NRA ADDENDUM TO

TD 30/87

DESIGN OF ROAD LIGHTING FOR ALL-PURPOSE TRUNK ROADS

Standard TD 30/87 – Design of Lighting for All-Purpose Trunk Roads – is applicable in Ireland with the following amendments:

GENERAL

1. Where the Standard is applied for the design of components which are procured through a contract incorporating the NRA Specification for Road Works, products conforming to equivalent standards and specifications of other member states of the European Union will be acceptable in accordance with the terms of Clauses 104 and 105 of that Specification. Any contract for the procurement of components which does not include these Clauses must contain a suitable clause of mutual recognition having the same effect, regarding which advice should be sought.

2. The Standard provides specification requirements for use in public purchasing contracts. It does not lay down legislation requirements for products and materials used in road construction in Ireland.

3. The Standard should be used forthwith for all schemes for the construction and/or improvement of national roads. The Standard should be applied to the design of schemes already being prepared unless, in the opinion of the National Roads Authority, application would result in significant additional expense or delay progress. In such cases, Design Organisations should confirm the application of this Standard to particular schemes with the National Roads Authority.

4. In several locations:

For: "trunk road"
Read: "national road";

For: "Department"
Read: "National Roads Authority";

For: "Departmental Standard"
Read: "Standard".

SPECIFIC

1. Contents Page, Appendix A, title:
   For: "List of British Standards"
   Read: "List of Standards".

2. Page 1, Paragraph 1.1, line 1:
   For: "This Departmental Standard implements the 1987 revisions"
   Read: "This Standard implements the 1992 to 1998 revisions".

3. Page 3, Paragraph 3.4.2, line 3:
   For: "Department's Specification for Highway Works"
   Read: "NRA Specification for Road Works".

4. Page 4, Paragraph 4.6(a), line 1:
   For: "BS 5490"
   Read: "IS EN 60529".

5. Page 7, Paragraph 6.2(c), line 2:
   For: "Department's Specification for Highway Works"
   Read: "NRA Specification for Road Works".

6. Page 7, Paragraph 6.2(e), line 2:
   Delete "(Refs 10, 11)".

7. Page 8, Section 7, references 1 and 2:
   Delete references 1 and 2 and replace with:

   "1. British Standard BS 5489-1 : 1992, Road Lighting, Guide to the General Principles.

   2. British Standard BS 5489-2 : 1992, Road Lighting, Code of Practice for Lighting for Traffic Routes."

8. Page 8, Section 7, reference 5:
   Delete reference 5 and replace with:

   "5. British Standard BS 5489-8 : 1998, Road Lighting, Code of Practice for Lighting That May Affect the Safe Use of Aerodromes, Railways, Harbours and Navigable Inland Waterways."

9. Page 8, Section 7, references 7 and 8:
   Delete references 7 and 8 and replace with:

   "7. NRA Manual of Contract Documents for Road Works, Volume 1: Specification For Road Works.

   8. IS EN 60529, Degrees of Protection Provided by Enclosures."

10. Page 9, Section 7, references 10 and 11:
    Delete references 10 and 11.

11. Page 9, Section 8:
Delete text and replace with:

"8.1 All technical enquiries or comments on this Standard should be sent in writing to:

Head of Project Management and Engineering
National Roads Authority
St Martin's House
Waterloo Road
Dublin 4"

12. Pages 10 and 11, Appendix A:
Delete Appendix A and replace with revised Appendix A enclosed on pages 5 and 6.

13. Page 12, Appendix B:
Delete Appendix B and replace with revised Appendix B enclosed on page 7.

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E O'CONNOR
Head of Project Management and
Engineering

APPENDIX A : LIST OF STANDARDS

Note: This list is not comprehensive.

A.1 BS 5489 Road Lighting

BS 5489-1: 1992, Guide to the General Principles.

BS 5489-2: 1992, Code of Practice for Lighting for Traffic Routes.

BS 5489-3: 1992, Code of Practice for Lighting for Subsidiary Roads and Associated Pedestrian Areas.

BS 5489-4: 1992, Code of Practice for Lighting for Single-level Road Junctions Including Roundabouts.

BS 5489-5: 1992, Code of Practice for Lighting for Grade-separated Junctions.

BS 5489-6: 1992, Code of Practice for Lighting for Bridges and Elevated Roads.

BS 5489-7: 1992, Code of Practice for Lighting of Tunnels and Underpasses.

BS 5489-8: 1998, Code of Practice for Lighting That May Affect the Safe Use of Aerodromes, Railways, Harbours and Navigable Inland Waterways.

BS 5489-9: 1996, Code of Practice for Lighting for Urban Centres and Public Amenity Areas.

BS 5489-10: 1992, Code of Practice for Lighting for Motorways.

A.2 Lanterns

IS EN 60598-2-3/A1: 1998, Luminaires, Part 2: Particular Requirements, Section 3: Luminaires for Road and Street Lighting.

A.3 Enclosure (IP) Rating

IS EN 60529: 1993, Degrees of Protection Provided by Enclosures.

A.4 Lighting Columns

IS EN 40-1: 1992, Lighting Columns, Part 1: Definitions and Terms.

IS EN 40-2: 1986, Lighting Columns, Part 2: Dimensions and Tolerances.

BS 5649: Specification for Lighting Columns, Parts 3 to 9.

A.5 Lamps

IS EN 60188: 1991, High-Pressure Mercury Vapour Lamps.

IS EN 60192: 1999, Low-Pressure Sodium Vapour Lamps.

IS EN 60662: 1993, High-Pressure Sodium Vapour Lamps.

A.6 Ballasts

IS EN 60920: 1992, Ballasts for Tubular Fluorescent Lamps - General and Safety Requirements.

IS EN 60921: 1992, Ballasts for Tubular Fluorescent Lamps - Performance Requirements.

IS EN 60922: 1998, Ballasts for Discharge Lamps (excluding tubular fluorescent lamps) - General and Safety Requirements.

IS EN 60923: 1999, Ballasts for Discharge Lamps (excluding tubular fluorescent lamps) - Performance Requirements.

A.7 Capacitors

IS EN 61048: 1993, Capacitors For Use in Tubular Fluorescent and other Discharge Lamp Circuits - General and Safety Requirements.

IS EN 61049: 1994, Capacitors For Use in Tubular Fluorescent and other Discharge Lamp Circuits - Performance Requirements.

A.8 Photoelectronic Controls (PECs)

IS 428: 1991, Photoelectronic Controls for Road Lighting.

APPENDIX B : LIST OF CONSULTEES

Note: This is not an exhaustive list. The choice of consultees will depend on local issues, as described in Paragraphs 3.2.3 and 5.4.

B.1 Air and Water, Navigation and Signal Issues

Irish Aviation Authority
Aer Rianta
Department of Defence (Air Corps)
Port Authorities
Córas Iompair Éireann
Ianród Éireann
An Taisce
Department of the Marine and Natural Resources

B.2 Environmental Issues

Department of the Marine and Natural Resources
Planning Authorities
Environmental Protection Agency
Duchas, The Heritage Service
An Taisce
Professional Astronomers

TD 30/87

DEPARTMENT OF TRANSPORT

HIGHWAYS AND TRAFFIC

DEPARTMENTAL STANDARD TD 30/87

DESIGN OF ROAD LIGHTING FOR ALL-PURPOSE TRUNK ROADS

SUMMARY

This Departmental Standard sets out the design objectives and procedure for lighting on all-purpose Trunk Roads.

SUBJECT AREA

Traffic Engineering and Control: Road Lighting

Printed and Published by the
Department of Transport

Price: 45p

NORTHERN IRELAND ADDENDUM

TO

DEPARTMENTAL STANDARD TD 30/87

DESIGN OF ROAD LIGHTING FOR ALL-PURPOSE TRUNK ROADS

Departmental Standard TD 30/87 - Design of Road Lighting for All-Purpose Trunk Roads - becomes applicable for use in Northern Ireland with the following amendments:

1. Page 12F, Appendix B

   Add : "Northern Ireland Railways"

   (b)

   Add : "Department of the Environment (NI)"

SCOTTISH ADDENDUM

TO

DEPARTMENTAL STANDARD TD30/87

DESIGN OF ROAD LIGHTING FOR ALL-PURPOSE TRUNK ROADS

Departmental Standard TD30/87 - Design of Road Lighting for All-Purpose Trunk Roads - becomes applicable in Scotland with the following amendment:-

1. Appendix B, Page 12F
   Section (b) ENVIRONMENTAL ISSUES
   For : 'Royal Fine Arts Commission (RFAC)'.
   Read : 'Royal Fine Arts Commission for Scotland'.
   For : 'English Heritage; Historic Buildings & Monuments Commission for England (HBMC).
   Read : 'The Scottish Office Environment Department - Historic Scotland'.

TD 30/87

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DESIGN OF ROAD LIGHTING FOR ALL-PURPOSE TRUNK ROADS - IMPLEMENTATION OF BS 5489: ROAD LIGHTING

1. INTRODUCTION

1.1 This Departmental Standard implements the 1987 revisions of British Standard BS 5489: Road Lighting: Part 1: Guide to the general principles (Ref 1) and Part 2: Code of Practice for Lighting for Traffic Routes (Ref 2). This Departmental Standard makes specific choices from the options given in Reference 2. Other Parts of BS 5489, listed in Appendix A, are referred to where necessary.

1.2 This Standard gives the design objectives for planning effective road lighting on all-purpose trunk roads. Road safety at night is the main consideration in designing road lighting systems.

1.3 The luminance method design procedure in this Standard introduces the preparation of alternative road lighting designs in performance terms. Performance is expressed in the photometric terms of road surface luminance level and uniformity with glare control, and the effect on these of varying several parameters can be tested. The procedure takes into account the expected operation and maintenance procedures, safety and environmental factors and lamp and lantern developments.

1.4 Applying the Departmental Advice Note TA 49/86 (Ref 3) leads to the decision on whether road lighting should be provided.

1.5 The above Advice Note (Ref 3) also indicates which modes of lighting are likely to be preferable in both economic and environmental terms. Such preliminary indications are subject to confirmation or modification during the design stage, since they depend on various environmental, safety, geometric and operating constraints and assumptions.

2. SCOPE

2.1 This Standard sets out the performance requirements and procedures which shall be adopted for the design of road lighting on all-purpose trunk roads, except that which is in tunnels.

3. PERFORMANCE REQUIREMENTS

3.1 General

3.1.1 Road lighting for all-purpose trunk roads shall be designed in accordance with the general principles, relevant performance requirements and design procedure of BS 5489 (Refs 1, 2, 5).

3.1.2 The objective is to achieve:-

(a) The quantifiable requirements of luminance level, luminance uniformity (overall and longitudinal) and glare control.

(b) The subjective requirements of visual guidance and appearance by day and by night.

3.1.3 The design procedure in Section 5 introduces the preparation of road lighting designs in performance terms, taking the required characteristics of equipment, environmental factors and maintenance procedures into account.

3.2 Quantifiable Performance Requirements

The design objectives for road lighting systems are now expressed in performance terms using the three photometric measures introduced in paragraphs 1.3 and 3.1, which can be calculated at the design stage. The requirements for the lighting equipment to provide that performance are set out in paragraph 3.4.

3.2.1 Luminance level and uniformity requirements for all-purpose trunk road lighting shall be as in categories 1 and 2 of Table 1 in Reference 2.

3.2.2 Glare control requirement shall be in terms of Threshold Increment (TI) as follows, referring to the lighting categories in Table 1 in Reference 2.

(a) On high speed and dual carriageway roads with category 1 lighting, the value of TI shall not exceed 15%.

(b) For installations on other roads with category 2 lighting, except where there are special requirements (see paragraph 3.2.3 below), the value of TI shall not exceed 30%.

3.2.3 Special light control shall be required:

(a) In the vicinity of airfields, where luminous intensity above the horizontal shall be limited (see Ref 5),

(b) In the vicinity or railways, docks and navigable waterways (see Ref 5),

(c) In environmentally sensitive areas, where stray or spill light would otherwise be regarded as unacceptable and visually intrusive (see Ref 1),

(d) In the vicinity of astronomical observatories (see Ref 6).

3.3 Subjective Performance Requirement

The requirements for visual guidance and performance by day and by night shall be as in References 1 and 2.

3.4 Equipment Performance Requirements

3.4.1 Equipment shall comply with the appropriate British Standard or International Standard. See Appendix A for a list of British and other Standards applicable to equipment used in all-purpose trunk road lighting.

3.4.2 The installation of road lighting as a part of constructional improvement work to an all-purpose trunk road shall be as set out in the Department's Specification for Highway Works (Ref 7).

4. DECISIONS PRIOR TO DESIGN

4.1 Mounting Height

Mounting height shall be in accordance with the options set out in Reference 2.

4.2 Limitation of Glare

The performance requirements of Section 3 of this Standard shall be met by the selection of lanterns as described in Reference 2, except in the special circumstances described in paragraph 3.2.3. In those cases, type FCO or AIR or other lanterns with specific light control requirements (see Refs 5, 6) shall be selected.

4.3 Lamp Type

Designs for road lighting schemes shall be prepared for both high pressure sodium (HPS) and low pressure sodium (LPS) lamp types, except where the choice is determined by specific site considerations (refs 1, 2, 5 and 6). A comparison of whole life present value of costs (PVC) for the two designs allows the most cost effective option to be chosen. The method for computing present value of costs is described in Departmental Advice Note TA 49/86 (Ref 3).

4.4 Overhang

Overhang shall be in accordance with the options set out in Reference 2.

4.5 Lantern Arrangement

Lantern arrangement shall be in accordance with the options set out in Reference 2.

4.6 Maintenance Factor

Maintenance factors, as defined in Reference 2, within the range of values 0.79 to 0.94 shall be taken for design from Table 4 of Reference 2 where:-

(a) The IP rating, as defined in BS 5490 (Ref 8), of the lamp housing is IP 54 (see paragraph 4.7).

(b) The proposed cleaning interval is in the range 12 to 36 months (see paragraph 4.8).

(c) The category of environmental atmospheric pollution is identified (see Ref 2).

4.7 Lantern Enclosure (IP) Rating

The lantern enclosure including the lamp housing shall have a minimum degree of ingress protection rating of IP 54, as defined in References 2 and 8.

4.8 Cleaning Interval

The normal cleaning interval shall be not less than 12 months.

4.9 Road Surface

Design tables based on the 'representative British road surface' as given in Table 3 of Reference 2 shall be used. However a more economical lighting design is possible if a concrete road surface is to be used.

The alternative enhanced reflection properties for a concrete surface shall be presented in the form of an 'r-table' as described in the CIE/PIARC Joint Technical Report (Ref 9).

If at a later stage the concrete surface is overlaid with bituminous material then the lighting shall be re-assessed.

5. DESIGN PROCEDURE

5.1 Normal Design Procedure

The design procedure shall be that set out in Reference 2, except where special factors as given in paragraph 5.2 apply.

5.2 Modified Design Procedure

In the special cases given below, the design procedure of paragraph 5.1 shall be modified as far as practicable to allow particular features to be taken into account. These features include:

(a) Unconventional road layouts outside the scope of References 2 and 5.

(b) Enhanced road surface reflection characteristics (see paragraph 4.9).

(c) Mounting height between or above 8, 10 and 12 metres covered in Reference 2.

(d) Tighter glare or light-spill limitation requirements (see paragraph 3.2.3).

5.3. Alternative Design Procedure

In the special cases of paragraph 5.2, where modifications to the requirements of paragraph 5.1 render the design tables inapplicable:-

either (a) the full calculation method in Appendix B of Reference 2,

(b) one of the CIE full luminance design computer programs as listed in CIE Publication 30-2 (Ref 4) or their derivatives

shall be used, together with the appropriate lantern 'I-tables' and road surface 'r-tables' (see Refs 2, 9).

5.4 Consultations

Consultations may be necessary during the design procedure in order to:

(a) Eliminate as far as possible any confusion with air or water navigation lights, railway signals or the safe operation of other services.

(b) Identify the most appropriate and acceptable mode of lighting for locations in environmentally sensitive and conservation areas.

For those situations where consultation is considered necessary, a typical list of consultees is given in Appendix B. This may vary to suit local circumstances.

6. DESIGN DOCUMENTATION

6.1 General

A full record of the design adopted (Section 5) shall be compiled by the Department's design agent and retained for inspection by the Department.

6.2 Design Records

The design records shall be in sufficient detail (eg performance requirements, design parameters, assumptions about safety, operational and maintenance conditions, calculation methods and results) and in suitable form for:

(a) Any necessary checking or consideration of alternatives (see Section 4).

(b) Any necessary consultations (see paragraph 5.4).

(c) Use in the preparation of site-specific working drawings, schedules, and appendices, in accordance with the Department's Specification for Highway Works (Ref 7).

(d) Reference during the subsequent installation and commissioning work including the preparation of 'as-built' drawings (Ref 7).

(e) Inventory purposes during the subsequent operation and maintenance procedures (Refs 10, 11).

(f) The recording of any subsequent alteration in safety, operational and maintenance conditions that affect the design.

7. REFERENCES

1. British Standard BS 5489. Road Lighting. Part 1. Guide to the general principles. 1987.

2. British Standard BS 5489. Road Lighting. Part 2. Code of practice for lighting for traffic routes. 1987.

3. Departmental Advice Note TA 49/86. Appraisal of New and Replacement Lighting on Trunk Roads and Trunk Road Motorways. Department of Transport. 1986.

4. Commission Internationale de l'Eclairage. Calculation and measurement of luminance and illuminance in road lighting. CIE Publication No. 30.2 (TC-4.6). CIE. 1982.

5. British Standard BS 5489. Road Lighting. Part 8. Code of practice for lighting for roads near aerodromes, railways, docks and navigable waterways. 1987.

6. International Astronomical Union/Commission Internationale de l'Eclairage. Guidelines for minimising Urban Sky Glow near Astronomical Observatories. IAU/CIE Publication No. 1. CIE. 1980.

7. Department of Transport. Specification for Highway Works. 6th Edition. HMSO. 1986.

8. British Standard BS 5490. Specification for classification of degrees of protection provided by enclosures. 1977 (1985).

9. Commission Internationale de l'Eclairage/Permanent International Association of Road Congresses. Road Surfaces and Lighting. Joint technical report CIE/PIARC. CIE Publication No. 66. CIE. 1984.

10. Departmental Standard TD 23/86. Trunk Roads and Trunk Road Motorways - Maintenance of Road Lighting. Department of Transport. 1986.

11. Departmental Code of Practice for Routine Maintenance. Department of Transport. 1985 (as amended).

8. ENQUIRIES

All enquiries or comments about this Departmental Standard should be sent in writing to:-

Head of Division
Roads Engineering Division
Department of Transport
St Christopher House
Southwark Street
LONDON SE1 0TE

Quoting Reference:
SASL 34/2/011

Orders for further copies of this Departmental Standard should be accompanied by the remittance shown on the cover and addressed to:-

DOE/DTp Publication Sales Unit
Building No. 1
Victoria Road
South Ruislip
Middlesex HA4 0NZ

Telephone No: 01-841 3425

D A HOLLAND
ACTING CHIEF HIGHWAY ENGINEER
St Christopher House
Southwark Street
London
SE1 0TE

November 1987

APPENDIX A

LIST OF BRITISH STANDARDS

Note: This list is not comprehensive.

A.1 BS 5489: ROAD LIGHTING

Part 1 Guide to the general principles

Part 2 Code of practice for lighting for traffic routes

Part 3 Code of practice for lighting for subsidiary roads and associated pedestrian areas

Part 4 Code of practice for lighting for single level road junctions including roundabouts

Part 5 Code of practice for lighting for grade separated junctions

Part 6 Code of practice for lighting for bridges and elevated roads

Part 7 Code of practice for lighting for tunnels and underpasses

Part 8 Code of practice for lighting for roads near aerodromes, railways, docks and navigable waterways.

Part 9 Code of practice for lighting for urban centres and other public amenity areas

Part 10 Code of practice for lighting for motorways (in preparation)

A.2 Lanterns

BS 4533: Luminaires

Part 101 General requirements and tests: 1981

Part 102 Particular requirements
Section 102.3 Luminaires for road and street lighting: 1981

Part 103 Performance requirements
Section 103.1 Light distribution from road-lighting lanterns: 1981 (due for amendment 1987)

A.3 Enclosure (IP) rating

BS 5490: Specification for classification of degrees of protection provided by enclosures: 1977 (1985).

A.4 Lighting columns

BS 5649: Lighting columns
implemented in accordance with Departmental Standard BD 26/86 Design and Supply of Lighting Columns, and the Department's Specification for Highway Works 1300 Series. 6th Edition. HMSO, 1986

A.5 Lamps

BS 3767: Low pressure sodium vapour lamps: 1982

IEC 662: High pressure sodium vapour lamps: 1980 with Amdt No 1: 1986

A.6 Ballasts

BS 4782: Ballasts for discharge lamps (excluding ballasts for tubular fluorescent lamps): 1971 with amd's to 1982

A.7 Capacitors

BS 4017: Capacitors for use in tubular fluorescent, high pressure mercury and low pressure sodium discharge lamp circuits: 1979.

A.8 Photo-electric Control Units (PECUs)

BS 5972: Specification for photo-electric control units for road lighting; 1980 under revision.

APPENDIX B

LIST OF CONSULTEES

Note. This is not an exhaustive list. The choice of consultees depends on local issues, as described in paragraphs 3.2.3 and 5.4.

(a) AIR AND WATER NAVIGATION AND SIGNAL ISSUES

Civil Airports Authority	- Civil airfields
Ministry of Defence	- Military airfields
Trinity House	- Coastal waters and harbours
Inland Waterways Navigation Authority	- Navigable waters
British Rail	

(b) ENVIRONMENTAL ISSUES

The Department of Transport's Landscape Advisors

Royal Fine Art Commission (RFAC)

English Heritage; Historic Buildings & Monuments Commission for England (HBMC)

Civic Trust

Professional Astronomers

Planning Officers