Aberdeenshire COUNCIL

TRANSPORTATION AND INFRASTRUCTURE

STANDARDS FOR ROAD CONSTRUCTION CONSENT AND ADOPTION

SPECIFICATION

Incorporating amendments to Appendix 14/4 & 14/5
Electrical Equipment & Electrical Equipment for Traffic Signs

TABLE OF CONTENTS

PREAMBLE TO THE SPECIFICATION

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

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

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

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

   (iv) Appendix 0/5: Special national alterations of the Local Roads Authority's Representative of Scotland, Wales or Northern Ireland.

2. Appendix 0/4 contains a list of the Drawings.

Schedule of Pages and Relevant Publication Dates

Series/Appendix	Page Number	Publication Date
000	1	March 1998
000	2 to 3F	February 2003
100	1 to 3,5 to 7, 11 to 15F, W1F, N1 to N2	May 2001
100	4, 8 to 10, N3 to N6F	August 2003
200	1 to 3F	May 2001
300	1	May 2001
300	2 to 6F	November 2002
400	1 to 12F	May 2001
500	1 to 8, 10 to 27F, N1 to N3F	May 2001
500	9	February 2003
600	1 to 15, 18 to 28,31 to 55, 57 to 60F, S1F	May 2001
600	N1 to N3F	May 2001
600	30 to 56	November 2002
600	16 to 17, 29	August 2003
700	6 to 8, 10 to 17, N5F	May 2001
700	1 to 2, 5, 9, 18 to 25F, N4	May 2002
700	3 to 4, N1 to N3	November 2002
800	1 to 11F, S1F, N1 to N6F	May 2001
900	46 to 49	May 2001
900	2 to 3, 5 and 50	May 2002
900	1, 4, 6 to 45, 51 to 67F	November 2002
1000	1 to 8, 10 to 19	May 2001
1000	2 to 3, 9	May 2002
1000	1, 20 to 47F	November 2002
1100	1, 3 to 4F, N1 to N2F	May 2001
1100	2	March 1998
1200	1, 5, 10 to 11, 13 to 15F, N1, N4f	May 2001
1200	4	March 1998
1200	2 to 3, 6 to 9, 12, W1F, N2 to N3	August 2003
1300	1 to 11F, N1F	May 2001
1400	1	March 1998
1400	2 to 8F, N1F	May 2001
1500	1 to 17F	May 2001
1500	1 to 4	February 2003
1600	1 to 49F	March 1998
1700	1 to 36F	May 2002
1800	1 to 2, 5 to 7, 9 to 10F	May 2001
1800	3 to 4, 8	February 2003
1900	1 to 15, 17 to 29F, S1	May 2003
1900	16, S2F	May 2001
2000	1 to 4F	May 2001
2100	1 to 4F	March 1988
2200	1 to 3F	May 2001
2300	1	March 1998
2300	2 to 3F	May 2001
2400	1 to 4F	March 1988
2500	1 to 11F	May 2001
2600	1 to 7F	March 1998

3000	1 to 27F	May 2001
5000	1 to 20F, S1F	May 2003
Appendix A	3, 7 to 8, 10 to 12F	May 2001
Appendix A	1 to 2, 5 to 6, 9	November 2002
Appendix A	4	February 2003
Appendix B	6F	May 2001
Appendix B	1 to 3, 5	February 2003
Appendix B	4	August 2003
Appendix C	1 to 2F	May 2002
#Appendix D	1F	May 2001
Appendix D (NI)	N1F	March 1998
#Appendix E	1F	May 2003
Appendix E (NI)	N1F	May 2003
Appendix F	5 to 7, 9 to 11, 13	May 2001
Appendix F	3, 12	May 2002
Appendix F	14	November 2002
Appendix F	8, 19	February 2003
Appendix F	17, 23	May 2003
Appendix F	1 to 2, 4, 15 to 16, 18, 20 to 22, 24 to 42 F	August 2003
Appendix G	1F	March 1998
Appendix H	1	May 2001
Appendix H	2 to 4, 6	November 2002
Appendix H	7F	May 2003

Amendment – August 2003

APPENDIX 0/1 - ADDITIONAL, SUBSTITUTE AND CANCELLED CLAUSES AND TABLES

Clause Number	Title	Written on Page Number
970	Precast Concrete Block Paving	
1728AR	Blast Furnace Slag concrete	
1729AR	Admixtures for concrete	

CLAUSE 970 PRECAST CONCRETE BLOCK PAVING

General

1. Precast concrete blocks shall comply with the requirements of BS6717: Part 1 and shall be laid in accordance with BS 7533: Part 3.

2. Precast concrete blocks shall have a work size thickness of not less than 80mm.

3. Sub-base material shall be Type 1 granular material placed and compacted all in accordance with Series 800 of the Specification for Highway Works.

4. Road Base material shall comply with the requirements of Series 900 of the Specification for Highway Works.

Regularity

5. The finished surface levels of each of the sub layers shall comply with the requirements of Series 700 of the Specification for Highway Works. In addition the difference in level between any two adjacent blocks shall not exceed 2mm.

6. The finished sub layer shall have, immediately before overlaying, a close textured surface, free from compaction planes, ridges, cracks or loose material and show no movement under the compaction plant.

Laying Course

7. The laying course shall consist of material complying with Table A below:

Table A

BS Sieve Size	Percentage by Mass Passing
5.00mm	90 to 100
2.36mm	75 to 100
1.18mm	55 to 90
600um	35 to 65
300um	10 to 45
150um	0 to 10
75um	0 to 1.5

8. The laying course shall have a nominal compacted thickness of 30mm.

Compaction

9. The laying course material shall be prepared by one of the following methods:

(i) Pre-Compaction: Spread out laying course material to a depth sufficient to give the required compacted nominal thickness after compaction of the material and the blocks (the uncompacted thickness of sand will depend on the nature and moisture content of the and a trial area may be necessary to ascertain the surcharge). Compact with a vibrating plate compactor and screed to level the surface, then lay blocks

(ii) Partial pre-compaction: Spread out uncompacted laying course material to a depth approximately equal to the required compacted nominal thickness after compaction of

the material and the blocks. Compact with a vibrating plate compactor, then lay and screed approximately another 15mm of loose material before laying blocks.

(iii) Compaction after laying blocks: Spread out uncompacted laying course material to a depth approximately equal to the required compacted thickness after compaction of the material and blocks. Screed the material to a depth sufficient to give the required compacted nominal thickness after compaction of the material and blocks (the uncompacted thickness of sand will depend on the nature and moisture content of the sand and a trial area may be necessary to ascertain the surcharge), and lay the blocks

10. The laying course material and blocks shall be compacted using a vibrating plate compactor. Note that a rubber or neoprene faced sole plate may be required for some blocks.

11. The vibrating plate compactor shall be as follows:

Plate Requirements			
Min Area (m^2)	Min Effective Force/Unit Area (kN/m^3)	Vibration Frequency	Min Mass Kg
0.25	75	65-100	200

Jointing

12. Blocks shall be laid with joints 2 to 5mm wide and compacted. Jointing sand shall be brushed into the joints to completely fill the joints followed by tow or more applications of the vibrating plate compactor. Additional sand shall be added to top up the joints as necessary after compaction. Jointing and shall not stain the surface of the blocks and have a grading as shown in Table B:

Table B

BS Sieve Size	Percentage by Mass Passing
2.36mm	100
1.18mm	95 to 100
600um	50 to 100
300um	15 to 60
150um	0 to 15
75um	0 to 3

Restraint

13. No blocks shall be laid within 1.0m of an unrestrained edge of the screeded sand layer.

14. Edge restraints shall be provided around all areas of blocks with vertical faces to the full depth of the blocks and laying course.

15. Edge restraints may be formed by existing structures, kerbs, channels, edgings, blocks set in concrete, etc. Edge restraints shall be capable of preventing the loss of laying sand, the sideways movement of blocks and of supporting anticipated traffic loads.

Obstructions

16. Where blocks are laid abutting drainage channels or fittings, the surface of the blocks shall be between 3 and 6mm above the channel or fitting.

17. Where blocks are laid abutting gullies, the surface of the blocks shall be between 5 and 10mm above the gully grating and frame.

Laying Requirements

18. Blocks shall be laid in a herring-bone pattern. A stretcher bond pattern is to be adopted around features in the carriageway surface, such as gullies or manhole covers. Particular regard should be shown to the requirement for edge restraint around such features. In general a minimum longitudinal gradient of 1.25% should be provided.

19. Blocks shall be either red, grey or buff in colour. Any other colour must be approved by the Local Road Authority's Representative.

20. The finished surface of the blocks shall meet the requirements for regularity set out in Series 700 of the Specification for Highway Works.

21. Blocks shall be cut where necessary using a block splitter or disc cutter. No blocks less than a quarter of the original plan size shall be incorporated in the pavement. This may require the use of half blocks to "break the bond".

22. Generally blocks should be laid in accordance with the requirements of "Precast Concrete Paving, Installation and Maintenance" published by Interpave.

1728AR BLAST FURNACE SLAG CONCRETE

1. Where shown in Appendix 17/1of the Specification, concrete classes with a suffix 'S' shall contain cement which is a mixture of Portland Cement to BS EN 197-1 and Ground Granulated Blast Furnace Slag to BS 6699.

2. The total quantity of Slag in the concrete shall not exceed 65% by weight of total cement.

3. Slag shall be obtained from a source to be approved by the Engineer. It shall be stored in a silo and delivered in quantities sufficient to ensure that there is no suspension or interruption of the work of concreting at any time.

4. Trail mixes in accordance with Clause 1705 shall be carried out.

5. The water/cement ratio expressed in terms of total weight of water to total weight of cement shall not exceed 0.40.

6. The Contractor shall provide test certificates giving the average value and standard deviation of the water soluble alkali content of the slag determined as described in paragraph 7 of this clause for the four week period during which a consignment of slag was manufactured. The reactive alkali to be added to the alkali summation for the whole concrete mix in accordance with Clause 1704 shall be ½ of the total water soluble alkali content.

7. The water soluble alkali content of the slag shall be determined by placing a mass of 500g of the dry subsample of the slag in a wide mouth, screw topped plastic bottle. 500 ml of distilled water shall be added and allowed to stand for 24 hours with occasional shaking. A 5 ml sample of the supernatant liquid (filtered when necessary) shall be transferred to a 500 ml volumetric flask by means of a pipette.

8. Using the reagents specified in Clause 16 of BS 4550: Part 2, 5 ml of nitric acid and 50 ml aluminium solution shall be added and, where necessary, sufficient of the calcium solution to bring the concentration of calcium oxide in the diluted solution to approximately 630 mg/litre. Water shall be added to produce 500 ml of the solution and mixed thoroughly. The procedure given in Clause 16.2.4.1 of the document quoted above shall be followed from the second paragraph onwards.

9. The calculation described in Clause 16.2.5 of BS 4550: Part 2 shall apply, except that for the given conditions of extraction and dilution, alkali oxide = 0.01C.

1729AR ADMIXTURES FOR CONCRETE

1. No other admixture types, other than those detailed in the Specification, will be permitted, unless previously approved in writing by the Engineer.

2. The contractor will submit materials and mix design details to the Engineer for approval prior to carrying out trial mixes.

3. Trial mixes shall be prepared for each (CI) grade concrete 35 days prior to concreting.

4. No adjustment of the approved concrete mix design will be permitted unless previously approved in writing by the Engineer.

5. Due allowance must be made for the water content of the corrosion inhibitor when calculating free Water/Cement ratio.

APPENDIX 0/2: CONTRACT-SPECIFIC MINOR ALTERATIONS TO EXISTING CLAUSES, TABLES AND FIGURES

The following references to Appendix L refer to that issue relevant to the Contract as listed in the Preamble to the Specification.

APPENDIX 0/3: LIST OF NUMBERED APPENDICES REFERRED TO IN THE SPECIFICATION

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

List 'A' is a list of the Numbered Appendices referred to in the Specification for Highway.

List 'B' gives the list of specific Numbered Appendices devised for this guide.

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

Volume No.	Completed by	Appx No.	Title
			INTRODUCTION
		0/1	Contract-specific Additional, Substitute and Cancelled, Clauses
		0/2	Contract-specific Minor Alterations to existing Clauses, Tables and figures.
		0/3	List of numbered Appendices referred to in the Specification
		0/4	List of Drawings.
		0/5	Special National Alterations of the Overseeing Department of Scotland
			PRELIMINARIES
		1/5	Testing to be Carried out by the Developer
		1/6	Supply and Delivery of Samples to the Local Roads Authority's Representative
			FENCING AND ENVIRONMENTAL BARRIERS
		3/1	Fencing, Gates and Styles
			SAFETY FENCES, SAFETY BARRIERS AND PEDESTRIAN GUARDRAILS
		4/1	Safety Fences and Safety Barriers
		4/2	Pedestrian Guardrails
			DRAINAGE AND SERVICE DUCTS
		5/1	Drainage Requirements
		5/2	Service Duct Requirements
		5/3	Surface Water Channels and Drainage Channel Blocks
		5/5	Combined Drainage and Kerb Systems
		5/6	Linear Drainage Channel Systems
			EARTHWORKS
		6/1	Requirements for Acceptability & Testing etc. of Earthworks Materials
		6/3	Requirements for Excavation, Deposition, Compaction (Other than Dynamic Compaction)
		6/5	Geotextiles Used to Separate Earthworks Materials
		6/6	Fill to Structures & Fill Above Structural Foundations
		6/7	Sub-formation & Capping & Preparation & Surface Treatment of Formation
		6/8	Topsoiling, Grass Seeding and Turfing

Volume No.	Completed by	Appx No.	Title
		6/9	Earthwork Environmental Bunds, Landscape Areas, Strengthened Embankments
			ROAD PAVEMENTS – GENERAL
		7/1	Permitted Pavement Options
		7/2	Excavation & Reinstatement of Existing Surfaces
		7/6	Breaking Up or Perforation of Existing Pavement
			KERBS, FOOTWAYS AND PAVED AREAS
		11/1	Kerbs, Footways & Paved Areas
			TRAFFIC SIGNS
		12/1	Traffic Signs: General
		12/2	Traffic Signs: Marker Posts
		12/3	Traffic Signs: Road Markings and Studs
			ROAD LIGHTING COLUMNS AND BRACKETS
		13/1	Information to be Provided When Specifying Lighting Columns & Brackets
		13/2	Column & Bracket Data Sheets 1 & 2
		13/3	Instructions for Completion of Column & Bracket Data Sheet
			ELECTRICAL WORK FOR ROAD LIGHTING AND TRAFFIC SIGNS
		14/1	Site Records
		14/2	Location of Lighting Units & Feeder Pillars
		14/3	Temporary Lighting
		14/4	Electrical Equipment for Road Lighting
		14/5	Electrical Equipment for Traffic Signs
			STRUCTURAL CONCRETE
		17/1	Concrete – Classification of Mixes
		17/2	Concrete - Impregnation Schedule
		17/3	Concrete - Surface Finishes
		17/4	Concrete - General
			STRUCTURAL STEELWORK
		18/1	Requirements for Structural Steelwork
			PROTECTION OF STEELWORK AGAINST CORROSION
		19/1	Requirements for Bridges, Parapets and other Highway Structures except Bearings and Lighting Columns
		19/2	Requirements for Bearings
		19/3	Requirements for Lighting Columns and Bracket Arms
		19/3**	(Alternative): Requirements for Lighting Columns and Bracket Arms
		19/3**	(Alternative): G2b System for Flange Mounted Columns with a Plinth Built Over the Flange
		19/4	Requirements for Other Work
		19/5	Form BE/P2 (New Works) Paint System Sheet
		19/6#	Form BE/P3 Paint Sample Despatch List (no ref. in SHW – see NG 1910)

Volume No.	Completed by	Appx No.	Title
		19/7#	Form BE/P4 Paint Sample Analysis Report (no ref. in SHW – see NG 1910)
		19/8	Form BE/P5 Paint Data Sheet
		19/9	General Requirements
			WATERPROOFING FOR STRUCTURES
		20/1	Form PWS Proprietary Waterproofing System Data Sheet & Annex 'A'
		20/2	Water Proofing for Concrete Structures
			BRIDGE BEARINGS
		21/1	Bridge Bearing Schedule
			PARAPETS
		22/1	Parapet Schedule
			BRIDGE EXPANSION JOINTS AND SEALING OF GAPS
		23/1	Bridge Deck Expansion Joint schedule
		23/2	Sealing of Gaps Schedule
			BRICKWORK, BLOCKWORK AND STONEWORK
		24/1	Brickwork, Blockwork and Stonework
			SPECIAL STRUCTURES
		25/1	Requirements for Corrugated Steel Buried Structures
		25/2	Requirements for Reinforced Soil and anchored earth Structures
		25/3	Requirements for Pocket Type Reinforced Brickwork Retaining Wall Structures
		25/4	Environmental Barriers
			MISCELLANEOUS
		26/1	Ancillary Concrete
		26/2	Bedding Mortar
		26/3	Cored Thermoplastic Node Markers

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

List 'B' gives the list of Specific Numbered Appendices Devised for this Guide.

Volume No.	Appendix No.	Appendix Title
	6/8-A	Topsoiling, Grassing and Seeding (General Roadside Areas)
	6/8-B	Topsoiling, Grassing and Seeding (Upland Areas - General Roadside Areas)
	6/8-C	Topsoiling, Grassing and Seeding – Amenity and Landscape Areas
	7/70	Preparation of Surfacing and Adjustment of Iron Work
	11/1A	Footways and Paved Areas (Precast Concrete Paving)
	11/1B	Footways and Paved Areas (Flexible Construction)
	11/1C	Footways and Paved Areas (Insitu Concrete Paving)
	11/1D	Footways and Paved Areas (Concrete Block Paving)
	11/1E	Footways and Paved Areas (Granolithic Concrete Paving)
	11/1F	Footways and Paved Areas (Granite Sett Paving)
	11/1G	Footways and Paved Areas (Stone Slabbed Paving)
	11/73	Footways and Paved Areas (Racking of Existing Kerbs, Setts and Slabs)

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

1. Drawings included in the guide

LIST OF DRAWINGS

SECTION 1
SERIES A – HIGHWAY SECTIONS

Drawing No. Title
Group 5: Flexible/Composite Construction
A107 Single Carriageway
A109 Standard Grass Verge VG5
A110 Verge with Footway VF5-1
A117 Single Carriageway Lane Widening

SERIES B – EDGE OF PAVEMENT DETAILS

Drawing No. Title
B70 Precast Concrete Kerbs (K1 – K11)
B71 Precast Concrete Edging (K12 – K14)
B72 Precast Concrete Kerbs (K15 – K19)
B73 Turf Edging Types 1 and 2
B74 Deterrent Paving Type 1 (Cobbles)
B75 Tie in Details
B78 Accesses to Light Industrial Property Urban Types 1 and 2
B81 Textured Footways at Pedestrian Crossing
B82 Textured Footways at Pedestrian Crossing
B83 Textured Footways at Pedestrian Crossing
B84 Vehicluar Access to Domestic Properties
B85 Pedestrian Crossing Details
B86 Replacement of Existing Kerb on New and Existing Foundation
B87 Textured Footways at Pedestrian Crossing

SERIES F – DRAINAGE

Drawing No. Title
F70 Gullies Channel – Type G1 and G2 Gullies Footway Type G7
F73 Typical Gully Layout (Rural Location)
F74 Typical Gully Layout (Urban Location)
F75 Combined Kerb and Drainage Blocks – Details at Crossings and Junctions
F76 Combined Kerb and Drainage Blocks – Silt traps and Stop Ends
F77 Combined Kerb and Drainage Blocks – Top and Base Block
F78 Combined Kerb and Drainage Blocks – Outfall Type 1
F79 Combined Kerb and Drainage Blocks – Outfall Type 2
F80 Manhole (Backdrop) Type (x) BD
F81 Typical Downpipe Connection
F82 Mandrel (For Use in Drains)
F83 Soakaway Type 1
F84 Rodding Eye Detail
F85 Headwalls
F86 Geotextile and Polythene Wrap to Drains
F87 Channel Drainage Proprietary Type
F88 Connection of Down Pipe through Footway
F89 Detail of Proprietary Footpath Crossing

SERIES I – UNDERGROUND CABLE DUCTS

Drawing No.	Title
I70	British Telecom Typical Trench Details
I71	Hydro Electric Typical Details

SERIES K – TRAFFIC SIGNS

Drawing No	Title
K70	Sign Face Construction Details
K71	Traffic Signs Support Details/Standard Signs up to 140 dia
K72	Traffic Signs Support Details/Non Standard Signs
K73	Ground Light Bollard
K74	Chevroflex Roundabout Units Lighting Details
K75	Delineation of Junctions with Hazard Marker Posts
K76	Car Park Entrance Bar
K77	Information Board
K78	Traffic Light & Controller Installation

SERIES K – ROAD LIGHTING

Drawing No.	Title
K80	Standard Column 5 metres
K81	Standard Column 8 metres
K82	Post Top Column 4 – 5 metres
K83	Column Base Layout. Looped Type Termination
K84	Column Base Layout. Live Service Type
K85	Feeder Pillars Typical Planting Details
K86	Feeder Pillar Internal Layout
K88	Electrical Warning Notice
K89	Aluminium Alloy Column
K90	Column Planting Details – Socket Type Root

2. Brought in By Reference

(a) Highway Construction Details (HCD) published by HMSO as Volume 3 of the Manual of Contract Documents for Highway Works contain the following drawings brought into the Contract by reference. Unless otherwise stated below the whole drawing is brought into the Contract.

SECTION 1: CARRIAGEWAY AND OTHER DETAILS

SERIES F – DRAINAGE

Drawing No	Title
F1	Surface water drains – trench and bedding details
F2	Filter drains – trench and bedding details
F3	Type 1 Chamber (brick or insitu concrete manhole) (Issue B – 8/94)
F4	Type 2 Chamber (brick or insitu concrete manhole)
F5	Type 3 Chamber (precast concrete manhole) (Issue B – 8/94)
F6	Type 4 Chamber (precast concrete manhole) (Issue B – 8/94)
F7	Type 5 Chamber (precast concrete manhole)
F8	Type 6 Chamber (precast concrete manhole)
F9	Type 6 Chamber grating details
F10	Chamber fittings – ladder, handhold and safety chain
F11	Type 7 Chamber (1050 catchpit) (Issue B – 8/94)
F12	Chamber Type 8 (600 catchpit)
F13	Precast and insitu cast gullies
F14	Sumpless gully chamber and alternative rising section
F15	Drainage channel blocks Types A, B and C
F16	Drainage channel blocks Types D, E and F
F17	Not used
F18	Edge of pavement drains – fin drains and narrow filter drains
F19	Edge of pavement drains – installation of fin drains
F20	Edge of pavement drains – installation of narrow filter drains
F21	Edge of pavement drains – under channel drainage layers

SERIES H – FENCES, STILES AND GATES

Drawing No.	Title
H1	Temporary fences Types 1 and 2
H2	Temporary fences Types 3 and 4
H3	Motorway/Accommodation Works wooden post and 4 (or 5) rail fences (Issue B–8/93)
H4	Motorway and Accommodation Works high tensile strained wire deer fences 135
H5	Motorway and Accommodation Works high tensile strained wire deer fences 180
H6	Motorway and Accommodation Works high tensile strained wire deer fences 210
H7	Turing posts strained wire fences
H8	General details strained wire fences
H9	General details strained wire fences
H10	General details strained wire fences
H11	Accommodation works chain link fences (Issue B – 8/93)
H12	Accommodation works rectangular wire mesh and hexagonal wire netting fences (Issue B – 8/93)
H13	Accommodation works strained wire fences (General Pattern) (Issue B – 8/93)
H14	Accommodation works wooden palisade and close boarded fences (Issue B – 8/93)
H15	Accommodation works wooden post and 3 rail fences (Issue B – 8/93)
H16	Accommodation works woven and lap boarded panel fences (Issue B – 8/93)
H17	Steel single field gate
H18	Steel half mesh single field gate
H19	Steel extra wide single field gate
H20	Steel double field gate
H21	Timber single field gate
H22	Timber double field gate
H23	Timber wicket gate Type 1
H24	Timber wicket gate Type 2
H25	Timber kissing gate
H26	Hinges for steel field gate
H27	D Latch, Type A for steel single field gates
H28	Sliding bolt latch, Type B for steel single field gates
H29	Tubular steel latch for steel double field gates
H30	Hinges for timber field gates
H31	Spring catch for timber field gates
H32	Latch and drop bolt for timber double field gates
H33	Standard gate stops
H34	Timber stile – Type 1 (Issue B – 8/93)
H35	Timber stile – Type 2 (Issue B – 8/93)

LIST OF DRAWINGS

SECTION 2

SERIES GA – GENERAL ARRANGEMENT DRAWINGS

Drawing No	Title
GA/01	Schedule of Fence types Codes and General Notes
GA/02	Verge, Set Back and Clearance Adjacent to Structures
GA/03	Verge, Fence Layout Adjacent to Obstruction (Single Sided)
GA/04	Central Reserve, Set-Back and Clearance Adjacent to Structures
GA/05	Central Reserve, Fence Layout Adjacent to Obstruction (Double Sided)
GA/06	Central Reserve, Fence Layout Adjacent to Obstruction (Single Sided)
GA/07	Central Reserve, Layout at Fence Crossover
GA/08	Central Reserve, Pedestrian Crossing Point
GA/09	Connections Between Fence Types
GA/10	Not Used
GA/11	Tensioned Corrugated Beam Single and Double Sided, General Arrangement (Sheet 1 of 3)
GA/12	Tensioned Corrugated Beam Single and Double Sided, General Arrangement (Sheet 2 of 3)
GA/13	Tensioned Corrugated Beam Single and Double Sided, General Arrangement (Sheet 3 of 3)
GA/14	Not Used
GA/15	Not Used
GA/16	Tensioned Corrugated Beam Crossing Point (Central Reserve)(Sheet 1 of 2)
GA/17	Tensioned Corrugated Beam Crossing Point (Central Reserve)(Sheet 2 of 2)
GA/18	Untensioned Corrugated Beam, Single Sided General Arrangement (Sheet 1 of 2)
GA/19	Untensioned Corrugated Beam, Single Sided General Arrangement (Sheet 2 of 2)
GA/20	Open Box Beam in Verge and Central Reserve, General Arrangement (Sheet 1 of 4)
GA/21	Open Box Beam in Verge and Central Reserve, General Arrangement (Sheet 2 of 4)
GA/22	Open Box Beam in Verge and Central Reserve, General Arrangement (Sheet 3 of 4)
GA/23	Open Box Beam in Verge and Central Reserve, General Arrangement (Sheet 4 of 4)
GA/24	Open Box Beam, Double Sided, Enclosing Lighting Columns General Arrangement (Sheet 1 of 2)
GA/25	Open Box Beam, Double Sided, Enclosing Lighting Columns General Arrangement (Sheet 2 of 2)
GA/26	Open Box Beam, Single Sided, Expansion Joint Anchorages at Bridges
GA/27	Open Box Beam, Double Sided, Expansion Joint Anchorages at Bridges
GA/28	Open Box Beam, Enclosing Lighting Columns, Expansion Joint Anchorages at Bridges
GA/29	Not Used
GA/30	Not Used
GA/31	Open Box Beam, Crossing Point (Central Reserve) (Sheet 1 of 2)
GA/32	Open Box Beam, Crossing Point (Central Reserve) (Sheet 2 of 2)
GA/33	Withdrawn
GA/34	Withdrawn
GA/35	Not Used
GA/36	Not Used
GA/37	Withdrawn
GA/38	Parapet Connection. TCB/OBB to Steel Parapet
GA/39	Parapet Connection. TCB/OBB to BACO Parapet (Preferred Method)
GA/40	Parapet Connection. TCB to BACO Parapet (Anchorage Frame Adjustment to Structure)
GA/41	Parapet Connection. TCB/OBB to AHDE Parapet (Preferred Method)
GA/42	Parapet Connection. TCB to AHDE Parapet (Anchorage Frame Adjustment to Structure)

SERIES GA – GENERAL ARRANGEMENT DRAWINGS continued

Drawing No	Title
GA/43	Withdrawn
GA/44	Withdrawn
GA/45	Withdrawn
GA/46	Withdrawn
GA/47	Parapet Connection, UCB to Steel Parapet
GA/48	Parapet Connection, UCB to BACO Parapet
GA/49	Parapet Connection, UCB to AHDE Parapet
GA/50	Verge – WRSF Interface with OBB at Structures
GA/51	Verge – Alternative WRSF Interface with OBB at Structures on Single Carriageways
GA/52	Central Reserve – WRSF Interface with OBB at Structures on Dual Carriageways
GA/53	Withdrawn
GA/54	Withdrawn
GA/55 to GA/199	Not Used
GA/200	Temporary Vertical Concrete Safety Barrier – Typical Layout for Use at Roadworks
GA/201	Temporary Vertical Concrete Safety Barrier (Precast) – Tapered Design
GA/202	Permanent Vertical Concrete Safety Barrier (Precast)
GA/203	Withdrawn
GA/204	Withdrawn
GA/205	Temporary Vertical Concrete Safety Barrier (Precast) – Universal Design

SERIES SF – SAFETY FENCE COMPONENT DRAWINGS

Item No.	Drawing No	Title
	SF/00	Fastener Schedule
A18	SF/01	Intermediate Post
A19	SF/02	Driven Post (central reserve)
A30		Driven Post (verge)
A55	SF/03	Long Driven Post (central reserve)
A56		Long Driven Post (verge)
A37	SF/04	Surface Mounted Post (central reserve)
A54		Surface Mounted Post (verge)
A38	SF/05	Post extension for surface mounted post
A70	SF/06	Socket (Intermediate post), 420mm long
A70A		Socket (Intermediate post), 360mm long
A70B		Socket (Intermediate post), 480mm long
A71		Socket cover (intermediate post)
A21	SF/07	Reinforcing ring
B69		Reinforcing rod (OBB)
C21		Reinforcing rod (TCB)
B03	SF/08	Standard open box beam
B04	SF/09	Half length beam
B05	SF/10	End beam
B74		Replaceable end beam
A06	SF/11	Connection piece (single sided)
A24	SF/12	Connection piece (double sided)
B36	SF/13	Expansion joint connector
B50	SF/14	Long expansion beam
B51	SF/15	Short expansion beam
B52		Expansion beam connector
B25	SF/16	End post (OBB)
B72	SF/l7	Socket (OBB end post)
B73		Socket cover (OBB end post)
B34	SF/18	Full height anchorage (OBB, single sided) (no lower rail)
B34A		Full height anchorage (OBB, single sided)
B41	SF/19	Full height anchorage (OBB, double sided)
B41A		Full height anchorage (OBB, double sided) (no lower rail)
B44	SF/20	Full height anchorage (OBB, lighting columns)
B44A		Full height anchorage (OBB, lighting columns) (no lower rail)
B11	SF/21	Mounting bracket
B12	SF/22	Fish plate (standard)
B13		Fish plate (special)
B17	SF/23	Standard clamp plate
B23		Long clamp plate
B49		Short clamp plate
B27	SF/24	Spacer, 95mm
B27A		Spacer, 145mm
B29	SF/25	Stiffener, 300mm
B29A		Stiffener, 400mm
B31A	SF/26	Tapered spacer, 30mm
B31B		Tapered spacer, 40mm
B31C		Tapered spacer, 80mm
B31D		Tapered spacer, 90mm
B48	SF/27	Parapet connection (OBB to steel parapet)
B57	SF/28	Parapet connection beam (OBB to aluminium parapet), (inclined) Type A (approach)
B58		Parapet connection beam (OBB to aluminium parapet), (inclined) Type A (departure)
B64		Parapet connection beam (OBB to aluminium parapet), (vertical) Type A
B65	SF/29	Parapet connection beam (OBB to aluminium parapet), (BACO vertical) Type B
B66		Parapet connection beam (OBB to aluminium parapet), (BACO inclined) Type B (approach)

SERIES SF – SAFETY FENCE COMPONENT DRAWINGS

Item No.	Drawing No	Title
B67		Parapet connection beam (OBB to aluminium parapet), (BACO inclined)Type B (departure)
B62	SF/30	Cradle anchorage (3 x M20)
B63	SF/31	Cradle anchorage (6 x M20)
B75	SF/32	Precast fairing (OBB)
B76	SF/33	Cradle anchorage (OBB fairing)
B77	SF/34	Adapter platform
B78	SF/35	Open box beam expansion assembly
	SF/36 to SF/49	Not used
B80	SF/50	Withdrawn
B81	SF/51	Withdrawn
B82		Withdrawn
B83	SF/52	Withdrawn
B84	SF/53	Withdrawn
B85	SF/54	Withdrawn
B86	SF/55	Withdrawn
B87	SF/56	Withdrawn
B88		Withdrawn
B89		Withdrawn
B90	SF/57	Withdrawn
B91	SF/58	Withdrawn
B91A		Withdrawn
B92		Withdrawn
B92A		Withdrawn
B93	SF/59	Withdrawn
B93A		Withdrawn
B94	SF/60	Withdrawn
B94A		Withdrawn
B95		Withdrawn
B96	SF/61	Withdrawn
B97	SF/62	Withdrawn
B70	SF/63	Socket (DROBB and UCB post), 420mm long
B70A		Socket (DROBB and UCB post), 360mm long
B70B		Socket (DROBB and UCB post), 4SOmm long
B71		Socket cover (DROBB and UCB post)
B98	SF/64	Withdrawn
V15	SF/65	Withdrawn
V16		Withdrawn
V17		VCB washer
SF/66		Not used
SF/67		Not used
SF/68		Not used
SF/69		Not used
SF/70	C0l	Standard corrugated beam
SF/71	C02	Double length corrugated beam
SF/72	C03	Adjuster beam
SF/73	C34 C35	Formed angled beam Slotted angled beam
SF/74	C06	Angled beam post (TCB)
SF/75	C08	End post (TCB)
SF/76	Cl2	Adjuster bracket
SF/77	C13	Connecting strap
	Cl8	Taper washer
	C33	Post bolt washer
SF/78	C25	Full height anchorage (TCB)
SF/79	C27	Full height anchorage beam
SF/80	C39	Removable end post (TCB)
SF/81	C37	Socket (TCB end post)
	C38	Socket cover (TCB end post)
SF/82	C40	Precast fairing (TCB)
SF/83	C41	Cradle anchorage (TCB fairing)
SF/84		Not used
SF/85		Not used

SERIES SF – SAFETY FENCE COMPONENT DRAWINGS continued

Item No.	Drawing No	Title
SF/86		Not used
SF/87		Not used
SF/88		Not used
SF/89		Not used
SF/90	C51	Intermediate post (UCB)
SF/91	C52	Driven post (UCB)
	C53	Long driven post (UCB)
SF/92	C54	Surface mounted post (UCB)
SF/93	C55	End post (UCB)
SF/94	C56	End shoe
SF/95	C57	Offset bracke
A06	SF/11	Connection piece (single sided)
A18	SF/01	Intermediate post
A19	SF/02	Driven post (central reserve)
A21	SF/07	Reinforcing ring
A24	SF/12	Connection piece (double sided)
A30	SF/02	Driven post (verge)
A37	SF/04	Surface mounted post (central reserve)
A38	SF/05	Post extension for surface mounted post
A54	SF/04	Surface mounted post (verge)
A55	SF/03	Long driven post (central reserve)
A56	SF/03	Long driven post (verge)
A70	SF/06	Socket (intermediate post), 420mm long
A70A	SF/06	Socket (intermediate post), 360mm long
A70B	SF/06	Socket (intermediate post), 480mm long
A71	SF/06	Socket cover (intermediate post)
B03	SF/08	Standard open box beam
B04	SF/09	Half length beam
B05	SF/l0	End beam
B11	SF/21	Mounting bracket
B12	SF/22	Fish plate (standard)
B13	SF/22	Fish plate (special)
B17	SF/23	Standard clamp plate
B23	SF/23	Long clamp plate
B25	SF/16	End post (OBB)
B27	SF/24	Spacer, 95mm
B27A	SF/24	Spacer, 145mm
B29	SF/25	Stiffener, 300mm
B29A	SF/25	Stiffener, 400mm
B31A	SF/26	Tapered spacer, 30mm
B31B	SF/26	Tapered spacer, 40mm
B31C	SF/26	Tapered spacer, 80mm
B31D	SF/26	Tapered spacer, 90mm
B34	SF/18	Full height anchorage (OBB, single sided)
B34A	SF/18	Full height anchorage (OBB, single sided) (no lower rail)
B36	SF/13	Expansion joint connector
B4l	SF/19	Full height anchorage (OBB, double sided)
B41A	SF/19	Full height anchorage (OBB, double sided) (no lower rail)
B44	SF/20	Full height anchorage (OBB, lighting columns)
B44A	SF/20	Full height anchorage (OBB, lighting columns) (no lower rail)
B48	SF/27	Parapet connection (OBB to steel parapet)
B49	SF/23	Short clamp plate
B50	SF/14	Long expansion beam
B51	SF/15	Short expansion beam
B52	SF/15	Expansion beam connector
B57	SF/28	Parapet Connection beam (OBB to aluminium parapet), (inclined) Type A (approach)
B58	SF/28	Parapet connection beam (OBB to aluminium parapet), (inclined), Type A (departure)
B62	SF/30	Cradle anchorage, (3 x M20)
B63	SF/31	Cradle anchorage, (6 x M20)

SERIES SF – SAFETY FENCE COMPONENT DRAWINGS continued

Item No.	Drawing No	Title
B64	SF/28	Parapet connection beam (OBB to aluminium parapet), (vertical) Type A
B65	SF/29	Parapet connection beam (OBB to aluminium parapet), (BACO vertical) Type B
B66		Parapet connection beam (OBB to aluminium parapet), (BACO inclined) Type B (approach)
B67		Parapet connection beam (BACO inclined) Type B (departure)
B69	SF/07	Reinforcing rod (OBB)
B70	SF/63	Socket (DROBB and UCB post), 420mm long
B70A	SF/63	Socket (DROBB and UCB post), 360mm long
B70B		Socket (DROBB and UCB post), 480mm long
B71		Socket cover (DROBB and UCB post)
B72	SF/17	Socket (OBB end post)
B73		Socket cover (OBB end post)
B74	SF/10	Replaceable end beam
B75	SF/32	Precast fairing (OBB)
B76	SF/33	Cradle anchorage (OBB fairing)
B77	SF/34	Adapter platform
B78	SF/35	Open box beam expansion assembly
B80	SF/50	Withdrawn
B81	SF/51	Withdrawn
B82		Withdrawn
B83	SF/52	Withdrawn
B84	SF/53	Withdrawn
B85	SF/54	Withdrawn
B86	SF/55	Withdrawn
B87	SF/56	Withdrawn
B88		Withdrawn
B89		Withdrawn
B90 B91	SF/57 SF/58	Withdrawn Withdrawn
B91A		Withdrawn
B92		Withdrawn
B92A		Withdrawn
B93	SF/59	Withdrawn
B93A		Withdrawn
B94	SF/60	Withdrawn
B94A		Withdrawn
B95		Withdrawn
B96	SF/6l	Withdrawn
B97	SF/62	Withdrawn
B98	SF/64	Withdrawn
C01	SF/70	Standard corrugated beam
C02	SF/71	Double length corrugated beam
C03	SF/72	Adjuster beam
C06	SF/74	Angled beam post (TCB)
C08	SF/75	End post (TCB)
C12	SF/76	Adjuster bracket
C13	SF/77	Connecting strap
C18		Taper washer
C21	SF/07	Reinforcing rod (TCB)
C25	SF/78	Full height anchorage (TCB)
C27	SF/79	Full height anchorage beam
C33	SF/77	Post bolt washer
C34	SF/73	Formed angled beam
C35		Slotted angled beam
C37	SF/81	Socket (TCB end post)
C38		Socket cover (TCB end post)
C39	SF/80	Removable end post (TCB)
C40	SF/82	Precast fairing (TCB)
C41	SF/83	Cradle anchorage (TCB fainng)
C51	SF/90	Intermediate post (UCB)

SERIES SF – SAFETY FENCE COMPONENT DRAWINGS continued

Item No.	Drawing No	Title
C52	SF/91	Driven post (UCB
C53		Long driven post (UCB)
C54	SF/92	Surface mounted post (UCB)
C55	SF/93	End post (UCB)
C56	SF/94	End shoe
C57	SF/95	Offset bracket
V15	SF165	Withdrawn
V16		Withdrawn
V17		VCB washer

SERIES SB - SAFETY BARRIER DRAWINGS

Drawing No	Item	Title
SB/01	V21, V22 V34, V35	Temporary Vertical Concrete Safety Barrier(precast)Intermediate unit(Tapered design), (Sheet 1 of 2)
SB/02	V2l-V24& V36	Temporary Vertical Concrete Safety Barrier(precast) - intermediate unit(Tapered design), (Sheet 2 of 2)
SB/03	V21-V24	Temporary Vertical Concrete Safety Barrier(precast) - Joint details (Tapered design)
SB/04	V23, V24	Temporary Vertical Concrete Safety Barrier(precast) - Termination unit (Tapered design)
SB/05	V21-V24	Temporary Vertical Concrete Safety Barrier(precast) - Reinforcement schedule (Tapered design)
SB/06		Not used
SB/07	V25	Temporary Vertical Concrete Safety Barrier(cast insitu) - (Tapered design)
SB/08	V28	Temporary Vertical Concrete Safety Barrier(precast) - Intermediate unit (Universal design), (Sheet 1 of 2)
SB/09	V28	Temporary Vertical Concrete Safety Barrier (precast) - Intermediate unit (Universal design), (Sheet 2 of 2)
SB/10	V28	Temporary Vertical Concrete Safety Barrier (precast) - Intermediate unit (Universal design) - Reinforcement schedule
SB/11	V28-V30	Temporary Vertical Concrete Safety Barrier (precast) - Joint details (Universal design)
SB/12	V29-V30	Temporary Vertical Concrete Safety Barrier (precast) - Termination unit (Universal design), (Sheet I of 2)
SB/13	V29-V30	Temporary Vertical Concrete Safety Barrier (precast) - Termination unit (Universal design), (Sheet 2 of 2)
SB/14	V29-V30	Temporary Vertical Concrete Safety Barrier (precast) - Termination unit (Universal design) - Reinforcement schedule
SB/15		Not used
SB/16		Not used
SB/17		Not used
SB/18		Not used
SB/19		Not used
SB/20	V01-V02	Permanent Vertical Concrete Safety Barrier (precast) - Intermediate units (Sheet 1 of 2)
SB/21	V01-V02	Permanent Vertical Concrete Safety Barrier (precast) - Intermediate units (Sheet 2 of 2)
SB/22	V01-V12	Permanent Vertical Concrete Safety Barrier (precast) - Detail of assembled joint
SB/23	V03-V04	Permanent Vertical Concrete Safety Barrier (precast) - Termination units (Sheet 1 of 2)
SB/24	V03-V04	Permanent Vertical Concrete Safety Barrier (precast) - Termination units (Sheet 2 of 2)
SB/25	V07	Withdrawn
SB/26	V07	Withdrawn
SB/27	V08-V12	Withdrawn
SB/28	V01-V12	Withdrawn
SB/29	V01-V12	Permanent Vertical Concrete Safety Barrier (precast) - Reinforcement schedule
SB/30	V05-V06	Permanent Vertical Concrete Safety Barrier (precast) - Make up unit (Sheet 1 of 2)
SB/31	V05-V06	Permanent Vertical Concrete Safety Barrier (precast) - Make up unit (Sheet 2 of 2)
SB/32	V31-V32	Vertical Concrete Safety Barrier (precast) - and V33Detaiis of anchor plate and gaskets
SB/33	V13-V14	Permanent Vertical Concrete Safety Barrier (precast) - Cradle anchorage (240 x 70) Cradle anchorage (240 x 100 x 70)
SB/34	V27	Permanent Vertical Concrete Safety Barrier (insitu) - Cross Section

SERIES SB - SAFETY BARRIER DRAWINGS continued

Drawing No	Item	Title
V01, V02	SB/20	Permanent Vertical Concrete Safety Barrier (precast) - Intermediate units (Sheet 1 of 2)
	SB/21	Permanent Vertical Concrete Safety Barrier (precast) - Intermediate units (Sheet 2 of 2)
V03, V04	SB/23	Permanent Vertical Concrete Safety Barrier (precast) - Termination units (Sheet 1 of 2)
	SB/24	Permanent Vertical Concrete Safety Barrier (precast) - Termination units (Sheet 2 of 2)
V05, V06	SB/30	Permanent Vertical Concrete Safety Barrier (precast) - Make up unit (Sheet 1 of 2)
	SB/31	Permanent Vertical Concrete Safety Barrier (precast) - Make up unit (Sheet 2 of 2)
V07	SB/25	Permanent Vertical Concrete Safety Barrier (precast) - Termination unit for connection to Double Sided Open Box Beam Safety Fence (Sheet 1 of 2)
V07	SB/26	Permanent Vertical Concrete Safety Barrier (precast) - Termination unit for connection to Double Sided Open Box Beam Safety Fence (Sheet 2 of 2)
V0l to V12	SB/22	Permanent Vertical Concrete Safety Barrier (precast) - Detail of assembled joint
V0l to V12	SB/29	Permanent Vertical Concrete Safety Barrier (precast) - Reinforcement schedule
V08 to V12	SB/27	Permanent Vertical Concrete Safety Barrier (precast) - Termination unit for connection to Single Sided Open Box Beam Safety Fence and RHS Beam Safety Fence (Sheet 1 of 2)
	SB/28	Permanent Vertical Concrete Safety Barrier (precast) - Termination unit for connection to Single Sided Open Box Beam Safety Fence and RHS Beam Safety Fence (Sheet 2 of 2)
V13, V14	SB/33	Permanent Vertical Concrete Safety Barrier (precast) - Cradle anchorage (240 x 70) Cradle anchorage (240 x 100 x 70)
V15		Not used
V16		Not used
V17		Not used
V18		Not used
V19		Not used
V20		Not used
V21, V22	SB/0l	Temporary Vertical Concrete Safety Bamer (precast) - Intermediate unit (Tapered design) (Sheet I of 2)
V21 to V24	SB/02	Temporary Vertical Concrete Safety Barrier (precast) - Intermediate unit (Tapered design) (Sheet 2 of 2)
	SB/03	Temporary Vertical Concrete Safety Barrier (precast) - Joint details (Tapered design)
	SB/05	Temporary Vertical Concrete Safety Barrier (precast) - Reinforcement schedule (Tapered design)
V23, V24	SB/04	Temporary Vertical Concrete Safety Barrier (precast) - Termination unit (Tapered design)
V25	SB/07	Temporary Vertical Concrete Safety Barrier (cast insitu) - (Tapered design)
V26		Not used
V27	SB/34	Permanent Vertical Concrete Safety Barrier (insitu) - Cross section

SERIES SB - SAFETY BARRIER DRAWINGS continued

Drawing No	Item	Title
V28	SB/08	Temporary Vertical Concrete Safety Barrier (precast) - Intermediate unit (Universal design) (Sheet I of 2)
	SB/09	Temporary Vertical Concrete Safety Barrier (precast) - Intermediate unit (Universal design) (Sheet 2 of 2)
	SB/10	Temporary Vertical Concrete Safety Barrier (precast) - Intermediate unit (Universal design) Reinforcement scheme
V28 to V30	SB/11	Temporary Vertical Concrete Safety Barrier (precast) Joint details (Universal design)
V29, V30	SB/12	Temporary Vertical Concrete Safety Barrier (precast) - Termination unit (Universal design) (Sheet 1 of 2)
	SB/l3	Temporary Vertical Concrete Safety Barrier (precast) - Termination unit (Universal design) (Sheet 2 of 2)
	SB/l4	Temporary Vertical Concrete Safety Barrier (precast) - Termination unit (Universal design) Reinforcement schedule
V31, V32	SB/32	Vertical Concrete Safety Barrier (precast) - Details of anchor plate and gaskets
V34, V35	SB/01	Temporary Vertical Concrete Safety Barrier (precast) - Intermediate unit (Tapered design) (Sheet 1 of 2)
V36	SB/02	Temporary Vertical Concrete Safety Barrier (precast) - Intermediate unit (Tapered design) (Sheet 2 of 2)

SERIES EOB - COMBINED OPEN BOX BEAM SAFETY FENCE AND ENVIRONMENTAL BARRIER

Drawing No	Title
EOB 38	Items List
EOB 38/1	Combined Open Box Beam Safety Fence and Environmental Barrier
EOB 38/1/1	A Post, (UB 152 x 89 x 16 Kg/m)
EOB 38/1/1	B Post, (UB 178 x 102 x 19 Kg/m)
EOB 38/1/1	C Post, (UB 203 x 102 x 23 Kg/m)
EOB 38/1/1	D Post, (UB 254 x 102 x 25 Kg/m)
EOB 38/1/1	E Post, (UB 305 x 102 x 28 Kg/m)
EOB 38/1/1	F Post, (UB 305 x 102 x 33 Kg/m)
EOB 38/1/2	A Mounting bracket
EOB 38/1/2	B Mounting bracket
EOB 38/1/3	Clamp
EOB 38/1/4	Clamp plate - Special, (Long)

SERIES RHS47 - TENSIONED RECTANGULAR HOLLOW SECTION BEAM SAFETY FENCE (100mm X 100mm)

Drawing No	Title
RHS 47	Items List
RHS 47/1	Tensioned RHS Beam Safety Fence (100mm x 100mm)
RHS 47/1/1	Post (Intermediate)
RHS 47/1/2	Posts, Driven (verge and central reserve)
RHS 47/1/3A	Nut (M10)
RHS 47/l/3B	Nut (M24)
RHS 47/l/3C	Nut (M12)
RHS 47/1/4	Anchorage beam
RHS 47/1/5	Beam
RHS 47/1/6	End post
RHS 47/1/7A	Strap (verge)
RHS 47/1/7B	Strap (central reserve)
RHS 47/1/8	Connector plate
RHS 47/1/9A	Strap bolt
RHS 47/1/9B	Connector screw
RHS 47/1/9C	Anchorage bolt
RHS 47/1/9D	Anchor screw
RHS 47/l/9E	Clamp screw
RHS 47/1/10	Connection piece (100 x 100 RHS to 200 x 100 RHS)
RHS 47/1/11	Connection piece (100 x 100 RHS to single sided Open Box Beam)
RHS 47/1/12	Connection piece (100 x 100 RHS to double sided Open Box Beam)
RHS 47/1/13	Post section profile (100 x 32)
RHS 47/2	Expansion joint anchorage - Bridges (central reserve)
RHS 47/2/1	Expansion joint anchorage - Socketed (central reserve)
RHS 47/2/2	Expansion joint anchorage - Bolted (central reserve)
RHS 47/2/3	Sleeve
RHS 47/2/4A	Socket (Cast in, 2 x M20)
RHS 47/2/4B	Socket (Cast in 6 x M20)
RHS 47/3	Expansion joint anchorages - Bridges (verge)
RHS 47/3/1	Expansion joint anchorages - Socketed (Types A and B - verge)
RHS 47/3/2	Expansion joint anchorages - Bolted (Types A and B - verge)
RHS 47/3/3	Socket (Cast in, 3 x M20)
RHS 47/4	Tensioner assembly
RHS 47/4/1A	Beam - Long
RHS 47/4/lB	Beam - Short
RHS 47/4/2	Tumbuckle
RHS 47/4/3	Cover
RHS 47/4/4A	Nut, M56 (Right hand)
RHS 47/4/4B	Nut, M56 (Left hand)
RHS 47/5	Surface mounted post, alternatives (verge)
RHS 47/5/lA	Surface mounted post - Verge
RHS 47/5/lB	Surface mounted post - Verge, Adjustable height - Short
RHS 47/5/1C	Surface mounted post - Verge, Adjustable height - Long
RHS 47/5/1D	Surface mounted post - Central reserve, Fixed height
RHS 47/5/1E	Surface mounted post - Central reserve, Adjustable height - Short
RHS 47/5/1F	Surface mounted post - Central reserve, Adjustable height, Long
RHS 47/5/2A	Extension (Surface mounted post - used on RI-IS 47 and 45 Series)
RHS 47/5/2B	Extension (Surface mounted post - used on RHS 48 Series)
RHS 47/6	Surface mounted post, alternatives (central reserve)
RHS 48	Items List (200mm x 100mm) - (Sheet 1 of 2)
RHS 48	Items List (200mm x 100mm) - (Sheet 2 of 2)
RHS 48/1	Tensioned RHS Beam Safety Fence (200mm x 100mm)
RHS 48/1/1	Post (intermediate)
RHS 48/l/2A	Post, Driven - Verge
RHS 48/l/2B	Post, Driven - Central reserve
RHS 48/1/2C	Post, Driven - Long - Verge
RHS 48/1/2D	Post, Driven - Long - Central reserve
RHS 48/1/3	Anchorage beam
RHS 48/1/4A	Beam

SERIES RHS47 - TENSIONED RECTANGULAR HOLLOW SECTION BEAM SAFETY FENCE (100mm X 100mm) continued

Drawing No	Title
RHS 48/1/4B	Termination beam
RHS 48/1/5	End post
RHS 48/1/6A	Strap - Verge
RHS 48/1/6B	Strap - central reserve
RHS 48/1/7	Connection piece (200 x 100 RHS to Single Sided Open Box Beam)
RHS 48/1/8	Connection Piece (200 x 100 RHS to Double Sided Open Box Beam)
RHS 48/2	Expansion joint box anchorages - Bridges (central reserve)
RHS 48/2/1	Expansion joint anchorage - Socketed (central reserve)
RHS 48/2/2	Expansion joint anchorage - Bolted (central reserve)
RHS 48/2/3	Sleeve
RHS 48/3	Expansion joint anchorages - Bridges (verge)
RHS 48/3/1	Expansion joint anchorage - Socketed (approach and departure - verge)
RHS 48/3/2	Expansion joint anchorage - Bolted (approach and departure - verge)
RHS 48/4	Connections adjacent to bridge piers (verge and central reserve)
RHS 48/4/1	Post (intermediate)
RHS 48/4/2A	Post, Driven - Verge
RHS 48/4/2B	Post, Driven - Central reserve
RHS 48/4/3A	Clamp strap - Verge
RHS 48/4/3B	Clamp strap - Central reserve
RHS 48/4/4	Clamp strap (mounting bracket)
RHS 48/4/5	Mounting bracket (bridge pier or parapet)
RHS 48/4/6	Post section profile, (110 x SO)
RHS 48/5	Connection to steel parapet
RHS 48/5/1	Connection piece (beam to steel parapet)
RHS 48/6	Connection to BACO parapet
RHS 48/6/1	Anchorage frame (departure and approach)
RHS 48/6/2A	Top Beam - Departure
RHS 48/6/2B	Top Beam - Approach
RHS 48/6/3	Connector bolt, (M20 x 130)
RHS 48/6/4	Nut, (M20)
RHS 48/7	Connection to BACO Parapet (Alternative)
RHS 48/7/lA	Parapet Connection Beam (BACO inclined, departure)
RHS 48/7/lB	Parapet Connection Beam (BACO Inclined, approach)
RHS 48/7/2	Parapet Connection Bean (BACO Vertical)
RHS 48/8	Connection to ASE Parapet
RHS 48/9	Connection to ASE Parapet (Alternative)
RHS 48/10	Tensioner assembly
RHS 48/10/1A	Beam - Long
RHS 48/10/lB	Beam - Short
RHS 48/10/2	Cover
RHS 48/l0/3A	Nut - M56 (Right hand)
RHS 48/l0/3B	Nut - M56 (Left hand)
RHS 48/11	Surface mounted post alternatives (Verge)
RHS 48/11/1A	Surface mounted post (Verge)
RHS 48/11/1B	Surface mounted post (Adjustable height - Long)
RHS 48/12	Surface mounted post alternatives (Central reserve)
RHS 48/13	Surface mounted post alternatives (Side mounted - Verge)
RHS 48/13/lA	Surface mounted post - Side mounted (Verge)
RHS 48/13/lB	Surface mounted post - Side mounted (Verge, Adjustable height - Short)
RHS 48/13/1C	Surface mounted post - Side mounted (Verge, Adjustable height - Long)
RHS 48/13/1D	Surface mounted post - Side mounted (Central reserve)
RHS 48/13/1E	Surface mounted post - Side mounted (Central reserve, Adjustable height - Short)
RHS 48/13/1F	Surface mounted post - Side mounted (Central reserve, Adjustable height - Long)
RHS 48/l3/2A	Extension - Surface mounted post - Side mounted - (Verge)
RHS 48/13/2B	Extension - Surface mounted post - Side mounted - (Central reserve)
RHS 48/14	Surface mounted post alternatives (Side mounted - Central reserve)

SERIES WR - NOT USED

SERIES PTE - POST FOUNDATION TESTING EQUIPMENT

Drawing No	Title
PTE	Items List
PTE 01	Isometric assemblies
PTE 02	Post box, Sub-assembly, (100 x 32)
PTE 03	Post box, Sub-assembly, (110 x 50)
PTE 04	Post box, Sub-assembly, (125 x 90)
PTE 05	Jacking pad, Sub-assembly, (Timber 150 x 150)
PTE 06	Cylinder assembly alternatives
PTE 07	Hydraulic assembly
PTE 08	Datum tripod
PTE 09	Test procedure for 100 x 32 and 110 x 50 ‘z’ Section steel posts
PTE 10	Test procedure for 125 x 90 ‘z’ Section steel and 150 x 150 timber posts
	Form PTE/Rev A Safety Fence Post Foundation Test Results

SERIES ATR 53- ANCHORAGE TEST RIG

Drawing No	Title
ATR 53	Items List
ATR 53/1	Anchorage Test rig
ATR 53/l/1	Frame
ATR 53/1/2	Leg
ATR 53/1/3	Road
ATR 53/l/4	Nut
ATR 53/1/5	Top plate
ATR 53/1/6A	A Anchor plate - M20
ATR 53/1/6B	B Anchor plate - M24
ATR 53/1/6C	C Anchor plate - M30
ATR 53/1/7	Pressure gauge calibration dial
ATR 53/1/8	Handwheel
ATR 53/1/9	Locking pin

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

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

None

SERIES SB –

SERIES EOB38 –

SERIES RHS47 –

SERIES RHS48 –

SERIES WR –

SERIES PTE –

SERIES ATR 53 –

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

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

None

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

Details of the Testing to be carried out by the Developer is shown below in Table 1/5. Where indicated below that a Test Certificate is required it is acceptable to supply this for sampling and associated tests carried out previously, provided the Certificate is not more than 12 months old. In these circumstances the Developer will not be required to carry out any Testing.

Notes:

1. Tests equivalent to those specified in this Appendix will be necessary for any equivalent work, goods or materials proposed by the Developer (see Sub-clause 105.4).

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

3. 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.

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

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

6. Sampling and testing will be carried out by the Developer to the frequency stated below and the Developer's rates for the work shall include for this. **All tests must be carried out by a Laboratory which has UKAS accreditation for that specific test**.

7. The Developer shall allow the Local Roads Authority's Representative every reasonable opportunity and facility to inspect and monitor the sampling and testing processes. The Developer shall notify the Local Roads Authority's Representative of who, where and when samples and testing are being carried out and be able to demonstrate that the UKAS accreditation required above is being complied with.

TABLE 1/5: Testing to be carried out by the Developer

Clause	Work Goods or Material	Test	Frequency of Testing	Test Cert.	Comment
Series 500					
501	Pipes for drainage and service ducts				Product Certification Scheme applies
	Vitrified Clay				Product Certification Scheme applies
	Precast Concrete				
	U.P.V.C				
	Ductile Iron				
	Other Materials				BBA Certification applies
503	Pipe Bedding	Grading (N)	1 per 500 tonnes	Required.	Source Approval.
		Soluble Sulphate Content (N)	1 per source	Required.	
		10% fines value (N)	1 per source	Required.	
505	Filter Material (Exc. Type B)	Plastic Index (N) Grading Permeability (N)	1 per source. 1 per 500 tonnes. 1 per source.	Required. Required. Required.	Source Approval.
507	Chambers Manhole Steps,				Product Certification Scheme applies
	Covers, Grates and Frames				Product Certification Scheme applies
	Cover Bolts				Quality management scheme applies
508	Gullies				Product Certification Scheme applies
513	Permeable backing to structures	Plastic Index (N) (Grade 7A only)	1 per source	Required	

Clause	Work Goods or Material		Test	Frequency of Testing	Test Cert.	Comment
Series 600						
601	Acceptable material				Required Required Required Required Required Required	
	Class	General Description				
	1	General Granular Fill	Grading/uniformity coefficient	Twice a week		
			mc/MCV (N)	2 per 1000m3		
	2	General Cohesive Fill	Grading	Twice a week		
			mc/MCV/PL Undrained shear strength	2 per 1000m3		
	5	Topsoil	Grading (N)	1 per source	Required	
	6	Selected granular fill	Grading (N) Sulphate Content (N) Mc/MCV (N)	1 per 400 tonnes weekly 1 per 400 tonnes	Required Required Required	
612	Compaction of fill					
	Method Compaction		Field Dry Density (N)	Minimum – each class of material as required		
	End Product compaction		Optimum mc (2.5kg rammer/vibrating hammer method) (N)	Each class or sub class of material		
618	Topsoiling and grass seeding		Rate of spread of fertiliser	1 per 1000 square metres	As required by Local Roads Authority's Representative	
			Rate of spread of seeding			

Clause	Work Goods or Material	Test	Frequency of Testing	Test Cert.	Comment
Series 800					
803	Granular Sub-base material Type 1	Frost Heave (N) 10% fines value (N) Soundness (N) Grading (N) Moisture Content	1 per source 1 per source 1 per source 1 per 250 tonnes (min 1 per day) 1 per source	Required. Required Required Required Required	
804	Granular Sub-base Material Type 2	Frost Heave (N) CBR (N) OMC/mc (N) 10 % fines value Soundness (N) Grading (N)	1 per source 1 per source 1 per source 1 per source 1 per source 1 per 250 tonnes (min 1 per day)	Required Required Required Required Required Required	
Series 900					
903 to 914, 916 925	Aggregates for bituminous materials				
926, 930	Hardness	10% fines value (N)	1 per source	Required	
932 to 934		Impact Value (N)	1 per source	Required	
970	Durability	Soundness (N)	1 per source	Required	
		Water Absorption (N)	1 per source	Required	
	Cleanness	Sieve test (mass passing 75μm sieve)(N)	Monthly	Required	Washing and sieving method to be used
	Crushed rock	Flakiness Index (N)	Monthly	Required	
	Coarse aggregate for wearing courses	PSV (N) AAV (N)	1 per source 1 per source	Required Required	

Clause	Work Goods or Material	Test	Frequency of Testing	Test Cert.	Comment
	Bituminous Mixtures	Grading (N) Binder Content (N) Temperature (N)	1 per 200 tonnes (min 1/day) 1 per 200 tonnes (min 1/day) Every Load	Required Required Required	
911	Rolled asphalt wearing course (design mix)	Stability Value (N) Flow Value (N) Density (N) Grading (N) Binder Content (N) Temperature (N)	1 per source 1 per source 1 per source 1 per 200 tonnes (min 1/day) 1 per 200 tonnes (min 1/day) Every Load	Required Required Required Required Required Required	
915, 925	Coated Chippings	Flakiness Index (N) PSV (N) AAV (N) Grading (N) Binder Content (N) Hot Sand Test (N) BS 598	1 per source 1 per source 1 per source 1 per 25 tonnes (min 1/day) 1 per 25 tonnes (min 1/day) 1 per 25 tonnes (min 1/day)	Required Required Required Required Required Required	
Series 1100					
1101	Precast concrete kerb channels edgings and quadrants	Transverse Strength (N) Water Adsorption (N) Dimensions (N)	3 per 1000 units 3 per 1000 units 3 per 1000 units	Required Required Required	
1104	Precast concrete slabs	Transverse strength (N) Water Absorption (N) Dimensions (N)	3 per 1000 units 3 per 1000 units 3 per 1000 units	Required Required Required	Product Certification Acceptable
	Bedding	Granular Material	Grading (N)	1 per source	
		Mortar	Cement Content (N)	1 per 500m²	

Clause	Work Goods or Material	Test	Frequency of Testing	Test Cert.	Comment
Series 1200					
1202	Permanent traffic signs				Certification that the traffic sign is capable of passing the tests in BS 873: Part 1 is required
1207	Anchorages in drilled holes to supports of traffic signs	Loading Test on Site			
1210	Holding down bolts and anchorages to base of permanent bollards				Certification that the holding down bolts and anchorages are capable of complying with the performance requirements of BS 873: Part 3 is required
1212	Thermoplastic road marking materials	Tests specified in BS 3262 Part 1 (N)			Quality management and product certification schemes apply. Sampling procedures are given in BS3262: Part 1
	Pavement marking paints			Required (BS 6044)	Quality management and product certification schemes apply.
1214	Permanent traffic cones and traffic cylinders			Required	Certification that permanent traffic cones and cylinders have been tested and comply with BS 873: Part 8 is required.
		Tests specified in BS 873: Part 8	2 of each size and category / type.		
	Other traffic delineators			Required	Certification that the delineators have been tested and comply with Clause 1214 is required.

Clause	Work Goods or Material	Test	Frequency of Testing	Test Cert.	Comment
Series 1400					
1421	Cable				Product Certification scheme applies
1424	Lighting Units and Networks	Test Specified in Clause 1424	Each Unit Each Network	Required	Cert. Installation complies with I.E.E. wiring regulations
Series 1700					
1702 1703 1704	Cement: - Portland			Required (BS 12)	Certificate to be provided annually for each type of cement. Quality management and produce certification schemes apply
	Cements (all types)	Chloride content	1 per source		Tests to be carried out by the manufacturer and results included on the test certificates required above
	Aggregates	Grading	1 per source		Results of routine control tests by the supplier to be provided. Product certification scheme applies.
	Admixtures	Chloride content. Sulphate Content. Acid-soluble alkali content.	1 per consignment 1 per consignment 1 per consignment	Required (BS 5075)	Product certification scheme applies.
1707	Concrete	Cube Strength (N)	As required in accordance with Clause 1707.2	Required.	
	Fresh Concrete	Air Content Mix Workability	Every Batch Every Batch	Required.	

Clause	Work Goods or Material	Test	Frequency of Testing	Test Cert.	Comment
1711	Grout	Bleeding Free expansion Cube strength	1 per mix 1 per mix 3 cubes from each batch		Only applicable if an expanding agent is used
	Admixtures			Required (BS 5075)	
1712	Reinforcement				
	Steel bars			Required (BS 4449)	Product certification scheme applies
	Steel wire			Required (BS 4482)	
	Steel fabric			Required (BS 4483)	

APPENDIX 1/6: SUPPLY AND DELIVER OF SAMPLES TO THE LOCAL ROADS AUTHORITY'S REPRESENTATIVE

1. Not withstanding the Developer's obligations under Appendix 1/5 during the construction period, irrespective of whether or not it is intended that the road(s) be subsequently adopted as public, the Local Roads Authority's Representative must be afforded access to the site to ensure that the works are being undertaken in conformity with the Construction Consent. The Developer and/or is Contractor shall provide every facility to enable the Local Roads Authority's Representative to examine the works being executed and the materials being used.

2. They shall supply, free of cost, samples of the various material to be used together with particulars as to the source of supply or manufacture of such materials.

3. Any costs incurred by the Local Roads Authority in undertaking the sampling or testing of any materials will be recovered from the Developer, in accordance with the terms of Section 140(6) of the Roads (Scotland) Act 1984

APPENDIX 3/1: FENCING, GATES AND STILES

General

1. Fencing and gates shall generally comply with the requirements of BS 1722 and BS 3470 respectively and with the Highway Construction Details.

APPENDIX 4/1: SAFETY FENCES AND SAFETY BARRIERS

1. The locations of safety fences and barriers are to be shown on the Consent drawings.

2. Fabrication and erection requirements for safety fences are shown on the following Series of Drawings.
Appendix 0/4 gives the full list of these Drawings:

Tensioned Corrugated Beam (TCB) Safety Fence	HCD: Section 2, GA and SF Series
Open Box Beam (OBB) Safety Fence	HCD: Section 2, GA and SF Series
Double Rail/Single Sided Open Box Beam (DROBB) Safety Fence	
Untensioned Corrugated Beam (UCB) Safety Fence	HCD: Section 2, GA and SF Series
Combined Open Box Beam (OBB) Safety Fence and Environmental Barrier	HCD: Section 2, EOB 38 Series
Rectangular Hollow Section (RHS) Safety Fences	HCD: Section 2, RHS47 and RHS48 Series

APPENDIX 4/2: PEDESTRIAN GUARDRAILS

1. All pedestrian guardrails shall comply with the requirements of BS 7818:1985. The guardrails shall be designed to a minimum of Class 2 with infill to a minimum of Class B.

2. All pedestrian guardrails shall have full height vertical infill. Infill shall be designed in such a manner as to provide adequate visibility as detailed in BS 7818:1985 Annex B 2.5.

3. Posts are to be of a bolt down type and fitted in accordance with the manufactures instructions.

APPENDIX 5/1: DRAINAGE REQUIREMENTS

Surface Water Drains – Materials

1. Surface water drains the following pipes meeting the requirements of Table 5/1 will be permitted.
   (i) Vitrified clay
   (ii) Precast concrete
   (iii)Unplasticised P.V.C.
   (iv)Ductile iron
   (v) Polypropylene (with BBA Roads and Bridges Certificate)

   For plastic pipes the Ultimate Pipe Stiffness (STES) value shall be 1400 Pa

Surface Water Drains – Bedding

2. With reference to Drawing F1 bed types A,B,F,N, and S are for use with rigid pipes and S and T with flexible pipes.

Filter Drains

3. The material meeting the requirements for (1) above will be acceptable as listed below in Table 5/1 below: -

TABLE 5/1:Filter Drains		
Drain Design Group	Group Cross section type Refer to HCD Drawing F2	Special Requirements
1	G, H, I	N/A
2	J, K	N/A
3	L, M	N/A

Groups 4, 5 and 6 as per Groups 1, 2 and 3 but with pipe lengths to suit radii of less than 40 metres.
Group 7 as per Group 1 except that the Type B material above sub-base shall be replaced with Type A material.
Group 8 Agriculture field drain.

Polythene Wrap

4. Where the design group has the suffix A or B the drain shall have a Polythene surround as detailed in Drawing F86.

Geotextile Wrap

5. Where the design group has the suffix C or D the drain shall have a Geotextile 'wrap' as per Drawing F86.

Gully Connections

6. In addition to material meeting 1 above, the use of flexible corrugated plastic pipes will be permitted provided it is surrounded with 150mm ST2 concrete and its use restricted to under verges etc.

Manholes

7. All manholes rings will require to be sealed with 'Toxstrip' or equivalent.
8. All manhole covers shall open such that an operative will have an unobscured view of the oncoming traffic when entering or leaving the manhole.
9. On heavily trafficked routes the Local Roads Authority's Representative may specify the use of Class D400 (complying with BS EN 124:1994) manhole covers, 150mm deep.

Testing of Pipes

10. All pipes to be 'mandrel' tested as directed by the Local Roads Authority's Representative.

Cover of Pipes

11. All pipes with less than 900mm cover to formation to be surrounded in concrete.

Gullies

12. Where the design indicates a new gully being connected to an existing gully connection, the Work shall include for demolishing the redundant gully, making good the connection to the existing pipe, including trimming the ends etc. and any additional backfilling required to fill the void formed by the removal of the gully.

Adjustment of Iron Work

13. Adjustment, renewal, etc. of manhole covers, gully frames, surface boxes, tobies, etc. shall be carried out immediately prior to commencing the wearing course, and shall be ramped or protected, where necessary, if the road is open to the public.
14. Manholes, surface boxes, tobies, etc. shall be set flush with the adjoining finished surface. Care shall be taken to remove old mortar and the frames shall be bedded on 2:1 cement mortar on top of additional engineering brick, as necessary, finished in a header course.
15. An epoxy resin mortar of an approved type shall be used where traffic is required to run over the cover within seven days of execution. The use of Polyester type mortars will be permitted, provided the thickness of any layer does not exceed 12mm.
16. Gullies shall be set 6mm below the level of adjoining surface and shall be bedded as above. If it is intended that the road shall be used before the wearing coarse is laid, the Developer shall leave the gully gratings at a suitable level to permit drainage and shall raise them to their final level at his expense prior to the wearing course being laid. Care should be taken to seal the space between the gully grating and the kerb with an approved bitumen material, or as directed by the Local Roads Authority's Representative.
17. Adjustment to levels of surface boxes will be made using standard precast concrete units.
18. Where standard precast rings have been used to form manholes or catchpits, a maximum of five courses of brick (old and new) will be allowed. Greater adjustment will require the installation of a new precast ring similar to existing rings.

Revision of Standards

20. Further to the requirements of Appendix F all manhole, gully frames and gratings shall comply with the requirements of BS EN 124:1994. The following will therefore apply: -

    (ii) All standard manholes, gully frames and gratings (which were previously specified as Class A) will require to be Class D400 complying with BS EN 124:1994 and have third party accreditation.

    (ii) Heavy duty manhole covers (which were previously specified as grade D) will require to be Class D400 manhole covers, 150mm deep, weight 150 Kg, complying with BS EN 124:1994 and having third party accreditation.

APPENDIX 5/2: SERVICE DUCT REQUIREMENTS

General

1. Ducts for Street Lighting, Illuminated Traffic signs and Traffic Signals will be 100mm U.P.V.C. laid on a bed type T as shown on H.C.D. Drawing No F1.

2. Unless otherwise indicated by the appropriate statutory undertaker, ducts shall be bedded on a bed Type T as shown on H.C.D. Drawing No F1 or similar.

3. The appropriate marking tape shall be placed 150mm above all cables and ducts laid for services.

Protection Requirements

4. Where shown on the drawings or as directed by the Local Roads Authority's Representative existing services affected by the works shall be protected by either covering with a minimum of 150mm of ST2 concrete or to the requirements of the appropriate authority prior to backfilling.

Colour of Ducts / Pipes

5. The colour of ducts will generally be as required by the authority. The following shall apply unless otherwise stated: -

(i)	Road Lighting including Traffic Bollards and Signs	Purple
(ii)	Traffic Signals	Orange
(iii)	British Telecom	Grey
(iv)	Scottish and Southern Energy	Black
(v)	Scottish Water	Blue
(vi)	Transco	Yellow

APPENDIX 5/5: COMBINED DRAINAGE AND KERB SYSTEMS

General Requirements

1. Typical details of combined drainage and kerb blocks are indicated on Drawings No F75, F76, F77, F78 and F79.

2. Blocks shall generally comply with the above and the following requirements:

   (i) Water inlet slots shall be either continuous slots, or discrete apertures with entry areas (measured in the vertical plane) of not less than $0.0075m^2$ and not less than $0.015m^2/m$ length.

(ii) Minimum waterway areas shall be 0.075m^2 for one part blocks or the combined parts of two blocks and shall be 0.04m^2 for the lower part of two blocks.

(iii) Discharge openings shall be circular and of a 225mm minimum diameter or shall be elliptical of minimum area 0.05m^2.

3. The junctions, accesses and other fittings completing the drainage block system shall be approved and designed in accordance with the drainage requirements.
4. The blocks shall be laid as described in Series 1100. Vertical joint faces shall be sealed with approved trowel applied mastic sealing compound.

5. Horizontal joint faces of two part blocks shall be interlocking and shall allow for Class 1 bedding mortar of depth 20 +/- 5mm.

APPENDIX 5/6: LINEAR DRAINAGE CHANNEL SYSTEMS

General Requirements

1. Typical details of linear drainage channel systems are indicated on Drawings No F87, F88 and F89.

2. Channel systems shall generally comply with the above.

3. The channels shall be laid as described in Series 1100.

4. Class of concrete bedding/ surround are as indicated on Drawings No F87 and F88. For proprietary footways crossings as detailed in Drawing No F89 the bedding shall be 100mm deep concrete ST1 under the area of the channel.

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

Permitted Classes of Material

1. General Fill – Imported: Class 1A

2. The Developer shall demonstrate the acceptability of both imported fill material and fill material arising from, and for use in, the site. The Developer shall submit test results, the relevant tests being listed in Appendix 1/5, to the Local Roads Authority's Representative.

2. The MCV of acceptable material shall be > 8.5.

4. In general all materials arising from excavation work shall be deemed as class U1 unacceptable.

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

1. All materials will be compacted in accordance with Clause 612

APPENDIX 6/5: GEOTEXTILES USED TO SEPARATE EARTHWORKS MATERIALS

General

1. Where a Geotextile is to be used as a separator under fill it shall be laid on top of the subgrade.

Geotextile

2. The Geotextile shall be manufactured from synthetic fibres and have a minimum life expectancy of 40 years.

   The geotextile shall sustain a tensile load of not less than 10 Kn/m and shall have a minimum axial strain of 20% at failure. It shall also have a minimum water flow at right angles to its principal plane in either direction of 50 litres/sqm/sec.

Installation

3. The geotextile shall be laid from rolls in a longitudinal direction along the line of the road. Jointing shall be by lapping only. Physical jointing will not be permitted. The lap width shall be 500mm minimum.

Drawings

4. The locations where geotextiles are to be used in separation layers should be clearly shown on the appropriate drawings

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

General

1. Details of the locations where Capping is required should be clearly shown on the appropriate drawings.
2. Allowable surface level tolerance shall be as per Clause 616.
3. Capping shall be constructed with either Class 6F1 or 6F2 material as detailed in Table 6/1
4. The material shall be compacted at a moisture content within the range specified in Table 6/1.
5. The C.B.R. value of the material shall be greater than 15%.

APPENDIX 6/8A: TOPSOILING, GRASSING AND SEEDING (GENERAL ROADSIDE AREAS)

Grass Seed

1. Grass seed shall be a tested mixture from an approved source and certificates of purity and germination shall be provided. All varieties of grass used shall be dwarf turf type cultivars currently listed by the Sports Turf Research Institute, Bingley. Unless otherwise agreed by the Local Roads Authority's Representative the mixture shall consist of the flowing mixture (or equivalent) parts by mass as specified in Table 6/8A.

TABLE 6/8A

Type	Mass
Lorina Perennial Reygrass (Certified dwarf on National List)	60.0
Logo Slender Creeping Red (Certified dwarf on National List)	35.0
Highland Browntop Bent (Certified dwarf on National List)	5.0
	100.0 Kg
(British Seed Houses A22 or Equivalent) Grass to be sown at a rate of 25g/sq.m	

Preparation for Sowing

2. Where the ground is required to lie for a period of time before sowing the Developer will use a Glyophosate chemical weedkiller to kill existing weeds etc.
3. Before commencing sowing a fertiliser as described in Clause 618.12 should be spread over the area.
4. Sowing of grass seed will generally be carried out during the season from 1 May to 30 September. The Developer will pay due regard to the weather conditions before sowing grass seed and shall take all reasonable measures to promote its growth. Immediately prior to seeding the Developer shall treat any undesirable vegetation using a weed-killer specifically formulated to eradicate this vegetation.
5. 150mm of good quality vegetable top soil shall be spread over the site and levelled. The finished level of the soil shall be 25mm above kerbs, paving or manhole covers.
6. The ground shall be cultivated to a depth of 150mm removing stones and debris over 25mm in size within the top 50mm of the topsoil. After the completion of the cultivation the Developer shall produce a seed bed of a fine tilth and even level to act as a seed bed.
7. The seed bed shall be fine, smooth and evenly formed but not over consolidated. All surplus vegetable matter, stones 25mm or over and foreign material shall be collected and removed off site to a tip. The grass seed will be sown evenly over the site; afterwards the seed will be lightly harrowed into the surface. Thereafter, the area will

be racked to remove foreign matter, stones over 25mm in size brought up by the harrow. These shall be collected and removed off site to a tip by the Developer.

8. The Contractor shall carry out measures to ensure the successful establishment and subsequent good condition of all grassed areas throughout the period of the work and Maintenance Period.
The Contractor shall spray the area with a Selective Herbicide weedkiller to control weed growth during this period.

Grass Cutting

9. When the grass is 30-40mm long it shall be inspected and the Developer will remove all surface stones which have a dimension of 25mm or more, together with any foreign material.

10. The Contractor will be responsible for cutting the grass during the period of the works and throughout the Maintenance Period. During the cutting season the first cut shall be made when the grass is 50mm high and after this cut the grass shall be no longer than 25mm high. Thereafter the grass shall be cut regularly so that at no time does it exceed 60mm in height.

11. Grassed area will be accepted as reaching practical completion only when germination has proved satisfactory and the grass is showing an even sward. The Developer shall remove and replace any areas which are not in a healthy condition.

APPENDIX 6/8B: TOPSOILING, GRASSING AND SEEDING (UPLAND AREAS – GENERAL ROADSIDE AREAS)

Grass Seed

1. Grass seed shall be a tested mixture from an approved source and certificates of purity and germination shall be provided. All varieties of grass used shall be dwarf turf type cultivars currently listed by the Sports Turf Research Institute, Bingley. Unless otherwise agreed by the Local Roads Authority's Representative the mixture shall consist of the flowing mixture (or equivalent) parts by mass as specified in Table 6/8B.

TABLE 6/8B (Peat Soils)	
Type	Mass
Perennial Reygrass	10.0
Creeping Red Fescue	70.0
Flattened Meadow Grass	12.5
Browntop Bent	5.0
White Clover	2.5
	100.0 Kg
(British Seed Houses A18 or Equivalent) Grass to be sown at a rate of 25g/sq.m	

Preparation for Sowing

2. Where the ground is required to lie for a period of time before sowing the Developer will use a Glyophosate chemical weedkiller to kill existing weeds etc.

3. Before commencing sowing a fertiliser as described in Clause 618.12 should be spread over the area.

4. Sowing of grass seed will generally be carried out during the season from 1 May to 30 September. The Developer will pay due regard to the weather conditions before sowing grass seed and shall take all reasonable measures to promote its growth. Immediately prior to seeding the Developer shall treat any undesirable vegetation using a weed-killer specifically formulated to eradicate this vegetation.

5. 150mm of good quality vegetable top soil shall be spread over the site and levelled. The finished level of the soil shall be 25mm above kerbs, paving or manhole covers.
6. The ground shall be cultivated to a depth of 150mm removing stones and debris over 25mm in size within the top 50mm of the topsoil. After the completion of the cultivation the Developer shall produce a seed bed of a fine tilth and even level to act as a seed bed.
7. The seed bed shall be fine, smooth and evenly formed but not over consolidated. All surplus vegetable matter, stones 25mm or over and foreign material shall be collected and removed off site to a tip. The grass seed will be sown evenly over the site; afterwards the seed will be lightly harrowed into the surface. Thereafter, the area will be racked to remove foreign matter, stones over 25mm in size brought up by the harrow. These shall be collected and removed off site to a tip by the Developer.
8. The Contractor shall carry out measures to ensure the successful establishment and subsequent good condition of all grassed areas throughout the period of the work and Maintenance Period.
   The Contractor shall spray the area with a Selective Herbicide weedkiller to control weed growth during this period.

Grass Cutting

9. When the grass is 30-40mm long it shall be inspected and the Developer will remove all surface stones which have a dimension of 25mm or more, together with any foreign material.
10. The Contractor will be responsible for cutting the grass during the period of the works and throughout the Maintenance Period. During the cutting season the first cut shall be made when the grass is 50mm high and after this cut the grass shall be no longer than 25mm high. Thereafter the grass shall be cut regularly so that at no time does it exceed 60mm in height.
11. Grassed area will be accepted as reaching practical completion only when germination has proved satisfactory and the grass is showing an even sward. The Developer shall remove and replace any areas which are not in a healthy condition.

APPENDIX 6/8C: TOPSOILING, GRASSING AND SEEDING (AMENITY AND LANDSCAPED AREAS)

Grass Seed

1. Grass seed shall be a tested mixture from an approved source and certificates of purity and germination shall be provided. All varieties of grass used shall be dwarf turf type cultivars currently listed by the Sports Turf Research Institute, Bingley. Unless otherwise agreed by the Local Roads Authority's Representative the mixture shall consist of the flowing mixture (or equivalent) parts by mass as specified in Table 6/8B.

TABLE 6/8C

Type	Mass
Perennial Reygrass (mad up of four varieties	40.0
Chewing Fescue	20.0
Creeping Red Fescue	35.0
Browntop Bent	5.0
	100.0 Kg

Grass to be sown at a rate of 40g/sq.m

Preparation for Sowing

2. Where the ground is required to lie for a period of time before sowing the Developer will use a Glyophosate chemical weedkiller to kill existing weeds etc.
3. Before commencing sowing a fertiliser as described in Clause 618.12 should be spread over the area.
4. Sowing of grass seed will generally be carried out during the season from 1 May to 30 September. The Developer will pay due regard to the weather conditions before sowing grass seed and shall take all reasonable measures to promote its growth. Immediately prior to seeding the Developer shall treat any undesirable vegetation using a weed-killer specifically formulated to eradicate this vegetation.
5. 150mm of good quality vegetable top soil shall be spread over the site and levelled. The finished level of the soil shall be 25mm above kerbs, paving or manhole covers.
6. The ground shall be cultivated to a depth of 150mm removing stones and debris over 25mm in size within the top 50mm of the topsoil. After the completion of the cultivation the Developer shall produce a seed bed of a fine tilth and even level to act as a seed bed.
7. The seed bed shall be fine, smooth and evenly formed but not over consolidated. All surplus vegetable matter, stones 25mm or over and foreign material shall be collected and removed off site to a tip. The grass seed will be sown evenly over the site; afterwards the seeed will be lightly harrowed into the surface. Thereafter, the area will be racked to remove foreign matter, stones over 25mm in size brought up by the harrow. These shall be collected and removed off site to a tip by the Developer.
8. The Contractor shall carry out measures to ensure the successful establishment and subsequent good condition of all grassed areas throughout the period of the work and Maintenance Period.
   The Contractor shall spray the area with a Selective Herbicide weedkiller to control weed growth during this period.

Grass Cutting

9. When the grass is 30-40mm long it shall be inspected and the Developer will remove all surface stones which have a dimension of 25mm or more, together with any foreign material.
10. The Contractor will be responsible for cutting the grass during the period of the works and throughout the Maintenance Period. During the cutting season the first cut shall be made when the grass is 50mm high and after this cut the grass shall be no longer than 25mm high. Thereafter the grass shall be cut regularly so that at no time does it exceed 60mm in height.
11. Grassed area will be accepted as reaching practical completion only when germination has proved satisfactory and the grass is showing an even sward. The Developer shall remove and replace any areas which are not in a healthy condition.

APPENDIX 6/9: EARTHWORKS, ENVIRONMENTAL BUNDS, LANDSCAPE AREAS, STRENGTHEND EMBANKMENTS

Landscaped Areas – General

1. Where landscaping is required to be carried out the Developer will clearly indicate these on the Consent drawings.

Topsoiling

2. Where areas are to be planted with shrubs etc. they shall be topsoiled to a thickness of 300mm in accordance with the requirements of Appendix 6/8C.

Ground Cultivation – Shrubs

3. Where the ground is required to lie for a period of time before planting the Developer use a Glyophosate chemical weedkiller to kill existing weeds etc.

4. Prior to planting the ground shall be cultivated to a depth of 300mm removing stones and debris over 50mm in size.

5. Shrubs shall be planted in beds as indicated in the Consent Drawings. Each shrub shall be planted at the same depth as it was grown in the Nursery, fertiliser shall be applied to each shrub at a rate of 50gms per shrub.

APPENDIX: 7/1: PERMITTED PAVEMENT OPTIONS

1. **Location**: ***All adoptable roads***

2. **Grid for checking surface levels of pavement course**

Longitudinal dimensions – 10 metres.
Transverse dimension - 2 metres.

Table 7/1: Tolerances in Surface Levels of Pavement Courses

Road Surfaces - general - adjustment to surface water channel	 +/- 6mm + 10 – 0 mm
Binder Course	+/- 6mm
Top surface of base in pavements without Binder course	+/- 8mm
Base other than above	+/- 15mm
Sub-base under concrete pavements surface slabs laid full thickness in one operation by machines with surface compaction	+/- 10mm
Sub-base	+10 -30mm

3. **Surface regularity**

Compliance with the surface regularity will be checked in accordance with Clause 702 for a Category A road.

Table 7/2: Maximum Permitted Number of Surface Irregularities

	Surfaces of carriageways, hard strips and hard shoulders				Surfaces of lay-bys, service areas, all bituminous binder courses and top surface of base in pavements without binder courses			
Irregularity	4mm		7mm		4mm		7mm	
Length	300	75	300	75	300	75	300	75
Category A Road	20	9	2	1	40	18	4	2
Category B Road	40	18	4	2	60	27	6	3

4. **Texture Depth**

Unless otherwise agreed, in writing, with the Local Roads Authority's Representative all roads with a speed limit greater than 50mph will be deemed to require texture depth as specified below: -

Texture depth >= 1.5mm average and >= 1.2mm individual.
Texture depth will be measured in accordance with Clause 921.1.

5. **PRD Testing**

The requirements of the PRD test are omitted from the guide.
The compaction of base and surfacing materials to be carried out in accordance with the appropriate British Standard.

6. **Remedial Works**

The Developer will be required to carry out remedial works within a 2 week period if there is any standing water on a carriageway, footway, cycletrack, or footpath constructed, reconstructed or reinstated under the Consent.

SURFACE COURSE

7. Rolled Asphalt Surface Course (Recipe Mix) Clause 910
   i) Pen of Binder: 85 pen
   ii) Reference: BS 594 Part 1 Table 6 Column 4 Schedule 1B
   iii) Coated Chippings: Nominal size – 20mm
   Minimum PSV 60 – Distributor Roads
   50 – Residential Roads
   Maximum AAV 12
   iv) Coarse aggregate – Crushed rock
   v) Minimum air temperature for laying surface course 5°C
   Minimum delivery temperature 150 °C (45mm thickness)
   Minimum rolling temperature 80 °C

8. Rolled Asphalt Surface Course (Design Mix) Clause 911
   i) Reference: BS 594 Part 1 Table 3 Column 2 OR Table 4 Column 2
   ii) Marshall Stability: 4Kn – 10Kn
   iii) Coated Chippings: Nominal size – 20mm
   Minimum PSV 60 – Distributor Roads
   50 – Residential Roads
   Maximum AAV 12
   iv) Minimum air temperature for laying surface course 5°C
   Minimum delivery temperature 150 °C (45mm thickness)
   Minimum rolling temperature 80 °C

9. Precast Concrete Block Paving (Clause 970)
   i) Blocks to comply with BS 6717:Part 1, 80mm thick.
   ii) Precast blocks to be laid in accordance with BS 7533:Part 3.
   iii) The laying course shall be 30mm
   iv) Blocks to be laid to a herring-bone pattern

BINDER COURSE

10. Dense Bitumen macadam Binder Course (Clause 906)
   i) Reference: BS 4987 – 6.5
   ii) Pen of Binder: 125 or 190 pen

11. Rolled Asphalt Binder Course (Clause 905)
   i) Reference: BS 594 Table 2 Column 4
   ii) Pen of Binder: 85 pen

BASE

12. Dense Bitumen Macadam Base (Clause 903)
   i) Reference: BS 4987 – 5.2 (Recipe Mix)
   ii) Pen of Binder: 125 or 190 pen

13. Rolled Asphalt Base (Clause 904)
   i) Reference: BS 594 Table 2
   ii) Pen of Binder: 85 pen

REGULATING COURSES

14. Asphalt Regulating (Sand Carpet)
    i) Reference: BS 594 Part 1 Table 3, Column 11
    ii) Pen of binder: 50/70 pen

NOTE: Recommended for regulating in layers from 10 to 25mm.

15. Rolled Asphalt Binder course in Regulating
    i) Reference: BS 594 Part 1 Table 2, Column 3
    ii) Pen of binder: 70 pen

NOTE: Recommended for regulating in layers from 45 to 80mm

16. Dense Bitumen Macadam Binder course in Regulating (Clause 906)
    i) BS 4987 – 6.5
    ii) Pen of binder – 100/200 pen

NOTE: Recommended for regulating in layers from 50 to 80mm

17. Dense Bitumen Macadam Base in Regulating
    i) BS 4987 – 5.2
    ii) Pen of binder – 100/200 pen

NOTE: Minimum thickness of regulating layer – 55mm.

SUB-BASE

18. Sub-Base
    i) Sub-base Type 1
    ii) Minimum (C.B.R. – 30%)
    iii) Frost Heave in accordance with BS 812: Part 124

APPENDIX 7/2: EXCAVATION, REPAIR AND REINSTATEMENT OF EXISTING SURFACES

1. The location of trenches, pits etc, which require to be excavated in the existing paved surface in order to carry out the Works to be shown on the Consent drawings.

2. The location and estimated areas of existing paved areas which require to be trimmed, regulated and reinstated to match levels where new and existing pavements abut to be shown on the Consent drawings.

General

3. All permanent patching to be carried out by the Developer once full settlement of the track has taken place.

Temporary Reinstatement

4. Temporary reinstatement shall be provided if traffic is required to run over potholes or tracks either in advance of carrying out the permanent reinstatement, or if the pothole or track is in a section of the existing road which is to be reconstructed at a later date.

5. Temporary reinstatement shall be of a minimum of 50mm dense bitumen macadam surfacing.

6. The temporary reinstatement must be maintained in a safe condition with an even surface.

Permanent Reinstatement

Carriageways – Permanent reinstatement shall consist of either Types 0, 1, 2, 3, 4 or Z as specified in Table 7/2A: -

Table 7/2A: Permanent Reinstatement Types 0, 1, 2, 3, 4 & Z		
	Type 0	**Type 1**
Surface Course	40mm Rolled Asphalt	40mm Rolled Asphalt
Binder Course	310mm Dense Bitmac	260mm Dense Bitmac
Sub-Base	150mm Sub-Base	150mm Sub-Base
	Type 2	**Type 3**
Surface Course	40mm Rolled Asphalt	40mm Rolled Asphalt
Binder Course	210mm Dense Bitmac	160mm Dense Bitmac
Sub-Base	200mm Sub-Base	250mm Sub-Base
	Type 4	**Type Z**
Surface Course	40mm Rolled Asphalt	-
Binder Course	110mm Dense Bitmac	260mm Dense Bitmac
Sub-Base	300mm Sub-Base	150mm Sub-Base

Verges

7. Where it is not required to replace the turf and where the verge has not been damaged beyond the limit of the trench, the disturbed area shall be brought up to the level of the area adjoining verge by spreading topsoil to a minimum depth of 150mm. All stones shall be cleared and the area lightly rolled. The area shall be seeded in accordance with Appendix 6/8.

Footways, Footpaths and Cycletracks

8. Footways shall be reconstructed with 100mm sub-base and surfaced to match existing in accordance with Appendix 11/1.

Excavation and Reinstatement in the Vicinity of Existing Trees

9. All excavation and reinstatement works adjacent to existing trees must be carried out in accordance with the "Guidelines for Planning, Installation and Maintenance of Utility Services in Proximity to trees" published by The National Joint Utility Group.

Cutting of Existing Blacktop Surfaces

10. Where the use of "Saw Cutting" is required, a water spray should be employed to reduce the effects of dust.

APPENDIX 7/70: PREPARATION FOR SURFACING AND ADJUSTMENT OF IRONWORK

Preparation for Surfacing

1. Prior to laying surfacing material, the existing road surface shall be cleaned, brushed and free of all loose material. The surface as a whole shall be dry and be completely free of standing water and any dampness.

Adjustment of Iron Work

2. Adjustment, renewal, etc. of manhole covers, gully frames, surface boxes, and tobies, etc. shall where practicable be carried out immediately prior to laying the wearing course or regulating course, otherwise ironwork shall be ramped or protected, where necessary, if the road is open to the public.
3. Manholes, surface boxes, tobies, etc. shall be set flush with the adjoining finished surface. Care shall be taken to remove old mortar and the frames shall be bedded on 2:1 cement mortar on top of additional engineering brick, as necessary, finished in a header course.
4. An epoxy resin mortar of an approved type shall be used where traffic is required to run over the cover within seven days of execution. The use of Polyester type mortars will be permitted, provided the thickness of any layer does not exceed 12mm.
5. Existing iron work shall be wire brushed and coated with hot bitumen prior to surfacing.
1. Gullies shall be set 6mm below the level of the adjoining surface and shall be bedded as above. If it is intended that the road shall be used before the wearing course is laid, the Developer shall leave the gully gratings at a suitable level to permit drainage and shall raise them to their final level at his own expense prior to the wearing course being laid. Care should be taken to seal the space between the gully frame and the kerb with an approved material, or as directed by the Local Roads Authority's Representative.
7. Drainage channels shall be laid 3mm below the level of the adjoining surface. If it is intended that the road shall be used before the wearing course is laid, the Developer shall leave the channels at a suitable level to permit drainage and shall raise them to their final level at his own expense prior to the wearing course being laid. Care should be taken to seal the space between the channel and the kerb with an approved material, or as directed by the Local Roads Authority's Representative.
8. Adjustment to levels of surface boxes will be made using standard precast concrete units.
9. Where standard precast rings have been used to form manholes or catchpits, a maximum of five courses of brick (old and new) will be allowed. Greater adjustment will require the installation of a new precast ring similar to existing rings.

Fire Hydrants

10. The depth between the road/path surface level and the outlet flange must never exceed 450mm or be less than 300mm if the adjustment of the surface results in alteration to these dimensions. Extension pieces should be fitted between the tee and the Hydrant where necessary.
11. The Developer must ensure that Fire Hydrants are kept clear of all road-building material and that free access is available to the Fire Brigade at all times.

APPENDIX 11/1: KERBS, FOOTWAYS AND PAVED AREAS

General

1. For details of the footway, footpath, cycletrack, and kerbing detail refer to Drawing Nos. B70, B71, B72, B73, B74

2. The kerbs used for the development will meet the requirements of Clause 1170

APPENDIX 11/1 – A: FOOTWAYS AND PAVED AREAS (PRECAST CONCRETE PAVING)

General

1. All precast concrete slabs shall be hydraulically pressed complying with BS 7263 and shall be laid bedded on cement/sand mortar on Type 1 sub-base material to the thickness described.

2. Slabs shall be cut to fit round tobies, cast iron boxes, "S" covers, etc., and to suit the width of the footway or other areas being slabbed.

3. Where appropriate, a narrow strip exceeding 15mm but not exceeding 75mm in width, and not less than the depth of the slab, may be filled with insitu concrete Grade 30/20 100mm thick at the rear of the footway or as otherwise approved.

4. Where the cutting of precast concrete slabs is carried out in areas near where the public have access the Developer is reminded of the need to take measures to minimise the affects of dust.

Precast Concrete Slabs

5. Precast concrete slabs to be either 600 x 600mm or 600 x 900mm.

6. Slabs shall be laid to the required crossfalls and bedded on a 25mm thick dry 1:6 cement/sand mortar. The slabs shall be laid to a 300mm offset with joints at right angles to the kerb or as otherwise approved.

7. After laying, the joints shall be filled in with a dry 1:4.5 cement/sand mortar with the surface brushed off and removed.

8. Unless otherwise described in the Contract slabs shall be 65mm thick.

9. On sections of straight footpath only full sized slabs should be used at the front of the footpath. Cutting of slabs should be kept to a minimum and the Developer's method of working should take this into account.

Small Element Precast Concrete Paving

10. Small element precast concrete slabs shall be either 400mm x 400mm or 450mm x 450mm. They shall be laid with a joint width of 2 to 4mm and to the required crossfalls, they shall be bedded on a 25mm thick compacted layer of medium/course concreting sand. The slab shall be laid to a 200mm minimum offset with joint at right angles to the kerb.

11. After laying, sand should be spread over the joints and the slabs bedded in using a rubber based vibrating plate and sand swept over the surface until the joints are full.

12. Unless otherwise described in the Consent slabs shall be 65mm thick.

Increased Areas of Sub-Base

13. Further to the above the sub-base shall be increased to 150mm at vehicular crossings or other such thickness as may be indicated in the Consent for other areas of footway strengthening.

Paving Thickness Schedule

14. The thickness of sub-base is given in the Paving Thickness Schedule Table 11/1A.

Table 11/1A: Thickness Schedule Precast Concrete Paving (mm)		
	Precast Contract Slabs	Small element Precast Concrete Slabs
Sub-base	100	150
Binder Course	25 6/1 Sand/Cement mix	25 course sand
Surface Course	65 slab, jointing sand as required	65 slab, jointing sand as required

APPENDIX 11/1 – B: FOOTWAYS AND PAVED AREAS (FLEXIBLE CONSTRUCTION)

General

1. The flexible surfacing shall be laid in accordance with the appropriate British Standard except that it shall be compacted by using a roller of between 1.5 and 3 tonnes weight.

2. The finished depth of the wearing course shall not deviate by more than 5mm from the depth specified in the Contract.

3. The finished footway, footpath, or cycletrack shall not deviate from the specified level more than +/- 6mm.

4. The whole footway, footpath, or cycletrack surface will be checked for surface regularity and shall have no irregularity exceeding +/- 5mm in 3 metres.

5. For checking compliance with the requirement transversely to the kerb on widths less than 3 metres, no irregularities shall exceed +/- 5mm on a straight edge laid across the full width of the new surface.

6. Surfaces out of tolerance shall have the full depth of the layer cut out and replaced with new material. The width shall be the footway width, and the minimum length to be removed shall be 2.0 metres

Types of Flexible Construction

7. DESIGN GROUP A - Single Coat Bitumen Macadam Surfacing (14mm nominal).

   i) Surfacing - Close Graded Surface course (14mm nominal) Crushed Rock Aggregate. Group Three 7.3 (BS 4987 Part 1).

   ii) Sub-base - Sub-base Type 1 or Type 4.

8. DESIGN GROUP B - Two Coat Bitumen Macadam Surfacing.

   i) Wearing Course - Dense Surface Course (6mm nominal). Crushed Rock Aggregate - Group Three 7.5 (BS 4987 Part 1).

ii) Base Course - Open or Close Graded Surface Course (14mm nominal Group Three 7.1 or 7.3 (BS 4987 Part 1).

iii) Sub-base - Sub-base Type 1 or Type 4.

9. DESIGN GROUP C - Two Coat Hot Rolled Asphalt Surfacing.

i) Wearing Course - Hot Rolled Asphalt Surface Course (Table 6 Column 2, Schedule 1B, BS 594). After laying 6-10mm coloured stone chippings or other approved shall be rolled into the surface at the rate 0.8 kg/sq.m.

ii) Base Course - Open or Close Graded Surface Course (14mm nominal Group Three 7.1 or 7.3 (BS 4987 Part 1).

iii) Sub-base - Sub-base Type 1 or Type 4.

10. DESIGN GROUP D - Single Coat Bitumen Macadam Surfacing (Close Graded).

i) Surfacing - Close Graded Surface Course (14mm nominal). Crushed Rock Aggregate - Group Three 7.3 (BS 4987 Part 1).

11. For overlay of existing footways, footpaths or cycletracks the surfacing will generally consist of Bitmac Open Graded Surface Course (10mm nominal) crushed rock aggregate as specified Group Three 7.4 of BS 4987 (Part 1) laid as directed in the Contract.

Increased Areas of Sub-Base

12. Further to the above the sub-base shall be increased to 150mm at vehicular crossings or other such thickness as may be indicated in the Consent for other areas of footway strengthening.

Footway Thickness Schedule

13. Details of the thickness of Sub-Base is given in the Footway Thickness Schedule Table 11/1B.

Table 11/1B: Footway Thickness Schedule (mm)

	Design Group A	Design Group B	Design Group C	Design Group D (Overlay)
Surface Course	40	20	30	40
Binder Course		40	40	
Sub Base	100	100	100	
	140	160	170	40

APPENDIX 11/1 - C: FOOTWAYS AND PAVED AREAS (INSITU CONCRETE PAVING)

General

1. High strength concrete footways shall consist of 30/20 Grade concrete (5% air entrained) laid in a 100mm thick slab, laid on 75mm of sub-base. Prior to laying the concrete, a layer of 'Visquene' or similar approved material should be laid over the sub-base to prevent grout loss.

Joints

2. The maximum size of slab will not exceed 4.5 metres. Flexcell joints or equivalent will be positioned at the end of each bay.

Finishing and Compacting

3. The concrete shall be compacted using a hand tamping beam or similar approved. After the slab has been compacted and all surplus moisture has disappeared, a wooden float should be applied to produce a closed hard surface. Two or three trowelling passes should follow at intervals as further moisture evaporates to produce a final smooth, hard and uniform surface. The surface should then be rolled with a concrete finishing roller to produce a dimpled finish. Particular attention should be given to all joints and any surplus mortar should be removed from adjacent bays.

Curing

4. As soon as the slab has been finished, it shall be protected from the effect of strong winds or sunlight and should be continuously cured by use of a resin curing membrane sprayed on the surface after the moisture has evaporated or after finishing.

   Where the footway is to be trafficked, the slab should then be protected by the use of 'duck boards' or similar for a period of 7 days.

Surface Tolerances

5. The footway surface will be checked for surface irregularity and shall have no irregularity exceeding $\pm$ 3mm on a 3 metre straight edge.

APPENDIX 11/1 - D: FOOTWAYS AND PAVED AREAS (CONCRETE BLOCK PAVING)

1. Precast concrete paving blocks shall be chamfered and shall comply with BS 6717 Part 1 - Specification for Paving Block and be laid in accordance with BS6717 Part 3 - Code of Practice for laying. Reference should also be made to the Specification for Precast Concrete Paving Blocks published jointly by the Cement and Concrete Association and the County Surveyors Society and the Interlocking Paving Association. They shall be rectangular and have a minimum thickness of 60mm for footpaths and 80mm elsewhere. They shall be in a colour to be agreed with the Local Roads Authority's Representative.
2. The layout of blocks and details at edges, manholes gullies and other openings shall be agreed with the Local Roads Authority's Representative prior to laying.
3. The sub-base shall be Sub-base Type 1 with a C.B.R. of not less than 30%. Sub-base Type 2 will not be permitted.
4. The blocks will be laid in a herring-bone pattern, or other pattern as approved by the Local Roads Authority's Representative, on a laying course with a compacted thickness of 50mm of washed sharp sand containing not more than 3% of silt and clay by weight and not more than 15% retained on a 2.36mm sieve. The sand should be uniform in both type and moisture content and should be spread to a smooth level without uneven pre-compaction. Compaction of the blocks will be by plate vibrator which has a plan area not less than 0.25m². Not less than 3 passes shall be given over the whole area. The compactor should transmit an effective force of 75-100kN per square metre of plate area. The frequency of vibration should be within the range of 75-100 Hz. After the initial vibration sand or crushed rock fines as specified for the laying course shall be brushed over the surface of the blocks and the whole area be vibrated to its final level with the same plate vibrator with not less than 3 passes. Vibration shall be even over the whole area. Thereafter the surplus sand shall be swept up and removed. Until vibration is complete no use of the surface will be permitted by any plant or machinery.
5. The finished surface level shall be within 6mm of the designed levels and the maximum deviation within the completed surface measured by a 3 metre straight edge shall not exceed 6mm. The level of any two adjacent blocks shall not differ by more than 2mm. If the final level is incorrect, the blocks shall be lifted and stacked and the sand thoroughly raked and re-screeded at a new level.

Increased Areas of Sub-Base

6. Further to the above the sub-base shall be increased to 150mm at vehicular crossings or other such thickness as may be indicated in the Consent for other areas of footway strengthening.

Footway Thickness Schedule

7. Details of the thickness of Sub-base is given in the Footway Thickness Schedule Table 11/1D.

Table 11/1D: Footway Thickness Schedule (mm)	
Sub Base	100 Type 1 Sub-base
Binder Course	50 sand
Surface Course	60 precast concrete block, jointing and as required

APPENDIX 11/ 1 - E: FOOTWAYS AND PAVED AREAS (GRANOLITHIC CONCRETE PAVING)

General

1. Granolithic concrete footways shall consist of a 20mm granolithic topping cast monolithically with an 80mm base slab to give a minimum thickness of pavement of 100mm laid on 75mm of sub-base. Prior to laying the concrete, a layer of heavy duty polythene should be laid over the sub-base to prevent grout loss.

Materials

2. Cement shall be ordinary Portland Cement complying with BS 12.

3. Aggregates should be sound, hard and clean crushed granite complying with BS 882, capable of producing a concrete with a drying shrinkage not greater than 0.045%. The aggregate should be nominally 10mm single sized.

4. Sand - Zone 2 to BS 882.

Batching and Mixing

5. All materials should preferably be batched by weight. Where volume batching is permitted by the Local Roads Authority's Representative, the aggregates should be batched in gauge boxes.

6. The cement, sand and aggregates should be mixed in the proportion 1:1:2. The water content should be the minimum to enable full compaction to be achieved.

Laying of Topping

1. The topping should be laid monolithically with the base slab within 3 hours of finishing base slab. Surplus water on the base slab should have evaporated or have been removed before the topping is placed.

Base Concrete

2. The base concrete should be Grade 30/20.

Joints

3. The maximum size of slab will not exceed 4.5 metres. An approved construction joint will be positioned at the end of each bay.

Finishing and Compacting

4. The concrete should be compacted using a hand tamping beam or similar approved. After the topping has been compacted, and all surplus moisture has disappeared, a wooden float should be applied to produce a closed and hard surface. Two or three trowelling passes should follow at interim's as further moisture evaporates to produce a final smooth, hard and uniform surface. The surface should then be rolled with a concrete finishing roller to produce a dimpled finish. Particular attention should be given to all joints and any surplus mortar should be removed from adjacent bays.

Curing

12. As soon as the topping has been finished, it should be protected from the effect of strong winds or sunlight and should be continuously cured by use of a resin curing membrane sprayed on the surface after the moisture sheen has evaporated or after final trowelling.

    The topping should then be protected by the use of 'duck boards' or similar for a period of 7 days.

Surface Tolerances

13. The footway surface will be checked for surface regularity and shall have no irregularity exceeding $\pm$ 3mm on a 3 metre straight edge.

APPENDIX 11/1 - F: FOOTWAYS AND PAVED AREAS (GRANITE SETT PAVING)

General

1. Before laying setts shall be cleaned of all bituminous material soil, grit or other matter.

Sett Paving

2. GRANITE SETT PAVING DESIGN GROUP 1

   i) Granite sett paving Group 1 shall be laid on sub-base Type 1 material bedded on a 50mm thick 1:4.5 cement/sand mortar. The setts shall be bonded and every sett shall be individually bedded to give a uniform and even surface laid level or to fall as directed. The maximum allowable gap between adjacent setts shall be 20mm.

   ii) The joints between the setts shall then be filled with bedding mortar. After the joints are completely sealed all surplus material shall be removed.

3. GRANITE SETT PAVING DESIGN GROUP 2

   i) Granite sett paving Group 2 shall be laid on Type 1 sub-base bedded on a 50mm thick 1:4.5 cement/sand mortar. The setts shall be individually bedded to give a uniform and even surface laid level or to falls as directed. The maximum allowable gap between adjacent setts shall be 20mm.

   ii) The joint between the setts shall be filled with a 6mm nominal size granite chips. Once the chips are packed tightly together the joints shall be sealed to a minimum depth of 30mm with 60/70 pen bitumen filled with limestone dust. After the joints are completely sealed all surplus material shall be removed.

4. GRANITE SETT PAVING DESIGN GROUP 3

   As per Group 2 but with Dry-bound Macadam Road-Base.

5. Granite Sett Paving Design Groups 2 & 3 should be laid such that existing traffic face is left exposed.

Paving Thickness Schedule

6. The Pavement Thickness Schedule detailing the thickness of Sub-Base for Groups 1, 2 & 3 is listed in Table 11/1F below.

TABLE 11/1F: Pavement Thickness Schedule - Granite Sett Paving (mm)			
	Group 1	Group 2	Group 3
Base	-	-	200
Sub-base	150	200	200
TOTAL	150	200	400

APPENDIX 11/1- G: FOOTWAYS AND PAVED AREAS (STONE SLABBED PAVING)

General

1. Slabs shall be laid on Granular Type 1 sub-base material.

2. Slabs shall be laid to the required crossfalls and bedded on a 1:3 cement / sand mortar, to the depths necessary to accommodate the varying thickness of the slabs, and to provide a minimum thickness of bedding of 50mm. The slabs shall be laid to a random offset with the courses at right angles to the kerb and over the full width of the footway or as otherwise approved. The maximum allowable gap between adjacent slabs shall be 15mm.

3. Slabs shall be selected to fit round tobies, cast iron "S" covers, etc., and to suit the width of the footway or other areas being slabbed. Otherwise, slabs should be cut as required.

4. Where appropriate, at the rear of the footway, narrow strip not exceeding 75mm in width and not less than 75mm in depth, maybe filled with insitu concrete Grade 30/20 100mm thick.

5. After laying, the joints shall be filled in with a wet 1:4.5 cement/sand mortar so that all joints are completely filled and all surplus mortar removed.

Paving Thickness Schedule

5. Unless otherwise described in the Contract the slabs shall be laid on the thickness of Sub-Base as described in Table 11/72A.

TABLE 11/72A: Pavement Thickness Schedule (mm)

Sub-base	150

APPENDIX 11/73: FOOTWAYS AND PAVED AREAS (RACKING OF EXISTING KERBS, SETTS AND SLABS)

1. Racking of existing kerbs, setts and slabs is defined as the adjustment insitu of kerbs, setts or slabs by raising the packing.

2. Racking of concrete kerbs and concrete paving slabs shall generally apply to the adjustment of kerbs and slabs adjacent to renewed lengths or areas. The racking of stone kerbs and stone slabs may additionally include complete areas and lengths.

3. The racked lengths or areas should be well packed with a 1:4.5 cement / sand mortar and beaten to the level or falls directed.

4. The racked areas of setts and slabs shall be grouted with a 1:4.5 cement / sand mortar so that all joints are completely filled and all surplus mortar brushed off and removed.

APPENDIX 12/1: TRAFFIC SIGNS - GENERAL REQUIREMENT FOR TRAFFIC SIGNS

General Requirements for Traffic Signs

1. The signs and accessories shall conform in all respects with the Traffic Signs Regulations and General Directions, the Traffic Signs Manual and BS 873 (Road Traffic Signs and Internally Illuminated Bollards).
2. The Developer may be required to supply 2 sets of the working drawings of the signs prior to the commencement of manufacture of the signs.
3. Unless otherwise indicated signs should be designed to withstand a wind pressure of 15 millibars (156 kg/sq.m.).
4. All traffic signs shall be permanently marked on the reverse side with an identifier consisting of the name or code of the Manufacturer, the month and year of manufacture and an identification number supplied by the Local Roads Authority.

Foundations for Permanent Traffic Signs

5. The type and size of foundation will be as Drawing No's K71 and K72 (Construction Details).

Poles for Traffic Signs

6. Poles will either be steel or aluminium complying with the requirements of BS 873. Steel poles and housing should galvanised in accordance with BS 729. The size of posts are taken from the nomograms in the Traffic Signs Manual.
7. Unless otherwise specified, all illuminated sign assemblies shall be provided with at least one large base post to accommodate the necessary electrical equipment. The electrical housing shall comply with BS 873 and should be of a size suitable for the electrical equipment being used. The base housing compartment may be circular or rectangular in section or alternatively side slung boxes to the electrical equipment may be attached to a standard post. The nominal door opening should be 500mm x 108mm.
8. In the case of illuminated signs particular attention should be given to the sitting of the posts. Wherever practicable, the post having the control base housing should be that one farthest from the edge of carriageway. Where this is not possible the control access opening should always face away from the carriageway. Care should also be taken when positioning lanterns on poles so that they do not obstruct the view of the sign from the road.
9. The post lengths include the length of posts required to accord with the depths of foundations, size of sign plates, mounting heights and where necessary an additional length to support an external luminaire.

Location and Erection of Permanent Traffic Signs

10. The following is given as guidance to the location and erection of permanent traffic signs.
    Attention is drawn to the recommendation of the Traffic Signs Manual Chapter 13 and the advice on positioning of signs given in the Traffic Signs Manual Chapter 1.
11. Direct illumination of permanent traffic signs and types of luminaires shall be constructed to comply with the requirements of BS 873 and CP 54.
12. Where possible, it is preferable to erect permanent traffic signs on existing street furniture e.g. street lighting columns. Signs may be attached to lighting columns if the surface area of the sign is 0.60m² or less. Every effort should be made to locate signs so they are coincident with lighting columns to avoid the situation where sign posts are erected a few metres away. Should the area of the sign exceed 0.60m² then the relevant column should be assessed and replaced by a stronger column if

necessary. It may also be possible to erect signs, especially "waiting restriction" signs, on walls, railings or barriers providing they are not affecting visibility.

Lighting of Signs

13. Guidance on the lighting of traffic signs is given in Schedule 17 of the current version of the Traffic Signs Regulations and General Directions.
14. If a sign is externally illuminated the bottom of the light unit must be between 0 to 25mm below the top of the sign.

Clearance of Signs

15. Vertical — Clearance to all new signs mounted on posts or lighting columns on footways should be a minimum of 2.3 metres. Direction signs situated in the central reserve and other "specials" may be erected so that the lower edge of the sign is between 0.9 metres and 1.5 metres above the highest point of the carriageway alongside but care must be taken that this does not affect visibility.

    Horizontal — In areas where the speed limit is 40mph or less the edge of the sign nearest the carriageway should be set at least 0.5 metres from the edge of the carriageway.

    Where the speed limit is greater than 40mph the clearance should be at least 1.2 metres.

Sign Plate for Permanent Traffic Signs

16. All sign plates shall be manufactured in accordance with the Traffic Signs Manual Chapter 13 from sheet aluminium of not less than 11 swg or 3mm thickness.

Faces for Permanent Traffic Signs

17. The faces of permanent traffic signs shall be fully reflective in all colours with the exception of any part of the sign face coloured black. All retro-flective and not-reflective sheeting shall be of the same manufacturer and compatible one with the other. Preparation of the aluminium base material prior to application of sheeting shall be in accordance with the sheeting manufacturer's instructions.
18. Class 1 reflective material shall be used for all traffic signs **EXCEPT** for all non-trunk roads where the provisions of this paragraph shall still apply.

    Sign face material for the Traffic Signs shall be: -

    i) Trunk Roads - Class 1 material

    ii) Other Routes - Material complying with Table 12/1-A

    iii) Street Name Plates - Class 1 background with Class 3 overlay

Entrance Angle	Observation Angle	Minimum coefficient of retroflection cd/(lx/m²)				
		Red	Yellow	Blue	White	Middle Brunswick Green
-5°	12min	24	100	8	140	20
	20min	20	70	6	100	14
	1.0°	2	6	1	10	0.3
15°	12min	20	70	6	110	15
	20min	16	40	4	90	10
	1.0°	1.5	4	0.6	6	0.2
40°	12min	6	16	2	30	6
	20min	5	10	1.6	20	5
	1.0°	0.6	1	0.2	3	0.1

Table 12/1-A Minimum Coefficients of Retroflection - Other Routes

Note: The following materials comply with the requirements of the Table (other materials meeting the above requirements will also be accepted).

i) 3M Diamond Grade
ii) 3M High Intensity
iii) Nikkalite Super Engineering Grade
iv) Stimsonite Series 5200 (entrance angle must not exceed 15°)

19. All signs supplied against the specification shall be guaranteed for a period of not less than 10 years to provide satisfactory performance.
20. The back of signs should be in a non-reflective metallic finish.

Permanent Bollards

21. Details of permanent bollards are shown on Drawing No K73 (Construction Details).
22. Housing for permanent bollards shall conform with BS 873 and shall be constructed of Medium Density Polyethylene (UV stabilised). All permanent bollards shall be the knockdown type, shall be internally illuminated in accordance with BS 873 and shall be provided with a strengthened base constructed of steel which has been hot dipped galvanised.

Framing

23. In general sign faces should be constructed and framed in accordance with Drawing No K70 (Construction Details).
24. Corners of signs should have a radius.
25. For details of the construction and framing of signs see Drawing No's K70-K72 (Construction Details).

X-Heights and Visibility Distances

26. The x-height of signs and their visibility distances should be in accordance with Table 12/2-A.

Table 12/2-A X-heights and Visibility Distances

Type of Road			A.D.S.	D.S.	R.C.
All dual carriageways and major "A" class roads	x-height	mm	150	125	125
	Minimum clear visibility	metres	105	60	60
	Distance from junction	metres	90-200	n/a	n/a
	Distance between signs	metres	70	n/a	n/a
All other roads	x-height	mm	125	100	100
	Minimum clear visibility	metres	60	45	45
	Distance from junction	metres	90	n/a	n/a
	Distance between signs	metres	50	n/a	n/a

Notes: i) The clear visibility distances indicated are minimum values. Greater distances should be provided where possible.

ii) All distances shown are for guidance only.

iii) All values may vary if 85% ile speeds are not considered consistent with type of road.

iv) ADS Advance Direction Sign
DS Direction Sign
RC Route Confirmatory

APPENDIX 12/3: ROAD MARKINGS

1. Where the Developer is required to lay road markings he shall comply with the following requirements:-

   a) the Works shall be programmed in order to comply with the following: -

   b) Where road markings are removed, all junction markings shall be applied within 24 hours. This requirement may be met initially by the application of temporary markings which must be maintained until the permanent markings are applied.

   c) All permanent road markings shall be applied within 2 weeks following any removal of existing road markings.

   d) During any period of absence of road markings signs to diagram 565.4 of the Traffic Signs Regulations and General Directions (HMSO 1981) shall be erected and maintained.

   e) Where a marking is laid on top or partially on top of an existing marking, the Developer shall be responsible for ensuring that the resulting combined marking complies with the current Traffic signs & General Directions.

2. The works shall be undertaken in accordance with the requirements of BS EN 1436 and the following: -

   i) All loose material shall be removed from the surface before the markings are applied.

   ii) Road marking materials shall only be applied to surfaces which are dry and clean. Markings shall be free from raggedness at their edges and shall be uniform and free from streaks. Longitudinal road markings shall be laid by approved mechanical means to a regular alignment.

   iii) Sprayed markings shall be applied by an approved pressure spraying unit to a thickness not less than 3.0mm exclusive of any surface glass beads.

   iv) Screed markings shall be laid to a thickness not less than 4.0mm and not greater than 5.0mm exclusive of any surface glass beads.

   v) Extruded markings shall be laid to a thickness not less than 3.0mm exclusive of any surface glass beads.

   vi) Immediately following the application of material for any white markings, Class B solid glass beads shall be applied to the surface of the laid thermoplastic.

3. The material used for white markings shall be high performance thermoplastic complying with the requirements of BS EN 1436 and the following: -

   i) Retroflective Class R2
   Luminance Class B2
   Skid Resistance Class S2

All permanent road markings other than "High Performance" shall have a skid resistance Class S1, except for arrows and worded markings having a large surface area which shall be skid resistance Class S2.

ii) Certificate of Compliance

The material must be a Kitemark product (or equivalent) and a test Certificate not more than 6 months old shall be provided detailing compliance with the requirements of BS EN 1436 and with the modifications given in paragraph (i) and ii).

Once approved no substitute materials will be allowed without evidence of compliance with the Specification as detailed above.

iii) Containers

The thermoplastic shall be supplied in powder form in low melting point bags to form a composite material when heated (BS EN 1436 Part 1 Section 9).

iv) Performance

Skid Resistance

Under normal conditions the skid resistance value shall not be less than 50 when measured by the Transport and Road Research Laboratory Portable Skid Resistance Tester (Road Research Note No 27) throughout the marking's guaranteed lift.

4. The material used for yellow markings shall be thermoplastic complying with the requirements of BS EN 1436. "Lemon" lines shall be laid to a width of 75mm, however "primrose" lines will be laid to a width of 50mm.

5. Yellow thermoplastic road markings shall be non-reflectorised and normally be coloured "lemon" to BS 381C No 355. In certain circumstances "primrose", to BS 381C No 310, may be required.

6. Where the Developer is required to remove existing road markings, this shall be undertaken carefully using hot compressed air. Damage to the road surface shall be avoided.

Road Studs – Reflecting

7. Details of the layout and colour of the reflecting Road Studs to be shown on the Consent Drawings.

Reflecting road studs shall be either: -

i) Self wiping "Cats Eye" type produced by Reflecting Roadstuds Limited.

ii) "Stimsonite 948 and 954" produced by Amerace Corporation, c/o Simsco.

or equivalent.

All centre-line road studs shall have bi-directional white lenses

Road Studs - Installation

8. "Cats Eyes" - shall be 254mm long, the studs shall be installed using methods described in the "1984" Paving Instructions using the profiling equipment. The studs are to be laid true to line and level. The tip of the stud shall be not more than 25mm + (0mm to 3mm) above the adjoining carriageway. The grout fill to the side cavity shall consist of 75% filler of slate or other approved dust, 25% bitumen 60-80 pen.

"Stimsonite 948 and 954" - shall be installed in accordance with the manufacturer's instructions. (Simsco documents 291041 and 291041A dated October 1994 including any revisions subsequently issued by the manufacturer)

If required by the Local Roads Authority's Representative all Road Studs eyes are to be thoroughly washed and cleaned immediately before the opening of the carriageway and any settlement rectified.

Road Studs - Non-reflective

9. Studs shall where specified be white, silver or light grey in colour and shall not be fitted with reflective lenses. The studs shall be either circular in shape with a diameter of not more than 110 millimetres or less than 95 millimetres or square in shape with each side being not more than 110 millimetres or less than 95 millimetres. Any stud shall not project more than 18 millimetres above the carriageway at its highest point nor more than 6 millimetres at its edges.

10. If made of stainless steel the studs shall conform to BS 873.

Waiting Restrictions

11. Where the Consent indicates that yellow thermoplastic lines are to be provided in waiting restrictions these should not be laid on site till instructions are received from the Local Roads Authority's Representative in writing confirming that all required Traffic Orders are in place.

APPENDIX 13/1: ROAD LIGHTING COLUMNS AND BRACKETS

General	1.	Columns shall comply with BS 5649/EN40-1 and where specified by the Roads Authority's Representative with the requirements of The Scottish Office Industry Department Standard BD 26/94.
K - Factor	2.	The design of the columns will take into account the following "K" Factors :- 4 to 8 metre columns - K = 1.8 10 and 12 metre columns - K = 2.5
Spigot Size	3.	Columns shall be designed for use with pole-top mounting lanterns using a 76mm spigot for 3 - 6 metre columns and 60 mm spigot for 8 - 12 metre columns.
Tube Diameter	4.	Columns shall have the following minimum base tube diameter to facilitate electrical equipment to be fitted internally. Up to 6 metre - 140mm 8 metre and above - 165mm
Material	5.	Columns shall be manufactured from a 6000 series Aluminium alloy to the following specification :- Alloy to be used: EN AW - 6063 Temper : T4 - T66 Chemical Symbols : EN AW - AIMgO, 7Si
Extrusion	6.	Columns shall be extruded in one piece to form a continuously tapered or conical shape having no welds or joins within the construction and equipped with a locking flush fitting door complete with separate earth connection.
Inner Tube	7.	Columns will preferably have an internal door opening strengthening tube fitted using an expansion method which shall be weld free to ensure no weak points are created during manufacture.
Door Opening	8.	Door opening size to be 600 x 100mm. Columns shall be erected so that an operator working at the base compartment faces the oncoming traffic except where the column is to be positioned close to a wall or fence etc, in which case the door should face outwards to facilitate access. All doors to come complete with a double door lock system.
Backing Board/Plate	9.	The column shall be fitted or extruded with an internal Aluminium backplate, consisting of an extruded Aluminium board, with internal slip nuts to enable the adjustment of internally mounted equipment, and with a separate earth connection. A substantially non-hygroscopic and rot-proof hardwood backboard shall be mounted on the backplate.
Earthing	10.	Brass earthing terminals shall be provided on the lighting column and the lighting column door, size M8 complete

		with brass washers and nuts (two of each); and shall be fitted with distinctly marked durable labels marked "SAFETY ELECTRICAL CONNECTION – DO NOT REMOVE".
Cable inlet	11.	The cable inlet hole shall be fitted with a subterranean cable protection sleeve to prevent cable chaffing. Cable entry to be 150mm x 75mm in size.
Root Section	12.	The root section of the column shall be protected with a grey co-polymer (thermoplastic) which shall be thermally bonded to the outer and inner surfaces of the column to a height of 250mm above ground level and shall be such that no ground or water course pollution is caused.
Column Base	13.	The base of the column shall have a high-density plastic protector fitted to prevent damage to the root protection during installation.
Column Finish	14.	Columns shall be supplied machine finished and shall have no other exterior coating other than natural, coloured anodising or powder coating where specifically instructed.
	15.	Columns shall have imprinted into their shaft the manufacturers name and year of manufacture.
Packing	16.	Columns shall be adequately packed and crated during transport and storage to prevent damage to their finish.
Storage	17.	Unpacked columns must not be stored on ground that may cause abrasions or scoring to their surface. Columns shall be installed by hand or, where necessary, using lifting equipment. Chains must <u>not</u> be used in the erection of the columns. If lifting equipment is required, fabric or other non-abrasive straps should be used. Until the column erection is complete as much of the temporary transit packaging as possible shall be left in place to protect against surface damage.
Data Sheet	18.	A copy of the completed Data Sheet for each column type shall be provided to the Roads Authority's Representative prior to commencement of installation.
Overhead Power Lines	19.	The Developer will provide written confirmation from the Electricity Supply Authority that agreement has been reached in relation to the proximity of lighting columns to any adjacent overhead power lines.

APPENDIX 14/1: SITE RECORDS

1. As built drawings shall be produced by the Developer, on 2 number copies of the Drawings relating to Road Lighting in accordance with the requirements of Clause 1402.
2. The Developer shall also supply test certificates cross-referenced to the apparatus identified on the as-built drawings.

APPENDIX 14/2: LOCATION OF APPARATUS

General

1. The position and description of Lighting Units and Feeder Pillars will be as shown on the Drawings.

   The exact location of such equipment shall be agreed on site before commencement of the works.

   Where a feeder pillar is erected on a grass verge, an area of hard standing shall be created in front of the pillar using a 900 x 600mm paving slab laid on a sand bed (or equivalent) on 150mm of Type 1 sub-base.

Electricity Supply

2. Unless otherwise agreed by the Roads Authority's Representative, the electricity supply to the feeder pillars shall be single-phase 240 volt 50Hz.

APPENDIX 14/3: TEMPORARY LIGHTING

1. Where existing lighting units are temporarily taken out of service to facilitate a Developers operations, then temporary lighting to provide an average illuminance of 10 Lux shall be provided for the safe passage of vehicles and pedestrians adjacent to the site. Any costs associated with this provision shall be met by the Developer.

APPENDIX 14/4: ELECTRICAL EQUIPMENT

General

1. Further to the requirements of Series 1400 the following requirements for electrical equipment shall apply:-

Luminaires and lamps

2. Unless otherwise agreed all luminaires shall be of type incorporating integral lamp control gear and shall be compatible with the columns specified in Appendix 13/1.

3. All luminaires shall be of sound and robust construction capable of being easily dismantled for maintenance or repair purposes. All luminaires shall be fitted with bowls made from vandal resistant material. All hinges, toggles, catches, captive screws, and nuts shall be made of non-corrosive material, preferably stainless steel.

4. Alternative luminaire types will require to be approved by the Roads Authority's Representative and shall be required to meet the recommended values given in BS5489 for the particular category of road from the column positions indicated on the drawings. The Developer shall supply a scale drawing of each type of luminaire proposed together with data sheets of light output, distribution etc. as required in BS 5489. Where the Developer is offering alternative type of luminaires to that used for the initial design calculations, the photometric design data, suitable for use with a PC computer aided road lighting design program shall be supplied on a 3.5 inch HD floppy disc in ASCII format.

5. Sealing of luminaire optics should be to IP66 and guaranteed against the ingress of dust or moisture.

Lamps	6.	Lamps shall be guaranteed for 8000 hours and have minimum design lumens at 2000 hours burning as detailed in the table below.
Photo-Electric Control Units	7.	Further to the requirements of Clause 1409.4 PECUs shall only be installed at feeder pillars with the detector mounted on an adjacent lantern.
	8.	The classification of the photocells, with reference to the protection against electric shock, shall be Class 2 and have an ingress protection of IP54 for the base unit.
	9.	The photocells shall comply with all European directives and regulations on Electro Magnetic interference.
	10.	All components used in the Photocell shall be capable of operating within the temperature range of -20^{o}C to +80^{o}C.
	11.	Plastic materials used in the Photocell shall be flame retardant in accordance with BS 4533 Part 101.
	12.	The Photocell shall be capable of withstanding shock and vibration.
	13.	The Photocell shall be suitable for use on 230V +/- 10%, 50Hz. It shall be capable of switching a reactive lighting load of 10A. 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 20000 cycles at rated load under normal operating conditions.
	14.	In no part of the Photocell shall material capable of deforming as a result of the working environment be sandwiched between electrical connections.
	15.	The sensor shall be a filtered silicon photodiode with zero drift over a 6 year period.
	16.	Calibration of the unit shall be carried out to provide levels 70 lux ON and 35 lux OFF to a measuring accuracy of +/- 5% in artificial light. The set switching level shall be maintained over the guaranteed life.
	17.	The Developer shall be required to guarantee all controls electrically, mechanically and photometrically over the period of maintenance.
	18.	All PECU's shall indicate the year and month of manufacture and incorporate a simple method of recording the date of installation.
	19.	The PECU shall be designed to fail in the ON mode.
Lamp Gear Elements	20.	All items of lamp gear shall comply with the relevant British Standards regarding design, construction, safety and interchangeability. All items shall be suitable for use in an enclosure subject to condensation and ingress of dust and moisture and shall be adequately protected for such service. All items shall have shrouded terminals of the screw type.
Earthing	21.	Adequate provision for earthing shall be provided on components manufactured or enclosed in non-insulating

		material. All items shall be supplied complete with suitable mounting facility.
Lamp Control Gear	22.	All lamp control gear shall be housed within the lantern and shall be of the electronic type operating on high or low frequency. The control gear shall be compatible with the lamp used and shall have power factor correction to 0.99.
	23. 24.	Not Used
Cut-Outs & MCB's	25.	Circuit protection on lamp circuits shall be provided by Type 2 MCB's which form an integral part of the armoured cable termination cut-out and shall be rated to suit the lamp circuit type.
Cut-Outs	26.	The cut-out enclosure shall be suitable for fixing within a lighting column base compartment and will have provision for mounting on to a wooden backboard and terminating up to 3 No. PVC/SWA/PVC cables of maximum size 25mm 23 core and supplying one or two outgoing lamp circuits of maximum cable size 6mm2 (3 core), as required, via circuit protection MCB(s).
	27.	The design and construction of the unit shall ensure that in normal use it will function in a reliable manner and cause no danger to persons or adjacent equipment. It shall be impact resistant and shall be constructed such that it cannot readily be deformed or mechanically damaged thereby allowing contact with live parts.
	28.	The unit must allow ease of access to allow electrical termination works to be carried out, with all separable parts having a positive location arrangement. Removable parts shall be such that they cannot be separated from the unit except by use of a key or tool.
Rating	29.	The unit shall be rated at 230 volts, 40 Amperes and shall comply with BS 5733, ESI1219 Specification, BS 7671 and when correctly installed shall provide a degree of protection as specified in BS 5490 category IP42.
Cable entry	30.	Cable entry shall be by means of a removable cast brass earth plate, of minimum thickness 2.5mm, with fixing points for back mounting and three 25mm diameter serrated ferrules cast integrally or secured to the plate by locknuts . Armour wires shall be terminated in stainless steel worm-drive type armour clamps. The plate shall come complete with one M6 min. earth stud with fitting and locating arrangement to allow connection of crimp terminals on protective and extraneous bonding conductors, both externally and internally.
Terminals	31.	Terminals shall consist of a 40mm x M6 stud suitable for use with compression cable connectors. The unit should be supplied complete with lock nuts, lock washers and spacers sufficient to allow termination of one to three cables.
Phase/Neutral	32.	2 No. Phase, 1 No. neutral and 1 No. earth terminals shall be provided and the earth terminal shall be linked to the

brass earth plate by a green/yellow conductor equivalent to 10mm^2 tri-rated cable. The 2 No. phase terminals shall be linked by a conductor equivalent to 16mm^2 tri-rated cable in order that the incoming and outgoing cables are separate. The unit shall be fitted with a D.P isolator and have capacity for up to 2 No. MCB's mounted on DIN rail with blanking pieces as necessary where this option is not taken up.

Dimensions

33. The approximate outer dimensions of the cut-out shall be as follows:-

- Height – 390mm
- Width – 88mm
- Depth – 92mm

Material

34. All materials used in the construction of the unit shall comply with the relevant British or European Standard and current carrying parts shall be manufactured in brass, copper or phosphor bronze and shall be electroplated.

MCB's

35. The unit shall be designed for installation of Type C Miniature Circuit Breakers between ring/radial and outgoing circuit. The outgoing circuit arrangement will be such that the cable enters the unit through one opening and is provided with a suitable cable-sealing device. Cable entry must not be from the rear of the unit. All cable terminations shall be made using insulated-type crimped connectors formed from solid drawn copper tube.

36. Cable core connections shall be as follows:

- Phase - RED
- Neutral BLACK or BLUE
- Earth – GREEN/YELLOW or YELLOW

37. Where the earth core in the underground cable is yellow, it shall be flagged with green/yellow markers at 50mm intervals along its length where exposed within cut-outs or distribution boards.

Feeder Pillars

38. Feeder pillars shall conform with the requirements shown in the following:-

39. Feeder pillars shall be constructed of stainless steel or hot dip galvanised to BS729, have a minimum wall thickness of 2.5mm and shall be of a size suitable for mounting the required distribution panel with spare space as described in Clause 1418.2 (sufficient to accommodate at least one extra circuit - at least 25% spare space on the backboard).

Dimensions

40. Approximate pillar shell external dimensions to be as follows:-

- Height – 900mm
- Width – 600mm
- Depth – 270mm

41. Access to the enclosure shall be by means of a hinged door(s) opening to a full 180^o at the front.

Finish	42.	Pillars shall be painted Light Grey to BS 10 A 03.
Pillar door locks	43.	Pillar door locking shall be by means of 2 x 'O'Ring locks.
Earthing	44.	The main earth terminal size M8 x 32mm long shall be provided at a readily accessible position within the cabinet section of the pillar. It shall be constructed from brass and be supplied complete with one full nut, 2 half nuts and 2 washers (all brass).
	45.	The enclosure shall be adequately ventilated by a suitable method to prevent the ingress of water, snow or foreign bodies.
	46.	Feeder Pillar(s) should be located as shown in the street lighting layout drawings and should be mounted on a 150mm thick foundation of mix ST5 concrete.
	47.	Where a feeder pillar is erected on a grass verge, an area of hard-standing shall be created at the pillar door using a 900 x 600 paving slab or equivalent.
Earthing	48.	Further to the requirements of Clause 1420.5 all equipotential bonding conductors, including that between columns doors and base compartments, shall be at least 10mm² cross-sectional area and shall have a copper core.
Control Panel	49.	The Control Panel shall be fitted within the feeder pillar in a galvanised steel enclosure maximum dimensions 500mm high x 450mm wide by 150mm deep. The enclosure shall be fitted with a hinged lockable door. A "Danger 230 Volt" sign shall be fitted to the door. The door shall be fitted with a lock of a different pattern to that of the feeder pillar and shall be fitted with a means of padlocking.
	50.	The IP Rating shall be 54.
Cable entry	51.	Cable entry shall be by means of a removable cast brass earth plate, of minimum thickness 2.5mm, with six 25mm diameter ferrules cast integrally. Armour wires shall be terminated in stainless steel worm-drive type armour clamps.
	52.	The enclosure shall be fixed to the backboard.
	53.	The electrical apparatus shall be shrouded to IP2X.
Earthing	54.	An M6 x 30 brass earthing stud complete with two washers and two nuts shall be fitted to the inside, outside and the door of the enclosure.
	55.	The feeder pillar panels equipment shall be installed and wired, incorporating the following components:-

- A 100 Amp double pole fused isolator to BS5419 complete with lockable facilities.
- Bussman Fuse base c/w 100 Amp Cartridge Fuse.
- A single pole contactor to BS5424 rated at 230 Volts 80 amps inductive load.(Moeller DIL2M or =)
- A Photo Electric Control Unit. (RTE ER4N or =)
- A DIN rail fitted with 6 No. Type C MCB's. The control circuit MCB shall be rated 40 Amp and the

other two MCB's to 6 Amp, unless specified on approved design drawing (4 x 40A rated and 2 x 6A rated).

- An inspection window to cover MCB's and PECU.
- A neutral rail and an earth rail suitable for connecting 6 number 16 sq.mm cables in addition to the internal wiring.

Underground and Ducted Cable	56.	Cables shall have BASEC or equivalent approval in all respects other than the over-sheath colour which shall be Purple.
	57.	Underground cables shall be PVC insulated steel wire armoured cable with copper conductors 600/1000V grade to BS6346.
Cable sizes	58.	Cables will normally be 3 core in the range2.5mm², 6mm², 16mm² or 25mm².
	59.	Where a column is to be serviced directly from the Electricity Authority's main cable, the service cable shall be 16mm² and of concentric construction unless otherwise agreed.
	60.	Cables following same route shall be laid with a clearance of 50mm as described in sub-clause 1421.7.
Cable Joints	61.	Cable joints will not be permitted since all underground cables supplying road lighting must employ a loop-in/loop-out system.
Armoured cable Terminations	62.	Cables shall be terminated in the column base compartments by means of cut-out units, which comply with the requirements of the section above entitled 'Cut-outs & MCBs'.

APPENDIX 14/5: ELECTRICAL EQUIPMENT FOR TRAFFIC SIGNS

General

1. Traffic signs shall generally comply with the requirements of appendix 14/1 and 14/4.

   The Developer shall submit to the Local Roads Authority's Representative details of the units he proposes to use for the lighting of the traffic signs.

   Signs shall only be lit where this is a mandatory requirement of the Traffic Signs Regulations and General Directions 2002.

Lighting of Traffic Signs

2. Signs shall be lit with the following unit as indicated below:-

   (i) Warning Signs (900mm and 1200mm)
   Unit of 2 No. 11 watt compact fluorescent lamps laid end to end and fitted with a reflector. Outreach of unit approx. 600mm.

   (ii) Warning Signs (600mm and 750mm)
   Unit of 1 No. 11 watt compact fluorescent lamp with a reflector. Outreach of unit approx. 400mm.

   (iii) Warning Signs (1500mm)
   Unit of 1 No. 36 watt compact fluorescent lamp with a reflector. Outreach of unit approx. 600mm.

   (iv) Triangular Warning Signs including Give Way (600mm)
   Unit of 1 No. 11 watt compact fluorescent lamp with a reflector. Outreach of unit approx. 400mm.

   (v) Triangular Warning Signs including Give Way (900mm and 1200mm)
   Unit of 2 No. 11 watt compact fluorescent lamps laid end to end and fitted with a reflector. Outreach of unit approx. 600mm.

   (vi) Give Way (1500mm)
   Unit of 2 No. 11 watt compact fluorescent lamps laid end to end and fitted with a reflector. Outreach of unit approx. 600mm.

   (vii) Rectangular and Finger Post Signs (up to 1000mm x 900mm)
   Unit of 2 No. 11 watt compact fluorescent lamps laid end to end and fitted with a reflector. Outreach of unit approx. 600mm.

   (viii) Rectangular and Finger Post Signs (up to 2000mm x 1000mm).
   Unit of 1 No. 36 watt compact fluorescent lamp with a reflector. Outreach of unit approx. 600mm.

Column Base Cable Termination

3. Traffic column base cable terminations shall comply with Appendix 14/4 and be either looped on single circuit, complying with Drawing K83 and K84.

INSTALLATION INSPECTION AND TEST CERTIFICATE			
Inspection and Test Certificate to be given by the Contractor or other person responsible for carrying out an inspection and test of an installation, or part of an installation, or by an authorised person acting on his behalf. I certify that the electrical installation at : has been inspected and tested in accordance with the requirements of Part 7 of the IEE Regulator for Electrical Installations (16th Edition) and that the results are as indicated below.			
Items Inspected	**Pass**	**Fail**	**Not Applicable**
1. Connections of conductors			
2. Identification of conductors			
3. Selection of conductors for current carrying capacity			
4. Connection of single pole devices in phase conductors only			
5. Correct connection of lampholders and socket outlets			
6. Protection against thermal affects			
7. Methods of protection against direct contact, ie protection by insulation of live parts; protection by enclosures; protection by placing out of reach			
8. Appropriate isolation and switching of devices			
9. Appropriate protection of devices			
10. Labelling of circuits, etc			
11. Selection of equipment for environmental conditions			
12. Presence of warning and danger notices			
13. Presence of diagrams, instructions etc			
14. Conditions of flexible cables, switches, plugs and socket outlets			
The following shall be tested, in the sequence indicated, and if any test indicates failure to comply, that test and those preceding shall be repeated in the correct sequence, after the fault has been rectified.			
15. The continuity of protective conductors, including main and supplementary equipotential bonding (Regulation 713-03)			
16. The continuity of final circuit conductors (Regulations 713-03)			
17. Insulation resistance, witch should not be less than 1 megohm for fixed installations and not less than 0.5 megohm for separate items of apparatus			
18. Protection by enclosures, which shall afford a degree of protection of not less than IP2X (Regulation 713-07)			
19. Polarity (Regulation 713-09)			
20. The earth fault loop impedance, which should be satisfactory for ready operation of protective devices in compliance with regulations 413-02 (Regulation 713-10) Circuit No Protective Device Earth fault loop impedance			
21. The operation of residual current devices tested independently of any facilities incorporated in the device (Regulations 713-12) Comments (if any) and departures from the Wiring Regulations Signed……. Date…….. For and on behalf of …….. Address …… …….			

APPENDIX 17/1: CONCRETE - CLASSIFICATION OF MIXES

	Mix Reference		
	C40/20(S) [1]	C30/20(S) [1]	
Ordinary or Special Concrete (O or S)	S	S	
Class of Concrete (Grade/Maximum Aggregate Size)	40/20	30/20	
Minimum Cement Content (kg/cu.m)	325	325	
Minimum Free Water/Cement Ratio	0.40	0.40	
Required Workability	100mm	100mm	
Maximum Cement Content (kg./cu.m)	550	400	
Required Type and Class of Cement	S [2]	S [2]	
Required Source Special Type of Aggregate	No	No	
Required Admixture	No	No	
Air Entrained Required (Yes/No)	Yes [3]	Yes [3]	
Minimum or Maximum Temperature of Fresh Concrete (°C)	5 °C minimum 30 °C maximum	5 °C minimum 30 °C maximum	
Sampling or Testing	To comply with Appendix 1/5	To comply with Appendix 1/5	
Other Requirements	[4]	[4] [5]	

Notes

1. All Structural Concrete shall incorporate blended cement mixes. See Specification Clause 1728AR "Blast Furnace Slag Concrete" and Clause 1729AR "Admixtures for Concrete"

2. A mixture of BS EN 197-1 (Cement) and BS 6699 (Ground Granulated Blast Furnace Slag for use with Portland Cement) provided that the amount of ggbs is not more than 65% by weight of total cement (Clause 1702.1)

3. Air entrainment to be a minimum of 1.5%

4. Proportions in accordance with the Specification for Highway Works except that a minimum replacement of 40% for ground granulated blast furnace slag shall be used.

5. All footway infill concrete shall be fibre reinforced.

APPENDIX 17/3: CONCRETE - SURFACE FINISHES

1. All exposed in-situ structural concrete constituents shall be supplied from a single source.

2. The requirements for Contract Specific Surface finishes are:

   F2 to all buried formed surfaces
   F1 or F2 shall not be permitted on any exposed surface.
   F3 to the edge beams
   F4 to all exposed formed surfaces (except edge beams), and with a ribbed finish for all exposed vertical abutment wall faces
   U4 to roof and floor slab
   U1 to other buried unformed surfaces
   U3 to other exposed unformed surfaces

APPENDIX 17/4: CONCRETE: GENERAL

1. Stainless steel tying wire shall be used throughout.

2. Type 2 deformed bars shall be used for reinforcement.

3. Where reinforcement bars are required to be coupled the coupling system shall have a current British Board of Agrement Roads and Bridges Certificate.

4. Sampling and testing shall be in accordance with appendices 1/5 and 1/6.

5. Exposed concrete arrises shall be finished with a 25mm by 25mm chamfer unless otherwise stated.

6. Drip checks shall be provided on all copings, parapet cantilevers, soffit edges, and other locations to prevent water running along the underside of structures.

7. All buried surfaces shall be treated with two coats of bitumen paint in accordance with the Specification for Highway Works.

8. Temporary works shall not be attached to any part of the permanent structures.

FORM HA/P1 (NEW WORKS) PAINT SYSTEM SHEET

Sheet No.1 of 1

1.Contract Title:				
2.Date of issue of Documents to Tenderers:				
3.Environment & Accessibility:				
4.Required Durability of System: **Major maintenance**: **No Maintenance:** **Minor Maintenance:**		**5. Colour of Finish:**		
6.Paint System to be Applied Over: **Area Ref**: _____ **Area Description**: _____ **Protective System Type (i.e. I, II, etc):** _____				
7. Details	**1st Coat**	**2nd Coat**	**3rd Coat**	**4th Coat**
Registered Description				
Item No & Colour				
Date Registered				
Brand Name & Manufacturer's Ref. No.				
Data Sheet No.				
Where Applied:				
How Applied:				
Max local dft (See Cl. 1914.7)				
Min dry film thickness (mdft)				
Estimated total volume of paint likely to used (litres)				
'A' type testing required? (Yes/No) (See Cl 1912.3)				
'B' type testing required? (Yes/No) (See Cl 1912.9)				
8.Stripe Coat Description (including Item No. & Colour) Shop: **Site:**		**9. Paint Manufacturer's official stamp:**		
10.Mdft (µm): Note: the minimum total dry film thickness of the paint system, neglecting primers and sealers under 30 microns, shall be 15% greater (to the nearest 25 microns) than the sum of the mdfts of the individual paint coats.				
11. Approved By: **Date:**				

FORM HA/P2 PAINT DATA SHEET

Sheet No.____

Manufacturer:

Item No.:

Registered Description:

Brand Name and Reference No.

Consistency and Method of Application:

For two pack paints:

Weight per 5 Litres (kg):

Base: Activator: Mixed components:

Volume Solids %:
For two pack paints volume solids % for mixed paint:

Manufacturer's Minimum Dry Film Thickness Range
Recommended lower mdft:
Recommended upper mdft:

Full Application Instructions:

Flash Point:

		5 ºC	10 ºC	20 ºC	30 ºC
Drying times	Surface Dry				
	Hard Dry				
Overcoating Times	Minimum				
	Maximum				

Cleaning Solvent:

State effect on Drying Times of Temperatures below 20 ºC:

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

Manufacturer's General Recommendations:

FORM HA/P3 PAINT SAMPLE DESPATCH LIST SHEET 1

Sheet No.____

Contract title:

Structure Name: Structure No.:

Client Name:

Supervising Firm:

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

Painting Inspection Firm:

Samples Despatched from: Date Despatched:
Inspector's Name: Tel No.:
Inspector's Signature:

SAMPLES:					
Sample No.	Item No.	Manufacturer Reference No.	Batch No.	Colour BS4800 reference	Sp.G.

Paint Manufacturer:

APPENDIX 20/1: WATERPROOFING FOR CONCRETE STRUCTURES

General

1. Permitted waterproofing systems incorporated in the Permanent Works shall have a current BBA (British Board of Agrement) Roads and Bridges Agrement Certificate which shall be registered with the Overseeing Organisation.

2. Permitted waterproofing systems incorporated in the Permanent Works shall be capable of being non destructively tested.

Waterproofing for concrete bridge deck and beneath carriageway through box structure

3. Short list of materials permitted for waterproofing concrete bridge decks.
   The following materials are permitted alternatives. Other proprietary materials may be used if agreed by the Engineer.
   (a) Spray applied waterproofing membrane.

4. Sprayed waterproofing membranes shall be tested in accordance with the following :-
   The Contractor shall provide with all batches of material delivered to site, a certificate of compliance with Appendix 20/1.
   The Contractor shall provide two free film samples, sprayed onto open moulds (at least 200mm x 200mm in area and minimum thickness 2mm), for tensile strength and elongation at break to BS 903 part A2 and tear strength to BS 903 part 3A Method C. The Contractor shall supply the Engineer with copies of the test results.
   The Contractor shall continuously monitor the coverage rate of the material applied to the deck and shall provide the Engineer with daily sheets showing the start/finish weights and area covered for each period of spray operation.
   The Contractor shall continuously monitor the wet film thickness using a gauge pin or a standard comb type thickness gauge. The Contractor shall provide the Engineer with daily sheets indicating the wet film thickness measured and location.
   The Contractor shall measure the adhesion of the fully cured membrane to the deck using an Elcometer Adhesion Tester Model 106 or similar. Three tests will be required per 500m^2 of sprayed membrane, smaller structures shall receive a minimum of three tests. The Contractor shall provide the Engineer with the test values and location of test. The Contractor shall reinstate the test areas including primer if necessary. It should be noted that test values below 0.7N/mm^2 will require spraying operations to be suspended while further investigation is undertaken. Areas deemed not to meet this figure will require to be removed and resprayed at the Contractors cost.
   The finished waterproof membrane surface will be “Holiday Tested” by the Contractor and any imperfections detected shall be rectified by the Contractor at his own expense. The Contractor shall make allowance in his programme of works for such testing.
   A 20mm sand carpet asphalt with a red indicator mesh on top shall be put on top of concrete bridge decks waterproofing as a protection.

Waterproofing for below-ground concrete surfaces

5. List of materials permitted for waterproofing below-ground concrete surfaces.
   The following materials are permitted alternatives. Other proprietary materials may be used if agreed by the Engineer.
   (a) Tar
   (b) Cut back bitumen
   Sealing with primer is required prior to the application of tar or bitumen waterproofing.

APPENDIX 30/1: LANDSCAPE AND ECOLOGY: GENERAL

1. The Construction of all structures adjacent to watercourses shall be in accordance with the Requirements of the Scottish Environment Protection Agency.

Requirement for Works in watercourses:

2. Minimising the impact on any watercourse is entirely dependent on the method employed by the Contractor. The Contractor shall therefore issue a method statement detailing measures employed to prevent release of sediment and other pollutants in to the burn. This method statement shall be prepared and discussed with SEPA.

3. Straw bales should be deployed downstream of the works to trap sediment created during the works.

4. All surplus materials from the construction should be stored in locations well away from the burn. No run off from the stored material should be allowed to flow into the burn.

5. Machines entering the watercourse should be kept to a minimum and work should, wherever possible, be carried out from the bank.

6. SEPA Pollution Prevention Guidelines PPG5 and PPG6 must be adhered to.

   In the event of a pollution incident the contractor should contact SEPA on 01224 248338.

7. All on site staff should be made aware of these recommendations and any recommendations made by SEPA and should monitor the state of the burn throughout the course of the works.

Requirement for Fish Migration:

8. Water velocity is a common problem preventing fish migration. To overcome this issue the culverts should incorporate the following measure:

9. Box and pipe culverts to have buried inverts with a stable depth of natural bed material above the invert having regard to the particle size and flow velocity. The arrangement shall permit brown trout free passage whilst causing minimal disruption to water draining through the culvert.

10. A culvert should be installed to ensure both inlet and outlets are set into the streambed to reduce the occurrence of perching during the lifespan of the culvert.

11. Resting places immediately upstream and downstream of a culvert should be created. This can be done creating small deep pools approx. 30cm depth, providing rocks and areas of overhanging vegetation.

Special Requirements In Relation To Working In River Dee Special Area Of Conservation (SAC)

12. The Contractors attention is drawn to the fact that the River Dee and Tarland Burn is a candidate SAC for salmon, otter and fresh water pearl mussels.

13. The Contractor is to install suitable and effective measures to prevent pollution and disturbance of the watercourse which must be fully described by detailed method statements to be approved by the Engineer in advance of the works.

14. The Contractors attention is drawn to the presence of the following sensitive species identified during ecological site assessment.

15. The Contractor will install and maintain suitable and effective arrangements within the watercourse downstream of the works to contain and filter any sediment or other polluting material arising from the works. Reference is made to Item 3 and 4 of SPECIAL REQUIREMENTS IN RELATION TO THE DEE DISTRICT SALMON FISHERY BOARD.