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Notes for Guidance on the Specification for Road Works Series NG 1300 - Road Lighting Columns and Brackets

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CC Construction & Commissioning

Standards

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Document Attributes

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NRA MCDRW prior to the launch of TII Publications, the NRA document reference used previously is listed above under 'historical reference'. The TII Publication Number also shown above now supersedes this historical reference. All historical references within this document are deemed to be replaced by the TII Publication Number. For the equivalent TII Publication Number for all other historical references contained within this document, please refer to the TII Publications website.

ROAD LIGHTING COLUMNS AND BRACKETS

Contents

Road Lighting Columns and Brackets

NG 1301 General

1 UK Department of Transport Standard BD 26/'94 is complementary to the Specification and includes details of acceptable materials and dimensional limitations.

The Specification includes design requirements since the Contractor is required to propose columns and brackets, which have been designed by the manufacturer; where required to design foundations for planted columns to meet the Engineer's stated requirements, and to submit designs to the Engineer for acceptance and aesthetic approval where appropriate. This responsibility where required includes for the design of planted column foundations for each of the types of soil listed in Appendix 13/1 and where required, the design of foundations for columns with flange plates. Where the Engineer designs anchorages and attachment systems, the use of proprietary systems should be avoided.

2 Electrical engineering requirements are given in the 1400 Series.

3 Wall mounting bracket positions should be detailed on the Drawings by the Engineer. Details of the provision to be made for electrical services e.g. ducting, conduits, junction boxes, etc. should be shown on the Drawings.

4 Where wall mounted brackets and fixtures are required, wayleaves, i.e. permission to fix, may be necessary.

5 The Engineer should obtain confirmation from the Contractor that the appropriate electricity suppliers have confirmed their approval to the clearances provided to overhead lines. The Engineer should ensure that the Contractor has done this in advance of installation.

6 Road lighting columns as specified in this series should be set back from the carriageway edge or edge of hard shoulder in accordance with the definition and the general principles outlined in Clause 9 : BS 5489 : Road Lighting : Part 1: 1987.

When used for the lighting of roads outside urban areas the following practice has applied for lighting columns 12 metres or less in nominal height:

(i) Clearance from edge of carriageway or edge of hard shoulder is at least 2.5 metres;

(ii) Column material is either Aluminium or Formed sheet steel, octagonal in shape.

This practice should be continued unless guard rail is provided and should be specified in Appendix 13/1 where appropriate.

7 The information to be provided by the Engineer at the time of inviting tenders should be given in Appendix 13/1.

NG 1302 Design of Lighting Columns, Brackets, Foundations, Anchorages and Attachment Systems

1 The Contractor should submit to the Engineer a facsimile of the design and check certificates for the design of each lighting column, bracket and for columns with flange plates their associated anchorages and attachment systems as required by sub-clause 1302.2 and certification as described in Appendix 13/4.

The Contractor should submit certificates specified in sub-Clauses 1302.3 and 1302.4 to the requirements described in Appendix 13/1.

2 In the case of a bridge it is necessary to agree the details of the lighting column attachments to the bridge with the engineer responsible for the bridge.

The Contractor should normally be made responsible for providing the design of wall mounted brackets and fixings. The Engineer should ensure that the wall on which mounted brackets are to be fixed is capable of carrying the additional loads and other forces that may be transmitted by the bracket.

Aesthetic Approval

3 The Engineer may require to submit the Contractor's designs of columns and lanterns, including bracket arms, to the appropriate Road Authority for aesthetic approval, and notify the Contractor accordingly when this approval has been received.

NG 1303 Data Sheets

1 The information required on the completed Data Sheets is that which is necessary to ensure that the equipment being offered satisfies the requirements of this Specification and is acceptable to the Engineer. A typical Standard Data Sheet is included in these Notes for Guidance. The information provided by the Engineer, including that in Appendix 13/1 should be all that is necessary to enable the Contractor to complete the Data Sheets in accordance with the "Instructions for Completion of Data Sheets" shown in Appendix 13/3.

In completing and submitting the Data Sheets the Contractor confirms compatibility of the columns and lanterns being offered.

The Engineer should specify in Appendix 13/1 the date by which completed Data Sheets are to be submitted. Where these are required at the time of tender this should be stated in Appendix 13/1 and the information provided by tenderers should be sufficient to evaluate the tenders and suitability of equipment being offered.

The Engineer should list in Appendix 1/4 the Contractors detail drawings which are to be submitted. Such drawings are normally submitted after the Contract is awarded unless there is good reason to specify otherwise. Drawings are usually required to give details unique to the scheme which can be of assistance to the road authority, e.g. sizes and centres of foundation holding down bolts, etc. Drawings which show only general construction details are not usually required.

NG 1304 Identification and Location Markings

1 The location marking required for each column will vary throughout the country and instructions in the Contract should generally be agreed with the road authorities concerned. The following should be specified:

(i) The direction in which the numbers should face.

(ii) The colour and background of the numbers.

(iii) The size of the numbers and distance above ground.

(iv) Method of marking e.g. in paint or plastic, etc.

(v) Number of marks on each column shaft (generally two for columns on central reserve).

(vi) The mark which will enable a particular column to be located.

(vii) Any distinctive system in order to highlight the location number at night.

NG 1305 Installation of Foundations, Anchorages and Attachment Systems

1 Examples of the evidence required by sub-Clause 1305.10(i) include:

(a) the results of testing to BS 5080 by a testing laboratory accredited by ILAB for such tests; or

(b) A certificate from any UEAtc (European Union of Agrement in construction) member together with the results of testing to the UEAtc Directive for the Assessment of Anchor Bolts MOAT (Method of Assessment & Test) No. 42: 1986 (adapted to include only anchorage types permitted by the specification).

An example of the evidence required by sub-Clause 1305.10(ii) is the result of testing to Clause 5.4.2.5 of MOAT No 42 (adapted to include only anchorage types permitted by the Specification).

If the four week time period required by sub-Clause 1305.10 is unrealistic then the appropriate time period should be stated in Appendix 13/1.

2 Failures of anchorages in drilled holes are known to occur due to either the lack of cleanliness of the hole or the excessive tolerances of the size of the hole. The manufacturer of the anchorage should give the maximum tolerance permitted and the evidence submitted in accordance with sub-Clause 1305.10 should show that the anchorages are satisfactory when installed in holes having these maximum tolerances.

3 Where lighting columns are to be installed on bridge decks, columns with flange plates should be used. Care should be taken to avoid damaging bridge deck waterproofing. Normally an anchorage and attachment system which avoids this problem should be used. In exceptional circumstances, where damage to the waterproofing is unavoidable, the Engineer should agree a compatible sealing system to prevent ingress of water and avoid corrosion.

4 Where attachment systems are used, the Engineer should ensure that the bolts or nuts

are tightened adequately in accordance with the manufacturer's instructions, to ensure that the attachment system does not work loose when subject to wind loading. In addition, it is important to ensure an adequate length of thread engagement.

Sealing of voids in anchorages, attachment systems and flange plates with a non-setting passive filler is important to prevent ingress of water and to avoid corrosion.

NG 1306 Site Tests on Anchorages in Drilled Holes

1 The Contractor is responsible for having Site tests carried out and, where required, for providing designs for the anchorages. The Engineer should select which anchorages he requires to be tested within the frequency given in Appendix 1/5 and instruct the Contractor accordingly.

2 Where designs for anchorages in drilled holes are provided by the Contractor, the Engineer should satisfy himself that the Contractor's calculations for the nominal tensile load have been correctly carried out and have been checked, before selecting the anchorages for testing.

3 The Contractor's test record documents should be included in the as-built records.

NG 1307 Materials and Surface Finishes

1 The Engineer should select the system of protection for steel columns relevant to the intended location and environment utilizing the information given in NG 1900 and he should state his requirements in Appendix 19/3.

2 The Engineer should ensure that the quality of the surface protection for temporary lighting columns and brackets is adequate. The full requirements of the 1900 Series for such lighting may not be necessary.

3 Metal fixings to concrete columns should also comply with the requirements of the 1300 Series. No protection to the concrete is normally required.

NG 1309 Amendments and Additions to BS 5649 : Part 2 : 1978

1 The amendments to Page 5 Clause 4 introduce the width of cable entry slot dimension "X" which should be 75 mm for all columns of nominal height of 8 m or more and may be 50 mm for columns of lesser height. The value of "X" should be stated in Appendix 13/1.

2 The additional sub-clause 8.7.1.3 in Specification Clause 1309 specifies the material thickness tolerance. In the event of the thickness of the material supplied being outside the *—5c/r* tolerances but still being within the tolerances specified for steel in BS 4360 or appropriate Euronorms as listed in IS EN 10 025, the material may be used providing its actual certified yield strength is not less than the product of the ratio of nominal thickness to actual thickness and the specified nominal yield strength, i.e.:

<*y_a ^

where
∘ y_a = actual certified yield strength
∘ y_n = nominal specified minimum yield strength in BS 4360 or BS EN 10 025
h = nominal specified thickness
t,, = actual thickness

Note: A similar approach may be adopted in the case of aluminium

The door dimensions should be determined. For steel road lighting columns (8 m to 12 m nominal height) NRA RCD Detail 2 in Clause 1311 of the Specification applies unless otherwise specified. It is essential to verify that the dimensions of the door opening and of the base compartment (NG 1311) are large enough to accept the electrical equipment that is to be fitted within the base compartment.

The height to the bottom of the door may be specified. A height of 1.2 metres is current practice. See also NG 1311.

Planting depth: Practice indicates a minimum value for metal columns as follows:

Nominal Height	Planting Depth
12	1.7 metres
K)	1.5 metres
8	1.2 metres

Planting depths may be standardised by varying the dimensions of the mass concrete backfill for different soils in accordance with Appendix B : BS 5649 : Part 2 : 1978 as modified by sub-Clause 8.2 of UK Department of Transport Standard BD 26/94.

6 These requirements should be included in Appendix 13/1 as considered appropriate.

NG 1310 Amendments and Additions to BS 5649 : Part 3 : 1982

Welding

1 Prior to the anticipated start of manufacture of columns, the Engineer should request copies of the most recent certified destructive test reports covering those component types to be supplied under the Contract. It is important to note that when relying on destructive tests or Welding Inspection Consultants' reports previously carried out as permitted by sub-Clause 7.1.5 it is necessary to confirm that the materials and welding consumables used in the manufacture at the time of the previous test or report are to the same specification as currently used.

2 The Engineer should arrange for sample column components and/or joints for destructive testing to be selected by an appropriately qualified Welding Inspector or equivalent. Selection should be made taking into account the manufacturer's inspection reports, previous destructive test reports and observations of current production practice on similar column types. Samples should be selected on the basis that they represent the lower end of quality in the production batch. Particular attention should be given to any features which could adversely affect the true throat size or the mechanical properties of the materials or introduce stress raisers transverse to the member axis.

3 For the purposes of defining lighting column types in 7.1.5, differences in either member cross-sectional shape, joint configuration or weld type, constitute a change in lighting column type. Variations in parent metal thickness or weld throat dimension from the specified sizes on the sample selected for destructive test may be included within the same lighting column type up to a limit of ± 40%.

4 Sample components and/or joints selected for destructive testing should be indelibly marked by the Engineer who should dispatch them to a testing laboratory appropriately accredited by ILAB for weld testing.

5 The Engineer should consider the following points when ascertaining the acceptability of components subject to destructive testing:

(a) Circumferential welds should be sectioned on at least 2 diameters. Seam welds should be sectioned at a minimum of 4 locations along their length. For welded reinforcement at door openings at least one section should be taken along each straight length of weld and at each change of weld direction. Where gusset plates are used the welding of at least one of the gusset plates shall be sectioned with a minimum of two sections one on each welded length. Other welds should be sectioned at intervals not exceeding 100 mm and at changes of direction. One side of each section should be ground, filed, linished or machined to a finish at least as smooth as that produced by a 120 grit paper to BS 871, so that the actual throat and leg dimensions can be measured and any discontinuities exposed. One nick break test in accordance with BS 709 on a length of weld of not less than 25 mm should be made for each joint type on each component. Additional sections and nick break tests may be required in cases of borderline acceptance. Non-conformances with IS EN 288 should be recorded. Non-conformances with the requirements of 7.1.4 should be cause for rejection, except that in 7.1.4.2 the throat and leg dimensions should be the true rather than the apparent dimensions.

(b) One representative section from each joint type for each type of column should be prepared for macro-examination. A hardness survey should be done where any of the parent material thickness exceeds 20 mm. An additional macro-examination should be made of each non-conforming weld.

6 The results of the destructive tests including macrographs should be reported and a certified copy sent to the manufacturer. In the event of non-conformances being found the Contractor and manufacturer should be notified as soon as possible. The test specimens, uniquely identified by hard stamped marks should be returned to the manufacturer's works.

NG 1311 Amendments and Additions to BS 5649 : Part 5 : 1982

1 The requirements for attaching electrical equipment, including the minimum dimensions in the base compartment, may be specified. The minimum dimensions required are determined by ease of access and the dimensions of the electrical equipment that is to be fitted into the base compartment.

2 For steel columns 8 metres to 12 metres in nominal height, practice indicates:

(i) A baseboard of hardwood (varnished with 3 coats of intumescent varnish to provide protection against fire propagation) or other suitable non-hygroscopic material of dimensions 550 mm x 95 mm x 15 mm.

(ii) A distance of 100 mm between the face of the baseboard and the inside face of the door has usually proved satisfactory. It is essential however to verify that this dimension caters adequately for the electrical equipment that is to be fitted within the base compartment.

3 The requirements should be stated in Appendix 13/1 as appropriate.

NG 1313 Laminated Glass Fibre Reinforced Plastic (GFRP) Columns

Manufacture of GFRP Laminates

1 The internal surface of the column should not contain any dry patches but may show the presence of cracking in resin-rich layers or occasional bubbles. These do not affect the strength of the column and may be ignored.

2 The thickness of the column may vary step-wise along its length. Around the door area, additional reinforcement layers should generally be provided dependent on design requirements.

NG 1315 Specification for Design Loads BS 5649 : Part 6 : 1982

The k value referred to in Clause 1315 should be obtained in accordance with Clause 6 of CP3, Chapter V : Part 2 : 1972. The basic wind speed required for this calculation is indicated in the Department of Environment, Building Regulations 1991, "Technical Guidance Document A Structure". The required value should be stated in Appendix 13/1 in accordance with Clause 1315.

NG SAMPLE APPENDED 13/1 : INFORMATION TO BE PROVIDED BY THE ENGINEER WHEN SPECIFYING LIGHTING COLUMNS AND BRACKETS

[Notes to compiler:

1 *Appendix 1311 should be specific and provide all the information which a tenderer will need in addition to information provided elsewhere in tfie documents, in order to submit a tender. Reference should be made in Appendix 13/1 to other relevant documents, e.g. drawings.*

2 *The requirements for each type of lighting column should include the following information as applicable:]*

(i) number of columns;

(ii) nominal height of column;

(iii) bracket projection, single or double: or whether post-top fitting;

(iv) lantern weight and windage area and centres of application of the forces from the centroid of the column shaft;

(v) size, length and angle of lantern fixing;

(vi) location of column, i.e. location factor k, 2.5, 3 or exceptionally greater than 3;

(vii) height of installation above ground level, i.e. for lighting columns mounted on a structure or embankment the height of installation should include the nominal height of the column plus the height of the datum above the adjacent ground level;

(viii) type of column base, i.e. planted with or without base plate or column with flange plate;

(ix) list of columns, planted and with flange plates where the Contractor is to design the foundations, anchorages and attachment systems;

(x) information on soil types for design in accordance with BS 5649 : Part 2 : 1978 Appendix B for individual or groups of columns;

(xi) requirements for base material and for backfilling if not to be as described in sub-Clause 1305.1;

(xii) size (NG 1309) and number of door openings, number of doors to be fitted with hinges or metal chains and direction doors are to face; height of door above ground level; door fastening details: alternative door requirements for columns where standard doors are not appropriate;

(xiii) size (minimum) requirements for base compartments and baseboard requirements, NG 1309 and NG 1311;

(xiv) acceptable column materials; shape if appropriate *[NG 1301];*

(xv) any specific requirements for aesthetic approval of lighting column and bracket combinations;

(xvi) number of door keys;

(xvii) identification and location markings;

(xviii) requirements for wall mountings including fixings;

(xix) requirements for certification. Specify particular requirements *[1302];*

(xx) requirements for earthing *[see NG 1420/;*

(xxi) columns to be mounted on structures or in situations where there is a risk that a detached door could cause an accident if it fell onto the area below;

(xxii) any other special requirements, e.g. dimension *X' for cable entry slot width; requirements related to testing of anchorages *[NG 1305.1];*

(xxiii) requirements of electricity supplier including warning notices regarding proximity to overhead power lines.

3 Latest time by which completed Data Sheets shall be provided.

NG SAMPLE APPENDIX 13/2 : TYPICAL COLUMN AND BRACKET DATA

TYPICAL COLUMN AND BRACKET DATA - SHEET 1

Name of Manufacturer:

Column
Reference No.

Revision No.

Date

NAME OF CONTRACT:

PART A General

Column nominal height (m)

Column material

Material design strength (N/mnr)

No. of door openings

Door opening size
- Height (mm i
-Width

Cross-section of base compartment

Height (mm!	Width (mm)	Depth (mm)

Acceptable positions of bracket arms relative to door position

Door Opening

Manufacturers drawing ref. no.

PART B Foundation Data

Planted base Planting depth

Diameter of concrete surround (if any)

Standard Soil Type Factor G		
630	390	230

Flange base

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

Relevant forces and moments at ground level

Line of action of max. moment relating to door opening

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

NG SAMPLE APPENDIX 13/2 : TYPICAL COLUMN AND BRACKET DATA (Continued)

TYPICAL COLUMN AND BRACKET DATA - SHEET 2

PART C Acceptable Lanterns

Post Top Column

Lantern Connection		LANTERN: MAXIMUM CHARACTERISTICS			
			Standard k Factors (see BS 5649)		
			2.5	3.0	
Diameter immi	Length (m)	Lantern Max Wt (kg)	Maximum Windage Area (m-) for standard k factors		

Single Arm Bracket Column:

Lantern Lever Arm l mm l	
Due to wt. of lantern	Due to windage

Bracket Projection (m)	Ref No.	Drawing No.	Material		Lantern Fixing Angle	Lantern Connection		Lantern Maximum Wt (kg)	Maximum Windage Area (m²) for standard k factors	
			Grade	Design Strength (N/mm²)		Diameter (mm)	Length (mm)			

Double Arm Bracket Column:

Lantern Lever Arm (mm)	
Due to wt. of lantern	Due to windage on lantern

Bracket Projection im)	Ref No.	Drawing No.	Material		Lantern Fixing Angle	Lantern Connection		Lantern Maximum Wt (kg)	Maximum Windage Area (m*) for standard k factors		
			Grade	Design Strength (N/mm')		Diameter (mm)	Length (mm)				

PART D Certification

It is certified that the information given in this Data Sheet has been obtained in accordance with the requirements of the National Roads Authority Specification for Road Works Series 1300.

Signed on behalf of the Contractor.....Date.....

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

General

1 When information is not required a dash shall be inserted in the appropriate boxes.

2 Where a Data Sheet is amended it shall be given a new revision number with a date.

3 The revision numbers shall be consecutive letters of the alphabet, commencing with "A".

4 The date of the revision shall agree with the date of the Contractor's signature.

5 The column, or bracket material shall be material approved for use in the Contract.

6 The material design strength shall be the minimum specified in the design. Where more than one material is used values for all materials shall be given.

7 All relevant entries shall be made on the Data Sheet before the document is certified by the Contractor.

Column Data

8 The column nominal height shall be selected from clause 2 or 3 of BS 5649 : Part 2 : 1978 as appropriate.

9 The number of door openings shall agree with the manufacturer's drawing.

10 The cross-section of the base compartment shall be indicated by a dimensioned diagram/sketch.

11 The acceptable positions of bracket arms relative to the door position shall be indicated on the diagram. Where all positions are acceptable the box noted "ANY" shall be ticked.

12 Where concrete is necessary around the planted base in accordance with sub-Clauses 1305.3 and 1305.4 the minimum diameter shall be entered.

13 For flange bases all forces and moments used (or for use) in the design of the foundations, anchorages and attachment systems shall be given.

14 The corrosion protection system used on the column when new shall be recorded. Where additional steel is provided for sacrificial purposes the amount shall be recorded.

Bracket Data

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

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

NG SAMPLE APPENDIX 13/4 : CERTIFICATION FOR LIGHTING COLUMNS

CONSULTANT'S CHECK CERTIFICATE

We certify that the design of the lighting column system accurately shown on drawing!s) No(s)..... has been checked by us and fully complies with :-

(i) National Roads Authority Specification for Road Works: 2000

(ii) Range of parameters for which column system has been checked as follows :-

We further certify that the design has been accurately transferred to the working drawings.

Signed.....
Team Leader

Signed.....
Partner / Director

Name of Consultant.....

Date.....

MANUFACTURER'S DESIGN CERTIFICATE

We certify that the design of the lighting column accurately shown on drawing(s) No(s)..... has been designed in accordance with and fully complies with :-

(i) National Road Authority Specification for Road Works: 2000

(ii) Range of parameters for which column system has been designed as follows :-

Signed.....
Designer

Signed.....
Director

Name of Manufacturer.....

Date.....

CERTIFICATE OF REGISTRATION ISO 9001 / 9002 (where applicable)

Manufacturer/Design House : Details of Quality Assurance System

NG SAMPLE APPENDIX 13/5: ROAD LIGHTING COLUMNS AND BRACKETS: NRA ROAD CONSTRUCTION DETAILS

Clause No.	Road Construction Detail
1309	This Detail should normally be RCD/1300/2.
1311 (Detail 1)	This Detail should normally be RCD/1300/1.
1311 (Detail 2)	This Detail should normally be RCD/1300/2.

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