

# PRELIMINARIES

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# PRELIMINARIES

## NG 101 Accommodation and Equipment for the Employer's Representative

1 This Clause will generally need to be supplemented by drawings cross-referenced in Appendix 1/1. This Appendix is set out in two parts as follows:

- (i) *Temporary accommodation and equipment for the Employer's Representative*
- (ii) *Accommodation and equipment which shall become the property of the Employer on issue of the Defects Certificate.*

In addition, Appendix 1/1 should indicate:

- (i) *accommodation and length of time it is required, if different from sub-Clauses 101.1 and 101.2;*
- (ii) *the size and nature of accommodation needed;*
- (iii) *all the required furniture and fittings, computers (including software), equipment (including surveying) supplies, definitive quantity of consumables, drainage facilities and other services. The Appendix should also include the standards of artificial lighting intensity and the minimum room temperature to be maintained during stated hours, including weekends where required.*

2 The temporary accommodation, furnishings and fittings and equipment provided should be in good condition, but unless there is any particular reason need not be new. Accommodation, furnishings and fittings for the Employer's ultimate use, must, however, be new.

3 The provision of special temporary accommodation may be unnecessary in some instances where suitable existing property can be used. In such instances details of the property should be described in Appendix 1/1 together with the terms under which the property can be made available.

4 Appendix 1/1 should indicate, when applicable, the accommodation requirements (which may be either portable or in existing premises) needed by the Employer's Representative to supervise major components of the Works likely to be manufactured and tested off Site.

5 Testing equipment to be listed in Appendix 1/1 should only include that to be used by the Employer's Representative for tests which are necessary to ensure compliance with the Specification. In particular, the list should include equipment for carrying out tests on samples described in Appendix 1/6, having regard to Irish National Accreditation Board (INAB) requirements where appropriate.

6 Where nuclear gauges are likely to be required for the Employer's Representative use special provision should be made for their storage and requirements should be included in Appendix 1/1 (see NG 123).

7 The Employer's Representative should note that INAB accreditation for tests becomes invalid where test equipment is defective, therefore the Employer's Representative should ensure that the Contractor takes prompt action to repair, replace and/or recalibrate any test equipment requiring such attention.

- 8** When the Contractor erects temporary accommodation for the Employer's Representative on land which is part of the Site or adjoining the Site (i.e. has a common boundary with it) planning permission for the erection of the temporary accommodation is deemed to have been granted for the duration of construction operations.

#### **NG 102 Vehicles for the Employer's Personnel**

- 1** This Clause will need supplementing by Appendix 1/2 which should describe the number and type of vehicles and indicate the period for which each vehicle is required.
- 2** Vehicles should not be described by proprietary names; if they cannot otherwise be described, the words 'or equivalent' should be added. New vehicles should only be required where the nature of the Works and Contract period make it essential.
- 3** Vehicles shall also include equipment as stated in clause 101 of the specification.

#### **NG 103 Communications System for the Employer's Personnel**

- 1** Mobile telephones have supplanted the traditional radio systems as Communication systems on roads schemes. Appendix 1/3 should identify:
- (i) *the number and type of mobiles telephones required by the Employer's Personnel.*
  - (ii) *the length of time they are required.*
  - (iii) *accessories such as chargers, spare batteries, etc.*
  - (iv) *connections to GSM service provider.*
- 2** When there are particular reasons for requiring the communication facilities earlier than the normal 4 weeks from the Starting Date (e.g. on major maintenance contracts where traffic management measures need to be commenced early after the Contract has been awarded) this should be stated in Appendix 1/3.

#### **NG 104 Standards, Quality Assurance Schemes, Agrément Certificates and Other Approvals**

##### **Standards**

- 1** Where there is no declaration of equivalence in respect of a proposed alternative standard, the Employer's Representative should ascertain whether or not the proposed standard lays down levels of safety, suitability and fitness for purpose equivalent to those required by the specified standard. The Employer's Representative may also need to seek advice from the designer and the Employer. The factors underlying the purpose of the specified standard and their criticality should be evaluated for each application. If the proposed standard only differs from the specified standard in a way not essential to the underlying purpose it should be considered equivalent. Similarly, if the proposed standard contains such factors but in a different technical form which achieves the same purpose as the specified standard, it should be considered equivalent.

##### **Quality Assurance Schemes**

- 2** Quality management schemes and product certification schemes in Appendices 1/24 and 1/25 should comply with the IS/EN 9000 Series and be third party certificated by a certification body satisfying the requirements of the EN ISE/IEC 17000 Series and accredited for the scheme.

- 3 The Employer's Representative should consider the critical factors which form the basis of the acceptability of the listed scheme when ascertaining whether or not a proposed alternative quality management scheme or product certification scheme is equivalent. The Employer's Representative should check that certification of the proposed quality assurance scheme has been undertaken by an independent body.
- 4 The Employer's Representative should check and retain the certificates of conformity provided in compliance with sub-Clause 104.3 as evidence of the operation of quality management schemes and product certification schemes.
- 5 The need for inspecting of manufacturer's premises and the testing of goods and materials subject to a quality management scheme or product certification scheme should be reviewed. If the Employer's Representative has a reasonable confidence in the operation of a quality management scheme or product certification scheme, he can substantially reduce the level of inspection and testing or in some cases eliminate it. It should be noted that a quality management scheme differs from a product certification scheme by being based solely on written management procedures. Such schemes do not guarantee the quality of the actual product or workmanship. In the case of product certification schemes, the goods and materials have already undergone independent testing. Nevertheless if the Employer's Representative is not satisfied with a product appropriate testing should be undertaken. If the performance of a quality assurance scheme is not satisfactory the certification body and the Employer should be informed in writing.

#### **NSAI Agrément Certificates**

- 6 The Employer's Representative may accept equivalent certificates issued by Members of the European Union of Agrément (UEAtc).

#### **Provision of Information**

- 7 The Employer's Representative should check that all information and certificates are valid. Where certificates relate to a particular batch, it is important to ensure that the goods or materials incorporated in the Works form part of that batch.
- 8 Frequently there is a need for the Contractor to submit working and fabrication drawings to the Employer's Representative. The compiler should include in Appendix 1/4 relevant details of all works (e.g. steelwork, parapets, diaphragm wall details, waterproofing details, traffic signs, lighting, bearings, piles, precast concrete, joints, environmental barriers, corrugated steel buried structures, combined drainage and kerb systems) for which he requires working or fabrication drawings to be prepared by the Contractor, together with the minimum periods for submission of the drawing prior to commencement of the related works.

### **NG 105 Goods, Materials, Sampling and Testing**

#### **Goods and Materials**

- 1 Samples of goods and materials should be retained until the completion of the Works.

#### **Sampling and Testing**

- 2 Details of testing to be carried out by the Contractor and test certificates to be supplied should be abstracted selectively from Table NG 1/1 and scheduled in Appendix 1/5 to enable tenderers to allow for these in their rates and prices. The Contractor may propose that testing be carried out on his behalf by a testing laboratory, manufacturer or supplier.

- 3 The testing detailed in Table NG 1/1 is not necessarily exhaustive and other tests may be required. Where Contract-specific Clauses contain testing requirements, details should be scheduled in Appendix 1/5 or 1/6 as appropriate.
- 4 It is not intended that all the testing (appropriate to the Contract) specified in the Specification for Road Works should necessarily be undertaken by the Contractor. The compiler should consider carefully and decide which of the specified tests would be better undertaken by the Employer's Representative. The Specification requires those tests marked '†' in Table NG 1/1 to be undertaken by the Contractor and this requirement should not normally be changed. Advice as to who should undertake particular tests can be obtained from the Irish National Accreditation Board and the Employer.
- 5 The frequencies of testing marked '\*' in Table NG 1/1 are given for general guidance and are only indicative of the frequencies that may be appropriate. The compiler should determine the frequencies to be used for the Contract, taking into account all relevant factors and circumstances such as size, location, time for completion, QA schemes. For materials covered by the 600 Series in instances where the quantities of material used are less than the volumetric quantities shown on Table NG 1/1, a minimum of 1 test per source shall be undertaken. Where an Irish or British Standard or Specification Clause number is listed, the frequency of testing is specified therein and should not normally be changed.
- 6 Details of provision and delivery of samples by the Contractor for testing by the Employer's Representative should be scheduled in Appendix 1/6, to enable tenderers to allow for these in their rates and prices. The compiler should avoid duplication of testing wherever possible.
- 7 Where a part of the permanent Works is to be designed by the Contractor and the associated materials and workmanship are to be tested by the Contractor, the compiler should ensure that the tests scheduled in Appendix 1/5 cover all the options permitted by the design specification. Similarly, where a part of the Works designed by the Contractor is to be tested by the Employer's Representative, the samples scheduled in Appendix 1/6 should cover all the permitted options. The same considerations apply where the Contractor selects materials from a range of permitted options (e.g. type of pavement, safety fencing, pipes for drainage and ducts).
- 8 It is the NRA's policy to require the use of testing laboratories accredited for certain tests by the Irish National Accreditation Board (INAB) for on Site and off Site testing and sampling. Test results which are required to be INAB accredited are indicated in Table NG 1/1.

### **Test Certificates**

- 9 Appendix 1/5 should indicate, where appropriate, the requirement for a test certificate for each test or series of tests carried out by the Contractor, supplier or manufacturer.
- 10 British Standards which specify tests are usually written in a form in which test requirements are a matter between the supplier or manufacturer and the purchaser. The Contractor is the purchaser in this context and sub-Clause 105.2 requires him to obtain test certificates provided for in a British Standard (or other standard or specification) where stated in Appendix 1/5.

## **NG 106 Design of permanent Works by the Contractor**

### **General**

- 1 Appendices 1/10 and 1/11 should include for each structure, structural element or feature listed a design specification (or design specifications where a choice is offered) incorporating any relevant Appendices, Standards or other requirements appropriate to the design.

A Designated Outline should be shown on the Drawings for each structure to be designed by the Contractor and each structure for which a choice of designs is offered.

## Structures

2 The Contract should be compiled in accordance with NRA BD 2, in respect of:

- (i) *Each structure for which a design (based on a proprietary manufactured structure) is to be submitted by the Contractor. (These structures should be listed in Appendix 1/10 (A)).*
- (ii) *Each structure for which the Employer's Representative has prepared a (non-proprietary) design but for which a proprietary manufactured structure is a suitable option. (These structures should be listed in Appendix 1/10 (B)).*

Examples of structures for which the suitability of proprietary systems should be considered are:

- *environmental barriers;*
- *drains (exceeding 0.9 m diameter);*
- *crib walling;*
- *precast concrete box culverts (up to 8 m span);*
- *corrugated steel buried structures (0.9 to 8 m span);*
- *reinforced earth structures;*
- *anchored earth structures;*
- *footbridges;*
- *small span underbridges (up to 8 m span).*

3 The compiler should ensure that for each structure the procedures required by NRA BD 2 has been issued to the structures section of the NRA and approved in advance of preparing contract documents including specification.

4 The design certificate, completed by the Contractor, should be forwarded to the Employer for acceptance, together with the check certificate.

## Lighting Columns and Brackets

5 Clause 1301 requires the Contractor to propose lighting columns and brackets which have been designed by the manufacturer (and checked by a checking consultant) in accordance with NRA BD 2 and Series 1300. The Employer's Representative should ensure that the design and check certificates provided comply with these requirements and where a sign is to be fitted to a lighting column, with the requirements of sub-Clause 1207.20.

## Structural Elements and Other Features

6 The compiler should ensure that structural elements and other features based on proprietary products have not been specified in the Contract. Such elements and features should be designed by the Contractor, or where appropriate, by the manufacturer and proposed by the Contractor. Such elements and features, examples of which are given below, should be listed in Appendix 1/11:

- *combined drainage and kerb systems;*
  - *linear drainage channels;*
  - *ground anchorages for anchored structures;*
  - *piles;*
  - *bridge bearings;*
  - *bridge expansion joints;*
  - *parapets.*
- 7 Non-proprietary structural elements and other features to be designed by the Contractor should also be listed in Appendix 1/11. Examples of such elements are the foundations to environmental barriers and lighting columns.

#### **NG 107 Site Extent and Limitations on Use**

- 1 The extent of the Site should normally be shown on the Drawings but for schemes where traffic management involves temporary traffic signs outside the area of the Works it may be more appropriate to describe the extent of the Site in Appendix 1/7. Care should be taken not to introduce text which conflicts with the definition of Site (in the Conditions). Where the Site is shown on the Drawings, the drawing numbers should be stated in Appendix 1/7.
- 2 Where the Contractor is responsible for temporary traffic signs giving advance warning of the Works, those areas of road necessary for the installation, maintenance and removal of advance signs, cones and road markings should be included in the Site, with the agreement of the Road Authority.
- 3 Any limitations on the use of the Site, for example restrictions on the use of verges and paved areas that have been coned off adjacent to traffic, should be described in Appendix 1/7.

#### **NG 108 Operatives for the Employer's Representative**

- 1 The number and function of operatives required by the Employer's Representative should be included in Appendix 1/8.

#### **NG 109 Control of Noise and Vibration**

##### **Noise**

- 1 Where it is envisaged that construction or reconstruction might involve noise disturbance, the Employer's Representative should have informal discussions with the Local Authority during the scheme preparation and, where possible, an informal agreement to a noise control system should be concluded.
- 2 The noise control requirements informally agreed with the Local Authority should be described in Appendix 1/9 together with any specific requirements of the Employer's Representative which are not covered by BS 5228 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise or by the Local Authority.

- 3 Appendix 1/9 should state that the Local Authority requirements are given as a guide to the Contractor, and it is for the Contractor to decide whether to seek the Local Authority's consent to his proposed method of work and to the steps he proposes to take to minimise noise.
- 4 Local Authorities have powers to control pollution by imposing requirements as to the way in which work is to be carried out and, in particular:
  - (i) *the plant or machinery which is, or is not, to be used;*
  - (ii) *the hours during which work may be carried out;*
  - (iii) *the level of noise which may be emitted*

Guidance on noise control legislation BS 5228 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise.

### **Vibration**

- 5 Any requirements for the control of vibration should be included in Appendix 1/9. Clause 607 gives the requirements for explosives and blasting for excavation.

### **NG 110 Information Boards**

- 1 The Employer's Representative should provide in Appendix 1/21 details of any specific requirements, and cross-refer to drawings of the information boards required for the Works. Whenever possible information boards should be erected within the road boundary, consistent with the safety of road users. The Employer's Representative should check that safety fencing has been detailed at the site of information boards where appropriate.

### **NG 112 Setting Out**

- 1 Generally on large schemes a pre-construction survey is undertaken by the Employer's Representatives to confirm the co-ordinates and levels of permanent ground markers (PGM's) and permanent bench marks (PBM's). The Employer's Representative should ensure that missing ones are replaced and new ones provided where required to ensure that there are a sufficient number immediately adjacent to the Works.
- 2 The compiler should include in Appendix 1/12 particulars of the setting out details which are available. This will usually include:
  - (i) *Co-ordinates and levels of PGM's, PBM's.*
  - (ii) *Offset information.*
  - (iii) *Cross-section details.*
  - (iv) *Computerised data.*
- 3 Normally it is not necessary to supply each tenderer with all this information, but it should be made available for inspection. Once the Contract is awarded, the details should be given to the Contractor, who is responsible for setting out.

- 4 No specific tolerances are given for setting out. The construction tolerances given in the Specification relate to the agreed lines and levels of the Works.
- 5 The Contractor should check the co-ordinates and levels of PGM's and PBM's before setting out and the Employer's Representative may check the setting out as the work proceeds.
- 6 Any specific requirements for setting out should be given in Appendix 1/12.
- 7 Any special requirements regarding the level of information on existing details to be recorded by the Contractor should be given in Appendix 1/12.

### **NG 113 Programme of Works**

- 1 Appendix 1/13 should describe the Employer's Representative's requirements for the programme to be submitted in accordance with the Conditions and all supplementary information related to the programme that the Employer's Representative may require.
- 2 The Contract may require the Employer's Representative to review this programme and in this respect a schedule of output and resources to support all activities shown in the programme should be requested.
- 3 Contractors will vary in the detail into which they break down the activities of the programme. It should be remembered that there is little to be gained from requiring the Contractor to provide a programme in more detail than is his usual practice for construction projects of similar complexity. This is likely to lead to the submission of a programme which although feasible soon becomes out of date as the work progresses.
- 4 Regardless of how carefully the Employer's Representative vets the programme, it is likely to require amendment as the work progresses. The aim should be for the programme to always represent the Contractor's current working programme throughout the Contract. This may require updating of the programme throughout the duration of the Contract. It is recommended that the Contractor should be requested to update the programme if necessary to match progress meetings.

### **NG 114 Monthly Statements**

- 1 Appendix 1/14 should describe the Employer's Representative's requirements for application for payment from the Contractor, unless described elsewhere within the Conditions. Standard requirements are described in NG Sample Appendix 1/14.

### **NG 115 Accommodation Works**

- 1 Accommodation works should be described in Appendix 1/15, indicating where appropriate the periods for completion together with the requirements on individual plots for the benefit of each owner, lessee or occupier. Where accommodation works are not known at the time of tender, Appendix 1/15 should state where CPO plans and schedules can be inspected. Details of accommodation works and where appropriate periods of completion that have been agreed after compilation of Appendix 1/15 should be available for reference where described therein .

### **NG 116 Privately and Publicly Owned Services or Supplies**

- 1 Generally the Employer's Representative will make preliminary arrangements with the Statutory Undertakers for the alteration of services and supplies affected by the Works. He should also, where possible, make similar arrangements for the alteration of other publicly and privately owned services and supplies.
- 2 The above particulars should be contained in Appendix 1/16 and include details of any advance contracts, agreements and pre-ordered material.
- 3 The position of all known services and supplies should be shown on the Drawings, cross-referenced in Appendix 1/16.
- 4 Appendix 1/16 should include details of Motorway communications and/or other motorway systems which may be affected by the works together with details of any necessary alterations or temporary alternative provisions.

### **NG 117 Traffic Safety and Management**

- 1 When major reconstruction or maintenance work is carried out on roads carrying a heavy flow of vehicles, for which the Employer is the Road Authority, particularly where contraflow traffic management is intended or envisaged, the Contractor may be required to undertake maintenance functions on such roads within the Site. If so, this should be stated, together with a list of these functions, in Appendix 1/17. The limits of the road to be maintained should be stated together with the timescale during which the Contractor is responsible for maintenance.
- 2 Where contraflow traffic operation is specified by the Employer's Representative for which crossovers are to be designed by the Contractor full design requirements should be given in Appendix 1/17. Where crossovers are specified in Appendix 1/17 the Employer's Representative should ensure that the Road Authority has been consulted, and list in Appendix 1/17 any maintenance functions to be carried out by the Contractor. When crossovers are proposed by the Contractor, they may only be constructed if the Road Authority agree and the Garda Siochana have been consulted before consent is given. The Contractor will agree details of construction and maintenance with the Road Authority and Clause 117 requires him to inform the Employer's Representative of these details. The compiler should state in Appendix 1/17 the timescale for submission and making of any statutory orders needed before work can commence.
- 3 If, in addition to routine maintenance functions, the Contractor is to be required when requested by a Road Authority to repair accidental or wilful damage to any road within the Site for which that authority is responsible (including any central reserve crossover specified by the Employer's Representative ), full details should be stated in Appendix 1/17. The Employer's Representative should ensure that the Road Authority has been consulted.

- 4 Legally, it is the Road Authority's responsibility to maintain the road and it is not a valid defence that the Contractor was employed to carry out or supervise the maintenance of the road. However, compensation for breach of contract may be obtainable from the Contractor if damages are paid by the Road Authority because of a failure in maintenance due to fault by the Contractor.
- 5 It is essential that all traffic safety measures are in accordance, where applicable with the requirements and advice given in Chapter 8 of the Traffic Signs Manual, any amendments thereto and any other relevant requirements.

Chapter 8 of the Traffic Signs Manual is not a Specification, and in many instances provides guidance and options. In such circumstances Appendix 1/17 should clearly indicate any specific requirements. The Contractor's programme for traffic management and site access/egress should take into account the views of the Garda Siochana and the appropriate Road Authority.

- 6 It may be necessary to erect, alter, cover, uncover and take down advance direction signs and other similar signs to be compatible with the state of the Works. The responsibility for this should be stated in Appendix 1/17. Where the Contractor is to be responsible, the areas of road affected by advance signs, cones and road markings should be included in Appendix 1/7 as forming part of the Site (see NG 107.2).
- 7 Authorisation of non-prescribed signs or temporary traffic signals should be obtained through the Employer giving at least 28 days notice. (This time period can vary.) Any other requirements which are likely to be needed should be included in Appendix 1/17.
- 8 The compiler should state in Appendix 1/17 the timescale for the Contractor to submit his traffic management proposals..

The Contractor should also ensure that necessary steps have been or are being taken to obtain any statutory orders required from the appropriate authority. Details of these orders should be stated in Appendix 1/17.

- 9 Appendix 1/17 should state the length of notice required for the making of orders necessitated by the Contractor's proposals, or if he wishes to vary the agreed measures.
- 10 Before the Contractor commences work on a road, or re-opens a closed road, he should ensure that the Garda Siochana and Road Authority agree with the proposals and are satisfied with the state of the road to be re-opened.
- 11 Any requirements for temporary lighting should be included by cross-reference to Appendix 14/3.
- 12 The X heights of the lettering on vehicle sign boards of 37.5, 50, 62.5, 75, 100 and 150 mm relate to the lower case and the capital sizes are 52.4, 70, 87.5, 105, 140 and 210 mm in height.
- 13 The compiler should detail in Appendix 1/17 the roads and private rights of way which are to be kept open, and those for which orders have been obtained for their closure.

#### **NG 118 Temporary Diversions for Traffic**

- 1 The definition of the term 'temporary diversion for traffic' is included in the Method of Measurement for Road Works, Chapter IV, Series 100, Paragraph 1 (c).

### **Temporary Diversions for Traffic Specified by the Employer's Representative**

**2** The Employer's Representative should ensure that:

- (i) *all temporary diversions for traffic required for reasons of safety or practicality, including any structures, have been specified in Appendix 1/18;*
- (ii) *details of their construction and maintenance, together with any constraints, have been agreed with the Road Authority, and described in Appendix 1/18;*
- (iii) *where applicable, licences or other rights to operate on land not owned by the Employer have been obtained and such land has been included in Appendix 1/7 as forming part of the Site;*
- (iv) *the necessary orders have been or will be made by the appropriate authority.*

**3** If, in addition to routine maintenance functions, the Contractor is to be required to repair accidental or wilful damage to any temporary diversion for traffic specified by the Employer's Representative at the request of the Road Authority responsible for that diversion, full details should be stated in Appendix 1/18.

**4** Where the Contractor is required to design a temporary diversion for traffic, or any temporary structures, design requirements should be stated in Appendix 1/18.

**5** If the ground over which the diversion route is to be provided is not to be reinstated to its original condition on completion of the Works this should be stated in Appendix 1/18 together with details of any treatment required.

### **Temporary Diversions for Traffic Proposed by the Contractor**

**6** If the Contractor proposes temporary diversions for traffic, the Employer's Representative may only consent if the appropriate authority agree and should consult the Garda Siochana before giving such consent.

**7** The Employer's Representative should state in Appendix 1/18 the timescale for submission of any statutory orders which would need to be made where required by the Contractor's proposals.

**8** The Contractor will agree details of construction and maintenance with the appropriate authority and Clause 118 requires him to inform the Employer's Representative of the details.

### **NG 119 Routing of Vehicles**

**1** Appendix 1/19 should contain where applicable the Employer's specific requirements. These should include details of:

- (i) *Routing of vehicles to and from the Site;*
- (ii) *The use of the permanent Works by construction traffic;*
- (iii) *Traffic control required for machinery and plant crossing public roads and notice required before this can be implemented;*
- (iv) *Procedures to be adopted in complying with the Conditions to enable the Contractor to satisfy the Employer's Representative of the adequacy of his proposals.*

## **NG 120 Recovery Vehicles for Breakdowns**

**1** If recovery vehicles for breakdowns are required in the Contract because of the Works interfering with roads carrying a heavy flow of vehicles this should be stated in Appendix 1/20 together with requirements specific to the Contract which should include:

(i) *Number, category of vehicle and period required. Vehicle categories are:*

(a) Heavy recovery vehicles;

(b) Light recovery vehicles;

*A list of equipment to be provided for each vehicle should be given in Appendix 1/20. In addition, it is recommended that towing trolleys should be required to be readily available on roads carrying a heavy flow of vehicles.*

(ii) *Location(s) where the recovery vehicle(s) must be sited.*

(iii) *Location(s) to which broken down or accident damaged vehicles must be removed and facilities to be provided at those locations.*

(iv) *Details of equipment for communication.*

**2** The Employer's Representative should provide a sample leaflet for the Contractor to hand out to the drivers of broken down or accident damaged vehicles prior to assistance being provided. Appendix 1/20 should contain a sample leaflet which should include the following information:

(i) *Definition of site limits. This is usually between the 'Roadworks Ahead - 1km' sign and the 'End of Roadworks' sign.*

(ii) *Location to which the vehicle is to be towed.*

(iii) *A statement that the recovery service is free and is limited to the area of the site limits (as (i) above) and between that and the location to which the vehicle is to be towed (as (ii) above).*

(iv) *A statement that it will be at the discretion of individual drivers to arrange for assistance or the removal of their vehicle to garages of their choice from the location to which it has been towed.*

(v) *The names of local garages who will assist if they are contacted.*

(vi) *The operators of the recovery vehicles do not make arrangements with private garages for the repair of vehicles.*

## **NG 122 Progress Photographs**

**1** When required, Clause 122 will need supplementing by Appendix 1/22, describing the number of, and interval between visits and the number, size, type (still or video) and finish of photographs required.

**2** The Employer's Representative shall nominate the person(s) to accompany the photographer to ensure that only relevant photographs are taken.

- 3 Photographs should be taken as a record of any procedures or features which are, or could be, the subject of a third party claim or complaint e.g. works which by their nature could generate considerable quantities of dust or existing damage to private property.

#### **NG 123 Ionising Radiations**

- 1 When the Contractor proposes to use, or is required in Appendix 1/5 to use, nuclear gauges, the Employer's Representative should ensure that the requirements of Clause 123 have been complied with.
- 2 When the Employer's Representative's staff will be using nuclear gauges on their own behalf, it will be necessary for the Employer's Representative to draw up 'Radiation Safety Procedures' covering their usage. The Employer's Representative will also need to appoint a 'Radiological Protection Officer' and notify particulars to the Radiological Protection Institute of Ireland in accordance with the requirements of S.I. No. 151/1993 — Radiological Protection Act, 1991 (General Control of Radioactive Substances, Nuclear Devices and Irradiating Apparatus) Order, 1993. The Employer's Representative should advise the Contractor of his designated 'Radiological Protection Officer' and provide the Contractor with a copy of the Employer's Representatives 'Radiation Safety Procedures'.

#### **NG 124 Substances Hazardous to Health**

- 1 Clause 124 can be supplemented by Appendix 1/23 which should describe any limitations on the Contractor's method of working or monitoring requirements when using substances hazardous to health such as silane, bridge deck waterproofing systems, paints, where these are used in locations which could result in a risk to members of the public.
- 2 Where protective clothing or other safety apparatus in relation to the specified use of substances hazardous to health is required for the Employer's Representative's staff, these should be listed in Appendix 1/1.

## NG SAMPLE APPENDICES

### NG SAMPLE APPENDIX 1/1 : ACCOMMODATION AND EQUIPMENT FOR THE EMPLOYER'S REPRESENTATIVE

#### A. Temporary Accommodation and Equipment for the Employer's Representative

**Accommodation Required** [Location (if appropriate) and floor area to be inserted or referenced to drawing numbers]

- 1 Temporary initial accommodation
- 2 Principal office
- 3 Subsidiary static office
- 4 Subsidiary portable office
- 5 Off Site accommodation at fabricator's or precaster's works

*[Note: The compiler should bear in mind that all accommodation should satisfy the relevant requirements of current legislation on health, safety and welfare.]*

#### **Duration of Time Accommodation Required**

*[To be included if the time when offices/laboratories are required and equipment is to be installed, tested and made operational is different from that stated in sub-Clauses 101.1 and 101.2*

*Include date all accommodation is vacated and removed.*

*Include time of day and number of days in week that accommodation is required.]*

#### **Fittings and Furnishings of Accommodation**

*[The details should include a list of consumable stores, Computer, surveying and testing equipment, computer software, first aid equipment and details of room temperature needed]*

#### B. Accommodation and Equipment for the Employer's Representative (which shall become the property of the Employer at the end of the Defects Period)

**Accommodation Required** [Location (if appropriate) and floor area to be inserted or referenced to drawing numbers]

- 1 Principal office

#### **Time Accommodation Required**

*[To be included if the time when offices/laboratories are required and equipment is to be installed, tested and made operational is different from that stated in sub-Clauses 101.1 and 101.2*

#### **Fittings and Furnishings of Accommodation (to be supplied new and unused)**

*[The details should include a list of consumable stores, surveying and testing equipment, first aid equipment and details of room temperature needed]*

**NG SAMPLE APPENDIX 1/2: VEHICLES FOR THE EMPLOYER’S PERSONNEL**

| <i>Type<br/>(as defined below)</i> | <i>Number<br/>Required</i> | <i>Period<br/>Required</i> |
|------------------------------------|----------------------------|----------------------------|
| A                                  |                            |                            |
| B                                  |                            |                            |
| C                                  |                            |                            |
| D                                  |                            |                            |

**Type “A” 8 Seat Vehicle**

The vehicle is to be non-commercial type, be suitable for off-road use, have 4 wheel drive, have seating for 8 persons and be supplied in an inconspicuous colour. The vehicle shall be free from markings identifying any company associated with the Contract. The equipment shall include:

Fire extinguisher, heater and demister, hazard flashing unit, heavy duty suspension, spare wheel, petrol filler cap lock, bonnet lock and spare wheel lock, internal and external mirrors, mud flaps, link mats front and rear, mudshield for front and rear brakes, rubber pads for clutch and brake pedals, interior sun visors, gearbox covers, tow rope, towing hooks front and rear, laminated windscreen, wire mesh guards for side, tail, stop and flasher lamps, covers for universal joints and one or more suitable roof mounted amber beacons .

**Type “B” Long Wheelbase Vehicle**

The vehicle is to be suitable for off-road use, have 4 wheel drive, have seating for 2 persons and be supplied with fully enclosed cab and hard top, in an inconspicuous colour. The vehicle shall be free from markings identifying any company associated with the Contract. The equipment shall be as for the Station Wagon with the following variations:

Link mats and heater shall be supplied for the front only. The vehicle shall be adapted for CBR testing to the approval of the Employer’s Representative.

**Type “C” Short Wheelbase Vehicle**

The vehicle is to be as type B but not adapted for CBR testing.

**Type “D” Light Van or Estate Car**

The vehicle shall have a carrying capacity of at least 0.25 tonne, a minimum ground clearance (unladen) of 150 mm and independent suspension.

The vehicle shall be finished in an inconspicuous colour. The vehicle shall be free from markings identifying any company associated with the Contract. The equipment shall include:

Reversing lamp, fire extinguisher, luggage rack complete with straps suitable for carrying survey equipment .

**NG SAMPLE APPENDIX 1/3: COMMUNICATIONS SYSTEM FOR THE EMPLOYER'S PERSONNEL**

- 1 Include the number and type of mobiles telephones required by the Employer's Personnel.
- 2 Identify the length of time the mobile telephones are required.
- 3 Identify accessories such as chargers, spare batteries, hands free sets, etc.
- 4 Specify connections to GSM service provider
- 5 Identify whether the telephones are required earlier than the normal 4 weeks from the Starting Date.

**NG SAMPLE APPENDIX 1/4: WORKING AND FABRICATION DRAWINGS**

| <i>Series</i> | <i>Description of Work</i> | <i>Minimum period for submission of drawings</i> |
|---------------|----------------------------|--|
|               |                            |  |

## NG SAMPLE APPENDIX 1/5: TESTING TO BE CARRIED OUT BY THE CONTRACTOR

[Notes to compiler:

- i) *The scope of the testing covered in Table NG 1/1 should not be regarded as exhaustive. Routine tests carried out by manufacturers and suppliers in compliance with an Irish or British Standard or other standard or specification are not included but where a standard or specification makes provision for a test certificate this is indicated in the table.*
- ii) *Where tests are taken from Irish Standards, or British Standards which are undated in the Specification they should be checked to ensure that test requirements have not been altered by subsequent issues since the date of the last published national alteration to the SRW (see NG 004.3).*
- iii) *The schedule of tests for the Contract should be completed by selecting the tests and data from Table NG 1/1. Different frequencies and additional tests should be included as appropriate. Where the frequency of testing in Table NG 1/1 is given by reference to a Clause in the SRW, the frequency requirements of the Clause should be repeated in full in Appendix 1/5.*
- iv) *Where INAB accreditation is required this should be indicated by the symbol (IL) in the Test column. Tests where this should apply are indicated in Table NG 1/1.]*

| <i>Clause</i> | <i>Work,<br/>Goods or<br/>Material</i> | <i>Test</i> | <i>Frequency<br/>Of Testing</i> | <i>Test<br/>Certificate</i> | <i>Comments</i> |
|---------------|--|-------------|---------------------------------|-----------------------------|-----------------|
|               |  |             |                                 |                             |                 |

Notes:

- 1 Tests comparable to those specified in this Appendix will be necessary for any equivalent work, goods or materials proposed by the Contractor (See sub-Clause 105.4).
- 2 (IL) indicates that an INAB test report or certificate is required.
- 3 Unless otherwise shown in this Appendix tests for work, goods or materials as scheduled under any one Clause are required for all such work, goods or materials in the Works.
- 4 Cube strength tests are not required for concrete complying with Clause 2602.
- 5 Unless otherwise shown in this Appendix test certificates for work, goods or materials as scheduled under any one Clause are required for all such work, goods or materials in the Works.

**NG SAMPLE APPENDIX 1/6 : SUPPLY AND DELIVERY OF SAMPLES TO THE EMPLOYER'S REPRESENTATIVE**

[Note to compiler:

Give details of the samples to be provided or made available by the Contractor for testing by the Employer's Representative and the locations to which they are to be delivered. . Where INAB laboratory accreditation for sampling is required this should be indicated by the symbol (IL) in the "Sample Description" column. Samples where this should apply can be determined from subsequent testing requirements. Tests which require accreditation are indicated in Table NG 1/1.]

| <i>Clause</i> | <i>Sample Description</i> | <i>Frequency Of Sampling</i> | <i>Delivery Location</i> | <i>Comments</i> |
|---------------|---------------------------|------------------------------|--------------------------|-----------------|
|               |                           |                              |                          |                 |

Notes:

- 1 Samples comparable to those specified in this Appendix will be necessary for any equivalent work, goods or materials proposed by the Contractor (See sub-Clause 105.4).
- 2 Unless otherwise shown in this Appendix samples of work, goods or materials as scheduled under any one Clause are required for all such work, goods or materials in the Works.
- 3 Unless otherwise scheduled under Clause 2602 samples of concrete complying with that Clause are not required.
- 4 (IL) indicates INAB laboratory accreditation is required for sampling

**NG SAMPLE APPENDIX 1/7: SITE EXTENT AND LIMITATIONS ON USE**

[Note to compiler: Include details as appropriate, under the following headings:]

- 1 Extent of the Site.

[Cross-reference should be made to the Drawings where appropriate.

Include areas of roads for advance signing and coning by the Contractor where relevant.]

- 2 Limitations on the Use of the Site.

[Cross-reference should be made to Appendix 1/23 where appropriate.]

**NG SAMPLE APPENDIX 1/8: OPERATIVES FOR THE EMPLOYER'S REPRESENTATIVE**

| <i>Operatives Required</i>                    | <i>No.</i> | <i>Period Required</i> |
|---|------------|------------------------|
| Chainman/Driver<br>Driver/Laboratory Handyman |            |                        |

## NG SAMPLE APPENDIX 1/9 : CONTROL OF NOISE AND VIBRATION

### Noise

- 1 The Local Authority has informally agreed that the following measures would be appropriate and these are given as a guide; however it is for the Contractor to decide whether to seek the Local Authority's formal consent to his proposed methods of work and to the steps he proposes in order to minimise noise.
- 2 The normal working hours within the Site shall be Monday to Friday between .. and .. hours and Saturday between .. and .. hours, with no working on public holidays. Exceptionally, the Employer's Representative's consent for work outside these hours may be given after any necessary consultation. .. days notice is required from the Contractor when seeking such consent.
- 3 The noise levels (see Note (i) below) scheduled below for periods outside the normal working hours will only be permitted when consent has been given to exceptional working.
- 4 The ambient noise level,  $L_{Aeq}$  (see Note (ii) below) from all sources when measured 2.0 m above the ground at noise control stations numbers 1 to .. on Drawing Numbers ..... shall either not exceed the appropriate level given in the Schedule or not exceed by more than 3Db(A) the existing ambient noise level,  $L_{Aeq}$  (see Note (iii) below), at the control station measured over the same period, whichever level is the greater. The maximum sound level at any noise control station shall not exceed the level given in the Schedule. Exceptionally the Contractor may be given permission to carry out works which exceed the noise levels in the Schedule, provided that .. days notice of the date and timing of these works is given to the Employer's Representative and the Contractor demonstrates that he intends to take all reasonable measures to mitigate the noise nuisance. After consultations with the Local Authority and any other interested bodies a decision will be given within .. days of receipt of the notice.

| <i>Schedule</i>   | <i>Total Noise Levels at Control Stations</i> |   |  |  |
|---|---|---|--|--|
| <i>Period</i>   | <i>Hours</i>                                  | <i>Ambient Noise Level,<br/><math>L_{Aeq}</math> measured at<br/>Control Station:<br/>dB(A)</i> | <i>Period of Hours<br/>over which <math>L_{Aeq}</math><br/>is applicable</i> | <i>Maximum Sound Level<br/>(see Note(iv)below<br/>measured<br/>at Control Station:<br/>dB(A)</i> |
| Mondays to Fridays<br>Saturdays<br>Sundays<br>All unattended plant<br>outside<br>normal working hours |   |   |  |  |

#### Notes:

- (i) Noise levels relate to free field conditions. Where noise control stations are located 1 m from facades of buildings, the permitted noise levels can be increased by 3 dB(A).
- (ii) The ambient noise level,  $L_{Aeq}$ , at a noise control station is the total  $L_{Aeq}$  from all the noise sources in the vicinity over the specified period.
- (iii) The existing ambient noise level,  $L_{Aeq}$ , at a control station is the total  $L_{Aeq}$  from all the noise sources in the vicinity over the specified period prior to the commencement of the Works.

- (iv) *Maximum sound level is the highest value indicated on a sound level meter which meets the requirements of IS EN 61672 : 1 Class 1 or 2 set to SLOW response and frequency weighting A or an integrating - averaging sound level meter to IS EN 61672 : 2.*

### **Vibration**

[Note to compiler: Include here:]

- (i) *Locations where vibration limits are to be complied with.*
- (ii) *Limits of vibrational amplitude and resultant peak particle velocity .*
- (iii) *Requirements for instrumentation and monitoring.*
- (iv) *Employer's Representative's arrangements for Contractor to monitor vibration in property off Site.*

### **NG SAMPLE APPENDIX 1/10 : STRUCTURES TO BE DESIGNED BY THE CONTRACTOR**

[Note to compiler: List under (A) the structures to be designed by the Contractor and under (B) the structures for which a choice of designs is offered, i.e. structures for which the Contractor may propose a design if he elects not to construct the design prepared by the Employer's Representative. The design specifications and any special requirements should either follow immediately after the table or be cross-referenced to other Appendices.]

| <i>Structure</i> | <i>Location</i> | <i>Design Specification</i> |
|------------------|-----------------|-----------------------------|
| (A)              |                 |                             |
| (B)              |                 |                             |

**NG SAMPLE APPENDIX 1/11 : STRUCTURAL ELEMENTS AND OTHER FEATURES TO BE DESIGNED BY THE CONTRACTOR**

[Note to compiler: List here the structural elements and other features to be designed by the Contractor. The design specifications and any special requirements should either follow immediately after the table or be cross-referenced to other Appendices.]

| <i>Structural Element</i> | <i>Location</i> | <i>Design Specification</i> |
|---------------------------|-----------------|-----------------------------|
|                           |                 |                             |

**NG SAMPLE APPENDIX 1/12: SETTING OUT AND EXISTING GROUND LEVELS**

1 The information given below will be available for inspection during the tender period at:

Local Authority/Consultants Office

Address .....

Tel No. ....

and will be supplied to the Contractor at the commencement of the Works.

[Note to compiler: Include here details of the setting out information that is available.]

2 Specific requirements for setting out.

3 References to drawings or schedules quoting existing ground levels [111.1].

4 Level of information on existing detail to be recorded by the Contractor.

## NG SAMPLE APPENDIX 1/13: PROGRAMME OF WORKS

- 1 The Contractor shall provide the programme in the form of a network diagram/bar chart [delete as appropriate] produced as a result of a “critical path analysis” and must abide by the constraints stated or implied in the Contract. It shall show the level of detail appropriate to each stage of the Works and all activities and restraints, each of which shall be given a short title. All events shall be numbered and annotated with earliest and latest event dates.
- 2 At the time of presentation of the programme the Contractor shall also provide a mass-haul diagram showing his intended earthworks movements and locations and capacities of anticipated plant and other resource input.
- 3 Schedule of Stated Constraints

*[The constraints known at tender stage should be inserted here. Typical constraints, including those that could have been commitments by the Employer, are as follows:]*

  - (i) *Work to privately and publicly owned services and supplies [although this is usually agreed informally giving the Contractor latitude in determining his programme].*
  - (ii) *Possession (rail, property, wayleave, etc).*
  - (iii) *Traffic safety and management including notice requirements and restrictions arising from the use of substances hazardous to health.*
  - (iv) *Provision of environmental protection prior to the main construction operations*
  - (v) *Trials and demonstrations in advance of main construction.*
  - (vi) *Approval by the Employer’s Representative of domestic subcontractor nominations.*
  - (vii) *Completion of the communications installation 8 weeks before the date for completion of the Works.*
  - (viii) *Compliance with technical approval procedures in relation to structures designed by the Contractor, including awaiting approvals, resubmissions and modifications.*
- 4 The level of detail should be not less than the following:

Level 1

  - (i) *Each bridge.*
  - (ii) *Earthworks – each cutting and embankment.*
  - (iii) *Roadworks – in lengths not exceeding 1.0 km for main route and for each side road, link road and slip road:*
    - (a) Fencing
    - (b) Site clearance
    - (c) Topsoil strip
    - (d) Drainage (pre-earthworks and second stage)
    - (e) Sub-base

- (f) Subgrade improvement layer
- (g) Roadbase or concrete paving
- (h) Surfacing.
- (iv) *Major privately and publicly owned services and supplies.*
- (v) *Traffic management measures including operation of site accesses, plant crossings and temporary diversions for traffic.*
- (vi) *Farm or householder Accommodation Works.*
- (vii) *Landscaping Works.*

#### **NG SAMPLE APPENDIX 1/14: MONTHLY STATEMENTS**

The monthly statements submitted by the Contractor to the Employer's Representative in accordance with the Conditions shall, whenever dealing with matters covered by the Bills of Quantities, be set out under Part and Section headings similar to those in the Bill of Quantities and shall separately identify each item and specify quantity, unit, rate and value.

#### **NG SAMPLE APPENDIX 1/15: ACCOMMODATION WORKS**

- 1 Schedule of Accommodation Works already determined and included in the Tender Documents.
- 2 Copies of Schedule of Accommodation Works and details which may be agreed during the Tender period will be made available at:  
  
Local Authority/Consultant's Office  
  
Address  
  
Tel No
- 3 Reference (where appropriate) to Accommodation Works and details which may be included in the Works but are unlikely to be determined prior to receipt of tenders.

**NG SAMPLE APPENDIX 1/16: PRIVATELY AND PUBLICLY OWNED SERVICES AND SUPPLIES**

- 1 This Appendix contains details of services and supplies affected by the Works, details of preliminary arrangements that have been made with Statutory Undertakers and others for the alteration of services affected by the Works, and details of any orders already placed.
- 2 The Contractor shall make arrangements with the Statutory Undertakers and others concerned, for the co-ordination of his work with all work which needs to be done by them or their contractors concurrently with the Works. Compliance with the periods of notice given in this Appendix does not relieve the Contractor of his obligations.
- 3 Private services to individual properties have not generally been listed or shown on the Drawings. The Contractor shall make arrangements with the Statutory Undertakers and others concerned for the phasing of all necessary disconnections and diversion of private services affected by the Works.
- 4 Disconnected apparatus shall be removed by the Contractor only with the prior consent of the Authority concerned.
- 5 The names, addresses and telephone numbers of the authorities serving in the locality are listed below.

| <i>Names</i>          | <i>Address and Tel No.</i> | <i>Contact</i> |
|-----------------------|----------------------------|----------------|
| Statutory Undertakers |                            |                |
| Other Authorities     |                            |                |

6 Services and Supplies Affected by the Works

| <i>Location</i>                      | <i>Description</i> | <i>Group*</i> | <i>Drawing No.</i> | <i>Notice Required to Commence</i> | <i>Time for Completion</i> |
|--------------------------------------|--------------------|---------------|--------------------|------------------------------------|----------------------------|
| Statutory Undertakers                |                    |               |                    |                                    |                            |
| Other Authorities/Bodies/Individuals |                    |               |                    |                                    |                            |

\*

- A Work expected to be completed before the commencement of the Works.
- B Work required after commencement of the Works which does not require prior work by the Contractor.
- C Work required after commencement of the Works which does require prior work by the Contractor.
- D Work expected to be under construction at the commencement of the Works.
- E Work required to be carried out jointly by the Contractor (all Civil Works) and the Statutory Undertaker (Cabling only) in close liaison and co-operation with each other.

F Work to be wholly undertaken by the Contractor (in liaison with the statutory undertaker)

*[Note to compiler: Insert here details of any other preliminary arrangements that have been made and/or details of any orders already placed]*

## **NG SAMPLE APPENDIX 1/17: TRAFFIC SAFETY AND MANAGEMENT**

*[Note to compiler:*

*The following should be inserted in the Appendix as appropriate and extended when required:]*

### **Traffic Safety and Management Requirements**

*[When the Contractor is not required to submit traffic management proposals or to supply sign faces, posts or fixings, this should be stated]*

- (i) Phasing of Works [include details of traffic orders that have been or are being made].
- (ii) Drawings showing traffic management layout, including:
  - (a) Geometric Design.
  - (b) Position of traffic signals.
  - (c) Width of lanes.
  - (d) Working areas.
  - (e) Safety zones.
  - (f) Crossovers [include construction details, and geometrical design required where this has not been shown on the Drawings].
  - (g) Running lane for emergency vehicles.
  - (h) Location for emergency vehicles.
  - (i) Access and exit locations for construction.
- (iii) Timing of operations.
- (iv) Road lighting requirements (Appendix 14/3).
- (v) Requirements for Temporary Emergency Telephones.
- (vi) Whether hazard warning lights are an acceptable alternative to a roof-mounted amber flashing lamp and if so, in what circumstances [117.14].
- (vii) Whether a traffic safety and control officer is required [117.18].
- (viii) Restrictions arising from the use of substances hazardous to health [cross-reference should be made to Appendix 1/23].

### **Maintenance Requirements**

- (i) Crossovers
- (ii) Ramps
- (iii) Roads

- (iv) Timescale for responsibility if different from sub-Clause 117.7

**Notice Requirements**

*Notice required by the Road Authority in order to arrange for:*

- (i) *amending or making traffic orders .....*
- (ii) *authorising of non-prescribed signs .....*
- (iii) *authorising temporary traffic signals .....*
- (iv) *moving signs to be compatible with the state of the Works as described in sub-Clause 117.11*

**Details of Events That Could Have a Bearing on the Works**

*[These could include such events as:]*

- Race meetings,
- Football fixtures, and
- Road reconstruction work being carried out in the vicinity.

**Roads, Private Roads, and Other Ways Affected by the Works**

| <i>Description</i> | <i>Predicted<br/>24 Hour<br/>Annual<br/>Average<br/>Daily Traffic<br/>AADT</i> | <i>Eighty Five<br/>Percentile<br/>Speed of<br/>Cars (mph)</i> | <i>Speed Limit<br/>(mph) if<br/>Proposed<br/>[State<br/>whether<br/>Mandatory or<br/>Advisory]</i> | <i>Type(s) of<br/>Traffic<br/>Control</i> | <i>Special<br/>Facilities<br/>[Pedestrian,<br/>Equestrian<br/>etc.]</i> | <i>Whether to<br/>be kept<br/>Open or<br/>Closed</i> |
|--------------------|--|---|--|---|---|--|
|                    |  |   |  |   |   |  |

Note: Particulars of temporary diversions for traffic are contained in Appendix 1/18.

Roads including footpaths, cycle tracks and other traffic routes, described above or listed in Appendix 1/19 are the responsibility of:

Authority

Address

Tel No

## NG SAMPLE APPENDIX 1/18: TEMPORARY DIVERSIONS FOR TRAFFIC

[Note to compiler: The following should be inserted in the Appendix as appropriate and extended when required:]

### 1 Temporary Diversions for Traffic Specified by the Employer's Representative

#### (i) Roads Open to Vehicles

| Description | Drawing No.<br>Or Ref. | Construction/<br>Design<br>Requirements* | Maintenance<br>Requirements<br>(including<br>timescale for<br>responsibility) | Remarks<br>(including<br>constraints and<br>reinstatement<br>details) |
|-------------|------------------------|--|---|---|
| Major       |                        |  |   |   |
| Minor       |                        |  |   |   |

#### (ii) Other Roads and Private Rights of Way

| Description                    | Drawing No.<br>Or Ref. | Existing<br>Usage | Construction/<br>Design<br>Requirements* | Maintenance<br>Requirements<br>(including<br>timescale for<br>responsibility) | Remarks<br>(including<br>constraints<br>and<br>reinstatement<br>details) |
|--------------------------------|------------------------|-------------------|--|---|--|
| Footpaths                      |                        |                   |  |   |  |
| Cycle Tracks                   |                        |                   |  |   |  |
| Bridleways                     |                        |                   |  |   |  |
| +Private<br>Means<br>of Access |                        |                   |  |   |  |

Note: Particulars of traffic are contained in Appendix 1/17.

[\* This could include a schedule of different forms of construction and geometrical design required where this has not been shown on the Drawings.

+ Not always a need to define individual accesses, particularly in urban situations. Reference can be made to road names or other appropriate means of identification.]

#### (iii) Temporary Structures Specified by the Employer's Representative

[Give full particulars, including outline Approval in Principle forms where appropriate, if temporary structures are to be designed by the Contractor.]

### 2 Temporary Diversions Proposed by the Contractor

#### (i) Notice Requirements [118.5]

#### (ii) Details of any Constraints

## **NG SAMPLE APPENDIX 1/19: ROUTEING OF VEHICLES**

*[Note to compiler: Insert details as appropriate under the following headings:]*

(i) *Permitted Access Routes To and From the Site*

*[A list of drawings showing the permitted access routes and details of temporary traffic signs.]*

(ii) *The Use of the Permanent Works by Construction Traffic*

*[The requirements with which the Contractor must comply in submitting details under the Conditions of Contract.]*

(iii) *Movement of Machinery and Plant Across Public Roads*

*[The requirements for the provision of haul route traffic signals, the equipment for which requires the approval of the Local Authority and An Garda Siochana.]*

(iv) *Temporary Structures for Construction Traffic Spanning Areas Used by the Public*

*[Detail to which temporary structures must be designed including, in the case of structures spanning a public road, the requirement for the Contractor to follow the technical approval procedures contained in NRA Standard BD 2. In the case of structures spanning a railway, river or canal, the requirements of the appropriate authority should be given.]*

## NG SAMPLE APPENDIX 1/20: RECOVERY VEHICLES FOR BREAKDOWNS

### Requirements for Recovery Vehicles

#### 1 Recovery Vehicles to be Provided

*[Include here details of circumstances when recovery vehicles are to be provided.]*

#### 1.2 Heavy recovery vehicles:

- (a) ... No. heavy recovery vehicle(s) shall be provided .
- (b) A heavy recovery vehicle shall comply with the following:

#### 1.3 Light Recovery Vehicle

- (a) ... No. light recovery vehicle(s) shall be provided.
- (b) A light recovery vehicle shall comply with the following:

#### 2 Inspection Requirements

The Contractor shall arrange for all recovery vehicles to be inspected for roadworthiness and a copy of each report shall be provided for the Employer's Representative. Each person manning the vehicle shall have a valid licence to operate the vehicle.

#### 3 Locations for Recovery Vehicles

*[Details of locations for recovery vehicles together with any specific requirements such as need for hardstandings.]*

#### 4 Communication System

*[Details of communication system required.]*

#### 5 Location(s) for Vehicle Removal

*[Details of location(s) to which broken down or accident damaged vehicles should be removed.]*

## NG SAMPLE APPENDIX 1/21: INFORMATION BOARDS

*[Note to compiler: Include here the locations and details of information boards including supports, wind bracing, etc., or cross-references to the drawings giving the information.]*

## NG SAMPLE APPENDIX 1/22: PROGRESS PHOTOGRAPHS

| <i>Location</i> | <i>Type</i> | <i>No.</i> | <i>Aerial / Ground</i> | <i>Frequency required</i> | <i>Remarks</i> |
|-----------------|-------------|------------|------------------------|---------------------------|----------------|
|                 |             |            |                        |                           |                |



## TABLE N/G 1/1

### Typical Testing Details

#### Key

- † indicates a requirement in SRW for the test to be carried out by the Contractor; such tests should therefore be scheduled in Appendix 1/5.
- †† indicates a statement in SRW that the test may/will be carried out under the direction of the Overseeing Organisation; samples for such tests should therefore be required in Appendix 1/6.
- \* indicates that the frequency of testing is given for general guidance and is only indicative of the frequency that may be appropriate (ie. no frequency is given in the SRW or reference documents). Where materials are known to be marginal or if initial test results show them to be such, the frequency of testing should be increased. Conversely where material properties are consistently in excess of specified minimum requirements or well below specified maximum limits, then the frequency of testing should be reduced.
- (IL) indicates that an Irish National Accreditation Board test report or certificate is required.

#### *[Notes to compiler:*

- 1. The above symbols apart from (IL) are for guidance when preparing Appendices 1/5 and 1/6 and should not be reproduced in those Appendices.*
- 2. Other guidance is printed in italics and should likewise not be reproduced in Appendices 1/5 and 1/6. Appropriate Contract-specific requirements should be scheduled.*
- 3. ‘Source approval’ and ‘1 test per  $x \text{ m}^3$  for each source’ indicates that a test result is required for each cut section within a road scheme or for each quarry producing that material (or for each part of a quarry where there is variation within the quarry) or other similar sources.*
- 4. For materials covered by the 600 Series in instances where the quantities of material used are less than the volumetric quantities shown on Table NG 1/1, a minimum of 1 test per source shall be undertaken]*

**Table NG 1/1 Typical Testing Details**

| Clause            | Work, Goods or Material      | Test                        | Frequency of Testing                                       | Test Certificate        | Comments  |
|-------------------|------------------------------|-----------------------------|--|-------------------------|---|
| Series 300        |                              |                             |  |                         |   |
| 306               | Permanent fencing            |                             |  |                         | Quality management scheme applies   |
|                   | Concrete components          | Cover to reinforcement      | 1 per consignment (maximum 1 per 100 components)           |                         | [Tests / samples should not normally be required]                                   |
| 308               | Gates and Stiles             |                             |  |                         | Quality management scheme applies   |
|                   | Reinforced concrete posts    | Cover to reinforcement      | 1 per consignment (maximum 1 per 100 components) (BS 3470) |                         | [Tests / samples should not normally be required]                                   |
| 310               | Environmental Noise Barriers |                             |  |                         |   |
|                   | Post Foundations             | Load test on site           | As required in Sub-Clause 310.29                           |                         | Evidence of design calculations required  |
|                   |                              | Deflection test on site     | As required in Sub-Clause 310.28                           |                         |   |
|                   | Preservation of Timber       | Moisture Content            | As required in sub-clause 310.14                           | Required                | Quality management scheme applies [Tests / samples should not normally be required] |
| Vandal resistance | Destruction testing          | As required in Appendix 3/2 |  | See sub-clause 310.11   |   |
| 311               | Preservation of timber       | Moisture content            | As required in sub-Clause 311.2                            | Required for each batch | Quality management scheme applies   |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause     | Work, Goods or Material    | Test                                   | Frequency of Testing                        | Test Certificate | Comments  |
|------------|----------------------------|--|---|------------------|---|
| Series 400 |                            |  |   |                  |   |
| 407        | Anchorage in drilled holes | On-site tensile load test              | <i>[As required (Appendix 4/1 and 4/7)]</i> | Required         | † See sub-Clause 407.1-4 <i>[Special requirements to be provided in Appendix 4/1 &amp; 4/7]</i> |
|            | Road Restraint System      | As required by the system manufacturer | As required by the system manufacturer      |                  | As required by the system manufacturer  |
|            | Ground Conditions          | In situ testing (sub-Clause 407.6 & 7) | <i>[As required (sub-clause 407.7)]</i>     |                  |   |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause          | Work, Goods or Material              | Test                    | Frequency of Testing | Test Certificate                                 | Comments   |
|-----------------|--------------------------------------|-------------------------|----------------------|--|--|
| Series 500      |                                      |                         |                      |  |  |
| 501             | Pipes for drainage and service ducts |                         |                      |  |  |
|                 | Vitrified clay                       | [See Note A]            |                      |  | Product Certification Scheme applies<br><br><i>[Note A: Additional manufacturer's tests are provided for in the relevant standard but should normally not be required.]</i><br><br><i>[Note B: Certificates are provided for in the relevant standard but should normally not be required except for pipes which are not quality marked in accordance with relevant standard.]</i> |
|                 | Concrete – PC/SRC                    | Not exceeding 900mm dia |                      | [See Note B]                                     |  |
|                 | Concrete- Pre-stressed               |                         |                      |  |  |
|                 | Iron - Cast                          |                         |                      |  |  |
|                 | Iron Ductile                         |                         |                      | [See Note B]                                     |  |
|                 | UPVC                                 |                         |                      |  |  |
|                 | Plastics (see Table 5/1)             |                         |                      |  |  |
|                 | Corrugated steel                     | (Manufacturer's tests)  |                      | Required (AASHTO)                                |  |
|                 | Corrugated steel bitumen protection  |                         |                      |  |  |
|                 | Concrete PC/SRC exceeding 900mm dia  | (Manufacturer's tests)  | As per Clause 509.10 | Required   |  |
| Other materials |                                      |                         | Required             | NSAI Agrément Certificate or equivalent required |  |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause | Work, Goods or Material | Test  | Frequency of Testing  | Test Certificate | Comments   |
|--------|-------------------------|---|-----------------------|------------------|--|
| 503    | Pipe bedding            |   |                       |                  | <i>Appropriate tests/samples for the resistance to freezing and thawing (magnesium sulphate soundness) should be scheduled where required, NG Series 800.]</i> |
|        |                         | Grading and fines content (Washing and sieving method to be used) | 1 per week(min of 3)* | Required         | <i>[Results of routine control tests from the factory production control system operated by the producer to be provided – see Annex C of IS EN 13242.</i>      |
|        |                         | Water Soluble Sulphate (WS) content (IN)                          | 5 per source*         |                  | <i>[Minimum to allow for natural variability of sulphur compounds]</i>   |
|        |                         | Resistance to fragmentation (IL)                                  | 1 per source*         |                  | <i>[LA Category]</i>   |
| 505    | Filter medium backfill  |   |                       |                  | <i>Appropriate tests/samples for the resistance to freezing and thawing (magnesium sulphate soundness) should be scheduled where required, NG Series 800.]</i> |
|        |                         | Plastic index (IL)  | 1 per source*         | Required         | <i>[Results of routine control tests from the factory production control system operated by the producer to be provided – see Annex C of IS EN 13242]</i>      |
|        |                         | Grading and fines content (Washing and                            | 1 per 500 tonnes*     |                  | <i>[Results of routine control tests from the factory production control system</i>  |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause         | Work, Goods or Material     | Test                                     | Frequency of Testing | Test Certificate | Comments  |
|----------------|-----------------------------|--|----------------------|------------------|---|
| 505<br>(Contd) |                             | sieving method to be used)               | 5 per source*        |                  | <i>operated by the producer to be provided – see Annex C of IS EN 1324.]</i>                  |
|                |                             | Water Soluble Sulphate (WS) content (IL) |                      |                  | <i>[Minimum to allow for natural variability of sulphur compounds]</i>                        |
|                |                             | Resistance to fragmentation (IL)         | 1 per source*        |                  | <i>[LA Category]</i>  |
| 506            | Sealing existing drains     |  |                      |                  | <i>[Appropriate tests/samples should be scheduled where not included under other clauses]</i> |
|                | Concrete                    |  |                      |                  |   |
|                | Grout                       |  |                      |                  |   |
| 507            | Chambers                    |  |                      |                  |   |
|                | Precast concrete            |  |                      |                  | Product certification scheme applies  |
|                | Corrugated galvanised steel | (Manufacturer's tests)                   |                      | Required         | Product certification scheme applies  |
|                | Manhole steps               |  |                      |                  | Product certification scheme applies  |
|                | Steel fitments              |  |                      |                  |   |
|                | Covers, grates and frames   |  |                      |                  | Product certification scheme applies  |
|                | Cover bolts                 |  |                      |                  | Quality management scheme applies   |
| 508            | Gullies and pipe junctions  |  |                      |                  | Product certification scheme applies  |
|                | Precast concrete            |  |                      |                  |   |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause         | Work, Goods or Material                         |                                | Test                                     | Frequency of Testing  | Test Certificate | Comments   |
|----------------|---|--------------------------------|--|---|------------------|--|
| 508<br>(Contd) |   | Cast iron and steel            |  |   |                  |  |
| 509            | Watertightness of joints                        |                                | Air test                                 | All pipelines with watertight joints [As required in Appendix 5/1 for partly watertight joints] | Required         |  |
| 512            | Backfill to pipe bays                           |                                | Grading                                  | 1 per 50 tonnes (min of 3)*   |                  |  |
|                |   |                                | Water Soluble Sulphate (WS) content (IL) | 5 per source*   |                  |  |
| 513            | Permeable backing to earth retaining structures |                                |  |   |                  | <i>Appropriate tests/samples for the resistance to freezing and thawing (magnesium sulphate soundness) should be scheduled where required, NG Series 800.]</i> |
|                | Granular Material                               | Piping Ratio (as Cl 513)       | 1 per 100 tonnes (min of 3)*             |   |                  |  |
|                |   | Permeability (as Cl 513)       |  |   |                  |  |
|                | Precast hollow concrete blocks                  | (Manufacturer's tests)         |  | Required  |                  |  |
| 514            | Fin Drains                                      |                                | (Manufacturer's tests)                   |   | Required         | INAB (or equivalent) certification applies   |
| 515            | Narrow Filter Drains                            |                                |  |   |                  |  |
|                |   | Geotextile, pipes and fittings | (Manufacturer's tests)                   |   | Required         | INAB (or equivalent) certification applies   |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause            | Work, Goods or Material            |               | Test  | Frequency of Testing                                   | Test Certificate | Comments   |
|-------------------|------------------------------------|---------------|---|--|------------------|--|
| 515<br>(Contd)    |                                    | Granular fill | Plastic Index (IL)  | 1 per source*  | Required         |  |
|                   |                                    |               | Resistance to fragmentation (IL)  |  |                  |  |
|                   |                                    |               | Water soluble sulphate (WS) content (IL)  | 5 per source*  |                  | <i>[Minimum to allow for natural variability of sulphur compounds]</i>   |
|                   |                                    |               | Oxidisable sulphides (OS) content and total potential sulphate (TPS) content (IL) |  | Required         | <i>[Results of routine control tests from the factory production control system operated by the producer to be provided – see Annex C of IS EN 13242.]</i> |
|                   |                                    |               | Grading and fines content   | 1 per week (min of 3)*                                 |                  |  |
| Permeability (IL) | 1 per source*                      |               |   |  |                  |  |
| 516               | Combined drainage and kerb systems |               | Load test   | A minimum of 1 test per 1000m for each type and source | Required         | Certification that the system complies with Clause 516 is required <i>[Quality mark in accordance with relevant standard or equivalent applies]</i>        |
|                   |                                    |               | (Manufacturer's tests)  |  | Required         |  |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause | Work, Goods or Material                          | Test                   | Frequency of Testing                                   | Test Certificate | Comments  |
|--------|--|------------------------|--|------------------|---|
| 517    | Linear drainage systems                          | Load test              | A minimum of 1 test per 1000m for each type and source | Required         | Certification that the system complies with Clause 517 is required [ <i>Quality mark in accordance with relevant standard or equivalent applies</i> ] |
| 518    | Thermoplastic structured wall pipes and fittings | (Manufacturer's tests) |  | Required         | INAB (or equivalent) certification applies  |
| 519    | Geotextiles for filter drains                    | (Manufacturer's tests) | 1 per source*  | Required         | Certification that the system complies with Clause 519 is required [ <i>Quality mark in accordance with relevant standard or equivalent applies</i> ] |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause                                 | Work, Goods or Material | Test                  | Frequency of Testing                          | Test Certificate  | Comments |   |
|--|-------------------------|-----------------------|---|---|----------|---|
| Series 600                             |                         |                       |   |   |          |   |
| 601<br>631 to 633<br>635 to 637<br>640 | Acceptable material     |                       |   |   |          |   |
|  |                         | Class                 | General Description                           |   |          |   |
|  | 1                       | General granular fill | Grading                                       | 1 test per 1,000m <sup>3</sup> for each source*                             |          |   |
|  |                         |                       | Uniformity Coefficient                        | 1 test per 1,000m <sup>3</sup> for each source*                             |          |   |
|  |                         |                       | MCV   | As Required*  |          |   |
|  |                         |                       | MC  | 1 test per 1,000m <sup>3</sup> for each source*                             |          |   |
|  |                         | 1C only               | LA Coefficient (IL)                           | 1 test per 1,000m <sup>3</sup> for each source (min of 2 total per source)* |          |   |
|  | 2                       | General cohesive fill | Grading                                       | 1 test per 1,000m <sup>3</sup> for each source*                             |          | <i>[Cross-reference should be made to any requirements in Appendix 6/1]</i> |
|  |                         |                       | Plastic Limit                                 | 1 test per 1,000m <sup>3</sup> for each source*                             |          |   |
|  |                         |                       | MC  | 1 test per 500m <sup>3</sup> for each source*                               |          |   |
| MCV                                    |                         |                       | 1 test per 500m <sup>3</sup> for each source* |   |          |   |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause   | Work, Goods or Material |                        | Test  | Frequency of Testing  | Test Certificate | Comments |
|--|-------------------------|------------------------|---|---|------------------|----------|
|  |                         |                        | Undrained Shear Strength                                    | 1 test per 1,000m <sup>3</sup> for each source (min of 2 total per source)* |                  |          |
| 601<br>631 to 633<br>635 to 637<br>640<br>(Cont'd) |                         |                        | Effective Angle of Internal Friction and Effective Cohesion | 1 test per 1,000m <sup>3</sup> for each source (min of 2 total per source)* |                  |          |
|  | 4                       | Landscape fill         | Grading (IL)  | 1 test per 2,000m <sup>3</sup> for each source*                             |                  |          |
|  |                         |                        | MC (IL)   | 1 test per 2,000m <sup>3</sup> for each source*                             |                  |          |
|  |                         |                        | MCV (IL)  | 1 test per 1,000m <sup>3</sup> for each source*                             |                  |          |
|  | 5                       | Topsoil                | Grading   | 1 test per 500m <sup>3</sup> (min of 1 per day during topsoiling works)*    |                  |          |
|  | 6                       | Selected granular fill |   |   |                  |          |
|  |                         | (Class 6A, 6B & 6C)    | Grading   | 1 test per 1,000m <sup>3</sup> for each source*                             |                  |          |
|  |                         |                        | Uniformity Coefficient                                      | 1 test per 1,000m <sup>3</sup> for each source*                             |                  |          |
|  |                         |                        | Plastic Limit (IL)  | 1 test per 2,000m <sup>3</sup> for each source*                             |                  |          |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause   | Work, Goods or Material              |  |  | Test                   | Frequency of Testing  | Test Certificate  | Comments |  |
|--|--------------------------------------|--|--|------------------------|---|---|----------|--|
| 601<br>631 to 633<br>635 to 637<br>640<br>(Cont'd) |                                      |  |  | LA Coefficient (IL)    | 1 test per 1,000m <sup>3</sup> for each source (min of 2 total per source)* |   |          |  |
|  |                                      |  |  | (Class 6C Only)        | Moisture Content (IL)   | 1 test per 2,000m <sup>3</sup> for each source*                             |          |  |
|  |                                      |  |  | (Class 6A & 6C Only)   | Slake Durability (IL)   | 1 test per 1,000m <sup>3</sup> for each source (min of 2 total per source)* |          |  |
|  |                                      |  |  | (Class 6F1, 6F2 & 6F3) | Grading   | 1 test per 500m <sup>3</sup> for each source*                               |          |  |
|  |                                      |  |  |                        | Optimum MC (IL)   | 1 test per 500m <sup>3</sup> for each source*                               |          |  |
|  |                                      |  |  |                        | MC  | 1 test per 500m <sup>3</sup> for each source*                               |          |  |
|  |                                      |  |  |                        | LA Coefficient (IL)   | 1 test per 1,000m <sup>3</sup> for each source*                             |          |  |
|  |                                      |  |  |                        | Slake Durability (IL)   | 1 test per 1,000m <sup>3</sup> for each source*                             |          |  |
| Total Sulfur Content (IL)                          | 1 test per source (source approval)* |  |  |                        |   |   |          |  |
| Class RA (asphalt) content (IL)                    | 2 per source*                        |  |  |                        |   |   |          |  |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause   | Work, Goods or Material |  |                 | Test                      | Frequency of Testing   | Test Certificate | Comments |
|--|-------------------------|--|-----------------|---------------------------|--|------------------|----------|
| 601<br>631 to 633<br>635 to 637<br>640<br>(Cont'd) |                         |  | (Class 6G)      | Bitumen Content (IL)      | 2 per source*  |                  |          |
|  |                         |  |                 | Grading                   | 1 test per 250m <sup>3</sup> for each source (min of 2 total per source)*                  |                  |          |
|  |                         |  |                 | LA Coefficient (IL)       | 1 test per 500m <sup>3</sup> for each source (min of 1 total per source)*                  |                  |          |
|  |                         |  | (Class 6H Only) | Grading                   | 1 test per 200m <sup>3</sup> for each source*  |                  |          |
|  |                         |  |                 | Plastic Limit (IL)        | 1 test per 500m <sup>3</sup> for each source*  |                  |          |
|  |                         |  |                 | LA Coefficient (IL)       | 1 test per 200m <sup>3</sup> for each source*  |                  |          |
|  |                         |  |                 | MC (IL)                   | 1 test per 200m <sup>3</sup> for each source*  |                  |          |
|  |                         |  |                 | MCV (IL)                  | 1 test per 200m <sup>3</sup> for each source*  |                  |          |
|  |                         |  |                 | pH Value (IL)             | Source approval and 1 test per 500m <sup>3</sup> for each source (min of 1 test per week)* |                  |          |
|  |                         |  |                 | Chloride Ion Content (IL) | Source approval and 1 test per 500m <sup>3</sup> for each source (min of 1 test per week)* |                  |          |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause   | Work, Goods or Material |  |  | Test   | Frequency of Testing   | Test Certificate | Comments |
|--|-------------------------|--|--|--|--|------------------|----------|
| 601<br>631 to 633<br>635 to 637<br>640<br>(Cont'd) |                         |  |  | Water soluble sulfate content (IL)                               | Source approval and 1 test per 500m <sup>3</sup> for each source (min of 1 test per week)* |                  |          |
|  |                         |  |  | Oxidisable sulfides (IL)   | Source approval and 1 test per 500m <sup>3</sup> for each source (min of 1 test per week)* |                  |          |
|  |                         |  |  | Resistivity (IL)   | 1 test per source (source approval)*   |                  |          |
|  |                         |  |  | Redox Potential (IL)   | 1 test per source (source approval)*   |                  |          |
|  | (Class 6I & 6J Only)    |  |  | Grading  | 1 test per 200m <sup>3</sup> for each source*  |                  |          |
|  |                         |  |  | Uniformity Coefficient   | 1 test per 500m <sup>3</sup> for each source*  |                  |          |
|  |                         |  |  | MC (IL)  | 1 test per 200m <sup>3</sup> for each source*  |                  |          |
|  |                         |  |  | MCV (IL)   | 1 test per 200m <sup>3</sup> for each source*  |                  |          |
|  |                         |  |  | Effective Angle of Internal Friction and Effective Cohesion (IL) | 1 test per 200m <sup>3</sup> for each source (min of 1 test per week)*                     |                  |          |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause   | Work, Goods or Material |  |  | Test                                      | Frequency of Testing   | Test Certificate | Comments |
|--|-------------------------|--|--|---|--|------------------|----------|
| 601<br>631 to 633<br>635 to 637<br>640<br>(Cont'd) |                         |  |  | Coefficient of friction and adhesion (IL) | 1 test per source (source approval)*   |                  |          |
|  |                         |  |  | pH Value (IL)                             | Source approval and 1 test per 500m <sup>3</sup> for each source (min of 1 test per week)* |                  |          |
|  |                         |  |  | Chloride Ion Content (IL)                 | Source approval and 1 test per 500m <sup>3</sup> for each source (min of 1 test per week)* |                  |          |
|  |                         |  |  | Water soluble sulfate content (IL)        | Source approval and 1 test per 500m <sup>3</sup> for each source (min of 1 test per week)* |                  |          |
|  |                         |  |  | Oxidisable sulfides (IL)                  | Source approval and 1 test per 500m <sup>3</sup> for each source (min of 1 test per week)* |                  |          |
|  |                         |  |  | Resistivity (IL)                          | 1 test per source (source approval)*   |                  |          |
|  |                         |  |  | Redox Potential (IL)                      | 1 test per source (source approval)*   |                  |          |
|  |                         |  |  | Organic Content (IL)                      | 1 test per source (source approval)*   |                  |          |
|  |                         |  |  | Microbial Activity (IL)                   | 1 test per source (source approval)*   |                  |          |
|  |                         |  |  | LA Coefficient (IL)                       | 1 test per 200m <sup>3</sup> for each source*  |                  |          |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause   | Work, Goods or Material |  |  | Test                  | Frequency of Testing                          | Test Certificate   | Comments |  |
|--|-------------------------|--|--|-----------------------|---|--|----------|--|
| 601<br>631 to 633<br>635 to 637<br>640<br>(Cont'd) |                         |  |  | Slake Durability (IL) | 1 test per 500m <sup>3</sup> for each source* |  |          |  |
|  |                         |  |  | (Class 6K, 6L & 6M)   | Grading                                       | 1 test per 200m <sup>3</sup> for each source*  |          |  |
|  |                         |  |  |                       | Plastic Limit (IL)                            | 1 test per 500m <sup>3</sup> for each source*  |          |  |
|  |                         |  |  |                       | Resistivity (IL)                              | 1 test per source (source approval)*   |          |  |
|  |                         |  |  |                       | Water soluble sulfate content (IL)            | Source approval and 1 test per 500m <sup>3</sup> for each source (min of 1 test per week)* |          |  |
|  |                         |  |  |                       | Oxidisable sulfides (IL)                      | Source approval and 1 test per 500m <sup>3</sup> for each source (min of 1 test per week)* |          |  |
|  |                         |  |  |                       | Chloride Ion Content (IL)                     | Source approval and 1 test per 500m <sup>3</sup> for each source*                          |          |  |
|  |                         |  |  |                       | pH Value (IL)                                 | Source approval and 1 test per 500m <sup>3</sup> for each source (min of 1 test per week)* |          |  |
|  |                         |  |  | (Class 6K & 6M Only)  | Uniformity Coefficient                        | 1 test per 500m <sup>3</sup> for each source*  |          |  |
|  |                         |  |  |                       | Optimum MC (IL)                               | 1 test per 200m <sup>3</sup> for each source*  |          |  |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause   | Work, Goods or Material |  |  | Test                  | Frequency of Testing  | Test Certificate   | Comments |  |
|--|-------------------------|--|--|-----------------------|---|--|----------|--|
| 601<br>631 to 633<br>635 to 637<br>640<br>(Cont'd) |                         |  |  | MC (IL)               | 1 test per 200m <sup>3</sup> for each source*                             |  |          |  |
|  |                         |  |  | MCV (IL)              | 1 test per 200m <sup>3</sup> for each source*                             |  |          |  |
|  |                         |  |  | LA Coefficient (IL)   | 1 test per 200m <sup>3</sup> for each source (min of 1 total per source)* |  |          |  |
|  |                         |  |  | (Class 6N1, 6N2 & 6P) | Grading   | 1 test per 200m <sup>3</sup> for each source*  |          |  |
|  |                         |  |  | LA Coefficient (IL)   | 1 test per 200m <sup>3</sup> for each source*                             |  |          |  |
|  |                         |  |  |                       | Undrained Shear Strength (IL)   | As Required  |          |  |
|  |                         |  |  |                       | Effective Angle of Internal Friction and Effective Cohesion (IL)          | Source approval and 1 test per 500m <sup>3</sup> for each source (min of 1 test per week)* |          |  |
|  |                         |  |  |                       | Permeability (IL)   | Source approval and 1 test per 500m <sup>3</sup> for each source*                          |          |  |
|  |                         |  |  |                       | MC  | 1 test per 200m <sup>3</sup> for each source*  |          |  |
|  |                         |  |  |                       | MCV (IL)  | 1 test per 200m <sup>3</sup> for each source*  |          |  |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause   | Work, Goods or Material |  |            | Test  | Frequency of Testing   | Test Certificate | Comments |
|--|-------------------------|--|------------|---|--|------------------|----------|
| 601<br>631 to 633<br>635 to 637<br>640<br>(Cont'd) |                         |  |            | pH Value (IL)   | Source approval and 1 test per 500m <sup>3</sup> for each source*                          |                  |          |
|  |                         |  |            | Water soluble sulfate content (IL)  | Source approval and 1 test per 500m <sup>3</sup> for each source (min of 1 test per week)* |                  |          |
|  |                         |  |            | Oxidisable sulfides (IL)  | Source approval and 1 test per 500m <sup>3</sup> for each source (min of 1 test per week)* |                  |          |
|  |                         |  |            | Slope Stability (IL)  | Source approval and 1 test per 500m <sup>3</sup> for each source*                          |                  |          |
|  |                         |  |            | Slake Durability (IL)   | 1 test per 200m <sup>3</sup> for each source*  |                  |          |
|  |                         |  | (Class 6Q) | Testing and frequency as per Class 1 Material with the addition of the following: |  |                  |          |
|  |                         |  |            | Water soluble sulfate content (IL)  | 1 test per 200m <sup>3</sup> for each source (min of 1 total per source)*                  |                  |          |
|  |                         |  |            | Oxidisable sulfides (IL)  | Source approval and 1 test per 500m <sup>3</sup> for each source (min of 1 test per week)* |                  |          |
|  |                         |  |            | Chloride Ion Content (IL)   | 1 test per 200m <sup>3</sup> for each source (min of 1 total per source)*                  |                  |          |
|  |                         |  |            | pH Value (IL)   | 1 test per 200m <sup>3</sup> for each source (min of 1 total per source)*                  |                  |          |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause   | Work, Goods or Material   |                                 | Test  | Frequency of Testing  | Test Certificate | Comments  |
|--|---|---------------------------------|---|---|------------------|---|
| 601<br>631 to 633<br>635 to 637<br>640<br>(Cont'd) | 7   | Cohesive Material<br>(Class 7H) | Testing and frequency as per Class 2 Material with the addition of the following: |   |                  |   |
|  |   |                                 | Water soluble sulfate content (IL)  | Source approval and 1 test per 500m <sup>3</sup> for each source* |                  |   |
|  |   |                                 | Oxidisable sulfides (IL)  | Source approval and 1 test per 500m <sup>3</sup> for each source* |                  |   |
|  |   |                                 | Chloride Ion Content (IL)   | Source approval and 1 test per 500m <sup>3</sup> for each source* |                  |   |
|  |   |                                 | pH Value (IL)   | Source approval and 1 test per 500m <sup>3</sup> for each source* |                  |   |
|  | 8   | Miscellaneous fill              | MC  | Source approval and 1 test per 500m <sup>3</sup> for each source* |                  |   |
| MCV (IL)   |   |                                 | Source approval and 1 test per 500m <sup>3</sup> for each source*                 |   |                  |   |
| 601.11 & 601.12                                    | Fill adjacent to cementitious materials or metallic elements                |                                 | Water soluble sulfate content (IL)  | 1 test per 250m <sup>3</sup> (min of 1 test per location)*        |                  |   |
|  |   |                                 | Oxidisable sulfides (IL)  | 1 test per 250m <sup>3</sup> (min of 1 test per location)*        |                  |   |
| 602.20   | Material within 350mm of designed final surface of road or central reserve. |                                 | Frost Heave (IL)  | 1 test per 5,000m <sup>3</sup> (min of 1 total per source)*       |                  |   |
| 609  | Geotextiles Used to Separate Earthworks Materials                           |                                 | Durability  | 1 test per source/supplier*                                       |                  | <i>Requirements should be given in Appendix 6/5 or 6/9 as appropriate</i> |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause          | Work, Goods or Material      | Test                            | Frequency of Testing  | Test Certificate | Comments |    |
|-----------------|------------------------------|---------------------------------|---|------------------|----------|----|
| 609<br>(Cont'd) |                              | Tensile Load                    | 1 test per 500m <sup>2</sup> (min of 1 test per source/supplier)* |                  |          |    |
|                 |                              | CBR Puncture Resistance         | 1 test per 500m <sup>2</sup> (min of 1 test per source/supplier)* |                  |          |    |
|                 |                              | Permeability                    | 1 test per 500m <sup>2</sup> (min of 1 test per source/supplier)* |                  |          |    |
|                 |                              | Pore Size                       | 1 test per 500m <sup>2</sup> (min of 1 test per source/supplier)* |                  |          |    |
| 612             | Compaction of Fill Material  |                                 |   |                  |          |    |
|                 | Method Compaction            | Field Dry Density (IL)          | 1 test per 10,000m <sup>2</sup> *                                 |                  |          | †† |
|                 |                              | Optimum MC (IL)                 | 1 test per each class of material and each source*                |                  |          | †  |
|                 | End Product Compaction       | Field Dry Density (IL)          | 1 test per 250m <sup>3</sup> *                                    |                  |          | †  |
| 618             | Topsoiling and grass seeding | Rate of spread of fertiliser    | 1 test per 1,000m <sup>2</sup>                                    |                  |          |    |
|                 |                              | Rate of spread of seeding       |   |                  |          |    |
|                 |                              | Chemical analysis of fertiliser | 1 per source*   |                  |          | †† |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause          | Work, Goods or Material                                       | Test  | Frequency of Testing                                    | Test Certificate         | Comments |
|-----------------|---|---|---|--------------------------|----------|
| 618<br>(Cont'd) |   | Grass seed germination and purity (Manufacturer's test) | 1 per source*   | Required prior to sowing | †        |
| 622             | Earthworks for reinforced earth and anchored earth structures | Redox Potential   | 5 locations within the affected area*                   |                          | †        |
|                 | Reinforcing Elements  | Coefficient of friction                                 | 1 test for each type of element with each type of fill* |                          |          |
|                 | Anchor Elements   | Adhesion  |   |                          |          |
| 624             | Ground Anchorages   | Proof Loading   | Every anchor  |                          | †        |
| 626             | Gabions   | Gabion mesh   | Source Approval   | Required                 |          |
| 642             | Earthworks materials adjacent to structures                   | Constrained soil modulus (M*)                           | 3 on each side of structure                             |                          |          |
| 614             | Lime and Cement Improvement - U1                              | Water soluble sulfate content                           | Source Approval   |                          |          |
|                 |   | Organic Content   | Source Approval   |                          |          |
|                 |   | Rate of spread  | 1 per 500m <sup>2</sup> *                               |                          |          |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause                   | Work, Goods or Material  | Test                                    | Frequency of Testing   | Test Certificate | Comments  |
|--------------------------|--|---|--|------------------|---|
| Series 800               |  |   |  |                  |   |
| 801<br>802<br>804<br>805 | Unbound mixtures placed within 500mm of cement bound materials, concrete pavements, structures or products | Water soluble sulfate (WS) content (IL) | 1 per 200m <sup>3</sup> for each source (min of 5 total per source)* | Required         | <i>[Where Required]<br/>[See NG 808]</i>  |
| 806<br>807<br>808<br>809 |  | Oxidisable sulphides (OS) content (IL)  | 1 per 200m <sup>3</sup> for each source (min of 5 total per source)* |                  |   |
| 806<br>807<br>808<br>809 | Unbound mixtures placed adjacent to metallic structural elements forming part of the Works                 | Water-soluble sulfate (WS) content (IL) | 1 per 200m <sup>3</sup> for each source (min of 5 total per source)* |                  | <i>[Where Required]<br/>[See NG 809]</i>  |
|                          |  | Oxidisable sulfides (OS) content (IL)   | 1 per 200m <sup>3</sup> for each source (min of 5 total per source)* |                  |   |
|                          | Unbound mixtures   | Grading and fines content               | 1 per 1000 tonnes or minimum of 2 per day*                           |                  | <i>[Results of routine control tests from the factory production control system operated by the producer to be provided - see Annex C of IS EN 13242]</i> |
|                          |  | Flakiness index (IL)                    | 1 per week*  |                  |   |
|                          |  | Los Angeles Coefficient (IL)            | 2 per year*  |                  |   |
|                          |  | Methylene Blue (IL)                     | 1 per week*  |                  |   |
|                          |  | Water absorption (IL)                   | <i>[As Required]</i>   |                  |   |
|                          |  |   |  |                  | <i>[See NG 801.10]</i>  |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause  | Work, Goods or Material | Test  | Frequency of Testing                                     | Test Certificate | Comments  |
|---|-------------------------|---|--|------------------|---|
| 801<br>802<br>804<br>805<br>806<br>807<br>808<br>809<br>(Contd) |                         | Magnesium Sulphate Soundness (IL)   | 1 per 2 years*   | Required         | [Where Required]  |
| Types A, B, C & D granular material                             |                         | OMC (IL)  | 2 per year*  |                  | [Declared values from the factory production control system operated by the producer to be provided - see Annex D of IS EN 13285] |
|   |                         | Moisture Content  | 1 per 1000 tonnes or minimum of 2 per day*               |                  |   |
| Types B, C, D & E granular material                             |                         | Liquid Limit (IL)   | 1 per week*  |                  |   |
| Types A & C granular material                                   |                         | CBR (IL)  | 1 per week*  |                  |   |
|   |                         | Density (IL)  | 2 per year*  |                  |   |
| Type C granular material  |                         | Percentage of crushed or broken particles and of totally rounded particles in coarse aggregates | 1 per month*   |                  |   |
| Type A granular material  | Plasticity index (IL)   | 1 per week*   |  |                  |   |
| 810<br>821<br>822<br>823<br>824<br>825<br>826                   | Cement Bound Mixtures   | Water soluble sulphate (WS) content (IL)  | 1 per 200m3 for each source (min of 5 total per source)* | Required         | [See NG 808 & 820]  |
| Oxidisable sulphides (OS) content (IL)                          |                         | 1 per 200m3 for each source (min of 5 total per source)*  | [See NG 808 & 820]                                       |                  |   |
| Tests for control and checking of HBM                           |                         | Tests specified in Table 8/15 and Table 8/16  | [See NG 825]   |                  |   |
| Coefficient of linear expansion (IL)                            |                         | [As required]   | [See Clause 819]   |                  |   |
| Tests for laboratory mixture design                             |                         | As specified in Clause 826  | [See NG 826]   |                  |   |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause                                 | Work, Goods or Material             | Test  | Frequency of Testing                         | Test Certificate | Comments  |                   |                                       |
|--|-------------------------------------|---|--|------------------|---|-------------------|---------------------------------------|
| Series 900                             |                                     |   |  |                  |   |                   |                                       |
| 901<br>925<br>937<br>938<br>942<br>943 | Aggregates for bituminous materials |   |  | Required         | IS EN 13108-21 Factory Production Control procedures apply. The test certificate is the CE Mark for the mixture |                   |                                       |
|  |                                     | Resistance to fragmentation (hardness)          | Resistance to fragmentation (IL)             |                  |   | Monthly*          |                                       |
|  |                                     | Resistance to freezing and thawing (durability) | Soundness (IL)                               |                  |   | 1 per source*     |                                       |
|  |                                     |   | Water absorption (IL)                        |                  |   | [As required]     | [Where require – See NG 901.10]       |
|  |                                     | Cleanness                                       | Sieve test (mass passing 0.063mm sieve) (IL) |                  |   | Monthly*          | Washing and sieving method to be used |
|  |                                     | Shape   | Flakiness index (IL)                         |                  |   | Monthly*          |                                       |
|  |                                     | Blastfurnace slag                               | Bulk density (IL)                            |                  |   | 1 per 500 tonnes* | [IS EN 1097-3]                        |
| Soundness (IL)                         | Once every 4 months                 |   |  |                  |   |                   |                                       |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause     | Work, Goods or Material              | Test                                      | Frequency of Testing | Test Certificate | Comments   |
|------------|--------------------------------------|---|----------------------|------------------|--|
| 901<br>925 |                                      | Dicalcium silicate disintegration (IL)    | 1 per 500 tonnes*    |                  | [These are for air-cooled blastfurnace slag]   |
| 937<br>938 |                                      | Iron disintegration (IL)                  | 1 per 500 tonnes*    |                  |  |
| 942<br>943 | Steel slag                           | Bulk density                              | 1 per 500 tonnes*    |                  |  |
| (Contd)    |                                      | Volume stability (IL)                     | 1 per 500 tonnes*    |                  |  |
|            | Course aggregate for surface courses | Resistance to polishing (PSV) (IL)        | 1 per source*        |                  |  |
|            |                                      | Resistance to surface abrasion (AAV) (IL) | 1 per source*        |                  |  |
|            | Binders for bituminous materials     | Penetration (IL)                          | 1 per 750 tonnes*    | Required         | IS EN 13108-21 Factory Production Control procedures apply. The test certificate is the CE Mark for the mixture. Except where specifically called for in the Specification for Road Works, the inclusion of polymer modified bitumen is subject to NRA approval. |
|            |                                      | Softening point (IL)                      | 1 per 750 tonnes*    |                  |  |
|            |                                      | [Other IS EN tests]                       | [As required]        |                  |  |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause   | Work, Goods or Material  | Test   | Frequency of Testing  | Test Certificate | Comments   |
|--|--|--|---|------------------|--|
| 902  | Reclaimed bituminous materials                                   | Recovered penetration (IL)   | 1 per 1000 tonnes or one per day whichever is greater*  | Required         | <i>[Recovered penetration of the final plant mixed material]</i>   |
| 903<br>906<br>907<br>909 to<br>912<br>916<br>925<br>929<br>930<br>937<br>938<br>942<br>943 | Bituminous mixtures  | Grading (IL)<br><br>Binder content (IL)                                | BS EN 13108-21 Factory Production Control (FPC) procedures apply. In addition a minimum of 1 per 375 tonnes or minimum 2 per five day period or part thereof whichever is greater of the FPC samples shall be retrieved from the delivery vehicle on arrival at site. | Required         | The test certificate is the CE Mark for the mixture. The site samples shall be split with one sample going to the FPC process and the second sample stored for possible audit test purposes. |
| 911  | Hot Rolled Asphalt surface course (Design Mixtures)              | Design Binder content  | 1 per source*   | Required         | The test certificate is the CE Mark for the mixture.   |
| 915  | Coated chippings for application to Hot Rolled Asphalt Surfacing | Hot sand test (IL)   | 1 per source*   |                  |  |
|  |  | Rate of spread (IL)  | <i>[As required]</i>  |                  |  |
|  |  | Determination of resistance to fragmentation – Los Angeles coefficient | Monthly*  |                  |  |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause         | Work, Goods or Material | Test  | Frequency of Testing      | Test Certificate | Comments |
|----------------|-------------------------|---|---------------------------|------------------|----------|
|                |                         | (IL)  |                           |                  |          |
| 915<br>(Contd) |                         | Determination of particle size distribution (IL)                                      | 1 per 75 tonnes*          |                  |          |
|                |                         | Binder content (IL)   | 1 per 75 tonnes*          |                  |          |
|                |                         | Determination of particle shape of aggregates – Flakiness Index (IL)                  | Monthly*                  |                  |          |
|                |                         | Determination of the polished stone value (PSV) (IL)                                  | 2 per year per source*    |                  |          |
|                |                         | Determination of resistance to surface abrasion – Aggregate Abrasion Value (AAV) (IL) | 2 per year per source*    |                  |          |
| 918            | Slurry Sealing          |   |                           |                  | †        |
|                | Site control tests      | Tests specified in Clause 918   | As required in Clause 918 |                  |          |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause         | Work, Goods or Material                            | Test  | Frequency of Testing                    | Test Certificate | Comments  |
|----------------|--|---|---|------------------|---|
| 919            | Surface Dressing                                   |   |   |                  |   |
|                | Aggregates   | <i>[Other IS EN / BS tests]</i>   | <i>[As required]</i>                    |                  | As required in IAT guidelines   |
| 919<br>(Contd) |  | Penetration (IL)  | 1 per 750 tonnes*                       |                  | <i>[More frequent tests / samples should be scheduled for modified binders]</i> |
|                | Binder   | Softening point (IL)  | 1 per 750 tonnes*                       |                  |   |
|                |  | <i>[Other IS EN / BS tests]</i>   | <i>[As required]</i>                    |                  | As required in IAT guidelines   |
|                | Rate of spread binder                              | Tests specified in IAT Publication "Guidelines for Surface Dressing in Ireland" | Daily*                                  |                  |   |
| 920            | Bond coats, tack coats and other bituminous sprays |   |   |                  |   |
|                | Binder   | Test as specified for surface dressing binder                                   | As required for surface dressing binder |                  | As per IAT guidelines   |
|                | Blinding material                                  | Determination of particle size distribution (IL)                                | 1 per contract*                         |                  |   |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause | Work, Goods or Material                                   | Test   | Frequency of Testing            | Test Certificate | Comments |
|--------|---|--|---------------------------------|------------------|----------|
|        |   | Rate of application                                      | Daily*                          |                  |          |
| 921    | Surface macrotexture                                      | Volumetric Patch (IL)                                    | [As required]                   | Required         |          |
| 924    | High friction surfaces                                    |  |                                 |                  |          |
|        | Aggregate   | Resistance to polishing (Manufacturer's test) (PSV) (IL) | 1 per source*                   | Required         |          |
|        |   | Determination of particle size distribution (IL)         | 1 per source*                   |                  |          |
|        | Binder  | Rate of spread   | [As required]                   |                  |          |
|        | Cured Binder  | Tensile strength   | 2 per 1000m <sup>2</sup> /shift |                  | ††       |
|        |   | Elongation   |                                 |                  |          |
| 929    | Base and binder Course Asphalt Concrete (Design Mixtures) | Permanent Works – In situ air void content (IL)          | [As required]                   | Required         |          |
|        |   | Permanent Works – Refusal air void                       |                                 |                  |          |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause      | Work, Goods or Material                      | Test  | Frequency of Testing | Test Certificate | Comments  |
|-------------|--|---|----------------------|------------------|---|
|             |  | content (IL)                                    |                      |                  |   |
|             |  | Permanent Works – Deformation resistance        |                      |                  |   |
| 929 (Contd) |  | Deformation resistance (design)                 | [As required]        | Required         | The test certificate is the CE Mark for the mixture |
|             |  | Stiffness (design)                              |                      |                  |   |
| 930         | EME 2  | Permanent Works – In situ air void content (IL) | [As required]        | Required         |   |
|             |  | Richness modulus (design)                       |                      |                  | The test certificate is the CE Mark for the mixture |
|             |  | Duriez (design)                                 |                      |                  |   |
|             |  | Deformation Resistance (design)                 |                      |                  |   |
|             |  | Stiffness (design)                              |                      |                  |   |
| 937         | Stone mastic asphalt (SMA) regulating course | Permanent Works – In situ air void              | [As required]        | Required         |   |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause      | Work, Goods or Material   | Test  | Frequency of Testing                                   | Test Certificate | Comments   |
|-------------|---|---|--|------------------|--|
|             |   | content (IL)                                    |  |                  |  |
|             |   | Permanent Works – Deformation resistance        |  |                  |  |
|             |   | Binder drainage (design)                        | <i>[As required]</i>                                   | Required         | The test certificate is the CE Mark for the mixture          |
| 937 (Contd) |   | Deformation resistance (design)                 |  |                  |  |
| 938         | Porous asphalt  | Relative hydraulic conductivity (IL)            | As required by Clause 938                              | Required         | † In addition European in-situ drainability testing required |
| 943         | Hot Rolled Asphalt surface course and binder course (performance related design mixtures) | Permanent Works – In situ air void content (IL) | <i>[As required]</i>                                   | Required         |  |
|             |   | Permanent Works – Deformation resistance        |  |                  |  |
|             |   | Deformation resistance (design)                 | <i>[As required]</i>                                   | Required         | The test certificate is the CE Mark for the mixture          |
| 906         | Bituminous mixtures   | Compaction control                              | As required by BS 594987 and the individual clauses of | Required         | †  |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause                   | Work, Goods or Material | Test | Frequency of Testing | Test Certificate | Comments |
|--------------------------|-------------------------|------|----------------------|------------------|----------|
| 929<br>930<br>937<br>943 |                         | (IL) | SRW                  |                  |          |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause      | Work, Goods or Material  | Test   | Frequency of Testing                        | Test Certificate | Comments   |
|-------------|--|--|---|------------------|--|
| Series 1000 |  |  |   |                  |  |
| 1001        | Cement types as stated in sub-Clause 1001.3                    |  |   | Required         | Certificate to be provided monthly* for each type of cement.<br>Quality management and product certification schemes apply<br><br>Tests to be carried out by the manufacturer and results included on the test certificates required above<br><br>Results of routine control tests by the manufacturer/ supplier to be provided.<br>Product certification scheme applies |
|             | Cements (all types)<br><br>Ground granulated blastfurnace slag | Chloride content   | Monthly*                                    |                  |  |
|             |  | Sulphate content   | Monthly*                                    |                  |  |
|             |  | Acid-soluble alkali content  | Daily (PC)<br>Weekly (PFA ggbs)             |                  |  |
|             | Aggregates   | Grading and fines content  | 1 per delivery<br>(min 1 weekly per source) |                  |  |
|             |  | Shell content (IL)<br>(Only required where marine aggregates are used) | Monthly *                                   |                  |  |
|             |  | Flakiness index (IL)   | Monthly*                                    |                  |  |
|             |  | Resistance to fragmentation (IL)                                       | Every 6 months*                             |                  |  |
|             |  | Chloride ion content (IL)  | Daily*                                      |                  |  |
|             |  |  | Acid soluble sulphate content (IL)          |                  |  |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause                                 | Work, Goods or Material |                           | Test                          | Frequency of Testing | Test Certificate    | Comments                              |
|--|-------------------------|---------------------------|-------------------------------|----------------------|---------------------|---------------------------------------|
| 1001<br>(Contd)                        |                         | Fine aggregate            | Acid-soluble material (IL)    | Monthly*             |                     | [As required, See sub-Clause 1001.11] |
|  | Water                   |                           | Tests specified in IS EN 1008 | [As required].       |                     |                                       |
|  |                         |                           | Chloride content              | Monthly*             |                     |                                       |
|  |                         |                           | Sulphate content              | Monthly*             |                     |                                       |
|  |                         |                           | Acid-soluble alkali content   | Weekly*              |                     |                                       |
|  | Admixtures              |                           | Chloride content              | 1 per consignment    | Required (BS 934-2) | [See sub-Clause 1001.5]               |
|  |                         |                           | Sulphate content              | 1 per consignment    | Required            |                                       |
|  |                         |                           | Acid-soluble alkali content   | 1 per consignment    |                     |                                       |
| 1002<br>1003<br>1004<br>1044           | Concrete                | Air content test (IL)     | As required in Table 10/9     | Required             |                     |                                       |
| Density of in situ Concrete cores (IL) |                         | As required in Table 10/9 |                               |                      |                     |                                       |
| Cube strength (IL)                     |                         | As required in Table 10/9 |                               |                      |                     |                                       |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause       | Work, Goods or Material           | Test                     | Frequency of Testing      | Test Certificate   | Comments                             |
|--------------|-----------------------------------|--------------------------|---------------------------|--------------------|--------------------------------------|
| 1005         | Consistence                       | Compaction index (IL)    | As required in Table 10/9 |                    | [See sub-Clause 1005.2]              |
|              |                                   | Vebe (IL)                |                           |                    |                                      |
| 1011<br>1012 | Dowel bars<br>Tie bars            |                          |                           | Required (BS 4449) | Product certification scheme applies |
|              | Dowel bars and supporting cradles | Load test                | 1 per arrangement*        |                    |                                      |
|              | Sheathed dowel bars               | Bond stress              | 4 bars                    |                    |                                      |
|              | Cranked tie bars (coated)         | Bend test                | 4 bars*                   |                    |                                      |
|              |                                   | Salt fog cabinet         | 4 bars*                   |                    |                                      |
| 1015         | Joint filler board                | Weathering test          | 3 per source              |                    | Normally undertaken by manufacturer  |
|              |                                   | Compression and recovery | 4 per source              |                    |                                      |
|              |                                   | Extrusion                | 1 per source              |                    |                                      |
|              | Cork filler board                 | Immersion in water       | 2 per source              |                    |                                      |
|              |                                   | Immersion in acid        | 2 per source              |                    |                                      |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause                  | Work, Goods or Material  | Test  | Frequency of Testing     | Test Certificate  | Comments |
|-------------------------|--------------------------|---|--------------------------|---|----------|
| 1016<br>1017            | Applied sealants         | Initial Penetration                                 | 1 per 1000m or 1 per day | Required (BS EN 14188-1, BS 2499-2, BS 5212-1, BS 5212-2) (IS EN 13880-2, IS EN 13880-3, and BS 4254) |          |
| 1016<br>1017<br>(Contd) |                          |   |                          |   |          |
|                         |                          | Resilience  | 1 per 1000m or 1 per day |   |          |
|                         | Compression seals        |   |                          | Required (ASTM D2628)   |          |
|                         |                          | Compression set                                     | 1 per type of seal*      | (BS 2752)<br>(BS 4443-4,  |          |
|                         |                          | Immersion in oil                                    | 1 per type of seal*      | Method 10 and<br>IS EN ISO<br>2440)<br>(IS EN ISO<br>1856)<br>(BS 903: Part<br>A16<br>or IS ISO 1817) |          |
|                         | Self expanding cork seal | Tests specified in<br>Clause 1017                   | 1 per type of seal*      | Required  |          |
| 1026<br>1044            | Surface macrotecture     | BS EN 13036-1<br>Volumetric Patch<br>Technique (IL) | 1 per day (set of 10)*   | Required  |          |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| <b>Clause</b> | <b>Work, Goods or Material</b> | <b>Test</b>      | <b>Frequency of Testing</b> | <b>Test Certificate</b> | <b>Comments</b> |
|---------------|--------------------------------|------------------|-----------------------------|-------------------------|-----------------|
| 1027          | Aluminised curing compound     | Efficiency Index | 1 per source*               |                         |                 |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause      | Work, Goods or Material                                 | Test                 | Frequency of Testing                                      | Test Certificate | Comments  |
|-------------|---|----------------------|---|------------------|---|
| Series 1100 |   |                      |   |                  |   |
| 1101        | Precast concrete kerbs, channels, edgings and quadrants | Bending strength     | Minimum of 8 per 1000 units of each product (IS EN 1340)  | Required         |   |
| 1102        | In situ asphalt kerbs                                   | Grading              | 1 test per 500 metres laid *                              | Required         | <i>[See BS 5931 for materials for in situ asphalt kerbs]</i>                                  |
|             |   | Binder Content       |   |                  |   |
| 1104        | Precast concrete flags                                  | Bending strength     | Minimum of 8 per 1000 units of each product (IS EN 1339)  | Required         | <i>[Appropriate tests/samples should be scheduled where not included under other Clauses]</i> |
|             | Bedding   | Granular material    |   |                  |   |
|             |   | Mortar               |   |                  |   |
| 1107        | Concrete block paving                                   | Compressive strength | Minimum of 8 per 1000 units of each product (IS EN 13389) | Required         |   |
| 1108        | Clay pavers   | Bending strength     | Minimum of 8 per 1000 units of each product (IS EN 1344)  | Required         |   |
|             |   | Skid resistance      | Minimum of 8 per 1000 units of each product (IS EN 1344)  |                  |   |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| <b>Clause</b> | <b>Work, Goods or Material</b> | <b>Test</b> | <b>Frequency of Testing</b> | <b>Test Certificate</b> | <b>Comments</b>  |
|---------------|--------------------------------|-------------|-----------------------------|-------------------------|--|
| 1109          | Cellular grass paving systems  |             |                             |                         | NSAI Agrément certificate or equivalent scheme applies |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause      | Work, Goods or Material                       | Test  | Frequency of Testing   | Test Certificate | Comments   |
|-------------|---|---|--|------------------|--|
| Series 1200 |   |   |  |                  |  |
| 1202        | Permanent traffic signs                       | Test specified in the Standard/Specification given in Clause 1202 |  | Required         | I.S. EN 12899-4 Factory Production Control procedures apply.   |
| 1213        | Permanent traffic cones and traffic cylinders | Part 7 of I.S. EN 13422   |  | Required         | Quality management and product certification schemes apply   |
| 1215        | Traffic signals                               |   |  |                  | Quality management scheme applies. Statutory approval of equipment applies   |
|             | Cables  |   |  |                  | <i>[Special sample tests to BS 6346 should be scheduled where appropriate]</i><br>Product certification scheme applies |
|             | Controllers <i>[Other equipment]</i>          | Tests specified in Appendix 12/5                                  | Each controller before delivery to Site and again after installation |                  |  |
|             | Cabling                                       | Tests a, b, c, e, f, g, h, j as defined in sub-Clause 1424.2      | Each traffic signals installation                                    | Required         | Certification that the installation complies with the National Rules for Electrical Installations is required.         |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause | Work, Goods or Material              | Test   | Frequency of Testing | Test Certificate | Comments  |
|--------|--------------------------------------|--|----------------------|------------------|---|
| 1216   | Thermoplastic road marking materials | Tested for the requirements of the specification in accordance with I.S. EN 1436 initially on application and as detailed during the guarantee period. |                      | Required         | Quality management and product certification schemes apply. |
| 1217   | Retroreflecting road studs           | Test specified in the Standard/ Specification given in Clause 1217   |                      | Required         | Quality management and product certification schemes apply  |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause      | Work, Goods or Material                                  | Test   | Frequency of Testing         | Test Certificate | Comments   |
|-------------|--|--|------------------------------|------------------|--|
| Series 1300 |  |  |                              |                  |  |
| 1305        | Anchorage for use in drilled holes                       | Tensile load (Manufacturer's tests)          |                              | Required         | To provide well attested and documented evidence |
| 1306        | Anchorage in drilled holes to columns with flange plates | Loading test on site                         | [As required]                |                  | †  |
| 1310        | Welding  | Welding procedures (manufacturer's tests)    | (Every seven years)          |                  | Quality management scheme applies                |
|             |  | Welding qualification (Manufacturer's tests) | (Every two years)            |                  |  |
|             |  | Production testing (Manufacturer's tests)    | (Clause 1310 (7.1.4))        |                  |  |
|             | Welded joints  | Destructive testing                          | [See sub-Clause 1310 (7.15)] |                  | †† (IL) [See NG 1310]                            |
| 1313        | GFRP laminates   | Loss on ignition                             | 1 per 200 production columns |                  |  |
|             |  | Colour fastness                              | 1 per batch                  |                  |  |
|             |  | Electric strength                            |                              |                  |  |
|             |  | Water absorption                             |                              |                  |  |
|             |  | Impact strength                              |                              |                  |  |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause      | Work, Goods or Material                       | Test                           | Frequency of Testing  | Test Certificate | Comments   |
|-------------|---|--------------------------------|-----------------------|------------------|--|
| 1314        | Brackets for laminating GFRP lighting columns | Polyurethane foam              | Bulk density          | 1 per batch      |  |
|             |   |                                | Surface hardness      |                  |  |
|             |   |                                | Apparent bulk density | 2 per batch      |  |
|             |   |                                | Impact strength       |                  |  |
|             |   |                                | Flexural stress       |                  |  |
| Series 1400 |   |                                |                       |                  |  |
| 1421        | Cable   |                                |                       |                  | Product certification scheme applies<br><i>[Special sample tests to BS 6346 should be scheduled where appropriate]</i>                                   |
| 1424        | Lighting Units                                | Tests specified in Clause 1424 | Each unit             | Required         | † Product certification scheme applies.<br>Certification that the installation complies with the National Rules for Electrical Installations is required |
|             | Networks                                      | Tests specified in Clause 1424 | Each network          | Required         | † Certification that the installation with the National Rules for Electrical Installations is required   |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause      | Work, Goods or Material                       | Test  | Frequency of Testing   | Test Certificate | Comments   |
|-------------|---|---|--|------------------|--|
| Series 1500 |   |   |  |                  |  |
| 1506        | Multipair communications cable                |   |  | Required         | Certification that each completed cable complies with the specification given in Appendix 15/1 |
|             | Fibre optic communications cable              |   |  | Required         | Certification that each completed cable complies with the specification given in Appendix 15/1 |
|             | Power supply cable for communications systems |   |  | Required         | Certification that each completed cable complies with the specification given in Appendix 15/1 |
| 1518        | Motorway communications and power cable       | Tests specified in the specification given in Appendix 15/1 | Each cable (Stage 1). As required in Appendix 15/1 (Stage 2) |                  | † Results to be reported in accordance with the specification                                  |
|             | Motorway optical fibre communications cable   | Tests specified in the specification given in Appendix 15/1 | Each cable (Stage 1). As required in Appendix 15/1 (Stage 2) |                  | † Results to be reported in accordance with the specification                                  |
|             | CCTV co-axial cable                           | <i>[As required]</i>  |  |                  | <i>[See NG 1518]</i>   |
| 1523        | Detector loops                                |   |  |                  |  |
|             |   | Cable   |  |                  | Required   |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause                | Work, Goods or Material                          | Test                          | Frequency of Testing | Test Certificate                                  | Comments   |
|-----------------------|--|-------------------------------|----------------------|---|--|
| 1523<br>(Con'd)       | Epoxy resin                                      |                               |                      | Required<br><i>[where considered Appropriate]</i> | Certification that the epoxy resin complies with Clause 1523 is required   |
|                       | Feeder cable                                     |                               |                      | Required  | Certification that completed cables comply with the specification stated in Appendix 15/1 is required  |
|                       | Joints   | Pull test (4 kgf)             | Each crimp           |   |  |
|                       | Installation                                     | Series resistance             |                      | Each loop   | Required   |
| Insulation resistance |  |                               |                      |   |  |
| Inductance            |  |                               |                      |   |  |
| 1530                  | Pipes for motorway communications ducts          |                               |                      |   |  |
|                       | UPVC   |                               |                      |   | Product Certification Scheme applies   |
|                       | Plastics (see Table 5/1)                         |                               |                      |   | Certificates are provided for in the relevant standard but should normally not be required except for pipes which are not quality marked in accordance with relevant standard. |
|                       | Other materials                                  |                               |                      | Required  | NSAI Agrément Certificate or equivalent required   |
|                       | Thermoplastic structured wall pipes and fittings | <i>[Manufacturer's Tests]</i> |                      | Required  | INAB (or equivalent) certification applies   |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause           | Work, Goods or Material | Test   | Frequency of Testing          | Test Certificate | Comments  |
|------------------|-------------------------|--|-------------------------------|------------------|---|
| 1530<br>(Cont'd) | Pipe bedding            |  |                               |                  | <i>[Appropriate tests/samples for the resistance to freezing and thawing (magnesium sulphate soundness) should be scheduled where required, NG Series 800.]</i> |
|                  |                         | Grading and fines content ( <i>Washing and sieving method to be used</i> ) | 1 per week(min of 3)*         | Required         | <i>[Results of routine control tests from the factory production control system operated by the producer to be provided – see Annex C of IS EN 13242.]</i>      |
|                  |                         | Water Soluble Sulphate (WS) content (IN)                                   | 5 per source*                 |                  | <i>[Minimum to allow for natural variability of sulphur compounds]</i>  |
|                  |                         | Resistance to fragmentation (IL)   | 1 per source*                 |                  | <i>[LA Category]</i>  |
| 1532             | Chambers                | Precast concrete   |                               |                  | Product certification scheme applies  |
|                  |                         | Corrugated galvanised steel  | <i>[Manufacturer's Tests]</i> | Required         | Product certification scheme applies  |
|                  |                         | Manhole steps  |                               |                  | Product certification scheme applies  |
|                  |                         | Steel fitments   |                               |                  |   |
|                  |                         | Covers, grates and frames  |                               |                  | Product certification scheme applies  |
|                  |                         |  |                               |                  |   |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause           | Work, Goods or Material | Test                          | Frequency of Testing | Test Certificate | Comments  |
|------------------|-------------------------|-------------------------------|----------------------|------------------|---|
| 1532<br>(Cont'd) | Cover bolts             |                               |                      |                  | Quality management scheme applies   |
| 1533             | Cable ducts             |                               |                      |                  |   |
|                  | Mandrel test            | Test specified in Clause 1533 | Each duct            | Required         | † Certificate that each length of duct between chambers satisfies the mandrel test is required. |
|                  | Air test                | Test specified in Clause 1533 | Each duct            | Required         | † Certificate that each length of duct between chambers satisfies the air test is required.     |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause                                       | Work, Goods or Material  | Test     | Frequency of Testing         | Test Certificate | Comments  |
|--|--|----------|------------------------------|------------------|---|
| Series 1600                                  |  |          |                              |                  |   |
| 1601   | Soil samples<br>In situ soil tests   |          |                              | Required         | <i>[Appropriate soil tests should be scheduled where required]</i>  |
| 1602<br>to<br>1606<br><br>1610<br>To<br>1615 | Concrete<br>Grout<br>Reinforcement<br>Prestressing<br>Steelwork<br>Welding<br>Protection against corrosion |          |                              | Required         | <i>[Appropriate tests / samples should be scheduled where not included under other Clauses / Series]</i>  |
| 1606   | Coatings for protection against corrosion  | Adhesion | As required in Appendix 16/6 |                  |   |
| 1607   | Reduction of friction on piles   |          |                              |                  | <i>[Particular requirements detailed in Appendix 16/7 should be scheduled]</i>  |
| 1608   | Integrity testing  |          |                              |                  | <i>[Particular requirements detailed in Appendix 16/8 should be scheduled]</i>  |
| 1616   | Dynamic testing  |          |                              |                  | <i>[Particular requirements detailed in Appendix 16/16 should be scheduled]</i>   |
| 1609   | Static load testing of piles   |          |                              | Required         | <i>[Testing of preliminary piles should not be scheduled in Appendix 1/5<br/>Particular requirements detailed in Appendix 16/9 should be scheduled]</i> |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause | Work, Goods or Material     | Test                             | Frequency of Testing | Test Certificate | Comments  |
|--------|-----------------------------|----------------------------------|----------------------|------------------|---|
| 1612   | Self hardening slurry mixes |                                  |                      |                  | <i>[Particular requirements detailed in Appendix 16/12 should be scheduled]</i> |
| 1617   | Instrumentation             |                                  |                      |                  | <i>[Particular requirements detailed in Appendix 16/17 should be scheduled]</i> |
| 1618   | Support fluids              | To be proposed by the Contractor |                      |                  | <i>[Particular requirements detailed in Appendix 16/18 should be scheduled]</i> |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause               | Work, Goods or Material                     | Test   | Frequency of Testing            | Test Certificate | Comments  |  |
|----------------------|---|--|---------------------------------|------------------|---|--|
| Series 1700          |   |  |                                 |                  |   |  |
| 1702<br>1703<br>1704 | Cement types as stated in sub-Clause 1702.1 |  |                                 | Required         | Certificate to be provided monthly* for each type of cement.<br>Quality management and product certification schemes apply. |  |
|                      | Cements (all types)                         | Chloride content   | Monthly*                        |                  | Tests to be carried out by the manufacturer and results included on the test certificates required above                    |  |
|                      | Ground granulated blastfurnace slag         | Sulphate content   | Monthly*                        |                  |   |  |
|                      |   | Acid-soluble alkali content  | Daily (PC)<br>Weekly (PFA ggbs) |                  |   |  |
|                      | Aggregates                                  | Grading and fines content  |                                 |                  | 1 per delivery<br>(min 1 weekly per source)   | Results of routine control tests by the manufacturer/ supplier to be provided.<br>Product certification scheme applies |
|                      |   | Shell content (IL)<br>(Only required where marine aggregates are used) |                                 |                  | Monthly *   |  |
|                      |   | Flakiness index (IL)   |                                 |                  | Monthly*  |  |
|                      |   | Resistance to fragmentation (IL)                                       |                                 |                  | Every 6 months*   |  |
|                      |   | Drying shrinkage (IL)  |                                 |                  | Monthly*  |  |
|                      |   | Chloride content (IL)  |                                 |                  | Daily*  |  |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause                          | Work, Goods or Material | Test                  | Frequency of Testing          | Test Certificate      | Comments               |                                |
|---------------------------------|-------------------------|-----------------------|-------------------------------|-----------------------|------------------------|--------------------------------|
| 1702<br>1703<br>1704<br>(Contd) |                         | Sulphate content (IL) | Monthly*                      |                       |                        |                                |
|                                 |                         | Blastfurnace slag     | Bulk density (IL)             | 1 per 500 tonnes *    |                        |                                |
|                                 |                         |                       | Stability (IL)                | 1 per 500 tonnes *    |                        |                                |
|                                 |                         |                       | Sulphur content (IL)          | 1 per 500 tonnes *    |                        |                                |
|                                 |                         | Water                 | Tests specified in IS EN 1008 | <i>[As required].</i> |                        |                                |
|                                 |                         |                       | Chloride content              | Monthly*              |                        |                                |
|                                 |                         |                       | Sulphate content              | Monthly*              |                        |                                |
|                                 |                         |                       | Acid-soluble alkali content   | Weekly*               |                        |                                |
|                                 |                         | Admixtures            | Chloride content              | 1 per consignment     | Required (IS EN 934-2) | <i>[See sub-Clause 1702.3]</i> |
|                                 |                         |                       | Sulphate content              | 1 per consignment     | Required               |                                |
|                                 |                         |                       | Acid-soluble alkali content   | 1 per consignment     |                        |                                |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause | Work, Goods or Material | Test  | Frequency of Testing   | Test Certificate                      | Comments   |
|--------|-------------------------|---|--|---------------------------------------|--|
| 1707   | Concrete                | Cube strength (IL)  | Prestressed concrete – 2 cubes from 12m <sup>3</sup> or 2 batches whichever represents the lesser volume | Required                              | Contractor to cast and test sufficient copies to demonstrate cube strength before transfer<br>†            |
|        |                         |   | Reinforced Concrete - 2 cubes from 24 m <sup>3</sup> or 4 batches whichever represents the lesser volume |                                       |  |
|        |                         |   | Mass Concrete – 2 cubes from 50 m <sup>3</sup> or 50 batches whichever represents the lesser volume      |                                       | [See also Table NG 17/1]   |
|        |                         |   |  | Additional cubes for special purposes | [Tests/samples should be scheduled as required See NG 1707.5]  |
|        |                         | Cube strength identity testing as described in Appendix 17/4 (IL) | 2 cubes from each of 2 samples of each batch   |                                       | [Requirements should be given in Appendix 17/4 as appropriate]<br>[See sub-Clause 1707.2 and Appendix 1/6] |
|        |                         | Density   | [As required]  |                                       | [Requirements should be given in Appendix 17/1 as appropriate]   |
|        |                         | Modulus of elasticity   |  |                                       |  |
|        |                         | Fresh concrete  | Consistence (IL)<br>[The method should be stated in Appendix 17/1]                                       | Each batch                            |  |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause           | Work, Goods or Material   | Test                                    | Frequency of Testing | Test Certificate           | Comments  |
|------------------|---|---|----------------------|----------------------------|---|
| 1707<br>(Cont'd) |   | Air content                             | Each batch           |                            |   |
|                  |   | Cement content                          | [As required]        |                            |   |
|                  |   | Water/cement ratio                      |                      |                            |   |
| 1709             | Silane  |   |                      | Required for each delivery | Certificate that the silane complies with Clause 1709 is required (Cl 1709.2)   |
|                  |   | Refractive Index                        | Three samples        |                            | [See sub-Clause 1709.2 (ii)]  |
|                  |   | Trial panels                            |                      |                            | [See sub-Clause 1709.8]   |
| 1710             | Concrete packing<br>Mortar packing<br>Epoxy resin bonding agent |   |                      |                            | [Appropriate tests/samples should be scheduled see NG 1710.9 (v)]   |
|                  | Precast concrete manufactured off Site                          | Cube strength<br>(Manufacturer's tests) |                      |                            | Contractor to make available records of tests by manufacturer   |
| 1711             | Grouting and Duct Systems for Post-tensioned Tendons            |   |                      |                            | CARES Scheme for Supply and Installation of Post-tensioned Systems In Concrete Structures or an equivalent scheme is required.<br><br>Quality management and product certification schemes for cement apply |
|                  |   | Full scale trials                       |                      |                            | See sub-Clause 1711.1 and Appendix 17/6   |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause           | Work, Goods or Material | Test                                     | Frequency of Testing | Test Certificate | Comments                                |  |
|------------------|-------------------------|--|----------------------|------------------|---|--|
| 1711<br>(Cont'd) |                         | Air pressure tests                       |                      |                  | See sub-Clause 1711.3 and Appendix 17/6 |  |
|                  |                         | Duct assembly verification tests         |                      |                  | See sub-Clause 1711.3 and Appendix 17/6 |  |
|                  |                         | Wall thickness of ducts after tensioning |                      | See Table 17/7   |   | See sub-Clause 1711.3 and Appendix 17/6. Contractor should provide evidence of testing   |
|                  |                         | Fluidity                                 |                      |                  |   | See sub-Clause 1711.8 and sub-Clause 1711.9 and Table 17/8   |
|                  |                         | Bleeding                                 |                      |                  | Required                                | Quality management and product certification schemes apply<br>Data on their suitability, including previous experience should be made available.<br>See sub-Clause 1711.10 |
|                  |                         | Volume change                            |                      |                  |   |  |
|                  |                         | Cube strength                            |                      |                  |   |  |
|                  |                         | Sieve                                    |                      |                  |   |  |
|                  | Sedimentation           |  |                      |                  |   |  |
| Admixtures       |                         |  |                      |                  |   |  |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause | Work, Goods or Material     | Test  | Frequency of Testing | Test Certificate                     | Comments   |
|--------|-----------------------------|---|----------------------|--------------------------------------|--|
| 1712   | Reinforcement               |   |                      |                                      | Product certification scheme applies   |
|        | Steel bars                  |   |                      | Required (BS 4449 & IS EN 10080)     |  |
|        | Steel wire                  |   |                      | Required (BS 4482 & IS EN 10080)     |  |
|        | Steel fabric                |   |                      | Required (BS 4483 & IS EN 10080)     |  |
|        | Stainless steel             |   |                      | Required (BS 6744)                   |  |
| 1713   | Fabricated reinforcement    |   |                      | Required                             | Certification that fabricated reinforcement complies with the routine inspection/testing requirements of BS 8666 is required if the fabrication is not covered by a product certification scheme listed in Appendix 1/25 |
| 1716   | Reinforced jointing systems | Permanent elongation<br>Characteristic strength<br>(Manufacturer's tests) |                      | Required for each type of connection | NSAI Agrément certificate or equivalent scheme to apply  |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause | Work, Goods or Material         | Test                                 | Frequency of Testing  | Test Certificate     | Comments   |
|--------|---------------------------------|--------------------------------------|---|----------------------|--|
| 1717   | Reinforcement metal arc welding | Welding procedure approval (BS 7123) | As required in BS 7123  |                      | <p><i>[Where tests in addition to those specified in BS 7123 (tensile test and macroetch test) are required full details should be scheduled]</i></p> <p>Tests should be carried out by an independent testing body specified in BS 8666</p> |
|        |                                 | Welder approval (BS 7123)            |   |                      |  |
| 1718   | Prestressing Tendons            |                                      |   |                      | Product certification scheme applies CARES (PT6-PT8)   |
|        |                                 | Steel wire                           |   | Required (BS 5896)   |  |
|        |                                 | Steel bar                            |   | Required (BS 4486)   |  |
|        |                                 | Seven-wire Strand                    |   | Required (BS 5896)   |  |
|        |                                 | Pre-stressing steel (all types)      | Proof load<br>Breaking load<br>Elongation<br>Ductility<br>Relaxation<br>Modulus of elasticity | <i>[As required]</i> |  |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause           | Work, Goods or Material                             |   | Test   | Frequency of Testing         | Test Certificate          | Comments  |
|------------------|---|---|--|------------------------------|---------------------------|---|
| 1718<br>(Cont'd) |   | Super strand to BS 5896 or other than lowest strength 3-7 mm dia wires to BS 5896 | 0.1% proof load<br>Breaking load                               | Each reel                    |                           | †   |
| 1724             | Post-tensioning anchorages                          |   | Tests in accordance with IS EN 13391<br>(Manufacturer's tests) |                              | Required<br>(IS EN 13391) | Product certification scheme applies<br>CARES Scheme                                      |
| 1726             | Stainless steel bar                                 |   |  |                              | Required (BS 6744)        | Product certification scheme applies  |
| 1727             | Inspection and testing of structures and components |   | As required by Appendix 17/4                                   | As required in Appendix 17/4 | Required                  | <i>[Tests should be scheduled as appropriate and requirements given in Appendix 17/4]</i> |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause         | Work, Goods or Material  | Test   | Frequency of Testing   | Test Certificate   | Comments  |
|----------------|--|--|--|--|---|
| Series 1800    |  |  |  |  |   |
| 1805.2         | Metallic products  | Inspection documents to EN10204  | All Metallic Products  | Required according to IS EN 1090-2:2008+A1:2011, Table 1 | [Give type of metallic product and document required, noting specific requirement for steel grade S355 JR and J0 described in 1805.2]   |
| 1805.3.4       | Special properties of constituent products   | Testing to identify internal discontinuities or cracks in zones to be welded as specified in Appendix 18/1 | As required in Appendix 18/1   |  | [Give specific testing requirements and frequency of testing in Appendix 18/1 with cross reference in Appendix 1/5]   |
| 1806.4.4       | Check of the capability of cutting processes that are likely to produce local hardness             | Testing in accordance with IS EN ISO 6507  | As required  |  |   |
| 1806.5.4 d)    | Check of the hardness and geometry of hollow section components subject to bending by cold forming | Check of the hardness, testing in accordance with IS EN ISO 6507   | As required  |  |   |
| 1807.4.1.2     | Qualification of welding procedures (Processes 111, 114, 12, 13 and 14)                            | Tests specified in IS EN ISO 15614-1 or IS EN ISO 15613  | As required in IS EN ISO 15614-1 or IS EN ISO 15613                        |  | Results to be reported in accordance with IS EN ISO 15614-1 or IS EN ISO 15613  |
| 1807.4.1.2 (3) | Qualification of welding procedures for joints with restricted access                              | Tests specified in IS EN ISO 15613   | As required in IS EN ISO 15613   |  | Results to be reported in accordance with IS EN ISO 15613   |
| 1807.4.1.3     | Qualification of welding procedures for other welding processes                                    | Tests specified in the standards listed in IS EN 1090-2:2008+A1:2011, Table 13                             | As required in the standards listed in IS EN 1090-2:2008+A1:2011, Table 13 |  | Results to be reported in accordance with the standards listed in IS EN 1090-2:2008+A1:2011, Table 13. Note the requirement in IS EN 1090-2:2008+A1:2011, 7.5.12 relating to stud weld procedure testing. |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause         | Work, Goods or Material  | Test  | Frequency of Testing  | Test Certificate | Comments   |
|----------------|--|---|---|------------------|--|
| 1807.4.1.4     | Validity of welding procedure qualification  | Additional tests specified in ISEN 1090-2:2008+A1:2011, 7.4.1.4 for a welding procedure qualified in accordance with IS EN ISO 15614-1, which is undertaken by a welding process that has not been used | As required in IS EN 1090-2:2008+A1:2011, 7.4.1.4                 |                  | Results to be reported in accordance with IS EN ISO 15614-1                                    |
| 1807.4.1.4 (1) | Validity of welding procedure qualification  | Welding production test in accordance with the qualification standard for the process concerned   | As required   |                  | Results to be reported in accordance with the qualification standard for the process concerned |
| 1807.4.2       | Qualification of welders and welding operators   | Tests specified in IS EN ISO 9606-1 (welders) or IS EN ISO 14732 (welding operators)  | As required in IS EN ISO 9606-1 or IS EN ISO 14732 as appropriate | Required         | Certificate to be in accordance with IS EN ISO 9606-1 or IS EN ISO 14732 as appropriate        |
| 1807.4.2       | Qualification of welders of hollow section branch connection with angles less than 60° | Specific qualification test. Tests specified in IS EN ISO 9606-1.   | As required   |                  |  |
| 1807.4.2 (1)   | Qualification of welders of joints with restricted access                              | Specific qualification test. Tests specified in IS EN ISO 9606-1.   | As required   |                  |  |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause         | Work, Goods or Material  | Test   | Frequency of Testing                                | Test Certificate | Comments   |
|----------------|--|--|---|------------------|--|
| 1807.5.1.1     | Verification that joint preparation in steel grades higher than S460 are free from cracks            | Testing in accordance with IS EN ISO 3452-1 (penetrant) or IS EN ISO 17638 (Magnetic particle) | As required   |                  |  |
| 1807.5.1.1 (1) | Qualification of welding procedures where prefabrication primers are to be left on the fusion faces. | Tests specified in IS EN ISO 15614-1 or IS EN ISO 15613 using such prefabrication primers      | As required in IS EN ISO 15614-1 or IS EN ISO 15613 |                  | Results to be reported in accordance with IS EN ISO 15614-1 or IS EN ISO 15613 |
| 1807.5.4 (1)   | Welding of joints in hollow sections, full penetration butt welds with restricted access             | Pre-production weld test conforming to IS EN ISO 15613.  | As required   |                  |  |
| 1807.5.6 (3)   | Verification of ground surface are free of cracks following removal of temporary welded attachments  | Testing in accordance with IS EN ISO 17638 (Magnetic particle)                                 | As required   |                  |  |
| 1807.5.9.2 (1) | Verification of the absence of surface cracking in continuity welds in permanent steel backing       | Testing in accordance with IS EN ISO 3452-1 (penetrant) or IS EN ISO 17638 (Magnetic particle) | As required   |                  |  |
| 1807.5.18      | Welding of bridge decks  | Production tests in accordance with IS EN 1090-2:2008+A1:2011, 12.4.4 c)                       | As required   |                  |  |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause          | Work, Goods or Material  | Test  | Frequency of Testing         | Test Certificate | Comments   |
|-----------------|--|---|------------------------------|------------------|--|
| 1808.5.3<br>(1) | k value check for the Torque method  | Test in accordance with IS EN 1090-2:2008+A1:2011, Annex H                                | Daily                        |                  |  |
| 1808.5.4<br>(2) | k value check for the combined method  | Test in accordance with IS EN 1090-2:2008+A1:2011, Annex H                                | Daily                        |                  |  |
| 1808.5.5<br>(1) | Preload check for HRC method   | Test in accordance with IS EN 1090-2:2008+A1:2011, Annex H                                | Each assembly lot            |                  |  |
| 1808.9          | Use of special fasteners and fastening methods                                       | Procedure tests for special fasteners and fastening methods as specified in Appendix 18/1 | As required in Appendix 18/1 |                  | <i>[Give specific testing requirements and frequency of testing in Appendix 18/1 with cross reference in Appendix 1/5]</i> |
| 1810.1 (5)      | Slip resistant connections   | Slip factor test in accordance with IS EN 1090-2:2008+A1:2011, Annex G                    | As required in Appendix 18/1 |                  | <i>[Give specific requirements in Appendix 18/1 with cross reference in Appendix 1/5]</i>                                  |
| 1810.1<br>(10)  | Verification of the preparation carried out before overcoating galvanized components | Test as specified in Appendix 18/1  | As required in Appendix 18/1 |                  | <i>[Give specific testing requirements and frequency of testing in Appendix 18/1 with cross reference in Appendix 1/5]</i> |
| 1812.2.1<br>(1) | Specific testing of constituent products not covered by standards.                   | Tests as specified in Appendix 18/1   | As required in Appendix 18/1 |                  | <i>[Give specific testing requirements and frequency of testing in Appendix 18/1 with cross reference in Appendix 1/5]</i> |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause         | Work, Goods or Material                                 | Test   | Frequency of Testing                               | Test Certificate | Comments   |
|----------------|---|--|--|------------------|--|
| 1812.2.1 (2)   | Mechanical fasteners                                    | Sample testing as specified in 1812.2.1 (2)  | As required in 1812.2.1 (2)                        |                  | Results to be reported in accordance with 1812.2.1 (2).<br>Testing not required if mechanical fasteners supplied by a NHSS 3 registered Organisation. See 1800.5.2 |
| 1812.2.1 (3)   | Mechanical fasteners                                    | Suitability testing as specified in 1812.2.1 (3)   | As required in 1812.2.1 (3)                        |                  | Results to be reported in accordance with 1812.2.1 (3).  |
| 1812.4.1       | Inspection before and during welding                    | None destructive testing methods selected in accordance with IS EN ISO 17635   | As required in IS EN 1090-2:2008+A1:2011, 12.4.1   |                  |  |
| 1812.4.2.2     | Inspection after welding – Scope of inspection          | Supplementary none destructive testing determined by the manufacturer, according to the nature of the work in normal production. | As required in IS EN 1090-2:2008+A1:2011, 12.4.2.2 |                  | See 1812.4.2.2 (6)   |
| 1812.4.2.2 (1) | Inspection after welding - Specific inspection of welds | Supplementary none destructive testing in accordance with 1812.4.2.2   | As required by 1812.4.2.2 (1) to (5)               |                  |  |
| 1812.4.3 (1)   | Welded shear studs                                      | Production tests as specified in IS EN ISO 14555, 14.2   | As required in 1812.4.3 (1)                        |                  | Results to be documented in accordance with 1812.4.3 (4)   |
| 1812.4.3 (2)   | Welded shear studs                                      | Hammer test as specified in 1812.4.3 (2)   | Every welded shear stud                            |                  |  |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause          | Work, Goods or Material                                 | Test  | Frequency of Testing         | Test Certificate | Comments  |
|-----------------|---|---|------------------------------|------------------|---|
| 1812.4.3<br>(3) | Welded shear studs                                      | Simplified production tests as specified in IS EN ISO 14555, 14.3                         | As required in 1812.4.3 (3)  |                  | Results to be documented in accordance with 1812.4.3 (4)                                  |
| 1812.4.4<br>(1) | Production tests on welding                             | Production tests on welding as specified in 1812.4.4 (1)                                  | As required in 1812.4.4 (1)  |                  | Results to be reported in accordance with the relevant standard                           |
| 1812.4.4<br>(2) | Production tests on welding using run-off coupon plates | Production tests on run-off coupon plates as specified in 1812.4.4 (2)                    | As required in 1812.4.4 (2)  |                  |   |
| 1812.7.4        | Other acceptance tests                                  | Test requirements for components erected to a specific load as specified in Appendix 18/1 | As required in Appendix 18/1 |                  | <i>[Give specific requirements in Appendix 18/1 with cross reference in Appendix 1/5]</i> |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause            | Work, Goods or Material                                    | Test  | Frequency of Testing   | Test Certificate                            | Comments  |
|-------------------|--|---|--|---|---|
| Series 1900       |  |   |  |   |   |
| 1903              | Abrasives  | Grading   | [As required]  |   | †† [See NG 1903]  |
|                   |  | Hardness  |  |   |   |
| 1909              | Galvanised Coatings  | Test specified in IS EN ISO 1461  | [As required]  |   |   |
|                   | Thermally sprayed aluminium metal coatings                 | Tests specified in IS EN ISO 2063   | [As required]  |   |   |
|                   | Aluminium coating material                                 |   |  | Required in accordance with IS EN ISO 14919 |   |
| 1910              | Thermally sprayed aluminium metal coating                  | Pull off adhesion test in accordance with IS EN ISO 4624, IS EN ISO 2063 or 'ASTM D4541-Type III' | At the start of the works and [specify subsequent intervals] |   |   |
|                   | Thermally sprayed aluminium metal coating (excepted areas) | Grid test specified in IS EN ISO 2063   | [As required]  |   |   |
| 1911, Table 19/2B | Hot dip galvanised coating to fasteners                    | Tests specified in IS EN ISO 10684  | [As required]  |   | [Any additional tests should be scheduled in Appendix 19/5] |
| 1912              | Paints   |   |  |   |   |
|                   |  | 'A' and 'B' Samples   | Provision of samples for 'A' and 'B' sample tests            |   | Samples selected in accordance with Clause 1912             |
|                   |  | Specific gravity  |  | As required by rate of 'A' and 'B' sampling | See NG 1912, 7; Appendix 19/4, Note 4;                      |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause | Work, Goods or Material                    | Test                              | Frequency of Testing  | Test Certificate  | Comments                |   |
|--------|--|-----------------------------------|---|---|-------------------------|---|
|        |  | Colour match                      | As required by rate of 'A' and 'B' sampling   |   | See NG 1912, 7          |   |
| 1914   | Coating System                             | Minimum film thicknesses          | Minimum dry film thickness measurements In accordance with IS EN ISO 2808                         | Required – representative testing   |                         |   |
|        |  | Adhesion                          | Pull off adhesion test in accordance with IS EN ISO 4624, IS EN ISO 2063 or ASTM D4541 – Type III | Required – representative testing   |                         |   |
|        |  | Defects                           | Visual assessment supplemented by appropriate testing   | Required  |                         | <i>[Any additional tests should be scheduled in Appendix 1/5]</i> |
|        |  | Defects – pin-holing or porosity  | Low or high voltage detectors in accordance with ASTM G62-07                                      | Required – representative testing excluding corners, bolted joints or welds |                         |   |
| 1972   | Abrasives                                  | Grading                           | <i>[As required]</i>  |   | †† <i>[See NG 1972]</i> |   |
|        |  | Hardness                          |   |   |                         |   |
| 1974   | Thermally sprayed aluminium metal coatings | Tests specified in IS EN ISO 2063 | <i>[As required]</i>  |   |                         |   |
|        | Aluminium coating material                 |                                   |   | Required in accordance with IS EN ISO 14919                                 |                         |   |



**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause       | Work, Goods or Material          | Test  | Frequency of Testing                                  | Test Certificate | Comments  |
|--------------|----------------------------------|---|---|------------------|---|
| Series 2000  |                                  |   |   |                  |   |
| 2003         | Permitted waterproofing systems  | <i>[As required – See NG 2003]</i>                |   |                  | NSAI Agrément Certificate or equivalent applies   |
|              | Additional bituminous protection | Tests specified in IS EN 13108-4                  | 1 per 15 tonnes*                                      |                  | Sampling to comply with IS EN 13108-4   |
|              |                                  | Stability value                                   | Tests specified in BS 594897                          | 1 per 15 tonnes* |   |
| 2004         | Permitted waterproofing systems  | <i>[As required – See NG 2004]</i>                |   |                  | NSAI certification or equivalent applies  |
| 2008<br>2009 | Waterproofing membrane           | Tensile strength, elongation at break (BS ISO 37) |   |                  | Tests results to be provided to the Employer's Representative ( Clause 2008.2)  |
|              |                                  | Tear strength (BS ISO 34-1)                       |   |                  |   |
|              |                                  | Deck adhesion (Clause 2008.5)                     | Three tests per 500m <sup>2</sup> of sprayed membrane |                  |   |
|              |                                  | "Holiday Test"                                    |   |                  |   |
| Series 2100  |                                  |   |   |                  |   |
| 2101         | Complete Bridge bearings         | Tests specified in Appendix 21/1                  | As required in Appendix 21/1                          |                  | <i>[Tests &amp; samples should be scheduled only where tests are required on samples cut from a finished bearing]</i> |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause      | Work, Goods or Material | Test             | Frequency of Testing | Test Certificate                       | Comments  |
|-------------|-------------------------|------------------|----------------------|--|---|
| Series 2400 |                         |                  |                      |  |   |
| 2401        | Masonry cement          |                  |                      | Required (IS EN 413-2)                 | Quality management scheme applies   |
|             |                         | Chloride content | Monthly              |  | Test to be carried out by the manufacturer and results included on the test certificate |
| 2402        | Sand                    |                  |                      | Required per consignment (IS EN 13139) |   |
|             |                         | Chloride content | Monthly              |  | Test to be carried out by the manufacturer and results included on the test certificate |
| 2404        | Mortar admixtures       |                  |                      | Required (IS EN 934-3)                 | Product certification scheme applies  |
| 2405        | Lime                    |                  |                      | Required (IS EN 459-1)                 |   |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause   | Work, Goods or Material | Test  | Frequency of Testing   | Test Certificate      | Comments  |
|----------|-------------------------|---|------------------------|-----------------------|---|
| 2406     | Bricks                  |   |                        |                       | Product certification scheme applies  |
|          | Clay                    | Active soluble salt content (IS EN 772-5)<br>Compressive strength (IS EN 772-1)<br>Water absorption (IS EN 772-7)<br>Freeze/thaw resistance |                        |                       | <i>[Tests/samples (in accordance with IS EN 771-1 should be scheduled as required)]</i> |
|          | Calcium silicate        |   |                        | Required IS EN 771-2) |   |
| Concrete |                         |   | Required (IS EN 772-2) |                       |   |
| 2407     | Blocks                  |   |                        |                       |   |
|          | Concrete                |   |                        |                       | Required (IS EN 772-2)  |
| 2408     | Manufactured Stone      | In accordance with IS EN 771-5  |                        | Required              |   |
| 2410     | Stainless Steel         |   |                        |                       |   |
| 2411     | Wire/fabric             |   |                        |                       | Required (IS EN 10088-1)  |
|          | Bars                    |   |                        |                       | Required (BS 6744)  |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause              | Work, Goods or Material   | Test | Frequency of Testing | Test Certificate  | Comments  |
|---------------------|---|------|----------------------|---|---|
| Series 2500         |   |      |                      |   |   |
| 2501                | Materials for corrugated steel buried structures  |      |                      |   | Type approval applies   |
|                     | Steel plate   |      |                      | Required as appropriate to the standard or specification listed in NRA BD 12 and Appendix 25/1. | NSAI Agrément Certificate or equivalent applies                           |
|                     | Nuts and bolts  |      |                      |   |   |
|                     | Metal coating   |      |                      |   |   |
|                     | Protective coating  |      |                      |   |   |
| Paved invert system |   |      |                      |   |   |
| 2502                | Materials for reinforcing elements, prefabricated facing and capping units, and washers |      |                      |   | NSAI Agrément Certificate or equivalent applies                           |
|                     | Carbon steel strip  |      |                      | Required (IS EN 10025-1 and IS EN 10025-2)  | Silicon content and mechanical properties to be stated on the certificate |
|                     | Stainless steel strip   |      |                      | Required (IS EN 10029, IS EN 10048, IS EN 10051 and IS EN ISO 9445)                             | Mechanical properties to be stated on the certificate                     |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause          | Work, Goods or Material  | Test | Frequency of Testing | Test Certificate   | Comments  |
|-----------------|--|------|----------------------|--|---|
| 2502<br>(Contd) | Reinforcing bar for anchor elements  |      |                      | Required (IS EN 10080 and BS 4449)   | Tests scheduled for welding and galvanizing of anchor elements under Series 1700 and Series 1900 respectively are required. |
|                 | Materials for fasteners  |      |                      |  |   |
|                 | Steel alloy  |      |                      | Required (IS EN ISO 898-1, IS EN ISO 4016, IS EN ISO 4018 and IS EN ISO 4034)    | Tests for galvanizing scheduled under Series 1900 are required  |
|                 | Stainless steel  |      |                      | Required (IS EN 10088-1, IS EN ISO 3506-1 and IS EN ISO 3506-2)                  |   |
|                 | Bolts, screws and nuts   |      |                      | Required (IS EN ISO 898-1 and IS EN ISO 4016, IS EN ISO 4018 and IS EN ISO 4034) | Tests for galvanizing scheduled under Series 1900 are required  |
| 2503            | Materials for Reinforced Clay Brickwork Retaining Walls of Pocket-type and Grouted Cavity Construction |      |                      |  |   |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause          | Work, Goods or Material |             | Test   | Frequency of Testing              | Test Certificate | Comments  |
|-----------------|-------------------------|-------------|--|-----------------------------------|------------------|---|
| 2503<br>(Contd) |                         | Clay bricks | Compressive strength (IS EN 772-1)<br>Water absorption (IS EN 772-7)<br>Freeze/thaw resistance | 1 set of tests per type of brick* |                  | <i>[Tests/samples (in accordance with IS EN 771-1 should be scheduled as required)]</i> |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause                                 | Work, Goods or Material                                 | Test   | Frequency of Testing | Test Certificate        | Comments   |
|--|---|--|----------------------|-------------------------|--|
| Series 2600                            |   |  |                      |                         |  |
| 2601                                   | Bedding mortar materials                                |  |                      | Required for each batch | Certification in accordance with Clause 2601 is required |
|  | Bedding Mortar  | Flow cone test   | Each batch           |                         | † Laboratory tests (IL)                                  |
|  |   | Flow between glass plates  |                      |                         |  |
|  |   | Compressive strength   |                      |                         |  |
|  |   | Expansion test   |                      |                         |  |
|  |   | Water absorption   |                      |                         |  |
|  |   | Elastic stability  | 1 per source         |                         |  |
| Flow cone test<br>Compressive strength | Each load   | Site control tests   |                      |                         |  |
| 2604                                   | Plastic coating to fencing posts, gates and ancillaries | Impact test<br>Adhesion<br>Retention of adhesion<br>Salt spray<br>Accelerated weathering<br>(Manufacturer's tests) |                      | Required (BS 1722-16)   | Records of all tests to be available for inspection      |

**Table NG 1/1 Typical Testing Details (Cont'd)**

| Clause      | Work, Goods or Material                 | Test   | Frequency of Testing         | Test Certificate | Comments  |
|-------------|---|--|------------------------------|------------------|---|
| Series 2700 |   |  |                              |                  |   |
| 2703        | Polyethelene Pipes                      |  |                              |                  |   |
|             | Butt fusion joints                      | Tensile test to WIS 4-32-08                    | As required in Appendix 27/1 |                  | Test Report to be made available to the Engineer's Representative   |
|             | Electrofusion joints                    | Double cantilever cleavage test to WIS 4-32-08 | As required in Appendix 27/1 |                  | Test Report to be made available to the Engineer's Representative   |
| 2708        | Integrity of pipes, joints and fittings | Pressure drop test to IS EN 815                | As required in Appendix 27/1 |                  | Test Records to be made available to the Engineer's Representative  |
| 2709        | Watermain disinfection                  | Chlorine residual test                         | <i>[As required]</i>         |                  | <i>[Tests should be scheduled as appropriate and requirements given in Appendix 27/1]</i><br>Test Records to be made available to the Engineer's Representative |
|             |   | Bacteriological testing                        | <i>[As required]</i>         |                  | <i>[Tests should be scheduled as appropriate and requirements given in Appendix 27/1]</i><br>Test Records to be made available to the Engineer's Representative |