

TRAFFIC SIGNS

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Traffic Signs

NG 1200 General

- 1 The 1200 Series covers all traffic signs including permanent, Engineer's temporary and temporary. It draws on BS 873 and the Department of the Environment Traffic Signs Manual (1996) for the majority of its requirements. For illuminated signs and traffic signals it utilises the 'electrical work' aspects of the 1400 Series.

NG 1201 Definitions, Sign Classification and Regulations

- 1 The Engineer should examine the Contractor's proposals for temporary traffic signs (including haul route signals) and discuss these with the Contractor, the Garda Síochána and the appropriate road authority.
- 2 The Contractor's proposals for traffic signal and control equipment, variable message signs and reflecting road studs will include details of any approvals previously obtained for their use.
- 3 The information to be given in Appendix 12/1 for Engineer's temporary signs should be the same as that for permanent signs. Where a sign is to be erected for less than 6 months, the Engineer may require that the sign be a fixed short life sign. The Engineer should state in Appendix 12/1 those signs which are to be fixed short life signs.
- 4 The Engineer should check that the current legal requirements have been met before a traffic sign is installed. Advice on current legal requirements can be obtained from the National Roads Authority or the Department of the Environment as appropriate.

NG 1202 General Requirements for Permanent Traffic Signs

- 1 Appendix 12/1 should include a Schedule of Traffic Signs containing the details listed in sample Appendix 12/1 and should also contain all the other information required to supplement the Specification Clauses which state 'as described in Appendix 12/...'. This other information may be shown on fully detailed drawings cross-referenced from the relevant Appendix.

The Engineer should determine the legend layout and therefrom the sizes of sign faces, adding on extra area for light-spill screens, where required. From this information he will be able to determine the actual sizes of sign posts and foundations.

Unless the Engineer requires otherwise the Contractor should have freedom to adopt the type of sign plate and should determine the stiffening and framing, if any, for the plate he adopts, so as to meet the requirements of the "Certification Scheme, Specification, and Guidance for the Construction of Traffic Signs -TS4".

Impact Category 1 of BS 873 : Part 5 should normally be specified unless the sign panels are so located that the likelihood of damage by vandals is remote.

Category 2 luminances to comply with BS 873 : Part 5 are suitable for locations with a high background luminance such as those described in BS 873 : Part 5.

It is not intended that the tests in BS 873 shall be carried out on each sign as BS 873 implies but that each sign shall be capable of passing the tests therein.

The Engineer should ensure when approving the Contractor's fabrication drawings that where dissimilar metals are used they are separated by electrical insulators.

Full details of the legend layout for faces of Contract-specific traffic signs (e.g. directional informatory and informatory) should be shown on fully detailed drawings listed in Appendix 12/1.

Legend layout of faces of non-prescribed traffic signs that have been authorised by the National Roads Authority or Department of the Environment as appropriate should also be fully detailed on drawings listed in Appendix 12/1.

- 10 Other traffic signs which have standard symbols and markings (with permitted variants) need not be drawn in detail. These signs are shown in the Department of Environment Traffic Signs Manual. The diagram number and where necessary the required permitted variant and the overall size of the sign or where no size is given, the x height of lettering required should be included in Appendix 12/1.

- 11 The standard of reflectivity and whether the sign is to be internally or externally lit, retro-reflective or non-retroreflective should be specified in Appendix 12/1 for each permanent traffic sign.
- 12 Guidance on the use of variable message signs on all-purpose roads and motorways is given in U.K. Department of Transport Advice Note TA 60 and Standard TD 33.
- 13 When it is proposed to fit signs to new lighting columns, technical approval from the appropriate road authority should be received before erecting the proposed signs. If many signs are to be added to existing columns it is likely that several different combinations of column and luminaire will be involved. In all cases where the columns are over 5 years old the possibility of reduced strength due to corrosion should be considered. A site inspection of the condition of the columns, particularly at ground level, should be carried out and allowance made for any loss of material. When considering the possibility of drilling holes in lighting columns the effect of the holes both on the strength and fatigue resistance of the column should be considered.

- 2 The National Roads Authority should be consulted with regard to the design of posts using steel circular and rectangular hollow sections and reinforced or prestressed concrete.
- 3 The Engineer should determine whether he requires 'large' or 'small integral' base housings or a separately attached 'root box', or a 'switch box' to accommodate electrical equipment and should describe these requirements in Appendix 12/1.

NG 1210 Reflective Markers

- 1 For reflective markers and posts the Engineer should decide the rate and type of testing of samples selected from the batch of reflective markers and posts supplied under the Contract. The requirements should be included in Appendix 12/2.

NG 1211 Road Markings

Permanent Road Markings

- 1 For road markings on motorways and all other roads, reference should be made to the Department of Environment Traffic Signs Manual.
- 2 It should be stated in Appendix 12/3 (cross-referring to the appropriate Drawing) where and whether thermoplastic or paint or other special materials are required and, if thermoplastic, whether it should be screed or spray applied. If a special material is required, full specification requirements should be included in Appendix 12/3.
- 3 Thermoplastic material, either screed or spray applied is recommended for use on all types of roads particularly those that carry a heavy flow of vehicles and at locations which are subject to turning movements.
- 4 Road marking paints are best used in situations where they are not subject to heavy traffic wear or are required as temporary markings. They are often suitable for edge lines on rural roads and yellow waiting restriction lines.
- 5 The following additional information should be stated in Appendix 12/3:

NG 1203 Foundations for Permanent Traffic Signs and Signals

- (i) Whether a tack coat is to be used. Generally a tack coat is only required on concrete or on some old, polished surfaces.

- 1 It has been assumed that all traffic signs and signals will have a concrete foundation. However, where the Engineer considers a sign can be founded purely in the soil this should be specified in Appendix 12/1.
- 2 The design of concrete foundations should be prepared by the Engineer adopting the advice given in NG 2602 utilising the wind loading described in BS 873 : Part 1.
- 3 The foundations for free-standing luminaires should be designed by the Engineer to the same standards as those for sign posts, the Engineer assessing the size of luminaires likely to be adopted.

NG 1204 Posts for Permanent Traffic Signs

- 1 The Engineer should decide the number, type, size and material of post required to satisfy the structural requirements of BS 873 : Part 7.

- (ii) Whether white or yellow colour is required.
 - (iii) Whether the material should be reflectorised, i.e. contain and be surface dressed with spherical glass beads. All road markings on motorways are to be reflectorised. The need for reflectorisation of road markings on other roads and on side roads forming part of the Works should be determined in conjunction with the appropriate roads authority. The Engineer should state in Appendix 12/3 that all temporary road markings shall be reflectorised.
 - (iv) Whether raised rib edge lines are required. (Approval for the use of these must be obtained from the appropriate road authority who will provide the appropriate advice.)
 - (v) Where gaps are required in raised rib road markings.
- 6 A figure of 55 for the skid resistance of road markings should be specified at potentially hazardous locations, e.g. where braking or turning is likely to occur on large areas of road surface covered by the road marking materials.

Temporary Road Markings

- 7 Permanent road marking material should not normally be permitted for temporary road markings on carriageways which form part of the Permanent Works. Instead, one of the prefabricated materials now available should be adopted but the limitations referred to in 8 below, as to their use, should be considered.
- 8 The Engineer should include in Appendix 12/3 the limitations as to where only certain of the prefabricated materials will be acceptable. For example materials which are only available in 100 mm and 150 mm wide strips should not be used to form warning arrows, etc. Others should not be used on particularly rugous surfaces such as a surfaced dressed finish.

NG 1212 Road Studs

Reflecting Road Studs

- 1 The Department of Environment Traffic Signs Manual shows the positions of permanent reflecting road studs on motorways and other roads.
- 2 Appendix 12/3 should list those locations where reflecting road studs are to be used, together with any other requirements.

- 3 Reflecting road studs should not be installed by any method other than that recommended by the manufacturer and approved by the roads authority. Full compliance with these installation instructions is essential. Some general advice for the installation of road studs is also included in BS 873 : Part 4.
- 4 Temporary reflecting road studs are special studs designed to be effective for a minimum of 3 months. After this period their colour may deteriorate and compliance with the photometric and colorimetric values may be outside the set limits. If the period of installation is expected to be much in excess of 3 months the temporary studs should be examined and renewed as necessary or permanent reflecting road studs may be used with the Engineer's approval, depending on the total expected duration and Site conditions of the Works.

NG 1213 Traffic Cones, Traffic Cylinders, Flat Traffic Delineators and Other Traffic Delineators

- 1 For permanent cones, cylinders, FTDs and other delineators the Engineer should decide whether testing of samples selected from the batch to be supplied under the Contract is required.
- 2 Where testing of permanent cones, cylinders, FTDs and other delineators is to be carried out it is recommended that not less than 1 item in 500 should be selected at random for testing. However, the minimum number to be tested should be determined by the numbers required for a single test; for example, for a single test to BS 873 : Part 1, two samples of cones and four samples of cylinders are required. For FTDs it may only be necessary to have extra samples of the blades. The requirements should be listed in Appendix 12/4 and cross-referenced in Appendix 1/5.

NG 1215 Temporary Signs, Signals, Road Markings and Delineators

- 1 The term temporary in the context of the Contract includes signs known as portable in BS 873 : Part 2.

NG 1216 Traffic Signals

General

- 1 Information on the installation and maintenance of permanent traffic signals together with technical advice, is available from the appropriate road authority.
- 2 The installation and commissioning of traffic signal controllers is a task calling for specialist skills and experience in this type of work. The Engineer should satisfy himself that, if the Contractor wishes to sub-contract the work under Clause 4 of the Conditions of Contract, any sub-contractor proposed has the necessary skills and experience.

Provision of Controllers

- 3 A minimum of four spare cores should be specified in cabling between each post and the controller. All cables should be marked or tagged at each end and at each intermediate joint or connection so as to identify the function of each cable clearly in the phasing sequence. The Engineer should specify the method of marking in Appendix 12/5.
- 4 All cables within the controller/signal installation should be specified to be of adequate size and rating to meet the electrical current requirements and electrical protection system and should be increased if necessary to ensure there is no voltage drop on longer cable lengths, e.g. extensions to mast arm or bracket assemblies.
- 5 The Engineer should design low voltage and extra low voltage cables to be kept separate and not used in the same multi-core cable.
- 6 The Engineer's minimum requirements for the location of all traffic signal equipment should be included in Appendix 12/5. The Engineer should include a Drawing to a scale of 1:500 which should include the position of the controller cabinet, all posts, signal heads and push button equipment, interconnecting ducts and cable requirements, loop detector locations and the mode of operation for the signal control cycle.
- 7 The Engineer should specify the cable core to function allocation for all cables.

Permanent

- 8 The Engineer should describe his requirements for permanent traffic signals, including installation of loop detector cables, in Appendix 12/5. This should be written for the particular

installation ensuring compatibility with the 1200 Series and the 1400 Series.

- 9 Any special requirements for servicing of the equipment once in use should be included in Appendix 12/5.

Temporary

- 10 The Engineer should determine whether temporary haul crossings and other Site accesses joining the public roadway are likely to be required and include his requirements for traffic signals for these or any other purposes (in addition to any requirements required under Clause 117.) in Appendix 12/5. The Engineer's requirements for standards of operation and for maintenance of all temporary traffic signals (including portable traffic signals used to control alternate one way working) should be included in Appendix 12/5.

NG 1217 Detector Loops

- 1 The Engineer should check the Contractors submitted loop installation record drawings and satisfy himself that they are complete before submitting them to the appropriate road authority. The requirements of sub-Clause 17 of Clause 1217 may be waived if the information is contained in other installation drawings or on the Drawings. The Engineer should provide the appropriate road authority with a copy of the loop circuit test results for their maintenance records.
- 2 If during slot cutting the saw breaks through into a hardcore bed or any other roadbase or into any reinforcing material, the Engineer should stop the work, inform the appropriate road authority that the loops cannot be installed to the Specification and seek alternative instructions.
- 3 For guidance on all matters relating to electrical work and safety, refer to the NG 1400 Series.
- 4 The following formula can be used to calculate the approximate inductance of a square or rectangular loop:

$$L = 0.82.P.N(N+1)$$

where L = Inductance of loop of microhenries
P = Perimeter of loop in metres
N = Number of turns in a loop

When connecting more than one loop to a detector channel in series the total loop inductance will be the sum of the inductances of the separate loops.

Vehicles can also be reliably detected when up to 300 m of feeder cable is connected to a loop system, therefore a length longer than 200 m may be installed provided approval has been granted by the appropriate roads authority. The Engineer should check with the appropriate roads authority that the detectors to be used are effective for their specified use with feeders in excess of 200 m.

NG 1220 Preparation and Finish of Metal and Other Surfaces

- 1 Any additional requirements not contained in the "Certification Scheme, Specification, and Guidance for the Construction of Traffic Signs - TS4", or requirements different to those stated, should be contained in Appendix 12/7.

NG 1218 Pedestrian Crossings

- 1 The Engineer should describe his requirements for pedestrian crossings in Appendix 12/5. The appropriate roads authority will advise on particular equipment specifications.
- 2 The required type, e.g. thermoplastic (screed or spray applied) or paint, for road markings related to pedestrian crossings other than on the crossing area should be stated in Appendix 12/5.
- 3 For the crossing area, the required material, e.g. screed applied thermoplastic or pre-fabricated plastic tiles, should also be stated in Appendix 12/5. The choice of material should be decided by the Engineer based upon traffic-flows or other requirements specific to the Site.
- 4 Details of pedestrian guard railing associated with pedestrian crossings should be detailed in Appendix 4/2 to comply with Clause 412.

NG 1219 Traffic Signs on Gantries

- 1 The Engineer's requirements for traffic signs on gantries including variable message signs and matrix signals should be included, in the same way as other traffic signs in Appendix 12/1.
- 2 Any illumination and electrical work on or to the gantry should also be specified utilising the 1400 Series supplemented with any special requirements in Appendix 14/5, cross-referring to gantry detail drawings as appropriate. Requirements for fabricated steel gantries which include sign supports and electrical apparatus e.g. cable trays etc. should be given in Appendix 12/6.

SAMPLE APPENDICES

[Note to compiler: Include in Appendices 12/1 to 12/8 the information listed below, referring to any drawing numbers where this information is otherwise located.]

NG SAMPLE APPENDIX 12/1 TRAFFIC SIGNS : GENERAL

1 Schedule of Traffic Signs:

- (i) Location of traffic signs included in Clause 1201 other than those in Appendices 12/2 to 12/6 inclusive.
- (ii) Drawing number or diagram number in Department of Environment Traffic Signs Manual and drawing numbers giving Contract-specific details.
- (iii) Overall sizes of sign plates and details of any light-spill screens.
- (iv) Requirements for type of material, preparation and finish, for sign plates, posts, etc.
/For painting, cross-reference should be made to Appendix 12/7 where required.]
- (v) Details of foundations including cable ducting, reinstatement and any requirements for anchorages and attachment systems including their loadings and torque settings.
- (vi) The number, type and size of posts including details of any baseplates or flange plates.
- (vii) Details of any electrical equipment compartments.
- (viii) The type of sign face material including the Class of any retroreflective material.
- (ix) The type of any direct illumination; whether internal or external, overhead mounted or upward pointing luminaires and whether free standing on separate foundations. Also the luminance and impact categories of the signs and luminaires.
- (x) The method of switching the illumination */e.g. photo-electric control, time switch].*
- (xi) Whether any bollards are to be internally illuminated or reflective only.

2 In addition, the following information should be given:

- (i) Any particular requirement for the covering of signs *[1206.1J]*.
- (ii) Where sign fabrication drawings are not required, and the details to be provided for warning and regulatory signs *[1202.8]*
- (iii) The number of keys required for locks to traffic sign housings *[1202.9]*.
- (iv) Details of location identifying marks */1202.10/*.
- (v) Requirements for filling pockets in concrete foundations if different from the requirements of sub-Clause 1205.4.

NG SAMPLE APPENDIX 12/2 TRAFFIC SIGNS : REFLECTIVE MARKERS

- (i) The types and requirements of reflective markers and posts.
- (ii) The requirements for reflectors and reflecting material.
- (iii) Details and dimensions of foundations for marker posts.
- (iv) The testing requirements and method of testing of reflective markers and posts.

NG SAMPLE APPENDIX 12/3 TRAFFIC SIGNS : ROAD MARKINGS AND STUDS

- (i) Requirements for permanent road markings including colour, location and material type. *[Any requirements for reflectorisation and for a tact coat should also be stated as should those for raised rib edge lines.]*
- (ii) Locations where gaps are required in raised rib road markings.
- (iii) Locations where a skid resistance level of 55 is required for permanent road markings.
- (iv) Requirements for temporary road markings.
- (v) Limitations on the use of prefabricated temporary road marking materials.
- (vi) Requirements and locations for reflecting road studs.
- (vii) Requirements for the temporary covering of road studs and road markings.

NG SAMPLE APPENDIX 12/4 TRAFFIC SIGNS : CONES, CYLINDERS, FTDs AND OTHER TRAFFIC DELINEATORS

- (i) Types of traffic delineators other than cones and cylinders and FTDs.
- iii) The requirements and method of testing delineators other than cones and cylinders and FTDs */cross referenced in Appendix I/5].*

NG SAMPLE APPENDIX 12/5 TRAFFIC SIGNS : TRAFFIC SIGNALS

1 Permanent Traffic Signals

- (i) Locations for:
 - (a) Signal heads.
 - (b) Controller.
 - (c) Ducting of carriageway and cable crossings.
 - <d) Electricity supply.
 - (e) Detection (including control units).
 - (f) Posts and gantries.
 - (g) Cables and routes.
 - (h) Telecommunications carrier interface.
 - (i) Inspection chambers,
 - (j) Road markings.

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

- (ii) Equipment:
 - (a) Vehicular signal heads.
 - (b) Pedestrian signal heads.
 - (c) Signal heads for cyclists.
 - (d) Light Rapid Transit (LRT) signal heads.
 - (e) Push buttons for pedestrians (including audible and tactile equipment).
 - (f) Additional signs.
 - (g) Green arrow aspects.
 - (h) Twin head or more with or without combinations of the above.
- (iii) Operation:
 - (a) Phasing/staging.
 - (b) Timings.
 - (c) Special functions.
 - (d) Linking.
- (iv) Detection:
 - (a) Type (Loop and above ground detection).
 - (b) Loop : location, configuration, size, shape, facilities.
 - (c) Power supply and cabling.
- (v) Testing:
 - (a) Factory.
 - (b) Site.
- (vi) Special road surfacing.
- (vii) Locations of other services (gas, water, electricity, etc.).
- (viii) Maintenance and servicing requirements.

NG SAMPLE APPENDED 12/5 TRAFFIC SIGNS : TRAFFIC SIGNALS (Continued)

2 Temporary Traffic Signals Specified by the Engineer

Generally as for 1 above with the exclusion of:

- (i) as this is liable to alteration during the progress of Works, it should state at what stages during the Works temporary traffic signals are required.
- (iii), (b) to (d) inclusive.
- (v), (a).
- (vi).
- (vii).
- (viii).

Add with regard to:

- (i) "a power supply may be a portable generator".
- (ii) cable crossing protection.

Traffic Signs

3 Signal Pedestrian Crossings

[Generally as for 1 above. 1

4 Zebra Crossings

- (i) Location.
 - (a) Road markings.
 - (b) Beacons.
 - (c) Electricity supply.
- (ii) Materials.
 - (a) Road surfacing.
 - (b) Road markings.

5 Specifications

- (i) traffic signal equipment.
- (ii) controllers.
- (iii) cabling.
- (iv) detector loops.
- (v) testing specifications.

NG SAMPLE APPENDIX 12/6 TRAFFIC SIGNS : SPECIAL SIGN REQUIREMENTS ON GANTRIES

(i) Material and constructional requirements for gantries.

(ii) Mounting details for traffic signs and any sign lighting luminaries on gantries.

[Electrical equipment should be described in Appendix 14/5. Traffic signs including variable message signs and matrix signals should be described in Appendix 12/1 J.]

NG SAMPLE APPENDIX 12/7 TRAFFIC SIGNS : PREPARATION AND FINISH OF METAL AND OTHER SURFACES

[Note to compiler: List here any additional requirements not contained in the "Certification Scheme, Specification, and Guidance for the Construction of Traffic Signs - TS4", or requirements different to those therein.]

