



A90/A96 HAUDAGAIN IMPROVEMENT

VOLUME 4 OF 6

SPECIFICATION

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A90/A96 HAUDAGAIN IMPROVEMENT
CONTRACT NUMBER TS/MTRIPS/WKS/2017/04

CONTRACT WORKING ISSUE

VOLUME 4 OF 6

SPECIFICATION

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TRANSPORT SCOTLAND

**THE DESIGN, CONSTRUCTION, COMPLETION AND MAINTENANCE OF
A90/A96 HAUDAGAIN IMPROVEMENT**

TS/MTRIPS/WKS/2017/04

CONTRACT WORKING ISSUE

VOLUME 4 OF 6

SPECIFICATION

DOCUMENT ISSUE RECORD

I hereby confirm that this is the current version of the Specification and supersedes all previous issues of such document by the Employer.

Signed _____
Name (Block capitals) _____
Date _____
Contractor _____

Copy of signed page shall be sent to, Transport Scotland, [REDACTED]

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**THE DESIGN, CONSTRUCTION, COMPLETION AND MAINTENANCE OF THE
A90/A96 HAUDAGAIN IMPROVEMENT**

VOLUME 4 OF 6

SPECIFICATION

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SPECIFICATION

PREAMBLE TO THE SPECIFICATION

1. The Specification referred to in the Tender shall be the 'Specification for Highway Works', published by The Stationery Office (formerly HMSO) as Volume 1 of the Manual of Contract Documents for Highway Works, as modified and extended by the following:
 - (i) Appendix 0/1: Contract-specific Additional, Substitute and Cancelled Clauses, Tables and Figures;
 - (ii) Appendix 0/2: Contract-specific minor alterations to existing Clauses, Tables and Figures;
 - (iii) The Numbered Appendices listed in Appendix 0/3; and
 - (iv) Appendix 0/5: Special National Alterations of the Overseeing Organisation of Scotland, Wales or Northern Ireland.

Appendix 0/4 contains a list of the Drawings.
2. The relevant publication date of each page of the Specification for Highway Works is given in the Schedule of Pages and Relevant Publication Dates.
3. An Additional Clause, as indicated by a suffix 'A' in Appendix 0/5 is an alteration originating from the Overseeing Organisation of Scotland, Wales or Northern Ireland.

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

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

A Cancelled Clause indicated by a suffix 'CR' in Appendix 0/1 is a Contract-specific alteration.
6. Insofar as any of the Numbered Appendices may conflict or be inconsistent with any provision of the Specification for Highway Works the Numbered Appendices shall always prevail.

Additionally, Numbered Appendices 0/1 and 0/2 shall take precedence over Numbered Appendix 0/5.
7. Any reference in the Contract to a Clause number or Appendix shall be deemed to refer to the corresponding Substitute Clause number or Appendix listed in Appendix 0/1, 0/2 or 0/5.
8. Where a Clause is altered any original Table/Figure referred to in the Clause shall apply unless the Table/Figure is also altered.

Where a Table/Figure is altered any reference in a Clause to the original Table/Figure shall apply to the altered Table/Figure.
9. Where a Clause in the Specification relates to work goods or materials which are not required for the Works it shall be deemed not to apply.

SPECIFICATION

PREAMBLE TO THE SPECIFICATION (Continued)

10. Any Appendix referred to in the Specification which is not used shall be deemed not to apply.
11. Where a Clause in the Specification is prefixed by an # this indicates that this particular Clause has a substitute National Alteration for one or more of the Overseeing Organisations of Scotland, Wales or Northern Ireland.
- Substitute or additional National Clauses shall be used within countries to which they specifically apply and they are deemed to replace corresponding Clauses in the main text of the Specification as appropriate.
- The substitute National Clauses are located at the end of the relevant Series together with the additional National Clauses of the Overseeing Organisations.
12. Other than where references to the Overseeing Organisation are made in the context of the Overseeing Organisation granting statutory or type approvals, the roles and functions of the Overseeing Organisation shall be undertaken by the 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 Major Transport Infrastructure Projects (MTRIPS) group of Transport Scotland.
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, such agreement, consent, approval shall be obtained from the Major Transport Infrastructure Projects (MTRIPS) group of Transport Scotland.
 - (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 requirements stated in the Contract.
14. Where a Clause or Sub-Clause in the Specification is annotated by "05/01" or similar, this indicates the relevant publication date that alteration(s) to the Clause or Sub-clause were made.
- The first double digit refers to the month and the second double digit refers to the year.

SCHEDULE OF PAGES AND RELEVANT PUBLICATION DATES OF SPECIFICATION FOR HIGHWAY WORKS

Series/Appendix	Page Number	Publication Date
000	1 to 3	May 2014
000	6 to 7F	February 2016
000	4 to 5	May 2017
100	1 to 2, 4 to 9, 12 to 29F, WF1, N2 to N11F	May 2014
100	3, 10 to 11, N1	December 2014
200	1 to 3F	February 2016
300	1	May 2001
300	4	November 2002
300	2 to 3, 5 to 6F	May 2008
400	1 to 24F	May 2017
500	23 to 24, 26	November 2004
500	28F	May 2005
500	3, 22, N1F	May 2006
500	2, 5, 27	November 2006
500	6, 25	November 2007
500	1, 4, 7 to 21	November 2009
600	1 to 68, 70 to 77F, S1 to S4F, W1 to W4F, N1 to N5F	February 2016
600	69	February 2017
700	1 to 36F, N1 to N6F	February 2016
800	1 to 31F	February 2016
900	2 to 5, 9 to 22, 24 to 26, 28 to 67F	August 2008
900	1, 6 to 8, S1F	November 2008
900	23, 27	May 2009
1000	1 to 45F	February 2016

SCHEDULE OF PAGES AND RELEVANT PUBLICATION DATES OF SPECIFICATION FOR HIGHWAY WORKS (Continued)

Series/Appendix	Page Number	Publication Date
1100	N1F	November 2006
1100	3	August 2008
1100	1 to 2, 4 to 6F	February 2017
1200	5	May 2001
1200	2 to 3, W1F	August 2003
1200	1, 14 to 16F	May 2004
1200	4, 9 to 11, 13	May 2005
1200	12	November 2006
1200	6 to 7, N1 to N4F	November 2007
1200	8	May 2008
1300	N2F	November 2003
1300	3 to 4	November 2004
1300	1, 5 to 10, 12F	November 2005
1300	2, 11 and N1	May 2006
1400	2, N1F	May 2001
1400	1, 3 to 9F	May 2006
1500	1 to 31F	February 2017
1600	1, 4 to 5, 9, 15, 17 to 18, 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	1 to 27F	December 2014
1800	1 to 35F	August 2014
1900	1 to 35F, S1 to S2F	August 2014
2000	1, 3 to 4F	May 2001
2000	2	November 2004
2100	1 to 2F	February 2016

SCHEDULE OF PAGES AND RELEVANT PUBLICATION DATES OF SPECIFICATION FOR HIGHWAY WORKS (Continued)

Series/Appendix	Page Number	Publication Date
2300	1	March 1998
2300	2 to 3F	May 2001
2400	1, 4, 7F	May 2005
2400	2	May 2006
2400	3, 5 to 6	May 2008
2500	1	May 2001
2500	2, 8, 11F	November 2003
2500	10	November 2004
2500	6 to 7, 9	May 2005
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	4 to 7, 10, 12 to 17, 19, 22 to 27F	May 2001
3000	20	November 2004
3000	2 to 3	May 2006
3000	8 to 9, 11, 18, 21	May 2008
5000	1, 4 to 19F, S1F	May 2005
5000	2 to 3	November 2008
Appendix A	1 to 4F	May 2014
Appendix B	1 to 3F	May 2014
Appendix C	1 to 2F	May 2014
#Appendix D	1F	May 2014
Appendix D (N1)	N1F	May 2014
Appendix E	1F	May 2014
Appendix F	1 to 52F	May 2017
Appendix G	Not Used	
Appendix H	1	May 2004
Appendix H	2	November 2005
Appendix H	3	November 2006
Appendix H	4 to 9F	November 2008

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

PART A: VOLUME 1 SPECIFICATION**LIST OF ADDITIONAL, SUBSTITUTE AND CANCELLED CLAUSES, TABLES AND FIGURES**

Clause No etc	Title
270 AR	Tree Felling
271 AR	Existing Vegetation to be Protected
370 AR	Rabbit, Hare Deer and Otter Fence Specifications
890 AR	Performance related Specification for Foundations
891 AR	Demonstration Area for Performance Foundations
892 AR	Permanent Works for Performance Specified Foundations
893 AR	CBR Strength Measurements
894 AR	Density Measurement
895 AR	Surface Modulus Measurement
896 AR	Wheelpath Deformation Measurement
952 AR	Pavement Cores
971 AR	Measurement of Texture Depth Using The TRL Mini Meter
1271 AR	Night Visibility
1471 AR	Special Tools
1472 AR	Fixings for Attachment to Structures
1728 AR	Construction Tolerances in Structural Concrete
1771 AR	Reinforcement Couplers
1772 AR	Concrete Repairs – General Requirements
1773 AR	Removal of Concrete in Areas to be Repaired
1774 AR	Surface Preparation
1775 AR	Concrete Repairs
1776 AR	Foamed Concrete Fill to Structures and Backfilling to Drainage Trenches
1777 AR	Installation of Resin Anchored Reinforcement
1778 AR	Early Thermal Cracking
2171 AR	Bearing Replacement
3000 AR	Landscape Operations
3001 AR	General Conditions
3003 AR	Delivery of Plants

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

ADDITIONAL, SUBSTITUTE AND CANCELLED CLAUSES, TABLES AND FIGURES

Clause No etc	Title and written text
270 AR	<p>1 Tree Felling</p> <p>1.1 Works shall be carried out in accordance with:</p> <ul style="list-style-type: none"> a) BS 5837: 2012 Trees in Relation to Construction. Recommendations; b) BS 3998: 2010 Recommendations for Tree Work; and c) BS 4428: 1989 Code of Practice for General Landscape Operations (excluding hard surfaces). <p>1.2 Marking of Trees to be Removed</p> <p>1.2.1 The Contractor shall set out the Works prior to the commencement of any tree felling operations and shall indicate with paint those trees the removal of which he considers necessary for the construction of the Permanent Works. No trees, bushes or hedges shall be felled or uprooted without approval from the Engineer. The Contractor shall submit his proposals for felling to the Engineer for approval not less than 10 working days in advance of felling works.</p> <p>1.3 Precautions</p> <p>1.3.1 Before commencing felling operations warning notices and arrangements shall be made by the Contractor to prevent public gaining access to the danger zone.</p> <p>1.3.2 When felling of mature trees takes place among trees and vegetation that shall be preserved, near property boundaries, public roads, buildings or other Structures, trees shall be carefully cut down in sections so as to avoid damage to adjacent features and vegetation. To avoid compaction of ground appropriate geotextiles shall be laid down where vehicles / plant have access to the Works Site.</p> <p>1.3.3 Where felling takes place close to side roads the Contractor shall notify the relevant roads authority and the police. The Contractor shall comply with the Code of Practice for Safety at Street and Road Works in respect of warning signs, direction notices and traffic control.</p> <p>1.3.4 The Contractor shall comply with the Special Requirements of Undertakers and other relevant companies, as provided in the Conditions of Contract.</p> <p>1.3.5 Where work is to be carried out within the vicinity of overhead telephone lines or electricity lines advice shall be sought from the relevant Undertakers.</p> <p>1.3.6 Position and depth of all pipes, cables and underground Structures shall be verified. The method of work shall take into account such items.</p> <p>1.3.7 Voids left after the removal of stumps and roots shall be filled with suitable material and compacted in compliance with Clause 612 of the Specification.</p>

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

Clause No etc	Title and written text
270 AR (continued)	1.3.8 Damage to trees, tree saplings, shrubs or hedges during felling shall be made good as described in BS 3998: 2010 Tree Work, Section 8.
	1.3.9 Prior to commencement of felling and tree work operations preconstruction ecological surveys shall be undertaken to determine presence of protected species including, but not limited, to bats, red squirrels and breeding birds.
	1.3.10 Tree work shall be avoided during the bird nesting season of March to August inclusive. During the bird nesting season tree work shall be carried out only after an inspection by the Ecological Clerk of Works (ECoW) establishes that there are no nesting birds present, and only after receiving consent in writing from the Engineer.
	1.3.11 Trees shall be checked for bats and appropriate mitigation shall be provided in accordance with sub-Clause 3012.13 of the Specification. Any bat roosts identified by the Contractor shall immediately be reported to the Engineer and ECoW.
	1.3.12 No trees containing confirmed bat roosts shall be felled without the necessary licences having been obtained from SNH. Any licences required from SNH shall be arranged by the Contractor once the species of bat and population size has been confirmed by a licensed bat ecologist.
	1.3.13 The Contractor shall notify the Engineer and ECoW not less than 7 days in advance of felling any trees containing confirmed bat roosts or having the potential for bat roosting.
	1.3.14 The Contractor shall undertake a pre-felling inspection of all trees identified as containing confirmed bat roosts or having the potential for bat roosting under the supervision of a licensed bat ecologist. Each tree with bat roosts or potential for bat roosting shall be inspected by safest practicable means and searched for signs of bats, using a torch and endoscope where necessary, as directed by the licensed bat ecologist. Where no signs of bats and no potential access points are identified the tree may be felled subject to the approval of the licensed bat ecologist.
	1.3.15 Where felling of trees containing bat roosts is undertaken under licence and where potential access points for bats are identified, the trees shall be section felled with the feature of interest lowered gently to the ground on a rope in the presence of the licensed bat ecologist, searched and left on the ground for a period of 24 to 48 hours with the access point exposed to allow any roosting bats to disperse.
	1.3.16 Should any bats be found to be present in trees during felling the Contractor shall cease felling works in the area and immediately contact SNH, the licensed bat ecologist and the Engineer and seek their instructions. No further works shall be undertaken on trees containing roosting bats without permission from SNH.

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

Clause No etc	Title and written text
270 AR (continued)	1.4 Weather Conditions for Tree Work
	1.4.1 Work shall cease when trees are very wet, covered in ice or snow, or during storms or high winds except in emergencies, where any work shall be the minimum to make the situation safe.
	1.5 Grubbing up Stumps and Filling Voids
	1.5.1 All stumps and tree roots shall be grubbed up, except stumps in woodland within areas of existing vegetation to be retained, provided this does not damage trees which are being retained. If a stump cannot be removed it shall be cut at least 300 millimetres below ground level, the hole shall be filled with soil, compacted, levelled and seeded.
	1.6 Chipping of Wood and Bark
	1.6.1 Small timber, twigs, bark and roots not infected by honey fungus may be chipped and left on the Site to compost at locations to be agreed with the Engineer and shall be turned over at specified intervals.
	1.7 Preliminary Tree Work - BS 3998: 2010
	1.7.1 The Contractor shall give notice of proposed tree work in conservation areas, and shall seek permission from the relevant authority where trees are protected by a Tree Preservation Order.
	1.7.2 Pruning works include the removal of dead, diseased or damaged branches, removal of heavy branches, crown lifting, crown thinning, pruning damaged tree saplings, bushes and roots and pruning and shaping of overgrown / neglected hedges.
	1.7.3 When a branch is to be removed the cut surface should be made at a fork or at the main stem and the final cut should be just outside the branch bark collar, where present. When there is not a collar the angle of the cut shall be the mirror image of the branch bark ridge (BS 3998: 2010: Page 13; 22; 23; Figure 1 and Figure 2). The outline of pruned trees shall be fair and symmetrical.
	1.7.4 Sealing of the cut surface with an approved wound protectant shall be carried out when there is a high risk of fungal or bacterial infection (BS 3998: 2010: Pages 34 and 35). Otherwise heartwood exposed by pruning shall be left untreated so that the surface dries out. A bitumastic or latex based paint shall be applied to the outer edge of the cut to prevent drying and dieback of the cambium. Treatment of the whole wound is for cosmetic reasons only; a thin layer of bitumastic or latex based paint or household emulsion can be applied.
	1.7.5 Heavy limbs shall be taken down in sections and shall be lowered with ropes to avoid damage to the tree and its surroundings. The method of pruning and sealing of cut surfaces shall be as prescribed.
	1.7.6 In crown lifting lower branches shall be removed to a given height above ground level in a manner described.

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

Clause No etc	Title and written text
270 AR (continued)	<p>1.7.7 Crown thinning involves the removal of a proportion of secondary branch growth throughout the crown to produce an open crown. Thinning shall not be too severe as it may induce fresh growth of epicormic shoots.</p> <p>1.7.8 Damaged tree saplings shall be cut back to sound wood just above a bud. Damaged bushes shall be cut to sound wood or the whole plant shall be cut to base to allow fresh growth to take over.</p> <p>1.8 Timber - Stacking</p> <p>1.8.1 Timber shall not be stacked against existing trees and shrubs to be retained. Timber stacks shall not exceed one metre high under any circumstances. Timber stacks shall be constructed in such a way as to prevent the movement or slippage of timber.</p> <p>1.9 Existing Woodland</p> <p>The timber from native species to be felled within or adjacent to, existing woodland shall be left within the woodland for habitat enhancement. Stumps within woodland are not to be ground down or removed.</p>
271 AR	<p>1 Existing Vegetation to be Protected</p> <p>1.1. Protection of existing vegetation which is to be retained shall be in accordance with BS 5837: 2012 and as follows:</p> <p>a) The Contractor shall ensure that all work is safeguarded against damage due to the carrying out of other Site operations. Should any damage or loss be caused to any existing or completed works then the Contractor shall reinstate and make good such damage or loss all with the acknowledgement in writing of the Engineer.</p> <p>b) No existing mature trees, protected or designated landscape areas or other artefact shall be removed or cleaned without the prior written agreement of the Engineer. The proposed extent of Site clearance works shall be submitted to the Engineer prior to the Works starting on the Works Site.</p> <p>c) Trees, bushes, undergrowth and other vegetation to be preserved shall be fenced off with protective barrier fencing as detailed in BS 5837: 2012 (Figures 2 and 3) or type CW 120 cleft chestnut pale fencing complying with BS 1722, Part 4 1986, placed in accordance with BS 5837: 2012, and shall be maintained in effective condition until the Works have been fully completed. Fences shall be erected before the Works commence. No existing trees, shrubs, or other plants shall be removed or cut without specific written instructions from the Designer. Protective fencing in accordance with BS 5837 2012 shall be erected prior to commencement of the Works to protect the areas shown in drawings. No soil, spoil, fuel oil, chemicals, construction materials or rubbish shall be stored or tipped within the spread of existing trees, shrubs or hedges.</p> <p>d) Should any tree or shrub be mistakenly uprooted, destroyed, or in the opinion of the Engineer, be damaged beyond reasonable chance of survival in its original shape due to the Contractor's negligence, then the Contractor shall provide and plant suitable replacement</p>

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

Clause No etc	Title and written text
	<p>trees or shrubs of a similar type and age. If such replacement trees or shrubs are not obtainable, alternative trees or shrubs, acknowledged in writing by the Engineer, shall be provided and planted. The Contractor's liability shall continue until the replacement trees and shrubs have survived the winter following the planting and have completed satisfactorily the following summer's growth.</p> <p>2 Management of Existing Vegetation to be Retained</p> <p>The Contractor shall manage existing vegetation to be retained in accordance with Section 4.4 of Part 1 of the Employer's Requirements.</p>
370 AR	<p>1. Rabbit, Hare, Deer and Otter Fence Specifications</p> <p>1.1. Rabbits and Hares</p> <p>1.1.1. Fences to protect planting areas from rabbits and hares shall be in accordance with the following specification:</p> <p>(a) Post and mesh fence with a galvanised hexagonal wire mesh 1200 millimetres wide having maximum openings of 31 millimetres and 1.25 millimetres (18 gauge) wire. Mesh to be affixed to two galvanised line wires of minimum 4 millimetres in diameter at 900 millimetres and 150 millimetres above ground level using galvanised fixing rings every 600 millimetres on top wire and 1200 millimetres on bottom wire. Mesh to be buried to 150 millimetres depth and returned outwards from protected area. End and change of direction posts to be 125 millimetres diameter round section, 1.87 metres long and driven 770 millimetres into the ground. Strut to be 65 millimetres round section located in notch on main post and held in the ground by 0.6 metre split rail. Line posts to be 1.6 metres long and 65 millimetres square section driven 500 millimetres into the ground at 4 metre centres. Mesh also to be fixed to line posts by 6 number staples per post.</p>
890 AR	<p>Performance related Specification for Foundations</p> <p>General</p> <p>1. Performance Foundations as defined in Interim Advice Note 73/06 Revision 1 (2009) draft must be constructed in accordance with Clause 890 to 896.</p> <p>2. The foundations for a scheme must be divided into Foundation Areas defined in Appendix 7/1. Each Area shall be defined by the Design subgrade strength or by different foundation materials used in the design.</p> <p>3. The structure of each Foundation Area must be defined in Appendix 7/1 as either Foundation Class 1, 2, 3 or 4, and foundation materials and minimum layer thicknesses to be constructed must be tabulated.</p>

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

Clause No etc	Title and written text
<p>890 AR (continued)</p>	<p>4. The tests to measure performance in accordance with this specification must be carried out for each Foundation stage at each of the following stages of construction: (i) Top of Sub-grade (ii) Top of Foundation</p> <p>5. The stiffness modulus performance requirements for the top of a foundation are set out in the Chapter 4 of the draft HD25 for the following situations:</p> <ul style="list-style-type: none"> • Long-term Foundation Class • Short-term Mean Foundation Surface Modulus to be exceeded by the running mean of five consecutive measurements • Short-term Minimum Foundation Surface Modulus to be exceeded by all individual measurements <p>Materials</p> <p>6. All foundation materials must comply with Series 600 and Series 800 clauses except that a layer thickness of up to 250mm may be used for layers other than the uppermost foundation layer.</p> <p>7. The use of all materials used in foundations must be acceptable to SEPA and other bodies responsible for the local environment and for water quality and must not result in a deleterious reaction with other pavement or sub-grade materials.</p> <p>8. Where a Contractor's proposed alternatives are permitted for unbound granular materials, no such materials must have a plasticity index greater than 6% when tested according to BS1377: Part 2 on material passing the 425 micron sieve unless the fraction of such material is less than 10% of the whole.</p> <p>Placement and Compaction</p> <p>9. Class 9D or 9E stabilised materials must not be placed or constructed above Class 6F granular materials or Class 6S granular filter layer materials.</p> <p>10. The minimum material layer thicknesses to be constructed as defined in Appendix 7/1 must include an allowance for construction tolerances. The Contractor must also make additional allowance for thickness or quality of material to ensure this is no damage if the foundation is to be used as a haul road.</p> <p>11. The minimum compacted layer thickness must be greater of the following: 2.5 times the maximum particle size or 150mm for bound layers; or 80mm for unbound layers.</p>

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

Clause No etc	Title and written text
890 AR (continued)	<p>12. Unbound foundation materials may be compacted in a layer thickness up to 250mm except for the uppermost foundation layer for which the thickness must not exceed 225mm.</p> <p>13. Unless stated otherwise in Appendix 7/1, no restriction is placed on the method of compaction of unbound materials so long as the dry density requirements given in sub-clauses 12 to 16 of this Clause are satisfied.</p> <p>14. Not used.</p> <p>15. For cement and other hydraulically bound mixtures to Clause 821, 822, 823, 830, 831, 832, 834 and 840, the compaction plant and method specified in Clause 814 must be used.</p> <p>Sub-grade Protection</p> <p>16. The Contactor must limit any areas of completed formation to suit the output of plant in use and the rate of deposition of sub-base. No prepared formation must remain continuously exposed to rain causing degradation or to be left uncovered overnight.</p>

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

Clause No etc	Title and written text
891 AR	<p>Demonstration Area for Performance Foundations</p> <p>General</p> <ol style="list-style-type: none"> 1. For each Foundation Area, a Demonstration Area must be prepared using the same methods, materials, thickness and compaction as proposed for the Permanent Works. Each Demonstration Area shall be not less than 400m² and not less than 60m long. For foundation constructed using HBM to Clause 810, the Demonstration Area shall comply with the requirements of Clause 817. 2. Records of the performance test results for each construction stage, referenced to the following condition details must be presented to the Engineer in an electronic spreadsheet format, prior to construction of the same foundation type for the Works: <ul style="list-style-type: none"> (i) Sub-grade CBR value immediately before foundation construction (ii) Date and time of mixing (for stabilised and slow-setting materials) (iii) Date and time of placing compaction (iv) Date of performance testing (v) Values of Surface Modulus recorded (vi) Values of material properties including density and layer thickness (vii) Weather conditions including temperature (viii) Details of samples taken for testing 3. The material placed in the Demonstration Area may form part of the Permanent Works, provided that they may meet the requirements of the Permanent Works. 4. Foundation layers containing at least 3% CEM1 cement by dry mass of mixture must not be tested or trafficked until 7 days after placing unless a strength criterion has been agreed with the Engineer. 5. Where the foundation includes any HBM, then 5 laboratory specimens must be manufactured from samples recovered at locations uniformly distributed across the Demonstration Areas and tested in accordance with the requirements for that material. 6. Where the completed Demonstration Area meets all the requirements, the methods, materials, thicknesses used must not be changed for the construction of the Main Works without further testing in a Demonstration Area.

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

Clause No etc	Title and written text
891 AR (continued)	<p>Demonstration Area for Performance Foundations (Continued)</p> <p>Trafficking Trial</p> <p>7. The Contractor must undertake controlled trafficking on the Top of Foundation Stage of construction in the Demonstration Area.</p> <p>8. Trafficking must be carried out using a heavy goods vehicle with axle configuration and load as required by Clause 816.28. The number of passes should be equivalent to 1000 standard axles as given in Clause 802 or as agreed otherwise. The deformation must be measured in accordance with, and must not exceed the limits stated in Clause 896.</p> <p>9. Foundation Surface Modulus performance tests at the Top of Foundation that includes bound materials, must be carried out both before and after Trafficking Trial. Each individual Surface Modulus measurement and the running mean of 5 consecutive measurements of the later series of tests must exceed the values in Clause 891 Sub-clause 16.</p> <p>Top of Sub-grade - Performance Assessment</p> <p>10. The short-term sub-grade CBR strength within the Demonstration Area must be determined in accordance with Clause 893 at not less than 5 locations, distributed uniformly over the Demonstration Area. The locations are to be identified to an accuracy of 0.5m. The measurement of strength must be taken at information level or at sub-information level if capping is part of the foundation design.</p> <p>11. Not used.</p> <p>12. Where in-situ stabilisation of the sub-grade is to be used as part of or as the first foundation layer, the sub-grade CBR strength must be measured immediately below the depth of the stabilisation by means of a Dynamic Cone Penetrometer, to the requirements of Clause 893.</p> <p>13. Where the sub-grade CBR test values are less than the Design CBR, the area must either be improved, and the improvement applied to the Permanent Works, or the Design CBR reset and another foundation designed, constructed and proved.</p> <p>Top of Foundation Stage - Performance Assessment</p> <p>14. Measurements of the short-term Surface Modulus must be carried out as detailed in Clause 895. A minimum of 25 stiffness tests must be completed, distributed uniformly over the Demonstration Area, with at least five of these tests located above the Top of Sub-grade CBR strength and density tests.</p> <p>15. Not used.</p>

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

Clause No etc	Title and written text
891 AR (continued)	<p>Demonstration Area for Performance Foundations (Continued)</p> <p>16. The short-term Surface Modulus performance requirements for each individual value and for the running mean of five consecutive measurements must be equal to or greater than the requirements for the particular Foundation Class identified in Appendix 7/1 following adjustment in accordance with the procedure in IAN 73 Chapter 4 to the median value of the five sub-grade CBR values from the Demonstration Area.</p> <p>17. Where the Surface Modulus performance measurements do not meet the requirements detailed in this Clause, the foundation must be redesigned and another Demonstration Area constructed and the design proved.</p>
892 AR	<p>Permanent Works for Performance Specified Foundations General</p> <p>1. For each Foundation Area, records of the performance test results for each construction stage, referenced to the following condition details must be presented to the Engineer in an electronic spreadsheet format, prior to construction of the pavement layers above:</p> <ul style="list-style-type: none"> (i) Sub-grade CBR value immediately before foundation construction (ii) Date and time of mixing (for stabilised and slow-setting materials) (iii) Date and time of placing compaction (iv) Date of performance testing (v) Values of Surface Modulus recorded (vi) Values of material properties including density and layer thickness (vii) Weather conditions including temperature (viii) Details of samples taken for testing <p>2. Foundation layers containing at least 3% CEM1 cement by dry mass of mixture must not be tested or trafficked until 7 days after placing unless a strength criterion has been agreed with the Engineer.</p> <p>Top of Sub-grade Stage of Construction Performance Assessment</p> <p>3. The short-term sub-grade CBR strength must be determined according to Clause 893 at 60m intervals along each lane of prepared sub-grade and staggered by 30m between adjacent lanes. At least 10 tests shall be carried out for each prepared Foundation Area. The location of each test must be identified to the nearest 0.5m. The measurement of strength must be taken at formation level or at sub-formation level if capping is part of the foundation design.</p> <p>4. The foundation must not be constructed in areas where the sub-grade strength is less than the Design CBR.</p>

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

Clause No etc	Title and written text
892 AR (continued)	<p>Permanent Works for Performance Specified Foundations (Continued)</p> <p>Top of Foundation Performance Assessment</p> <p>5. The top of foundation must be tested for Surface Modulus in accordance with Clause 895 immediately prior construction of overlying pavement layers and at 20m intervals along each lane, staggered by 10m between adjacent lanes. Tests should coincide with sub-grade CBR and density tests where appropriate.</p> <p>6. The short-term Surface Modulus performance for each individual measurement and for the running mean of 5 consecutive measurements must be equal or greater than the minimum and mean values set out in Chapter 4 of IAN 73 for the Foundation Class and identified in Appendix 7/1.</p> <p>7. A foundation containing unbound materials that fails to comply with the performance requirements of this Clause when the recorded moisture content is in excess of that in the Demonstration Area, may be retested for compliance when the foundation moisture content has reduced to that of the Demonstration Area.</p> <p>Where the Surface Modulus performance values do not meet the requirements detailed in this Clause, the foundation must be redesigned and another Demonstration Area constructed and the design proved.</p> <p>8. Density tests, as detailed in Clause 894 are to be performed at a spacing of every 200 metres along each lane of the road when Clause 802 (the method specification for laying and compacting unbound materials) has been followed; otherwise the spacing of these tests shall be every 60m, coinciding with surface stiffness modulus tests where such tests are performed. Tests performed in adjacent lanes must be staggered by 30m. The results shall comply with the requirements of Clause 894.</p> <p>9. Wheelpath deformation must be monitored and measured along all lengths of prepared foundation in accordance with the requirements of Clause 896 and the measured values must not exceed those stipulated in that Clause.</p> <p>10. Density tests, as detailed in Clause 894 are to be performed at a spacing of every 200 metres along each lane of the road when Clause 802 (the method specification for laying and compacting unbound materials) has been followed; otherwise the spacing of these tests shall be every 60m, coinciding with surface stiffness modulus tests. Tests performed in adjacent lanes must be staggered by 30m. The results shall comply with the requirements of Clause 894.</p>

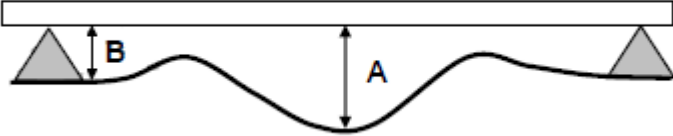
APPENDIX 0/1: CONTRACT-SPECIFIC ADDITIONAL, SUBSTITUTE AND CANCELLED CLAUSES, TABLES AND FIGURES INCLUDED IN THE CONTRACT (Continued)

Clause No etc	Title and written text
893 AR	<p>CBR Strength Measurements</p> <ol style="list-style-type: none"> <li>1. CBR strength measurements of the prepared sub-grade must be carried out using a Dynamic Cone Penetrometer (DCP) unless the type of soil is inappropriate for such testing when Dynamic Plate testing must be used. The DCP equipment must incorporate an 8kg steel drop weight that falls vertically through 575mm and makes contact with a steel anvil. This anvil must be rigidly attached, via steel rods (less than 20mm diameter), to a 20mm diameter 60° steel cone, which is driven vertically into the ground. Also see HD29 (DMRB 7.3.2). <li>2. The result for each test must be expressed as a 50th percentile penetration rate in millimetres per blow between 50mm and 550mm of penetration from top of sub-grade level. If the penetration rate is less than 2mm per blow, then the test should be aborted with one further test attempted nearby. <li>3. Soil strength expressed as mm/blow must be converted to a CBR value using the following relationship: $\text{Log}_{10}(\text{CBR}) = 2.48 - 1.057 * \text{Log}_{10}(\text{mm/blow})$ where CBR is given as a percentage value and the penetration rate of the cone is given in units of mm/blow.
894 AR	<p>Density Measurement</p> <ol style="list-style-type: none"> <li>1. Each 'stage' of the foundation construction shall be tested for in situ density by a nuclear density gauge, calibrated for the material being tested, in accordance with BS1377: Part 9 for unbound materials or Clause 870 for cement and other hydraulically bound mixtures, or by such other in situ density test as may be approved by the Overseeing Organisation. The results shall comply with the requirements of this Clause. <li>2. The unbound material used in each compacted foundation layer shall achieve a minimum in-situ dry density, when tested in accordance with BS1377: Part 9, or such other test as the Overseeing Organisation may permit, of 95% of the maximum dry density, as determined from the method in BS EN 13286-4. Cement and other hydraulically bound mixtures shall attain a minimum in-situ wet density, when tested in accordance with Clause 870, of 95% of the average wet density of at least five cubes manufactured to BS EN 13286-51. <li>3. Maximum dry density (for unbound materials) or maximum wet density (for cement and other hydraulically bound mixtures) shall be determined for every 1000 tonnes of material unless otherwise stated in Appendix 7/1 or agreed by the Overseeing Organisation.

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

Clause No etc	Title and written text
895 AR	<p>Surface Modulus Measurement</p> <ol style="list-style-type: none"> <li>1. Surface Modulus testing must be carried out using Dynamic Plate Test Device, which has been calibrated to the manufacture’s specification. Regular checking and calibration of the load cell and deflection sensors must be carried out as recommended by the manufacturer. The equipment must be capable of producing a peak stress of 100kPa with a pulse rise time of between 8 to 12 milliseconds, applied to a rigid circular plate of 300mm diameter. Both the applied load and the transient deflection, measured directly on the tested surface, must be recorded. The deflection measurement transducer must be capable of measuring deflections in the range 40-1500 microns. The accuracy of the readings should be ±0.1kN for the load and ± 2 microns for deflection. <li>2. The peak stress applied during each test shall be selected to produce as high a deflection as possible within the measurement range of the deflection sensor. <li>3. The following procedure is to be adopted for dynamic plate testing. Each test site should be stable and flat and free from water, ice and snow. The temperature down to 100mm below the surface should be at least 4°C. For a lightweight test device, at least 10 drops are necessary at the beginning of each test session to warm up the rubber buffers. At each test point, 3 initial ‘seating’ drops shall be carried out to bed the plate into the surface. Three further drops shall then be carried out. The results from the last set of three drops shall be averaged to given the Surface Modulus applicable to that test point. <li>4. The stiffness modulus shall be computed at each point tested, using the following formula: $E = \frac{2(1 - \nu^2) \times R \times P}{D}$ where: E = Foundation Surface Modulus (in MN/m² or MPa) ν = Poisson’s Ratio (ν, by default, = 0.35) R = Load Plate Radius (R, by default, = 150mm) P = Contact Pressure (in kPa) D = Deflection under the centre of the plate (in microns) <li>5. If a lightweight test device is used, it must be correlated to an FWD which will remain the reference test method. The following procedure must to be used to correlate a lightweight device: The FWD and the lightweight devices are to both to be used on the same material and at adjacent test positions in the Demonstration Area for the 25 measurement points. The Surface Modulus values obtained from the two devices are to be compared and the square of the correlation coefficient (r²) is to be calculated, if this value is more than 0.45 then there is considered to be sufficient correlation between the two devices.

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

Clause No etc	Title and written text
895 AR (continued)	<p>Surface Modulus Measurement (Continued)</p> <p>An adjustment factor should then be calculated as the mean of the ratios of each FWD value to lightweight value. The lightweight device readings are to be adjusted by this factor for all further readings on that material for that scheme.</p>
896 AR	<p>Wheelpath Deformation Measurement</p> <ol style="list-style-type: none"> 1. Ruts that develop under construction traffic, measured in accordance with this Clause, shall nowhere exceed the following limits: <ul style="list-style-type: none"> • All stabilised/bound surfaces -10mm • < 250mm thick granular material - 30mm • 250mm thick granular material - 40mm 2. At each point, the cumulative rut, calculated by summing the deformations from each trafficked foundation layer shall not exceed 50mm. 3. Wheelpath deformation measurement shall be carried out using a straight edge with a length of at least 2m. The straight edge shall be placed transverse to the rut and raised clear from the rut by two identical blocks. The blocks shall be placed on undisturbed material outside of the wheel path. The amount of deformation shall be the difference between the deepest vertical measurement from the straight edge to the surface of the foundation (A) and the height of the blocks (B). <div style="text-align: center;">  <p>Deformation = A – B</p> </div>

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

Clause No etc	Title and written text
952 AR	<p>Pavement Cores</p> <ol style="list-style-type: none"> <li>1. Nominal 150mm diameter cores, required for sampling and testing at the frequencies stated in Appendix 1/5, shall be taken using a suitable coring machine in accordance with BS 598:Part100. <li>2. For each core extracted a Roadside Record Sheet (RRS1) shall be completed in order to record the site location, coring conditions and condition of the core. <li>3. All cores shall be labelled, protected, transported and stored according to the Testing Organisation's quality procedures. <li>4. In the laboratory each core, prior to any testing, shall be examined, photographed and the information recorded on a Core Record Sheet (CRS1). The cores shall be photographed on a white background with the project, location and core number clearly shown together with the units of measurement that will be easily identifiable on the size of photograph produced. <li>5. The records are to be stored within the Contractors Quality Records and made available to the Overseeing Organisation when required.

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

ROADSIDE RECORD SHEET (RRS1)

a) General

b) Project Name	
Coring Date	
Core Number	
Chainage	
Road Name	
Road Type (See Note 1)	
Lane Direction (See Note 2)	
Lane Number (See Note 3)	
Weather Conditions	

c) Pavement Coring Description

Did the core barrel lock/jam whilst cutting pavement?	Yes	No	If Yes, at what depth? Depth (mm):	
Were there difficulties in extracting the core from the barrel?	Yes		No	
Condition of core (Tick as appropriate)	Good	De-bonded	Shattered	Partial recovery
Depth of coring				
Core length				
Any additional information on the core not included above				

Notes:

1. Insert as appropriate i.e. D2AP, S2 etc.
2. Insert eastbound, westbound, northbound, and southbound as appropriate.
3. Insert appropriate descriptor e.g. lane 1 (nearside), lane 2 (offside), hard shoulder.

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

Core Record Sheet (CRS1)

Project Name					Road type (See Note 1)		
Road Name					Lane Direction (See Note 2)		
Coring Date					Lane Number (See Note 3)		
Core Number					Chainage		
Layer Number	Layers			Material	Aggregate		Comments
Top (mm)	Bottom (mm)	Thicknes s (mm)	Maximum size (mm)		Type		

Insert picture of core
HERE

(The units of measurement should be clearly seen on the photograph)

Notes:

- 1) Insert as appropriate i.e. D2AP, S2 etc.
- 2) Insert eastbound, westbound, northbound, and southbound as appropriate.
- 3) Insert appropriate descriptor e.g. lane 1 (nearside), lane 2 (offside), hard shoulder.

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

ADDITIONAL CLAUSES, TABLES AND FIGURES (CONTINUED)

Clause No etc	Title and written text
971 AR	<p>Measurement of Texture Depth Using The TRL Mini Meter</p> <ol style="list-style-type: none"> 1. Texture depth may be measured by TRL Mini Meter (TMM) manufactured or modified to and calibrated to the 1985 TRL specification by a licensed manufacturer. 2. The TMM will be operated and maintained in accordance with the manufacturer's instructions and recommendations as contained in their operating maintenance manual (1986). A Certificate showing the Calibration Factor certified by the manufacturer and dated less than 12 months prior to use will be kept available for reference. This calibration factor must agree with that shown on the recording tape output by the TMM. 3. Texture depth will be measured as soon as possible after surfacing has been laid and before the surfacing has been open to traffic. The road shall be clean, free from loose material and dry or barely damp. 4. The TMM will be operated at a speed between 3 and 6 kph on the "Texture HRA" program. 5. The sensitivity of the TMM will be checked daily on the check provided. The drop out percentage (DO%) of five consecutive tests averaged to the nearest whole number shall be 40 +/-3%. 6. Surface texture will be measured over one or more sections of carriageway lane 1000m in length or the complete carriageway lane if less than 1000m. Measurements will be made on successive 50m lane lengths along the whole of the section tested, on a diagonal line across the carriageway lane width from left to right in the direction of traffic flow. No measurements will be taken closer than 300mm to the edge of the carriageway. 7. The report will be made in accordance with this clause and include the following: <ol style="list-style-type: none"> (a) The serial number and calibration factor of the meter used. (b) The location of each lane tested. (c) The individual Sensor Measured Texture Depth (SMTD) for each 50m lane length comprising each section together with their average value. (d) Affirmation that the surface course was dry, clean and untrafficked. Any departure from this must be reported. (e) A copy of the printed output for any 50m lane length where the message "DO% HIGH" or "DO% LOW" has been printed in place of the 10m results, together with clear identification of location.

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

Clause No etc	Title and written text
971 AR (continued)	<p>Measurement of Texture Depth Using The TRL Mini Meter (Continued)</p> <p>8. The TRL Mini Meter may be used on all surfacing contracts where texture depth is a requirement. However for comparative purposes the sand patch test, in accordance with BSI BS EN 13036-1, is to be used in addition to the Mini Meter. One set of tests will be required for each 10,000m² of surfacing or part thereof laid under any contract. The Sand Patch Tests shall be carried out in a linear manner along the same track as the Mini Meter. This supersedes the particular requirement of BS 598: Part 5 concerning the alignment of the sand patch test locations. The Contractor shall record the location of the Sand Patch Tests and submit details to the Engineer in order that a direct comparison can be made between results.</p>
1271 AR	<p>Night Visibility</p> <p>Immediately after application and throughout the period of 60 months thereafter, the retro-reflectivity of the road marking line shall be not less than 150 mcd/lux/m² when measured in accordance with the method below:</p> <p>1. Apparatus</p> <p>The apparatus for measuring the retroreflectivity (SL value) of material shall consist essentially of a light source and a photodetector with a geometry for observation and illumination of 1.37 degrees and 0.74 degrees respectively.</p> <p>2. Procedure</p> <p>Calibrate the instrument in accordance with the manufacturer's instructions.</p> <p>Air temperature shall not be below 10 degrees nor exceed 30 degrees centigrade.</p> <p>The area to be measured shall be 200 millimetres x 100 millimetres. Measurements shall be made at five positions at approximately 200 millimetre intervals along the marking. This procedure shall be repeated at two further locations along the line and within 50 metres of the first set of measurements. The overall average of the fifteen readings shall be reported as the retro-reflectivity value. The road marking will be tested in a dry condition after removal of any loose dirt or foreign particles. If the retroreflectivity value measured is less than the specified value the line shall be thoroughly wetted and cleaned following BS 3262: Part 2 Clause D2 procedure, then dried and re-measured.</p>
1471 AR	<p>Special Tools</p> <p>1. Duplicate sets of special tools, keys and handling devices essential for the correct running operation and maintenance of any equipment shall be made available to the Overseeing Organisation and provided to the Overseeing Organisation on Completion of the Works.</p>

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

1472 AR	Fixings for Attachment to Structures <ol style="list-style-type: none">1. Fixings for attachment to Structures shall use a resin fixed replaceable bolt system.
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APPENDIX 0/1: CONTRACT-SPECIFIC ADDITIONAL, SUBSTITUTE AND CANCELLED CLAUSES, TABLES AND FIGURES INCLUDED IN THE CONTRACT (Continued)

Clause No etc	Title and written text																														
1728 AR	<p>1. Construction Tolerances in Structural Concrete</p> <p>(i) General</p> <p>Notwithstanding any tolerances stated in the DMRB, British and European Standards the following tolerances shall be adopted in the Design, Construction, Completion and Maintenance of the Works.</p> <p>1.1. In-Situ Concrete</p> <p>(i) The maximum deviation of hardened concrete surfaces prior to the removal of formwork shall not be greater than 3 millimetres in 3 metres (which tolerance shall not be cumulative) nor greater than 2 millimetres in 1 metre. Of the foregoing deviations, not more than 2 millimetres shall occur at a formwork joint. The overall standard of workmanship to be achieved shall be such that the lines of the finished surfaces shall be smoothly continuous.</p> <p>(ii) Where concrete surfaces are not permanently exposed, the maximum deviation of the finished concrete surfaces shall not be greater than 6 millimetres in 3 metres (which tolerance shall not be cumulative).</p> <p>1.2. Precast Concrete</p> <p>(i) For members other than pre-stressed pre-tensioned members, the length, cross-section dimensions, straightness, squareness, twist and flatness of precast concrete shall be measured at 28 ± 2 days after casting. Unless otherwise stated, the allowable dimensional variations shall not exceed the following:</p> <table> <thead> <tr> <th>a) Length</th> <th>Variation</th> </tr> </thead> <tbody> <tr> <td>Up to 3 metres</td> <td>± 6 mm</td> </tr> <tr> <td>3 to 4.5 metres</td> <td>± 9 mm</td> </tr> <tr> <td>4.5 to 6 metres</td> <td>± 12 mm</td> </tr> <tr> <td>Additional for every subsequent 6 metres</td> <td>± 6 mm</td> </tr> <tr> <th>b) Cross section (each direction)</th> <th></th> </tr> <tr> <td>Up to 500 mm</td> <td>± 6 mm</td> </tr> <tr> <td>500 to 750 mm</td> <td>± 9 mm</td> </tr> <tr> <td>Additional for every subsequent 250 mm</td> <td>± 3 mm</td> </tr> <tr> <th>c) Straightness or bow (deviation from intended line)</th> <th></th> </tr> <tr> <td>Up to 3 metres</td> <td>± 6 mm</td> </tr> <tr> <td>3 to 6 metres</td> <td>± 9 mm</td> </tr> <tr> <td>6 to 12 metres</td> <td>± 12 mm</td> </tr> <tr> <td>Additional for every subsequent 6 metres</td> <td>± 6 mm</td> </tr> <tr> <td>d) <i>Squareness.</i> When considering the squareness of a corner, the longer of the two adjacent sides being checked shall be taken as the base line. The shorter side shall not vary in its distance from a perpendicular so that the difference between the greatest and shortest dimensions exceeds the following:</td> <td></td> </tr> </tbody> </table>	a) Length	Variation	Up to 3 metres	± 6 mm	3 to 4.5 metres	± 9 mm	4.5 to 6 metres	± 12 mm	Additional for every subsequent 6 metres	± 6 mm	b) Cross section (each direction)		Up to 500 mm	± 6 mm	500 to 750 mm	± 9 mm	Additional for every subsequent 250 mm	± 3 mm	c) Straightness or bow (deviation from intended line)		Up to 3 metres	± 6 mm	3 to 6 metres	± 9 mm	6 to 12 metres	± 12 mm	Additional for every subsequent 6 metres	± 6 mm	d) <i>Squareness.</i> When considering the squareness of a corner, the longer of the two adjacent sides being checked shall be taken as the base line. The shorter side shall not vary in its distance from a perpendicular so that the difference between the greatest and shortest dimensions exceeds the following:	
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APPENDIX 0/1: CONTRACT-SPECIFIC ADDITIONAL, SUBSTITUTE AND CANCELLED CLAUSES, TABLES AND FIGURES INCLUDED IN THE CONTRACT (Continued)

Clause No etc	Title and written text										
1728 AR (continued)	<p>Length of shorter sides:</p> <table border="0"> <tr> <td>Up to and including 1.2 metres</td> <td>6 mm</td> </tr> <tr> <td>Over 1.2 metres but less than 1.8 metres</td> <td>9 mm</td> </tr> <tr> <td>1.8 metres and over</td> <td>12 mm</td> </tr> </table> <p>When considering squareness, any error due to lack of straightness shall be ignored; squareness shall be measured with respect to the straight lines that are closest to parallel with the features being checked.</p> <p>When the nominal angle is other than 90°, the included angle between check lines shall be varied accordingly.</p> <p>e) <i>Twist</i>. Any corner shall not be more than the deviation stated from the plane containing the other three corners:</p> <table border="0"> <tr> <td>Up to 600 mm wide and up to 6 metres in length</td> <td>6 mm</td> </tr> <tr> <td>Over 600 mm wide and for any length</td> <td>12 mm</td> </tr> </table> <p>f) <i>Flatness</i>. The maximum deviation from a 1.5 metre straight edge placed in any position on a nominally plane surface shall not exceed 6 mm.</p> <p>In addition, for members where accuracy is important, for example those which form bridge deck copes, the allowable dimensional variations and deviations shall not exceed half the values listed above.</p> <p>2. Assembly and Erection of Precast Concrete Members other than Prestressed Pretensioned Members</p> <p>(i) The vertical alignment of the member shall not depart from the Design level along the line by more than ± 5mm nor more than 3mm in a distance of 3 metres, nor greater than 2mm in 1 metre.</p> <p>(ii) The horizontal alignment of the member shall not depart from the Design alignment along the line where accuracy is important by more than ± 5mm nor more than 3mm in a distance of 3 metres, nor greater than 2mm in 1 metre.</p> <p>(iii) At the joints between adjacent members, the difference in level at the point where accuracy is important shall not exceed 2mm.</p> <p>(iv) At the joints between adjacent members, the difference in horizontal alignment at the point where accuracy is important shall not exceed 2mm.</p> <p>(v) The width of gaps between adjacent members shall be as uniform as possible.</p> <p>(vi) The erection procedure shall incorporate means of accurately locating members in their final position. The procedure shall also incorporate means of making fine adjustments to the level and alignment of the units after installation.</p>	Up to and including 1.2 metres	6 mm	Over 1.2 metres but less than 1.8 metres	9 mm	1.8 metres and over	12 mm	Up to 600 mm wide and up to 6 metres in length	6 mm	Over 600 mm wide and for any length	12 mm
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APPENDIX 0/1: CONTRACT-SPECIFIC ADDITIONAL, SUBSTITUTE AND CANCELLED CLAUSES, TABLES AND FIGURES INCLUDED IN THE CONTRACT (Continued)

Clause No etc	Title and written text
1771 AR	<p>1 Couplers</p> <p>1.1 The use of threaded mechanical couplers is acceptable subject to:</p> <ul style="list-style-type: none"> a) The Contractor shall submit the source and suppliers to the Overseeing Organisation for agreement; b) Manufacturers and suppliers shall hold a relevant valid CARES Certificate of Approval unless otherwise agreed by the Overseeing Organisation; c) All couplers shall be covered by a relevant CARES Technical Approval or other relevant product approval from an appropriate UKAS accredited product certification body; and d) Concrete cover shall be maintained. <p>1.2 Tensile Capacity</p> <p>1.2.1 The tensile strength of the coupled bar should exceed 540 newtons per square millimetre for BS 4449+A3 grade B500B or Grade B500C hot rolled reinforcement steel.</p> <p>1.3 Slip (permanent elongation test)</p> <p>1.3.1 When a test is made of a representative gauge length assembly comprising reinforcement size, grade and profile to be used and a coupler of the precise type to be used, the permanent elongation after loading to 0.6f, shall not exceed 0.1 millimetres.</p> <p>1.4 Fatigue</p> <p>1.4.1 The Contractor shall obtain from the coupler manufacturer the fatigue design S-N curve established as defined below, which he shall furnish to the Designer, Checker and Overseeing Organisation with the Design Documentation. Existing fatigue design S-N data may be taken as an acceptable alternative.</p> <p>1.5 Performance testing</p> <p>1.5.1 The material to be used for the performance tests shall be in all respects similar to those which the Contractor proposes to use in the Works.</p> <p>1.5.2 Mechanical connections shall be qualified for use in the construction on the basis of the following performance tests:</p> <p>1.6 Static tensile strength tests</p> <p>1.6.1 A minimum number of six static tensile strength tests shall be conducted considering the range of all variables. All test samples shall meet the requirements of sub Clause 1.2 above.</p> <p>1.7 Slip testing</p> <p>1.7.1 A minimum number of two slip tests shall be conducted considering the range of variables. All test samples shall meet the requirements of sub-Clause 1.3 above.</p>

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

Clause No etc	Title and written text																				
<p>1771 AR (continued)</p>	<p>1.8 Fatigue testing</p>																				
	<p>1.8.1 Sampling</p>																				
	<p>1.8.1.1 Couplers shall be formed into batches of 20 bars of a single type and size, manufactured at the same time. All couplers of the same diameter should preferably be from the same melt. If not, the melt of each test specimen should be known and there should be a representative number of couplers from each melt.</p>																				
	<p>1.8.1.2 Each test specimen shall be selected at random from the batches and shall be representative of the production run.</p>																				
	<p>1.8.2 Testing</p>																				
	<p>1.8.2.1 The fatigue properties for each coupler size shall be established by a competent testing laboratory complying with the requirements Schedule 2 of the Works Requirements.</p>																				
	<p>1.8.2.2 Test specimens shall be tested in air under axial tensile loading using tapered grips and a suitable gripping medium.</p>																				
	<p>1.8.2.3 Testing shall be carried out under load control and stress shall be calculated using nominal cross-sectional area.</p>																				
	<p>1.8.2.4 Tests shall be performed for couplers for reinforcing bar diameters 25 millimetres, 32 millimetres, 40 millimetres on BS 4449+A3 grade B500B or grade B500C.</p>																				
	<p>1.8.2.5 The number of load cycles per test shall be performed until failure.</p>																				
	<p>1.8.2.6 The frequency of testing shall be in the range 5 to 10 hertz.</p>																				
	<p>1.8.2.7 The samples of all diameters shall be tested at the following stress ranges (all newtons per square millimetre):</p>																				
	<table border="1"> <thead> <tr> <th>Stress Range</th> <th>Max Stress</th> <th>Min Stress</th> <th>Mean Stress</th> </tr> </thead> <tbody> <tr> <td>400</td> <td>450</td> <td>50</td> <td>250</td> </tr> <tr> <td>300</td> <td>400</td> <td>100</td> <td>250</td> </tr> <tr> <td>200</td> <td>350</td> <td>150</td> <td>250</td> </tr> <tr> <td>160</td> <td>360</td> <td>200</td> <td>280</td> </tr> </tbody> </table>	Stress Range	Max Stress	Min Stress	Mean Stress	400	450	50	250	300	400	100	250	200	350	150	250	160	360	200	280
	Stress Range	Max Stress	Min Stress	Mean Stress																	
400	450	50	250																		
300	400	100	250																		
200	350	150	250																		
160	360	200	280																		
<p>1.8.2.8 The S-N curves shall be presented as straight lines, using a log-log scale of stress versus number of cycles to failure. They shall be based upon standard statistical regression analysis methods and give the 97.5 per cent confidence of survival.</p>																					
<p>1.8.3 Frequency of testing</p>																					
<p>1.8.3.1 3 samples shall be tested for each bar / coupler size and stress range; giving a total number of 12 sets of tests per bar / coupler size.</p>																					

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

Clause No etc	Title and written text
1772 AR	<p>1 Concrete Repairs – General Requirements</p> <p>1.1 Storage of Materials</p> <p>1.1.1 All proprietary materials shall be stored in a dry weatherproof lock up store free from extremes of cold or heat in accordance with the manufacturer’s written instructions. The materials shall not be removed from the store for use until immediately prior to mixing.</p> <p>1.2 Records</p> <p>1.2.1 As repair work proceeds the Contractor shall keep records including date stamped photographs. Records shall be held in accordance with the procedures in the Quality Plan and be available for inspection by the Engineer.</p> <p>1.3 High Pressure Water Jetting</p> <p>1.3.1 High pressure water jetting shall use clean and fresh potable water which complies with the requirements of BS EN 1008. The Contractor shall not add antifreeze agents or any other chemicals.</p>
1773 AR	<p>1 Removal of Concrete in Areas to be Repaired</p> <p>1.1 Requirements for the Removal of Concrete</p> <p>1.1.1 The Contractor shall cut out and remove concrete from areas specifically identified following inspection and testing.</p> <p>1.1.2 Concrete shall be removed from the area until sound concrete is reached. Where reinforcement becomes exposed concrete shall be removed for a minimum distance of 25 millimetres beyond the rear face of the reinforcement. Where corroded reinforcement is identified the area of concrete removed shall be extended to expose 100 millimetres of uncorroded reinforcement in all directions.</p> <p>1.1.3 Before cutting out the Contractor shall determine the position and depth of the reinforcement. The perimeter of the concrete to be removed shall be saw cut perpendicularly to the face of the concrete to a depth of not less than 15 millimetres or to within 10 millimetres of the reinforcement, whichever shall be the lesser.</p> <p>1.1.4 At the upper limits of repairs to be made using repair concrete, sloping cuts may be used to avoid the entrapment of air when the concrete is poured.</p> <p>1.1.5 The saw cut edges shall be abraded by grit blasting or equivalent methods.</p> <p>1.1.6 The concrete shall be removed by the use of suitable hand or mechanical tools or high pressure water jetting. Removal of concrete by water jetting shall be carried out by firms who are registered members of the Association of High Pressure Water Jetting Companies.</p>

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

Clause No etc	Title and written text
1773 AR (continued)	<p>1.1.7 Where concrete is removed by high pressure water jetting a lightweight electric or pneumatic chipping hammer may be used for final trimming of the area broken out.</p> <p>1.1.8 Overbreak of concrete shall be made good using a concrete repair system selected from Clause 1775AR.</p> <p>1.1.9 Reinforcement damaged during concrete removal shall be made good. Existing reinforcement which has corroded or is otherwise damaged shall be removed and additional steel reinforcement shall be lapped or welded onto the existing reinforcement. All such welding shall be in accordance with Clause 1717. All loose reinforcement shall be securely tied with stainless steel tying wire.</p> <p>1.1.10 The Site shall be kept free of debris or standing water arising from the high pressure water jetting activities.</p> <p>1.1.11 On completion of removal of concrete all concrete surfaces and exposed reinforcement which shall be in contact with repair materials shall be prepared in accordance with Clause 1774AR.</p>
1774 AR	<p>1 Surface Preparation</p> <p>1.1 General Requirements</p> <p>1.1.1 Blast cleaning - The Contractor shall ensure that the grade and particle shape of abrasives is adequate to achieve the appropriate standard of cleanliness. Non-metallic abrasives shall not be recycled.</p> <p>1.1.2 Water for cleaning - Only clean cold water which complies with the requirements of BS EN 1008 shall be used for cleaning and rinsing.</p> <p>1.2 Preparation of Surfaces of Reinforcement</p> <p>1.2.1 Standard - Bright steel</p> <p>1.2.1.1 Removal of all detrimental contamination and corrosion products to produce a generally bright appearance overall. The surfaces shall be free of embedded abrasive particles and corrosion products when viewed through a X10 illuminated magnifying glass.</p> <p>1.2.2 Method</p> <p>1.2.2.1 Blast cleaning using dry air / abrasive system, or</p> <p>1.2.2.2 Wet blast cleaning using a low pressure air / water / abrasive system. The equipment shall not allow the air / water pressure to exceed 14 bar and shall incorporate a metering device to allow the abrasive quantity introduced to be adjusted from 0 to 14 bar.</p> <p>1.2.2.3 Within an hour of cleaning the treated reinforcement shall be pressure washed with clean water.</p>

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

Clause No etc	Title and written text
1774 AR (continued)	<p>1.3 Preparation of Surfaces of Concrete</p> <p>1.3.1 Standard</p> <p>1.3.1.1 Concrete surfaces shall be clean and dry and free of cement laitance contaminants and loose friable material. The surface shall be wetted one hour before repair concrete is applied. There shall be no standing water. The surface shall be such that repair concrete shall flow freely into all voids and be in intimate contact with the existing concrete.</p> <p>1.3.2 Method</p> <p>1.3.2.1 High Pressure Water Jet</p> <p>The surface profile after cutting out shall be irregular with aggregate particles projecting above the surrounding concrete matrix.</p> <p>1.3.2.2 Hand or Mechanical Tools</p> <p>All concrete surfaces to receive repair materials exposed by percussive methods using hand or mechanical tools shall be prepared by grit blasting or high pressure water jetting to remove all fractured or "bruised" concrete surfaces to expose sound aggregate particles.</p> <p>1.4 Procedure Trials</p> <p>1.4.1 The Contractor shall remove, cut back and prepare the surface of an area of one square metre of concrete to be repaired as a trial of the methods proposed for carrying out the work and obtain a photographic record for inspection by the Engineer.</p>
1775 AR	<p>1 Concrete Repairs</p> <p>1.1 General</p> <p>1.1.1 Concrete repairs shall be carried out using either normal flow concrete, proprietary repair mortar, high-flow repair concrete, proprietary sprayed concrete, or a proprietary repair system proposed by the Contractor and subject to consent in writing by the Engineer.</p> <p>1.1.1.1 Crack repairs carried out by a resin injection system shall be proposed by the Contractor and subject to consent in writing by the Engineer.</p> <p>1.1.2 Proprietary repair materials and systems shall have an Agrément Board Roads and Bridges Certificate registered with the Department for Transport / Highways Agency.</p> <p>1.1.3 Proprietary repair mortars shall be used for repair areas less than or equal to 1 metre squared or repair depths less than or equal to 30 millimetres deep. Normal flow concrete or high flow concrete or sprayed concrete shall be used for repair areas greater than 1 metre squared or greater than 30 millimetres deep or as otherwise proposed by the Contractor and subject to consent in writing by the Engineer.</p>

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

Clause No etc	Title and written text
1775 AR (continued)	1.2 Repairs Using Normal Flow Concrete
	1.2.1 Repair concrete shall be a designed mix for special structural concrete as defined in Clauses 1701 and 1705 of the Specification.
	1.2.2 Cement content shall be not less than 400 kilograms per cubic metre or more than 550 kilograms per cubic metre.
	1.2.3 Maximum aggregate size shall be 20 millimetres.
	1.2.4 The free water / cement ratio shall not be greater than 0.4.
	1.2.5 The minimum 28 day compressive strength shall be 40 newtons per square millimetre.
	1.2.6 Alkali – silica reaction shall be controlled as specified in Clause 1704.5.
	1.3 Repairs Using Proprietary Repair Mortar
	1.3.1 Pre-batched polymer modified cementitious mortars incorporating a shrinkage reduction agent shall be used.
	1.3.2 Mortars for hand screeding of surfaces to be waterproofed shall be sand/cement mortar containing styrene acrylate or styrene butadiene polymer bonding mixture.
	1.3.3 The free water / cement ratio shall be not greater than 0.4.
	1.3.4 The maximum aggregate grain size in the mortar shall be suitable for the depths of repair required.
	1.3.5 Water required to mix repair mortars shall comply with the requirements of BS EN 1008.
	1.3.6 The cement content shall be not less than 400 kilograms per cubic metre or more than 550 kilograms per cubic metre.
	1.3.7 The maximum total chloride content expressed as % of chloride ion by mass of cement of the materials shall not exceed 0.3%. The total chloride ion content of the materials for repairs to prestressed or heat cured concrete shall not exceed 0.1 per cent of the weight of cement. Calcium chloride or admixtures containing chloride salts shall not be used.
	1.3.8 The minimum 28 day strength of the mortar shall be 40 Newtons per square millimetre. Alkali-silica reaction shall be controlled as specified in Clause 1704.5 of the Specification.
	1.4 Delivery and Storage of Material
	1.4.1 The Contractor shall supply with each batch of the material delivered to the Works certificates furnished by the supplier stating:

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

Clause No etc	Title and written text
1775 AR (continued)	<ul style="list-style-type: none"> a) the polymer used; b) evidence that the chloride contents are less than specified in sub-Clause 1.3.7 above; c) the content of sodium oxide equivalent in the mortar; d) Maximum shelf life; and e) Handling arrangements. <p>1.4.2 The material shall be stored in a dry environment free from extremes of cold and heat and any specific storage requirements of the manufacturers.</p> <p>1.4.3 The materials shall not be removed from the store for use until immediately prior to mixing.</p> <p>1.5 Placing Repair Mortar</p> <p>1.5.1 The repair shall be built up in layers in accordance with the repair mortar manufacturer's written instructions. The surface of each layer except the final layer shall be scored to provide a key for the next layer.</p> <p>1.5.2 The repair mortar shall be suitable for the purpose intended i.e. for soffits or vertical surfaces as appropriate.</p> <p>1.5.3 Repair mortar shall not be applied when the temperature of the surface to be repaired falls below five degrees Celsius.</p> <p>1.5.4 The material shall be incorporated within one hour of mixing or such lesser period as stated in writing by the manufacturer.</p> <p>1.5.5 Repair mortar shall be cured in accordance with sub-Clause 1710.5 and the manufacturer's written instructions. During the curing period the temperatures of the repair mortar shall be maintained at or above five degrees Celsius by artificial means if necessary.</p> <p>1.6 Surface Finish to Repair Mortar</p> <p>1.6.1 Repair mortar shall be float finished to produce a dense smooth uniform surface free from float marks to the specified line and level.</p> <p>1.7 Repairs Using High-Flow Repair Concrete</p> <p>1.7.1 Materials</p> <p>1.7.1.1 Cement shall comply with Clause 1702.</p> <p>1.7.1.2 Cement content shall be not less than 400 kilograms per cubic metre or more than 550 kilograms per cubic metre.</p> <p>1.7.1.3 Alkali-silica reaction shall be controlled as specified in Clause 1704.</p> <p>1.7.1.4 The total chloride ion content of the materials shall not exceed 0.1% of the weight of cement. Any chloride or admixtures containing chloride salts shall not be used.</p>

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

Clause No etc	Title and written text										
<p>1775 AR (continued)</p>	<p>1.7.1.5 Aggregate shall be well graded with the maximum size not exceeding eight millimetres except when pumping is to be employed when the maximum size shall not exceed 6 millimetres and shall comply with sub-Clause 1702.2.</p>										
	<p>1.7.1.6 Proprietary material shall be of such composition and grading that when mixed with water a flowable concrete is produced which shall flow freely into the confined spaces to be filled and shall not be prone to segregation bleeding or cracking in either the plastic or hardened state.</p>										
	<p>1.7.1.7 Combinations and additions may comprise pulverised fuel ash ground granulated blast furnace slag microsilica plasticisers aggregate suspension agents and shrinkage reduction agents. Calcium chloride or admixtures containing chloride salts shall not be used.</p>										
	<p>1.7.1.8 Microsilica content shall not exceed five per cent of the mass of the cement. Microsilica shall comply with Table 17/70.</p>										
	<p>TABLE 17/70 MICROSILICA CONTENT</p> <table border="1"> <thead> <tr> <th>Item</th> <th>Limit (by mass)</th> </tr> </thead> <tbody> <tr> <td>Silica content (SiO₂)</td> <td>minimum 85%</td> </tr> <tr> <td>Alkali content (NaO₂)</td> <td>maximum 2%</td> </tr> <tr> <td>Carbon</td> <td>maximum 2%</td> </tr> <tr> <td>Proportion passing 50 micron sieve</td> <td>minimum 99%</td> </tr> </tbody> </table>	Item	Limit (by mass)	Silica content (SiO ₂)	minimum 85%	Alkali content (NaO ₂)	maximum 2%	Carbon	maximum 2%	Proportion passing 50 micron sieve	minimum 99%
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	Silica content (SiO ₂)	minimum 85%									
	Alkali content (NaO ₂)	maximum 2%									
	Carbon	maximum 2%									
	Proportion passing 50 micron sieve	minimum 99%									
<p>1.7.1.9 Water shall comply with the requirements of BS EN 1008.</p>											
<p>1.7.1.10 The specified minimum 28 day strength of the concrete shall be not less than 40 Newtons per square millimetre. The maximum free water / cement ratio shall not exceed 0.4.</p>											
<p>1.7.2 Delivery and Storage of Material</p>											
<p>1.7.2.1 Records shall be kept of each batch of material delivered to the site of the Works in accordance with the procedures in the Quality Plan and shall include:</p> <ul style="list-style-type: none"> a) formulator’s name and address; b) formulator’s agent’s name and address where applicable; c) material identification; d) batch reference number size of batch and number of containers in the delivery; e) date of manufacture; f) evidence that the chloride contents are less than specified in sub-Clause 7(iv) above; g) details of the significant rock components contained in the aggregates; 											

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

Clause No etc	Title and written text
1775 AR (continued)	<ul style="list-style-type: none"> h) cement content; i) combinations and additions used; and j) The equivalent sodium oxide content. <p>1.7.2.2 Containers shall be damp proof and readily emptied of their contents</p> <p>1.7.2.3 Containers shall be marked with the following information:</p> <ul style="list-style-type: none"> a) material identification; b) batch reference number; c) formulator’s name; d) net weight and lifting arrangements and storage specific requirements; and e) Any warnings or precautions concerning the contents. <p>1.7.2.4 The material shall be stored in a dry environment free from extremes of cold and heat.</p> <p>1.7.2.5 Material shall not be older than three months or a lesser period specified by the formulator when used in the Works.</p> <p>1.7.2.6 The materials shall not be removed from the store for use in the Works until immediately prior to mixing.</p> <p>1.7.3 Formwork Site Mixing Placing and Curing</p> <p>1.7.3.1 Formwork shall be Class F3 to sub-Clause 1708.4 with the perimeter of the repair well sealed to prevent grout loss. Release agents shall be compatible with proposed surface treatments.</p> <p>1.7.3.2 Mixing in a forced action paddle mixer and placing shall be carried out strictly in accordance with the formulator’s written instructions together with the following additional conditions:</p> <ul style="list-style-type: none"> a) The free water cement ratio shall not exceed 0.4. The water content shall be determined during approval tests and maintained for batch tests works tests and in the Works within ± 2 per cent of the agreed content. b) No extra water shall be added after the original mixing. c) The material shall be incorporated in the Works within 20 minutes of completion of mixing or such lesser period as stated by the formulator. The concrete shall be continuously agitated after the mixing and before placing. d) The material shall not be mixed or placed in the Works at ambient temperatures lower than five degrees Celsius or where the surface temperature of the concrete in the repair void is less than five degrees Celsius.

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

ADDITIONAL CLAUSES, TABLES AND FIGURES (Continued)

Clause No etc	Title and written text
1775 AR (continued)	e) The concrete when placed shall have a temperature of not less than five degrees Celsius and not more than 20 degrees Celsius.
	f) The surface temperature of the concrete shall be maintained at not less than five degrees Celsius until the concrete reaches a strength of 10 newtons per square millimetre as determined by tests on cubes cured under similar conditions to the structural concrete. Heat shall not be applied direct to any concrete.
	g) Repair concrete shall not be placed against other concrete which has been in position for more than 30 minutes unless a construction joint is formed in accordance with Clause 1710. In addition the joint surface shall be saturated for a minimum of 2 hours before concrete is placed against it. When repair concrete has been in place for four hours no further concrete shall be placed against it for a further 20 hours.
	h) Vibration shall not be used. The side shutters shall be tapped lightly with a hammer to expel surface air voids.
	1.7.3.3 Immediately after placing and for 14 days thereafter concrete shall be protected against harmful effects of weather including rain, rapid temperature changes and frost and from drying out. Impregnation may be carried out in accordance with the manufacturer's written instructions and not before 14 days as described in BD 43. Curing membranes shall not be used.
	1.7.3.4 When the mix proportions have been determined no variations shall be made in the manufacture supply mix proportions or method of mixing of the material.
	1.7.4 Approval Tests
	1.7.4.1 Before Works commence all properties of the proposed high-flow repair concrete shall be demonstrated by the Contractor and the formulator's representative by carrying out the tests specified below in an UKAS accredited laboratory. Records shall be maintained of all tests in accordance with the procedures in the Quality Plan.
	1.7.4.2 The composition of the high flow concrete including the source of water the mix proportions and the method of mixing shall be the same as that proposed for use in the Works. The composition shall not be varied throughout the course of the tests and the material shall be obtained from the same batch.
	1.7.4.3 The tests fall into two categories: flowability and compressive strength.

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

Clause No etc	Title and written text
1775 AR (continued)	<p>1.7.4.4 The flowability tests shall demonstrate:</p> <ul style="list-style-type: none"> a) flow characteristics in a trough at five degrees Celsius and 20 degrees Celsius as specified in Note 1 below; and b) flow characteristics in a simulated soffit repair at five degrees Celsius and 20 degrees Celsius as specified in Note 2 below. <p>Note 1: The flow characteristics of the concrete in a trough shall be assessed. For each test the concrete and trough shall be at the specified temperature. The funnel of the apparatus shall be fitted with a rubber bung and charged with 6 litres of concrete. On release of the bung the concrete shall flow along the trough and the length of the flow along the trough shall be measured. A test shall consist of three readings the flow requirements shall be deemed to be satisfied if none of the readings is below 750 millimetres in 30 seconds without signs of segregation or bleeding.</p> <p>Note 2: The flow characteristics of the concrete in a simulated soffit repair shall be tested in accordance with BD27. For each test the concrete and apparatus shall be at the specified temperature. The concrete shall be poured in one operation into the supply tube until the level of the concrete has reached 100 millimetres above the underside of the top plate. After the concrete has set the specimen shall be removed from the apparatus and sawn into two parts and the sawn concrete surfaces shall be examined. The concrete shall be homogeneous free from excessive air holes voids segregation and other defects and shall completely fill the simulated repair.</p> <p>1.7.5 Compressive Strength Tests</p> <p>1.7.5.1 Compressive strength tests shall be carried out to determine the compressive strength of the concrete at five degrees Celsius and 20 degrees Celsius. These shall conform to the requirements in BS 8500-2:2015 + A1:2016.</p> <p>1.7.5.2 Test cubes shall be made in 100 millimetres metal moulds to BS EN 12390-1:2012. The moulds shall be carefully filled by pouring concrete through a funnel to produce void free specimens. There shall be no compaction. The cubes shall be cured and tested in accordance with BS EN 12390-2:2012.</p> <p>1.7.5.3 The minimum compressive strength shall be established using a set of three cubes. The requirement shall be satisfied if none of the compressive strengths obtained is lower than the specified value and the difference between the highest and lowest values is not more than 20% of the average. Identity testing where required shall be carried out in accordance with Clause 1707.</p>

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

Clause No etc	Title and written text
1775 AR (continued)	1.7.6 Batch Acceptance Test
	1.7.6.1 Each batch of material delivered to the Sites shall be tested as follows: a) the material shall be taken at random from one or more containers from the same batch; b) flow through tests shall be carried out as specified in Note 1 of sub-Clause 1.7.4.4 above at 20 degrees Celsius; and c) Compressive strength tests shall be carried out as specified in sub-Clause 1.7.5 above at 20 degrees Celsius.
	1.7.7 Site Tests
	1.7.7.1 Site tests shall be carried out to monitor: a) flowability; and b) compressive strength.
	1.7.7.2 The flowability of a sample of fresh concrete shall be determined in a trough as specified in sub-Clause 1.7.4.4 Note 1.
	1.7.7.3 The gain in strength of the repair concrete shall be monitored by testing cubes cured alongside the repaired areas at ambient temperature.
	1.7.7.4 For each days production of repair concrete six 100 millimetres cubes shall be made in accordance with sub-Clause 1.7.5 above. The cubes shall be cured for 24 hours in the moulds with the top surfaces covered by polythene sheets. After 24 hours the cubes shall be stripped and placed in polythene bags which shall be sealed. The cubes shall continue to be stored alongside the repaired areas throughout the curing period until required for testing. The cubes shall be crushed at times determined by the Contractor but at least two cubes shall be retained to be tested at 28 days.
	1.8 Repairs Using Proprietary Sprayed Concrete
	1.8.1 Materials
	1.8.1.1 The proprietary material shall be pre-weighed and pre-mixed at a location off the site of the Works.
	1.8.1.2 Cement shall comply with Clause 1702.
	1.8.1.3 Alkali-silica reaction shall be controlled as specified in Clause 1704.
	1.8.1.4 The total chloride ion content of the materials shall not exceed 0.1% of the weight of cement. Any chloride or admixtures containing chloride salts as defined by sub-Clause 1702.2 shall not be used.
	1.8.1.5 Aggregate shall be well graded with the maximum size not exceeding 3 millimetres and shall comply with sub-Clause 1702.2.

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

ADDITIONAL CLAUSES, TABLES AND FIGURES (Continued)

Clause No etc	Title and written text																
1775 AR (continued)	1.8.1.6 Combinations and additions may comprise pulverised fuel ash ground granulated blast furnace slag microsilica and plasticisers. Calcium chloride or admixtures containing chloride salts and expansion agents shall not be used.																
	1.8.1.7 The maximum sulphate content shall comply with sub-Clause 1704.6.																
	1.8.1.8 Material shall be capable of being applied to a thickness of 100 millimetres without the requirement for additional mesh reinforcement or fibres. Once placed it shall be capable of being profiled and trowel finished (to the equivalent of formed Class F3) without detrimental effects.																
	1.8.2 Performance Characteristics																
	1.8.2.1 The proprietary material shall have performance characteristics as detailed in Table 17/71 which are to be verified by an independent testing authority.																
	TABLE 17/71: Performance Characteristics																
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">TEST</th> <th style="text-align: left;">PERFORMANCE</th> </tr> </thead> <tbody> <tr> <td>Adhesion to concrete substrate</td> <td>greater than 2.0 Newtons per square millimetre</td> </tr> <tr> <td>Characteristic strength of cores (28 days)</td> <td>40 Newtons per square millimetre</td> </tr> <tr> <td>Tensile splitting strength (28 days)</td> <td>greater than 2.4 Newtons per square millimetre</td> </tr> <tr> <td>Static Modulus of elasticity</td> <td>27000 ± 3000 Newtons per square millimetre</td> </tr> <tr> <td>Shrinkage</td> <td>less than 0.002 per cent</td> </tr> <tr> <td>Coefficient of Thermal Expansion</td> <td>8 to 12 x 10⁻⁶/ degrees Celsius</td> </tr> <tr> <td>Coefficient of Chloride Ion Diffusion</td> <td>to be agreed with the Engineer</td> </tr> </tbody> </table>	TEST	PERFORMANCE	Adhesion to concrete substrate	greater than 2.0 Newtons per square millimetre	Characteristic strength of cores (28 days)	40 Newtons per square millimetre	Tensile splitting strength (28 days)	greater than 2.4 Newtons per square millimetre	Static Modulus of elasticity	27000 ± 3000 Newtons per square millimetre	Shrinkage	less than 0.002 per cent	Coefficient of Thermal Expansion	8 to 12 x 10 ⁻⁶ / degrees Celsius	Coefficient of Chloride Ion Diffusion	to be agreed with the Engineer
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Coefficient of Chloride Ion Diffusion	to be agreed with the Engineer																
1.8.3 Delivery and Storage of Material																	
1.8.3.1 Records shall be kept of each batch of material delivered to the Site and shall include:																	
a) formulator's name and address;																	
b) formulator's agent's name and address where applicable;																	
c) batch reference number size of batch and number of containers in the delivery;																	
d) date of manufacture;																	

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

ADDITIONAL CLAUSES, TABLES AND FIGURES (Continued)

Clause No etc	Title and written text
1775 AR (continued)	<ul style="list-style-type: none"> e) evidence that the chloride contents are less than specified in sub-Clause 1.8.1.4 above; f) details of the significant rock components contained in the aggregates; g) cement content; h) additives used; and i) the sodium oxide equivalent content. <p>1.8.3.2 Containers shall be damp proof and readily emptied of their contents.</p> <p>1.8.3.3 Containers shall be marked with the following information:</p> <ul style="list-style-type: none"> a) material identification; b) batch reference number; c) formulator's name; d) net weight; and e) any warnings or precautions concerning the contents. <p>1.8.3.4 The material shall be stored in a dry environment free from extremes of cold and heat.</p> <p>1.8.3.5 Material shall not be older than three months or lesser period specified by the formulator when incorporated in the Works.</p> <p>1.8.3.6 The materials shall not be removed from the store for use in the Works until immediately prior to mixing.</p> <p>1.8.4 Trial Mixes</p> <p>1.8.4.1 Practical tests shall be carried out on the Site by constructing test panels to confirm the suitability of the mix for the Works. In these tests the type of Constructional Plant used for mixing and placing and the finished face to the panel shall be similar in all respects to those intended for use in the Works.</p> <p>1.8.5 Procedure Trials</p> <p>1.8.5.1 Before work commences on the site of the Works procedure trials shall be carried out to pre-qualify the nozzle men proposed for use on the Works. Nozzle men who have not been pre-qualified shall not be used.</p> <p>1.8.5.2 Each nozzle man shall carry out procedure trial panels. The procedure trial panels shall have minimum dimensions of 750 millimetres x 750 millimetres x 100 millimetres deep and shall be made of plywood with 45 degrees sloped edge to permit rebound to escape.</p>

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

ADDITIONAL CLAUSES, TABLES AND FIGURES (Continued)

Clause No etc	Title and written text
1775 AR (continued)	1.8.5.3 One half of each procedure trial panel shall contain reinforcement representative of the size and spacing of the work. The second half of the procedure trial panel shall contain no reinforcement (with the exception of fibre reinforcement) to allow for the extraction of cores for testing in accordance with sub Clause 1.17.2 of this Clause.
	1.8.5.4 One procedure trial panel shall be undertaken using each proposed mixture proportion at each proposed orientation i.e. horizontal overhead and the like.
	1.8.5.5 A minimum of three 100 millimetre diameter cores shall be extracted from the location of intersecting reinforcing steel to check the adequacy of consolidation of the sprayed concrete around the reinforcement.
	1.8.5.6 No sprayed concrete shall be carried out on the Works until the procedure trial testing requirements have been met.
	1.9 Surface Preparation for Sprayed Concrete
	1.9.1 Sound surfaces which are to receive sprayed concrete shall be thoroughly cleaned and roughened by grit blasting or high pressure water jetting.
	1.9.2 All concrete surfaces to receive sprayed concrete, exposed by percussive methods using hand or mechanical tools, shall be prepared by low vibration processes, such as grit blasting or high pressure water jetting, to remove all fractured aggregate particles and expose a sound substrate. Grit blasted areas shall have sprayed concrete applied within 48 hours or shall be reblasted.
	1.9.3 Immediately prior to spray concreting all the surfaces to be sprayed shall be thoroughly cleaned and wetted with a strong blast of oil-free air and water to comply with the requirements of BS EN 1008.
	1.10 Outline Definition
	1.10.1 The outline of the finished sprayed concrete shall be defined by screed boards guide wires or other means proposed by the Contractor and consented to in writing by the Engineer.
	1.10.2 Guide wires shall be installed tight and true to line and in such a manner that they may be easily tightened.
	1.11 Mixing Sprayed Concrete
	1.11.1 Sprayed concrete shall be mixed in a batch type mixer capable of delivering water direct to the nozzle. The delivery equipment shall be capable of delivering a continuous even stream of uniformly mixed material to the nozzle. Water supply at the nozzle shall be maintained at a uniform pressure sufficient to ensure adequate hydration at all times. The delivery equipment and nozzle shall be thoroughly cleaned and inspected at the end of each day and parts replaced as required.

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

Clause No etc	Title and written text
1775 AR (continued)	1.11.2 The temperature of water and cement when added to the mix shall not exceed 60 degrees Celsius and 65 degrees Celsius respectively.
	1.11.3 Water used in sprayed concrete shall comply with the requirements of BS EN 1008.
	1.12 Reinforcement
	1.12.1 Welded wire mesh fabric reinforcement shall be fixed to prepared surfaces and shall be carefully bent to follow the shape of the members and held in position by anchors spaced at not less than two per square metre. The fabric shall be spaced at not less than 25 millimetres from the finished surface of the concrete.
	1.13 Transport and Placing Sprayed Concrete
	1.13.1 No concrete shall be sprayed in air temperatures less than five degrees Celsius or onto a surface temperature less than five degrees Celsius. Surfaces shall be free from standing water.
	1.13.2 Sprayed concrete shall emerge from the nozzle in a steady uninterrupted flow and an uninterrupted supply of compressed air shall be provided to maintain adequate nozzle velocity. Should the flow become intermittent the nozzle shall be directed away from the work until the flow again becomes uniform.
	1.13.3 Sprayed concrete shall be applied under sufficient pressure so as to give a dense and homogeneous covering to the surface in one or more layers of a thickness compatible with the mix Design constituents' position of reinforcement and plane of application to ensure the placed concrete does not slump or sag.
	1.13.4 Adequate precautions shall be taken to ensure that sprayed concrete rebound is not incorporated in the finished work and that any previously deposited hardened rebound which may prevent a proper bond or encasement is removed from reinforcement.
	1.13.5 Adequate protection shall be given to the nozzle and application surface during high winds.
	1.13.6 The final coat shall be hand screeded to a Class U3 finish in accordance with sub-Clause 1708.4.
	1.14 Fibre Reinforced Sprayed Concrete
	1.14.1 The weight of steel and / or composite fibres shall not exceed five per cent by weight of the combined weight of cement and aggregate. Fibres shall be added to the mix in such a manner that the fibres are evenly distributed and not bent. Procedure trials shall be undertaken to demonstrate that the proposed methods can achieve the requirements of this sub-Clause.
	1.14.2 Unless otherwise stated elsewhere in the Contract a final 15 millimetres thick coat of unreinforced sprayed concrete shall be applied over the whole exposed surface to cover exposed fibres.
	1.14.3 The gun and nozzle shall be electrically earthed.

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

Clause No etc	Title and written text
1775 AR (continued)	1.15 Construction Joints
	1.15.1 Construction joints in sprayed concrete shall be tapered at approximately 30 degrees or cut back square to the reinforcement and then tapered at 30 degrees. The construction joint shall be thoroughly cleaned and all laitance and loose material removed and the surface wetted using a strong blast of air and water prior to the placement of adjacent sprayed concrete.
	1.16 Curing of Sprayed Concrete
	1.16.1 Freshly sprayed concrete shall be protected from rain or water until the surface is sufficiently hard to resist damage.
	1.16.2 Immediately after placing and for 14 days thereafter sprayed concrete shall be protected against harmful effects of weather including rain rapid temperature changes and frost and from drying out. Curing membranes shall not be used.
	1.16.3 Impregnation in accordance with BD 43 may be carried out after 14 days.
	1.17 Production Testing of Sprayed Concrete
	1.17.1 One production test panel shall be carried out for each nozzle orientation for each day of sprayed concrete production or every five cubic metres of sprayed concrete whichever is the lesser.
	1.17.2 Sprayed concrete production test panels shall be made with dimensions 450 millimetres x 450 millimetres x 100 millimetres thick with 45 degrees sloped edge forms to permit escape of rebound. Production test panels shall contain no reinforcement (other than fibre reinforcement). The production test panels shall be marked cured cored and tested in compression in accordance with the appropriate parts of BS EN 12350 and BS EN 12390. They shall be tested in a UKAS accredited laboratory. Records shall be maintained of all tests and stored at a suitable location.
	1.17.3 Routine tests shall be carried out by the Contractor on the finished sprayed concrete. These shall consist of taking 25 millimetres or 100 millimetres dia. cores from the finished sprayed concrete and testing them in the same manner as cores taken from the test panels or by carrying out non-destructive tests by means of a 'Schmidt' hammer or 'Windsor Probe' to determine compressive strength and testing for bond by the use of a hand hammer.
	1.18 Resin Injection Repairs
	1.18.1 Preparation of Surfaces Around Cracks

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

Clause No etc	Title and written text
1775 AR (continued)	<p>1.18.1.1 The concrete surface at least 50 millimetres either side of the crack shall be dry blast cleaned to a sound surface free from dirt moss salt staining and loose concrete. The full extent of the crack shall be found and the cleaned area shall extend 50 millimetres beyond the end of the crack or until the crack becomes too narrow to warrant resin injection.</p> <p>1.18.1.2 Where algae or other bacterial growth emanates from the crack it shall be removed by scrubbing with bactericide and rinsing with clean water. Health and safety precautions appropriate to the bactericide cleaning agent used shall be adopted including those recommended in writing by the manufacturers. Measures shall be taken to ensure that any adjacent water course is not contaminated and that run-off is collected and disposed of in a safe manner.</p> <p>1.18.2 Moisture in Cracks</p> <p>1.18.2.1 Where the moisture level in the crack to be resin injected is unacceptably high the crack shall be blown through with dry hot air starting at the top of the crack. A temporary crack sealant shall be applied immediately after blowing through and the resin shall be injected into the crack immediately the necessary preparations are complete.</p> <p>1.18.2.2 If for whatever reason the crack becomes damp before it is resin injected no further work shall be permitted until the temporary crack sealant is removed and the crack blown through again with dry hot air.</p> <p>1.18.2.3 The temperature of the hot air shall be sufficient to dry the full depth of the crack and shall not exceed the maximum temperature specified by the equipment manufacturer.</p> <p>1.18.3 Resin Injection</p> <p>1.18.3.1 The resin to be used shall be either polyester or epoxy based and shall be mixed and injected in accordance with the manufacturer's written specification. Resin shall not be injected when the air temperature or the surface temperature concrete to be repaired is less than five degrees Celsius.</p> <p>1.18.3.2 The spacing of the nozzle positions shall be equal to the depth of the crack and shall not in any case be less than 250 millimetres.</p> <p>1.18.3.3 Injecting shall start at the bottom of the crack and work shall proceed upwards in a continuous operation throughout. Resin shall be seen extruding from the crack at the next nozzle position before the current nozzle location is locked off.</p> <p>1.18.3.4 The injected crack shall be left undisturbed for a period of at least 24 hours to allow the resin to harden.</p> <p>1.18.3.5 When the resins are sufficiently cured the cracks and any resin spillages shall be cleaned from the face of the concrete.</p>

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

ADDITIONAL CLAUSES, TABLES AND FIGURES (Continued)

Clause No etc	Title and written text
1775 AR (continued)	<p>1.18.4 Proving Tests</p> <p>1.18.4.1 When the resin has set, two 20 millimetres diameter proving cores shall be taken to the full depth of the crack. These shall be filled with either the resin used for injecting or with a suitable filler of a compatible thixotropic resin.</p> <p>1.19 Sealing of Cracks in Concrete Bridge Decks</p> <p>1.19.1 The preparation of surfaces around cracks and the measures to deal with algae or other growth in cracks shall be as described in sub-Clause 1.18 above.</p> <p>1.19.2 Application of Sealer</p> <p>1.19.2.1 The sealing resin shall be a low viscosity polyester epoxy or acrylic polymer which shall be compatible with any proposed waterproofing system.</p> <p>1.19.2.2 The material shall be applied by pouring through a fine nozzle directly into the crack or into pre-formed dams.</p> <p>1.19.2.3 The injected crack shall be left undisturbed for a period of at least 24 hours to allow the resin to harden.</p> <p>1.19.2.4 When the resins are sufficiently cured the cracks and resin spillages shall be cleaned to the face of the concrete.</p>
1776 AR	<p>1 Foamed Concrete Fill to Structures and Backfilling to Drainage Trenches</p> <p>1.1 Foamed concrete fill to arches or bridge decks shall be of density 1400 – 1600 kilograms per cubic metre. Minimum cement content shall be 350 kilograms per cubic metre. The maximum free water cement ratio shall be 0.4. The minimum compressive strength shall be eight Newtons per square millimetre.</p> <p>1.2 Foamed concrete fill to drainage trenches shall comply with sub-Clause 1 above.</p>

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

Clause No etc	Title and written text
1777 AR	<p>1 Installation of Resin Anchored Reinforcement</p> <p>1.1 General</p> <p>1.1.1 Installation of resin anchored reinforcement into existing reinforced concrete shall utilise proprietary products, materials and methods suitable for highway works and for the conditions set out below.</p> <p>1.1.2 The Contractor shall consult and comply with the requirements of Transport Scotland with regard to all resin anchor systems. The Contractor shall provide the Engineer with completed Consultation Certificates in accordance with Section 8 of the Employer's Requirements in respect of this requirement.</p> <p>1.1.3 The resin anchor system proposed shall be checked against the anchorage design to ensure that it is capable of resisting the design loads by means of testing. For the purposes of testing the test loading shall be the load calculated allowing for a 30 per cent increase above ULS design load and adjusted to allow group effects to be ignored.</p> <p>1.1.4 Site testing to verify the above loads is required and is specified in sub-Clause 1.2 below.</p> <p>1.1.5 Materials</p> <p>1.1.5.1 Resin adhesive grout for anchoring reinforcement shall be polyester or epoxy based and non-expansive. Grout shall be stable over the temperature range of -20 degrees Celsius to +40 degrees Celsius and be resistant to mechanical and chemical degradation under normal service conditions.</p> <p>1.1.6 Workmanship</p> <p>1.1.6.1 Installation shall strictly follow the methods and working procedures specified by the proprietary product manufacturer. Adequate preparations shall be made to work involving resin grouting to avoid inconsistent results.</p> <p>1.1.6.2 Locations for the drilling of holes shall be determined by the design of the Works. The design of the Works shall ensure that locations can be adjusted within tolerances specified in the design of the Works to avoid existing reinforcement. It shall be ensured that holes do not clash with existing buried reinforcement by using non-destructive test methods (e.g. cover meter) prior to commencement of drilling.</p> <p>1.1.6.3 Before and after drilling holes it shall be ensured that the existing concrete is sound, and that any significant defects such as loose fractures and voids are repaired. Any defective holes shall be repaired and not used. Alternative holes shall be re-drilled in new locations without affecting the design of the Works.</p> <p>1.1.6.4 Holes shall be formed using rotary percussion drilling. The diameter and minimum depth shall be as required by the design of the Works.</p>

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

Clause No etc	Title and written text
1777 AR (continued)	<p>1.1.6.5 After drilling, holes shall be free of all contaminants including dust and water before injecting grout. It shall be ensured that grout fills the hole entirely without air voids following insertion of the reinforcement, and that the reinforcement is fully coated by the grout. Excess grout shall be removed immediately.</p> <p>1.1.6.6 Reinforcement shall not be inserted or grout used after the gel time, and the completed installation shall not be disturbed until the grout is fully cured. Gel times and curing times as stated by the product manufacturer will depend on concrete temperature, therefore temperature shall be recorded during installation.</p> <p>1.2 Testing of Resin Anchored Reinforcement</p> <p>1.2.1 The adequacy of resin fixed reinforcement shall be verified by site testing. For each combination of bar size and embedment depth, 1 No. test shall be carried out for every 20 bars, subject to a minimum of 3 No. tests.</p> <p>1.2.2 A test rig equivalent to that shown in BS 5080 Part 1: 1993, Figure 3 shall be used. The test rig shall be capable of testing the anchor bars in situ.</p> <p>1.2.3 If, due to the shape code or spacings of the bars to be resin grouted into the deck, it is not possible to apply the test rig to a bar, the following procedure should be followed: A straight bar of the same type, diameter and embedment depth shall be tested as close to the scheduled test bar as is practical.</p> <p>1.2.4 The bars shall be capable of resisting the test loads given in sub-Clause 1.1.3 above.</p> <p>1.2.5 A force sufficient to take up any slack in the apparatus, attachment and seating should be initially applied in accordance with BS 5080 Part 1: 1993. Readings taken at this stage will constitute the base from which subsequent relative movement shall be measured.</p> <p>1.2.6 Each tested anchor shall be loaded incrementally in tension in accordance with BS 5080 Part 1: 1993 up to the test load.</p> <p>1.2.7 Incremental loads shall be held for not less than half a minute and the test load for not less than five minutes.</p> <p>1.2.8 Readings shall be taken immediately after applying load and at the ends of the time intervals stated above.</p> <p>1.2.9 There should be no movement of the anchorage during the test and total movement should be no greater than the load / extension characteristics of the reinforcement bar being tested and the testing apparatus being used.</p> <p>1.2.10 Any evidence of slip during loading up to the test load, as demonstrated by a significant change in the slope of the load / extension curve, shall constitute a failure.</p> <p>1.2.11 Testing records shall be retained at the end of each testing day.</p>

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

ADDITIONAL CLAUSES, TABLES AND FIGURES (Continued)

Clause No etc	Title and written text
1778 AR	<p>1 Early Thermal cracking</p>
	<p>1.1 The Contractor shall develop suitable concrete mix designs and safe curing methods to ensure that any cracking due to early thermal effects does not exceed appropriate permissible crack widths in BS EN 1992-2 and to ensure compliance with the following criteria.</p> <p>a) Peak temperature: 65 degrees Celsius</p> <p>b) Maximum temperature differential within a single pour: in accordance with Table 7.1 of CIRIA C660 for internal restraint, $R = 0.42$, for the appropriate coarse aggregate type. If limestone coarse aggregate is to be used, the assumed value for coefficient of linear thermal expansion shall be demonstrated by measurements on concrete specimens.</p> <p>i) The demonstration shall include the results of early thermal cracking trial pours, as scheduled in Appendix 1/5 of the specification. The temperature rise recorded in the trial pours may be used to establish the temperature rise for the concrete and to enable more reliable predictions of temperature rise using CIRIA C660.</p> <p>ii) The relationship established from the trial pours between temperature and strain change may be used to determine the coefficient of thermal expansion and contraction as the temperature in the block rises and falls. This performance data can then be used to demonstrate compliance with the Agreement requirements to restrict early thermal cracking.</p>
	<p>2 Early Thermal Cracking Trial Pours</p>
	<p>2.1 Early thermal cracking trial pours shall be performed in advance of construction for each proposed concrete mix subject to these considerations. Further testing shall be performed in advance of any changes to materials or mix composition that might have a significant effect on these properties including, but not limited to, changes in type, source or content of cement, ground granulated blastfurnace cement or fly ash.</p>
	<p>2.2 Insulated 'hot-blocks' (one cubic metre) shall be used to simulate the temperature conditions in large sections. The base, sides and top should be contained in 18 millimetre plywood with 50 millimetres of polystyrene insulation. The temperature in the block should be measured using thermocouples (at the centre and at the surface). 100 millimetres cores shall be taken at 28 days for testing compressive strength and checking for internal cracks.</p>

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

ADDITIONAL CLAUSES, TABLES AND FIGURES (Continued)

Clause No etc	Title and written text
1778 AR (continued)	<p>2.3 The test blocks should be instrumented using thermocouples and Vibrating Wire strain gauges (VWG) to provide a measure of the temperature rise and the associated strain.</p> <p>2.4 The following test data shall be recorded on the test certificate:</p> <ul style="list-style-type: none"> a) Name and address of the test laboratory; b) Date and identification number of the test report; c) Name and address of the organisation responsible for the testing; d) Name and address of the concrete supplier; e) Date of arrival of the concrete; f) Composition of the concrete tested, including sources of materials; g) Purpose of the test; h) Test method; i) Any deviation from the test method; j) Name of the person who performed the test; k) Date of the test; l) Test results, including: <ul style="list-style-type: none"> i) Compressive strength of cores taken and tested in accordance with BS EN 12504-1 and BS EN 13791 at an age of 28 days; ii) The temperature rise; and m) Date and signature.
2171 AR	<p>1. Bearing Replacement</p> <p>1.1 Bearings to new structures</p> <p>1.1.1 Bridges supported on bearings shall be designed to allow the inspection, maintenance, removal and replacement of such bearings without the need to close the bridge to normal traffic. Under such circumstances, only traffic loads due to Load Model 1 and Load Model 2 shall be considered. Other traffic loads shall not apply, i.e., Load Model 3 (Special Vehicles) and Fatigue Load Models need not be considered.</p> <p>1.1.2 Replacement of bearings by jacking shall allow for the effect of the deck being raised by 10 millimetres, or other specified value appropriate to the particular bearing in accordance with the manufacturer's requirements, to facilitate removal and replacement of bearings.</p>

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

ADDITIONAL CLAUSES, TABLES AND FIGURES (Continued)

Clause No etc	Title and written text
2171 AR (continued)	1.1.3 Jacking points shall be designed to accommodate the jacking loads including any fixed / sliding articulation requirements to ensure the overall stability of the structure during bearing replacement operations.
	1.1.4 The effects due to jacking of a Structure for bearing replacement shall be considered in combination with permanent and variable actions as follows: <ul style="list-style-type: none"> a. ultimate limit state: application of Equation 6.10 of BS EN 1990+A1; and b. serviceability limit state: as a frequent load combination as defined in Clause 6.5 of BS EN 1990+A1.
	1.1.5 The location of temporary jacking points and any restrictions on the positioning of jacks, e.g. in relation to jacking stiffeners in steel web plates, and safe working loads assumed in the design of the temporary jacking system shall be clearly identified on the drawings.
	1.2 Bearings to existing structures
	1.2.1 The design of replacement bearings shall allow the inspection, maintenance, removal and replacement of such replacement bearings without the need to close the bridge to normal traffic.
	1.2.2 Replacement of bearings to be undertaken by jacking shall allow for the effect of the deck being raised by 10 millimetres, or other value appropriate to the particular existing and replacement bearings in accordance with the manufacturer's requirements, to facilitate removal and replacement of the bearings.
	1.2.3 The deck shall be jacked from suitable jacking points which shall accommodate the jacking loads including any fixed / sliding articulation requirements to ensure the overall stability of the structure during bearing replacement operations. Where necessary, the existing deck shall be modified and/or strengthened to accommodate the jacking points to be used in the replacement of the bearings.
	1.2.4 Replacement bearings shall be designed for the load effects due to Load Models LM1, LM2 and LM3 (Special Vehicles).
	1.2.5 The location of temporary jacking points and any restrictions on the positioning of jacks, e.g. in relation to jacking stiffeners in steel web plates, and safe working loads assumed in the design of the temporary jacking system shall be clearly identified on the drawings.

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

Clause No etc	Title and written text
3000 AR	Landscape Operations - Planting and Landscape Maintenance
3001 AR	<p>General Conditions</p> <p>(i) All landscape preparation, planting and seeding work shall be completed at the earliest practical opportunity to ensure early establishment.</p> <p>(ii) Landscape Maintenance</p> <p>i. Landscape Maintenance shall cover a period of 156 weeks from the issue of the Certificate of Completion.</p> <p>(iii) Special Requirements</p> <p>i. The Contractor shall comply with the requirements of Environmental Criteria given in Section 4.4 of the Employers Requirements and any other requirements detailed in the Contract Documents.</p> <p>ii. The Contractor shall make due allowance for undertaking landscape operations whilst the roads are in use.</p> <p>(iv) Temporary Site Nursery and Accommodation</p> <p>i. The Contractor shall make all arrangements for the delivery or use of temporary or permanent buildings as required, in order to establish a temporary site nursery and to carry out the landscape Works, with the prior acknowledgement of the Overseeing Organisation.</p> <p>(v) Standard of Work</p> <p>i. All Works shall be carried out according to the recommendations of BS 4428: 1989 'General Landscape Operations'.</p> <p>(vi) Cleansing of Site Area</p> <p>From the date of entry to the Land Made Available by the Employer for the Works until the end of the Period of Establishment Maintenance, the Contractor shall be responsible for the removal of all types of litter, debris and rubbish from the Site as follows:</p> <ol style="list-style-type: none"> 1 provision shall be made for removing all arisings and waste resulting from the Works at the end of each day's work, and on completion, the Site shall be left in a clean and tidy condition; 2 all paved and hard areas shall be kept clean and free from contamination with soil, arisings, plants and planting materials which shall be cleared after each day's work; 3 provision shall be made for the reinstatement of all tracks, grass and agricultural areas used for access as part of the Works.

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

Clause No etc	Title and written text
3001 AR (continued)	<p>(vii) Protection of Drains</p> <p>Notwithstanding the other provisions of this Contract precautions shall be taken during all planting operations to ensure that drainage systems shall not be damaged, contaminated with soil and the like.</p>
3003AR	<p>Delivery of Plants</p> <p>1. Deliveries of plant material shall be co-ordinated with planting operations to ensure that no plants are left unplanted for excessive periods and that the Works proceed in accordance with the Clause 14 Programme. Any stock arriving on Site which is defective or below the other provisions of the Contract shall not be permitted in the Works. The Contractor shall ensure that plant material shall be stored as follows:</p> <ul style="list-style-type: none"> (i) All bare rooted plants shall have their root systems immersed in an alginate root dip immediately on receipt from the supplier and prior to planting. Bare-rooted plants shall be heeled in moist friable soil, or supported upright on a well-drained area and the roots immersed in a deep layer of moist straw, compost, pulverised bark, or other suitable material. The material shall be firmed to exclude air (particularly on the inside of bundles) and watered periodically as the condition of the material requires. Watering shall not be carried out in freezing conditions and polythene wrappings shall be removed prior to the plants being heeled in. (ii) Container-grown plants shall be maintained upright on a well-drained area and protected from direct sunlight. The containers/pots shall be covered with a layer of peat and watered as required. Watering and spraying shall not be carried out in freezing conditions. (iii) Rootballed plants with permeable wrappings shall be kept moist by watering and polythene wrappings shall be protected from direct sunlight. For longer periods of storage, rootballs with permeable wrapping shall be placed on a well-drained surface and covered with a deep layer of moist straw, compost, pulverised bark, or other suitable material. (iv) All polythene wrappings shall be non-transparent and shall be protected from direct sunlight at all times. Where delays of more than a few days occur, the bags shall be stored upright, in a cool shady position with the plants root systems covered with a deep layer of moist straw, compost, pulverised bark, or other suitable material.

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

PART B: VOLUME 2 NOTES FOR GUIDANCE ON THE SPECIFICATION FOR HIGHWAY WORKS

LIST OF ADDITIONAL, SUBSTITUTE AND CANCELLED CLAUSES TABLES AND FIGURES

Clause No etc	Title
None	

APPENDIX 0/2: CONTRACT-SPECIFIC MINOR ALTERATIONS TO EXISTING CLAUSES, TABLES AND FIGURES INCLUDED IN THE CONTRACT
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PART A: VOLUME 1 SPECIFICATION**LIST OF MINOR ALTERATIONS TO EXISTING CLAUSES**

Clause No etc	Alteration to be made
121	Tidal, Flowing and Standing Water
201	Clearing
606	Watercourses
618	Topsoiling, Grass Seeding and Turfing
901	Bituminous Pavement Mixtures
920	Bond Coats, Track Coats and Other Bituminous Sprays
930	EME2 Base and Binder Course Asphalt Concrete
942	Thin Wearing Course Systems
1309	Amendments and additions to BS 5649 : Part 2 : 1978 (AMD 3136,1979)
1714	Reinforcement – Fixing
2006	Workmanship for Waterproofing Below Ground Concrete Surfaces

APPENDIX 0/2: CONTRACT-SPECIFIC MINOR ALTERATIONS TO EXISTING CLAUSES, TABLES AND FIGURES INCLUDED IN THE CONTRACT (Continued)

MINOR ALTERATIONS TO EXISTING CLAUSES

Clause No etc	Alteration to be made
121	<p>Tidal, Flowing and Standing Water</p> <p><i>Add at the end of Clause:</i></p> <p>Notwithstanding any other provisions of the Contract, the Contractor shall take adequate precautions to prevent the damage and pollution of streams, waterways and water courses and shall indemnify the Employer against all claims arising from any such pollution caused by virtue of the operation during the currency of the Contract. The Contractor shall make good any unnecessary damage to streams, waterways and watercourse at his own expense.</p>
201	<p>Clearing</p> <p><i>Delete sub-Clause 3 and insert new sub-Clause 3:</i></p> <p>Disused chambers located under the road pavement or verge shall be demolished to a depth of 0.5 metres below formation, properly cleaned out, and filled or capped to meet the requirements of the Relevant Roads Authority. To permit free drainage holes of 76mm diameter (minimum) shall be made at 500mm centres over the whole areas of slabs basements etc, which are not removed and which are liable to hold water.</p>
606	<p>Watercourses</p> <p><i>Add to sub-Clause 2</i></p> <p>With the exception of gravels, water worn pebbles and boulders from areas of redundant watercourses which may be excavated and set aside for reuse.</p>
618	<p>Topsoiling, Grass Seeding and Turfing</p> <p><i>Delete sub-clause 2 and insert</i></p> <p>Class 5B imported topsoil shall only be used as required to make up any deficit in Class 5A material and shall be tested for major nutrient requirements in accordance with Appendix 1/5.</p>
901	<p>Bituminous Pavement Mixtures</p> <p><i>Paragraphs 1 to 18 as per the Specification for Highway Works</i></p> <p><i>Add the following sub clause after sub-clause 18:</i></p> <p>19 Asphalt Durability</p> <p>In accordance with SEDD Interim Amendment No. 12 – Bituminous pavement courses shall be made using the materials described in Appendix 7/1 and shall be in compliance with the sector Scheme Document for the laying of Asphalt Mixes described in Appendix A.</p> <p>Appendix A Quality Management Scheme 14</p> <p><i>Insert Note 2 as follows:</i></p> <p>“Note 2 in addition to the list of British Standards, the TRL Project Report 65 is to be included for use in the production of the Stone Mastic Asphalt (SMA) mix design for the Works”</p>

APPENDIX 0/2: CONTRACT-SPECIFIC MINOR ALTERATIONS TO EXISTING CLAUSES, TABLES AND FIGURES INCLUDED IN THE CONTRACT (Continued)

Clause No etc	Alteration to be made
920	<p>Bond Coats, Tack Coats and other Bituminous Sprays</p> <p><i>Sub-Clause 1</i></p> <p>Delete last sentence and replace with: “In the event that no British Board of Agrément HAPAS Certificates have been issued in respect of any proprietary bond coats, tack coats or other bituminous sprays that comply with Sub-clauses 2 to 12 of this Clause and the requirements specified in Appendix 7/4, detailed proposals accompanied by the Contractors Quality Plans and method statements appropriate to the Design, Construction, Completion and maintenance of the Works may be submitted to the Overseeing Organisation for approval on a project specific basis.”</p>
930	<p>EME2 Base and Binder Course Asphalt Concrete</p> <p>Paragraphs 1 – 20 as per the Specification for Highway Works</p> <p>Add the following sub-clauses after sub-clause 20:</p> <p>Job Mixture Verification Trial</p> <p>21 General</p> <p>For each mixture, a job mixture verification trial shall be carried out to verify the properties of the mixture and the effectiveness of the compaction plant and rolling procedures. The trial area shall be not less than 30m long and shall be of appropriate width for the laying and rolling procedures being demonstrated. Mixing, laying and compaction plant and procedures shall be as close as possible to those to be encountered on the full scale works.</p> <p>EME2 Base and Binder Course Asphalt Concrete (Continued)</p> <p>22 Mix analysis</p> <p>During the laying of the trial area, samples of loose mixture shall be taken at three evenly spaced locations along the trial length, in accordance with BS598: Part 100BS EN 12697-27. These shall be analysed for soluble binder content and grading to demonstrate conformity with the target composition as described in Table B.8 of PD 6691+A1 (2015).</p> <p>23 Maximum Density</p> <p>At each of the locations described in Clause 22, a further loose mix sample shall be taken for maximum density determination. The maximum density of each sample shall be determined in accordance with BS_EN 1267512697-5. The average value of maximum density r_{max} expressed in Mg/m³ shall then be used for subsequent calculation of the air void content of the compacted mixture.</p> <p>24 Bulk Density and Void Content</p> <p>At three locations, pairs of 150mm diameter cores shall be taken in accordance with BS598 Part 100BS EN 12697-27, six cores in total. Two of the cores shall be in the wheel track zones (between 0.5m and 1.1m and between 2.55m and 3.15m from the nearside lane marking) of the completed lane or mat, the third shall be selected as appropriate. The bulk</p>

APPENDIX 0/2: CONTRACT-SPECIFIC MINOR ALTERATIONS TO EXISTING CLAUSES, TABLES AND FIGURES INCLUDED IN THE CONTRACT (Continued)

Clause No etc	Alteration to be made
	<p>density ρ of each core shall be determined in accordance with BS EN 12697-6 Procedure A. Void contents shall be calculated to $\pm 0.1\%$ as follows:</p> <ul style="list-style-type: none"> • Air voids content = $(1 - \rho/\rho_{\max}) \times 100\%$ • The average value of the six air void contents shall be in accordance with Clause 930.15. <p>25 Dynamic Stiffness</p> <p>The six cores taken under Clause 24 shall be used for the preparation of specimens for testing of Indirect Tensile Stiffness Modulus in accordance with BS DD213 (1993)BS EN 12697-26. The mean result shall be used to determine conformity with Clause 26.</p> <p>26 The mean Indirect Tensile Stiffness Modulus of the six 150mm diameter cored specimens shall not be less than 4.5 GPa.</p>
942 CR	<p>Thin Surface Course Systems</p> <p>Thin Surface Course Systems are not permitted for use. <i>Amend sub-Clause 14</i> Delete “for a period of two years from the date of opening the surfacing to traffic” and insert ‘for a period of five years from the date of issue of the Certificate of Completion’.</p> <p>Add the following sub-clauses after sub-clause 16: The Tenderer shall provide with his tender full details of the proposed Thin Surface Course Systems to be used in the Works.</p> <p>Tenderers must consult with Transport Scotland, Trunk Road and Bus Operations, 58 Port Dundas Road, Glasgow G4 0HF, regarding the details of the proposed product. Tenderers should be advised that Thin Surface Course System(s) will not be accepted unless details of the Thin Surface Course System(s) proposals have been discussed with and approved in advance by Transport Scotland, Trunk Road and Bus Operations, Asset Management, Finance and Technical Branch (8th Floor), 58 Port Dundas Road, Glasgow G4 0HF.</p>
1309	<p>Amendments and additions to BS 5649 : Part 2 : 1978 (AMD 3136,1979)</p> <p><i>Page 5 Clause 3</i></p> <p>Delete references to 3 degrees, 15 degrees, 1.5 metres and 2.5 metres</p> <p><i>Add</i></p> <p>‘In the table delete bracket projections w of 1.25 metres, 2 metres and 3 metres.’</p>
1714	<p>Reinforcement – Fixing</p> <p><i>Add sub Clause 2:</i></p> <p>The cover survey shall be carried out by the use of an electronic covermeter with a facility for downloading to a computer. The results of the cover survey shall be</p>

APPENDIX 0/2: CONTRACT-SPECIFIC MINOR ALTERATIONS TO EXISTING CLAUSES, TABLES AND FIGURES INCLUDED IN THE CONTRACT (Continued)

Clause No etc	Alteration to be made																																																																	
	downloaded to a computer and passed to the Engineer within 24 hours and the results shall also be included in the Bridge Maintenance Manual.																																																																	
<p>Table 19/3B</p>	<p>Requirements for Steel in Bridge Bearings (and Metal Coated Fasteners) Protective System Type V</p> <p>Replace Areas A, B, C, D and F with:</p> <table border="1"> <thead> <tr> <th>Applied over</th> <th></th> <th>Metal Coating</th> <th>1st Coat</th> <th>2nd Coat</th> <th>3rd Coat</th> <th>4th Coat</th> <th>Minimum total dry film thickness of the paint system (microns)</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Area A and D</td> <td>Item No</td> <td></td> <td>109</td> <td>112</td> <td>112</td> <td>168</td> <td rowspan="2">350</td> </tr> <tr> <td>Min dry film thickness per coat (µm)</td> <td></td> <td>50</td> <td>125</td> <td>125</td> <td>50</td> </tr> <tr> <td rowspan="2">Area B</td> <td>Item No</td> <td></td> <td>112</td> <td></td> <td></td> <td></td> <td rowspan="2">150</td> </tr> <tr> <td>Min dry film thickness per coat (µm)</td> <td></td> <td>150</td> <td></td> <td></td> <td></td> </tr> <tr> <td rowspan="2">Area C</td> <td>Item No</td> <td></td> <td>109</td> <td>112</td> <td>112</td> <td>168</td> <td rowspan="2">350</td> </tr> <tr> <td>Min dry film thickness per coat (µm)</td> <td></td> <td>50</td> <td>125</td> <td>125</td> <td>50</td> </tr> <tr> <td>Area F</td> <td>Item No</td> <td>Hot dip galvanize</td> <td>Adhesion promoter (see Notes)</td> <td>110</td> <td>112 or 121</td> <td>167, 168, 169 or 185</td> <td>275 (325 if Item 185 finish is specified)</td> </tr> </tbody> </table>								Applied over		Metal Coating	1st Coat	2nd Coat	3rd Coat	4th Coat	Minimum total dry film thickness of the paint system (microns)	Area A and D	Item No		109	112	112	168	350	Min dry film thickness per coat (µm)		50	125	125	50	Area B	Item No		112				150	Min dry film thickness per coat (µm)		150				Area C	Item No		109	112	112	168	350	Min dry film thickness per coat (µm)		50	125	125	50	Area F	Item No	Hot dip galvanize	Adhesion promoter (see Notes)	110	112 or 121	167, 168, 169 or 185	275 (325 if Item 185 finish is specified)
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APPENDIX 0/2: CONTRACT-SPECIFIC MINOR ALTERATIONS TO EXISTING CLAUSES, TABLES AND FIGURES INCLUDED IN THE CONTRACT (Continued)

Clause No etc	Alteration to be made
2006	<p>Workmanship for Waterproofing Below Ground Concrete Surfaces</p> <p><i>Add at the end of sub-Clause 3:</i></p> <p>The waterproofing shall be applied strictly in accordance with the manufacturers written instructions at the recommended rate of application.</p> <p><i>Add at the end of sub-Clause 4:</i></p> <p>Details of the proprietary system shall be submitted for the consent of the Overseeing Organisation prior to the inclusion in the Works.</p>

APPENDIX 0/2: CONTRACT-SPECIFIC MINOR ALTERATIONS TO EXISTING CLAUSES, TABLES AND FIGURES INCLUDED IN THE CONTRACT (Continued)
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PART B: VOLUME 2 NOTES FOR GUIDANCE ON THE SPECIFICATION FOR HIGHWAY WORKS

LIST OF MINOR ALTERATIONS TO EXISTING CLAUSES

Clause No etc	Alteration to be made
None	

APPENDIX 0/3: LIST OF CONTRACT-SPECIFIC NUMBERED APPENDICES REFERRED TO IN THE SPECIFICATION AND INCLUDED IN THE CONTRACT

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

List 'A': This is a complete list of the Numbered Appendices referred to in the Specification for Highway Works with those not adopted marked 'Not Used'.

List 'B': This is a complete list of contract- specific Numbered Appendices devised for the Contract.

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 Overseeing Organisation.
(Co)(T)	Compiler partially compiles and Tenderer completes and returns with Tender.
(C)	Contractor completes and returns to Overseeing Organisation.
(P)	This indicates the Appendix is a national pro forma and format must not be altered.
(T)	Tenderer completes and returns with Tender.

APPENDIX 0/3: LIST OF CONTRACT-SPECIFIC NUMBERED APPENDICES REFERRED TO IN THE SPECIFICATION AND INCLUDED IN THE CONTRACT (Continued)

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

Volume Number	Completed by	Appendix Number	Title
			INTRODUCTION
	(Co)	0/1	Contract-specific Additional, Substitute and Cancelled Clauses, Tables and Figures Included in the Contract
	(Co)	0/2	Contract-specific Minor Alterations to Existing Clauses, Tables and Figures Included in the Contract
	(Co)	0/3	List of contract-specific Numbered Appendices Referred to in the Specification and Included in the Contract
	(Co)	0/4	List of Drawings Included in the Contract
	(Co)	0/5	Special National Alterations of the Overseeing Organisation of Scotland/Wales/Northern Ireland
			PRELIMINARIES
	(Co)	1/1	Temporary Accommodation and Equipment for the Overseeing Organisation
	(Co)	1/2	Vehicles for the Overseeing Organisation
	(Co)	1/3	Radio Communication System for the Overseeing Organisation
	(C)	1/4	Working and Fabrication Drawings
	(Co)(C)	1/5	Testing to be Carried out by the Contractor
	(Co)	1/6	Supply and Delivery of Samples to the Overseeing Organisation
	(Co)	1/7	Site Extent and Limitations on Use
	(Co)	1/8	Operatives for the Overseeing Organisation
	(Co)	1/9	Control of Noise and Vibration
	(Co)	1/10	Permanent Works to be Designed by the Contractor
	(Co)	1/11	Temporary Works Design
	(Co)	1/12	Setting Out and Existing Ground Levels
	(Co)(C)	1/13	Programme of Works
	(Co)	1/14	Payment Applications
	(Co)	1/15	Accommodation Works
	(Co)(T)	1/16	Privately and Publicly Owned Services and Supplies
	(Co)	1/17	Traffic Safety and Management
	(Co)	1/18	Temporary Diversions for Traffic
	(Co)	1/19	Routeing of Vehicles
	Not Used	1/20	Recovery Vehicles and Operation for Breakdowns
	(Co)	1/21	Information Boards
	(Co)	1/22	Progress Photographs
	(C)	1/23	Risks to Health and Safety
	(Co)(C)	1/24	Quality Management System
	Not Used	1/25	Temporary Closed Circuit Television (CCTV) System for the Monitoring of Traffic

APPENDIX 0/3: LIST OF CONTRACT-SPECIFIC NUMBERED APPENDICES REFERRED TO IN THE SPECIFICATION AND INCLUDED IN THE CONTRACT (Continued)

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

Volume Number	Completed by	Appendix Number	Title
	Not Used	1/27	Temporary Automatic Speed Camera System for the Enforcement of Mandatory Speed Limits at Road Works (TASCAR)
	Not Used	2/1	SITE CLEARANCE List of Buildings, etc. to be Demolished or Partially Demolished
	(C)	2/2	Filling of Trenches and Pipes
	(C)	2/3	Retention of Material Arising from Site Clearance
	(Co)(C)	2/4	Explosives and Blasting
	(Co)(C)	2/5	Hazardous Materials
	(Co)(C)	3/1	FENCING AND ENVIRONMENTAL BARRIERS Fencing, Gates and Stiles
	(Co)	4/1	ROAD RESTRAINT SYSTEMS (VEHICLE AND PEDESTRIAN) Road Restraint Systems (Vehicle and Pedestrian)
	(Co)(C)	4/2	Information Required to Demonstrate Compliance of Road Restraint Systems to BS EN 1317-1, BS EN 1317-2, BS EN 1317-3 and DD ENV 1317-4: 2002
	(C)	5/1	DRAINAGE AND SERVICE DUCTS Drainage Requirements
	(C)	5/2	Service Duct Requirements
	(C)	5/3	Surface Water Channels and Drainage Channel Blocks
	(C)	5/4	Fin Drains and Narrow Filter Drains
	(C)	5/5	Combined Drainage and Kerb Systems
	(C)	5/6	Linear Drainage Channel Systems
	(C)	5/7	Thermoplastics Structural Wall Pipes and Fittings
	(C)	6/1	EARTHWORKS Requirements for Acceptability and Testing etc. of Earthworks Materials
	(C)	6/2	Requirements for Dealing with Class U1B and Class U2 Unacceptable Materials
	(C)	6/3	Requirements for Excavation, Deposition, Compaction (other than Dynamic Compaction)
	(C)	6/4	Requirements for Class 3 Material

APPENDIX 0/3: LIST OF CONTRACT-SPECIFIC NUMBERED APPENDICES REFERRED TO IN THE SPECIFICATION AND INCLUDED IN THE CONTRACT (Continued)

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

Volume Number	Completed by	Appendix Number	Title
	(C)	6/5	Geotextiles Used to Separate Earthworks Materials
	(C)	6/6	Fill to Structures and Fill Above Structural Foundations
	(C)	6/7	Sub-formation and Capping and Preparation and Surface Treatment of Formation
	(C)	6/8	Topsoiling
	(C)	6/9	Earthworks Environmental Bunds, Landscape Areas, Strengthened Embankments
	(C)	6/10	Ground Anchorages, Crib Walling and Gabions
	(C)	6/11	Swallow Holes and Other Naturally Occurring Cavities and Disused Mine Workings
	(Co)(C)	6/12	Instrumentation And Monitoring
	(C)	6/13	Ground Improvement
	(C)	6/14	Limiting Values for Pollution of Controlled Waters
	(C)	6/15	Limiting Values for Harm to Human Health and the Environment
			ROAD PAVEMENTS - GENERAL
	(T)(C)	7/1	Permitted Pavement Options (Schedules 1, 2, 3, 4 and 5)
	(C)	7/2	Excavation, Trimming and Reinstatement of Existing Surfaces
	(C)	7/3	Surface Dressing (Sheets 1, 2 and 3)
	(C)(P)	7/4	Bond Coats, Tack Coats and Other Bituminous Sprays (Sheets 1, 2 and Binder Data Sheet)
	(C)(P)	7/5	In-Situ Recycling - The Remix and Repave Processes
	(C)(P)	7/6	Breaking Up or Perforation of Existing Pavement
	Not Used	7/7	Slurry Surfacing Incorporating Microsurfacing (Sheets 1, 2 and 3)
	Not Used	7/8	Not Used
	(C)	7/9	Cold-Milling (Planing) of Bituminous Bound Flexible Pavement
	Not Used	7/10	Not Used
	Not Used	7/11	Overband and Inlaid Crack Sealing Systems
	Not Used	7/12	Arrester Beds
	Not Used	7/13	Saw-Cut, Crack and Seal Bituminous Overlays on Existing Joined Concrete Pavements
	Not Used	7/14	Preparation of Jointed Concrete Pavements Prior to Overlaying and Saw-Cut and Seal of Bituminous Overlay
	Not Used	7/15	Saw-Cut and Seal Existing Jointed Reinforced Concrete Pavements
	Not Used	7/16	Cracking and Seating of Existing Jointed Unreinforced Concrete Pavements and CBM Bases
	Not Used	7/17	Cracking Plant and Equipment Progress Record

APPENDIX 0/3: LIST OF CONTRACT-SPECIFIC NUMBERED APPENDICES REFERRED TO IN THE SPECIFICATION AND INCLUDED IN THE CONTRACT (Continued)

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

Volume Number	Completed by	Appendix Number	Title
	Not Used	7/18	Site Specific Details and Requirements for Cold Recycled Bitumen Bound Material
	Not Used	7/19	Site Specific Details and Requirements for Recycled Cement Bound Material
	Not Used	7/20	Not Used
	Not Used	7/21	Surface Dressing – Recipe Specification (Sheets 1, 2 and Binder Data Sheet)
	Not Used	7/22	Repair to Potholes
			ROAD PAVEMENTS – CONCRETE AND CEMENT BOUND MATERIALS
	Not Used	10/1	Plant and Equipment for the Construction of Exposed Aggregate Concrete Surface
			KERBS, FOOTWAYS AND PAVED AREAS
	(C)	11/1	Kerbs, Footways and Paved Areas
	(C)	11/2	Access Steps
			TRAFFIC SIGNS
	(C)	12/1	Traffic Signs: General
	(C)	12/2	Traffic Signs: Marker Posts
	(C)	12/3	Traffic Signs: Road Markings and Studs
	(C)	12/4	Traffic Signs: Cones, Cylinders, FTDs and Other Traffic Delineators
	(Co)	12/5	Traffic Signs: Traffic Signals
	Not Used	12/6	Traffic Signs: Special Sign Requirements on Gantries
			ROAD LIGHTING COLUMNS AND BRACKETS
	(Co)	13/1	Information to be Provided When Specifying Lighting Columns and Brackets
	(C)	13/2	(Specification for Highway Works) Typical Lighting Column and Bracket Data Sheets 1 and 2
	(C)	13/3	Instructions for Completion of Lighting Column and Bracket Data Sheets
	Not Used	13/4	Information to be Provided When Specifying CCTV Masts
	Not Used	13/5	(Specification for Highway Works) Typical CCTV Mast Data Sheet
	Not Used	13/6	Instructions for Completion of CCTV Mast Sheets
	Not Used	13/7	Information to be Provided When Specifying Cantilever Masts
	Not Used	13/8	(Specification for Highway Works) Typical Cantilever Masts Data Sheets 1 and 2
	Not Used	13/9	Instructions for Completion of Cantilever Masts Data Sheets

APPENDIX 0/3: LIST OF CONTRACT-SPECIFIC NUMBERED APPENDICES REFERRED TO IN THE SPECIFICATION AND INCLUDED IN THE CONTRACT (Continued)

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

Volume Number	Completed by	Appendix Number	Title
			ELECTRICAL WORK FOR ROAD LIGHTING AND TRAFFIC SIGNS
	(Co)	14/1	Site Records
	(Co)	14/2	Location of Lighting Units and Feeder Pillars
	Not Used	14/3	Temporary Lighting
	(Co)	14/4	Electrical Equipment for Road Lighting
	(Co)	14/5	Electrical Equipment for Traffic Signs
			MOTORWAY COMMUNICATIONS
	Not Used	15/1	Motorway Communications
	Not Used	15/2	Cable Duct Requirements
			PILING AND EMBEDDED RETAINING WALLS
	(C)	16/1	General Requirements for Piling and Embedded Retaining Walls
	(C)	16/2	Precast Reinforced and Pre-stressed Concrete Piles and Precast Reinforced Concrete Segmental Piles
	(C)	16/3	Bored Cast-in Place Piles
	(C)	16/4	Bored Piles Constructed using Continuous Flight Augers and Concrete or Grout Injection
	(C)	16/5	Driven Cast-in-Place Piles
	(C)	16/6	Steel Bearing Piles
	(C)	16/7	Reduction of Friction on Piles
	(C)	16/8	Non-Destructive Methods for Testing Piles
	(C)	16/9	Static Load Testing of Piles
	(C)	16/10	Diaphragm Walls
	(C)	16/11	Hard/Hard Secant Pile Walls
	(C)	16/12	Hard/Soft Secant Pile Walls
	(C)	16/13	Contiguous Bored Pile Walls
	(C)	16/14	King Post Walls
	(C)	16/15	Steel Sheet Piles
	(C)	16/16	Integrity Testing of Wall Elements
	(C)	16/17	Instrumentation for Piles and Embedded Walls
	(C)	16/18	Support Fluid
			STRUCTURAL CONCRETE
	(C)	17/1	Schedule for the Specification of Design Concrete
	Not Used	17/2	Not Used
	(C)	17/3	Concrete - Surface Finishes
	(C)	17/4	Concrete – General
	(C)	17/5	Buried Concrete
	(C)	17/6	Grouting and Duct Systems for Post-tensioned Tendons
	(C)	17/7	Precast Concrete Products

APPENDIX 0/3: LIST OF CONTRACT-SPECIFIC NUMBERED APPENDICES REFERRED TO IN THE SPECIFICATION AND INCLUDED IN THE CONTRACT (Continued)

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

Volume Number	Completed by	Appendix Number	Title
	(C)	18/1	STRUCTURAL STEELWORK Requirements for Structural Steelwork
	(C)(P)	19/1	PROTECTION OF STEELWORK AGAINST CORROSION (Specification for Highway Works) Form HA/P1 (Works) Paint System Sheet
	(C)(P)	19/2	Requirements for Other Work
	(C)(P)	19/3	(Specification for Highway Works) Form HA/P2 Paint Data Sheet
	(C)(P)	19/4SE	(Specification for Highway Works) Form SEDD/P3 Paint Sample Despatch List: Sheets 1 and 2
	Not Used	19/5	General Requirements
	(C)	20/1	WATERPROOFING FOR STRUCTURES Waterproofing For Concrete Structures
	(C)	21/1	BRIDGE BEARINGS Bridge Bearing Schedule
	Not Used	22/1	Not Used
	(C)	23/1	BRIDGE EXPANSION JOINTS AND SEALING OF GAPS Bridge Deck Expansion Joint Schedule
	(C)	23/2	Sealing of Gaps Schedule (Other than in Bridge Deck Expansion Joints)
	(C)	24/1	BRICKWORK, BLOCKWORK AND STONEMWORK Brickwork, Blockwork and Stonework
	Not Used	25/1	SPECIAL STRUCTURES Requirements for Corrugated Steel Buried Structures
	Not Used	25/2	Requirements for Reinforced Earth and Anchored Earth Structures
	Not Used	25/3	Requirements for Pocket - Type and Grouted Cavity Reinforced Brickwork Retaining Wall Structures
	(Co)	25/4	Environmental Barriers
	Not Used	25/5	Requirements for Buried Rigid Pipes for Drainage Structures
	(C)	26/1	MISCELLANEOUS Ancillary Concrete
	(C)	26/2	Bedding Mortar
	(C)	26/3	Cored Thermoplastic Node Markers

APPENDIX 0/3: LIST OF CONTRACT-SPECIFIC NUMBERED APPENDICES REFERRED TO IN THE SPECIFICATION AND INCLUDED IN THE CONTRACT (Continued)

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

Volume Number	Completed by	Appendix Number	Title
			LANDSCAPE AND ECOLOGY
	(Co)(C)(P)	30/1	General, Sheets 1 and 2
	(Co)	30/2	Weed Control
	(Co)	30/3	Control of Rabbits and Deer
	(Co)	30/4	Ground Preparation
	(Co)	30/5	Grass Seeding, Wildflower Seeding and Turfing
	(Co)	30/6	Planting, sheets 1 and 2
	(Co)	30/7	Grass, Bulbs and Wildflower Maintenance
	(Co)	30/8	Watering
	(Co)	30/9	Establishment Maintenance for Planting
	(Co)	30/10	Maintenance of Established Trees and Shrubs
	(Co)	30/11	Management of Waterbodies
	(Co)	30/12	Special Ecological Measures
			MAINTENANCE PAINTING OF STEELWORK
	(C)(P)	50/1	(Specification for Highway Works) Form HA/P1 (Maintenance) Paint System Sheet
	(C)(P)	50/2	Requirements for Other Work
	(C)(P)	50/3	(Specification for Highway Works) Form HA/P2 Paint Data Sheet
	(C)(P)	50/4SE	(Specification for Highway Works) Form SEDD/P3 Paint Sample Despatch List - Sheets 1 and 2
	(C)(P)	50/5	General Requirements

APPENDIX 0/3: LIST OF CONTRACT-SPECIFIC NUMBERED APPENDICES REFERRED TO IN THE SPECIFICATION AND INCLUDED IN THE CONTRACT (Continued)

APPENDIX 0/3: LIST OF CONTRACT-SPECIFIC NUMBERED APPENDICES REFERRED TO IN THE SPECIFICATION AND INCLUDED IN THE CONTRACT (Continued)

LIST 'B': List of Contract – specific Numbered Appendices devised for the Contract.

Volume Number	Completed by	Appendix Number	Appendix Title
	Not Used	0/6	Carbon Management System – Data Requirements and Instructions
	(Co)(C)	0/7	Training and Employment Opportunities
	(Co)	1/70	Site Safety

APPENDIX 0/4: LIST OF DRAWINGS INCLUDED IN THE CONTRACT

1. CONTRACT SPECIFIC DRAWINGS SUPPLIED TO EACH PARTICIPANT / TENDERER CONTAINED IN VOLUME 5 OF THE CONTRACT

Drawing Number	Revision	Title
Land Made Available Drawings		
B1557630/CD/LMA/001	4	Land Made Available by the Employer for the Works (Sheet 1 of 1)

Drawing Number	Revision	Title
Reference Drawings		
B1557630/CD/REF/001	4	Reference Drawing (Sheet 1 of 1)
B1557630/CD/REF/002	4	Indicative Fencing Works Reference Drawing (Sheet 1 of 1)

Drawing Number	Revision	Title
Indicative Undertakers Works Drawings		
Aberdeen City Council		
B1557630/CD/2701/001	2	Proposed Aberdeen City Council Diversions (Sheet 1 of 4)
B1557630/CD/2701/002	1	Proposed Aberdeen City Council Diversions (Sheet 2 of 4)
B1557630/CD/2701/003	1	Proposed Aberdeen City Council Diversions (Sheet 3 of 4)
B1557630/CD/2701/004	1	Proposed Aberdeen City Council Diversions (Sheet 4 of 4)
Openreach		
B1557630/CD/2702/001	2	Proposed BT Openreach Diversions (Sheet 1 of 4)
B1557630/CD/2702/002	3	Proposed BT Openreach Diversions (Sheet 2 of 4)
B1557630/CD/2702/003	2	Proposed BT Openreach Diversions (Sheet 3 of 4)

APPENDIX 0/4: LIST OF DRAWINGS INCLUDED IN THE CONTRACT (continued)

Drawing Number	Revision	Title
B1557630/CD/2702/004	1	Proposed BT Openreach Diversions (Sheet 4 of 4)
Vodafone		
B1557630/CD/2703/001	0	Proposed Vodafone Diversions (Sheet 1 of 4)
B1557630/CD/2703/002	0	Proposed Vodafone Diversions (Sheet 2 of 4)
B1557630/CD/2703/003	0	Proposed Vodafone Diversions (Sheet 3 of 4)
B1557630/CD/2703/004	0	Proposed Vodafone Diversions (Sheet 4 of 4)
Scottish and Southern Energy		
B1557630/CD/2704/001	2	Proposed Scottish and Southern Energy Diversions (Sheet 1 of 4)
B1557630/CD/2704/002	1	Proposed Scottish and Southern Energy Diversions (Sheet 2 of 4)
B1557630/CD/2704/003	1	Proposed Scottish and Southern Energy Diversions (Sheet 3 of 4)
B1557630/CD/2704/004	1	Proposed Scottish and Southern Energy Diversions (Sheet 4 of 4)
Scotland Gas Networks		
B1557630/CD/2705/001	2	Proposed Scotland Gas Networks Diversions (Sheet 1 of 4)
B1557630/CD/2705/002	1	Proposed Scotland Gas Networks Diversions (Sheet 1 of 4)
B1557630/CD/2705/003	1	Proposed Scotland Gas Networks Diversions (Sheet 1 of 4)
B1557630/CD/2705/004	1	Proposed Scotland Gas Networks Diversions (Sheet 1 of 4)
Scottish Water (Supply)		
B1557630/CD/2706/001	4	Proposed Scottish Water – Supply Diversions (Sheet 1 of 4)
B1557630/CD/2706/002	1	Proposed Scottish Water – Supply Diversions (Sheet 2 of 4)

APPENDIX 0/4: LIST OF DRAWINGS INCLUDED IN THE CONTRACT (continued)

Drawing Number	Revision	Title
B1557630/CD/2706/003	3	Proposed Scottish Water – Supply Diversions (Sheet 3 of 4)
B1557630/CD/2706/004	1	Proposed Scottish Water – Supply Diversions (Sheet 4 of 4)
Scottish Water (Sewer)		
B1557630/CD/2707/001	0	Proposed Scottish Water – Sewer Diversions (Sheet 1 of 4)
B1557630/CD/2707/002	0	Proposed Scottish Water – Sewer Diversions (Sheet 2 of 4)
B1557630/CD/2707/003	0	Proposed Scottish Water – Sewer Diversions (Sheet 3 of 4)
B1557630/CD/2707/004	0	Proposed Scottish Water – Sewer Diversions (Sheet 4 of 4)
Trafficmaster		
B1557630/CD/2708/001	0	Proposed Trafficmaster Diversions (Sheet 1 of 4)
B1557630/CD/2708/002	0	Proposed Trafficmaster Diversions (Sheet 2 of 4)
B1557630/CD/2708/003	0	Proposed Trafficmaster Diversions (Sheet 3 of 4)
B1557630/CD/2708/004	0	Proposed Trafficmaster Diversions (Sheet 4 of 4)
City Fibre		
B1557630/CD/2709/001	3	Proposed City Fibre Diversions (Sheet 1 of 4)
B1557630/CD/2709/002	3	Proposed City Fibre Diversions (Sheet 2 of 4)
B1557630/CD/2709/003	3	Proposed City Fibre Diversions (Sheet 3 of 4)
B1557630/CD/2709/004	0	Proposed City Fibre Diversions (Sheet 4 of 4)

APPENDIX 0/4: LIST OF DRAWINGS INCLUDED IN THE CONTRACT (continued)

Drawing Number	Revision	Title
Standard Details		
B1557630/CD/SD/F1	0	Standard Details Fence Type F1 Estate Fencing (Sheet 1 of 1)
B1557630/CD/SD/F2	0	Standard Details Fence Type F2 And Gate Type G2 (Sheet 1 of 1)
B1557630/CD/SD/G1	0	Standard Details Gate Type G1 (Sheet 1 of 1)
B1557630/CD/SD/G3	0	Standard Details Gate Type G3 (Sheet 1 of 1)
B1557630/CD/SD/G4	0	Standard Details Gate Type G4 (Sheet 1 of 1)
B1557630/CD/SD/L1	0	ACC Pillar Distribution Panel K86 Road Lighting Layout (Sheet 1 of 1)

Drawing Number	Revision	Title
Indicative Landscape Drawings		
B1557630/CD/LAN/001	4	Indicative Landscape and Planting Works drawing

APPENDIX 0/4: LIST OF DRAWINGS INCLUDED IN THE CONTRACT (continued)

2. STANDARD DRAWINGS**2(i) SUPPLIED TO EACH TENDERER**

NOT USED

2(ii) INSPECTED BY TENDERERS

NOT USED

2(iii) List of Drawings Brought into the Contract by Reference

Highway Construction Details (HCD) published by The Stationery Office (formerly 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.

Drawing Number	Title	Date	Aspect/Alternative(s) if Not Whole Drawing
HCD	All drawings other than those listed below.	Nov 08	

APPENDIX 0/5: SPECIAL NATIONAL ALTERATIONS OF THE OVERSEEING ORGANISATION OF SCOTLAND

The following Additions, Substitutions, Cancellations and minor alteration shall be made:

List of Substitute Clauses, Tables and Figures

Clause No	Title
All 1500	Substitute all clauses of the MCHW Series 1500 with: <i>NDS1500 Rev. 14.a: "The National Alterations of the Overseeing Organisation of Scotland – Traffic Scotland Series 1500"</i> The Contract Specific items detailed in Appendix 0/1 modify NDS 1500.

List of Minor Alterations Clauses, Tables and Figures

Clause No	Title
NONE	

APPENDIX 0/7: TRAINING AND EMPLOYMENT OPPORTUNITIES

1. Employability & Skills Plan (ESP)

- 1.1 The Contractor shall be required to provide the Employer with a completed version of the template Employment and Skills Plan (ESP) contained in Appendix 0/7, taking cognisance of the Construction Industry Training Board's (CITB) Client Based Approach (<https://www.citb.co.uk/national-skills-academy-for-construction/what-is-the-national-skills-academy-for-construction/client-based-approach/>). The output figures for the ESP are to indicate the minimum outputs for each month against the relevant Construction Industry Training Board Employment and Skills Areas contained in the ESP. The 'Summary – Planned Total' column in the ESP template is to be completed utilising the minimum CITB benchmark requirement figures for the Contract provided in Table 1 in Appendix 0/7. Guidance on the Employment and Skills Areas is included within Appendix 0/7. The Contractor is to use his own judgement as to what additional outputs he considers are achievable in relation to the Contract.

Table 1: Employment & Skills Areas - Benchmark Requirements

ESA Ref	Employment and Skills Area	Benchmark Requirement for Contract
1	Work Placements – Persons (Total of 1(a)+1(b))	3
1(a)	Work Placements (In education) - persons	
1(b)	Work Placements (Not in education) - persons	
2	Jobs created by a National Skills Academy for Construction (NSAfC) project (Total of 2(a)+2(b)+2(c))	7
2(a)	Jobs created by a NSAfC project (Apprentices)	
2(b)	Jobs created by a NSAfC project (New Entrants)	
2(c)	Jobs created by a NSAfC project (Graduates)	
3	Construction Careers Information, Advice & Guidance (CCIAG) Events	3
4	Training Weeks on site (Total of 4(a)+4(b)+4(c))	118
4(a)	Training Weeks on site (Apprenticeships)	
4(b)	Training Weeks on site (Graduates)	
4(c)	Training Weeks on site (New Entrants)	
5	Qualifying the Workforce – project workforce (Total of 5(a)+5(b)+5(c)+5(d))	15
5(a)	Qualifications gained (equivalent VQ2 and above) (Main Contractor)	
5(b)	Qualifications gained (equivalent VQ2 and above) (Sub-Contractor)	
5(c)	Industry certification gained (Main Contractor)	
5(d)	Industry certification gained (Sub-Contractor)	
6	Training Plans	2
7	Case Studies	2

APPENDIX 0/7: TRAINING AND EMPLOYMENT OPPORTUNITIES (Continued)

- 1.2 In relation to the Employment and Skills Area 5(a) listed in Table 1 the Contractor shall maintain the following training opportunity:
- (a) a minimum of 2 professional training site-based places for persons undertaking a professional engineering training scheme recognised and accredited by a national professional body (such as the Institution of Civil Engineers) and leading to membership of the professional body at technician or chartered level or equivalent.

2. Employment and Skills Plan (ESP) Method Statement

- 2.1 The Contractor is required to provide a detailed ESP Method Statement setting out how he intends to implement the employment and training requirements of the Employer and to deliver the ESP. The Method Statement should be restricted to 1000 words and clearly set out the proposed approach for delivery against the Employment and Skills Areas contained in Table 1. The ESP Method Statement should cover, as a minimum, the requirements listed in Table 2.

Table 2: ESP Method Statement Content Requirements

ESP Method Statement Content Requirements
Details of the person(s) in the organisation who will be responsible for managing the training scheme and overseeing the proposals
Details of the education and training providers who will be involved with the delivery of the ESP
Details of the types of accredited and non-accredited training expected to be offered and who are expected to be the main beneficiaries of this training
Details of the trades or occupational areas it is envisaged will be offering Apprenticeship opportunities
Details of the types of Apprenticeship expected to be offered (i.e. traditional, programme, Advanced etc.)
Details of how the target outputs as set out in the ESP will be delivered
Details of how health and safety training will be managed
Details of the actions that will be taken to ensure the support of sub-contractors working on the project
Details of how compliance will be managed (and monitored) with respect to the organising subcontractors

3. Reporting Requirements

- 3.1 The Contractor shall provide to the Employer the following reports, (a) and (b) on a monthly basis:
- (a) A report on a monthly basis, outlining the achievements during the previous month against the ESP and ESP Method Statement and shall provide details of the various employment and skills activities delivered in the month. The Employer will monitor the Contractor's compliance with and implementation of the ESP and ESP Method

APPENDIX 0/7: TRAINING AND EMPLOYMENT OPPORTUNITIES (Continued)

Statement. The template ESP provided in Appendix 0/7 is suitable for monthly reporting. Documentary evidence (electronic or hard copy) to support validation of each activity shall be collated by the Contractor and filed in date order under each benefit heading. On receipt of each monthly report the Engineer will validate the delivery of benefits, querying as necessary any evidence that is unclear or inconclusive. The Engineer will send a copy of the validated monthly report to Transport Scotland, who may, at any time, carry out monitoring, spot checks or audit the delivery of benefits. A report on a monthly basis, identifying the following information:

For the Contractor:

- (i) numbers of staff employed on site broken down by postcode; and
- (ii) number of staff providing head office support to the site.

For all Contractor Parties:

- (i) numbers of staff employed on site broken down by postcode;
 - (ii) the total number of staff broken down by postcode providing head office support to the site; and
 - (iii) the Company Reference Number as registered at Companies House for each Contractor Party.
- (b) A report on a monthly basis, in relation to the wider community benefits being delivered, a report covering the data requirements contained in Table 3. Such reporting forms part of the Employer's reporting obligations under the Procurement Reform (Scotland) Act 2014 and in accordance with the Scottish Governments requirements.

Table 3: Community Benefit Reporting Requirements

Ref	ESA Ref	Reporting Criteria	Measure	Monthly Total	Cumulative Total
CB1	ESA 2	Number of vacancies filled by priority groups*	1 job (vacancy)		
CB2	ESA 2(a)	Number of apprenticeships filled by priority groups*	1 job (apprenticeship)		
CB3	ESA 2(a)	Number of apprenticeships recruited to deliver contract	1 person (apprentice)		
CB4	ESA 1(b)	Number of work placements for priority groups*	1 completed placement		
CB5	ESA 1(a)	Number of work placements for school pupils, college and university students	1 completed placement		

APPENDIX 0/7: TRAINING AND EMPLOYMENT OPPORTUNITIES (Continued)

Ref	ESA Ref	Reporting Criteria	Measure	Monthly Total	Cumulative Total
CB6	ESA 4&5	Number of qualifications achieved through training by priority groups*	1 qualification/certification		
CB7	ESA 4&5	Number of qualifications achieved through training by other employees	1 qualification/certification		
CB8	ESA 2	Number of recruits from priority groups* employed at 26 weeks after job start	1 person		
CB9	ESA 2(b)	Number of apprenticeships from priority groups* employed at 26 weeks after apprenticeship start	1 person		
CB10	ESA 1&2	Number of work placements for priority groups* subsequently recruited by Contractor/Sub-Contractor	1 person		
CB11	-	Total number of jobs advertised through local job centres	1 job		
CB12	ESA 2	Number of jobs filled by priority groups*	1 job		
CB13	-	Number recruited to deliver Contract	1 person		
CB14	-	Number of sub-contracts awarded to Small to Medium Enterprises SMEs	1 contract		
CB15	-	Value of sub-contracts awarded to Small to Medium Enterprises (SMEs)	£ value		

APPENDIX 0/7: TRAINING AND EMPLOYMENT OPPORTUNITIES (Continued)

Ref	ESA Ref	Reporting Criteria	Measure	Monthly Total	Cumulative Total
CB16	-	Number of sub-contracts awarded to Social Enterprises	1 contract		
CB17	-	Value of sub-contracts awarded to Social Enterprises	£ value		
CB18	-	Number of sub-contracts awarded to Supported Businesses	1 contract		
CB19	-	Value of sub-contracts awarded to Supported Businesses	£ value		
CB20	-	Number of sub-contracts advertised via Public Contracts Scotland portal	1 sub-contract		
CB21	ESA 3	Community Engagement Activities	Individual activity		

* Priority groups include young people, unemployed & disadvantaged groups

APPENDIX 0/7: TRAINING AND EMPLOYMENT OPPORTUNITIES (Continued)

A90/A96 Haudagain Improvement Scheme
 Community Benefits -
 Employment & Skills Delivery
 Plan and Monitoring

Month:

Employment and Skills Areas	Minimum Requirement	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	...	Month "n"	Summary - Planned Total	Validation - Total to date	Validated by Employers Representatives (ER to complete)	Progress (RAG)	Notes
1 Work Placements (Total of 1a + 1b) <i>(Actual)</i>	3														
1a Work Placement (in Education)															
1b Work Placement (not in Education)															
2 Jobs created by a NSAFC project (Total of 2a + 2b + 2c) <i>(Actual)</i>	7														
2a Jobs created by a NSAFC project (Apprentices)															
2b Jobs Created by a NSAFC project (New Entrants)															
2c Jobs Created by a NSAFC project (Graduates) <i>(Actual)</i>															
3 Construction Careers Information, Advice and Guidance (CCIAG) Events <i>(Actual)</i>	3														
4 Training Weeks on Site (Total of 4a + 4b + 4c) <i>(Actual)</i>	118														
4a Training Weeks on Site - (Apprenticeships)															
4b Training Weeks on Site - (Graduates)															
4c Training Weeks on Site (New Entrants)															
5 Qualifying the Workforce - project workforce Total of 5a+5b+5c+5d) <i>(Actual)</i>	15														
5a Qualifications Gained (equiv. VQ2 and above) (Main Contractor)															
5b Qualifications Gained (equiv. VQ2 and above) (Sub Contractors)															
5c Industry Certification Gained (Main Contractor)															
5d Industry Certification Gained (Sub Contractor) <i>(Actual)</i>															
6 Training Plans <i>(Actual)</i>	2														
7 Case Studies <i>(Actual)</i>	2														

APPENDIX 1/1: TEMPORARY ACCOMMODATION AND EQUIPMENT FOR THE OVERSEEING ORGANISATION

1. Accommodation Required

1.1 Office Accommodation for Period 1 defined in Section 11 of this Appendix.

An integrated office-building facility comprising accommodation for shared occupation by the Overseeing Organisation and the Contractor shall be provided by the Contractor with single joint entrance and reception area, including shared conference room and messing facilities, car parking and security arrangements.

The office building shall be constructed of secure 'anti-vandal' steel shell office-accommodation units or any system, which is deemed suitable for temporary accommodation of this nature, which is acceptable to the Overseeing Organisation.

The office-building facility shall be connected to existing water, 240 volt AC electricity supply, and telecommunication utilities for provision of water, heating, lighting and telephone. Sewage disposal shall be either direct to existing piped mains facility or specially provided septic tanks which shall be regularly serviced. The Office Building shall comply with and be maintained to comply with the Construction (Health, Safety and Welfare) Regulations 1996. The Electricity at Work Regulations 1989 shall be complied with in all respects in case of equipment and furnishing of rooms in the office-building. Prior to occupation the Contractor shall have the Building appropriately certified by the local authority and fire brigade as suitable for occupation and use intended.

The office accommodation for the use of the Overseeing Organisation and all facilities to be shared with the Contractor shall be to a high standard of, including for but not limited to, structural integrity, aesthetics, internal finishing, equipment and furniture as described below. The location and layout of the integrated office facility shall be wholly acceptable to the Overseeing Organisation whilst conveniently located in close proximity to, and possibly overlooking, the construction works. At the same time the integrated office-building facility shall be set apart from the Contractor's site operations plant store and depot and routes used by construction traffic.

The office building shall also be provided with a separate entrance and lobby area away from the main entrance, conveniently located within its layout for direct access by personnel of the Employer and Engineer's Representative and Contractor when either visiting or returning from the construction site for the purpose of changing into or removing/cleaning and storing boots and safety gear.

Raised doorway entrances and access ways to the office building that have steps/stairway approaches shall have tubular steel handrails fitted either side of the access stairway.

The Contractor shall form access from the public road a minimum of 3 metres wide and provide car parking allowing space for 6 No. Overseeing Organisation vehicles and 3 visitor's cars. The roads and car park shall have a bituminous surface. The road access shall be kept clear of mud and debris and shall not be used by construction plant.

Fire exit routes from the offices shall be of concrete slabs or bituminous surface free from steps and other obstacles constructed so as to enable rapid and efficient drainage. All road surfaces and access to the public road connected with the office building shall be constructed on a prepared ground and covered with bituminous surfacing and have positive drainage.

APPENDIX 1/1: TEMPORARY ACCOMMODATION AND EQUIPMENT FOR THE OVERSEEING ORGANISATION (Continued)**1.1 Office Accommodation for Period 1 defined in Section 11 of this Appendix. (Continued)**

The Overseeing Organisation shall be consulted by the Contractor on the entire integrated layout and specification of the office-building facility that the Contractor intends to provide, based on the requirements stated in this Appendix, and shall obtain the approval of the Overseeing Organisation prior to commencement of any work in connection with the building facility.

The integrated office-building (or units) facility shall be adequately guarded at all times to ensure no unlawful or unauthorised entry.

The integrated office-buildings (or units) facility shall fulfil the following construction requirements and operational conditions as a minimum requirement:

The office building shall be erected on pre-prepared under-building of brick or concrete dwarf walls founded on concrete strip-footings with damp-proof course. The underside of the external walls and floors of the office-building shall not be less than 400 millimetres above surrounding ground level. Floors of the office shall be of tongue and groove timber, lined with hardboard or plywood and covered with vinyl floor covering. External walls shall contain a suitable vapour barrier and a 25 millimetres layer of glass wool or equivalent insulation. Internal walls shall be smooth with coloured oil based paint. Headroom shall be not less than 2.25 metres. Ceilings shall be plasterboard covered on top with 25 millimetres layer of glass wool insulation and finished with two coats of white water based paint. The office-building shall be completely weatherproof and watertight. Windows shall comprise double-glazed sealed units or equivalent with window-area being not less than 2 square metres for every 10 square metres of floor area and with each window having opening facility for at least one-third of the window size. All windows shall be fitted with external roller-blinds operated internally for purpose of security and Venetian-type blinds shall be fitted internally.

All pipe-work shall be suitably lagged and/or insulated to prevent freezing.

All internal doors to rooms shall be fitted with mortice-locks and 2 [all] sets of keys for rooms occupied by the Overseeing Organisation and its Representatives shall be handed over to the Overseeing Organisation. The Contractor shall record the distribution of all room-keys and control additional issue of room-keys. The external doors shall be fitted with draught excluders and mortise locks, whilst the doors to the entrance and reception area shall be fitted with an electronic opening and closing / locking device operated by means of electronic smart-card. The Contractor shall provide smart-cards for use by individuals in the Overseeing Organisation and shall record the distribution of all smart-cards.

1.1 Office Accommodation for Period 1 defined in Section 11 of this Appendix. (Continued)

The offices shall be provided with 240 volt AC electricity supply with 13 amp socket outlets suitably spaced and provided around the office on the basis of 2 dual gang socket for each 5 square metres of office space.

Within the integrated office-building facility, the Contractor shall provide individual office space / rooms for the sole use of the Overseeing Organisation's staff excepting in cases where staff and /or representatives of the Overseeing Organisation and the Contractor are carrying out comparable duties in which case such office space and rooms shall be occupied by Overseeing Organisation and the Contractor.

APPENDIX 1/1: TEMPORARY ACCOMMODATION AND EQUIPMENT FOR THE OVERSEEING ORGANISATION (Continued)

The office-building facility including both individual office space/rooms and the jointly occupied office space/rooms and facilities provided for use by the Overseeing Organisation shall include furniture, fixtures and fittings, equipment, stores, protective clothing, and surveying equipment and supplies as listed below, for the Overseeing Organisation's exclusive use and shall be regarded as the minimum requirement.

All furniture, fixtures and fittings, equipment, stores, protective clothing, and surveying equipment computers, computer peripherals software and all supplies for the Overseeing Organisation's exclusive use shall be new and unused.

Complete security, privacy and confidentiality shall be ensured at all times in the rooms and for all facilities including computers and peripherals which are provided for contract administration activities undertaken by the Overseeing Organisation as described below.

All the telecommunication lines and facilities provided for use by the Overseeing Organisation as described below, shall be completely independent of the Contractor's facilities, to ensure privacy and confidentiality and shall be as a separate account.

The room - layout and particular room requirements of that part of the office-building facility occupied by the Overseeing Organisation and its Representatives shall have minimum floor areas as listed in the table immediately below:

APPENDIX 1/1: TEMPORARY ACCOMMODATION AND EQUIPMENT FOR THE OVERSEEING ORGANISATION (Continued)

ROOM DESCRIPTION	REF	AREA (SQ METRES)	PARTICULAR REQUIREMENTS
Overseeing Organisation			
Overseeing Organisation	A	20	
Reception (with waiting area) - telephone and security desk	B	20	Shared / Managed by Contractor
Conference Room	C	40	Located near main entrance and reception
Engineer's Representative and Staff			
Engineer's Representative	D	20	Adjoining room E/accessed through E
Secretary / Administration	E	16	Located near reception
Senior Site Engineers (2) and Assistant Site Engineer (1)	F	24	
Room for printer/photocopier	G	10	Room adjoining room E but with common access off corridor and not accessed through room E.
Inspectors and part time Engineers / ECoW (2)	H	16	
Storage room	I	12	
General Shared Facilities			
Kitchen - cooking and dish washing facilities	J	20	Shared with Contractor
Dining Area with drinking water dispenser	K	20	Shared with Contractor
Lobby Area / Boot Room	L	10	Shared with Contractor
Male Toilet Facilities – Linked with N	M	15	Shared with Contractor
Male Shower Closet and changing area - Accessed via M	N	5	Shared with Contractor
Female Toilet Facilities – Linked with P	O	10	Shared with Contractor
Female Shower Closet and changing area - Accessed via O	P	5	Shared with Contractor

APPENDIX 1/1: TEMPORARY ACCOMMODATION AND EQUIPMENT FOR THE OVERSEEING ORGANISATION (Continued)

A regularly serviced supply of cooled bottled drinking water and dispensing device shall be provided in the kitchen area.

The management and administration system implemented by the Contractor shall include for effective and advance allocation of the shared conference room facility to meet the requirements of both the Overseeing Organisation and the Contractor.

The office building shall be properly cleaned and serviced at least once per working day, for so long as it is in use with essential cleaning and servicing being carried out outside normal Site working hours but not without presence of office security or other authorised personnel.

1.2 Office Accommodation for Period 2 of the Works as defined in Section 11 of this Appendix.

A reduced office requirement shall be provided for use by the Overseeing Organisation for Period 2 over the duration stated in Section 11 of this Appendix while maintaining equal standard of provision and service as for Period 1.

The office layout or area of office accommodation that is to remain occupied shall be as agreed by the Overseeing Organisation such as to fulfil the requirements of the Overseeing Organisation and its Representatives for Period 2. The area of office accommodation in the table herewith below is indicative of such requirements which are the minimum.

ROOM DESCRIPTION	REFERENCE	AREA (SQ. METRES)
Overseeing Organisation	A	20
Conference Room	C	40
Office	D	20
Office	E	16
Room for printer/photocopier	H	10
Office	F	24
Storage room	I	12
Kitchen facilities	J	Shared with Contractor
Male Toilets	M	Shared with Contractor
Female Toilet	O	Shared with Contractor

APPENDIX 1/1: TEMPORARY ACCOMMODATION AND EQUIPMENT FOR THE OVERSEEING ORGANISATION (Continued)

2. Furnishings and Fitments

ROOM A - Overseeing Organisation

Quantity	Item
1	Independent telephone and ISDN line
1	Telephone
1	1.8 metres by 1.0 metres double pedestal desk with locking drawers with side unit with veneered surface
1	5 point swivel wheeled desk armchair fully adjustable
1	Meeting table; 2 metres long by 1 metre wide or similar with veneered surface with 4 padded chairs
2	White Marker Board 1m x 1.5m (with supply markers) mounted on wall at appropriate position
2	Full height secure PPE lockers
4	Coat hooks
1	Wastepaper bin
1	Paper punch and stapler
1	Set /4 tier filing trays
2	Cat 5 (RJ45) surface mounted boxes – connected to LAN
1	Stand alone A3/A4 colour printer with installation software
1	Laptop as per Section 4.1 and 4.3 below

ROOM C - Conference Room

Quantity	Item
1	Conference table 4 metres by 1.5 metres or similar approved
15	Conference chairs
1	1m deep framed cork or strawboard mounted on length of one wall at appropriate height
1	White Marker Board 1m x 1.5m (with supply markers) mounted on wall at appropriate position.
2	Cat 5 (RJ45) surface mount boxes – connected to LAN
1	Conference call speaker phone

APPENDIX 1/1: TEMPORARY ACCOMMODATION AND EQUIPMENT FOR THE OVERSEEING ORGANISATION (Continued)

ROOM D - Engineer's Representative

Quantity	Item
1	Telephone
1	1.8 metres by 1.0 metres double pedestal desk with locking drawers and side unit with veneered surface
1	5 point swivel wheeled desk armchair fully adjustable
1	Meeting table 2 metres x 1 metre with veneered surface with 4 padded chairs
1	Plan chest A0 size with 6 drawers or Vertical plan-file
2	Padded office arm chairs
1	Lockable steel cupboard 1.2 metres by 1.8 metres minimum
1	Lockable 4 drawer steel filing cabinet, each drawer complete with hangers
1	Framed cork or strawboard panelling wall board mounted 3mx1m
1	White Marker Board 1m x 1.5m (with supply markers) mounted on wall at appropriate position
1	Glass fronted bookcase 1.5 metres wide by 1.0 metres high
4	Coat hooks
1	Wastepaper bin
1	Paper punch and stapler
1	Set / 4 tier filing trays
1	3metres of 225 millimetres by 25 millimetres shelving
2	Cat 5 (RJ45) surface mount boxes – connected to hub (LAN)
1	Laptop as per Section 4.1 and 4.3 below

APPENDIX 1/1: TEMPORARY ACCOMMODATION AND EQUIPMENT FOR THE OVERSEEING ORGANISATION (Continued)

ROOM E - Secretary / Administration

Quantity	Item
1	1.8 m by 1.0m secretarial work station with side desk with locking drawers with veneered surface
1	5 point swivel wheeled armchair fully adjustable
1	Work -table 2 metres x 1 metre wide with veneered surface
1	Office chairs
2	Lockable steel cupboard 1.2 metres by 1.8 metres minimum
4	Lockable 4 drawer steel filing cabinet, each drawer complete with hangers
1	Framed cork or strawboard panelling wall board mounted 3m x 1m
6	Coat hooks
1	Wastepaper bin
1	Paper punch and stapler
2	Set/ 4 tier filing tray
2	Cat 5 (RJ45) surface mount boxes – connected to hub (LAN)
1	Telephone
1	Document shredder - business type fully mounted with disposal container.
1	Laptop as per Section 4.1 and 4.3 below
Supply of	A4 and A3 copying paper as required for photocopier and word processing for duration of Period

APPENDIX 1/1: TEMPORARY ACCOMMODATION AND EQUIPMENT FOR THE OVERSEEING ORGANISATION (Continued)

ROOM F - Senior Site Engineers (2 personnel) and Assistant Site Engineers (1 personnel)

Quantity	Item
1 per person	Telephone
1 per person	1.8 metres by 1.0 metres double pedestal desk with locking drawers and side unit with veneered surface
1 per person	5 point swivel wheeled armchair fully adjustable
1 per room	Table / bench 3.0 metres by 1.0 metres 1 metre above floor level
1 per room	Plan chest A0 size with 6 drawers or Vertical plan-file
1 per person	5 point swivel wheeled chair
1 per person	Lockable steel cupboard 1.2 metres by 1.8 metres minimum
1 per person	Lockable 4 drawer, steel filing cabinet, each drawer complete with A4 hangers
1 per room	White Marker Board 1m x 1.5m (with supply markers) mounted on wall at appropriate position
1 per person	Glass fronted bookcase 1.5 metres wide by 1.0 metres high
1 set per room	Coat hooks (4)
1 per person	Wastepaper bin
1 per person	Paper punch and stapler
1 per person	4 tier beanstalk filing tray with base
1 set per room	6 metres of 225 millimetres shelving
1 per person	Cat 5 (RJ45) surface mount boxes – connected to LAN
1 per person	Laptop as per Section 4.1 and 4.3 below

ROOM G - ER's Printer/Photocopier Room

Quantity	Item
1	Network colour printer copier scanner with e-mail facility, document feeder and sorting collating facility for exclusive use of the Overseeing Organisation as per Section 4.3.2 below
1	Work - table 2m x 1m with veneered surface
1	Storage cupboard for supplies, paper etc. (lockable)

APPENDIX 1/1: TEMPORARY ACCOMMODATION AND EQUIPMENT FOR THE OVERSEEING ORGANISATION (Continued)

ROOM H – Inspectors and part time Engineers / ECoW (2 personnel)

Quantity	Item
2	Telephone
2	1.5 metres by 1.0 metres double pedestal desk with locking drawers with veneered surface
2	5 point swivel wheeled armchair fully adjustable
1	Work table 3.0 metres by 1.0 metres with veneered surface
2	Office chairs
1	Plan chest A0 size with 6 drawers
1	Vertical Plan file (open hangers)
1	Lockable 4 drawer, steel filing cabinet, each drawer complete with vertical hangers
2	3 metres x 1 metre framed cork or strawboard panelling mounted on wall 1.0 metres above floor
2	3 metre long shelves 225 millimetres by 25 millimetres
3	Coat hooks
2	Wastepaper bin
2	Set /4 tier filing tray
1	Cat 5 (RJ45) surface mount boxes – connected to LAN
2	Laptop as per Section 4.1 and 4.3 below

ROOM I - Storage Room

Quantity	Item
1	10 metres shelving
1	Storage racks for survey equipment
2	Lockable steel cabinet 1.0 metres wide by 2.0 metres high with shelving

APPENDIX 1/1: TEMPORARY ACCOMMODATION AND EQUIPMENT FOR THE OVERSEEING ORGANISATION (Continued)

ROOMS J and K - Kitchen and Dining Area

Quantity	Item
1	Stainless steel sink with draining board, complete with cupboards and Formica worktop, hot and cold water supply
1	Dishwasher
1 set	'King size' waste (segregated recycling) bins complete with supply of liners
1	Wall mounted cupboard 2.0 metres long
1	Base unit 2.0 metres long with drawers and cupboards complete with Formica worktop 3.5 metres long
1	Electric water urn, with filling facilities
1	3 pint electric kettle with automatic switch-off
1	3 pint teapot
1	3 pint coffee pot
1	6 cubic feet refrigerator
1	900 watt microwave with turntable
1	Cold water drinking dispenser
1	Fire extinguisher (dry powder)
1	Fire blanket
1	Window mounted powered extractor fan
1	First aid kit complying with the requirements of the Health and Safety (First Aid) Regulations 1981.
1 set	Crockery, cutlery and cooking utensils for 10 persons or as required by the Overseeing Organisation (to be replaced as required)
	Supply of tea, coffee, milk and sugar (replenished as required during periods)
	Supply of towels (replenished and laundered during periods)
Min 3 sets	Table and 4 chairs

ROOM L- Lobby Area / Boot Room

Quantity	Item
2	Timber bench (or fixed seating) 2 metres long
10	Personal metal lockers
1	Clothes drying rack with tubular heater and 8/10 number coat hooks

APPENDIX 1/1: TEMPORARY ACCOMMODATION AND EQUIPMENT FOR THE OVERSEEING ORGANISATION (Continued)

ROOMS M and N- Male Toilet Facilities and Shower Unit

Quantity	Item
3	WC suites
3	Toilet roll holders and supply of toilet rolls
3	Bowl type urinals complete with auto-flush
3	Wash-hand basins complete with taps and hot and cold water supply
2	Towel dispensers laundered and replenished when required
2	Liquid soap dispensers with supply of liquid soap, or supply of soap
1	Electric wall-mounted hand drier
1	Wall mirror
4	Coat hooks
1	Window mounted powered extractor fan
1	Shower unit and changing area in separate compartment with door off main toilet area.

ROOMS O and P - Female Toilet Facilities

Quantity	Item
2	WC suites
2	Toilet roll holders and supply of toilet rolls
1	Wash–hand basins complete with taps and hot and cold water supply
1	Towel dispensers laundered and replenished when required
1	Electric wall-mounted hand drier
1	Liquid soap dispensers with supply of liquid soap, or supply of soap
1	Sanitary bin
2	Wall mirrors
3	Coat hooks
1	Window mounted powered extractor fan
1	Shower unit and changing area in separate compartment with door off main toilet area

APPENDIX 1/1: TEMPORARY ACCOMMODATION AND EQUIPMENT FOR THE OVERSEEING ORGANISATION (Continued)

3. Weather Recording Apparatus

The Contractor shall set up and maintain, at a position to be determined by the Overseeing Organisation, a set of apparatus comprising: maximum/minimum thermometer in a standard shelter and a rain gauge for daily reading. The Contractor shall supply and maintain a portable anemometer provided with tripod and recording device.

4. Computer Equipment

All the equipment listed below shall be maintained by the Contractor up to the issue of the Certificate of Completion for the whole Works plus 12 weeks unless otherwise stated. The equipment will be installed and commissioned by a reputable Quality Assured supplier (BS EN9001). The equipment will be covered by a hardware maintenance contract with an eight hour maximum response time for repair or replacement. Equipment is to be installed in the respective rooms described above in the preceding Section 2 according to the details specified below; these are regarded as typical and alternative suppliers may be considered; the details of the entire package of computers and peripherals shall however be agreed with the Engineer

4.1 Laptop /notebook computers – (to be retained by the allocated users for the duration of the Period of Maintenance)

Dell Latitude E7450 or similar mid range light-weight laptop approved by the Engineer	
Processor type	Intel® Core™ i5 Mobile processor
	• Intel® Core i5
	• 2.53GHz (minimum)
Operating system installed	Genuine Microsoft® Windows® 7 Professional 64-bit
Compatible operating systems	Genuine Windows Vista® Business 64-bit, Genuine Windows Vista® Enterprise, SuSE Linux Enterprise Desktop 10
Display type	WXGA
Display size	14.1 inches diagonal
Product weight	Maximum Weight 2.2kg
Product dimensions (W x D x H)	3.1 (at front) x 33.1 x 24.3 cm
Battery life	Up to 8 hours
System features	
Internal drives	256 GB
Optical drives	LightScribe DVD+/-RW SuperMulti with Double Layer Fixed
Standard memory	8 GB RAM (minimum)
Chipset	nVIDIA Quadro NVS Graphics Card (minimum)
Portability	
Product weight	Maximum Weight 2.2kg
Product dimensions (W x D x H)	3.1 (at front) x 33.1 x 24.3 cm
Display type	WXGA
Display size	14.1 inches diagonal

APPENDIX 1/1: TEMPORARY ACCOMMODATION AND EQUIPMENT FOR THE OVERSEEING ORGANISATION (Continued)

Laptop /notebook computers – (continued)

Connectivity	
Wireless technologies	Intel 802.11a/b/g/n mini-pci card, Bluetooth; 3G Broadband Wireless integrated
Wireless capability	Yes
Modem	56K modem
Network interface	Intel Gigabit Network Connection (10/100/1000 NIC)
Expandability	
External I/O ports	3 USB 2.0 ports, VGA, stereo microphone in, stereo headphone/line out, Firewire (1394a), power connector, RJ- 11, RJ-45
Graphic / audio	
Video resolutions description	1280 x 800 WXGA with camera
Audio	High Definition Audio, stereo speakers, stereo headphone/line out, stereo microphone in, integrated dual- microphone array
Other information	
Keyboard	Full-sized keyboard
Pointing device	Enhanced dual pointing devices (touchpad and pointstick) with scroll zone
Power features	Lithium-Ion battery
Power requirements	AC Adapter with Fast Charge, Spare power pack and cables, Car Charging lead.
Battery life	Up to 8 hours Extended Battery
Security management	McAfee Security Solution, Kensington Lock slot, HP Privacy Filter (optional)
Docking solution	Port Replicator and cabling for mounting in office. Port replicator to be lockable (with 2 keys provided) to allow secure fixing of computer if left in office outside of working hours. Security cable to be provided to connect between locking-point on port replicator and appropriate fixing at the other end mounted securely to the frame of the desk.
Monitor	Minimum 21.5" 1280x800 WXGA
Configuration management	Manufacturer Client Configuration Management Agent

4.2 Network (LAN)

The contractor shall provide the following:-

Facilities to allow for a minimum of ten concurrent Virtual Private Network (VPN) connections via a high speed broadband solution with a minimum connection speed of 8Mb per VPN connection.

One desktop pc is required in order to function as a network server for the Overseeing Organisation. This shall have at least two hard drives (minimum capacity 2Tb each). The server shall have a degree of hardware redundancy built in by utilising hard drive mirroring or similar and an external USB drive (minimum capacity 8Tb) attached to back up data on the server each evening.

The network shall be installed by the Contractor to facilitate free access to internet and enable inter-office communication via email.

APPENDIX 1/1: TEMPORARY ACCOMMODATION AND EQUIPMENT FOR THE OVERSEEING ORGANISATION (Continued)

Facilities to allow for server back up held off-site.

4.3 Ancillary Equipment

4.3.1 Computer Software - All of which shall be the most up to date version available at the Date of Award of Contract

The latest versions of the following software shall be installed on each computer:

- Microsoft Office Professional
- Microsoft Outlook
- Firewall hardware (minimum frequency of updates to be weekly for the duration of the contract)
- Anti Virus software (minimum frequency of updates to be weekly for the duration of the contract)
- Photo editing/image handling software
- CD/DVD authoring/writing software
- Adobe reader
- Autodesk DWG True View and Autodesk DWF viewer
- Suitable software to download Total Station information

The Contractor shall provide 2 copies of AutoCAD LT, MS Project and 1 copy of Adobe Professional with licences to be installed on computers as directed by the Overseeing Organisation.

The software shall be installed on each computer while each full set of the disks and documentation must be supplied for each set of software installed to the Overseeing Organisation.

4.3.2 Copier/Printers

The following are required to be installed in the Rooms, as indicated in the respective tables in preceding Section 2.

1 No combined colour printer copier scanner with e-mail facility, document feeder and sorting collating facility for exclusive use of the Overseeing Organisation. It shall be capable of printing/scanning/copying to both A4 and A3 paper size, producing more than 20 A4 copies per minute. The equipment shall be provided new and installed and commissioned by a reputable Quality Assured supplier (BSEN9001). The equipment shall be covered by a hardware maintenance contract with a minimum eight hour maximum response time for repair or replacement. It shall be connected to the computer network (LAN) and must have associated network software and cabling. Paper and all consumables shall be supplied by the Contractor as required.

1 No stand alone A3 colour printer (with installation software) shall be provided in room A

4.3.3 Photographic and Video Equipment

Portable video camera (GoPro 4 or similar) and appropriate vehicle dashcam mounting kit, spare battery, charger, in-vehicle power supply, memory card (2 No) and memory card reader / transfer cable.

4.4 Telephone System

The Contractor shall provide and maintain a telephone system to service the office accommodation for the use of the Overseeing Organisation.

APPENDIX 1/1: TEMPORARY ACCOMMODATION AND EQUIPMENT FOR THE OVERSEEING ORGANISATION (Continued)

The telephone system shall include sufficient cabling, routers, switches, terminals, telephones and the like such that each member of the Overseeing Organisation and its Representatives has an individual telephone in addition to the telephones provided by the Contractor for its staff.

The Contractor shall provide a general office telephone number, staffed by a receptionist at the offices at the Site compound. The telephone system shall include an appropriate telephone terminal for the receptionist to handle all incoming calls and forward calls to the appropriate staff member in the Overseeing Organisation's team.

The telephone system shall provide direct dial telephone numbers and internal extension numbers for each telephone and shall cater for internal calls between all personnel within the offices.

Each telephone shall provide voicemail, including allowing the recording of an individual voicemail message by the telephone user, and shall allow call management, including holding and transferring calls to other extensions on the telephone system.

The telephone system shall provide sufficient outside lines to allow calls to be made simultaneously from all telephones that form part of the telephone system.

The telephone system may be a network-based system. If the Contractor provides a network-based telephone system, the Contractor shall provide such higher specification of network and broadband system as may be necessary to ensure that the network and broadband provided for the Overseeing Organisation and its Representatives does not deliver a lesser level of performance to the network and broadband specified in Section 4.2 of this Appendix.

The Contractor shall provide and install a conference call speaker phone in room reference C as listed in Section 1.1 above. The conference phone shall as a minimum requirement be a tabletop phone console with integrated LCD display, keypad and loudspeaker, phone book allowing up to 25 entries, adjustable volume control for speaker and 3 microphones with up to 10 ft. microphone pickup range.

Room A, as listed in Section 1.1 above, shall also have 2 No. independent telephone lines and 2 No. ISDN connections in addition to the above.

APPENDIX 1/1: TEMPORARY ACCOMMODATION AND EQUIPMENT FOR THE OVERSEEING ORGANISATION (Continued)

5. Schedule of Surveying and Other Equipment

The following equipment shall be for the exclusive use of the Overseeing Organisation, and shall be as described, or equivalent. The Contractor shall be responsible for the supply of labour and materials for cleaning the equipment as well as maintaining any applicable certification for the equipment throughout the period of the Contract:

Quantity	Item
1	<p>Total Station with the following minimum equipment and specifications:</p> <ul style="list-style-type: none"> • Continuous angle encoder with standard deviation (ISO 17123-3) of 5" and minimum reading of 1" of arc. Accuracy 2mm + 2ppm (ISO 17123-4) with capability of measuring to 3km to a single prism. Capable of measuring to all types of prism targets including retro tape. Fitted with laser plummet. Endless horizontal and vertical drives. On-board memory for at least 10,000 data blocks board applications – surveying and orientation, free station, stakeout, tie distance, height transfers, reference line/arc, are calculations, remote height and hidden point.
2	<p>Heavy duty tripod, tribrach, 2 sets internal batteries and charger, data transfer cable, detail pole and large circular prism with target plate.</p> <p>Half transverse kit comprising a heavy duty wooden tripod, tribrach, carrier, optical plummet and prism.</p> <p>If GPS technology is being used on the contract then the Contractor must supply a GPS(GNSS) receiver to meet the following specifications:</p> <ul style="list-style-type: none"> (i) Completely cable-free 220 channel GNSS rover capable of tracking GPS frequencies (L1, L2, L2C & L5) and GLONASS frequencies (L1, L2). Fully integrated radio or GPRS modem capable of receiving RTCM 3.x and CMRx corrections. Receiver should be fully ruggedized to IP67 rating. (ii) Accuracy (RMS) in Kinematic mode of 8 millimetres+1ppm in plan and 15 millimetres +1ppm in height. Accuracy (RMS) in Network RTK mode of 8 millimetres +0.5ppm in plan and 15 millimetres +0.5ppm in height. (iii) Initialisation reliability should be >99.9% and standard time for initialisation should be less than 10 seconds. (iv) Logger at pole should be fully ruggedized (MIL-STD-810F); have a Windows Mobile operating system and a battery life of up to 30 hours. Application programs to be included – surveying, stakeout, reference line / arc, area calculations and roading. The roading program should support the reading and use of the industry standard MX GENIO format directly (without conversion to maintain integrity of the data). (v) Heavy duty wooden tripod, tribrach, GPS Tribrach adapter, 2 internal batteries, (2400Ah each) and detail pole. (vi) If a local transformation or calibration is being used by the Contractor, the parameters must be supplied. <p>While the total station / GNSS receiver must meet all the above requirements, the total station / GNSS receiver shall not be to any lesser specification than that used by the Contractor's staff and shall be compatible with the Contractor's method of setting out / setting out data and equipment.</p>

APPENDIX 1/1: TEMPORARY ACCOMMODATION AND EQUIPMENT FOR THE OVERSEEING ORGANISATION (Continued)

	The Contractor shall provide training as requested by the Overseeing Organisation on the operation and use of the Total Station.	
1	Automatic Level with (Minimum specification as follows: 30x magnification, accuracy per 1km double levelling of 0.8mm , Single measurement accuracy of 1.2mm at 30m), aluminium tripod, aluminium staff and detachable staff bubble. Notwithstanding the above requirements, the automatic level shall not be to any lesser specification than that used by the Contractor's staff. The Contractor shall provide training as requested by the Overseeing Organisation on the operation and use of the automatic level.	
1	Electronic cover meter (with facility for downloading to computer)	
3	30 metre measuring steel tape	} To be renewed by the Contractor as required by the Overseeing Organisation
1	50 metre measuring fibron tape	
2	30 metre measuring fibron tape	
5	5 metre pocket measuring tapes	
1	Universal straight edge with wedge gauge for measuring depressions	
2	1.0m and 0.3m spirit levels	
4	Rechargeable torch with batteries – replaced as required	
4	LED head torches with batteries – replaced as required	
-	Supply of waterproof marking chalk in various colours, spray road marking paint in various colours, pegs, rails, wooden stakes, nails string and nylon line. Supplies to be renewed by the Contractor as and when required	
3	Claw Hammer	
2	Lump / Club Hammer	
2	Maximum and minimum thermometers in weatherproof case	
1	Intrinsically safe inspection lamp with supply of batteries or chargers	
1	Gas detection apparatus with charger	
1	Digital thermometer with material, surface and air probes	

APPENDIX 1/1: TEMPORARY ACCOMMODATION AND EQUIPMENT FOR THE OVERSEEING ORGANISATION (Continued)

The Contractor shall at any reasonable time make available for the use of the Engineer's Representative, his staff and others acting at his request, all appropriate safety equipment necessary to gain safe access to any part of the Works. The Contractor shall provide all training and attendance necessary for the safe and effective use of equipment provided for the purpose of gaining access to the Works.

The Contractor shall make available to the Engineer the use of any other survey equipment on Site as required.

6. Supply of Documentation

The Contractor shall supply and maintain for the sole use of the Overseeing Organisation one copy, on compact disk from the Stationary Office, suitable for display on the equipment specified in Section 4.1 of Appendix 1/1 of this Specification, of The Manual of Contract Documents for Highway Works and Design Manual for Roads and Bridges comprising:

Specification and Bill of Quantities

- Volume 1 Specification for Highway Works
- Volume 2 Notes for Guidance on the Specification for Highway Works
- Volume 3 Highway Construction Details
- Volume 4 Bills of Quantities for Highway Works

Design Manual for Roads and Bridges

- Volume 1 Highway Structures: Approval Procedures and General Design
- Volume 1a Highway Structures: Approval Procedures and General Design
- Volume 2 Highway Structures: Design (Substructures and Special Structures) Materials
- Volume 2a Highway Structures: Design (Substructures and Special Structures) Materials
- Volume 3 Highway Structures: Inspection and Maintenance
- Volume 3a Highway Structures: Inspection and Maintenance
- Volume 3b Highway Structures: Inspection and Maintenance
- Volume 4 Geotechnics and Drainage
- Volume 4a Geotechnics and Drainage
- Volume 5 Assessment and Preparation of Road Scheme
- Volume 6 Road Geometry
- Volume 7 Pavement Design and Maintenance
- Volume 8 Traffic Signs and Lighting
- Volume 10 Environmental Design and Management
- Volume 10a Environmental Design and Management
- Volume 11 Environmental Assessment
- Volume 12 Traffic Appraisal of Roads Schemes
- Volume 12a Traffic Appraisal of Roads Schemes

APPENDIX 1/1: TEMPORARY ACCOMMODATION AND EQUIPMENT FOR THE OVERSEEING ORGANISATION (Continued)

Traffic Signs Manual

- 1 Copy of Chapter 8 of the Traffic Signs Manual published by the Stationary Office Ltd.
- 1 Copy of Traffic Sign Regulation and General Directions.

British Standards and TRRL Publications

- 1 Copy of each current British Standard and Code of Practice or computerised equivalent all as referred to or cross referenced in the Contract.

- 1 Copy of each relevant Road Note.

Local Authority

- 1 Copy of Aberdeen City Council's 'Guidelines and Specifications for Roads within Residential and Industrial Developments (1998)'.

All volumes shall be current at the reference date as specified in Appendix A to Form of Tender.

7. Safety and Protective Clothing

Sets of the following to be supplied new within 4 weeks after Date of commencement of the Works in sizes as required by the Overseeing Organisation.

Quantity	Item
6 pairs	Wellington Boots with steel toe cap and mid-sole (type to be as agreed by Engineer's Representative)
6 pairs	Waterproof and breathable Protective Safety Boots with steel toe cap and mid-sole (type to be as agreed by Engineer's Representative)
6	Fleece Jacket 380g/m with 2 zipped pockets and draw cord hem. (type to be as agreed by Engineer's Representative)
6	Two band and brace high visibility yellow coats made from high performance waterproof and breathable fabric conforming to BS EN 471 Class 3 and BS EN 343 Class 3 : 3. (GORE-TEX or equivalent type to be as agreed with by Engineer's Representative)
6 pairs	Waterproof over trousers, high visibility to BS EN 471 Class 3 (type to be as agreed by Engineer's Representative)
6 pairs	Poly/cotton work trousers, high visibility to BS EN 471 Class 3 (type to be as agreed by Engineer's Representative)
6	Safety helmets with comfort band chin straps, built in eye protection, detachable ear defenders and detachable thermal insulation
6 pairs	Industrial penetration resistant waterproof gloves
6 pairs	Industrial thermally insulated work gloves
6	High visibility long sleeve vests to BS EN 471 Class 3
12 pairs	Thermally insulated socks
6 pairs	Safety glasses / goggles

APPENDIX 1/1: TEMPORARY ACCOMMODATION AND EQUIPMENT FOR THE OVERSEEING ORGANISATION (Continued)

Additional protective clothing for up to 5 visitors shall be made available on request, for periods of up to one day, comprising 5 No. sets high visibility waterproof anorak and safety helmets plus any other equipment utilised on site as standard / minimum requirement PPE.

The Contractor shall make available for the use of the Engineer's Representative and/or his staff, all appropriate safety equipment necessary to gain safe access to any part of the Works at any reasonable time. The Contractor shall provide all training and attendance necessary for the safe and effective use of equipment provided for the purpose of gaining access to the Works

8. Initial Consumable Stores

The Contractor shall provide regular supplies of consumable items such as those identified in the list below as required for the sole use of the Overseeing Organisation; the quantity stated for each item in the list below is to be supplied immediately or within reasonable time after Date of commencement of the Works.

Quantity	Description
20	A4 lever arch files with dust covers
20	A4 ring binder files
20	Set A4 file indices (plastic) (A - Z or 1 – 20)
20	Set A4 file dividers
6	A4 fold over clipboards
12	A4 pads ruled feint and margin (200 sheets)
2	A4 pads graph paper
1	A3 pads graph paper
12	Ruled all weather cover A6 notebook
8	Ruled hard cover A4 books
2	Box USB storage device (minimum 16Gb each - 25 per box)
2	Box 25 millimetres paper clips
1	Box large drawing pins
4	Bottle white correction fluid
12	Ball point pens (black)
12	Ball point pens (blue)
12	Ball point pens (red)
12	Felt tip pens (Fineliner or equivalent) (black)
12	Felt tip pens (Fineliner or equivalent) (red)
12	Felt tip pens (Fineliner or equivalent) (green)
12	Pencils (HB)

APPENDIX 1/1: TEMPORARY ACCOMMODATION AND EQUIPMENT FOR THE OVERSEEING ORGANISATION (Continued)

1	Box coloured pencils (12 assorted)
3	Pencil Sharpeners
5	Pack highlighter marker pens (6 assorted)
75	A4 manila envelopes
75	DL gummed envelopes
5	Stick adhesive (Pritt stick or equivalent)
5	Roll sellotape with dispenser (25 millimetres wide)
5	Roll invisible tape with dispenser (25 millimetres wide)
20	"Post it" note pads 76 x 127 millimetres
4	Roll drafting tape
1	Time and date received dial stamp
1	Stamp pad with black ink
20	A4 document wallet
100	A4 clear plastic file pockets (top opening)
100	Suspension files with tabs and inserts

9. Office Insurance

The Contractor shall provide for the insurance against all risks, of the contents of the offices including the property of the Overseeing Organisation and his staff together with any staff of the Employer who may visit the offices from time to time. This includes personal effects required in the normal course of duty and other computer equipment supplied by the Overseeing Organisation and/or the Employer.

10. Heating and Lighting

The offices shall be adequately provided with electric heating capable of maintaining a uniform room temperature of at least 20 degrees centigrade and shall be lit with electrical fluorescent diffused lighting to a standard acceptable for a drawing office to achieve a minimum of 500 lux measured at drawing boards and the horizontal tops of desks. An external light shall be provided over the entrance to the building shielded to prevent misleading traffic on the public road.

11. Required Time Duration for Providing and Maintaining Accommodation and Equipment

Period 1: Period 1 means

The Principal Offices including their contents, access roads and hard-standings thereto shall be available for occupation within 4 weeks of the Date for Commencement of the Works and shall be maintained and serviced until 12 weeks after the issue of the Certificate of Completion pursuant to Clause 48 of the Conditions of Contract in respect of the whole of the Works as referred to in Sub Clause 48(3), or until completion of any outstanding works, whichever is the latest.

APPENDIX 1/1: TEMPORARY ACCOMMODATION AND EQUIPMENT FOR THE OVERSEEING ORGANISATION (Continued)

Period 2: Period 2 means

The reduced office accommodation including contents applicable to the rooms defined, access road and hard-standings shall be maintained and serviced from the expiry of the Period 1 until 24 weeks after the issue of the Certificate of Completion for the whole of the Works as specified in the Form of Tender.

APPENDIX 1/2: VEHICLES FOR OVERSEEING ORGANISATION
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The following specification fulfils the vehicle requirements for the Works.

Vehicles shall be new, of a light colour, approved by the Engineer in accordance with Section O5.2 of Part 2 of Chapter 8 of the Traffic Signs Manual and be free from markings identifying any company associated with the Contract. If the vehicle is not a conspicuous colour a minimum 50 mm wide high visibility fluorescent yellow retroreflective tape shall be applied along each side of the vehicle.

The vehicles shall be equipped with high visibility rear markings. High visibility rear markings should comprise of chevron markings comprising alternate strips of fluorescent orange-red retroreflective material and fluorescent yellow non-retroreflective material, of not less than 150mm width each, inclined at 45-60° to the horizontal and pointing upwards. The markings should cover as much of the rear-facing portion of the vehicle as possible without obscuring windows, vehicle lighting or registration plates. Retroreflective tape shall be placed on the rear facing edges of doors that are opened.

The vehicles shall be equipped with fire extinguisher, first aid kit, sign board reading 'Highway Maintenance' in accordance with Diagram 7404 of Schedule 13, Part 6 of the Traffic Signs Regulations and General Directions 2016 (The lettering shall be the largest x height that can be accommodated out of the following heights: 37.5, 50, 62.5, 75 or 100mm) and one or more suitable roof mounted amber flashing distinctive lamps fitted in accordance with Section O5.3 of Part 2 of Chapter 8 of the Traffic Signs Manual and The Road Vehicle Lighting Regulations.

Vehicle Types A to B shall be provided for the exclusive use of the Engineer at all times. The Contractor shall indemnify the Overseeing Organisation, the Engineer, his representatives and their respective staffs authorised to drive the vehicles against claims in respect of damage to vehicles including claims from passengers. The vehicles shall be cleaned inside and outside once per week by the Contractor. An equivalent vehicle shall be provided whilst any vehicle undergoes servicing or repair.

Unless agreed otherwise with the Overseeing Organisation vehicles shall be plug in hybrid or electric. One charging point per vehicle (powered from the National Grid) shall be provided as part of the parking requirements for the Overseeing Organisation in accordance with Section 1.1 of Appendix 1/1.

Anticipated mileage is 250 miles/week/vehicle.

The following vehicles of EC manufacture shall be provided:

TYPE	VEHICLE	NUMBER REQUIRED	PERIOD REQUIRED
A	Short wheelbase vehicle suitable for off-road use with 4 wheel drive, hard top and sides (Mitsubishi Outlander PHEV or similar).	1	From Commencement to Date of Completion for the whole of the Works plus 12 weeks
B	2/4 door estate / hatchback (Nissan Leaf or similar)	2	From Commencement to Date of Completion for the whole of the Works plus 12 weeks

In addition to the above, vehicle of type A above shall be fitted with heavy duty suspension, tyres suitable for off-road use (from 01 October to 15 May vehicle tyres are to be changed for winter – 3PMSF certified versions), spare wheel, fuel filler cap lock, bonnet lock and spare wheel lock, internal and external mirrors, mud flaps, link mats front and rear (where applicable), mudshields for

APPENDIX 1/2: VEHICLES FOR OVERSEEING ORGANISATION (Continued)
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front and rear brakes, rubbers pads for clutch and brake pedals, interior sun visors, gearbox covers, tow rope, towing hooks front and rear, laminated windscreen, wire mesh guards for side, tail and flasher lamps, covers for universal joints/hernbolts and sumpguards and 2 number fitted rear seats to vehicle Type A.

APPENDIX 1/3: RADIO COMMUNICATION SYSTEM FOR THE OVERSEEING ORGANISATION

The following specification fulfils the communication system requirements for the Works.

6 No. mobile smartphones (minimum internal memory 16GB) with colour screen and the capacity to record and send minimum 13MP photographic images, capable of reception at all parts of the site.

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

Notes:

1. Unless otherwise stated below, all sampling and testing in this Appendix shall be undertaken by the Contractor.
2. Tests comparable to those specified in this Appendix will be necessary for any equivalent work, goods or materials proposed by the Contractor (See sub-clause 105.4)
3. (N) indicates that a United Kingdom Accreditation Service (UKAS) or European Co-operation for Accreditation of Laboratories (EAL) accredited laboratory sampling and test report or certificate is required.
4. Unless otherwise shown in this Appendix, tests for work, goods or materials as scheduled under any one Clause are required for all such work, goods or materials in the Works.
5. Cube strengths are not required for concrete complying with Clause 2602.
6. Unless otherwise shown in this Appendix, test certificates for work, goods or materials as scheduled under any one Clause are required for all such work, goods or materials in the Works.
7. The Contractor's attention is drawn to the Employer's Requirements for additional testing requirements.

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.

8. All samples and cores taken for testing in accordance with Series 900 of the Specification shall be photographed against a suitable base scale to the approval of the Overseeing Organisation.
The photographs, together with corresponding RRS1 and CRS1 Forms included in Clause 952AR of Appendix 0/1, shall be delivered to the Overseeing Organisation within seven days of the sampling on site.
9. All reference to FWD within this Appendix shall mean Falling Weight Deflectometer as described in HD29 of the DMRB.

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

Clause	Works, Goods or Material	Test	Frequency Testing	of	Test Certificate	Comments
Series 100						
109	Noise Control	L _{Aeq}	As required in Appendix 1/9			Standard as per Appendix 1/9
	Vibration Control	Peak particle velocity	As required in Appendix 1/9			Standard as per Appendix 1/9
Series 300						
306	Permanent fencing					Quality management scheme applies
	Concrete components	Cover to reinforcement	1 per consignment (maximum 1 per 100 components) (BS 1722)			
308	Gates and stiles					Quality management scheme applies
	Reinforced concrete posts	Cover to reinforcement	1 per consignment (maximum 1 per 100 components) (BS3470)			
308 and 311	Preservation of timber	Full sapwood penetration	As required in sub-Clause 311.2(v)		Required for each batch	Quality management scheme applies
Series 400						
402	Welding	Welding procedures (Manufacturer's tests)	(Every seven years)		Required	Quality management scheme applies
		Welder qualification (Manufacturer's tests)	As required in sub-Clause 402.6 (iii)			
		Production testing (Manufacturer's tests)	As required in sub-Clause 402.6(iv)			
	Welded joints	Destructive testing	As required in sub-Clause 402.6(v) and (vi)			
403	Anchorage and attachment systems for use in drilled holes.	Ultimate tensile load (Manufacturer's tests).			Required	To provide well attested and documented evidence.
404	Anchorage in drilled holes	On-site tensile load test	As required in Appendix 4/1		Required	
	Post foundations		A minimum of 1 test and not less than 1 test per 100m of safety barrier			

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

Clause	Works, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 400 (continued)					
406	Vehicle Parapets.			Required (BS6779-1 1998 (Amd No 14290, 21 March 2003))	Quality Management Scheme applies
407	Anchorage and attachment systems for use in drilled holes	Ultimate tensile load (Manufacturers test)		Required	To provide well attested and documented evidence
409	Vehicle parapet posts	Production testing as specified BS6779-1 1998 Amd No 14290 21 March 2003 (Manufacturers tests)		Required	Certification in accordance with Clause 409 is required
410	Anchorage in drilled holes	On site tensile load test	As required in Appendix 4/1	Required	

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

Clause	Works, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments		
Series 500							
501	Pipes for drainage and service ducts	Vitrified clay			Product certification scheme applies		
		Concrete - PC/SRC				not exceeding 900mm diameter	(See Note 2)
		Concrete - Pre-stressed					
		Iron - cast					
		Iron - ductile				(See Note 2)	
		PVC-U					
		GRP					
		Plastics. See Table 5/1					
		Corrugated steel				(Manufacturer's tests)	Required (AASHTO)
		Corrugated steel bitumen protection				Not exceeding 900 mm diameter	
	Other materials		Required	BBA certification (or equivalent) applies			
503	Pipe bedding	Grading and fines content	1 per week (min of 3)	Required			
		Water-soluble sulfate (WS) content (N)	5 per source				
		Oxidisable sulfides (OS) content and total potential sulfate (TPS) content (N)					
		Resistance to fragmentation (N)	1 per source				

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

Clause	Works, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 500 (continued)					
505	Filter medium backfill	Plastic index (N)	1 per source	Required	
		Resistance to fragmentation (N)	1 per source		
		Water-soluble sulfate (WS) content (N)	5 per source		
		Oxidisable sulfides (OS) content and total potential sulfate (TPS) content (N)	5 per source		
		Grading and fines content	1 per week		
		Permeability (N)	1 per source		
506	Sealing existing drains				
	Concrete				
	Grout				
507	Chambers				Product certification scheme applies
	Precast concrete				
	Corrugated galvanized steel	(Manufacturer's tests)		Required	Product certification scheme applies
	Manhole steps				
	Steel fitments				
	Covers, grates and frames				Product certification scheme applies
Cover bolts					Quality management scheme applies

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

Clause	Works, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 500 (continued)					
508	Gullies and pipe junction				Product certification scheme applies
		Precast concrete			
		Clay			
		Cast iron and steel			
509	Watertightness of joints	Air test	All pipelines with watertight joints	Required	
512	Backfill to pipe bays	Grading	1 per 50 tonnes (min of 3)	Required	Minimum to allow for natural variability of sulfur compounds
		Water-soluble sulfate (WS) content (N)	5 per source		
		Oxidisable sulfides (OS) content and total potential sulfate (TPS) content (N)	5 per source		
513	Permeable backing to earth retaining structures	Plastic index (N)	1 per source	Required	
		Water-soluble sulfate (WS) content (N)	5 per source	Required	
		Oxidisable sulfides (OS) content and total potential sulfate (TPS) content (N)	5 per source		
		Resistance to fragmentation (N)	1 per source		
		Grading	1 per 200 tonnes (min of 3)		
		Permeability (N)	1 per source		
	Precast hollow concrete blocks	(Manufacturer's tests)		Required	

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

Clause	Works, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments	
Series 500 (continued)						
514	Fin Drains	(Manufacturer's tests)		Required	BBA certification (or equivalent) applies	
515	Narrow filter drains					
		Geotextile, pipes and fittings	(Manufacturer's tests)		Required	BBA certification (or equivalent) applies
		Granular fill	Plastic index (N)	1 per source		
			Resistance to fragmentation (N)			
			Water-soluble sulfate (WS) content (N)	5 per source		
			Oxidisable sulfides (OS) content and total potential sulfate (TPS) content (N)	5 per source		
			Grading and fines content	1 per week (min of 3)		
Permeability (N)	1 per source					
516	Combined drainage and kerb systems	Load test	A minimum of 1 test and not less than 1 test per 1000 metres for each type and source	Required	Certification that the systems comply with Clause 516 is required	
517	Linear Drainage Systems	Load Test	A minimum of 1 test and not less than 1 test per 1000 metres for each type and source	Required	Certification that the systems comply with Clause 517 is required	
518	Thermoplastics structured wall pipes and fittings	(Manufacturer's tests)		Required	BBA certification (or equivalent) applies	

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

Clause	Works, Goods or Material		Test	Frequency of Testing	Test Certificate	Comments	
Series 600							
601, 631 to 637, 640	Acceptable material				Required	[For recycled aggregate see sub-Clauses 601.12 and 601.18]	
	Class	General Description					
	1	General granular fill	Grading/uniformity coefficient	Twice a week	2 per 1000 m ³ up to max of 5 per day per source	Required	[LA category]
			mc/MCV (N)	Weekly			
			1C only	Resistance to fragmentation (N)			
	2	General cohesive fill	Grading	Twice a week	2 per 1000 m ³ up to max of 5 per day per source	Required	Cross reference should be made to any requirements in Appendix 6/1.
			mc/MCV/PL Undrained shear strength (N)				
			Bulk density (pfa) (N)	2 per 1000 m ³ up to max of 5 per day per source			
	3					Required	
	4	Landscape fill	Grading/mc/MCV (N)	Daily			
	5	Topsoil	Testing for characteristics in accordance with BS 3882:2015, Table 1	Daily			
	6	Selected granular fill	Grading/uniformity coefficient	1 per 400 tonnes	1 per 400 tonnes	Required	[LA category but not for Class 6F4 and 6F5]
			PI/LL (N)	Daily			
			Resistance to fragmentation (N)	Weekly for on-site material			
SMC (N)			Weekly				
		omc/mc, mc/MCV (N)	1 per 400 tonnes			[Not for Class 6F4 and 6F5]	

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

Clause	Works, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments	
Series 600 (continued)						
601, 631 to 637 640 (cont'd)	6 (cont'd)	Selected Granular fill (cont'd)	Organic matter/water soluble (WS) sulfate content (N)	Weekly	Required	[At least 5 tests per source sulfur compounds over the course of the contract in accordance with TRL Report 447, tests 1-5]
			Oxidisable sulfides (OS) content and total potential sulfate (TPS) content (N)	Weekly		
			pH/chloride ion content (N)	Weekly		
			Resistivity (N)	As required		
			Undrained and drained shear parameters (N)	As required			[Cross reference should be made to any requirements in Appendix 6/1]
	6F4 and 6F5	Selected granular fill	Size designation and overall grading category	1 per week	Required	[Results of routine control tests from the factory production control system operated by the producer to be provided for Class 6F4 and Class 6F5 – see Annex C of BSI BS EN 13242 + A1 and Annex C of BS EN 13285]
			Maximum fines and oversize categories	1 per week		
			Volume stability of blast furnace slag	6 monthly		
			Volume stability of steel (BOF and EAF) slag	6 monthly		
			Other aggregate requirements	Annex C of BSI BS EN 13242 + A1		
			Laboratory dry density and optimum water content	As required		
	Water content	As required	[Declared values from the factory production control system operated by the producer to be provided for Class 6F4 and Class 6F5 – see Annex C of BS EN 13285]			
	7	Selected cohesive fill	Grading/mc/MCV/bulk density (N)	1 per 400 tonnes	Required	[At least 5 tests per source for sulfur compounds over the course of the contract in accordance with TRL Report 447, tests 1-5]
PI/LL (N)			Daily			
Organic matter water soluble (WS) sulfate content (N)			Twice a week or daily when sulfates are expected			

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

Clause	Works, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments	
Series 600 (continued)						
601, 631 to 637 640 (cont'd)	7 (cont'd)	Selected cohesive fill (cont'd)	Oxidisable sulphides (OS) and total potential sulfate (TPS) content (N)	Twice a week or daily when sulphides are expected	Required	[At least 5 tests per source for sulfur compounds over the course of the course of the contract]
			pH/chloride ion content (N)	Weekly		
			Resistivity (N)	As required		
			Undrained and drained shear parameters (N)	As required		
			Permeability (N)	As required		
	8	Miscellaneous fill	mc/MCV (N)	Daily		[Cross reference should be made to any requirements in Appendix 6/1].
	9	Stabilised materials	Pulverisation	1 per lane width per 200 metre length		
			mc/MCV (N) Bearing ratio (N)			
	Pulverised fuel ash		Chemical analysis	1 per consignment		[At least 5 tests per source for sulfur compounds over the course of the contract in accordance with TRL Report 447, tests 1-5]
	Furnace bottom ash		Grading	1 per 300 tonnes		
Fill adjacent to cementitious material or metallic items		Water-soluble sulphate sulfate (WS) content, oxidisable sulphides (OS) content and total potential sulfate (TPS) content (N)	1 per 400 tonnes or per location if less than 400 tonnes			
602	Earthworks material beneath surface of a road or paved central reserve		Frost heave (N)		Required	
	(i) Imported onto site			1 every four months		
	(ii) On Site source			1 per source		
609 621	Geotextiles		Tensile strength	1 per 400 square metres	Required	
			Elongation			
			Tensile strength of seams and joints			
			Static puncture			
			Characterisitic opening size			
			Water permeability			
			Durability			

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

Clause	Works, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments	
Series 600 (continued)						
612	Compaction of fills			Required		
		Method compaction	Field dry density (N)		As required	
		End product compaction	Optimum mc (2.5kg rammer/vibrating hammer method) (N)		Each class or sub class of material	
			Field dry density (N)		1 per 400 tonnes	
614	Cement stabilisation to form capping	Rate of spread of cement	1 per 500 square metres of cement spread	Required		
		Grading	1 per 1000m ²			
		Uniformity Coefficient				
		Mc	3 per 1000m ²			
		MCV	Immediately before compaction			
		Liquid Limit	1 per 1000m ²			
		Plasticity Index	1 per 1000m ²			
		Organic Matter	1 per 1000m ²			
		Water soluble (WS) sulfate content	1 per 1000m ²			
		Oxidisable sulphide (OS) content	1 per 1000m ²			
		Total potential sulfate (TS) content	1 per 1000m ²			
		Pulverisation	2 per 1000m ²			
		Bearing ratio	5 per 1000m ²			
615 641 643	Lime stabilisation to form capping	Rate of spread of lime	1 per 500 square metres of lime spread	Required		
		Available lime content	Each source of lime weekly during stabilisation operation			
		Grading	1 per 1000m ²			
		Mc	3 per 1000m ²			
		MCV	Immediately before compaction			
		Plasticity Index	1 per 1000m ²			
		Organic Matter	1 per 1000m ²			
		Water soluble (WS) sulfate content	1 per 1000m ²			
		Oxidisable sulphide (OS) content	1 per 1000m ²			
		Total potential sulfate (TS) content	1 per 1000m ²			
		Pulverisation	2 per 1000m ²			
Bearing ratio	5 per 1000m ²					
622 638 639	Earthworks for reinforced soil and anchored earth structures	Redox potential	5 locations within the affected area	Required		
		Drainage layers	Grading		1 per 400 tonnes	
			Chemical analysis			
		Reinforcing elements	Coeff. of friction		Each type of element with each type of fill	
Anchor elements	Adhesion					
624	Ground anchorages	Proof loading	As required in Appendix 6/10	Required		
626	Gabions			Required (ASTM G23)		
		Fill	Grading		1 per 400 tonnes	

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

		Los Angeles coefficient			
		Geomesh	[As appropriate to properties stated in Appendix 6/10]	1 per 400 square metres	
		PVC coated wire			
631	Subgrade	Falling Weight Deflectometer Testing (FWD) or Light Weight Deflectometer in accordance with Clause 895AR)	FWD/LWD testing at 20m centres per lane.	Required	Foundation Surface Modulus
	Capping or Stabilised Materials	Falling Weight Deflectometer Testing (FWD) (or Light Weight Deflectometer in accordance with Clause 895AR)	FWD/LWD testing at 20m centres per lane.	Required	Foundation Surface Modulus
642	Earthworks materials for corrugated steel buried structures	Constrained soil modulus (M*)	3 on each side of each structure	Required	

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

Clause	Works, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 700					
710	Constituent materials in recycled aggregate	Quality control	Checks are to be carried out by the Contractor in accordance with the procedure set down in 'Quality Control – Production of Recycled Aggregates' and with those in this Clause	Required	The quality control procedure should be in accordance with the 'Quality Control – Production of Recycled Aggregates' published by Waste and Resources Action Programme is available from WRAP website, http://www.wrap.org.uk The results of all quality control checks shall be delivered promptly to the Scottish Ministers on request
711	Overbanding and inlaid crack sealing systems			Required	BBA certification (or equivalent) applies

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

Series 800					
801, 803, 804, 805, 806	General requirements for unbound mixtures adjacent to cement bound materials, concrete pavements, structures or products	Water-soluble sulfate (WS) content (N)	1 per 400 tonnes or per location if less than 400 tonnes	Required	
		Oxidisable sulfides (OS) content and total potential sulfate (TPS) content (N)	1 per 400 tonnes or per location if less than 400 tonnes		
	Unbound mixtures beneath surface of a road or paved central reserve	Frost heave (N)	1 per source		
		Grading and fines content	1 per week		
		Plastic index (N)			
		Resistance to fragmentation (N)	6 monthly		
		Resistance to wear micro-Deval test	1 per source		
		Resistance to freezing and thawing (magnesium sulfate soundness) (N)	1 per source		
		Water absorption (N)	As required		
		Volume stability of blast furnace slags	6 monthly		
		Volume stability of steel (BOF and EAF) slags	6 monthly		
		CBR (N)	1 per source and then monthly		
		OMC/mc (N)	As required		
		Density (N)	As required		
		Water absorption (N)	As required		
	Falling Weight Deflectometer Testing (FWD) (or Light Weight Deflectometer in accordance with Clause 895AR).	FWD/LWD testing at 20 metre centres per lane.	Foundation Surface Modulus		
821, 822	Cement and other Hydraulically Bound Mixtures (HBM)	Tests for control and checking of HBM	Test specified in Table 8/14 and Table 8/15	Required	
		Coefficient of linear expansion	As required		
		Tests for laboratory mixture design	Test specified in Clause 880		
		Falling Weight Deflectometer Testing (FWD) (or Light Weight Deflectometer in accordance with Clause 895AR)	FWD/LWD testing at 20metre centres per lane.			Foundation Surface Modulus

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

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments	
Series 900						
901, 925, 937, 938, 943	Aggregates for bituminous material			Required	National quality management scheme applies	
		Resistance to fragmentation (hardness)	Resistance to fragmentation (N)	1 per source and then annually		
		Resistance to freezing and thawing (durability)	Soundness (N)	1 per source and then annually		
			Water absorption (N)	1 per source and then annually		
		Cleanness	Sieve test (mass passing 0.063mm sieve) (N)	Monthly		Washing and sieving method to be used
		Shape	Flakiness index (N)	Monthly		
		Blast furnace slag	Bulk density (N)	1 per 500 tonnes		[BS EN 1097-3]
			Soundness (N)	Once every 4 months		
			Dicalcium silicate disintegration (N)	1 per 500 tonnes		
			Iron disintegration (N)			
		Steel slag	Bulk density (N)	1 per 500 tonnes		
			Volume stability (N)	1 per 500 tonnes		
		Coarse aggregate for surface courses	Resistance to polishing (PSV) (N)	Latest 3 results and then annually per source		
			Resistance to surface abrasion (AAV) (N)	1 per source and then annually		
		Binders for bituminous materials	Penetration (N)	1 per 750 tonnes		Required	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 Scottish Ministers
	Softening part (N)		1 per 750 tonnes			

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

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 900 (continued)					
903 to 907, 909 to 912, 914, 916, 925, 926, 929, 930, 937, 938, 941, 943, 946 to 948	Bituminous mixtures	Grading (N)	For Audit Test purpose only		All bituminous mixtures shall be CE marked
		Binder Content (N)			
929	Base and Binder Course Asphalt Concrete (Design Mixtures) Base and Binder Course Macadams	Permanent Works - In situ air void content (N)	20m intervals in alternate wheel-tracks	Required	
		Permanent Works - Refusal air void content (N) (PRD Test)	Every 500 lane metres		
		Deformation resistance (design) (N)	6 cores from the first km then 1 core from subsequent kms		
		Stiffness (N)	1 wheeltrack core pair per lane km		
		Air voids in wheeltrack cores	1 wheeltrack core pair per lane km		
		Air voids in edge cores	1 per 250 lane metres, unsupported edge only		
930	EME 2	Permanent Works - In situ air void content (N)	20m intervals in alternate wheel-tracks	Required	The test certificate is the CE Mark for the mixture
		Richness modulus (design)		Required	
		Duriez (design)			
		Deformation Resistance (design)			
		Stiffness (design)			
		Air voids in wheeltrack cores	1 wheeltrack core pair per lane km		
		Air voids in edge cores	1 per 250 lane metres, unsupported edge only		
Stiffness (N)	1 wheeltrack core pair per lane km				
911TS	Hot Rolled Asphalt surface course (design mix)	Stability value (N)	1 per source	Required	The test certificate is the CE Mark for the mixture. National quality management sector scheme applies
		Flow value (N)			
		Density (N)			
915	Coated chippings	Grading (N)	1 per source	Required	
		Binder content (N)			
		Flakiness index (N)			
		Resistance to polishing (PSV) (N)			
		Resistance to surface abrasion (AAV) (N)			
		Hot sand test (N)			
		Rate of spread (N)			

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

921	Surface macrotexture	Volumetric Patch (N) BS EN 13036-1 Volumetric Patch Technique (N)	10 individual measurement taken at approximately 5m spacing along a diagonal line across the lane width	Required	There is no compliance requirement for surface macrotexture in TS2010 materials, testing to be carried out for information gathering purposes only
924	High Friction Surfaces	Quality control checks	As required in sub- Clause 924.5. As required in sub-Clause 924.6	Required	BBA HAPAS Roads and Bridges certification (or equivalent) applies
		System coverage			
	Aggregate	Resistance to polishing (PSV) (N)	1 per source* and as required for coated chippings in Clause 915.3	Required	
Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 900 (continued)					
937	Stone mastic asphalt (SMA) binder course and regulating course	Permanent Works - In situ air void content (N)	6 cores from the first Km then 1 core from each subsequent Km	Required	National quality management sector scheme applies
		Permanent Works - Deformation resistance.			
		Binder drainage test (design)			
		Deformation resistance (design)			
Scottish Surface Course Specificatio n TS2010	Thin surface course system, TS2010	General properties	In accordance with TS2010 Surface Course specification & Guidance Issue 03 (October 2015) and BS EN 13108- 21	Required	Approval certificate required National quality management sector scheme applies.
943	Hot Rolled Asphalt surface course and binder course (performance related design mixtures)	Permanent Works - In situ air void content (N)	6 cores from first Km then 1 core from each subsequent Km	Required	National quality management sector scheme applies. The test certificate is the CE mark for the mixture,
		Permanent Works - Deformation resistance(N)			

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

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments		
Series 900 (continued)							
918	Slurry surfacing incorporating microsurfacing	Binder			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, Scottish Ministers.		
			Product identification	Per product per source	Required	Tests are expected to be repeated every two years	
			Vialit cohesion	Per product per source	Required	Tests are expected to be repeated every two years	
			Rate of spread	For each machine	Required	Not more than 6 weeks prior to start of work	
			Penetration at 25°C and 5°C (N)	Every manufactured batch		Manufacturer's QA test results may be submitted	
			Aggregates	Flakiness index (N)	1 per source	Required	<i>(Less than 6 months prior to work)</i>
				Resistance to polishing (AAV) (N)	Source approval	Required	<i>(Less than 6 months prior to work)</i>
				Resistance to surface abrasion (AAV) (N)	Source approval	Required	<i>(Less than 6 months prior to work)</i>
			Grading (N)	1 per 200 tonnes	Required		
			System	TAIT or BBA/HAPAS		Required	
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	

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

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 900 (continued)					
919 922	Surface Dressing				National quality management sector scheme applies
		Binder			
	Product identification		1 per product per source	Required	Tests are expected to be repeated every two years
	Vialit cohesion (N)		1 per product per source	Required	Tests are expected to be repeated every two years
	Accuracy of spread		1 for each binder and spray per week	Required	Not more than 6 weeks prior to start of work and one per week
	Rate of spread		Every 1000 linear metres initially	Required	Frequency to be reduced to daily after 3 satisfactory results, but not less than 1 test per site
	Penetration at 25°C and 5°C (N)		Every batch		For cut back binders as supplied, manufacturer's QA viscosity test results may be submitted
	Chippings	Resistance to (PSV) polishing (N)	Source approval	Required	Less than 6 months prior to work
		Resistance to abrasion (AAV) (N)	Source approval	Required	Less than 6 months prior to work
		Grading (N)	1 per 200 tonnes	Required	
		Binder content (N)	1 per 200 tonnes	Required	Coated chippings only
		Flakiness index (N)	1 per 200 tonnes	Required	
		Accuracy of spread (N)	1 for each chipping spreader for every change of chipping size or source	Required	Initial test not more than 6 weeks prior to start of work
		Rate of spread	Every 500 linear metres initially		Frequency to be reduced to daily after 3 satisfactory results, but not less than 1 test per site
	System	TAIT or BBA/HAPAS		Required	
	Rollers	Water spray bars working	Before work starts and daily during works		

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

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 900 (continued)					
950	Depressions				BBA HAPAS Roads and Bridges Certification (or equivalent) applies.
Series 1000					
1001 1030 1044	Cement			Required	Quality management and product certification schemes apply
	Portland cement CEM I				Tests and test certificates are required
	Portland blastfurnace cement				
	Blastfurnace cement CEM III/A				
	Portland PFA cement CEM II/B-V				
	Pozzolan cement CEM IV/A			Required (BS6610)	
	Portland cement with microsilica			Required	BBA Roads and Bridges Certificate required for microsilica
	Pulverised - fuel ash				Tests and test certificates are required.
	Ground granulated blast furnace slag				Product certification schemes apply to pfa and slag.
	Admixtures				
Mixing water	Sulfate content (N)	Monthly			
Aggregates	Resistance to freezing and thawing - magnesium sulfate soundness (N)		1 per source	Required	
	Water absorption (N)		As required		

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

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 1000 (continued)					
1001 1030 1044 (cont'd)		Flakiness index (N)	Monthly	Required	
		Shell content (N)	1 per source		
		Resistance to fragmentation (N)	6 monthly		
		Resistance to polishing (PSV) (N)	1 per source		
		Resistance to abrasion (AAV) (N)	1 per source		
		Grading and fines content (N)	1 per week as per source		
		Chloride content (N)	Weekly or as otherwise agreed (1 per source for CBM Aggregate)		
		Total sulfur (TS) and acid-soluble sulfate (AS) content (N)	Every 6 months		
	Flint coarse aggregate containing white flints	Water absorption (N)	3 per source thereafter weekly	Required	Not required for CBM aggregate
	Sand (i.e. Fine aggregate)	Acid-soluble material (N)	Monthly		
	Blastfurnace slag	Bulk density (N)	Every 6 months	Required	
		Dicalcium silicate disintegration (N)	Every 6 months		
		Iron disintegration (N)	Every 6 months		
		Total sulfur (TS) and acid-soluble sulfate (AS) content (N)	Every 6 months		
	Pulverised-fuel ash			Required (BS3892: Part 2)	

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

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 1000 (continued)					
1002 1003 1004 1044	Pavement Concrete	Air content test (N)	As required in Table 10/10	Required	Product certification scheme applies
		Density (N)	As required in Table 10/10		
		Strength (N)	As required in Table 10/10		
1005	Consistence (Workability)	Degree of Compactability (Compaction Index) (N)	As required in Table 10/10	Required	
		Vebe (N)			
		Slump (N)			
1011 1012	Dowel bars Tie bars			Required (BS 4449)	Product certification scheme applies
	Dowel bars and supporting cradles	Load test	1 per arrangement		
	Sheathed dowel bars	Bond stress	4 bars		
	Cranked tie bars (coated)	Bend test Salt fog cabinet	4 bars 4 bars		
1015	Joint filler board	Weathering test	3 per source	Required	Normally undertaken by manufacturer
		Compression and recovery	4 per source		
		Extrusion	1 per source		
	Cork filler board	Immersion in water	2 per source		
		Immersion in acid	2 per source		
1016 1017	Applied sealants	Initial Penetration	1 per 1000 m or 1 per day	Required (BS EN14188-1, BS 2499-2, BS5212-1, BS5212-2, (BSEN13880-2, BSEN13880-3 and BS42454)	
			Resilience			1 per 1000 m or 1 per day

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

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 1000 (continued)					
1016 1017 (cont'd)	Compression seals			Required (ASTM D2628) (BS2752)(BS 4443:Part 4 Method 10 and BS EN ISO 2440) (BS EN ISO 1856) (BS903: Part A16 or BS ISO 1817)	
		Compression set	1 per type of seal		
	Immersion in oil	1 per type of seal			
	Self expanding cork seal	Tests specified in Clause 1017	1 per type of seal	Required	
1026 1044	Surface macrotexture	BS EN 13036 – 1 Volumetric Patch Technique (N)	1 per day (set of 10)	Required	
1027	Aluminised curing compound	Efficiency index	1 per source	Required	
1030	Wet lean concrete	Density	As required in Table 10/9	Required	
		Cube strength (N)			
1043	Foamed Concrete	Cube strength (N)	2 cubes per 12m ³	Required	

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

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 1100					
1101	Precast concrete kerbs, channels, edgings and quadrants	Bending Strength	Minimum of 8 per 1000 units of each product (BS EN 1340)	Required	
1102	In situ asphalt kerbs	Grading	1 test per 500 metres laid	Required	
		Binder content			
1104	Precast concrete flags	Bending strength	Minimum of 8 per 1000 m ² of each product (BS EN 1339)	Required	
		Bedding				Granular material Mortar
1107	Concrete block paving	Compressive strength	Minimum of 8 per 1000 m ² of each product (BS EN 1338)	Required	
1108	Clay pavers	Bending strength	Minimum of 8 per 1000 m ² of each product (BS EN 1344)	Required	
		Skid resistance	Minimum of 8 per 1000 m ² of each product (BS EN 1344)		

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

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 1200					
1202	Permanent traffic signs			Required	Quality management scheme applies. Certification that the traffic sign is capable of passing the tests in BS 873: Part 1 is required.
1207	Anchorage in drilled holes to supports of traffic signs	Loading test on site			
1210	Holding down bolts and anchorages to bases of permanent bollards			Required	Certification that the holding down bolts and anchorages are capable of complying with the performance requirements of BS873: Part 3 is required.
1212	Road Markings	Tests specified in BS EN 1824		Required	National quality management sector scheme applies. Procedures are given in BS EN 1824
	Glass Beads	Arsenic trioxide content, lead and Antimony content (N)	One per contract and for specific source of supply	Required	

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

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 1200 (continued)					
1214	Permanent traffic cones and traffic cylinders			Required	Certification that permanent traffic cones and cylinders have been tested and comply with BS EN 13422 is required
		Test specified in BS EN 13422	2 of each size and category / type		
	Flat traffic delineators			Required	Certification that the FTD's have been tested and comply with Clause 1214 is required
		Test specified in Clause 1214	As required		
	Other traffic delineators			Required	Certification that the delineators have been tested and comply with Clause 1214 is required.
		Test specified in Appendix 12/4	As required		
Temporary cones, cylinders, FTD's and other delineators			Required	Certification that at least 1 in 500 of any batch of cones, cylinders, FTD's and other delineators to be used in the Temporary Works have passed the tests in Clause 1214 as appropriate is required.	
1217	Traffic signals				Quality management scheme applies. Statutory type approval of equipment applies.
	Cables				Product certification scheme applies
	Controllers <i>[Other equipment]</i>	Test specified in Appendix 12/5	Each controller before delivery to Site and again after installation		
	Cabling	Tests a, b, c, e, f, g, h, j as defined in sub-Clause 1424.2	Each traffic signals installation	Required	Certification that the installation complies with BS7671 (the IEE Wiring Regulations) is required

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

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 1200 (continued)					
1218	Detector loops				
	Cable			Required	Certification that completed cables comply with specification TR 2029 is required
	Epoxy resin			Required	Certification that the epoxy resin complies with specification MCH 1540 is required
	Feeder cable			Required	Certification that completed cables comply with specification TR 2031 is required.
	Joints	Pull test (4 kgf)	Each crimp		
	Installation	Series resistance	Each loop	Required	Certification in accordance with specification MCH 1540 is required
		Insulation resistance			
		Inductance			
Series 1300					
1305	Anchorage for use in drilled holes	Tensile load (Manufacturer's tests)		Required	To provide well attested and documented evidence
1306	Anchorage in drilled holes to columns and masts with flange plates	Loading test on site	As required		
1310	Welding	Welding procedures (Manufacturer's tests)	(Every seven years)		Quality management scheme applies
		Welder qualification (Manufacturer's tests)	(Sub-clauses 1310.1 and 1310.2 (7.1.3.))		Quality management scheme applies
		Production testing (Manufacturer's tests)	(Sub-Clauses 1310.1 and 1310.2 (7.1.4))		
	Welded joints	Destructive testing	(Sub-Clause 1310.1 and 1310.2 (7.1.5))		
1313	GFRP laminates	Loss of ignition	1 per 50 production columns		
		Colour fastness	1 per batch		
		Electric strength			

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

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 1300 (continued)					
1313 (cont'd)		Water absorption			
		Impact strength			
1314	Brackets for laminated GFRP lighting columns			Required	
		Polyurethane foam	Bulk density			1 per batch
	Surface hardness				
	Apparent bulk density		2 per batch		
	Impact strength				
	Flexural stress				
Series 1400					
1421	Cable				Product certification scheme applies
1424	Lighting Units	Tests specified in Clause 1424	Each unit	Required	Product certification scheme applies Certification that the installation complies with BS7671 (the IEE Wiring Regulations) is required.
	Networks	Test specified in Clause 1424	Each network	Required	Certification that the installation complies with BS 7671 (the IEE Wiring Regulations) is required
Series 1500					
1506	Copper communications cable			Required	Certification that each completed cable complies with specification TR2150 or TR 2158, as appropriate, is required
	Optical fibre communications cable			Required	Certification that each completed cable complies with specification TR2151 or TR 2159, as appropriate, is required
	Coaxial communications cable				Certification that each completed cable complies with specification TR2152 or TR 2160, as appropriate, is required
	Energy cable			Required	Certification that each completed cable complies with specification TR2153 or TR 2161, as appropriate, is required

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

Clause	Works, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 1500 (continued)					
1513	Cable joint enclosures	Test specified in Clause 1513.12	Each CJE	Required	Certification that CJE satisfies the air pressure test is required
1518	Coaxial and copper Communications and power cable	Tests specified in specification MCG 1022 or MCG 1099, as appropriate	Each cable (Stage 1) As required in Appendix 15/1 (Stage 2)		Results to be reported in accordance with MCG 1022 or MCG 1099, as appropriate
	Optical fibre communications cable	Tests specified in specification MCG 1055 or MCG 1099, as appropriate	Each cable (Stage 1) As required in Appendix 15/1 (Stage 2)		Results to be reported in accordance with MCG 1055 or MCG 1099, as appropriate
1522	Motorwarn System				
	Steel posts			Required (BS 6323)	
1526	Electrical installations	Tests specified in BS 7671	Each installation	Required	Certification that the installation complies with BS7671 (the IEE Wiring Regulations) is required
1530	Cable ducts	Tests specified in BS EN 50086-1, 2 and 4	Each supplier	Required	Current British Board of Agrément Certificate is required
1533	Cable ducts				
	Mandrel test	Tests specified in Clause 1533	Each duct	Required	Certificate that each length of duct between chambers satisfies the mandrel test is required
	Air test	Tests specified in Clause 1533	Each duct	Required	Certificate that each length of duct between chambers satisfies the air test is required
Series 1600					
1601	Soil samples In situ soil tests			Required	
1602 to 1606 1610 to 1615	Concrete Grout Reinforcement Prestressing Steelwork Welding Protection against corrosion			Required	
1606	Coatings for protection against corrosion	Adhesion	As required in Appendix 16/6		

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

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 1600 (continued)					
1607	Reduction of friction on piles				
1608	Integrity testing				
1616	Dynamic testing				
1609	Static load testing of piles			Required	
1612	Self hardening slurry mixes			Required	
1617	Instrumentation			Required	
1618	Support fluids	To be proposed by the Contractor			See Appendix 16/18
Series 1700					
1702 1704	Cement types as stated in sub-Clause 1702.1			Required	Certificate to be provided monthly for each type of cement. Quality management and product certification schemes apply.
	Cements (all types)	Chloride content	Monthly		Tests to be carried out by the manufacturer and results included on the test certificates required above
	Pulverised-fuel ash	Sulfate content	Monthly		
	Ground granulated blast furnace slag	Acid-soluble alkali content	Daily (PC) Weekly (pfa ggs)		
	Aggregates	Grading and fines content	1 per delivery (per source)		Results of routine control tests from the factory production control system operated by the producer to be provided - see Annex H of BS EN 12620 Product certification scheme applies
		Shell content (N)	Monthly		
		Flakiness index (N)	Monthly		
		Resistance to fragmentation (N)	Monthly		
		Drying shrinkage (N)	1 per 5 years		
		Chloride content (N)	1 per week or as otherwise agreed		
		Sulfate Content (N)	Yearly		
		Blastfurnace slag	Bulk density (N)	Every 6 months	
	Stability (N)		Every 6 months		
	Sulfur content (N)		Every 6 months		
	Water	Tests specified in BS EN 1008	As required		

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

Clause	Work Goods or Material	Test	Frequency of Testing	Test Certificate	Comments			
Series1700 (continued)								
1702 1704 cont	Water (continued)	Chloride content	Monthly					
		Sulfate content	Monthly					
		Acid-soluble alkali content	Weekly					
	Admixtures	Chloride Content	1 per consignment	Required (BS EN 934-2)				
		Sulfate content	1 per consignment	Required				
		Acid-soluble alkali content	1 per consignment					
1707	Hardened concrete – Identity Testing	Cube strength (N) – as described in contract specific Appendix 17/4	Pre stressed concrete two cubes from 12 m ³ or 2 batches whichever represents the lesser volume	Required	Contractor to cast and test sufficient additional cubes to demonstrate cube strength before transfer			
			Reinforced concrete two cubes from 24 m ³ or 4 batches whichever represents the lesser volume					
			Mass concrete - two cubes from 50 m ³ or 50 batches whichever represents the lesser volume					
			Additional cubes for special purposes			Contractor to specify as required.		
		Cube strength - identity testing as described in Appendix 17/4 (N)	2 cubes from each of 2 samples of each batch					
		Density	As required					
		Modus of elasticity						
		Fresh concrete – Identity Testing	Consistence (slump or flow) (N)			Each batch	Required	
			Air content			Each batch		
			Cement content			As required		
	Density							
	Water/cement ratio							

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

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 1700 (continued)					
1710	Concrete packing Mortar packing Epoxy resin bonding agent				
	Precast concrete not conforming to any Product Standard or to BS EN 13369	Cube strength (Manufacturer's tests)			Contractor to make available records of tests by the manufacturer. See sub-Clause 1710.8
1711	Grouting and Duct Systems for Post-tensioned tendons				Product acceptance scheme or equivalent applies.
		Full scale trials, where required in the Contract			See sub-clause 1711.1 and Appendix 17/6
		Duct assembly verification tests			See sub-clause 1711.4 and Appendix 17/6
		Fluidity	In accordance with BS EN 447 and BS EN 446		See sub-clause 1711.2 and sub-clause 1711.3
		Bleeding			
		Volume change			
		Cube strength			
		Sieve			
Density					
Time Setting					
1712	Reinforcement	Steel bars		Required (BS4449)	Product certification scheme or equivalent applies
		Steel wire		Required (BS4482)	
		Steel fabric		Required (BS4483)	
		Stainless Steel		Required (BS6744)	

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

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 1700 (continued)					
1713	Fabricated reinforcement			Required	Certification that fabricated reinforcement complies with the routine inspection / testing requirements of BS 8666 is required if the fabrication is not covered by a product certification scheme or equivalent.
1716	Reinforcement jointing systems	Permanent elongation characteristic strength (Manufacturer's test)		Required for each type of connection	Product acceptance scheme or equivalent applies
1717	Reinforcement Welding	Welding procedure approval (BS EN ISO 17660)	As required in BS EN ISO 17660		Tests should be carried out by an independent testing body.
		Welder approval (BS EN ISO 17660)			
1718	Prestressing tendons	Steel wire and strand		Required (BS5896)	Product certification scheme or equivalent applies
		Steel bar		Required (BS4486)	
	Prestressing steel (all types)	Proof load Breaking load Elongation Ductility Relaxation Modulus of elasticity	As required		
	Other than lowest strength wires or strand to BS5896	0.1% proof load	Each reel		
1724	Post-tensioning anchorages	Tests in accordance with BS EN 13391 (Manufacturer's tests)		Required (BS EN 13391)	Product certification scheme or equivalent applies
1726	Stainless steel bar			Required (BS6744)	Product certification scheme or equivalent applies
1727	Inspection and testing of structures and components				Contractor to specify as appropriate to requirements of Appendix 17/4.

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

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 1800					
1805	1805.2 Metallic products			Required according to BS EN 1090-2:2008+A1:2011, Table 1	
	1805.3.4 Special properties of constituent products	Testing to identify internal discontinuities or cracks in zones to be welded as specified in Appendix 18/1	As required in Appendix 18/1		
1806	1806.4.4 Check of the capability of cutting processes that are likely to produce local hardness	Testing in accordance with BS EN ISO 6507	As required		
	1806.5.4 d) Check of the hardness and geometry of hollow section components subject to bending by cold forming	Check of the hardness, testing in accordance with BS EN ISO 6507	As required		
1807	1807.4.1.2 Qualification of welding procedures (Processes 111, 114, 12, 13 and 14)	Tests specified in BS EN ISO 15614-1 or BS EN ISO 15613	As required in BS EN ISO 15614-1 or BS EN ISO 15613		Results to be reported in accordance with BS EN ISO 15614-1 or BS EN ISO 15613
	1807.4.1.2 (3) Qualification of welding procedures for joints with restricted access	Tests specified in BS EN ISO 15613	As required in BS EN ISO 15613		Results to be reported in accordance with BS EN ISO 15613
	1807.4.1.3 Qualification of welding procedures for other welding processes	Tests specified in the standards listed in BS EN 1090-2:2008+A1:2011, Table 13	As required in the standards listed in BS EN 1090-2:2008+A1:2011, Table 13		Results to be reported in accordance with the standards listed in BS EN 1090-2:2008+A1:2011, Table 13
	1807.4.1.4 Validity of welding procedure qualification	Additional tests specified in BS EN 1090-2:2008+A1:2011, 7.4.1.4 for a welding procedure qualified in accordance with BS EN ISO 15614-1, which is undertaken by a welding process that has not been used	As required in BS EN 1090-2:2008+A1:2011, 7.4.1.4		Results to be reported in accordance with BS EN ISO 15614-1 Note the requirement in BS EN 1090-2:2008+A1:2011, 7.5.12 relating to stud weld procedure testing.
	1807.4.1.4 (1) Validity of welding procedure qualification	Welding production test in accordance with the qualification standard for the process concerned	As required		Results to be reported in accordance with the qualification standard for the process concerned
	1807.4.2 Qualification of welders and welding operators	Tests specified in BS EN 287-1 (welders) or BS EN 1418 and BS EN ISO 14732:2013 (welding operators)	As required in BS EN 287-1 or BS EN 1418 and BS EN ISO 14732:2013 as appropriate	Required	Certificate to be in accordance with BS EN 287-1, Annex A or BS EN 1418 and BS EN ISO 14732:2013 Annex C as appropriate

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

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 1800 (continued)					
	1807.4.2 Qualification of welders of hollow section branch connection with angles less than 60°	Specific qualification test. Test specified in BS EN 287-1.	As required		
	1807.4.2 (1) Qualification of welders of joints with restricted access	Specific qualification test. Test specified in BS EN 287-1.	As required		
	1807.5.1.1 Verification that joint preparation in steel grades higher than S460 are free from cracks	Testing in accordance with BS EN 571-1 1 and BS EN ISO 3452-1:2013 (penetrant) or BS EN 1290 and BS EN ISO 17638:2016 (Magnetic particle)	As required		
	1807.5.1.1 (1) Qualification of welding procedures where prefabrication primers are to be left on the fusion faces	Tests specified in BS EN ISO 15614-1 or BS EN ISO 15613 using such prefabrication primers	As required in BS EN ISO 15614-1 or BS EN ISO 15613		Results to be reported in accordance with BS EN ISO 15614-1 or BS EN ISO 15613
	1807.5.4 (1) Welding of joints in hollow sections, full penetration butt welds with restricted access	Pre-production weld test conforming to BS EN ISO 15613	As required		
	1807.5.6 (3) Verification of ground surface are free of cracks following removal of temporary welded attachments	Testing in accordance with BS EN 1290 and BS EN ISO 17638:2016 (Magnetic particle)	As required		
	1807.5.9.2 (1) Verification of the absence of surface cracking in continuity welds in permanent steel backing	Testing in accordance with BS EN 571-1 and BS EN ISO 3452-1:2013 (penetrant) or BS EN 1290 and BS EN ISO 17638:2016 (Magnetic particle)	As required		
	1807.5.18 Welding of bridge decks	Production tests in accordance with BS EN 1090-2:2008+A1:2011, 12.4.4 c)	As required		
1808	1808.5.3 (1) k value check for Torque method	Test in accordance with BS EN 1090-2:2008+A1:2011, Annex H	Daily		
	1808.5.4 (2) k value check for the combined method	Test in accordance with BS EN 1090-2:2008+A1:2011, Annex H	Daily		
	1808.5.5 (1) Preload check for HRC method	Test in accordance with BS EN 1090-2:2008+A1:2011, Annex H	Each assembly lot		
	1808.9 Use of special fasteners and fastening methods	Procedure tests for special fasteners and fastening methods as specified in Appendix 18/1	As required in Appendix 18/1		

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

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 1800 (continued)					
1810	1810.1 (5) Slip resistant connections	Slip factor test in accordance with BS EN 1090-2:2008+A1:2011, Annex G	As required in Appendix 18/1		
	1810.1 (10) Verification of the preparation carried out before overcoating galvanized components	Test as specified in Appendix 18/1	As required in Appendix 18/1		
1812	1812.2.1 (1) Specific testing of constituent products not covered by standards	Test as specified in Appendix 18/1	As required in Appendix 18/1		
	1812.2.1 (2) Mechanical fasteners	Sample testing as specified in 1812.2.1 (2)	As required in 1812.2.1 (2)		Results to be reported in accordance with 1812.2.1 (2). Testing not required if mechanical fasteners supplied by a NHSS 3 registered Organisation. See 1800.5.2
	1812.2.1 (3) Mechanical fasteners	Suitability testing as specified in 1812.2.1 (3)	As required in 1812.2.1 (3)		Results to be reported in accordance with 1812.2.1 (3).
	1812.4.1 Inspection before and during welding	Non destructive testing methods selected in accordance with BS EN 12062 and BS EN ISO 17635:2016	As required in BS EN 1090-2:2008+ A1:2011, 12.4.1		
	1812.4.2.2 Inspection after welding – Scope of inspection	Supplementary non destructive testing determined by the manufacturer	As required in BS EN 1090-2:2008+ A1:2011, 12.4.2.2		See 1812.4.2.2 (6)
	1812.4.2.2 (1) Inspection after welding – Specific inspection of welds	Supplementary non destructive testing in accordance with 1812.4.2.2	As required by 1812.4.2.2 (1) to (5)		
	1812.4.3 (1) Welded shear studs	Production tests as specified in BS EN ISO 14555, 14.2	As required in 1812.4.3 (1)		Results to be documented in accordance with 1812.4.3 (4)
	1812.4.3 (2) Welded shear studs	Hammer tests as specified in 1812.4.3 (2)	Every welded shear stud		
	1812.4.3 (3) Welded shear studs	Simplified production tests as specified in BS EN ISO 14555, 14.3	As required in 1812.4.3 (3)		Results to be documented in accordance with 1812.4.3 (4)
	1812.4.4 (1) Production tests on welding	Production tests on welding as specified in 1812.4.4 (1)	As required in 1812.4.4 (1)		Results to be reported in accordance with the relevant standard
	1812.4.4 (2) Production tests on welding using run-off coupon plates	Production tests on run-off coupon plates as specified in 1812.4.4 (2)	As required in 1812.4.4 (2)		

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

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 1800 (continued)					
	1812.7.4 Other acceptance tests	Testing requirements for components erected to a specific load as specified in Appendix 18/1	As required in Appendix 18/1		
Series 1900					
1903	Abrasives	Grading Hardness	As required		
1909	Galvanised coatings	Test specified in BS EN ISO 1461	As required		
1911, Table 19/2B	Hot dip galvanised coating to fasteners	Tests specified in BS EN ISO 10684	As required		
1912 1912SE	Paints – 'A' and 'B' samples	Provision of samples for 'A' and 'B' sample tests			Samples selected in accordance with Clause 1912SE
	Paints – 'A' and 'B' samples	Specific gravity	As required by rate of 'A' and 'B' sampling		See NG 1912, 3; Appendix 19/4, Note 4; Appendix 19/4SE, Note 4; NG 1912.3NI, 3 and Appendix 19/4NI.
	Paints – 'A' and 'B' samples	Colour match	As required by rate of 'A' and 'B' sampling		See NG 1912, 3 and NG 1912NI, 3.
1914	Coating system minimum film thickness	Minimum dry film thickness measurements. In accordance with BS EN ISO 2808, BS3900-C5	Required – representative testing		
	Coating system adhesion	Pull off adhesion test in accordance with ASTM D4541 – Type III	Required – representative testing		
	Coating system defects	Visual assessment supplemented by appropriate testing	Required		
	Coating system defects – pin-holing or porosity	Low or high voltage detectors in accordance with ASTM G62-07	Required – representative testing excluding corners, bolted joints or welds		
Series 2000					
2003	Permitted waterproofing systems				Product Acceptance Scheme or equivalent applies.
	Additional bituminous protection		1 per 15 tonnes		
	Stability value		1 per 15 tonnes		
2004	Tar	Tests specified in BS76	1 per source		Sampling to comply with BS76
	Cut back bitumen		1 per source		

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

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 2100					
2101	Bridge bearings				
	Bearings (other than Elastomeric bearings)	Load testing – serviceability limit state Load testing – ultimate limit state Other tests specified in contract specific Appendix 21/1	As required in contract specific Appendix 21/1		
	Elastomeric bearings	Compressive test Stiffness test Shear stiffness test Other tests specified in contract specific Appendix 21/1	As required in contract specific Appendix 21/1		
Series 2400					
2401	Masonry cement				
2402	Sand				
2403	Water	Tests specified in BS EN 1008	As required		
2404	Mortar admixtures				
2405	Lime				
2406/ 2417	Bricks				
	Clay				
	Calcium silicate				
	Concrete				
2407	Blocks				
	Clay				
	Concrete				
2408	Reconstituted stone				
2410 2411	Stainless steel				
	Wire/fabric				
	Bars				
	Ready mixed mortars				
	Mortars		1 set of tests per mix		
Series 2500					
2501	Materials for corrugated steel buried structures exceeding 900mm clear span or internal diameter				Type approval applies
	Steel components				
	Zinc coating				
	Protective coating				
	Paved invert system			Required as appropriate to the standard or specification listed in the type approval Certificate	Product Acceptance Scheme or equivalent applies

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

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 2500 (continued)					
2502	Materials for reinforcing elements, prefabricated facing and capping units, and washers	Carbon steel strip		Required (BS1449: Part 1.1 or BS EN 10025-1 and BS EN 10025-2)	Product Acceptance Scheme or equivalent applies Silicon content and mechanical properties to be stated on the certificate
		Stainless steel strip		Required (BS EN 10029, 10048, 10051, 10258 and 10259)	Mechanical properties to be stated on the certificate
	Reinforcing bar for anchor elements			Required (BS4449)	Tests scheduled under Clauses 1717 and 1909 are required for welding and galvanising of anchor elements
	Materials for fasteners				
		Stainless steel Bolts, screws and nuts			
2503	Materials for pocket type reinforced brickwork retaining wall structures	Clay bricks	(Soluble salt content; Efflorescence; Compressive strength; Water absorption; and Initial rate of suction) (BS 3921 and BS EN 771-2011+A1:2015/TRL Report 447) (N)	1 set of tests per type of brick	
2504	Environmental barriers	Timber			Quality management scheme applies
		Concrete			
		Steel			
		Brickwork			
		Other materials			
	Barriers	Sound absorption Sound insulation	As required in Appendix 25/4		
	Post foundations	Loading test on site	As required in Appendix 25/4		
2505, 2506	Drainage structures/buried rigid pipes for drainage structures. Pipes for drains and culverts having diameters or clear span exceeding 900 mm	Vitrified clay			Type Approval Certificate and Product Acceptance Scheme or equivalent apply.
		Concrete PC/SRC	(Manufacturer's test)		
		Iron			
		Corrugated steel	(Manufacturer's test)		
					See sub-clause 2506.28

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

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments
Series 2600					
2601	Bedding mortar materials			Required for each batch	Certification in accordance with Clause 2601 is required
	Bedding Mortar	Flow cone test	Each batch		Laboratory tests
		Flow between glass plates			
		Compressive strength			
		Expansion test			
		Water absorption			
		Elastic stability	1 per source		
	Flow cone test Compressive strength	Each load		Site control tests	
2604	Plastic coating to fencing posts, gates and ancillaries			Required (BS 1722 : Part 16)	Certification by powder manufacturer and coating applicator is required.
2607	Granolithic concrete				Testing to be in accordance with Clauses 1702, 1703, 1707 and 1710
Series 3000					
3001	General				Inspection reports as required in Appendix 30/1
3005	Grass Seeding, Wildflower Seeding and Turfing	Rate of spread of fertiliser	1 per 1000 square metres		
		Rate of spread of seeding	1 per 1000 square metres		
		Chemical analysis of fertiliser	1 per source		
		Grass seed germination and purity (Official Seed Testing Station tests)	1 per source and mix variety	Required prior to sowing	
Series 5000					
5003	Abrasives	Grading	As required		
		Hardness			
5005	Aluminium and zinc spray coatings	Test specified in BSI BS EN ISO 2063	As required		Areas to be tested in accordance with Clause 5006
		Aluminium coating material		Required (BS EN 1301-1)	
		Zinc coating material		Required (BS EN 1179)	
	Sheradized coatings	Tests specified in BS 7371	As required		
	Zinc electroplated coatings	Tests specified in BS 7371	As required		
	Plating to high strength grip and tension control bolts				
	5006	Metal spray coatings	Tensile test specified in BSI BS EN ISO 2063	As required	
Grid test specified in BSI BS EN ISO 2063			As required		

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

Clause	Work, Goods or Material	Test	Frequency of Testing	Test Certificate	Comments	
Series 5000 (continued)						
5007S E	Paints	'A' and 'B' Samples	Specific gravity			Samples will be selected in accordance with Clause 5007SE
			Colour match			
			Composition			
			Application Characteristics			

APPENDIX 1/6: SUPPLY AND DELIVERY OF SAMPLES TO THE OVERSEEING ORGANISATION

When required by the Engineer the Contractor shall provide samples of any material proposed to be incorporated in the Works.

APPENDIX 1/7: SITE EXTENTS AND LIMITATION ON USE

1. Site Extent

- 1.1 The Site Extent is defined in Clause 1 of the Conditions of Contract as 'Land Made Available by the Employer for the Works' and comprise:
- (i) The Land Made Available by the Employer for the Works is described in Section 3.1 of the Employer's Requirements.
 - (ii) Any further Land acquired by or conveyed to the Employer (from any person, including the Contractor) from time to time for the purposes of the Design and the Works.
 - (iii) The Contractor shall make provision for carrying out work on private land as required under the Contract for example traffic signing, drainage works and the like.

2. Limitations On The Use Of The Site

- 2.1 The Site shall be used solely for the construction and maintenance of the Works.
- 2.2 The Contractor's attention is drawn to the Special Requirements listed in Clauses 77 and 78 of the Conditions of Contract.
- 2.3 The Contractor shall not use areas of land with a temporary right of access for any purpose other than the construction and maintenance of the Works.
- 2.4 When carrying out Accommodation Works on land not made available by the Employer for the Works, the Contractor shall minimise the area of land occupied to that which is essential for the safe construction and maintenance of such part of the Works.
- 2.5 The Contractor shall ensure that all areas of land which have been temporarily occupied are reinstated to the satisfaction of the affected landowner, occupier and the relevant Authorities.

APPENDIX 1/8: OPERATIVES FOR THE OVERSEEING ORGANISATION

The following specification fulfils the operative requirements for the whole of the Works.

Operatives	Number	Period Required
Driver / Handyman	1 available on request	From Date of Commencement of the Works as defined in Clause 41 of the Conditions of Contract to date of issue of Certificate of Completion

APPENDIX 1/9: CONTROL OF NOISE AND VIBRATION**Noise Control**

1. The Contractor shall consult and comply with the requirements of Aberdeen City Council prior to commencement of work on Site.

These requirements, together with the Contractor's proposed methods of work and Constructional Plant to be used shall be discussed and agreed in writing by Aberdeen City Council prior to commencement of the relevant activities on Site.

2. The Contractor shall comply with the contents and recommendations of BS 5228: 2009+A1 and BS 5228: 2009 + A1: 2014 "Code of Practice for Noise and Vibration Control on Construction and Open Sites, Part 1: Noise and Part 2: Vibration" together with the specific requirements of this Appendix. Reference should also be made to Department for Environment, Food and Rural Affairs "Update of Noise Database for Prediction of Noise on Construction and Open Sites" when predicting noise levels.

3. All Constructional Plant used on the Works shall be subject to the acknowledgement of the Overseeing Organisation and shall be the quietest of its type practical for carrying out the work required and shall be maintained in good condition with regard to minimising noise output.

All Constructional Plant shall be operated and maintained in accordance with the manufacturer's written recommendations.

4. Best practicable means shall be employed including the positioning of Constructional Plant and activities to minimise noise at sensitive locations, the use of mufflers on pneumatic tools, the use of non-reciprocating Constructional Plant and the use where practical of effective sound reducing enclosures to ensure all Constructional Plant used in connection with the Works operates with the minimum of noise.

5. Subject to the other requirements of the contract the normal working hours within the Site shall be Monday to Friday between 07.00 and 19.00 hours and Saturday between 08.00 and 13.00 hours, with no working on Sundays and public holidays.

The Contractor shall have written permission to operate at the relevant permissible noise levels for each area, within the normal working hours, from Aberdeen City Council.

The Contractor shall apply, in writing, for permission to work outside normal working hours, including Sundays and public holidays, to Aberdeen City Council, at least 14 days in advance of the proposed work. Operating times and noise levels shall be subject to the agreement and written consent of Aberdeen City Council.

In the event of permission being granted, in writing, the Contractor shall provide the Overseeing Organisation with a copy of the written permission at least 48 hours prior to commencing the work.

The Contractor shall also arrange for leaflets to be delivered to residents within 100 metres of the Site boundary and shall request from Aberdeen City Council the vacancy statuses of all properties contained within this leafleting boundary to minimise leafleting to vacant properties. Leaflets shall give a full description of the proposed Works and their duration and of the sources, character and levels of noise expected to arise, and a named contact to respond to any noise or vibration concerns. The leaflets shall be issued 48 hours prior to Works commencing.

APPENDIX 1/9: CONTROL OF NOISE AND VIBRATION (Continued)
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6. The construction noise levels, L_{Aeq} from the locations specified in the Schedule contained in this Appendix shall not exceed the appropriate level agreed with Aberdeen City Council.
7. Notwithstanding the specific requirements of this Appendix 1/9, the Contractor shall comply with the contents of The Noise Insulation (Scotland) Regulations 1975.
8. A pre-construction ambient noise assessment shall be undertaken by the Contractor using an appropriately qualified acoustician before the Works commence, for agreement with Aberdeen City Council. The noise assessment shall demonstrate the typical pre-construction ambient noise levels at representative properties adjacent to the Works.
9. Measurement locations chosen for the pre-construction ambient noise assessment shall be representative of surrounding properties, shall be considered the "worst case" property in terms of construction noise impacts for that particular area.
10. The Contractor's noise expert shall be required to undertake additional assessments or noise measurements at locations using methods agreed previously in writing with Aberdeen City Council as necessary.
11. Certificates of Consent from Aberdeen City Council under Section 61 of the Control of Pollution Act 1974 shall be required for any work outwith the normal working hours, defined in Clause 5 of this Appendix.

The granting of such Certificates will be dependent amongst other things on the Contractor demonstrating to the satisfaction of Aberdeen City Council in his application that:

- (i) It is not reasonably practicable to carry out the work during normal working hours;
- (ii) He has considered all mitigation measures and has implemented appropriate measures;
- (iii) He has consulted all interested parties; and
- (iv) He has explored all means to reduce the amount of work to be carried out outwith normal working hours.

A Certificate of Consent shall be required for each and every occasion when the Contractor proposes to work out-with normal working hours.

12. Permissible construction noise levels shall avoid significant effects in accordance with Annex E of BS 5228-1:2009+A1:2014, where possible.
13. Any proposed screening at properties shall be installed at the start of construction.

APPENDIX 1/9: CONTROL OF NOISE AND VIBRATION (Continued)
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Vibration Control

1. The Contractor shall consult and comply with the requirements of Aberdeen City Council, as appropriate, prior to commencement of work on Site. These requirements, together with the Contractor's proposed methods of work and Constructional Plant to be used shall be discussed and agreed in writing by Aberdeen City Council, as appropriate, prior to commencement of the relevant activities on Site.
2. The Contractor shall provide Consultation Certificates in accordance with the Certification Procedure in respect of this requirement.
The maximum permitted peak particle velocity generated by the construction of the Works shall be 5 millimetres/second measured at the building closest to the operations being carried out. At frequencies below 4Hz a maximum displacement of 0.6mm (zero to peak) should not be exceeded.
3. This applies to all operations.
4. With reference to BS 6472: 2008 "Evaluation of human exposure to vibrations in buildings (1Hz to 80Hz)", the Vibration Dose Value shall not exceed a daytime (16 hour) value of 0.4 $\text{m/s}^{1.75}$ or a night time (8 hour) value of 0.2 $\text{m/s}^{1.75}$.
5. The Contractor shall provide written details of the proposed method and periodicity of monitoring of the Vibration Dose Value, to Aberdeen City Council and the Overseeing Organisation.
6. The Contractor shall carry out a risk assessment of the effects of Design, construction and maintenance on the structural integrity of adjacent buildings.
7. The Contractor shall carry out a structural or dilapidation survey of all buildings that are considered to be at risk and inform the Overseeing Organisation in advance such that the survey can be witnessed, and provide a copy of the survey to the Overseeing Organisation prior to construction of the Works commencing

Vibration Monitoring Equipment

1. To ensure compliance with the specified vibration limits, monitoring shall be undertaken by the Contractor using a vibration monitor compliant with BS EN ISO 8041:2005.

Consultations

All consultations shall be undertaken with Aberdeen City Council,

Contact: [REDACTED]

Telephone: [REDACTED]

Email: [REDACTED]

APPENDIX 1/10: PERMANENT WORKS TO BE DESIGNED BY THE CONTRACTOR

1. Refer to the Employer's Requirements for details of Permanent Works to be designed by the Contractor.

APPENDIX 1/11: TEMPORARY WORKS DESIGN

1. Refer to the Employer's Requirements for details of Temporary Works to be designed by the Contractor.

APPENDIX 1/12: SETTING OUT AND EXISTING GROUND LEVELS

1. The Contractor shall supply setting out information, including a schedule of co-ordinated survey stations, to the Overseeing Organisation whenever such information is available, updated or revised.
2. Clearly marked chainage markers at 50 metre intervals shall be erected by the Contractor at suitable locations for the duration of the Works.
3. Before commencement of any earthworks, the Contractor shall establish permanent survey stations within the Site sufficient for the setting out and checking of the Works.

APPENDIX 1/13: PROGRAMME OF WORKS

1. Form of Programme

The Contractor shall provide the programme in the form of a Time Chainage Chart supported by Bar Charts as follows:

- 1.1 The work required for the Design and the Works shall be subdivided into individual distinct operations, which shall be illustrated in the Time/Chainage Chart and the Bar Charts.
 - 1.2
 - (i) The Time Chainage Chart shall be ruled in columns and rows using a horizontal scale of chainage (min. 1:1250, i.e. 10 millimetres wide column per 12.5 metres) and a vertical scale of Time (minimum 0.5 centimetres high row per week). On the Time Chainage Chart the Contractor shall plot his programme start (date/chainage point) and finish (date/chainage point) for each Milestone, and shall draw a line (the "Milestone Line") connecting each start point to the corresponding finish point for that operation. The Milestone Line shall be taken as a representation of the Contractor's programmed average rate of progress of that operation from its start to its finish by reference to the date and chainage at intermediate (date/chainage) points along the Milestone Line. The Overseeing Organisation shall have the right to require the Contractor to provide further details by sub-dividing operations and showing corresponding Operation Lines for each sub-division.
 - (ii) Where at a particular part of the Works there is a local concentration of individual distinct operations which cannot be satisfactorily represented by Milestone Lines (e.g. at a Structure, etc) such operations shall be shown on the Time/Chainage Chart as a rectangular box (the "Operations Box") whose diagonal is the Operation Line for all operations required for that part of the Works considered en bloc. Each Operations Box shall be named to identify the part of the Works to which it refers and shall show the number of the Bar Chart (refer below) on which these operations are illustrated.
 - (iii) The Time Chainage Chart shall show along its top diagrammatic plan (the "Diagram") showing, suitably annotated, the features of the parts of the Works represented by the Chart. The Diagram shall be drawn to the same horizontal scale as the Time Chainage Chart, and be aligned with the chainage columns of the chart in vertical projection.
 - 1.3 The Overseeing Organisation shall have the right to reasonably require the Contractor to provide a Bar Chart for any part of the Works and the Contractor shall comply with such requirement. Bar Charts shall list the location and description of the operations to which they refer and show for each listed operation a horizontal bar indicating the start, duration and stop date of that operation plotted to a horizontal scale of time. Bar Charts shall be provided by the Contractor for all operations contained in the Operations Boxes. The Overseeing Organisation shall have the right to require the Contractor to introduce additional Operations Boxes into the Time Chainage Chart and the Contractor shall comply with such requirement and to supply to the Overseeing Organisation the amended Time Chainage Chart and Bar Charts.
2. At the time of presentation of the programme the Contractor shall also provide a mass-haul diagram showing his intended earthworks movements and locations and capacities of anticipated plant and other resource input.

APPENDIX 1/13: PROGRAMME OF WORKS (Continued)

3. Schedule of Constraints

The programme shall take account of constraints imposed by the Employer's Requirements and the Specification in respect of but not limited to:

- (i) Work to Privately and Publicly Owned Services and Supplies and, in particular, cognisance shall be given to the Notice Periods and liaison stipulated in Appendix 1/16. Notice Periods and Time to Completion shall be shown on the Programme. Advance Works shall also be shown on the Programme where relevant;
- (ii) Restrictions arising from advance utility diversion works – City Fibre have been instructed to undertake advance works compromising diversion reference CF-01B as detailed in Section 5.2 of Part 2 of the Employer's Requirements and as listed within Appendix 1/16. Programming for these works are still to be confirmed however it is anticipated that they will commence prior to Contract Award and will continue thereafter. The Contractor is to allow sufficient time for these works to be completed before commencing works in the area;
- (iii) Traffic Safety and management. Refer to Appendix 1/17 for more detailed constraints, Notice Periods and consultation requirements, which should all be shown on the Programme;
- (iv) Restrictions arising from the use of substances hazardous to health;
- (v) Not used;
- (vi) Not used;
- (vii) Not used;
- (viii) Compliance with technical approval procedures in relation to Structural Elements and other Features to be designed by the Contractor, including awaiting approvals, resubmissions and modifications. Refer to Appendix 1/11. The Contractor shall show this on the Programme;
- (ix) Not used;
- (x) The Contractor shall demonstrate to the Overseeing Organisation that he has available in a suitably located stockpile an adequate supply of surface dressing chippings which will enable him to not only commence the Works on the due date, but will enable him to progress the work at such a rate as will ensure compliance with the Programme of Works including traffic management;
- (xi) Submission by the Contractor of Road Restraint Systems for acceptance, including awaiting acceptance and resubmission;
- (xii) Availability of offices for the Overseeing Organisation and the Engineer and the Required Time Duration for Providing and Maintaining Accommodation and Equipment as defined in Appendix 1/1;
- (xiii) Not used;
- (xiv) Private access and egress requirements throughout construction; and
- (xv) Erection of fencing to protect areas of vegetation to be retained prior to the main construction operations.

APPENDIX 1/13: PROGRAMME OF WORKS (Continued)

4. The level of detail should be not less than the following:

Level 1

Within 21 days after the acceptance of Tender and any subsequent revision:

- (i) Each Structure.
- (ii) Earthworks - each cutting and embankment.
- (iii) Roadworks - for each road:
 - (a) Fencing;
 - (b) Site clearance;
 - (c) Topsoil strip;
 - (d) Drainage (pre-earthworks and second stage);
 - (e) Sub-base;
 - (f) Sub-grade improvement layer;
 - (g) Base or concrete paving;
 - (h) Surfacing; and
 - (i) Drilling / grouting.
- (iv) Major Apparatus and Private Apparatus.
- (v) Traffic management measures including operation of site accesses, plant crossings and temporary diversions for traffic.
- (vi) Landscaping Works and planting seasons.

Level 2

At least four weeks before the commencement of any item of work:

- (i) For each structure:
 - All Structural details.
- (ii) Roadworks:
 - As for Level 1 but intervals not exceeding 100m and including lighting, signing, soiling and seeding, road marking, cabling and communications equipment.
- (iii) All Undertaker's Works and Private Apparatus Works.

Level 3

Further breakdown of items and other details as may be required.

5. The Contractor shall provide the Overseeing Organisation with a programme in the form of a bar chart for the Planting Works, and shall show the level of detail appropriate to each stage of the Works and all activities and restraints, each of which shall be given a short title.

All events shall be numbered and annotated with the earliest and latest event dates.

The programme shall be submitted four weeks before the commencement of any work and shall detail the main areas of Work as follows:

APPENDIX 1/13: PROGRAMME OF WORKS (Continued)

- (i) Early landscape Works which may be carried out in advance of the main Works;
 - (ii) Landscape implementation Works; and
 - (iii) Maintenance for each relevant fifty two week period.
- 5.1 The level of detail for areas of trees, shrubs and grass shall not be less than the following:
- (i) For implementation:
 - (a) soil preparation;
 - (b) protective fencing and other measures;
 - (c) seeding and fertiliser; and
 - (d) planting and fertiliser.
 - (ii) For maintenance:
 - (a) grass cutting;
 - (b) Site scavenge;
 - (c) pernicious weed control;
 - (d) re-firming of plants and adjustment of stakes and ties;
 - (e) disease and pest inspection;
 - (f) watering;
 - (g) fertiliser; and
 - (h) protective fence check and repair.
6. The Contractor shall provide all of the information described above in both paper copy (3 copies of each) and electronically (one copy of each).
- In addition the Contractor shall note that the programme shall be produced using Microsoft Project 2016 or the current version as supplied in accordance with Appendix 1/1.
- No other format shall be used.
- Such software shall be provided to the Engineer prior to submission of the Contract Programmes.

APPENDIX 1/14: PAYMENT APPLICATIONS

The monthly statements submitted to the Engineer by the Contractor in accordance with Clause 60 of the Conditions of Contract shall inter alia set out in detail the Schedule of Payments which are either [REDACTED] complete for each Milestone.

APPENDIX 1/15: ACCOMMODATION WORKS

1. Not Used.

APPENDIX 1/16: PRIVATELY AND PUBLICLY OWNED SERVICES AND SUPPLIES**Undertakers Works**

1. Notwithstanding any information provided in this Schedule of Indicative Undertakers Works for the Design, construction, completion and maintenance of the Works, the Contractor shall consult and comply with the requirements of all Undertakers necessary to determine the effect of the Design, construction, completion and maintenance of the Works on Apparatus, and to arrange any alterations of any Apparatus or Private Apparatus which, in the opinion of the Undertakers, may be necessary for or resulting from the Design construction, completion and maintenance of the Works.
2. The Contractor shall make arrangements with the Undertakers and others concerned for the coordination of the Design, construction, completion and maintenance of the Works with all Undertakers' Works and otherwise required to be carried out concurrently with the Design, construction, completion and maintenance of Works.
3. The Contractor shall make arrangements with Undertakers and others for the phasing of all necessary Undertakers Works affected by or forming part of the Works, including the consideration of network outages and embargos implemented by each Undertaker. The Contractor shall consult with each Undertaker to confirm when network outages and embargos are proposed.
4. The Contractor shall consult and comply with all Undertakers and others in connection with diversion routes, road closures, interruptions to supplies and otherwise while Undertakers Works are being carried out.
5. The Contractor shall comply with any periods of notice given by Undertakers.

Any such compliance by the Contractor shall not relieve the Contractor of any of his other obligations under the Contract.

6. The locations of:
 - (i) existing Apparatus;
 - (ii) existing Private Apparatus; and
 - (iii) any advance Undertakers Works

shown on the Drawings listed in Appendix 0/4 of the Specification are approximate only.

The Contractor shall satisfy himself as to the exact location of all Apparatus and Private Apparatus (including private water supplies) prior to carrying out work in any part of the Site.

No warranty or representation is given by the Employer as to the accuracy or completeness of any such information.

The Employer shall be under no liability for any error, misstatement or omission, and none of such information shall constitute a contract or part of a contract between the Employer and the Contractor and shall not create a duty of care by the Employer to the Contractor.

7. The Contractor shall satisfy himself that the Design, construction, completion and maintenance of the Works take account of all existing Apparatus whether or not such existing Apparatus are shown on any Drawings listed in Appendix 0/4 of the Specification.
8. Apparatus and/or Private Apparatus to individual properties have not been shown on all of the Drawings listed in Appendix 0/4 of the Specification. The Contractor shall satisfy himself as to the exact location of all Apparatus and/or Private Apparatus to individual properties prior to carrying out work in the vicinity of properties and/or properties that have been demolished.

The Contractor shall make arrangements with Undertakers and relevant owners of Private Apparatus and others concerned for the phasing of all necessary Undertakers Works and Private Apparatus Works affected by the Design, construction, completion and maintenance of the Works.

APPENDIX 1/16: PRIVATELY AND PUBLICLY OWNED SERVICES AND SUPPLIES (Continued)

9. The names, addresses and telephone numbers of the Undertakers with Apparatus in the locality of the Site include, but not limited to, those described in Table 1/16A.

Notwithstanding the names, addresses and telephone numbers of the Undertakers with Apparatus in the locality of the Site including, but not limited to, those described in Table 1/16A or the Undertakers referred to elsewhere in the Contract, the Contractor shall satisfy himself as part of the Design, construction, completion and maintenance of the Works that he has consulted and complied with the requirements of all Undertakers and any others affected by the Design construction, completion and maintenance of the Works.

Table 1/16A

Undertakers and other Companies	Address and Telephone Number	Contact
Aberdeen City Council (Telecommunications)	[REDACTED]	[REDACTED]
Aberdeen City Council (District Heating)	[REDACTED]	[REDACTED]
Openreach	[REDACTED]	[REDACTED]
Scottish and Southern Energy	[REDACTED]	[REDACTED]
Scottish Water	[REDACTED]	[REDACTED]
Scotland Gas Networks	[REDACTED]	[REDACTED]
Vodafone	[REDACTED]	[REDACTED]
Trafficmaster	[REDACTED]	[REDACTED]
City Fibre	[REDACTED]	[REDACTED]

Private Apparatus Works

10. The Contractor shall consult and comply with Undertakers and relevant parties for Private Apparatus Works to determine the effect of the Design, construction, completion and maintenance of the Works and Undertaker's Works on Private Apparatus.
11. The Contractor shall bear the cost of all Private Apparatus Works or any other work which may be required for the Design, construction, completion and maintenance of the Works.
12. It shall be the Contractor's responsibility to co-ordinate all Undertakers Works and Private Apparatus Works or future provision Works to meet the requirements of Undertakers or relevant owners of Private Apparatus notwithstanding any indicative diversions identified in this Appendix.

General

13. Not used.

APPENDIX 1/16: PRIVATELY AND PUBLICLY OWNED SERVICES AND SUPPLIES (Continued)

14. Within the Indicative Schedule of Undertakers Works (Table 1/16B) for the Works contained in this Appendix, where chainage is referenced to the Left (L) and Right (R) of chainage points, this is relative to the direction of increasing chainage and is given in metres.

All chainages are approximate.

15. The Contractor shall be responsible for the provision and full coordination of all traffic management associated with the Works in connection with all Undertakers Works and Private Apparatus Works required to be carried out in accordance with the Contract, including traffic management requirements outwith the Land Made Available.
16. Not used.
17. The Contractor shall carry out all works required resulting from the requirement upon the Contractor to consult and comply with the requirements of the Undertakers and the other provisions of the Contract to enable the Undertakers Works in the Indicative Schedule of Undertakers Works contained in Table 1/16B to be completed.
18. The Contractor shall comply with the Special Requirements of Undertakers and other relevant companies, as provided in the Conditions of Contract.
19. Not used.

APPENDIX 1/16: PRIVATELY AND PUBLICLY OWNED SERVICES AND SUPPLIES SCHEDULE OF INDICATIVE UNDERTAKERS WORKS
(Continued)

Table 1/16B – Indicative Schedule of Undertakers Works			
TELECOMMUNICATIONS – ABERDEEN CITY COUNCIL			
Reference Drawing Reference	General Description of Services	UG, OH or OG	Works by Undertakers
ACC-01A B1557630/CD/2701/ 001 to B1557630/CD/2701/ 003	[REDACTED]	UG	1. Design works
			2. Procure cabling apparatus
			3. Temporarily protect and slew apparatus. Install joints in apparatus (if required)
			4. Notify customers impacted by the works.
ACC-01B B1557630/CD/2701/ 001 to B1557630/CD/2701/ 003	[REDACTED]	UG	1. Design works
			2. Procure cabling apparatus
			3. Transfer new cable to new duct route.
			4. Notify customers impacted by the works.

APPENDIX 1/16: PRIVATELY AND PUBLICLY OWNED SERVICES AND SUPPLIES SCHEDULE OF INDICATIVE UNDERTAKERS WORKS
(Continued)

Table 1/16B – Indicative Schedule of Undertakers Works			
DISTRICT HEATING – ABERDEEN CITY COUNCIL			
Reference Drawing Reference	General Description of Services	UG, OH or OG	Works by Undertakers
ACC-02 B1557630/CD/2701/ 001	[REDACTED]	UG	1. Design works in consultation with Contractor 2. Procure apparatus 3. Install ducts and associated apparatus.

Notes

1. Reference ACC-01A, ACC-01B and ACC-02 refers to those diversions and protection Works to Aberdeen City Council services shown on Drawing Numbers B1557630/CD/2701/001 to B1557630/CD/2701/004 as listed in Appendix 0/4 of the Specification.
2. UG – Underground; OH – Overhead; OG – Overground; L and LHS – Left hand side; R and RHS – Right hand side.
3. The distance between chambers on the proposed duct route (as described within Section 4.8.5 of Part 2 of the Employer's Requirements) shall not exceed 150m. Chamber locations to be reviewed in conjunction with the chamber requirements for the ITS and Traffic Signal design packages and consulted with Aberdeen City Council.

APPENDIX 1/16: PRIVATELY AND PUBLICLY OWNED SERVICES AND SUPPLIES SCHEDULE OF INDICATIVE UNDERTAKERS WORKS
(Continued)

Table 1/16B – Indicative Schedule of Undertakers Works

TELECOMMUNICATIONS – BT OPENREACH

Reference Drawing Reference	General Description of Services	UG, OH or OG	Works by Undertakers
<p>BT-01 B1557630/CD/2702/ 001 and B1557630/CD/2702/ 004</p>	<p>[REDACTED]</p>	<p>UG</p>	<ol style="list-style-type: none"> 1. Design works. Establish if full scope of diversion is required based on Contractor's Design. 2. Procure apparatus 3. Obtain third party wayleave/servitude as required. 4. Install ducts and jointing chambers and transfer all new cables and recover all out of use cables. Including excavation and reinstatement works. Transfer all new cables to new duct route. Slew ducts where it is possible to reduce the scope of the diversion based on Contractor's Design. 5. Notify customers impacted by the works. 6. Recover cables. Abandoned apparatus (including but not limited to ducting and chambers) to be left by Openreach for removal by Contractor.

APPENDIX 1/16: PRIVATELY AND PUBLICLY OWNED SERVICES AND SUPPLIES SCHEDULE OF INDICATIVE UNDERTAKERS WORKS
(Continued)

Table 1/16B – Indicative Schedule of Undertakers Works			
TELECOMMUNICATIONS – OPENREACH			
Reference Drawing Reference	General Description of Services	UG, OH or OG	Works by Undertakers
BT-02 B1557630/CD/2702/ 001 and B1557630/CD/2702/ 002	[REDACTED]	UG	1. Design works
			2. Procure apparatus
			3. Obtain third party wayleave/servitude as required.
			4. Install ducts and jointing chambers and transfer all new cables and recover all out of use cables. Including excavation and reinstatement works. Transfer all new cables to new duct route.
			5. Notify customers impacted by the works.
			6. Recover cables. Abandoned apparatus (including but not limited to ducting and chambers) to be left by Openreach for removal by the Contractor.

APPENDIX 1/16: PRIVATELY AND PUBLICLY OWNED SERVICES AND SUPPLIES SCHEDULE OF INDICATIVE UNDERTAKERS WORKS
(Continued)

Table 1/16B – Indicative Schedule of Undertakers Works			
TELECOMMUNICATIONS – BT OPENREACH			
Reference Drawing Reference	General Description of Services	UG, OH or OG	Works by Undertakers
BT-03 B1557630/CD/2702/ 002	[REDACTED]	UG	1. Design works
			2. Procure apparatus
			3. Obtain third party wayleave/servitude as required.
			4. Install ducts and jointing chambers and transfer all new cables and recover all out of use cables. Including excavation and reinstatement works. Transfer all new cables to new duct route.
			5. Notify customers impacted by the works.
			6. Recover cables. Abandoned apparatus (including but not limited to ducting and chambers) to be left by Openreach for removal by the Contractor.

APPENDIX 1/16: PRIVATELY AND PUBLICLY OWNED SERVICES AND SUPPLIES SCHEDULE OF INDICATIVE UNDERTAKERS WORKS
(Continued)

Table 1/16B – Indicative Schedule of Undertakers Works			
TELECOMMUNICATIONS – BT OPENREACH			
Reference Drawing Reference	General Description of Services	UG, OH or OG	Works by Undertakers
BT-04 B1557630/CD/2702/ 002 and B1557630/CD/2702/ 003	[REDACTED]	UG	1. Design works
			2. Procure apparatus
			3. Install ducts and jointing chambers and transfer all new cables and recover all out of use cables, including excavation and reinstatement works. Transfer all new cables to new duct route.
			4. Notify customers impacted by the works.

APPENDIX 1/16: PRIVATELY AND PUBLICLY OWNED SERVICES AND SUPPLIES SCHEDULE OF INDICATIVE UNDERTAKERS WORKS
(Continued)

			5. Recover cables. Abandoned apparatus (including but not limited to ducting and chambers) to be left by Openreach for removal by the Contractor.
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APPENDIX 1/16: PRIVATELY AND PUBLICLY OWNED SERVICES AND SUPPLIES SCHEDULE OF INDICATIVE UNDERTAKERS WORKS
(Continued)

Table 1/16B – Indicative Schedule of Undertakers Works			
TELECOMMUNICATIONS – BT OPENREACH			
Reference Drawing Reference	General Description of Services	UG, OH or OG	Works by Undertakers
BT-05 B1557630/CD/2702/ 002	[REDACTED]	UG	1. Design works
			2. Procure apparatus
			3. Obtain third party wayleaves/servitude as required.
			4. Install ducts and jointing chambers and transfer all new cables and recover all out of use cables. Including excavation and reinstatement works. Transfer all new cables to new duct route.
			5. Notify customers impacted by the works.
			6. Recover cables. Abandoned apparatus (including but not limited to ducting and chambers) to be left by Openreach for removal by the Contractor.
BT-06 B1557630/CD/2702/ 002	[REDACTED]	OG	1. Design works
			2. Procure apparatus
			3. Arrange for power to be disconnected from telephone box site. Remove telephone box and associated equipment from site.
			4. Arrange for power to be connected to new telephone box site. Erect telephone box and associated equipment to proposed location.

APPENDIX 1/16: PRIVATELY AND PUBLICLY OWNED SERVICES AND SUPPLIES SCHEDULE OF INDICATIVE UNDERTAKERS WORKS (Continued)

Notes

1. References BT01 to BT05 refer to those diversions and protection Works to Openreach services shown on Drawing Numbers B1557630/CD/2702/001 to B1557630/CD/2702/004 as listed in Appendix 0/4 of the Specification.
2. UG – Underground; OH – Overhead; OG – Overground; L and LHS – Left hand side; R and RHS – Right hand side.
3. The design, procurement, notification, and site works for BT01 to BT05 inclusive will, on occasions, take place concurrently.
4. [REDACTED]
5. [REDACTED]
6. Work carried out on Openreach apparatus is subject to network embargos. No work can be completed on the Openreach network during these periods. The Contractor shall consult with Openreach to confirm the exact dates of any embargos to avoid an impact on programme
7. 8 weeks (TBC) minimum advance notice for works within main Contractor's existing traffic management or non-traffic situations.
8. Openreach field staff will be responsible for the transfer of all cables into new duct work and the cutting and sealing of cables to preserve the network.
9. Following the completion of Openreach works, the Contractor will demolish or remove all redundant chambers as directed by the Openreach Project Engineer.

APPENDIX 1/16: PRIVATELY AND PUBLICLY OWNED SERVICES AND SUPPLIES SCHEDULE OF INDICATIVE UNDERTAKERS WORKS
(Continued)

Table 1/16B – Indicative Schedule of Undertakers Works			
TELECOMMUNICATIONS – Vodafone			
Reference Drawing Reference	General Description of Services	UG or OH	Works by Undertakers
VTC-01 B1557630/CD/2703/ 001 to B1557630/CD/2703/ 004	[REDACTED]	UG	1. Design works
			2. Procure apparatus
			3. Install ducts and chambers, including excavation and reinstatement works. Install fibre cables in new duct route.
			4. Notify customers impacted by the works.
			5. Recover cables. Abandoned ducting and chambers to be removed by the Contractor.
VTC-01A (Temporary Diversion) B1557630/CD/2703/ 001	[REDACTED]	UG	1. Design works
			2. Procure apparatus
			3. Install and protect ducts (TBC)

Notes

- Reference VTC 01 and VTC-01A refers to the diversion works to Vodafone services shown on Drawing Numbers B1557630/CD/2703/001 to B1557630/CD/2703/004 as listed in Appendix 0/4 of the Specification.

APPENDIX 1/16: PRIVATELY AND PUBLICLY OWNED SERVICES AND SUPPLIES SCHEDULE OF INDICATIVE UNDERTAKERS WORKS (Continued)

2. UG – Underground; OH – Overhead; OG – Overground; L and LHS – Left hand side; R and RHS – Right hand side.
3. The design, procurement, notification, and site works for VTC-01 will, on occasions, take place concurrently.
4. [REDACTED]
5. [REDACTED]

APPENDIX 1/16: PRIVATELY AND PUBLICLY OWNED SERVICES AND SUPPLIES SCHEDULE OF INDICATIVE UNDERTAKERS WORKS
(Continued)

Table 1/16B – Indicative Schedule of Undertakers Works			
ELECTRICITY – SCOTTISH AND SOUTHERN ENERGY			
Reference Drawing Reference	General Description of Services	UG or OH	Works by Undertakers
SSE-01 B1557630/CD/2704/ 001	[REDACTED]	UG	1. Design works
			2. Procure apparatus
			3. All cable laying, including excavation and reinstatement works, relocating and jointing. Relocation of substation.

APPENDIX 1/16: PRIVATELY AND PUBLICLY OWNED SERVICES AND SUPPLIES SCHEDULE OF INDICATIVE UNDERTAKERS WORKS
(Continued)

Table 1/16B – Indicative Schedule of Undertakers Works			
ELECTRICITY – SCOTTISH AND SOUTHERN ENERGY			
Reference Drawing Reference	General Description of Services	UG or OH	Works by Undertakers
SSE-02 B1557630/CD/2704/ 001 and B1557630/CD/2704/ 002	[REDACTED]	UG	1. Design works
			2. Procure apparatus
			3. All cable laying, including excavation and reinstatement works, relocating and jointing.
SSE-02A (Temporary Diversion) B1557630/CD/2704/ 001 and B1557630/CD/2704/ 002	[REDACTED]		1. Design works
			2. Procure apparatus
			3. All cable laying, including excavating and reinstatement works, relocating and jointing.

APPENDIX 1/16: PRIVATELY AND PUBLICLY OWNED SERVICES AND SUPPLIES SCHEDULE OF INDICATIVE UNDERTAKERS WORKS
(Continued)

Table 1/16B – Indicative Schedule of Undertakers Works			
ELECTRICITY – SCOTTISH AND SOUTHERN ENERGY			
Reference Drawing Reference	General Description of Services	UG or OH	Works by Undertakers
SSE-03 B1557630/CD/2704/ 002 and B1557630/CD/2704/ 003	[REDACTED]	UG	1. Design works
			2. Procure apparatus
			3. All cable laying, including excavation and reinstatement works, relocating and jointing.

APPENDIX 1/16: PRIVATELY AND PUBLICLY OWNED SERVICES AND SUPPLIES SCHEDULE OF INDICATIVE UNDERTAKERS WORKS
(Continued)

Table 1/16B – Indicative Schedule of Undertakers Works			
ELECTRICITY – SCOTTISH AND SOUTHERN ENERGY			
Reference Drawing Reference	General Description of Services	UG or OH	Works by Undertakers
SSE-04 B1557630/CD/2704/ 002	[REDACTED]	UG	1. Design works
			2. Procure apparatus
			3. All cable laying, including excavation and reinstatement works, relocating and jointing.

Notes

1. Reference SSE 01 to SSE 04 refers to those diversions and protection Works to Scottish and Southern Energy services shown on Drawing Numbers B1557630/CD/2704/001 to B1557630/CD/2704/004 as listed in Appendix 0/4 of the Specification.
2. UG – Underground; OH – Overhead; OG – Overground; L and LHS – Left hand side; R and RHS – Right hand side.
3. The design, procurement, notification, and site works for SSE 01 to SSE 04 will, on occasions, take place concurrently.
4. All excavations and reinstatement works associated with the diversionary works and excavations for joint bays, shall be undertaken by the Contractor. Duct installation and supply of ducts.
5. [REDACTED]

APPENDIX 1/16: PRIVATELY AND PUBLICLY OWNED SERVICES AND SUPPLIES SCHEDULE OF INDICATIVE UNDERTAKERS WORKS
(Continued)

Table 1/16B – Indicative Schedule of Undertakers Works			
GAS – SCOTLAND GAS NETWORKS			
Reference Drawing Reference	General Description of Services	UG or OH	Works by Undertakers
SGN-01(IP) B1557630/CD/2705/ 002 and B1557630/CD/2705/ 003	[REDACTED]	UG	1. Design works
			2. Procure apparatus
			3. Remove redundant apparatus and install new apparatus (TBC)

APPENDIX 1/16: PRIVATELY AND PUBLICLY OWNED SERVICES AND SUPPLIES SCHEDULE OF INDICATIVE UNDERTAKERS WORKS
(Continued)

Table 1/16B – Indicative Schedule of Undertakers Works

GAS – SCOTLAND GAS NETWORKS

Reference Drawing Reference	General Description of Services	UG or OH	Works by Undertakers
SGN-02(LP) B1557630/CD/2705/ 001	[REDACTED]	UG	<ol style="list-style-type: none"> 1. Design works 2. Procure apparatus 3. Remove redundant apparatus and install new apparatus.

APPENDIX 1/16: PRIVATELY AND PUBLICLY OWNED SERVICES AND SUPPLIES SCHEDULE OF INDICATIVE UNDERTAKERS WORKS
(Continued)

Table 1/16B – Indicative Schedule of Undertakers Works			
GAS – SCOTLAND GAS NETWORKS			
Reference Drawing Reference	General Description of Services	UG or OH	Works by Undertakers
SGN-03(LP) B1557630/CD/2705/ 001 to B1557630/CD/2705/ 004	[REDACTED]	UG	1. Design works
			2. Procure apparatus
			3. Remove redundant apparatus and install new apparatus (TBC)
			4. Obtain third party wayleaves.

APPENDIX 1/16: PRIVATELY AND PUBLICLY OWNED SERVICES AND SUPPLIES SCHEDULE OF INDICATIVE UNDERTAKERS WORKS
(Continued)

Table 1/16B – Indicative Schedule of Undertakers Works			
GAS – SCOTLAND GAS NETWORKS			
Reference Drawing Reference	General Description of Services	UG or OH	Works by Undertakers
SGN-04 B1557630/CD/2705/ 003	[REDACTED]	UG	<ol style="list-style-type: none"> 1. Design works 2. Procure apparatus 3. Remove redundant apparatus and install new apparatus (TBC)

APPENDIX 1/16: PRIVATELY AND PUBLICLY OWNED SERVICES AND SUPPLIES SCHEDULE OF INDICATIVE UNDERTAKERS WORKS
(Continued)

Table 1/16B – Indicative Schedule of Undertakers Works			
GAS – SCOTLAND GAS NETWORKS			
Reference Drawing Reference	General Description of Services	UG or OH	Works by Undertakers
SGN-05 B1557630/CD/2705/ 002	[REDACTED]	UG	1. Design works 2. Procure apparatus 3. Remove redundant apparatus and install new apparatus (TBC) 4. Obtain third party wayleaves.

Notes

1. Reference SGN 01 to SGN 05 refers to those diversions and protection Works to SGN services shown on Drawing Numbers B1557630/CD/2705/001 to B1557630/CD/2705/004 as listed in Appendix 0/4 of the Specification.
2. UG – Underground; OH – Overhead; OG – Overground; L and LHS – Left hand side; R and RHS – Right hand side.
3. The design, procurement, notification, and site works for SGN 01 to SGN 05 will, on occasions, take place concurrently.
4. Any traffic management required for the diversion works shall be provided by the Contractor.
5. SGN will only be responsible for excavation and backfill, all permanent reinstatement shall be carried out by the Contractor.
6. Final levels to be provided to SGN by Contractor prior to pipe installation.

APPENDIX 1/16: PRIVATELY AND PUBLICLY OWNED SERVICES AND SUPPLIES SCHEDULE OF INDICATIVE UNDERTAKERS WORKS
(Continued)

Table 1/16B – Indicative Schedule of Undertakers Works			
WATER – SCOTTISH WATER - Supply			
Reference Drawing Reference	General Description of Services	UG or OH	Works by Undertakers
SWW-01A B1557630/CD/2706/ 001	[REDACTED]	UG	1. Design works
			2. Procure apparatus
			3. Install new apparatus; connect, test and commission as appropriate (TBC)
SWW-01B (Includes Temporary Diversion) B1557630/CD/2706/ 001	[REDACTED]	UG	1. Design works
			2. Procure apparatus
			3. Install new apparatus (including temporary apparatus); connect, test and commission as appropriate (TBC)
SWW-01C B1557630/CD/2706/ 001	[REDACTED]	UG	1. Design works
			2. Procure apparatus
			3. Install new apparatus; connect, test and commission as appropriate (TBC)
			4. Abandon temporary apparatus.

APPENDIX 1/16: PRIVATELY AND PUBLICLY OWNED SERVICES AND SUPPLIES SCHEDULE OF INDICATIVE UNDERTAKERS WORKS
(Continued)

Table 1/16B – Indicative Schedule of Undertakers Works			
WATER – SCOTTISH WATER - Supply			
Reference Drawing Reference	General Description of Services	UG or OH	Works by Undertakers
SWW-02 B1557630/CD/2706/ 001 to B1557630/CD/2706/ 002	[REDACTED]	UG	<ol style="list-style-type: none"> 1. Design works in consultation with the Main Works Contractor 2. Procure apparatus 3. Install new apparatus; connect, test and commission as appropriate (TBC)

APPENDIX 1/16: PRIVATELY AND PUBLICLY OWNED SERVICES AND SUPPLIES SCHEDULE OF INDICATIVE UNDERTAKERS WORKS
(Continued)

Table 1/16B – Indicative Schedule of Undertakers Works			
WATER – SCOTTISH WATER - Supply			
Reference Drawing Reference	General Description of Services	UG or OH	Works by Undertakers
SWW-03 B1557630/CD/2706/ 003	[REDACTED]	UG	<ol style="list-style-type: none"> 1. Design works and any protection works. 2. Procure apparatus 3. Install new apparatus; connect, test and commission as appropriate (TBC)

APPENDIX 1/16: PRIVATELY AND PUBLICLY OWNED SERVICES AND SUPPLIES SCHEDULE OF INDICATIVE UNDERTAKERS WORKS
(Continued)

Table 1/16B – Indicative Schedule of Undertakers Works			
WATER – SCOTTISH WATER - Supply			
Reference Drawing Reference	General Description of Services	UG or OH	Works by Undertakers
SWW-04 B1557630/CD/2706/ 002	[REDACTED]	UG	1. Design works and any protection works. 2. Procure apparatus 3. Install new apparatus; connect, test and commission as appropriate (TBC)

Notes

1. Reference SWW 01 to SWW 04 refers to those diversions and protection Works to Scottish Water services shown on Drawing Numbers B1557630/CD/2706/001 to B1557630/CD/2706/004 as listed in Appendix 0/4 of the Specification.
2. UG – Underground; OH – Overhead; OG – Overground; L and LHS – Left hand side; R and RHS – Right hand side.
3. The design, procurement, notification, and site works for SWW 01 to SWW 04 will, on occasions, take place concurrently.

APPENDIX 1/16: PRIVATELY AND PUBLICLY OWNED SERVICES AND SUPPLIES SCHEDULE OF INDICATIVE UNDERTAKERS WORKS
(Continued)

Table 1/16B – Indicative Schedule of Undertakers Works			
Sewers – SCOTTISH WATER - Sewers			
Reference Drawing Reference	General Description of Services	UG or OH	Works by Undertakers
SWS-01 B1557630/CD/2707/ 003	[REDACTED]	UG	<ol style="list-style-type: none"> 1. Design works 2. Procure apparatus 3. Install new apparatus; connect, test and commission as appropriate (TBC)

APPENDIX 1/16: PRIVATELY AND PUBLICLY OWNED SERVICES AND SUPPLIES SCHEDULE OF INDICATIVE UNDERTAKERS WORKS
(Continued)

Table 1/16B – Indicative Schedule of Undertakers Works			
Sewers – SCOTTISH WATER - Sewers			
Reference Drawing Reference	General Description of Services	UG or OH	Works by Undertakers
SWS-02 B1557630/CD/2707/ 002	[REDACTED]	UG	<ol style="list-style-type: none"> 1. Design works 2. Procure apparatus 3. Install new apparatus; connect, test and commission as appropriate (TBC)

APPENDIX 1/16: PRIVATELY AND PUBLICLY OWNED SERVICES AND SUPPLIES SCHEDULE OF INDICATIVE UNDERTAKERS WORKS
(Continued)

Table 1/16B – Indicative Schedule of Undertakers Works			
Sewers – SCOTTISH WATER - Sewers			
Reference Drawing Reference	General Description of Services	UG or OH	Works by Undertakers
SWS-03 B1557630/CD/2707/ 001 to B1557630/CD/2707/ 002	[REDACTED]	UG	<ol style="list-style-type: none"> 1. Design works in consultation with the Main Works Contractor. 2. Procure apparatus 3. Install new apparatus; connect, test and commission as appropriate (TBC)

APPENDIX 1/16: PRIVATELY AND PUBLICLY OWNED SERVICES AND SUPPLIES SCHEDULE OF INDICATIVE UNDERTAKERS WORKS
(Continued)

Table 1/16B – Indicative Schedule of Undertakers Works			
Sewers – SCOTTISH WATER - Sewers			
Reference Drawing Reference	General Description of Services	UG or OH	Works by Undertakers
SWS-04 B1557630/CD/2707/ 001	[REDACTED]	UG	1. Design works
			2. Procure apparatus
			3. Install new apparatus; connect, test and commission as appropriate (TBC)

Notes

1. Reference SWS 01 to SWS 04 refers to those diversions and protection Works to Scottish Water services shown on Drawing Numbers B1557630/CD/2707/001 to B1557630/CD/2707/004 as listed in Appendix 0/4 of the Specification.
2. UG – Underground; OH – Overhead; OG – Overground; L and LHS – Left hand side; R and RHS – Right hand side.
3. The design, procurement, notification, and site works for SWS 01 to SWS 04 will, on occasions, take place concurrently.

APPENDIX 1/16: PRIVATELY AND PUBLICLY OWNED SERVICES AND SUPPLIES SCHEDULE OF INDICATIVE UNDERTAKERS WORKS
(Continued)

Table 1/16B – Indicative Schedule of Undertakers Works			
TRAFFIC – Trafficmaster			
Reference Drawing Reference	General Description of Services	UG, OH or OG	Works by Undertakers
TM-01 B1557630/CD/2708/ 003 and B1557630/CD/2708/ 004	[REDACTED]	OG	1. Carry out Statutory Undertakers works associated the removal and reinstallation of equipment. 2. Procure apparatus 3. Connect, test and commission equipment as appropriate.

Notes

1. Reference TM 01 refers to diversion and protection Works to Trafficmaster apparatus shown on Drawing Numbers B1557630/CD/2708/001 to B1557630/CD/2708/004 as listed in Appendix 0/4 of the Specification.
2. UG – Underground; OH – Overhead; OG – Overground; L and LHS – Left hand side; R and RHS – Right hand side.
3. The design, procurement, notification, and site works for TM 01 will, on occasions, take place concurrently.
4. [REDACTED]
5. [REDACTED]
6. [REDACTED]
7. [REDACTED]

APPENDIX 1/16: PRIVATELY AND PUBLICLY OWNED SERVICES AND SUPPLIES SCHEDULE OF INDICATIVE UNDERTAKERS WORKS
(Continued)

Table 1/16B – Indicative Schedule of Undertakers Works			
TELECOMMUNICATIONS – City Fibre			
Contract Reference Drawing Reference	General Description of Services	UG, OH or OG	Works by Undertakers
CF-01A (Advance Works) B1557630/CD/2709/ 002 and B1557630/CD/2709/ 003	[REDACTED]	UG	1. Design Works
			2. Procure Apparatus
			3. Install fibre cables in new duct route.
			4. Consult with the Contractor for any protection measures required.
CF-01B (Advance Works) B1557630/CD/2709/ 002 and B1557630/CD/2709/ 003	[REDACTED]	UG	1. Design Works
			2. Procure Apparatus
			3. Install ducts and chambers, including excavation and reinstatement works.
			4. Notify customers impacted by the works.
			5. Recover cables. Abandoned ducting and chambers to be removed by the Contractor.

APPENDIX 1/16: PRIVATELY AND PUBLICLY OWNED SERVICES AND SUPPLIES SCHEDULE OF INDICATIVE UNDERTAKERS WORKS
(Continued)

			6. Consult with the Contractor for any protection measures required.
<p>CF-01C B1557630/CD/2709/001 and B1557630/CD/2709/002</p>	[REDACTED]	UG	<p>1. Design works</p> <p>2. Procure apparatus</p> <p>3. Install ducts and chambers, including excavation and reinstatement works. Install fibre cables in new duct route.</p> <p>4. Notify customers impacted by the works.</p> <p>5. Recover cables. Abandoned ducting and chambers to be removed by the Contractor.</p>

APPENDIX 1/16: PRIVATELY AND PUBLICLY OWNED SERVICES AND SUPPLIES SCHEDULE OF INDICATIVE UNDERTAKERS WORKS
(Continued)

Table 1/16B – Indicative Schedule of Undertakers Works			
TELECOMMUNICATIONS – City Fibre			
Reference Drawing Reference	General Description of Services	UG or OH	Works by Undertakers
CF-02 B1557630/CD/2709/ 001	[REDACTED]	UG	<ol style="list-style-type: none"> 1. Design works and any protection works in consultation with the Contractor. 2. Procure apparatus 3. Install ducts and chambers, including excavation and reinstatement works.

APPENDIX 1/16: PRIVATELY AND PUBLICLY OWNED SERVICES AND SUPPLIES SCHEDULE OF INDICATIVE UNDERTAKERS WORKS
(Continued)

Table 1/16B – Indicative Schedule of Undertakers Works			
TELECOMMUNICATIONS – City Fibre			
Reference Drawing Reference	General Description of Services	UG or OH	Works by Undertakers
CF-03A B1557630/CD/2709/ 002 and B1557630/CD/2709/ 003	[REDACTED]	UG	1. Protection works in consultation with the Contractor.
CF-03B B1557630/CD/2709/ 002 and B1557630/CD/2709/ 003	[REDACTED]	UG	1. Design works and any protection works in consultation with the Contractor. 2. Procure apparatus. 3. Install ducts and chambers, including excavation and reinstatement works.

Notes

1. References CF-01(A, B and C), CF02 and CF-03 (A and B) refers to those diversions and protection Works to City Fibre services shown on Drawing Numbers B1557630/CD/2709/001 to B1557630/CD/2709/004 as listed in Appendix 0/4 of the Specification.
2. UG – Underground; OH – Overhead; OG – Overground; L and LHS – Left hand side; R and RHS – Right hand side.
3. The design, procurement, notification, and site works for CF-01 will, on occasions, take place concurrently.
4. [REDACTED]
5. [REDACTED]
6. Work carried out on City Fibre apparatus is subject to network embargos. No work can be completed on the City Fibre network during these periods. The Contractor shall consult with City Fibre to confirm exact dates of any embargos to avoid any impact on programme.
7. [REDACTED]
8. [REDACTED]

APPENDIX 1/17: TRAFFIC SAFETY AND MANAGEMENT

1. All Traffic Management shall be carried out in a manner which avoids causing traffic to divert on to alternative routes, minimises the impact on the local community and minimises delays and disruptions to existing traffic. The Contractor shall demonstrate to the satisfaction of those consulted as given in Paragraph 3 of this Appendix that his Traffic Management proposals have been developed such that they include all necessary measures to minimise delays, disruptions and diversions to traffic.
2. Subject to the other requirements of the Contract the Contractor shall comply at all times with the requirements of Chapter 8 of the Traffic Signs Manual and any additional requirements detailed in the Design Manual for Roads and Bridges.
3. Notwithstanding any requirement of the Contract, the Contractor shall liaise with Aberdeen City Council, the Traffic Police and the Overseeing Organisation on all temporary traffic management proposals and shall obtain Consultation Certificates signed by the Contractor and the relevant third parties in accordance with Section 8.9 of the Employer's Requirements.

Liaison shall be through the following offices:

Police Scotland

Road Policing, Operational Planning and Support

Contact: [REDACTED]

Telephone: [REDACTED]

Email: [REDACTED]

Local Road Network

Aberdeen City Council,

[REDACTED]

Contact: [REDACTED]

Telephone: [REDACTED]

Email: [REDACTED]

Trunk Road

Network Management (North) Trunk Roads and Bus Operations (TRBO)

[REDACTED]

Contact: [REDACTED]

Email: [REDACTED]

Telephone: [REDACTED]

Trunk Roads Managed and Maintained by:

BEAR Scotland Limited

[REDACTED]

Contact: [REDACTED]

Email: [REDACTED]

Telephone: [REDACTED]

Aberdeen City Council,

[REDACTED]

Contact: [REDACTED]

Telephone: [REDACTED]

Email: [REDACTED]

4. Where Works are carried out on or adjacent to a road open to vehicles, all vehicles and mobile plant operating on or adjacent to that road in the execution of the Works shall be painted in a conspicuous colour as described hereafter:-

APPENDIX 1/17: TRAFFIC SAFETY AND MANAGEMENT (Continued)
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- (i) All vehicles used in mobile lane closures as defined in Section D6.24 of Part 1 of Chapter 8 of the Traffic Signs Manual shall be painted in non-reflectorised yellow (Colour No 355 to BS 381 C or similar).

Similarly all vehicles engaged in Works within unprotected trafficked lanes (for example, setting up major traffic management layouts such as tapers and contraflows) on high speed roads shall be painted non-reflectorised yellow.

- (ii) All other vehicles undertaking Works shall be generally light in colour preferably but not necessarily non-reflectorised yellow and/or provide, over the full width and height of the vehicle which is exposed to approaching vehicles, conspicuous markings and signs to define clearly that the vehicle is a roadworks vehicle.
- (iii) Vehicles shall have a sign board reading "Highway Maintenance" (to Diagram 7404 of Schedule 13 Part 6 of the Traffic Signs Regulations and General Directions 2016) fixed at the rear.

The lettering shall be 150 millimetres "x height" except that for light vans and cars it shall be the largest "x height" that can be accommodated out of the following heights: 37.5, 50, 62.5 or 100 millimetres.

The lettering shall be black capital letters from the alphabet as described in Schedule 17 Part 2 of the Traffic Signs Regulations and General Directions 2016 on a yellow non-reflectorised background in accordance with BS 381C, Colour No 355.

In addition all purpose vehicles and plant shall be provided with either roof mounted light bars or at least two amber flashing beacons, and light vans and cars shall be provided with a roof mounted amber flashing distinctive lamp.

- (iv) All warning lamps shall be switched on when the vehicle or plant is manoeuvring into or out of the location of the Works, operating at low speed on the carriageway or standing on a carriageway.

5. Proposals for the management of all vehicular and pedestrian traffic shall be submitted to the Overseeing Organisation and Aberdeen City Council prior to the commencement of any Works.
6. All applications relating to Traffic Orders and/or authorisation of signs and/or signals shall be submitted to the Overseeing Organisation and Aberdeen City Council in writing and require the following notice period:
- (i) amending or making temporary traffic orders – 8 weeks;
 - (ii) authorisation of temporary traffic signals – 3 weeks; and
 - (iii) authorisation of non prescribed signs – 8 weeks.
7. The Contractor shall be responsible for the payment of all charges associated with the preparation and publication of all road related orders.
8. The Contractor shall comply with Section 8.11.7 of Part 1 of the Employer's Requirements in relation to the provision of Stage 2 and Stage 3 Road Safety Audits on all temporary traffic management proposals.
9. Prior to any Works starting on Site, the Contractor shall supply to the Overseeing Organisation details of the following:
- (i) Phasing of the Works.
 - (ii) Drawings showing traffic management layouts including, but not limited to, the following:
 - a) Position of traffic signs, signals and cones;

APPENDIX 1/17: TRAFFIC SAFETY AND MANAGEMENT (Continued)
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- b) Width of lanes;
 - c) Working areas;
 - d) Safety zones;
 - e) Details of temporary barriers for the protection of personnel;
 - f) Entry points for site traffic;
 - g) Provisions for emergency vehicles;
 - h) Crossovers (suitable for moving traffic for a minimum design speed of 50kph on the Trunk Roads);
 - i) Pedestrian / Cyclist Access; and
 - j) Provisions for bus routes and bus stops.
- (iii) Timing of operations.
 - (iv) Sufficient information to demonstrate the objectives stated in paragraph 1 of this Appendix 1/17 can be achieved.
 - (v) Name and telephone numbers of the Traffic Safety and Control Officer and other personnel.
 - (vi) Names and telephone numbers of a minimum of 3 personnel who can be contacted by Police Scotland, Aberdeen City Council and/or the Overseeing Organisation, both during or outwith the working day, and who shall be responsible for initiating whatever action shall reasonably be required in the event of an emergency. At least 2 of these contacts shall be available at any one time including periods when the Site is closed.

A communications system sufficient to allow contact to be achieved at all times with coverage extending to the Site and the A90 and A96 Trunk Roads.

- 10. Not less than 10 days before implementation of any temporary traffic management proposals the Contractor shall submit to the Overseeing Organisation the two signed copies of a Stage 2 Road Safety Audit Certificate in respect of the temporary traffic management proposals.
- 11. Not less than 7 days before implementation of any temporary traffic management proposals the Contractor shall submit to the Overseeing Organisation the following:
 - (i) Two signed copies of Consultation Certificates in respect of the temporary traffic management proposals signed by the Contractor and Police Scotland.
 - (ii) Two signed copies of Consultation Certificates in respect of the temporary traffic management proposals signed by the Contractor, Aberdeen City Council, and Overseeing Organisation.
 - (iv) Four copies of drawings showing the temporary traffic management proposal layouts including, as appropriate:
 - a) Position of traffic signs, signals and cones;
 - b) Width of lanes;
 - c) Working areas;
 - d) Safety zones;
 - e) Details of temporary barriers for the protection of personnel;
 - f) Entry points for site traffic;
 - g) Provisions for emergency vehicles;

APPENDIX 1/17: TRAFFIC SAFETY AND MANAGEMENT (Continued)
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- h) Pedestrian / Cyclist Access; and
 - i) Provisions for bus routes and bus stops.
 - (v) Crossovers (suitable for moving traffic at a minimum design speed of 50kph on the Trunk Roads).
 - (vi) Details of any relevant correspondence between the Contractor and Police Scotland and the Contractor and Aberdeen City Council.
12. The erection and removal of any traffic management installation or temporary diversion and Stage 3 Road Safety Audit shall not be carried out during the following hours and at any other time periods specified by the Overseeing Organisation:-
- Monday to Sunday – 06:30 to 09:30 hours inclusive and 15.30 to 19.30 hours inclusive and on any local or national public holiday.
13. The Contractor shall provide and maintain all necessary temporary signing with regard to the temporary Traffic Regulation Orders required for the construction of the Works.
14. Temporary crossovers shall be designed for a minimum Design speed (85 percentile speed) of 50kph on the Trunk Roads.
15. “Merge in turn” layout. NOT USED.
16. Notwithstanding any other requirements of the Contract, safety zones at all temporary traffic management proposals on the Site shall be provided as per the requirements of Chapter 8 of the Traffic Signs Manual.
17. The Contractor shall not take down existing local or advance direction signs or regulatory or informatory signs without first either providing temporary signs displaying the same information or replacement permanent signs.
18. The Contractor shall ensure that while any temporary traffic management proposals are in force they are constantly monitored, any defects identified being rectified immediately to the satisfaction of the Overseeing Organisation, Police Scotland and Aberdeen City Council.
19. The Contractor shall keep a daily record of all defects in any temporary traffic management proposals, the times when they were identified or reported to him, the action taken to correct the defects, and the times when they were successfully corrected.
- A copy of this record shall be forwarded to the Overseeing Organisation on the following day.
20. In the event of a traffic accident occurring in or adjacent to any of the Works, the Contractor shall immediately contact the Trunk Road Operator, Police Scotland, Fire and Ambulance emergency services as appropriate, the Overseeing Organisation and Aberdeen City Council informing them of the following:
- (i) Location of the accident; and
 - (ii) The seriousness of the accident and whether any persons are trapped; whether the collision involves vehicles carrying inflammable, corrosive or hazardous substances; whether there is a possibility of ignition from leaking fuel or chemicals.

APPENDIX 1/17: TRAFFIC SAFETY AND MANAGEMENT (Continued)
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21. All drivers including those delivering Constructional Plant and materials shall be given clear instructions regarding the traffic arrangements applicable at any particular time.
22. Provision for the passage of abnormal loads through the Works shall be as follows:
 - (i) The Contractor shall assist Police Scotland in moving abnormal loads through the Works by modifying the signing/coning as necessary.

Signs/cones so moved shall be replaced immediately after the abnormal loads have passed through the Works.
 - (ii) The Contractor shall be responsible for the provision of holding locations for abnormal loads for the Works, including appropriate signing.

Police Scotland and the relevant Roads Authority shall be consulted with regard to the use of the existing road network for this purpose.
 - (iii) The Contractor shall not be entitled to any further payment by the Overseeing Organisation in respect of the provisions made, measures taken or disruption caused by such abnormal loads.

For the purposes of this Section an abnormal load shall consist of any number of vehicles in convoy at any one time, requiring special measures to be taken in order to gain passage through the Works.

23. The Contractor shall be responsible for maintaining the running carriageway adjacent to and within the Works in a clean and safe condition at all times.
24. Heavy Goods Vehicles used on Site by the Contractor, his sub-contractors or suppliers shall be fitted with an audible reversing warning device.
25. Meetings between the Overseeing Organisation, Contractor, Police Scotland and Aberdeen City Council shall be arranged by the Contractor monthly throughout the duration of the Works, at initiation or changes of traffic management layouts and at any other time deemed necessary by any of these parties. A record of this meeting shall be forwarded to the Engineer within seven days.
26. The Contractor shall ensure that his traffic management proposals take account of events and public holidays that are likely to affect traffic flows.
27. The Contractor shall accommodate roadwork schemes adjacent to the Works and shall consult and comply with the relevant Roads Authority in this respect.
28. The Contractor shall nominate two members of staff to liaise with the Traffic Scotland National Control Centre at all times. As part of the nomination information the Contractor shall provide 24 hour contact telephone numbers for the staff.
29. The contact address is: [REDACTED] Telephone: [REDACTED]
30. The Contractor shall notify the National Control Centre, BEAR Scotland, Aberdeen City Council and the emergency services at least two weeks in advance of the initial implementation of any Temporary Traffic Management and any planned major changes to the traffic management layouts. The Contractor shall provide at the time of each notification an indication of the delays that are likely to occur.

APPENDIX 1/17: TRAFFIC SAFETY AND MANAGEMENT (Continued)

- 31. In accordance with Appendix 1/24 of the Specification the Contractor shall within his Method Statements for Traffic Management include procedures to inform the motoring public of delays and queues on the approaches to and within the site.
- 32. The following organisations are to be informed of the frequencies indicated in clause 34 below:

Traffic Scotland Operations & Infrastructure Services (TSOIS) Contractor
Telephone: [REDACTED]

- 33. Traffic queues shall be monitored by the Contractor at all times during periods when temporary traffic management systems are in operation for the duration of the Contract.
- 34. Traffic queues shall be measured by means of time delay. Queue lengths measured as being less than eight minutes shall be defined as representing “No substantial delay”.

Substantial delay queue lengths shall be quoted in the following bands;

<u>Measured Delay</u>	<u>Quoted Delay</u>
Up to 8 minutes	No substantial delay
Between 8 and 12 minutes	10 minute delay
Between 13 and 17 minutes	15 minute delay
Between 18 and 22 minutes	20 minute delay
subsequent 5 minute time bands	add 5 minute delay

When communicating a traffic queue its length is to also be quoted as a distance in miles.

For the purposes of the Contract a queue is defined as being where the speed of vehicles is less than 20 miles per hour.

Reporting Frequencies

The traffic information points of contact listed in clause 32 shall be informed by the Contractor if;

- (i) A queue reaches eight minutes delay;
- (ii) A queue changes by five minute band; or
- (iii) Substantial delay ends i.e. delay less than eight minutes

The Contractor shall report to TSNCC every 30 minutes when there is a queue as defined in this clause.

- 35. Vehicular and pedestrian access to any private premises shall not be restricted by the Works without the express prior written approval of the owner/occupier of the private premises.
- 36. The Contractor shall provide to the Overseeing Organisation evidence of any such written approval in advance of a restriction taking place.
- 37. Not used
- 38. Not used
- 39. All traffic signs required by the Traffic Signs Regulations and General Directions 2016 that are to be reflective shall be made reflective by the application of Class 1 retroreflective material.
- 40. As a minimum provision on trunk roads the traffic management arrangements must ensure that a single lane width of at least 3.65m is available at all times for use by all permitted classes of vehicles.

APPENDIX 1/17: TRAFFIC SAFETY AND MANAGEMENT (Continued)

41. All temporary traffic signs must comply with the Traffic Signs Regulations and General Directions 2016.
42. Public Roads, Private Roads and Other Ways Affected by the Works

The following public roads are under the control of Transport Scotland and Aberdeen City Council:-

Description	Predicted 24 Hour Annual Average Daily Traffic AADT and %age HGV	Estimated Eighty Five Percentile Speed of Cars (mph)	Speed Limit (mph) if Proposed	Type(s) of Traffic Control	Special facilities (pedestrian equestrian)	Whether to be Kept Open or Closed
A90 Trunk Road (Northbound)	16,900 with 3.2% HGV	40	Contractor's Traffic Management proposals	Contractor's Traffic Management proposals	Where any special facility exists it shall be maintained	Open
A90 Trunk Road (Southbound)	16,700 with 3.2% HGV	40	Contractor's Traffic Management proposals	Contractor's Traffic Management proposals	Where any special facility exists it shall be maintained	Open
A96 Trunk Road (Westbound)	19,000 with 5.2% HGV	40	Contractor's Traffic Management proposals	Contractor's Traffic Management proposals	Where any special facility exists it shall be maintained	Open
A96 Trunk Road (Eastbound)	21,400 with 4.7% HGV	40	Contractor's Traffic Management proposals	Contractor's Traffic Management proposals	Where any special facility exists it shall be maintained	Open
Manor Avenue	3,700 with 1.2% HGV	30	Contractor's Traffic Management proposals	Contractor's Traffic Management proposals	Where any special facility exists it shall be maintained	Open until a reasonably convenient alternative route, as agreed with Aberdeen City Council, is provided. Local access to be maintained.
Manor Drive	1,600 with 0.9% HGV	20	Contractor's Traffic Management proposals	Contractor's Traffic Management proposals	Where any special facility exists it shall be maintained	Open until a reasonably convenient alternative route, as agreed with Aberdeen City Council, is provided. Local access to be maintained.
Logie Avenue	60 with 1.6% HGV	20	Contractor's Traffic Management proposals	Contractor's Traffic Management proposals	Where any special facility exists it shall be maintained	Local access to be maintained.
Logie Place	1,300 with 0.6% HGV	17	Contractor's Traffic	Contractor's Traffic	Where any special facility	Local access to retained

APPENDIX 1/17: TRAFFIC SAFETY AND MANAGEMENT (Continued)

			Management proposals	Management proposals	exists it shall be maintained	properties to be maintained
Logie Terrace	800 with 0.2% HGVS	18	Contractor's Traffic Management proposals	Contractor's Traffic Management proposals	Where any special facility exists it shall be maintained	Open until a replacement bus turning facility is available. Local access to be maintained.
Manor Terrace	1,000 with 1.2% HGVS	20	Contractor's Traffic Management proposals	Contractor's Traffic Management proposals	Where any special facility exists it shall be maintained	Open until a replacement bus turning facility is available.

- 43 (i) In addition to the minimum requirements for signing and coning under Chapter 8 of the Traffic Signs Manual the Contractor shall erect and maintain the following:
- (a) Advanced signing at locations agreed with the Overseeing Organisation and Aberdeen City Council prior to roadworks, as shown on drawing No. (P7004 sheet 1 of 3), detailing modification to sign WBM 338.1 of Chapter 8 of the Traffic Signs Manual.

Drawing No. P7004 Sheet 1 of 3 shall be updated with alternative legends as shown within Chapter 8 of the Traffic Signs Manual. The standard two-line legend "Road Repairs" shall be replaced by "Major Roadworks".
 - (b) Signing erected at locations agreed with the Overseeing Organisation and Aberdeen City Council in advance of roadworks as drawing No (P) 7005 detailing modification to sign WBM 338 of Chapter 8 of the Traffic Signs Manual.

The standard two line legend shall read "Delays Possible" and a third line added to the legend indicating how long delays are possible.

At the commencement of the Contract, the additional line shall read, for example "until Summer 2019".

At least ten working days before the end of the carriageway restrictions, the date shall be specified more precisely, for example "until 25 June 2019".

This date shall be further revised if necessary, until the restrictions are removed.
 - (ii) Only the following abbreviations shall be used: Jan, Feb, Mar, Apr, Aug, Sep, Oct, Nov and Dec.
 - (iii) Not used.
 - (iv) Signing to Drawing Numbers W(S) 148 and W(S) 149 shall be deposited in accordance with signs WBM 339.1 and WBM 339 respectively under Chapter 8 of the Traffic Signs Manual.
 - (v) Where within all of the drawings listed above reference is made to "The Scottish Office", it shall be deleted and replaced with "Transport Scotland" and the logo amended accordingly.
 - (vi) Black on yellow signs as Drawing Numbers [(P) 7004 sheet 2 of 3] and [(P) 7004 sheet 3 of 3] sited at the approaches to the Works to explain why part of the road has been coned off but no Works is, or appears to be taking place. The Contractor shall use

APPENDIX 1/17: TRAFFIC SAFETY AND MANAGEMENT (Continued)
--

legend variants in accordance with Chapter 8 of the Traffic Signs Manual and as agreed with the Engineer and Aberdeen City Council.

This signing shall comprise a frame on to which signs displaying any one of the approved messages shall be fitted.

This equipment shall either be permanently sited, for the duration of the Works, where it is safe and convenient to do so, or kept on one side ready for display when it is required.

The signs shall be constructed and mounted in accordance with the general principles outlined in Chapter 8 of the Traffic Signs Manual.

They shall be reflectorised by the use of Class1 retroreflective material.

- (vii) The legends required to the Works shall follow the following variants in accordance with Chapter 8 of the Traffic Signs Manual:

REPLACING DAMAGED BRIDGE SUPPORTS

WORK SUSPENDED UNSUITABLE WEATHER

REPAIR WORK ON BRIDGE BELOW

LANE CLOSED TO PROTECT WORKFORCE

- (viii) The minimum period of inactivity which would warrant the display of a sign is 15 minutes.

44. (i) The Contractor shall appoint a suitably experienced and qualified Traffic Safety and Control Officer ("TSCO") and nominated deputies as necessary in accordance with Sub-Clause 117 of SHW Series 100. In addition to those set out in Sub-Clause 117 of SHW Series 100, the responsibilities of the TSCO and of his nominated deputies shall include, without limitation, the following matters:
- (a) ensuring that, within 15 minutes of notification of the occurrence of an incident , resulting in stationary vehicle(s) on a road open to the public, the driver is facilitated with contact details for suitably qualified local recovery services and that the Operating Company is notified of the incident;
 - (b) liaising with Traffic Scotland on matters that affect the traffic flow;
 - (c) all traffic management measures associated with the Works;
 - (d) ensuring that all traffic management equipment is in place and in full working order at all times;
 - (e) enforcement of all relevant Health and Safety directives, relating to traffic management operations and live traffic;
 - (f) enforcement of site access requirements; and
 - (g) arranging maintenance patrols of the TTMS whenever traffic management is present on the A90 or A96.
- (ii) The Contractor shall notify the Employer and any relevant authority with the name and 24 hour contact telephone number of the TSCO and his deputies appointed prior to any Works commencing on site.

APPENDIX 1/17: TRAFFIC SAFETY AND MANAGEMENT (Continued)

Scheme Ref.		x-height	125.0
Sign Ref.	Road Works Sign 1	SIGN FACE	
Letter colour	BLACK	Width	2790mm
Background	YELLOW	Height	1830mm
Border	BLACK	Area	5.10sq.m
Material	Microprismatic		

Notes:

1. Traffic signs to be manufactured in accordance with BS EN 12899-1:2007 in the case of Class B signs, or BS 4499:2005 in the case of microprismatic signs.
2. All dimensions are in millimeters unless otherwise stated.
3. Lengths, widths and spacings of route numbers, logos, blocks and borders shall be in accordance with the Traffic Signs Manual Chapter 8 and the Working Drawings for Traffic Sign Design and Manufacture Volume 1, 2 and 3.
4. The actual location of traffic signs shall be agreed with the Engineer prior to commencement.
5. The legend is from the Transport Heavy Alphabet of the x-height above.
6. For guidance on the use and size of the Transport Scotland logo refer to the 'Motorway, Trunk Road Guidelines'.


REVISIONS

No.	Date	Description of Works
01	July 2016	Not to scale


TRANSPORT SCOTLAND

(P) 004 Sheet 1 of 3

APPENDIX 1/17: TRAFFIC SAFETY AND MANAGEMENT (Continued)




Scheme Ref.			
Sign	Ref. Road Works Sign 2	x-height	100-125
Letter colour	BLACK	SIGN FACE	
Background	YELLOW	Width	—
Border	BLACK	Height	—
Material	Microprismatic	Area	—




Scheme Ref.			
Sign	Ref. Road Works Sign 3	x-height	100-125
Letter colour	BLACK	SIGN FACE	
Background	YELLOW	Width	—
Border	BLACK	Height	—
Material	Microprismatic	Area	—

Notes:


1. Traffic signs to be manufactured in accordance with BS EN 12899-1:2007 in the case of Class RA signs, or BS EN 12899-2:2005 in the case of microprismatic signs.
2. All dimensions are in millimeters unless otherwise stated.
3. Lengths, widths and spacings of route numbers, legends, blocks and borders shall be in accordance with the Traffic Signs Manual Chapter 8 and the Working Drawings for Traffic Sign Design and Manufacture Volume 1, 2 and 3.
4. The actual location of traffic signs shall be agreed with the Engineer prior to commencement.
5. The legend is from the Transport Heavy alphabet of the x-heights shown.
6. For guidance on the use and size of the Transport Scotland logo refer to the Motorway, Trunk Road Guidelines.

REVISIONS
1000 July 2010 1001 Not to Scale
DESCRIPTION OF WORKS
 <small>© 2010 Transport Scotland</small>
(P) 7004 Sheet 2 of 3


APPENDIX 1/17: TRAFFIC SAFETY AND MANAGEMENT (Continued)



Scheme Ref.		
Sign Ref.	Road Works Sign 4	x-height 100–125
Letter colour	BLACK	SIGN FACE
Background	YELLOW	Width –
Border	BLACK	Height –
Material	Microprismatic	Area –



Scheme Ref.		
Sign Ref.	Road Works Sign 5	x-height 100–125
Letter colour	BLACK	SIGN FACE
Background	YELLOW	Width –
Border	BLACK	Height –
Material	Microprismatic	Area –




Scheme Ref.		
Sign Ref.	Road Works Sign 6	x-height 100–125
Letter colour	BLACK	SIGN FACE
Background	YELLOW	Width –
Border	BLACK	Height –
Material	Microprismatic	Area –

Notes:

- Traffic signs to be manufactured in accordance with BS EN 12899-1:2007 in the case of Class RA signs, or BS 8438:2005 in the case of microprismatic signs.
- All dimensions are in millimeters unless otherwise stated.
- Lengths, widths and spacings of route numbers, legends, blocks and borders shall be in accordance with the Traffic Signs Manual Chapter 8 and the Working Drawings for Traffic Sign Design and Manufacture Volume 1, 2 and 3.
- The actual location of traffic signs shall be agreed with the Engineer prior to commencement.
- The legend is from the Transport Heavy alphabet at the x-heights shown.
- For guidance on the use and size of the Transport Scotland logo refer to the Motorway, Trunk Road Guidelines.

REVISIONS

¹⁰⁰⁰ July 2010
¹⁰⁰¹ Not to Scale
¹⁰⁰²

DESCRIPTION OF WORKS
 TRANSPORT SCOTLAND <small>... 2019</small>

¹⁰⁰³ (P) 7004 Sheet 3 of 3

APPENDIX 1/17: TRAFFIC SAFETY AND MANAGEMENT (Continued)


Scheme Ref.	
Sign Ref.	Road Roads Sign 7
x-height	125.0
Letter colour	BLACK
SIGN FACE	
Background	YELLOW
Width	2585mm
Border	BLACK
Height	1830mm
Material	Microprismatic
Area	4.72sq.m

Notes:

- Traffic signs to be manufactured in accordance with BS EN 12899-1:2007 in the case of Class RA signs, or BS 8408:2005 in the case of microprismatic signs.
- All dimensions are in millimeters unless otherwise stated.
- Lengths, widths and spacings of route numbers, legends, blocks and borders shall be in accordance with the Traffic Signs Manual Chapter 8 and the Working Drawings for Traffic Sign Design and Manufacture Volume 1, 2 and 3.
- The actual location of traffic signs shall be agreed with the Engineer prior to commencement.
- The legend is from the Transport Heavy alphabet of the x-heights sheet.
- For guidance on the use and size of the Transport Scotland logo refer to the 'Motorway, Trunk Road Guidelines'

REVISIONS
1000 July 2010 1001 Not to Scale
DELAY AND DISTANCE TO WORKS
(P) 7005

APPENDIX 1/17: TRAFFIC SAFETY AND MANAGEMENT (Continued)



Scheme Ref.	
Sign Ref.	Road Works Sign 8
x-height	125.0
Letter colour	BLACK
SIGN FACE	
Background	YELLOW
Width	3180mm
Border	BLACK
Height	2325mm
Material	Microprismatic
Area	7.40sq.m

Notes:

- Traffic signs to be manufactured in accordance with BS EN 12899-1:2007 in the case of Class BA signs, or BS 6908:2005 in the case of microprismatic signs.
- All dimensions are in millimeters unless otherwise stated.
- Lengths, widths and spacings of route numbers, legends, blocks and borders shall be in accordance with the Traffic Signs Manual Chapter 8 and the Working Drawings for Traffic Sign Design and Manufacture Volume 1, 2 and 3.
- The actual location of traffic signs shall be agreed with the Engineer prior to commencement.
- The legend is from the Transport Heavy alphabet of the x-heights shown.
- For guidance on the use and size of the Transport Scotland logo refer to the Motorway, Trunk Road Guidelines.

REVISIONS
1 July 2010
2 Not to Scale
3 WORK STARTS HERE DELAYS POSSIBLE
4 TRANSPORT SCOTLAND
5 W(S) 148

APPENDIX 1/17: TRAFFIC SAFETY AND MANAGEMENT (Continued)

Scheme Ref.		
Sign Ref.	Road Sign X	x-height 125.0
Letter colour	BLACK	SIGN FACE
Background	YELLOW	Width 2915mm
Border	BLACK	Height 1830mm
Material	Microprismatic	Area 5.33sq.m

Notes:

- Traffic signs to be manufactured in accordance with BS EN 12899-1:2007 in the case of Class RA signs, or BS EN 12899-2:2005 in the case of microprismatic signs.
- All dimensions are in millimeters unless otherwise stated.
- Lengths, widths and spacings of route numbers, legends, blocks and borders shall be in accordance with the Traffic Signs Manual Chapter 8 and the Working Drawings for Traffic Sign Design and Manufacture Volume 1, 2 and 3.
- The actual location of traffic signs shall be agreed with the Engineer prior to commencement.
- The legend is from the Transport Heavy Alphabet at the x-heights shown.
- For guidance on the use and size of the Transport Scotland logo refer to the 'Motorway, Trunk Road Guidelines'.

REVISIONS	
100	July 2010
101	Not to Scale
102	SORRY FOR ANY DELAY
W(S) 149	

APPENDIX 1/18: TEMPORARY DIVERSIONS FOR TRAFFIC

1. Safe access across the Works shall be maintained or diversions provided in accordance with the minimum standards shown in Tables A and B to this Appendix.
2. The Contractor shall provide and maintain access to all properties adjacent to the Works. Temporary diversions shall be maintained at all times.
3. The Contractor shall make all necessary arrangements with owners and occupiers of any land in addition to that provided in the Contract, which is temporarily required for the diversion of traffic.
4. The Contractor shall submit for approval to the Overseeing Organisation and Aberdeen City Council his detailed proposals as below for the temporary diversion of traffic (including pedestrian and bus routes) at least 6 weeks prior to the implementation date:
 - (i) Phasing of the Works
 - (ii) Drawings showing traffic management layouts including as follows:
 1. Position of traffic signs and signals;
 2. Width of Lanes;
 3. Working areas;
 4. Safety zones;
 5. Entry points for site vehicles, etc;
 6. Signing; and
 7. Pedestrian / Cyclist Access
 - (iii) Making or amending traffic orders
The Contractor shall be responsible for the payment of all charges associated with the preparation and publication of all road related orders.
5. The Contractor shall give the Overseeing Organisation at least 14 days written notice of any phased Works which require Lane or Carriageway Occupations, and shall not alter or adjust the traffic until the Overseeing Organisation has acknowledged receipt of the relevant Consultation Certificate.
6. The standard of construction and lighting of diversions shall be suitable in all respects for the class or classes of traffic using the existing carriageways. Any temporary diversion of a road shall have a bituminous or asphaltic surface.
7. All access provision shall be to a standard equivalent to that in place upon commencement of the Works.
8. Any temporary diversions of side roads shall be designed to the current speed limit, unless otherwise agreed with the Engineer or Aberdeen City Council.
9. Table B gives minimum standards for diversions of traffic.
The standards shall be used to Design temporary diversions of traffic for the road or way in question should it not be possible to maintain the required width on the existing carriageway.
10. Stage 2 and Stage 3 Road Safety Audits shall be carried out on all temporary traffic management proposals as described in Appendix 1/17 of this Specification.
11. Notwithstanding any other requirements of the Contract any generator required for powering temporary traffic lights shall not be permitted within 100 metres of any occupied property.

APPENDIX 1/18: TEMPORARY DIVERSIONS FOR TRAFFIC (Continued)

Table A: Requirements of the Overseeing Organisation in the Execution of Temporary Diversions necessitated by the Works.

Description	Requirement (Clause 118.2 or Amendment)	Remarks
Existing A90 Trunk Road	<p>Full closure of the A90 trunk road shall not be permitted. Two way running to be maintained at all times.</p> <p>No diversion outwith the limits of the Trunk Road will be permitted.</p> <p>A minimum of one lane, with a minimum lane width of 3.65m, for use by all permitted classes of vehicles shall be maintained in each direction, unless otherwise agreed with the Overseeing Organisation and Aberdeen City Council in accordance with paragraph 3 of Specification Appendix 1/17.</p> <p>Traffic control by means of temporary traffic signals will be subject to the agreement of the Overseeing Organisation and Aberdeen City Council and with the written approval of the Engineer.</p> <p>Not more than one set of temporary traffic signals shall be permitted in connection with the Works unless agreed with the Engineer.</p> <p>No shuttle working is permitted on the A90 trunk road, unless otherwise agreed with the Overseeing Organisation and Aberdeen City Council.</p>	
Existing A96 Trunk Road	<p>Full closure of the A96 trunk road shall not be permitted. Two way running to be maintained at all times.</p> <p>No diversion outwith the limits of the Trunk Road will be permitted.</p> <p>A minimum of one lane for use by all permitted classes of vehicles shall be maintained in each direction. A minimum lane width of 3.65m shall be maintained, unless otherwise agreed with the Overseeing Organisation and Aberdeen City Council in accordance with paragraph 3 of Specification Appendix 1/17.</p> <p>The existing bus lane may be used as a running lane for all traffic subject to agreement with the Overseeing Organisation and Aberdeen City Council.</p>	

APPENDIX 1/18: TEMPORARY DIVERSIONS FOR TRAFFIC (Continued)

	<p>Traffic control by means of traffic signals will be subject to the agreement of the Overseeing Organisation and Aberdeen City Council and with the written approval of the Engineer.</p> <p>Not more than one set of temporary traffic signals shall be permitted in connection with the Works unless agreed with the Engineer.</p> <p>No shuttle working is permitted on the A96 trunk road, unless otherwise agreed with the Overseeing Organisation and Aberdeen City Council.</p>	
Existing Side Roads	<p>Access shall be maintained at all times.</p> <p>Traffic diversions using Rosehill Drive, Provost Rust Drive, Hilton Drive, Hilton Road and Clifton Road shall not be permitted, unless agreed by the Engineer and Aberdeen City Council.</p> <p>Traffic diversions involving the reopening of connections between Wilkie Avenue and Fowler Avenue and Manor Avenue and Logie Avenue may be permitted to maintain local access, subject to the agreement of Aberdeen City Council and the Engineer. HGV's are not permitted to use these routes. Temporary Traffic Orders shall be provided in accordance with paragraph 6 of Specification Appendix 1/17.</p>	
Non-Motorised User Facilities	<p>Temporary diversions of Non-Motorised User facilities shall be agreed with Aberdeen City Council and the Engineer.</p> <p>Access to existing NMU facilities shall be maintained at all times, including but not limited to:</p> <ul style="list-style-type: none"> • Footways and Cycleways • Footpaths • Bus Stops • Pedestrian and NMU Crossings 	

APPENDIX 1/18: TEMPORARY DIVERSIONS FOR TRAFFIC (Continued)

Table B: Schedule of Standards for Temporary Diversion of Traffic

Route	Parameter	Minimum standard
A90 and A96 Trunk Roads	General	Subject to the requirements of Chapter 8 of the Traffic Signs Manual.
	Temporary running surface on carriageway widening	The standard of construction of diversions shall be suitable in all respects for the class or classes of traffic using the existing carriageways. Any temporary diversion of a road shall have a bituminous or asphaltic surface. All temporary diversions shall be maintained at all times. Gradients shall not be greater than 6 per cent (except where otherwise agreed by the Overseeing Organisation).
Side Roads	General	Subject to the requirements of Chapter 8 of the Traffic Signs Manual.
NMU Facilities	General	Temporary footways and footway/cycleways shall be designed in accordance with Transport Scotland's 'Roads for All: Good Practice Guide for Roads', July 2013 and Transport Scotland's 'Cycling by Design', 2010.

APPENDIX 1/19: ROUTEING OF VEHICLES

1. The Contractor shall submit his proposals for Site access points including access to offices and the like, at least two weeks in advance of the proposed start date for construction.
2. Access to the Site shall be taken at the following Points only:
 - (i) The existing A90 Trunk Road; and
 - (ii) The existing A96 Trunk Road.

Access from the existing A90 and A96 Trunk Roads may utilise the existing Manor Drive and Manor Avenue, respectively, however no right turn vehicular manoeuvres are permitted from the following points:

- (i) The existing A96 Trunk Road to the existing Manor Drive; and
- (ii) The existing A90 Trunk Road to the existing Manor Avenue.

The extent of the haul route on Manor Drive and Manor Avenue shall be agreed with the Overseeing Organisation and Aberdeen City Council.

Any other existing public and private roads including footways and house accesses shall only be used by the Contractor with the prior agreement of the owner, the Overseeing Organisation or Aberdeen City Council, as appropriate. Any such roads or access used by vehicles engaged in the Works or any new roads which are part of the Works and which are used by traffic shall be kept clean of dirt, mud or other materials dropped by said vehicles at all times. The Contractor shall provide, maintain and keep available at all times equipment as may be necessary to keep such ways clean.

3. Bulk Haulage of material excavated within the Site shall be carried out on haul roads within the Site wherever possible.

The use of public roads for this operation shall only be permitted subject to consultation with the Overseeing Organisation or Aberdeen City Council, as appropriate, notwithstanding at grade crossings of public roads, which may be permitted subject to the Contractor submitting satisfactory traffic management proposals to the Overseeing Organisation.

Sufficient information, including details of the frequency of plant crossing, loads and working period of crossings shall be supplied to the Overseeing Organisation to enable the Overseeing Organisation to consider the proposal.

The Contractor shall minimise delays to traffic due to right turning access to the site.

4. If the proposed method of construction involves the use of any part of the Permanent Works by construction traffic or plant, the Contractor shall in accordance with Clause 14(3) of the Conditions of Contract and at least one week before he intends to use the Permanent Works, submit to the Overseeing Organisation sufficient information as to enable the Overseeing Organisation to consider the proposal.

Such information should include details of location, plant, applied loads, frequency of loading, duration, calculations of stresses strains deflections and other relevant data, and also the measures to be taken to protect the Permanent Works.

5. The Contractor shall submit to the Overseeing Organisation details of proposed borrow pits and tipping areas, which are off Site and the intended routing of vehicles to and from such sites.
6. The Contractor should also inform the Overseeing Organisation of the type of such vehicles to be used for transport, which should be compatible with the standard of the above routes.

APPENDIX 1/19: ROUTEING OF VEHICLES (Continued)

7. The Contractor shall provide, erect and maintain such traffic signs, lamps and barriers etc. complying with Clause 117 of the Specification as may be required to ensure the observance of requirements and restrictions detailed in this Appendix.

APPENDIX 1/21: INFORMATION BOARDS

1. Scheme Information Boards

- (i) The Contractor shall supply two scheme information boards, which shall be in accordance with Traffic Signs Regulations and General Directions Diagram Number 7007.1, with the Highways England logo and Department for Transport logo replaced by the below logo



The legend for signs shall comprise:

Line 1: "A90/A96 Haudagain Improvement"

Line 2: "Road Opening" (to be input by the Contractor)

- (ii) The location of the scheme information boards shall be agreed on Site by the Overseeing Organisation.
- (iii) The Contractor shall Design, supply and construct suitable poles and foundations for the information boards.
- (iv) The legend shall have an x-height of 150 millimetres.
- (v) The A90/A96 Haudagain Improvement Scheme information boards shall be as shown in Figure 1/21A



Figure 1/21A – A90/A96 Haudagain Improvement scheme information board

2. Publicity Sign Boards

- (i) The Contractor shall supply three publicity sign boards.
- (ii) The location of the publicity sign boards shall be at locations to be agreed by the Overseeing Organisation. The publicity boards shall be situated on or adjacent to existing footways or their diversions to enable the public to read them in safety.
- (iii) The publicity sign boards should contain information pertaining to the scope of the works and their progress.

APPENDIX 1/21: INFORMATION BOARDS (Continued)

- (iv) The progress information shall be updated by the Contractor on a monthly basis throughout the period for the construction of the Works.
- (v) The publicity sign boards shall consist of a weather tight board which shall be suitable for displaying a minimum of four A3 size pages.

3. Project Sign Board

- (i) The project sign board shall include the following information:
 - Transport Scotland logo (file TS-LRE)
 - A90/A96 Haudagain Improvement Scheme
 - Employer: Transport Scotland
 - Enquiries: (telephone number to be provided by Contractor)
 - Transport Scotland logo (file TS-BS), Jacobs' logo, Contractor's logo
- (ii) The location of the project sign boards shall be at a prominent location at the Site Compound as agreed by the Overseeing Organisation.
- (iii) The project sign board shall have dimensions of 2850 millimetres by 1500 millimetres.
- (iv) The A90/A96 Haudagain Improvement project sign board is shown in Figure 1/21B.
- (v) A separate 'Investing in Scotland' board (file TSI-E), 2850 millimetres by 810 millimetres shall be attached on the same poles.

APPENDIX 1/21: INFORMATION BOARDS (Continued)



Figure 1/21B – A90/A96 Haudagain Improvement project sign board

APPENDIX 1/22: PROGRESS PHOTOGRAPHS

The following specification fulfils the progress photographs requirements for the whole of the Works.

1. Ground Progress Photographs
 - (i) A set of ground progress photographs shall be taken prior to commencement of the Works on site and then at approximately one month intervals or as directed by the Engineer until Completion of the Works.
 - (ii) A set of ground progress photographs shall comprise not less than 50 photographs.
 - (iii) Each photograph shall be high-resolution and a minimum of 12 million pixels and incorporate geolocation metadata in the image file. Two copies of each set of progress photographs in high-resolution JPEG format shall also be supplied on hard drive in a standard format.
 - (iv) A report shall be provided with each set of photographs detailing the date, location and direction of view for each photograph in the set.
2. Aerial Progress Photographs
 - (i) A set of aerial progress photographs shall be taken at the Commencement of the Works and further sets of aerial photographs shall be taken at 2 monthly intervals during the Works. A final set of aerial progress photographs shall be taken immediately following the Date of Completion of the Works.
 - (ii) A set of aerial progress photographs shall comprise a minimum of 10 photographs, taken with a Single Lens Reflex Digital Camera.
 - (iii) Each photograph shall be high-resolution and a minimum of 12 million pixels and incorporate geolocation metadata in the image file. Two copies of each set of aerial progress photographs in high-resolution JPEG format shall also be supplied on hard drive in a standard format.
 - (iv) Photographs shall be taken from the same height, direction and of the same viewpoint at each 2-month interval.
 - (v) Viewpoints, heights & directions will be determined & detailed on an Ordnance Survey Map prior to photographs being taken.
 - (vi) The choice of aircraft used for taking the shots should be such that it will maximise the accuracy of photographing the viewpoints.
3. The photographer shall be accompanied for both ground and aerial progress photographs by a member of the Overseeing Organisation, should they wish to attend.
4. Copyright of photographs shall be vested in the Overseeing Organisation.
5. Web cams
 - (i) Not used.

APPENDIX 1/24: QUALITY MANAGEMENT SYSTEM
--

1. The Contractor shall institute, maintain and operate a Quality Management System complying with BS EN ISO 9001, BS EN ISO 14001 and OHSAS 18001 and Clause 104 of the Specification.

The Quality Management System shall be described in a Quality Plan that shall be submitted to the Overseeing Organisation.

For details relating to the Environmental Management Systems refer to clause 5 of this Appendix 1/24.

The Quality Plan shall cover but not be limited to the following items:

- (i) the Contractor's organisation and management of the Contract;
 - (ii) the Contractor's method statements and construction procedures for the Works;
 - (iii) the Supervision of the Works;
 - (iv) the Contractor's construction quality control for the Works;
 - (v) the Suppliers Quality Plans. (For each of the Quality Management Schemes listed in Appendix A of the Specification for Highway Works.); and
 - (vi) the Contractor's deer management plan.
2. The Quality Plan shall conform with but not be limited to the requirements shown in sub-clauses 2.1, 2.2, 2.3, 2.4 and 2.5 of this Appendix, as follows:

- 2.1 Contractor's Organisation and Management of the Contract

This part of the Quality Plan shall include but not be limited to:

- (i) the definition of the Contract and its documentation;
- (ii) the organisation of the Contract including the line of command and communication links between all the parties involved in the Contract in the form of annotated chart(s);
- (iii) the names, roles, responsibilities, curriculum vitae and authority of principals and key personnel involved in the Design, construction and maintenance of the Contract;
- (iv) These will include the roles undertaken by the Project Director, Contracts Manager, Site Agent/Contractor's Project Manager, Management Representative for Quality, Contract Quality Manager, Management Representative for environmental protection, Sustainability Manager, Sub-agents, General Foreman, Foremen, Engineers, Contract Quantity Surveyor, Safety Officer, Contractor's and Designer's Supervisor(s) for the Works, Designer's Team Leader(s) and Site Representative(s), Checker's Team Leader(s), Road Safety Auditor(s), Planning Supervisor and any other principal party involved in the Design and the Works;
- (v) procedures for the control of consultations, liaison and meetings with third parties including Undertakers, Police Scotland and any other relevant stakeholders;
- (vi) the identification of the Contractor's staff responsible for overseeing each major activity including Design, Design Checks and all sub-contract activities;
- (vii) procedures for the control of sub-contracts which must include the assessment of the sub-contractor's quality assurance and quality control capabilities, the identification and implementation of additional controls needed on such sub-contractors to fulfil the Contractor's obligations in respect of this Appendix and the Contract;

APPENDIX 1/24: QUALITY MANAGEMENT SYSTEM (Continued)
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- (viii) procedures for the control of all documentation;
- (ix) a programme for submission of Design and Design Check Certificates and associated documentation, method statements and Suppliers Quality Plans;
- (x) These shall be submitted to the Engineer at least 14 days prior to commencement of the associated activity;
- (xi) the Quality Plans for sub-contractors and suppliers of work, goods and materials which are the subject of quality management schemes;
- (xii) Suppliers Quality Plan(s) for schemes listed in Appendix A of the Specification for Highway Works shall be based on this Appendix;
- (xiii) procedures for the preparation, review and adjustment of programmes for the effective progression and completion of the Design and the Works and the recording of same;
- (xiv) procedures for the control and approval of purchases of materials;
- (xv) procedures for the control of off-Site activities;
- (xvi) procedures for the regular review and recording by the Contractor which demonstrates that the Design and the Works meet the requirements of the Contract;
- (xvii) procedures for the control of personnel selection which demonstrate that such personnel have appropriate skill and experience for undertaking their appointed role;
- (xviii) procedures for the management review/audits to monitor and demonstrate control over the implementation of the Quality Plan;
- (xix) procedures for ensuring compliance with the Specification for Highway Works (SHW) Volume 1 of the Manual of Contract Documents for Highway Works (MCHW);
- (xx) procedures for ensuring compliance with the Design Manual for Roads and Bridges (DMRB) and the Employer's Requirements;
- (xxi) These procedures shall include verification that the relevant sections and sub-sections within the Employer's Requirements have been complied with and shall indicate whether the part of the Design;
 - (a) complies with the sub-section;
 - (b) requires a consultation certificate; or
 - (c) is not relevant to the sub-section.
- (xxii) procedures for the review of the Conceptual Design and the preparation of the Design and construction documentation;
- (xxiii) procedures for the review of the Design including the frequency of and personnel responsible for such reviews; and
- (xxiv) any other relevant item which may during the Contract be brought to the attention of the Contractor by the Overseeing Organisation and which shall be inserted into the Quality Plan.

APPENDIX 1/24: QUALITY MANAGEMENT SYSTEM (Continued)
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2.2 Contractor's Method Statements and Construction Procedures for the Works

This part of the Quality Plan shall include but not be limited to:

- (i) Detailed method statements for each major activity whether such activities are directly controlled by the Contractor or subcontracted and shall include those major activities listed in sub-clause 4 below.

The method statements shall identify hold points and invoke for all activities:

- (a) work instructions;
- (b) quality control procedures;
- (c) compliance testing/inspection arrangements;
- (d) work acceptance procedure; and
- (e) validation of design assumptions by appropriate inspection and testing on site.

Method statements shall describe each stage of the construction, the layout of the Works, identify the Construction Plant and materials to be used, Temporary Works, safety measures, working space considerations, and where appropriate the requirements for skilled labour and/or special supervision and the like.

Where work is subject to environmental requirements, for example, temperature, noise and dust control, working hours, traffic conditions, vehicle routings, screening and the like, these shall be stated.

Hold points shall be identified at stages of work where checks are necessary before continuing. The authority for release of the hold points shall also be identified.

Method Statements and Construction Procedures submitted to the Overseeing Organisation shall be subject to a trial section(s), which may be incorporated into the Works with the consent of the Overseeing Organisation.

- (a) the identification of the relevant construction procedures in the Contractor's own Quality Management System. Procedures invoked by method statements shall include, from the quality controls required by the Contractor's construction quality control: the control, identification and traceability of materials;
- (b) procedures for the prevention of inadvertent use, installation or covering up of non-conforming work; and
- (c) any other corporate and/or contract specific work instructions to be applied.

APPENDIX 1/24: QUALITY MANAGEMENT SYSTEM (Continued)
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2.3 Supervision of the Works

This part of the Quality Plan shall include but not be limited to:

- (i) a statement of the Contractor's and Designer's responsibility to supervise the Works including the duty to supervise the construction, completion and testing of the Works;
- (ii) procedures for undertaking the supervision of the Works detailing:
 - (a) the stages of work when the inspection(s) is to be undertaken;
 - (b) the personnel carrying out the inspection(s);
 - (c) the frequency of inspection(s);
 - (d) the procedures to be followed when dealing with non-conforming Works; and
 - (e) the recording of inspection(s)
- (iii) procedures for the review of the extent and frequency of supervision;
- (iv) procedures for the issuing of Construction certificates;
- (v) procedures for document control including the receipt, control and retention of all documents;
- (vi) procedures for reporting progress and the identification of problems; and
- (vii) procedures for the observation of testing and the reporting of results of testing.

2.4 Contractor's Construction Quality Control for the Works

This part of the Quality Plan shall include but not be limited to:

- (i) a statement of the Contractor's organisation for quality control and shall identify the:
 - (a) responsibility for the initiation and updating of the Quality Plan;
 - (b) responsibility of the "Management Representative for Quality" for monitoring and ensuring compliance with the Quality Plan; and
 - (c) responsibility for the adequacy of the quality records produced.
- (ii) procedures for the arrangements for "receiving" and "in-process" testing;
- (iii) procedures for the control of test laboratories;
- (iv) procedures for the control of test, measuring and inspection equipment;
- (v) procedures for document control and shall include their identification, traceability requirements, control of document issues and their status. Documents recording the verification, review, approval, release and amendment of the Works shall similarly be controlled;
- (vi) procedures for monitoring and recording the inspection, test and approval status of the construction/installed work including the identification of "hold points";

APPENDIX 1/24: QUALITY MANAGEMENT SYSTEM (Continued)
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- (vii) procedures for tests and inspections for the purpose of the Contractor certifying that prior to covering up, each part of the Works is complete and conforms to the Contract.

The procedures shall identify the proforma and/or database to be used for recording the inspection and test results, and the proforma to be used for recording the certification of compliance of all items of the Works by authorised key personnel. Each submission shall be separately identified;

- (viii) procedures for the review of work submitted for review but not accepted as conforming to the Contract.

These procedures shall include options for identification of non-conforming work and proposals for reworking and remedial work; and

- (ix) procedures for the collation of quality records as identified in BS EN ISO 9001, BS EN ISO 14001 and OHSAS 18001 as appropriate, including reference to those records listed in the Specification for Highway Works Appendix H.

APPENDIX 1/24: QUALITY MANAGEMENT SYSTEM (Continued)

2.5 Suppliers' Quality Plans

The Quality Plan shall include but not be limited to:

- (i) a definition of the product or service which shall be provided;
- (ii) annotated chart(s) showing the organisation structure of the Supplier describing the line of command and stating the name of the senior manager responsible for the contracted Work and the name of the Supplier's on-site management representative. Contact addresses, telephone numbers and the like shall be provided.

This shall address all activities, including those sub-let. Names of any sub-contractors and suppliers involved in the production shall be provided;

- (iii) the identification of the relevant parts of the Supplier's Quality Management System relevant to the product or service being provided;
- (iv) procedures for the control of personnel selection (at works and on Site), including special requirements for skilled personnel for example; certification of welders, training of operatives, experience requirements and the like.

The Suppliers shall provide evidence that the training and experience requirements given in the appropriate Quality Assessment Schedule are being met;

- (v) procedures for the receipt and examination of certificates of conformity and test results for purchased products;
- (vi) procedures for product identification and traceability.

Each piece or bundle of delivered product shall be indelibly marked and where appropriate, the lot identification shall be included on each package;

- (vii) procedures for handling, storage, packaging and delivery to Site and storage and handling on Site, including instructions for repair of damaged products where appropriate; and
- (viii) procedures for compiling Quality Records which shall include documents to demonstrate the achievement of the requirement standard for example; Site logs, record of visits, records of verification, review and release, certificates of conformity and records of all Design modifications to products and specifications.

3. Items 1(i), 1(iii) and 1(iv) of the Quality Plan shall be submitted to the Overseeing Organisation for approval not later than 21 days after the award of the Contract.

The Contractor shall submit the remaining parts of the Quality Plan to the Overseeing Organisation for approval prior to commencement of any associated work or activity and to the programme included with item 1(i).

4. Method statements shall be required inter alia for the following activities:

- (i) Traffic Management;
- (ii) Demolition and Site Clearance;
- (iii) Fencing and Environmental Barriers;
- (iv) Road Restraint Systems;
- (v) Drainage and Service Ducts;
- (vi) Earthworks;

APPENDIX 1/24: QUALITY MANAGEMENT SYSTEM (Continued)
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- (vii) Road Pavements;
- (viii) Kerbs, Footways and Paved Areas;
- (ix) Traffic Signs;
- (x) Traffic and Pedestrian Signals;
- (xi) Road Lighting;
- (xii) Electrical Works;
- (xiii) Structures;
- (xiv) Landscape Operations; and
- (xv) ITS.

5. Environmental Management System

The Contractor shall institute and maintain, during the construction, completion and maintenance of the Works, an Environmental Management System in accordance with the requirements of BS EN ISO 14001 “Environmental Management Systems – Requirements with guidance for use”.

The environmental management system shall be described in a Construction Environmental Management Plan (CEMP) that shall be submitted to the Overseeing Organisation.

This shall define the organisational policy, structure, responsibilities, practices, procedures, processes and resources provided for environmental management and shall form part of the Quality System as detailed in this Appendix 1/24 of the Specification.

It shall be developed to avoid wherever possible environmental accidents and pollution, to encourage reduced consumption of resources, to restrict the production of waste and to promote good relationships with the relevant authorities.

Commitments made regarding mitigation, their implementation and subsequent monitoring shall be recorded.

Notwithstanding any other requirements of the Contract the Environmental Management System shall:

- (i) Include Site-specific method statements for all operations where there is a risk of environmental damage. These shall show how the proposed methods of construction shall restrict impacts to the best practicable environmental option, and how contingency plans and emergency procedures shall limit damage caused by accidents, spillage or other unforeseen events.

The method statements shall include notification procedures to the relevant authorities;

- (ii) Institute and maintain during the construction of the Works, a Waste Management Plan in accordance with “Waste Management - A Duty of Care - A Code of Practice” - HMSO 1991;
- (iii) Ensure that the Contractor shall submit to the Overseeing Organisation details of the Environmental Management System, method statements and Waste Management Plans for approval in advance of the construction of the Works.

The Works shall not be commenced without such approvals having been obtained in writing from the Overseeing Organisation.

APPENDIX 1/24: QUALITY MANAGEMENT SYSTEM (Continued)
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- (iv) Include liaison with the local community during the Contract.
This shall include providing information about activities likely to give rise to complaints, and a telephone number for complaints to be registered.
A log of all complaints and follow-up actions shall be kept and made available for inspection by the Engineer.
- (v) Include NATURA 2000 training for all site personnel, including sub-contractors and suppliers prior to such personnel accessing the Site.

APPENDIX 1/24: QUALITY MANAGEMENT SYSTEM (Continued)
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5.1 Waste Management Plan

The Contractor shall prepare a Waste Management Plan (“WMP”) as part of the Environmental Management Plan.. This shall contain targets to reduce, re-use and / or recycle waste to ensure that no unnecessary waste arisings go to landfill.

As part of the WMP, the Contractor shall provide a system for tracking and recording the movement of all contaminated material and waste within the site. This shall include details of the locations from which material has been excavated and its final placement.

Notwithstanding any other provisions of the Contract the Waste Management Plan shall inter alia define:

- (i) the roles and functions of :
 - a. the Contractor (including the members of the Contractor's site personnel and all other key personnel associated with the Works);
 - b. the Employer; and
 - c. all other sub-contractors and relevant third parties;
- (ii) the execution of the Works and any other matters for which the Contractor shall be responsible under the terms of the Waste Management Plan;
- (iii) the provision of records tracing the origin and location in the Site of everything incorporated in the Works;
- (iv) how the Contractor and any Contractor Party shall minimise any adverse impacts that the Works have on the environment;
- (v) how the design process, materials selection, construction techniques, and operational methods shall minimise any adverse impacts that the Works have on the environment;
- (vi) how the Waste Management Plan shall comply with regulatory requirements; and
- (vii) project-specific targets for waste recovery and reused and recycled content and for waste reduction.

The Contractor shall provide the following information to the Engineer in which the performance for construction, demolition and excavation waste streams shall be identified separately:

- (i) prior to starting on site, provide a copy of the Waste Management Plan, which shall identify but not be limited to:
 - a. the estimated total mass of waste and the estimated recovery rate before mitigating actions, with a list of actions to reduce waste and increase the level of recovery (distinguishing construction, demolition/strip-out and excavation wastes as appropriate) and increase reused and recycled content; and
 - b. a revised estimate of the total mass of waste and the estimated recovery rate after mitigating actions, and forecast performance indicators for:
 - (i) tonnes of waste sent to landfill per £[REDACTED] construction value; and
 - (ii) tonnes of waste produced per £[REDACTED] construction value.
- (ii) A monthly report identifying actual performance for waste quantities, disposal routes, and reused and recycled content used in construction, identifying the following indicators of actual performance:
 - a. tonnes of waste sent to landfill per £[REDACTED] construction value; and
 - b. tonnes of waste produced per £[REDACTED] construction value.

APPENDIX 1/24: QUALITY MANAGEMENT SYSTEM (Continued)
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(iii) Upon completion of the Works, a completed Waste Management Plan, identifying the forecast and actual performance for waste quantities, disposal routes, and reused and recycled content used in construction, including the following indicators of actual performance:

- a. tonnes of waste sent to landfill per £[REDACTED] construction value; and
- b. tonnes of waste produced per £[REDACTED] construction value.

6. Schools Liaison

The Contractor shall carry out liaison with Manor Park Primary School with regards to works in and around the School grounds and shall participate in education programmes and visits with local schools during the Works at the request of the Overseeing Organisation.

7. News Letters

Quarterly, the Contractor shall produce and distribute a newsletter to the residents of Middlefield detailing the following:

- (i) outline works programme;
- (ii) summary of works completed to date;
- (iii) progress overview;
- (iv) details of any notable events on site in the period; and
- (v) any other details as requested by the Overseeing Organisation.

All newsletters shall be submitted for approval to the Overseeing Organisation prior to issue.

Extent of newsletter distribution area to be agreed with the Overseeing Organisation prior to issue.

APPENDIX 1/70: SITE SAFETY**1.0 General**

- 1.1 The Contractor at all times shall comply with the requirements of the Health and Safety at Work Etc. Act 1974 and any other Acts Regulations or Orders pertaining to the health and safety of employees.
- 1.2 The Contractor shall comply with his own published Safety Policy, the Construction (Design and Management) Regulations 2015 (CDM) and the requirements of this contract.
- 1.3 The Contractor shall while carrying out the Works comply with the following:
- The Waste Management Licensing (Scotland) Regulations 2011
 - Control of Substances Hazardous to Health (COSHH) Regulations 2002
 - Environmental Protection (Duty of Care) Regulations 1991
 - Electricity at Work Regulations 1989
 - The Working Time Road Transport Directive (2002/15/EC) unless exempt under the Horizontal Amending Directive 203 in which case the UK domestic Driver's hours will apply.
- 1.4 The Contractor shall prior to complying with paragraphs 1 to 4 carry out a formal risk assessment as required by the Management of Health and Safety at Statutory Instrument No. 2951, conforming to the Code of Practice. The records of any risk assessment shall be maintained and made available for inspection by the Engineer at any time.
- 1.5 The Engineer may suspend the work or part thereof in the event of non-compliance by the Contractor with health and safety matters as described in the Contract. The Contractor shall not resume the work until the Engineer is satisfied that the noncompliance has been rectified. In respect of any such period of suspension, the Contractor shall not add any cost to the work price and no extra time shall be allowed for completion.

2.0 The Wearing of Safety Helmets

- 2.1 All sites under the jurisdiction of the Overseeing Organisation must be managed in strict accordance with the Construction (Head Protection) Regulations 1989 and supporting Health and Safety Executive guidance.
- 2.2 When entering into any sub-contract for the execution of parts of the Works, the Contractor shall bring this requirement to the attention of the Sub-contractor.
- 2.3 The Contractor shall display at appropriate locations signs as described in the HSE Guidance on Regulations (Regulation 5).

APPENDIX 1/70: SITE SAFETY (Continued)
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2.4 The Contractor's attention is drawn to Clause 16 of the Conditions of Contract with respect to the removal from the site of any person who fails to conform to a particular provision set out in the Specification with regard to safety.

3.0 High Visibility Clothing

3.1 The Contractor's attention is specifically drawn to paragraph 18 of Clause 117 of the Specification regarding the wearing of high visibility clothing. It should be noted that all vests and jackets are to be long-sleeved only, with no exceptions.

3.2 The Contractor shall ensure that the clothing required to be worn is maintained to a standard that accords with its intended use.

APPENDIX 2/1: LIST OF BUILDINGS, ETC TO BE DEMOLISHED OR PARTIALLY DEMOLISHED

Not Used

APPENDIX 2/4: EXPLOSIVES AND BLASTING

1. The use of explosives and blasting within the Site shall not be permitted.

APPENDIX 2/5: HAZARDOUS MATERIALS

The following shall be included as part of the Specification Appendix 2/5 to be completed by the Contractor.

1. In the event that hazardous or suspected hazardous material is found on site during the Works the Contractor shall stop Works in the vicinity and cordon the area off. He shall then instigate a contamination survey, which shall be an intrusive investigation and shall include collection of samples of soil and water for chemical testing. Only personnel experienced in this type of work shall carry out this investigation.
2. Samples collected as part of the investigation shall be subjected to chemical analysis at laboratories with UKAS and MCERTS accreditation for the tests being performed. The MCERTS accreditation extending only to those determinants listed in Annex A of Performance Standards for Laboratories Undertaking Chemical Testing of Soil published by the Environment Agency.
3. On completion of the investigation and chemical analysis the Contractor shall arrange for appropriately qualified personnel to undertake a contaminated land environmental risk assessment and prepare a remediation strategy.
4. The Contractor shall consult with and conform to the requirements of the Controlling Authorities, which shall include SEPA and Environmental Health Officer, Aberdeen City Council, for the remediation of the site.
5. The Contractor shall arrange for the removal and disposal of any asbestos-containing materials in accordance with The Control of Asbestos Regulations 2012 by a sub-contractor that is licensed by the Health & Safety Executive.

APPENDIX 3/1: FENCING, GATES AND STILES

1. Temporary Fencing

Temporary boundary fencing shall be agreed with the Engineer. The Contractor shall be responsible for the maintenance and removal of this fencing.

2. Timber Quality

All timber for temporary and permanent fencing shall be treated off site unless otherwise agreed by the Engineer.

3. Fittings

Not Used

4. Permanent Fencing: Wooden Fencing, Gates and Stiles including Planting Works Fencing

Fencing for the protection of planted areas shall be provided in accordance with sub-Clauses 306.4 (i) and 306.5(i).

Permanent fencing to be erected adjacent to footways shall be at an offset of 0.5m from the back of the footway unless otherwise agreed by the Engineer.

Permanent boundary fencing to be erected at the boundary of domestic properties shall be erected in accordance with Table 7 of Appendix A in Part 3.

5. Permanent Fencing: Wire Dropper Fencing

Not Used

6. Wire Mesh to Permanent or Existing Fencing

Not Used

7. Badger Gates

Not Used

8. Fenced Tree Guards

Not Used

9. Preservation of Timber

Not Used

10. Other

Not Used

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

1. This Appendix has been written in accordance with TD 19/06: Requirement for Road Restraint Systems.
2. Road vehicle restraint systems shall comply with the Containment Performance Class and Working Width requirements for safety barriers, vehicle parapets etc., as described in the SHW Series 400 published in TD19/06.
3. The Contractor shall be responsible for the design, selection, submission for acceptance, and installation of road vehicle restraint systems necessary for completion of the Works.
4. The Contractor shall submit to the Overseeing Organisation full details of his proposed vehicle restraint systems for approval.
5. Safety barriers shall be continuous for each installation, and shall be provided with suitable transitions or connections for each safety barrier system and into proposed parapets or structures as appropriate.
6. Safety barrier posts set in bound materials in excess of 40mm thick shall be installed in sockets. The top surface of passive filler to sockets shall be finished flush with the surrounding surface. Any unused post sockets shall be fitted with caps.
7. At all changes of type of road vehicle restraint system and/or containment level, suitable transitions shall be provided in accordance with TD 19/06, Section 6.

APPENDIX 4/2: INFORMATION REQUIRED TO DEMONSTRATE COMPLIANCE OF ROAD RESTRAINT SYSTEMS TO BS1317-1, BS EN1317-2, BS-EN 1317-3 AND DD ENV 1317-4:2002

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

EUROPEAN COMMITTEE FOR STANDARDIZATION (CEN) COMPLIANCE¹

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

1. Test reports in accordance with Section 6 of BS EN 1317-2:2010 for safety barriers (including any additional test data required under clauses 7.3 and 7.4 of DD ENV 1317-4:2002 for terminals and transitions of safety barriers) and Section 8 of BS EN 1317-3:2010 for crash cushions.
2. Video/high speed film of test annotated showing date, test number and performance class.
3. Still photographs of complete installation including anchorage points.
4. Still photographs of vehicle before and after impact.
5. Full drawings of tested items.
6. Certification from the manufacturer that the item tested complies with drawing supplied.
7. Certificate from test house accredited in accordance with the requirements of Series 400 of the MCHW.

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

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

Notes:

¹ Items 12 and 13 are required for safety barrier systems and transitions.

² Items 14 and 15 are required for vehicle parapets.

APPENDIX 4/2: INFORMATION REQUIRED TO DEMONSTRATE COMPLIANCE OF ROAD RESTRAINT SYSTEMS TO BS1317-1, BS EN1317-2, BS-EN 1317-3 AND DD ENV 1317-4:2002. (Continued)

Sheet 1 of 4

SUBMISSION FOR COMPLIANCE WITH BS EN 1317-1, BS EN 1317-2, BS EN 1317-3, AND DD ENV 1317-4:2002				
TYPE OF VEHICLE RESTRAINT SYSTEM:				
CONTAINMENT PERFORMANCE CLASS/PERFORMANCE LEVEL/PERFORMANCE CLASS (*):				
TEST REPORT NUMBER:		(Test of)		
Test Type: Primary/Complementary Test) (*)		TEST DATE:		
TEST NUMBER:		TEST DATE:		
(*) delete as appropriate				
COMPANY NAME:				
CONTACT:				
ADDRESS:				
Tel./Fax./E-mail:				
PRODUCT NAME:				
Initial submission documents to be supplied for consideration of Initial Type Test (ITT)				
Item		Comment	Item Received (Y or N)	Date requested
1	Test report	Test reports in accordance with Section 6 of BS EN 1317-2:2010 for safety barriers (including any additional test data required under clauses 7.3 and 7.4 of DD ENV 1317-4:2002 for terminals and transitions of safety barriers) and Section 8 of BS EN 1317-3:2010 for crash cushions		
2	Video/high speed film	Of test coverage as specified in relevant part of BS EN 1317 or DD ENV 1317-4:2002 Annotated showing date, test number and performance class		
3	Still photographs	Of complete installation including anchorage points		
4	Still photographs	Of vehicle before and after impact		
5	Drawings	Fully detailed drawings of tested item		
6	Certification from the manufacturer	Confirming that the item tested complies with drawing supplied		
7	Confirmation from test house	That the test conforms to the relevant requirements of BS EN 1317-1 (and including any additional test data required under BS EN 1317-2, BS EN 1317-3 and DD ENV 1317-4:2002)		
Additional information, which will be required on acceptance of initial type test prior to installation				
8	System specification	Manufacturer's specification		
9	Installation details	Manufacturer's drawings		
10	Installation procedures	Manufacturer's installation instructions		
11	Maintenance Manual	Manufacturer's inspection, repair and maintenance instructions		
12	Certificate of compliance	With the Quality Management Sector Scheme 1 for Manufacture of Fencing Components ¹		
13	Certificate of compliance	With the Quality Management Sector Scheme 2B for the Supply and Installation of Vehicle Restraint Systems ¹		
14	Certificate of compliance	With the Quality Management Sector Scheme 5 for the Fabrication and Installation of Bridge Parapets and Cradle Anchorages ² 1) Sector Scheme 5A for The Manufacture of Parapets for Road Restraint Systems; and 2) Sector Scheme 5B for The Installation of Parapets for Road Restraint Systems.		
15	Support loads	Nominal loads (direct loads, bending moments and shear forces) that have to be transferred from the vehicle restraint system to the supporting structure or foundation ²		
Signature:		Name:		
Date:				
Notes:				
1. Items 12 and 13 are required for safety barrier systems and transitions				
2. Items 14 and 15 are required for vehicle parapets				

APPENDIX 4/2: INFORMATION REQUIRED TO DEMONSTRATE COMPLIANCE OF ROAD RESTRAINT SYSTEMS TO BS1317-1, BS EN1317-2, BS-EN 1317-3 AND DD ENV 1317-4:2002. (Continued)

Sheet 2 of 4

SUBMISSION FOR COMPLIANCE WITH BS EN 1317-1, BS EN 1317-2, BS EN 1317-3, AND DD ENV 1317-4:2002 TYPE OF VEHICLE RESTRAINT SYSTEM: Safety Barrier, Vehicle Parapet or Transition (*) CONTAINMENT PERFORMANCE CLASS/LEVEL (*): TEST REPORT NUMBER: (Test of) Test Type: Primary/Complementary Test (*) TEST NUMBER: TEST DATE: (*) delete as appropriate						
COMPANY NAME: CONTACT: ADDRESS: Tel./Fax:/E-mail: PRODUCT NAME:						
Initial submission documents to be supplied for consideration of Initial Type Test (ITT)						
			Specified	Actual	Satisfactory (Yes or No)	Compliance
BS EN 1317-1, Table 1	Vehicle Details	Impact Conditions				
		Total vehicle mass (kg) (±...)			
		Speed (km/h)	..... (0, +7%)			
		Angle (degrees)	..... (-1, +1.5)			
		Centre of Gravity				
		Vertical height (m)	..... (± 10%)			
		Longitudinal (m)	..... (± 10%)			
		Lateral (m)	±			
		Model				N/A
BS EN 1317-2, clause 4.2	Vehicle Restraint System (VRS) Behaviour	1) The safety barrier including vehicle parapet shall contain the vehicle without complete breakage of any of the principal longitudinal elements of the system. 2) All totally detached parts of the safety barrier with a mass greater than 2,0 kg shall be identified, located and recorded in the test report with their size. This information can be used to define sites where the barriers with detached parts shall not be used to provide safety for people behind the barrier. 3) Elements of the safety barrier including vehicle parapet shall not penetrate the passenger compartment of the vehicle. 4) Deformations of, or intrusions into the passenger compartment that can cause serious injuries shall not be permitted. 5) Foundations, ground anchorages and fixings shall perform according to the design of the safety barrier including vehicle parapets.				
BS EN 1317-2, clause 4.3	Vehicle Behaviour	1) During and after the impact, no more than one of the wheels of the vehicle shall completely pass over or under the safety barrier. 2) The vehicle shall not roll over (including rollover of the vehicle onto its side) during or after impact 3) For tests with HGVs and buses, not more than 5 % of the mass of the ballast shall become detached or be spilt during the test up to the time when the wheel tracks of the vehicle leaves the exit box 4) The vehicle shall leave the safety barrier including vehicle parapet after impact so that the wheel track does not cross a line parallel to the initial traffic face of the system, at a distance A (2.2m) plus the width of the vehicle plus 16 % of the length of the vehicle within a distance B (10m) from the last (namely closest to the downstream end of the barrier) point P, where the last of the vehicle wheel tracks re-crosses the original line of the traffic face of the barrier after initial impact				

APPENDIX 4/2: INFORMATION REQUIRED TO DEMONSTRATE COMPLIANCE OF ROAD RESTRAINT SYSTEMS TO BS1317-1, BS EN1317-2, BS-EN 1317-3 AND DD ENV 1317-4:2002. (Continued)

BS EN 1317-2, clause 5.3.2	Installation	<ol style="list-style-type: none"> 1) The length of the safety barrier or vehicle parapet tested shall be sufficient to demonstrate the full performance characteristic of any longer installation. After the test the adequacy of the length of installation shall be checked by procedure as the one in Annex B. The test lengths shall be defined by the manufacturer prior to the test so that the car test(s) demonstrates the maximum severity of impact, and the large vehicle test demonstrates the maximum dynamic deflection characteristics 2) End conditions (for example end anchorage) shall be provided in accordance with the safety barrier including vehicle parapet specification and defined by the manufacturer. If an end anchorage is used which is specifically for testing and not part of the design of the system being tested, this end anchorage shall be fully described in the test report. Any end anchorage should not restrict the maximum lateral deflection of the safety barrier. 3) Foundations shall meet the design specification 4) When testing pretensioned systems, where tension can be adjusted (for example cable barriers), the small vehicle test shall be performed with a tension corresponding to a temperature of - 10 °C and the large vehicle test with a tension corresponding to a temperature of + 30 °C. For the containment levels with only one test, the tension shall correspond to a temperature of 0 °C. The data for the recommended tensions/temperature shall be supplied by the manufacturer 5) Where a vehicle parapet is required to have infilling or other modification in order that it may function as a vehicle pedestrian parapet, this infilling or other modification shall be included in the test installation if it will affect the performance of the vehicle parapet 		
BS EN 1317-2, clause 4.4	Severity Indices	SPECIFIED THIV Limit 33km/h PHD Limit 20g ASI Limit 1.4	ACTUAL THIV km/h PHD g ASI	
BS EN 1317-2, clause 5.6, Figure 4	Photo graphic coverage	<ol style="list-style-type: none"> 1) Photographic coverage shall be sufficient to clearly describe the barrier including vehicle parapet behaviour and the vehicle motion during and after impact 2) A known scale shall be visible in overhead camera view to assist measurement from the photographic coverage following the test. 3) High speed cameras shall be operated at a minimum of 200 frames per second 4) Normal speed cameras shall be operated at a minimum of 24 frames per second 5) As recommended in clause 5.7 and Figure 4 		
	Drawings	Drawings included		
				N/A = Not Applicable
FULLY COMPLIES WITH STANDARD: BS EN 1317-1, BS EN 1317-2, DD ENV 1317-4:2002				
Signature:			Name:	
Date:				

APPENDIX 4/2: INFORMATION REQUIRED TO DEMONSTRATE COMPLIANCE OF ROAD RESTRAINT SYSTEMS TO BS1317-1, BS EN1317-2, BS-EN 1317-3 AND DD ENV 1317-4:2002. (Continued)

Sheet 3 of 4

SUBMISSION FOR COMPLIANCE WITH BS EN 1317-1, and BS EN 1317-3 TYPE OF VEHICLE RESTRAINT SYSTEM: Crash Cushion (Redirective [R] or Non-redirective [NR] (*) TEST REPORT NUMBER: _____ TEST TYPE: (Primary/Complementary Test) (*) PERFORMANCE LEVEL: _____ VELOCITY CLASS: _____ (Test of) TEST NUMBER: _____ TEST DATE: _____ (*) delete as appropriate						
COMPANY NAME: CONTACT: ADDRESS: Tel:/Fax:/E-mail: PRODUCT NAME:						
			Specified	Actual	Satisfactory (Yes or No)	Compliance
BS EN 1317-1, Table 1	Vehicle Details	Impact Conditions				
		Total vehicle mass (kg) (±...)			
		Speed (km/h)	..... (0, +7%)			
		Angle (degrees)	..... (-1, +1.5)			
Centre of Gravity						
Vertical height (m)	..... (± 10%)					
Longitudinal (m)	..... (± 10%)					
Lateral (m)	±					
Model						N/A
BS EN 1317-3, clause 6.2	Crash Cushion Behaviour	1) Elements of the crash cushion shall not penetrate the passenger compartment of the vehicle. There shall be no deformations of, or intrusions into, the passenger compartment that could cause serious injuries to the occupants. 2) All totally detached parts of the crash cushion with a mass greater than 2,0 kg shall be included in the determination of the displacement classification (see 6.5 of BS EN 1317-3). 3) Foundations, ground anchorages and fixings shall perform according to the design of the crash cushion. The deformed crash cushion shall not encroach into the front surface of the obstacle.				
BS EN 1317-3, clause 6.3	Vehicle Behaviour	1) The vehicle shall not roll over (including rollover of the vehicle onto its side) during or after impact. 2) The post-impact trajectory of the test vehicle shall be evaluated by means of the exit box shown in Figures 5a and 5b as well as that detailed in Table 10, Table 11 and the full clause 6.3 of BS EN 1317-3.				
BS EN 1317-3, clause 7.3.2	Installation	1) The installation of the crash cushion for the test, including its foundations, shall comply with the structural design details and with the on-road system details as given in the design specification.				
BS EN 1317-3, clause 5.5 and Table 3	Impact Severity Indices	SPECIFIED		ACTUAL		
		Level A: THIV≤44km/h (Tests 1, 2 & 3) THIV≤ 33km/h (Tests 4 & 5) ASI ≤ 1.0				
		Level B: THIV≤44km/h (Tests 1, 2 & 3) HIV ≤ 33km/h (Tests 4 & 5) ASI ≤ 1.4				
Levels A & B: PHD ≤ 20g						
BS EN 1317-3, clause 7.4.7, Figure 8 and Figure 9	Photo-graphic coverage	1) High speed cameras and/or high speed video cameras shall be operated at a minimum of 200 frames per second. 2) The photographic coverage shall be at minimum as indicated in Figure 8. 3) As recommended in clause 7.4.7 and Figure 8 and Figure 9.				
	Drawings	Drawings included				
N/A = Not Applicable						
FULLY COMPLIES WITH STANDARD: BS EN 1317-1, and BS EN 1317-3						
Signature:			Name:			
Date:						

APPENDIX 4/2: INFORMATION REQUIRED TO DEMONSTRATE COMPLIANCE OF ROAD RESTRAINT SYSTEMS TO BS1317-1, BS EN1317-2, BS-EN 1317-3 AND DD ENV 1317-4:2002. (Continued)

Sheet 4 of 4

SUBMISSION FOR COMPLIANCE WITH BS EN 1317-1 AND DD ENV 1317-4:2002 TYPE OF VEHICLE RESTRAINT SYSTEM: Terminal (Test of) PERFORMANCE CLASS: (Test of) Test Type: Primary/Complementary Test) (*) TEST TYPE NUMBER: TEST NUMBER: TEST DATE: (*) delete as appropriate					
COMPANY NAME:					
CONTACT:					
ADDRESS:					
Tel:/Fax:/E-mail:					
PRODUCT NAME:					
			Specified	Actual	Satisfactory (Yes or No)
BS EN 1317-1, Table 1 DD ENV 1317-4:2002, clauses 7.4 and 7.5	Vehicle Details	Impact Conditions Total vehicle mass (kg) Speed (km/h) Angle (degrees)	..... (±...) ..... (0, +7%) (-1, +1.5)		
		Centre of Gravity Vertical height (m) Longitudinal (m) Lateral (m)	..... (± 10%) (± 10%) ±		
		Model			N/A
DD ENV 1317-4:2002, clauses 5.4 and 5.5.2	Terminal Behaviour	1. Elements of the terminal shall not penetrate the passenger compartment of the vehicle. Deformations of, or intrusions into, the passenger compartment that could cause serious injuries are not permitted. 2. No major part of the terminal shall be come totally detached and come to rest outside the permanent lateral displacement zones defined in clause 5.4. 3. Anchorages and fixings shall perform to the terminal design specifications and other specified requirements as listed in the rest report.			
DD ENV 1317-4:2002, clause 5.5.3	Vehicle Behaviour	1. The vehicle shall not overturn, although rolling, yawing and moderate pitching may be accepted. For the performance class P1 rolling onto a side may be accepted. 2. The exit box values for the specified test are as defined in Figure 5, Table 7 and Table 8 (as appropriate).			
DD ENV 1317-4:2002 clause 7.3.2	Installation	1. The terminal and transition shall conform to the structural design details and with the system installation details as given in the design specification of the manufacturer.			
DD ENV 1317-4:2002, clause 5.5.4 and Table 5	Impact Severity Indices	SPECIFIED Level A: THIV ≤ 44km/h (Tests 1, 2 & 3) THIV ≤ 33km/h (Tests 4 & 5) ASI ≤ 1.0 Level B: THIV ≤ 44km/h (Tests 1, 2 & 3) HIV ≤ 33km/h (Tests 4 & 5) ASI ≤ 1.4 Levels A & B: PHD ≤ 20g	ACTUAL		
DD ENV 1317-4, 2002 clause 7.7, Figure 7	Photo graphic coverage	1. Photographic coverage shall be sufficient to describe clearly terminal/transition and vehicle motion during and after impact. 2. High speed cameras and/or high speed video cameras shall be operated at a minimum of 200 frames per second. 3. High speed cameras and one normal speed camera shall be located to record the performance of the terminal/transition. For the recommended camera schedule see Figure 7.			
	Drawings	Drawings included			
FULLY COMPLIES WITH STANDARD: BS EN 1317-1 AND DD ENV 1317-4:2002					
Signature:			Name:		
Date:					

APPENDIX 5/2: SERVICE DUCT REQUIREMENTS

Traffic Signal & Communications**1 General**

- 1.1 All materials and equipment shall comply with current Department for Transport (DfT) specifications, recommendations and current British Standards and Specifications.
- 1.2 The Contractor shall be responsible for removing all surplus materials from the site on completion of the Works and shall ensure that the site does not constitute a potential hazard.
- 1.3 The Contractor should also include for any materials and work which may not be expressly specified but which are implied and necessary for the satisfactory completion of the installation.
- 1.4 The Works shall be carried out fully in accordance with DfT Local Transport Note 1/98 – ‘The Installation of Traffic Signals and Associated Equipment’ (formally DETR).

2. Ducts

- 2.1 All cable shall be fully ducted within a closed duct system with access chambers at all changes of direction. All ducting in footways shall be at least twin ducts and all ducting within carriageways shall be at least triple ducts.
- 2.2 The traffic signal ducts shall be 100mm diameter medium/high density smooth internal bore polyethylene, minimum wall thickness of 5mm with a tolerance of +/-0.1mm, coloured orange, with the words *Traffic Signals* printed in white lettering 9mm high, along the length at intervals of not more than one metre. The ducts shall be impact resistant, impervious to water and sufficiently flexible to follow undulations in a trench bottom. When laid, all duct lengths shall be properly jointed or sleeved to give a continuous smooth internal bore, installed with the printed words *Traffic Signals* uppermost. The ducts shall have draw ropes installed.
- 2.3 Ducts in the carriageway shall be installed to a minimum depth to cover of 600mm below ground level. Ducts in the footway, footpath or any hard landscaped area shall be installed to a minimum depth to cover of 450mm below ground level.
- 2.4 Ducts for fibre optic communication cable shall be 100mm diameter medium/high density smooth internal bore polyethylene, minimum wall thickness of 5mm with a tolerance of +/-0.1mm, coloured green. The ducts shall be impact resistant, impervious to water and sufficiently flexible to follow undulations in a trench bottom. When laid, all duct lengths shall be properly jointed or sleeved to give a continuous smooth internal bore. The ducts shall have draw ropes installed.
- 2.5 Ducts for power cable connections shall be 100mm diameter medium/high density smooth internal bore polyethylene, minimum wall thickness of 5mm with a tolerance of +/-0.1mm, coloured black. The ducts shall be impact resistant, impervious to water and sufficiently flexible to follow undulations in a trench bottom. When laid, all duct lengths shall be properly jointed or sleeved to give a continuous smooth internal bore. The ducts shall have draw ropes installed.
- 2.6 The duct access chambers shall be manufactured from high-density polyethylene and have a minimum of three pre-formed 100mm diameter cut-outs in each wall to allow for

APPENDIX 5/2: SERVICE DUCT REQUIREMENTS (Continued)

future alterations. The access chambers are required to form a push-fit chamber wall connection with the ducts prior to final site installation. The duct access chambers should be a twin wall modular system, with composite covers and capable of withstanding vertical loads in excess of 40 tonnes without the requirement for structural support. The duct access chamber when installed will incorporate some form of soakaway. The access chamber covers shall be lightweight, anti-slip and should blend with the existing footway, marked for Traffic Signals, Communications or Power.

- 2.7 The maximum distance between duct access chambers for traffic signals and communications equipment shall be 50m.
- 2.8 Traffic signal pole retention sockets shall be modular in construction and shall be manufactured from ductile iron to BS2789 500-7(GGG50-Din 1693). A bottom cable entry bend shall have a rotation through 360 degrees to permit cable access from any direction or Tee-bend retention socket.

3. Maintenance

- 3.1 Maintenance shall be undertaken for a minimum period of 12 calendar months from commissioning.

APPENDIX 6/12: INSTRUMENTATION AND MONITORING

This Specification sets out the minimum instrumentation and monitoring requirements for the Works. The Contractor shall amend the Specification to reflect any additional monitoring proposed.

1. The locations of instrumentation and details of the instruments required shall be shown on the Earthworks Drawings.
2. All instruments shall be numbered and labelled by type, mainline chainage and offset from the proposed alignment centreline. For example, Surface Movement Pegs at chainage 200.00m off-set east and west of proposed alignment centreline by 20m would be labelled as SMP 200/U20 and SMP 200/D20 respectively.

The following instrumentation is required as part of the Works as a minimum requirement:

Instrument Type	Minimum Requirement
<p>Surface Movement Peg (SMP)</p> <p>The Contractor shall propose a design suitable for monitoring slope instability movements. The detail of monitoring installations shall be approved by the Engineer.</p>	As specified by the Designer
<p>Inclinometer (INC)</p> <p>Inclinometers shall be installed by a specialist geotechnical instrument contractor and shall be industry standard kit suitable for monitoring slope instability movements. Inclinometer installations shall extend to a minimum of: double the depth of the cutting plus 2m, or 2m into bedrock, whichever is the lesser.</p>	As specified by the Designer
<p>Piezometers (PZ)</p> <p>The design and installation of piezometers shall be suitable to monitor groundwater levels within the deposits in which they are installed including groundwater levels at the drift / bedrock level interface.</p>	As specified by the Designer
<p>Standpipes (SP)</p> <p>The design and installation of standpipes shall be suitable to allow for monitoring of groundwater levels and sampling of groundwater, within the deposits in which they are installed.</p>	<p>Existing standpipe installations BH04A, BH14, BH101, BH102, BH104, BH105, BH106 and BH109 are to be monitored for gas / groundwater level as required.</p> <p>Monitoring of groundwater levels immediately adjacent to the</p>

APPENDIX 6/12: INSTRUMENTATION AND MONITORING (Continued)

	<p>mainline cutting between Chainage 250m and Chainage 450m, the realigned Manor Avenue cutting and the associated adjacent properties shall be undertaken throughout the construction period. The Designer shall specify the location of any additional instrumentation to comply with this requirement.</p> <p>Other standpipe monitoring requirements to be as specified by the Designer.</p>
Other Instrumentation	As specified by the Designer

The Designer shall design a geotechnical instrumentation and monitoring scheme appropriate for their design incorporating the above minimum requirements.

3. Not required.
4. All instruments shall be installed by the Contractor prior to construction at any specific location and shall be surveyed by the Contractor to provide X, Y, Z co-ordinates for each station to an accuracy of +/- 2mm.
5. The Contractor shall calibrate and monitor all instruments for baseline readings at least two week ahead of adjacent or overlying construction during which the Contractor shall take three sets of base readings. The results shall be provided to the Designer to confirm that all readings are repeatable before adjacent Works are commenced.
6. All monitoring stations shall be clearly marked with a unique reference number as above. The Contractor shall ensure that all instruments are protected from damage during installation. As appropriate on completion of installation the Contractor shall provide/erect temporary surface protection of the instruments so that damage by site traffic or other plant does not occur.
7. Not required.
8. Monitoring instruments shall be read as a minimum requirement to the frequency and accuracy indicated in the following table:

Table 6/12 - 1

Instrument	Location	Frequency of reading	Accuracy
Surface Movement Points	Above / below extent of proposed works.	Twice Weekly	+/- 5mm
Surface Movement Points	Above temporary works adjacent to sections of live carriageway	Daily	+/- 2mm

APPENDIX 6/12: INSTRUMENTATION AND MONITORING (Continued)

Monitoring Points	As required to demonstrate no adverse effect on neighbouring properties	As specified by the Designer	+/- 1mm
Inclinometer	General	Fortnightly	+/- 1mm
Piezometer	General	Twice weekly	+/- 10mm
Standpipes BH04A BH14 BH101 BH102 BH104 BH105 BH106 BH109	SP SP SP SP SP SP SP SP And as specified by the Designer	Minimum, Fortnightly, or any Increased frequency as Specified by the Designer	+/- 10 millimetres maximum, or greater accuracy as specified by the Designer
Other instrumentation	As specified by the Designer		

Monitoring shall be undertaken throughout the duration of the Works or until a period agreed with the Designer. In the case of surface movement monitoring this is likely to be when negligible movement has been demonstrated following the completion of adjacent earthwork activities.

In the case of surface movement monitoring points and inclinometers any changes in position or level beyond the required accuracy tolerances set out in the above table shall be reported immediately to the Designer.

The results of all monitoring shall be reviewed by the Designer not more than 24hrs after readings are taken. The Contractor shall make available the results of all monitoring data to the Designer in digital (Excel Spreadsheet) format and also as a graphical plot (Excel Format) such that changes with time are apparent. The exact format of the presentation of results is to be agreed with the Designer. Following each measurement, the Contractor shall update the database and graphical output immediately.

All monitoring data shall be made available to the Employer not more than 7 days after readings are taken or as and when requested.

APPENDIX 7/1: PERMITTED PAVEMENT OPTIONS
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Appendix 7/1 below.

APPENDIX 12/5: TRAFFIC SIGNS: TRAFFIC SIGNALS

Permanent Traffic Signals

1 General

- 1.1 All materials and equipment shall comply with current Department for Transport (DfT) specifications, recommendations and current British Standards and Specifications.
- 1.2 The system provided shall be controlled using equipment which conforms to the TOPAS 2500A and current amendments. The operation of the system shall be in accordance with the appropriate sections of this Specification.
- 1.3 All necessary equipment, poles, cabinet, roots, temporary cabinets are to be stored by the Contractor in strict accordance with the manufacturer's specifications. The signal controller should be stored in a heated store until it is installed on site, it should be powered the same day that it is installed.
- 1.4 The Contractor shall allow for the pulling of all cables through ducting and delivery of all necessary materials to site.
- 1.5 The bases of cabinets containing electrical equipment shall be sealed against the ingress of moisture and gas.
- 1.6 The Contractor shall be responsible for removing all surplus materials from the site on completion of the Works and shall ensure that the site does not constitute a potential hazard.
- 1.7 The Contractor should also include for any materials and work which may not be expressly specified but which are implied and necessary for the satisfactory completion of the installation.
- 1.8 The Signal Contractor employed to supply and install the traffic signals shall operate a registered quality assurance scheme conforming to ISO 9001 specifications.
- 1.9 The Contractor shall be responsible for the electrical design of the installation and the installation of all cables, signal heads, detectors, push button, electrical and control equipment; also for the installation of all poles and housings.
- 1.10 The Works shall be carried out fully in accordance with DfT Local Transport Note 1/98 – 'The Installation of Traffic Signals and Associated Equipment' (formally DETR).

2. Electrical

- 2.1 All equipment specified herein shall be tested electrically in accordance with the current edition of British Standard BS7671. Requirements for Electrical Installations, and TRO102A, DTP Standard Traffic Signals published by the Highways Agency, as amended to include:
 - (a) earth continuity test;
 - (b) polarity check;
 - (c) earth loop impedance; and
 - (d) residual current device test.

APPENDIX 12/5: TRAFFIC SIGNS: TRAFFIC SIGNALS (Continued)

- 2.2 A Completion Certificate shall be issued to the Engineer as prescribed In BS7671 at the time of commissioning. A copy of the certificate as recommended is enclosed in LTN 1/98 'The Installation of Traffic Signals and Associated Equipment'. Commissioning will not take place until this certificate has been completed and signed.
- 2.3 A separate power distribution pillar shall be supplied which shall provide facilities to isolate the control equipment and provide accommodation for the Electricity Company's cut out. A spare isolated supply point shall also be provided. A consumer earth terminal shall be provided adjacent to the Electricity Company's cut-out.
- 2.4 The equipment provided should meet the requirements of TRG 1068, Electro Magnetic Compatibility Tests published by the Highways Agency, and have a high tolerance to external noise which may be present in the intersection environment, particularly that which may be introduced into the equipment by the cabling.
- 2.5 Low level inputs to signal equipment shall be immune to spurious operation by standing voltages picked up by the cabling and shall be protected so that no damage occurs.
- 2.6 All points above 50 volts with respect to earth shall be protected in a suitable manner so as to prevent contact with any live voltage points.
- 2.7 Earthing shall be in accordance with the British Standard Code of Practice CP 1013 or equivalent.
- 2.8 In the event of a mains supply interruption equal to less than 20 minutes all equipment shall retain functionality once power is restored.
- 2.9 The Contractor shall state prior to installation the power consumption and peak load of the proposed equipment in such a manner as to satisfy the requirements of Schedule 1 of Second Tier Unmetered Supplies Procedure ap001 (STUSP), Highway Power Supplies consumption ratings produced by STUSP Committee in agreement with Scottish and Southern Energy, the host regional electricity company.
- 2.10 Uninterruptible Power Supply (UPS)
- (i) At each traffic signal controller location, a separate Miscellaneous Equipment Cabinet (MEC) shall be installed housing a UPS. The UPS shall be installed between the power supply feeder pillar and the controller, so that the controller is supplied through the UPS.
 - (ii) UPS fault and status reporting shall be available either via Urban Traffic Control (UTC) or via a dedicated IP-connected management system. In the former case, the bit patterns shall be amended by agreement with the Project Manager.
 - (iii) The UPS shall provide power to the traffic signal controller for a period of at least 4 hours in the event of a power supply failure, allowing time for the provision of emergency traffic management.
 - (iv) The UPS shall use lead crystal or similar non-hazardous batteries permitting their deployment in a standard cabinet, and providing an expected operational life of at least eight years.

APPENDIX 12/5: TRAFFIC SIGNS: TRAFFIC SIGNALS (Continued)

3. Signals and Associated Equipment

- 3.1 All on-street traffic signal equipment must operate on Extra Low Voltage (ELV).
- 3.2 Advanced warning signs “New Traffic Signals” to Diagram 7014 of the Traffic Signs Regulations and General Directions 2016 shall be implemented on all approaches to the proposed junctions for a period of 3 months from completion of the site commissioning.
- 3.3 LED lanterns, capable of being lamp monitored, shall be provided and pole mounted. All necessary brackets and fixings shall be provided.
- 3.4 Powder coated galvanised steel poles shall be provided. Standard height poles are nominally 4m in length and 114mm diameter. These poles shall be of such a length as to enable the centre of the amber lens to be sited not less than 2.4m nor more than 3.1m above finished level with regard to '3 in line' signal heads. The amber lens of each vehicular aspect on any one approach shall be at the same height above carriageway level. Where a double signal head on a tall pole is proposed, the higher signal head shall have its amber lens positioned 2.0m above the amber lens of the lower signal head. Push button units shall be mounted so as the top of the unit is 1.5m above the finished level of the footway. Poles carrying Pedestrian nearside indicators shall be positioned 0.5m from the face of the kerb and from the stud line unless alternative positions have been specified on the certified design drawings. The poles shall be coloured grey unless otherwise specified. Where cranked poles are specified they shall be of the “swan neck” type. All poles shall be compatible with the proprietary traffic signal pole retention socket system unless otherwise specified and the appropriate pole type shall be used in conjunction with the appropriate size of socket.
- 3.5 Minimum clearances between any part of the street furniture and the edge of the adjacent carriageway shall be 500mm and all signal head arrangements shall have a minimum vertical clearance of 2.5m from the adjacent finished ground level.
- 3.6 Unused cable cores shall be connected to earth at both ends.
- 3.7 The installation shall be free from any cable joints, other than those required for any inductive loop detection. The Contractor shall not joint any cable without the express permission of the Engineer if it is to form part of the permanent installation. Any joints so carried out shall be clearly marked on the site plan and associated cabling diagram.
- 3.8 Each pole shall be provided with separate cables from controller to pole.
- 3.9 All low and extra low voltage cables shall be armoured multi-core cable and shall contain a minimum of 5 spare cores. The cable outer sheathing shall be orange in colour. The cable cores shall be identified by colour and the Contractor shall be consistent in the use of coloured cores.
- 3.10 Cores carrying a voltage of less than 110 volts must not be housed in the same cable as others carrying a voltage above 110 volts.
- 3.11 Detector and extra low voltage cables shall not utilise the same ducts as low voltage cables where ever this is practical.

APPENDIX 12/5: TRAFFIC SIGNS: TRAFFIC SIGNALS (Continued)

- 3.12 Traffic signal cables forming an integral part of the system shall not pass through ducts or chambers used for any other service.
- 3.13 Draw cords shall be replaced in each duct by the Contractor following installation of the cables.
- 3.14 All cables shall be labelled at each termination and within each chamber using suitable waterproof labels.
- 3.15 The traffic signal controller casing shall be provided with a minimum of one door to facilitate maintenance and be treated with anti-flyposting material, coloured grey. (It may on request be coloured black).
- 3.16 Signal head mounting brackets shall be made from steel and powder coated to ensure they provide a suitable level of corrosion protection. They shall be long enough to provide sufficient rotational movement to allow correct alignment of heads.
- 3.17 Alignment of the heads shall be carried out during site acceptance in accordance with the Engineer's representatives' instructions.
- 3.18 Backing boards, top strips and bottom strips with retro-reflective tape shall be supplied and fitted to all lanterns and shall be bolted to the signal head. Appropriate cowls shall be fitted to all aspects.
- 3.19 All pedestrian push button 'wait' indicators shall be illuminated by LED's. All pedestrian push button units shall work on SELV (safety extra low voltage).
- 3.20 Signal heads shall be lettered to identify their phases and signal posts shall be numbered as identified on the certified design drawings. 40 to 80mm high self adhesive vinyl labels shall be used. Post numbers shall be placed immediately below the signal heads and facing the adjacent carriageway. Phase letters shall be placed in such a way that the phase letter can be clearly seen from the controller position; If not practical, the phase letters should be placed to the bottom of the near side of the signal head.
- 3.21 The Contractor shall affix a permanent label indicating the date of commissioning, power supply requirements, power consumption, performance characteristics and the Appendices of TOPAS 2500A to which it is approved to the inside top left hand side corner of the controller cabinet door.
- 3.22 All pedestrian push button units will be fitted with tactile cones and audio units unless otherwise specified. The tactile and audio units shall be capable of independent operation.
- 3.23 For full Traffic Signals Service Ducts Specification refer to Appendix 5/2: Service Duct Requirements.

4. Traffic Signal Controller Facilities

- 4.1 The traffic signal controller will be compliant with TOPAS 2500A and include the facilities described in appendices A, B, C, D, E, F, G, H, I, J, K and L unless otherwise specified. A parallel interface compliant with TOPAS 2523A shall be provided.

APPENDIX 12/5: TRAFFIC SIGNS: TRAFFIC SIGNALS (Continued)

- 4.2 Red lamp monitoring shall be provided.
- 4.3 Separately fused power supplies for the operation of the ancillary equipment shall be provided within each control cabinet. A maintenance socket shall be provided which shall be protected by an ELCB and shall remain for the sole use of the maintainer.
- 4.4 The Contractor shall ensure the cabinet doors are equipped with both a lock and a minimum of two security devices. Two sets of keys or other devices to open the cabinet doors shall be provided.
- 4.5 The equipment housings shall provide stays or similar devices to opening doors to ensure that the doors can be held in an open position.
- 4.6 Signal lamp dimming shall be provided.
- 4.7 Where UTC facility and/or connection is specified, the Contractor shall provide a UTMC compliant Outstation Transmission Unit (OTU) and ensure that the following requirements are met:
- (i) The controller is to be modified as necessary for UTC including a UTC interface with a 3U rack including sufficient void space and backwiring to accommodate a UTMC compliant OUT or an integral OTU which has been supplied as part of the controller.
 - (ii) The modification wiring is to include all sockets for connection to the OTU.
 - (iii) The bit pattern shall be as specified in the UTC database sheet(s) of the TOPAS 2500A specification forms. These forms shall be submitted to the Engineer for approval a minimum of 10 working days in advance of their requirement.
 - (iv) The Police panel is to be fitted with a 'computer on' LED operated by the presence of force bits from the UTC computer and with a remote reconnect switch. The police panel LED shall be labelled 'UTC on'.
 - (v) The Contractor is to provide self tuning multi-channel detector units for all SCOOT loops which are to be mounted and wired in the OTU detector rack using the power from the OTU detector power pack or in the designated space in the case of integral OTUs.
 - (vi) The Contractor will arrange for the required telemetry connection to be fitted in the controller cabinet. This may be BT leased circuit, private line fibre optics or digital wireless secure system.
 - (vii) The Contractor shall be responsible for commissioning the detection, control and reply bits, and shall be responsible for supplying all necessary equipment for testing purposes.
- 4.8 Unless the site has been specified as a UTC site all sites are to be connected to the Authority's Remote Monitoring System. The Contractor shall provide an incompatible Outstation Monitoring Control Unit (OMCU) and ensure that the following requirements are met:

APPENDIX 12/5: TRAFFIC SIGNS: TRAFFIC SIGNALS (Continued)

- (i) A standard 3U rack is to be provided for an Outstation Monitoring Unit (OMU) to be fitted in the controller cabinet containing a 300mm wide by 300mm deep void space.
- (ii) The Contractor shall arrange for a telemetry line connected to the Public Switched Telephone Network to be fitted in the controller cabinet unless a GSM OTU has been specified.
- (iii) All controller detector inputs shall be capable of being remotely monitored.
- (iv) A separately fused supply shall be provided solely for use of the OMU.

4.9 Where MOVA control is specified the Contractor shall provide a MOVA unit and ensure that the following requirements are met:

- (i) A standard 3U rack is to be provided for a MOVA/ Outstation Monitoring Unit to be fitted in the controller cabinet containing a 300mm wide by 300mm deep void space.
- (ii) A current version MOVA unit to be fitted in the controller cabinet and interfaced to the traffic signal controller.
- (iii) A UTC interface is provided inside the controller for MOVA control. The Contractor shall test the output of all UTC bits at the Site commissioning (*Note this may be replaced by a direct RS232 connection in approved cases*).
- (iv) All controller detector inputs shall be capable of being remotely monitored. All control and reply bits shall be capable of being wired to the MOVA unit.
- (v) The Contractor shall terminate all MOVA loops into self tuning multi-channel microprocessor type detector cards. For combined MOVA and VA loops these may need to have two outputs one to the Controller one to the MOVA Unit.
- (vi) The Police panel shall include a 'computer on' LED which shall indicate when the controller is operating under MOVA control. The LED shall be labelled 'MOVA on-line'. For dual MOVA units within the same controller this indicator shall be configured as specified in the TOPAS 2500A forms.
- (vii) All demand dependent pedestrian phases shall include a separate output signal for MOVA. The output signal shall be latched until the pedestrian phase operates, except for Puffin outputs.
- (viii) The MOVA equipment shall be of a type approved by Aberdeen City Council and must interface with the authority's Remote Monitoring System.

4.10 The traffic signal controller shall be equipped with a wireless remote handset unit and interface.

5. Detection

5.1 Microwave Vehicle Detectors shall meet or exceed the requirements of TOPAS 2505A Performance Specification for Above Ground Vehicle Detection Systems for use at Permanent Traffic Signal Installations with the following variations:

APPENDIX 12/5: TRAFFIC SIGNS: TRAFFIC SIGNALS (Continued)

(i) Detector power supply

Detectors shall operate from 24 volts ac or dc 20%. The Current drawn by a detector shall not exceed 350 mA. The Power supply will normally be located in the controller housing and, where possible will be delivered from the controller. Where this is not possible, a 24 volt transformer with a 5amp fuse at the output shall be installed in the controller housing.

(ii) Detector mounting brackets and fixings

All detectors shall be supplied with a mounting bracket in accordance with DfT drawing number MCX 0329. This shall include a stainless steel bolt, nut and washer for fixing the bracket to the signal head strut.

(iii) Detector outputs

The Output device shall be & relay with one set of changeover contacts. The output condition shall be closed on detect or open on detect. The option required will be selected from the appropriate connector pins (sec Clause 5.1 E).

(iv) Connectors

All detectors shall be fitted with a flying Cable, 750mm +50mm -0mm in length, terminated with a Bulgin Buccaneer Flex Connector PX0728/P (or equivalent). Each detector shall be supplied with a Bulkhead Connector PX0762/S (or equivalent). Each Bulkhead Connector shall he fitted with a sealing cap PX0733 (or equivalent) and supplied with four stainless steel fixing nuts, bolts and washers.

(v) Contact designation for connectors in accordance with TOPAS 2505A

PIN	CIRCUIT	CORE COLOUR
1	24V	RED
2	24V	BLACK
3	EARTH/SCREEN	GREEN/SCREEN
4	COMMON	WHITE
5	OUTPUT	YELLOW
6	SPARE	BLUE
7	SPARE	VIOLET

APPENDIX 12/5: TRAFFIC SIGNS: TRAFFIC SIGNALS (Continued)

8	SPARE	ORANGE
9	SPARE	PINK/BROWN

Notes (i) Cable screen to be connected to earth inside MVD and cut flush with outer sheath at connector.

(ii) Unused Conductors to be cut flush with outer sheath at both ends of cable.

(vi) Connecting cable

Miniature range (Def Stan 61-12 Part 4) 7/0.2mm PVC insulated, overall braid screened, PVC sheathed (STC 7-2-10c or equivalent).

- 5.2 Detectors shall be mounted on a top horizontal strut of the signal head using a 10mm clearance hold midway between the rear of the signal head and the vertical part of the strut.
- 5.3 Connection between the MVD and the controller housing will be, via four conductors in the ELV cables. These conductors will operate at extra low voltages (eg 24 volts or below) and spare conductors in cables which carry mains voltages shall not be used.
- 5.4 The bulkhead mounting socket shall be mounted in the side of the nearest signal head adjacent to the flexible conduit entry from the pole top and facing the footway.
- 5.5 The 24 volt power for the detectors shall be obtained preferably from the controller auxiliary supply, the installation Contractor shall install a 24 volt transformer with the following specification:
- (i) With 240 volts supply:
- (a) Output voltage: 24 volts 10% (zero to maximum current);
- (b) Output current: 2.5 amps; and
- (c) Fuse at output: 5 amps.
- To ensure interchangeability of different manufacturers of MVD, the requirements of this clause shall be strictly adhered to.
- 5.6 All conductors and cables shall be identified at the controller.
- 5.7 The extension time in the controller shall be set to 0.6 seconds or as specified in the approved TOPAS 2500A and appendices.
- 5.8 MVDs shall be set up to detect cars at 30m from the stop line. The following requirements are mandatory when setting up MVDs:
- (i) setting up shall be done only under light traffic conditions;
- (ii) a marker (eg a cone) shall be placed on the footway 30m from the stop line; and
- (iii) a test box with a buzzer which operates on detect shall be connected to the MVD during setting up.

APPENDIX 12/5: TRAFFIC SIGNS: TRAFFIC SIGNALS (Continued)

- 5.9 All traffic MVDs to be low speed threshold type (detect at vehicle speeds of 5mph and higher). Type approved kerbside and on-crossing detection to be installed at crossing locations in similar manor to MVDs, where appropriate.
- 5.10 In the case of PUFFIN and TOUCAN crossings, Pedestrian Detection shall meet or exceed the requirements of TR 2506 Performance Specification for Above Ground On-Crossing Pedestrian Detection Systems and TR 2507 Performance Specification for Kerbside Detection Systems for use with Nearside Signals and Demand Units.
- 5.11 Kerbside detection shall be of the optical type and fully configurable with respect to the size and shape of the detection zone. The Contractor shall supply one portable handset and software for the configuration and fault diagnosis of Kerbside detection units.
- 5.12 The position and size of all System D, MOVA, SCOOT, call/cancel, stop line, speed discrimination and selective vehicle.
- 5.13 All inductive loops shall be installed to conform with MCH1540F specification. A test certificate for each site shall be issued to the Engineer upon completion of the Works. The Contractor shall be responsible for removing all surplus materials from the site on completion of the Works and shall ensure that the site does not constitute a potential hazard. The Contractor should also include for any materials and work which may not be expressly specified but which are implied and necessary for the satisfactory completion of the installation.
- 5.14 System D, speed discrimination and stop line detector loops are shown schematically on the site drawings and shall be cut to the standard configuration. The location of detector loops shall conform with the latest issue of MCE 0108C "Siting of Inductive Loops for Vehicle Detecting Equipments at Permanent Road Traffic Signal Installations", incorporating all released amendments.
- 5.15 The selective vehicle detection strategy shall be integrated into the traffic signal controller and allow vehicle types to be classified.
- 5.16 The loop and its tail shall consist of one continuous cable and be assembled on site from either of the following cable types:
- (i) 50/0.25mm (2.5mm²) Butyl Rubber EPR or EPR/CSP insulated cable.
 - (ii) 30/0.25mm (1.5mm²) CSP insulated cable.
- 5.17 Detection shall be supplied as follows, unless otherwise determined by the Engineer's representative:
- (i) Detector loops are to be connected via individual pairs of feeder cables;
 - (ii) Detector loops are to be connected to detector cards.
- 5.18 All detector cards shall be clearly labelled with the corresponding loop names.
- 5.19 Slots for detector feeder cable shall be of sufficient depth to allow a minimum cover of 50 mm over the feeder cable and shall have a minimum width of 20mm, where detector feeds are slot cut in the carriageway or footway.
- 5.20 Detector feeder cables shall be jointed to the detector loop within specially provided connection chamber in the footway / verge and loop boxes shall be used in the

APPENDIX 12/5: TRAFFIC SIGNS: TRAFFIC SIGNALS (Continued)

carriageway. No additional joints between the detector loop and detector unit shall be permitted unless agreed with the Engineer prior to the commencement of the Works.

- 5.21 Individual cores shall be jointed by means of insulated crimp connectors using a ratchet type of crimping tool and staggered to avoid the possibility of any short circuits. The joint shall be waterproof and able to withstand a vigorous "pull-test" of approximately 3kg.
- 5.22 Slots shall be cut at least one metre from any ferrous objects or areas of poor surfacing unless otherwise approved by the Engineer.
- 5.23 Slots shall be properly dried and cleared of all debris before laying loop or detector feeder cable.
- 5.24 The depth of the slot shall be checked along the whole length of the slot.
- 5.25 All cable shall be dry before laying in slots.
- 5.26 Sharp implements shall not be used to seat cable in slots.
- 5.27 The corners of the loop shall be crosscut.
- 5.28 After backfilling, which shall be 1 part bitumen, excessive spillages of bitumen shall be removed from the road surface and loose asphalt shall be swept clear of the road surface and disposed of off Site.
- 5.29 Loop cable shall conform with Departmental Specification TR2031. Loop cable shall be 1.5 mm² copper wire (30/0.25) insulated with an inner layer of ethylene propylene rubber (EPR) with 0.8 mm radial thickness and an outer sheath of polychloroprene (PCP), black in colour with a radial thickness of 1.4 mm. Overall diameter to be between 5.8 mm and 7.2 mm. Generally all loops shall comprise three turns of loop wire in a continuous lay.
- 5.30 Feeder cable shall be PVC sheathed natural polyethylene shielded armoured or non armoured cable. These feeder cables shall be run in MDP ducts in adjacent footway or verge to preformed access chambers. Where the Contractor proposes to use armoured feeder cable slot cut into the carriageway surface he shall get the Engineer's written permission before commencing installation.
- 5.31 Slots for loop configuration shall be cut to a width 50% greater than the maximum dimension of the loop wire cross section and to a depth to allow 50 mm of cover over the loop wires and backfilled with hot poured bitumen.
- 5.32 Loop tails shall be cut directly back to the loop box or under kerbway ducting and cabled into a preformed access chamber for jointing. Cutting through kerb stones shall not be permitted.
- 5.33 Where loop tails in excess of 1 metre are slot-cut in the carriageway these also shall be cut to allow 50 mm of cover over cables and backfilled with hot poured bitumen. Width of slot shall be 50% greater than the maximum dimension of the twisted loop tail cross section.
- 5.34 Loops shall be cut and connected to feeder cables on the same visit.

APPENDIX 12/5: TRAFFIC SIGNS: TRAFFIC SIGNALS (Continued)

- 5.35 Loop cable shall be taken through ducts from the loop box to the footway pit, where the cable shall be jointed to the feeder cable.
- 5.36 Where the bitumen backfill is below the road surface, the Contractor shall be responsible for topping up the bitumen backfill to achieve a level finish with the road surface. The Contractor shall be responsible for additional backfilling of the slots should the level of backfill fall below the road surface within the 12 month maintenance period.
- 5.37 Where the drawing indicates the application of new special surfacing on the carriageway all slot cutting and backfilling of cables in these areas shall be completed prior to the application of the special surfacing.

6. Testing

- 6.1 The Contractor shall give the Engineer at least ten working days notice of the controller(s) being ready for Factory Acceptance Testing (FAT) and shall allow for attendance at those tests by the Engineer's representative(s).
- 6.2 Suitable signal lamp mimics and means of simulating inputs shall be required and the test shall demonstrate full compliance with the operational specification. This test shall be sufficient to suitably demonstrate the functionality of the controller and must include the connection of all appropriate facilities to be supplied. This will include the MOVA Unit / OMU for MOVA sites and the OTU for SCOOT sites. The Contractor will need to satisfactorily demonstrate all green conflict monitoring using a test set approved by the Engineer. Under no circumstances may fly leads be used for this procedure.
- 6.3 Any non-compliance's identified by the Engineer's representative(s) shall be rectified by the Contractor at his own expense. Where controller emulation programs, or test bed controllers are used to test configurations, the Contractor shall supply a certificate confirming the actual controller has been checked by a suitably experienced and competent person and proved fully functional with the specification prior to dispatch.
- 6.4 After installation of the equipment, site testing shall be carried out by the Contractor prior to the commissioning in order to demonstrate full compliance with the specification. The Contractor shall test the operation of all lamps, detectors and push buttons. Only after the tests have proved satisfactory shall the Engineer's representative(s) be asked to attend the installation in order that it may be commissioned. The Contractor shall supply all equipment necessary for testing purposes.
- 6.5 Any non-compliance identified by the Engineer's representative(s) shall be resolved at the commissioning by the Contractor. If after taking all reasonable action the Contractor is unable to rectify any outstanding non-compliance and the Engineer's representative(s) considers that the non-compliance is such that the signal equipment cannot be switched on the Contractor shall reattend the site to resolve any non-compliance immediately the following day and each day thereafter until the item is rectified. Where the non-compliance is not deemed serious enough by the Engineer's representative(s) to affect the switching on of the signal equipment and the Contractor has taken all reasonable measures at the commissioning, the outstanding non-compliance item/s must be resolved within 5 working days. All labour, plant and materials required to resolve the non-compliant item/s shall be undertaken at the Contractor's expense.

APPENDIX 12/5: TRAFFIC SIGNS: TRAFFIC SIGNALS (Continued)

6.6 All testing shall be carried out fully in accordance with Chapters 12 and 15 of the DfT Local Transport Note 1/98 – ‘The Installation of Traffic Signals and Associated Equipment’ (formally DETR).

7 Documentation

- 7.1 The Contractor shall supply two copies of the ‘as built’ cable drawings, TOPAS 2500A specifications within 28 days of commissioning the site. The drawings shall be at a scale of not less than 1:200 and shall clearly show the cable layout.
- 7.2 One complete set of manufacturers user manuals detailing procedures for the installation, operation and maintenance of the equipment installed shall be provided.
- 7.3 A site logbook shall be provided and this shall be stored, together with site drawings and timings, in a waterproof wallet which shall be held in a metal document holder fixed to the inside of the controller door.
- 7.4 All documentation shall be provided in a durable form to enable prolonged use. It will generally be of hard backed, loose-leaf format and manufactured in grease resistant materials.
- 7.5 Installation drawings shall show details of all cables installed and shall identify core colours and the use to which they have been put at each point in the termination; spare cores shall be clearly shown.

APPENDIX 13/1: ROAD LIGHTING COLUMNS AND BRACKETS, CCTV MASTS AND CANTILEVER MASTS
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- (i) Typical column mounting heights are as follows:
 - a) 12m, 10m or 8m for main roads;
 - b) 6m for residential access type roads; and
 - c) 5m or 6m raise and lower for inaccessible areas.

- (ii) The lighting Design for new lighting installations shall comply with the following criteria:
 - a) design factors relative to the loading of lighting columns shall be applied in accordance with BSEN 40-6;
 - b) a cleaning interval of six years to coincide with maintenance requirements and electrical testing (lamp replacement, etc.) for Light Emitting Diodes (LED) light sources and luminaires;
 - c) for all lighting columns, a Terrain Category of Class one shall be applied in accordance with BSEN 40-3-1; and
 - d) luminaires shall be IP66 rated with lighting outputs in compliance with BSEN 13201-2 Table 1a, Table 2, Table 3 and Table A.1 or any specific requirements.

- (iii) All lighting columns shall be manufactured from aluminium in accordance with the requirements of BS EN 40. Aluminium columns shall be extruded to form a regular tapered or conical shape. They shall be equipped with a locking flush fitting door complete with separate earth connection.

Columns on footpaths with no direct access for maintenance vehicles shall be specified as raise and lower.

The intended service life of the columns proposed for use shall be inserted in the Appendix to the Tender and submitted with the tender. The column manufacturer shall base his assessment of intended service life on structural performance, robustness and durability under local conditions. However, columns shall be capable of a service life of at least 50 years.

- (iv) Aluminium columns shall be supplied in natural condition with corrosion protection applied to the internal and external surfaces of the ground section. Corrosion protection to the ground section of aluminium columns shall consist of a 250 micron minimum thickness of bitumen extending to 250mm above ground level or equivalent alternative providing the same degree of protection. Columns shall be packaged for delivery so as to protect them from all damage and allow them to be handled and taken into store with packaging intact.

- (v) Columns and brackets shall carry a unique identification mark which indicates the name of the manufacturer, the date of production, the batch number and any other data to enable details of the column and bracket to be determined at any time. The identification mark shall include the prefix "SP35". This information should be located such that it is clearly visible in service.

The column cable entry slot, which shall be positioned on the face to the right of the column access door opening, shall have minimum dimensions of 150 millimetres by 75 millimetres with the lower edge of the slot 500 millimetres below ground level. The cable entry slot shall be free from irregularities and burrs.

APPENDIX 13/1: ROAD LIGHTING COLUMNS AND BRACKETS, CCTV MASTS AND CANTILEVER MASTS (Continued)

All verge located lighting columns shall be installed such that the door is facing away from the oncoming traffic allowing maintenance personnel to access the door while facing the traffic unless the column is installed at the rear of a footpath then it should be perpendicular to the carriageway.

- (vi) The design wind loadings shall be as BS EN 40-3-1 and PD 6547:2004 & A1:2009 except that:
- (a) the use of rationalised wind loading factors shall not be permitted;
 - (b) the 10 minute mean wind velocity shall be taken as 35 m/sec;
 - (c) the characteristic wind pressure derived shall be multiplied by a funnelling factor of 1.05;
 - (d) the characteristic wind pressure derived shall be multiplied by a gust factor of 1.10.

Columns 6m or less in height shall be designed to be capable of carrying a lantern 11kg in weight with 0.15 square metres windage. Columns 8m or more in height shall be designed to be capable of carrying a lantern 22kg in weight with 0.25 square metres windage.

- (vii) Columns shall also be designed to allow for the attachment of a sign 0.30 square metres in surface area, 5Kg in weight, mounted 2.5m above ground level with an eccentricity of 300mm and a banner up to 2.0 square metres in surface area, mounted 4.5m above ground level with an eccentricity of 500mm.
- (viii) Columns shall also be designed to allow for the attachment of flower baskets which may either be hanging from an extended arm attached to the column or mounted circumferentially around the column. The weight of hanging baskets shall be taken as 25 kg with an eccentricity of 300mm. The weight of circumferential baskets shall be taken as 40kg. The attachment point shall be taken as 2.8m above ground level.
- (ix) Shape coefficients for columns, brackets, lanterns and signs shall be as BS EN 40-3-1 Section 3.3 except that the shape coefficient for signs & banners shall be taken as 1.8 and for baskets as 1.5.
- (x) The Topography Factor shall be taken as 1.25 (Para 3.2.5, BS EN 40-3-1).
- (xi) The Exposure Coefficient shall be taken from Table 2 or Figure 2 of BS EN 40-3-1 for Terrain Category I (Para 3.2.6, BS EN 40-3-1).
- (xii) All columns shall have a non-hygroscopic back-board, not less than 15mm thick and of a sufficient size to accept the selected cut-out, positioned in the base compartment opposite the access door. The back-board shall be securely fixed to the inside of the column. All fixings used for the attachment of equipment and components to this back-board shall be of stainless steel.
- (xiii) Lighting columns and access doors shall be permanently earth bonded, via an earth link cable of the flexible braid type, and secured to brass earthing terminals fitted on both the column and its access door. The terminations shall be distinctly and durably marked with a metal label bearing the wording "Safety Electrical Connection – Do Not Remove".

APPENDIX 13/1: ROAD LIGHTING COLUMNS AND BRACKETS, CCTV MASTS AND CANTILEVER MASTS (Continued)

- (xiv) Each column shall be fitted with an eight millimetre (minimum) diameter earth terminal complete with two plain washers, one full nut and one locking nut. These items shall be corrosion resistant and compatible with the column material. Earth terminals shall be readily accessible through the door opening and located such as to minimise the risk of injury to persons accessing them while undertaking installation and maintenance.
- (xv) The flush fitting weatherproof single access door shall provide protection no less than IP33 and shall be free from any irregularities, burrs or sharp edges likely to cause injury. Each column access door shall have two locks using a triangular type key. The number of column door keys which shall be supplied shall be ten per cent of the number of columns erected subject to a minimum of three keys. All column access door keys shall be manufactured from metal and be of an adequate size for physical handling.
- (xvi) On completion of the installation, all door locking components shall be coated with an application of suitable corrosion inhibitor grease providing lubrication and protection from seizure and general deterioration.
- (xvii) New lighting column base compartment, cableways and compartment doors shall comply with the requirements of BS 5649 part 5.
- (xviii) Where columns are to be situated in grass verge, an area of hard standing shall be provided around the column. This is to be 0.5m each side of the column, a minimum of 0.3m to the rear and a minimum of 0.8m to the road kerb to the front.

APPENDIX 14/1: SITE RECORDS

- (i) As-built drawings shall be produced by the Contractor, and shall be in accordance with the requirements of Clause 1402 Volume 2: Specifications for Highways Works 'Electrical Work for Road Lighting and Traffic Signs'.

Where necessary large scale inserts shall be produced by the contractor where layouts are complex.

- (ii) The Contractor shall prior to placement of any orders for materials, submit to the Engineer for approval, triplicate copies of completed Appendix 13/2 Data sheets for each type lighting column.
- (iii) The Contractor shall also supply completed test certificates cross-referenced to the apparatus identified on the as-installed drawings.
- (iv) The Contractor shall supply Operations and Maintenance manuals to support the site records.

APPENDIX 14/2: LOCATION OF LIGHTING UNITS AND FEEDER PILLARS
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(i) The locations of the feeder pillars shall allow safe and easy access for future maintenance. A person access hard standing area shall be allowed for in front of the feeder pillar to facilitate ease of maintenance.

(ii) The Contractor shall consult and comply with the requirements of

(a) Aberdeen City Council

Contact person: [REDACTED]

Telephone number: [REDACTED]

Email: [REDACTED]

to develop the feeder pillar arrangement.

The Contractor shall provide the Engineer with the completed Consultation Certificate(s) in accordance with the Certification Procedure.

APPENDIX 14/4: ELECTRICAL EQUIPMENT FOR ROAD LIGHTING**1 Luminaires**

- (i) Light source to be LED for all luminaires including illuminated signs and bollards. LED colour temperature to be neutral white approximately 4000K. Colour temperature must be stable over the defined life of the lantern with variations not greater than +/-200K.
- (ii) All luminaires shall be post-top mounted on lighting columns.
- (iii) Dimmable electronic, DALI (or optional WiMAC) dimmable ballasts shall be provided in all luminaires.
- (iv) All luminaire shall have Constant Light Output (CLO) functionality activated.
- (v) All luminaires shall be group controlled by a Photo-Electric Control Units (PECU) located on the column adjacent to the feeder pillar.
- (vi) All combinations of luminaires, lamps and electronic LED drivers, shall be included in Elexon's list of approved equipment and be allocated a valid Unmetered Supplies ("UMS") charge code and should be CE marked.
- (vii) The bowl or other part of the lantern providing access to the interior of the lantern shall, when in the closed position, be firmly attached to the fixed part of the lantern. In the open position it shall be attached so that it may not become accidentally detached or blow against the fixed part of the lantern, the bracket or the column.
- (viii) LED drivers shall have a surge protection of 10kV, where possible. LED drivers shall have a minimum surge protection of 4kV.
- (ix) All new luminaires shall have an Ingress Protection rating of no less than IP 66 for the Electronic LED driver and lamp compartments.
- (x) Adjustable tilt angle (to the horizontal) shall be provided allowing a variation of between -10 and +10 degrees. This may be achieved using spigot adaptors. All LED type luminaires shall be installed at 5 degrees above the horizontal. Light output above the horizontal shall be zero when mounted horizontally. Luminaires shall have a minimum glare rating of G3 as defined in the BS13201-2:2003.
- (xi) Power factor must be clearly stated and be 0.92 or better.
- (xii) The maximum weight and windage permitted are as follows:-
 - (a) Major Traffic Routes – 21.5 kg, 0.08m²
 - (b) Minor Traffic Routes – 15.5 kg, 0.07m²
 - (c) Residential Areas – 11kg, 0.06m²
- (xiii) The luminaire shall be designed for easy installation and maintenance and shall be supplied tested and ready for installation. Minimum luminaire life L80F10 to be taken as 20 years /80,000 hours.
- (xiv) An LED system shall be deemed to be not in light if more than 10% of the individual LED's within the LED system array have failed. For LED lanterns, the manufacturer is to provide Lifetime residual flux data in accordance with IES LM-80 – TM-21.

APPENDIX 14/4: ELECTRICAL EQUIPMENT FOR ROAD LIGHTING (continued)

- (xv) All luminaires shall be fitted with 7-pin NEMA socket and a dummy NEMA socket cap (except photocell columns located closest to the feeder pillars) suitable for future Central Management System.
- (xvi) The lantern shall have a minimum guarantee life of 10 years. Guarantees shall require the replacement of items or components to be undertaken by the supplier where failures occur due to component failure or poor workmanship at no cost to the Employer or Aberdeen City Council. Any guarantees shall be transferred from the Contractor to Aberdeen City Council by novation upon completion of the Period of Maintenance.

2 Photo-Electric Control Units (PECU)

- (i) Photo-electric cell units shall be fully electronic incorporating a solid state switching circuit with zero crossover.
- (ii) The classification of the Photo Control, with reference to protection against electric shock, shall be Class 2 and IP 65.
- (iii) The Photo Controls shall comply with all European directives and regulations on Electro Magnetic interference.
- (iv) All components used in the Photo Control shall be capable of operating within the temperature range of -20°C to + 80°C.
- (v) Photo-electric cell units shall be TWO-PART UNIT – in which the photo-electric sensor and the load switching components are housed in separate enclosures. The photo-electric sensor in its housing shall be suitable for direct mounting to luminaire canopies or other equipment by means of mechanical screwed fixing.
- (vi) The cone should have a smooth finish and be shaped such that it is self-cleaning. It should be capable of sustaining the impact test set out in BS 4533 Part 101:1990 as BS 5972: 1980 refers.
- (vii) Plastic materials used in the Photo Control shall be flame retardant in accordance with BS 4533 Part 101: 1990.
- (viii) The complete Photo Control should be capable of withstanding shock and vibration as prescribed in BS 2011 Part 23.1: 1983.
- (ix) The Photo Control shall be suitable for use on 230V +10% -6% 50Hz. It shall be capable of switching a reactive lighting load of 10 Amperes. The unit shall have no thermal switching components. The average daily power consumption of the Control should not exceed 1 watt. The switching device shall be capable of performing not less than 30,000 operations at rated load under normal operating conditions.
- (x) In no part of the Control shall material capable of deforming as a result of the working environment be sandwiched between electrical connections.

APPENDIX 14/4: ELECTRICAL EQUIPMENT FOR ROAD LIGHTING (continued)

- (xi) The sensor shall be either Photo Diode or Photo Transistor and have an MTBF (mean time between failures) of at least 1 million hours and will be fitted with an optical filter spectrally matched to the CIE photopic curve.
- (xii) Calibration of the unit shall be carried out to provide levels 35 Lux ON and 18 Lux OFF to a measuring accuracy of +/-5% in artificial light. The set switching level shall be maintained over the guaranteed life of the control.
- (xiii) A minimum time delay of 20 seconds shall be incorporated into PECU switch operation to prevent spurious operation due to transient effects such as vehicle headlights etc.
- (xiv) PECU should be designed (in so far as is practicable) to fail in the 'ON' mode to comply with the Directives of the Department of Transport.
- (xv) The Supplier will be required to guarantee all controls electrically, mechanically and photometrically for a period of 12 years. Guarantees shall require the replacement of items or components to be undertaken by the supplier where failures occur due to component failure or poor workmanship at no cost to the Employer or Aberdeen City Council. Any guarantees shall be transferred from the Contractor to Aberdeen City Council by novation upon completion of the Period of Maintenance.
- (xvi) All PECU's shall indicate the year and month of manufacture and incorporate a simple method of recording the date of installation by the Contractor.
- (xvii) PECU's shall have been subjected to tests whilst loaded with 3 x 400 watt road lighting luminaries including a minimum power factor correction capacitance of 136 μ F (line to neutral) to verify that the unit can switch this load for a minimum of 30,000 cycles.

3 Cut – outs

- (i) All road lighting and sign column cut-outs shall comply with BS7654. The cut-out manufacturer shall be accredited to ISO 9002 by an accredited certification body.
- (ii) All single phase road lighting cut-outs shall be double-pole ensuring both phase and neutral are broken by the removal of the fuse carrier. An earth terminal shall be provided within the cut-out enclosure. The continuity of the earth path shall not be broken by the removal of the cut-out fuse carrier.
- (iii) The cut-out gland plates shall be an integral part of the cut-out and be capable of terminating XLPE or MDPE / PVC / SWA / PVC cables up to 25 mm² and have the capacity for looping in-out. The brass gland plate shall typically accommodate up to three cables. Additional armoured cable termination, cut-out capacity and isolation devices shall be provided at multi-headed columns and at locations where spur supplies are provided.
- (iv) Cut – out shall be specified in accordance with Section 11.0 "Specification for Underground Cable Termination Cut - Outs – ABDN Type 1" and / or "Specification for Underground Cable Termination Cut - Outs – ABDN Type 2" of Aberdeen City Council's "C, H & I – Roads Operation, Street Lighting".

APPENDIX 14/4: ELECTRICAL EQUIPMENT FOR ROAD LIGHTING (continued)

4 Feeder Pillars

(i) The Contractor shall consult and comply with the requirements of

(a) Aberdeen City Council

Contact person: [REDACTED]

Telephone number: [REDACTED]

Email: [REDACTED]

in connection with the feeder pillar specification.

The Contractor shall provide the Engineer with the completed Consultation Certificate(s) in accordance with the Certification Procedure.

(ii) The feeder pillar shall have 7 SPN way BS88 HRC fuse board. Except for the photocell circuit and adjacent (Control) column with the photocell fitted are to be fitted with a Type C MCB.

(iii) The panel shall be suitable for use on a 240V 1Ph 50Hz supply and have 5No. BS88 fuse carriers for outgoing circuit protection, 1No. 6 Amp MCB for protecting the control pole circuit and a 6A MCB protecting the PECU and contactor coils. MCB/ Fuse carriers are to be raised through the pillar door sufficiently so as to provide a minimal clearance of 21mm to allow for the fitment of lockout devices on the MCB/ fuse carriers. PECU MCB to be clearly marked.

(iv) Back feeds shall be considered to allow for temporary power of adjacent faulty circuits.

(v) Feeder Pillars shall be specified in accordance with Contract Drawing B1557630/CD/SD/L1.

5 Wiring

(i) All new road lighting installations shall be wired in XLPE or MDPE / PVC / SWA / PVC cables.

(ii) The size of cable shall be 3 core in the range 2.5, 6.0, 10.0 and 16.0 mm². Cable sheaths shall have meterage marked at 1 metre intervals along their total length.

(iii) All new traffic signs and bollard installations shall be wired in XLPE or MDPE / PVC / SWA / PVC cables. The size of cable shall be 2.5mm sq. 3 core.

(iv) The cable shall have BASEC or HAR approval in all respects other than the over sheath colour which shall be PURPLE.

(v) Internal wiring of the lighting unit shall be blue sheathed artic grade PVC 5 core, flexible cable 1.5mm².

(vi) The insulation layer shall be brown for the phase conductor and blue for the neutral conductor. The sheath layer shall be blue. The circuit protective

APPENDIX 14/4: ELECTRICAL EQUIPMENT FOR ROAD LIGHTING (continued)

conductor shall be 1.5mm² PVC insulated and core colour should be green/yellow.

- (vii) Cables shall not be subjected to an internal bending radius of less than 12 times the external diameter of the cable or less than the radius recommended by the manufacturer, whichever is greater.
- (viii) All cable sheathing shall be Chlorine Free.

APPENDIX 14/4: ELECTRICAL EQUIPMENT FOR ROAD LIGHTING (continued)

6 Earthing

- (i) An earth rod shall be installed at each control pillar, complete with rod, inspection pit and cover. The connection between the earth rod and the pillar shall be made with an earth cable of no less than 16 mm² in diameter with resistance to ground of 20 ohms or less.
- (ii) An earth rod shall be connected to the last or penultimate column for each circuit.
- (iii) Earth bonding connectors shall be of a braided flexible copper wire and be equivalent to a cable cross section 10mm² and be sleeved in a green/ yellow insulating material. The length should be approx. 500mm and a 10mm² copper tube lug, 10mm stud hole is to be fitted at each end.

7 Underground Ducting and Cabling

- (i) All new road lighting cabling for supply to lighting columns shall be installed in not less than two purple UPVC walled high density polypropylene with smooth bore of 100 millimetres internal diameter to BS EN 50086-2-4 in verges. All ducts will be imprinted with the words "STREET LIGHTING" at intervals of not more than one metre throughout their length.
- (ii) The ducting shall be laid in such a manner to:
 - (a) Prevent the cable from being subjected to the bending radius described in 5(vii) of this section; and
 - (b) Prevent the duct alignment, where it differs from the trench, from exceeding a 1:30 transition from the vertical or horizontal.
- (iii) All new road crossings for lighting cables shall consist of not less than four UPVC walled high density polypropylene ducts. The ducts shall have a minimum cover of 750mm and shall be protected by a concrete surround of mix ST2 concrete to BS8500-2. All ducts shall be smooth bore, 100mm internal diameter to BS EN 50086-2-4 to facilitate the crossing of the carriageway. The purple ducts shall be imprinted with the words "STREET LIGHTING" at intervals of not more than one metre throughout their length.
- (iv) Ducts shall be impervious to water, capable of being laid in temperature down to -10 degrees Celsius and be sufficiently flexible to follow undulation in a trench bottom.
- (v) At least 75mm clearance shall be given between the cable duct and the sides of the trench and between ducts sharing the same trench.
- (vi) Unless agreed otherwise with the Engineer, at least 150mm clearance shall be given between cable ducts and services pipes belonging to Statutory Undertakers. At least 500mm minimum between lighting electrical cable ducts and communications cable ducts.
- (vii) Trenches in verges and trenches crossing below the carriageways shall be 600mm wide and not more than 1.5m deep for the laying of ducts.
- (viii) All ducting shall be Chlorine Free polyethylene.

APPENDIX 14/4: ELECTRICAL EQUIPMENT FOR ROAD LIGHTING (continued)

- (ix) 450mm by 450mm polypropylene preformed twin-wall modular distribution chambers shall be used at road crossings with a distribution chamber located in each verge with a minimum of four 100mm minimum internal diameter ducts running between chambers. Chambers covers shall be heavy duty D400 covers in accordance with the requirements of BS EN 124 (Gully tops and manhole tops for vehicular and pedestrian areas. Design requirements, type testing, marking, quality control).
- (x) The location of all distribution chambers and ducts shall be recorded on as-built drawings with an accuracy of +/-100mm. Location measurements shall be taken from the nearest edge of the carriageway or fence line.
- (xi) Under no circumstances shall cables enter a column, post, bollard or pillar base without the protection of ducting. Such ducts shall continue into the base and terminate at a suitable height to allow a seal to be formed using expanding foam sealant or similar.
- (xii) Ducts shall be jointed in such a manner as to preclude ingress of solid material. All cables and ducts shall have a suitable marker tape laid directly above them at a position 150mm below ground.
- (xiii) The Contractor shall consult and comply with the requirements of
- (a) Aberdeen City Council
- | | |
|-------------------|------------|
| Contact person: | [REDACTED] |
| Telephone number: | [REDACTED] |
| Email: | [REDACTED] |

in connection with the specification of service ducts.

The Contractor shall provide the Engineer with the completed Consultation Certificate(s) in accordance with the Certification Procedure.

APPENDIX 14/5: ELECTRICAL EQUIPMENT FOR TRAFFIC SIGNS

- (i) All new lit bollards shall be internally illuminated by LEDs with a galvanised steel base lit arrangement and a minimum Ingress Protection rating of IP67, in accordance with BS EN 12899.
- (ii) All bollard external fastenings shall be manufactured from stainless steel.
- (iii) Illuminated signs shall have a mean luminance in accordance with the requirements of BS EN 12899.
- (iv) Illuminated Traffic Sign luminaires shall use LED type lanterns complete with associated electronic LED drivers.
- (v) All electrical works for new installations shall comply with the latest edition of BS 7671 IEE Wiring Regulations, including updates, and the Electricity at work Regulations 1989.
- (vi) The electrical installation shall be tested in accordance with the latest edition of BS 7671 IEE Wiring Regulations, including updates.
- (vii) Lighting of signs shall be as prescribed in the Traffic Signs Regulations and General Directions.
- (viii) The luminaires shall be designed for easy installation and maintenance and shall be supplied tested in accordance with BS 4533-102.1 and BS 60598-1 and ready for installation.
- (ix) All illuminated sign lanterns shall be supplied with an electronic Dali driver (or optional WIMAC), a 7-PIN NEMA socket fitted with a mini PECU.
- (x) The lantern body shall be IP rated to IP54 and the electronic driver shall be IP rated to IP67.
- (xi) Sign posts shall be equipped with a fused lockable double pole isolator. Fuse holders and carriers shall be complete with HRC fuses to BS EN 60269. Terminal shields shall be fitted to prevent accidental contact with any conductors. HRC fuses shall be to BS 88. Cut-outs shall be sized to accommodate the cables specified.
- (xii) All combinations of luminaires, lamps and electronic LED drivers, shall be included in Elexon's list of approved equipment and be allocated a valid Unmetered Supplies ("UMS") charge code and should be CE marked.

APPENDIX 25/4: ENVIRONMENTAL BARRIERS

**Sub-
Clause
Ref.**

Design

The Contractor shall design the environmental barriers listed in Part 2 of the Employers Requirements.

The Contractor shall design foundations, posts and/or other supports. The Contractor shall submit his design to the Overseeing Organisation for aesthetic approval.

Posts shall be spaced at maximum 3 m centres.

Stepping of panels shall only be permitted with the agreement of the Engineer.

The Contractor shall erect 2 sample panels of barrier not less than 6 weeks before starting construction. One section shall show the horizontal elevation, the other a sloping elevation. The sample panels shall be used as the standard which must be maintained throughout the Contract.

Landscape and ecology Works shall comply with this Series and the associated quality management schemes detailed in Appendix 1/24.

Additional sub-Clause The design shall comply with the requirements of HA 65/94, HA 66/95, BD 2/12, BS EN 1990: 2002 + A1: 2005, BS EN 1991-1-1: 2002, BS EN 1992-1-1: 2004, BS EN 1991-1-4: 2005 + A1: 2010 and the associated National Annexes. Environmental barriers less than 3m high shall be designated as Category 0 structures in accordance with BD 2/12. Environmental barriers 3m or more in height shall be designated as Category 1 structures in accordance with BD 2/12.

Additional sub-Clause The environmental barriers shall be designed to have a minimum maintenance-free life of 20 years.

Testing of Acoustic Performance

2040.16 The complete form of construction proposed for an environmental barrier shall have been tested, by an appropriate organisation accredited in accordance with sub-Clauses 105.3 and 105.4, for acoustic testing in accordance with BS EN 1793.

Additional sub-Clause Environmental barriers shall be CE marked in accordance with the Construction Products Regulations. Such barrier must have performance characteristics declared in Table ZA.1.1 of BS EN 14388: 2015.

APPENDIX 25/4: ENVIRONMENTAL BARRIERS (continued)

Insulation Requirements

- 2040.17 The minimum noise insulation category required for each barrier, under BS 1793-2, is B3.

Absorption Requirements

- 2040.18 The minimum noise absorption category required for each barrier, under BS 1793-1, is A3.

APPENDIX 30/1: GENERAL

**Sub-
Clause
Ref.****3001.2 Notice and Liaison**

- (i) The Contractor shall give 48 hours notice to the Engineer prior to commencing any of the operations listed under sub clause 3001.2. The Contractor shall give 7 working days notice to the Engineer prior to commencing the following;
- Vegetation clearance and tree removal
 - Watering
 - Works to Waterbodies
 - Setting out of planting plots, seeding areas and individual plant stations for all plants
 - Preparation of planting pits prior to backfilling
 - Arrival of compost, topsoil, soil additives and soil ameliorants on site
 - Arrival of plants on site; and
Each visit during the Period of Establishment Maintenance
Replacement planting and defects checks
- (ii) The Contractor shall liaise with other landowners directly only after obtaining the agreement in writing of the Engineer.

Landscape and ecology Works shall comply with this Series and the associated quality management schemes detailed in Appendix 1/24.

3001.3 Peat

Peat and peat based products shall not be used except with the written agreement of the Engineer.

APPENDIX 30/1: GENERAL (continued)

**Sub-
Clause**

APPENDIX 30/1: GENERAL (continued)

3001.13 Pesticide Application

Pesticides record forms in accordance with the template attached, detailing information as required in sub-clause 3001.12, shall be submitted to the Engineer on a monthly basis during the construction works and immediately after each application during the Period of Establishment Maintenance.

In addition to the requirements of specification sub-Clauses 3001.4 to 13, the chemical(s) used shall be selected at the discretion of and at the sole risk of the Contractor having due regard to the location, site soil and vegetation type; public access, nature conservation interests, the season and the species. The Contractor's attention is specifically drawn to the Control of Substances Hazardous to Health Legislation (COSHH). All chemicals for use on horticultural works shall be non-toxic to human beings, birds and animals under normal use and, in the vicinity of watercourses, shall be non-toxic to aquatic organisms.

Application of herbicides etc shall be by persons qualified in accordance with statutory requirements relevant to their use, and trained to the appropriate National Proficiency Test Council Standard (N.P.T.C.) or similar certified accordingly.

The minimum standard for persons using herbicides shall be N.P.T.C/ group 6A – Hand held applicators. For vehicle mounted spraying the minimum standard shall be N.P.T.C. Group 2A.

3001.14 Bird Nesting Season

Damaging or destroying the nest of any wild bird (whilst being built or in use) is an offence under the Wildlife and Countryside Act 1981. Therefore any clearance or felling of vegetation, in which birds could nest, should be undertaken outside the breeding season. The bird nesting period for the Contract shall be from March to August inclusive, unless otherwise agreed in writing with SNH.

Should the Contractor require to undertake any works during the breeding season, the Contractor shall be responsible for undertaking all necessary ecological surveys, watching briefs to determine the presence or otherwise of nesting birds. Only when the required surveys demonstrate the absence of nesting birds, and approval from the Engineer has been confirmed, can the works proceed and in doing so shall take full cognisance of any special measures identified within the ecological surveys.

3001.15 Inspection Reports

Inspection reports shall be prepared in accordance with the template attached by the Contractor's landscape architect and shall be submitted to the Engineer at the following intervals:

- (i) In the case of activities carried out under Clause 3007 and 3010 once per year.
- (ii) In the case of activities carried out under Clause 3009:
 - a) Six times per year in the first year of the Period of Establishment Maintenance;
 - b) Four times per year in the second year of the Period of Establishment Maintenance; and
 - c) Three times per year for the remainder of the Period of Establishment Maintenance.

APPENDIX 30/1: GENERAL (continued)

LANDSCAPE WORKS – PESTICIDE RECORD

Contract Reference number:		Date of visit : (minimum one record per day)
Contract Name:		
Name of Contractor:		
Contractor's telephone no:		
Operations carried out		
Pesticide used		
Location of operation		
Total weed control		
Selective herbicide		
Weed control in vicinity of any burn, ditch, or open water		
Weed control around planting		
Weed control to cultivated beds		
Other		
Names of operatives on site:		Qualifications of operatives:
Supervisor		
Storeman		
Application by:		
Signed for Contractor		
Contractor's observations on damage or any other incidents:		

APPENDIX 30/1: GENERAL (continued)

LANDSCAPE WORKS – INSPECTION REPORT	
Contract Reference number:	Date of visit : (minimum one record per day)
Contract Name:	
Name of Contractor:	
Contractor's telephone no:	
Operations carried out:	
Location of operation:	
Names of operatives on site:	Qualifications of operatives:
Contractor's observations on damage or any other incidents:	
This maintenance visit has been satisfactorily completed.	
SIGNED (for Contractor)	
NAME (Block Capitals)	DATE.
SIGNED (For Engineer)	
NAME: (Block Capitals)	DATE

APPENDIX 30/1: GENERAL (continued)

APPENDIX 30/2: WEED CONTROL

**Sub-
Clause****3002.1 General**

Weed control for all injurious weed species and Invasive Non Native Species including those listed in sub-Clause 3002.1 with the addition of Oil Seed Rape and Rhododendron shall be carried out from the start of the Works until the end of the Period of Establishment Maintenance at sufficient frequency to eliminate them and prevent their spread.

In locations where effective weed control shall be possible and practicable by other means allowed within the Contract there shall be a presumption against the use of chemical herbicides.

3002.3 Total Weed Control

Herbicides for total weed control shall be applied during the growing season at a frequency to ensure full control of weeds from the start of the Works to the end of the Period of Establishment Maintenance to the following locations:

- (i) All paved areas and hardstandings, filter drains and gravel areas including but not limited to gravelled central reservations; and
- (ii) As otherwise instructed.

The Contractor shall apply herbicides at sufficient frequency to eliminate weed growth from the start of the Works until the end of the Period of Establishment Maintenance. No less than two applications shall be made each year.

3002.4 Total weed control by a non-residual translocated herbicide shall apply to the following locations:

- (i) All areas prior to seeding or planting;
- (ii) All stockpiles of topsoil; and
- (iii) A 500mm radius around each plant station where trees are planted with grassed areas and a 250mm radius around each plant station for hedge plants.

Application shall be frequent enough to keep the plant circles weed free, prior to Completion and thereafter, throughout the Period of Establishment Maintenance.

A suitable period of time, as recommended by the herbicide manufacturer, shall be allowed to elapse between herbicide application and planting or seeding/turfing operations.

3002.5 A translocated herbicide approved by the Scottish Environment Protection Agency (SEPA) or their successors for use in or near water shall be used for weed control in all open ditches, lagoons, watercourses and filter drains. All use of herbicides in or near water shall be subject to SEPA's approval which shall be obtained through submission of a Non-Aerial Herbicide use in or Near Water: Application Form. Control shall be at sufficient frequency to eliminate weed growth throughout the Works until the end of the Period of Establishment Maintenance.

APPENDIX 30/2: WEED CONTROL (Continued)

**Sub-
Clause**

3002.6

Selective Weed Control in Grass

Selective weed control using translocated herbicide shall be applied in all non-hardened verges, central reserves, planted areas and other grassed areas.

Operations shall be carried out 3 times per year in March, April and June from the start of the Works until the end of the Period of Establishment Maintenance and additionally when necessary to restrict growth and prevent the spread of broadleaf weed species as directed by the Engineer. Treatments shall be during periods of active growth.

Selective weed control shall not be used on newly seeded areas within 6 months after sowing depending on the season of seeding and the herbicide manufacturer's recommendations.

3002.7

Weed Control by Spot Application of Herbicide

Weed control by spot application of translocated herbicide shall be undertaken as necessary to control weed species listed in Sub Clause 3002.1, and in any case no less than twice a year during periods of active growth throughout the Works until the end of the Period of Establishment Maintenance at the following locations:

- (i) For control of injurious weeds in grass and wildflower areas;
- (ii) All woodland and planted areas;
- (iii) All hedge planting areas; and
- (iv) As otherwise instructed.

Spot treatment shall typically be via controlled droplet application of a type appropriate to the herbicide, the species being treated and the location.

Herbicides shall not be used on newly seeded areas for 4 to 6 months after sowing depending on the season of seeding and the herbicide manufacturers' recommendations.

A combination of spot treatment and hand weeding may be required to control all weeds listed in Clause 3002.1 and infestations of annual, biannual and perennial weeds. Spraying shall be at the appropriate time of year and growth development of the plant species to be targeted when plants are actively growing throughout the year.

APPENDIX 30/2: WEED CONTROL (Continued)

**Sub-
Clause****3002.8 Weed Control by Pulling/Hand weeding**

Weed control by hand weeding shall be carried out as necessary, and in any case no less than twice a year throughout the Works until the end of the Period of Establishment Maintenance at the following locations:

- (i) All woodland and other planting areas where herbicide application may cause damage;
- (ii) Hedge planting where spot application may cause damage;
- (iii) Wildflower areas and areas densely populated with desirable broadleaf species where spot application may cause damage;
- (iv) Within plant protectors and tree/shrub shelters;
- (v) Around planting stations in existing woodland; and
- (vi) Where necessary throughout the Site for the elimination of Ragwort and Oil Seed Rape.

3002.9 Weed Control by Cutting

The Contractor shall carry out weed control by cutting as necessary in areas where the extent of growth or type of weed cannot be effectively controlled by herbicide application or hand weeding and in newly seeded grass areas where the grass is too young for herbicide application.

3002.10 Arisings from Weed Control Operations

The Contractor shall remove all arisings in accordance with sub-clause 3002.10 from weed control operations that involve hand weeding and cutting. Following weed control by herbicide the Contractor shall refer to the manufacturer's instructions for the period of time for removal of dead weeds following herbicide application.

APPENDIX 30/3: CONTROL OF RABBITS AND DEER
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**Sub-
Clause****3003.1 General**

The Contractor shall carry out rabbit, hare and deer control as necessary to ensure successful establishment of all planting and seeding areas for the duration of the Works until the end of the Period of Establishment Maintenance. Control shall include preventing the establishment of rabbit warrens and damage to existing retained vegetation and grass.

Any existing warrens or rabbit burrows within any planting areas shall be cleared of rabbits and the entry/exit holes effectively blocked prior to any planting taking place.

All individual guards and shelters shall be maintained as an effective rabbit and hare proof barrier, for the duration of the Works until the end of the Period of Establishment Maintenance.

3003.5 Control Operations

Brambles and herbage that interfere with the control of rabbits shall be cut and the arisings dealt with in accordance with sub-Clauses 3010.3 and 3010.4. The arisings shall be used to form habitat piles in locations within the site where they are not likely to become visually intrusive or interfere with access or maintenance.

3003.6 Initial clearance and thereafter effective control of rabbit infestations shall be undertaken within the Site.

3003.8 Rabbit Control within the Site Boundary

The Contractor shall ensure effective rabbit control during the Works and for the entire duration of the Period of Establishment Maintenance and shall be responsible for contacting adjacent landowners regarding their obligation to control infestations on their own land.

The Contractor shall carry out regular site inspections to ensure effective control of rabbits for all areas of the site from the start of Works on site until the end of the Period of Establishment Maintenance.

3003.9 The Contractor shall undertake an inspection of the site accompanied by representative of the Engineer at monthly intervals to ensure effective control has been achieved.

3003.10 Clearance Of Rabbits And Deer Within Planted Areas If Deemed Necessary Once Operations Have Started On Site

Any rabbit burrows located within fenced enclosures for planting shall be cleared of all rabbits and all entry/exit holes effectively blocked immediately after completing the fencing of each enclosure.

APPENDIX 30/3: CONTROL OF RABBITS AND DEER (continued)
--

**Sub-
Clause**

3003.11 The Contractor shall not plant any area until all rabbits, hares and deer have been cleared from any fenced enclosure.

The Contractor shall maintain planting enclosures free of rabbits and burrows including exit/entry holes, and deer for the Period of Establishment Maintenance.

3003.12 **Clearance of Rabbits and Deer in Fenced Areas to be Planted**

The Contractor shall keep planting enclosures free of rabbits, rabbit burrows including exit/entry holes and deer until the end of the Period of Establishment Maintenance.

3003.13 The Contractor shall replace all damaged plants on a like-for-like basis during the Contract period and maintain them for the entire duration of the Period of Establishment Maintenance.

APPENDIX 30/4: GROUND PREPARATION

Sub-Clause

3004.1

Vegetation Clearance

Grasses and other herbaceous vegetation on all areas to be planted or seeded (except where noxious weeds are to be treated) shall be cut in accordance with sub-Clause 3002.9 to a height between 50 mm and 75 mm and the arisings removed off site.

3004.2

The Contractor shall apply a non-residual translocated herbicide in accordance with sub-Clause 3002.4 to all areas to be planted or seeded (with the exception of areas in existing woodland and other planted areas) between 21-25 days prior to planting.

At feathered, standard, heavy standard and extra heavy standard tree planting stations all existing grass and herbaceous vegetation shall be cut to the full extent of the area required to be excavated for planting pits prior to excavation of the pits.

3004.5

Sub Soil Treatments

Subsoil in planting areas within areas of undisturbed ground, shall be ripped to a minimum depth of 450 millimetres prior to spreading of topsoil.

3004.6

A conventional subsoiler shall be used (not winged) with tines at 600mm spacing.

3004.7

Final Preparation of Soils

The requirements of sub-clauses 3004.8 - 3004.11 shall apply to all subsoil to be seeded or topsoil spread, including all planting and seeding/turfing areas, all other existing soiled areas to be seeded/turfed or planted that have been damaged by the Works and any areas to be reinstated, except where otherwise stated in Appendix 30/4.

APPENDIX 30/4: GROUND PREPARATION (Continued)

**Sub-
Clause**

3004.8 All undesirable material brought to the surface including, but not limited to, stones, roots, tufts of grass and foreign matter larger than the sizes specified below shall be removed off Site unless otherwise agreed with the Engineer. The size of the stones / debris which shall be removed relates to the proposed vegetation type. The maximum stone / debris size permitted for each, is as follows :

- (i) Grass verges, visibility splays and all other grassland areas: 25 millimetre protruding stone after topsoil has been firmed / rolled;
- (ii) Planted areas: 50 millimetres.

The above stone removal shall apply to the full depth of topsoil required for the proposed vegetation cover. The overall stone content by percentage volume shall not be greater than that of the adjacent soils.

All inorganic foreign matter shall be removed off the site unless otherwise agreed in writing by the Engineer.

3004.10 Delete sub-clause 10 and insert:

Finished levels of material after settlement shall be:

- (i) as shown on the Drawings adjoining pavings, kerbs or grass areas;
- (ii) not less than 150 mm below damp proof course of adjoining buildings;
and
- (iii) at the same level as adjoining soil areas.

APPENDIX 30/5: GRASS SEEDING, WILDFLOWER SEEDING AND TURFING**Sub-
Clause****3005.1 Season**

Subject to suitable weather conditions grass seed shall be sown during the periods 1 March to 31 May or 1 September to 31 October when the soil is moist and workable and as agreed with the Engineer. Seeding shall be undertaken in the first available season as soon as soil preparations have been completed.

The Contractor shall ensure grass seeding operations are undertaken at the optimum time when soils are warm enough to allow the seed to germinate i.e. when the soil temperature is above 4 degrees.

Wildflower seed shall be sown in early spring or autumn at the same time as grass or as otherwise recommended by the supplier.

3005.2 Final Cultivations

All areas to be seeded or turfed shall be cultivated as per sub-clause 3005.2. A 250 millimetre radius shall be left clear of cultivation and seeding around each new tree and shrub. Cultivations shall extend into adjacent grass areas to ensure full marrying in of levels.

Final cultivations of soils shall be during dry conditions.

3005.3 All areas to be seeded with general purpose grass shall have fertiliser and or other soil ameliorants incorporated into the upper 50 millimetre of soil at a rate(s) considered necessary for successful establishment. The rate of application and composition of fertilizer and other ameliorants shall be based upon the topsoil test results (as per Appendix 1/5).

No fertiliser or soil ameliorants shall be applied to areas to be seeded with wildflower (species-rich) grassland.

3005.4 Seed

Grass seed mixes shall be to the written approval of the Engineer and Aberdeen City Council and shall be as follows:

Verge and General Purpose Grass Mix

A General Purpose Grass seed mix shall be used in road verges, embankments and cuttings and where other grassland is required. The seed mix(es) shall provide a rapidly establishing hard wearing sward to provide a neat tidy appearance.

APPENDIX 30/5: GRASS SEEDING, WILDFLOWER SEEDING AND TURFING (Continued)

Species-Rich Grass Mix

The following wildflower seed mix shall be applied to all proposed species-rich grassland areas.

Latin Name	Common Name	% Mix
Wildflowers (20%)		
Achillea millefolium	Yarrow	1
Centaurea nigra	Common Knapweed	1
Cerastium fontanum	Common Mouse-ear	1
Galium verum	Lady's Bedstraw	2
Lathyrus pratensis	Meadow Vetchling	0.5
Leucanthemum vulgare	Ox-eye Daisy	2
Lotus corniculatus	Birdsfoot Trefoil	0.5
Pimpinella saxifraga	Burnet Saxifrage	0.2
Plantago lanceolata	Ribwort Plantain	2
Primula veris	Cowslip	0.1
Prunella vulgaris	Selfheal	2
Ranunculus acris	Meadow Buttercup	2.5
Rhinanthus minor	Yellow Rattle	1.2
Rumex acetosa	Common Sorrel	1.5
Scorzoneroide autumnalis	Autumn Hawkbit	0.5
Succisa pratensis	Devils-bit Scabious	0.5
Vicia cracca	Tufted Vetch	1.5
Grasses (80%)		
Agrostis capillaris	Common Bent (c)	8
Alopecurus pratensis	Meadow Foxtail (c)	3
Anthoxanthum odoratum	Sweet Vernal Grass	5
Cynosurus cristatus	Crested Dog's Tail (c)	12
Festuca rubra ssp. commutata	Chewings Fescue (c)	35
Poa pratensis	Smooth-stalked Meadow Grass (c)	17

Additional Clause

All grass seed shall have a certified germination of not less than 90% and a certificate of purity of not less than 90%. Total weed seed and other crop seed content shall be not more than 1%. All grass seed shall be from an approved source and true to name and be noted as not intended for fodder production in the UK National List latest edition. All seed is to be delivered to site in the supplier's original bags, unopened. A label shall be attached to each bag giving details of species and percentage breakdown. The same details shall be enclosed within each bag. Each bag shall be numbered uniquely and relate to the label and documents within the bag. The documents shall be submitted to the Engineer prior to sowing.

The Contractor shall provide fresh seed for each season throughout the Contract period. Grass seed shall be stored in dry and vermin proof conditions.

APPENDIX 30/5: GRASS SEEDING, WILDFLOWER SEEDING AND TURFING (Continued)

3005.6 A supplier's certificate giving the composition, purity, germination year of harvest and country of origin of the individual grasses in any seed mixture shall be submitted to the Engineer a minimum of two weeks before sowing is due to take place. Seed which is vermin damaged or not to specification or certificate shall be rejected and the Contractor shall, at their own expense, replace such seed with an equivalent quantity which shall be inspected and approved by the Engineer. The seed mixture shall meet the requirements for germination and purity laid down in BS 4428:1989 Section 5.1

3005.7 Wildflower seed shall be of UK native origin and where possible from Local UK Provenance Zones 202 as defined in Figure 1 of Forestry Commission Practice Note 8: Using Local Stock for Planting Native Trees and Shrubs (August 1999).

The Contractor shall complete and submit to the Engineer a wildflower seed Provenance Certificate in accordance with the Certification Procedure.

Local provenance seed shall be supplied by either harvesting from the approved sites or from nursery propagation to the approval of Scottish Natural Heritage. If nursery propagated seed is used the Contractor shall allow sufficient time in their programme to ensure that the seed is available when required for sowing.

All wildflower seed shall be tested by an independent organisation such as the Scottish Agricultural Science Agency (SASA) to verify purity of seed (percentage of seed / inert material), species composition, and percentage germination. The test certificates shall be made available to the Engineer for consent prior to sowing.

The wildflower seed mixes shall contain a minimum percentage of:

- i) 95% pure seed, not inert material (% by weight); and
- ii) a percentage of flora rather than grass seed species which matches the percentage of flora species in the surrounding plant communities of greatest nature conservation value.

Seeds within the wildflower seed mixes shall have a minimum germination rate of 80%.

3005.8 **Conventional Sowing**

Sowing of seed shall be carried out at the rate specified below or in accordance with the supplier's recommendations if different:

Verge and General Purpose Grass seed shall be sown at a rate of not less than 20g/m² for verges, side slopes of cuttings and embankments and all other grass areas not sown with species rich grassland.

Species-rich grassland areas shall be sown at a rate of not less than 5g/m². The sowing of seed shall be carried out as soon as practicable in order to benefit soils stabilisation.

Approval shall be sought from the Engineer where alternative sowing rates are proposed, in advance of any seeding operations commencing.

APPENDIX 30/5: GRASS SEEDING, WILDFLOWER SEEDING AND TURFING (Continued)

- 3005.10 **Hydraulic Seeding**
Hydraulic seeding shall be applied only subject to the agreement of the Engineer, in areas which cannot be practicably broadcast seeded by hand or mechanical means. The seed mixes for hydraulic seeding shall be as per conventional sowing. The rate of application of grass seed for hydraulic seeding shall be the same as for hand or broadcast seeding unless otherwise agreed with the Engineer. The other ingredients in the hydraulic mixture shall be as recommended by the specialist hydroseeding sub-contractor and agreed with the Engineer.
- The Contractor shall be responsible for arranging access to water and any other licences, which may be required.
- Turf**
- 3005.14 Any turf imported shall comply with sub-clause 3005.14 and shall contain a grass and/or herb mixture which reflects adjacent and surrounding grassland communities.
- 3005.25 Turf on slopes greater than 1 in 4 shall be secured using either galvanised wire pins or softwood pegs as per sub-clause 3005.25.
- 3005.26 Newly laid turf laid shall be watered as per sub-clause 3005.26.

APPENDIX 30/5: GRASS SEEDING, WILDFLOWER SEEDING AND TURFING (Continued)

3005.29 Establishment Cuts

Verge and General Purpose Grass shall be cut to 20mm height each time the sward has reached 50mm height. A minimum of two establishment cuts shall be undertaken, with further cuts as necessary to achieve coverage as stated in sub-clause 3005.11 and one cut subsequent to the required sward coverage being achieved.

There shall be no establishment cut for Species-Rich grassland.

A list of machinery and plant proposed to be used by the Contractor for mowing shall be submitted to the Engineer for approval prior to commencing cutting on site.

Additional
Sub-
clause

Humps or depressions appearing after sowing of grass seed shall be levelled or filled with new topsoil and re-seeded using the relevant seed mixture listed in 3005.4 above.

3005.30 All General Purpose Grass areas shall be left clear of grass clippings following each mowing by raking or other suitable method except where grass height is less than 200mm at the time of cutting in which case grass cuttings may be left in situ.

APPENDIX 30/6 PLANTING

Plants

3006. Plant stock and sizes shall be as Tables 30/6.1, 30/6.2, 30/6.3 and 30/6.4.
 03 Species, varieties and plant spacings shall be in accordance with the Indicative Landscape Design drawings.

Table 30/6.1 Specimen Trees

Type	Girth at 1 metre Above Ground Level (centimetres)	Clear Stems from Ground Level (metres)	Minimum Height from Ground Level (metres)	Maximum Height from Ground Level (metres)
Extra heavy standard	14-20	1.8	4.25	6.0
Heavy standard	12-14	1.8	3.5	4.25
Standard	8-10	1.75	2.5	3.0
Large rootballed specimens	-	-	1.5	1.75
Large conifers – rootballed	-	-	1.5	1.75

Table 30/6.2 Trees - Feathered, Transplants and Container Grown Stock

Type	Minimum Age	Minimum Height Above Ground Level	Minimum Container Size
Transplants whips (broadleaves only)	2+1 years	450 millimetres	-
Transplant in tree shelters (broadleaves only)	1+1 years	400 millimetres	-
Container grown evergreens	2+1years	600 millimetres Holly to be cut back to 200 millimetres immediately prior to delivery	2 litres
Feathered Trees	as B.S.	1.5-2.5 metres	-

APPENDIX 30/6: PLANTING (Continued)

Table 30/6.3: Cell Grown Stock

Type	Approximate Height (millimetres)	Minimum Cell Volume (ml)	Minimum Root Collar Diameter (millimetres)
Conifers	200-400	150	5
	200-400	350	8
Broadleaves	400-600	150	6
	400-750	350	8
Holly	200-400	150	7
Shrubs	200-400	150	5

At least 25% of plants shall be supplied in the larger size range. Plants in 350ml cells shall not be more than 3 years old. All other plants shall not be more than 2 years old.

Table 30/6.4 Shrubs, Conifers, Hedge Plants, Climbers and Ground Cover Plants

Type	Minimum Age	Column A Acceptable Height	Column B Minimum Height for Small/Slow Growing Plants not Readily Available to Sizes Shown in Column A
Bare root/Hedge plants	2+1 years	400-600 millimetres	-
Transplants	1+1years	400-600 millimetres	-
Container grown shrubs and conifers	2+1 years	450-600 millimetres	300-450 millimetres
Container grown climbers	3 years	600-900 millimetres	400-600 millimetres
Ground cover plants	3 years	300-450 millimetres	150-200 millimetres
Rooted Cuttings	2years	400-600 millimetres	

APPENDIX 30/6: PLANTING (Continued)

**Sub-
Clause**

Additional sub-
clause All native species plants shall be sourced of British Origin and from the Local UK Provenance Zone 202 or 203 as defined by Forestry Commission Practice Note 8: Using Local Stock for Planting Native Trees and Shrubs (August 1999), subject to availability. All plants shall be obtained from a Horticultural Trades Association (HTA) accredited nursery in the Nursery Certification Scheme. The Provenance Certificate pro-forma supplied in Part 3 of the Employer's Requirements.

The Contractor shall provide written confirmation that the United Kingdom native plant species of trees, shrubs climbers and wildflower (seeds and plants) have been sourced from the highest available preference for selecting native seed sources. This confirmation, which shall be provided prior to the commencement of the landscape planting Works, shall consist of the completed Provenance Certificates. Where there is a choice of form of plant, the highest preference shall be given to the most local provenance.

- 3006.7 The Contractor shall make arrangements for the Engineer to select individual trees of Standard size and larger, at the nursery.
- 3006.10 Labels, canes and ties shall be removed immediately after planting and disposed of off Site.
- 3006.11 Holly species grown to over 500 millimetres height shall be cut back to 200 millimetres immediately prior to delivery.

APPENDIX 30/6: PLANTING (Continued)

**Sub-
Clause**

3006.12 Tree pits shall be back-filled with Class 5A (Site won) topsoil. If imported topsoil is required, it shall be Class 5B.

Imported topsoil, to make up deficiencies on site, shall comply with BS 3882: 2015 specifications for Multipurpose topsoil, as specified in Table 1 and Figure 1 of that publication.

Topsoil shall be imported from a source approved by the Engineer. It shall be friable, not be sticky or leave a polished surface when smeared or be easily moulded when moist. It shall be free from subsoil, rubbish, roots of perennial weeds, non-soil material, brick or other construction materials, any toxic substances and substances injurious to plant growth including contamination from Japanese Knotweed or Himalayan Balsam. Topsoil shall be free of rubbish and stones over 50mm in diameter.

Laboratory analyses and units of measurement shall be in accordance with the methods and units specified in BS 3882. Analyses shall cover soil texture/particle size analysis, stone content, pH value, nutrient content (N, P, K and Mg), organic matter content (through loss on ignition) and electrical conductivity (supplemented by exchangeable sodium percentage, where appropriate). Laboratory analysis shall be submitted to the Overseeing Organisation together with topsoil samples for approval.

Analyses shall be carried out of levels of potentially phyto-toxic metals, comprising cadmium, copper, lead, nickel, zinc, water soluble boron, arsenic, mercury, chromium. It should be noted that the ICRL Guidelines referred to in BS 3882 have been superseded by Defra's Contaminated Land Exposure Assessment (CLEA2002). However, the quoted levels there are for soil contaminants in relation to human health and maximum threshold levels are too high for most plants. For example, copper becomes toxic to plants at levels in excess of 300 mg/kg but the CLEA guidelines allow copper levels of up to 154,500 mg/kg. The issue of phyto-toxicity is extremely complex (being related to such factors as pH) and the suitability of imported topsoil with elevated levels of metals will have to be assessed by the Overseeing Organisation who will seek expert advice.

Elevated levels (as ppm in dry matter) shall be taken to be as follows:

- Copper 200.0 ppm
- Zinc 400.0
- Lead 200.0
- Nickel 50.0
- Chromium 100.0
- Cadmium 1.5
- Mercury 1.0

APPENDIX 30/6: PLANTING (Continued)

**Sub-
Clause**

3006.13 Planting compost shall be required for backfilling of tree pits and hedge trenches.

- 3006.14 Compost pH, conductivity and nutrient composition shall be as follows;
- Conductivity 900 μ S/cm.
 - PH 6.5 - 7.5
 - Organic matter content of 80%, a dry matter content of 50% and a bulk density of 450grams/litre.
 - Medium levels of N, P, Mg and high levels of K as defined by BS 4156:1990. Water soluble levels of nutrients should be within the following limits;
 - Available Nitrogen (Nitrate and Ammonium) 250 -350 mg/l
 - Phosphorous 35 -100 mg/l
 - Potassium 600 -850 mg/l
 - Magnesium 30-50 mg/l

The compost shall contain no substances toxic to animals or plants and possess no objectionable odours. The compost shall be of a friable texture and without excessive moisture, so that it can easily be blended and applied. It shall be free from any non-biodegradable material, weed material, plant pathogens, physical and chemical contaminants.

Delivery notes bearing the product name, nutrient status, volume of load, date and contract address shall be retained on site for inspection by the Overseeing Organisation if requested. This shall apply for either bagged supplies or loose bulk delivery stating volume in litres delivered. Compost is required to be quality assured, traceable and safe.

- 3006.15 Slow release fertiliser shall be incorporated into backfill, into the top 75 millimetres of planting bed soil, at the following standard rates using the fertiliser specified unless the results of the soil tests indicate otherwise.

Slow release fertilizer with a Nitrogen: Potassium: Phosphorus: Magnesium ratio of 14:8:13:2 shall be incorporated into the backfill of tree pits/planting areas as follows:

- (i) Feathered and Standard trees and Rootballed Conifers: 20g;
- (ii) Heavy Standard trees: 40g;
- (iii) Extra Heavy Standard trees 100g; and

Hedge planting beds 50g per square metre.

- 3006.16 Root dips shall be applied to all bare root plants and anti-desiccant sprays shall be applied to all conifers at the following times:
- (i) At the time of lifting from the nursery;
 - (ii) On arrival at site; and
 - (iii) Immediately prior to planting.

APPENDIX 30/6: PLANTING (Continued)

**Sub-
Clause**

Additional Clause All bare rooted plants shall be dipped in a solution of, or dusted with powder of, mycorrhizal fungi appropriate to the plant species at a rate in accordance with the fungi supplier, immediately prior to planting.

3006.17 Time of Planting

All bare rooted stock shall be planted between December and February; container and cell grown nursery stock shall be planted from November to 31 March during favourable weather conditions. Root balled conifers or evergreens shall be planted during November or March.

3006.22 Planting Depth

For container grown plants and rootballed plants, the Contractor shall ensure that the top of the rootball is covered with a 10 – 30mm depth, layer of soil to prevent drying out. All other plants shall be planted to the depth of their nursery soil mark.

APPENDIX 30/6: PLANTING (Continued)

**Sub-
Clause****3006.23 Notch Planting of Trees, Shrubs and Hedges**

Bare root whips, transplants and cell grown plants may be notch planted into areas of cultivated or existing topsoil of minimum 300 millimetres depth in accordance with methods (i) of sub-clause 3006.23 unless planting is into inverted curves, when method (ii) shall be used.

3006.24 Planting Pits, Beds and Trenches

Pits for whips, transplants and shrubs shall be dug in accordance with sub-clause 3006.24 in locations where topsoil depths are less than 300 millimetres. All container grown plants shall be pit planted. Trenches for hedges shall be dug in locations where there is less than 300 millimetres depth of topsoil.

Arisings from planting pits and trenches shall be retained on the Site and deposited within proposed landscape earthworks.

3006.25 Pits for shrub and tree transplants located on sloping ground shall be backfilled so the top of the pit forms a horizontal surface, which will enable the entire base of the shelter to be in contact with the ground.

3006.27 Prior to backfilling 1800 mm x 1800 mm x 750 mm pits, a 200 mm thick layer of river-washed gravel or crushed stone, 0-25 mm, shall be laid in the base to facilitate drainage. This drainage layer shall be linked by pipes to the surface water drainage system such that waterlogging of individual pits is avoided.

Planting in Cultivated Beds and Hedge Trenches

3006.28 Hedge trenches excavated in accordance with Table 30/1 shall be backfilled with a mixture of 80% topsoil and 20% compost with slow release fertiliser added as required to make up for any nutrient deficiencies identified in the soil test results.

3006.29 All planting areas with spread or existing topsoil shall be cultivated in compliance with sub-clause 3006.29 prior to planting.

Slow release fertiliser shall be scattered over the soil in compliance with Sub-Clause 3006.15.

3006.30 A 600mm wide strip along all hedge lines except those that have been backfilled shall be cultivated in accordance with sub-clause 3006.30.

3006.33 The soil shall be watered to field capacity immediately after planting if there is a risk to plants of water stress or wilting.

APPENDIX 30/6: PLANTING (Continued)

Sub Clause**Planting of Trees**

- 3006.38 Root barriers shall be required where the clearances required for underground services and drainage infrastructure or the integrity of structures would otherwise be adversely affected by plant roots or where required by the Relevant Authorities.
- The Contractor shall seek agreement of the relevant statutory undertaker regarding the location of proposed trees and the specification for an appropriate root barrier to be fitted in accordance with the manufacturer's recommendations.
- 3006.41 The minimum length of tree stakes for heavy standard and extra heavy standard trees shall be 2.5 metres and the minimum width 75 millimetres. Tree stake sizes for other tree forms shall be in accordance with sub-Clause 3006.41.
- Additional sub-clause Where planting on a slope stakes may be driven at an angle mid-way between the slope below the tree and the vertical tree stem.
- 3006.43 Heavy standard and extra heavy standard trees shall be single staked. Stakes shall be driven vertically into the pit to a depth of not less than 500 millimetres below the bottom of the pit. Stakes shall not pass through the rootball.
- 3006.44 Heavy standard and extra heavy standard trees shall be secured to the stakes with a supporting band of webbing or equivalent propriety strap of minimum width 50 millimetres positioned with the upper edge of the webbing band / strap 50 millimetres below the top of the stake which shall be driven or trimmed to approximately 1700 millimetres above ground level. The band shall be looped around the tree stem and through a purpose made rubber or equivalent pad to separate the tree from the stake. The band shall be nailed to the stake using at least two 25 millimetre galvanised clout nails.
- 3006.45 Semi-mature trees shall be planted as shown on Drawing Number K5 to Volume 3 of the MCHW in compliance with the Contractor's Quality Plan and associated method statements and consented to by the Engineer.
- 3006.49 All extra heavy standard, heavy standard, feathered and standard trees shall be watered to field capacity immediately following planting. All other tree and shrub plants shall be watered to field capacity immediately after planting if there is a risk to plants of water stress or wilting.

APPENDIX 30/6: PLANTING (Continued)

**Sub-
Clause**

3006.52 Tubes, Guards and Ties

Standard, heavy standard and extra heavy standard trees shall be protected by 1.8m high 250mm diameter welded mesh tree guards manufactured from 12 gauge galvanised wire with 25mm x 75mm grid size secured in accordance with the manufacturer's written instructions.

All feathered trees shall be protected with spiral guards, 750mm height. Plastic spiral guards shall be made from perforated PVC strips coiled spirally into a 50mm tube. The spiral guards shall be transparent and colourless and 750mm in height. The spiral guards shall be wound round the stem of the plant to be protected to the full height of the spiral guard. The Contractor shall ensure that the gaps are kept to a minimum when winding the spiral guards around branched stems.

Tree or shrub shelters / tubular plant protectors shall not be used as the means of protecting hedge plants.

Organic Mulches

3006.54 All hedge lines and 1000mm diameter tree circles around all feathered, standard, heavy standard and extra heavy standard trees in grassed areas shall be mulched to a depth of 75mm in accordance with sub-Clauses 3006.54 to 3006.57.

Planting of Reeds, Rushes, Marginal, Emergent and Aquatic Plants

3006.73 Reeds, rushes, marginal and aquatic plants shall be planted within the base of dry basin SuDS features in accordance with the Works Requirements the Contractor's Quality Plan and associated method statements.

3006.77 Excavated material from sub-clause 3006.77 operations shall be spread throughout the planting area.

Sub-Clause**Replacement of Failed or Defective Plants**

3006.87 The Contractor shall replace all plants found to be defective or vandalised annually for the duration of the Works until the end of the Period of Establishment Maintenance.

Additional sub-clause Satisfactory establishment as referred to in sub-clause 3006.87 and 3006.89 shall only be deemed to have occurred where there has been a minimum extension growth of 150 millimetres per year, unless otherwise agreed with the Engineer.

APPENDIX 30/6: PLANTING (Continued)

**Sub-
Clause**

Additional sub-clause Failed plants shall be clearly marked or removed at the time of the inspection.

3006.92 The Contractor shall carry out maintenance of new planting in accordance with clauses 3007 and 3009 for the duration of the Works until the end of the Period of Establishment Maintenance.

APPENDIX 30/7: GRASS, BULBS AND WILDFLOWER MAINTENANCE**Sub-
Clause****General Grass Maintenance**

- 3007.1 All grass and wildflower areas within the boundary of the Site shall be maintained throughout the Period of Establishment Maintenance in accordance with Clause 3007.
- 3007.5 No cutting shall be carried out within 250 millimetres of unprotected trees and shrubs. Strimmers shall not be used for cutting grass within unprotected planted areas.
- 3007.6 Grass cuttings and arisings shall be cleared from all Species Rich Grassland Mix areas. In all other grass areas cuttings may be left in situ provided they are finely chopped and evenly distributed over the surface of the grass.

Grass Cutting: High frequency

- 3007.9 High frequency grass cutting shall be undertaken in accordance with sub–Clause 3007.9 in the following areas:
- (i) Grassed verges;
 - (ii) Grassed areas within visibility splays; and
 - (iii) All other grassed areas within the Works boundary except species-rich grassland / wildflower areas.

Additional selective cuts shall be undertaken as necessary to maintain visibility. The areas subject to additional selective cuts shall be extended beyond the minimum area required to maintain visibility in order that they appear naturalistic with smoothly curving edges, avoiding straight lines and abrupt angles.

Grass Cutting: Banks and Ditches

- 3007.22 All banks and ditches shall be cut in accordance with sub-clause 3007.22. All arisings shall be dispersed over the sward avoiding the blocking of drains and ditches.
- 3007.24 All large arisings such as brambles resulting from cutting operations within planting areas shall be removed off Site.

APPENDIX 30/7: GRASS, BULBS AND WILDFLOWER MAINTENANCE (Continued)
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**Sub-
Clause****Wildflower Areas and Areas of Nature Conservation Value**

3007.26-27 All Species-Rich grassland areas shall be inspected by the Contractor's landscape architect throughout the Period of Establishment Maintenance to assess the progress of establishment.

All areas seeded with wildflowers shall be cut according to the most appropriate regime detailed in sub-clause 3007.26 and according to sub-clause 3007.27. The cutting regime shall be in compliance with the recommendations of the Contractor's Ecological Clerk of Works, the Contractor's Quality Plan and associated method statements to suit the wildflowers within the seed mixes as specified in sub-clause 3005.4.

3007.28 The ground shall be scarified only where it is necessary for wildflower colonisation in compliance with the Contractor's Quality Plan and associated Method Statements and agreed in writing by the Engineer.

3007.29 Spot herbicide treatment in accordance with sub-Clause 3007.29 shall be carried out at an appropriate frequency in all wildflower areas to eliminate undesirable broadleaf weed species.

3007.30 Areas of wildflower seeding that cannot be effectively controlled by chemical means without risk to of damage to wildflowers shall be hand weeded to eliminate undesirable broadleaf weed species.

Additional sub-clause All damaged or failed sward shall be reinstated with seed to match the surrounding area.

Molehills

3007.31 Molehills shall be removed before grass cutting as specified in sub-clause 3007.4.

APPENDIX 30/8: WATERING

**Sub-
Clause****Establishment Watering**

3008.6 The Contractor shall water all planting for the Period of Establishment Maintenance at a frequency necessary to ensure establishment and survival.

Additional Watering

3008.7 Additional watering shall be undertaken to all areas as instructed by the Engineer in accordance with sub-Clause 3008.7 in periods of abnormally dry conditions.

APPENDIX 30/9: ESTABLISHMENT MAINTENANCE FOR PLANTING

Sub-Clause**General**

3009.1 All planting and planting areas shall be maintained for the Period of Establishment Maintenance in accordance with sub-clauses 3009.2 to 3009.25.

Stakes, Tubes, Guards and Their Ties

Additional sub-clause Shelters, spirals, guards and stakes shall be maintained upright and in firm contact with the ground. Horizontal crossbars/ties shall be maintained in good working order.

3009.4 Tree stakes, tubes, guards and ties shall be removed from plants when they are no longer required, and in any event before the end of the Period of Establishment Maintenance, and shall be offered to the Engineer for re-use. Where the Engineer declines the offer the Contractor shall dispose of them to a licensed disposal facility.

Pruning

Additional sub-clause Branches and stems shall be cut back so that they do not encroach into visibility splays or footpaths, cycleways or roads.

Sub-Clause

3009.9 Delete sub-Clause 9 and insert:

Plant circles shall be defined as the area within which weed control operations shall be carried out follows:

- (i) In woodland and scrub planting areas the area within 250 millimetres radius of an individual tree or shrub.
- (ii) For standard, heavy standard or extra heavy standard trees in grassed or wildflower areas the area within 500 millimetres radius of an individual tree.

Weed Control: Young Trees and Shrubs in Grass Plots

3009.10 Translocated herbicide shall be applied at a frequency as necessary to keep plant circles weed free, whilst protecting trees and shrubs from the herbicide. Hand weeding shall be undertaken to remove weeds from within tree and shrub shelters and guards.

3009.11 Where alternative means of weed control prove ineffective residual herbicide shall be applied at a frequency as necessary to keep plant circles weed free in accordance with sub-Clause 3009.11.

3009.12 The depth of mulch in individual plant circles shall be inspected once per year in March and if less than an even depth of 75 mm, new mulch to sub-Clause 3006.55 shall be laid to restore the depth to 75 mm.

APPENDIX 30/9: ESTABLISHMENT MAINTENANCE FOR PLANTING (Continued)

Weed Control: Hedges

3009.20 All hedges and an area of 300mm width on either side of the hedge plants bases shall be maintained weed free for the duration of the Period of Establishment Maintenance in accordance with sub-clause 3009.20.

3009.21 The Contractor shall inspect the depth of mulch along hedge lines once per year in March. If the mulch is less than an even depth of 75 mm, new mulch to sub-Clause 3006.55 shall be laid to restore the depth to 75 mm.

Additional sub-clause During the first 2 years after planting, hedge plants shall be pruned once each year between 1st September and 31st January to encourage formation of a vigorous, compact, uniform hedge. The current year's growth of prominent new shoots shall be reduced in length by one third. Arisings shall be removed from Site to the Contractor's tip.

Inspection of Feathered, Standard, Extra Heavy Standard and Heavy Standard Trees and Rootballed Conifers

Additional sub-clause All feathered, standard, extra heavy standard and heavy standard trees and rootballed conifer trees shall be inspected and maintained annually in accordance with sub clause 3009.25.

APPENDIX 30/10: MAINTENANCE OF ESTABLISHED TREES AND SHRUBS

**Sub-
Clause**

3010.1 All established trees, shrubs and hedges shall be maintained for the duration of the period of the Works and the Period of Establishment Maintenance in accordance with sub-clauses 3010.2 - 3010.71.

Arisings from Pruning, Cutting or Felling of Woody Plants

3010.4 Healthy arisings shall be dealt with in accordance with one or more of items (iv) to (ix) of sub-Clause 3010.4 in compliance with the Contractor's Quality Plan and associated method statements.

Hedge Maintenance

3010.12 Hedges shall be cut once a year between September and January.

3010.20 If any hedge laying shall be required it shall be undertaken in an appropriate style in order to reflect the adjacent or local appearance.

3010.22 Mixed hedgerows shall be laid in an appropriate style in order to reflect the adjacent or local appearance.

3010.31 New hedge plants to infill significant gaps in hedges after they have been laid or cut shall be of size, species, and planting density to match the existing hedgerow.

Tree Surgery

3010.45 Tree size categories shall be in compliance with the Contractor's Quality Plan and associated method statements.

3010.54 Crown lifting shall be in compliance with the Contractor's Quality Plan and associated method statements.

3010.55 Crown thinning shall be in compliance with the Contractor's Quality Plan and associated method statements.

3010.56 Crown reduction or reshaping shall be in compliance with the Contractor's Quality Plan and associated method statements.

Tree Felling

3010.57 Straight felling shall be in compliance with the Contractor's Quality Plan and associated method statements.

3010.58 Sectional felling shall be in compliance with the Contractor's Quality Plan and associated method statements.

3010.59 Stumps shall be cut as close to the ground as possible or where the tree is growing in a hedge the stump shall be left level with the top of the hedge.

3010.60 Stump treatment shall be in compliance with the Contractor's Quality Plan and associated method statements.

APPENDIX 30/10: MAINTENANCE OF ESTABLISHED TREES AND SHRUBS (Continued)**Sub-
Clause**

- 3010.62 Stump removal shall be in compliance with the Contractor's Quality Plan and associated method statements.
- 3010.63 All arisings shall be disposed of off the Works Site or placed within woodland areas as log piles and or windrows where this is consistent with the management objectives for the woodland and the Contractor's Quality Plan and associated method statements.

Thinning and Coppicing

- 3010.65 Thinning and coppicing shall be carried out in areas of establishing and maturing woodland in accordance with Table 30/10.1 and where identified as being required by the Contractor's regular inspections.

Scrub Control in Grass

- 3010.68 Undesirable scrub species shall be controlled in accordance with Table 30/10.1 and where identified as being required by the Contractor's regular inspections.
- 3010.69 Undesirable scrub tree and shrub species that shall be controlled shall typically have a stem diameter of 0-75 millimetres and a height of 0.75-2.5 metres.
- Additional Clause Undesirable scrub species shall be cut down to 50mm above ground level and plants allowed to re-grow. The Contractor shall then apply translocated herbicide during the first year of active growth after cutting at a suitable time to maximize the effectiveness of the herbicide.
- 3010.71 Operations in accordance with sub-clause 3010.71 shall be carried out in compliance with Table 30/10.1 and the Contractor's Quality Plan and associated method statements.

APPENDIX 30/11: MANAGEMENT OF WATERBODIES

**Sub-
Clause**

- 3011.1 The management operations under Clause 3011 shall take place in all waterbodies and open ditches within the Works Site. The Contractor shall compile a schedule of areas and operations in accordance with Clause 3011 for the management of ponds and ditches that are part of the road drainage system.
- 3011.3 All inlets and outlets that form part of the Works shall be inspected in accordance with sub-clause 3011.3.
- 3011.4 The Contractor shall eliminate injurious weeds growing within or immediately adjacent to water bodies. Ponds, swales and ditches shall be inspected annually for build - up of invasive weeds. All waterbodies on the site shall be monitored for the following species and, where necessary, control measures shall be implemented:
- Monkey flower (*Mimulus guttatus*)
 - New Zealand pygmy weed (*Crassula helmsii*)
 - Canadian pondweed (*Elodea canadensis*)
 - Water Fern (*Azolla filiculoides*) – to be treated by nematode
 - Parrot's feather (*Myriophyllum aquaticum*)
 - Floating marsh pennywort – *Hydrocotyle ranunculoides*
 - Nuttall's pondweed – *Elodea nuttallii*
 - Curly pondweed – *Lagarosiphon major*
 - Least duckweed – *Lemna minuta*
 - Water hyacinth – *Eichhornia crassipes*
 - Water chestnut – *Trapa natans*
 - Water lettuce – *Pistia stratiotes*

Where reed growth covers more than 80% of the surface area of any ponds, it should be reduced to no more than 50% of the surface area.

Weed Control

- 3011.6 Injurious weeds in or on the banks of waterbodies within the Works Site shall be removed by hand in accordance with sub-clause 3002.8. Before resorting to chemical control of overgrown ponds and ditches, vegetation should be removed by physical means, either through the use of rakes or nets. Removed vegetation shall be left around the edges of the pond for at least two days to allow any wildlife to return to the pond. The removed vegetation shall then be removed from Site to the Contractor's tip.

APPENDIX 30/11: MANAGEMENT OF WATERBODIES (Continued)

Silt

- 3011.8 Silt shall be removed from waterbodies that are part of the road drainage system as required to maintain their functional requirements in accordance with sub-Clause 3011.8. The Contractor shall be responsible for consulting with SEPA and any other relevant bodies prior to undertaking any operations affecting a water body.

Reedbeds and Marginal Plants

- 3011.10 All reedbeds and marginal plants shall be inspected twice a year in early February and October in accordance to sub-clause 3011.9.

APPENDIX 30/12: SPECIAL ECOLOGICAL MEASURES

Sub-Clause

3012.1 Special Ecological Measures shall be maintained for the duration of the Works and during the Period of Establishment Maintenance following completion.

The Contractor shall be responsible for obtaining the relevant European Protected Species licences from SNH in respect to any works likely to result in the disturbance, damage or destruction to a resting place used by a European Protected Species (e.g. bats) prior to the commencement of the works.

An invasive non-native species management plan shall be produced and put into operation prior to construction to avoid the risk of illegally spreading invasive non-native species.

Site staff shall be made aware of the potential presence of European Protected Species within the Works area and details must be included in the site induction.

3012.2 Special Ecological Measures Works shall be carried out in seasons to be agreed with Statutory Consultees and the Engineer.

3012.3 In respect of fencing and underpasses for wildlife the contractor shall consult and comply with all Statutory Consultees.

3012.4 In respect of Wildlife grilles the contractor shall consult and comply with all Statutory Consultees.

3012.5 All of the mammal underpasses and fencing referred to in 3012.3 above shall be maintained in accordance with the Contract. The location, Design and construction shall follow the guidance set out in Volume 10 of the Design Manual for Roads and Bridges and shall meet the requirements of SNH.

APPENDIX 30/12: SPECIAL ECOLOGICAL MEASURES (Continued)

Sub-Clause

3012.12 The locations of protected and notable species are given below:

Birds

Nesting birds occur throughout the Site where suitable habitat exists.

Bats

Bats are known to forage in habitats present within the Site: additionally there are a number of trees present, which may have the potential to support roosting / hibernating bats. No such trees shall be felled without an inspection by a suitably qualified and licenced ecologist.

Badgers

Badgers have been recorded within neighbouring areas.

A licence from SNH will be required for Works that are likely to disturb any badgers occupying a sett. This applies to setts within 30m of any proposed Works.