- (iii) Contractor's construction quality control
- (iv) Supplier's Quality Plans
(for each of the quality management schemes listed at Appendix A)

2 Quality Plans shall conform with the requirements tabulated in this Appendix, as follows:

CONTRACTOR'S ORGANISATION AND MANAGEMENT

This section of the Quality Plan shall include:

- 1. Definition of the Contract and its documentation.
- 2. The organisation of the Contract, including the line of command and communication between parties involved in the Contract.
- 3. Names, roles, responsibilities and authority of principals and key personnel.
- 4. Control of liaison and meetings with third parties.
- 5. Identification of the Contractor's own staff responsible for overseeing each major activity.
- 6. The main Contractor's control of sub-contracts.
- 7. Document control.
- 8. Programme for submission of method statements and Suppliers' Quality Plans.

The Quality Plan shall identify procedures (which may be a part of the Contractor's general procedures) that cover the topics listed below. Copies of these procedures shall be made available to the Overseeing Organisation on request.

- 9. The quality of plans for sub-contractors and suppliers of work, goods and materials which are the subject of quality management schemes.
- 10. Procedure for the preparation, review and adjustment of programmes for the effective progression of the Works and the recording of this.
- 11. Control and approval of purchases of materials.
- 12. Control of off-site activities (where appropriate).
- 13. Procedures for the regular review and recording by the Contractor of the quality of the Works.
- 14. Control of personnel selection, based on their care, skill and experience.
- 15. Management review/audits to monitor and exercise adequate control over the implementation of the quality plan.
- 16. Any other relevant item.

CONTRACTOR'S METHOD STATEMENTS AND CONSTRUCTION PROCEDURES

This section of the Quality Plan shall include:

- 1. Detailed method statements for each major activity whether directly controlled or subcontracted.

The method statements shall identify hold points and invoke:

- works instructions

- quality control procedures
- compliance testing/inspection requirements
- and work acceptance procedures

for all activities that might affect the quality of the permanent and temporary works.

2. Identify the relevant construction procedures in the Contractor's own Quality Management System (and provide copies on request).

CONTRACTOR'S CONSTRUCTION QUALITY CONTROL

This section of the Quality Plan shall include:

1. Statement of the Contractor's organisation for quality control.

The quality plan shall identify procedures (which may be a part of the Contractor's general procedures) that cover the topics listed below. Copies of these procedures shall be made available to the Overseeing Organisation on request.

2. Arrangements for "receiving" and "in-process" testing.
3. Control of test laboratories.
4. Control of test, measuring and inspection equipment.
5. Document control.
6. Procedure for monitoring and recording the inspection, test and approval status of the constructed/installed work.
7. Procedures for tests and inspections for the purpose of the Contractor certifying that prior to covering up, each part of the Works are complete and conforms to the Contract.
8. Procedure for the review of work submitted for review but not accepted as conforming to the Contract.
9. Procedure for the collation of quality records as identified in BS EN ISO 9002, and provision or copies when requested by the Overseeing Organisation.

SUPPLIERS' QUALITY PLANS

The Quality Plan shall include:

1. Definition of the product or service to be provided.
2. The organisation of the Supplier describing the line of command and stating the name of the senior manager responsible for the contracted Work and the name of the Supplier's on-site management representative. Contact addresses, telephone numbers, etc, shall be provided.
- 3.* Identification of the relevant parts of the Supplier's quality system relevant to the product or service being provided. (Copies to be provided to the Overseeing Organisation on request.)
4. The control of personnel selection (at works and on site), including special requirements for skilled personnel e.g. certification of welders, training of operatives, experience requirements etc.

Specific procedures for the following:

- 5.* Receipt and examination of certificates of conformity and test results for purchased products.
- 6.* Product identification and traceability.
- 7.* Handling, storage, packaging and delivery to Site and storage and handling on Site.
8. Quality records.

Items marked * Where available and appropriate, copies of the Supplier's quality system/general procedures may be acceptable.

3 Items i) and iii) of the Quality Plan shall be submitted to the Overseeing Organisation for its acceptance not later than 21 days after award of the Contract.

The Contractor shall submit other parts of the Quality Plan prior to the commencement of any related work or activity and to a timetable included in item i).

APPENDIX 1/25: TEMPORARY CLOSED CIRCUIT TELEVISION (CCTV) SYSTEM FOR THE MONITORING OF TRAFFIC

1. Requirements for Temporary Closed Circuit Television (CCTV) system:
 - 1.1. The Contractor shall supply, install, maintain, and subsequently remove the temporary closed circuit television (CCTV) system, as specified in Clause 125 (SHW), for the entire period that traffic management is required, to accommodate works where recovery vehicles are necessary and, in addition where narrow lanes are to be employed.
 - 1.2. 1no. CCTV camera unit shall be provided for each monitored lane.
 - 1.3. CCTV shall be operational for the hours of operation of the traffic management unless agreed otherwise with the Overseeing Organisation.
2. Camera(s) for the Temporary Closed Circuit Television System shall be located in accordance with manufacturer's specifications.
3. The monitoring station shall be equipped with a monitoring screen capable of being switched between all cameras and a recording/playback facility.
4. The CCTV System shall be installed and tested before the works to be monitored commence. It shall operate continuously throughout the duration of the works.
5. If the Contractor wishes to fix cameras to existing structures technical approval will be required from the maintaining authority. It shall be the Contractor's responsibility to secure any such approvals.

APPENDIX 1/26: TEMPORARY AUTOMATIC SPEED CAMERA SYSTEM FOR THE ENFORCEMENT OF MANDATORY SPEED LIMITS AT ROAD WORKS (TASCAR)**General**

1 The Contractor shall supply, install, maintain in conjunction with the Chief Officer of Police and remove on completion the Temporary Automatic Speed Camera System for the Enforcement of Mandatory Speed Limits at Road works (TASCAR) as described in this Appendix and in Appendix 1/27. Wherever the 'Chief Officer of Police' occurs in this Appendix it shall be construed to refer to the Chief Officer of Police named in Appendix 1/27. The Contractor shall ensure that the system is completely installed and fully operational from the time defined in Appendix 1/27 and that it remains in operation for the duration of the Contract unless otherwise specified in Appendix 1/27.

For reference use Highways Agency publication **"Speed Limit Enforcement at Road works: Guidance and Best Practice"**

2 As a prescribed device under the provisions of the Road Traffic Act 1991, all equipment shall conform as a minimum to the requirements of the Home Office "The Speed meter Handbook" (fourth Edition) issued by the Police Scientific Development Branch (PSDB), Publication No 15/05, and have received 'type approval' from the Secretary of State at the Home Office. Should there be any inconsistency between the requirements of the contract and HOTA the latter should take precedence. All equipment shall be so maintained by the Contractor throughout the period that the TASCAR is required to be provided, as specified in Appendix 1/27.

3 The number of monitoring sites required for this Contract is as specified in Appendix 1/27 or the Scheme Information. All equipment necessary to bring the sites into operation shall be provided by the Contractor.

4 The Contractor shall be responsible for the design of the System which shall be approved by the Overseeing Organisation and the Chief Officer of Police before installation commences. The Contractor shall contact the Chief Officer of Police to determine operating requirements.

Average Speed Measuring System

5 The system shall include one or more linked pairs of camera outstations located at entry and exit points of a defined zone or zones as specified in Appendix 1/27 or the Scheme Information. Each pair of camera outstations shall include one entry outstation and one exit outstation unless otherwise specified. The camera outstations shall be connected to one or more roadside cabinets as referred to below.

6 There shall be an adequate electrical supply to all components of the system

Camera and Control Unit

7 The equipment shall be capable of calculating the average speed of vehicles over a defined zone and generating a record of those violating a preset threshold.

8 The violation record shall include an image of the target vehicle in the context of its surroundings and the registration number of the target vehicle will be legible in all but adverse lighting and poor weather conditions.

9 A record of detected violations shall be written onto Write Once Read Many (WORM) disks in accordance with the requirements of the Home Office Type Approval (HOTA). WORM disks shall be capable of storing at least 8000 speed violation records. WORM disks shall be supplied as specified below (Para 22). WORM disks shall be housed within an enforcement cabinet, the location of which shall be as agreed with the Overseeing Organisation. The equipment shall be stored such that only authorised personnel may gain access to it.

- 10 Each speed violation record shall have the following information as a minimum:
- a) Data of violation displayed in Day, Month, Year;
 - b) Time of violation displayed in Hours, Minutes, Seconds;
 - c) Average Speed of offending vehicle;
 - d) Site Identification Code;
 - e) Offence number;
 - f) WORM disk reference number;
 - g) Distance and time taken to travel between the entry and exit cameras
- 11 The system shall have an inbuilt self test mechanism and shall not be capable of operation while any fault in the system exists.
- 12 The control unit shall be capable of recording the total number of vehicles monitored and the total number of offences above an operator-specified threshold

Dummy Equipment

- 13 The dummy equipment shall be designed to be portable and easily transferable between housings and of external appearance indistinguishable from that of a live one.

Street Furniture

- 14 Camera outstations shall be installed such that there is a minimum height clearance of 5.41m over any part of the pavement or verge capable of being trafficked. There shall be an unrestricted view from the camera of the section of carriageway to be monitored. Camera outstations are to be mounted on purpose- designed columns. Where this is impracticable, suitable existing structures may be used.
- 15 When the camera outstation is column mounted, the column and foundation design shall comply with BD 94/07, 'Design of Minor Structures'. The Contractor shall provide the Overseeing Organisation with 2 copies of certified drawings of the cameras columns and foundation for approval.

Installation

- 16 The Contractor shall install the equipment required under this Appendix and Appendix 1/27 and in accordance with any particular installation requirements in Appendix 1/27
- 17 The distance between linked outstations shall be measured in accordance with the requirements of the HOTA.
- 18 The video cable connecting each camera outstation to the roadside cabinet shall be surface laid or tied to barriers as directed. Where the cable is to cross any carriageway this shall be by means of bridges, gantries or ducts as defined in Appendix 1/27 or as specified in the Scheme Information. Where ducts are used, these are to be rodded and roped prior to cable installation by the main contractor
- 19 The Contractor shall carry out any necessary reinstatement on removal.

Commissioning and Acceptance

- 20 The Contractor shall be responsible for the commissioning of the TASCAR as a whole, including secondary checks and the calibration of each piece of equipment, including ensuring its correct operation.

21 The commissioning of the TASCAR shall be carried out by the supplier of the system in the presence of and for acceptance of the Chief Officer of the Police. The Contractor shall give at least 4 days notice of his intention to carry out this work to allow for a designated representative of the Chief Officer of Police to attend. Commissioning certificates shall be provided to the Overseeing Organisation

Operation and Maintenance

22 The TASCAR operator will be the Chief Officer of Police and his delegated officers. Once the TASCAR has been commissioned any redirecting of the camera outstations or the switching of detection equipments between zones will be the responsibility of the Chief Officer of Police as operator. He will also be responsible for the loading and unloading of WORM disks Each enforcement cabinet shall be provided with 1 WORM disk per week and replacement disks shall be provided by the supplier to the Contractor The Contractor shall furnish whatever assistance is requested by the Chief Officer of Police through the Overseeing Organisation to carry out these tasks.

23 The Contractor shall provide all temporary speed limit signs, repeater signs and other associated signing, and provide the Overseeing Organisation with a log showing the locations of all such signs relative to existing marker posts.

24 The Contractor and his supplier shall maintain the System as specified in paragraphs 1 to 4 above and in Appendix 1/27.

APPENDIX 1/27: TEMPORARY AUTOMATIC SPEED CAMERA SYSTEM FOR THE ENFORCEMENT OF MANDATORY SPEED LIMITS AT ROAD WORKS (TASCAR) – PARTICULAR REQUIREMENTS

Scope

- 1 A camera outstation consists of a video camera and its infra-red lighting source. A pair of linked camera outstations is required for each monitored lane within a speed controlled zone. The number of lanes to be monitored within the speed controlled zone is 2 no. The lanes to be monitored are to be confirmed on site. Length of site is 2000m.
- 2 The Contractor shall supply install and maintain and remove on completion the TASCAR specified in Appendix 1/26 and in this Appendix at the locations agree with the Police and the Overseeing Organisation.

Chief Officer of Police

- 3 The Chief Officer of Police in Appendix 1/26 is the CPO for affected police district(s).

Provision of Write Once Read Many (WORM) disks

- 4 Each roadside cabinet shall be provided with a WORM disk as specified in Appendix 1/26. Replacement disks will be provided by the Contractor at the rate of one disk per week of operation of the system.

Installation, Commissioning and Period of Operation

- 5 Camera outstations shall be installed and commissioned at least 12 hours before installation of the temporary traffic management is complete. They shall remain in continuous operation until removal of the temporary traffic management arrangement commences. The above shall apply for each and every phase of temporary traffic management unless directed otherwise by the Overseeing Organisation. At the end of the period of operation required under the Contract the equipment shall remain the property of the Contractor.

Reinstatement of Surfaces

- 7 Reinstatement of verge areas shall consist of backfilling any hole(s) with acceptable material to Clause 601 up to a level 100mm below specified finished levels. The remaining 100mm thickness shall be filled with topsoil Class 5B to Clause 601.
- 6 Reinstatement of paved footway areas shall consist of backfilling any holes with sub-base Type 1 to Clause 803 and compacting adequately such that this terminates 65mm below specified finish levels. The remaining 65mm thickness shall be backfilled with a 50mm thick layer of dense macadam (20mm aggregate) to Clause 906 covered by 15mm thickness of dense macadam wearing course (6mm aggregate) to Clause 909. The wearing course shall extend not less than 150mm beyond the hole which has been backfilled and shall be keyed into existing surfacing by its prior excavation to a depth not greater than 15mm.

Temporary Traffic Signs

- 9 Additional temporary traffic signs may be needed to operate with TASCAR, the Overseeing Organisation will advise the Contractor of the type and quantity of signs required.

APPENDIX 1/71:

General

1. The security measures adopted by the Contractor shall, as a minimum, consist of the following:
 - 1.1.1. The Contractor shall appoint a Security Co-ordinator who shall make all arrangements necessary for site security. The Security Co-ordinator shall have one or more nominated deputies. The Contractor shall provide the Overseeing Organisation with the names of this co-ordinator and his nominated deputies and with telephone numbers or details of other means by which they or one of them can be contacted at any time. The Security Co-ordinator or his nominated deputy shall be on the Site at all times during working hours and shall be readily available to deal with matters related to site security.
 - 1.1.2. A dedicated security guard shall be present on of the site to monitor security at all times outside of working hours. The security guard shall inspect all parts of those site areas at intervals, the longest of which shall not exceed 1 hour. A log of all inspections shall be maintained and be available to the Overseeing Organisation upon request.
 - 1.1.3. Security fencing and gates shall be provided around the perimeter of the working areas. The precise location of the fencing and gates shall be agreed with the Overseeing Organisation on site. The security fencing shall as a minimum be 1.8m high chainlink as detailed in the Highway Construction Details Drawing H11.
 - 1.1.4. The Contractor shall ensure that steps, ladders or other plant that could be used to gain access to the works are not left accessible outside working hours.
 - 1.1.5. Outside of working hours scaffolding and steelwork accessible from ground level shall have security fencing erected around its perimeter to prevent unauthorised access.
2. The provision of these security measures does not relieve the Contractor of his obligations under the Contract.
3. The Contractor shall provide security cover from commencement of the Works until completion of the Works unless otherwise agreed with the Overseeing Organisation.

APPENDIX 2/3: RETENTION OF MATERIALS ARISING FROM SITE CLEARANCE

1. Unless otherwise stated in the Package Order, all materials from site clearance to be disposed to tip off site.

APPENDIX 2/4: EXPLOSIVES AND BLASTING

1. Explosives shall not be used.

APPENDIX 3/1: FENCING, GATES AND STILES

Details of fencing shown on Highway Construction Details drawings H1 to H48.

APPENDIX 4/1: ROAD RESTRAINT SYSTEMS (VEHICLE AND PEDESTRIAN)

1 Location:

1.1 Vehicle Restraint Systems

(i) The location, Containment Level, Impact Severity Level (ISL), Working Width Class, maximum height that allows the required visibility, and the Length of Need requirements for safety barriers and transitions are shown in the Scheme Information.

(ii) The location, Containment Level, Impact Severity Level (ISL), and Working Width Class requirements for vehicle parapets are shown in the Scheme Information.

(iii) The location, Performance Class, Impact Severity Level (ISL), Permanent Lateral Displacement Zone (PLDZ) Characteristic, Exit Box Class (D), and maximum height that allows the required visibility requirements for terminals are shown in the Scheme Information.

(iv) The location, Performance Level, Type of *Crash cushion (R) or (9NR)*, Impact Severity Level (ISL), Redirection Zone Class (Z), are shown in the Scheme Information.

(v) Permanent Lateral Displacement Zone Class (D) and maximum height that allows the required visibility requirements for crash cushions are shown in the Scheme Information.

1.2 Pedestrian Restraint Systems

(i) The location for pedestrian parapets and pedestrian guardrails are shown in the Scheme Information.

1.3 Anti-glare Screens

(i) The location for anti-glare screens are shown in the Scheme Information.

2 Pedestrian Restraint Systems

2.1 Requirements for pedestrian parapets and pedestrian guardrails - see also Table C.1 of BS 7818

3. Anti-glare Screens

3.1 Shall conform to CI 412 and any requirements given in the Scheme Information.

2 Testing

2.1 The Contractor shall supply details of proposed Vehicle Restraint Systems in accordance with Clause 401, 402, and 403.

2.2 The Contractor is to provide testing equipment and carry out testing in accordance with Clauses 404, 406, 407, 409, and 410 and Appendix 1/5 as appropriate.

3 Temporary Safety Barriers

Temporary Safety Barriers are to be provided in accordance with Clause 401 and 405 at locations as defined in the Scheme Information.

APPENDIX 4/2: INFORMATION REQUIRED TO DEMONSTRATE COMPLIANCE OF ROAD RESTRAINT SYSTEMS TO BS EN 1317-1, BS EN 1317-2, BS EN 1317-3 AND DD ENV 1317-4:2002

The Contractor shall submit the following supporting information demonstrating compliance with BS EN 1317-1, BS EN 1317-2, BS EN 1317-3 and DD ENV 1317-4:2002 to the Overseeing Organisation for acceptance:

EUROPEAN COMMITTEE FOR STANDARDIZATION (CEN) COMPLIANCE See Note 1

Initial submission documents to be supplied for consideration of initial type test are as follows:

1. Test report in accordance with BS EN1317-1, clause 9 (and including any additional test data required under BS EN 1317-3, clauses 7.3 and 7.4 and DD ENV 1317-4:2002, clauses 7.3 and 7.4).
2. Video/high speed film of test annotated showing date, test number and performance class.
3. Still photographs of complete installation including anchorage points.
4. Still photographs of vehicle before and after impact.
5. Full drawings of tested items.
6. Certification from the manufacturer that the item tested complies with drawings supplied.
7. Certificate from test house accredited in accordance with the requirements of Series 400 (MCHW 1.400).

Additional information, which will be required on acceptance of initial type test prior to installation.

8. Manufacturer's specification.
9. Installation drawings.
10. Manufacturer's installation instructions including foundation requirements and test methods to verify their performance.
11. Manufacturer's repair and maintenance manual.
12. Certificate of compliance with the Quality Management Scheme 1 for the Manufacture of Fencing Components. See Note 2.
13. Compliance with the Quality Management Sector Scheme 2 - Supply and Installation of Fences:
 - (i) Sector Scheme 2B for Vehicle Restraint Systems. See Note 2.
14. Certificate of compliance for the Quality Management Sector Scheme 5 for the Manufacture and Installation of Bridge Parapets and Cradle Anchorages. See Note 3: (11/06)
 - (i) Sector Scheme 5A for the Manufacture of Parapets for Road Restraint Systems; and (11/06)
 - (ii) Sector Scheme 5B for the Installation of Parapets for Road Restraint Systems. (11/06)
15. Nominal loads (direct forces, moments and co-existent shears) to be transferred from the parapet to the structure or foundation. See Notes 2 & 3.

Notes:

1. All documents, which are not in English, will have to be translated. If they are in a language other than French or German the promoter will be required to supply a full translation.
2. Items 12 and 13 are required for safety barrier systems and transitions
3. Items 14 and, 15 are required for vehicle parapets. See also Note 1 under Sector Scheme B in Appendix A of the Specification for Highway Works. (11/06)

SUBMISSION FOR COMPLIANCE WITH BS EN 1317-1, BS EN 1317-2, BS EN 1317-3 and DD ENV 1317-4:2002

TYPE OF VEHICLE RESTRAINT SYSTEM:

CONTAINMENT PERFORMANCE CLASS/PERFORMANCE LEVEL/PERFORMANCE CLASS (*):

TEST REPORT NUMBER: (Test of)

Test Type: (Primary/Complementary Test) (*)

TEST NUMBER: TEST DATE: (*) delete as appropriate

COMPANY NAME:

CONTACT:

ADDRESS:

Tel: / Fax: / E-mail:

PRODUCT NAME:

Initial submission documents to be supplied for consideration of Initial Type Test (ITT).

Item	Comment	Item Received (Y or N)	Date requested
1	Test report	In accordance with BS EN1317-1, clause 9 (and including any additional test data required under BS EN 1317-3, clauses 7.3 and 7.4 and DD ENV 1317-4:2002, clauses 7.3 and 7.4).	
2	Video/high speed film	Of test coverage as specified in relevant part of BS EN 1317 or DD ENV 1317-4:2002. Annotated showing date, test number and performance class.	
3	Still photographs	Of complete installation including anchorage points.	
4	Still photographs	Of vehicle before and after impact.	
5	Drawings	Fully detailed drawings of tested item.	
6	Certification from the manufacturer	Confirming that the item tested complies with drawings supplied.	
7	Confirmation from test house	That the test conforms to the relevant requirements of BS EN 1317-1 (and including any additional test data required under BS EN 1317-2, BS EN 1317-3 and DD ENV 1317-4:2002).	

Additional information, which will be required on acceptance of initial type test prior to installation.

8	System specification	Manufacturer's specification.	
9	Installation details	Manufacturer's drawings.	
10	Installation procedures	Manufacturer's installation instructions.	
11	Maintenance Manual	Manufacturer's inspection, repair and maintenance instructions.	
12	Certificate of compliance	With the Quality Management Scheme 1 for Manufacture of Fencing Components. ²	
13	Certificate of compliance	With the Quality Management Sector Scheme 2B for the Supply and Installation of Vehicle Restraint Systems. ² (11/06)	
14	Certificate of compliance	(11/06) With the Quality Management Sector Schemes 5A and 5B for the Manufacture and Installation of Bridge Parapets and Cradle Anchorages ³ : (i) Sector Scheme 5A for the Manufacture of Parapets for Road Restraint Systems; and (ii) Sector Scheme 5B for the Installation of Parapets for Road Restraint Systems.	
15	Support loads	Nominal loads (direct loads, bending moments and shear forces) that have to be transferred from the vehicle restraint system to the supporting structure or foundation. ³	

Notes:

1. All documents, which are not in English, will have to be translated. If they are in a language other than French or German the promoter will be required to supply a full translation.

2. Items 12 and 13 are required for safety barrier systems and transitions.

3. Items 14 and 15 are required for vehicle parapets. See also Note 1 under Sector Scheme B in Appendix A of the Specification for Highway Works. (11/06)

Signature:

Name:

Date:

SUBMISSION FOR COMPLIANCE WITH BS EN 1317-1, BS EN 1317-2 and DD ENV 1317-4:2002						
TYPE OF VEHICLE RESTRAINT SYSTEM:			Safety Barrier, Vehicle Parapet or Transition (*)			
CONTAINMENT PERFORMANCE CLASS/LEVEL(*)						
TEST REPORT NUMBER:			(Test of)			
Test Type: (Primary/Complementary Test) (*)						
TEST NUMBER:			TEST DATE: (*) delete as appropriate			
COMPANY NAME:						
CONTACT:						
ADDRESS:						
Tel: / Fax: / E-mail:						
PRODUCT NAME:						
			Specified	Actual	Satisfactory (Yes or No)	Compliance
BS EN 1317-1, Table 1	Vehicle Details	Impact Conditions				
		Total vehicle mass (kg)	 (± ...)			
		Speed (km/h)	 (0, +7%)			
		Angle (degrees)	 (-1, + 1.5)			
		Centre of Gravity				
		Vertical height (m)	 (± 10%)			
		Longitudinal (m)	 (± 10%)			
		Lateral (m)	±			
		Model				N/A
BS EN 1317-2, clause 4.2	Vehicle Restraint System (VRS) Behaviour	1) The VRS shall contain and redirect the vehicle without breakage of principal longitudinal elements of the system. 2) No major part of the VRS shall become totally detached or present an undue hazard to other traffic, pedestrians or personnel in a work zone. 3) Elements of the VRS shall not penetrate the passenger compartment of the vehicle. Deformations of, or intrusions into the passenger compartment that can cause serious injuries are not permitted. 4) Ground anchorages and fixings shall perform according to the design of the VRS.				
BS EN 1317-2, clause 4.3	Vehicle Behaviour	1) The centre of gravity (CG) of the vehicle shall not cross the centreline of the deformed system. 2) The vehicle shall remain upright during and after impact, although moderate rolling, pitching and yawing are acceptable. 3) The vehicle shall leave the VRS after impact, so that the wheel track does not cross a line parallel to the initial traffic face of the VRS, at a distance A (2.2 m) plus vehicle width + 16% of the length of the vehicle within a distance B (10 m) from the final intersection (break) of wheel track with the initial traffic face of the VRS.				
BS EN 1317-2, clause 5.3.2	Installation	1) The length of the VRS shall be sufficient to demonstrate the full performance characteristics of the system. 2) If the VRS has to develop tension, end anchorages shall be provided in accordance with the VRS specification. Post foundation shall meet the design specification.				
BS EN 1317-2, clause 4.4	Severity Indices	SPECIFIED THIV Limit 33 km/h PHD Limit 20 g ASI Limit 1.4	ACTUAL THIV km/h PHD g ASI			
BS EN 1317-2, clause 5.7, Figure 3	Photo-graphic coverage	1) Photographic coverage shall be sufficient to clearly describe behaviour and vehicle motion during and after impact. 2) High speed cameras shall be operated at a minimum of 200 frames per second and stills. 3) As recommended in clause 5.7 and Figure 3.				
	Drawings	Drawings included				
					N/A = Not Applicable	
FULLY COMPLIES WITH STANDARD: BS EN 1317-1, BS EN 1317-2, DD ENV 1317-4:2002						
Signature:			Name:			
Date:						

SUBMISSION FOR COMPLIANCE WITH BS EN 1317-1 and BS EN 1317-3					
TYPE OF VEHICLE RESTRAINT SYSTEM:		Crash cushion (Redirective [R] or Non-redirective [NR])(*)			
TEST REPORT NUMBER:		TEST TYPE: (Primary/Complementary Test) (*)			
PERFORMANCE LEVEL:		VELOCITY CLASS: (Test of)			
TEST NUMBER:		TEST DATE: (*) delete as appropriate			
COMPANY NAME:					
CONTACT:					
ADDRESS:					
Tel: / Fax: / E-mail:					
PRODUCT NAME:					
		Specified	Actual	Satisfactory (Yes or No)	Compliance
BS EN 1317-1	Vehicle Details	Impact Conditions Total vehicle mass (kg) (± ...) Speed (kmh) (0, +7%) Angle (degrees) (-1, + 1.5)			
		Centre of Gravity Vertical height (m) (± 10%) Longitudinal (m) (± 10%) Lateral (m) ±			
		Model			N/A
BS EN 1317-3, clause 6.2	Crash Cushion Behaviour	1) Elements of the crash cushion shall not penetrate the passenger compartment of the vehicle. Deformations of, or intrusions into, the passenger compartment that could cause serious injuries are not permitted. 2) No major element of the crash cushion, having a solid mass greater than or equal to 2.0kg, shall become totally detached, unless this is required by the working of the crash cushion. No major element of the crash cushion shall impede the path of adjacent traffic. The final position of the detached element shall be considered to determine the displacement classification.			
BS EN 1317-3, clause 6.3	Vehicle Behaviour	1) The vehicle shall remain upright during and after the collision although yawing and moderate rolling and pitching are acceptable. The post-impact trajectory of the test vehicle shall be controlled by means of the exit box shown in Figure 2 and specified as detailed in Tables 11 and 12.			
BS EN 1317-3, clause 7.3.2	Installation	1) The installation of the crash cushion for the test shall comply with the structural design details and the on-road system details as given in the design specification.			
BS EN 1317-3, clause 5.4 and Table 4	Impact Severity Levels	SPECIFIED Level A: THIV ≤ 44km/h (Tests 1, 2 & 3) THIV ≤ 33km/h (Tests 4 and 5) ASI ≤ 1.0 Level B: THIV ≤ 44km/h (Tests 1, 2 & 3) HIV ≤ 33km/h (Tests 4 and 5) ASI ≤ 1.4 Levels A & B: PHD ≤ 20 g	ACTUAL		
BS EN 1317-3, clause 7.7, Figure 4	Photo-graphic coverage	1) High speed cameras and/or high speed video cameras shall be operated at minimum of 200 frames per second. 2) Stills 3) As recommended in clause 7.7 and Figure 4.			
	Drawings	Drawings included			
				N/A = Not Applicable	
FULLY COMPLIES WITH STANDARD: BS EN 1317-1 and BS EN 1317-3					
Signature:			Name:		
Date:					

SUBMISSION FOR COMPLIANCE WITH BS EN 1317-1 and DD ENV 1317-4:2002 TYPE OF VEHICLE RESTRAINT SYSTEM: Terminal PERFORMANCE CLASS: (Test of) Test Type: (Primary/Complementary Test) (*) TEST TYPE NUMBER: TEST NUMBER: TEST DATE: (*) delete as appropriate						
COMPANY NAME: CONTACT: ADDRESS: Tel: / Fax: / E-mail: PRODUCT NAME:						
			Specified	Actual	Satisfactory (Yes or No)	Compliance
BS EN 1317-1, Table 1, DD ENV 1317-4: 2002, clauses 7.4 and 7.5	Vehicle Details	Impact Conditions				
		Total vehicle mass (kg)	 (± ...)			
		Speed (kmh)	 (0, +7%)			
		Angle (degrees)	 (-1, + 1.5)			
		Centre of Gravity				
		Vertical height (m)	 (± 10%)			
		Longitudinal (m)	 (± 10%)			
		Lateral (m)	±			
		Model				N/A
DD ENV 1317-4: 2002, clauses 5.4 and 5.5.2	Terminal Behaviour	1) Elements of the terminal shall not penetrate the passenger compartment of the vehicle. Deformations of, or intrusions into, the passenger compartment that could cause serious injuries are not permitted. 2) No major part of the terminal shall become totally detached and come to rest outside the permanent lateral displacement zones defined in clause 5.4. 3) Anchorages and fixings shall perform to the terminal design specifications and other specified requirements as listed in the test report.				
DD ENV 1317-4: 2002, clause 5.5.3	Vehicle Behaviour	1) The vehicle shall not overturn, although rolling, yawing and moderate pitching may be accepted. For the Performance Class P1 rolling onto a side may be accepted. (11/06) 2) The exit box values for the specified test are as defined in Figures 5.6 and 7 (as appropriate).				
DD ENV 1317-4: 2002, clause 7.3.2	Installation	1) The terminal shall conform to the structural design details and with the system installation details as given in the design specification of the manufacturer.				
DD ENV 1317-4: 2002, clause 5.5.4 and Table 5	Impact Severity Classes	SPECIFIED Level A: THIV ≤ 44km/h (Tests 1, 2 & 3) THIV ≤ 33km/h (Tests 4 and 5) ASI ≤ 1.0 Level B: THIV ≤ 44km/h (Tests 1, 2 & 3) HIV ≤ 33km/h (Tests 4 and 5) ASI ≤ 1.4 Levels A & B: PHD ≤ 20 g		ACTUAL		
DD ENV 1317-4: 2002, clause 7.7 and Figure 7	Photo-graphic coverage	1) Photographic coverage shall be sufficient to describe clearly terminal and vehicle motion during and after impact. 2) High speed cameras and/or high speed video cameras at a minimum of 200 framer per second. 3) Stills.				
	Drawings	Drawings included				
					N/A = Not Applicable	
FULLY COMPLIES WITH STANDARD: BS EN 1317-1 and DD ENV 1317-4:2002						
Signature:				Name:		
Date:						

APPENDIX 5/1: DRAINAGE REQUIREMENTS

- 1 Plastic Pipes:
 - (a) Ultimate pipe stiffness (STES) in excess of 1400 N/m² when tested in accordance with BS4962.
 - (b) Resistance to impact complying with BS4962 except that the striker used in the test shall have a mass of 1kg and a 25mm hemispherical radius.

3 Joints in surface water drains shall be watertight.

4 Existing land drains severed by the works are to be connected into the drainage system in accordance with Cl. 511.

5 Covers to Chambers and Gullies including replacement of covers, gratings.

Covers to chambers and gullies to be used on this Contract shall comply with BS EN 124 as follows:

Chambers

BS EN 124 Ref D400 comprising: Ductile heavy duty, double triangular, three point suspension, non-rocking cover suitable for trunk roads. Opening to be square. Minimum size 600x600mm.

When situated in the carriageway or other paved surface, the Polished Skid Resistance Value is to be no less than the adjacent surfacing. PSRV for chamber covers must comply with HD28/04

Where chamber cover levels are to be increased the maximum number of brick layers shall be three. Increases in excess of this shall be carried out in chamber rings.

Gullies

BS EN 124 Ref D400 suitable for trunk roads comprising: double triangular two piece (as two triangular segments), non-rocking gully grating with minimum waterway area 1230cm². Minimum size of grating shall be 440mm x 400mm.

Where covers and gratings are being adjusted or replaced, they shall be bedded using a proprietary quick setting high strength mortar in accordance with clause 507.18

6 Cleaning of Existing Drainage Systems

Existing drainage systems to be cleared are shown in the Scheme Information.

7. Testing the Drainage System

All new carrier, foul and filter drains and linear drainage but excluding all fin and narrow filter drains shall be surveyed by Closed Circuit Television (CCTV) and records handed over to the Overseeing Organisation.

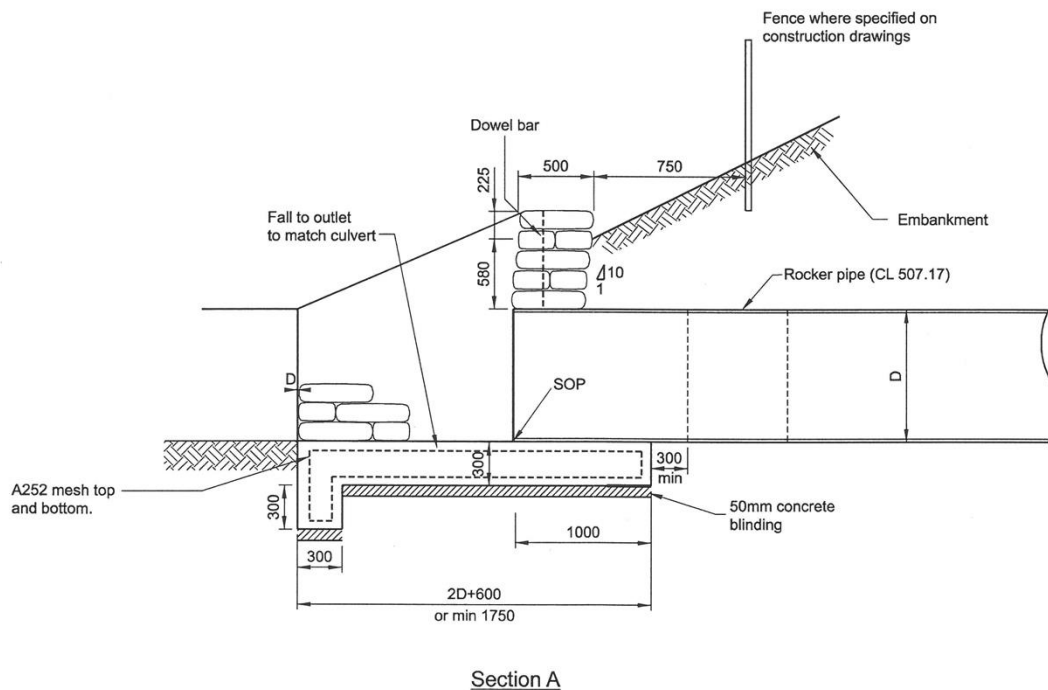
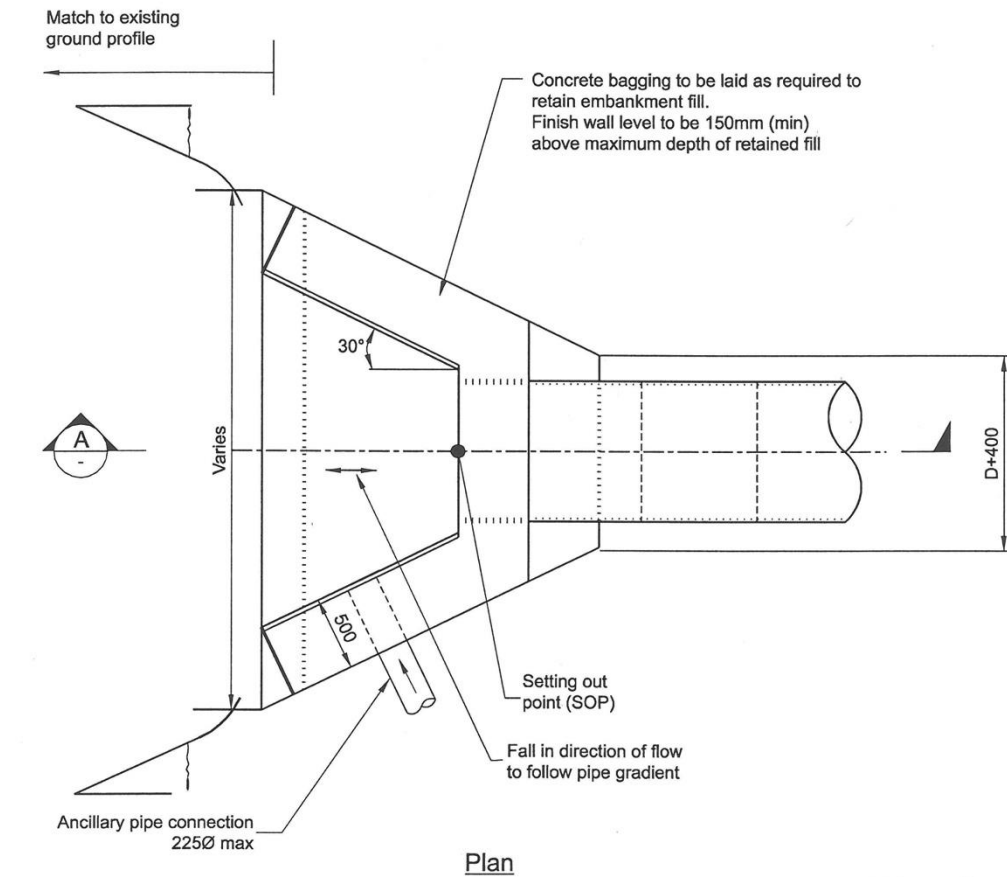
During the progress of the Works all existing chambers, gullies and rodding eyes shall be kept clean and free from obstruction. On completion of the whole of the Works, all new chambers, gullies and drains including verge/surface water drains and filter drains excluding all fin and narrow file drains shall be flushed from end to end with water and left free from obstructions. Catchpit chambers shall be left clean and free from silt.

The Contractor shall comply with Clause 516 for any Combined Drainage and Kerb System which is installed. The Contractor shall perform a Load Test on the installation at a frequency of a minimum of 1 test and not less than 1 test per 1000m of each type and source. The Contractor shall supply certification of compliance to the Overseeing Organisation

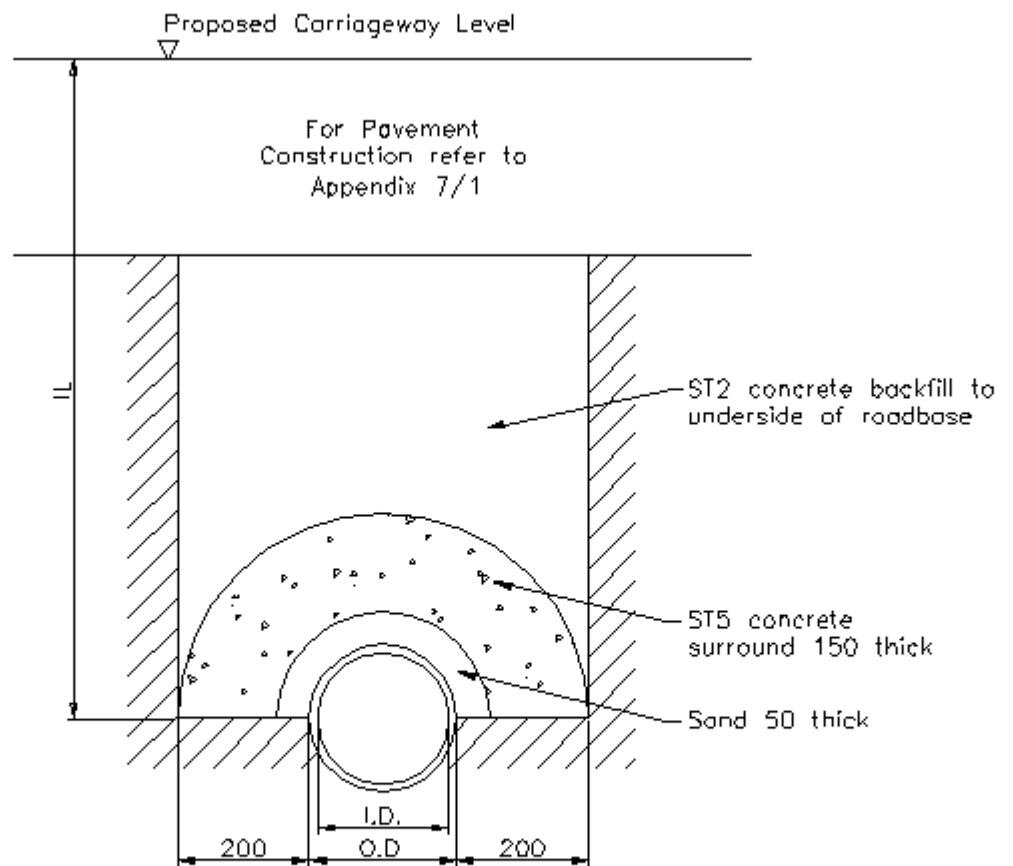
The Contractor shall comply with Clause 517 for any Linear Drainage System which is installed. The Contractor shall perform a Load Test on the installation at a frequency of a minimum of 1 test and not less than 1 test per 1000m of each type and source. The Contractor shall supply certification of compliance to the Overseeing Organisation.

The Contractor shall comply with Clause 518 for any Thermoplastic Structured Wall pipes and fittings used. The Contractor shall supply certification of compliance to the Overseeing Organisation

- 8 Connections between new and existing pipes shall use proprietary joints/sleeves. Saddled connections may be made for pipes no larger than 150mm diameter. Before connecting new drains into existing drainage runs trial pits should be dug to ascertain the exact level of the existing pipe.
- 9 A functioning drainage system (permanent or temporary) shall be in place before any operational drainage features are removed or modified.
10. Headwall construction details as provided in the figures below. Location details to be provided as part of the Scheme Information. For all pipelines terminating in headwalls, the nearest joint to any headwalls shall be not more than 500mm from the back face of the headwall and shall not be restricted by any concrete. Between this and the next joint, the length of the articulated pipe shall be agreed on site with the Overseeing Organisation.



11. The detail for the concrete protection to existing drains, service ducts or service mains is given below.



Detail Of Concrete Protection to Existing Drains, Service Ducts or Service Main

SCHEDULE OF PIPE/BED COMBINATIONS - CARRIER DRAINS

Pipe Dia. (mm)	Pipe Group No.	Vitrified Clay			Precast Concrete			Asbestos Cement			Unplasticised PVC		
		S	ES	SS	L	M	H	L	M	H		Nominal Diameter	
												(mm)	(in)
150	5	A,S, B,F	A,S, B,F	A,S,B ,F,N	A,S, B,F	A,S, B,F,N				A,S, B,F,N	S	160	6
150	11	Z	Z	Z	Z	Z				Z	Z	160	6
225	5	A,S, B	A,S, B,F	A,S,B ,F	A,S, B	A,S,B ,F				A,S, B,F,N	S		9
225	11	Z	Z	Z	Z	Z				Z	Z		
300	5	A,S	A,S, B	A,S,B ,F	A,S, B	A,S,B			A,S, B,F	A,S, B,F,N	S	315	12
300	11	Z	Z	Z	Z	Z				Z	Z		
600	5	A,S	A,S, B	A,S,B ,F	A,S, B	A,S,B			A,S, B,F	A,S, B,F,N			
600	9	Z	Z	Z	Z	Z				Z			
700	5	A,S	A,S, B	A,S,B ,F	A,S, B	A,S,B			A,S, B,F	A,S, B,F,N			
700	9	Z	Z	Z	Z	Z				Z			

Trench and bedding details shown on drawing HCD F1.

SCHEDULE OF PIPE/BED COMBINATIONS - FILTER DRAINS

Pipe Dia. (mm)	Pipe Group No.	Vitrified Clay			Precast Concrete				Unplasticised PVC		
		S	ES	SS	S/L	ES	M	H		Nominal Diameter	
										(mm)	(in)
150	1	G,H,I, J,K,L, M	G,H,I, J,K,L, M	G,H,I ,J,K,L ,M	G,H,I, J,K,L, M		G,H,I, J,K,L, M		G,H,I,J, K,L,M	160	6
225	1	G,H,I, J,K,L, M	G,H,I, J,K,L, M	G,H,I ,J,K,L ,M	G,H,I, J,K,L, M		G,H,I, J,K,L, M		G,H,I,J, K,L,M		9
300	1	G,H,I, J,K,L, M	G,H,I, J,K,L, M	G,H,I ,J,K,L ,M	G,H,I, J,K,L, M		G,H,I, J,K,L, M		G,H,I,J, K,L,M	315	12

Trench and bedding details shown on drawing HCD F2.

Pipe schedule

Information to be provided as part of the Scheme Information

Chamber Schedule

Information to be provided as part of the Scheme Information

Gullies

Gullies are shown on HCD F13.

APPENDIX 5/2: SERVICE DUCT REQUIREMENTS

1. Details of duct construction are shown on drawing number HCD I1 and I2.
2. Cross carriageway ducts shall be provided in the locations shown in the Scheme Information.

APPENDIX 5/4: FIN DRAINS AND NARROW FILTER DRAINS

1. The Contractor is to determine the type of fin drain to be used. They will be either Type 5, 6 or 7 as detailed on HCD F18. Narrow filter drains shall be Type 8.
2. Locations of fin drains or narrow filter drains are to be installed in accordance with the relevant HCD or as specified in the Works Package.
3. The maximum permissible O90 of the geotextile is 0.15mm.
4. The permeability of the geotextile shall be $100\text{m}^{-2}\text{s}^{-1}$.
5. Where applicable, the D15 particle size for the Type 8 narrow filter drain shall be 0.1mm.
6. The long term in-plane flow for the fin drain shall be $5\text{ls}^{-1}\text{m}^{-1}$.
7. The maximum pipe diameter shall be 100mm.
8. The permeability of granular material in narrow filter drains shall be greater than $1 \times 10^{-4}\text{ms}^{-1}$.

APPENDIX 5/5: COMBINED DRAINAGE AND KERB SYSTEMS

Combined Drainage and Kerb Systems

- 1 Further information showing locations etc of the combined drainage and kerb systems will be provided as part of the Scheme Information.
- 2 Width of top of system to match width of type HB or SP kerb.
- 3 Profile of system to match type HB or SP kerb.
- 4 System to permit lateral entry of surface water from the channel either continuously or at intervals not exceeding one metre.
- 5 The system shall be suitable for its intended purpose. The Contractor shall provide evidence of such suitability.
- 6 Units must be in accordance with BS EN 1433 Class D, unless specifically identified otherwise in the Scheme Information information. Class C units may only be installed in locations which are protected from direct traffic loading, eg. in areas behind safety barriers. Units lower than Class C are not permitted. Type I units (BS EN 1433) of monolithic construction will not be used in locations exposed to severe or continuous impacts and loading. These locations and Site Specific Requirements will be identified as part of the Scheme Information.
- 7 Where units are being installed as replacements for existing units, the hydraulic capacity will not be less than that of the existing units.
- 8 The system shall have access units compliant with BS EN 1433 Load Classification D400. All components will be compliant with BS EN 124: Load Class D400. Access fittings are to be installed at minimum 50m spacings, and at all terminals, sumps and outlets. The minimum spacings for shallow systems on bridges shall be 20m centres.
- 9 Proprietary systems shall be installed in accordance with manufacturer's specification and recommendations.
- 10 Joints between units comprising the system, and between the channel and units, shall be watertight. Joints between bridge deck waterproofing and component parts passing through the waterproofing shall be watertight. Sealants shall be compatible with the waterproofing system.
- 11 The system shall be cleaned out by high pressure water jetting or other appropriate means on completion of the Works. The system shall be left clean and free from all obstructions.
- 12 Outfalls shall be trapped and be provided with an access cover.

APPENDIX 5/7: THERMOPLASTICS STRUCTURAL WALL PIPES AND FITTINGS

Information to be provided by the Contractor

The Contractor shall provide the following information, in accordance with sub-Clause 518.2, for the range of pipes and fittings (to be verified by the Certification body – see sub-Clause 518.15):

- 1 Technical drawings showing dimensions and tolerances including sealing rings and weight per metre, together with properties, as specified in sub-Clause 518.3 and 518.5.

Material specification, as required in sub-clause 518.2:

Table 1: Unplasticised polyvinyl-chloride (PVC-U)

Property	Test method reference	Specification
Tensile Properties	BS EN , ISO 6259, BS EN ISO 527-1	
Vicat	EN 727	
Longitudinal reversion	BS EN 743	
K-value	BS EN 922:1995	
PVC content	BS EN 1905:1999	
Density	ISO 1183, ISO 4451	
Heat Reversion	ISO 12091:1995	
Effects of heating (injection moulded fittings only)	BS EN 763	

Table 2: Polyethylene (PE)

Property	Test method reference	Specification
Tensile Properties	BS EN , ISO 6529 BS EN ISO 527-1	
Oxygen induction time	EN 728	
Melt Flow Rate	BS EN ISO 1133	
Density	BS EN ISO 1183-3, ISO 4451	
Melt Flow Rate	ISO 4440	
Heat Reversion	ISO 12091	

Effects of heating (injection moulded fittings only)	BS EN 763	
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Table 3: Polypropylene (PP)

Property	Test method reference	Specification
Tensile Properties	BS EN ISO 6529 BS EN ISO-1	
Oxygen induction time	BS EN 728	
Melt Flow Rate	BS EN ISO 1133	
Density	BS EN ISO 1183-3, ISO 4451	
Heat Reversion	ISO 12091	
Effects of heating (injection moulded fittings only)	BS EN 763	

APPENDIX 6/1: REQUIREMENTS FOR ACCEPTABILITY AND TESTING ETC. OF EARTHWORKS MATERIALS

Classification of existing materials

All materials excavated on site shall be classified Class U1A unless stated otherwise.

Excavation of Hard Material

The following material shall be classified as hard material:

- Existing bituminous pavement/footway layers
- Existing concrete sub-base layers
- Concrete to central reserve construction
- Existing kerbs and foundation

Structural Backfill Class 6N

- A minimum ϕ value of 35° is required for class 6N fill.
- Lower limit of moisture content, MC (as measured in accordance with BS 1377:Pt2) shall be optimum moisture content, OMC (as measured in accordance with BS 1377:Pt4) minus 2%.
- Upper limit of MC shall be OMC plus 1%.

APPENDIX 6/3: REQUIREMENTS FOR EXCAVATION, DEPOSITION, COMPACTION (OTHER THAN DYNAMIC COMPACTION)

General Information

1. Refer to Works Package.

Excavation

2. The adequacy of the extent of excavation on site will be checked and confirmed by the Overseeing Organisation.
3. Blasting is not permitted as an alternative to normal excavation methods.
4. Faces of cuttings which are to receive topsoil shall have measures carried out in accordance with Clause 603.7 as appropriate.

Deposition

5. Embankment infilling will be constructed evenly over their full width and their fullest possible extent and the Contractor will control and direct constructional plant and other vehicular traffic uniformly over them. Damage by constructional plant and other vehicular traffic will be made good by the Contractor with material having the same characteristics and strength as the material had before it was damaged.
6. Benching shall be provided in the following situations:-
 - (i) against the side slopes of the existing carriageway, normally 1 (v) : 2 (h), after topsoil has been removed.
 - (ii) on existing ground where the slope of the ground exceeds 1 (v) : 5 (h), after topsoil has been removed.
7. The maximum bench height shall be 1 metre, and the orientation of the cross fall of the benching shall have a 1(v) : 10(h) fall in the downhill direction of the natural slope on which it is cut. The width of benches varies according to the slope and shall be determined on site.

Compaction

Compaction of backfill will be in accordance with Table 6/4 and Clause 612.

APPENDIX 6/6: FILL TO STRUCTURES AND FILL ABOVE STRUCTURAL FOUNDATIONS

1. Unless otherwise stated backfill to all new structures and replacement of backfill to all existing structures shall be class 6N.
2. Class 6N fill not be permitted for use for reinstatement of cutting slopes unless a slope stability test as defined by clause 610.6 has been successfully carried out.

**APPENDIX 6/7 SUB-FORMATION AND CAPPING AND PREPARATION AND SURFACE
TREATMENT OF FORMATION**

Preparation

1. Preparation and surface treatment of formation and sub-formation shall be carried out only after completion of sub-grade drainage and unless otherwise agreed by the Overseeing Organisation immediately prior to laying capping or sub-base.

Capping Material

2. The Contractor will be required to determine the suitability of the road formation on site to suit the on site conditions. All arrangement shall be approved in advance by the Overseeing Organisation and the Contractor will provide all necessary calculations in support of his application.
3. If testing of formation on site in relation to CBR and other methods of testing, as detailed in the relevant Appendix, are found on site to be lower than expected then the Contractor will provide to the Overseeing Organisation proposals for a re-design of the relevant areas of road formation and sub-formation for his approval, this may include the requirement for a Capping and sub-base design as opposed to the illustrative sub-base only design, in which case the relevant clauses in the MCHW specification will be followed.

APPENDIX 6/8: TOP SOILING

1. Topsoil and sub-soil shall be stripped and stored in accordance with BS4428 Section 2.5 and with Clause 13.6 of HA 56/92 soil shall be spread in accordance with Chapter 13 of HA 56/92. Excavated topsoil should be kept separate from excavated sub-soil. Do not remove the topsoil from below the spread of trees.
2. Sufficient topsoil to reinstate the areas stripped from each construction site shall be stored at a designated area adjacent to the site, wherever possible, with locations agreed with the Overseeing Organisation. Excess material shall be removed from site. Should no area be available to store topsoil at the construction site, as agreed with the Overseeing Organisation, then topsoil shall be removed to a designated storage site in the Contractor's compound, and stored and managed in accordance with best practice as set out in Chapter 13 of HA56/92.
3. Should insufficient quantities and the quality of site derived topsoil not meet requirements, then topsoil Class 5B to BS 3882, General Purpose Grade shall be imported. The quality of site derived topsoil and any imported topsoil shall be reviewed with the Overseeing Organisation prior to placement.
4. The requirement of Clause 618.3 will apply.
5. The Contractor will prevent topsoil from being compacted, becoming adulterated with subsoil, rubbish, stone or hardcore, being contaminated with petrol, lime, cement or other injurious substances. He will remove from site any adulterated or contaminated topsoil and replace it with approved imported topsoil as necessary. Impacted top soil is not permitted for any other purpose.
6. The earthworks outline will be graded to smooth flowing contours to achieve tolerances specified for the finished level of topsoil, finished levels after settlement has occurred, are to be tied in with adjoining soil areas.. All stone, wood and other hard material over 50mm in any dimension will be removed.
7. Final topsoil grading, preparation and seeding operations shall be carried out in accordance with the requirements of the Specification for Highway works, Series 3000 Landscape and Ecology, as applicable.
8. Multiple handling of topsoil must be minimised.

**APPENDIX 6/9: EARTHWORK ENVIRONMENTAL BUNDS, LANDSCAPE AREAS,
STRENGTHENED EMBANKMENTS**

1 Landscape Areas

- 1.1 Compaction, if required, method to be specified in the Scheme Information.
- 1.2 Landscape areas shall not be constructed simultaneously with adjoining embankments, unless specified in the Scheme Information.

APPENDIX 6/10: GROUND ANCHORAGES'S, CRIB WALLING AND GABIONS

Gabions

1. Gabions for embankment toe retention shall be double twist hexagonal woven mesh 76 x 76 aperture with galvanised mesh wire having a minimum diameter 3mm and PVC coating of mean wall thickness 0.5mm, with triangular support brackets to form the facing. All joints and connections to be formed with continuous 2.2mm PVC coated galvanised lacing wire and / or high tensile 3mm diameter stainless steel 'C' rings. Internal diaphragms to be used on all gabion units longer than 1.5m. The wires are to comply with BS EN 10223-3:1998 with a tensile strength of between 350 and 500N/mm² and a minimum elongation at failure of 10%.
2. Gabions will be constructed by filling and placing by hand in a manner similar to that achieved by "Dry Stone Dyking". Machine filling will not be permitted in any part of the box gabion interior. Gabions shall be placed and installed in line with manufacturers recommendations, with careful infilling by hand to ensure a uniform rock face to a maximum incline of 6 degrees to the vertical. On submission of alternatives the Overseeing Organisation will provide amendments and additions where necessary to Table 6/1 and the Appendix.
3. Gabion Fill will be in accordance with Class 6G (Table 6/1).
4. Gabions to achieve a design life of 120 years in accordance with BBA certificate No 93/RO75 or similar.
5. The gabion wall is to be founded on mass concrete classification ST4.

APPENDIX 7/1: PERMITTED PAVEMENT OPTIONS – HA TO COMPLETE**1 Permitted Pavement Options – Schedule 1**

Schedule 1: Permitted Pavement Options			
Drawing Ref:	Area	General Requirements	Permitted Pavement Option

2 General Requirements – Schedule 2

Schedule 2A: General Requirements		
Grid for checking surface levels of pavement courses	Longitudinal Dimension	10.0m
	Transverse Dimension	2.0m
Surface Regularity	Category of Road:	A
Interval for measurement of longitudinal regularity		As Table 7/2
Interval for measurement of transverse regularity		Each wheel track
Surface texture is required. Measurement of surface texture shall be in accordance with clause 921.		

Permitted Construction Materials – Schedule 3

Schedule 3: Permitted Construction Materials		
Pavement Layer	Material Ref (s)	Thickness (mm)
Surface Treatment	HFS1	
Surface Course	WC1, WC2, WC3, WC4	
Binder Course	BC1, BC2	
Base	BA1, BA2	
Subbase	SB1, SB2, SB3	
Regulating	RC1	

4 General Requirements for Construction Materials – Schedule 4

Schedule 4: General Requirements for Construction Materials	
Clause	Requirement

5 Requirements for Construction Materials – Schedule 5

Schedule 5: Requirements for Construction Materials			
Material Ref.	Clause	Description	Requirement
SB1	803	Type 1 Unbound mixture	
SB2	805	Type 3 (open graded) Unbound Mixtures	
SB3	806	Category B (close graded) Unbound Mixtures	
RC	907	Regulating Course	Regulating material should match the binder course used on the particular site or part of the site with an aggregate grading to suit the layer thickness
BA1	929	Dense Base Asphalt Concrete (Design Mixtures)	Base Mixture Designation: AC 32 HDM base 40/60 des.
BA2	930	EME2 Base Course Asphalt Concrete	Base Mixture Designation: AC 20 EME2 base 15/25 des.
BA3	930	EME2 Base Course Asphalt Concrete	Base Mixture Designation: AC 10 EME2 base 15/25 des.
BC1	929	Dense Binder Course Asphalt Concrete (Design Mixtures)	Binder Course Mixture Designation: AC 20 HDM bin 40/60 des.
BC2	930	EME2 Binder Course Asphalt Concrete	Binder Mixture Designation: AC 14 EME2 bin 15/25 des.
BC3	930	EME2 Binder Course Asphalt Concrete	Binder Mixture Designation: AC 10 EME2 bin 15/25 des.
WC1	942	Thin Surface Course Systems	Traffic Count: see Network Information Site definition and stress level: see Network Information Minimum declared PSV category in accordance with BS EN 13043, clause 4.2.3 = PSV68 Maximum aggregate abrasion value of coarse aggregate for thin surface course systems based on surface dressing and slurry surfacing techniques: see the Scheme Information Maximum aggregate abrasion value of coarse aggregate for thin surface course systems not based on surface dressing and slurry surfacing techniques: see the Scheme Information Minimum wheel-tracking level required on British Board of Agreement HAPAS Roads and Bridges Certificate: 3 Road/tyre noise level relative to hot rolled asphalt required on British Board of Agreement HAPAS Roads and Bridges Certificate: 2

			The macrotexture depth shall be in accordance with clause 942.13 Surfacing Integrity performance requirements shall be in accordance with clause 942.16
WC2	942	Thin Surface Course Systems	Traffic Count: see Network Information Site definition and stress level: see Network Information Minimum declared PSV category in accordance with BS EN 13043, clause 4.2.3 = PSV62 Maximum aggregate abrasion value of coarse aggregate for thin surface course systems based on surface dressing and slurry surfacing techniques: see the Scheme Information Maximum aggregate abrasion value of coarse aggregate for thin surface course systems not based on surface dressing and slurry surfacing techniques: see the Scheme Information Minimum wheel-tracking level required on British Board of Agreement HAPAS Roads and Bridges Certificate: 3 Road/tyre noise level relative to hot rolled asphalt required on British Board of Agreement HAPAS Roads and Bridges Certificate: 2 The macrotexture depth shall be in accordance with clause 942.13 Surfacing Integrity performance requirements shall be in accordance with clause 942.16
WC3	942	Thin Surface Course Systems	Traffic Count: see Network Information Site definition and stress level: see Network Information Minimum declared PSV category in accordance with BS EN 13043, clause 4.2.3 = PSV56 Maximum aggregate abrasion value of coarse aggregate for thin surface course systems based on surface dressing and slurry surfacing techniques: see the Scheme Information Maximum aggregate abrasion value of coarse aggregate for thin surface course systems not based on surface dressing and slurry surfacing techniques: see the Scheme Information Minimum wheel-tracking level required on British Board of Agreement HAPAS Roads and Bridges Certificate: 3 Road/tyre noise level relative to hot rolled asphalt required on British Board of Agreement HAPAS Roads and Bridges Certificate: 2 The macrotexture depth shall be in accordance with clause 942.13 Surfacing Integrity performance requirements shall be in accordance with clause 942.16
WC4	943	Hot Rolled Asphalt Wearing Course (Performance Related Design Mix)	Resistance to permanent deformation in accordance with Table C.3 of BSI PD 6691 : Level 2 Coated Chippings: 14/20 Size BSI PD 6691 Annex C Cl C.2.8 Coated Chippings Minimum declared PSV category = PSV65 Coated Chippings Maximum declared AAV category: See the Scheme Information Minimum delivery temperature shall be in accordance with sub-Clause 945.4 Maximum wind speed and minimum air temperature shall be in accordance with sub-Clause 945.4 Test temperature for wheel-tracking and rut depth tests shall be 60°C.

HFS1	924	High Friction Surfaces	Type Classification: Type 1 Minimum declared PSV category in accordance with BS EN 13043, clause 4.2.3 = PSV68 Maximum AAV in accordance with BS EN 13043, clause 4.2.4.= AAV10 Colour: Varies Where thin wearing course is to be covered by high friction surfacing (HFS), the contractor shall reduce the texture of the area of the thin wearing course system to between 1 and 2mm as measured by the sand patch test. This may be achieved by any suitable means, as detailed in HD 37/99. Where the surfacing is to be trafficked prior to the application of HFS, 3mm grit shall be applied and rolled in to provide enhanced short-term skid resistance, as detailed in HD 37/99. If the wearing course is opened to traffic before High Friction Surfacing is laid, the Contractor shall erect temporary road signs as approved by the Overseeing Organisation.
LC	1030	Wet Lean Concrete 1 to 4	Strength as Clause 1030.1

6 Thin Surface Course Systems: Information to be provided by the Contractor

The Contractor shall provide the following information with his tender:

- (i) A copy of the British Board of Agreement HAPAS Roads and Bridges Certificate or Certificates for the thin surface course system or systems that are proposed for use in the works, together with a copy of the Quality Plan and Installation Method Statement associated with each Certificate.
- (ii) For any Certificate that covers several variants of one thin surface course system, proposed variant or variants of the system to be used in the Works.
- (iii) If requested, or if the thin surface course system is not produced under a Sector Scheme, the proposed component materials to be used in the thin surface course system and their proportions for each proposed system.
- (iv) Proposed source or sources of coarse aggregate together with a statement of its properties including polished stone value, ten percent fines value, aggregate abrasion value and flakiness index.
- (v) If regulating material is to be used, evidence of its deformation resistance either independently or in combination with the thin surface course system.

7 Modified Binder and Mixture Data Requirements

The following data shall be provided to the Overseeing Organisation for modified binders as required in sub-Clauses 937.4 and 943.4. The data should not be more than 12 months old. A table in which the binder data may be recorded is given at the end of this section.

For work carried out for the Highways Agency, a copy of the results should be handed to the Overseeing Organisation, to be forwarded to: Pavement Engineering Team at Highways Agency, Woodlands, Manton Lane, Manton Industrial Estate, Bedford, MK41 7LW.

I. Binder Samples

Bituminous binders shall be sampled from the delivery according to BS EN 58. For modifiers blended with the other component materials of the mixture at the mixer a simulated binder shall be prepared. Such modifiers are generally less intimately mixed with the bitumen and less well dispersed throughout the mixture than when pre-blended. Evidence that the simulated binder

offers the same performance as the binder produced when the modifier is added at the mixer shall be provided.

II. Penetration

Binder penetration at 25°C (BS EN 1426), 100g 5 seconds, and at 5°C, 200g 60 seconds, before and after hardening in the Rolling Thin Film Oven Test (RTFOT) in accordance with BS EN 12607-1, or alternatively, after RTFOT and after RTFOT and Ageing in accordance with Clause 955.

III. Product Identification Test and Rheological Properties

Results for the binder(s) proposed shall comprise rheological data for each binder in the form of complex shear (stiffness) modulus (G^*) and phase angle (δ) determined in accordance with Clause 956 for binder as supplied, after RTFOT and after RTFOT and Ageing in accordance with Clause 955.

IV. Storage Stability Test

All binders shall be stored strictly in accordance with the manufacturer's instructions. Polymer modified binders claimed to remain homogeneous in storage without agitation shall be tested for storage stability in the manner described in Clause 958. The mean of the differences in softening point between the top and bottom samples, of not less than five pairs of such samples shall not exceed 5°C. Manufacturers of pre-blended modified binders shall state what precautions are necessary to ensure that adequate homogeneity is maintained during storage.

V. Photomicrograph

A typical photomicrograph of the modified binder and binder using ultra-violet or other technique to provide maximum contrast of the polymer structure to the binder before modification shall be supplied together with details of sample preparation techniques.

VI. Cohesion

Vialit Pendulum cohesion test curve of the binder, in accordance with Clause 957 for the binder as supplied, after RTFOT and after RTFOT and Ageing in accordance with Clause 955.

VII. FRAASS Brittle Point

FRAASS brittle point measured using BS EN 12593 shall be provided on the binder as supplied, after RTFOT and after RTFOT and Ageing in accordance with Clause 955.

Summary of binder data

Manufacturer of Binder:	Product name		
Binder type:		Batch ref:	
Binder source:			
Softening point difference in storage stability test			
Test	Supplied binder	After RTFOT	After Ageing
Penetration at 25°C 0,1 mm (100g and 5 secs)			
Penetration at 5°C 0,1 mm (200g and 60 secs)			
Vialit pendulum cohesion see Clause 939 maximum peak value J/cm ²	#	#	#
Product identification test	#	#	#
Complex shear (stiffness) modulus (G^*) and phase angle (δ) data. See Clause 928			
Fraass brittle point			

Other properties the Contractor considers useful			
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Where indicated with # the Contractor shall attach a graphical output to this schedule.

8 Mixture Data Requirements

The following data should be provided to the Overseeing Organisation for materials designed in accordance with Clause 901.17 and Clause 929 in respect of the proposed mixture. For work carried out for the Highways Agency, a copy of the results should be handed to the Overseeing Organisation, to be forwarded to: Pavement Engineering Team at Highways Agency, Woodlands, Manton Lane, Manton Industrial Estate, Bedford, MK41 7LW.

I. Saturation Ageing Tensile Stiffness (SAT S) ratio – as described in Clause 953.

APPENDIX 7/2: EXCAVATION AND REINSTATEMENT OF EXISTING SURFACES

1. Milled surfaces that are to receive live traffic shall not be greater than 50mm below the adjacent running lane.
2. Typical trench reinstatement details are shown on HCD Drawing No K4.
3. Where a trench is excavated through an existing road pavement reinstatement shall consist of 50mm wearing course (with 14/20 chippings) to Clause 911, 60mm binder course to Clause 905 or 906 and 240mm base to Clause 929 (Type 1 reinstatement). Where the existing surface is to be overlaid, reinstatement shall consist of 300mm base to Clause 929 (Type 2 Reinstatement).
4. Planed areas shall be overlaid within 14 days.
5. Planings material removed from the carriageway shall be the property of the Contractor.

APPENDIX 7/4: BOND COATS, TACK COATS AND OTHER BITUMINOUS SPRAYS

- 1 Bond or tack coats shall be applied between all pavement layers. The Contractor shall ensure that a suitable bond or tack coat is provided for use with proprietary thin surface course systems in accordance with Clause 920.1.
- 2 All surfaces shall be kept clean and uncontaminated in accordance with SHW sub-clause 903.3.
- 3 All surfaces (except new pavement layers) should be mechanically suction swept before application of tack and bond coats.
- 4 Bond or tack coat shall be supplied and laid in accordance with BS 594987.
- 5 The Contractor shall submit evidence of the suitability of the bond or tack coats intended for use when overlaying concrete surfaces, in accordance with SHW sub-clause 920.5.
- 6 Existing ironwork, kerbs and street furniture shall be masked using self-adhesive masking material before application starts and removed on completion of works.
- 7 Before spraying is commenced, the surface shall be free of all loose material and standing water. Surface preparation shall be carried out in accordance with BS 594987.
- 8 Rate of spread should comply with SHW sub-clause 920.8.
- 9 Accuracy of application should comply with SHW sub-clause 920.9.
- 10 The Contractor shall provide the following information prior to the commencement of the work:
 1. The product or products he proposes to use together with their data sheets, product identification data, and cohesivity data as specified.
 2. For each product, a copy of the BS EN ISO 9001 certificate showing the name of the manufacturer, the name of the certification body and the reference number and date of the certificate.
 3. The spraying equipment proposed, and a test certificate.
 4. The source or sources of blinding material proposed.
 5. Contingency plans in the event of any breakdown.
 6. The results of any other tests or other data the Contractor considers would assist in assessing the technical merit of the treatment such as:
 - i. Tackiness test and/or trafficability time and methods of test
 - ii. Breaking time test results for different weather conditions and substrates
 - iii. Test results for bond to newly laid concrete. The data supplied should not be more than 6 months old.

Binder Data Sheet – Appendix 7/4 (08/08)		Bond Coats, Tack Coats and Other Bituminous Sprays	
Manufacturer of Binder:		Product name:	
Binder type:		Batch no:	
Binder Grade (highlight 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 955	Aged in accordance with Clause 955
Penetration at 25°C 0,1 mm (100g and 5 secs)			
Penetration at 5°C 0,1 mm (200g and 60 secs)			
Vialit pendulum cohesion see Clause 957 maximum peak value J/cm ²		The Contractor shall attach a Report and graphical output to this schedule as specified in Clause 957.	The Contractor shall attach a Report and graphical output to this schedule as specified in Clause 957.
Product identification test. The provision of data for identification and ageing is optional for unmodified bituminous 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 956.		The Contractor shall attach a Report and graphical output to this schedule as specified in Clause 956.	The Contractor shall attach a Report and graphical output to this schedule as specified in Clause 956.
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 manufacturer: road or air temperatures; humidity; wind chill adjustment; tolerance of surface dampness; etc. Temperature max: Temperature min: Other:			

APPENDIX 7/7: Slurry Surfacing Incorporating Microsurfacing

1	Location:	
2	Traffic count:	The central reserve will not be trafficked
3	Traffic speed:	N/A
4	Category of site	N/A
5	Description of existing surface	new binder layer material
6	Thickness of Slurry Surfacing:	3mm
7	Guarantee period:	2 years
8	Minimum declared PSV of coarse aggregate:	60
9	Maximum AAV of coarse aggregate	12
10	Preparation and masking requirements	protection of ironwork and the concrete or steel safety fence elements
11	Definition of colour required	Red
12	Surface finish required	transverse brushing
13	Minimum macrotexture depth at end of guarantee period	minimum 1 mm
14	Maximum texture depth after 4 weeks trafficking	N/A
15	Maximum percentage decrease in macrotexture initially measured and at the end of the guarantee period	40%]
16	Category of area defects (% area affected) acceptable	8%
17	Category of linear defects (m per 100 m) acceptable	1
18	Class of transverse regularity [	Class 0
19	Class of longitudinal regularity	Class 0
20	Special restrictions laying only permitted between	minimum road surface temperature 4°C and maximum of 40°C

Note a material similar to “Regupave” by Wilson and Scot would be acceptable with appropriate HAPAS certificates

APPENDIX 7/7: Slurry Surfacing Incorporating Microsurfacing (Continued)

SHEET 2: Information to be provided by the Contractor:

- 1 A copy of BS EN ISO 9001 certificate showing at least the name of the Company, the name of the certification body and the reference number and date of the certificate. A copy of the relevant part of the company Quality Assurance (QA) document showing the appropriate scope (Slurry Surfacing and Sector Scheme) and limitations of the certification. The Overseeing Organisation may wish to inspect all or any of the Company's QA documentation as part of the vendor assessment system and may wish to satisfy himself on the nature of the QA systems of the Company's material suppliers.
- 2 Design Proposal for Slurry Surfacing for each location and target binder content with tolerances.
- 3 Estimated Design Life of the Slurry Surfacing for each location.
- 4 A copy of the TAIT Certificate within the Sector Scheme for Slurry Surfacing for the proposed system together with its supporting data. In the event of no certificates being issued a statement of any previous applications on roads similar in site type to the Contract sites containing the same data as listed in NG Sample Appendix Sheet 3.
- 5 A method statement for each site or group of similar sites showing how it is proposed to carry out the works in conformance with the specification. *[Contractors will be expected to commit enough resources to carry out the proposed design; the type and age of the Slurry Surfacing Machine should be detailed]*.
- 6 Proposed source or sources of coarse aggregate together with statements of properties including target grading, declared PSV and AAV.
- 7 Proposed source or sources of fine aggregate including target grading and other constituents together with statements of properties.
- 8 Proposed binder together with data sheets and cohesivity data. For work carried out for the Highways Agency, a copy of all the data should be handed to the Overseeing Organisation, to be forwarded to: Pavement Engineering Team at Highways Agency, Bedford Office.
- 9 Proposals for traffic control and aftercare for each site and reaction times for: carrying out remedial measures; sweeping; and site visits with the Overseeing Organisation.
- 10 Contingency plans in the event of any breakdown of plant or failure of the Slurry Surfacing.
- 11 An 'As Built Manual' as specified.
- 12 If available the following information should be provided in order to assist the Overseeing Organisation to assess the technical merits of the Design Proposal:
 - (i) Test method for binder content.
 - (ii) Test for thickness of Slurry Surfacing.
 - (iii) Traffic ability time, including method of test.
 - (iv) Wheel tracking test results at 45°C or 60°C or other suitable measure of the ability of the proposed system to resist deformation and flow.
 - (v) Water sensitivity test results from the test used by BBA/HAPAS thin surfacing Guidelines Document or from wet wheel tracking (whichever is available).
 - (vi) Permeability test carried out on the system, if it is claimed that the process seals the existing surface together with the method of test.

- (vii) Accelerated ageing test results in accordance with the appropriate BBA/HAPAS test. Amendment - November 2004 A22
- (viii) Bond test results using the BBA/HAPAS test on either a bituminous or a concrete substrate as appropriate to the site or Bond Coat binder BBA/HAPAS certificate.
- (ix) Shaking Abrasion test results.
- (x) Slurry surfacing mix cohesion.
- (xi) The results of any other tests or other data the Contractor considers would assist the Overseeing Organisation in assessing the technical merit of the Design Proposal.

APPENDIX 7/7: Slurry Surfacing Incorporating Microsurfacing (Continued)

Binder Data Sheet - Appendix 7/7	Slurry Surfacing Incorporating Microsurfacing		
Manufacturer of Binder:	Product name:		
Binder type:	Batch no:		
Binder source:			
Test	Binder as supplied to site	Recovered binder in accordance with Clause 955	Aged binder in accordance with Clause 955
Penetration at 25°C 0,1 mm (100g and 5 secs)			
Penetration at 5°C 0,1 mm (200g and 60 secs)			
Vialit pendulum cohesion see Clause 957 maximum peak value J/cm ²		#	#
Product identification test sub-Clause 918.7. Complex shear (stiffness) modulus (G*) and phase angle (δ) data. See Clause 956.		#	#
Other properties the Contractor considers useful			
Weather limits - information from binder manufacturer: road or air temperatures; humidity; wind chill adjustment; etc.	Temperature max: Temperature min: Other:		

Where indicated with # the Contractor shall attach a graphical output to this schedule.

APPENDIX 7/7: Slurry Surfacing Incorporating Microsurfacing (Continued)

SHEET 3: TAIT Certificate: Information to be provided by the Contractor

The Contractor shall provide the TAIT Certificate containing at least the following information with his tender:

Company Name and Address:

QA reference number and certifying body:

TAIT reference number:

Date of TAIT:

Self-certified within the Sector Scheme for Slurry Surfacing or certified by BBA:

Proprietary Name:

Description of material:

Design procedure or method:

Material thickness (if applicable):

Macrotexture depth at 1 year (as measured and as a percentage of the initial value):

Colour retention (if applicable):

Other optional claims as declared by the installer (e.g. Profile improvement, reduced tyre-road noise emission or RSI, ability to accommodate a variable substrate, skid resistance if greater than PSV and macrotexture would indicate, etc.):

Expected life (Estimated Design Life):

Field of application for the particular material:

Traffic - maximum commercial vehicles per lane per day:

Traffic - total traffic per lane per day:

Traffic - Speed limit:

Degree of Site difficulty, see HD 36 (DMRB 7.5.1) for categories:

Constraints on application for the particular material:

Time of year:

Temperature:

Variability of existing surface hardness or type:

Other as declared by the installer:

Name and signature of company representative responsible for the TAIT:

**APPENDIX 7/10: WORKSHEET PRO-FORMA FOR RESULTS OF TESTING FOR
CONSTITUENT MATERIALS IN RECYCLED COARSE AGGREGATE AND RECYCLED
CONCRETE AGGREGATE**

RESULTS OF TESTING FOR CONSTITUENT MATERIALS IN RECYCLED COARSE
AGGREGATE AND RECYCLED CONCRETE AGGREGATE

Sample reference	
Date	
Tested by	

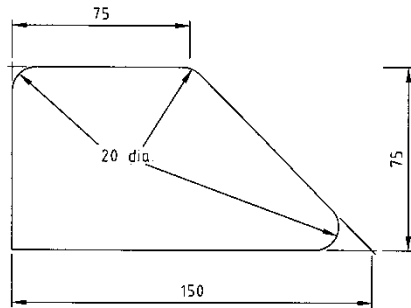
Mass of test portion, M_{total} , Duplicate 1	
Mass of test portion, M_{total} , Duplicate 2	

Category	Mass $M_{\text{subscript}}$		Percentage $P_{\text{subscript}}$		
	Duplicate 1	Duplicate 2	Duplicate 1	Duplicate 2	Mean
Asphalt (Class A)					
Masonry (Class B)					
Concrete and concrete products (Class C)					
Glass (Class G)					
Lightweight particles (Class L)					
Unbound aggregate (Class U)					
Other particles (Class X)					
Sum*					

*Sum is the total of $M_A + M_B + M_C + M_G + M_L + M_U + M_X$. If Sum is not within 1% of M_{total} , repeat the test.

APPENDIX 11/1: KERBS, FOOTWAYS AND PAVED AREAS**Kerbs, Edgings and Channels**

- 1 Precast concrete kerbs, edgings and channels shall be designated in accordance with BS EN 1339. They shall be laid and bedded in accordance with clause 1101. The thickness of the concrete bed and surround shall be not less than 150mm.
- 2 Extruded asphalt kerbing shall be to the dimensions shown below.

**Paved Area Type 1**

- 3 Formation to be treated with weed killer prior to reconstruction.

25mm	AC 6 dense asphalt surface course 100/150. to Clause 909
75mm	AC 20 dense binder 100/150 rec. to Clause 906
150mm	Sub base to Clause 803 Type 1

Footway Type 1

- 4 Formation to be treated with weed killer prior to reconstruction.

25mm	AC 6 dense asphalt surface course 100/150. to Clause 909
75mm	AC 20 dense binder 100/150 rec. to Clause 906
150mm	Sub base to Clause 803 Type 1

Flag and Block Paving

- 5 Concrete slab and clay block paving elements shall be natural coloured and rectangular in shape. Slabs shall be 50mm thick and clay blocks 75mm thick.
- 6 Mortar bedding shall be 10mm thick (nominal).

APPENDIX 11/2: ACCESS STEPS

General

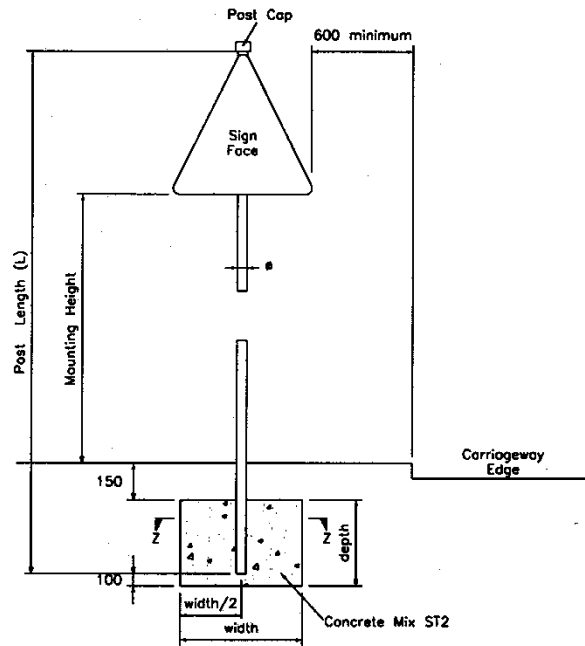
- 1 Access steps to feeder pillars, communications cabinets, traffic counter cabinets, ice prediction installations and the like should conform to the requirements of the latest issue of MCX drawings contained in HCD Volume 3.

APPENDIX 12/1: TRAFFIC SIGNS: GENERAL

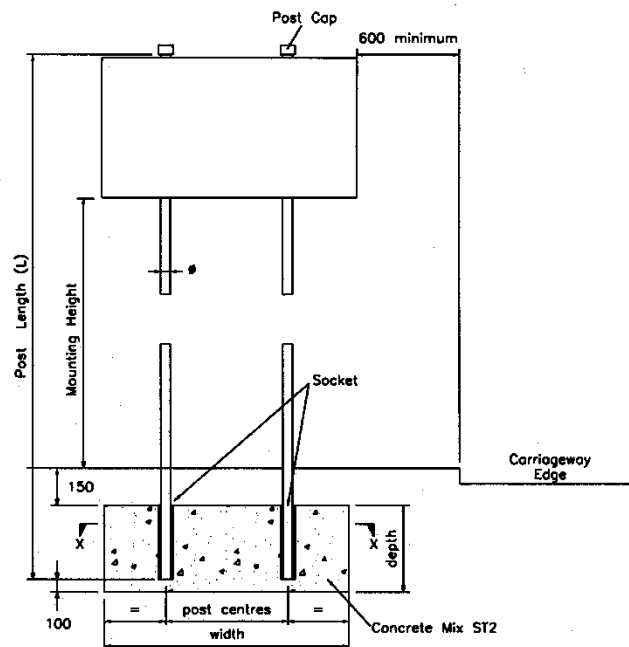
- 1 The location of traffic signs and bollards are shown in the Scheme Information. The actual location is to be agreed on site with the Overseeing Organisation.
- 2 Retroreflective Sign face material - sign faces manufactured using glass bead sheeting;
 - (i) BS EN 12899-1; 2007 Class RA2
 - (a) Sign face sheeting shall comply with the following as appropriate
 - (b) Table 1 Class CR1 Chromaticity & luminance for Retroreflective signs
 - (c) Table 4 Class RA2 Coefficient of retroreflection
 - (d) Table 16 Class NR1 Chromaticity & luminance for Non retroreflective signs
 - (e) 4.1.1.5 Durability;
 - (f) Clause 7.2.1 Retroreflective signs
 - (g) Clause 7.2.2 Non-retroreflective signs
 - (h) Clause 7.2.2 Impact resistance
- 2.2 All Grey backboards shall be non-reflective.
- 2.3 All signs should have a dew resistant film applied, where manufacturing processes permit, the total sign face will be overlaid with the dew resistant film, otherwise the dew resistant film must be applied to all retro-reflective text, symbols and borders.
- 2.4 Where dew resistant sign face materials are specified, the sign face should be coated with a water soluble coating to afford protection to the Dew Resistant surface during manufacture and installation. The coating shall be removed by flushing with clear water after installation of the sign.
- 3 Additional Information
 - 3.1 No verge sign under 10m² shall be manufactured from extruded aluminium plank.
 - 3.2 Steel constructions and steel mounting elements shall conform to EN 1993-1-1.
 - 3.3 All plate signs shall be sheet aluminium in accordance with BS EN 1999-1-1.
 - 3.4 The sign face sheeting and any screen printing inks, coloured overlay films and non retroreflective sheeting should carry a minimum 12 year warranty, be from a single sheeting supplier and supported by the sheeting suppliers written traffic sign warranty.
 - 3.5 Where any sign face material applied in accordance with a manufacturer's application and fabrication procedures fails in terms of its guaranteed performance levels during the first three quarters of its warranty period, the manufacturer shall be liable for returning the sign to its original effectiveness.
 - 3.6 Signs taken down from site and re-erected on new posts shall have their faces cleaned immediately prior to the completion date. The construction team is required to follow the cleaning recommendations of the sign face supplier to ensure that cleaning methods and material do not cause damage.

- 3.7 The sign face material manufacturer's instructions regarding transportation; storage, erection and cleaning shall be adhered to.
- 3.8 The Contractor shall prepare and submit a fabrication drawing for each sign to the Overseeing Organisation for approval. Sign manufacture shall not commence until the HA's approval has been received.
- 3.9 The Contractor shall provide and fix the sign identification numbers to the schedule provided in the Scheme Information.
- 3.10 Posts shall not protrude above the top of the sign unless supporting an external luminaire, in which case the protrusion shall be kept to a minimum.
- 3.11 Typical post foundation details are shown below.
- 3.12 All traffic signs mounted on a singular tubular steel post or lighting column shall be attached using anti-rotational clips.
- 3.13 Where passively safe posts are identified in the schedule the Contractor shall obtain the details of the design of posts and pre-cast foundations from the Manufacturer. The pre cast foundation is to be installed in accordance with manufacturer's recommendations. All Passively safe posts shall be non energy absorbing category NE and speed class 100 kph in accordance with BS EN 12767. Passively safe posts may satisfy any of the four occupant safety levels specified in Table 5 of BS EN 12767. Where signs are mounted on passive sign posts, the minimum mounting height shall be 1800 mm.
- 3.14 All sockets formed in foundations shall be flush to the top of the foundation and the method used to form the socket shall be approved by the Overseeing Organisation.
- 3.15 Each individual sign shall have a label in accordance with BS EN 12899-1:2007
- 3.16 Where signs are to be temporarily, fully or partially covered over, this shall be in accordance with Clause 1209.4 of the Specification and only upon agreement with the Overseeing Organisation.
- 3.17 Two keys per locked traffic sign housing or feeder pillar shall be provided.
- 3.18 For illuminated signs the electrical equipment shall be enclosed in an integral base housing of inside diameter not less than 130 mm. The central access opening shall face away from the carriageway. Entry to the interior of such compartments shall be by means of a weatherproof door having tamper-resistant key fastenings of a type acceptable to the Highway Authority. Six keys shall be supplied to the Highway Authority for each type of lock. The door opening shall be not less than 100 mm x 400 mm unless agreed otherwise and shall afford easy access. The lower edge of the door shall be positioned so that, when the post is installed as intended, it is not less than 300 mm above ground level.
- 3.19 An internal baseboard of dimensions not less than 80 mm x 300 mm x 12 mm manufactured from substantially non-hygroscopic and rot-resistant material shall be fixed in the box and an earthing screw or bolt shall be provided. The distance from the face of the baseboard to the inside front of the housing shall be of sufficient size to allow installation of a suitable cut out. A suitable cable entry shall be provided below ground level.
- 3.20 All existing signs that are to remain are to be checked to ensure that sufficient working width can be achieved between the sign and any new road restraint system. Where the required working width cannot be achieved the contractor shall relocate the sign to achieve working width.

- 3.21 Where mounted above the gantry, gantry signs shall have a light spill 'skirt' fitted to fill the gap between the bottom of the sign and the gantry frame constructed as part of the grey backboard as shown on the series 1200/GS drawings. This skirt will typically be 400mm although reference should be made to the 1800 series contract drawings for the exact dimensions and mounting arrangement as it may be greater in certain locations.



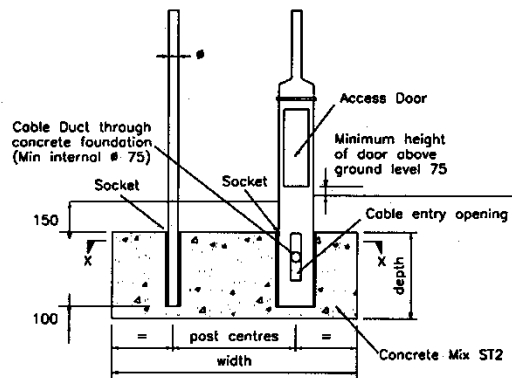
POST FOUNDATION DETAIL FOR UNLIT
SIGN ON SINGLE POST



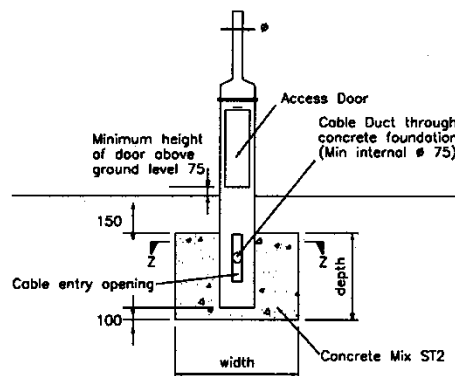
POST FOUNDATION DETAIL FOR UNLIT
SIGN ON DOUBLE POSTS

Notes

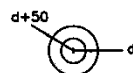
1. Sockets shall be cleaned out prior to erection of posts.
2. Sockets are to be packed with well compacted sharp sand after insertion of post and capped with a 50mm layer of ST1 concrete.



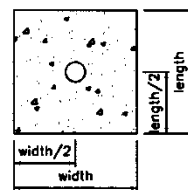
POST FOUNDATION DETAIL FOR LIT
SIGN ON DOUBLE POSTS



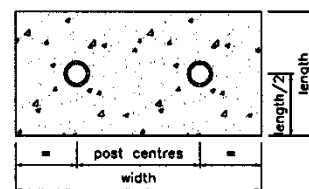
POST FOUNDATION DETAIL FOR LIT
SIGN ON SINGLE POST



PLAN OF POST SOCKET



SECTION Z-Z



SECTION X-X

Notes

1. Sockets shall be cleaned out prior to erection of posts.
3. Sockets are to be packed with well compacted sharp sand after insertion of post and capped with a 50mm layer of ST1 concrete.

APPENDIX 12/2 TRAFFIC SIGNS: MARKER POSTS

Hazard marker posts shall be as detailed on HCD drawings E1, E2, E3, E4 and E5.

APPENDIX 12/3 TRAFFIC SIGNS: ROAD MARKINGS AND STUDS

1 A minimum skid resistance of 55 is required for all permanent road markings.

2 Permanent Road Markings – General

2.1 White road markings shall comply with the following:

2.1.1 Proposed road markings to comply with:- Regulations: TSRGD 2002

2.1.2 Performance Standard: - BS EN 1436:2007 +A1:2008 (Road marking materials - Road marking performance for road users).

2.1.3 Thermoplastic material. Product Standard:- BS EN 1871:2000 Road marking materials – Physical properties;

2.1.4 Component Standard:- BS EN 1423:2012 Road marking materials - Drop on materials - Glass beads, anti-skid aggregates and mixtures of the two; BS EN 1424:1998 Road marking materials - Premix glass beads.

2.1.5 Road markings shall have the following minimum standard of performance for the duration of their functional life (as defined in BS EN 1436:2007 +A1:2008)

2.2 White markings

Property	BS EN 1436 Reference	Requirement	Value
Colour	Table 6	White	x,y co-ordinates given
Luminance Factor	Table 2	Class B3	0.4
Skid Resistance	Table 7	Class S3	55
Retro reflectivity	Table 3, Classes of R_L for dry markings	Class R2	100

2.3 When there is a requirement of enhanced visibility for road markings during wetness the following retro-reflectivity performance shall be specified:-

Retro reflectivity	Table 4, Classes of R_L for road markings during wetness	Class RW3	≥ 50
Retro reflectivity	Table 5, Classes of R_L for road markings during rain	Class RR3	≥ 50

2.4 Unless otherwise stated, road markings shall not be laid more than 6mm thick.

2.5 The length and width of the road markings shall be as specified in the Scheme Information in accordance with Traffic Signs Regulations and General Directions 2002 with a permitted tolerance as shown in Table below

Dimension shown in the diagrams	Allowable tolerance
3m or more.	Up to 15% greater than or 10% less than the specified dimensions.
300mm or more, but less than 3m	Up to 20% greater than or 10% less than the specified dimensions
50mm or more, but less than 300mm	Up to 30% greater than or 10% less than the specified dimensions.

- 2.6 Temporary road markings when laid on permanent carriageways shall be removable and shall be Departmental Type Approved.

3. Temporary removal of road markings

- 3.1 Road markings shall only be removed by scabbling technique.

4. Temporary removal of road studs

- 4.1 Removal of existing road studs shall be carried out without damage to the road surface and with a minimum of residue.

5. Road Studs

- 5.1 Locations will be specified in the Scheme Information.
- 5.2 The Contractor shall provide details of the proposed reflecting road studs together with a copy of the statutory type approval certified for each type for approval by the Overseeing Organisation.
- 5.3 All road studs on a public road in the UK must fully comply with the Traffic Signs Regulations and General Directions 2002 (TSRGD) Directions 57 and 58 and the classes prescribed therein through testing and certification to BS EN 1463 parts 1 (BS EN 1463-1:2009) and 2 (BS EN 1463-2:2000).
- 5.4 All road studs shall be laid in accordance with manufacturer's specifications.

APPENDIX 13/1: INFORMATION TO BE PROVIDED WHEN SPECIFYING LIGHTING COLUMNS AND BRACKETS

1. Lighting columns shall be steel with either circular or multi-faceted cross section, with continuously tapering or parallel form above any base compartment and should be as slender as possible. Stepped columns are not acceptable.
2. Columns when erected shall have the door opening in a position agreed by the Overseeing Organisation but this shall generally be parallel to the bracket on the side of the column away from the direction of approaching traffic so that an operator working on the column will be facing on-coming traffic.
3. Completed data sheets shall be submitted with the documents at the time of tendering.
4. Soil types in accordance with BS5649: Part 2 : 1978 Appendix B (EN 40) are Average.
5. Column cable entry slot shall be 75mm wide.

APPENDIX 13/2 (05/01)**(SPECIFICATION FOR HIGHWAY WORKS)****TYPICAL LIGHTING COLUMN AND BRACKET DATA - SHEET 1**

Name of Manufacturer:	<table style="width: 100%;"> <tr> <td style="width: 60%;">Column Reference No.</td> <td> </td> </tr> <tr> <td>Revision No.</td> <td> </td> </tr> <tr> <td>Date</td> <td> </td> </tr> </table>	Column Reference No.		Revision No.		Date	
Column Reference No.							
Revision No.							
Date							

NAME OF CONTRACT

Part A General

Column nominal height	(m)						
Column material							
Material design strength	(N/mm ²)						
No. of door openings							
Door opening size - Height	(mm)						
- Width	(mm)						
Cross-section of base compartment	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%; text-align: center;">Height (mm)</td> <td style="width: 33%; text-align: center;">Width (mm)</td> <td style="width: 33%; text-align: center;">Depth (mm)</td> </tr> <tr> <td style="height: 40px;"> </td> <td> </td> <td> </td> </tr> </table>	Height (mm)	Width (mm)	Depth (mm)			
Height (mm)	Width (mm)	Depth (mm)					

Acceptable positions of bracket arms relative to door position

Door Opening 	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%; text-align: center;">Any</td> <td style="width: 40%;"> </td> </tr> </table>	Any	
Any			
Manufacturer's drawing ref. no.			

(11/03) Corrosion protection (steel columns only) - basic system type (sub-Clauses 1911.9 and 1911.10)

(11/04) Reference Wind Velocity V_{ref} as defined in BS EN 40-3-1 m/sDetails of signs and attachments allowed for in the design Area (mm²), Eccentricity (mm), Height

- additional sacrificial steel thickness, above that needed in the design, from the bottom of the column to at least 250 mm above the anticipated ground level

 (mm)**Part B Foundation Data**

Planted base

Planting depth

 (m)

Standard Soil Type Factor G

630	390	230
-----	-----	-----

Diameter of concrete surround (if any)

(11/03) Flange plate

Bolt hole centres	Bolt Hole diameter	Design load/bolt
(mm)	(mm)	(N)

Relevant forces and moments at ground level

Line of action of max. moment relating to door opening

NOTE: For flange plates with slotted holes a diagram shall be included with this Data Sheet.

APPENDIX 13/2 (05/01)

(SPECIFICATION FOR HIGHWAY WORKS)

TYPICAL LIGHTING COLUMN AND BRACKET

DATA - SHEET 2

(11/03) Part C Acceptable Luminaires

Luminaire: Maximum Characteristics

Post Top Column			(11/04) Terrain Categories as defined in BS EN 40-3-1				
			I	II	III	IV	
	Luminaire Max Wt (kg)		(11/04) Maximum Windage Area (m ²) for Terrain Categories as defined in BS EN 40-3-1				
	Luminaire Connection						
Single Arm Bracket Column:	Diameter	Length					

Single Arm
Bracket
Column:

Luminaire Lever Arm (mm)	
Due to wt. of luminaire	Due to windage on luminaire

Bracket Projection (m)	Ref No.	Drawing No.	Material		Luminaire Fixing Angle	Luminaire Connection		Luminaire Maximum Wt (kg)	(11/04) Maximum Windage Area (m ²) for Terrain Categories as defined in BS EN 40-3-1				
			Grade	Design Strength (N/mm ²)		Diameter (mm)	Length (mm)						

Double Arm
Bracket
Column:

Luminaire Lever Arm (mm)	
Due to wt. of luminaire	Due to windage on luminaire

Bracket Projection (m)	Ref No.	Drawing No.	Material		Luminaire Fixing Angle	Luminaire Connection		Luminaire Maximum Wt (kg)	(11/04) Maximum Windage Area (m ²) for Terrain Categories as defined in BS EN 40-3-1				
			Grade	Design Strength (N/mm ²)		Diameter (mm)	Length (mm)						

Part D Certification

It is certified that the information given in this Data Sheet has been obtained in accordance with Departmental Standard BD 26 (DMRB 2.2.1) and the Specifications.

Signed on behalf of the Contractor

Date

APPENDIX 13/3: INSTRUCTIONS FOR COMPLETION OF COLUMN AND BRACKET DATA SHEETS

General

1. When information is not required a dash shall be inserted in the appropriate boxes.
2. Where a Data Sheet is amended it shall be given a new revision number with a date.
3. The revision numbers shall be consecutive letters of the alphabet, commencing with "A".
4. The date of the revision shall agree with the date of the Contractor's signature.
5. The column, or bracket material shall be steel.
6. The material design strength shall be the minimum specified in the design. Where more than one material is used values for all materials shall be given.
7. All relevant entries shall be made on the Data Sheet before the document is certified by the Contractor.

Column Data

8. The column nominal height shall be as specified.
9. The number of door openings shall agree with the manufacturer's drawing.
10. The cross-section of the base compartment shall be indicated by a dimensioned diagram/sketch.
11. The acceptable position of bracket arms relative to the door position shall be indicated on the diagram. Where all positions are acceptable the box noted "ANY" shall be ticked.
12. Where concrete is necessary around the planted base in accordance with sub-Clauses 1305.3 and 1305.4 the minimum diameter shall be entered.
13. For flange bases all forces and moments used in the design of the foundations, anchorages and attachment system shall be given.
14. The corrosion protection system used on the column when new shall be recorded. Where additional steel is provided for sacrificial purposes the amount shall be recorded.
15. The signs and attachments surface area, eccentricity from the centre line of the column to the centre of area of the sign and height above ground level to the centre of area of the sign shall be stated.

5.3.i.2 Bracket Data

16. The luminaire lever arms, weight and maximum windage area quoted shall be based on the most adverse loading on the bracket when it is attached to any of the columns quoted in the compatible columns sections.

(Note: The lantern lever arms are the horizontal distances from the centre of gravity of the luminaire and, if applicable, the centroid of the windage surface area to the end of the bracket joint).

APPENDIX 14/1: SITE RECORDS

1. As-built drawings shall be produced by the Contractor using AutoCAD or other approved compatible program.
2. The as-built drawings shall include inserts to a larger scale when layouts are complex.
3. The as-built drawings shall include cable wiring schematic drawings.
4. If during construction the longitudinal location measurements have to be related initially to contract chainages the Contractor shall convert them to refer to permanent highway features such as bridge abutments or marker posts when these are defined.
5. The handover requirements shall be in accordance with TSDL 1/96 (Maintenance and Operational requirements for new networks and equipment)

APPENDIX 14/2: LOCATION OF LIGHTING UNITS AND FEEDER PILLARS

1. The position of lighting units and feeder pillars as per the Scheme Information.
2. The Contractor shall be responsible for liaison and co-ordination with the Electricity Distribution Company for the supply connections to the new feeder pillars.

APPENDIX 14/4: ELECTRICAL EQUIPMENT FOR ROAD LIGHTING

The Contractor shall insert below details of the equipment which he proposes to use in the Works and shall submit the information as soon as the contract has been awarded.

5.3.i.3 Luminaires and Lamps

The luminaires shall be compatible with the columns and brackets offered in Appendix 13/2 and the information shall include the lamp type and wattage and luminaire circuit wattage.

Ancillary Equipment

Clause	Item	Manufacturer	Catalogue or Type No.	Requirements
1407 / 1408	Lanterns / Lamps			
1409	Photo-electric control units			
1410	Shorting plugs			
1411	Time switches			
1416	Cut Outs			
	Fuse (Links)			
	MCBs			
1418	Feeder Pillars			
1419	Wiring			

Cables and Cable Joints

Cable trenches shall be as MCX drawings 0141 for armoured cable and 0814 for ducted cables.

Chambers

Chambers shall be Type A, B or C as MCX drawing 0815.

APPENDIX 14/5: ELECTRICAL EQUIPMENT FOR TRAFFIC SIGNS

1. The positioning of equipment within the base compartment of posts shall be as described in the Scheme Information.
2. Requirements for wiring and installation of components within posts and Lit Sign Units shall be as described in the Scheme Information.

APPENDIX 15/1: MOTORWAY COMMUNICATIONS

Specification documents required are available from TSS Plans Registry, Bristol, Tel: 01173 728270 or email Tss_plans_registry@highways.gov.uk.

They can also be accessed via the portal: <https://tssplansregistry.dft.gov.uk/login.asp>

APPENDIX 16/1 General Requirements for Piling and Embedded Retaining Walls

1. Comply with the current edition of the 'Specification for piling and embedded retaining walls' (SPERW) unless specified otherwise in this section.
2. Ensure that a copy of the SPERW is available at all times during the course of the works.
3. Refer to Appendix 16/8 and 16/9 for details of the testing of working cast-in-place piles.
4. The Contractor shall allow for the provision of lighting to be lowered down the pile bore of bored cast-in-place piles for inspection purposes prior to concreting.
5. The Contractor shall submit design calculations, details of materials to be used and a schedule of dimensions for all proposed piling structures and elements.
6. The Contractor shall supply to the Overseeing Organisation a minimum of 7 days prior to the commencement of piling operations details of the method of piling, the plant and the monitoring equipment he plans to adopt.
7. On completion of the piling operations the Contractor shall supply to the Overseeing Organisation signed copies of the piling records. A copy of these records shall be submitted to the Overseeing Organisation no later than 24 hours after the completion of the pile.
8. Material or workmanship that is unsatisfactory shall not be made good or replaced without the prior knowledge of the Overseeing Organisation.
9. Total sulphur, water soluble or total sulphate, pH and chloride (for pH < 5.5) tests shall be carried out on samples taken at 0.5 metres and 1.2 metres depth from inspection pits, if the test has not already been carried out. No concreting shall be carried out at any site prior to the submission of all chemical test results stated in this Appendix.
10. The Contractor shall ensure that damage does not occur to completed piles through his method of working. The Contractor shall submit to the Overseeing Organisation a programme of his proposed sequence and timing of constructing piles having regard to the avoidance of damage to adjacent piles or unfilled pile excavations. Piling shall not commence until approval has been given.

EXISTING UNDERGROUND SERVICES

The Contractor shall:

1. Obtain proof that services are dead before breaking through.
2. Establish location of live services by hand-digging and obtain instructions where these clash with pile locations.
3. Ensure any work carried out to or which affects new or existing services must be in accordance with the byelaws or regulations of the relevant statutory authority.
4. Protect drains, manholes, gullies, vent pipes and fittings still in use and ensure that they are kept free of debris at all times.
5. Notify the Overseeing Organisation and service authority or owner of any damage

6. Make all arrangements for repair to the satisfaction of the Overseeing Organisation and service authority or owner and bear any costs arising.
7. Make good any damage arising from piling work and leave clean and in working order at completion.

EXISTING OBSTRUCTIONS

The Piling Contractor should undertake the removal of redundant foundations and other obstructions where they will clash with pile locations and replace with DoT Type 1 fill before constructing the piles.

SITE INSPECTIONS

The Piling Contractor must make such inspection of the site as he may consider necessary to satisfy himself that he has allowed fully for all matters of access and mobility on the site.

APPENDIX 16/3: BORED CAST-IN-PLACE PILES

1. Pile diameter: Provided in the Scheme Information.
2. Pile Length: Provided in the Scheme Information.
3. The use of bentonite or an alternative support fluid is permitted to maintain the stability of the pile bores.
4. All piles shall be constructed to the toe levels indicated in the Scheme Information.
5. For concrete grade and specification, refer to Appendix 17/1.
6. Piles to be tested as follows:-
7. Integrity Test: Details provided in the Scheme Information and Appendix 16/8.
8. Reinforcement: Details of the grades and cover to reinforcement shall be as identified in the Scheme Information. High yield reinforcement shall be B500B ribbed bar.
9. Testing of concrete shall be carried out as specified in Appendix 1/5.

**APPENDIX 16/4: BORED PILES CONSTRUCTED USING CONTINUOUS FLIGHT
AUGERS AND CONCRETE OR GROUT INJECTION THROUGH HOLLOW AUGER STEMS**

Details provided as part of the Scheme Information.

APPENDIX 16/6: STEEL BEARING PILES

Details provided as part of the Scheme Information

APPENDIX 16/8: NON-DESTRUCTIVE METHODS FOR TESTING PILES

1. Integrity tests are to confirm that the required length of the piles has been obtained and to identify acoustic anomalies in the piles that could have a structural significance with regards to the performance and the durability of the pile.
2. The pile is monolithic, of the required density and the full cross sectional area of concrete as indicated in the Scheme Information drawings has been maintained throughout its length.
3. The Overseeing organisation may request additional piles to be dynamically tested if the pile type or installation procedures are modified, the pile capacity requirements are changed, unusual blow counts or penetrations are observed or any other piling behaviour different from normal installation is observed.
4. All piles shall be tested by using the dynamic impulse shock method. The tests shall comply with the following:-
 - i) The shock method, used in a test shall study the transient state dynamic response to an applied impulse.
 - ii) Testing shall only be undertaken by an experienced testing organisation, independent of the piling contractor and approved by the Overseeing Organisation.
 - iii) All the main items of the testing equipment shall be approved by the Overseeing Organisation and found to be of a type suitable for use in checking the integrity of the pile shaft in conformity with (iv) and (v) below. The equipment shall consist of a small (approx 1kg) load cell for measuring transient (dynamic) force, a transducer for monitoring response, a command/control unit, and an oscilloscope capable of displaying for control and record purposes signals of applied hammer force (F) and pile head vibration velocity (V) on a simultaneous time base. The signals shall be stored by a microprocessor (or computer) and the response transformed using the Fast Fourier Transformation technique (or similar approved) to give automatic plots on an X-Y recorder of the mechanical admittance (V/F) versus load cell generated frequency (f). Any new acceptable values of (V) and (F), obtained from several tests on the same pile, shall be added to the previous values in the storage and used cumulatively in the processing. The X-Y recorder of the admittance versus frequency plots shall be capable of re-plotting the first 100 Hz on an expanded scale for an accurate determination of the pile head stiffness.
 - iv) The equipment shall be robust and suitable for use on an open construction site.
 - v) The Contractor shall make available to the testing organisation's representative on site a plan showing the layout and the constructed length of the piles to be tested. These piles shall be indicated to the testing team on site and numbered. The basic information regarding the materials from which the pile is made, the dimensions of the pile including under-reaming, the age of the pile and the ground conditions through which the pile penetrates shall be made available to the testing team. Access shall be provided for the service van (typically to within 30 metres of all piles to be tested).
 - vi) Testing shall not be carried out on a pile within seven days of casting. The pile head of vertical piles shall be prepared by removing all loose material and debris to expose sound concrete over an approximately horizontal top surface, and be kept free of standing water. The central 150mm dia. area and one (or more as

directed) peripheral 100mm dia. area shall be bush hammered flat and level, without bending out of the way or otherwise damaging reinforcement. The pile head shall be kept free from close contact with blinding during the test and top surface kept at a minimum 50mm above the surrounding ground/surface level unless directed otherwise by the Overseeing Organisation.

- vii) After a thorough check of the electronic circuit, the load cell shall be placed centrally on the pile head in an optimum position for a transmission free of site reflections. The pile head shall be forced into a transient vibration by a tap on the load cell with a light hammer weighting approximately 1kg. The signals of the applied force (F) and pile head vibration velocity (V) shall be monitored on the oscilloscope and checked that they are acceptable. The transformed signals, resulting in plots of the mechanical admittance versus frequency, shall be entered on the X-Y recorder for the detailed evaluation of pile vibration characteristics. The pile number and depth shall be recorded on each X-Y graph. The test shall be repeated a number of times to reduce the background noise on the V/F plot: four tests are normally sufficient on noisy sites. More pronounced faults (ie. honeycombing, poor concrete, etc.) noted on the recorder shall be indicated to the Overseeing Organisation on site for his early consideration and instructions for further tests. In the special circumstances when the tests are repeated, the Overseeing Organisation may request to see for the examination and record the Polaroid photographs of the seismic signals from the oscilloscope, and these shall be presented to him.
- viii) The test results shall be in the form of X-Y plots of mechanical admittance versus frequency, clearly identifying the pile being tested. The accompanying written interpretation shall contain observations on the following: the length of pile as deduced from the tests, the stiffness of pile/soil system (corresponding to the fundamental mode of vibration), the integrity of pile shaft (represented in the X-Y plot by the geometric mean of the mechanical admittance values measured within waves of the secondary oscillation in the resonant high frequency portion of the spectrum), deduced cross-sectional area of pile (or the concrete quality if the area is known), the velocity of the plan waves in concrete, the actual density of concrete as cast and the mass of pile. In the conclusions, the test interpretation shall include brief comments on the detected irregularities and faults in the concrete, and on expected skin friction characteristics and mode of settlement.
- ix) The Contractor shall within 7 days of the completion of integrity testing of piles at each gantry site submit to the Overseeing Organisation a report on the integrity of each pile.
- x) Preliminary results of the tests shall be submitted to the Overseeing Organisation within 24 hours of carrying out the tests.
- xi) In the event that an anomaly is found in the results indicating a possible defect in the pile, the Contractor shall report such anomalies to the Overseeing Organisation immediately. The Contractor shall demonstrate to the Overseeing Organisation that the pile is satisfactory for its intended use or, subject to the Overseeing Organisation's approval, shall carry out remedial works to make it so.

APPENDIX 16/15: STEEL SHEET PILES

Detailed drawings and location to be provided in the Scheme Information.

Section Modulus = 800-1200 cm³/m

APPENDIX 17/1: CONCRETE – CLASSIFICATION OF MIXES

Information to be provided as part of the Scheme Information.

INFORMATION TO BE SUPPLIED BY THE OVERSEEING ORGANISATION			
Intended Location of Concrete	Gantry Piles	Gantry Pilecaps	ERA Retaining Wall Capping Beam
Intended Working Life of Structure			
Nominal Cover to Reinforcement			
Applicable Exposure Classes (Excluding DC-class)			
DC-class (where appropriate)			
Compressive Strength Class of Concrete			
Minimum Cement Content (kg/m ³)			
Maximum Free Water/Cement Ratio			
Required Group or Type and Class of Cement or Combination (where a DC-class has not been specified)			
Maximum Aggregate Size, mm			
Chloride Content Class			
For Lightweight Concrete, the Density Class or Target Density			
For Heavyweight Concrete, the Target Density			
Consistence Class (Contractor to confirm)			
Special Type or Class of Cement or Combination			
Required Source/Special Type of Aggregate			
Maximum Cement Content (kg/m ³)			
Required Admixture			
Air Entrainment Required [YES/NO]			
Minimum or Maximum Temperature of Fresh Concrete °C			
Sampling and Testing			
Other Requirements			

APPENDIX 17/2: CONCRETE – IMPREGNATION SCHEDULE

In accordance with BD 43/03.

APPENDIX 17/3: CONCRETE – SURFACE FINISHES

1. Requirements for Trial Panels

- 1.1. The surface finish of concrete shall comply with the requirements of Clause 1708.
- 1.2. The Contractor shall produce one precast trial unit in accordance with Clause 1708.1 to determine the acceptability of the concrete surface finish to class F3 and 'patterned profile' and overall colour of the concrete. The trial panel shall have minimum dimensions 1.0m wide by 1.0m high by 0.5m deep. One 1.0m wide side of the panel shall have a 'patterned profile'; the other faces shall have F3 finish.
- 1.3. The trial unit shall use the concrete Mix reference A as detailed in Appendix 17/1 and be representative of the formwork to be used in the permanent works. Cover (spacer) blocks, tie bar and reinforcement shall be incorporated in the trial panel. On completion and approval of the trial unit, the Contractor shall maintain the panel available for inspection by the Employer until the completion of works.
- 1.4. The Contractor shall construct as many trial panels as may be required to achieve the approval of the Overseeing Organisation.

APPENDIX 17/4: CONCRETE – GENERAL

1. All tying wires shall be 1.2mm diameter stainless steel wire. All reinforcing bars shall be type 2 deformed bars.
2. Reinforcing bars shall be type 2 to BS4449.
3. Any change to position of construction joints proposed by the Contractor shall be approved by the Supervisor.

APPENDIX 18/1 REQUIREMENTS FOR STRUCTURAL STEELWORK

1. Documentation

- 1.1 Fabrication drawings or the equivalent shall be provided.
- 1.2 At least 6 weeks prior to erection, the Contractor shall submit an erection statement in accordance with the requirements of the Health and Safety Plan.

2. Modifications to BS5400:PT6:1999

- 2.1 Refer to Clause 1803 of the Highways Agency “Specification for Highway Works” for modified references to other standards in BS5400: Part 6 :1999
- 2.2 The amendments in clause 1803 to clauses 3.1.4 and 5.5.2 are deleted.

3. Materials

3.1 General

- 3.2 The Contractor shall maintain a record of the source of, and test certificates for, each plate, section, welding consumable, bolt, rivet, washer, nut and shear connector.

3.3 Structural Steels

- 3.4 The following optional technical delivery conditions shall be invoked:

(a) Where indicated on the drawings, material shall comply with the requirements for improved deformation properties perpendicular to the surface of the product according to BS EN 10164, class Z35.

(b) Where indicated on the drawings, the material shall be suitable for hot-dip galvanised coating (Option 5 of BS EN 10025).

(c) Where material is to be bent in the cold condition, it shall be of a grade suitable for cold forming.

(d) Rimming steel shall not be used.

(e) The Overseeing Organization shall be afforded the opportunity of inspecting the steel and witnessing tests at the manufacturer's works.

Specific inspection and testing shall be carried out. The inspection document shall be inspection certificate type 3.1 as defined in Clause 4.1 of BS EN 10204.

The tolerance on thickness of plates and flats shall be Class A to BS EN 10029.

The surface condition shall comply with Class A3 (for flat products) or Class C3 (for sections) to BS EN 10163.

In addition to the areas mentioned in clause 3.1.4.1 of BS5400-6 as amended by Clause 1803 of the Specification for Highway Works, and where indicated on the drawings, areas of plate shall not have internal imperfections exceeding the limits of class S1 to BS EN 10160:1999 .

The surface of the steel material, before surface preparation and protective treatment, shall comply with rust grades A or B according to BS 7079. Material which is pitted, i.e. rust grades C or D, shall not be used.

For welded cruciform and tee joints the material used shall not contain internal imperfections of such an extent in the region of the weld as to prevent compliance with the limits specified in clause 5.5.2.4.2 of BS5400-6 as amended by Clause 1803 of the Specification for Highways Works.

4. Workmanship

4.1 Fabrication Tolerances

The steelwork dimensions given on the drawings are specified for a mean temperature of 11.5

□C. The Contractor shall make adjustments as necessary to achieve the specified dimensions at this temperature.

The Contractor shall make allowance in the fabricating of the steelwork for changes in the dimensions and profile of the steelwork due to the method of fabrication and due to the method of connecting together of the steelwork during erection.

If no trial erection is to be performed the fabricated steelwork shall be measured for length in the workshop:

- on length over each span, measured between bearing centrelines.
- on the cumulative length from the North end.
- on length of transverse bracing members

The results of the measurements shall be reported to the Overseeing Organization.

As an alternative to machining of bearing surfaces in accordance with Clause 4.2.3, BS5400-6:1999, an equivalent fit may be achieved between two surfaces by grinding until the two surfaces mate to give a maximum 0.5mm gap.

4.2 Preparation of edges, ends and surfaces

Where ends of stiffeners are required to be fitted, they shall be ground or otherwise prepared, so that the maximum gap between the end of the stiffeners and the surface against which it is fitted does not exceed 0.25mm over 60% of the fitted areas and does not exceed 0.75mm over the remainder of the fitted area.

In addition to the requirements of clause 4.3.3, all flame cut edges shall be ground or machined to remove all visible signs of drag lines.

4.3 Bolts, nuts and washers

Unless otherwise specified by the Overseeing Organization, compliance and use requirements for high strength friction grip bolts shall be as given in Clause 3.4 and Table 2 of BS5400-6:1999. Holding down bolts shall comply with BS7419: 1991.

4.4 Holes for rivets and bolts

Punching holes to full size will not be permitted.

Unless otherwise specified by the Overseeing Organization, holes for high strength friction grip bolts shall comply with the requirements of BS 4604.

4.5 Welding

The fit-up of parts joined by fillet welds shall comply with the requirements of BS EN 1011-2. Additionally, gaps between parts joined by fillet welds shall not exceed 1mm average (measured over 1m or the length of the weld, whichever is smaller). Where this additional requirement is not

achieved, Contractor shall increase the size of the fillet weld accordingly, unless otherwise agreed by the Overseeing Organisation.

The position of any welded temporary attachments and additional shop butt welds shall be to the approval of the Overseeing Organization and a written record of the details shall be provided. In general, temporary welded attachments will not be allowed within 25mm of the edges of flange plates.

Identification shall be provided to enable each weld to be traced to the welder or operator who made it.

Relevant pre-qualified welding procedures, certified by an independent inspection authority, will be considered by the Overseeing Organization.

The Contractor shall submit written procedures for flame cutting and shearing before commencing fabrication. Documentary evidence shall be submitted to show that procedure trials witnessed by an independent inspection authority demonstrate that these procedures comply with the requirements of Clause 4.3.3, BS5400-6:1999 (as modified by SHW clause 1803).

Formal procedures for the repair of welds will be required.

Weld discontinuities which are not acceptable according to clause 5.5.2.4 of BS5400-6 as amended by Clause 1803 of the Specification for Highways Works shall be removed by grinding or repaired by welding as appropriate, but not before the rectification procedure has been approved by the Overseeing Organization. The preparation for weld repairs shall be by grinding, chipping or air-arc gouging followed by grinding and proved free of exposed defects using magnetic particle inspection to BS EN ISO 9934-1:2001 prior to re-welding.

The whole of the repaired length of the joint shall be inspected using the non-destructive testing methods and criteria for acceptance specified for the original weld.

In addition to the requirements of Clause 4.7.5, BS5400-6:1999, the cause of any defects shall be identified and details given to the Overseeing Organization.

4.6 Straightening and flattening

A visual re-check of all the local and adjacent welds following any straightening procedures shall be completed.

4.7 Camber

Where cambering is achieved by a series of chords to form a curve, the chords shall be agreed by the Overseeing Organization.

Cambering shall be to a smooth continuous curve.

4.8 Marking for erection

The Contractors shall supply drawings to show the marking scheme for members for approval by the Overseeing Organization. Any marking scheme shall be applied before dismantling any trial erection, but shall not be obliterated by subsequent blast cleaning or painting. Markings should preferably be on plate ends and visible when the structure is assembled.

Hard stamping shall not be used in areas of high fatigue or as marked on the drawings.

A “low stress hard stamp” where the leading edge of the character is radiused shall be used.

4.9 Additional clauses

All welds shall be continuous, unless otherwise specified by the Overseeing Organization.

All sharp corners shall be 1 mm radiused.

5. Inspection and Testing

5.1 General

Inspection and testing shall be carried out by relevantly qualified personnel.

5.2 Surface defects and edge laminations

Steelwork shall be inspected for surface defects and exposed edge laminations during fabrication and blast cleaning. Significant edge laminations found shall be reported to the Overseeing Organization for his decision. Following rectification of these affected areas they shall be tested for defects to the satisfaction of the Overseeing Organization.

5.3 Procedure trials

In table 3, delete “when specified by the Engineer”

5.4 Production tests

The weld metal and heat affected zone in production test plates shall be tested to ensure compliance with Clause 5.4.1.2, BS 5400: Part 6, assuming that the applied principal tensile stress at the ultimate limit state is greater than 100N/mm².

All loose rust and scale, slag residue and weld spatter shall be removed prior to inspection.

5.5 Non-destructive testing of welding for structural steel.

Partial inspection

After completion of the visual examination above and where less than 100% inspection is specified in the following clauses, the length of weld inspected shall not be less than 300 mm or for shorter welds the total length of the weld. The inspected lengths shall be spaced along the weld and include any lengths where visual inspection has indicated that internal quality is in doubt.

Ultrasonic inspection

Post fabrication ultrasonic testing of support diaphragms or bearing stiffeners adjacent to welds, plates in box girder construction adjacent to corner welds, flange plates adjacent to web/flange welds, material at cruciform welds or any other details shall be carried out where specified by the Overseeing Organization.

5.6 Acceptance Criteria

Ultrasonic inspection

Discontinuities identified as cracks, other than lamellar tearing permitted below, shall be rejected.

Where porosity or slag lines are such to impede reliable detection or evaluation of other discontinuities the joint shall be rejected.

Embedded discontinuities other than porosity shall comply with the requirements of Table 6 of BS 5400-6:1999 subject to the following:

5.6.1 Transverse in line butt welds

For transverse welds, the notation shall be as given beneath Table 6 and in Figure 2, BS 5400-6:1999.

5.6.2 Welded transverse cruciform and tee joints

For the continuous plate in such joints, the embedded discontinuities within the zones indicated in Figure 3, BS 5400-6:1999 shall comply with the requirements of Table 6 for “not-specified” minimum class requirement.

Notes:

1. Where two or more adjacent discontinuities exist such that the spacing between them is $H < 6$ mm and $L < 10$ mm they shall be considered as one and the combined length between the outer ends of any such discontinuities ($\square l + \square L$) shall not exceed l_{max} . Only one discontinuity in that group shall be permitted to be within 6 mm of a free surface.
2. Where discontinuities in different planes overlap, the through thickness distance H shall not be less than 6 mm.
3. Where the weld length is less than 600mm, the permitted value of $\square l$ shall be reduced in linear proportion.

In addition the following defects are unacceptable:

- i) stray-arcing spots;
- ii) any undercut perceptible to the naked eye at the corners of plate or section elements at weld ends, returns or adjacent to longitudinal weld toes;
- iii) irregular weld appearance and poor profile; in particular fillet weld throat thicknesses in excess of 0.9 times or less than 0.7 times the specified leg length and butt weld reinforcement profiles which do not blend smoothly with the parent metal surface, and which for in-plane joints have thicknesses in excess of 3 mm for nominal throat thickness up to and including 25 mm and in excess of 5 mm for nominal throat thicknesses in excess of 25 mm;
- iv) planarity misalignment of butt welds not in accordance with clause 4.2.4.2 in BS 5400-6:1999;
- v) surface defects including cracks, worm holes, porosity and overlap; and
- vi) under sized welds;

6. Handling, Transport and Erection

6.1 Erection

The allowances for permanent deformation and other associated dimensions shown on the drawings allow for the nominal effects of the following loads and effects:

After Steelwork Erection:

Steelwork dead load

After Completion of Structure:

Steelwork dead load

Superimposed dead load

Unless noted below the tolerance on steelwork dimensions and levels at completion shall be in accordance with the National Structural Steelwork Specification for Building Construction:

on level, relative to that specified:

at the supports: $\pm 5\text{mm}$.

at midspan: $\pm \text{span}/1000$, up to a maximum of $\pm 35\text{mm}$.

on plan position of steelwork, in any direction (structure at datum temperature):

at bearing positions: $\pm 5\text{mm}$.

at all other positions, unless otherwise specified: $\pm 10\text{mm}$.

If the steelwork is not within tolerance, it shall be adjusted, as required by Clause 6.3.1, BS 5400: Part 6, to the satisfaction of the Overseeing Organization.

The Contractor shall provide any additional bracing or other restraints that may be required to ensure stability and strength of the steelwork during handling, transport and erection.

Bolted splices shall be completed, including final tightening of bolts, as soon as reasonably practicable after assembly of the splice.

Bolts shall be tightened using the part turn method (see Table 3A in SHW clause 1803).

Where bolts are exposed, bolts on flanges shall, wherever possible, have their heads on the underside of the flange and bolts on webs shall have their heads on the external (more visible) face of the web.

APPENDIX 19/1: FORM HA/P1 (NEW WORKS) PAINT SYSTEM SHEET

(SPECIFICATION FOR HIGHWAY WORKS)
FORM HA/P1 (NEW WORKS) PAINT SYSTEM SHEET

Sheet No: 1

1. SCHEME TITLE: STRUCTURE NO: GRID REF:				
2. DATE OF ISSUE OF DOCUMENTS:				
3. ENVIRONMENT AND ACCESSIBILITY: Inland and Difficult				
4. REQUIRED DURABILITY OF SYSTEM: MAJOR MAINTENANCE after 15 YEARS NO MAINTENANCE up to 8 YEARS MINOR MAINTENANCE after 8 YEARS		5. COLOUR OF FINISH		
6. PAINT SYSTEM TO BE APPLIED OVER: AREA REF: AREA DESCRIPTION: PROTECTIVE SYSTEM TYPE: (i.e. I, II, etc):				
7. DETAILS	1 st Coat	2 nd Coat	3 rd Coat	4 th Coat
Registered Description Item No. and Colour Date Registered Brand Name and Manufacturer's Ref. No Data Sheet No. Where applied How applied Min dry film thickness (mdft) Max local dft (See Cl. 1914.7) Estimated total volume of paint likely to be used. (litres) 'A' type testing required? (YES/NO) (See Cl 1912.3) 'B' type testing required? (YES/NO) (See Cl 1912.9)				
8. STRIPE COAT DESCRIPTION (Including Item No. and colour) Shop: Site:		9. PAINT MANUFACTURER'S OFFICIAL STAMP:		
10. Mdft (µm) NOTE: The minimum total dry film thickness of the paint system, neglecting primers and sealers under 30 microns, shall be 15% greater (to the nearest 25 microns) that the sum of the mdfts of the individual paint coats.		11. APPROVED BY: DATE:		

APPENDIX 19/3:- FORM HA/P2 PAINT DATA SHEET

(SPECIFICATION FOR HIGHWAY WORKS)
FORM HA/P2 PAINT DATA SHEET

Sheet No.

Manufacturer :
 Item No :
 Registered Description :
 Brand Name and Reference No :
 Consistency and Method of Application :
 Weight per 5 Litres (kgs) :
 For two pack paints :
 Base: Activator : Mixed components:
 Volume Solids % :
 For two pack paints volume solids % for mixed paint:
 Manufacturer's Minimum
 Dry Film Thickness Range
 Recommended lower mdft :
 Recommended upper mdft :
 Full Application Instructions :
 Flash Point :

		5°C	10°C	20°C	30°C
Drying Times (hours)	Surface Dry				
	Hard Dry				
Over coating Times (hours)	Minimum				
	Maximum				
Pot Life (hours)					

Cleaning Solvent :
 State effect on Drying Times of
 Temperatures below 20°C :
 Manufacturer's Application
 Restrictions, e.g. for Temperatures or
 Humidity :
 Manufacturer's General
 Recommendations :

APPENDIX 19/4: FORM HA/P3 PAINT SAMPLE DISPATCH LIST SHEETS 1 & 2

(SPECIFICATION FOR HIGHWAY WORKS)
FORM HA/P3 PAINT SAMPLE DISPATCH LIST: SHEET 1**Contract****Title**.....

Structure Name Structure No.

Client Name: Highways Agency

Supervising Firm.....

Supervising Firm's Representative NameTel no.

Painting Inspection Firm.....

Samples Despatched From..... (Note 1) Date Despatched.....

Inspector's Name Tel no.

Inspector's Signature

Samples: (Numbered A1, A2 etc or B1, B2 etc) (Note 2)

<i>Sample No</i>	Item No	Manufacturer's Reference No	Batch No	Colour BS 4800 reference (Note 3)	Sp.G. (Notes 4 and 5)

Paint Manufacturer

APPENDIX 19/4

**(SPECIFICATION FOR HIGHWAY WORKS)
FORM HA/P3 PAINT SAMPLE DISPATCH LIST: SHEET 2**

INSPECTOR to complete Form HA/P3 and to forward single copies to each of the following within 24 hours of dispatch of samples by the Contractor to DERA

- | | |
|--|---|
| 1. ESG
Coatings Team
Derwent House
Bretby Business Park
Ashby Road
Burton on Trent
Derbyshire DE15 0XD | 2. Highways Agency
Paint Specialist
NetServ
Piccadilly Gate
Store Street
Manchester M1 2WD |
|--|---|

INSPECTOR to forward Form(s) HA/P1 Paint System Sheet(s) with the first Form HA/P3 to both addresses.

INSPECTOR to select "A" samples and to ensure that manufacturer's labels on tins comply with specification.

INSPECTOR to take and mark each "B" sample tin with Item No. manufacturer's name and brand reference No, batch No, sample No and colour (NOTE 2).

CONTRACTOR to CLIP DOWN LIDS of all tins and to pack, address and dispatch samples. In addition to address, CONTRACTOR to label each case (or tin sent loose): "HA (State structure name) and DATE (date of dispatch as noted above)".

Notes

1. State whether from shop or site (give name and address).
1. Batch samples comprising unopened tins to be marked A1, A2, etc. Control samples in 0.5 litre tins to be marked B1, B2, etc. Samples No to run consecutively, i.e. A1 and B1 onwards.
2. Colour reference to BS4800 to be given, as stated on Form HA/P1 (New Works) Paint System Sheet, e.g. 18 B 25
3. For "A" samples specific gravity (Sp.G.) to be measured by Inspector from separate tins of the same batch. For "B" samples Sp.G. to be measured by Inspector when taking samples. Samples will be rejected unless Sp.G. is filled in above by Inspector.
4. If Sp.G. differs appreciably from data sheet do not dispatch "A" or "B" samples.

APPENDIX 19/5: GENERAL REQUIREMENTS

Lighting Columns

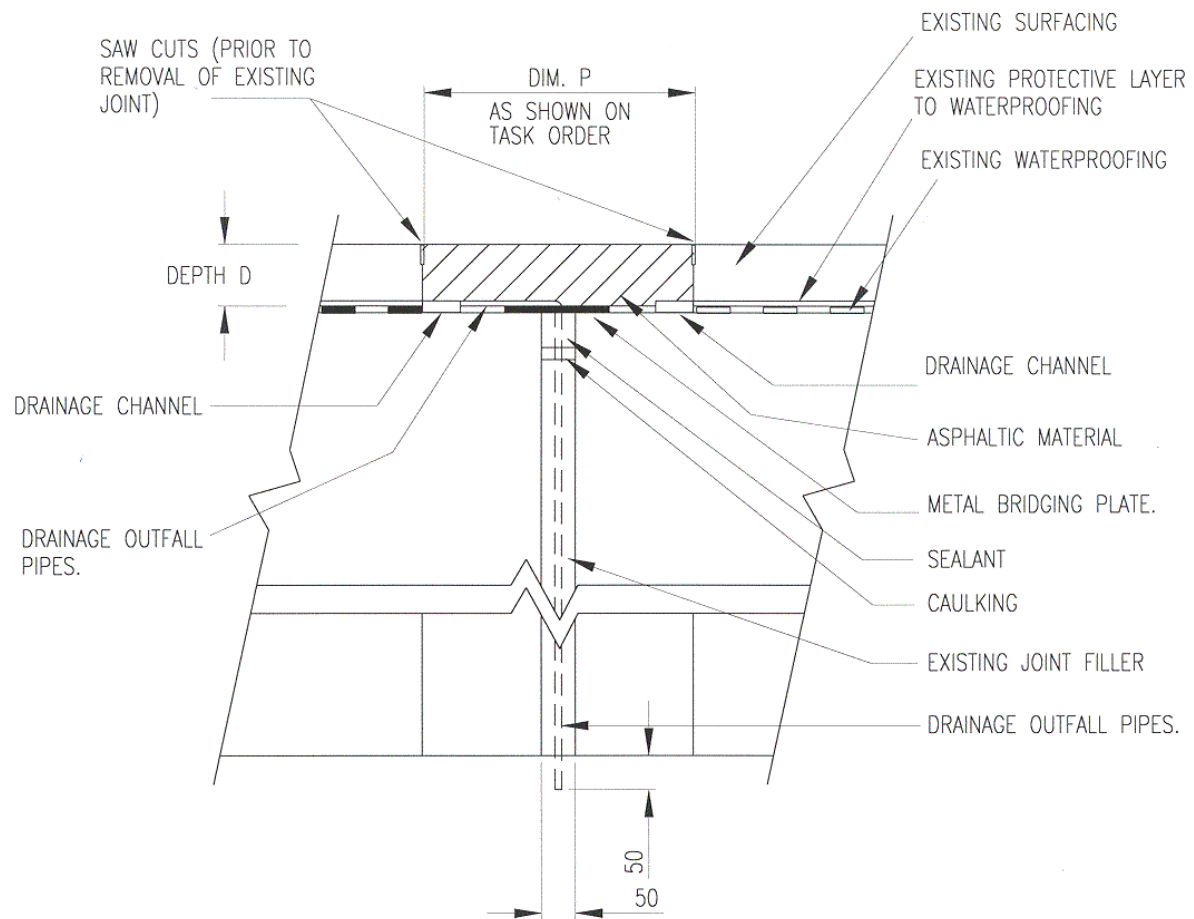
1. The protective system for planted and flange mounted lighting columns with bracket arms shall be G2a and the environmental, accessibility and durability requirements is as described in Sheet 1 of Appendix 19/1.
2. The 'ground level' shall be the actual ground level for each column.
3. The colour of finish shall be as described in the Package Order.
4. Paints for any one system shall be obtained from the same manufacturer.

APPENDIX 20/1 : WATERPROOFING FOR CONCRETE STRUCTURES

1. Proprietary materials will in general be permitted for waterproofing concrete surfaces.
2. Sealing with primer is required prior to the application of tar or bitumen waterproofing.
3. Non-destructive integrity testing of waterproofing will be specified if required in the Scheme Information.
4. Existing waterproofing systems for individual structures are as described in the Scheme Information.
5. Prior to the re-waterproofing of the whole deck, the adhesion of any repairs to the concrete substrate and the waterproofing membrane to the repair material should be established. They shall be tested in accordance with BS EN 4624:2003 or ASTM D4541-02. The repaired area must be large enough to completely contain the sample of waterproofing (or the waterproofing shall be cut back within the repair boundaries) so that all tensile load passes to the repaired area. Two tests shall be carried out per deck as directed by the Supervisor and both tests must achieve an adhesion value of 1N/mm².
6. To achieve the 2mm minimum waterproofing depth, the Contractor shall determine the appropriate application rate for the encountered concrete surface texture. When the structure being waterproofed comprises a significant proportion of existing concrete, the Contractor shall have been assumed to have allowed in his tender an extra 25% above the manufacturers normal minimum coverage rates to achieve the required Specification membrane thickness. This allows for the possibility that older structures may have concrete finishes with a texture depth greater than that for a U4 finish.
7. Surfaces shall be prepared and the waterproofing system shall be installed in accordance with the manufacturer's instructions and approved by the Overseeing Organisation.
8. Arises on existing concrete shall be ground down to a 25mm x 25mm profile of smooth concrete suitable for the receipt of the waterproofing membrane.
9. 25mm x25mm fillets of repair mortar shall be formed where waterproofing is to be laid in sharp internal angles. The surfaces to receive a fillet shall be scarified, cleaned and pre-soaked with clean water for 2 hours prior to removal of excess water and laying of mortar. Mortar shall be hand trowelled into place and form a smooth surface suitable for receipt of the waterproofing membrane.

APPENDIX 23/1: BRIDGE DECK EXPANSION JOINT SCHEDULE

1. For basic types of expansion joints refer to attached drawing.



SECTION

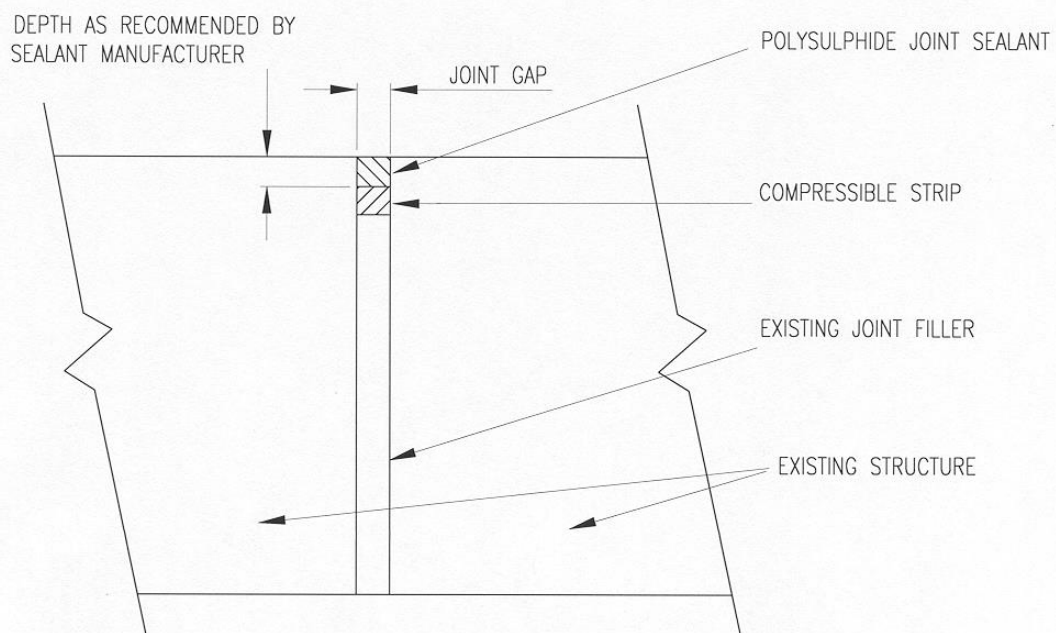
WIDTH THICKNESS	DIM.P UP TO 500 mm.	DIM.P EXCEEDING 500 mm.
	TYPE A	TYPE C
DEPTH D UP TO 100 mm	TYPE A	TYPE C
DEPTH D > THAN 100 mm	TYPE B	TYPE D

JOINT TYPES

Bridge Deck Expansion Joints

APPENDIX 23/2: SEALING OF GAPS SCHEDULE (OTHER THAN IN BRIDGE DECK EXPANSION JOINTS)

Gaps shall be sealed in accordance with the attached drawing.



SECTION

JOINT SEALANT TYPE X – JOINT GAP NOT EXCEEDING 30 mm
 JOINT SEALANT TYPE Y – JOINT GAP WIDTH EXCEEDING 30 mm BUT NOT EXCEEDING 50 mm.

Sealing of Gaps

APPENDIX 24/1: BRICKWORK, BLOCK WORK AND STONework

Unless specified otherwise the following shall apply:

1. Mortar shall be designation (ii) comprising Portland cement complying with BS EN 197.1.
2. Bricks shall be clay complying with the particular requirements of BS 3921, BS EN 771.3 and BS EN 772.7.
3. All exposed pointing shall be bucket handle.

APPENDIX 25/4: ENVIRONMENTAL BARRIERS

Location details to be provided as part of the Scheme Information.

APPENDIX 26/2: BEDDING MORTAR

- 1 Mortars shall comply with the requirements of clause 2601 of the Specification.
- 2 Resinous mortars:
Resinous mortars shall have the following additional properties:
 - compressive strength after 3 hours to be greater than 40 Mpa
 - tensile strength after 3 hours to be greater than 8 Mpa
 - low shrinkage after 28 days
- 3 Quick setting mortar:
Quick setting mortar shall contain quick setting cement or approved additive to obtain early mortar hardening and strength.
4. Compressive Strength Requirements
 - (i) Cementitious bedding mortar shall have the following minimum compressive strength requirements in addition to the requirements of Clause 2601.1(i):-
 - (a) 10 N/mm² at 24 hours at 5°C;
 - (b) 40 N/mm² at 72 hours at 20°C.
 - (ii) The laboratory approval tests for compressive strength shall be extended to include the production and testing of a total of twelve further cubes in accordance with Clause 2601.4(iv) to prove compliance with the requirements stated in paragraph (i) above.
5. Early Loading Requirements
 - (i) The material may be loaded once it has achieved a compressive strength of 40 N/mm².
 - (ii) The gain in strength of the cementitious mortar shall be monitored by testing cubes cured alongside the work area at ambient temperature. For each pour of mortar four cubes shall be made as specified in Clause 2601.4(iv). The cubes shall be cured for 24 hours in the moulds with the top surfaces covered by polythene sheets. After 24 hours the cubes shall be stripped and either placed in polythene bags which shall be sealed or protected as specified in Clause 2601.3. The cubes shall continue to be stored alongside the work area until required for testing. The cubes shall be crushed in sets of two, at times determined by the Contractor until the compressive strength of both cubes in a set is not less than 40 N/mm².

APPENDIX 26/3: CORED THERMOPLASTIC NODE MARKERS

- 1 Cored Thermoplastic Node Markers shall be positioned in the same locations as the existing nodes. The Contractor shall provide the Overseeing Organisation with exact locations prior to removal of the existing markers.

APPENDIX 30/1: GENERAL

1. Notice and liaison requirements detailed in the Scheme Information.
2. Use of peat or peat based products not allowed unless specified in the Scheme Information.
3. Details of statement of intervals of time at which record forms noting the use of pesticides; bird nesting season; provision of inspection reports and the intervals of time at which they are required; shall be provided in the Scheme Information.
4. Pesticide record and inspection report proforma as per MCHW Notes for Guidance Sample Appendix 30/1 Sheets 2 and 3.

APPENDIX 30/2: WEED CONTROL

1. Location and frequency of application to be provided in the Scheme Information.

APPENDIX 30/3: CONTROL OF RABBITS AND DEER

1. Location details and the time period to keep planting enclosures free of rabbits and deer and also the period that damaged plants are to be replaced are given in the Scheme Information.
2. Measures to be carried out at any time.
3. Arisings to be spread on site unless specified in the Scheme Information.

APPENDIX 30/4: GROUND PREPARATION

1. Location details to be provided in the Scheme Information.

APPENDIX 30/5: GRASS SEEDING, WILDFLOWER SEEDING AND TURFING

1. Wildflower planting season will be given in the Scheme Information.
2. Immediately prior to sowing the upper 50mm of soil shall be reduced to a fine tilth by use of a chain harrow or other suitable plant.
3. Seed mixture for grass seeding shall be:

60%	Dwarf variety Perennial Ryegrass;
35%	Slender Creeping Red Fescue;
5%	Highland Browntop Bent;

APPENDIX 30/6: PLANTING

1. Plant schedule, planting seasons and properties of the compost to be provided as part of the Scheme Information.
2. Provenance Certificate as per MCHW Notes for Guidance SAMPLE APPENDIX 30/6 to be used in compliance with sub-Clause 3006.6
3. 25 no./m2 bulbs to be planted per unit area.
4. Planting depths to be 120mm.

APPENDIX 30/12: SPECIAL ECOLOGICAL MEASURES

Details will be provided as part of the Scheme Information.

APPENDIX 50/1: FORM HA/P1 (MAINTENANCE) PAINT SYSTEM SHEET

As per MCHW Notes for Guidance Series 5000. Form HA/P1 from Notes for Guidance Appendix 50/1 is to be completed. Some of the information will be included as part of the Scheme Information. The Contractor will also have to complete part of the form.

APPENDIX 50/3

(SPECIFICATION FOR HIGHWAY WORKS) FORM HA/P2 PAINT DATA SHEET

(05/05) BBA HAPAS Road and Bridges Certificate Reference and Date:

Manufacturer :

Item No. :

Registered Description :

Brand Name and Reference No. :

Consistency and Method of Application :

Weight per 5 Litres (kg) :

Specific gravity: Colour:

For two-pack paints: (05/05)

Base: Activator: Mixed components:

Volume Solids % :

For two-pack paints volume solids % for mixed paint: (05/05)

VOC content g/l (mixed): :

Manufacturer's Minimum Dry Film Thickness Range

Recommended lower mdft :

Recommended upper mdft :

Full Application Instructions :

Mix ratio :

Flash Point :

Temperature		5°C	10°C	20°C	30°C
Drying Times (hours)	Surface Dry				
	Hard Dry				
Overcoating Times (hours)	Minimum				
	Maximum				
Pot Life (hours)					

Cleaning Solvent/thinner :

State effects on Drying Times of
Temperatures below 20°C :

Manufacturer's Application Restrictions,
e.g. for Temperatures or Humidity :

Manufacturer's General Recommendations :

#APPENDIX 50/4

(SPECIFICATION FOR HIGHWAY WORKS)
FORM HA/P3 PAINT SAMPLE DESPATCH LIST: SHEET 1

Contract Title.....
 Structure Name.....Structure No.....
 Client Name.....(Highways Agency or other company)
 Supervising
 Firm.....

Supervising Firm's Representative Name: Tel No.
 Address:
 Painting Inspection Firm:

Samples Dispatched From: (Note 1) Date Dispatched
 Inspector's Name: Tel No.
 Inspector's Signature

SAMPLES: (Numbered A1, A2 etc. or B1, B2 etc.) (Note 2)

Sample No.	Item No.	Manufacturer's Reference No.	Batch No.	Colour BS 4800 reference (Note 3)	Sp.G. (Notes 4 & 5)

Paint Manufacturer:.....

#APPENDIX 50/4

**(SPECIFICATION FOR HIGHWAY WORKS)
FORM HA/P3 PAINT SAMPLE DESPATCH LIST: SHEET 2**

INSPECTOR to complete Form HA/P3 and to forward single copies to each of the following within 24 hours of despatch of samples by the Contractor to Scientifics Ltd:

- | | |
|--|---|
| i. Scientifics Ltd
500 London Road
Derby DE24 8BQ. | ii. (05/05) Highways Agency
Paint Specialist
Safety Standards and Research (SSR)
City Tower
Piccadilly Plaza
Manchester M1 4BE |
|--|---|

INSPECTOR to forward Form(s) HA/P1 Paint System Sheet(s) with the first Form HA/P3 to both addresses.
INSPECTOR to select 'A' samples and to ensure that manufacturer's labels on tins comply with the Specification.

INSPECTOR to take and mark each 'B' sample tin with Item No., manufacturer's name and brand reference No., batch No. sample No. and colour (Note 2).

CONTRACTOR to CLIP DOWN LIDS of all tins and to pack, address and despatch samples. In addition to address, CONTRACTOR to label each case (or tin sent loose): 'HA (State structure name) and DATE (date of despatch as noted above)'.

Note

- 1 (05/05) State whether from workshop or site (give name and address).
- 2 Batch samples comprising unopened tins to be marked A1, A2, etc. Control samples in 0.5 litre tins to be marked B1, B2, etc. Samples No. to run consecutively, i.e. A1 and B1 onwards.
- 3 Colour reference to BS 4800 to be given, as stated on Form HA/P1 (Maintenance) Paint System Sheet, e.g. 18 B 25.
- 4 For 'A' samples specific gravity (Sp.G.) to be measured by Inspector from separate tins of the same batch. For 'B' samples Sp.G. to be measured by Inspector when taking samples. Samples will be rejected unless Sp.G. is filled in above by Inspector.
- 5 If Sp.G. differs appreciably from data sheet do not dispatch 'A' or 'B' samples.
- 6 Do not use this form and send samples if the client is not the Highways Agency, e.g. for a local authority contract.