VOLUME 1 HIGHWAY STRUCTURES: APPROVAL PROCEDURES AND GENERAL DESIGN

SECTION 1 APPROVAL PROCEDURES

PART 1

BD 2/02

TECHNICAL APPROVAL OF HIGHWAY STRUCTURES

SUMMARY

This Standard specifies the procedures for Technical Approval for Highway Structures. It updates and supersedes BD 2/79 Part IV, BD 2/89 Parts I and III, BA 32/89 Part 1, NIRS 7/82 and BE 1/74.

INSTRUCTIONS FOR USE

This revised Standard is to be incorporated in the Manual.

1. This document supersedes BD 2/79 Part IV, BD 2/89 Parts I and III, BA 32/89 Part 1, NIRS 7/82 and BE1/74, which are now withdrawn.

2. Remove existing contents page for Volume 1, and insert new contents page for Volume 1, dated May 2002.

3. Remove BD 2/79 Part IV, BD 2/89 Parts I and III, BA 32/89 Part 1, NIRS 7/82 and BE1/74, which is superseded by BD 2/02, and archive as appropriate.

4. Insert BD 2/02, in Volume 1, Section 1, Part 1.

5. Archive this sheet as appropriate.

Note: A quarterly index with a full set of Volume Contents Pages is available separately from The Stationery Office Ltd.

THE HIGHWAYS AGENCY

SCOTTISH EXECUTIVE DEVELOPMENT DEPARTMENT

THE NATIONAL ASSEMBLY FOR WALES
CYNULLIAD CENEDLAETHOL CYMRU

THE DEPARTMENT FOR REGIONAL DEVELOPMENT
NORTHERN IRELAND

Technical Approval of Highway Structures

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REGISTRATION OF AMENDMENTS

Amend No	Page No	Signature & Date of incorporation of amendments	Amend No	Page No	Signature & Date of incorporation of amendments

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PART 1

BD 2/02

TECHNICAL APPROVAL OF HIGHWAY STRUCTURES

Contents

Chapter

1. INTRODUCTION

General

1.1 This Standard specifies the Technical Approval (TA) procedures for Highway Structures on motorways and other trunk roads or designated roads.

1.2 The following Standards and Advice Notes are superseded and are now withdrawn:

BD 2/79	Technical Approval of Highway Structures on Motorways and Other Trunk Roads Part IV Procedures for Lighting Columns	(DMRB 1.1)
BD 2/89	Technical Approval of Highway Structures on Motorways and Other Trunk Roads Part I General Procedures	(DMRB 1.1)
BD 2/89	Technical Approval of Highway Structures on Motorways and Other Trunk Roads Part III Procedures for Tunnels	(DMRB 1.1)
BA 32/89	Technical Approval of Highway Structures on Motorways and Other Trunk Roads Part I General Procedures	(DMRB 1.1)
NIRS 7/82	DOE (NI) Roads Service Technical Approval Scheme – 6th Revision	(DMRB 1.1)
BE 1/74	The Independent Checking of Erection Proposals and Temporary Works Details for Major Highway Structures on Trunk Roads and Motorways	(DMRB 1.2)

1.3 The TA procedures entail a review of the Proposals by a Technical Approval Authority (TAA), an independent checking carried out by a Checker and certification by the Designer, Assessor, Checker and others. The procedural requirements impose a discipline on the process that encourages good practice and should reduce the possibility of errors affecting structural fitness for purpose. Most importantly however, the procedures are in place to minimise the possible risks to highway users and others who may be affected.

1.4 The TA procedures differ from the Quality Assurance process, which formalises and records good management practice. Quality Assurance thus supplements TA but it will in no way be a substitute for the comprehensive technical requirements in the TA procedures.

1.5 The TA procedures will help the Overseeing Organisation to automatically identify those features that are not adequately covered by existing codes and Standards. It provides a valuable feedback and would initiate a course of action for improvement of existing codes and Standards.

Objectives

1.6 The fundamental objectives of the TA procedures are to ensure as far as reasonably practicable that Highway Structures are safe and serviceable in use, economic to build and maintain, sustainable and with minimal impact on the environment, and which satisfactorily perform their intended functions. The TA procedures also ensure as far as reasonably practicable that the highway user and any others who may be affected are protected from any adverse effects resulting from any work carried out to any Highway Structure and that there is adequate provision for safety under all circumstances.

1.7 TA provides procedures to safeguard the Overseeing Organisations' responsibilities, through their TAAs, in protecting the Secretary of State's (in Northern Ireland, the Department for Regional Development's; in Scotland, the Scottish Minsters' and in Wales, the Welsh Minsters') interests and statutory duties of public safety.

Scope

1.8 TA applies to Proposals, including private development, within the highway boundary. It also applies to Proposals, which are outside the highway boundary, for adoption of Highway Structures by the Overseeing Organisation. It is recommended that TA be applied to Proposals outside the highway boundary resulting from planning applications that are referred to the Overseeing Organisation for direction, as they may affect the highway. TA does not apply to cases where there are no public safety issues such as temporary works in green field sites or only in place during full road closures with no other public access. However, TA applies to temporary works where the permanent works Proposal has identified the need for an independent check.

1.9 The scope of TA shall be as specified in Chapters 3 to 7.

Contractual Responsibilities and Procedures

1.10 TA does not in any way modify the contractual and statutory responsibilities of any party for the work carried out or the legal responsibilities of professional engineers.

1.11 This Standard has been written such that it is applicable in principle to all current and likely future forms of procurement. The procedures, format and terms used in this Standard, including the model Approval in Principle (AIP) forms, Technical Approval Schedules (TAS) and certificates provided in Annexes A to C, are intended to be contract-neutral and should be taken as models.

These shall be amended and agreed with the Overseeing Organisation, to suit specific contract requirements, such as design and construct contracts.

Timings and procedures should be identified in the scheme specific contract requirements.

1.12 The contract requirements may clarify whether the Proposals and the AIP are of an outline nature sufficient for the invitation or acceptance of tenders or whether they are fully comprehensive and sufficient for detailed design or assessment. The principles, detailed requirements and recommendations contained in this Standard should apply accordingly.

1.13 For some forms of procurement, TA for the design would typically be completed in detail before tenders for carrying out the construction work required by the design are invited. For other forms of procurement, where the design has not yet been completed prior to inviting tenders, the TA process would typically only be partially completed during the tender period. Submission of a final detailed AIP would usually take place following award of contract.

Definitions

1.14 The following definitions shall apply throughout this Standard (see 1.11):

Approval in Principle (AIP)	The document, which records the agreed basis and criteria for the detailed design or assessment of a Highway Structure.
Assessment Team	The group of engineers responsible for the assessment. It may comprise an appropriate mix of specialists under the direction of a Team Leader.
Assessor	The organisation responsible for the overall assessment, including proprietary components.
Category	The classification of the Proposals, which determines the need for AIP, the form of check to be applied and the certificates to be prepared.

Checker	The organisation responsible for the independent check of the design or assessment.
Checking Team	The group of engineers responsible for the check of the design or assessment. It may comprise an appropriate mix of specialists under the direction of a Team Leader.
Contractor	The organisation contracted by the Overseeing Organisation to undertake construction works on its behalf.
Contractor's Representative	A representative of the Contractor, with responsibility for overseeing the construction works.
Departure	Criterion, which departs from, or is an aspect not covered by, the Standards contained in the Technical Approval Schedule.
Designer	The organisation responsible for the overall design including proprietary components.
Design Team	The group of engineers responsible for the design. It may comprise an appropriate mix of specialists under the direction of a Team Leader.
Geotechnical Report	A report that contains geotechnical information relevant to the design or assessment (see HD 22 (DMRB 4.1.2).
Highway Structure	Structure or installation coming within the scope of this Standard and situated under, over or adjacent to a motorway or other trunk road or designated road.
Large Service Tunnel	A tunnel installed by trench-less technology beneath a highway for any purpose, in an excavated bore of diameter or span greater than 2000mm.
Lighting Column System	Range of combinations of column heights and lengths of brackets together with the weights and windage areas of lanterns and attachments for which the column has been designed.
Maintaining Agent (MA)	The organisation responsible for the maintenance of a Highway Structure.
Overseeing Organisation	The highway authority responsible for motorways and other trunk roads or designated roads in England, Scotland, Wales or Northern Ireland.
Principal	A senior representative of the Designer, Assessor or Checker having authority to sign certificates on its behalf.
Project Manager of the Overseeing Organisation	Representative of the Overseeing Organisation with responsibility for project management of tunnel or bridge gantry operating procedures.

Proposals	The proposals relating to the design or assessment of a Highway Structure including the mechanical and electrical (M & E) installations covered by this Standard.
Road Tunnel	A subsurface Highway Structure enclosed for a length of 150m or more.
Service Tunnel Promoter	Authority or Organisation other than the Overseeing Organisation, sponsoring a service tunnel
Small Service Tunnel	A tunnel installed by trench less technology beneath a highway for any purpose, in an excavated bore of diameter or span greater than 900mm but less than 2000mm.
Team Leader	The person responsible for overseeing and co-ordinating the work of the design, assessment or checking team and having authority to sign on behalf of the team.
Technical Approval (TA)	The submission of Proposals for agreement by the Technical Approval Authority and the subsequent provision and acceptance of certificates confirming that the design, assessment, specification or construction works complies with the agreed Approval in Principle and design/ assessment and specification certificates as appropriate.
Technical Approval Authority (TAA)	The organisation responsible for agreeing the Approval in Principle and subsequently accepting the relevant certificates.
Technical Approval Schedule (TAS)	The schedule of documents to be used for the design or assessment of a Highway Structure.
Works Examiner	The organisation nominated in the Contract to undertake independent examination of the construction, commissioning (of M&E) or testing of works carried out by the Contractor.

Implementation

1.15 This Standard shall be used forthwith on all projects for the construction, maintaining and improvement of motorways and other trunk roads (and roads designated by the Overseeing Organisation in Northern Ireland) except where the preparation of a contract has reached a stage at which, in the opinion of the Overseeing Organisation, its use would result in significant additional expense or delay progress. Notwithstanding the above, this Standard shall be used on all projects for which tenders are to be invited after 1 January 2003, unless specific approval has been obtained from the Overseeing Organisation to use other documents. This Standard shall also be used to implement the procedures for private development within the highway boundary, other works that affect the structural integrity of existing Highway Structures and for proposals for adoption of Highway Structures by the Overseeing Organisation. Designers or Assessors shall confirm its application to particular projects with the Overseeing Organisation.

Mandatory Requirements

1.16 Sections of this Standard that are mandatory requirements of the Overseeing Organisations are highlighted by being contained within boxes. The remainder of the document contains advice and guidance.

2. GENERAL REQUIREMENTS AND PRINCIPLES

Overseeing Organisation's Requirements

2.1 Technical requirements for the design, construction, maintenance and operation of Highway Structures are contained in the TAS (in some forms of contract, such as design and construct, these may be contained in the contract requirements). The TAS normally includes the Design Manual for Roads and Bridges (DMRB), the Manual of Contract Documents for Highway Works (MCHW) and other supplementary Standards for specific project requirements.

2.2 TAA should be consulted at the earliest appropriate opportunity in order to avoid the risk of abortive work and allow timely consideration to be given to the Proposals.

Category of Proposals

2.3 The Proposals shall be placed in one of four Categories: 0, 1, 2 or 3, according to the criteria described in Chapters 3 to 7. The Category shall be proposed by the Designer or Assessor and agreed by the TAA. The category boundaries are not rigid. In case of doubt each case shall be decided in consultation with the TAA on its merits, having regard to potential consequences of failure, design complexity and whole life costs.

2.4 AIPs are required for Categories 1, 2 and 3, but not Category 0. The Designer or Assessor shall submit brief details of proposed Category 0 to the TAA for agreement of Category.

2.5 Where a structure has been placed in Category 0 or 1, and a proposal arises subsequently requiring a Departure, the category shall be changed to 2. However if the TAA considers that the Departure has little or no structural implication, then a change of Category may not be required. In such circumstances for Category 1, an amendment or addendum to the AIP shall be submitted. The agreement of the TAA will be required before the proposals can be incorporated in the design or assessment.

Proposals

2.6 Proposals for Categories 1, 2 and 3 shall:

2.6.1 Provide sufficient information and evidence to demonstrate compliance with the Overseeing Organisation's requirements and to justify their viability. Potential risks and hazards during the whole life of the structure such as construction, operation, maintenance and demolition, shall be identified, assessed and considered. Where available, references, special investigations and studies that have been carried out shall be included. The overall project should consider appropriate methods of risk management such as those given in the Value for Money Manual.

2.6.2 Provide evidence that appropriate consultation has taken place with all relevant parties having a direct interest in the Proposals, and that full and proper consideration has been given to their respective interests. Risks and hazards which may affect the structure as a result of other parties' requirements (eg leakage of gas or water mains) shall also be identified, assessed and considered. Documentation relating to consultation and special requirements of those consulted shall be included as part of the AIP submission.

2.6.3 Describe the information that is available concerning existing records and assumptions made regarding the interpretation of available data that will be relevant to the design or assessment.

2.6.4 List in the TAS all relevant documents that are being proposed for use in the design or assessment.

2.7 Proposals for Designs shall, in addition to 2.6:

2.7.1 Consider aspects relating to:

- sustainability (sustainable development which meets the needs of the present without compromising the ability of future generations to meet their own needs e.g. prudent use of natural resources)
- environment (to minimise the impact of structures on both the natural and built environment)
- aesthetics
- buildability (the extent to which the design facilitates ease of construction, allowing the most efficient and economic use of resources, subject to the overall requirements for the completed project)
- structure robustness (the ability of a structure not to be damaged disproportionately in the event of accident, misuse or deterioration)
- durability
- maintenance and operational commitments in terms of whole life costs in design options and choices of materials
- provision of access for periodic inspection

2.7.2 Where specified, consider and make provisions for future heavier loads or future widening and describe how the structure may be upgraded. In the case of road tunnels, it may be necessary to make provision for future development above or adjacent to the tunnel.

2.7.3 Consult the TAA at an early stage to determine whether submission is required to the Commission for Architecture and the Built Environment (CABE) in England or to equivalent bodies in Scotland, Wales and Northern Ireland. This applies to major structures, including tunnel portals, tunnel service buildings and landscaping, and those structures in environmentally sensitive locations, such as National Parks, areas of outstanding natural beauty, green-belts, urban areas, etc.

2.7.4 State any assumptions that have been made with regard to construction processes or temporary works aspects that are significant factors in the design. If construction processes or temporary works during the course of construction have structural implications different from those assumed by the Designer, a further TA shall be completed before the commencement of construction of that part of the works.

2.8 Proposals for Assessments shall, in addition to 2.6, describe proposed arrangements for access, traffic management and intrusive investigation

Departures from Standards

2.9 Designers or Assessors may seek to introduce cost savings, innovative techniques, research findings or developments in the state of the art by the adoption of Departures.

In cases where mixing Standards with different design principles such as limit states, load factors and working stress are used, they may need to be considered as Departures unless it can be demonstrated that there is consistency and compatibility between the different design principles.

2.10 All applications for Departures shall be subject to the approval procedures of the Overseeing Organisation and details of the proposed Departures together with reasons and justification, including benefits to the Overseeing Organisation, shall be submitted to the TAA for consideration. Applications for Departures shall allow adequate time for consideration by the TAA prior to inclusion in the AIP or an addendum to the AIP.

In some cases the Checker's comments on the proposed Departure may be required to assist the TAA in the deliberation.

Submissions for AIP

2.11 Submissions for AIP to the TAA shall be in accordance with the Overseeing Organisation's particular requirements. Generally submissions comprise a completed AIP, a location plan, a general arrangement drawing, relevant parts of the Geotechnical Report, documents relating to consultation and any other relevant information. Calculations and detailed drawings are not required as part of the submission.

2.12 The AIP shall record all the agreed criteria on which the design or assessment is to be based. Changes to an agreed AIP to account for subsequent variations during design, assessment or construction shall render the AIP subject to re-approval and agreement by the TAA. This shall be confirmed either in the form of an amended version of the agreed AIP or as a separate addendum to the agreed AIP. Submissions clearly indicating deletions or additions that have been made to the agreed AIP shall be signed by the Designer or Assessor and forwarded with supporting information to the TAA. Addenda shall refer to the original AIP by the date of agreement by the TAA.

2.13 AIP is a continuing exercise. The period over which it extends will vary according to the size and complexity of the structure and number of Departures. To avoid any unnecessary delay, AIP may be given in stages in the form of interim AIP as principles are evolved and agreed. However the use of the interim AIP should not be allowed to prejudice the agreement of an AIP for the full structure.

Technical Approval

2.14 In order to achieve the objectives stated in 1.6 and 1.7, the TAA shall carry out the following aspects, where applicable:

(i) examine the proposed design or assessment criteria, principles and methods;

(ii) agree the Category of the Proposals;

(iii) agree any special studies concerning safety and risk assessment and management that have a bearing on the final design or assessment or the construction process;

(iv) to ensure that adequate consideration has been given to safety, sustainability, buildability, traffic management, environmental impact, aesthetics, structure robustness, durability, maintainability, access and inspection, upgradeability, whole life costs and compliance with the Overseeing Organisation's requirements;

(v) agree the list of documents selected from the TAS and proposals for additional documents and Departures;

(vi) appraise the geotechnical conditions and other relevant investigations;

(vii) agree the adequacy of existing records and investigation data and the need for further investigations or studies that have a significant bearing on the preliminary or final design, assessment, operation, construction, maintenance or demolition processes;

(viii) review the adequacy of consultation with other parties and the incorporation of agreed requirements;

(ix) agree proposed Category 3 Checker;

(x) be available to the Designer, Assessor or Checker for consultation and advice on the interpretation of codes and Standards;

(xi) resolve any point(s) of difference between the Designer or Assessor and the Checker.

2.15 When satisfied with the Proposals, the TAA shall confirm its agreement by signature of the AIP. On completion of the detailed design or assessment, the TAA shall accept the appropriate certificates.

2.16 The agreement of the AIP or acceptance of the certificates by the TAA does not relieve the Designer, Assessor or Checker of the responsibility for the validity and arithmetical correctness of the calculations nor their translations into design details and drawings, specification clauses or assessed capacities.

2.17 The AIP is valid for three years after the date of agreement by the TAA. If the construction has not yet commenced within this period, the AIP shall be re-submitted to the TAA. The TAA shall review the AIP and determine whether any updating or amendment to the design is required. In such circumstances the outcome shall be recorded in an amendment or addendum to the AIP and the agreement of the TAA will be required before the construction can proceed.

Design and Assessment Procedure

2.18 The design/assessment shall comply with the AIP.

Model AIP forms are given in Annex A but different forms may be used depending on the Overseeing Organisation's particular requirements.

2.19 The Designer or Assessor shall be responsible for the applicability and accuracy of all computer programs used and shall also ensure the validity of the programs for each application.

Checking Procedure

2.20 Assessments, designs and drawings, together with bar bending schedules, shall be checked as follows:

(a) Categories 0 and 1 require an independent check by another engineer who may be from the Design/Assessment Team.

(b) Category 2 requires a check by a Checking Team, which may be from the same organisation but shall be independent of the Design/Assessment Team.

(c) Category 3 requires a check to be carried out by a Checking Team from a separate organisation proposed by the Designer Assessor and agreed by the Overseeing Organisation.

2.21 The Checker shall carry out a comprehensive examination of all aspects of the design or assessment and any proposed Departure where required by the TAA, including Specification clauses that affect structural integrity eg new materials, and shall ensure that it complies with the Overseeing Organisation's requirements. The Checker shall ensure that the calculations are translated accurately into design details and drawings, specification clauses or assessed capacities.

2.22 The Checker shall be responsible for checking, with due professional skill and care, in accordance with the agreed AIP. In the course of checking the Checker shall draw the attention of the Designer or Assessor and TAA to any aspect of the agreed AIP where changes are considered necessary. The agreement of the TAA to variations in the AIP shall be confirmed in accordance with 2.12.

2.23 The Checker's analytical work shall be independent of that of the Designer or Assessor and carried out without exchange of calculation sheets or similar information between the Designer or Assessor and the Checker.

2.24 The Checker shall be responsible for the applicability and accuracy of all computer programs used in the check and shall ensure the validity of the programs for each application.

2.25 The method of analysis employed by the respective teams need not be the same but the Designer or Assessor and the Checker should consult with each other during the course of their work to ensure that the results they are obtaining are comparable.

2.26 The start of the check need not await the completion of the design or assessment. Both activities may proceed in parallel as far as is practicable.

Certification

2.27 The certificates are required to be signed to declare the satisfactory completion of the work involved and that the organisations concerned have exercised due professional skill and care.

2.28 For all proposals, a single organisation shall assume responsibility for the whole of each activity; the Design, Assessment, Checking or Construction Compliance. The Designer, Assessor, Checker, Contractor's Representative or Works Examiner shall sign each certificate as appropriate, which shall be countersigned upon acceptance by the TAA. All signatories to certificates shall be competent in the field of work undertaken and have relevant experience and appropriate Engineering qualifications, which shall be clearly indicated on the certificate along with their name and position in their organisation. One signatory from the Designer, Assessor or Checker shall be the Team Leader and the other shall be a Principal of the organisation concerned. Signatories for the Construction Certificate shall comprise a representative of the Contractor and Principals of both the Contractor and of the Works Examiner. The signatory for the TAA shall be a person delegated to undertake this task on its behalf.

2.29 The Design, Assessment and Check certificates shall refer to the relevant AIP and any addenda by their respective dates of agreement by the TAA and any Departures or, in the case of Category 0 structures, relevant Standards and Departures, if any, and be submitted for acceptance by the TAA.

2.30 A copy of the general arrangement drawing shall accompany Certificates for Category 0 structures.

2.31 Where additional and substitute Specification clauses have been prepared, they should be submitted for acceptance by the TAA. They may be submitted either individually or collectively on a Specification Certificate. Where clauses affect structural integrity e.g. new materials, they shall be checked in accordance with the AIP.

2.32 The Construction Compliance Certificate shall refer to the relevant AIP, Design and Check Certificates, Specification and As-Constructed drawings and shall be submitted to the TAA for acceptance.

2.33 Model certificates are contained in Annex C. However, the wording may vary depending on the Overseeing Organisation's particular requirements/type of contract. If the completed certificate consists of more than one page, each page should be identifiable by the name of the project and by the name and reference number of the Structure and the date of preparation.

The forms of certificate specified in the contract requirements shall be used.

3. BRIDGES AND OTHER HIGHWAY STRUCTURES

Introduction

3.1 This Chapter describes specific TA requirements for bridges and other Highway Structures and shall be read in conjunction with Chapters 1 and 2.

3.2 The TA requirements shall apply without limitation to:

3.2.1 Design of new structures.

3.2.2 Assessment and related construction work that affects structural integrity.

3.2.3 Assessment relating to loading beyond that for which a structure has been designed or previously assessed.

3.2.4 Assessment relating to loading for which a structure has been designed or previously assessed but the condition of the critical structural elements has subsequently deteriorated to the extent that an assessment is required.

Scope

3.3 In addition to 1.8, the procedures described in this Chapter shall without limitation apply to the following Highway Structures:

(a) Bridge, buried structure, subway underpass, culvert and any other structure supporting the highway with clear span or internal diameter greater than 0.9m,

(b) Overhead crossing carrying conveyor or utility service,

(c) Access gantry,

(d) Earth retaining structure where the effective retained height, ie the level of the fill at the back of the structure above the finished ground level in front of the structure, is greater than 1.5m (1.0m in Northern Ireland),

(e) Reinforced/strengthened soil/fill structure, with hard facings, where the effective retained height is greater than 1.5m (1.0m in Northern Ireland),

(f) Reinforced/strengthened soil/fill which is an integral part of another highway structure,

(g) Portal and cantilever sign and/or signal gantry,

(h) Cantilever traffic signal mast,

(i) Lighting column,

(j) High mast of more than 20m in height for lighting,

(k) Masts for cameras, radio and telecommunication transmission equipment,

(l) Catenary lighting support system,

(m) Environmental barrier,

(n) Proprietary manufactured Highway Structure,

(o) Highway signs on posts of more than 4m in height,

(p) Multi-level public car parks proposed for adoption by Roads Service (in Northern Ireland only).

Category

3.4 In addition to 2.3 to 2.5, the following criteria shall be considered when determining Category:

3.4.1 **Category 0:**

Structures, which conform in all aspects of design, assessment and construction to DMRB and MCHW Standards and contain no Departures, provided they also conform to one of the following:

(a) Buried structures of less than 3m clear span diameter and having more than 1m cover,

(b) Multi-cell buried structures, where the cumulative span is less than 5m, and having more than 1m cover,

(c) Environmental barriers less than 3m high,

(d) Lighting columns within the scope of BD 26 (DMRB 2.2.1) and not situated at a very exposed site,

(e) Other mast structures that are less than 10m in height and where the horizontal arm projection is less than 3m,

(f) Highway signs on posts that are more than 4m in height but less than 10m in height,

(g) Single span simply supported structures with span of less than 5m,

(h) Masonry arches with span of less than 6.5m (for assessment only),

(i) Retaining walls with an effective retained height of less than 2m.

3.4.2 **Category 1:**

Structures, other than those in Category 0, which conform in all aspects of design/assessment and construction to DMRB and MCHW Standards and contain no Departures, provided they also conform to one of the following:

(a) Structures with a single simply supported span of less than 20m and having less than 25° skew,

(b) Buried concrete box and corrugated steel buried structures with less than 8m clear span,

(c) Retaining walls with an effective retained height of less than 7m,

(d) Environmental barriers 3m or more in height,

(e) Lighting columns situated at a very exposed site or outside the scope of BD 26 (DMRB 2.2.1)

(f) Other mast structures that are more than 10m in height but less than 25m in height, or where the horizontal arm projection is more than 3m.

3.4.3 **Category 2**

Structures, not within the parameters of Categories 0, 1 or 3.

3.4.4 **Category 3**

Complex structures, which require sophisticated analysis or with any one of the following features:

(a) High structural redundancy,

(b) Unconventional, novel or esoteric design aspects,

(c) Any span exceeding 50 m,

(d) Skew exceeding 45°,

(e) Difficult foundation problems,

(f) Moveable bridges,

(g) Access gantries,

(h) Bridges with suspension systems,

(i) Steel orthotropic decks,

(j) Internal grouted duct form of post tensioned concrete structures.

3.4.5 **Assessment and related construction work**

3.4.5.1 The assessment of load carrying capacity of existing structures and related construction work such as demolition, repair, renewal, refurbishment and strengthening work that affects structural integrity shall generally be categorised on the same basis that the original structure would have warranted.

3.4.5.2 (In Northern Ireland only) A check of the assessment is generally required for Category 3 structures only. In cases of doubt guidance shall be sought from the TAA.

Technical Approval

3.5 In addition to 2.14, the TAA shall consider where applicable the following aspects (this list is not necessarily exhaustive):

(i) cross-section and headroom clearances,

(ii) the loading and design or assessment criteria,

(iii) any provision to be made additional to items (i) and (ii) for abnormally high and/or heavy loads,

(iv) in the case of construction work, such as repairs, strengthening, monitoring, partial renewals or demolitions, that the structural adequacy at all stages of the work has been fully considered,

(v) proposals for the independent checking of temporary works,

(vi) in the case of proprietary structures where circumstances are appropriate, that proper consideration has been given to facilitate their adoption by the Overseeing Organisation.

Documentation

3.6 The relevant model AIP form for Highway Structures within the scope of this Chapter is A1 from Annex A. Relevant model certificates are C1 and C2 from Annex C. The form of certificates may vary depending on the Overseeing Organisation's particular requirements.

4. TEMPORARY WORKS

Introduction

4.1 This Chapter describes the TA requirements for temporary works including temporary structures and shall be read in conjunction with Chapters 1 to 3.

4.2 The TA requirements shall apply to the following types of proposals:

(a) **Type A proposals:**

Erection proposals or temporary works which require:

(i) an independent check in accordance with the AIP for permanent works, **and**

(ii) where the works would not affect or potentially affect any highway or other way or area used by or accessible to the public.

(b) **Type B proposals:**

Erection proposals, temporary works including those over, under, alongside or otherwise affecting or potentially affecting any highway or other way or area used by, or accessible, to the public.

Scope

4.3 In addition to 1.8, the procedures described in this Chapter shall apply without limitation to the following temporary structures:

(a) Temporary works and falsework for major and complex structures.

(b) Proposals where erection procedure, method of construction or the procedure for the demolition or removal of an existing structure is of critical importance.

(c) Purpose built or prefabricated forms of temporary works that are alongside or temporarily support or span live carriageways or railway lines or other areas with public access, including facilities or construction procedures that maintain the structural integrity or safe operation of an existing structure.

(d) Temporary works details, erection proposals or construction procedures involving work that affects or potentially affects the structural integrity or operating procedures of a structure during its reconstruction, demolition and removal, maintenance, monitoring, alteration or repair.

Category

4.4 In addition to 2.3 and 2.4 the temporary works shall be in Category 2 or 3. The Category adopted shall reflect the seriousness of any potential failure. For Type A proposals, consideration should be given to adopting the same Category as the permanent structure.

Design Criteria Relating to Permanent Works

4.5 Design criteria for temporary works shall include all relevant design data concerning the design and construction of the permanent works. This includes the protection and/or safe operation of the permanent work or live carriageway during the use of a temporary highway structure, or temporary conditions of construction of new designs or the alteration of existing structures (eg allowable deflections, settlements, rotations, loading, jacking forces, propping requirements, clearances, impact protection, erection or demolition procedures, traffic control, carriageway possessions etc).

Proposals

4.6 Proposals for temporary works shall be described in an AIP in accordance with the requirements and form of submission described in Chapter 2.

4.7 The limits of application of a submission and related certification shall be clearly described and, where applicable, related to constraints of staged construction.

4.8 Proposals shall state the criteria that have been adopted to encompass the technical, operational and safety requirements of the authorities consulted and shall demonstrate to the satisfaction of the TAA that adequate safeguards and contingency measures have been introduced and will be maintained throughout the duration of the work.

Type A proposals

4.9 Design certificate is not required as the Contractor is responsible for the safety and adequacy of erection or temporary works proposals.

4.10 Prior to the commencement of the relevant parts of the Works, check certificate(s) in the form given in Annex C related to Type A proposals for erection proposals or temporary works details identified in the AIP shall be submitted to the TAA, for retention with the AIP for the permanent structure.

4.11 The purpose of requiring a certified independent check is to ensure that not only are the erection proposals and/or temporary works details properly prepared but also that an independent engineer examines and certifies for their adequacy.

Type B proposals

4.12 All design, checking and certification of temporary works for Type B proposals shall comply with the TA procedures of Chapters 1 and 2. The Type B certificate shall be accepted by the TAA before consent to proceed with the works can be given.

Technical Approval

4.13 In addition to 2.14, the TAA shall consider where applicable the following aspects (this list is not necessarily exhaustive):

(i) structural adequacy and stability at all stages,

(ii) precautions during erection/dismantling operations,

(iii) protection of the temporary works (including protection against vehicle or other impact),

(iv) general provisions in terms of permanent works construction,

(v) loading and design criteria,

(vi) effects on any existing structures or earthworks,

(vii) working spaces for installation and removal,

(viii) clearances and access for construction plant and machinery,

(ix) provision for periodic inspection and checking.

Documentation

4.14 The relevant model AIP for temporary works within the scope of this Chapter is A1 from Annex A. Relevant model certificates are C3 and C4 from Annex C. The form of certificates may vary depending on the Overseeing Organisation's particular requirements.

5. ROAD TUNNEL AND LARGE SERVICE TUNNEL STRUCTURES

Introduction

5.1 This Chapter describes specific TA requirements for road tunnel structures including Large Service Tunnels and major tunnelling or building operations within the zone of influence of an existing Road Tunnel. It shall be read in conjunction with Chapters 1, 2, 6, and 7, and in the case of cut and cover construction and for tunnel portals and road decks, the relevant sections of Chapter 3. The requirements of the Tunnel Design and Safety Consultation Group referred to in BD 78 (DMRB 2.2.9) shall be complied with.

Scope

5.2 In addition to 1.8, the procedures described in this Chapter shall apply to:

(i) The design and construction of new Road Tunnels, tunnel services buildings and Large Service Tunnels,

(ii) The assessment of existing tunnels that are subject to the effects of new temporary or permanent construction above or adjacent to the tunnel structure,

(iii) The refurbishment and strengthening of existing road tunnels.

Category

5.3 In addition to 2.3 and 2.4, Proposals for the design or assessment of Road Tunnel structures and Large Service Tunnels shall be in Category 3.

Technical Approval

5.4 In addition to 2.14, the TAA will consider the following aspects (this list is not necessarily exhaustive):

5.4.1 **Structure and Form**

(i) Methods of excavation and construction including proposed ground categorisation for tunnelling,

(ii) Tunnel profile,

(iii) Bore spacing,

(iv) Portal design,

(v) Waterproofing,

(vi) Maintenance access,

(vii) Ventilation shafts,

(viii) Proposed tunnel wall finish,

(ix) Fire resistance,

(x) Stability of ground above portals,

(xi) Primary support design,

(xii) Ground water control,

(xiii) Effect on overlying or adjacent structures or tunnels,

(xiv) Secondary lining and cladding,

(xv) Ground movements,

(xvi) Loading history of the site and effect of proposed new loading sequences,

(xvii) The adequacy of the assessment of the loading conditions involved.

5.4.2 **Alignment and Clearances**

(i) Site constraints,

(ii) Highway and tunnel alignment,

(iii) Stopping sight distances,

(iv) Carriageway and verge widths,

(v) Duct provision for services,

(vi) Horizontal and vertical clearances,

(vii) Effect of super-elevation,

(viii) Space requirements for equipment beyond the traffic space,

(ix) Cross-connections between traffic bores and escape passages,

(x) Emergency point spacing,

(xi) Tunnel signing,

(xii) Parking for emergency vehicles,

(xiii) Area for casualty attendance,

(xiv) Emergency crossovers and portal space.

5.4.3 **General**

(i) Provision made for inspection and maintenance,

(ii) Proposals for the checking of temporary works,

(iii) The safeguards adopted to ensure that construction effects are kept within tolerable limits,

(iv) An intervention facility being in place to regulate progress or halt work in the event of unforeseen situations which might adversely affect or compromise the structural integrity or operational regime of the tunnel,

(v) The arrangements to sustain all necessary liaison between interested parties.

Documentation

5.5 The relevant model AIP for Road Tunnel and Large Service Tunnel structures within the scope of this Chapter is A2 from Annex A. The relevant model certificate is C1 from Annex C. The form of certificates may vary depending on the Overseeing Organisation's particular requirements.

6. SMALL SERVICE TUNNELS

Introduction

6.1 This Chapter describes specific TA requirements for Small Service Tunnels and shall be read in conjunction with Chapters 1, 2 and 5.

Scope

6.2 In addition to 1.8, the procedures described in this Chapter shall apply to small (900mm - 2000mm) diameter Service Tunnels. Proposals for Small Service Tunnels shall only be assessed in terms of the safety and serviceability of the existing highway.

6.3 TA of Large Service Tunnels shall be in accordance the appropriate requirements of Chapter 5 together with the relevant supplementary requirements contained in this Chapter.

Category

6.4 In addition to 2.3 and 2.4 Proposals for the design or assessment of a small service tunnel shall be in Category 2.

Submissions for AIP

6.5 In addition to 2.11 and 2.14 the following shall be included:

(i) A site plan showing road chainages and other references, locations of Service Tunnel crossings, all potentially affected structures, manholes, boreholes, Statutory Undertakers' equipment and similar cables and pipelines owned by others.

(ii) A longitudinal section showing ground profile along the tunnel, borehole logs including ground water levels, existing road construction, existing ground levels, tunnel inverts, minimum cover to crown, all potentially affected structures, Statutory Undertakers' equipment and similar cables and pipelines owned by others.

(iii) Cross section(s) at minimum or critical cover showing all potentially affected structures, Statutory Undertakers' equipment and similar cables and pipelines owned by others.

(iv) All necessary information relating to existing Highway Structures, carriageways, Statutory Undertakers' equipment and similar cables and pipelines owned by others, that has been provided by the relevant authorities and its effect on the design and construction of the Service Tunnel.

6.6 Submissions by Service Tunnel Promoters shall be made through the appropriate Regional Office of the Overseeing Organisation, for forwarding to the TAA and to the Maintaining Agent (MA). The MA shall review the submission, with particular reference to their local knowledge of the site, liaise as necessary with the Designer and confirm to the TAA when they are satisfied with the AIP submission.

6.7 The TAA will not consider Contractor's method statements as part of the AIP unless they are fully approved and endorsed by the Service Tunnel Promoter or the Service Tunnel Designer.

6.8 Methods of construction chosen by the Contractor or tunnelling difficulties encountered during the Contract, which give rise to changes in the construction procedures described in the AIP shall be brought to the attention of the TAA for a ruling on the need for an amendment or addendum to AIP in accordance with 2.12.

6.9 A comprehensive condition survey of the structures and carriageway within the zone of influence of the tunnelling work shall be carried out with the agreement of the MA prior to commencement of the works.

6.10 The highway must be continuously monitored during the installation of the service tunnel to ensure surface movements are kept within prior agreed limits to protect ride quality and drainage gradients.

6.11 Installation of the service tunnel under the highway shall be executed on a 24-hour continuous basis.

Technical Approval

6.12 In addition to 2.14, the TAA shall consider where applicable the following aspects (this list is not necessarily exhaustive):

(i) Temporary supports to construction processes that may affect the stability or integrity of the existing highway, Highway Structures, Statutory Undertakers' equipment and similar cables and pipelines owned by others, and public safety;

(ii) Safeguards to ensure that tunnelling effects are kept within limits that protect pavement riding quality and drainage gradients at carriageway level;

(iii) Arrangements for a condition survey prior to installation and carriageway monitoring during and after the tunnel drive and installation;

(iv) Impact on traffic management, delays during construction and future maintenance proposals.

Documentation

6.13 The relevant model AIP for Small Service Tunnels within the scope of this Chapter is A5 from Annex A. The relevant model certificate is C1 from Annex C. The form of certificates may vary depending on the Overseeing Organisation's particular requirements.

7. MECHANICAL AND ELECTRICAL INSTALLATIONS

Introduction

7.1 This Chapter describes specific TA requirements for mechanical and electrical (M&E) installations in Highway Structures and shall be read in conjunction with Chapters 1, 2 and 3 or 5 as appropriate.

Scope

7.2 In addition to 1.8, the procedures described in this Chapter shall apply without limitation to the following:

(a) Moveable bridges and bridge access gantries.

(b) Road Tunnels and tunnel services buildings.

(c) Pumped drainage installations for underpasses.

Category

7.3 In addition to 2.3 and 2.4, Proposals for work covered by this Chapter shall be in Category 3.

Proposals

7.4 In addition to 2.6 to 2.8, Proposals shall:

(i) Be presented in terms of preliminary and/or final design proposals as appropriate with due consideration to whole life costs.

(ii) Fully describe the provision to be made for component replacement and provision for keeping the facility operational in the event of component failure.

(iii) Include a draft report on maintenance and operating procedures (Safety Consultation Document) based on the relevant model document in Annex A.

Technical Approval

7.5 In addition to 2.14, the TAA shall consider where applicable the following aspects (this list is not necessarily exhaustive):

(i) The adequacy of the consultation and proposals forming the basis of the draft Operating Procedures (Safety Consultation Document).

(ii) For moveable bridges:

1. The provision of integrated methods of incorporating safety of road users and bridge operatives e.g. road barriers and traffic lights, linked to the bridge moving mechanism, to safeguard bridge users.

2. The static and dynamic loading and design criteria under normal and adverse operating conditions including ‘locked-in’ stresses and over-turning.

3. That all loads for the M&E design are consistent with those for the design of the bridge structure.

4. The adequacy of system redundancy to guard against single component failure.

5. The provision for manual operation in the event of power failure or equipment failure.

Certification

7.6 The design and check certificates shall take account of 2.27 to 2.33 and be carried out in two stages.

(i) Stage 1 certificates shall confirm that the principles in the AIP are valid and that they have been translated into appropriate levels of equipping, design and specification. It shall also confirm that sufficient information has been provided to enable the detailed design of the installation to be developed and completed in accordance with the Overseeing Organisation's requirements and that details of work tests and commissioning trials have been specified for the purpose of performance verification and formal handover.

(ii) Stage 2 certificates shall confirm that the completed design Proposals, the testing of components and the commissioning of the complete installation meet the Overseeing Organisation's requirements.

(iii) The format and wording of Stage 1 and Stage 2 certificates shall be agreed with the TAA.

7.7 A copy of the relevant Safety Consultation Document with original signatures shall accompany the design and check certificates.

Documentation

7.8 The relevant model AIPs for Highway Structures within the scope of this Chapter are A3 and A4 from Annex A. The relevant Safety Consultation Documents are A6 and A7 from Annex A. Relevant model certificate is C1 from Annex C. The form of certificates may vary depending on the Overseeing Organisation's particular requirements.

8. REFERENCES

8.1 **Design Manual for Roads and Bridges**

BD 26 – Design of Lighting Columns
(DMRB 2.2.1)

BD 78 – Design of Road Tunnels (DMRB 2.2.9)

8.2 **Manual of Contract Documents for Highway Works**

Volume 1: Specification for Highway Works
(MCHW 1)

8.2 **Value for Money Manual**

Value for Money Manual (TSO 1999)

9. ENQUIRIES

All technical enquiries or comments on this Advice Note should be sent in writing as appropriate to:

Chief Highway Engineer
The Highways Agency
St Christopher House
Southwark Street
London SE1 0TE

G CLARKE
Chief Highway Engineer

Chief Road Engineer
Scottish Executive Development Department
Victoria Quay
Edinburgh
EH6 6QQ

J HOWISON
Chief Road Engineer

Chief Highway Engineer
The National Assembly for Wales
Cynulliad Cenedlaethol Cymru
Crown Buildings
Cathays Park
Cardiff CF10 3NQ

J R REES
Chief Highway Engineer

Director of Engineering
Department for Regional Development
Roads Service
Clarence Court
10-18 Adelaide Street
Belfast BT2 8GB

G W ALLISTER
Director of Engineering

ANNEX A

Model AIP Forms

A1	For the design or assessment of bridges and other Highway Structures
A2	For the design or assessment of Road Tunnel structures and Large Service Tunnels
A3	For M&E installations in moveable bridges and access gantries
A4	For M&E installations in Road Tunnels and services buildings
A5	For the design or assessment of Small Service Tunnels
A6	Safety Consultation Document Operation, Control and Maintenance of Moveable Bridges and Bridge Access Gantries
A7	Safety Consultation Document Tunnel Operation, Control and Maintenance

Annex A1

Model form of Approval in Principle for the design/ assessment[1] of bridges and other highway structures

Name of Project _____

Name of Bridge or Structure _____

Structure Ref No _____

1. HIGHWAY DETAILS

1.1 Type of highway
1.2 Permitted traffic speed 2
1.3 Existing weight restriction 3

2. SITE DETAILS

2.1 Obstacles crossed

3. PROPOSED STRUCTURE

3.1 Description of structure
3.2 Structural type
3.3 Foundation type
3.4 Span arrangements
3.5 Articulation arrangements
3.6 Road restraint system type
3.7 Proposed arrangements for maintenance and inspection/Inspection for Assessment[1]
- 3.7.1 Traffic management
- 3.7.2 Access
- 3.7.3[A] Intrusive or further investigations proposed

3.8 Materials and finishes/Materials strengths assumed and basis of assumptions[1] 4
3.9 Risks and hazards considered 5
3.10[D] Estimated cost of proposed structure together with other structural forms considered and the reasons for their rejection including comparative whole life costs with dates of estimates
3.11[D] Proposed arrangements for construction
- 3.11.1 Traffic management
- 3.11.2 Service diversions
- 3.11.3 Interface with existing structures

3.10[A] Year of construction
3.11[A] Reason for assessment
3.12[A] Part of structure to be assessed

4. DESIGN/ASSESSMENT[1] CRITERIA

4.1 Live loading, Headroom
- 4.1.1 Loading relating to normal traffic under AW regulations and C&U regulations 6
- 4.1.2 Loading relating to General Order Traffic under STGO regulations 7
- 4.1.3 Footway or footbridge live loading
- 4.1.4 Loading relating to Special Order Traffic, provision for exceptional abnormal indivisible loads including location of vehicle track on deck cross-section 8
- 4.1.5 Any special loading not covered above
- 4.1.6 Heavy or high load route requirements and arrangements being made to preserve the route, including any provision for future heavier loads or future widening
- 4.1.7 Minimum headroom provided _____ m
- 4.1.8 Authorities consulted and any special conditions required

4.2 List of relevant documents from the TAS
- 4.2.1 Additional relevant Standards

4.3 Proposed departures from Standards given in 4.2 and 4.2.1
4.4 Proposed methods for dealing with aspects not covered by Standards in 4.2 and 4.2.1

5. STRUCTURAL ANALYSIS

5.1 Methods of analysis proposed for superstructure, substructure and foundations
5.2 Description and diagram of idealised structure to be used for analysis
5.3 Assumptions intended for calculation of structural element stiffness
5.4 Proposed earth pressure coefficients (k_a, k_0 or k_p) to be used in the design/assessment[1] of earth retaining elements

6. GEOTECHNICAL CONDITIONS

6.1 Acceptance of recommendations of Section 8 of the Geotechnical Report to be used in the design/assessment[1] and reasons for any proposed changes
6.2 Geotechnical Report Highway Structure Summary Information (Form C)[9]
6.3 Differential settlement to be allowed for in the design/assessment[1] of the structure
6.4[D] If the Geotechnical Report is not yet available, state when the results are expected and list the sources of information used to justify the preliminary choice of foundations [10]

7. CHECKING

7.1 Proposed Category
7.2 If Category 3, name of proposed independent Checker
7.3[D] Erection proposals or temporary works for which an independent check will be required, listing parts of the structure affected with reasons for recommending an independent check

8. DRAWINGS AND DOCUMENTS

8.1 List of drawings (including numbers) and documents accompanying the submission [11]
8.2[A] List of construction and record drawings (including numbers) to be used in the assessment
8.3[A] List of pile driving or other construction records [12]
8.4[A] List of previous inspection and assessment reports

9. THE ABOVE IS SUBMITTED FOR ACCEPTANCE

Signed _____

Name _____

Design/Assessment[1] Team Leader

Engineering Qualifications _____ [13]

Name of organisation _____

Date _____

10. THE ABOVE IS REJECTED/AGREED SUBJECT TO THE AMENDMENTS AND CONDITIONS SHOWN BELOW[1, 14]

Signed _____

Name _____

Postion held _____

Engineering Qualifications _____ [13]

TAA _____

Date _____

Notes

D. *Indicates clauses to be used in Design AIP only*

A. *Indicates clauses to be used in Assessment AIP only*

1. *Delete as appropriate*

2. *For a bridge, give over and/or under*

3. *Include restrictions at or adjacent to the bridge and any environmental restrictions*

4. *From record drawings or intrusive investigation*

5. *eg Risks and Hazards required to be considered under CDM such as construction methods, future demolition, jacking for bearing replacement*

6. *eg HA Loading*

7. *eg HB or SV Loading*

8. *Include the following as applicable:*

a) Gross weight of the vehicle in tonnes and vehicle No
b) Axle load and spacing (longitudinally and transversely)
c) Air cushion in tonnes over area applied in m x m
d) Single or twin tyres and wheel contact areas

9. *Include the Geotechnical Report Highway Structure Summary Information Form C listing relevant design/assessment parameters*

10. *When the results of the ground investigation become available, an addendum to the AIP, covering section 6, shall be submitted to the TAA. The addendum shall have its own sections 8, 9 and 10 to provide a list of drawings, documents and signatures*

11. *Include, without limitation:*

a) Technical Approval Schedule (TAS)
b) General Arrangement Drawing
c) Relevant extracts from the Geotechnical Report (Section 8), Inspection Report, Intrusive Investigation Report, Previous Assessment Report (or reference for Report)
d) Departures from Standards
e) Methods of dealing with aspects not covered by Standards
f) Relevant correspondence and documents from consultations

12. *Include details of previous structural maintenance and/or strengthening works*

13. *CEng, MICE, MIStructE or equivalent*

14. *AIP is valid for three years after the date of agreement by the TAA. If the construction has not yet commenced within this period, the AIP shall be re-submitted to the TAA for review*

Annex A2

Model form of Approval in Principle for the design or assessment of road tunnel structures and large service tunnels

Name of Project _____

Name of Road/Large Service Tunnel _____

Road/Large Service Tunnel Ref No _____

1. HIGHWAY DETAILS

1.1 Type of highway
1.2 Permitted traffic speed

2. TUNNEL DETAILS

2.1 Basic layout 1
2.2 Restrictions to traffic

3. BRIEF DESCRIPTION OF TUNNEL, TRAFFIC AND TUNNEL GEOMETRY

3.1 Structural form of tunnel
3.2 Structural form of portal structures
3.3 Traffic and Geometry
- 3.3.1 Horizontal and vertical alignment of tunnel and tunnel approaches
- 3.3.2 Cross-section 2
- 3.3.3 Highway Standards 3
- 3.3.4 Accommodation of M&E services in Tunnel 4
- 3.3.5 Minimum headroom (traffic gauge), horizontal clearances
- 3.3.6 Structure gauge

3.4 Proposed arrangements for inspection and maintenance
3.5 Provision to be made in the tunnel layout for emergency communication and escape facilities, fire points, cross passages etc
3.6 Landscaping above tunnel and protection of tunnel roof
3.7 Materials and finishes for structural walls, ceiling and secondary cladding including fire protection
3.8 Estimate cost of proposed structure together with other structural forms considered and the reasons for their rejection - give comparative whole life costs (with date of estimate)

4. DESIGN CRITERIA

4.1 Live loading, Headroom
- 4.1.1 Loading relating to normal traffic under AW regulations and C&U regulations 5
- 4.1.2 Loading relating to General Order Traffic under STGO regulations 6
- 4.1.3 Loading relating to Special Order Traffic, provision for exceptional abnormal indivisible loads including location of vehicle track on deck cross-section 7
- 4.1.4 Side verge loading
- 4.1.5 Authorities consulted and any special conditions required
- 4.1.6 Is the tunnel on a heavy and/or high load route, and any provision for future heavier loads or future widening
- 4.1.7 Any loading from planned development over or adjacent to tunnel

4.2 List of relevant documents from the TAS
- 4.2.1 Additional relevant Standards

4.3 Proposed departures from Standards given in 4.2 and 4.2.1
4.4 Proposed methods for dealing with aspects not covered by Standards in 4.2 and 4.2.1

5. DESCRIPTION AND DIAGRAM OF IDEALISED STRUCTURE TO BE USED FOR ANALYSIS. METHODS OF ANALYSIS AND DESIGN PROPOSED FOR TUNNEL SUPPORT SYSTEM(S) AND PORTAL STRUCTURES

5.1 Methods of analysis proposed

5.2 Assumptions intended for calculation of structural element stiffness

5.3 Proposed earth pressure coefficients (k_a, k_0 or k_p)

5.4 Proposed fire design including protection of structure and cables

6. GEOTECHNICAL CONDITIONS

6.1 Geotechnical Report Highway Structure Summary Information (Form C)[8]. Give details of any further geotechnical investigation required to validate basis of design/assessment

6.2 Acceptance of recommendations of Section 8 of the Geotechnical Report to be used in the design/assessment[1] and reasons for any proposed changes. (A copy of the Geotechnical Report should be supplied to the TAA in advance of the AIP submission whenever possible)

6.3 Is there any evidence of past mining or is any current or future mineral extraction likely to affect the tunnel?

6.4 If the Geotechnical Report is not yet available, state when the results are expected and list the sources of information used to justify the preliminary choice of foundations 9

7. DRAINAGE AND WATERPROOFING

7.1 Details of proposed drainage

- 7.1.1 Ground water seepage, run off through the portals
- 7.1.2 Accidental spillage, water carried in by vehicles
- 7.1.3 Fire main burst
- 7.1.4 Tunnel washing

7.2 Details of proposed waterproofing

7.3 Articulation arrangement (immersed tube)

7.4 List special requirements of load drainage authority

8. TUNNEL SUPPORT SYSTEM AND METHOD OF CONSTRUCTION

8.1 Give the basis of the design of the tunnel support system for temporary and permanent conditions and any proposals for ground treatment

8.2 Show how the proposed method of construction, ie excavation and application of ground support, will ensure the continued safe use of the highway and prevent structural failure of the carriageway

8.3 Give details of predicted tunnelling effects on adjoining structures and the carriageway; including maximum vertical settlement and trough width

8.4 Indicate any proposals to use explosives. State any vibration limits adopted or imposed. Have specific site rules relating to charge weight, distance, peak particle velocity and frequency been determined?

8.5 State method(s) to be adopted to monitor and control the effects of tunnel construction to ensure compliance with any criteria imposed to limit surface movements or vibrations

9. CHECKING

9.1 Structure to be Category 3 10

9.2 Name of proposed independent Checker

10. DRAWINGS AND DOCUMENTS

10.1 List of drawings (including numbers) and documents accompanying the submission 11

11. THE ABOVE IS SUBMITTED FOR ACCEPTANCE

Signed _____

Name _____
Design Team Leader

Engineering Qualifications _____ [12]
Name of organisation

Date _____

12. THE ABOVE IS REJECTED/AGREED SUBJECT TO THE AMENDMENTS AND CONDITIONS SHOWN BELOW[13]

Signed _____

Name _____
Postion held

Engineering Qualifications _____ [12]

TAA _____

Date _____

Notes

1. *Number of tubes, lanes, length between portals*
2. *Include widths of lanes, verges, emergency stopping lanes, space outside traffic gauge provided for M&E equipment*
3. *Include design flows and speeds and any proposed Departures from highway Standards*
4. *A separate submission is required for M&E functions and tunnel services buildings*
5. *eg HA Loading*
6. *eg HB or SV Loading*
7. *Include the following as applicable:*
   a) *Gross weight of the vehicle in tonnes and vehicle No*
   b) *Axle load and spacing (longitudinally and transversely)*
   c) *Air cushion in tonnes over area applied in m x m*
   d) *Single or twin tyres and wheel contact areas*
8. *Include the Geotechnical Report Highway Structure Summary Information Form C listing relevant design/assessment parameters*
9. *When the results of the geotechnical investigation become available, an addendum to the AIP, covering section 6, should be submitted to the TAA. The addendum should have its own sections 8, 9 and 10 to provide a list of drawings, documents and signatures*
10. *Category 3 for Road Tunnel and Large Service Tunnel Structures*
11. *Include, without limitation:*
    a) *Technical Approval Schedule (TAS)*
    b) *General Arrangement Drawing*
    c) *Relevant extracts from the Geotechnical Report (Section 8)*
    d) *Departures from Standards*
    e) *Methods of dealing with aspects not covered by Standards*
    f) *Relevant correspondence and documents from consultations*
12. *CEng, MICE, MIStructE or equivalent*
13. *Delete as appropriate*

Annex A3

Model form of Approval in Principle for M&E installations in moveable bridges and access gantries

Name of Project _____

Name of Structure _____

Structure Ref No _____

1. HIGHWAY DETAILS
- 1.1 Type of highway
- 1.2 Permitted traffic speed

2. STRUCTURE DETAILS
- 2.1 Brief description of structure
- 2.2 Date of AIP for structure

3. GENERAL DESCRIPTION OF MECHANICAL AND ELECTRICAL INSTALLATION (M&E)
- 3.1 Proposed mode of operation of structure
- 3.2 Location of operating and control mechanism
- 3.3 Electrical power supply and distribution
- 3.4 Stand-by power facilities (UPS etc)
- 3.5 Whole life cost considerations

4. OPERATIONAL DESIGN CRITERIA (As relevant)
- 4.1 Live Loading
- 4.2 Traffic Loading
- 4.3 Snow Loading
- 4.4 Wind Loading
- 4.5 Temperature Range
- 4.6 Any Special Loading not listed above (eg ship impact)
- 4.7 List relevant Safety Consultation document
  - 4.7.1 Additional relevant Standards
- 4.8 Proposed departures from Standards given in 4.7 and 4.7.1
- 4.9 Proposed methods of dealing with aspects not covered by Standards in 4.7 and 4.7.1

5. BASIS OF OPERATION AND CONTROL
- 5.1 Normal operation conditions
- 5.2 Authorities consulted
- 5.3 State any special requirements imposed during liaison with such authorities
- 5.4 Describe communications system involved
- 5.5 Design requirements for emergency works testing and site operating conditions
- 5.6 Fail safe operation safety systems, failure and mode effect (FME) analysis
- 5.7 Arrangements for commissioning and handover to maintaining authority including relevant documentation, operators' manuals

6. PLANT ROOM
- 6.1 General layout
- 6.2 Drainage and associated pumping requirements
- 6.3 Plant room environment; heating, lighting, humidity, ventilation
- 6.4 Mechanical and electrical equipping
- 6.5 Security; intruder and fire alarm systems
- 6.6 Proposed fire fighting measures

7. DESCRIPTION OF INSPECTION AND MAINTENANCE ARRANGEMENTS
- 7.1 Proposals for inspection and maintenance of the moveable bridge structure or gantry are given in the AIP for the structure
- 7.2 Proposals for inspection and maintenance of M&E installation
- 7.3 Proposed documentation
- 7.4 Proposals for plant monitoring, data collection and management

8. CHECKING

8.1 M&E installation to be Category 3 [4]
8.2 Name of proposed independent Checkers

9. DRAWINGS AND DOCUMENTS

9.1 List of drawings and documents (including numbers) accompanying the submission [5]
9.2 List of documents relating to inspection, maintenance and safe operation

10. THE ABOVE IS SUBMITTED FOR ACCEPTANCE

Signed _____

Name _____
Design Team Leader

Engineering Qualifications _____ [6]

Name of organisation _____

Date _____

11. THE ABOVE IS REJECTED/AGREED SUBJECT TO THE AMENDMENTS AND CONDITIONS SHOWN BELOW[7]

Signed _____

Name _____

Postion held _____

Engineering Qualifications _____ [6]

TAA _____

Date _____

Notes

1. *For a bridge, give over and/or under*
2. *For example; Traffic, Police, Highway, Maintenance, Local, Harbour, River, Emergency Services*
3. *Maintenance manual and operator's manual including safe operating procedures*
4. *Category 3 for all M&E Installations*
5. *Include, without limitation:*
   a) *AIP for Structure*
   b) *General Arrangement Drawing*
   c) *Departures from Standards*
   d) *Aspects not covered by Standards*
   e) *Relevant correspondence and documents from consultations*
   f) *Relevant loading data from the structural design*
6. *CEng from an appropriate Chartered Engineering Institution*
7. *Delete as appropriate*

Annex A4

Model form of Approval in Principle for M&E installations in road tunnels and services buildings

Name of Project _____

Name of Structure _____

Structure Ref No _____

15. THE ABOVE IS SUBMITTED FOR ACCEPTANCE

Signed _____

Name _____
Design Team Leader

Engineering Qualifications _____ [30]
Name of organisation

Date _____

16. THE ABOVE IS REJECTED/AGREED SUBJECT TO THE AMENDMENTS AND CONDITIONS SHOWN BELOW[31]

Signed _____

Name _____
Postion held

Engineering Qualifications _____ [30]

TAA _____

Date _____

Notes

1. *Design speed and during maintenance*
2. *Number of tubes, lanes, length between portals*
3. *For example; Traffic, Police, Highway, Maintenance, Local, Harbour, River, Emergency Services*
4. *Widths, heights, horizontal and vertical alignments*
5. *Ambient temperature variations, relative humidity, effects of tunnel washing, road salts etc*
6. *Traffic composition and system, tunnel site aspects, environmental effects, air velocities, response to fire*
7. *Pollution thresholds and emission criteria*
8. *Basis of determination of fresh air requirements, provision for smoke control details of computer modelling*
9. *Management of carbon monoxide, visibility, wind speed and direction, tunnel air velocity*
10. *Road and wall surface maintenance factor*
11. *Including any limitations imposed by the Drainage Authority*
12. *Ground water, precipitation, wall washing, fire fighting supplies*
13. *Ventilation, gas detectors, fire prevention and control including automatic systems*
14. *Fire scenarios and fire modelling, fire loading*
15. *Fire points and equipment communications, escape means, smoke control, operating procedures*
16. *Protection of structure, cabling, role of secondary cladding, cross connection doors*
17. *Fire detection and control including automatic systems*

18. *Emergency public, service, fire phones*

19. *Communication between Police, Fire Brigade, Ambulance, Maintaining Authority including system of underground communication*

20. *Including advance warning and diversions, vehicle over height detection*

21. *Automatic traffic surveillance, closed circuit television*

22. *Provision for various operating conditions and resources entailed*

23. *Details of high voltage distribution on the road tunnel side of Electricity Supply Authority boundary*

24. *Uninterrupted power supply, justification for standby generator*

25. *Type, location and protection*

26. *Including a drawing of all plant floors showing equipment layout*

27. *Plant room and access way loading indicating any loading restrictions in the provision made for transfer and temporary positioning of heavy plant during installation maintenance or replacement*

28. *Including fire alarm systems*

29. *Include, without limitation:*

    a) *Technical Approval Schedule (TAS)*
    b) *General Arrangement Drawing*
    c) *Departures from Standards*
    d) *Aspects not covered by Standards*
    e) *Relevant correspondence and documents from consultations*

30. *CEng from an appropriate Chartered Engineering Institution*

31. *Delete as appropriate*

Annex A5

Model form of Approval in Principle for the design or assessment of small service tunnels

Name of Project _____

Name of Small Service Tunnel _____

Small Service Tunnel Ref No _____

1. PROJECT DESCRIPTION

1.1 State purpose for which tunnel is required and give details of alternative routes that have been considered and reasons why they will not serve

2. NAME OF TUNNEL AND ROAD NUMBER

2.1 Location of tunnel 1

2.2 Description of carriageway construction 2

3. TUNNEL GEOMETRY AND STRUCTURE

3.1 Length 3

3.2 Cross-section 4

3.3 State structure and form of tunnel and give geometric requirements 5

3.4 Proposed arrangements for inspections and maintenance 6

3.5 Materials and finishes 7

3.6 List risks and hazards considered and give reasons for special safety measures deemed necessary (eg fire) for both construction and operating periods 8

4. DESIGN LOADS AND DOCUMENTS

4.1 Live Loading

4.1.1 Loading relating to normal traffic under AW regulations and C&U regulations 9

4.1.2 Loading relating to General Order Traffic under STGO regulations 10

4.1.3 Loading relating to Special Order Traffic, provision for exceptional abnormal indivisible loads including location of vehicle track on deck cross-section 11

4.1.4 Any loading imposed by other structures/Statutory Authorities' equipment 12

4.1.5 Authorities consulted and any special conditions required 13

4.2 List relevant documents from the TAS

4.2.1 Additional relevant Standards

4.3 Proposed departures from Standards given in 4.2 and 4.2.1

4.4 Proposed methods for dealing with aspects not covered by Standards 4.2 and 4.2.1

5. TUNNEL DESIGN, METHOD OF CONSTRUCTION, SITE SUPERVISION

5.1 Give the basis of the design of the tunnel support system for temporary and permanent conditions and any proposals for ground treatment

5.2 Show how the proposed method of construction, ie excavation and application of ground support, will ensure the continued safe use of the highway and prevent structural failure of the carriageway. Include proposals for dealing with over-breaking, annular space and emergency stoppage of work

5.3 Give details of predicted long and short term tunnelling effects on the carriageway; including maximum vertical settlement and trough width and consequential effects on structures or Statutory Undertakers' equipment within the zone of influence of the tunnelling work

5.4 Indicate any proposal to use explosives. State any vibration limits adopted or imposed. State specific site rules relating to charge weight, distance, peak particle velocity and frequency that have been determined

5.5 State method to be adopted to monitor the effects of tunnel construction to ensure compliance with any criteria imposed to limit surface movements or vibrations

5.6 State arrangements to halt work in the event of unforeseen circumstances and arrangements for repair and maintenance

6. GEOTECHNICAL CONDITIONS

6.1 Acceptance of recommendations of Section 8 of the Geotechnical Report and reasons for any proposed changes

6.2 Geotechnical Report Highway Structure Summary Information (Form C)[14]. Give details of any further geotechnical investigation required to validate basis of design/assessment

6.3 Indicate any evidence of past mining or any current or future mineral extraction likely to affect the tunnel

6.4 If the Geotechnical Report is not yet available, state when the results are expected and list the sources of information used to justify the preliminary choice [15]

7. DESIGN AND CHECK CERTIFICATION

7.1 Nominated Designer responsible for design

7.2 Proposed category of structure [16]

7.3 If Category 3, nominated Checker

8. DRAWINGS AND DOCUMENTS

8.1 List of drawings (including numbers) and documents accompanying the submission [17]

9. THE ABOVE IS SUBMITTED FOR ACCEPTANCE

Signed _____

Name _____

Design Team Leader

Engineering Qualifications _____ [18]

Name of organisation _____

Date _____

10. THE ABOVE IS REJECTED/AGREED SUBJECT TO THE AMENDMENTS AND CONDITIONS SHOWN BELOW[19]

Signed _____

Name _____

Position held _____

Engineering Qualifications _____ [19]

TAA _____

Date _____

Notes

1. *Relate to highway chainage marker post and map reference*
2. *Type of construction, materials, depth of construction etc*
3. *State length within limits of trunk road land*
4. *Internal and external diameters or principal dimensions if non-circular*
5. *Invert level and cover. Include drawings showing tunnel location, horizontal and vertical alignments, cross-sections, depth below ground, minimum cover to crown and/or carriageway, other structures and Statutory Undertakers' equipment that is affected*
6. *Method of entry and system of work*
7. *Temporary and permanent support materials*
8. *eg Risks and Hazards required to be considered under CDM such as construction methods*
9. *eg HA Loading*
10. *eg HB or SV Loading*
11. *Include the following as applicable:*
    a) *Gross weight of the vehicle in tonnes and vehicle No*
    b) *Axle load and spacing (longitudinally and transversely)*
    c) *Air cushion in tonnes over area applied in m x m*
    d) *Single or twin tyres and wheel contact areas*
12. *For example; retaining walls, foundations*
13. *Overseeing Organisation, Highway Authorities and Statutory Undertakers, including water, gas, electric companies, telecommunications operator*
14. *Include the Geotechnical Report Highway Structure Summary Information Form C listing relevant design parameters*
15. *When the results of the ground investigation become available, an addendum to the AIP, covering section 6, should be submitted to the TAA. The addendum should have its own sections 8, 9, and 10 to provide a list of drawings, documents and signatures*
16. *Category 2 or 3 only*
17. *Include, without limitation:*
    a) *Technical Approval Schedule (TAS)*
    b) *General Arrangement Drawing*
    c) *Relevant extracts from the Geotechnical Report (Section 8)*
    d) *Departures from Standards*
    e) *Methods of dealing with aspects not covered by Standards*
    f) *Relevant correspondence and documents from consultations*
18. *CEng, MICE, MIStructE or equivalent*
19. *Delete as appropriate*

Annex A6

Model form of background discussion document for appending to AIP

Name of Project _____

Name of Structure _____

Structure Ref No _____

THE OPERATION, CONTROL AND MAINTENANCE OF MOVEABLE BRIDGES AND BRIDGE ACCESS GANTRIES - SAFETY CONSULTATION DOCUMENT

6. The provisions and procedures described in this document, draft No (number) dated (date) were accepted by the working party on (date)

Signed _____
Project Manager of the Overseeing Organisation

Name _____

Engineering Qualifications _____ [2]

Date _____

APPENDICES

A General Layout
B General details of system
C Communications
(i) General provision
(ii) Location of contacts

Notes

1. *The Moveable Bridge/Bridge Access Gantry Design and Safety Consultation Group should carry out similar functions to the Tunnel Design and Safety Consultation Group (TDSCG) (see BD 78 DMRB 2.2.9)*

2. *CEng from an appropriate Chartered Engineering Institution*

Annex A7

Model form of background discussion document for appending to AIP

Name of Project _____

Name of Structure _____

Structure Ref No _____

TUNNEL OPERATION, CONTROL AND MAINTENANCE - SAFETY CONSULTATION DOCUMENT

1. INTRODUCTION

- 1.1 Purpose of Tunnel Design and Safety Consultation Group (TDSCG) (see BD 78 DMRB 2.2.9)
- 1.2 Terms of reference
- 1.3 Organisational responsibilities
- 1.4 Overview (see Appendices)
- 1.5 Safety considerations for road tunnels
- 1.6 Traffic Management & Signing
- 1.7 Tunnel Plant
  - 1.7.1 Ventilation
  - 1.7.2 Lighting
  - 1.7.3 Drainage
  - 1.7.4 Role in emergencies
- 1.8 Communications
  - 1.8.1 Tunnel
  - 1.8.2 Regional
  - 1.8.3 Emergency
- 1.9 Power Supply
  - 1.9.1 Normal distribution
  - 1.9.2 Emergency arrangements
- 1.10 Emergency Equipment
  - 1.10.1 Fire points
  - 1.10.2 Telephones
  - 1.10.3 CCTV
  - 1.10.4 Cross Connections between tunnel bores
- 1.11 Tunnel Services Building and Plant Room
  - 1.11.1 Functions
  - 1.11.2 Maintenance Access
  - 1.11.3 Security Protection
  - 1.11.4 Fire Protection

2. POLICE

- 2.1 Functions
- 2.2 Police HQ facilities
- 2.3 Traffic control
- 2.4 Emergency closures
- 2.5 Radio communication
- 2.6 Police computer terminal operations manual
- 2.7 Special requirements

3. FIRE BRIGADE
- 3.1 Fire fighting facilities - Tunnel
- 3.2 Fire fighting facilities - Services building
- 3.3 Accidental spillages
- 3.4 Radio communications

4. AMBULANCE SERVICE
- 4.1 General
- 4.2 Radio communications

5. ENVIRONMENT AGENCY
- 5.1 General
- 5.2 Specific requirements

6. MAINTAINING AUTHORITY
- 6.1 General
- 6.2 Lines of communication and emergency cover
- 6.3 Documentation
  - 6.3.1 Maintenance and Inspection manuals
  - 6.3.2 Permit to work
  - 6.3.3 Condition monitoring
- 6.4 Use of tunnel data
- 6.5 Day-to-day operations
- 6.6 Planned maintenance activities
- 6.7 Emergencies
- 6.8 Plant failure recording
- 6.9 Tunnel maintenance equipment
  - 6.9.1 Wall washing requirements
  - 6.9.2 Maintenance access

7. TRAINING

8. MAINTENANCE CONTRACTS
- 8.1 General

9. TUNNEL EMERGENCIES
- 9.1 General
- 9.2 Fire plan
- 9.3 Major incident response
  - 9.3.1 Use of emergency cross passages (doors)
  - 9.3.2 Emergency drill exercise

10. The provisions and procedures described in this document draft No. (number) dated (date), were accepted by the working party on (date)

Signed _____
Project Manager of the Overseeing Organisation

Name _____

Engineering Qualifications _____ 2

Date _____

APPENDICES

A. Plan of route
B. Cross section of tunnel
C. Plan of tunnel identifying:
   (i) EPD's Fire points by number
   (ii) Bores
   (iii) Cross passages
   (iv) Fan positions, overrides and controls
D. Communications
   (i) General layout
   (ii) Location of CCTV
E. Tunnel drainage
F. Traffic management plan

Notes

1. *Police, Fire Brigade, Ambulance Service, Environment Agency, Maintaining Authority*

2. *CEng from an appropriate Chartered Engineering Institution*

ANNEX B

Model TA Schedules

ANNEX B1

Schedule of Documents Relating to Design or Assessment of Highway Bridges and Structures

British Standards

BS 5268;	Part 2; (Date)*	Structural Use of Timber
BS 5400		Steel concrete and composite bridges
	Part 1; (Date)*	General Statement (see BD 15 (DMRB 1.3.2))
	Part 2; (Date)*	Specification for loads (as implemented by BD 37 (DMRB 1.3))
	Part 3; (Date)*	CP for design of steel bridges (see BD 13 (DMRB 1.3))
	Part 4; (Date)*	CP for design of concrete bridges (see BD 24 (DMRB 1.3.1))
	Part 5; (Date)*	CP for design of composite bridges (see BD 16 (DMRB 1.3))
	Part 9; (Date)*	Bridge bearings (see BD 20 (DMRB 2.3.1))
	Part 10; (Date)*	CP for fatigue (see BD 9 (DMRB 1.3))
BS 5628;	Part 1; (Date)*	Unreinforced Masonry
BS 5930;	(Date)*	Site Investigations
BS 6031;	(Date)*	Earthworks
BS 8002;	(Date)*	Earth retaining structures
BS 8004;	(Date)*	Foundations
BS 8118;	(Date)*	The structural use of aluminium
BS EN 1317-1-1998 Road Restraints Systems - Part 1		Terminology and general criteria for test methods
BS EN 1317-2-1998 Road Restraint Systems - Part 2		Performance classes, impact test acceptance criteria and test methods for safety barriers
BS EN 1317-3-2000 Road Restraint Systems - Part 3		Performance classes, impact test acceptance criteria and test methods for crash cushions
ENV 1317-4-2002 Road Restraint Systems - Part 4		Terminals and Transitions

Department of Transport Local Government and the Regions (DTLR)

Railway Group Approved Code of Practice GC/RC5510: Recommendations for the Design of Bridges (1998)

Railway Group Approved Code of Practice GC/RT5204: Structure Gauging and Clearances

Simplified Tables of External Loads on Buried Pipelines (1986)

Miscellaneous

Circular Roads No 61/72 - Routes for heavy and high abnormal loads

The Manual of Contract Documents for Highway Works (MCDHW)

Volume 1: Specification for Highway Works (Date)*

Volume 2: Notes for Guidance on the Specification for Highway Works (Date)*

Volume 3: Highway Construction Details (Date)*

The Design Manual for Roads and Bridges (DMRB)

Bridges and Structures, Advice Notes (BA Series)

The current alpha-numeric index in the DMRB, Volume 1, Section 0, Part 2 should be reproduced.

Bridges and Structures, Standards (BD Series)

The current alpha-numeric index in the DMRB, Volume 1, Section 0, Part 2 should be reproduced.

Bridges and Structures, Technical Memoranda (BE Series)

The current alpha-numeric index in the DMRB, Volume 1, Section 0, Part 2 should be reproduced.

Traffic Engineering and Control, Standards (TD Series)

TD 9/(Date)*	Road layout and geometry. Highway link design
TD 19/(Date)*	Safety fences and barriers
TD 27/(Date)*	Cross Sections and headroom
TD 36/(Date)*	Subways for pedestrians and cyclists, layout and dimensions

Highways, Advice Notes (HA Series)

HA 66/(Date)*	Environmental Barriers - Technical Requirements

Highways, Standards (HD Series)

HD 22/(Date)*	Ground Investigation and Earthworks - Procedure for Geotechnical Certification

* The compiler of the AIP should insert the current date of publication of the asterisked British Standards. MCHW and DMRB Standards and Advice Notes. This should be in the form of the year of publication for British Standards, the month and year of publication for MCHW, and the last two digits of the year of publication for DMRB Standards and Advice Notes. The dates of any Amendments should also be included.

ANNEX B2

Schedule of Documents Relating to Design of Temporary Works

British Standards

BS 449	Part 2	1969	-	Specification for the use of structural steel in building
BS 1139	Part 1: Section 1.1	(Date)*	-	Metal Scaffolding. Tubes. Specification for Steel Tube
BS 1139	Part 1: Section 1.2	(Date)*	-	Metal Scaffolding. Tubes. Specification for Aluminium Tube
BS 1139	Part 2: Section 2.1	(Date)*	-	Metal Scaffolding. Couplers. Specification for Steel Couplers, Loose Spigots and Baseplates for use in Working Scaffolds and Falsework Made of Steel Tubes
BS 1139	Part 2: Section 2.2	(Date)*	-	Metal Scaffolding. Couplers. Specification for Steel and Aluminium Couplers, Fittings and Accessories for use in Tubular Scaffolding
BS 1139	Part 3	(Date)*	-	Metal Scaffolding. Specification for Prefabricated Mobile Access and Working Towers
BS 1139	Part 4	(Date)*	-	Metal Scaffolding. Specification for Prefabricated Steel Splitheads and Trestles
BS 4074		(Date)*	-	Specification for Steel Trench Struts
BS 5950	Part 1	(Date)*	-	Structural use of Steelwork in Building. Code of Practice for Design of Rolled and Welded Sections
BS 5950	Part 2	(Date)*	-	Structural use of Steelwork in Building. Specification for Materials, Fabrication and Erection. Rolled and Welded Sections
BS 5950	Part 5	(Date)*	-	Structural use of Steelwork in Building. Code of Practice for Design of Cold Formed Thin Gauge Sections
BS 5973		(Date)*	-	Code of Practice for Access and Working Scaffolds and Special Scaffold Structures in Steel
BS 5974		(Date)*	-	Code of Practice for Temporarily Installed Suspended Scaffolds and Access Equipment
BS 5975		(Date)*	-	Code of Practice for Falsework
BS 6187		(Date)*	-	Code of Practice for Demolition
BS 6399	Part 1	(Date)*	-	Loading for buildings. Code of Practice for Dead and Imposed Loads
BS 6399	Part 2	(Date)*	-	Loading for buildings. Code of practice for wind loads

BS 7121	Part 1	(Date)*	-	Code of Practice for the Safe use of Cranes
BS 8081		(Date)*	-	Code of Practice for Ground Anchors
BS 8110	Part 1	(Date)*	-	Structural use of Concrete. Code of Practice for Design and Construction

Miscellaneous

Formwork - A Guide to Good Practice, 2nd edition, 1995. Concrete Society.

Design and Construction of Sheet Pile Cofferdams. CIRIA Report No. 95

Trenching Practice CIRIA Report No. 97

Concrete Pressure on Formwork. CIRIA Report No. 108

Control of Ground Water for Temporary Works. CIRIA Report No. 113

Concreting of Deep Lifts Large Volume Pours CIRIA Report No. 135

Formwork Striking Times. CIRIA Report No. 136

BSC Piling Handbook (Edition, Date)

Code of Practice for the Safe Use of Lifting Equipment. Lifting Equipment Engineers Association

* The compiler of the AIP should insert the current date of publication of the asterisked British Standards.

ANNEX B3

Schedule of Documents Relating to Design or Assessment of Road Tunnels, Large Service Tunnels and M&E Installations

Documents relating to Structures

The documents listed in Annex B1 make no specific reference to the design and construction of tunnel structures, but both Parts apply where they are appropriate to the type of construction and materials used, eg design of cut and cover construction and/or the design of discrete structural elements in other forms of tunnel construction. BD 78 (DMRB 2.2.9) gives general requirements for the performance of a tunnel structure.

Documents relating to M&E Installations

The procedural, contractual and technical performance requirements for the M&E Installations for road tunnels, movable bridges and bridge access gantries are contained in the Manual of Contract Documents for Highway Works (MCHW) Volume 5 Section 7. BD 78 (DMRB 2.2.9) describes the design and operational requirements for road tunnels and is compatible with MCHW Volume 5 Section 7.

Documents relating to Planning, Design, Operation and major Refurbishment

Guidance and requirements for decision making relevant to the planning, design, operation and major refurbishment of road tunnels is contained in BD 78 (DMRB 2.2.9). The requirements for the inspection and records required for road tunnels are given in BD 53 (DMRB 3.1.6). ***BA 72 (draft) provides advice on the maintenance of road tunnels.***

Acts and Statutory Instruments

In the planning, design, installation and operation of road tunnel and tunnel services buildings, it is the Designer's responsibility to identify and to ensure appliance with all relevant Acts and Statutory Instruments.

British Standards

BS 727		(Date)*	-	Specification for Radio-interference Measuring Apparatus
BS 4683		(Date)*	-	Specification for Electrical Apparatus for Explosive Atmospheres
BS 4683	Part 1	(Date)*	-	Classification of Maximum Surface Temperatures
BS 4683	Part 2	(Date)*	-	The Construction and Testing of Flameproof Enclosures of Electrical Apparatus
BS 5045		(Date)*	-	Transportable Gas Containers
BS 5045	Part 2	(Date)*	-	Specification for Steel Containers of 0.5 L up to 450 L Water Capacity With Welded Seams
BS 5045	Part 6	(Date)*	-	Specification for Seamless Containers of Less than 0.5 Litre Water Capacity
BS 5045	Part 7	(Date)*	-	Specification for Seamless Steel Gas Containers of Water Capacity 0.5 L up to 15 L for Special Portable Applications

BS 5045	Part 8	(Date)*	-	Specification for Seamless Aluminium Alloy Gas Containers of Water Capacity 0.5 L up to 15 L and up to 300 bar Charged Pressure at 15° C for Special Portable Application
BS 5445		(Date)*	-	Components of Automatic Fire Detection Systems
BS 5445	Part 5	(Date)*	-	Heat Sensitive Detectors – Point Detectors Containing a Static Element
BS 5445	Part 7	(Date)*	-	Specification for Point-Type Smoke Detectors using Scattered Light, Transmitted Light or Ionization
BS 5445	Part 8	(Date)*	-	Specification for High Temperature Heat Detectors
BS 5445	Part 9	(Date)*	-	Methods of Test of Sensitivity to Fire
BS 5499		(Date)*	-	Fire Safety Signs, Notices and Graphic Symbols
BS 5499	Part 1	(Date)*	-	Specification for Fire Safety Signs
BS 5499	Part 2	(Date)*	-	Specification for Self-Luminous Fire Safety Signs
BS 5499	Part 3	(Date)*	-	Specification for Internally-Illuminated Fire Safety Signs
BS 5499	Part 4	(Date)*	-	Code of Practice for Escape Route Signing
BS 5501		(Date)*	-	Electrical Apparatus for Potentially Explosive Atmospheres
BS 5501	Part 1	(Date)*	-	General Requirements
BS 5501	Part 2	(Date)*	-	Oil Immersion ‘o’
BS 5501	Part 4	(Date)*	-	Powder Filling ‘q’
BS 5501	Part 5	(Date)*	-	Flameproof Enclosure ‘d’
BS 5501	Part 6	(Date)*	-	Increased Safety ‘e’
BS 5501	Part 7	(Date)*	-	Intrinsic Safety ‘i’
BS 5501	Part 8	(Date)*	-	Electrical Apparatus for Potentially Explosive Atmospheres. Encapsulation ‘m’
BS 5501	Part 9	(Date)*	-	Specification for Intrinsically Safe Electrical Systems ‘i’
BS 6535		(Date)*	-	Fire Extinguishing Media
BS 6535 (BS EN 25923)	Part 1	(Date)*	-	Carbon Dioxide
BS 6941		(Date)*	-	Specification for Electrical Apparatus for Explosive Atmospheres with Type of Protection N
BS 7430		(Date)*	-	Code of Practice for Earthing
BS 7863		(Date)*	-	Recommendations for Colour Coding to Indicate the Extinguishing Media Contained in Portable Fire Extinguishers

BS EN 2	(Date)*	-	Classification of fires
BS EN 3	(Date)*	-	Portable Fire Extinguishers
BS EN 3-1	(Date)*	-	Description, Duration of Operation, Class A and B Fire Test
BS EN 3-2	(Date)*	-	Tightness, Dielectric Test, Tamping Test, Special Provisions
BS EN 3-3	(Date)*	-	Construction, Resistance to pressure, Mechanical Tests
BS EN 3-4	(Date)*	-	Charges, Minimum Required Fire
BS EN 3-5	(Date)*	-	Specification and Supplementary Tests
BS EN 3-6	(Date)*	-	Provisions for the Attestation of Conformity of Portable Fire Extinguishers in Accordance with EN 3 Part 1 to Part 5
BS EN 124	(Date)*	-	Gully Tops and Manhole Tops for Vehicular and Pedestrian Areas. Design Requirements, Type Testing, Marking, Quality Control
BS EN 25923	(Date)*	-	Carbon Dioxide
BS EN 50014	(Date)*	-	Electrical Apparatus For Potentially Explosive Atmospheres. General Requirements
BS EN 50015	(Date)*	-	Electrical apparatus For Potentially Explosive Atmospheres. Oil Immersion 'o'

Miscellaneous

The Traffic Signs Regulations and General Directions 1994 (S.I. 1994 No. 1519)

Reports of the PIARC (Permanent International Association of Road Congresses) Technical Committee on Road Tunnels

Proceedings of BHRA (British Hydromechanics Research Association) Symposiums

Department of Transport Local Government and the Regions (DTLR) or Highways Agency

List of Drawings, Specifications and Instruction: Traffic Systems and Lighting, MCS 206

* The compiler of the AIP should insert the current date of publication of the asterisked British Standards.

ANNEX B4

Schedule of Documents Relating to Design and Construction of Large and Small Service Tunnels

Guide to best practice for the installation of pipe jacks and micro-tunnels. (Pipe Jacking Association)

New Roads and Street Works Act – Specification for the Reinstatement of Openings in Highways. A Code of Practice. (Highways Authorities Utilities Committee) TSO.

The guide to Pipelines Safety Regulations HSE 1996

BS 6164 (Date)*	Code of Practice for Safety in Tunnelling in the Construction Industry.
BS 5911; Part 120 (Date)*	Precast Concrete Pipes. Fittings and Ancillary Products – Specification for Reinforced Jacking Pipes with Flexible Joints.

* The compiler of the AIP should insert the current date of publication of the asterisked British Standards.

ANNEX C

Model Certificates

C1	Highway Structures, including Road and Service Tunnels, in Categories 0, 1, 2 or 3 (May also be used as basis for Stage 1 and Stage 2 certification of M&E Installations)
C2	Lighting Column Systems
C3	Type 'A' temporary works
C4	Type 'B' temporary works
C5	Specification variation
C6	Construction Compliance

Annex C1

Model form of certificate for the design/assessment[1] and/or check[1] of Highway Structures, including Road and Service Tunnels, in Categories 0, 1, 2 or 3

Name of Project _____

Name of Structure _____

Structure Ref No _____

1. We certify that reasonable professional skill and care has been used in the preparation of the design/ assessment[1] and/or check[1] of Name of Structure with a view to securing that: 2

   i. It has been designed/assessed[1] and/or checked[1] in accordance with:

      a. The following Standards; **or** 3

      The Approval in Principle dated date including the following: 4

      5

      6

      b. The TAA directive for items listed in 2.ii below 7

   ii. It has been checked for compliance with the relevant Standards in i; **or** 8

   The assessed capacity of the structure is as follows: 9

   iii. It has been accurately translated into construction drawings and bar bending schedules (all of which have been checked)[10]. The unique numbers of these drawings and schedules are:

Signed _____

Name _____

Design/Assessment/Checking[1] Team Leader

Engineering Qualifications _____ 11

Signed _____

Name _____

Position held 12

Name of organisation _____

Date _____

2. i. The Departures from Standards and additional criteria given in paragraph 1 are agreed [7]

ii. It has been directed that the following items shall be dealt with as described [7]

[13]

3. The certificate is accepted by the TAA

Signed _____

Name _____

Position held

Engineering Qualifications _____ [14]

TAA _____

Date _____

Notes

1. *Delete if not required*
2. *Where several Category 0 or 1 structures occur in a project, they may be listed on one certificate*
3. *Used for Category 0 only. Insert relevant current Standards including amendments to date. This certificate will be accompanied by a General Arrangement drawing*
4. *Not required for Category 0. Insert date of agreement of the AIP by the TAA including the dates of any addenda. Note the AIP is valid for three years after the date of agreement by the TAA. If the construction has not yet commenced within this period, the AIP should be re-submitted to the TAA for review*
5. *List any Departures and additional methods or criteria*
6. *For the certification of M&E functions for Highway Structures, include here the reference number and date of the relevant Safety Consultation Document*
7. *Delete if not required. Note: not permitted for Categories 0 or 1 unless the TAA considers that the Departure has little or no structural implication*
8. *Delete for Categories 2 and 3, which require a separate check certificate*
9. *Used for assessments only*
10. *Applicable for Categories 0 and 1 design certificate only*
11. *CEng, MICE, MIStructE or equivalent*
12. *A Principal of the organisation responsible for the design or assessment*
13. *Describe the point at issue and the directed course of action*
14. *Engineer with appropriate degree qualification and experience for Categories 0 and 1, and with CEng, MICE, MIStructE or equivalent for Categories 2 and 3*

Annex C2

Model form of certificate for Lighting Column Systems on motorways and trunk roads

Name of Project _____

Lighting Column Ref No _____

1. We certify that the Lighting Column System accurately shown on drawing(s) numbers (list drawing numbers) has been designed/checked[1] for the following range of parameters[2] and fully complies with:

   i. The Specification for Highway Works (edition, date)

   ii. BD 26/(date) (DMRB 2.2.1)

   Signed _____

   Name _____

   Designer/Checker [1]

   Engineering Qualifications _____ [3]

   Signed _____

   Name _____

   Position held [4]

   Name of organisation _____ [5]

   Date _____

2. This certificate is accepted by the TAA

   Signed _____

   Name _____ Position held

   Engineering Qualifications _____ [3]

   TAA _____

   Date _____

Notes

1. *Delete as required*
2. *Specify the range of combinations of column heights and lengths of brackets together with the weights and windage areas of the lanterns for which the column has been designed*
3. *CEng, MICE, MIStructE or equivalent*
4. *A Principal of the organisation responsible for the design or check*
5. *Manufacturer or organisation responsible for the design or check*

Annex C3

Model form of certificate for type 'A' temporary works[1]

Name of Project _____

Name of Structure _____

Structure Ref No _____

We certify that reasonable professional skill and care has been used in the checking of the design for the temporary works comprising (description of temporary works)[2] listed in the attached schedule.

We also certify, but without undertaking any responsibility other than towards (name of organisation procuring the temporary works) that in our opinion the erection proposals and proposed temporary works details specified in the attached schedule for the construction of (project title) are satisfactory for the proper discharge of his responsibilities, for the safety of the said part of the Works and for their safe execution in accordance with the drawings and specification and without detriment to the related permanent works.

Signed _____

Name _____

Temporary Works Checker

Engineering Qualifications _____ [3]

_____

Name of organisation

Date _____

Signed _____

Name _____

Position held

_____

Name of organisation procuring the temporary works

Date _____

Notes

1. *A copy of this certificate should be forwarded to the TAA for retention with the AIP for the permanent structure to which it relates*
2. *The description to be inserted should define unambiguously the extent of the structure to which the check is to be applied. Where necessary the extent of the Works should be shown on the drawings and the relevant Drawing numbers stated*
3. *CEng, MICE, MIStructE or equivalent*

Annex C4

Model form of certificate for type 'B' temporary works

Name of Project _____

Name of Structure _____

Structure Ref No _____

1. We certify that reasonable professional skill and care has been used in the preparation of the design/check[3] of the temporary works comprising (description of temporary works) with a view to securing that:

   i. It has been designed/checked[3] in accordance with:

      a. The Approval in Principle dated (date) including the following: [1]

      [2]

      b. The TAA directives for the items listed in 3.ii below. [3]

   ii. The design proposals reflect the requirements of the relevant highway authorities for all affected highways.

   iii. The design of the temporary works has been accurately translated into temporary works drawings. The unique numbers of these drawings and schedules are:

   Signed _____

   Name _____

   Design/Checking[3] Team Leader

   Engineering Qualifications _____ [4]

   Signed _____

   Name _____

   Position held [5]

   Name of organisation _____

   Date _____

2. This certificate is received and consent to proceed has been given [6]

   Signed _____

   Name _____

   Position held

   Name of organisation _____

   Date _____

3. i. The Departures from Standards and additional criteria given in paragraph 1 are agreed. [3]

ii. It has been directed that the following items shall be dealt with as described. [3]

[7]

4. The certificate is accepted by the TAA

Signed _____

Name _____

Position held _____

Engineering Qualifications _____ [4]

TAA _____

Date _____

Notes

1. *Insert date of acceptance of the AIP by the TAA including the dates of any addenda*
2. *List any Departures and additional methods or criteria*
3. *Delete if not required*
4. *CEng, MICE, MIStructE or equivalent*
5. *A Principal of the organisation responsible for the design/check*
6. *This certificate is to be accepted by the TAA before consent to proceed can be given*
7. *Describe the point at issue and the directed course of action*

Annex C5

Model form of certificate for specification variation

Name of Project _____

Name of Structure _____

Structure Ref No _____

1. We certify that reasonable professional skill and care has been used in the preparation/check[1] of the following additional and substitute clauses; list clause numbers[2] to the bridgework series clauses of the Specification for Highway Works for (Name of Project or Structures).

   The text of these clauses is appended to this certificate.

   Signed _____

   Name _____

   Design/Check[1] Team Leader

   Engineering Qualifications _____ [3]

   Signed _____

   Name _____

   Position held [4]

   Name of organisation _____

   Date _____

2. The additional and substitute clauses listed in paragraph 1 above and appended to this certificate are agreed.

3. The certificate is accepted by the TAA

   Signed _____

   Name _____

   Position held _____

   Engineering Qualifications _____ [3]

   TAA _____

   Date _____

Notes

1. *Delete as appropriate*
2. *Only clauses that affect structural integrity eg new materials are required to be checked. The Category of check should be the same as in the AIP*
3. *CEng, MICE, MIStructE or equivalent*
4. *A Principal of the organisation responsible for the design or check*

Annex C6

Model form of certificate of construction compliance

Name of Structure _____

Structure Ref No _____

1. We certify that Name of Structure:

   i. Has been constructed, commissioned and tested[1] in accordance with:

      a. The Approval in Principle dated (date)

      b. The Design/Check Certificates dated (date) [1]

      c. The Specification for Highway Works (edition, date)

   ii. The construction of the works has been accurately translated into As Constructed drawings. The unique numbers of these drawings and schedules are:

Signed _____

Name _____

Contractor's Representative

Engineering Qualifications _____ [2]

Signed _____

Name _____

Position held [3]

Name of organisation _____

Date _____

2. We certify reasonable professional skill and care has been used in examining the construction of Name of Structure and that:

   i. It has been constructed, commissioned and tested[1] in accordance with:

      a. The Approval in Principle dated (date)

      b. The Design/Check Certificates dated (date) [1]

      c. The Specification for Highway Works (version, date)

   ii. The construction of the works has been accurately translated into As Constructed drawings scheduled in 1.ii.

Signed _____

Name _____

Position held [4]

Name of organisation _____

Date _____

3. This certificate is accepted by the TAA

Signed _____

Name _____

Position held _____

Engineering Qualifications _____ [2]

TAA _____

Date _____

Notes

1. *Delete as required*
2. *CEng, MICE, MIStructE or equivalent*
3. *A Principal of the Contractor or organisation responsible for the construction*
4. *A Principal of the Works Examiner*