

## Design Approval and Certification Process

On day 8 of the Inquiry, during cross examination, Mr Kenning outlined the processes he anticipated would be followed by Network Rail in respect of the works proposed under the Order (if made). The Inspector requested further details of the proposed approval and certification processes. This Note sets out the proposed processes in chronological order.

1. Order powers awarded.
2. Prior to approval in principle<sup>1</sup> of the Scheduled Works<sup>2</sup>:
  - (i) site access by Network Rail – by agreement with land owners or under article 18 of the Order (*Power to survey and investigate land*) . If by agreement, agreement in place for the duration of the works (and inspection of) & maintenance until full hand over to the highway authority.
3. Site visits
  - a. Site access for further site specific details for structures (Scheduled Works); geotechnical details and heights & levels for the immediate area of any structures.
  - b. Site walkout with the highway authority & Network Rail.
  - c. Creation of the schedule of works (this defines the required finish of the new diversionary route and any works to achieve this). Setting out of any hold points during construction. Agreeing / capturing any Ordinance Survey grid references and other details required for the Legal Event Modification Order (LEMO).
4. Detailed design of the Scheduled Works for each crossing to be submitted to the highway authority for approval.
5. Prior to the start of the works:
  - (i) approval of detailed design for structures; and
  - (ii) discharge of planning conditions by the local planning authority (NB not applicable to all crossings).
6. Prior to construction of the works:
  - (i) Network Rail to provide to the highway authority with a programme of construction works; and
  - (ii) identify proposed dates for hold points<sup>3</sup> for inspection of works for structures.

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<sup>1</sup> Via the process set out in DMRB BD2/12 'Technical Approval of Highway Structures'. BD2/12 has been adopted by Suffolk County Council as the appropriate standard for technical approval of highway structures on their highway and PROW network. An extract is appended to this Note.

<sup>2</sup> See Schedule 1 of the draft Order – essentially bridge structures over water course

<sup>3</sup> A 'hold point' is a point where an inspection by the approving authority will need to be carried out before further works are undertaken. An example of this is inspection of foundations, which would later be covered up by a structure, and thus making inspection of the foundations either very difficult or resulting in a structure having to be dismantled to allow inspection.

7. Construction undertaken of alternative route on the line in the Order plans, including any lineside security fencing of the railway (as set out, indicatively, on the Design Freeze Plans<sup>4</sup>).
8. Inspections by the highway authority during construction (if required and set out in the schedule of works).
9. Construction of diversion route completed.
10. On completion of work, site walk with the highway authority.
11. Application for certification of works under article 16 of the Order by Network Rail to the highway authority.
12. Certification of alternative route provided by the highway authority within 28 days of request (item 11 above).
13. In the event that the highway authority does not reply to a request for certification within 28 days of receiving the request, the new highways are deemed to be completed to the satisfaction of the highway authority.
14. Network Rail to provide the highway authority:
  - (i) prior to the new route opening to the public - a set of native GIS files showing where the proposed diversion routes will be in relation to the wider network.; and
  - (ii) as soon as reasonably practicable following completion of construction - 'as built' plans, including changes to the extent of the highway network details.
15. Diversionary route open to the public.
16. Start of a 12 months' maintenance period of new highways by Network Rail.
17. Fencing off of the level crossing and removal of any signage associated with the extinguished footpath route.
18. Removal of the level crossing infrastructure.
19. Network Rail to provide the Health & Safety file (as per Regulation 12 of the Construction (Design and Management) Regulations 2015) to the highway authority.
20. After the expiry of the 12 months' maintenance period, handover of asset to the highway authority.

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<sup>4</sup> See Part 5 of the Design Guide (NR12)

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**VOLUME 1    HIGHWAY STRUCTURES:  
APPROVAL PROCEDURES  
AND GENERAL DESIGN**

**SECTION 1    APPROVAL PROCEDURES**

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**PART 1**

**BD 2/12**

**TECHNICAL APPROVAL OF HIGHWAY  
STRUCTURES**

**SUMMARY**

This Standard specifies the procedures for Technical Approval for Highway Structures. It updates and supersedes BD 2/05.

**INSTRUCTIONS FOR USE**

This revised Standard is to be incorporated in the Manual.

1. This document supersedes BD 2/05, which is now withdrawn.
2. Remove existing contents pages for Volume 1, and insert new contents page for Volume 1, dated May 2012.
3. Remove BD 2/05, which is superseded by BD 2/12, and archive as appropriate.
4. Insert BD 2/12, 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



An agency of  The Scottish Government

TRANSPORT SCOTLAND



Llywodraeth Cymru  
Welsh Government

WELSH GOVERNMENT  
LLYWODRAETH CYMRU



THE DEPARTMENT FOR REGIONAL DEVELOPMENT  
NORTHERN IRELAND

# Technical Approval of Highway Structures

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                  APPROVAL PROCEDURES  
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**SECTION 1    APPROVAL PROCEDURES**

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**PART 1**

**BD 2/12**

**TECHNICAL APPROVAL OF HIGHWAY  
STRUCTURES**

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# 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 Major changes in this version of BD 2 are (all clause references quoted are for this version of BD 2 unless stated otherwise):

- Amended clauses to make reference to the Overseeing Organisation's current requirements for the use of Eurocodes for the design of highway structures.
- Amended clauses and model AIP to include CDM co-ordinator, which is stipulated in Construction (Design and Management) Regulations 2007.
- Amended clauses to replace reference of Type A and Type B Proposals for temporary works with Type S and Type P Proposals respectively.
- Clause 2.13.1: added a new item for 'structural resilience'.
- Clause 2.29: clarified the need for an addendum to AIP and/or additional certificate where changes are made to the design during construction.
- Clause 2.34: clarified some aspects of checking procedure.
- Clause 4.6(ii): permitted some Type P Proposals to be Category 0.
- Deleted chapter on "Small Service Tunnels".
- Clause 5.2: added procedure for dealing with service tunnels of internal diameter less than 2m.
- Annex A1: separate model AIP forms are given for the design of highway structures to UK National Standards (Eurocodes) and for the design and assessment of highway structures to UK National Standards (Non-Eurocodes).
- Annex A1: temporary works designer is required to certify that details of design will be passed to the permanent works designer for review.
- Annex B: general notes for compiling a model Technical Approval Schedules are given instead of a model TAS.
- Annexes C3 and C4: permanent works designer is required to certify that the temporary works have no detrimental effects on the permanent works.
- Annex C6: substantially revised.
- Deleted entire Annex on "Special Requirements for Records in Overseeing Organisations".
- Annex D: avoidance of "barriers to trade" requirements for proprietary manufactured structures and products are given in Chapter 2.
- Added requirements with respect to proprietary structures supplied in accordance with EU directive 89/106/EEC – the Construction Products Directive (CPD).

1.3 In the early 1970s, failures at Yarra (Australia), Milford Haven (Pembrokeshire, Wales), Koblenz (Germany) and over the Danube (Austria) occurred during erection. Resulting from these failures and the subsequent Report of the Merrison Committee, the following important changes were made by the then Ministry of Transport:

- (i) The Department would continue to examine design criteria and methods but not computations.
- (ii) The requirements by the Department for a certificate of independent check of the design and computations.
- (iii) The application of Approval in Principle (AIP) stage to all but minor structures, which would cover the selection of bridge type, the materials for its construction and methods of analysis and design to be adopted.

1.4 The TA procedures as described in this Standard generally require the proposer to submit an AIP to the Overseeing Organisation and to receive endorsement of the AIP before proceeding with any design or assessment. The completed design or assessment cannot be implemented until the Overseeing Organisation is in receipt of certified confirmation that the implementation documents are accurate and fully in compliance with the

requirements of the AIP. TA procedures for proprietary manufactured structures and products are given in 2.4 to 2.6.

1.5 The TA 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 minimise the possible risks to highway users and others who may be affected. The procedures may be applied to any other circumstances where the highway authority considers the requirements to be appropriate.

### Objectives

1.6 The fundamental objectives of the TA procedures are to give increased assurance for the required execution, refurbishment or demolition of highway structures. This will help to ensure that the Proposals are safe to implement, that any new structures procured are serviceable in use, economic to build and maintain, comply with the objectives of sustainability, have due regard for the environment and that they satisfactorily perform their intended functions. The TA procedures also ensure, as far as reasonably practicable, that highway users, the public and any others who may be affected are protected from adverse effects resulting from any work carried out to any highway structure.

1.7 TA provides procedures to demonstrate that the Overseeing Organisation, in its capacity of highway authority, has carried out its duty to safeguard the highway users and others who may be affected.

### Scope

1.8 Subject to any exclusions expressly stated in this document TA procedures must be applied to all Proposals, including private development, to construct, widen, assess, improve, repair (where structural integrity may be implicated) or demolish a structure within the highway boundary. It must also be applied to Proposals for highway structures that are outside the highway boundary, where the structures are to be adopted by the Overseeing Organisation.

It is recommended TA procedures also be applied to Proposals for structures that are outside the highway boundary where the design, construction, maintenance or demolition of the structure may affect the highway, highway structure or the safety of the highway user.

1.9 The scope of TA must be as specified in Chapters 3 to 6.

1.10 In cases where the design and construction of a Third Party Proposal for temporary works or temporary structures are outside the expertise of the Overseeing Organisation, the TAA should consider implementing the special requirements given in Annex E.

1.11 TA procedures are not necessary where there are no public safety issues e.g. temporary works in green field sites or works within the highway boundary where there will be no interface with the public. However, TA procedures apply to temporary works where the permanent works Proposal has identified the need for an independent check.

### Contractual Responsibilities and Procedures

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

1.13 This Standard has been written such that it is applicable in principle to all current and likely future forms of procurement (with the exception of DBFO Contracts –see Annex F). The procedures, format and terms used in this Standard, including the model AIP forms and certificates provided in Annexes A and C, are intended to be contract-neutral and are to be taken as models. Different procedures, format or terms may be used subject to the agreement of the Overseeing Organisation.

1.14 In departing from the procedures, format or terms used in this Standard, users must ensure that the following objectives are achieved:

- (i) That the required design or assessment principles are formally agreed, prior to award of any contract, to a sufficient extent to avoid contractual repercussions.
- (ii) That execution is not allowed to proceed until there is formal agreement to a comprehensive submission of the design or assessment principles in accordance with the requirements of this Standard.

1.15 The model AIP forms and certificates provided in Annexes A and C must be amended and agreed with the Overseeing Organisation, to suit specific contract requirements. Timings and procedures must be identified in the scheme specific contract requirements.

1.16 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 comprehensive and sufficient for detailed design or assessment. The principles, detailed requirements and recommendations contained in this Standard should apply accordingly. The Outline AIP (O/AIP) may be based on the relevant sections of the model AIP Annex A1 or D.4.

1.17 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. The TAA are to be consulted to agree the TA procedures where there are any uncertainties.

## Implementation

1.18 This Standard must be used forthwith on all projects for the assessment, design, execution, operation and maintenance of motorway and all-purpose trunk roads (and all roads in Northern Ireland) except where procurement of works has reached a stage at which, in the opinion of the Overseeing Organisation, its use would result in significant additional expense or delay progress (in which case the decision must be recorded in accordance with the procedure required by the Overseeing Organisation).

1.19 This Standard must also be used to implement the procedures for private development within the highway boundary. (See 1.8)

## Mandatory Sections

1.20 Sections of this Standard containing mandatory requirements are identified by being contained in boxes. These requirements must be complied with or a prior agreement to a Departure from Standard must be obtained from the Overseeing Organisation. The text outside boxes contains advice and explanation, which is commended to users for consideration.

## Definitions

1.21 For the purpose of this Standard, the following definitions apply (see also 1.13):



<b>Approval in Principle (AIP)</b>	The document, which records the agreed basis and criteria for the detailed design or assessment of a highway structure.
<b>Assessment Team</b>	The group of engineers responsible for the assessment. It may comprise an appropriate mix of specialists under the direction of a Team Leader.
<b>Assessor</b>	The organisation responsible for the overall assessment.
<b>Category</b>	The classification of the Proposals, which determines the need for AIP, the form of check to be applied and the certificates to be prepared.
<b>CDM co-ordinator</b>	The person appointed by the client on a notifiable project to perform the duties specified in the Construction (Design and Management) Regulations 2007.
<b>CE marking</b>	The marking that the manufacturer applies to declare compliance of a product with relevant EU product directives including the directive 89/106/EEC the Construction Products Directive.
<b>Checker</b>	The organisation responsible for the independent check of the design or assessment.
<b>Check Team</b>	The group of engineers responsible for the independent check of the design or assessment. It may comprise an appropriate mix of specialists under the direction of a Check Team Leader.
<b>Construction Compliance</b>	Execution works in compliance with the documents agreed before and during the execution.
<b>Contractor</b>	The organisation contracted by the Overseeing Organisation to undertake execution works on its behalf.
<b>Contractor's Representative</b>	A representative of the Contractor, with responsibility for overseeing the execution works.
<b>Departure</b>	Criterion, which departs from, or is an aspect not covered by, the standards contained in the Technical Approval Schedule.
<b>Designer</b>	The organisation responsible for the overall design.
<b>Design Team</b>	The group of engineers responsible for the design. It may comprise an appropriate mix of specialists under the direction of a Design Team Leader.
<b>Eurocodes</b>	<i>As defined in BS EN 1990</i>
<b>execution</b>	<i>As defined in BS EN 1990</i>
<b>foundation</b>	Generally in a highway structure, that part of the substructure in direct contact with, and transmitting load to, the ground.  Note: Specific elements forming the foundation should be given in the AIP.
<b>Geotechnical Design Report</b>	A report that contains geotechnical information relevant to the design or assessment (see HD 22 (DMRB 4.1.2)).
<b>highway structure</b>	Structure or installation coming within the scope of this Standard and situated under, over or adjacent to a motorway or other trunk road or road designated by the Overseeing Organisation.
<b>Lighting Column System</b>	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.
<b>Maintaining Agent (MA)</b>	The organisation with delegated responsibility for the maintenance of a highway structure.
<b>Outline Approval in Principle (O/AIP)</b>	The document, which records the agreed basis and outline criteria for the detailed design of a highway structure.

<b>Overseeing Organisation</b>	This refers to the following organisations (or their successors): The Highways Agency; Transport Scotland; Welsh Government (Llywodraeth Cymru) and The Department for Regional Development (Northern Ireland)
<b>Principal</b>	A senior representative of the Designer, Assessor, Checker, Contractor or Works Examiner having authority to sign certificates on its behalf.
<b>Project Manager of the Overseeing Organisation</b>	Representative of the Overseeing Organisation with responsibility for project management of tunnel or bridge gantry operating procedures.
<b>Proposal</b>	The proposal relating to the design or assessment of a highway structure including the mechanical and electrical (M&E) installations covered by this Standard.
<b>Proprietary Manufactured Structure or Products</b>	A structure with CE marking or product with CE marking manufactured to a system covered by a patent and/or a registered design.
<b>road tunnel</b>	A subsurface highway structure enclosed for a length of 150m or more.
<b>service tunnel</b>	A tunnel structure installed by trench-less technology beneath a highway for any purpose. This can be regarded as a service crossing if the internal diameter is 2m or less.
<b>substructure</b>	Generally in a highway structure, the wing walls, piers, columns, towers and abutments that support the superstructure.  Note: Specific elements forming the substructure should be given in the AIP.
<b>superstructure</b>	Generally in a highway structure, that part of the structure which is supported by the piers, columns and abutments.  Note: Specific elements forming the superstructure are to be given in the AIP.
<b>Team Leader</b>	The person responsible for overseeing and co-ordinating the work of the Design, Assessment or Check Team and having authority to sign on behalf of the team. The Team Leader must be appropriately qualified and competent in relevant fields of engineering related to the work and is to be a Chartered Member of a relevant Institution or suitable equivalent.
<b>Technical Approval (TA)</b>	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.
<b>Technical Approval Authority (TAA)</b>	The organisation responsible for agreeing the Approval in Principle and subsequently accepting the relevant certificates.
<b>Technical Approval Schedule (TAS)</b>	The schedule of documents to be used for the design or assessment of a highway structure.
<b>Third Party</b>	Any person, organisation or other legal identity that is not employed directly or indirectly by the Overseeing Organisation.
<b>UK National Standards (Eurocodes)</b>	The suite of Eurocodes to be implemented by BSi as UK National Standards, covering structural design of all civil engineering works, including bridges.
<b>UK National Standards (Non-Eurocodes)</b>	British Standards that, prior to being replaced by UK National Standards (Eurocodes), were used for the design of highway structures or British Standards that apply to aspects not covered by Eurocodes.
<b>Works Examiner</b>	The organisation nominated in the Contract to undertake independent examination of the execution, commissioning (of M&E) or testing of works carried out by the Contractor.

## Mutual Recognition

1.22 Any reference in this specification to a “British Standard”, or to a “British Standard which is an adopted European Standard”, is to be taken to include reference also to the following standards:

- (a) a standard or code of practice of a national standards body or equivalent body of any EEA state;
- (b) any international standard recognised for use as a standard or code of practice by any EEA state;
- (c) a technical specification recognised for use as a standard by a public authority of any EEA state; and
- (d) a European Technical Approval (ETA) issued in accordance with the procedure set out in directive 89/106/EEC.

Where there is a requirement in this specification for compliance with any part of a British Standard or a British Standard which is an adopted European Standard, that requirement may be met by compliance with any of the standards given above, provided that the relevant standard imposes an equivalent level of performance and safety provided for by a British Standard or a British Standard which is an adopted European Standard.

“EEA State” means a state which is a contracting party to the EEA Agreement.

“EEA Agreement” means the agreement on an European Economic Area signed at Oporto on the 2nd of May 1992 as adjusted or amended.

## 2. GENERAL REQUIREMENTS AND PRINCIPLES

### Overseeing Organisation's Requirements

2.1 Technical requirements for the design, execution, operation and maintenance of highway structures are contained in the TAS. In some forms of contract, such as design and construct, technical requirements may be contained in the contract requirements. The TAS normally includes the Design Manual for Roads and Bridges (DMRB), the British Standards (including Eurocodes, National Annexes and Published Documents), Manual of Contract Documents for Highway Works (MCHW) and other supplementary Standards for specific project requirements (see Annex B).

2.2 Unless agreed otherwise with the TAA, two sets of documents (AIP and Certificates) with original manuscript signatures must be submitted. In England, this requirement may be waived if the use of electronic signatures is agreed with the TAA.

2.3 Third Party Proposals must be dealt with as follows:

- (i) Inside highway boundary: the principles given for the TA procedures in this Standard must be adopted to meet the objective stated in 1.6. However the TAA must not take on the responsibility that belongs to the Third Party. The principles of special requirements given in Annex E must be applied where the Overseeing Organisation would not be able to give an opinion on whether the Third Party Proposal is safe or not as the Overseeing Organisation does not have a specific knowledge or expertise. For Third Party Proposal of temporary work or temporary structure, refer to Chapter 4.
- (ii) Outside highway boundary: refer to 1.8

### Proprietary Manufactured Structures and Products

2.4 Proprietary manufactured structures and products are to be subject to the full TA procedures, with the exception of those that comply with the requirements of the CPD and will be used for their intended purpose. An essential consideration for adoption of proprietary

manufactured structures or products is the avoidance of discrimination against any structure or product that has the required declared performance either under a CE mark applied in compliance with the CPD or a recognised product registration system and would satisfy the specified end use. Any discrimination that does create a “barrier to trade” would be in contravention of European Community legislation. The procedures are to avoid two forms of discrimination in particular: (a) discrimination between different forms of construction or product that will satisfy the same end use, and (b) discrimination between directly competing proprietary systems or products.

2.5 When considering proprietary manufactured structures or products CE marked in accordance with the CPD the procedures must comply with the following principles:

- (a) The proprietary manufactured structures with CE markings or products with CE markings may be accepted for their correct intended use and satisfy the specified performance requirements. The TA procedures must not be applied to any aspect related to this acceptance except to confirm that the declared performance of the product meets that required.
- (b) Additional requirements must not be imposed on manufactured structures with CE markings or products with CE markings that are used for their intended use. If additional requirements are given in the Design Manual for Roads and Bridges (DMRB) documents, they must be waived unless there are safety issues, in which case TAA must be consulted.

2.6 Notwithstanding the requirements and advice given in 2.4 and 2.5 above, TA procedures may apply to issues relating to installation of structures or products but not their manufacture. TA procedures may also apply to proprietary manufactured structures or products with CE markings for an unintended use. Also see 3.5(f) and Annex D.

## **Use of UK National Standards**

2.7 For the design of highway structures using UK National Standards (Eurocodes), refer to the Overseeing Organisation's current requirements for the use of Eurocodes for the design of highway structures. The model AIP form in Annex A1a is to be used.

2.8 For the design or assessment of highway structures using UK National Standards (Non-Eurocodes), the model AIP form in Annex A1b is to be used.

## **Category of Proposals**

2.9 The Proposals must be placed in one of four Categories: 0, 1, 2 or 3, according to the criteria described in Chapters 3 to 6. The Category must be proposed by the Designer or Assessor and outline details submitted to the TAA for agreement. The Category boundaries are not rigid and the category of each Proposal will be decided on its merits, having regard to potential consequences of failure, design complexity and whole life costs.

2.10 AIPs are required for Categories 1, 2 and 3, but not Category 0.

2.11 Where a structure has been placed in Category 0 or 1, and a Proposal arises subsequently requiring a Departure, the Design Organisation must contact the TAA requesting a review of the Category. Typically a change to Category 2 will be required but if the TAA considers that the Departure has little or no structural implication, then a change of Category may not be necessary. In such circumstances for Category 1, an amendment or addendum to the AIP must be submitted. The agreement of the TAA will be required before the Proposals can be incorporated in the design or assessment.

## **Proposals**

2.12 Proposals for Categories 1, 2 and 3 must:

- (i) 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 execution, operation, maintenance and demolition, must be identified, assessed and considered, with a view to eliminating or minimising them as far as reasonably practicable. The CDM co-ordinator, if appointed, must be informed by the Designer of all risks and hazards identified, assessed and considered. Where available, references, special investigations and studies that have been carried out must be included. The overall project should consider appropriate methods of risk management.
- (ii) List in the AIP only risks and hazards that would not be apparent to an experienced and competent Contractor or are likely to require special attention to manage them effectively.
- (iii) Provide evidence that appropriate consultation has taken place with all relevant stakeholders 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 stakeholders' requirements (e.g. leakage of gas or water mains) must also be identified, assessed and considered. Likewise, risks and hazards posed by the structure to other infrastructure belonging to a Third Party must be identified, assessed and considered. Documentation relating to consultation and special requirements of those consulted must be included as part of the AIP submission. This must include any comments from the CDM co-ordinator.
- (iv) 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.



- (v) List in the TAS all relevant documents that are being proposed for use in the design or assessment.

2.13 Proposals for Designs must, in addition to 2.12:

2.13.1 Consider aspects relating to:

- (a) 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)
- (b) Environment (give regard for both the natural and built environment)
- (c) Aesthetics
- (d) Buildability (the extent to which the design facilitates ease and safety of construction, allowing the most efficient and economic use of resources, subject to the overall requirements for the completed project)
- (e) Structure robustness (the ability of a structure not to be damaged disproportionately in the event of accident, misuse or deterioration)
- (f) Structure resilience (the ability of structure to resist deliberate damage which may arise from the actions of vandals, thieves and terrorists)
- (g) Durability
- (h) Maintenance and operational commitments in terms of whole life costs in design options and choices of materials
- (i) Provision of safe access for periodic inspection
- (j) Avoidance of 'barrier to trade' and the requirements for using Proprietary Manufactured Structures or Products.

2.13.2 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 also be necessary to make provision for future development above or adjacent to the tunnel.

2.13.3 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 and urban areas.

2.13.4 Ensure that the required environmental and planning legislation is complied with during the development of the design. This includes, but is not limited to Environmental Assessments, Environmental Statements and Habitat Surveys. Affected stakeholders such as Natural England (and the equivalent bodies for Scotland, Wales and Northern Ireland) and the Wildlife Trusts must be consulted to ascertain environmental requirements during and post construction, including translocation of endangered species (e.g. greater crested newts, rare plants/soils), acceptable environmental mitigation (e.g. sustainable urban drainage systems) and other measures such as otter ledges along banks on river bridges and wildlife tunnels where existing habitats are disrupted. Where Proposals are located close to or cross watercourses, the Environment Agency for England and Wales (and the equivalent bodies for Scotland and Northern Ireland) must also be consulted.

2.13.5 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 must be completed before the commencement of construction of that part of the works.

2.14 Proposals for Assessments must, in addition to 2.12, describe proposed arrangements for access, traffic management and intrusive investigation where required.

### Departures from Standards

2.15 Designers or Assessors may seek to introduce innovative techniques, research findings or developments in the state of the art and best practice by the adoption of Departures.

2.16 Where UK National Standards (Eurocodes) are used, the limitations for Departures are given in the Overseeing Organisation's current requirements for the use of Eurocodes for the design of highway structures.

2.17 In cases where a structure is in the ownership of the Overseeing Organisation but accommodates a highway, railway, waterway or other infrastructure that is the responsibility of another owner, authority or Third Party, the Designer or Assessor must consult the party concerned and seek its comments on, and if possible, acceptance of the Proposal. This should be recorded in the AIP.

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

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

### Submissions for AIP

2.20 Submissions for AIP to the TAA must 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 Design Report, documents relating to consultation and any other relevant information or reports. The reports should be referenced in the AIP and written with a clear proposal or objective. Calculations and detailed drawings are not required as part of the submission.

2.21 The O/AIP may be based on the relevant sections of the model AIP Annex A1 or Annex D, Section D.4 for some generic AIPs e.g. sign gantries, Model AIPs for temporary works systems, modular arch systems, etc.

2.22 If the designs of the superstructure, substructure and/or foundation are carried out by different teams, the Designer of the superstructure and/or substructure must give the conditions and loads to be taken into account by the Designer of the substructure and/or foundation respectively. The conditions and loads must be covered in the AIP. (See also 2.42)

2.23 The AIP must 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 execution render the AIP subject to re-approval and agreement by the TAA. This must be confirmed either in the form of an amended version of the agreed AIP or as a separate addendum to the agreed AIP. Submissions must clearly indicate deletions or additions that have been made to the agreed AIP, must be signed by the Designer or Assessor and forwarded with supporting information to the TAA for agreement. Addenda must refer to the original AIP by the date of agreement by the TAA.

2.24 AIP is a continuing exercise that should start at an early stage of development of Proposals. This is particularly important for structures where early submission of AIP to the TAA allows timely consideration of other fundamental aspects, such as crossing requirements, carriageway alignment.

2.25 The period over which TA 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. However, the use of interim AIP will not prejudice the agreement of an AIP for the full structure.

### Technical Approval

2.26 The Designer must provide sufficient information to enable the TAA to carry out the following aspects, where applicable:

- (i) Appraise the proposed design or assessment criteria, principles and methods.
- (ii) Agree the required working life for the structure and its main components.
- (iii) Agree the Category of the Proposals.
- (iv) Ensure consideration has been given to any special studies concerning safety and risk assessment and management that have a bearing on the final design or assessment or the construction process.
- (v) Be satisfied 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, demolition and compliance with the Overseeing Organisation's requirements.
- (vi) Agree the list of documents included in the TAS and Departures.
- (vii) Appraise the geotechnical conditions and other relevant investigations.
- (viii) Appraise 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, execution, operation, maintenance or demolition processes.
- (ix) Review the adequacy of consultation with other stakeholders and the incorporation of agreed requirements.
- (x) Agree proposed Category 3 Checker based on their relevant experience and competence.
- (xi) Resolve any point(s) of difference between the Designer or Assessor and the Checker.

2.27 When satisfied with the Proposals, the TAA will confirm its agreement by signature of the AIP. On completion of the detailed design, check or assessment, the TAA will receive and consider the appropriate certificates for acceptance.

2.28 The agreement of the AIP or acceptance of the certificates by the TAA does not relieve the Designer, Assessor or Checker of any of their responsibilities including the validity and arithmetical correctness of the calculations, methods and techniques and their translations into design details and drawings, specification clauses or assessed capacities.

2.29 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 must be re-submitted to the TAA. The Designer will review the AIP and determine whether any updating or amendment to the design is required. In such circumstances the outcome must be recorded in an amendment or addendum to the AIP and the agreement of the TAA will be required before the execution can proceed. The Works Examiner must inform the TAA of any amendments to the design, during execution, which have structural implications and such amendments must normally be included in an addendum to the AIP. Certificates must be revised to take account of such amendments. Additionally, where the proposed erection procedure induces different stresses in the completed structure from those anticipated in the design, any changes to agreed details in the AIPs or certificates will need to be covered by an AIP addendum and/or additional certificates as appropriate and accepted by the TAA before erection commences.

### Design and Assessment Procedure

2.30 The design/assessment must comply with the AIP.

2.31 The Designer or Assessor must ensure the applicability and accuracy of all computer programs used and the validity of the programs for each application.



## Checking Procedure

2.32 Assessments, designs and drawings, together with bar bending schedules, must 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 Check Team, which may be from the same organisation but must be independent of the Design/Assessment Team.
- (c) Category 3 requires a check to be carried out by a Check Team from a separate organisation proposed by the Designer or Assessor and agreed by the TAA.

2.33 The Checker must carry out a comprehensive examination of all aspects of the design or assessment and must check that it complies with the Overseeing Organisation's requirements. Where required by the TAA, the scope of work also includes any proposed Departure, including Specification clauses that affect structural integrity (e.g. new materials). The Checker must check that the calculations are translated accurately into design details and drawings, specification clauses or assessed capacities.

2.34 The Checker must carry out the check, with due professional skill and care, in accordance with the agreed AIP. In the course of the check the Checker must submit a report to the Designer or Assessor and TAA for any aspect of the agreed AIP, design or assessment where changes are considered necessary. The agreement of the TAA to variations in the AIP must be confirmed in accordance with 2.23. Any disagreement arising between Designer or Assessor and Checker that they cannot resolve must be notified immediately to the TAA.

2.35 The Checker's analytical models and analytical work must be independent of that of the Designer or Assessor and carried out without exchange of calculation sheets or similar analytical work between the Designer or Assessor and the Checker. However, the method of analysis employed by the respective teams need not be the

same. The Designer or Assessor and the Checker may consult with each other during the course of their work to ensure that the results they are obtaining are comparable.

2.36 The Checker must take responsibility for the applicability and accuracy of all computer programs used in the check and the validity of the programs for each application.

2.37 It is not necessary to await the completion of the design/assessment before commencing the check. Both activities of design/assessment and check may proceed in parallel as far as is practicable.

## Certification

2.38 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. For some structures the TAA may call a pre-certification meeting with the Designer/ Assessor and the Checker, to discuss their findings prior to accepting certificates.

2.39 For structures where assessed capacity is less than current operational needs, the Assessor must notify the TAA and agree any necessary actions before submitting the certificates.

2.40 Where several similar Category 0 or 1 structures occur in a project, with the agreement of the TAA a single certificate may be used to cover them.

2.41 For all Proposals, a single organisation must assume responsibility for the whole of each activity; the Design, Assessment, Check or Construction Compliance for the entire structure. The Designer, Assessor, Checker, Contractor's Representative or Works Examiner must endorse each certificate as appropriate, which will be countersigned where required upon acceptance by the TAA. All signatories to certificates must be competent in the field of work undertaken and have relevant experience and appropriate engineering qualifications, which must be clearly indicated on the certificate along with their name

and position in their organisation. One signatory from the Designer, Assessor or Checker must be the Team Leader and the other must be a Principal of the organisation concerned. Signatories for the Construction Compliance certificate must comprise a representative of the Contractor and Principals of both the Contractor and of the Works Examiner. The signatory for the TAA will be a person delegated to undertake this task on its behalf.

2.42 Where the TAA agrees that the design of the superstructure, substructure and/or foundation of highway structures are carried out by different teams, the conditions and loads imposed by the superstructure and/or substructure for the design of the substructure and/or foundation respectively must be given in the AIP and/or certificate as appropriate.

2.43 The Design, Assessment and Check certificates must 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, unless otherwise stated in Chapters 3 to 6.

2.44 A copy of the general arrangement drawing and any relevant supporting information must accompany Certificates for Category 0 structures.

2.45 Where additional and substitute Specification clauses have been prepared by the Designer, they must be submitted for acceptance by the TAA. They may be submitted either individually or collectively on a Specification Certificate. Where clauses might affect structural integrity, for example clauses concerning new materials, they must be checked in accordance with the AIP.

2.46 Unless otherwise stated in Chapters 3 to 6, the Construction Compliance certificate must refer to, if available, the relevant AIP, Design and Check Certificates, Specification and As-Constructed drawings and must be submitted to the TAA (the Overseeing Organisation if in Northern Ireland) for acceptance.

2.47 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.

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

### Records

2.49 Relevant data, information and documents, which have an effect on safety, access, structural or traffic management e.g. assessed load carrying capacity of structure, must be recorded as required by the Overseeing Organisation's management system for structures.

2.50 For Categories 2 or 3 checks, when Eurocodes are used, the Designer record for the choices and options adopted, which is not required to be submitted to the TAA, must be recorded as required by the Overseeing Organisation's management system for structures. In Wales the schedule of options and choices must be included in the AIP.

## 3. BRIDGES AND OTHER HIGHWAY STRUCTURES

### Introduction

3.1 This Chapter describes specific TA requirements for bridges and other highway structures and must be read in conjunction with Chapters 1 and 2.

3.2 The TA requirements must be applied without limitation to:

- (a) Design and execution of new structures.
- (b) Assessment and related construction work, whether refurbishment, maintenance or strengthening, that affects structural integrity.
- (c) Assessment relating to loading beyond that for which a structure has been designed or previously assessed.
- (d) 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 a re-assessment is required.

### Scope

3.3 In addition to 1.8, the procedures described in this Chapter must be applied 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, (2.0m or greater in Scotland except that corrugated steel buried structures are included if they have spans of 0.9m or more).
- (b) Overhead crossing carrying conveyor or utility service.
- (c) Moveable inspection access gantry, gantry rail and gantry support system.

- (d) Earth retaining structure where the effective retained height, i.e. 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 or greater in Northern Ireland).
- (e) Reinforced/strengthened soil/fill structure, with hard facings, where the effective retained height is greater than 1.5m (1.0m or greater 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 mast for traffic signal and/or speed camera.
- (i) Lighting column.
- (j) High mast of more than 20m in height i.e. the vertical distance from top of post to bottom of flange plate, for lighting.
- (k) Mast for camera, radio and telecommunication transmission equipment.
- (l) Catenary lighting support system.
- (m) Environmental barrier.
- (n) Proprietary manufactured structure or product.
- (o) Traffic sign/signal posts of more than 7m in height, i.e. the vertical distance from top of post to bottom of flange plate or top of foundation whichever is the lesser.
- (p) (In Northern Ireland only) Mass gabion steep slope/retaining structure, face slope not greater than 70° to the horizontal where the effective retained height is 1.0m or greater.

- (q) (In Wales only) Reinforced/strengthened soil/fill structure where hard facings are not provided and the face inclination exceeds 45 degrees, the Overseeing Organisation may decide to require structural TA in accordance with this Standard.
- (r) Fitting of M&E apparatus and fixtures to existing structures, including Tunnels, either permanent or temporary (Wales and Northern Ireland only). The Category must be proposed by the designer and is subject to agreement by the TAA.

### Category

3.4 In addition to 2.9 to 2.11, the following criteria must be considered when determining Category:

#### 3.4.1 Category 0:

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

- (a) Single span simply supported structures with span of less than 5m.
- (b) Buried concrete boxes, buried rigid pipes and corrugated steel buried structures of less than 3m clear span/diameter and having more than 1m cover.
- (c) Multi-cell buried structures, where the cumulative span is less than 5m, and having more than 1m cover.
- (d) Earth retaining structures with an effective retained height of greater than 1.5m (1.0m or greater in Northern Ireland) but less than 2m.
- (e) Minor structures within the scope of BD 94 (DMRB 2.2.1) and not situated at a very exposed site as defined in BD 94.
- (f) High masts  $\leq 25$ m and not situated at a very exposed site as defined in BD 94.

- (g) Environmental barriers less than 3m high and without overhangs.
- (h) Masonry arches with span of less than 6.5m (for assessment only).

#### 3.4.2 Category 1:

Structures, other than those in Category 0, which conform in all aspects of design, assessment and execution 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 5m or greater but less than 20m and having less than 25° skew.
- (b) Buried concrete boxes, buried rigid pipes and corrugated steel buried structures with a clear span/diameter of 8m or less.
- (c) Earth retaining structures with an effective retained height of 2m or greater but less than 7m.
- (d) Minor structures outside the scope of BD 94 (DMRB 2.2.1) or situated at a very exposed site as defined in BD 94.
- (e) High masts  $> 25$ m or situated at a very exposed site as defined in BD 94.
- (f) Environmental barriers 3m or more in height or with overhangs.
- (g) Portal and cantilever sign and/or signal gantries with a span of less than 20m.

#### 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 50m.
- (d) Skew exceeding 45°.
- (e) Difficult foundation problems.
- (f) Moveable bridges.
- (g) Moveable inspection access gantries, gantry rail and gantry support systems.
- (h) Bridges with suspension systems.
- (i) Steel orthotropic decks.
- (j) Internal grouted duct form of post tensioned concrete structures.
- (k) Earth retaining structures with an effective retained height of 14m or greater.
- (l) Rock anchorages (Wales only).

#### 3.4.5 Assessment and related construction work

In general 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 must be categorised on the same basis that the original structure would have warranted. However, the TAA may decide to require a higher or lower Category where deemed appropriate.

### Technical Approval

3.5 In addition to 2.26, the Designer or Assessor must provide sufficient information to enable the TAA to consider the following aspects, where applicable (this list is not necessarily exhaustive):

- (a) Cross-section and headroom clearances.
- (b) The loading and design or assessment criteria.
- (c) Any provision to be made additional to items (a) and (b) for abnormally high and/or heavy loads.
- (d) 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.
- (e) Proposals for the independent checking of temporary works.
- (f) In the case of proprietary manufactured structures with CE markings or products with CE markings where circumstances are appropriate, that proper consideration has been given to facilitate their adoption by the Overseeing Organisation (see Annex D).

### Certification

3.6 For Category 0 minor structures as defined in 3.4.1(e), approval by the TAA is not required. However, a certificate in the form given in Annex C2 or an EC certificate or declaration of conformity must be submitted to the TAA for retention.

### Documentation

3.7 The relevant model AIP form for highway structures within the scope of this Chapter are A1a and A1b from Annex A. TASs are to be prepared in accordance with the notes given in Annex B. Relevant model certificates are C1, C2 and C6 from Annex C. The form of certificates may vary depending on the Overseeing Organisation's particular requirements.

## 7. REFERENCES

### 7.1 National Standards

BS EN 1990 – Eurocode – Basis of structural design

BS EN 1991-2:2003 Eurocode 1: Actions on structures. Traffic loads on bridges

### 7.2 Design Manual for Roads and Bridges

BD 94 – Design of Minor Structures  
(DMRB 2.2.1)

HD 22 – Managing Geotechnical Risk  
(DMRB 4.1.2)

### 7.3 Regulations

Construction (Design and Management)  
Regulations 2007

### 7.4 EU Legislation

Council Directive 89/106/EEC on construction products

## 8. ENQUIRIES

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

Chief Highway Engineer  
The Highways Agency  
123 Buckingham Palace Road  
London  
SW1W 9HA

G CLARKE  
Chief Highway Engineer

Director, Trunk Road and Bus Operations  
Transport Scotland  
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