~~SPECIFICATION~~

PREAMBLE TO THE SPECIFICATION

1. The Specification referred to in the Tender shall be the "Specification for Highway Works", published by HMSO as Volume 1 of the Manual of Contract Documents for Highways 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 Department of Scotland.

   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 Department of Scotland. 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 Department of Scotland. 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 Department of Scotland. 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. 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 Engineer.+~~

~~Where the Specification requires the provision of documentation to the Overseeing Organisation for statutory or type approval such documentation shall be provided to the Engineer+~~

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

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

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

~~+ 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~~

Schedule of Pages and Relevant Publication Dates

Comment [a1]: Updated Dec 2006 - ANM

000	1	March 1998
000	3F	May 2005
000	2	November 2006
100	2	May 2001
100	W1F	May 2005
100	12 to 14, 20F	November 2005
100	1, 3 to 7, N1, N3, N5	May 2006
100	8 to 11, 15 to 19, N2, N4 to N6F	November 2006
200	1, 3F	May 2001
200	2	May 2004
300	1	May 2001
300	2, 4, 6F	November 2002
300	5	May 2006
300	3	November 2006
400	1 to 12F	November 2006
500	20, 23 to 26	November 2004
500	28F	May 2005
500	1, 7, 11, 13 to 14, 16 to 19, 21	November 2005
500	3, 12, 22, N1F	May 2006
500	2, 4 to 6, 8 to 10, 15, 27	November 2006
600	33	November 2003
600	2, 27 to 32, 34 to 67F, N1, N3 to N4F	November 2005
600	1, 3 to 26, S1 to S3F, N2	November 2006
700	1	November 2004
700	16 to 17	May 2001
700	23 to 25F	May 2002
700	2 to 15, 18 to 22, N1 to N5F	November 2006
800	1, 22 to 25, 27 to 32F	May 2005
800	4 to 6, 8 to 9, 13 to 16, 19 to 21	November 2004
800	7	May 2004
800	2, 17 to 18, 26	November 2005
800	3, 10 to 12	November 2006
900	6 to 20, 23 to 31, 33 to 34, 36 to 37, 39, 41 to 44, 46, 49 to 51, 53, 58 to 72F	November 2004
900	3 to 4, 21 to 22, 32, 45, 47, 52	May 2005
900	48	November 2003
900	5, 35, 38, 40	May 2006
900	1 to 2, 54 to 57	November 2006
1000	3, 5 to 6	November 2005
1000	1 to 2, 4, 7 to 15, 19 to 33F	May 2006
1000	16 to 18	November 2006
1100	1, 3 to 4F	November 2004
1100	2, N1F	November 2006
1200	1, 14 to 16F, N3	May 2004
1200	2 to 3, 6 to 7, W1F, N2	August 2003
1200	4, 8 to 11, 13, N4F	May 2005

Schedule of Pages and Relevant Publication Dates

Comment [a1]: Updated Dec 2006 - ANM

1200	5	May 2001
1200	12, N1	November 2006
1300	3 to 4	November 2004
1300	N2F	November 2003
1300	1, 5 to 12F	November 2005
1300	2, 11 and N1	May 2006
1400	2, N1F	May 2001
1400	1, 3 to 9F	May 2006
1500	2	February 2003
1500	3 to 4, 8 to 11, 13	November 2004
1500	7	May 2001
1500	1, 5 to 6, 12, 14 to 17F	November 2006
1600	1, 4 to 5, 9, 15, 17 to 18, 22, 24 to 26, 29 to 31, 35, 38, 49F	March 1998
1600	2, 6 to 8, 10 to 14, 16, 19, 27 to 28, 32 to 34, 36 to 37, 39 to 42, 44 to 48	November 2003
1600	3, 20 to 23, 43	November 2005
1700	2 to 7, 10 to 15	May 2004
1700	8 to 9	May 2005
1700	1, 16 to 22F	May 2006
1800	1, 4, 6, 8 to 9	May 2004
1800	2 to 3, 5, 7, 10 to 12F	November 2005
1900	1 to 16, 18 to 30F, S1 to S2F	May 2005
1900	17	May 2003
2000	1, 3 to 4F	May 2001
2000	2	November 2004
2100	1, 4F	March 1998
2100	2	November 2003
2100	3	November 2005
2300	1	March 1998
2300	2 to 3F	May 2001
2400	1, 4, 7F	May 2005
2400	2 to 3m 5 to 6	May 2006
2500	1	May 2001
2500	2, 8, 11F	November 2003
2500	6 to 7, 9	May 2005
2500	10	November 2004
2500	5	May 2006
2500	3 to 4	November 2006
2600	1	March 1998
2600	2 to 4	November 2003
2600	5	November 2004
2600	6	May 2005
2600	7F	November 2006
3000	1, 4 to 19, 21 to 27F	May 2001
3000	20	November 2004

Schedule of Pages and Relevant Publication Dates

Comment [a1]: Updated Dec 2006 - ANM

3000	2 to 3	May 2006
5000	1 to 19F, S1F	May 2005
Appendix A	1 to 25F	November 2006
Appendix B	1	May 2006
Appendix B	2 to 7F	November 2006
Appendix C	1	May 2005
Appendix C	2F	November 2006
#Appendix D	1F	May 2005
Appendix D (NI)	N1F	March 1998
#Appendix E	1F	May 2005
Appendix E (NI)	N1F	May 2005
Appendix F	1 to 57F	November 2006
Appendix G	1F	May 2004
Appendix H	1	May 2004
Appendix H	2, 6 to 8F	November 2005
Appendix H	3 to 5	November 2006

Comment [r2]: Revise schedule in accordance with latest revision of the Specification for Highway Works –*ANM - done to 2006 amd.*

APPENDIX 0/1: Contract Specific Additional, Substitute and Cancelled

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

List of Additional Clauses and Tables

Comment [r4]: Revise page numbering as required

Comment [a3]: Last action to be completed

Clause No	Title	Written on Page No Following
170AR	Discharge Into Watercourses	51
171AR	Specified Materials or Equivalent	
172AR	Standby plant and equipment	
173AR	Construction Constraints	
174AR	Storage and Handling of Materials on the Bridge	
175AR	Elements of the Permanent Works Designed by the Contractor	
960AR	Mastic Asphalt Wearing Course	
961AR	Coated Chippings for Application to Premixed Surfacings	
962AR	Surface Texture of Bituminous Surfacings for High Speed Roads	
2008AR	Primer Application	
2009AR	Membrane Application	
2010AR	Patching and Repairs	
2011AR	Protection Against Overspray	
2012AR	Tack Coat	
2013AR	Protection from Vehicles	
2701AR	Quality Assurance of Formulated Materials	
2702AR	Site Checking of Mixing Ratios	
2703AR	Thickness Check on Membrane	
2704AR	Membrane Adhesion Tests	
2705AR	Testing of Surface Texture for Bituminous Surfacing	
2706AR	Testing of Surface Skid Resistance	
2707AR	Integrity Test for Waterproofing Membrane	

APPENDIX 0/1 cont'd

Additional Clauses, Tables and Figures	
Clause No. (etc)	**Title and Written Text**
002 SR	**Definitions**
The following definitions shall apply in this Contract and, where relevant, supersede those definitions given in BS 6100:	
carriageway:	That part of the deck of the Bridge between the outer and central safety barriers available for use by vehicular traffic as shown on the drawings.
northbound (southbound) carriageway:	That part of the carriageway indicated by traffic signs and road markings for the use by northbound (southbound) traffic including required clearances to safety barriers.
lane 1:	The traffic lane on the extreme left in the direction of flow (nearside).
lane 2:	The traffic lane on the extreme right in the direction of flow (offside).
carriageway closure:	Closure of northbound (NB) or southbound (SB) carriageway to public vehicular traffic.
buffer zone:	Where there is no central reserve that part of the carriageway which separates, by traffic signs and road markings, the northbound and southbound carriageways.
works area:	That part of the deck within which the Contractor is executing his work at any one time. This includes the closed carriageway and does not include the area in the main cable vertical shadow.
working space:	That part of the deck adjacent to the works area for use by the Contractor enabling the Contractor to execute his work.
safety zone:	That part of the deck which is clearly marked out by means of a continuous barrier to separate the works area and the working space from that part of the carriageway being used by vehicular traffic.
works location:	That part of the deck comprising the works area together with all associated working space and safety zones.
works access:	A short break in the safety zone allowing entry or exit to the works locations to or from an adjacent lane by vehicles engaged in the Works.
footway/ cycletrack:	A separate part of the deck normally reserved exclusively for pedestrians and pedal cycles.
deck *panel* length:	The distance (along chainage) between adjacent sections of deck that were separately fabricated, prior to being joined in place; normally, but not always, 18.126m in length.

deck *bay* length:	The distance (along chainage) between adjacent internal diaphragms, normally coincident with barrier post centrelines. Nominally, crossgirders are centred at 3.048m spacing.
pre-trials	Controlled tests and trials performed on or off site prior to any of the described work commencing on the Works. To be witnessed by the Engineer. Generally performed off structure.
007AR	**Scope of Works** The Forth Road Bridge is a suspension bridge that is comprised of an all-steel deck main span (between the main towers) and a concrete deck on both sidespans. The mainspan is approx. 1006 metres in length and both sidespans are equal in length at 408 metres. The deck is made up of 18.1m long panels supported on the main truss. See drg 1159/002. This specification describes the requirements for replacing the whole surfacing system of **only** the Northbound carriageway over the entire suspended structure (between the side towers). In addition, there is a requirement to undertake concrete and steel repair work to the decks and to perform NDT inspections on a proportion of the steel panels. The lateral extent of each carriageway is delineated by plate steel kerb units set at a standard carriageway width of approx. 7.34m Resurfacing Activities shall take place continuously over weekends only (Appx. 1/17) between the months of April and October 2007 and shall be suspended during the months of July and August (see the Form of Tender in the Conditions of Contract). At each tower, there are specialised steel expansion joints which will not be resurfaced. The existing surfacing system has a varied makeup depending upon location and substrate, but comprises a high performance keyed waterproofing layer overlain with a bridge grade, lake mastic asphalt with a rolled in chipped surface texture. The overall depth of the existing system is approximately 40-45mm. The Bridge was completed in 1964 and consequently, most of the original dimensions are in imperial units.

Comment [a5]: General one page length of descriptive prose describing the works in summary and outlining the Client's hopes & aspirations, etc…

	Series 100: Preliminaries
170AR	**Discharge Into Watercourses** The Contractor shall at all times comply with the requirements of the Scottish Environmental Protection Agency and shall not discharge or allow to be discharged into any watercourse any foreign matter or foul or dirty water.
171AR	**Specified Materials or Equivalent** Where materials or goods are specifically referred to on the drawings or in the Specification the Contractor may propose an alternative. Details of the Contractor's alternative shall be submitted to the Engineer for approval in adequate time, but not less than four weeks prior to its incorporation in the Works. Alternative material which is not approved by the Engineer shall not be incorporated in the Works. The Contractor shall be responsible for ensuring that his alternative material is suitable for inclusion in the Works both for construction purposes and the permanent condition. The Engineer's acceptance of the Contractor's proposal shall not relieve the Contractor of these responsibilities.
172AR	**Standby Plant and Equipment** The Contractor shall have the standby plant and equipment given in Appendix 1/72 available at all times when he is undertaking the Works. The equipment shall be located in the Contractor's compound adjacent to the Forth Road Bridge Administration Building. The asphalt plant shall be located within a 30 mile radius of the Bridge. The plant and equipment shall be operated by trained operatives.
173AR	**Construction Constraints** Details of Construction Constraints which will be applicable to the Contractor are contained in the following Appendices: Appendix 1/70: Construction Constraints - General Appendix 1/71: Construction Constraints - Northbound Carriageway Resurfacing Appendix 1/13: Programme of Works
174AR	**Storage and Handling of Materials** The Contractor shall store and handle materials on the Bridge in a manner which will not be detrimental to the existing structure or surfacings. The existing surfacing removed from the Bridge will not be stored on the Bridge or adjacent to mixing plant in the Contractor's compound, but will be taken to a remote site for disposal.

~~APPENDIX 0/1 cont'd~~

~~Additional Clauses, Tables and Figures~~	
~~Clause No. (etc)~~	~~Title and Written Text~~

~~175AR~~ ~~Elements of the Permanent Works Designed by the Contractor~~

~~Where the Contractor designs an element of the permanent works as an alternative the element shall be designed by a Chartered Engineer experienced in work of this nature. The Contractor shall provide a relevant design certificate certifying that the element is fit for the purpose and that the design complies with the relevant British Standards or other standards as agreed with the Engineer. The design certificate shall be provided a minimum of one week prior to the inclusion of the element in the Works. *At the time of writing of this Specification, no Contractor design element is anticipated.*~~

Comment [a6]: ANM - Are any parts designed by Contractor???

~~176AR~~ ~~Safe Working Practice – Safety Provisions on the Crossing~~

1. ~~The Contractor shall ensure that all personnel are made aware of and comply with "*Safety Guidelines for Contractors and Others Undertaking Contracts on the forth Road Bridge and Premises or other Areas for The Forth Estuary Transport Authority.*"~~

Comment [a7]: FNP insertions follow as 100 series clauses – ***Robert***, please review necessity in light of own experience…..

~~177AR~~ ~~Cleanliness of the Site~~

1. ~~The Contractor shall keep the Site clean and unpolluted and shall remove from the Site all waste materials and rubbish which accrue as a result of the Works at the end of each day. In accordance with the Contractor's Statutory obligations, portable latrines with adequate holding tanks shall be provided at approved locations as close as possible to the execution of the Works. They shall be emptied at an approved location each day. Chemical latrines shall not be employed either on or off structure.~~
2. ~~The Contractor shall provide and place drip trays under all plant and shall refuel and maintain items of plant without spillage or discharge of oils, lubricants or fuel over the footway, cycle track or other surfaces. Any plant which is considered by the Engineer to be leaking excessive oil or fuel or emitting excessive fumes shall be removed immediately on his/her instruction.~~
3. ~~All structures and facilities to be sited on the deck, whether temporary or semi-permanent in nature shall be properly secured following approval in writing by the Engineer. Calculations for wind and other loadings shall be submitted in advance of the need for installation.~~

~~178AR~~ ~~Use of the Footway/Cycletrack and Carriageway~~

~~Refer to "*Safety Guidelines for Contractors and Others Undertaking Contracts on the forth Road Bridge and Premises or other Areas for The Forth Estuary Transport Authority.*"~~

1. ~~Use of the carriageway by Cranes and Heavy Vehicles.~~

Before bringing onto the Bridge any crane or vehicle for lifting heavy items of materials, plant or equipment, the Contractor shall seek prior approval in writing from the Engineer, submitting his proposals (and full calculations demonstrating deck adequacy) for spreading local wheel and outrigger loads over the deck.

The maximum laden weight of any vehicles permitted on the Bridge shall be 44 tonnes, and the maximum wheel load shall be 9 tonnes with a tyre contact area of not less than 800 cm^2 on surfaced deck and 1300 cm^2 on unsurfaced deck unless otherwise approved by the Engineer.

2. Access by Others onto the Carriageway or Cycletrack / Footway.

The Contractor shall allow access on and within the site to the Emergency Services and to FETA, its accredited agents and specialist contractors and all vehicles or personnel authorised by the Bridgemaster.

3. Unauthorised vehicles

Contractor's vehicles and any vehicles driven by Contractor's personnel will be removed from the carriageway, cycle track, footway, access roads and car parks at the Contractor's expense if they are driven or parked without authorisation.

179AR Contractor's Compound for Offices, Messes and Storage of Materials and Equipment

Refer to "*Safety Guidelines for Contractors and Others Undertaking Contracts on the forth Road Bridge and Premises or other Areas for The Forth Estuary Transport Authority*."

1. Access to and from the Contractor's Compound

In general, all traffic from the Contractor's Compound heading towards the works area on the northbound carriageway of the bridge will leave the compound in the lorry park via the barrier into the car park and then proceed via the access road under the south approach viaduct and into the works area from the west side of the toll plaza. Any vehicles which are too wide for the controlled barrier or which exceed the height restriction of 13' 0" below the viewing area should access the site via the northbound sliproad from the Echline Roundabout and the out of gauge vehicle barrier on the west side of the toll plaza.

Vehicles leaving the works to the north should join the northbound A90 at the end of the contraflow and leave at the Ferrytoll Junction and return across the bridge on the southbound A90. Access to the site compound will generally be via the access road from the toll plaza except for wide or over-height vehicles which should use the sliproad to the Echline Roundabout, the A8000 and Ferrymuir Gait.

Vehicles which leave the works area in the southbound direction should return to the site compound via the service road from the west side of the toll plaza and return to the car park via the controlled access barrier. Light vehicles will generally use this route to return to the compound.

Note that reversing is **not** permitted on the bridge.

2. **Power Supply & Services**
A metered electricity supply can be provided, but the Contractor shall make his own arrangements for water and sewerage.

3. **Reinstatement of compound**
The Contractor shall reinstate the area of the compound to the satisfaction of the General Manager of the Forth Road Bridge immediately upon completion of the works.

The Compound shall be cleared of all Contractor's plant, offices and materials and left clean and tidy. It shall be left in as good or better condition as pertained at the commencement of the Works, all to the satisfaction of the General Manager of the Forth Road Bridge.

4. **Storage Area**
Materials and plant associated with the Contract shall, when not in use, be stored in the compound as shown on the Drawings. If the Contractor wishes to use alternative secure storage areas, these shall be agreed with the Engineer and shall be deemed to be part of the Site as defined in Clause 1(n) of the Conditions of Contract as amended.

5. **Security**
The materials and plant shall be stored in a tidy manner and suitably protected against the weather. The Contractor shall be responsible for the safe keeping of all stored materials and plant.

5. **Storage of Materials on Deck**
The Contractor shall not be permitted to store materials on the Bridge Deck or on the footway or cycle track.

180AR **Protection of Existing Works**

Any damage to the Existing Works that is considered by the Engineer to be attributable to the Contractor will be made good under the direction of the Engineer, at the Contractor's expense.

181AR **Publicity**

1. The Contractor or any agents or servants in his employ or any Sub-Contractor or Supplier shall not give any information or advertisement concerning the Works for publication to the press, or radio, television, internet or elsewhere during the Contract without the written approval of the General Manager of the Forth Road Bridge.

2. No advertisement shall be erected within the Site without the written approval of the General Manager of the Forth Road Bridge.

3. Any publication concerning the Works shall be subject to prior written approval by the General Manager of the Forth Road Bridge.

182AR **Emergency Personnel**
The Contractor shall submit to the Engineer the name and address and telephone number of a member (or members) of his staff who can be contacted at all times outside normal working hours by the Engineer, General Manager of the Forth Road Bridge or Police in any emergency

affecting the Works. Such persons shall be competent and have authority to take any necessary action. Such names, addresses and telephone numbers shall be posted in a conspicuous place adjacent to the offices of the Resident Engineer.

183AR **Proprietary Products and Approved Suppliers**

1. Where proprietary products are to be used and are not fully defined by a current British Standard the Contractor shall submit to the Engineer full technical data, Health and Safety data, methods and procedures for the use of the products for his approval at least 28 days prior to their use.

2. Approved suppliers and manufacturers are given in the relevant Clauses of this Specification.

184AR **Installation of Materials**

1. Materials shall be installed in the Works in strict accordance with the manufacturer's and supplier's *recommendations* to the satisfaction of the Engineer in accordance with approved Method Statements. The Contractor shall be deemed to have consulted with the manufacturers and suppliers and have available on Site any advice notes etc, on the use and installation of the material, including Health and Safety requirements.

2. Special attention should be made to substrate preparation and priming or adhesive coats and that the Contractor has purchased all necessary integral components to complete the installation of the materials in accordance with the manufacturer's or supplier's recommendations.

3. The Contractor is required to submit with his tender the names and addresses of ALL specialist firms and Sub-Contractors he proposes to employ in the Works, which are subject to approval by the Engineer.

4. The Contractor is required to submit with his tender the source of supply (not the merchant) of all main items of manufactured goods or equipment proposed to be used in the construction of the Works, which are subject to approval by the Engineer.

185AR **Engineer's Consent and Method Statements**

1. The Contractor shall give adequate notice in writing to the Engineer when an inspection of the works is required in the Contract. Unless otherwise specified in the Contract such notice shall be submitted to the Engineer during normal working hours at least 1 hour before the work is ready for inspection. The Engineer's consent in writing must be received before any of the ensuing operations may proceed.

2. The Contractor shall prepare Method Statements for all aspects of the work. He shall submit them to the Engineer for comment, amend them until the Engineer has no further comment and ensure that all his personnel adhere to the final versions, which the Contractor shall make available to all concerned at least 7 days in advance of the work concerned. The Contractor shall allow sufficient time and resource in his programme for this procedure. Method statement production shall commence immediately upon award of Contract. ***Failure to complete***

approval of principal Method Statements in advance of the Works will result in denial, by the Engineer, of Traffic Management provision and of authority to commence breaking out.

3. Each method statement shall give full details of the person responsible for the operation, the proposed equipment and procedures to be used, including the proposed methods of protection for the areas of the bridge used by the public. The Contractor shall contain all dust, excess material and debris by appropriate means to prevent contamination of the bridge, land, water and property in the vicinity of the bridge. The arrangements to be made shall be set down in the method statement.

4. The process of induction of Contractor's staff onto the Works at the start of their employment on the site shall be the subject of a Method Statement requiring approval to which FETA shall be invited to add comment . All members of the Engineer's staff shall also be expected to undergo Contractor's induction.

Comment [A8]: Specification & Appendices 1-4

. *"All members of the Engineer's staff shall also be expected to undergo Contractor's induction"* - Item coverage?

Comment [r9]: Please explain above comment re item coverage.

186AR Surveys, Setting Out and Measurement

Where surveys are made either by the Engineer or the Contractor of any portion of the Site or the land adjoining the Site, the Contractor shall provide all skilled chainmen and unskilled labour. Such assistance shall also be afforded in checking the setting out and measuring of the Works and in interpreting any marks made by the Contractor for the purpose of setting out.
Refer also to Appendix 1/12.

187AR Payment of Bridge Tolls

All vehicles accessing the site should do so visa the lorry park and the service road to reach the west side of the toll plaza, with the exception of vehicles which are too wide to fit through the barriers or too high to pass beneath the viewing platform Such vehicles should use the out of gauge vehicle lane on the west side of the toll plaza where they will be allowed to enter the works area once the Contractor informs the Control Room.

Any vehicle which passes through the toll booths will be required to pay the relevant toll.

188AR Electrical Power Supplies and Other Services

A limited power supply exists along the Bridge which may be used for external lights, tools, etc. Water and compressed air supplies are also available. Requests to use these supplies must be made in advance to the General Manager.

189AR Access procedures

1. Vehicle access shall only be permitted in accordance with the Drawings and the traffic management and safety requirements of Clauses 117 and 176 AR.

2. Authorisation of Access to areas outwith the Works Location.

If necessary, the Contractor shall make any requests for access to the Engineer who will notify the Contractor as to the access areas and points which may be used following coordination of the Contractor's

requirements with those of others.

190AR **Lighting**

Details of temporary lighting arrangements must be submitted to the Engineer for approval at least 28 days prior to the work proposed.

193AR **Weather Station**

Prior to work commencing, a small weather station shall be established on the deck at main centrespan to record/produce the following parameters continuously:

Windspeed and direction, air temperature, surface wetness, relative humidity and steel deck temperature at a height of approximately 2m above the deck. Automatic dewpoint calculation shall be provided.

The equipment shall be proven and reliable and subject to the Engineer's approval. Results shall be acquired and logged digitally and provided to the Engineer on a weekly basis. Calibration shall be carried out by the Contractor at the supplier's recommended interval. The station shall not replace the need for *manual readings* to be taken local to specific activities, which shall still be recorded for quality control purposes. The Contractor shall be responsible for the security of the system.

Comment [A10]:

Weather Station - Requirements

Comment [a11]: Add bill item

Instrument Description	**Performance Requirements**	**Sampling Requirement**	**Notes**
Anemometer + Vane	To 40m/s, ± 1m/s	3s gust max, 5 min. mean	*i.e.* Peak 3s value every 5 mins *(3s may be relaxed to 10s).*
Steel Thermocouples, 2 off	±1°C, -20 to +70°C	5 min. max, min, mean	Attached in shade to deck steel as agreed.
Air temperature	Solar screen, ±1°C, -20 to +70°C	5 min., max, min, mean	
Relative Humidity	±2%, 0 to 95%RH	5 min. max, min, mean	
Surface Wetness Probe	Proven and practical usage in similar applications.	5 min. on/off	
Logger	Robust; capable of storing 14 days data. Swappable data card and reader. Battery backup.	Remotely accessible for direct viewing and data download via radio or wireless modem.	
Enclosure and all fittings	IP56, lockable.		

194AR **Damage to Protection System**

Where damage occurs to the paint protection system of the bridge, including that on the barriers, it shall be made good by FETA maintenance staff at the Contractor's expense.

944 AR **Removal of Existing Surfacing and Waterproofing from Steel Deck**

Comment [a12]: To be stripped down & moved to correct location – App 1/71

Refer also to: *APPENDIX 1/71: Construction Constraints - Northbound Carriageway Resurfacing*

1. A detailed method statement shall be submitted to the Engineer for the removal and disposal of the existing surfacing (including waterproofing) and to ensure there is no damage to the steel deck. The method statement shall include full details of plant and machinery to be used, and procedures for the complete cleansing of the deck. Unless otherwise agreed with the Engineer, it will be necessary to remove mastic and any other asphalt surfacing.

2. The existing surfacing on the deck panels on the side spans of the southbound carriageway is generally *Masterflex* stone mastic asphalt on top of a thin layer of Asphapol. At the edges of these panels the Asphapol is to the full depths of the surfacing.

3. On the main span of the northbound carriageway the surfacing is mastic asphalt.

Comment [r13]: Change to Northbound

4. The existing surfacing is 36mm nominal thickness laid on top of the existing waterproofing membrane which is Eliminator HM as manufactured by Stirling Lloyd Polychem Ltd.

5. The existing surfacing shall be removed without damage to the existing deck.

6. Where sawcutting is to be employed, the edges of the area surrounding that to be removed from the deck shall be cut to a controlled depth of 25mm to prevent overbreak, ensure a clean edge and ensure that no damage occurs to the steel deck, edge trimmers or kerbs. The cutting depth shall be controlled precisely and carefully supervised to prevent a cut of greater depth. The typical thickness of existing surfacing should be between 35mm and 40mm but depths encountered may vary significantly.

7. In order to ensure that there is no damage to the steel deck, only flat ended tools, such as pneumatically powered clay spades or wide chisels that have been deliberately blunted and had their corners radiussed, shall be used for removal of existing surfacing (including waterproofing). Any other mechanical methods of surfacing removal may require tests and will require the prior approval of the Engineer, and shall include a method of preventing damage to the steel deck. Machine buckets or any other equipment used for loading or removal operations shall have plain blades. The corners and edges of the blades of powered tools used to break up the wearing course shall be deliberately kept in a blunt condition. Extreme care shall be exercised when removing the existing system in the vicinity of the deckplate welds.

8. Where the Contractor uses a planing (cold milling) machine to remove the existing surfacing the depth of material remaining after planing shall be 5mm absolute minimum, i.e. tolerance 0mm. The material shall first be planed to a depth of 26mm after which test holes shall be excavated at the direction of the Engineer to ascertain the remaining depth of bituminous material. Where necessary, the surfacing shall then be planed again the achieve a nominal residual depth of surfacing of 5mm

9. The surfacing material that remains after planing, include the waterproofing membrane shall be removed by high pressure water jetting

~~using a *Scater T20* manufactured by Falch Gmbh, or equivalent, on the main span and by a combination and of high pressure water jetting and mechanical means on the side spans in such a manner that surface of the existing concrete deck on the side spans is not damaged.~~

Comment [r14]: Revise to include provision for retention of existing *biscuit* where sound and removal of loose material by other methods. *Done – 10.*

10. ~~If approved by the Engineer, it may be permissible to leave a thin (<=5mm) skim of existing mastic asphalt in place. This should only be contemplated when the waterproofing and residual mastic asphalt are sound and free from cracking and loose material. Such residual material should be robustly tested for integrity and adhesion.~~

11. ~~The surfacing and waterproofing within 150mm of the edge trimmers and side kerbs of the panels will be carefully removed using hand tools or as approved by the Engineer.~~

12. ~~Subject to the Engineer's approval the existing surfacing may be gently heated using infra-red heaters to assist in its removal.~~

13. ~~The Contractor shall ensure that no damage occurs to the deck of the bridge during the removal of the existing surfacing and waterproofing membrane. If such damage does occur, it shall be inspected, repaired and MPI'd at the Contractor's own expense.~~

14. ~~All material taken from the deck shall be removed completely from the Bridge and disposed of as it is removed, and shall not be left or stockpiled on the bridge or stored on any area of land belonging to FETA or adjacent to the mixing plant. Arisings shall be safely transported to a registered and licensed tip or preferably recycled where feasible with the Engineer's approval.~~

15. ~~The Contractor shall ensure that all debris from the removal operation (including blasting grit) is prevented from entering all areas of the bridge in use by the public and falling into the Firth of Forth. The Contractor shall contain all dust and debris by appropriate means to prevent accumulation on the suspended structure and contamination of land, water and property in the vicinity of the Bridge. The arrangements for satisfying these criteria shall be set down in the method statement provided in accordance with Clause 185 AR.~~

~~945 AR Surface Preparation of Deck~~

Comment [a15]: To be stripped down & moved to correct location

Comment [r16R15]: Do we require to include grit blasting? Based on experience I 2004, the waterjetting process produced an suitable surface on the steel for the application of the waterproofing membrane.

1. ~~Workmanship standards shall comply with the requirements of Clauses 1902, 1903 and 1907, the steel being wet or dry blast cleaned to 2nd Quality Coarse profile, cleanliness standard Sa2½ (BS EN ISO 8501-1, BS7079-A1).~~
~~Shot based mobile plant may be used, provided that the profile and cleanliness requirements are met.~~

3. ~~A method statement shall be submitted to the Engineer in accordance with Clause 185 AR, giving full details of the proposed blast cleaning equipment, grit abrasive and procedures to be used. The Contractor shall ensure that surface comparator plates and profile meters are available to the final blast operatives at all times.~~

4. Uncontained open blasting will not be permitted. The Contractor shall ensure that all blasting grit and other debris from the surface preparation operations is prevented from entering the areas of the bridge in use by the public and falling into the Firth of Forth. The Contractor shall contain all dust and debris by appropriate means to prevent accumulation on the suspended structure and contamination of land, water and property in the vicinity of the Crossing. The arrangements to be made shall be set down in the method statement provided in accordance with Clause 185 AR.

5. All dust, zinc coating, residues and debris shall be removed from the steel surface to the satisfaction of the Engineer before the deck inspection is carried out. Well adhered zinc may be left on the deck provided the required profile and the minimum required adhesion value (1.0 N/mm²) are both achieved and the surface preparation is approved prior to handing over the deck for the inspection. However, where weld inspection by the Contractor is required, **all** zinc and impurities shall be removed within 150mm of all welds and weld remnants including all embedded rust.

6. The Contractor shall allow for inspection in accordance with Clause 947 AR.

7. The Contractor shall carry out repairs following the deck inspection, in accordance with Appendix 18/2. ***Following MPI inspection and any repair, the deck shall be reblasted to achieve the standard of cleanliness and profile required for the waterproofing system.***

8. Adequacy of Plant Provision
(Refer also to Appendix 1/72)
Full details of sources, types and numbers of blasting plant shall be included in the tender returns; an assumed expected unit reliability figure shall be included expressed in terms of the required anticipated proportion of time working against time requiring repair. The description of how plant reliability will be achieved will be form a part of the quality assessment of the tenders. Assumed productivity rates should be detailed.

9. CONCRETE DECK – SIDE SPANS

a) The deck will be inspected by the Engineer and where necessary, repairs to the deck will be undertaken using METASET 300 INDUSTRY high performance rapid access repair system as manufactured by Stirling Lloyd Polychem Ltd or equivalent in accordance with the manufacturer's instructions.

b) Where necessary repairs are to be undertaken to the existing filler at the edge trimmers and kerbs of the panel using METASET 200V resin mortar repair kit for vertical surfaces as manufactured by Stirling Lloyd Polychem Ltd or equivalent in accordance with the manufacturer's instructions.

946AR Selection of Panels for Deck Inspection and Repair

FETA require that the welds of 10 no. deck panels are inspected for

defects. The selection shall be evenly distributed through the Works and agreed with the Engineer.
The Contractor shall have, as a minimum, a fully qualified weld inspector and suitably coded welder on site at all times when:

a)planing/blasting activities are underway;
b)deck inspection and repair is required;
c)prior to acceptance of deck for priming or waterproofing.

Formatted: Bullets and Numbering

Comment [r17]: Isit possible to reduce requirement for weld inspector to be during deck plate weld inspections only?

947 AR Steel Deck Inspection and Repair

Comment [a18]: To be stripped down & moved to correct location

1. Deck Inspection (selected panels)
Steel deck panels selected as described above and prepared in accordance with Clause 945 AR shall be inspected by the Contractor as follows:
   - All deck plate butt welds shall be subject to 100% MPI.
   - All fillet welds and 150mm of accompanying plate around the four edges of the panels and the barrier post tongue plates shall be subject to 10% MPI, as agreed with the Engineer on site.
   - All four corners shall be subject to 100% MPI.
   - Any anomalies or defects in the welds or plates marked up by the Engineer shall be subject to MPI.

Formatted: Bullets and Numbering

Comment [r19]: Delete these sections.

Steel deck prepared in accordance with Clause 945 AR shall be made available to the Engineer for visual inspection and markup of areas for special attention, including the deck plates. During periods of the deck inspection, each length shall be free from all plant and material. Safety zones and access to these lengths shall be provided, in accordance with the requirements of Clause 117, for the Engineer to undertake the visual inspection. Marking media shall be paint and not wax based.

2. Visual Inspection and Notification of Plate Defects (all panels)

The Contractor's Inspection team will visually inspect and mark up the prepared lengths and notify the Contractor's Repair team of any anomalies to be repaired or removed by grinding, including the Engineer's markups. The Contractor shall carry out the removal in accordance with Appendix 18/2. Inspection shall also include MPI of new welds, including new trimmer strip welds laid ahead of the main works (see Clause 948AR).

Comment [r20]: Replace with Engineer

3. Detailed Inspection and Notification of Other Defects

The Contractor's Inspection team will fully inspect the prepared lengths and notify the Contractor's repair team of all remaining defects requiring repair, to be carried out in accordance with Appendix 18/2.

Comment [r21]: Replace with Engineer

4. Attendance and Supervision

The Contractor shall carry out the grinding and polishing with the Engineer in attendance, to ensure that the defects have been removed prior to the laying of new weld metal. Where repair may be effected by polishing alone, this will be carried out by Contractor's skilled operatives,

where necessary, acting under the direction of the Engineer's inspectorate.

5. Control Records

Full records of deck repairs including the total number of polishes, the length and final depth category of each repair and resource records where applicable shall be agreed with the Engineer as the work proceeds, and in any case within 48 hours.

6. Contractors Responsibilities for Testing and Inspection

All welds laid by the Contractor shall be subject to 100% visual inspection and 100% MPI by the Contractor. The Contractor shall be responsible for carrying out these inspections in accordance with the requirements of Appendix 18/1.

7. Approval of Repairs

All repairs shall be subject to the approval of the Engineer in accordance with the minimum acceptance criteria given in Appendix 18/1 or as modified and agreed with the Engineer in writing.

Following welding a minimum period of 0.5 hours shall be allowed prior to the Contractor inspecting the welds. During this period, new repair weld caps shall be ground flush in accordance with Appendix 18/2.

8. Allowance for Weather

The above operations are weather sensitive, and if the condition of the deck deteriorates, such as to prevent satisfactory inspection and/or repair of the deck the Contractor shall reinstate the deck to a condition acceptable to the Engineer.

948AR Replacement of Transverse Edge Trimmers

The Contractor shall programme the mainspan edge trimmer replacement and repair work as described in Clause 1804 AR and on the drawings as follows:

1. An initial adjacent pair of edge trimmers on the mainspan section of the deck panels shall be removed and replaced as shown on drawing S1159/103 as a prototype replacement. The location of the edge trimmers to be replaced shall be agreed with the Engineer. This prototype replacement shall be undertaken within four weeks of Contract Commencement and shall also be a test of the temporary asphalt backfill material.

2. The locations of edge trimmer repairs and replacement will be agreed by surveying the edge trimmers during the weekend closures for the resurfacing of the concrete sidespan panels.

3. Subsequent to 1. and 2. above being successfully completed and no sooner than eight weeks after contract commencement the Contractor shall replace or undertake repairs on the remaining edge trimmers as

Comment [r22]: Is this necessary? We are aware that temporary infill materials, such as SMA's will fail in a relatively short timescale on the main span.

Comment [r23]: Have we specified elsewhere in the document that the side spans are to be undertaken in advance of the main span?

described in Clause 1804 AR. Panels will be repaired in advance of the resurfacing front and backfilled with a temporary asphalt. The trimmer repair must not get too far ahead of the resurfacing due to a concern that the temporary asphalt may not be durable. Unless otherwise agreed by the Engineer only pairs of adjacent edge trimmers that are on panels that are be resurfaced within the following two weeks shall be worked on.

4. Edge trimmer repair or replacement welds shall be subject to MPI as described in Clause 1804 AR.

960AR Mastic Asphalt Surface Course – Preparation and Application

1. The mastic asphalt surface course shall be designed, manufactured and laid in accordance with BS1447:1988 Type T50, Grade S, Roads and Carriageways.

2. The specific gravity of the asphaltic cement at 25°C shall be between 1.20 and 1.30.

3. The mastic asphalt shall be works mixed and brought to the site as a hot charge unless agreed otherwise with the Engineer. The mastic asphalt shall be delivered to the site in self heating and agitating tankers with the temperature maintained between 180°C and 230°C. Under no circumstances shall material be held longer than 16 hours before laying unless the bitumen content is controlled to the approval of the Engineer.

Laying shall only be carried out when the steel deck temperature is greater than 4°C and the air temperature is greater than 7°C allowing for wind chill effects. Wind screens shall be used if so directed by the Engineer.

4. The top 31mm of the existing mastic asphalt, or Asphapol, shall be removed by milling (cold planing). On the main span (steel deck) the resultant layer of surfacing and the existing Eliminator waterproofing membrane shall be removed by high pressure water jetting using a Scater T20 floor cleaner, manufactured by Falch Gmbh, or equivalent, operating at a pressure upto 2000 bar. Intact asphalt biscuit to a maximum thickness of 5mm may be left in place with the following provisos:

i)The recorded instance specific agreement of the Engineer;

ii)That all material is sound, well adhered, uncracked and incapable of retaining moisture.

On the side spans (concrete) the resultant layer of surfacing and the existing Eliminator waterproofing membrane shall be removed by high pressure water jetting or mechanical means so as not to damage the concrete deck. At the edge trimmers and edges of the panels, the existing surfacing and waterproofing membrane will be removed by the use of hand tools.

Comment [r24]: Please discuss. We feel that any trimmer repair/replacement should only be undertaken when the panels are cleared for resurfacing. Temporary backfilling may become a problem if there are delays due to weather, etc. and the material is required to remain in-situ longer than anticipated

Comment [a25]: Move to section on removal

Formatted: Bullets and Numbering

Formatted: Bullets and Numbering

Comment [r26]: Clause to be reworded to allow for retention of intact *biscuit* where possible and removal of loose material by other methods. Add requirement to provide suitable protection to prevent debris blowing onto adjacent carriageway, footway and other areas of the structure. ***Removal*** *probably should not be here in the spec -ANM*

~~APPENDIX 0/1 cont'd~~

~~Additional Clauses, Tables and Figures~~	
~~Clause No. (etc)~~	~~Title and Written Text~~

~~960AR (continued)~~

~~5. The mastic asphalt shall be laid in 3 No strips in the widths, manner and sequence indicated on Drg Nos S1159/100 and 101, unless otherwise approved by the Engineer.~~

~~6. The full thickness of mastic asphalt shall be laid in one course with a finished thickness of 36mm with tolerances of; -0mm, +4mm. The asphalt shall be laid only after the tack coat has been applied to the waterproofing membrane and has cured.~~

~~7. The accuracy of the finish on the carriageways shall be measured in accordance with Clause A.4.9 of BS1447:1988, however, the maximum surface depression over a 3m length shall be limited to 4mm.~~

~~8. The mastic asphalt shall only be laid on the steel deck when the deck temperature is greater than 4°C. Wind screens shall only be used with the Engineer's approval.~~

~~9. Laying shall only be carried out when the surface on which the mastic asphalt is to be laid is dry and free from unevaporated solvents.~~

~~10. After initial laying any blowholes shall formed shall be eliminated by a method approved by and to the satisfaction of the Engineer.~~

Comment [a27]: See previous comment – move to appropriate section.

Comment [r28]: Delete reference to polymer modified

Comment [r29]: Delete reference to polymer modified

APPENDIX 0/1 cont'd

Additional Clauses, Tables and Figures	
Clause No. (etc)	Title and Written Text
960AR (continued)	11. Construction joints shall be formed in accordance with BS1447:1988. 12. The longitudinal saw cut joints, and the longitudinal and transverse edge seals, shall be formed using suitably shaped and treated timber batons and filled with a hot poured sealant to BS2449, Type N2, Pliastic N2, or approved equivalent, as shown on Drg Nos S1159/100 and 101. 13. Coated chippings shall be 14mm nominal size complying with the requirements of Clause 961AR and spread at the appropriate rate to achieve the requirements of Clause 962AR. 14. Material delivered hot direct to the site shall be accompanied by a weighbridge certificate detailing the following information: a) Relevant name of supplier; b) Relevant British Standard, *i.e.* BS1447:1988; c) Type of asphaltic cement, *i.e.* T50; d) Grade, *i.e.* S, Roads and Carriageways; e) Nett weight supplied; f) Time mixing started; g) Time tanker despatched from mixing plant. 15. Sampling and testing shall be in accordance with BS5284:1993. Samples shall be taken on site from each tanker load of mastic asphalt delivered for compositional analysis. 16. Samples for hardness tests shall be taken from each load prior to the addition of the aggregate and the results supplied to the Engineer within 3 days of the sampling. Refer to Appendix 1/5 and Annexe. 17. Hardness and Strength The hardness number of the wearing course as laid shall be tested as specified in BS 598 Part 2, and shall be between 10 and 20 at 35°C. In addition, Marshall mould specimens shall be tested in accordance with BS 598, except that the stability shall be recorded at a flow of 5mm and 15mm. The stability shall be between 4 kN and 9 kN at 5mm flow and between 8 kN and 18 kN at 15mm flow. Refer tp Appendix 1/5 and Annexe.

Comment [r30]: Check currency of BS. *ANM - Current*

Comment [r31]: This is a withdrawn standard. Are these additional tests required?

18. All sampling and testing procedures in process and final inspection shall be Quality Assured and comply with the relevant British Standard or equivalent. all sampling and testing shall be undertaken by a NAMAS accredited laboratory.

19. Control of contaminating substances
All asphalt handling plant shall be kept completely free of diesel or other unsuitable contaminants. Particular attention shall be paid to the cleanliness of all prepared surfaces and material transporting containers both on structure and at the batching plant.

961AR **Coated Chippings for Application to Premixed Surfacings**

1. The chippings shall comply with Appendix 7/1 and the manner of application when used for rolling into the surface of the asphalt shall be in accordance with BS594:1992 subject to the following provises.

961AR (continued)

2. The aggregate to be used for the chippings shall be crushed rock of the granite, basalt or quartzite groups. The crushed rock shall be strong, clean and durable and comply with the following properties:

a) The clay, silt and fine dust content shall not exceed 1.5% when determined by the Decantation method given in BS812.

b) The standard aggregate impact value of the aggregate source shall not exceed 20.

c) The magnesium sulphate soundness test shall be used as a measure of the durability of the aggregate. The soundness value shall not exceed 18% by mass when tested in accordance with the method devised by the Directorate of Civil Engineering Development, Property Services Agency, Department of the Environment.

d) The aggregate shall have a minimum Polished Stone Value of 60 and a maximum Aggregate Abrasion Value of 10.

3. Coated chippings shall be clean and bright in appearance detached and free flowing and have the following properties:

a) The shape and size index shall not exceed 40;

b) Not less than 80% by mass shall be of the specified size;

c) The flakiness index shall not exceed 20:

Comment [r32]: Check currency of BS. *Currently BS 594-1:2005 and -2:2003.*

Comment [r33]: Do we need to revise this reference to reflect current BS.

Comment [r34]: Check currency of BS.
ANM- *Still current, but some (of the many) parts covered by newer standards.*

	~~d) The elongation index shall not exceed 20.~~ ~~4. The binder used for coating shall conform to Table 1, Binder No 4 of BS 594:1992 requirements and the minimum binder content shall be 1.5% by mass.~~ ~~5. Coated chippings shall be tested as described in Clause 925 of the Specification and shall comply with the following requirement:~~ ~~The mass of sand retained in the hot sand test shall be not less than 50g/kg for 14mm chippings and not more 7.5% of chippings shall fail the visual assessment of sand cover.~~

~~APPENDIX 0/1 cont'd~~

~~Additional Clauses, Tables and Figures~~	
~~Clause No. (etc)~~	~~Title and Written Text~~
~~962AR~~	~~Surface Texture of Bituminous Surfacings for High Speed Roads~~ ~~1. The surface of bituminous wearing course shall have an average texture depth of not less than of not less than 1.2mm. In addition to the requirements of Clause 2705AR, the surface texture will have a regular appearance with the coated chippings equally distributed on the surface.~~ ~~2. The texture depth shall be measured as soon as possible after the surfacing has been laid and where practicable before the surfacing has been opened to traffic. Measurements shall be taken and the texture determined as follows:~~ ~~a) Surface texture shall be measured where directed by the Engineer over complete lengths of the carriageway lanes;~~ ~~b) Measurements shall be made on 50 metre lane lengths regularly spaced along the section and covering not less than one third of the section tested;~~ ~~c) On each 50 metre lane length 10 individual measurements of the texture depth shall be taken at 5 metre spacing along a diagonal line across the carriageway lane width. No measurement shall be taken within 300 millimetres of the longitudinal edge of the carriageway;~~ ~~d) The average texture depth determined for each section of carriageway lane tested shall not be less than 1.2mm and the average of each set of 10 individual measurements shall be not less than 1.0mm.~~ ~~3. The measure of texture depth shall be as described as Clause 2705AR.~~

~~APPENDIX 0/1 cont'd~~

~~Additional Clauses, Tables and Figures~~	
~~Clause No. (etc)~~	~~Title and Written Text~~
~~1804 AR~~	~~Edge Trimmers~~ ~~1. Existing edge trimmers shall be replaced or repaired as instructed by the Engineer and measured in accordance with the Provisional Items in the Bill of Quantities. Complete new trimmers and stiffener repairs are shown on drawing S1159/102. *The Contractor may be required to replace an edge trimmer that has been initially identified for repair if additional defects are found during the repair process.*~~ ~~2. An initial edge trimmer prototype shall be fabricated and installed as described in 948AR. Subsequent repairs and replacement shall only commence following a successful trial period of the new edge trimmer detail.~~ ~~3. The existing welds between edge trimmers and the deck shall be inspected by MPI prior to edge trimmer repairs starting. The areas of existing deck plate to be welded to and a surround distance of 25mm shall be magnetic particle inspected prior to new welds being placed.~~ ~~4. Where edge trimmers are repaired this may be carried out using one or a combination of the following methods:~~ ~~i)insertion of additional stiffeners as shown on the drawings to reinforce an existing trimmer;~~ ~~ii)cutting out 1m lengths of existing trimmer and inserting lengths of new trimmer as shown on the drawings. The existing and new trimmers shall be butt-welded together;~~ ~~iii)excavation and replacement of existing welds.~~ ~~5. Where edge trimmers are to be replaced the existing trimmer shall be removed and the deck plate prepared to receive the new trimmer. Short lengths, up to 150mm, of the existing trimmer may be left at the edges of the carriageway with the agreement of the Engineer. The new trimmer may need to be fitted in shorter lengths and butt welded together to accommodate any profile in the deck plate. The minimum length of trimmer to be replaced will be 1 metre (or similar length to suit the slots in the new trimmer) in any one repair location on a trimmer. If more than 3 lengths of repair are required then the entire trimmer will be replaced.~~ ~~6. New edge trimmers shall be fitted so that the top of the vertical leg is at a 40mm nominal height above the adjacent deck plate.~~ ~~7. Temporary infill material shall be placed after edge trimmer~~

~~Formatted: Bullets and Numbering~~

~~Formatted: Bullets and Numbering~~

~~Formatted: Bullets and Numbering~~

Additional Clauses, Tables and Figures	
Clause No. (etc)	Title and Written Text
	repairs or replacement has been completed. The infill material shall be robust enough to withstand traffic and be sloped as necessary to protect the edge trimmer. The infill material shall be left in place until the permanent resurfacing takes place on that panel. The Contractor will be responsible for inspecting and repairing any defective infill material until this time. 8. New welds on the edge trimmers shall be inspected by MPI after 48 hours. The welds shall be inspected concurrently with the main resurfacing inspection work on the panels. 9. Weld repairs between existing trimmers and the deck plate will be treated as general weld repairs to the deck. **Series 2000: Waterproofing for Structures** The following specification is based on *Eliminator* acrylic membrane manufactured by Stirling Lloyd Polychem Ltd. The Contractor may propose an alternative membrane in accordance with Clause 171AR of this Specification. Should an alternative material be proposed a full specification, including details as outlined below, for the material shall be submitted to the Engineer for approval. The proposed alternative shall be tested to ensure that it is compatible with the proposed mastic asphalt surfacing and that a sufficient bond between the two materials can be achieved. Waterproofing shall be applied over the entire panel and shall comprise a thin primer coat oversprayed with two layers of Eliminator waterproofing membrane. The membrane layer thicknesses shall be as defined below. The top membrane shall contain a shear key in the form of a fine Flintag aggregate, broadcast whilst the top waterproofing layer is still wet. **Primer Application** *i) Steel Substrate* All steel surfaces exposed during the works to remove the existing surfacing and waterproofing membrane shall be cleaned to the satisfaction of the Engineer by the use of high pressure water jetting. Stirling Lloyd ZED S94 Primer shall, be thoroughly stirred before use and applied to the prepared deck by airless spray or roller at a rate of 100-200g/sq m. The primer should be left to dry (approximately 30 minutes @ 20°C, 1 hour @ 10°C or 3 hours @ 0°C) before being overcoated with Eliminator membrane. The finished primer coat on steel shall have a minimum dry film thickness of 50 microns.
2008AR	

Comment [r35]: How??????

Comment [r36]: Delete reference to polymer modified. *Done*

Comment [r37]: The addition of this paragraph does not alow fo the retention and repair of existing Eliminator.

Additional Clauses, Tables and Figures	
Clause No. (etc)	**Title and Written Text**
	ii) Concrete Substrate Concrete surfaces should be visually inspected to establish that the surface texture conforms to a U4 finish as defined in Clause 1708.4(ii). Any residual old waterproofing membrane that is sound and well bonded may be left in place provided it can be cleaned sufficiently to remove surface contaminants and bitumen residue, such that the adhesion of the new primer and waterproofing shall not be compromised. Prepared concrete surfaces shall be primed with Stirling Lloyd's PAR1 Concrete Primer at an approximate coverage of 250g/sq m. Variations in the surface texture or porosity may require more than the indicative coverage rate. If a sheen like finish is not obtained that area will require a second coat of primer. The substrate must be inspected and approved before work commences.
2009AR	**Membrane Application** 1. The waterproofing membrane shall be Eliminator Acrylic Membrane manufactured by Stirling Lloyd Polychem Ltd. 2.All materials for the membrane shall be mixed and used strictly in accordance with the manufacturer's instructions with particular regard to the mixing of the catalyst into part B of the material, and of the 1 to 1 ratio of mixing the part A with the prepared part B. For small areas and repairs, single component HG (hand grade) material may be used.

Comment [a38]: The removed spec. from 2004 drawings to be cross-checked with this clause.

Formatted: Bullets and Numbering

APPENDIX 0/1 cont'd

Additional Clauses, Tables and Figures	
Clause No. (etc)	**Title and Written Text**
2009AR (continued)	3. Eliminator Acrylic Membrane shall be applied, by fully competent Stirling Lloyd certified application staff, as shown on Drg Nos S1159/100 and 101, the minimum overlap of Eliminator between two adjacent areas shall be 100mm. For 2.0mm thick membrane (concrete substrate) the minimum application rate shall be 2.4kg/sq m. For 1.5mm thick membrane (steel substrate) the minimum application rate shall be 1.85kg/sq m. The thickness shall be maintained at all locations, particularly over weld caps. For 1.0mm thick membrane (second coat on both concrete and steel) the minimum application rate shall be 1.2kg/sq m. Variation in dry film thickness shall be -0.00mm of +0.5mm. If any membrane is pitted by rain or sleet before full cure is achieved it shall be dried and overcoated to provide the required minimum thickness at all locations. 4. The first or subsequent coat(s) shall be applied and allowed to set sufficient such that the next coat can be applied without damaging the previous coat. The first coat of membrane shall be visually inspected and any defects repaired prior to the application of the second coat, which shall be of a contrasting colour to the first layer. Whilst the final coat is still fluid the dressing shall be applied. The rate of curing of the Eliminator is not linear and is dependent on the ambient temperature and humidity. Table 2009.1 shows typical cure times and these shall be the minimum period before subsequent coats of Eliminator or the surfacing may be applied. 5. When terminating at a *day joint* the membrane should not be feathered. The finishing edge should be no less than 1mm wft, as should be the subsequent overlap and the minimum thickness stated in 3 (above) should be achieved when the work is completed. 6. The dressing for the waterproofing shall be *Flintag* Grade 2 or approved equivalent, unless otherwise agreed by the Engineer. The aggregate shall be 2mm nominal size and the grading shall be such that not more than 5% is retained on a 3.55mm BS sieve and not more than 5% passes a 1.18mm BS sieve. The aggregate shall be dry, clean and free from foreign matter, including **all** dust. 7. The dressing shall be applied uniformly to the final layer of Eliminator while it is still fluid. The dressing shall be applied by a mechanical spreader, or other method approved by the Engineer which allows it to fall vertically onto the Eliminator. The rate of application of the dressing shall be 2.2 kg/sq m ± 0.3 kg/sq m, distributed evenly, unless otherwise directed by the Engineer.

Comment [r39]: Change to "Stirling Lloyd certified". *Done*

Comment [r40]: Change drawing numbers

Comment [ANM41]: Query on 1st layer thickness - 2mm ?? Tolerance needed

Comment [ANM42]: Coverage for 2mm would require an adjustment to coverage rate too. Tolerance needed also

Comment [a43]: Check provenance of **2mm** grading size.

Additional Clauses, Tables and Figures

Clause No. (etc)	Title and Written Text
2009AR (continued)	8. Dressing that is not fully adhered to the waterproofing shall be removed by stiff brushing after the minimum curing time for application of the mastic asphalt given in Table 2009.1. The dressing removed may be re-used subject to the agreement of the Engineer. Any areas where the dressing has not been retained within the Eliminator will need to be investigated. In any event it will be necessary to locally repeat the process taking corrective action as recommended by the membrane manufacturers.

Table2009.1

Ambient Temperature	Minimum Time Before Application		
	Subsequent coat and/or Foot Traffic	Rubber Tyred Vehicles	Mastic Asphalt
> 20°C	30 minutes	35 minutes	65 minutes
10°C	40 minutes	50 minutes	95 minutes
0°C	50 minutes	65 minutes	125 minutes

Notes:
1. Minimum application temperature is 0°C. Below this temperature contact Stirling Lloyd Polychem Ltd for further advice.
2. The coatings should not be applied if the substrate is below the dew point.
3. No vehicular traffic shall be permitted on the waterproofing membrane except where agreed with the Engineer.

2010AR Patching and Repair

1. If an area is left inadequately treated or the membrane becomes damaged, a patch repair shall be carried out to restore the integrity of the waterproofing. The damaged area is to be cut back to sound material and wiped with a rag soaked with methyl ethyl ketone or acetone up to a width of at least 100mm on the periphery. Any Tack Coat will need to be removed from the repair area including the full width of the lap before the new Eliminator patch is applied. Any bare steel is to be primed with primer ZED S94 and then Eliminator HG grade material is to be hand applied to ensure a continuous membrane is obtained with total thickness of 3mm and with a 100mm overlap onto the surrounding membrane.

2. For hand application the one pack HG material is to have benzoyl peroxide powder added and thoroughly dispersed by hand to give a uniform colour throughout, all in strict accordance with the manufacturer's instructions. The mixed material is to be applied using brushes, rollers or spreaders.

3. Where, after agreement with the Engineer, existing Eliminator is to be left in place and requires repair, the above repair procedure should also be used.

Comment [r44]: Insert additional paragraph dealing with repair of existing eliminator which is to be retained.

APPENDIX 0/1 cont'd

Additional Clauses, Tables and Figures	
Clause No. (etc)	**Title and Written Text**
2011AR	**Protection Against Overspray** Adequate measure such as masking and sheeting shall be taken to ensure that a neat finish is achieved and that no overspray is allowed to contaminate adjacent elements of the structure or its components, traffic on adjacent carriageway or the river below. Spray operations will cease when the wind speed renders this impossible to achieve.
2012AR	**Tack coat** 1. After curing, inspection, testing and any necessary repairs of the completed membrane, Stirling Lloyd Tack Coat No 2 shall be sprayed or roller applied at the rate of 100g 200g/sq m over the complete area of the membrane which will be in contact with the wearing course. *Day joint* laps shall be kept free of Tack Coat. 2.The Tack Coat shall be dry before application of the surfacing. Minimum overcoating times should be in accordance with those shown in Table 2009.1. 3.The Tack Coat shall be free of surface contamination and moisture when the surfacing is applied. The temperature of the surfacing when applied shall exceed both the activation temperature of Tack Coat No 2, which is 85°C, and the minimum required application temperature for the asphalt.
2013AR	**Protection from Vehicles** The Contractor shall ensure that no vehicular traffic is permitted to travel on the waterproofing membrane without the permission of the Engineer.
	Series 2700: Testing of Materials and Workmanship
2701AR	**Quality Assurance of Formulated Materials** An adequate quality assurance system shall be set up when the contract for the supply of the waterproofing materials is let. This must ensure that all materials supplied and the membrane produced from them meet the requirements set out below. A written record of all checks and tests should be maintained on a standard format and a copy provided to the Engineer. Physical properties to be tested are tensile strength and elongation at break to BS ISO 37. These are determined on slabs cast in open moulds to a thickness of 2mm +/- 0.2mm. All figures are for 7 days cure at room temperature.

Comment [r45]: Change to shall. *done.*

Formatted: Bullets and Numbering

Formatted: Bullets and Numbering

APPENDIX 0/1 cont'd

Additional Clauses, Tables and Figures	
Clause No. (etc)	Title and Written Text
2701AR (continued)	The following results are minimum requirements for Eliminator HM Eliminator — Tensile strength — 9MN/sq m — Elongation at break — 90% Alternative systems shall be required to achieve equivalent results as achieved by the Engineer.
2702AR	**Site Checking of Mixing Ratios** The Contractor shall undertake site checks to ascertain correct proportioning of the waterproofing membrane materials are being dispensed from the spraying equipment being employed to apply the membrane. The Contractor shall submit his proposals for completing such test to the Engineer for approval a minimum of four weeks prior to the execution of the works.
2703AR	**Thickness Check on Membrane** Constant check shall be maintained of the weight of material used against the area covered to ensure the application rate complies with the manufacturer's recommendations for achieving the required membrane thickness. Wet film thickness shall be checked every 10m^2 by standard comb type thickness gauges.
2704AR	**Membrane Adhesion Tests** The adhesion of the membrane to the deck shall be measured prior to spraying by random spot application, under the engineer's direction, using the Elcometer Adhesion Tester Model 1006 Scale No 2 (0-70kgf/sq cm) or similar approved. The instrument should be used in accordance with the manufacturer's instructions. Average adhesion values should not fall below the following for Eliminator HM: Eliminator on concrete — 0.7MN/sq m — Minimum value Eliminator on primed steel — 2.0MN/sq m — Average value — 1.5MN/sq m — Minimum value Average value shall be average of 5 values taken on a grid of 0.5m x 0.5m. Alternative systems shall be required to achieve equivalent results as agreed by the Engineer.

Comment [r46]: Why have these values been increased from the previous contract?

APPENDIX 0/1 cont'd

Additional Clauses, Tables and Figures	
Clause No. (etc)	**Title and Written Text**
2705AR	**Testing of Surfacing Texture for Bituminous Surfacing** 1. Clause 962AR of this Specification requires that the surface of bituminous wearing courses shall have an average texture depth of not less than 1.2mm 2. The following apparatus and method shall be used in determining the average texture depth for bituminous surfacings: a) A plastic cylinder of volume 50 cu cm b) A flat wooden disc 64mm diameter with a hard rubber disc, 1.5mm thick, stuck to one face, the reverse being provided with a handle. c) Dry natural sand which will pass a 300 micron BS sieve and be retained on a 150 micron BS sieve. 3. Method Dry the surface to be measured and sweep clean using a stiff brush at right angles and parallel to the carriageway. Fill the cylinder with sand, tapping the base 3 times to ensure compaction, and strike off the sand level with the top of the cylinder. Pour the sand into a heap on the surface to be tested. Spread the sand over the surface , working the disc with its face kept flat, in a circular motion so that the sand is spread into a circular patch with the surface depressions filled with sand to the level of the peaks. Measure 4 diameters of the patch to the nearest 6mm, each diameter being set mutually at 45 degrees to the adjacent diameters, and calculate the mean diameter. The texture depth is $(63650/d^2)$mm, where D is the mean diameter of the patch in mm. **2706AR** **Testing of Surface Skid Resistance** 1. The Contractor shall undertake a measurement of the skid resistance of both lanes of the southbound carriageway over the full length of the side spans and the main span of the Bridge using a Sideway force Coefficient Routine Investigation Machine (SCRIM) in accordance with the Design Manual for Roads and Bridges (DMRB) 7.3.1 (Departmental Standard HD28/94) and the following requirements: a) Level of survey to be SCRIM Category 1 (Equivalent) in each lane;

APPENDIX 0/1 cont'd

Additional Clauses, Tables and Figures	
Clause No. (etc)	**Title and Written Text**
2706AR (continued)	b) Measurements shall be made within four weeks of the completion of the Works; c) Results shall be reported, with adjustment by a seasonal factor subject to the Engineer's approval, within 14 days of the survey being undertaken; d) The measurements shall be taken outwith the periods of peak traffic flow at a time agreed with the Engineer. 2. The Contractor shall submit his method statement for undertaking the SCRIM survey, including details of his proposals to calibrate the SCRIM, to the Engineer for approval a minimum of four weeks prior to the survey.
2707AR	**Integrity Testing of the Waterproofing Membrane** 1. The Contractor shall undertake an electrostatic 'Holiday' Test for pinholes immediately following the application of the first coat of waterproofing membrane and prior to the application of the final coat. In addition, where patch repairs are made, or where is has been agreed that existing Eliminator membrane is to be retained, these areas shall be also subjected to Holiday testing. 2. Prior to the Works commencing, the Contractor shall instigate an off-structure pre trial to 'tune' the inspection method for testing in both the single layer and gritted dual layer scenarios. A suitably prepared (blasted and waterproofed) steel plate of minimum dimensions of 1.2m square shall be employed for this. The waterproofing shall be 'seeded' with hidden defects. Not withstanding the manufacturer's instructions for use, the following requirements and conditions shall apply: a) The testing shall be carried out over the whole area of each protected deck panel; b) The instrument should be applied at a voltage sufficient for a clear signal without the risk of breaking down the membrane; c) The earth lead should be no more than 10 metres long. The signal weakens with the distance from the earth point and holidays (pinholes) could be missed; d) Earthing with a spring clip or an approved equivalent shall be made to suitable parts of the deck steelwork subject to the approval of the Engineer. e) When a holiday is detected its position should be marked with

Comment [r47]: Please discuss. I am not aware of it being possible to Holiday test the second layer of eliminator with the Flintag added.

	~~a permanent marker pen that is chemically compatible with the waterproofing system. Chalk or wax crayon is not suitable;~~ ~~f) The instrument should not be used on wet or damp surfaces which will act as a conducting layer;~~ ~~g) Any holidays that have been detected should be repaired in strict accordance with this Specification;~~ ~~h) Any holiday testing equipment should be in a good state of repair. A current certificate of compliance/calibration should be made available to the Engineer.~~

~~APPENDIX 0/2: Contract-specific Minor Alterations to Existing Clauses and Tables~~

~~NONE~~

Appendix 0/3: List of Numbered Appendices Referred to in the Specification and included in the Contract.

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

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

Guide to types of Numbered Appendices - who compiles/completes

Symbol

(Co) Compiler compiles: Identified in the Notes for Guidance examples by the term 'Sample' included in their title.

(Co/C) Compiler partially compiles and Contractor completes and returns to Engineer

(Co/T) Compiler partially compiles and Tenderer completes and returns with Tender

(C) Contractor completes and returns to Engineer

(I) For Contractor's information only

(P) This indicates the Appendix is a national proforma and format must not be altered

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

Appendix 0/3: List of Numbered Appendices Referred to in the Specification and Included in the Contract - List A

Comment [r48]: Revise Appendix 0/3 in accordance with the latest revision of the Specification for Highway Works and as required

Volume No	Completed by	Appx No	Title
			INTRODUCTION
	Co	0/1	Contract Specific Additional, Substitute and Cancelled Clauses, Tables and Figures Included in the Contract
		0/2	Not Used
	Co	0/3	List of Numbered Appendices Referred to in the Specification and Included in the Contract
	Co	0/4	List of Drawings Included in the Contract
		0/5	Not Used.
			PRELIMINARIES
	Co	1/1	Temporary Accommodation and Equipment for the Engineer
	Co	1/2	Vehicles for the Engineer
	Co	1/3	Communication System for the Engineer
		1/4	Not Used
	Co	1/5	Testing to be carried out by the Contractor
	Co	1/6	Supply and Delivery of Samples to the Engineer
	Co	1/7	Site Extent and Limitations on Use
		1/8	Not Used
	Co	1/9	Control of Noise and Vibration
		1/10	Not Used
		1/11	Not Used
	Co	1/12	Surveys & Deck Position Monitoring
	Co	1/13	Programme of Works
	Co	1/14	Payment Applications
		1/15	Not Used
	Co	1/16	Private and Publicly Owned Services and Supplies
	Co	1/17	Traffic Safety & Management
		1/18	Not Used
	Co	1/19	Routeing of Vehicles
	Co	1/20	Recovery Vehicles for Breakdowns
	Co	1/21	Information Boards
		1/22	Progress Photographs
	Co	1/23	Risks to Health & Safety from Materials or Substances
		1/24	Not Used
		1/25	Not Used
		1/26	Not Used
		1/27	Not Used
	Co	1/70	Construction Constraints - General
	Co	1/71	Construction Constraints - Southbound Carriageway Resurfacing
	Co, C	1/72	Standby Plant and Equipment
			SITE CLEARANCE
		2/1	Not Used
		2/2	Not Used
		2/3	Not Used
	Co	2/4	Explosives & Blasting
	Co	2/5	Hazardous Materials
			FENCING AND ENVIRONMENTAL BARRIERS
		3/1	Not Used

Volume No	Completed by	Appx No	Title
			SAFETY FENCES, SAFETY BARRIERS AND PEDESTRIAN GUARDRAILS
		4/1	Not Used
		4/2	Not Used
			DRAINAGE AND SERVICE DUCTS
		5/1	Not Used
		5/2	Not Used
		5/3	Not Used
		5/4	Not Used
		5/5	Not Used
		5/6	Not Used
		5/7	Not Used
			EARTHWORKS
		6/1	Not Used
		6/2	Not Used
		6/3	Not Used
		6/4	Not Used
		6/5	Not Used
		6/6	Not Used
		6/7	Not Used
		6/8	Not Used
		6/9	Not Used
		6/10	Not Used
		6/11	Not Used
		6/12	Not Used
		6/13	Not Used
			ROAD PAVEMENTS - GENERAL
		7/1	
		7/2	Not Used
		7/3	Not Used
		7/4	Bond Coats, Tacks Coats and Other Bituminous Sprays (Sheets 1, 2 and Binder Data Sheet)
		7/5	Not Used
		7/6	Not Used
		7/7	Not Used
		7/8	Not Used
		7/9	Cold milling (Planing) of Bituminous Bound Flexible Pavement
		7/10	Not Used
		7/11	Not Used
		7/12	Not Used
		7/13	Not Used
		7/14	Not Used
		7/15	Not Used
		7/16	Not Used
		7/17	Not Used
		7/18	Not Used
		7/19	Not Used
		7/20	Not Used
		7/21	Not Used
		7/22	Not Used

Volume No	Completed by	Appx No	Title
			ROAD PAVEMENTS – CONCRETE AND CEMENT BOUND MATERIALS
		10/1	Not Used
			KERBS, FOOTWAYS AND PAVED AREAS
		11/1	Not Used
		11/2#	Not Used
			TRAFFIC SIGNS
		12/1	Not Used
		12/2	Not Used
	Co	12/3	Traffic Signs: Road Markings and Studs
		12/4	Not Used
		12/5	Not Used
		12/6	Not Used
			ROAD LIGHTING COLUMNS AND BRACKETS AND CCTV MASTS
		13/1	Not Used
		13/2	Not Used
		13/3	Not Used
		13/4	Not Used
		13/5	Not Used
		13/6	Not Used
			ELECTRICAL WORK FOR ROAD LIGHTING AND TRAFFIC SIGNS
		14/1	Not Used
		14/2	Not Used
		14/3	Not Used
		14/4	Not Used
		14/5	Not Used
			MOTORWAY COMMUNICATIONS
		15/1	Not Used
		15/2	Not Used
			PILING AND EMBEDDED RETAINING WALLS
		16/1	Not Used
		16/2	Not Used
		16/3	Not Used
		16/4	Not Used
		16/5	Not Used
		16/6	Not Used
		16/7	Not Used
		16/8	Not Used
		16/9	Not Used
		16/10	Not Used
		16/11	Not Used
		16/12	Not Used
		16/13	Not Used
		16/14	Not Used
		16/15	Not Used
		16/16	Not Used
		16/17	Not Used
		16/18	Not Used

Volume No	Completed by	Appx No	Title
			STRUCTURAL CONCRETE
		17/1	Not Used
		17/2	Not Used
		17/3	Not Used
		17/4	Not Used
		17/5	Not Used
		17/6	Not Used
			STRUCTURAL STEELWORK
		18/1	Not Used
			PROTECTION OF STEELWORK AGAINST CORROSION
		19/1	Not Used
		19/2	Not Used
		19/3	Not Used
		19/4#	Not Used
		19/5	Not Used
			WATERPROOFING FOR STRUCTURES
		20/1	Not Used
			BRIDGE BEARINGS
		21/1	Not Used
			PARAPETS
		22/1	Not Used
			BRIDGE EXPANSION JOINTS AND SEALING OF GAPS
		23/1	Not Used
		23/2	Not Used
			BRICKWORK, BLOCKWORK AND STONEWORK
		24/1	Not Used
			SPECIAL STRUCTURES
		25/1	Not Used
		25/2	Not Used
		25/3	Not Used
		25/4	Not Used
		25/5	Not Used
			MISCELLANEOUS
		26/1	Not Used
		26/2	Not Used
		26/3	Not Used

Volume No	Completed by	Appx No	Title
			LANDSCAPE AND ECOLOGY
		30/1	Not Used
		30/2	Not Used
		30/3	Not Used
		30/4	Not Used
		30/5	Not Used
		30/6	Not Used
		30/7	Not Used
		30/8	Not Used
		30/9	Not Used
		30/10	Not Used
		30/11	Not Used
		30/12	Not Used

APPENDIX 0/4: List of Drawings Included in the Contract

1. Contract Specific Drawings Supplied to Each Tenderer

Drawing No.	Title
S1159/001	Site Extent, Contractor's Compound and Routeing of Vehicles
S1159/002	Forth Road Bridge General Arrangement
S1159/100	Main Span Resurfacing
S1159/101	Side Span Resurfacing
S1159/102	Mainspan Panels, Edge trimmer Repairs & Replacement

APPENDIX 0/4: Cont. List of Standard Drawings

2(I) Standard Drawings Supplied to Each Tenderer	
Drawing No.	Title
	NONE

Comment [r49]: Revise if required

APPENDIX 0/4: Cont. List of Drawings Included In the Contract

2(ii) Drawings available for inspection by Tenderers	
Drawing No.	Title
	Record drawings held by FETA.

APPENDIX 0/4: Cont. List of Drawings Included in the Contract

2(iii) Standard Drawings Brought into the Contract by Reference

HCD published by HMSO as Volume 3 of the Manual of Contract Documents for Highway Works contains the following drawings brought into the Contract by reference. Unless otherwise stated below the whole drawing is brought into the contract

Drg No.	Title	Date	Aspect/Alternative(s) required if not whole drawings
	None		

Comment [r50]: Revise if required

APPENDIX 1/1: Temporary Accommodation and Equipment for the Engineer

1. Accommodation Required

Accommodation equipment and supplies shall be available for the Engineer on the date of commencement of the Works, or as agreed with the Engineer.

2. Accommodation Requirements to be as follows:

Principal Office

The Contractor shall provide, maintain, service and remove on completion of the Works a secure accommodation for the sole use of the Engineer. This shall be located within the Contractor's compound.

(i) Site at location agreed on site entirely separate from any of the Contractor's accommodation.

(ii) Floor area 20m^2 suitably covered.

(iii) Lighting: Adequate natural lighting and electric fluorescent lighting

(iv) 8 No 13 amp electric power points.

(v) The Engineer shall have full access to welfare facilities on site, which are in accordance with statutory requirements. This shall include shower facilities. The Contractor shall ensure that welfare facilities are clean and tidy at all times, and maintain a supply of consumable items as required throughout the Contract, e.g. toilet rolls, soap, towels, fluorescent light tubes etc.

(vi) The dimensions given for office and factory made fittings are for guidance only. The Contractor shall only vary the dimensions of the office accommodation and fixtures where prior approval of the Engineer has been given.

(vii) All external doors shall be provided with hinge bolts and mortice locks to BS 3621.

Comment [r51]: Check BS reference. *2004 version current*

(viii) All offices, including their contents, access roads and hard standing thereto, shall be regularly and properly cleaned for so long as they are in use. This shall include:

Daily — Washing and sweeping of all floors, emptying bins, dusting cleaning all sanitary and messing accommodation and polishing of desks.

Calibration — The Contractor shall allow for calibration of all equipment.

(xi) The furniture need not be new, but should be clean and in a good condition.

3. Duration of Time Accommodation Required

(i) From commencement to completion of each section of the Works or when otherwise instructed.

4. Fittings and Furnishings of Accommodation

(i) Convector heaters to maintain a minimum temperature of 20°C.

(ii) Telephone, answering machine and plain paper fax machine

(iii) Furniture and furnishings as follows:

2 No drawer lockable kneehole desk
6 No upholstered office chairs
1 No 4-drawer filing cabinet (lockable)
1 No table 1.6m x 0.8m minimum dimension
5 lin. m shelving
2 No litter bins
1 No wall clock
1 No 1 metre x 2 metre notice board
6 No coat hooks
1 No multiple paper trays, 3 tier
1 No A3/A4 black and white photocopier with 50 reams paper, maintenance and other consumables
1 No sink with cold potable water supply
1 No refrigerator minimum 3 cu ft capacity
1 No kettle minimum 1 litre capacity
6 No mugs and teaspoons
6 No plates
1 No First Aid box
Fire fighting equipment as recommended by Local Fire Officer
2 No Mobile portable telephones solely for the Engineer's use (including all costs), see Appendix 1/3.

(iv) Safety, Testing and Office Equipment (including calibration certificates).

6 No safety helmets to BS EN 397 with chin straps and ear defenders
6 No yellow reflective jackets and trousers for highway use to current safety standards
6 No yellow *waterproof* reflective jackets and trousers for highway use to current safety standards
6 No yellow reflective vests (with sleeves) for highway use to current safety standards
6 No pairs safety glasses
6 No sets of boiler suits
6 pairs of waterproof gloves
10 pairs if disposable rubber gloves
6 pairs of leather safety boots
2 No. Sets of tables for relative humidity and dew point
2 Industrial pocket knives
2 No Torches with rechargeable batteries and charger
2 No stainless steel rulers 300mm

6 No stainless steel rulers 150mm
1 No. measuring wheel*
5 No. tape measures (5m)
1 No. steel tape measure (30m)
2 No. 1m spirit levels
2 No. Maximum/minimum thermometers
2 No. Hand held anemometers
3 No. Electronic calibrated digital K type thermometers
2 No. Short K type probe
1 No. Long T bar probe
2 No. Short surface contact probe
1 No. Pocket (portable) IRHD durometer (H.W. Wallace Ltd, Croydon) or similar approved.
4 No. Stainless steel Wet Film Thickness gauges (or boxes of disposables)
1 No. Elcometer 456 paint/zinc thickness gauge
2 No. Elcometer 319 Dewmeters
1 No. 1.26m long Rabone – Chesterman stainless steel straight edge (or equivalent)
2 No. TWI approved welding gauge
1 No. Elcometer 123 Surface Profile gauge
2 No. Elcometer 125 Surface profile comparator plate sets for Grit & Shot
1 No. ELE International Microcovermeter for system thickness measurement c/w Mini probe.
1 Supply of waterproof and French chalk, adhesion dollies, fixing material, nylon gut.

1 No. IBM compatible wireless laptop Dual-Core computer with minimum specification: 1.8Ghz CPU speed, 512Mb RAM, 36x speed CD RW drive, 3.5" floppy disk drive, 80Gb hard disk drive, 1024x768 XGA colour monitor, 56K modem + fax, keyboard, mouse, with MS Windows XP Professional operating system, MS Office XP (Excel, Word and Powerpoint), MS Outlook, Adobe Acrobat, Internet Explorer 6, McAfee Anti-virus software with updates, WinZip software, with mains adapter/charger and carrying case*.
1 No. A3/A4 colour inkjet printer (HP DJ1280 or equivalent)*
1 No. digital camera with minimum 5 megapixel capacity, 3 x optical zoom, optical viewfinder, flash, macro facility, with 512Mb data card & reader, software to be installed on the laptop computer*
2 No. battery recharging units each with 2 sets of NiMH rechargeable batteries
Assorted stationery and other items to the value of £500.00.

* All items indicated will become the property of the Employer.

(v) Publications

The following is a list of consumable publications which the Contractor shall provide:

a) 1 copy of 'Health and Safety in Construction' – HSE books ISBN 0-7176-1143-4

Comment [r52]: Revise to current specifications

b) 1 copy of the ICE Conditions of Contract, Measurement Version, 7th Edition
c) 1 copy of the Guidance Notes to the ICE Conditions of Contract, 7th Edition

(vi) Insurance

The Contractor shall provide and maintain for the duration of the Contract insurance for items and equipment provided by others and detailed as follows:

a)	Personal effects	To include clothing, equipment, etc., belonging to individuals and on site for purposes in connection with their duties to a total value of £5,000 in any one claim.
b)	Computer hardware	Computers, plotters, etc., provided by the Employer or Engineer, to a total value of £10,000 in any one claim.
c)	Other equipment	Equipment supplied by the Engineer or purchased through the Contract, to a total value of £20,000 in any one claim.

All equipment, which is the property of the Contractor, but is supplied to the Engineer for his use, shall be covered by the Contractor's insurance.

APPENDIX 1/2: Vehicles for the Engineer

General

1. The number and types of vehicles as scheduled shall be provided for the Date for the Commencement of the Works, or as directed by the Engineer.

2. The vehicles need not be new, but shall be less than 12 months old and shall have a recorded mileage not exceeding 20,000 when supplied, and be to the approval of the Engineer.

3. All vehicles shall be light in colour and free from markings identifying any company associated with the Contract.

4. All vehicles shall be cleaned internally and externally on a regular basis from the date of supply until the end of period required. The frequency shall vary with type of use, but shall not be less than twice a month.

5. The Contractor shall provide fully comprehensive insurance for the Engineer and his staff.

6. The Contractor shall maintain an account with a local garage in South Queensferry at which fuel for the Engineer's vehicles may be obtained.

Schedule of Vehicles Required

Vehicle Type (as defined below)	Number Required	Period Required	Availability
E	3	Commencement of the Contract until the completion of Phase 1 The commencement of Phase 2 until Substantial Completion	At all times

Type E – 5 Door Hatchback

The Type E vehicle shall have a minimum engine capacity of 1400cc, a minimum ground clearance (unladen) of 150mm and independent suspension.

The equipment shall include: Reversing lamp, fire extinguisher, first aid kit, removable roof mounted amber flashing light and HIGHWAY MAINTENANCE sign mounted in the rear window.

APPENDIX 1/3: Communication System for the Engineer

Radio System

1. The Contractor shall, within 1 week of the Date of Commencement of the Works, establish a suitable system of joint communication capable of reaching all parts of the site. The Contractor shall install, maintain and remove at the end of the period required the system including all necessary aerials, boosters, repeater stations etc.

2. The Contractor shall arrange for all licences, frequencies, etc., and ensure the system operates satisfactorily throughout the site.

3. Where it is necessary to locate equipment out with the site boundaries, the Contractor shall arrange all necessary wayleaves.

4. The radio system supplied to the Engineer shall have an exclusive frequency for the sole use of the Engineer in addition to access to the general frequencies in use by the Contractor on the site.

5. The radios shall provide a talk through facility for direct communication between handsets supplied. The radios shall be capable of operating at all locations on the bridge, including the tower legs and within the anchorages.

6. The hand held radios shall be provided with a shoulder strap. A spare battery and charging facility shall be supplied with each radio. Each hand held set shall be capable of operating for a minimum of 12 hours continuously without recharging the battery.

Units	Number	Period Required
Portable (Hand held sets)	3	Commencement of the Contract until the completion of Phase 1 The commencement of Phase 2 until Substantial Completion

~~**APPENDIX 1/3 (continued**~~

~~**Mobile Telephones**~~

~~1. The Contractor shall provide and maintain 2 No hand held mobile phones with appropriate connection arrangements for the exclusive use of the Engineer and his staff from the start of the Contract. The phone system shall be able to make and receive calls from all locations on and around the Bridge to the satisfaction of the Engineer. The Contractor shall supply 2 No extended life batteries with charger for each phone.~~

~~2. The telephones shall be capable of being powered from a car cigarette lighter and shall have a recharging unit.~~

~~3. The Contractor shall provide the mobile telephones for the use of the Engineer and his staff 5 days before the commencement of the works until such time as all the works are complete. The mobiles telephones will not be required in the period between Phases 1 and 2 of the Works.~~

~~4. The Contractor shall provide a hands free kit for each mobile telephone to allow them to be used in vehicles in accordance with current legislation.~~

APPENDIX 1/5: Testing to be Carried Out by the Contractor

Notes:

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

2. (N) indicates that a NAMAS test report or certificate is required.

3. Tests for work, goods or materials as scheduled under one clause are required for all such work, goods or materials in the Works.

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

5. Test certificates for work, goods or materials as scheduled under one Clause are required for all such work, goods or materials in the Works.

6. The Contractor shall incorporate in the schedule of tests required under Clause 36 of the Conditions of Contract as a minimum the tests detailed in the following table together with all additional tests required by the Contract.

7. Where reference is made in the following table to an Appendix or section to be completed by the Contractor the method and frequency of testing shall be agreed by the Engineer.

8. Where reference is made in the following table to the Overseeing Organisation this shall mean the Engineer.

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 900					
901, 925, 937, 938 960AR, 961AR	Aggregates for bituminous materials				National quality management sector schemes apply
	Hardness	10% fines value (N)	Monthly*		
		Impact value (N)	Monthly*		
	Durability	Soundness (N)	1 per source*		
		Water absorption (N)			
	Cleanness	Sieve test (mass passing 75 micron sieve) (N)	Monthly*		Washing and sieving method to be used
	Shape	Flakiness Index (N)	Monthly*		
	Blast furnace slag	Soundness	Once every 4 months		
		Bulk density (N)	1 per 500 tonnes*		
		Stability (N)			
		Sulphur content (N)			
	Steel slag	Bulk density	1 per 500 tonnes*		
	Coarse aggregate for wearing courses	PSV (N)	1 per source*		
		AAV (N)	1 per source*		
	Binders for bituminous materials	Penetration (N)	1 per 750 tonnes*		National quality management sector schemes apply. Modified binders should have a BBA HAPAS Roads and Bridges Certificate. In the event that no such Certificates have been issued, then in the interim, only modified binders undergoing BBA assessment should be considered for approval by the Overseeing Organisation.
		Softening point (N)	1 per 750 tonnes*		
960AR	Mastic Asphalt	Tests specified in BS5284, 960AR and Annexe to App'x 1/5	In accordance with BS5284		

Comment [r53]: See previous comments

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 900 (continued)					
915 925 961AR	Coated chippings	Grading (N)	1 per stockpile*		
		Binder	1 per stockpile*		
		Flakiness index (N)	1 per source*		
		PSV (N)	1 per source*		
		AAV (N)	1 per source*		
		Hot sand test (N)	1 per source*		Not required for coated chippings for surface dressing to Clause 919
		Rate of spread (N)			
921	Surface macrotexture	BS EN 13036-1 Volumetric Patch Technique (N)	BS EN 13036-1		
920	Bond coats, tack coats and other bituminous sprays				
	Binder	Product identification	1 per product per source	Required	Tests are expected to be repeated every two years
		Vialit cohesion	1 per product per source	Required	Tests are expected to be repeated every two years
		Accuracy of spread	1 for each binder and sprayer per month	Required	Not more than 6 weeks prior to start of work and one per month
		Rate of spread	1 per week		
		Penetration at 25°C and 5°C (N)	Every manufactured batch		Manufacturer's QA test results may be submitted
Series 1200					
1212	Road Markings				National quality management sector scheme applies. Procedures are given in BS EN 1824
		Tests specified in BS EN 1824		Required	
Series 1800					
1801 1803	Structural steels to BS EN 10025, BS EN 10113, BS EN 10137, BS EN 10155, BS EN 10210			Required	
	Structural steels to BS 7668			Required (BS 7668)	
	Steel plate	Ultrasonic testing			

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 1800 (continued)					
	Welding electrodes				
	Covered steel			Required (BS EN 499)	
	Wire			Required (BS EN 756; BS EN 760)	
	Welding				
	Welding procedures	Tests specified in BS EN 288 : Part 3	As required in BS EN 288 : Part 3 and Appendix 18/1		Results to be reported in accordance with Annex A of BS EN 288: Part 3
	Welder qualification	Tests specified in BS EN 287 : Part 1	As required in BS EN 287 : Part 1 for each welder	Required (BS EN 287 : Part 1)	Certificate to be in accordance with Annex B of BS EN 287 : Part 1 Welder Designation to be BS EN287-1, 111, P, BW, W01, B, t12, PE, ss, nb
	Butt weld 'run-off' plates	Destructive tests specified in BS 5400 : Part 6	As required in BS 5400 : Part 6		
	Butt welds and adjacent areas of steelwork	Non-destructive tests using methods to be agreed	As required in BS 5400 : Part 6 and the following:		
	Fillet welds	Non-destructive tests			
Series 2000, 2700					
2003 2702A R	Permitted waterproofing systems	In accordance with the manufacturers requirements	In accordance with the manufacturers requirements	In accordance with the manufacturers requirements	Registration and BBA Roads and Bridges Agreement certification apply
		Holiday Test	Every panel		
	Additional bituminous protection	Tests specified in BS 594: Part 1	1 per 15 tonnes*		Sampling to comply with BS 594: Part 1
	Stability value	Test specified in BS 598: Part 107	1 per 15 tonnes*		
Series 5000					
5003	Abrasives	Grading			††
		Hardness			

† indicates a requirement in SHW for the test to be carried out by the Contractor; such tests should therefore be scheduled in Appendix 1/5.

†† indicates a statement in SHW that the test may/will be carried out under the direction of the Overseeing Organisation; samples for such tests should therefore be required in Appendix 1/6.

* indicates that the frequency of testing is given for general guidance and is only indicative of the frequency that may be appropriate (i.e. no frequency is given in the SHW or reference documents). Where materials are known to be marginal or if initial test results show them to be such, the frequency of testing should be increased. Conversely where material properties are consistently in excess of specified minimum requirements or well below specified maximum limits, then the frequency of testing should be reduced.

(N) indicates that a UKAS accredited laboratory sampling and test report or certificate is required.

Comment [r54]: Revise in accordance with the latest revision of the Specification for Highway Works and as required

(continues on next page….)

APPENDIX 1/5: *[continued]*

Schedule of On-SiteTrials

The following Table lists the on- and off- structure trials to be performed to prove the proposed application methodologies following award of Contract prior to and during the first works on deck. These trials are separate to the specified production testing associated with each surfacing activity. The table is meant only as a guide; statutory testing requirements are not overridden.

Where indicated with a **'C'**, trials will be designed by the Contractor and proposed to the Engineer for discussion and approval immediately following award of Contract.

Trials to be performed off-structure in advance of first carriageway closure		
Waterproofing/tackcoat application	Control to achieve coverage and impermeability (Holiday tests)	C
Waterproofing remedials	Method of repair of anomalies found during holiday testing	C
Shear key application	To achieve correct coverage and adhesion	C
Waterjetting removal		
Weld procedure trials & welder certification	Standard requirements	C 1800 series
Holiday testing	To prove effectiveness with chosen system and determine optimum voltages	C
Asphalt batching	To prove mix consistency and for trials – full materials testing.	C
Asphalt laying off-structure on plate	To prove control of thickness, regulation and temperature. Until good control exhibited.	C
Asphalt jointing - practical off-structure	To prove effectiveness and consistency of poulticing method. Temperature control.	C
Trials to be performed on-structure during the first carriageway closure		
Removal of Surfacing	To prove method wrt full avoidance of deck plate damage.	C
Preparation of steel deck	To prove productivity rates and profile achievable with plant.	C
Trials to be performed on-structure subsequent to the first carriageway closure		
Trimmer strip prototype replacement	To prove method and infill material	C

Comment [r55]: Is this required if Stirling Lloyd certified applicators are employed?

Comment [r56]: How can this be undertaken?

Comment [r57]: Is this necessary if suitably coded welder provided as detailed in Appendix 1/5?

Comment [r58]: Is this required if Stirling Lloyd certified applicators are employed?

Comment [r59]: Covered by suppliers QA procedures and requirement is Appendix 1/5.

Comment [r60]: How can we replicate the geometry of the deck plates to simulate on site conditions?

Comment [r61]: Is this necessary as longitudinal joints are subsequently saw cut and sealed?

Annexe to Appendix 1/5: Sampling and Testing of Mastic Asphalt

1. Quality Control

A method statement shall be submitted in accordance with Clause 185 AR covering all of the above aspects, giving full details of the proposed equipment and procedures to be used, including the proposed methods of protection for the areas of the bridge used by the public. The Contractor shall contain all dust, excess material and debris by appropriate means to prevent contamination of land, water and property in the vicinity of the Crossing. The arrangements to be made shall be set down in the method statement.

Quality control shall be carried out in accordance with Clauses 960 AR and the requirements of BS 598 and 1447, except where modified by the subclauses above, and the following.

Sets of samples shall be provided by the Contractor at the following times from each separate batch of material delivered to the Works:

(i) from the first 20% of each batch;
(ii) from the middle 40% to 60%;
(iii) from the final 20% of each batch.

Each set of samples shall be taken such that sufficient material is available for the following numbers of samples or specimens:

Compositional analysis	2 bulk samples
Hardness specimens	2 pairs
Marshall moulds	3 moulds

The Marshall mould specimens will be prepared, tested and reported in accordance with Appendix 9/1.

A visual inspection of every asphalt wagon load shall be made. This shall include assessment of uniformity with previous similar mixtures, uniformity of coating, uniformity of mixing (no segregation) and any unusual features, and shall be carried out during the production, loading, unloading and laying and finishing of the material.

2. Preparation and Testing of Marshall moulds for Mastic Asphalt to Clause 960 AR

The procedure shall be in accordance with BS 598: Part 3: 1985 including Amendment No. 1, Clause 4 except as follows:

Comment [r62]: This BS is withdrawn. Is this testing relevant/necessary?

4.1	:	NOT RELEVANT
4.2.6 to 9	:	NOT Required - No compaction for this material.
4.3 and 4.4 (a) to (f)	:	NOT APPLICABLE - Samples are taken as mixed on site.
4.4(g), NOTE	:	Table 2: replace by: 1220g of total mix.

4.4(h) to (j) : NOT APPLICABLE – Samples are taken as mixed on site.

4.5.1 : NOT APPLICABLE – Samples are taken as mixed on site.

4.5.2 : Temperature of mix for mould should be 190°C ± 20°C
REMAINDER NOT APPLICABLE

4.5.3 : Note: Care needs to be taken to retain mix in mould and to ensure the surface is not CONCAVE.

(g) to (l) : No compaction required; top surface to be smoothed by disc trowel or spare mould base.

4.7(a) : Test after 24 hours or longer

4.8.1 : Stability to be stated at flow of 5mm and 15mm
REMAINDER GENERALLY NOT APPLICABLE

4.9 : Replace (a) to (k) by:

The following information shall be reported:

Mix temperature, mix density, specimen height, stability at 5mm and 15mm flow. Graph of stability against flow up to a flow of 20mm.
Visual report of specimen after removal.

Any modification to the above procedure shall be by agreement with the Engineer.

APPENDIX 1/7: Site Extent and Limitations on Use

Extent of Site

1. The extent of the Site, and details of site access are shown on Drawing No S1159/001.

2. The extent of the site shall consist only of the area as shown on Drawing No S1159/001 and shall consist of the northbound carriageway of the bridge from the north end of the north side span of the bridge to the junction with the Service Road at the Toll Plaza which is coned off from live traffic, plus the compound area provided for the Contractor in the lorry park adjacent to the Administration Building.

3. The site shall also include any areas of land owned by the Forth Estuary Transport Authority that the Contractor is given permission to occupy on a temporary basis for operations relating to the Works. Such areas will form part of the site only during the periods when the Contractor is in possession of them and has not formally returned them to the Forth Estuary Transport Authority.

Limitations on the Use of the Site

1. The Site shall only be used for the purposes of undertaking the Works.

Comment [r63]: Change as required

Comment [r64]: Change as required

Comment [r65]: Change to northbound

APPENDIX 1/9 : Control of Noise and Vibration

1. The Contractor shall comply with the general recommendations set out in BS 5228, Parts 1 & 2, and employ the best means practicable to minimise noise and variation produced by his operations.

All measurements shall be made on either a sound meter to BS EN 61672 (preferably type 1 but at least type 2) set on slow response, or an equivalent noise meter. Without prejudice to the generality of the Contractor's obligations under the preceding paragraph, the Contractor shall comply in particular with the following requirements:

(i)All vehicles and mechanical plant used for the purpose of the works shall be fitted with effective exhaust silencers and shall be maintained in good and efficient working order. In addition, all diesel engine powered plant shall be fitted with effective air intake silencers.

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

(iii)Machines in intermittent use shall be shut down in the intervening periods between work or throttled down to a minimum, unless otherwise directed by the Engineer.

(iv)All ancillary plant, such as generators and pumps, shall be positioned so as to cause minimum noise disturbance. If necessary, acoustic enclosures shall be provided.

2. The sound level at any point one metre from the facade of any noise sensitive buildings due to noise arising from the Contractor's operations shall not exceed the levels stated in the Table overleaf.

The noise levels stated in the Table for night time or Sunday working are subject to the Engineer permitting work during these periods in accordance with his powers under the Conditions of Contract. In these circumstances, the Contractor must submit to the Engineer full details of the plant to be used for his approval.

Any plant which the Engineer considers is likely to cause annoyance to the residents of any occupied building will not be permitted unless measures are taken by the Contractor to provide a suitable and efficient sound proofing system to the offending plant. Wherever practicable, equipment used during the night time period shall be powered by electricity.

The Table is given for guidance only and **it is the responsibility of the Contractor to consult with the relevant Local Authorities prior to the commencement of the Works.**

Comment [r66]: Check currency of British Standard. *Still current parts 1-2 relevant -ANM*

Comment [r67]: Check currency of British Standard - *updated*

Formatted: Bullets and Numbering

Formatted: Bullets and Numbering

Formatted: Bullets and Numbering

Formatted: Bullets and Numbering

TIME PERIODS												
Mon-Fri Day Hours 0700-1900			Saturday Day Hours 0700-1200			Saturday Day Hours 1200-1900			Evening Hours 1900-2200		
Leq (12hr) dB(A)	L1 dB	Max (A)	Leq (6hr) dB(A)	L1 DB	Max (A)	Leq (6hr) DB(A)	L1 dB	Max (A)	Leq (3hr) dB(A)	L1 dB	Max (A)
75	85		60	70		75	85		60	70	

Sunday and Night Hours 2200-0700			Public and Local Holidays and Sunday Day Hours 1000-1800			Public Holiday, Local Holidays and Sunday all Other times		
Leq (1hr) dB(A)	L1 dB	Max (A)	Leq (3hr)	L1 dB	Max (A)	Leq (1hr) dB(A)	L1 dB	Max (A)
42	50		60	70		42	50	

L1 equals 1 percent of monitored times

3. The best practical means, as defined in Section 72 of the current Control of Pollution Act, to reduce noise to a minimum shall be employed at all times.

4. The Contractor shall comply with BS 6472:1992 Evaluations of Human Exposure to Vibration in Buildings (1Hz – 80 Hz). Any vibration monitoring carried out should also be in compliance with BS 6472:1992.

Comment [r68]: Check requirements with City of Edinburgh and Fife Council's and revise accordingly

Comment [r69]: Check currency of British Standard. *Current*

APPENDIX 1/12: Surveys & Deck Position Monitoring

1.Deck Position Monitoring

Formatted: Bullets and Numbering

In advance of any surfacing removal, the Contractor shall, subject to trial, design, supply and install pairs of permanent Electromagnetic Distance Measurement (EDM) prisms to the underside of the deck on the deck truss at ¼, ½ and ¾ main span locations to monitor deck deflections. Each pair shall be positioned at the same relative position at a given cross girder stiffening truss.

The mounting brackets and fixings shall be fabricated in marine grade stainless steel, shall be provided with PTFE isolation faces and bushes to protect the bridge protection system and shall attach by clamping. Each centre span bracket shall hold two prisms, each pointing towards both tower leg bases; 8 no. permanent prisms and prism mounts are required in total.
Prisms should be fully sealed and guaranteed for a marine environment; the prism face diameter should be not smaller than 60mm. The prism targets should be clearly visible from the survey locations.

The brackets will have to be positioned to avoid clashing with the underdeck gantries, which shall be used for the installation with assistance from FETA staff. Permanent control points at the tower leg bases shall be established for use before and after the Contract and thereafter.

Surveys shall commence in advance of the Works and be carried out on three separate occasions prior to works commencing and three separate occasions after completion. Successive surveys should be separated by no less than 24 hours.

Surveys should be carried out before dawn during quiet periods of weather at weekends from both tower bases simultaneously. The prism bracket designs shall be agreed with the Engineer.

Results of each survey shall be submitted to the Engineer in digital format along with all station and offset data needed to enable ongoing surveys by FETA's surveyor.

Comment [r70]: Delete this section.

2.Replacement System Thickness Surveys

Formatted: Bullets and Numbering

The thickness of the completed waterproofing layers and the finished asphalt layer shall be measured by using calibrated results from a covermeter. Measurements shall be made along both wheeltracks on each lane at precise intervals equivalent to half a bay length. The method of calibration of the covermeter shall be agreed/witnessed with the Engineer. The Engineer shall also be given access to a covermeter to enable spot checks to be made. Final thicknesses to the asphalt top surface shall be available within 1 hour of laying to permit timely corrective action where necessary.

APPENDIX 1/13: Programme of Works

1. The Contractor shall submit, in accordance with Clause 14 of the Conditions of Contract, his programme for the works in the form of 2 No paper copies. The programme shall state the activities, resource levels, earliest start and latest finish dates, extent of float for each activity and clearly indicate the Critical Path throughout the Contract Period.

2. In addition to the general Programme of Works, the Contractor shall prepare the breakdown of individual items as required by the Engineer. This detailed programme of parts of the Works shall be correlated with a Method Statement and shall be submitted to the Engineer a minimum of four weeks before the activity is due to start.

3. Progress meetings shall be held at weekly intervals.

4. At site level, technical/programme meetings shall be held at weekly intervals between the Contractor's Agent and the Resident Engineer (RE) and the Employer. The Contractor shall, at these meetings inform the RE of his proposed work for the coming week and provide written details of resources for each activity on a daily basis. In addition, the Contractor, at these meetings, shall supply the RE with a four week look-ahead programme and notification of requests for traffic management a minimum of four weeks in advance of when they are required. The four week look ahead programme shall be updated on a weekly basis.

5. Detailed Method Statements and Programmes for all activities shall be submitted to the Engineer a minimum of four weeks prior to their start date.

6. In programming the works, the Contractor shall take full account of any construction or traffic management restraints imposed by this Specification.

7. The Contractor shall plan, programme and execute the Works in such a manner that the following requirements are met:

   7.1 The Contractor's attention is drawn to the fact that the following other Contractors will be working on the Bridge at the same time as this Contract:

   (i) Painting of the South Main Tower — FETA
   (ii) Access Gantry for the South Main Tower — A.L.P.S.
   (iii) Dropped Object Canopy — FETA
   (iv) Main Cable Dehumidification — C. Spencer
   (v) Viaduct traffic barrier replacement — Not yet appointed

8. No carriageway closures will be permitted during July and August.

APPENDIX 1/14: Payment Applications

The monthly statements to the Engineer in accordance with Clause 60(1) of the Conditions of Contract shall, whenever dealing with matters covered by the Bills of Quantities, be set out under Part and Section headings similar to those in the Bills of quantities and shall be separately identify each item and specify quantity, unit rate and value. Items not described in the Bills of quantities but appropriate for inclusion as measured work shall be shown at the end of the relevant section or under section headings as appropriate indicating quantity, unit rate and value. In respect of all other matters referred to in Clause 60(1) the Contractor shall separately show in the statement quantities, units and rates of goods and/or materials and also details of any other matters to which he considers himself entitled. The Contractor shall allow the Engineer to inspect invoices for goods or materials included in the statement pursuant to Clause 60(1) (b) and (c) as may be required.

APPENDIX 1/16: Private and Publicly Owned Services and Supplies

The following services are installed on the Bridge and will be made available to the Contractor where practical, though not for his exclusive use, during the period of the contract. Details of the charges and conditions which shall apply to the use of the supplies can be obtained from the Forth Estuary Transport Authority.

Where an existing service is utilised for the Works, the Contractor shall be responsible for the supply, connection, maintenance and use of all connection, power lines, flexible hoses and any other items installed by the Contractor for the purposes of the Works.

The supply of any of the following services cannot be guaranteed and in the event of a loss of the service for whatever reason, the Contractor will be required to make alternative arrangements at his own expense for the duration which the service is not available.

Electricity A 100 amp fused terminal for a 415 Volt 3 phase power supply is available to the Contractor at the electrical switch gear cabinets located on the side span face of each tower leg, externally at road level. This connection may be used for lighting and small tools only.

Air A compressed air ring main supply is located at deck level between the carriageway and the footway/ cycle path. Air is delivered at approximately 100 psi through a 2 inch instantaneous connection from the ring main installation.

The Contractor may take supplies of compressed air from the ring main installation which runs the full length of the Bridge side and main spans, free of charge, during the hours of 08.30 to 16:00 hours Monday to Thursday, and 08:30 to 12:00 hours Friday. Requests for the supply out with these hours and on weekends shall be made to the General Manager at least 48 hours in advance. The Contractor shall reimburse all costs incurred by the Authority in providing the supply out with normal working hours.

In the event of a breakdown in the bridge supply the Contractor shall be responsible for making alternative provisions for the period of the breakdown. The cost of such a provision shall be the sole responsibility of the Contractor.

Water A ring main is located at deck level between the carriageway and the footway/ cycle path. The main provides a 1 inch instantaneous connection with the water pressure at the pump house, located below the approach viaduct being approximately 75 psi. The water supply is turned off and drained in winter for a period of approximately four months (November to March) depending on temperature.

Specific procedures may apply regarding access to these services.

APPENDIX 1/17: Traffic Safety and Management

1. Traffic Safety and Management Requirements

(i) The Forth Estuary Transport Authority shall provide, install and remove the necessary signing and cones for lane or carriageway closures required by the Works.

(ii) The Contractor shall provide a minimum of four weeks notice in writing to the Engineer of his requirements with regard to any traffic management. In addition the Contractor shall provide a minimum of four weeks notice in writing to the Engineer with regard to any footway/ cycle path closures. Full details of the Contractor's requirements shall be provided with the written notice.

(iii) Delivery of labour and materials to the construction areas and the construction of the Works shall be carried out by the Contractor without disruption to vehicular traffic using the Bridge and associated areas.

2. Restrictions on Closures of Carriageways, Lanes or Footpaths/ Cycle ways

(i) No work requiring carriageway or lane closures shall be undertaken without the written approval of the Engineer. This approval will be subject to the operational requirements of Forth Estuary Transport Authority and the need to maintain a free flow of traffic across the bridge.

(ii) Carriageway or lane closures which will restrict the flow of traffic across the bridge or using the toll plaza shall only be permitted during the following hours, unless otherwise stated elsewhere in the Contract Documents. These times show the period during which the Contractor shall be permitted to occupy the closure. It may be possible to gain earlier access depending upon traffic conditions.

Friday 21:30 until Monday 04:00

Comment [r71]: Times to be confirmed

(iii) A financial charge will be levied against the Contractor for occupancy of a carriageway or a lane beyond those permitted hours. For details of the charges refer to Clause 78 and Appendix Part 1 to the Form of Tender.

a) On national and local holidays or when special events are taking place the timings of restrictions may be amended.

b) In an emergency, or if required by the Police, the Emergency Services or the Forth Estuary Transport Authority, the Contractor shall vacate the carriageway or lane that he is in possession of immediately.

~~c) Where the Contractor makes use of an approved carriageway or lane closure, the Contractor shall ensure that the carriageway or lane, which he has been occupying, is cleaned and free from all debris to the satisfaction of the Engineer prior to returning the carriageway or lane for the use of the Forth Estuary Transport Authority. The Contractor shall be responsible for any delay of Forth Estuary Transport Authority operations should further cleansing be required after the Engineer' inspection.~~

APPENDIX 1/19: Routeing of Vehicles

1. Permitted Access Routes to and From the Site

a) Unless otherwise agreed with the Engineer general access to and from the Site of the Works at deck level for site plant, delivery of materials and supplies, personnel, etc. shall only be permitted ~~via the Administration Building access road, the service road from the east side to the west side of the toll plaza and the adjoining section of the northbound carriageway of the Bridge as made available for access to the works, subject to the restrictions set out in this document.~~as agreed with the Forth Estuary Transport Authority and as detailed in the Contractor's site transport plan.

b) The contractor shall submit to the engineer four weeks prior to the commencement of the Works or, where appropriate and agreed with the Engineer, section of the Works, details of all construction plant, equipment, materials and supplies which the Contractor intends to use or transport onto the Bridge.

c) Access to the Bridge of the Contractor's vehicles is controlled by the Forth Estuary Transport Authority with permits being issued to each vehicle. Only authorised vehicles shall be allowed access and the Contractor shall provide a list of vehicles to the Engineer he proposes to use for this purpose (including all of his sub-contractor's vehicles) a minimum of one week prior to the vehicle being used on site.

~~d) Vehicles crossing the Bridge northbound will be required to pay the toll. No toll will be charged however for authorised vehicles accessing the Bridge for the purposes of the Works.~~

d~~e~~) All vehicles accessing the site must carry a roof mounted orange warning light.

e~~f~~) All vehicles accessing the site, with the exception of cars and light vans, are required to be fitted an audible reversing warning system.

~~**2. The Use of the Permanent Works by Construction Traffic**~~

~~This section has already been covered under Appendix 1/18: Permitted Access Routes although this does not alleviate the Contractor from complying with the requirements of the Conditions of Contract.~~

~~**3. Movement of Machinery and Plant Across Public Roads**~~

~~There will be no requirement for the Contractor to make provision for haul route traffic signals. However, all vehicle movements must be carried out with the utmost caution and in accordance with the current edition of The Highway Code, issued by the Department of Transport.~~

~~The maximum gross vehicle weight permitted on the footways and cycletracks is 3.5 tonnes unless agreed otherwise with the Chief Engineer of the Forth Estuary Transport Authority.~~

~~f)~~

Comment [r72]: Add ", the service road from the east side to the west side of the toll plaza

Formatted: Not Highlight

Formatted: Not Highlight

Formatted: Not Highlight

Formatted: Not Highlight

Comment [r73]: Change to northbound

Formatted: Indent: Left: 0 cm, First line: 0 cm

Formatted: Tab stops: 2 cm, List tab

Formatted: Indent: Left: 1 cm, Hanging: 1 cm, Numbered + Level: 1 + Numbering Style: a, b, c, … + Start at: 6 + Alignment: Left + Aligned at: 1.27 cm + Tab after: 1.9 cm + Indent at: 1.9 cm, Tab stops: 2 cm, List tab + Not at 1.9 cm

Formatted: Bullets and Numbering

APPENDIX 1/20: Recovery Vehicles for Breakdowns

1. Recovery Vehicles to be Provided

1.1 Circumstances for use shall be as described in Clause 120 of the Specification. The Contractor shall, provide the required recovery vehicles for the duration of each carriageway possession period approved by the Engineer plus from 18:00 hours on each Friday before the commencement of the Works and until the traffic management has been completely removed at the end of each weekend possession. The Contractor shall remove the required recovery vehicle from Site only with the Engineer's approval.

Comment [r74]: Change to "from 18:00 hours on each Friday before the commencement of the Works and until the traffic management has been completely removed at the end of each weekend possession.

1.2 Heavy recovery vehicles:

(a) 1 No heavy recovery vehicle shall be provided, having a crew of at least two operatives.

(b) A heavy recovery vehicle shall comply with the following:

(i) Be a recovery vehicle with not less than three axles, capable of towing by means of an underlift a loaded 44 tonnes vehicle up a slope of 4° and shall comply with all current legislation including Motor Vehicle construction and Use Regulations, Road Transport Act and Road Traffic Act. The vehicle shall be fitted with either a 10 tonne single power winch or two power winches of not less than 8 tonnes each. All equipment shall be power operated with SWL indicated and with operating levers/buttons clearly marked for operational use.

(ii) Be equipped with chains, wire ropes and shackles suitable for the recovery of a fully laden 44 tonnes GVW vehicle. All chains, wire ropes and shackles shall have test certificates and/or stamped showing the SWL, be free from snags, excess stretching and wear.

(iii) Have seating for not less than two adult passengers (in addition to the recovery operatives).

(iv) Be conspicuous, for example, by marking with suitable tape (not less than 125mm wide) to sides and rear of vehicle.

(v) The heavy recovery vehicle shall be fitted with the following as a minimum requirement:

(a) 1 No amber lightbar to comply with The Road Vehicles Lighting Regulations 1989.

(b) 2 No fully adjustable lights to illuminate both the sides and rear of the vehicle.

(c) 2 No fire extinguishers (1 No 6kg(nett) dry powder; 1 No 9 litre(nett) aqueous film forming foam).

(d) 1 No 1-10 person first aid kit to include disposable surgical gloves.

(e) 2 No 10m 12 tonne nylon straps,

(f) 2 No 30m x 13mm polypropylene ropes.

(g) 1 No 44 tonne straight tow pole.

(h) 1 No 44 tonne cranked tow pole.

(j) 10 No highway cones 750mm height.

(k) 1 No proof load tested crane (Overlift proof test static 7.5 tonnes, underlift proof test static 7.0 tonnes)

(l) 1 No suitable socket set including AF/Metric and BA sizes.

(m) 1 No suitable tool kit.

(n) 2 No 12 tonne bottle jacks.

(o) 1 No suitable wheelbrace to fit HGV's in common use and torque wrench.

(p) 1 No pair of jump leads (24 volt).

(q) 1 No explosion and flameproof hand lamp.

(r) 1 No crowbar.

(s) 1 No copper hammer).

(t) The necessary fittings for connection from air braking system of a broken down or accident damaged vehicle to the air braking system of the heavy recovery vehicle.

(u) 1 No broom and shovel.

(v) 2 No wheel chocks of HGV size.

(w) 4 No suitable lengths of wood block skidding.

(x) 1 No rear lighting board incorporating "On Tow" legend in lettering of not less than 70mm on conspicuously coloured background to conform with the size, colour and type illustrated by Diagram 5, Section B, Schedule 19 of the Road Vehicles Lighting Regulations, 1989. The board shall be fitted with lights reflectors and indicators. When required the recovery vehicle index number or trade licence plate shall be fitted.

(y) 1 No sledge hammer 7lbs minimum.

(z) 1 No ADR (HAZCHEM) chart.

(aa) 50kg of dry fine sand stored in a waterproof container.

(iv) The heavy recovery vehicle shall also carry as a minimum requirement:

(a) 4 No 'D' shackles SWL 12 tonnes each.

(b) 4 No 'D' shackles SWL 3 tonnes each.

(c) 2 No suitable length chains SWL 12 tonnes each.

(d) 2 No suitable length chains SWL 5 tonnes each.

(e) 2 No suitable length chains SWL 5 tonnes each.

NOTE: All lifting chains and equipment must be fully certified by an independent competent person to comply with all current legislation. Shackles listed in (vi) (a) and (b) should be stamped with the appropriate SWL. Equivalent wire ropes may be substituted for chains listed in (vi) (c), (d) and (e).

(vii) The heavy recovery shall carry, and use when necessary, equipment designed and manufactured for the purpose of locking the steering of the broken down or accident damaged vehicle in order to tow it safely in a reverse direction.

(viii) The heavy recovery vehicle shall carry equipment to enable the recovery crew to remove the drive line or shafts of the broken-down or accident damaged vehicle.

(ix) The heavy recovery vehicle shall carry blocks with a SWL of 8 tonnes , 1 No winch and 2 No on boom (crane) wires.

1.3 Light Recovery Vehicle

(a) 1 No light recovery vehicle(s) shall be provided, having a crew of not less than one operative.

(b) A light recovery vehicle shall comply with the following:

(i) Be capable of carrying or towing, by means of an underlift, a vehicle weighing 2880kg up a slope of 4° and shall comply with all appropriate legislation including Motor Vehicle Construction and Use Regulations, Road Transport Act and Road Traffic Act.

(ii) Be capable of recovering motorcycles.

(iii) Be capable of recovering trailers (i.e. caravans, boat trailers, horse boxes, etc.)

(iv) Have seating capacity for four adult passengers (in addition to recovery operatives).

(v) Be conspicuous, for example, by marking with suitable tape (not less than 125mm wide) to sides and rear of the vehicle.

(vi) The light recovery vehicle(s) shall be fitted with the following as a minimum requirement:

(a) 1 No amber light to comply with The Road Vehicles Lighting Regulations 1989.

(b) 2 No fully adjustable lights to illuminate the sides and rear of the vehicle.

(c) 2 No fire extinguishers (1 No 6kg (nett) dry powder; 1 No 9 litre (nett) aqueous film forming foam).

(d) 1 No 1-10 person first aid kit which shall include disposable surgical; gloves.

~~(e) 1 No 30m x 13mm polypropylene rope.~~

~~(f) 1 No 6 tonne straight tow pole.~~

~~(g) 10 No highway cones 750mm high.~~

~~(h) 1 No proof load tested winch and/or spectacle lift.~~

~~(j) 1 No suitable socket set including AF/Metric and BA sizes.~~

~~(k) 1 No suitable tool kit.~~

~~(l) 1 No 3 tonne bottle or trolley jack.~~

~~(m) 1 No suitable wheelbrace to fit cars and light goods vehicles in common use.~~

~~(n) 1 No pair jump leads (24 volt).~~

~~(o) 1 No explosion and flameproof hand lamp.~~

~~(p) 1 No crowbar.~~

~~(q) 1 No quick change towing hitch suitable for 50mm, 2 inch or jaw type fittings.~~

~~(r) 1 No broom and shovel.~~

~~(s) 2 No suitable lengths of wood block skidding.~~

~~(t) 1 No rear lighting board incorporating "On Tow" legend in lettering of not less than 70mm on conspicuously coloured background to conform with the size, colour and type illustrated by Diagram 5, Section B, Schedule 19 of the Road Vehicles Lighting Regulations, 1989. The board shall be fitted with lights reflectors and indicators. When required the recovery vehicle index number or trade licence plate shall be fitted.~~

~~(v) Total lift facility - 2800kg slideback deck (7.6m minimum) or heavy duty dollies.~~

~~(w) 50kg of dry fine sand stored in a waterproof container.~~

(vii) The light recovery vehicle(s) shall also carry as a minimum requirement:

(a) 4 No "D" shackles SWL 3 tonnes each.

(b) 2 No suitable length wire ropes SWL 3 tonnes each.

(c) 2 No ratchet jacks SWL 6 tonnes each, or hydraulic equivalent.

(d) 1 No suitable towing trolley.

NOTE: All lifting ropes and equipment must be fully certified by an independent competent person to comply with all current legislation. An equivalent chain may be substituted for the wire rope listed in (vii) (b).

(viii) The light recovery vehicle(s) shall carry, and use when necessary, equipment designed and manufactured for the purpose of locking the steering of the broken-down or accident-damaged vehicle in order to tow in a reverse direction.

2. Inspection Requirements

2.1 The Vehicle

The Contractor shall ensure that all recovery vehicles are maintained in such condition that at all times the vehicles conform to the requirements of the Road Traffic Act and Regulations made thereunder (Construction and Use and Road Vehicle Lighting Regulations) so as to be fit to be used on the road. Evidence of this roadworthiness shall be by successful completion of an inspection by the Vehicle Inspectorate or Freight Transport Association, conducted not less than 14 days nor more than 28 days before the vehicles are required.

If the duration of the works exceeds 6 months, the Contractor shall arrange for all recovery vehicles to be inspected by the Vehicle Inspectorate or Freight Transport Association at not less than 6 monthly intervals.

2.2 Lifting Equipment

All lifting equipment shall be fully certified by an independent competent person to comply with all current legislation.

2.3 Reports

A copy of each inspection report shall be:

(i) provided for the Engineer;

(ii) kept in the recovery vehicle

2.4 Record Form

The Contractor shall submit weekly to the Engineer duplicate record forms which log the regular checks made on each recovery vehicle. A sample form is given in Sheet 2 of this Appendix.

Comment [r75]: Check requirements in latest edition of the Specification for Highway Works and update if required.

3. Locations for Recovery Vehicles

The heavy recovery and light recovery vehicles provided by the Contractor shall be stationed adjacent to the toll booths on the northbound carriageway.

4. Communication System

The Contractor shall provide a communication system to operate between the recovery vehicles and the Bridge control room in the Administration Building at all times during the operation of the recovery vehicles.

5. Locations for Removed Vehicles

The recovery vehicles shall remove all broken down or accident damaged vehicles and the like to either the lorry park adjacent to the Administration Building or the Welldean Layby on the north side of the Bridge.

6. Explanatory Leaflet

The Contractor shall ensure that the recovery vehicle operatives issue leaflets to the drivers of leaflets requiring assistance, before recovery commences. These shall be in accordance with Sheet 3 of this Appendix.

7. Limits of Service

The free recovery service will be available between the Welldean lay-by at the north end of the Bridge to the Echline Roundabout at the south end of the Bridge. Northbound vehicles will be taken to the Welldean lay-by, whilst southbound vehicles will be taken to the Lorry Park adjacent to the Administration Building.

Comment [r76]: Change order to make relevant to northbound operation

8. Requirements for Recovery Personnel

(a) Suitability: It is the responsibility of the Contractor to ensure that all personnel involved with the vehicle recovery are suitable to work with *vulnerable* motorists.

(b) Training: The Contractor shall ensure that all personnel involved with vehicle recovery shall hold a certificate certifying successful completion of an appropriate vehicle recovery source recognised by either the Institute of the Motor Industry (IMI) of the Motor Industry Training Standards Council (MITSC). A copy of each certificate shall be provided to the engineer not less than 14 days before the commencement of the Works.

(c) Personal Protective Equipment: In addition to the risks identified in the Health and Safety risk assessment conducted by the Contractor, the following items will be provided for each crew member of the recovery vehicle:

(i) Safety helmet CE marked to EN 397;

(ii) Reflective Safety Garment complying with sub-Clause 117.18 of the Specification;

(iii) Boots with steel reinforcement toecaps and/or safety footwear in accordance with BSEN 345;

(iv) Suitable gloves with the appropriate CE kitemark;

(v) Protective Goggles in accordance with BS 2092.

~~Note: All Personal Protective Equipment should be stored in good, clean condition.~~

~~(d) Identification: The Contractor shall ensure that all personnel involved with vehicle recovery are issued with the following:~~

~~(i) An identity card which incorporates the name of the recovery contractor (or the Contractor), and the name and photograph of the holder. This card must be available for inspection at all times and a copy must be submitted to the Engineer prior to the commencement of the operative working.~~

~~(ii) A reflective Safety Garment (referred to in (c) (ii) above) which prominently displays the Contractor's name.~~

~~(e) Working Hours~~

~~The maximum length of duty for operatives involved with vehicle recovery will be 12 hours with the provision that no work should be undertaken in the following 12 hour period.~~

~~9. Record Form~~

~~The Contractor shall submit weekly to the Engineer completed duplicate record forms which log the assistance given by the recovery vehicle and their operatives. Sample forms are given in Sheet 4 of this Appendix.~~

Comment [r77]: Check requirements in latest edition of the Specification for Highway Works and update if required.

~~Sheet 2: Form for "Recovery Vehicle Daily Check Sheet"~~

Comment [r78]: Check requirements in latest edition of the Specification for Highway Works and update if required.

~~RECOVERY VEHICLE DAILY CHECK SHEET~~

~~Week Commencing.....~~

~~Driver's Name:~~	~~Vehicle Type/Registration No:~~	~~Mileage:~~

~~Driver to initial against check list below:~~

	~~Monday~~	~~Tuesday~~	~~Wednesday~~	~~Thursday~~	~~Friday~~	~~Saturday~~	~~Sunday~~
~~Oil Level~~							
~~Water~~							
~~Engine~~							
~~Cleanliness - interior~~							
~~Cleanliness - exterior~~							
~~Wipers/washers~~							
~~Tyres~~							
~~Lights~~							

~~Driver's Report (detail any problems):~~

~~Action Taken (to solve any problems above):~~

~~Date:~~	~~Supervisor's Signature:~~

~~COMPLETED SHEET TO BE RETURNED TO THE ENGINEER EACH WEEK~~

Sheet 3

Leaflet for Issue by Recovery Vehicle Operatives to Drivers of All Broken-down or Accident-damaged Vehicles

Name of Scheme: Forth Road Bridge - Northbound Carriageway Resurfacing

Vehicle Recovery Service - Explanatory Leaflet authorised by the Forth Estuary Transport Authority for issue to drivers of broken down and accident damaged vehicles within the above works.

1. The roadworks operations commence at the Echline Roundabout at the south end of the bridge and end at the Welldean Lay-by at the north end of the bridge.

2. The recovery operation provided along the extent of the roadworks operations is free.

3. Subject to police directions, vehicles will be towed clear of the roadworks operations to one of the following points:

(a) The lorry park adjacent to the Administration Building on the south side of the Bridge;

(b) The Welldean Lay-by at the north end of the Bridge;

(c) Any other point as directed by the police.

4. It will then be at the discretion of individual drivers to arrange for assistance or the removal of their vehicles to garages of their choice. The police will assist with names of local garages if they are contacted via the Emergency telephones or from any other phone by telephoning:.....

(Contractor shall obtain and insert suitable telephone number as agreed with the Police).

Comment [r79]: Change to Northbound

Comment [r80]: Change order to make relevant for northbound working

Sheet 4

LAYOUT FOR VEHICLE RECOVERY LOGSHEET

Comment [r81]: Check requirements in latest edition of the Specification for Highway Works and update if required.

VEHICLE RECOVERY LOGSHEET (1 OF 2) Forth Road Bridge Southbound Carriageway Resurfacing				Recovery Vehicle:.....				Week Ending:.....				Sheet No:.....			
Date	Time			Where	Dir	Police, Etc Present*	Incident		Recovery	Vehicle Type #	Q'ing	Weather	Road Surface		Remarks
	Call Out	Arrival at Scene	Road Clear	PP No			Acc	B/d	Tow? ** Y/N		Y/N		Dry	Wet	

*P - Police **Y - Tow/Lift #C - Car
F - Fire Service R - Restart M/C - Motorcycle
A - Ambulance F - False Call V - Van
HGV - Heavy Goods Vehicle

Sheet 4 (continued)

VEHICLE RECOVERY LOGSHEET (2 OF 2) Forth Road Bridge Southbound Carriageway Resurfacing	Recovery Vehicle:.....	Week Ending:.....	Sheet No:.....

Date & Time	Type of Vehicle	Registration Number	Name and Address of Driver or Firm	Location of Breakdown	Nature of Breakdown	Recovery Operator's Name

~~APPENDIX 1/21: Information Boards~~

~~2 No information boards shall be provided by the Contractor. The Information Boards shall be of a reasonable size to be agreed with the Engineer. The locations shall be agreed with the Engineer.~~

APPENDIX 1/23: Risks to Health & Safety from Materials or Substances

(i) Restrictions in relation to working practices

(a) The Contractor shall take suitable care when preparing exposed steelwork, in order to contain all material debris and residue resulting from the work. Such measures shall be as required by Regulation 7 of the Control of Substances Hazardous to Health Regulations 1988.

Comment [r82]: Check currency and revise as required

(b) The Contractor shall ensure that similar working conditions and arrangements as set out above are maintained for the collection and disposal of all material, debris and residue resulting from carrying out the Works.

(b) The material, debris and residue collected shall be disposed of at an authorised and properly licensed waste disposal site approved by the Engineer. Receipts for each load of material deposited at the waste disposal site shall be obtained by the Contractor and copies provided to the Engineer.

(ii) Measure to be taken to protect members of the public

(i) The Contractor shall ensure that no material is permitted to blow from the Contractor's work area onto the adjacent live carriageway or footway/cycleway at any time .

(ii) All entry and exit arrangements into the Contractor's working area shall be designed to ensure that the requirements of above are maintained.

(iii) All spraying, cleaning, welding and grinding processes shall be screened from members of the public and river users.

(iii) Monitoring to be undertaken by the Contractor

Details of noise and vibration monitoring are given in Appendix 1/9.

APPENDIX 1/70: Construction Constraints - General

The Contractor shall plan and programme his Works in such a manner that the following requirements are met:

1. Access for plant labour and materials to the works shall be as set out in Appendices 1/17 and 1/19 to this Specification.

2. During **the** works closure period, no specialist subcontractor may leave site without the consent of the Engineer.

3. No work will be permitted above or adjacent to moving traffic without adequate protection being provided by the Contractor.

4. The southbound carriageway of the Bridge shall remain open at all times.

Comment [r83]: Change to southbound *.done*

5. Lighting levels for the public using the Bridge shall be maintained at all times.

6. Access for maintenance of the existing structure by Forth Estuary Transport Authority personnel shall be maintained at all times.

7. The Contractor shall supply a list of contact mobile telephone numbers for all site management personnel, to enable contact to be made outwith site hours and during holidays, in the event of an emergency.

APPENDIX 1/71: Construction Constraints - Northbound Carriageway Resurfacing

Strategic Method Statement for Resurfacing Works

The Contractor shall provide a minimum of four weeks notice in writing to the Engineer of his requirements with regard to using the available closures. Full details of the Contractor's requirements, including the proposed execution of other Works unconnected with resurfacing, shall be provided with the written notice.

The Contractor shall prepare and forward to the Engineer for comment a method statement for all resurfacing work. The Contractor shall include details in his method statement of the measure he proposes to employ to ensure that a sound road surface is re-established within the carriageway possession period in the event of sustained inclement weather, plant breakdown or whatever other reason preventing the new surfacing being laid. The Contractor shall also include in his method statement specific details of the control of vibration of the plant, depth control for the removal of the existing asphalt and methods for ensuring the existing steelwork is not damaged by his operations. The method statement shall be passed to the Engineer for comment a minimum of four weeks prior to the works commencing on site. No resurfacing work shall be undertaken by the Contractor until the Engineer has no further comments to make regarding the Contractor's proposals. **Refer also to Cl 185AR**.

Liaison with Forth Estuary Transport Authority

The Contractor shall take all reasonable measure to co-operate with the Forth Estuary Transport Authority to minimise the detrimental effects to the existing steel deck plate paint system caused by the temperatures induced during the laying of the new surfacing.

Comment [r84]: Have the requirements previously listed in this section been replicated elsewhere within the document?
If not they require to be reinstated.

APPENDIX 1/72: Standby Plant and Equipment

The carriageway shall be available for unrestricted use by traffic at all times, other than those for which a carriageway or lane possession have been given. The Contractor shall provide sufficient standby plant and equipment to ensure that the work, programmed to be undertaken within the agreed possession, can be completed within the possession time in the event of plant or equipment failure.

The tenderer is to enter in the table below the minimum standby plant he will have on site; this should include small plant, such as compressors and generators, as well as major items that could impinge on production such boilers and laying plant. This equipment will be located in the Contractor's compound and available for use immediately if required.

The tenderer is to state also the standby plant, its location and the other arrangements (such as having fitters on standby) he will make to ensure that both said plant and resurfacing material are available at all times during a carriageway possession.

STANDBY PLANT/EQUIPMENT	TENDERER TO GIVE DETAILS OF EQUIPMENT AND PROCEDURES PROPOSED
Standby Batching Plant	
Standby Equipment	

~~APPENDIX 2/4 : Explosives and Blasting~~

~~Blasting is not permitted.~~

APPENDIX 2/5: Hazardous Materials

1. The Contractor shall liaise with and conform to the requirements of the relevant Authorities for the handling and disposal of hazardous material found during site clearance operations

2. In the event of hazardous material found during site clearance operations the Contractor shall produce a full ground contamination survey, as detailed by the relevant Authority, and organise for suitable analysis by qualified personnel.

APPENDIX 7/1: PERMITTED PAVEMENT OPTIONS

Chippings

Chippings shall comply with Clause 915 and the following:

1. The chippings shall be size 8/14 mm Gc85/15 to BS EN 13043.
2. The aggregate to be used for the chippings shall be crushed rock of the granite, basalt or quartzite groups. The crushed rock shall be strong, clean and durable.
3. The aggregate shall have a minimum Polished Stone Value of 60 in accordance with BS EN 13043, clause 4.2.3.
4. The aggregate shall have a maximum category of Aggregate Abrasion Value of AAV12 in accordance with BS EN 13043, clause 4.2.4.
5. The shape shall comply with Clause 915.
6. The clay, silt and fine dust content shall not exceed 1.5% when determined by the Decantation method given in BS 812.
7. The resistance to fragmentation of coarse aggregate shall be a maximum Los Angeles Coefficient of LA_{30} as defined in BS EN 13043, clause 4.2.2.
8. The magnesium sulphate soundness test shall be used as a measure of the durability of the aggregate. The soundness value shall not exceed 18% by mass when tested in accordance with the method devised by the Directorate of Civil Engineering Development, Property Services Agency, Department of the Environment.
9. The flakiness index of the aggregate shall comply with a maximum flakiness index of Category FI_{20} as defined in BS EN 13043, clause 4.1.6.
10. The elongation index to BS 812 shall not exceed 20.
11. The binder used for coating shall conform to Table 1, Binder No 4 of BS 594 1:2003 requirements and the minimum binder content shall be 1.5% by mass.
12. Coated chippings shall be tested as described in Clause 925 of the Specification and shall comply with the following requirement:

The mass of sand retained in the hot sand test shall be not less than 50g/kg for the specified size of chippings and not more 7.5% of chippings shall fail the visual assessment of sand cover.

Formatted: Bullets and Numbering

Comment [SCW85]: AAV of 12 instead of 10 to match new EN. SCW

Comment [SCW86]: FETA need to check they are content with this method (as EN) rather than the original impact test. There is an impact test in the EN based on a DIN standard but it may be difficult to find a lab who can undertake such a test in the UK. SCW

Comment [SCW87]: FETA need to check they are content with this grade as equivalent to old BS flakiness of 25 not 20. SCW.

Comment [SCW88]: BS 812 tests retained where no EN equivalent. SCW

Comment [r89]: Revised standards should match or exceed previous standards

~~APPENDIX 7/4: Bond Coats, Tack Coats and Other Bituminous Sprays (Sheets1, 2 and Binder Data Sheet)~~

~~Sheet 1: Information to be provided by the Compiler~~

~~After curing, inspection, testing and any necessary repairs of the completed waterproofing membrane, Stirling Lloyd Tack Coat No 2 shall be sprayed or roller applied at the rate of 100g-200g/sq m over the complete area of the membrane which will be in contact with the wearing course.~~

APPENDIX 7/4: Bond Coats, Tack Coats and Other Bituminous Sprays (Sheets1, 2 and Binder Data Sheet)

Sheet 2: Information to be provided by the Contractor

The Contractor shall provide the following information prior to the commencement of the Works:

1. The product or products he proposes to use together with their data sheets, product identification data, cohesivity data as specified.

A suitable sheet for the provision of binder data is given attached to this Appendix.

2. For each product a copy of the BS EN ISO9002:1994 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 result of any tests or other data the Contractor considers would assist the Engineer 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.

Comment [r90]: Check requirements in latest edition of the Specification for Highway Works and update if required.

APPENDIX 7/4: Bond Coats, Tack Coats and Other Bituminous Sprays (Sheets1, 2 and Binder Data Sheet)

Comment [r91]: Check requirements in latest edition of the Specification for Highway Works and update if required.

Binder Data Sheet - Appendix 7/4	Bond Coats, Tack Coats and Other Bituminous Sprays	
Manufacturer of Binder:	Product Name:	
Binder Type:	Batch No. (if known):	
Binder Grade (highlight as required): Conventional Intermediate Premium Non-tack Other		
Binder Source → / Test ↓	Recovered Binder Recovered in accordance with Clause 923	Recovered Binder after Ageing Test Ageing BBA/HAPAS HiPAT or extended Recovery Test (Clause 923)
Penetration at 25°C 0,1mm (100g and 5 secs)		
Penetration at 5°C 0,1mm (200g and 60 secs)		
Vialit pendulum cohesion see Clause 939 maximum peak value J/cm^2	The Contractor shall attach a report and graphical output to this schedule as specified in Clause 939	The Contractor shall attach a report and graphical output to this schedule as specified in Clause 939
Product identification test. The provision of date for identification and ageing is optional for unmodified bituminous emulsions to BS434 and for bitumen to BS EN 12591 and cut back bitumen to BS 3690. complex shear (stiffness) modulus (G*) and phase angle (δ) data. See Clause 928.	The Contractor shall attach a report and graphical output to this schedule as specified in Clause 928	The Contractor shall attach a report and graphical output to this schedule as specified in Clause 928

Other properties the Contractor considers useful:

Minimum Binder Content

Binder temperature range for spray application

Emulsion Properties and Viscosity

Break time

Break 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 7/9: Cold Milling (Planing) of Bituminous Bound Flexible Pavement~~

~~1. Cold milling (planing) of existing wearing course will be carried out on the areas of the deck shown on Drg Nos S1159/100 and 101 to a nominal depth of 31mm~~

Comment [r92]: Change drawing numbers as required

APPENDIX 12/3: Traffic Signs and Road Markings Studs

Permanent road markings

Permanent road markings shall be thermoplastic material complying with BS EN 1871 and BS EN 1824 pursuant to a BS3262 Pt 1 Class A equivalent standard, and shall be laid to the colours and locations shown on Drawing Nos S1159/100 and 101.

All road markings, both permanent and temporary, shall be reflectorised in accordance with BS EN 1871.

Screeded thermoplastic markings shall be laid to a minimum thickness of 3 millimetres. Sprayed thermoplastic markings are not a permitted alternative.

Removal of existing road markings from bituminous surfaces shall be by mechanical means or forced air abrasive (shot blast) only. Any damage to the existing underlying and adjacent pavement and kerbing is to be reinstated by the Contractor, at his own expense, to the satisfaction of the Engineer.

Comment [r93]: Check currency of British Standard and revise as required – *cannot find!*

Comment [r94]: Check currency of British Standard and revise as required

Appendix 18/1: Requirements for Structural Steelwork

1. The structural steelwork details are given on the drawings listed in Appendix 0/4 of this Specification.

2. Requirements for Materials, Workmanship, Inspection and Testing, Handling, Transport and Erection, Supply, Measurement and Weighing in accordance with BS5400 Part 6: 1999 as amended by Clause 1801.2 shall be further amended as follows:

Page 1

Insert new Clause as follows:

"3.0.1 Material certificates

"The Contractor shall maintain a record of the source of, and test certificates for, each plate, section, welding consumable, bolt, rivet, washer and nut used in the Permanent Works."

Page 11:

Delete existing Clause 5.5.2.3.1 and insert:

"5.5.2.3.1 Visual and Magnetic Particle Inspection

a)100% of the length of all new welds shall be visually inspected;

b)100% of all new repair welds shall be subject to magnetic particle inspection (MPI). 10% of the total length of new edge trimmer welds plus all welds on corners shall be subject to MPI. MPI shall only be carried out after welds have passed visual inspection. A minimum surround distance of 25mm at the sides and at the ends of the welds shall be included in the area inspected;

c)If any new weld fails MPI then the inspection frequency of the new welds shall be increased to 100% unless agreed otherwise with the Engineer;

d)Entire areas from which existing and new temporary attachments have been removed shall also be inspected as in a) and b) above."

Delete existing Clause 5.5.2.3.2.

Page 16: insert new Clause as follows:

"6.3.5 Special Requirements for Erection of Steelwork

The bridge steelwork shall be erected in accordance with any special requirements specified in Appendix 18/1"

3. Surface preparation and corrosion protection of new steelwork shall be in accordance with Series 900.

The surface of all new steel material, before surface treatment and corrosion protection, 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.

Formatted: Bullets and Numbering

Formatted: Bullets and Numbering

Formatted: Bullets and Numbering

Formatted: Bullets and Numbering

4. Particular requirements for Materials, Workmanship, Inspection and Testing, Handling, Transport and Erection, Supply, Measurement and Weighing, as required by BS 5400: Part 6: 1999 as amended by Clause 1803 and paragraph 2 above, are as follows (clause references to BS 5400 Part 6 as amended are in brackets thus *[]*):

a)Structural steels to standards other than those stated shall only be used with the approval of the Engineer. The Contractor shall provide details of material grades and/or test certificates of such material for consideration by the Engineer *[3.1.1]*;

b)The following options are required *[3.1.1, 3.1.6]*:

BS EN 10 025-1: Options 1, 2, 3, 5[a], 10[b] (refer to 10 025-2 options below)
BS EN 10 025-2: Option 1, 2[a], 3, 4[b], 6, 7, 8, 9[d], 10[e], 14[f], 15[g],16[g],17[h],19A[i]
BS EN 10 025-3: Option 1, 2[a], 3, 4[b], 6, 7, 8, 9[d], 10[e], 14[f], 15[g],16[g],17[h],29A[i]
BS EN 10 210-1: Options 1.2, 1.3, 1.4, 1.7[c], 1.8 & 1.9 (for grade J0)
BS EN 10088-3: As allowed for in Clause 7.1 an inspection document shall be provided as described in paragraph f) below. The delivery condition shall be agreed with the Engineer.

a Product analysis shall be as c) below.
b Improved deformation properties perpendicular to the surface are not required
d This option may be taken up at the discretion of the Engineer
e marking shall not be by stamping
f for tensile and impact testing see f) below
g the surface condition of steels supplied to BS EN 10 025 shall comply with Class A3 (for flat products) or Class C3 (for sections) to BS EN 10 163, repair of surface defects by welding shall not be permitted.
h The supply of bars is not envisaged under this contract however, if bars are to be supplied the Engineer will advise the requirements for Option 17 of BS EN 10025-2.
i Steel shall be supplied in delivery condition +N (normalized or normalized rolled) or if steel in this condition is not available it may be supplied in the as rolled (+AR) condition with the agreement of the Engineer.

Steels to other standards are not envisaged as being required. If steels to other standards are proposed by the Contractor the Engineer will advise the options under which these steels are to be supplied. Rimming steels are not permitted.

c)The ladle analysis of steel shall be supplied. In accordance with b) above, each technical delivery note shall give the maximum carbon equivalent value or provide sufficient information such that the CEV may be calculated. This shall not exceed 0.45%. *[3.1.1]*;

d)Unless noted otherwise on the drawings grades of steel for notch toughness shall be J2 to BS EN 10025. *[3.1.3]*;

e)internal discontinuities *[3.1.4]* – no additional requirements;

Formatted: Bullets and Numbering

Formatted: Bullets and Numbering

Formatted: Bullets and Numbering

Formatted: Bullets and Numbering

Formatted: Bullets and Numbering

f)Inspection Documents *[3.1.6]*. Specific inspection and testing shall be carried out by cast and include tensile and impact testing. The inspection document shall be inspection certificate type 3.1.B as defined in clause 3.1.B of BS EN 10204. The Engineer shall be afforded the opportunity of inspecting all steel upon delivery;

Formatted: Bullets and Numbering

g)rivet steels *[3.2]* – Not Applicable ;

Formatted: Bullets and Numbering

h)steel for shear connectors *[3.3]* – Not Applicable ;

Formatted: Bullets and Numbering

i) Bolts, nuts and washers *[3.4.1, 3.4.3, 3.4.4, 3.4.5, 4.4]* – Bolting is not envisaged under this contract. If bolting is to be undertaken the Engineer will advise the Contractor of requirements;

j)welding consumables *[3.5]* – welding consumables shall comply with, be stored and used in accordance with BS EN 1011-1. Manual metal arc electrodes shall also comply with BS EN 499 or BS EN ISO 2560 *[3.5]*. Manual metal arc electrodes shall also comply with BS EN 1600 and tubular cored electrodes and rods shall comply with BS EN ISO 17633:2006 *[3.5]*;

Formatted: Bullets and Numbering

k)cast iron *[3.10]* – Not Applicable ;

Formatted: Bullets and Numbering

l)interchangeability of parts *[4.1]* – there is no requirement for interchangeability of parts *[4.1]*;

Formatted: Bullets and Numbering

m)fabrication tolerances *[4.2.2, 4.2.3]* – the fabrication tolerances shall be as BS 5400 Part 6: 1999 or as agreed with the Engineer;

Formatted: Bullets and Numbering

n)plate edge grinding or machining *[4.3.3]* – all flame cut edges that will not be subsequently incorporated into welds shall be ground or machined to remove all visible signs of drag lines. External edges not formed by rolling nor incorporated into a weld shall be ground to a radius of 2mm;

Formatted: Bullets and Numbering

o)high strength friction grip (HSFG) bolt connection surface treatment *[4.3.6]* – see i) above;

Formatted: Bullets and Numbering

p)see i) above *[4.5.1, 4.5.3]*;

Formatted: Bullets and Numbering

q)rivet heads *[4.6]* – Not Applicable;

Formatted: Bullets and Numbering

r)welding processes and procedures *[4.7.1, 4.7.2]*;

Formatted: Bullets and Numbering

r.1) The information required by section A.2 of Annex A of BS EN 1011-1 is as follows:

(a)the application standard is BS 5400: Part 6 as amended by this Specification ;

Formatted: Bullets and Numbering

(b)new parent metal is as shown on the drawings. The required weld metal shall comply with Clause 3.5 of BS 5400: Part 6 as amended. In no case is the weld metal as deposited nor the heat affected zone of the new parent material to have properties which do not comply with those specified for the new parent material being welded. The existing structure is composed of material to BS 15 (Mild Steel) and BS 968 (high yield steel). For the purposes of wled procedures and welder approval tests the Carbon Equivalent (CE) of these steels shall be taken as 0.45 unless otherwise specified by the Engineer and/or demonstrated by tests approved by the Engineer. Welding procedures shall comply with BS5400:Part 6 as amended and these particular requirements;

(c)location, dimensions and details of new welds shall be as shown on the drawings or for weld repairs as instructed by the Engineer. Existing welds requiring repair shall be the same

nominal dimensions, mostly 6mm fillet welds, except where directed otherwise by the Engineer;
(d)welds shall be in the (work)shop or on site as appropriate;
(e)written weld procedures are required as described in BS 5400 Part 6: 1999 as amended and item s) below;
(f)welding procedure approval is required as described in s) below;
(g)means of identification to enable welds to be traced to the welder who made them in accordance with r.4) below is required;
(h)surface finish of welds shall be as described in item r.9) below;
(i)welder approval for each procedure is required as described in BS 5400 Part 6 as amended; quality control arrangements shall be as described in BS 5400 Part 6: 1999 as amended, as described elsewhere in this item r) and as described in items s) and cc);
(j)correction of non conformities *e.g.*, correction of faulty welds or distortion shall be carried out in accordance with approved repair procedures.

r.1) [continued] In addition post weld treatment is not envisaged. Any other information required in section A.3 of Annex A of BS EN 1011-1 or BS EN 1011-3, where not described in this Specification will be supplied by the Engineer as part of the approval of weld and repair procedures.

r.2) The fit up of parts joined by fillet welds shall comply with the requirements of BS 5400 Part 6 as amended. Additionally, gaps between parts joined by fillet welds shall not exceed 1mm average (measured over 1m or the length of weld, whichever is smaller). Where this additional requirement is not achieved, the Contractor shall increase the size of the fillet weld accordingly, unless otherwise agreed by the Engineer;

r.3) The position of any welded temporary attachments and additional shop butt welds shall be to the approval of the Engineer and a written record of the details shall be provided. In general, temporary welded attachments will not be allowed within 25mm of the open edges of plates. All temporary attachments that are installed shall be completely removed when they are no longer required and any scars shall be made good to the satisfaction of the Engineer;

r.4) Identification shall be provided to enable each weld to be traced to the welder or operator who made it;

r.5) Where the Contractor is instructed that a weld is to be partially or completely ground out and rewelded, no length in excess of 10% of the length of the weld or 250mm, whichever is lesser, shall be ground out at one time except when otherwise approved by the Engineer;

r.6) Welding of galvanised components is not permitted;

r.7) Welders must be in possession of the relevant procedure when carrying out the work. All welders must be qualified in accordance with BS EN 287: Part 1. Written weld procedures shall be submitted as part of the Contractor's method statement for on site welding;

r.8) All welding equipment is to have been tested, certified and where applicable calibrated before use. Copies of calibration certificates shall be submitted to the Engineer if requested;

r.9) Particular attention will be paid by the Engineer to the surface finish and profile of the welds. Processes, techniques and consumables which do not give a

profile to the satisfaction of the Engineer will not be approved and any substandard welds produced, notwithstanding the use of an approved procedure, will be dressed and/or repaired to the satisfaction of the Engineer;

s)welding, flame cutting and shearing procedure trials:

s.1) Relevant pre-qualified welding procedures certified by an independent inspection authority will be considered by the Engineer. Application tests on unusual or difficult details shall be undertaken when so directed by the Engineer. Notwithstanding the approval of any procedure in accordance with BS 5400: Part 6, no welding procedure shall be used without the approval of the Engineer *[4.7.1, 4.7.3]*;

s.2) If welding to existing steelwork is required then the Engineer will direct the requirements of the trials required;

s.2) The Contractor shall submit to the Engineer 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 BS 5400 : Part 6, as amended *[4.7.3]*;

s.3) Formal procedures for the rectification of welds will be required. In addition to the requirements of BS 5400: Part 6 : 1999, the cause of any defect shall be identified and details given to the Engineer *[4.7.5]*;

t)bending and pressing *[4.8]* – where material is to be bent in the cold condition, it shall be of a grade suitable for cold forming. See b) above also;

u)straightening and flattening *[4.9]* – there are no alternative requirements for new steelwork. However, it is possible that the existing steelwork contains distortions and it may be necessary to incorporate packing which may be machined to achieve a satisfactory fit-up with new plates or sections, as directed by the Engineer;

v)tie rod fabrication *[4.11]* – Not Applicable;

w)pin hole fabrication *[4.13]* – Not Applicable;

x)formation of camber *[4.14]* – Not Applicable;

y)marking for erection *[4.15]* – Hardstamping shall not be used unless agreed by the Engineer. Every part shall be marked for erection as shown on the drawings listed in Appendix 0/4 or as Clause 18. There are no other special or alternative requirements;

z)rectification and testing of defects *[4.16, 5.3]* – all surface defects revealed during fabrication or blast cleaning shall be visually examined and tested non-destructively. A report of the examination and test shall be submitted to the Engineer before any repair work is carried out. Repair by welding of any surface defect or exposed edge discontinuities shall only be carried out with the approval of the Engineer and using a procedure complying with the requirements of r) above;

aa)steels with improved atmospheric corrosion resistance *[4.17]* – Not Applicable;

bb)procedure trial weld testing *[5.4.1]* – in addition to the requirements of BS5400 Part 6 as amended, hardness testing shall be carried out on weld metal, heat affected zone (HAZ) and parent material of a macro section from each application test sample. The hardness tests shall consist of at least three lines across the macro section at varying depths. Each line

Formatted: Bullets and Numbering

Formatted: Bullets and Numbering

Formatted: Bullets and Numbering

Formatted: Bullets and Numbering

Formatted: Bullets and Numbering

Formatted: Bullets and Numbering

Formatted: Bullets and Numbering

Formatted: Bullets and Numbering

Formatted: Bullets and Numbering

Formatted: Bullets and Numbering

shall consist of at least six hardness tests in the weld metal, HAZ and parent material evenly distributed each side of the weld centreline. The results shall be recorded and submitted to the Engineer;

cc)production weld testing *[5.5.1.1, 5.5.1.2, 5.5.2]*

cc.1) Destructive testing of welding for structural steel – in addition to the requirements of Clause 5.5.1.2 of BS 5400 Part 6 the weld metal and heat affected zone in production test plates shall be tested to ensure compliance with Clause 5.4.1.2 of BS 5400: Part 6 as amended, assuming that the applied principal tensile stress at the ultimate limit state is greater than 100 N/mm^2. Production test plates shall be marked before removal in a durable medium or by hardstamping to indicate the welder ID, the procedure and date the weld was made;

cc.2) Non-destructive testing of welding for structural steel – all loose rust and scale, slag residue and weld spatter shall be removed prior to inspection. In addition to the requirements of BS 5400 : Part 6 : 1999, clause 5.5.2.4, stray-arcing spots are unacceptable. All inspection personnel are required to be qualified in accordance with the CSWIP or PCN Qualification Scheme and hold a level 2 Certificate of Proficiency for each inspection discipline.

dd)checking of deviations *[Table 7, 5.6.6]* – if steelwork is not within tolerance, it shall be adjusted to the satisfaction of the Engineer;

ee)temporary erection *[5.9]* shall be as described in Series 1800;

ff)lines and levels of completed structure *[6.3.1]* – the new steelwork shall conform to the lines and levels as shown on the drawings listed in Appendix 0/4 or where this is not shown to the existing line or level of the structure except where directed otherwise by the Engineer;

gg)Spare bolt supply *[7.3]* – spare bolts are not required;

hh)Erection *[6.3.5]:*

hh.1) If the Contractor proposes to adopt an alternative construction method and/or sequence to those outlined in the Specification, the Contractor shall submit in accordance with the Contract such information as will enable the Engineer to decide whether the alternative method and/or sequence can be used without detriment to the permanent Works;

hh.2) The Contractor shall provide any additional bracing, lifting points or other restraints that may be required to ensure stability and strength of the steelwork during handling, transport and erection.

Formatted: Bullets and Numbering

Formatted: Bullets and Numbering

Formatted: Bullets and Numbering

Formatted: Bullets and Numbering

Formatted: Bullets and Numbering

Formatted: Bullets and Numbering

Appendix 18/2 Guidance on Steel Deck Repair

1. General

The Contractor shall allow for inspection of the deck in accordance with 900 Series. The following is to guide the Contractor in the typical repair procedures that will be required however, all repairs will be as instructed by the Engineer.

2. Plate Defects

Plate defects shall be removed by polishing, using careful application of a grinding disc to 'dish' the deck plate at the defect to a depth of 1mm within an approximate diameter of 100mm. Where this does not remove the defect it shall then be repaired in the manner described for butt weld defects.

Comment [r95]: If defect < 1mm leave.
>1mm and <4mm Dish/round off to remove sharp edges/stress raisers.
>4mm Repair by welding and grind flush with deck.

3. Butt Weld Defects

Butt weld defects shall be repaired by grinding out the defect to a depth up to 3mm. The Engineer will then inspect and if the defect is still present the Contractor will be instructed to grind to a depth up to 6mm. The Engineer will again inspect and if the defect is still present the Contractor may be instructed to continue grinding until the defect is removed or to stop grinding any further. Once the defect is removed or the weld preparation is 6mm deep the Contractor shall re-weld to an approved procedure.

4. Fillet Weld Defects

Fillet weld defects shall be repaired by grinding out the whole fillet weld at the defect location. The ends of excavated lengths of long welds shall be suitably prepared for re-welding. The Engineer will inspect the area to ensure there are no further defects present. The Contractor shall re-weld the joint to an approved procedure.

5. Weld Caps

Weld caps which are isolated by a minimum of 25mm from the longitudinal and transverse welds are to be ground flush with the deck plate.

6. Laminations, Corrosion Pitting and Other Defects

Instructions for the repair of such defects will be given by the Engineer.

7. Acceptance Criteria and Quality Assurance

All repairs shall comply with the minimum acceptance criteria set out in Appendix 18/1.

~~(This page is blank intentionally)~~