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Notes for Guidance on the Specification for Road Works Series NG 1400 - Electrical Work for Road Lighting and Traffic Signs

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Standards

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For all documents that existed within the NRA DMRB or the NRA MCDRW prior to the launch of TII Publications, the NRA document reference used previously is listed above under 'historical reference'. The TII Publication Number also shown above now supersedes this historical reference. All historical references within this document are deemed to be replaced by the TII Publication Number. For the equivalent TII Publication Number for all other historical references contained within this document, please refer to the TII Publications website.

ELECTRICAL WORK FOR ROAD LIGHTING AND TRAFFIC SIGNS

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Electrical Work for Road Lighting and TVaffic Signs

NG 1401 General

1 The Engineer should check that the electricity supplier has been consulted on requirements for terminating power supply cable in Lighting Units and feeder pillars in the design stage, to avoid delay in connecting an electricity supply.

2 The Engineer's attention is drawn to the 'Code of Practice for Electrical Safety in Public-Lighting Operations' available from the Institution of Lighting Engineers (ILE) and the references in sub-Clause 1401.1.

3 The term 'lantern' is defined as a 'luminaire designed for road lighting' in BS 4533 : Section 103.1 and used throughout BS 5489. Both terms are therefore used in the Specification.

4 The term 'network' is defined to ensure that testing to Clause 1424 is not applied to Lighting Units and feeder pillars where it could cause damage to equipment.

5 Where cable owned by the electricity supplier is utilized for the power supply to individual locations and the Contractor is not required to provide and install cables, the reference to 'network' is not applicable.

NG 1402 Site Records

1 'As-built' drawings, which should include inserts to a larger scale when layouts are complex, may be produced either by the Engineer from daily records or by the Contractor (these being checked by the Engineer against his records). The requirements should be described in Appendix 14/1 for road lighting and traffic signs. If it is considered practical, any motorway communication details should also be added.

2 During construction, the longitudinal locational measurements may have to be related initially to chainages and converted to refer to permanent highway features such as bridge abutments, or marker posts when these are defined.

3 The production of accurate daily site records, which should be on a form supplied, or approved, by the Engineer is of assistance in the preparation and checking of the 'as-built' drawings, and more particularly for the location of underground cables etc. and for fault-finding in the interval between the issue of a Certificate of Completion and the availability of 'as-built' drawings.

NG 1403 Location of Lighting Units and Feeder Pillars

1 The approximate position of all Lighting Units and feeder pillars should be indicated on the Drawings and differentiation made between each type of Lighting Unit and feeder pillar. Location of overhead power lines should also be indicated to ensure that minimum safety clearances are maintained. Appendix 14/2 can be used to describe the location and type of all Lighting Units and feeder pillars. For example, the Appendix can be used to show in table form the set-back of lighting columns from the kerb or the edge of carriageway.

NG 1404 Change of Lighting Arrangements

1 New Lighting Units should not normally be switched on and left in operation, apart from testing, before the road is opened to traffic. They are liable to mislead and confuse drivers particularly where temporary diversion routes have been introduced or a newly completed road has not been opened to traffic. Existing Lighting Units should not be switched off until the new permanent, or appropriate temporary. Lighting Units are available.

NG 1405 Temporary Lighting

1 Appendix 14/3 should include details of the Engineer's requirements for the provision of temporary Lighting Units required by the Engineer, and design and specification requirements for temporary lighting which the Contractor may require in the execution of the Contract.

NG 1407 Luminaires

1 Any particular requirements should be listed in Appendix 14/4 giving details of glare control

(whether low threshold increment (LIT), moderate threshold increment (MTI) or other), lamp type and wattage, whether fitted with integral gear and whether to have higher IP rating. In practice lanterns have a three prong twist lock socket to take a PEC fitted on top at the spigot end and suitably sealed with a weather proof gasket and fixed to the lantern body by non-corrosive fixing screws. Lanterns not to be fitted with photoelectronic control sockets should be included in the Appendix. If two part PECs are specified, PEC sockets will not be required in the lanterns but alternative fixings should be detailed.

2 The Engineer should state in Appendix 12/1 which signs are to be lit by internal illumination and which by overhead or free-standing luminaires.

3 The Engineer should give in Appendix 12/1 his particular requirements for Lit Sign Units.

4 If fuses are required in any integral gear compartment their rating should be specified in Appendix 14/4.

5 The Engineer should note the procedure given in Clause NG 1302 regarding aesthetic approval.

NG 1408 Lamps

1 Lamp type and wattage should usually be listed with the associated luminaire.

2 For road lighting design, the term 'lighting design lumens' linked to 2000 hours is being replaced by new definitions in BS 5489 : Part 1. The light output for normal design purposes is defined in sub-Clause 1408.2. The initial luminous flux of a lamp is the luminous flux in lumens after an initial ageing period under stated running conditions. The lamp flux maintenance factor is the proportion of the initial luminous flux of a lamp that is produced after a set time.

NG 1409 Photoelectronic Controls (PECs)

1 Photoelectronic controls may be one part or two part. Where ballasts are incorporated in luminaires, one part units are generally more appropriate.

2 A time delay of 20 to 30 seconds should be incorporated into PEC switch operation to prevent the lamp being switched in response to transient changes in light conditions.

3 The switching level and differential of the PEC should be specified in Appendix 14/4.

NG 1410 Shorting Plugs

1 Shorting plugs (i.e. dummy PECs) when used: Consideration should be given to their location so as to facilitate planned maintenance access to PECs.

NG 1411 Time Switches

1 Photoelectronic controls are preferred but where it is not practical for them to be used, time switches may be specified in Appendix 14/4.

NG 1412 Ballasts

1 If ballasts are for other than 230 V operation this should be specified in Appendix 14/4.

2 If information related to control gear watt losses and power factor is to be provided this should be stated in Appendix 14/4.

NG 1413 Ignitors for Discharge Lamps

1 Ignitors integrated with lamps may be accepted as an alternative.

NG 1416 Cut-outs, Fuseholders, Fuses and Miniature Circuit Breakers (MCBs)

1 The rating of fuses and MCBs in luminaires, columns, feeder pillars etc. should be specified in Appendix 14/4.

2 Proper discrimination in their operation should be ensured to avoid unnecessary interruption of supplies.

3 Where service cut-outs are provided by the electricity supplier, the Engineer should ensure that sufficient space has been left by the Contractor in Lighting Units and feeder pillars to accommodate them.

4 The type of cut-out, fuse holder and MCB required will be dependent upon the cabling system and cable size and should be specified in Appendix 14/4.

5 The class of MCB will depend on the maximum prospective fault current and should be specified in Appendix 14/4.

NG 1418 Feeder Pillars

1 As the electricity supplier may require an undertaking to pay for energy before agreeing to provide a supply, the Engineer should normally make arrangements with the supplier for the provision of services to Lighting Units and feeder pillars although it remains the Contractor's responsibility to ensure that supplies are available to meet his programme.

2 The material and construction of the feeder pillar case, and the finished treatment should be described in Appendix 14/4; see NG 1425. Intumescent varnish should be applied to the backboard in three coats to provide protection against fire propagation.

3 The Engineer should specify in Appendix 14/4 the equipment required in the feeder pillar as follows:

(i) Mounting facilities for the electricity supplier's cable cut-out.

(ii) Terminations, glands, trunking, method of fixing and sizes for cables and wiring.

(iii) A suitably rated 1 or 3-phase switch fuse to BS 5419 as appropriate for the supply cable.

(iv) Distribution boards fitted with MCBs or fuses for the outgoing cables. The maximum breaking capacity of the MCB should be not less than the prospective maximum short circuit current.

(v) An earth stud with washers and clamping nuts.

(vi) Circuit diagrams, and labelling as required by the Engineer showing details of interconnection of equipment and the connection of cables to and from the pillar; all indelibly drawn or engraved on a material not subject to damage by the environment or normal use.

(vii) When required, a thermostatically controlled 60 watt heater should be mounted at the bottom of the base board.

4 In cases where the Engineer requires the supply of keys to the pillar door he should specify his requirements in Appendix 14/4.

5 In cases where the Engineer requires group control of Road Lighting Units he should specify his requirements in Appendix 14/4.

6 A drawing, of each type of pillar should be provided showing:

(i) The desired layout of the equipment. (It should be noted that the variety of suitable equipment available may make it impracticable to define specific sizes).

(ii) Internal wiring details, including main earth connections as required by the National Rules for Electrical Installations for the type of system of which the installation is to form a part, to take account of the requirements of the electricity supplier.

(iii) The method of sealing the base of the pillar.

7 The Contractor should be required to detail any variation from the feeder pillar layout described.

NG 1419 Wiring

1 The Engineer should detail his requirements for component layout and wiring on typical schematic drawings; guidance is given in NG 1401.2. The Contractor may be required to prepare detailed drawings for approval by the Engineer.

2 If the wiring specified in Clause 1419 is to be altered, Contract-specific requirements should be described in Appendix 14/4.

NG 1420 Earthing

1 The Engineer should detail his requirements for earthing arrangements on typical schematic drawings.

2 The National Rules for Electrical Installations specify the electrical requirements for safety and reference should be made to those Rules when there is doubt on the extent of bonding and of earth electrode provision required.

NG 1421 Underground and Ducted Cables

1 If the cable type required in Clauses 1420 and 1421 is to be varied (e.g. concentric or split concentric) Contract-specific requirements should be described in Appendix 14/4.

2 Cable type conductors, sizes and materials should be shown on the Drawings, cross-referenced in Appendix 14/4 related to cable runs. It should be made clear where cables are to be laid in troughs, or in ducts, where they are to be attached to structures, and where additional protection and support is required. Where ducts are required these should comply with Clause 501 unless there are any particular requirements, which should be listed in Appendix 5/2. The Engineer should ensure that the Drawings show that cables have a minimum clearance of 500 mm from safety fence foundations.

3 Cable supports should be provided as necessary where cables cross drawpit chambers etc. so as to maintain a maximum of 450 mm between supports. Where cables are laid in public footpaths and in other cases where additional protection is required, cable covers should be shown on the Drawings, cross-referenced in Appendix 14/4. Cover sizes should be 150 x 225 mm for one cable not exceeding 50 mm diameter and 225 x 300 mm for one cable exceeding 50 mm diameter or two not exceeding 37 mm diameter each.

4 The minimum requirements for depth of cover on cables are those specified by the National Rules for Electrical Installations.

5 Where existing buried cables are required to be removed, details should be included in Appendix 2/2 and the advice given in NG 201 followed.

NG 1422 Cable Joints

1 If several different types of joint are to be provided the various types, e.g. through, breeches and tee, should be shown on the Drawings, cross-referenced in Appendix 14/4 including cable sizes for both main and branch cables.

2 Provision of joints not shown on the Drawings is generally unacceptable. Shortage of cable through incorrect measurement, wilful or accidental cable damage, should not be considered as justification for additional joints.

3 The Engineer should ensure that jointing is carried out under adequate supervision and complies with BS 6910 : Part 2. The Engineer should, in considering evidence of the jointers competence, consider if the jointer has recently attended a recognised course and his length of experience. If there are any doubts on the competence of a jointer, a sample joint should be required from the jointer prior to commencement of the work.

NG 1424 Inspection and Testing to be Carried Out by the Contractor

1 The use of methods of testing other than those given in the National Rules for Electrical Installations is not precluded provided the Engineer is satisfied they give no less effective results.

2 An acceptable test of cable sheath insulation is provided by the application of 1000 V from an insulation tester.

3 The certificate from the Contractor verifying compliance with the National Rules for Electrical Installations and the test results provided by the Contractor in compliance with Clause 1424 should form part of the completed documentation and be forwarded by the Engineer to the relevant Road Authority along with other site records.

NG 1425 Preparation and Finish of Metal and Other Surfaces

1 The requirements for Preparation and Finish of metal and other surfaces should be in accordance with the following as appropriate:

(i) Steel Feeder Pillars (and other external enclosures) should be finished inside and out by galvanizing, zinc or aluminium spray or painting as follows:

(a) Galvanizing in accordance with the relevant sub-Clauses of Clause 1307;

(b) Sprayed metal coatings to comply with BS 2569 : Part 1 and with the following:

Aluminium coating to be material with composition in accordance with BS 1475 and zinc coating to be material Zn' with composition in accordance with BS 3436.

The thickness of the coating should not be less than 100 microns.

The strength of adhesion of metal spray coatings should not be less than the following:

Aluminium	50 kgf/cm-
Zinc	80 kgf/cm^2

Metal spray coatings should be applied continuously over each 0.5 m^2 per gun or the area of the component whichever is the lesser until the specified thickness has been achieved.

The procedures for applying metal spray in separate layers described in BS 2569 should not be used.

All surfaces to be metal sprayed, including that of the reference panel described in BS 2569, are to be blast cleaned with chilled cast iron grit and the standard to be clean steel.

(c) Painting should be in accordance with the relevant Clauses of the 1900 Series. Final coats of paint are to be applied on Site after final installations including the fitting of internal apparatus required as part of the Permanent Works. Internal surfaces should receive the same treatment as for external surfaces except that final paint coats should be applied before internal components are installed.

(ii) Aluminium Feeder Pillars (and other external enclosures) may be left untreated or painted. Surfaces to receive paint should be lightly abraided, cleaned and primed. Final painting as in (c) above.

2 In the case of fixings and other ancillaries appropriate Preparation and Finish may be required as follows:

(a) Sherardized Coatings:

Sherardized coatings to comply with Class 1, Table 1 of BS 4921 : 1988.

(b) Electroplated Coatings:

Electroplated coatings to comply with BS 3382 : Part 2. Additionally BS 3382 : Part 2 may be deemed to cover the electroplating of components up to and including 36 mm in diameter. Electroplated surfaces which are to be painted should not receive chromate passivation treatment.

(c) Other Finishes as in 1 above.

3 These requirements should be described in Appendix 14/6.

NG SAMPLE APPENDIX 14/1 : SITE RECORDS

[Note to compiler: Include as appropriate]

1 As-built drawings will be produced by the Engineer/shall be produced by the Contractor, on . . . . .number copies of drawing no. . . . . .which will be provided by the Engineer and shall be in accordance with the requirements of Clause 1402.

2 Motorway communications details shall/shall not be included on the drawings.

3 Indicate the details to be provided 11402).

NG SAMPLE APPENDED 14/2 : LOCATION OF LIGHTING UNITS AND FEEDER PILLARS

[Note to compiler: Include either:]

The position and description of Lighting Units and feeder pillars are shown on the following drawings.....

I or: |

The position and description of Lighting Units and feeder pillars are scheduled below:

Description of Equipment	*Location of Equipment*

[Notes to compiler:

1 Information on the design of road lighting in accordance with the appropriate Part or Parts of BS 5489 implemented by the relevant Standard may be included.

2 The various types of Lighting Unit will call for different location dimensions and descriptions. Both position and description entries may be divided into normal and special categories for drawings or schedules.

3 Details of the electricity supply (i.e. single-phase 230V or three-phase 400V, 50 Hz) should be stated.]

NG SAMPLE APPENDIX 14/3 : TEMPORARY LIGHTING

[Note to compiler: Include here:]

(i) The requirements for any temporary lighting. *[For example for traffic management during temporary diversions for traffic, and at central reserve crossovers.]*

(ii) The requirements for any advance fixed Road Lighting Units *[in final positions as far as practicable [* to fulfil the requirements of li).

NG SAMPLE APPENDLX 14/4 : ELECTRICAL EQUIPMENT FOR ROAD LIGHTING

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

(i) Lanterns and Lamps

The lanterns shall be compatible with the columns and brackets offered in Appendix 13/2 and the information shall include the lamp type and wattage, lantern circuit wattage and toe in angle if applicable.

[The compiler should state here any particular requirements described in NG 1407. For example: lantern design attitude, lantern (glare control) classification, LTI, MTI, flat glass or bowl or other, IP (Ingress Protection) enclosure rating, any exclusion of PEC sockets, mounting height (nominal), ratings of fuses in integral gear compartments., Specification for lamps used in the Contract, Location of PECs]

Manufacturer	*Cat. No.*	*Glare Control Class (TI)*	*IP Rating*	*PEC Socket*	*(Design Table Ref No.) **	*(Isoluminance Template Ref No.) **

[^If required, to ensure the assembly of Road Lighting Units conforms to the performance requirements of BS 5489 :Part 2.1

(ii) Ancillary Equipment

[Note to compiler : Include here:]

1 The positioning of equipment described in Clauses 1411 to 1416 within the base compartment of columns *[1417.1]*

2 Requirements for wiring and installation of components within columns *[1419.1].*

3 Requirements for group switching *[1409.4].*

4 Data required related to gear losses and power factor.

NG SAMPLE APPENDIX 14/4 : ELECTRICAL EQUIPMENT FOR ROAD LIGHTING (Continued)

Clause	*Item*	*Manufacturer*	*Catalogue or Type No.*	*Requirements [Compiler to complete]*
1409	Photoelectronic controls			Differential and switching levels (if required)
1410	Shorting plug			
1411	Time Switches			
1412	Ballasts			
1413	Ignitors			
1414	Starters			
1415	Capacitors			
1416	Cut-outs			Current rating
	Fuse Holders			Conductor size
	Fuse Links			Current rating
	MCBs			MCB class
1419	Wiring			

Note: Compiler may add other items.

(iii) Feeder Pillars

Feeder pillars shall be suitable for the layouts shown on drawing nos. . . . . and confirm with the requirements shown on the Drawings and in the following list.

[The compiler should state here:]

1 Any particular requirements for locks, keys, circuit details, earth electrodes.

2 Requirements for the bonding conductor cross-sectional area and for earth electrode */1420]*

3 Requirements for Labelling *[1418.8]*.

4 Materials to be used, Construction Details.

Location of Feeder Pillar	*Manufacturer*	*Catalogue No.*

NG SAMPLE APPENDIX 14/4 : ELECTRICAL EQUIPMENT FOR ROAD LIGHTING (Continued)

(iv) Cables and Cable Joints

I *The compiler should state here:}*

1 References to drawings which show requirements for the installation of cable covers \ *1421.3].*

2 Reference to drawings which show cable lines, cable joints and cable joint marker blocks *[1421.4, 1422.3, 1422.6].*

3 Requirement for cable trenches: Particular requirements for ducts should be listed in Appendix 5/2 *[1421.4 NG 1421.2].*

4 Particular requirements for cable laying, additional protection and support *[1421.5].*

5 Requirement for cables following the same route if different from the requirement of sub-Clause 1421.7.

6 Requirements for installation of power supply cables adjacent to communication cables if different from the requirements of sub-Clause 1421.8.

7 Reference to drawings which show identifying marks to be indented in permanent marker blocks *[1421.11 J. I Cross-reference should be made to RCD drawing where appropriate].*

8 Requirements for terminating armoured cables 1*1423.1[.*

Location of *(a) Cables* *(h) Cable joints*	*Manufacturer*	*Catalogue No.* *Reference No.* *or Name of Cable*

NG SAMPLE APPENDLX 14/5 : ELECTRICAL EQUIPMENT FOR TRAFFIC SIGNS

[Note to compiler: Include here:]

1 The positioning of equipment described in Clauses 1411 to 1416 within the base compartment of posts *[1417.1].*

2 Requirements for wiring and installation of components within posts and Lit Sign Units */1419.1]*

3 Special requirements for illumination and electrical work on or to gantries */1220.3]*

[Note to compiler: Electrical equipment for traffic signals should be described in Appendix 1215].

NG SAMPLE APPENDIX 1476: PREPARATION AND FINISH OF METAL AND OTHER SURFACES

[Notes to compiler: State here the Preparation and Finish required for enclosures, fixings and other ancillaries. The requirements indicated in NG 1425 may be used.]

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