A66 Northern Trans-Pennine Project
TR010062

7.17 Overview of Design Process for Trout Beck Bridge, Cringle Beck Viaduct and Moor Beck Viaduct

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7.17 OVERVIEW OF DESIGN PROCESS FOR TROUT BECK BRIDGE, CRINGLE BECK VIADUCT AND MOOR BECK VIADUCT

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Author:	A66 Northern Trans-Pennine Project Team, National Highways

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APPENDICES

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1 Introduction and purpose of document

1.1.1 This document has been prepared to support the Development Consent Order (DCO) Examination process for the A66 Northern Trans-Pennine Project ("the Project"). It forms part of the Applicant's, National Highways, submission to the Examining Authority (the "ExA") for Deadline 3 (24 January 2023).

1.1.2 This document responds to queries raised by the ExA at Issue Specific Hearing 2 ("ISH2"), held on 1 December 2022. This hearing was attended by the ExA, the Applicant and a number of Interested Parties and Affected Persons.

1.1.3 The ExA's questions related to the approach taken to the design of structures along the route, notably the viaduct structures at Trout Beck (as part of Scheme 0405 Temple Sowerby to Appleby), Cringle Beck (as part of Scheme 06 Appleby to Brough) and Moor Beck (also as part of Scheme 06 Appleby to Brough).

1.1.4 In the Deadline 1 Submission – 7.3 Issue Specific Hearing 2 (ISH2) Post Hearing Submissions [REP1-009], as outlined under Agenda Item 3.1 the Applicant committed to:

"...submit commentary at Deadline 3 on the approach taken to date in respect of the design of Trout Beck, Cringle Beck and Moor Beck Structures. This will include consideration of site-specific constraints and sensitivities, the functional requirements of the structures as well as site context and design outcome objectives (including aesthetics). This commentary will include examples (images) of similar structures as well as a commentary on how the Project Design Principles, to be secured by the DCO, arose in relation to structures such as these, and how the Project Design Principles will be implemented during the detailed design process for these structures."

1.1.5 This document therefore responds to the questions raised and provides further information to support the ExA in their Examination of the DCO application for the Project.

2 Design approach taken to date for structures

2.1.1 As outlined in the Project Design Principles [Document Reference 5.11, APP-302], the A66 Northern Trans-Pennine ("A66 NTP") Project takes account of the strategic principles set out in the National Infrastructure Commission's *Design Principles for National Infrastructure*[1] around context-driven design, and their four key principles of design for climate, people, place and value. Alongside this, The Design Council's *A design-led approach to infrastructure* and the *National Design Guide*[2] have been key guiding documents for the design development of the Project.

2.1.2 The optioneering and preliminary design for the Project have also been developed in accordance with the Design Manual for Roads and Bridges ("DMRB") guidance and National Highways' Project Control Framework ("PCF") process. This approach is standard practice for a National Highways major project, including all those that are consented by way of a Development Consent Order.

2.2 Design Manual for Roads and Bridges guidance

2.2.1 Structure Options Reports ("SORs") were initially developed for each of the structures in accordance with DMRB publication CG 300 *'Technical Approval of Highway Structures'* (provided in Appendix A to this document). Preferred options identified in the SORs were then developed as a further part of the preliminary design process.

2.2.2 Stakeholders were consulted and engaged throughout this preliminary design process to establish the design constraints and inform the SOR and subsequent design development. The following stakeholders were consulted (as part of the DCO process) and/or engaged with separately for the design of the structures for Trout Beck Bridge, Cringle Beck Viaduct and Moor Beck Viaduct:

- National Highways' Area 13 Asset Delivery team
- National Highways' Safety, Engineering and Standards ("SES") Structures Advisors
- National Highways' Geotechnical and Environmental Teams
- Cumbria County Council
- Environment Agency and Natural England
- Historic England and the Local Authorities' County Archaeologists

[1] National Infrastructure Commission (2020) *Design Principles for National Infrastructure*, available at: https://nic.org.uk/app/uploads/NIC-Design-Principles.pdf
[2] Design Council (2012) A design led approach to infrastructure, available at: https://www.designcouncil.org.uk/sites/default/files/asset/document/A_design_led_approach_to_infrastructure_Cabe.pdf

- Statutory undertakers
- Local businesses, landowners and residents
- National Highways' Strategic Design Panel[3]
- The Eden River Trust.

2.2.3 In addition, the Project team sought advice from the Design Council, as reported on page 32 of the Project Design Report [Document Reference 2.3, APP-009]. The Design Council are an independent charity and the government's advisor on design and have provided feedback to the project team on several occasions throughout the development of the Project.

2.2.4 The design of all structures on the A66 NTP project has been undertaken in accordance with DMRB publication CD 351 '*The Design and Appearance of Highway Structures*' (provided in Appendix B to this document).

2.2.5 CD 351 is a DMRB standard that sets out requirements and provides guidance which aims to improve the aesthetic outcomes of projects that include bridges and other highway structures. It outlines an underlying approach to encourage best practice, establish intended outcomes that support aesthetic quality and evidence how these can be addressed throughout all stages of the design lifecycle of a highway structure.

2.2.6 The standard introduces the Aesthetic Appraisal Document ("AAD"), which helps demonstrate how aesthetic quality has been considered in the design of highway structures. The AAD communicates a clear design narrative that demonstrates an appreciation of the aspects identified in Table 3.2.1 of CD 351 throughout the various stages of the design lifecycle and provides a clear description of the rationale underpinning all key decisions that influence the aesthetics of structures. An extract from Table 3.2.1 of CD 351 is given in Table 1 below, with the full version provided within Appendix B.

2.2.7 The AADs on the Project have been developed in parallel with the SORs and the above consultation/engagement (refer to 2.2.2) also informed the development of the AADs. The output of the SORs and AADs informed the development of the Project Design Principles ("PDP"), which essentially forms the design brief for the detailed design of the Project and compliance with which is secured through the DCO.

[3] Highways England (2018), *The road to good design.* Available at: https://nationalhighways.co.uk/media/l4ihgawx/strategic-design-panel-the-road-to-good-design.pdf

Table 1 Extract from CD 351 Table 3.2.1 Core Information for inclusion in the AAD at the different stages of the design life-cycle

Design life-cycle stage	AAD information
AAD 1 – Project initiation (prior to option finalisation)	1. The structure's location, function and any site specific constraints or sensitivities identified; 2. Any specific requirement to take architectural advice; 3. Aesthetic category; 4. Project review panel make up, where relevant
AAD 2.1 – Preliminary design AAD 2.2 – Detailed design	Design outcome objectives Aspects related to context including: 1. Key transportation and functional requirements and physical features to be negotiated; 2. Key physical, cultural and social connections to be established and maintained; 3. User mode interfaces and accessibility concerns; 4. Challenges and opportunities associated with local community/cultural imperatives and heritage aspects; 5. Significant environmental issues, challenges and opportunities; 6. Key relevant aspects of context of the structure that are to be accommodated within the design; 7. Potential structural forms and proportions to suit geometric and loading constraints; 8. Identification of context-specific materials or finishes, where relevant. Aspects related to the process including: 1. Milestones at which the AAD is updated throughout the design process (at preliminary and detailed design as a minimum); 2. Lead discipline and all other contributing disciplines that are anticipated to be involved in the design process of the highway structures; 3. Extent and process for public/stakeholder consultation.

Design life-cycle stage	AAD information
	Aspects related to specific project requirements including: 1. Vehicle containment/parapet requirements; 2. Signage and lighting requirements.
AAD 3 – Construction	Changes to design as a result of site constraints or construction process requirements (as necessary)
AAD 4 – Post construction review	Feedback on how well the final design and completed structure have met the design outcome objectives

2.3 National Highways' Project Control Framework process

2.3.1 The Project Control Framework ("PCF") is a joint Department for Transport and National Highways approach to managing major infrastructure projects, as outlined in Section 3.2 of the Project Development Overview Report [Document Reference 4.1, APP-244]. It is designed to support the development and delivery of major projects and comprises a standardised project life cycle, deliverables, project control processes and governance arrangements.

2.3.2 The Project Control Framework constitutes four key phases, as shown in Figure 2 below. The Project is currently within the Development phase, with the Examination of the DCO forming a key component of PCF Stage 4.

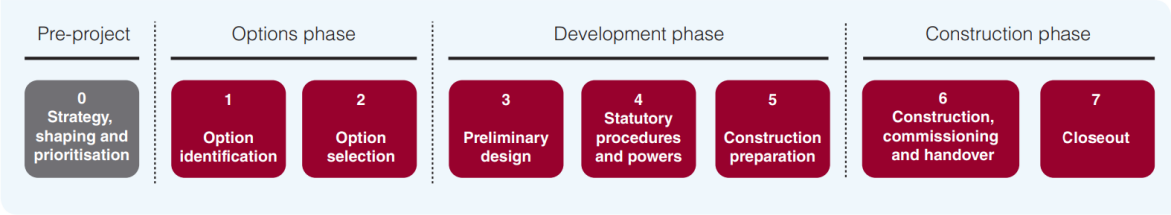


Figure 1 Project Control Framework Major Projects Lifecycle

2.3.3 The Aesthetic Appraisal Document is a live document and is to be reviewed and updated at each PCF Stage in accordance with CD 351 Table E/1.1N4 351. An extract from Table E/1.1N4 of CD 351 is given in Table 2 below, with the full version provided within Appendix B. The AAD 2.1 that is developed during preliminary design (PCF Stage 3) is intended to provide considerations affecting the aesthetics of the whole structure, whereas the AAD 2.2 that is developed during detailed design

(PCF Stage 5) is intended to provide considerations affecting both the whole structure and specific parts. As such, for a project consented through the DCO process, AAD 2.1 informs and develops the design elements that should be secured through the DCO; in the case of the A66 NTP Project, the Project Design Principles.

Table 2 Extract from CD 351 Table E/1.1N4 AAD design life-cyclye stage mapped to PCF stages

Design life-cycle stage	PCF Stage
AAD 1 – project initiation (prior to option finalisation)	PCF Stage 2 – option selection
AAD 2.1 – preliminary design	PCF Stage 3 – preliminary design
AAD 2.2 – detailed design	PCF Stage 5 – construction preparation
AAD 3 – construction	PCF Stage 6 – construction
AAD 4 – post construction review	PCF Stage 7 – closeout

2.3.4 AAD 2.1 documents for Trout Beck Bridge, Cringle Beck Viaduct and Moor Beck Viaduct were developed during preliminary design (PCF Stage 3) and submitted to National Highways' SES committee. Following the Examination of the Development Consent Order (PCF Stage 4, Statutory procedures and powers), the AAD 2.1 documents are due to next be updated as part of PCF Stage 5 (Construction preparation). These updated AAD 2.1 documents will need to take into account (and implement) the PDP, as required by the DCO.

2.3.5 Sections 2.5, 2.6 and 2.7 of this document are drawn from these AAD 2.1 documents and summarise the key points relevant to the aesthetic design of these structures, as per the ExA's question raised at Issue Specific Hearing 2.

2.4 Design Outcome Objectives for the A66 Northern Trans-Pennine Project

2.4.1 A list of Design Outcome Objectives was developed for each structure in its corresponding AAD 2.1 document. These are to be complied within future PCF Stages of the project and as such have been incorporated into the A66 NTP Project Design Principles [Document Reference 5.11, APP-009] as outlined below:

- Access requirements for construction and future inspection and maintenance should be considered as an integral part of the viaduct design and may not be compromised when developing the aesthetic composition.
- The span arrangement for the viaduct shall be designed such that the vertical clearance from the watercourse (in normal conditions) shall be a minimum of 2.5m.

- The structure must allow for full functionality of normal supporting river processes including flood flows and associated erosion/sediment regime, and the migration of the channel across its flood plain.
- The orientation of the piers must be informed by detailed flood modelling so that they do not influence the migratory nature of the river. All piers are to be designed as in-channel structures to allow for the movement of the river and avoid the need to add scour protection in the future.
- The design should support ecological and landscape connectivity, with a clean and simple structure which is economical with the use of piers.
- Structure should generally be designed to promote an open appearance and maintain the continuity of the associated road earthworks.
- Proportions of deck spans, thicknesses and substructure heights should be considered as part of the design development and symmetry and line of principal elements should also be considered.
- The visual complexity of the structure should be minimised. The structure should be low key in the rural landscape.
- There should be a consistent and unified approach to the appearance of the structure and its material components.
- The overall form of the structure should minimise visual bulk where possible and obstruction of views to the surrounding landscape.
- In-situ deck slabs should cantilever beyond the main deck beams to reduce the physical dominance of the bridge deck on the A66 approaches.
- Deck slab edge profile should continue above and beyond the abutments to reduce the physical dominance of the abutments and make the bridge appear longer and more elegant.
- Bridge piers should be proportionally elegant and with a clean, simple uncluttered appearance.
- There is a preference for texture on bridge abutments and piers, expressed in vertical lines (either for reinforced earth wall abutment/wingwalls or in-situ reinforced concrete abutments/piers, finished with a patterned profile).
- Parapets should be set out on a whole panel basis and coordinated with the overall bridge design and length, with no cutting or shortening of standard panel length and end supports should be adjusted to facilitate this.
- Bridge deck to be designed with appropriate falls in the longitudinal and transvers directions to manage surface and subsurface water. Drainage to be provided at the backs of the abutment walls.

2.5 Trout Beck Bridge

Structure location and functional requirements

2.5.1 Trout Beck Bridge is proposed to carry the re-aligned A66 over the tributary of the River Eden, known as Trout Beck, together with the associated Special Area of Conservation ("SAC"), influencing landscape and the floodplain.

2.5.2 The location of the proposed structure is shown on Sheet 4 of 7 of General Arrangement Drawings Scheme 0405 Temple Sowerby to Appleby [Document Reference 2.5, APP-013].

2.5.3 It is located at an 'offline' section of the proposed A66, on the southern outskirts of Kirkby Thore village. As such, impacts on residents, landowners, local road users, emergency services and other stakeholders during construction will be considered and minimised where practicable. Such impacts include those associated with temporarily closing local roads during construction works, and the resultant visual impact of the structure in the landscape.

Site-specific constraints and sensitivities

2.5.4 The key site-specific constraints and sensitivities for Trout Beck Bridge can be summarised as follows:

- Trout Beck forms part of the River Eden SAC.
- The proposed route is 'offline' at the point where it crosses over a 'straight' section of Trout Beck.
- The proposed structure is intended to present minimal obstruction to future meandering and migration of the watercourse within its floodplain. This includes the potential restoration of the beck at Sleastonhow; National Highways have been engaging with Eden River Trust throughout the development of the Project with regard to the interaction of Trout Beck Bridge and the proposed Sleastonhow River Restoration Project. This engagement will continue throughout detailed design to ensure that the proposed structure shall not prevent the river restoration scheme from progressing.
- The overall length of the proposed structure is governed by the extent of the SAC, the area which provides 'supporting processes' to the SAC and of the floodplain. The design intent is to set the abutments just outside these limits.
- The form of the proposed structure has been influenced by the need to minimise disturbance to the floodplain, the SAC, and the associated floodplain that provides 'supporting processes' to the SAC.
- The landscape is noteworthy, and it is recognised that the structure will be prominent in the landscape and visible to local properties, local road users and walkers.
- The structure is proposed to be located in an area with a high chance of finding archaeological remains.

Site context and design outcome objectives

2.5.5 The provision of an open aspect structure with bank-seat abutments would result in an increased total span with little saving in abutment cost, whilst the presence of full-height abutments is not considered to detract from the open and aesthetically pleasing appearance of the viaduct. The large overall length of the structure will help provide an open appearance and the provision of reinforced earth wingwalls will help to minimise the visual bulk and physical dominance of the abutments.

2.5.6 The detailed design of Trout Beck Bridge will comply with the Design Outcome Objectives as outlined in Sections 3.2 (Table 3-1) and 4.3 (Table 4-6) of the A66 NTP Project Design Principles [Document Reference 5.11, APP-009]. Following the guidance outlined in CD 351 (see Table 3.4N1 of Appendix B), Trout Beck Bridge:

- Is considered to be a landmark structure that can generate significant local or national interest
- Is considered to have a significant visual effect in a location with environmental, heritage, landscape and visual sensitivities
- Will be highly visible within the proposed A66 NTP route
- Will carry significant volumes of traffic.

2.5.7 Examples of similar structures, which are considered to look similar and to have a similar impact on their surrounding landscape, are shown below in Figure 2, Figure 3 and Figure 4.

Figure 2 : Viaduct carrying the A14 over the River Great Ouse, under construction

Figure 3 : Viaduct carrying the A15 Lincoln Eastern Bypass over the River Witham, after completion

Figure 4 : Great Ouse Viaduct showing haunched soffit weathering steel beams contrasting with the concrete composite deck

2.6 Cringle Beck Viaduct

Structure location and functional requirements

2.6.1 Cringle Beck Viaduct is proposed to carry the new A66 dual carriageway over the tributaries of the River Eden known as Cringle Beck and 'Unnamed Tributary of Cringle Beck 6.1', together with the associated SAC, influencing landscape and the floodplain. The structure will also span over agricultural accommodation tracks and separate Public Rights of Way.

2.6.2 The location of the proposed structure is shown on Sheet 3 of 6 of General Arrangement Drawings Scheme 06 Appleby to Brough [Document Reference 2.5, APP-014].

2.6.3 It is located on an offline section of the A66, to the south of Wheat Sheaf Farm and approximately 1km northwest of Warcop village. As such, impacts on residents, landowners, local road users, emergency services and other stakeholders during construction will be considered and minimised where practicable. Such impacts include those associated with temporarily closing local roads during construction works, and the resultant visual impact of the structure in the landscape.

Site-specific constraints and sensitivities

2.6.4 The key site-specific constraints and sensitivities for Cringle Beck Viaduct can be summarised as follows:

- Both Cringle Beck and 'Unnamed Tributary of Cringle Beck 6.1' form part of the River Eden SAC. The overall length of the proposed structure is governed by the extent of the SAC, the area which provides 'supporting processes' to the SAC and of the floodplain.
- The proposed structure is intended to present minimal obstruction to natural existing geomorphological processes (e.g., erosion, deposition and sediment transport), ensuring they can continue both in the channel and floodplain.
- Wheat Sheaf Farm lies to the north of the proposed location of Cringle Beck Viaduct and therefore the structure would be in full view from the property. The property lies on the route of the existing A66 road, which will be de-trunked and used only as an access road to Wheat Sheaf Farm. The land surrounding the site of the proposed structure is under the ownership of the Wheat Sheaf Farm landowner and will likely continue to be used for agricultural means following the construction of the viaduct.
- Pedestrian footpaths would run alongside the farm accommodation tracks underneath the structure, so the public will have full visibility of the viaduct from the ground level. The structure would also be visible from the proposed cycleway, running parallel to the north.
- The structure is proposed to be located in an area with a high chance of finding archaeological remains.

Site context and design outcome objectives

2.6.5 Due to the site topography, the proposed A66 alignment will be elevated above the existing ground level by approximately 15m. This will result in a high structure for the Cringle Beck Viaduct, with associated tall piers, such as the A9 Tomatin viaduct located southeast of Inverness (Figure 5 below).

Figure 5: Example of a viaduct in a rural setting – A9 Tomatin viaduct in Scotland

2.6.6 Due to the large level difference, a 'closed aspect' solution has been discounted due to both construction difficulties associated with 15m high abutments, and aesthetics. Therefore, an open aspect solution is proposed to tie into the dominating embankments. This design will minimise the visual 'bulk' of the structure.

2.6.7 The detailed design of Cringle Beck Viaduct on the proposed A66 NTP route will comply with the Design Outcome Objectives as outlined in Sections 3.2 (Table 3-1) and 4.4 (Table 4-8, with reference to row 0405.04 of Table 4-6 in Section 4.3) of the A66 NTP Project Design Principles [Document Reference 5.11, APP-009]. Following the guidance outlined in CD 351 (see Table 3.4N1 of Appendix B), Cringle Beck Viaduct:

- Is considered to be a landmark structure that can generate significant local or national interest
- Is considered to have a significant visual effect in a location with environmental, heritage, landscape and visual sensitivities
- Will be highly visible within the proposed A66 NTP route
- Will carry significant volumes of traffic.

2.6.8 As such, given the proposed viaduct will be located in a rural setting, detailed design will ensure, through the implementation of the PDP, that the structure does not dominate the landscape and is sympathetic to the surrounding area.

2.7 Moor Beck Viaduct

Structure location and functional requirements

2.7.1 Moor Beck Viaduct is proposed to carry the proposed A66 dual carriageway over the tributaries of the River Eden known as Moor Beck and Mill Leat, together with the associated SAC, influencing landscape and the floodplain.

2.7.2 The location of the proposed structure is shown on Sheet 3 of 6 of General Arrangement Drawings Scheme 06 Appleby to Brough [Document Reference 2.5, APP-014].

2.7.3 It is located on an offline section of the A66, approximately 0.5km north of Warcop village. As such, impacts on residents, landowners, local road users, emergency services and other stakeholders during construction must be considered and minimised where practicable. Such impacts include those associated with temporarily closing local roads during construction works, and the resultant visual impact of the structure in the landscape.

Site-specific constraints and sensitivities

2.7.4 The key site-specific constraints and sensitivities for Moor Beck Viaduct can be summarised as follows:

- Both Moor Beck and Mill Leat form part of the River Eden SAC. The overall length of the proposed structure is governed by the extent of the SAC, the area which provides ‘supporting processes’ to the SAC and of the floodplain.
- The proposed structure is intended to present minimal obstruction to natural existing geomorphological processes (e.g., erosion, deposition and sediment transport), ensuring they can continue both in the channel and floodplain.
- The structure will be designed to minimise interruption to flow dynamics in a high flow / flood event. This way, water would not be funnelled through the structure, which would result an “unnatural” erosion, sediment transport and deposition upstream and downstream of the crossing. Relatively long spans would also be beneficial for animal crossings, especially otters and bats.
- A 2.5m vertical headroom is required for the purposes of maintenance access underneath.
- The structure will be visible from the de-trunked A66 / new local road, a proposed cycleway, and a proposed footpath.
- The structure is proposed to be located close to agricultural activities.
- The structure is proposed to be located in an area with a high chance of finding archaeological remains.

Site context and design outcome objectives

2.7.5 The structure will have limited elevation above the ground, as the proposed A66 alignment will need to tie-in with the existing A66 road shortly after crossing Moor Beck. This will result in a low-lying structure, similar to the River Eden Bridge on the Temple Sowerby Bypass (see Figure 6 below).

Figure 6: Example of a low-lying viaduct – River Eden Bridge

2.7.6 This results in comparatively little difference between open and closed aspect designs, however it is proposed that an open aspect is adopted as this will be a more aesthetically pleasing and economical method of spanning the entirety of the Moor Beck floodplain.

2.7.7 The detailed design of Moor Beck Viaduct on the proposed A66 NTP route will comply with the Design Outcome Objectives as outlined in Sections 3.2 (Table 3-1) and 4.4 (Table 4-8, with reference to row 0405.04 of Table 4-6 in Section 4.3) of the A66 NTP Project Design Principles [Document Reference 5.11, APP-009]. Following the guidance outlined in CD 351 (see Table 3.4N1 of Appendix B), Moor Beck Viaduct:

- Is considered to have a significant visual effect in a location with environmental, heritage, landscape and visual sensitivities

- Will not be highly visible within the proposed A66 NTP route but will be visible from the proposed Warcop junction, the de-trunked section of A66 and from routes used by walkers, horse riders and cyclists
- Will carry significant volumes of traffic.

2.7.8 As such, given the proposed viaduct will be located in a rural setting, detailed design will ensure, through the implementation of the PDP, that the structure does not dominate the landscape and is sympathetic to the surrounding area.

3 Conclusions and next steps

3.1.1 As outlined in Agenda Item 3.1 of Deadline 1 Submission – 7.3 Issue Specific Hearing 2 (ISH2) Post Hearing Submissions [REP1-009], the Applicant explained that the Project Design Principles [Document Reference 5.11, APP-302] is the key document intended to guide the detailed designers to develop the Project such that it meets the criteria for good design set out in the National Policy Statement for National Networks and the other relevant design guidance cited in the Project Design Report [Document Reference 2.3, APP-009]. It is also the vehicle for securing important aspects of the design that are relied upon for essential mitigation in the Environmental Statement and the detailed designer will therefore be required to comply with the A66 NTP Project Design Principles (as per article 54 of the DCO) and CD 351, in accordance with National Highways' standard processes, for the future PCF Stages of this project.

3.1.2 The outputs of the SORs and the live AAD 2.1 documents that were developed during PCF Stage 3 (Preliminary Design) informed the development of the PDP, which essentially forms the design brief for the detailed design of the Project. The designers for PCF Stage 5 (Construction Preparation) are obliged to implement the PDP during the development of the detailed design and construction. This is generally no different to the approach taken by National Highways (and approved by the Secretary of State) on numerous other DCOs. Indeed, the PDP secures a more detailed design 'envelope' than many other DCOs, reflecting the active approach of National Highways to consider the design of these structures.

3.1.3 The DMRB and the National Highways Project Control Framework processes will help to ensure the PDP is implemented during detailed design. The live AADs will be developed during detailed design as per DMRB CD 351, with the AAD 2.2 versions being produced during PCF Stage 5 (Construction Preparation). The Design Outcome Objectives will be developed in the AAD 2.2, with the detail intended to provide considerations affecting the aesthetics of both the whole structure and specific parts, whilst complying with the PDP.

3.1.4 The detailed design will continue to comply with DMRB CG 300; Approvals in Principle and Design and Check Certificates will be developed throughout PCF Stage 5. Consultations with key stakeholders will continue during detailed design and be documented be in AAD 2.2s and the Approvals in Principle. National Highways will consider the requirements of the PDP, the DMRB and the National Highways Project Control Framework throughout the remaining stages of this Project, particularly during engagement with the designers and review of their submissions. Stakeholder requirements will be considered as part of these processes. They will allow National Highways to monitor the technical and aesthetic design of the structures on the project and ensure that the PDP is being adhered to during the detailed design and construction. This is standard practice for all National Highways major projects, including projects that have been consented by way of a DCO.

A Appendix A: CG 300 Technical approval of highway structures

Design Manual for Roads and Bridges

Highway Structures & Bridges
General Information

CG 300
Technical approval of highway structures

(formerly BD 2/12)

Version 0.1.0

Summary
Former DMRB document BD 2/12 has been amended as follows to form this document: *Amended clauses and model AIP to include Principal Designer, which is stipulated in Construction (Design and Management) Regulations 2015 *Added provisions for structures options reports.*Clause 2.29.7 added 'Water management' as a specific aspect for assessment.*Clauses 3.5 - 3.12 have alterations to some height/span ranges for some structures following feedback.*Added Type N classification to temporary works section to reflect provisions within PAS 8811 (see references).*Amended procedure to require Designer to agree design or assessment criteria within AIP with checker prior to submission to TAA.* Requirements included to identify safety critical fixings.*Updates to model forms.

Application by Overseeing Organisations
Any specific requirements for Overseeing Organisations alternative or supplementary to those given in this document are given in National Application Annexes to this document.

Feedback and Enquiries
Users of this document are encouraged to raise any enquiries and/or provide feedback on the content and usage of this document to the dedicated Highways England team. The email address for all enquiries and feedback is: Standards_Enquiries@highwaysengland.co.uk

This is a controlled document.

Contents

Latest release notes

Document code	Version number	Date of publication of relevant change	Changes made to	Type of change
CG 300	0.**1**.0	April 2021	Core document, England NAA	Incremental change to requirements
Various changes and amendments for clarity and administration purposes. No technical changes.				

Previous versions

Document code	Version number	Date of publication of relevant change	Changes made to	Type of change
CG 300	0	March 2020		

Foreword

Publishing information

This document is published by Highways England

This document supersedes BD 2/12, which is withdrawn.

Contractual and legal considerations

This document forms part of the works specification. It does not purport to include all the necessary provisions of a contract. Users are responsible for applying all appropriate documents applicable to their contract.

Introduction

Background

This document specifies the technical approval (TA) procedures for highway structures on motorways, trunk roads or any road designated by the Overseeing Organisation.

In the early 1970s, structure 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 Merrison Report [Ref 2.I], the following important changes were made by the then Ministry of Transport:

1) the Department would continue to examine design criteria and methods but not computations;
2) the requirements by the Department for a certificate of independent check of the design and computations; and,
3) 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.

The TA procedures as described in this document generally require the proposer to submit an AIP to the Checker for agreement prior to submission 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 also covered in this document.

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 are being affected. The procedures can be applied to any other circumstances where the highway authority considers the requirements to be appropriate.

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 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.

Assumptions made in the preparation of this document

The assumptions made in GG 101 [Ref 9.N] apply to this document.

Mutual Recognition

Where there is a requirement in this document for compliance with any part of a "British Standard" or other technical specification, that requirement can be met by compliance with the mutual recognition clause in GG 101 [Ref 9.N].

Abbreviations

Abbreviations

Abbreviation	Definition
AIP	Approval in principle
CEng	Chartered Engineer
CPR	Construction Products Regulations
EOTA	European Organisation for Technical Approvals
ETA	European Technical Approval
M&E	Mechanical and electrical
MICE	Member of the Institution of Civil Engineers
MIStructE	Member of the Institution of Structural Engineers
O/AIP	Outline approval in principle
TA	Technical approval
TAA	Technical approval authority
TAS	Technical approval schedule
TDA	Tunnel design authority
TDSCG	Tunnel design and safety consultation group

Terms and definitions

Terms

Term	Definition
All lane running	England only term for a smart motorway which includes the permanent conversion of a hard shoulder to a running lane
Approval in principle	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
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
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
CE marking	the marking that the manufacturer applies to declare compliance of a product with relevant EU product regulations including the Construction Products Regulation (CPR) 305/2011/EU [Ref 2.N]
Checker	the organisation responsible for the independent check of the design or assessment
Check team	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.
Construction compliance	confirmation that the execution works undertaken are in compliance with the agreed documents (such as AIP, design, specification, drawings, etc.)
Contractor	the organisation contracted by the Overseeing Organisation to undertake execution works on its behalf. Also known as Principal Contractor
Contractor's representative	a representative of the Contractor, with responsibility for overseeing the execution 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 or assessment. Also known as Principal Designer

Terms (continued)

Term	Definition
Design team	the group of engineers responsible for the design. It may comprise an appropriate mix of specialists under the direction of a design team leader
Eurocodes	as defined in BS EN 1990 [Ref 7.N]
Execution	as defined in BS EN 1990 [Ref 7.N]
Foundation	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 are to be given in the AIP
Ground investigation report	a report that contains geotechnical information relevant to the design or assessment. See CD 622 [Ref 10.N]
Highway boundary	limits of the highway that are the responsibility of the Overseeing Organisation. This includes the road, footpaths, verges, slopes, etc. within those limits
Highway structure	structure or installation coming within the scope of this document and situated under, over or adjacent to a motorway or other trunk road or road designated by the Overseeing Organisation
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	the organisation with delegated responsibility for the maintenance of a highway structure
Outline approval in principle	the document, which records the agreed basis and outline criteria for the detailed design of a highway structure
Overseeing Organisation	this refers to the following organisations (or their successors): Highways England; Transport Scotland; Welsh Government (Llywodraeth Cymru) and The Department for Infrastructure (Northern Ireland). Additionally, it will refer to any other organisation that chooses to use this document for technical approval.
Principal	a senior representative of the designer, assessor, checker, contractor or works examiner having authority to sign certificates on its behalf
Principal Contractor	the organisation or individual appointed by the client to plan, manage and monitor and coordinate the construction phase of work where there is more than one contractor
Principal Designer	the organisation or individual appointed by the client to plan, manage and monitor the pre-construction phase, and where appropriate liaise with the principal contractor during the construction phase

Terms (continued)

Term	Definition
Project manager of the Overseeing Organisation	representative of the Overseeing Organisation with responsibility for project management of execution works to highway structures
Proposal	the proposal relating to the design or assessment of a highway structure including the mechanical and electrical (M&E) installations covered by this document
Proprietary manufactured structure or products	a structure with CE marking or product with CE marking manufactured to a system covered by a patent and/or a registered design
Road tunnel	a subsurface highway structure enclosed for a length of 1 50 m or more
Safety critical fixing	application in which the failure of a post-installed reinforcement or anchor can: 1) result in the collapse or partial collapse of the structure; 2) cause risk to human life; or, 3) lead to significant economic loss
Service tunnel	a tunnel structure installed by trenchless technology beneath a highway for any purpose. This can be regarded as a service crossing if the internal diameter is 2m or less
Structure resilience	the ability of structure to resist deliberate damage which may arise from the actions of vandals, thieves and terrorists
Structure robustness	the ability of a structure not to be damaged disproportionately in the event of accident, misuse or deterioration
Substructure	generally in a highway structure, the wing walls, piers, columns, towers and abutments that support the superstructure Note: Specific elements forming the substructure are to be given in the AIP.
Superstructure	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
Team leader	the person responsible for overseeing and co-coordinating the work of the design, assessment or check team and having authority to sign on behalf of the team. The team leader is to 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.

Terms (continued)

Term	Definition
Technical approval	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	the organisation responsible for agreeing the approval in principle and subsequently accepting the relevant certificates
Technical approval schedule	the schedule of documents to be used for the design or assessment of a highway structure
Third party	any person, organisation or other legal identity that is not employed directly or indirectly by the Overseeing Organisation
Tunnel Design Authority (TDA)	A central high level governance group - As ENAA for CD 352 [Ref 1.I]
UK national standards (Eurocodes)	the suite of Eurocodes to be implemented by BSI as UK national standards, covering structural design of all civil engineering works, including bridges
UK national standards (non-Eurocodes)	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
Works Examiner	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

1. Scope

Aspects covered

1.1 Subject to any exclusions expressly stated in this document, technical approval (TA) procedures shall be applied to all proposals, including third party proposals and private developments, that are:

1) within the highway boundary;
2) outside the highway boundary, where the structures are to be adopted by the Overseeing Organisation;
3) outside the highway boundary where works can affect the highway or highway structure; and,
4) outside the highway boundary where works can affect the safety of the highway user.

NOTE *Proposals can relate to construction, widening, assessment, improvement, repair (where structural integrity is implicated), and demolition.*

1.2 The scope of TA shall be in accordance with Sections 3 to 6 of this document.

1.2.1 In cases where the design and construction of a third party proposal for temporary works or temporary structures are outside the competence of the Overseeing Organisation, the special requirements given in respective National Annexes may be implemented.

1.3 TA procedures shall apply to temporary works where the permanent works proposal has identified the need for an independent check.

1.4 TA procedures shall not apply where there are no public safety issues.

NOTE *Temporary work in green field sites or works within the highway boundary where there will be no interface with the public are examples of works where there are no public safety issues.*

Contractual responsibilities and procedure

1.5 TA shall 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.

NOTE *This document is written such that it is applicable in principle to all current and likely future forms of procurement (refer to respective National Annexes for exceptions).*

1.6 Where departing from the procedures, format or terms used in this document, the Designer/Assessor shall ensure that the following objectives are achieved:

1) the required design or assessment principles are formally agreed prior to award of any contract; and,
2) execution of the works 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 document.

NOTE *Formal agreement of design or assessment principles can avoid contractual repercussions.*

1.7 The model AIP forms and certificates provided in the appendices shall be amended and agreed with the Overseeing Organisation, to suit specific contract requirements.

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

NOTE *It is recommended to consult the TAA in advance to agree timings and include these in the works programme.*

1.9 The contract requirements shall clarify whether the proposals and the AIP are of an outline nature or whether they are comprehensive and sufficient for detailed design or assessment.

NOTE 1 *Outline proposals are sufficient for the invitation or acceptance of tenders.*

NOTE 2 *For detailed design, the principles, detailed requirements and recommendations of this document apply .*

1.9.1 The TAA should be consulted to agree the TA procedures where there are any uncertainties with regard to procurement.

NOTE *For example, TA for the design can typically be completed in detail before tender; in other forms of procurement where design and the TA process is incomplete prior to inviting tenders, submission of a final detailed AIP can take place following award of contract.*

Implementation

1.10 This document shall be implemented forthwith on all schemes involving the assessment, design, execution, operation and maintenance of highway structures on the Overseeing Organisations' motorway and all-purpose trunk roads according to the implementation requirements of GG 101 [Ref 9.N].

1.11 This document shall be used to implement the procedures for private development within the highway boundary.

Use of GG 101

1.12 The requirements contained in GG 101 [Ref 9.N] shall be followed in respect of activities covered by this document.

2. General requirements and principles

Overseeing Organisation's requirements

2.1 Technical requirements for the design, execution, operation and maintenance, decommissioning and demolition of highway structures shall be contained in the technical approval schedule (TAS).

2.1.1 In some forms of contract, such as design and construct, technical requirements may be contained in the contract requirements.

NOTE The TAs includes the DMRB, the British Standards (including Eurocodes, National Annexes and Published Documents), MCHW and other supplementary standards for specific projects requirements.

2.2 All submissions shall be in an agreed electronic format in accordance with the Overseeing Organisations' requirements, unless set out otherwise in contract documents.

2.3 The format selected shall allow the Designer, Checker and TAA to review all information and, when required, attach unique electronic signatures.

2.4 Third party proposals covered in Section 1 shall be dealt with as follows:

1) the principles given for the TA procedures in this document are adopted;
2) the TAA does not take on the responsibility that belongs to the third party;
3) the principles of special requirements given in the respective NAAs are applied where the Overseeing Organisation does not have a specific competence or expertise to give an opinion on whether the third party proposal or temporary works are safe or not; and,
4) for third party proposal of temporary work or temporary structure, Section 4 of this document is to be followed.

NOTE Third party proposals includes any from adjacent landowners, statutory undertakers, private developers, government bodies, etc.

Proprietary manufactured structures and products

2.5 Proprietary manufactured structures and products shall be subject to the full TA procedures, with the exception of those that comply with the requirements of the Construction Products Regulations (CPR) 305/2011/EU [Ref 2.N].

2.6 Proprietary manufactured structures and products shall be used for their intended purpose.

NOTE 1 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 CPR or a recognised product registration system and would satisfy the specified end use.

NOTE 2 Any discrimination that does create a "barrier to trade" is 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.

2.7 Proprietary manufactured structures or products with CE marking in accordance with CPR procedures shall be accepted for their correct intended use and satisfy the specified performance requirements.

2.8 The TA procedures shall not be applied to any aspect related to this acceptance except to confirm that the declared performance of the product meets that required.

2.9 Additional requirements must not be imposed on manufactured structures with CE markings or products with CE markings that are used for their intended use.

2.10 Where there are potential safety issues with the use of manufactured structures with CE markings or products with CE markings, TAA shall be consulted.

2.11 TA procedures shall apply for installation of CE marked structures or products, but not their manufacture.

2.12 TA procedures shall apply where unintended use is proposed for CE marked structures or products.

NOTE *Further information is given in 3.12(6) and Appendix P.*

Use of UK National Standards

2.13 For the design of highway structures using UK National Standards (Eurocodes), reference shall be made to the Overseeing Organisations' current requirements for the use of Eurocodes for the design of highway structures.

2.14 For the design of highway structures using UK National Standards (Eurocodes), the model AIP form in Appendix A shall be used.

2.15 For the design or assessment of highway structures using UK National Standards (non-Eurocodes), the model AIP form in Appendix B shall be used.

NOTE *Model forms are intended to be generic and can be enhanced and edited to suit particular proposals as required.*

Options report

2.16 An options report shall be submitted for all works listed below, unless indicated otherwise by the Overseeing Organisation:

1) where there are a number of realistic cost effective alternatives for permanent structures expected to be category 2 or 3 (as described in Sections 3 to 6 of this document);
2) for structures to be category 0 or 1 with an estimated construction cost in excess of £0.5M; and,
3) where directed.

2.17 The options report shall be prepared by the Designer.

2.18 The format, content and level of detail of the options report shall be as agreed with the Overseeing Organisation.

NOTE 1 *Guidance is provided in Appendix O.*

NOTE 2 *It is intended that the options are limited to the primary alternatives rather than numerous iterations of similar or unrealistic options. Typically, the option report sets out possible alternative structure solutions considering factors such as complexity, buildability, durability, risk, programme, cost, etc..*

2.19 An options report for assessment shall not be required, unless this has been included as an alternative to new work options above.

Category of proposals

2.20 The proposals shall be placed in one of four categories: 0, 1, 2 or 3, according to the criteria described in Sections 3 to 6.

2.21 The category from clause 2.20 shall be proposed by the Designer or Assessor and details of the proposal submitted to the TAA for agreement.

2.21.1 The Designer or Assessor may undertake an initial screening process with the TAA to obtain an early agreement on the category.

NOTE *The category boundaries are not rigid and the category of each proposal is decided on its merits, having regard to potential consequences of failure, design complexity and whole life costs.*

2.22 AIP's shall be required for categories 1, 2 and 3.

NOTE *AIP's are not required for category 0.*

2.22.1 Where TA agrees that the AIP does not add value, it may be omitted for category 1 and 2.

2.23 Where a structure has been placed in category 0 or 1 and a proposal arises subsequently requiring a departure, the TAA shall be contacted to request a review of the category.

2.23.1 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.

2.24 Where the TAA has reviewed the category and agreed to retain category 0, a new certificate shall be submitted making reference to the approved departure from standard.

2.25 Where the TAA has reviewed the category and agreed to retain category 1, an amendment or addendum to the AIP shall be submitted.

2.26 The agreement of the TAA shall be required before any proposal that includes a departure can be incorporated in the design or assessment.

Proposals

Proposals for categories

2.27 Proposals for categories 1, 2 and 3 shall provide the following:

1) provide sufficient information and evidence to demonstrate compliance with the Overseeing Organisation's requirements and to justify their viability;
2) identify, assess and take into account, through appropriate methods of risk management, potential risks and hazards during the whole life of the structure such as execution, operation, maintenance and demolition, with a view to eliminating or minimising these risks;
3) 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;
4) provide evidence that appropriate consultation has taken place with all relevant stakeholders, and that full and proper consideration has been given to their respective interests;
5) identify, assess and consider risks and hazards that can affect the structure as a result of other stakeholders' requirements (such as leakage of gas or water mains);
6) identify, assess and take into account risks and hazards posed by the structure to other infrastructure belonging to a third party;
7) include documentation relating to consultation and special requirements of those consulted within the AIP;
8) 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; and,
9) list in the TAS all relevant documents that are being proposed for use in the design or assessment.

2.28 Documentation relating to consultation and special requirements of those consulted shall be included as part of the AIP submission.

Proposals for designs

2.29 In addition to proposals for categories, proposals for designs shall address the following:

1) sustainability;
2) environment (both the natural and built environment) and the requirements of any cultural heritage, environmental management plans and walking, cycling and horse riding assessments;
3) aesthetics;
4) buildability;
5) structure robustness;
6) structure resilience;

7) water management (describe how water will be managed within the design of the structure. This includes internally (transport of water on and through the structure and sealing of elements to prevent water ingress) and externally (global management considering interface with other assets, such as watercourses, drainage, pavement, geotechnical features, etc.);
8) maintenance and operational commitments in terms of whole-life costs in design options and choices of materials;
9) provision of safe access for periodic inspection;
10) avoidance of a 'barrier to trade' and the requirements for using proprietary manufactured structures or products; and,
11) resilience and security.

2.30 Proposals for designs shall include for the likelihood of future heavier loads, all lane running and/or widening and describe how the structure may be upgraded.

2.30.1 In the case of road tunnels, proposals for designs should consider future development above or adjacent to the tunnel.

NOTE *It is not intended that additional provision be included within the design unless agreed with the Overseeing Organisation.*

2.31 For major structures and those sited in environmentally sensitive locations the TAA shall be consulted at an early stage to determine whether submission is required to relevant environmental or architectural bodies or a design panel.

NOTE 1 *Major structures can include tunnel portals, tunnel service buildings and landscaping.*

NOTE 2 *Environmentally sensitive locations can include National Parks, areas of outstanding natural beauty, green-belts and urban areas.*

2.32 Proposals for designs must comply with the relevant environmental and planning legislation during the development of the design.

NOTE *Legislation includes, but is not limited to, environmental assessments, environmental statements and habitat surveys.*

2.33 Affected stakeholders shall be consulted to ascertain environmental requirements during the development of the design and post construction.

NOTE *For example translocation of endangered species, acceptable environmental mitigation and other measures where existing habitats are disrupted.*

2.34 Where proposals are located close to or cross watercourses, the relevant national environmental body shall be consulted.

2.35 Proposals for designs shall state any assumptions that have been made with regard to construction processes or temporary works aspects that are significant factors in the design.

NOTE *For example the design of an integral bridge could assume a phi value or stiffness for abutment backfill.*

2.36 Where construction processes or temporary works during the course of construction have structural implications different from those assumed by the Designer, the TA shall be consulted and agreement obtained before the commencement of construction of that part of the works.

2.37 Proposals by the Designer for an independent checker shall be submitted to the TAA for consideration/agreement.

NOTE *Agreement to checkers for category 3 structures depends on relevant experience and competence.*

Proposals for assessments

2.38 In addition to proposals for designs, proposals for assessments shall describe proposed arrangements for access, traffic management and intrusive investigation where required.

Departures from standards

2.39 All applications for departures shall be subject to the approval procedures of the Overseeing Organisation.

NOTE *Designers or assessors can seek to introduce innovative techniques, research findings or developments in the state of the art and best practice by the adoption of departures.*

2.40 Applications for departures shall include reasons and justification, including benefits and dis-benefits to the Overseeing Organisation.

2.41 Applications for departures shall allow sufficient time for consideration by the Overseeing Organisation prior to inclusion in the AIP or an addendum to the AIP.

NOTE *In some cases the checker's comments on the proposed departure can be required to assist the TAA in the deliberation.*

2.42 Where UK national standards are used, the limitations for the use of departures shall be given in the Overseeing Organisation's requirements.

2.43 Where a structure is in the ownership of the Overseeing Organisation but accommodates other infrastructure that is the responsibility of another party, the party concerned shall be consulted by the Designer or Assessor.

NOTE *Factors that affect the design, construction phasing, and obtaining any required agreements together with timescales need to be taken account of.*

2.43.1 A record of consultation and any agreements in place or to be put in place with the party should be recorded in the AIP.

NOTE *Areas of specific concern can include vehicle restraint systems especially in transition areas, drainage, slopes, maintenance, etc. It is recommended that where possible individual responsibilities are agreed and set out during design and operational phases of the work.*

Submission for AIP

2.44 Submissions for AIP to the TAA shall be in accordance with the Overseeing Organisation's requirements.

NOTE *Generally submissions comprise a completed AIP, a location plan, a general arrangement drawing, relevant parts of the geotechnical investigation report, documents relating to consultation and any other relevant information or reports.*

2.44.1 A single AIP for the whole structure, should be submitted by the Principal Designer.

2.44.2 Where the designs of the superstructure, substructure and/or foundation are carried out by different teams, the designer of the superstructure and/or substructure should give the conditions and loads to be taken into account by the designer of the substructure and/or foundations respectively.

NOTE *The Principal Designer is responsible for ensuring that any separately designed elements are compatible.*

2.44.3 Relevant information and reports submitted to the TAA should be referenced in the AIP and written with regard to a clear proposal or objective.

2.45 Calculations and detailed drawings shall not form part of the submission.

NOTE *Any submitted calculations and detailed drawings will not be reviewed by the TAA.*

2.46 The AIP (or O/AIP) shall be based on the relevant sections of the model AIPs provided in Appendix A, Appendix B or Appendix O.

2.47 The AIP shall record all the agreed criteria on which the design or assessment is to be based.

2.48 Deviations from an agreed AIP to account for subsequent variations during design, assessment or execution shall render the AIP invalid.

2.49 Revisions to the AIP shall be agreed by the TAA.

2.50 Agreement shall be confirmed either in the form of an amended version of the agreed AIP or as a separate addendum to the agreed AIP.

2.51 Revised AIP submissions to the TAA for agreement shall:

1) clearly indicate deletions or additions that have been made to the agreed AIP;
2) take account of any comments or conditions of approval imposed by the TAA on the original submission;
3) be signed by the Designer/Assessor and Checker and forwarded with supporting information to the TAA; and,
4) ensure addenda refers to the original AIP by the date of agreement by the TAA.

NOTE *Retaining the same clause numbering as the original AIP, showing mark-ups, etc. help all reviewers to understand the changes and to minimise duplication of work.*

2.51.1 TA should start at an early stage of development of proposals.

NOTE 1 *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 and carriageway alignment.*

NOTE 2 *The period over which TA extends can vary according to the size and complexity of the structure and number of departures. To avoid any unnecessary delay, AIP can be given in stages in the form of interim AIP as principles are evolved. However, the use of interim AIP does not prejudice the agreement of an AIP for the full structure.*

Technical approval

2.52 Sufficient information shall be provided, by the Designer, to enable the TAA to carry out the following aspects, where applicable:

1) appraise the proposed design or assessment criteria, principles and methods;
2) agree the required working life for the structure and its main components;
3) agree the category of the proposals;
4) 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;
5) be satisfied that the following have been considered:
    a) safety;
    b) sustainability;
    c) buildability;
    d) traffic management;
    e) environmental impact;
    f) aesthetics;
    g) structure robustness;
    h) water management;
    i) durability;
    j) maintenance, access and inspection;
    k) upgradeability;
    l) whole life costs;
    m) demolition; and,
    n) compliance with the Overseeing Organisation's requirements;
6) agree the list of documents included in the TAS and departures;
7) appraise the geotechnical conditions and other relevant investigations;

8) 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;
9) review the adequacy of consultation with other stakeholders and the incorporation of agreed requirements;
10) agree proposed category 3 Checker based on their relevant experience and competence;
11) resolve any point(s) of difference between the Designer or Assessor and the Checker;
12) confirm agreement of Designer and Checker by signature on AIP; and,
13) for tunnels, confirmation that the tunnel design authority output report has been signed off.

2.53 When satisfied with the proposals, the TAA shall confirm its agreement by signature of the AIP.

2.54 On completion of the detailed design, check or assessment, the TAA shall receive and consider the appropriate certificates for acceptance.

2.55 The agreement of the AIP or acceptance of the certificates by the TAA shall not relieve the Designer, Assessor nor Checker of any of their responsibilities.

NOTE *Responsibilities include the accuracy of information of all information submitted in TA submissions, the validity and arithmetical correctness of the calculations, methods and techniques and their translations into design details and drawings, specification clauses or assessed capacities.*

2.56 The AIP shall be valid for three years after the date of agreement by the TAA.

2.57 Where the construction has not yet commenced within this 3-year period, the AIP shall be re-submitted to the TAA.

2.58 Prior to re-submission of an AIP it shall be reviewed by the Designer.

2.59 Whether any updating or amendment to the design is required shall be determined by the review and the outcome recorded in an amendment or addendum to the AIP.

2.60 The agreement of the TAA to the re-submitted AIP shall be required before the execution can proceed.

2.61 The works examiner shall inform the TAA of any amendments to the design, during execution, which have structural implications.

2.61.1 The proposed works examiner should be notified to the TAA prior to construction (unless already defined in the contract).

2.62 Any amendments which have structural implications shall be included in an addendum to the AIP.

2.63 Certificates shall be revised to take account of the amendments.

2.63.1 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 should be covered by an AIP addendum and/or additional certificates.

2.64 Any AIP addendum and/or additional certificates shall require acceptance by the TAA before erection commences.

Design and assessment procedure

2.65 The design/assessment shall comply with the AIP.

2.66 The applicability and accuracy of all computer programs used, and the validity of the programs for each application, shall be ensured by the Designer or Assessor.

Checking procedure

2.67 Assessments, designs, drawings, bar bending schedules and other relevant documentation, shall be checked as follows:

1) categories 0 and 1 are checked independently by another engineer who may be from the design/assessment team;
2) category 2 are checked by a check team, which may be from the same organisation but independent of the design/assessment team; and,
3) category 3 are checked by a check team from a separate organisation proposed by the Designer or Assessor and agreed by the TAA.

2.68 The Checker shall carry out the check, with due professional skill and care, in accordance with the agreed AIP.

2.69 The Checker shall carry out a comprehensive examination of all aspects of the design or assessment in accordance with the Overseeing Organisation's requirements.

NOTE *This can include any proposed departures and specification clauses that could affect structural integrity. (e.g. new materials)*

2.70 The check shall include that the calculations are translated accurately into design details and drawings, specification clauses or assessed capacities.

2.71 During the course of the check a report shall be submitted to the Designer or Assessor and TAA for any aspect of the agreed AIP, design or assessment where changes are considered necessary.

2.72 The agreement of the TAA to variations in the AIP shall be confirmed in accordance with clauses 2.47 to 2.51.

2.73 Any disagreement arising between Designer or Assessor and Checker that they cannot resolve shall be notified immediately to the TAA.

2.74 The Checker's analytical models and analytical work shall 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.

2.74.1 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.

NOTE *The method of analysis employed by the respective teams need not be the same.*

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

2.75.1 Both activities of design/assessment and check may proceed in parallel.

Certification

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

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

2.77 Where structures have an assessed capacity of less than current operational needs or there are aspects with the potential to lead to other safety or operational risks in the near future, the Assessor shall notify the TAA and agree any necessary actions before submitting the certificates.

NOTE *In agreement with the TAA this can be included within the assessment report and include recommendations for risk mitigation measures/options with, where possible, timescales.*

2.78 For all proposals, a single organisation shall assume responsibility for the whole of each activity; the design, assessment, check or construction compliance for the entire structure.

NOTE *Clause 2.78 does not preclude the design of elements of the structure being done by others. However, the responsibility for the overall structure remains with the Principal Designer. This ensures that elements are not designed in isolation and the interfaces between any element and the global performance is included in the design. In relation to the detailed design of elements designed by*

others, the Principal Designer could obtain assurance through certification received from another designer, rely on separate certification (accepted by the TAA) or by producing performance requirements where elements are supplied that meet those, (such as identifying loading, dimensional limits, and movement ranges).

2.79 Each certificate shall be endorsed, as required, by the Designer, Assessor, Checker, Contractor's representative and Works Examiner.

2.80 Each certificate shall be submitted where required for acceptance by the TAA.

2.81 Signatories shall be required from the team leader and another from the principal of the organisation concerned.

2.81.1 The team leader may be the Designer, Assessor or Checker.

2.82 All signatories to certificates shall:

1) be authorised to sign on behalf of their organisation;
2) be competent in the field of work undertaken; and,
3) have relevant experience and appropriate engineering qualifications.

2.83 Signatories' qualifications shall be clearly indicated on the certificate along with their name and position in their organisation.

2.84 Signatories for the construction compliance certificate shall comprise a representative of the Contractor and principals of both the Contractor and of the Works Examiner.

2.85 The signatory for the TAA shall be a person delegated to undertake this task on its behalf.

2.86 Where TAA agrees that the design of the superstructure, substructure and/or foundations 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 shall be given in the AIP and/or certificate as applicable.

NOTE *Clause 2.86 above does not negate the requirement for a single organisation to take overall responsibility for the design of the entire structure.*

2.87 Where a proprietary structure or product is supplied in accordance with an O/AIP, and the item has been CE marked in accordance with the CPR, the Designer shall confirm to the TAA in a certificate that they have inspected the declared performance under the CE mark and that declared performance of the item meets the requirements of the O/AIP (refer to Appendix P).

2.88 For category 1, 2 and 3 structures 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.

2.89 Where additional and substitute specification clauses have been prepared by the Designer, they shall be endorsed by the Checker, if in agreement, and submitted as a Departure from standards for acceptance by the TAA.

NOTE *Many specifications require the designer to prepare a schedules of performance requirements or set out requirements within an appendix. A Departure is not required for these provided these are prepared in compliance with that specification.*

2.89.1 Additional and substitute specification clauses may be submitted either individually or collectively on a specification certificate.

2.90 Where additional and substitute specification clauses can affect structural integrity, for example clauses concerning new materials, they shall be checked in accordance with the AIP.

2.91 For category 0 structures, the design, assessment and check certificates shall refer to the relevant standards and departures and be submitted for acceptance by the TAA, unless otherwise stated in Sections 3 to 6.

2.92 A copy of the general arrangement drawing and any relevant supporting information shall accompany certificates for category 0 structures.

2.92.1 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.

2.93 Construction of the structure shall not proceed until the design or assessment certificates have been formally accepted by the TAA.

2.94 The construction compliance certificate shall be submitted to the TAA for acceptance by the Overseeing Organisation.

2.95 The public shall not be permitted to use a structure or have access to places where their safety would depend on the integrity of that structure until the TAA has accepted the Construction Compliance Certificate.

2.95.1 The TAA may agree an interim certificate to allow highways to be opened while the information for the final certificate is being prepared.

NOTE 1 Typically as-built drawings, bar bending schedules and material schedules are completed after construction.

NOTE 2 The Interim Construction Compliance Certificate can be based on the model in Appendix N, but clearly marked as "Interim" and omitting any reference to "as-constructed drawings and bar bending schedules".

2.96 Unless otherwise stated in Sections 3 to 6, the construction compliance certificate shall refer to, if available, the relevant AIP, design and check certificates, specification and as-constructed drawings.

2.97 The format of certificates shall be agreed with the Overseeing Organisation.

NOTE 1 The wording on certificates can vary depending on the Overseeing Organisation's particular requirements/type of contract.

NOTE 2 Model certificates are provided in Appendices I to N.

2.97.1 Where 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.

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

2.99 All certification, after acceptance by the TAA, shall be uploaded onto the Overseeing Organisation's structures management system.

Records

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

2.101 For categories 2 or 3 checks, when Eurocodes are used, the Designer's record for the choices and options adopted shall not be submitted to the TAA.

2.102 For categories 2 or 3 checks, when Eurocodes are used, the Designer record shall be recorded as required in the Overseeing Organisation's management system for structures.

3. Bridges and other highway structures

3.1 This section covers specific TA requirements for bridges and other highway structures and shall be read in conjunction with Sections 1 and 2.

3.2 The TA requirements shall be applied without limitation to:

1) design and execution of new structures;
2) assessment and related construction work, whether refurbishment, maintenance or strengthening, that affects structural integrity;
3) assessment relating to loading beyond that for which a structure has been designed or previously assessed; and,
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 a reassessment is required.

3.3 In addition to 1.1, the procedures described in this Section shall be applied to the following highway structures:

1) bridge, buried structure, subway, underpass, culvert and any other structure over the highway or supporting the highway with a clear span or internal diameter greater than 0.9 m;
2) overhead crossing carrying conveyor or utility service;
3) movable inspection access gantry, gantry rail and gantry support system;
4) earth retaining structure where the effective retained height, i.e. the level of fill at the back of the structure above ground level in front of the structure is greater than 1.5 m;
5) reinforced/strengthened soil/fill structure, with hard facings where the effective retained height is greater than 1.5 m;
6) reinforced/strengthened soil/fill which is an integral part of another highway structure;
7) portal and cantilever sign and/or signal gantry;
8) minor structures listed below:
    a) cantilever mast for traffic signal and/or speed camera;
    b) lighting column;
    c) high mast of more than 20 m in height, i.e. the vertical distance from top of post to bottom of flange plate, for lighting;
    d) mast for monitoring equipment. i.e. camera, radio and telecommunication transmission equipment;
    e) catenary lighting support system;
    f) noise barrier;
    g) traffic sign/signal posts of more than 7 m in height, i.e. the vertical distance from top of post to bottom of flange plate or top of foundation, whichever is the lesser;
    h) other 'mast type' structures identified by the TAA as requiring technical approval.
    i) 'fence type' structures, including environmental barriers, visual screens and fencing, identified by the TAA as requiring technical approval
9) proprietary manufactured structure or product;
10) reinforced/strengthened soil/fill structure where hard facings are not provided and the face inclination exceeds 45 degrees, unless agreed with the Overseeing Organisation that structural TA in accordance with this document is not required;
11) fitting of M&E apparatus and fixtures to existing structures, including tunnels, either permanent or temporary;
12) design, selection and installation of cathodic protection systems for reinforced concrete structures; and,
13) safety critical fixings (as defined in CD 372 [Ref 4.N])

Category

3.4 In addition to 2.20 to 2.26, the following criteria shall be considered when determining category.

3.4.1 The TAA may require a higher or lower category where deemed appropriate.

Category 0

3.5 Category 0 structures shall:

1) conform in all aspects of design, assessment and execution to DMRB and MCHW standards;
2) contain no departures; and,
3) be a structure covered by clause 3.6

3.6 Unless otherwise indicated by the TAA the following structures shall be category 0:

1) single-span structures with span of less than 5 m;
2) buried concrete boxes, buried rigid pipes and corrugated steel buried structures of less than 3 m clear span/diameter and having more than 1 m cover;
3) multi-cell buried structures, where the cumulative span is less than 5 m, and having more than 1 m cover;
4) earth retaining structures with an effective retained height of greater than 1.5 m but less than 2.5 m;
5) minor structures listed within clause 3.3 (8) and not situated at a very exposed site as defined in CD 354 [Ref 3.N];
6) high masts 25 m or less in height and not situated at a very exposed site as defined in CD 354 [Ref 3.N].
7) noise barriers less than 7 m high and without overhangs;
8) masonry arches with span of less than 6.5 m (for assessment only); and,
9) portal and cantilever sign and/or signal gantries compliant with a generic AIP.

Category 1

3.7 Category 1 structures shall:

1) conform in all aspects of design, assessment and execution to DMRB and MCHW standards;
2) contain no departures; and,
3) be a structure covered by clause 3.8.

3.8 Unless otherwise indicated by the TAA the following structures shall be category 1:

1) structures with a single simply supported or integral span of 5 m or greater but less than 20 m and having less than 25° skew;
2) buried concrete boxes, buried rigid pipes and corrugated steel buried structures with a clear span/diameter of 8 m or less;
3) earth retaining structures with an effective retained height of 2.5 m or greater but less than 7 m;
4) minor structures outside the limits of those listed within clause 3.3 item (8) or situated at a very exposed site as defined in CD 354 [Ref 3.N];
5) high masts greater than 25 m in height or situated at a very exposed site as defined in CD 354 [Ref 3.N];
6) noise barriers 7 m or more in height or with overhangs; and,
7) portal and cantilever sign and/or signal gantries with a span of less than 20 m.

Category 2

3.9 Structures not included within the parameters of categories 0, 1 or 3 shall be category 2.

Category 3

3.10 Complex structures which require sophisticated analysis or have any one of the following features shall be category 3:

1) high structural redundancy;
2) unconventional, novel or esoteric design aspects;
3) any span exceeding 50 m;
4) skew exceeding 45 degrees;
5) difficult foundation problems;
6) movable bridges;
7) movable inspection access gantries, gantry rail and gantry support systems;
8) bridges with suspension systems;
9) steel orthotropic decks;
10) post-tensioned concrete structures;
11) earth retaining structures with an effective retained height of 14 m or greater;
12) rock anchorages and anchorages forming part of a structure.
13) portal sign and/or signal gantries with a span greater than 50 m;
14) structures with hidden or difficult to inspect critical elements; or,
15) structures with cathodic protection systems installed in accordance with clause 6.5 of CD 370 [Ref 1.N].

Assessment and related construction work

3.11 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 be categorised on the same basis that the original structure would have warranted.

3.11.1 The TAA may require a higher or lower category where deemed appropriate.

Technical approval

3.12 Sufficient information to enable the TAA to consider the following aspects, where applicable, shall be provided by the Designer or Assessor in addition to clause 2.52:

1) cross-section and headroom clearances;
2) the loading and design or assessment criteria;
3) any provision to be made additional to items (1) and (2) for abnormally high and/or heavy loads;
4) the structural adequacy at all stages of construction work, such as repairs, strengthening, monitoring, partial renewals or demolitions;;
5) proposals for the independent checking of temporary works; and,
6) that proper consideration has been given to the adoption of proprietary manufactured structures or products with CE markings by the Overseeing Organisation (see Appendix P).

NOTE *The list in clause 3.12 above is not necessarily exhaustive.*

Certification

3.13 For category 0 minor structures as defined in 3.6(5) a certificate in the form given in Appendix J and an EC certificate or declaration of conformity shall be submitted to the TAA for retention.

Documentation

3.14 The AIP for highway structures within the scope of this section shall be based on the relevant model AIP forms given in Appendices A and B.

3.15 TASs shall be prepared in accordance with the notes given in Appendix H.

3.16 Certificates shall be based on the relevant model certificates given in Appendices I, J and N.

NOTE *The form of certificates can vary depending on the Overseeing Organisation's particular requirements.*

4. Temporary works

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

4.2 All temporary works proposals shall be reviewed and allocated into one of the following categories:

1) type N proposals: temporary works having no potential for impact on client or third party assets or on any person other than those under the direct control of the Principal Contractor;
2) type S (structure) proposals: erection proposals or temporary works which require both:
   a) an independent check of the effects of temporary works on permanent works (refer to the AIP for permanent works), and,
   b) where the works would not affect or potentially affect any highway or other way or area used by or accessible to the public; and,
3) type P (public) 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.

4.3 Where required a summary of the categorised list shall be provided to the TAA.

4.4 The TA requirements shall be applied to type S and type P proposals.

4.4.1 Where necessary and depending on the degree of risk, the TAA may change the proposal from type N to type S or from type S to type P.

4.4.2 Where the temporary works are permanently left in place (e.g. sheet piling), they may be considered instead, if appropriate, in the AIP of the permanent highway structure.

Scope

4.5 In addition to 1.1, the procedures described in this section shall be applied without limitation to the following temporary structures:

1) temporary works and falsework for major and complex structures;
2) proposals where erection procedure, method of construction or the procedure for the demolition or removal of an existing structure is of critical importance;
3) 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; and,
4) 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 of temporary works

4.6 The category adopted shall reflect the adverse consequences of any potential failure and comply with clauses 2.20 to 2.26.

4.7 For type N proposals, the Contractor's own procedures shall determine the relevant category.

4.8 For type S proposals, the category shall be the same as the category of the permanent structure.

4.9 For type P proposals, the category shall be 2 or 3.

4.9.1 Where agreed with the TAA that the risk is relatively minor and the reasoning is recorded in the AIP (or certificate in the case of category 0), proposals may be lowered to category 1 or 0.

Design criteria relating to permanent works

4.10 Design criteria for temporary works shall include all relevant design data concerning the design and construction of the permanent works.

4.11 The design data shall include, where applicable:

1) protection and/or safe operation of the permanent work or live carriageway during the use of a temporary highway structure; and,
2) temporary conditions of construction of new designs or the alteration of existing structures.

NOTE *Relevant design data can include allowable deflections, settlements, rotations, loading, jacking forces, propping requirements, clearances, impact protection, erection or demolition procedures, traffic control, carriageway possessions, etc.*

Proposals

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

4.13 Proposals shall state the criteria that have been adopted to encompass the technical, operational and safety requirements of the authorities consulted.

4.14 Proposals shall demonstrate to the satisfaction of the TAA that safeguards and contingency measures have been introduced and will be maintained throughout the duration of the work.

Type N proposals

4.15 No certification shall be submitted to the Overseeing Organisation.

NOTE *The Contractor is responsible for all aspects of this work.*

Type S proposals

4.16 For type S temporary works proposals the classification shall be agreed with the TAA.

4.17 Check certificate shall be required to confirm checking is carried out.

4.18 Design certificate and AIP of temporary works shall not be required.

NOTE *They are not required as there is no risk to the public and the contractor is responsible for the safety and adequacy of erection or temporary works proposals.*

4.19 Prior to the commencement of the relevant parts of the works, check certificate(s) based on those given in Appendix K related to type S proposals shall be submitted to the TAA.

4.20 The check certificate shall be recorded and kept in the Overseeing Organisation's management system for the permanent structure.

NOTE *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 P proposals

4.21 Unless otherwise stated in 4.24 and 4.25 or agreed with the TAA as category 0, proposals for temporary works shall be described in an AIP in accordance with the requirements and form of submission described in Section 2.

4.22 Unless otherwise stated in 4.24 and 4.25, all design, checking and certification of temporary works for type P proposals shall comply with the TA procedures of Sections 1 and 2.

4.23 The type P certificate shall be accepted by the TAA before consent to proceed with the works can be given.

4.24 Special requirements given in the respective NAAs shall be complied with for third party proposals of temporary works or temporary structures that are not described in Sections 3 to 6.

4.25 Special requirements given in the respective NAAs shall be complied with where the Overseeing Organisation has no specific competence or expertise to enable it to review the safety aspects of the proposal.

Technical approval

4.26 Sufficient information to enable the TAA to consider the following aspects, where applicable and in addition to clause 2.52, shall be provided by the Designer:

1) structural adequacy and stability at all stages;
2) precautions during erection/dismantling operations;
3) protection of the temporary works (including protection against vehicle or other impact);
4) general provisions in terms of permanent works execution;
5) loading and design criteria, including factors of safety where limit states design codes for bridges are not used;
6) effects on any existing structures or earthworks assessed by the permanent works designer during design;
7) working spaces for installation and removal;
8) clearances and access for construction plant and machinery; and,
9) provision for periodic inspection and checking.

NOTE *The list in clause 4.26 above is not necessarily exhaustive.*

Documentation

4.27 The AIP for temporary works within the scope of this Section shall be based on the model forms given in Appendices A or B, as relevant.

4.28 TASs shall be prepared in accordance with the notes given in Appendix H.

4.29 The certificates shall be based on the model certificates given in Appendices K, L and N.

NOTE *The form of certificates can vary depending on the Overseeing Organisation's particular requirements.*

4.30 A certificate of construction compliance shall be provided for temporary bridges and any structures and installations identified by the TAA .

NOTE *Generally a certificate of construction compliance is not required for temporary works.*

Special requirements concerning third party proposals

4.31 For third party proposals of temporary works or temporary structures that are not described in Sections 3 to 6, or where the Overseeing Organisation does not have a specific knowledge or expertise, the OO shall not be able to give an opinion on whether they are safe or not.

4.32 The third party shall have the required experience and competence to carry out the proposed works and be responsible for them.

4.33 The steps set out in clauses 4.34 and 4.35 shall be taken to ensure that the proposal is safe and the works are safely carried out.

4.34 The third party shall seek an agreement for its proposal and draw up a legal agreement with the Overseeing Organisation.

4.35 The legal agreement shall contain, amongst other things, the following:

1) outline procedures in dealing with the proposal which can include:
   a) certification to confirm that the principles of design and/or execution have been appropriately transformed into an appropriate design using due reasonable professional skill and care;

b) required information to be submitted to the Overseeing Organisation. Where appropriate this could be a general arrangement drawing, reason for structure, type of highway, traffic speed, description of structure, span arrangements, headrooms, foundation types, arrangement for inspection and maintenance, highway and other live loadings, ground conditions, risks and hazards, period of service, etc.;

c) seeking and taking into consideration of Overseeing Organisation considered comments on the proposal. If the Overseeing Organisation consider there is any safety issue and that safety issue is not resolved to the satisfaction of the Overseeing Organisation, the works cannot be carried out; and,

d) administrative processes e.g. establish contact points; agree relevant periods of notices; third party to give notifications; Overseeing Organisation to give comments and requirements; Overseeing Organisation to grant agreement; third party to start work; Overseeing Organisation to serve notice to stop work etc;

2) for temporary works or temporary structures, the following are to be considered:

a) the Overseeing Organisation is not required to approve or disapprove the temporary works or temporary structures or any of their isolated aspects;

b) a statement to confirm that the proposal is in compliance with normal industry standards and practices;

c) clearances e.g. headroom;

d) effect of temporary works or temporary structures on roads such as sight line or other highway structures (load on bridges);

e) where appropriate, requirement of geotechnical certification to CD 622 [Ref 10.N];

f) where there is little or no proven track record of the proposal or the proposal is an innovative solution, it is recommended that the proposal first be tried on a test site or a minor road; and,

g) certification to confirm that the proposal has been checked by an appropriately qualified and competent organisation which is independent from the third party. The relevant experience/competence of the Checker is to be agreed with the Overseeing Organisation before employing them;

3) for aspects other than temporary works or temporary structures, the following are to be considered:

a) for road traffic operations and/or management such as signage, parking and access of support vehicles, coning, lighting etc that are described in sections 3 to 6 or where Overseeing Organisation have the necessary expertise, the normal Overseeing Organisation practices required for appropriate Overseeing Organisation technical approval processes or operational requirements are to be applied; and,

b) the relevant parts of the Design Manual for Roads and Bridges are to be applied and Departures sought where appropriate;

4) agreement on an amount of public liability insurance and provision of a copy of the insurance certificate to the Overseeing Organisation;

5) provide confirmation to the Overseeing Organisation that the third party has taken appropriate safety advice identifying what advice has been taken and from whom;

6) agree to making good of any damages due to the work by the third party and obtain a certificate from the Overseeing Organisation area maintaining agent that the condition of the road network is almost the same before and after the work by the third party; and,

7) confirmation that all costs associated with the proposal will be borne by the third party.

5. Road tunnel and service tunnel structures

5.1 Technical approval (TA) requirements in this section shall be followed for the following:

1) road tunnel structures;
2) service tunnels where the internal diameter is greater than 2 m; and,
3) major tunnelling or building operations within the zone of influence of an existing road tunnel.

5.2 This section shall be read in conjunction with Sections 1, 2 and 6, and in the case of cut-and-over construction and for tunnel portals and road decks, the relevant parts of Section 3.

5.3 The requirements of the Tunnel Design and Safety Consultation Group shall be complied with.

5.4 The TA requirements within this document shall not apply to service tunnels where the internal diameter is 2 m or less.

5.5 For service tunnels where the internal diameter is 2 m or less requirements of CD 622 [Ref 10.N] shall apply.

Scope

5.6 In addition to 1.1, the procedures described in this Section shall be applied to:

1) the design and execution of new road tunnels, tunnel services buildings and service tunnels;
2) the assessment of existing tunnels that are subject to the effects of new temporary or permanent construction above or adjacent to the tunnel structure; and,
3) the refurbishment and strengthening of existing road tunnels.

Category

5.7 In addition to clauses 2.20 to 2.26, proposals for the design or assessment of road tunnel structures and service tunnels shall be in category 3.

Technical Approval

5.8 Sufficient information to enable the TAA to consider the following aspects, where applicable and in addition to clause 2.52, shall be provided by the Designer:

1) structure and form:
   a) methods of excavation and construction including proposed ground categorisation for tunnelling;
   b) tunnel profile;
   c) bore spacing;
   d) portal design;
   e) waterproofing;
   f) maintenance access;
   g) ventilation shafts;
   h) proposed tunnel wall finish;
   i) fire resistance;
   j) stability of ground above portals;
   k) primary support design;
   l) groundwater control;
   m) effect on overlying or adjacent structures or tunnels;
   n) secondary lining and cladding;
   o) ground movements;
   p) loading history of the site and effect of proposed new loading sequences;
   q) the adequacy of the assessment of the loading conditions involved;

r) water management; and,
s) safety critical fixings.

2) alignment and clearances:
a) site constraints;
b) highway and tunnel alignment;
c) stopping sight distances;
d) carriageway and verge widths;
e) duct provision for services;
f) horizontal and vertical clearances;
g) effect of super-elevation;
h) space requirements for equipment beyond the traffic space;
i) cross-connections between traffic bores and escape passages;
j) emergency point spacing;
k) tunnel signing;
l) parking for emergency vehicles;
m) area for casualty attendance; and,
n) emergency crossovers and portal space.

3) general:
a) provision made for inspection and maintenance;
b) proposals for the checking of temporary works;
c) the safeguards adopted to ensure that construction effects are kept within tolerable limits;
d) 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; and,
e) the arrangements to sustain all necessary liaison between interested stakeholders.

NOTE *This list in clause 5.8 above is not necessarily exhaustive.*

Documentation

5.9 The AIP for road tunnel and service tunnel structures within the scope of this section shall be based on the model AIP form given in Appendix C.

5.10 TASs shall be prepared in accordance with the notes given in Appendix H.

5.11 Certificates shall be based on the relevant model certificates given in Appendices I and N.

NOTE *The form of certificates can vary depending on the Overseeing Organisation's particular requirements.*

6. Mechanical and electrical installations

6.1 This section describes specific TA requirements for mechanical and electrical (M&E) installations in highway structures and shall be read in conjunction with Sections 1, 2 and 3 or 5 as required.

Scope

6.2 In addition to 1.1, the procedures described in this Section shall be applied without limitation to the following:

1) movable bridges and bridge access gantries;
2) road tunnels and tunnel services buildings; and,
3) pumped drainage installations for underpasses.

Category

6.3 In addition to 2.20 and 2.26, proposals for work covered by this section shall be in category 3.

Proposals

6.4 In addition to clauses 2.27 to 2.29, proposals shall:

1) be presented in terms of preliminary and/or final design proposals as required with due consideration to whole life costs;
2) fully describe the provision to be made for component replacement;
3) fully describe the provision for keeping the facility operational in the event of component failure; and,
4) include a draft report on maintenance and operating procedures (safety consultation document) based on the relevant model document in Appendix F and G.

Technical Approval

6.5 Sufficient information to enable the TAA to consider the following aspects, where applicable and in addition to clause 2.52, shall be provided by the Designer:

1) the adequacy of the consultation and proposals forming the basis of the draft operating procedures (safety consultation document);
2) for movable bridges:
   a) 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);
   b) the static and dynamic loading and design criteria under normal and adverse operating conditions including 'locked-in' stresses and over-turning;
   c) that all loads for the M&E design are consistent with those for the design of the bridge structure;
   d) the adequacy of system redundancy to guard against single component failure; and,
   e) the provision for manual operation (e.g. in the event of power failure or equipment failure).

NOTE *This list in clause 6.5 above is not necessarily exhaustive.*

Mechanical and electrical Installation certification

6.6 The design and check certificates shall take account of 2.82 to 2.96 and be carried out in two stages.

6.7 Stage 1 certification shall:

1) confirm that the principles in the AIP are valid and that they have been translated into appropriate levels of equipping, design and specification;

2) 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,
3) require that details of work tests for equipment/systems tested at the manufacturer's work site and commissioning trials have been specified for the purpose of performance verification and formal handover.

6.8 Stage 2 certification shall confirm that the following meet the Overseeing Organisation's requirements:

1) the completed design proposals;
2) the testing of components; and,
3) the commissioning of the complete installation.

6.9 The format and wording of stage 1 and stage 2 certificates shall be agreed with the TAA.

6.10 A copy of the relevant safety consultation document with original signatures shall accompany the design and check certificates.

Documentation

6.11 The AIPs for highway structures within the scope of this section shall be based on Appendices D and E.

6.12 The relevant safety consultation documents that shall be used are given in Appendices F and G.

6.13 TASs shall be prepared in accordance with the notes given in Appendix H.

6.14 The certificates shall be based on the relevant model certificates provided in Appendices I and N.

NOTE *The form of certificates can vary depending on the Overseeing Organisation's particular requirements.*

7. Normative references

The following documents, in whole or in part, are normative references for this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Ref 1.N	Highways England. CD 370, 'Cathodic protection for use in reinforced concrete structures.'
Ref 2.N	305/2011/EU, 'Construction Products Regulation'
Ref 3.N	Highways England. CD 354, 'Design of minor structures'
Ref 4.N	Highways England. CD 372, 'Design of post-installed anchors and reinforcing bar connections in concrete'
Ref 5.N	Highways England. GD 304, 'Designing health and safety into maintenance'
Ref 6.N	BSI. BS EN 1991-2, 'Eurocode 1. Actions on structures. Traffic loads on bridges'
Ref 7.N	BSI. BS EN 1990, 'Eurocode: Basis of structural design'
Ref 8.N	Highways England. GG 103, 'Introduction and general requirements for sustainable development and design'
Ref 9.N	Highways England. GG 101, 'Introduction to the Design Manual for Roads and Bridges'
Ref 10.N	Highways England. CD 622, 'Managing geotechnical risk'

8. Informative references

The following documents are informative references for this document and provide supporting information.

Ref 1.I	Highways England. CD 352, 'Design of road tunnels'
Ref 2.I	HMSO. Merrison Report, 'Inquiry into the Basis of Design and Method of Erection of Steel Box Girder Bridges'
Ref 3.I	Highways England. Standards for Highways (website), 'www.standardsforhighways.co.uk'

Appendix A. Model form of Approval in Principle for the design of bridges and other highway structures where UK National Standards (Eurocodes) are used

Project details:

Name of project

Name of bridge or structure

Structure reference no.

Summary: set out a brief summary of what this AIP covers, why it is necessary and anticipated construction dates.

1. HIGHWAY DETAILS

1.1 Type of highway

1.2 Design traffic speed [1]

1.3 Existing restrictions [2]

2. SITE DETAILS

2.1 Obstacles crossed

3. PROPOSED STRUCTURE

3.1 Description of structure and design working life [3]

3.2 Structural type

3.3 Foundation type

3.4 Span arrangements

3.5 Articulation arrangements[4]

3.6 Classes and levels[5]

1) consequence class;
2) reliability class;
3) inspection level.

3.7 Road restraint systems requirements

3.8 Proposals for water management[6]

3.9 Proposed arrangements for future maintenance and inspection

1) traffic management;
2) arrangements for future maintenance and inspection of structure. Access arrangements to structure.

3.10 Environment and sustainability[7]

3.11 Durability - materials and finishes [8]

3.12 Risks and hazards considered for design, execution, maintenance and demolition. Consultation with and/or agreement from Overseeing Organisation [9]

3.13 Estimated cost of proposed structure together with other structural forms considered (including where appropriate proprietary manufactured structure), and the reasons for their rejection (including comparative whole life costs with dates of estimates). Reference should be made to any options reports done.

3.14 Proposed arrangements for construction

1) construction of structure;
2) traffic management;
3) service diversions;
4) interface with existing structures.

3.15 Resilience and security.

4. DESIGN CRITERIA

4.1 Actions

1) permanent actions;
2) snow, wind and thermal actions;
3) actions relating to normal traffic under AW regulations and C&U regulations[10];
4) actions relating to General Order traffic under STGO regulations [11];
5) footway or footbridge variable actions;
6) actions relating to Special Order traffic, provision for exceptional abnormal indivisible; loads including location of vehicle track on deck cross-section [12, 13];
7) accidental actions;
8) actions during construction;
9) any special action not covered above [14].

4.2 Heavy or high load route requirements and arrangements being made to preserve the route, including any provision for future heavier loads or future widening

4.3 Proposed minimum headroom to be provided

4.4 Set out measures that will be incorporated into design to minimise maintenance.[15]

4.5 Authorities consulted and any special conditions required

4.6 Standards and documents listed in the technical approval schedule (TAS)

4.7 Proposed departures from standards listed in 4.6

4.8 Proposed departures from standards concerning methods for dealing with aspects not covered by standards listed in 4.6

4.9 Proposed safety critical fixings

5. STRUCTURAL ANALYSIS

5.1 Methods of analysis proposed for superstructure, substructure and foundations [16]

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 range of soil parameters to be used in the design of earth retaining elements

6. GEOTECHNICAL CONDITIONS

6.1 Acceptance of recommendations of the ground investigation report (reference/dates) to be used in the design and reasons for any proposed changes

6.2 Summary of design for highway structure in the ground investigation report

6.3 Differential settlement to be allowed for in the design of the structure

6.4 If the ground investigation 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 [17]

7. CHECK

7.1 Proposed category and design supervision level

7.2 If category 3, name of proposed independent checker

7.3 Erection proposals or temporary works for which types S and P proposals will be required, listing structural parts of the permanent structure affected with reasons

8. DRAWINGS AND DOCUMENTS

8.1 List of drawings (including numbers) and documents accompanying the submission [18]

9. THE ABOVE IS SUBMITTED FOR ACCEPTANCE

We confirm that details of the temporary works design will be/have been[19] passed to the permanent works designer for review.[20]

Signed _____

Name _____ Design Team Leader

Engineering Qualifications _____ [21]

Name of Organisation _____

Date _____

Signed _____

Name _____ Check Team Leader

Engineering Qualifications _____ [21]

Name of Organisation _____

Date _____

10. THE ABOVE IS REJECTED/AGREED[19] SUBJECT TO THE AMENDMENTS AND CONDITIONS SHOWN BELOW[20]

Signed _____

Name _____

Position held _____

Engineering Qualifications _____ [21]

TAA _____

Date _____

Notes

1) For a bridge, give over and/or under.
2) Include weight, height, width and any environmental restrictions at or adjacent to the bridge.

3) The design working life of the structure including temporary structure, and replaceable structural parts are to be given. They are to be expressed as a number of years rather than a range of years. A design working life is to be based on the DMRB if stated, otherwise it may be based on the guidance given in the Overseeing Organisation's current requirements for the use of Eurocodes for the design of highway structures.
4) Bearings and joints are components that will require maintenance and are vulnerable to water ingress. Where it is proposed not to have a structure with integral construction provide justification for that.
5) State the classes and levels for the whole structure, as well as those for the individual structural elements if higher or lower. See the Overseeing Organisation's current requirements for the use of Eurocodes for the design of highway structures.
6) Describe how water will be managed within the design of the structure. This includes internally (transport of water through the structure and sealing of elements to prevent water ingress) and externally (global management considering interface with other assets, (watercourses, drainage, pavement, geotechnical features, etc.)
7) Designers to set out the measures they will put in place to ensure that the design will follow industry guidance and best practice on environmental and sustainability aspects in accordance with GG 103 [Ref 8.N].
8) For concrete structures, give applicable exposure classes for particular structural elements. For all material strengths given, list the relevant codes/standards.
9) Designers to confirm that they have reviewed the risks and hazards identified in the AIP and are satisfied. Also see clause 2.27.
10) e.g. Load Models 1 and 2, BS EN 1991-2 [Ref 6.N]
11) e.g. SV model vehicle in Load Model 3, BS EN 1991-2 [Ref 6.N]
12) e.g. SOV model vehicle in Load Model 3, BS EN 1991-2 [Ref 6.N] and/or individual vehicle which includes the following information as applicable:
    a) gross weight of the vehicle in tonnes and vehicle type and number;
    b) axle load and spacing (longitudinally and transversely);
    c) air cushion in tonnes over area applied (in metres, longitudinally and transversely);
    d) single or twin tyres and wheel contact areas.
13) The heavy or high load route requirements should be confirmed by the relevant administration e.g. Abnormal Indivisible Load team in Highways England.
14) e.g. seismic action, atmospheric icing, floating debris, etc.
15) Designs that have minimal maintenance provide significant benefits in reducing the safety risk to the workforce and reducing disruption to the network. Designs that include elements with relatively high maintenance interventions need to be justified through the maintenance and repair statement in accordance with GD 304 [Ref 5.N].
16) List the main structural elements for superstructure, substructure and foundation. If the designs of the superstructure, substructure and/or foundation are carried out by different teams, refer to clause 2.84.
17) When the ground investigation report becomes available, an addendum to the AIP, covering section 6, is to be submitted to the TAA. The addendum is to have its own sections 8, 9 and 10 to provide a list of drawings, documents and signatures.
18) Include, without limitation:
    a) technical approval schedule (TAS);
    b) general arrangement drawing;
    c) relevant extracts from the ground investigation report;
    d) departures;
    e) relevant correspondence and documents from consultations.
19) Delete as appropriate.

20) This statement is applicable to temporary works design AIP only.

21) CEng MICE, CEng MIStructE or equivalent.

22) 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 is to be re-submitted to the TAA for review.

Appendix B. Model form of Approval in Principle for the design/assessment of bridges and other highway structures where UK National Standards (Non-Eurocodes) are used

Model form of Approval in Principle (AIP) for the design/assessment[1] of bridges and other highway structures where UK national standards (non-Eurocodes) are used.

Project details:

Name of project:

Name of bridge or structure:

Structure reference no.

Summary: set out a brief summary of what this AIP covers, why it is necessary and anticipated construction dates.

1. HIGHWAY DETAILS

1.1 Type of highway

1.2 Design traffic speed [2]

1.3 Existing restrictions [3]

2. SITE DETAILS

2.1 Obstacles crossed

3. PROPOSED STRUCTURE

3.1 Description of structure and design working life

3.2 Structural type

3.3 Foundation type

3.4 Span arrangements

3.5 Articulation arrangements

3.6 Road restraint systems requirements

3.7 Proposals for water management

3.8 Proposed arrangements for future maintenance and inspection/inspection for assessment:[1]

1) traffic management
2) arrangements for future maintenance and inspection of structure. Access arrangements to structure
3) intrusive or further investigations proposed[A]

3.9 Environment and sustainability

3.10 Durability - materials and finishes/materials strengths assumed and basis of assumptions[1,4]

3.11 Risks and hazards considered for design, execution, maintenance and demolition. Consultation with and/or agreement from the Overseeing Organisation [5]

3.12[D] Estimated cost of proposed structure, together with other structural forms considered (including where appropriate proprietary manufactured structure), and the reasons for their rejection (including comparative whole life costs with dates of estimates). Reference should be made to any options reports done.

3.13[D] Proposed arrangements for construction:

1) construction of structure
2) traffic management
3) service diversions
4) interface with existing structures

3.14 Resilience and security

3.15[A] Year of construction.

3.16[A] Reason for assessment.

3.17[A] Part of structure to be assessed.

4. DESIGN/ASSESSMENT[1] CRITERIA

4.1 Actions:

1) permanent actions
2) snow, wind and thermal actions
3) actions relating to normal traffic under AW regulations and C&U regulations [6]
4) actions relating to General Order traffic under STGO regulations [7]
5) footway or footbridge variable actions
6) actions relating to Special Order traffic, provision for exceptional abnormal indivisible loads including location of vehicle track on deck cross-section [8]
7) accidental actions
8) actions during construction
9) any special action not covered above [9]

4.2 Heavy or high load route requirements and arrangements being made to preserve the route, including any provision for future heavier loads or future widening [10]

4.3 Minimum headroom provided

4.4 Authorities consulted and any special conditions required

4.5 Standards and documents listed in the Technical Approval Schedule (TAS)

4.6 Proposed departures from standards listed in 4.5

4.7 Proposed departures from standards concerning methods for dealing with aspects not covered by standards in 4.5

4.8 Proposals for design/assessment[1] of safety critical fixings.

5. STRUCTURAL ANALYSIS

5.1 Methods of analysis proposed for superstructure, substructure and foundations [11], [12]

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 range of soil parameters to be used in the design/assessment of earth retaining elements [13]

6. GEOTECHNICAL CONDITIONS

6.1 Acceptance of recommendations of the ground investigation report to be used in the design/assessment[1] and reasons for any proposed changes

6.2 Summary of design for highway structure in ground investigation report

6.3 Differential settlement to be allowed for in the design/assessment[1] of the structure

6.4[D] If the ground investigation 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. [14]

7. CHECK

7.1 Proposed category

7.2 If category 3, name of proposed independent Checker

7.3[D] Erection proposals or temporary works for which types S and P proposals will be required, listing structural parts of the permanent structure affected with reasons

8. DRAWINGS AND DOCUMENTS

8.1 List of drawings (including numbers) and documents accompanying the submission [15]

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 [19]

8.4[A] List of previous inspection and assessment reports

9. THE ABOVE IS SUBMITTED FOR ACCEPTANCE

We confirm that details of the temporary works design will be/have been[1] passed to the permanent works designer for review.[16]

Signed _____

Name _____ Design/Assessment[1] Team Leader

Engineering Qualifications _____ [17]

Name of Organisation _____

Date _____

Signed _____

Name _____ Check Team Leader

Engineering Qualifications _____ [17]

Name of Organisation _____

Date _____

10. THE ABOVE IS REJECTED/AGREED[1] SUBJECT TO THE AMENDMENTS AND CONDITIONS SHOWN BELOW[18]

Signed _____

Name _____

Position held _____

Engineering Qualifications _____ [17]

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 weight, height, width and any environmental restrictions at or adjacent to the bridge.
4) In cases of design, give applicable exposure classes for particular concrete structural elements. In cases of assessment, give material strengths from record drawings or intrusive investigation. For all material strengths given, list the relevant codes/standards.
5) Designers to confirm that they have reviewed the risks and hazards identified in the AIP and are satisfied. Also see clause 2.27.
6) e.g. HA Loading
7) e.g. HB or SV Loading
8) e.g. individual vehicle which includes the following information as applicable:
   a) gross weight of the vehicle in tonnes and vehicle type and number;
   b) axle load and spacing (longitudinally and transversely);
   c) air cushion in tonnes over area applied (in metres, longitudinally and transversely);
   d) single or twin tyres and wheel contact areas.
9) e.g. seismic loading, atmospheric icing, floating debris etc
10) If in doubt, the heavy or high load route requirements are to be confirmed by the relevant administration.
11) List the main structural elements for superstructure, substructure and foundation. If the designs of the superstructure, substructure and/or foundation are carried out by different teams, refer to cl. 2.84.
12) Factors of Safety are required where limit state design codes for bridges are not used. See 4.24(5).
13) Where no such geotechnical information is available, suggested earth pressure coefficient values given in relevant DMRB parts should be used instead.
14) When the results of the ground investigation become available, an addendum to the AIP, covering section 6, is to be submitted to the TAA. The addendum is to have its own sections 8, 9 and 10 to provide a list of drawings, documents and signatures.
15) Include, without limitation:
   a) technical approval schedule (TAS);
   b) general arrangement drawing;
   c) relevant extracts from the ground investigation report, inspection report, intrusive investigation report, previous assessment report (or reference for report);
   d) departures;
   e) relevant correspondence and documents from consultations.
16) This statement is applicable to temporary works design AIP only.
17) CEng MICE, CEng MIStructE or equivalent.
18) 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 is to be re-submitted to the TAA for review.
19) Include details of previous structural maintenance and/or strengthening works.

Appendix C. Model form of Approval in Principle for the design/assessment of road tunnel structures and service tunnels

Model form of approval in principle for the design/ assessment[1] of road tunnel structures and service tunnels.

Project details:

Name of project

Name of road/service[1] tunnel

Road/Service[1] tunnel reference no.

1. HIGHWAY DETAILS

1.1 Type of highway

1.2 Design traffic speed

2. TUNNEL DETAILS

2.1 Basic layout [2]

2.2 Restrictions to traffic

3. BRIEF DESCRIPTION OF TUNNEL, TRAFFIC AND TUNNEL GEOMETRY

3.1 Structural form of tunnel and design working life

3.2 Structural form of portal structures

3.3 Traffic and geometry:

1) horizontal and vertical alignment of tunnel and tunnel approaches ;
2) cross-section [3];
3) highway standards [4];
4) accommodation of M&E services in tunnel [5];
5) minimum headroom (traffic gauge), horizontal clearances;
6) structure gauge.

3.4 Classes and levels: [6]

1) Consequence class;
2) Reliability class;
3) Inspection level.

3.5 Proposed arrangements for future inspection and maintenance

3.6 Provision to be made in the tunnel layout for emergency communication and escape facilities, fire points, fixed fire fighting systems, cross passages etc

3.7 Landscaping above tunnel and protection of tunnel roof

3.8 Sustainability issues considered. Materials and finishes for structural walls, ceiling and secondary cladding including fire protection

3.9 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). Reference to be made to any options reports done.

3.10 Compliance with EU road tunnel Safety Directive requirements or alternatives with accompanying risk analysis

3.11 Risks and hazards considered for design, execution, maintenance and demolition. Consultation with and/or agreement from Overseeing Organisation [7]

3.12 Resilience and security.

4. DESIGN/ASSESSMENT[1] CRITERIA

4.1 Actions

1) permanent actions;
2) actions relating to normal traffic under AW regulations and C&U regulations [8];
3) actions relating to General Order traffic under STGO regulations [9];
4) actions relating to Special Order traffic, provision for exceptional abnormal indivisible loads; including location of vehicle track on deck cross-section [10];
5) side verge actions;
6) accidental actions;
7) any special action not covered above.

4.2 Authorities consulted and any special conditions required

4.3 Is the tunnel on a heavy and/or high load route, and any provision for future heavier loads or future widening?

4.4 Any loading from planned development over or adjacent to tunnel

4.5 Technical Approval Schedule (TAS)

4.6 Proposed departures from standards given in 4.5

4.7 Proposed departures relating to methods for dealing with aspects not covered by standards in 4.5

4.8 Proposals for design/assessment of safety critical fixings

4.9 Equality impact assessments

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 range of angle of shearing resistance (ϕ) representative of the soil type(s) concerned

5.4 Proposed fire design including protection of structure and cables

6. GEOTECHNICAL CONDITIONS

6.1 Acceptance of recommendations of the ground investigation report to be used in the design/assessment[1] and reasons for any proposed changes. (A copy of the ground investigation report is to be supplied to the TAA in advance of the AIP submission whenever possible)

6.2 Summary of design for highway structure in ground investigation report highway structure summary Information. Give details of any further ground investigation required to validate basis of design/assessment

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 ground investigation 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.[11]

7. WATER MANAGEMENT

7.1 Details of proposed drainage:

1) ground water seepage, run off through the portal;
2) accidental spillage, water carried in by vehicles;
3) fire main burst;
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, i.e. 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. CHECK

9.1 Structure to be category 3 and design supervision level 3 [12]

9.2 Name of proposed independent Checker

10. DRAWINGS AND DOCUMENTS

10.1 List of drawings (including numbers) and documents accompanying the submission [13]

11. THE ABOVE IS SUBMITTED FOR ACCEPTANCE

Signed _____

Name _____ Design/Assessment[1] Team Leader

Engineering Qualifications _____ [14]

Name of Organisation _____

Date _____

Signed _____

Name _____ Check Team Leader

Engineering Qualifications _____ [14]

Name of Organisation _____

Date _____

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

Signed _____

Name _____

Position held _____

Engineering Qualifications _____ [14]

TAA _____

Date _____

Notes

1) Delete as appropriate.
2) Number of tubes, lanes, length between portals.
3) Include widths of lanes, verges, emergency stopping lanes, space outside traffic gauge provided for M&E equipment.
4) Include design flows and speeds and any proposed Departures.
5) A separate submission is required for M&E functions and tunnel services buildings.
6) State the classes and levels for the whole structure, as well as those for the individual structural elements if higher or lower. See the Overseeing Organisation's current requirements for the use of Eurocodes for the design of highway structures.
7) Designers to confirm that they have reviewed the risks and hazards identified in the AIP and are satisfied. Also, see clause 2.27.
8) e.g. Load Models 1 and 2 of BS EN 1991-2 [Ref 6.N]
9) e.g. SV model vehicle in Load Model 3 in BS EN 1991-2 [Ref 6.N].
10) e.g. SOV model vehicle in Load Model 3 in BS EN 1991-2 [Ref 6.N] and/or Individual vehicle which includes the following information as applicable:
    a) gross weight of the vehicle in tonnes and vehicle type and number;
    b) axle load and spacing (longitudinally and transversely);
    c) air cushion in tonnes over area applied (in metres, longitudinally and transversely);
    d) single or twin tyres and wheel contact areas.
11) When the ground investigation report becomes available, an addendum to the AIP, covering section 6, is to be submitted to the TAA. The addendum is to have its own sections 10, 11 and 12 to provide a list of drawings, documents and signatures.
12) Category 3 for road tunnel and service tunnel structures
13) Include, without limitation:
    a) technical approval schedule (TAS);
    b) general arrangement drawing;
    c) relevant extracts from the ground investigation report;
    d) departures;
    e) relevant correspondence and documents from consultations;
    f) Tunnel Design Authority output report.
14) CEng MICE, CEng MIStructE or equivalent.

Appendix D. Model form of Approval in Principle for M&E installations in movable bridges and access gantries

Project details:

Name of project

Name of bridge or structure

Structure reference no.

Summary: set out a brief summary of what this AIP covers, why it is necessary and anticipated construction dates.

1. HIGHWAY DETAILS

1.1 Type of highway

1.2 Design traffic speed [1]

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 Design working life, whole life cost and sustainability considerations

3.6 Resilience and security.

4. OPERATIONAL DESIGN CRITERIA (as relevant)

4.1 Variable actions

4.2 Traffic actions

4.3 Snow actions

4.4 Wind actions

4.5 Thermal actions including temperature range

4.6 Any special actions not listed above (e.g. ship impact)

4.7 List of relevant safety consultation documents:

1) additional relevant standards and publications

4.8 Proposed departures relating to departures from standards given in CG 300 clauses 4.7 and 4.7.1

4.9 Proposed departures relating to methods of dealing with aspects not covered by standards in CG 300 clauses 4.7 and 4.7.1

4.10 Proposed safety critical fixings

5. BASIS OF OPERATION AND CONTROL

5.1 Normal operation conditions

5.2 Authorities consulted [2]

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 movable 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 [3]

7.4 Proposals for plant monitoring, data collection and management

8. CHECK

8.1 M&E installation to be category 3 [4]

8.2 Name of proposed independent checker

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 _____

Signed _____

Name _____ Check 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 _____

Position 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;
    d) relevant correspondence and documents from consultations;
    e) relevant loading data from the structural design.
6) CEng from an appropriate Chartered Engineering Institution.
7) Delete as appropriate.

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

Project details:

Name of project

Name of bridge or structure

Structure reference no.

Summary: set out a brief summary of what this AIP covers, why it is necessary and anticipated construction dates.

1. HIGHWAY DETAILS

1.1 Type of highway

1.2 Design traffic speed [1]

1.3 General description [2]

1.4 Any restriction to traffic including maintenance

2. BRIEF DESCRIPTION OF STRUCTURE OPERATION AND MAINTENANCE FRAMEWORK

2.1 Type of structure

2.2 Accommodation of M&E services in the tunnel

2.3 Location of tunnel monitoring centre and maintenance building(s)

2.4 Proposed arrangements for inspection and maintenance

2.5 Location of tunnel services building

2.6 Design working life and estimated costs of M&E services including all running, maintenance and replacement costs and sustainability considerations

3. AUTHORITIES CONSULTED

3.1 List authorities consulted and any special requirements [3]

4. LAYOUT AND BASIC DESIGN CRITERIA

4.1 Basic tunnel geometry [4]

4.2 Environmental conditions within the tunnel plant rooms and buildings [5]

4.3 Technical Approval Schedule (TAS)

4.4 Proposed departures relating to departure from standards given in 4.3

4.5 Proposed departures relating to methods for dealing with aspects not covered by standards in 4.3

4.6 Proposed safety critical fixings

4.7 Equality impact assessments

4.8 Resilience and security.

5. VENTILATION

5.1 General description including justification

5.2 Design criteria [6]

5.3 Pollution and vehicle emissions [7]

5.4 Fresh air requirements [8]

5.5 Proposed ventilation system

5.6 Ventilation fans

5.7 Monitoring and control [9]

6. LIGHTING

6.1 General description

6.2 Design criteria

6.3 Surface reflectivity [10]

6.4 Special operating conditions

6.5 Monitoring and control

7. WATER MANAGEMENT

7.1 General description, design criteria

7.2 Effluent standards [11]

7.3 Amounts to be handled

7.4 Pumping equipment [12]

7.5 Safety precautions [13]

7.6 Siting of sumps

7.7 Sizing of sumps

8. FIRE SAFETY

8.1 Design criteria [14]

8.2 Active protection [15]

8.3 Passive protection [16]

8.4 Services building and plant rooms [17]

9. COMMUNICATIONS AND TRAFFIC CONTROL

9.1 General description, design criteria. Traffic management authority

9.2 Telephone system [18]

9.3 Emergency liaison [19]

9.4 Traffic signs [20]

9.5 Traffic monitoring [21]

10. TUNNEL OPERATION AND PLANT CONTROL

10.1 Basis of tunnel operation. Operating and maintaining authority [22]

10.2 Plant monitoring and control

10.3 Data logging and transfer

10.4 Safety integrity level

10.5 Plant inspection and maintenance

11. ELECTRICAL POWER SUPPLY AND DISTRIBUTION

11.1 General description and design criteria including an analysis of power requirements, supply costs and tunnel operating conditions in relation to security of supply

11.2 Supply distribution [23]

11.3 Emergency arrangements [24]

11.4 Cabling [25]

12. TUNNEL SERVICES BUILDINGS AND PLANT ROOMS

12.1 General description [26]

12.2 Design criteria and layout [27]

12.3 Building security and protection [28]

13. CHECK

13.1 Give proposals for checking M&E installations including the design of tunnel services buildings.

13.2 Name of proposed Checker

14. DRAWINGS AND DOCUMENTS

14.1 List of drawings (including numbers) and documents accompanying the submission [29]

15. THE ABOVE IS SUBMITTED FOR ACCEPTANCE

Signed _____

Name _____ Design Team Leader

Engineering Qualifications _____ [30]

Name of Organisation _____

Date _____

Signed _____

Name _____ Check 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 _____

Position held _____

Engineering Qualifications _____ [30]

TAA _____

Date _____

Notes

1) Design speed and during maintenance.
2) Number of tubes, lanes, length between portals
3) For examples: 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, fixed firefighting systems, 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 and Rescue Service, Ambulance, maintaining authority including system of underground communication
20) Including advance warning and diversions, vehicle overheight 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's boundary.
24) Uninterrupted power supply, justification for standby generator
25) Type, location and protection, including a drawing of all plant floors showing equipment layout
26) 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
27) Include fire alarm systems.
28) Include, without limitation:
    a) technical approval schedule (TAS);
    b) general arrangement drawing;
    c) departures;
    d) relevant correspondence and documents from consultations;
    e) Tunnel Design Authority output report.
29) CEng from an appropriate chartered engineering institution

Appendix F. Operation, control and maintenance of movable bridges, and bridge access gantries - Safety Consultation Document

Model form of background discussion document for appending to AIP.

Project details:

Name of project

Name of bridge or structure

Structure reference no.

1. INTRODUCTION

1.1 Purpose of Movable Bridge/Bridge Access Gantry Design and Safety Consultation Group [1]

1.2 Terms of reference

1.3 Systems overview (see appendices)

1.4 Safety considerations in the use of movable bridges/access gantries

1.5 Plant

1.6 Communications

1.7 Power supply:

1) emergency supply arrangements

1.8 Emergency breakdown arrangements

1.9 Organisational responsibilities, e.g. maintaining authority

2. MAINTAINING AUTHORITY

2.1 General

2.2 Lines of communication and cover

2.3 Documentation:

1) operator's manuals ;
2) maintenance & Inspection manuals;
3) permit to work;
4) condition monitoring .

2.4 Day-to-day operations

2.5 Planned maintenance activities

2.6 Emergencies

2.7 Plant failures

3. TRAINING

4. MAINTENANCE COSTS

4.1 General

5. PROCEDURAL TRIALS AND HANDOVER

5.1 Normal use

5.2 Emergency drill

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

1) general provision
2) location of contacts

Notes

1) The Movable Bridge/Bridge Access Gantry Design and Safety Consultation Group carries out similar functions to the Tunnel Design and Safety Consultation Group (TDSCG).
2) CEng from an appropriate Chartered Engineering Institution.

Appendix G. Tunnel, operation, control and maintenance - Safety Consultation Document

Model form of background discussion document for appending to AIP.

Project details:

Name of project

Name of bridge or structure

Structure reference no.

1. INTRODUCTION

1.1 Purpose of tunnel design and safety consultation group (TDSCG)

1.2 Terms of reference

1.3 Organisational responsibilities [1]

1.4 Overview (see appendices)

1.5 Safety considerations for road tunnels

1.6 Traffic management & signing

1.7 Tunnel plant:

1) ventilation;
2) lighting;
3) drainage;
4) role in emergencies.

1.8 Communications:

1) tunnel;
2) regional;
3) emergency.

1.9 Power supply:

1) normal distribution;
2) emergency arrangements.

1.10 Emergency equipment:

1) fire points;
2) telephones;
3) CCTV;
4) cross connections between tunnel bores.

1.11 Tunnel services building and plant room:

1) functions;
2) maintenance access;
3) security protection;
4) fire protection.

2. POLICE AND/OR HE TRAFFIC OFFICERS

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 AND RESCUE SERVICE

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:

1) maintenance and Inspection manuals;
2) permit to work;
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:

1) wall washing requirements;
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:

1) use of emergency cross passages (doors);
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:

1) EPD's Fire points by number;
2) bores;
3) cross passages;
4) fan positions, overrides and controls.

D. Communications:

1) general layout;
2) location of CCTV.

E. Tunnel drainage

F. Traffic management plan

Notes

1. Police, Fire and Rescue Service, ambulance service, Environment Agency, Maintaining Authority.
2. CEng from an appropriate Chartered Engineering Institution.

Appendix H. Notes for compiling Technical Approval Schedules

Only relevant standards are to be listed. The TAA is to be consulted to confirm whether any specific documents need to be added to the Technical Approval Schedule (TAS).

The Technical Approval Schedule (TAS) is to include the current, relevant publications of the following groups of standards and guidance documents:

1) British Standards;
2) Eurocodes and associated UK national annexes;
3) BSI published documents;
4) Execution Standards referenced in British Standards or Eurocodes;
5) Product Standards referenced in British Standards or Eurocodes;
6) The Manual of Contract Documents for Highway Works (MCHW);
7) The Design Manual for Roads and Bridges (DMRB);
8) Interim Advice Notes (IAN);
9) Specific documents required by the Overseeing Organisation.

The date of the publications (and any amendment) included in the TAS should be given, in the following forms:

1) the year of publication for British Standards, Eurocodes and associated UK national annexes, BSI Published Documents, Execution Standards and Product Standards;
2) the month and year of publication for MCHW documents;
3) the last two digits of the year of publication for DMRB documents

The latest information on DMRB standards documents can be obtained from the Standards for Highways (website) [Ref 3.I]

Insert other relevant supplementary references in the TAS. These can include statutory acts and regulations, Department for Transport or Highways England publications, industry approved codes of practice or guidance literature on best practice, technical papers/journals, and relevant information from recognised sources.

For new designs, the use of British Standards conflicting with Eurocodes will require approval from the TAA.

An example of a TAS can be obtained from the Standards for Highways (website) [Ref 3.I] and entering TAS in the DMRB search bar.

Appendix I. Model form of certificate for the design/assessment and/or check of highway structures, including road and service tunnels

Model form of certificate for the design/assessment[1] and/or check[1] of highway structures, including road and service tunnels.

Project details:

Name of project

Name of bridge or structure

Structure reference no.

Section 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]

1) It has been designed/assessed1 and/or checked[1] in accordance with
   a) the following standards; or [3]
   b) the Approval in Principle dated (date) including the following: [4, 5, 6]
2) It has been checked for compliance with:
   a) the relevant standards in 1); or, [7]
   b) the assessed capacity of the structure, or elements of the structure, is as follows: [8]

(iii) It has been accurately translated into construction drawings and bar bending schedules (all of which have been checked)[9]. The unique numbers of these drawings and schedules are:

Signed _____

Name _____ Design/Assessment Team Leader

Engineering Qualifications _____ [11]

Signed _____

Name _____

Position held _____ [12]

Name of Organisation _____

Date _____

Signed _____[7]

Name _____ Check Team Leader[7]

Engineering Qualifications _____ [11, 7]

Signed _____

Name _____

Position held _____ [12]

Name of Organisation _____

Date _____

Section 2

The departures and additional criteria given in paragraph 1 are agreed [13]

The certificate is accepted by the TAA

Signed _____

Name _____

Position held _____

Engineering Qualifications _____ [14]

TAA _____

Date _____

Notes

1) Delete as appropriate.
2) Where several similar 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 should 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, criteria or specification clauses.
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 for categories 2 and 3, which require a separate check certificate.
8) Used for assessments only. Assessed capacity is to be recorded in the Overseeing Organisation's management system for structures.
9) The statement "(all of which have been checked)" is not applicable to categories 2 and 3 design certificates.
10) Delete as appropriate or repeat two columns if they are signed by both design/assessment and check teams.
11) CEng MICE, CEng MIStructE or equivalent, but this qualification can be relaxed for Categories 0 and 1 with the agreement of TAA. For Category 3 designs or assessments, the TAA can request a CV for the Design Team Leader (or Assessment Team Leader) demonstrating experience relevant to the design (or assessment).
12) A principal of the organisation responsible for the design or assessment.
13) Delete as appropriate. Note: not permitted for categories 0 or 1 unless the TAA considers that the departure has little or no structural implication.
14) An engineer with appropriate qualification and experience for categories 0 and 1, and with CEng MICE, CEng MIStructE or equivalent for categories 2 and 3.

Appendix J. Model form of certificate for minor structures and telecom masts on motorways and trunk roads

Model form of certificate for minor structures and telecom masts on motorways and trunk roads

Project details:

Name of project

Column/mast[1] reference no.

Section 1

We certify that the lighting column system/CCTV masts/cantilever masts for traffic signs/signals, speed cameras, telecom masts and/or noise barriers[1] accurately shown on drawing(s) numbers (list drawing numbers) has/have[1] been designed/checked[1] for the following range of parameters[2] and fully complies with:

1) The Specification for Highway Works (edition, date),
2) CD 354 [Ref 3.N], or,
3) the following standards (for the design of telecom masts):

Signed _____

Name _____ Design/Check Team Leaders [3]

Engineering Qualifications _____ [4]

Signed _____

Name _____

Position held _____ [5]

Name of Organisation _____ [6]

Date _____

Section 2

This certificate is accepted by the TAA[7]

Signed _____

Name _____

Position held _____

Engineering Qualifications _____ [4]

TAA _____

Date _____

Notes

1) Delete as appropriate.

2) For lighting column system, specify the range of combinations of column heights and lengths of brackets together with the weights and windage areas of the attachments such as lanterns, design wind speed and assumed ground conditions for which the column has been designed. For CCTV mast, cantilever mast and telecom mast, specify the design wind speed and assumed ground conditions for which the column has been designed. (Note: model data sheets are contained in Series NG1300 of MCHW).
3) Delete as appropriate or repeat if signed by both Designer and Checker.
4) Engineer with appropriate position, qualifications and experience for categories 0 and 1, and with CEng MICE, CEng MIStructE or equivalent for categories 2 and 3.
5) A principal of the organisation responsible for the design or check.
6) Manufacturer or organisation responsible for the design or check.
7) For category 0 minor structures, section 2 is not required.

Appendix K. Model form of certificate for type 'S' temporary works

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

Project details:

Name of project

Name of structure

Structure reference no.

Section 1

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 execution 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[3, 4].

Signed _____

Name _____ Temporary Works Checker

Engineering Qualifications _____ [5]

Name of Organisation _____

Date _____

Signed _____

Name _____

Position held _____

Name of Organisation procuring the temporary works _____

Date _____

Section 2

The permanent works Designer is satisfied that the temporary works have no detrimental effects on the permanent works[6]

Signed _____

Name _____ Permanent Works Designer

Engineering Qualifications _____ [5]

Name of Organisation _____

Date _____

Notes

1) A copy of this certificate should be forwarded to the TAA for retention with the AIP, except for category 0, for the permanent structure to which it relates.
2) The description to be inserted is to define unambiguously the extent of the structure to which the check is to be applied. Where necessary the extent of the works is be shown on the drawings and the relevant drawing numbers stated.
3) Delete 'and without detriment to the related permanent works' if the check is carried out by permanent works designer.
4) If there is a detrimental effect on the permanent works, an addendum to the permanent works AIP is to be submitted to the TAA for review.
5) Engineer with appropriate qualification and experience for categories 0 and 1, and with CEng MICE, CEng MIStructE or equivalent for categories 2 and 3.
6) This clause is not required if the check is carried out by permanent works designer.

Appendix L. Model form of certificate for type 'P' temporary works

Model form of certificate for type 'P' temporary works.

Project details:

Name of project

Name of structure

Structure reference no.

Section 1

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

1) It has been designed/checked[1] in accordance with:
   a) The Approval in Principle dated (date) including the following: [2] [3]
   b) The TAA directives for the items listed in 3.ii below.[1]
2) The design proposals reflect the requirements of the relevant highway authorities for all affected highways.
3) 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/Check[1] Team Leader

Engineering qualifications _____ [4]

Signed _____

Name _____

Position held _____ [5]

Name of organisation _____

Date _____

Section 2

This certificate is received [6]

Signed _____

Name _____

Position held _____

Name of organisation _____

Date _____

Section 3

1) The departures and additional criteria given in paragraph 1 are agreed. [1]

2) It has been directed that the following items are to be dealt with as described. [1,7]

Section 4

1) The Permanent Works Designer is satisfied that the temporary works have no detrimental effects on the permanent works[8]

Signed _____

Name _____ Permanent Works Designer[8]

Engineering qualifications _____ [4]

Name of organisation _____

Date _____

Section 5

We have considered and recommend the TAA to accept this certificate [9]

Signed _____

Name _____

Position held _____

Name of organisation _____

Engineering qualifications _____ [4]

Date _____

Section 6

The certificate is accepted by the TAA [10]

Signed _____

Name _____

Position held _____

Engineering qualifications _____ [4]

TAA _____

Date _____

Notes

1) Delete as appropriate.
2) Insert date of acceptance of the AIP by the TAA including the dates of any addenda.
3) List any departures and additional methods or criteria.
4) CEng MICE, CEng MIStructE or equivalent.
5) A principal of the organisation responsible for the design/check.
6) This is to be completed by the organisation that procures the temporary works. 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.
8) Not applicable to design certificate. Not necessary for existing structures if agreed by the TAA.
9) This is to be completed by the employer's representative on site when applicable.
10) The TAA should inform of its acceptance of this certificate to the organisation that procures the temporary works so that work may then proceed.

Appendix M. Model form of certificate for specification variation

Project details:

Name of project

Name of structure

Structure reference no.

Summary: Set out a brief summary of what this certificate covers, why it is necessary and anticipated construction dates.

Section 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[1] Team Leader

Engineering qualifications _____ [3]

Signed _____

Name _____

Position held _____ [4]

Name of organisation _____

Date _____

Signed _____

Name _____ Check[1] Team Leader

Engineering qualifications _____ [3]

Signed _____

Name _____

Position held _____ [4]

Name of organisation _____

Date _____

Section 2

The additional and substitute clauses listed in section 1 above and appended to this certificate are agreed as departures.

Section 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 e.g. new materials are required to be checked. The category of check should be the same as in the AIP.
3) Engineer with appropriate qualification and experience for categories 0 and 1, and with CEng MICE, CEng MIStructE or equivalent for categories 2 and 3.
4) A Principal of the organisation responsible for the design or check.

Appendix N. Model form of certificate of construction compliance

Project details:

Name of project

Name of structure

Structure reference no.

Approval in Principle[1] dated (date) and addenda[1] (date):

Construction drawings (permanent and temporary works[1,2]) and bar bending schedules listed within the design and check certificate/certificates[1] (date) [3]:

As constructed drawings[3] and bar bending schedules[3], the unique numbers of these drawings and schedules are:

Schedule of drawings/bending schedules

Document Number	Title	Revision	Date

The Specification for Highway Works (date), including additional and substituted clauses recorded in certificates for specification variations[1,3] (date):

Section 1

We certify that (name of structure) and its equipment[4]:

1) have been constructed, commissioned and tested[1] in accordance with:
   a) the construction drawings and bar bending schedules listed within the above design and check certificate/certificates[1], with any modifications in accordance with the technical approval procedures given in CG300(/date), [1]except (list exception(s) and give appropriate information and reason for non-compliance [5]).
   b) the above Specification for Highway Works and specification variations, [1]except (list exception(s) and give appropriate information and reason for non-compliance [5]).
2) The execution of the works has been accurately translated into 'As Constructed' drawings and bar bending schedules as listed above.[10]

Signed _____

Name _____ Contractor's Representative

Engineering qualifications _____ [6]

Signed _____

Name _____

Position held _____[7]

Name of organisation _____

Date _____

Section 2

We certify reasonable professional skill and care has been used, relating to the execution of (name of structure), in the task described below (choose[8] either 1), 2) or 3):

1) [1]Examining the execution and that it has been constructed, commissioned and tested in accordance with:
   a) the above Approval in Principle, Design and Check Certificate/Certificates[1], with any modifications in accordance with the technical approval procedures given in CG300/(date),[1] except (list exception(s) and give appropriate information and reason for non-compliance[5])
   b) the construction drawings and bar bending schedules listed within the Design and Check Certificate/Certificates[1] (date)[3], as modified by authorised variations accepted by the Overseeing Organisation,[1]except (list exception(s) and give appropriate information and reason for non-compliance[5]).
2) [1,9]Hands off audit role assessment to ensure that the correct quality control procedures have been followed
3) [1](state task/role required under the contract's work specification or if different, the actual task/role performed and give appropriate information and reason for non-compliance[8])

Signed _____

Name _____

Work Examiner's Representative

Engineering qualifications _____ [6]

Position held

Name of organisation

Date _____

3. This certificate is accepted by the TAA

Signed _____

Name _____

Position held

Engineering qualifications _____ [6]

TAA _____

Date _____

Notes

1) Delete as appropriate.
2) Temporary works are required where they may have significant effect on the permanent works.
3) A full list to be given including any addenda.
4) Certification for mechanical and electrical installations are not required as they are covered in Section 6 of CG300. However all the maintenance and operation manuals, including guarantees, should be provided to the Overseeing Organisation.
5) Consider appropriate measure if required and advise the TAA if it needs to be recorded in the Overseeing Organisation's management system for structures.

6) Competent engineer with appropriate qualification and experience e.g. for Categories 0 and 1, and with CEng MICE, CEng MIStructE or equivalent for Categories 2 and 3. The acceptance of competency criteria may be varied subject to TAA agreement.
7) A principal of the Contractor or organisation responsible for the execution
8) Options 2 & 3 allow for certification by independent parties to provide assurance on work elements. However Option 1 is a requirement for all projects.
9) A hands off audit role provides additional assurance for complex projects or procedures. Where required, this will be in addition to the works examiner.
10) Where 'As Constructed' drawings and bar bending schedules have not been completed then this clause is to be omitted and the certificate marked as 'Interim' – reference Clause 2.95.1.

Appendix O. Structure options report

O.1 Introduction

The TAA is to be consulted prior to preparing the report to assist in determining the most appropriate options to be included in the report.

The format is provided in O.2 of a structure options reports for new works, maintenance, modification, refurbishment, strengthening and demolition where there are a number of realistic cost effective alternatives to be considered. This applies to permanent structures expected to be category 2 or 3 and to permanent structures expected to be category 0 or 1 with an estimated cost of more than £0.5million. The report should contain only necessary relevant information and state 'Not Applicable' in sections not relevant. Additional sections are to be added where necessary.

The structure options report should briefly summarise the development process for each of the structure proposals, identifying all significant influences on the form of structure proposed and reasons for rejecting other structural forms.

Where a proposal has previously been considered in procedures such as value management, it is important that this is referenced in section 1.1 of the options report. This is to ensure relevant continuity is maintained between these procedures and the conclusions of the options report. For consistency, an option brought forward from previous considerations is to be detailed as option 1 in the options report.

For maintenance work, where options during value management processes have been considered in sufficient detail to meet the above criteria then, with agreement of the TAA, separate options report may not be necessary.

O.2 Report structure and content

Project details:

Name of project

Name of structure

Structure reference no.[1]

Report structure and content

Report section	Notes for guidance
1.1 Introduction	Brief scheme overview. State if the structure has previously been considered in other procedures such as value management. For an existing structure give a description of the structure, current condition and state what certification exists with the current assessment rating. List the options considered at pre-options stage, state which options will be considered in detail within this report, which have been discounted and state the reasons. Append location plan and schedule of structures.
1.2 Consultations and requirements	List all parties consulted, e.g. project managers, maintaining agent, other authorities, specialist suppliers, Principal Designer, etc. State their requirements and what agreements have been made. Describe the current and proposed utilities.

Report structure and content (continued)

1.3 Geology	Where relevant, summarise the geology of the site and any key risks
1.4 Loading	State high and heavy load route requirements. State any current restrictions and or constraints.
1.5 Environment	Summarise environmental requirements and any constraints.
1.6 Land and property	Summarise land and property requirements and any constraints.
2.1 Description of proposed structure options	State if option is brought forward from consideration in other procedures (as described in section 1.1). Attach an outline general arrangement drawing to illustrate each option. Include cross sections showing any construction constraints associated with carrying out the work.
2.2 Capital cost and whole life cost	List major assumptions in determining whole life costs. List separately any user delay costs during construction as well as during future maintenance.
2.3 Appearance	Describe the aesthetic form and the setting, and if consultation required with Design Panel. Describe proposed finishes (for preferred option only).
2.4 Sustainability and use of natural resources	Give anticipated requirements for use of natural resources and potential for use of recycled materials.
2.5 Durability/design life	State durability assumptions and design life. State how water will be managed, including surface/subsurface drainage and mitigation measures for controlling leakages from service ducts.
2.6 Health and safety, and potential risks and constraints to the project	List any unusual hazards and risks.
2.7 Proposed design method	Describe the proposed design method. e.g. linear elastic grillage.
2.8 Departures from standards	Include a brief summary of all departures from standard proposals necessary for each option, and indicate any yet to be agreed or likely to be critical to option.
2.9 Construction issues	Describe any construction constraints, including interfaces with existing highway or other infrastructure. State temporary traffic management measures agreed with the Overseeing Organisation project manager.

Report structure and content (continued)

2.10 Operation and maintenance	Describe any unusual methods and facilities required to carry out inspections and maintenance.
2.11 Preferred option	A brief conclusion identifying the preferred option and reason for selection.
2.12 Proposed category of check	State reason for proposed category of check when not in accordance with guidance in this document.
2.13 Role of the works examiner supervising the works	Role of the works examiner to be agreed by the Overseeing Organisation (i.e. options 1, 2, or 3 listed in section 2 of the construction compliance certificate in Appendix N).

THE ABOVE IS SUBMITTED FOR ACCEPTANCE

Signed _____

Name _____

Position held _____

Engineering qualifications _____ [2]

Name of organisation _____

Date _____

PREFERRED OPTION AGREED

Signed _____

Name _____

Position held _____

Engineering qualifications _____ [2]

TAA _____

Date _____

Notes

1. Ideally this should be a structure key from the Overseeing Organisation's asset management database if available.

2. CEng MICE, CEng MIStructE or equivalent

Appendix P. Proprietary manufactured structures

1. Scope

The range of proprietary manufactured structures may include various types of culverts; small span underbridges (up to eight metres span) in precast concrete; various systems for earth retaining structures such as reinforced/anchored earth systems; crib and gabion walls, lighting columns, large sign supports (greater than 7 m high) and environmental barriers.

These structures may be supplied with their performance declared in accordance with the requirements of the CPR (under a CE mark) either through compliance with a European harmonised standard or a European Technical Approval (ETA) issued by the European Organisation for Technical Approvals (EOTA).

Requirements for avoiding "barriers to trade" when specifying proprietary manufactured structures and products and for application of the TA procedure to proprietary products that have their performance declared in accordance with the CPR are given in CG 300 clause 2.5.

2. Different forms of construction

Generally the form of structure appropriate for a particular application will fall into one of the following groups:

1) those where a uniquely designed structure is most suitable for the site conditions and end requirements. Such a design will be based substantially on non-proprietary materials such as reinforced concrete or structural steel, although some of the individual components may be proprietary products;
2) those where a proprietary manufactured structure is the most suitable, e.g. a corrugated steel buried structure, a precast concrete culvert selected from a manufacturer's range of products, or a proprietary reinforced earth wall system;
3) those where either form of construction would be more or less equally suitable.

To avoid the risk of discrimination, the Designer is to demonstrate to the TAA at the AIP stage that all three groups as described in 2, as above, have been considered. However, there is no obligation on the Designer to adopt a design in a particular form, if there are sound engineering or aesthetic reasons for believing it to be inappropriate, or another option has clearly identified advantages that justify limiting the choice. The reasons for the final selection should be clearly recorded on the AIP form agreed by the TAA.

Where the use of a proprietary manufactured structure is not considered appropriate for aesthetic or other reasons, the status and authority of the person(s) making that judgement should be clearly established and recorded on the AIP form. Where others, such as planning or water authorities, with a legitimate interest or statutory duty to consider the form of structure to be provided, will not permit a particular form, that authority should be asked to provide a written justification of its position and confirmation that it is aware of the legal implications.

In assessing the suitability of a particular form of construction, the Designer will consider whether maintenance costs can affect the choice. In order to ensure fair competition between different structures, the foreseeable special maintenance costs could need to be added to the contract construction costs. Where this is considered necessary, it should be made clear in the O/AIP (see clause 4).

3. Proprietary designs

Where the Designer decides that a proprietary manufactured structure is the most suitable, an outline AIP (O/AIP) should be provided for all the relevant design parameters and end use requirements for the structure. This should include appropriate statements regarding appearance, environment and maintenance considerations. A check list of requirements for the O/AIP is given in P.4. The O/AIP should be submitted to the TAA for agreement.

4. Outline AIP

The O/AIP for proprietary manufactured structures may be based on the relevant sections of the model AIP Appendix O and include any other additional requirements. A check list of requirements for the O/AIP is given as follows:

CHECK LIST OF ESSENTIAL REQUIREMENTS FOR AN OUTLINE AIP (O/AIP)

1. Location
2. Operational dimensions/levels
3. Requirements for traffic loads
4. Requirements for other actions
5. Relevant Overseeing Organisation standards, UK national standards (Eurocodes and non-Eurocodes), BSI Published Documents, Codes of Practice, etc.
6. General arrangement drawing including the designated outline

CHECK LIST OF OTHER REQUIREMENTS FOR AN OUTLINE AIP (O/AIP)

7. Ground investigation data
8. Appearance of structure
9. Environmental factors
10. Constraints/external control during execution
11. Operational or user requirements
12. Special maintenance
13. Any other essential requirements

5. Confirmation of compliance

Where a proprietary structure or product is supplied in accordance with an O/AIP and the item has been CE marked in accordance with the CPR the designer is to confirm to the TAA in a certificate that they have inspected the declared performance under the CE mark and that declared performance of the item meets the requirements of the O/AIP.

Highway Structures & Bridges
General Information

CG 300
England National Application Annex to CG 300 Technical approval of highway structures

(formerly BD 2/12)

Version 0.1.0

Summary
This National Application Annex sets out the Highways England-specific requirements on technical approval (TA) of highway structures.

Feedback and Enquiries
Users of this document are encouraged to raise any enquiries and/or provide feedback on the content and usage of this document to the dedicated Highways England team. The email address for all enquiries and feedback is: Standards_Enquiries@highwaysengland.co.uk

This is a controlled document.

Contents

Latest release notes

Document code	Version number	Date of publication of relevant change	Changes made to	Type of change
CG 300	0.**1**.0	April 2021	England NAA	Incremental change to requirements
Update to clause E/1.3				

Previous versions

Document code	Version number	Date of publication of relevant change	Changes made to	Type of change
CG 300	0	March 2020		

Foreword

Publishing information

This document is published by Highways England.

This document supersedes part of BD 2/12, which is withdrawn.

Contractual and legal considerations

This document forms part of the works specification. It does not purport to include all the necessary provisions of a contract. Users are responsible for applying all appropriate documents applicable to their contract.

Introduction

Background

This National Application Annex gives the Highways England-specific requirements and advice for the application of technical approval (TA) procedures in England.

Assumptions made in the preparation of this document

The assumptions made in GG 101 [Ref 1.N] apply to this document.

Mutual Recognition

Where there is a requirement in this document for compliance with any part of a "British Standard" or other technical specification, that requirement may be met by compliance with the Mutual Recognition (See GG 101 [Ref 1.N]).

Abbreviations

Abbreviation	Meaning
DBFO	Design, build, finance, operate (contract scheme)
TA	Technical approval

E/1. Particular requirements for DBFO schemes (CG 300, whole document & 3.4-3.10)

Use of interim requirements for technical approval of highway structures in English DBFO schemes

E/1.1 When used on the A69 Carlisle to Newcastle DBFO Contract, this document shall be amended as follows:

Table E/1.1 A69 Carlisle to Newcastle DBFO Contract

Paragraph no.	Description
Whole document	Delete whole document except the paragraphs identified below.
3.4 to 3.10 Criteria for Categories 0, 1, 2 and 3.	These criteria replace the criteria in Paragraph 34 of Section A of Part 3 of Schedule 4.

E/1.2 When used on the A1(M) Alconbury to Peterborough DBFO Contract, the A417/A419 Swindon to Gloucester DBFO Contract, the M1A1 Link Road (Lofthouse to Bramham) DBFO Contract, the A50/A564 Stoke-Derby Link DBFO Contract, the A30/A35 Exeter to Bere Regis DBFO Contract, the M40 Junctions 1 to 15 DBFO Contract, the A19 Dishforth to Tyne Tunnel DBFO Contract, the A1 Darrington to Dishforth DBFO Contract and the A249 Stockbury (M2) to Sheerness DBFO Contract, this document shall be amended as described in Table E/1.2:

Table E/1.2 CG 300 amendments for specific DBFO contracts

Paragraph no.	Description
Whole document	Delete whole document except the paragraphs identified below.
3.4 to 3.10 Criteria for Categories 0, 1, 2 and 3.	These criteria replace the criteria in Paragraph 35 of Section A of Part 3 of Schedule 4.

E/1.3 When used on the M25 DBFO Contract, this document shall be amended as described in Table E/1.3:

Table E/1.3 Document amendments for M25 DBFO Contract

Paragraph no.	Description
Whole document	Delete whole document except the paragraphs identified below
3.4 to 3.10 Criteria for Categories 0, 1, 2 and 3.	These criteria replace the criteria in Paragraph 12.2 of Section A of Part 1 of Schedule 8

E/2. Normative references

The following documents, in whole or in part, are normative references for this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Ref 1.N	Highways England. GG 101, 'Introduction to the Design Manual for Roads and Bridges'

Department for Infrastructure
An Roinn Bonneagair

Highway Structures & Bridges
General information

CG 300
Northern Ireland National Application Annex to CG 300 Technical approval of highway structures

(formerly BD 2/12)

Revision 0

Summary
This National Application Annex sets out the Department for Infrastructure, Northern Ireland-specific requirements on technical approval of highway structures.

Feedback and Enquiries
Users of this document are encouraged to raise any enquiries and/or provide feedback on the content and usage of this document to the dedicated team in the Department for Infrastructure, Northern Ireland. The email address for all enquiries and feedback is: dcu@infrastructure-ni.gov.uk

This is a controlled document.

Contents

Release notes

Version	Date	Details of amendments
0	Mar 2020	Department for Infrastructure Northern Ireland National Application Annex to CG 300.

Foreword

Publishing information

This document is published by Highways England on behalf of the Department for Infrastructure Northern Ireland.

This document supersedes BD 2/12, which is withdrawn.

Contractual and legal considerations

This document forms part of the works specification. It does not purport to include all the necessary provisions of a contract. Users are responsible for applying all appropriate documents applicable to their contract.

Introduction

Background

This National Application Annex gives the Department for Infrastructure, Northern Ireland-specific requirements and advice for the application of technical approval procedures on all roads in Northern Ireland.

Assumptions made in the preparation of this document

The assumptions made in GG 101 [Ref 1.N] apply to this document.

Mutual Recognition

Where there is a requirement in this document for compliance with any part of a "British Standard" or other technical specification, that requirement may be met by compliance with the Mutual Recognition clause in GG 101 [Ref 1.N].

Abbreviations

Abbreviation	Meaning
AiP	Approval in Principle
TAA	Technical approval authority

NI/1. General requirements and principles (CG 300, 2)

Overseeing Organisation requirements (CG 300, 2.2 & 2.3)

NI/1.1 The initial submission of Approval in Principle (AiP) and certificates shall be in hard copy and electronic format.

NI/1.1.1 Subsequent re-submissions of AiP and certificates may be in electronic format only, where agreed by the TAA.

NI/1.2 Original manuscript signatures shall be submitted on all documents.

Use of UK national Standards (CG 300, 2.14 & 2.15)

NI/1.3 Model forms specific to Department for Infrastructure, available on the Department for Infrastructure website, shall be used.

Options report (CG 300, 2.16)

NI/1.4 An options report shall not be required unless specifically requested by the TAA.

Submission for AiP (CG 300, 2.46)

NI/1.5 Model forms specific to Department for Infrastructure shall be used and are available on the Department for Infrastructure website.

Certification (CG 300, 2.94)

NI/1.6 Construction compliance certificate shall be submitted to the Department for Infrastructure Roads divisional office for acceptance.

NI/2. Bridges and other highway structures

NI/2.1 Where the document mentions Interim Advice Notes (IAN) confirmation shall be sought from the Overseeing Organisation as to the applicability of the information within that note to any particular proposal or if alternative documents are referenced.

Bridges and other highway structures (CG 300, 3.3 parts 4), 5) & 6))

NI/2.2 In addition to to the requirements of 3.3, the procedures described in Section 3 shall be applied to

1) earth retaining structures 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 1.0m or greater;
2) reinforced/strengthened soil/fill structure, with hard facings, where the effective retained height is 1.0m or greater;
3) reinforced/strengthened soil/fill structure where hard facings are not provided and the face inclination exceeds 70 degrees.

Certification (CG 300, 3.13)

NI/2.3 Model forms specific to the Department for Infrastructure shall be used and are available on the Department for Infrastructure website.

Documentation (CG 300, 3.14 & 3.16)

NI/2.4 Model forms specific to the Department for Infrastructure shall be used and are available on the Department for Infrastructure website.

NI/3. Temporary works (CG 300, 4.0)

Temporary works (CG 300, 4.2 & 4.4.1)

NI/3.1 Type N temporary works proposals shall be dealt with under the Principal Contractors' own procedures and do not require involvement of the Overseeing Organisation, nor any submission to be made to the technical approval authority.

Type S proposals (CG 300, 4.19)

NI/3.2 Model forms specific to the Department for Infrastructure shall be used and are available on the Department for Infrastructure website.

NI/4. Normative references

The following documents, in whole or in part, are normative references for this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Ref 1.N	Highways England. GG 101, 'Introduction to the Design Manual for Roads and Bridges'

Highway Structures & Bridges
General information

CG 300
Scotland National Application Annex to CG 300 Technical approval of highway structures

(formerly BD 2/12)

Revision 0

Summary
This National Application Annex sets out Transport Scotland's specific requirements on the technical approvals of highway structures.

Feedback and Enquiries
Users of this document are encouraged to raise any enquiries and/or provide feedback on the content and usage of this document to the dedicated Transport Scotland team. The email address for all enquiries and feedback is: TSStandardsBranch@transport.gov.scot

This is a controlled document.

Contents

Release notes

Version	Date	Details of amendments
0	Mar 2020	Transport Scotland National Application Annex to CG 300.

Foreword

Publishing information

This document is published by Highways England on behalf of Transport Scotland.

This document supersedes BD 2/12, which is withdrawn.

Contractual and legal considerations

This document forms part of the works specification. It does not purport to include all the necessary provisions of a contract. Users are responsible for applying all appropriate documents applicable to their contract.

Introduction

Background

This National Application Annex gives the Transport Scotland-specific requirements for technical approval procedures of highway structures.

Assumptions made in the preparation of this document

The assumptions made in GG 101 [Ref 1.N] apply to this document.

Mutual Recognition

Where there is a requirement in this document for compliance with any part of a "British Standard" or other technical specification, that requirement may be met by compliance with the Mutual Recognition clause in GG 101 [Ref 1.N].

S/1. Bridges and other highway structures (CG 300, 1)

Scope

S/1.1 Where the document mentions interim advice notes (IANs) confirmation shall be sought from the Overseeing Organisations as to the applicability of the information within that note to any particular proposal or if alternative documents are referenced.

S/1.2 CG 300 clause 3.3 list item 1) shall not apply and be amended to the following:

1) highway structures with clear span or internal diameters of 2.0 m or greater;
2) corrugated buried structures 0.9 m span or greater.

S/2. Normative references

The following documents, in whole or in part, are normative references for this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Ref 1.N	Highways England. GG 101, 'Introduction to the Design Manual for Roads and Bridges'

Design Manual for Roads and Bridges

Llywodraeth Cymru
Welsh Government

Highway Structures & Bridges
General Information

CG 300
Wales National Application Annex to CG 300 Technical approval of highway structures

(formerly BD 2/12)

Version 0.1.0

Summary
This National Application Annex gives the Welsh Government-specific requirements for the technical approval procedures of highway structures in Wales.

Feedback and Enquiries
Users of this document are encouraged to raise any enquiries and/or provide feedback on the content and usage of this document to the dedicated Welsh Government team. The email address for all enquiries and feedback is: Standards_Feedback_and_Enquiries@gov.wales

This is a controlled document.

Contents

Latest release notes

Document code	Version number	Date of publication of relevant change	Changes made to	Type of change
CG 300	0.**1**.0	April 2021	Wales NAA	Incremental change to requirements

Revision 1 (DATE TBC) W/1 - alternative requirements to list in clauses 3.6 and 3.8 of core document. Revision 0 (March 2020) Welsh Government National Application Annex to CG 300.

Previous versions

Document code	Version number	Date of publication of relevant change	Changes made to	Type of change
CG 300	0	March 2020		

Foreword

Publishing information

This document is published by Highways England on behalf of the Welsh Government.

This document supersedes BD 2/12, which is withdrawn.

Contractual and legal considerations

This document forms part of the works specification. It does not purport to include all the necessary provisions of a contract. Users are responsible for applying all appropriate documents applicable to their contract.

Introduction

Background

This National Application Annex gives the Welsh Government-specific requirements for the technical approval procedures of highway structures in Wales.

Assumptions made in the preparation of this document

The assumptions made in GG 101 [Ref 1.N] apply to this document.

Mutual Recognition

Where there is a requirement in this document for compliance with any part of a "British Standard" or other technical specification, that requirement may be met by compliance with the Mutual Recognition clause in GG 101 [Ref 1.N].

W/1. Bridges and other highway structures (CG 300, 1)

Scope

W/1.1 Where the document mentions interim advice notes (IANs), confirmation shall be sought from the Overseeing Organisation as to the applicability of the information within that note to any particular proposal, or if alternative documents are referenced.

NOTE *For example the TRMM (Trunk road maintenance manual) and asset management strategy & plan.*

W/1.2 Clause 3.6 7) shall be amended to apply to noise barriers less than 3m high and without overhangs.

W/1.3 Clause 3.8 6) shall be amended to apply to noise barriers 3m or more or with overhangs.

W/2. Normative references

The following documents, in whole or in part, are normative references for this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Ref 1.N	Highways England. GG 101, 'Introduction to the Design Manual for Roads and Bridges'

B Appendix B: CD 351 The design and appearance of highway structures

Design Manual for Roads and Bridges

Highway Structures & Bridges
Design

CD 351
The design and appearance of highway structures

(formerly BA 41/98)

Revision 0

Summary
This document provides requirements and guidance which aim to improve the aesthetic outcomes of schemes that include bridges and other highway structures.

Application by Overseeing Organisations
Any specific requirements for Overseeing Organisations alternative or supplementary to those given in this document are given in National Application Annexes to this document.

Feedback and Enquiries
Users of this document are encouraged to raise any enquiries and/or provide feedback on the content and usage of this document to the dedicated Highways England team. The email address for all enquiries and feedback is: Standards_Enquiries@highwaysengland.co.uk

This is a controlled document.

Contents

Release notes

Version	Date	Details of amendments
0	Mar 2020	CD 351 replaces BA 41/98. This document introduces the aesthetic appraisal document, which helps demonstrate how aesthetic quality has been taken into account in the design of highway structures. This full document has been re-written to make it compliant with the new Highways England drafting rules.

Foreword

Publishing information

This document is published by Highways England.

This document supersedes BA 41/98, which is withdrawn.

Contractual and legal considerations

This document forms part of the works specification. It does not purport to include all the necessary provisions of a contract. Users are responsible for applying all appropriate documents applicable to their contract.

Introduction

Background

This document provides requirements and guidance which aim to improve the aesthetic outcomes of schemes that include bridges and other highway structures. It outlines an underlying approach to encourage best practice, establish intended outcomes that support aesthetic quality, and evidence how these can be addressed throughout all stages of the design life-cycle of a highway structure.

The provisions in this document are not instructions for how to design good highway structures, but are prompts for all parties involved throughout the design life-cycle to improve aesthetic quality and design outcomes.

This document is intended for use by engineers, architects and planning professionals, as well as to inform communities of the design philosophy and principles that can be implemented to ensure good design.

Aesthetics is only one of the aspects affecting good road design, and has to be balanced with functional and technological considerations covered in other DMRB documents as relevant.

Assumptions made in the preparation of this document

The assumptions made in GG 101 [Ref 2.N] apply to this document.

Abbreviations

Abbreviations

Abbreviation	Definition
AAD	Aesthetic Appraisal Document
AC	Aesthetic Category
AIP	Approval in Principle
GRP	Glass Reinforced Plastic

Terms and definitions

Terms

Term	Definition
Design life-cycle	The period of time between the inception of design and the point at which the designed item no longer exists in its designed form. NOTE: Design life-cycle includes the stages of option identification, option selection, preliminary design and detailed design and is to include any design changes that occur during the construction and commissioning period.
Discipline	A branch of knowledge involved in the design of highway structures, for example highways, drainage, structural engineering or architecture.
Highway structure	Structure or installation as defined in accordance with CG 300 [Ref 4.N].
Project review panel	A body which includes representation from the stakeholders in the project (e.g. from the Overseeing Organisation or users of the project deliverables), which helps ensure that the principles of good road design have been taken into account for an individual road scheme / project or a specific programme.
Recreational waterway	A waterway that typically sees high level of usage from members of the public, for recreational purposes such as boating, sailing, swimming etc.

1. Scope

Aspects covered

1.1 This document shall be followed to demonstrate how the aesthetic quality has been taken into account throughout the design life-cycle of all categories of highway structures for new construction and renewal schemes.

NOTE 1 This document does not provide prescriptive rules or a formulaic approach on how the subject of aesthetics is dealt with for highway structures; instead, it covers:

1) overarching aesthetic influences relevant to highway structures;

2) the process of identifying, evidencing and working towards positive aesthetic outcomes.

NOTE 2 Aesthetic impact is not limited to higher profile, landmark structures that stand out as a result of their scale, location or role within their local cultural vernacular, but also to structures that are regarded as commonplace, widespread and therefore highly visible elements within the highway network.

NOTE 3 The objectives and processes set out in this document are based on general principles of design excellence and complement the principles of good road design established within GG 103 [Ref 1.N].

Implementation

1.2 This document shall be implemented forthwith on all schemes involving the design and appearance of highway structures on the Overseeing Organisations' motorway and all-purpose trunk roads according to the implementation requirements of GG 101 [Ref 2.N].

Use of GG 101

1.3 The requirements contained in GG 101 [Ref 2.N] shall be followed in respect of activities covered by this document.

2. Approach to design

2.1 The design process of highway structures shall include an evaluation of all aspects that affect the aesthetic quality of the completed structure, its position in the landscape and its impact on social, cultural and heritage sensitivities within the community.

NOTE 1 The treatment of aesthetics is a fundamental component of the design process throughout the design life-cycle from its outset.

NOTE 2 Appendix A provides guidance on aesthetic aspects that can influence the design process.

NOTE 3 Appendix B provides guidance on the approach to design for highway structures in general.

NOTE 4 Appendix C provides guidance on the approach to design specifically for highway bridges.

NOTE 5 The NN NPS [Ref 4.I] sets out a number of assessment criteria which affects the quality of design for a highway structure.

2.2 The design input across all disciplines involved in the design process of structures within a highway environment shall be coordinated to achieve outcomes of aesthetic merit.

2.3 Liaison shall be maintained with the relevant Overseeing Organisation throughout design development and any statutory consent procedures.

3. Aesthetic appraisal document

Development and approval

3.1 The aesthetic appraisal document (AAD) shall be reviewed and updated at key stages throughout the design life-cycle and submitted for approval to the Overseeing Organisation at agreed milestones.

NOTE *The AAD is the means by which the key influences and decisions that shape the approach to aesthetics is recorded and agreed.*

Content and scope of application

3.2 The AAD shall be a live document, updated at key stages throughout the design life-cycle.

3.2.1 The AAD should communicate a clear design narrative that demonstrates an appreciation of the aspects identified in Table 3.2.1 throughout the various stages of the design life-cycle and provide a clear description of the rationale underpinning all key decisions that influence the aesthetics of structures.

Table 3.2.1 : Core information for inclusion in the AAD at the different stages of the design life-cycle

Design life-cycle stage	AAD information
AAD 1(1) - Project initiation (prior to option finalisation)	1) the structure's location, function and any site specific constraints or sensitivities identified; 2) any specific requirement to take architectural advice; 3) aesthetic category (2); 4) project review panel make up, where relevant (3)

Table 3.2.1 : Core information for inclusion in the AAD at the different stages of the design life-cycle (continued)

Design life-cycle stage	AAD information
AAD 2.1 - Preliminary design AAD 2.2 - Detailed design (5)	Design outcome objectives (4) Aspects related to context including: 1) key transportation and functional requirements and physical features to be negotiated; 2) key physical, cultural and social connections to be established and maintained; 3) user mode interfaces and accessibility constraints; 4) challenges and opportunities associated with local community/cultural imperatives and heritage aspects; 5) significant environmental issues, challenges and opportunities; 6) key relevant aspects of context of the structure that are to be accommodated within the design; 7) potential structural forms and proportions to suit geometric and loading constraints; 8) identification of context-specific materials or finishes, where relevant. Aspects related to the process including: 1) milestones at which the AAD is updated throughout the design process (at preliminary and detailed design as a minimum); 2) lead discipline and all other contributing disciplines that are anticipated to be involved in the design process of the highway structures; 3) extent and process for public/stakeholder consultation. Aspects related to specific project requirements including: 1) vehicle containment/parapet requirements; 2) signage and lighting requirements.
AAD 3 - Construction	Changes to design as a result of site constraints or construction process requirements (as necessary)
AAD 4 - Post construction review	Feedback on how well the final design and completed structure have met the design outcome objectives (4)
Note (1): AAD1 is the outline AAD which is typically prepared by the Overseeing Organisation which forms part of the project brief. Note (2): See "Aesthetic category" in Section 3. Note (3): The size and make-up of the project review panel, which is set up by the Overseeing Organisation where needed, is appropriate to the aesthetic category and scale of the project. For smaller scale projects, a project review panel can comprise a single, named responsible person. Note (4): See "Design outcome objectives" in Section 3. Note (5): AAD 2.1 is intended to provide considerations affecting the aesthetics of the whole structure, whereas AAD 2.2 is intended to provide considerations affecting both the whole structure and specific parts.	

3.2.2 The AAD should be as concise as possible whilst providing clarity and continuity across the design

life-cycle.

NOTE *The level of supporting detail and extent of content within the AAD increases from category AC1 to category AC3 (see "Aesthetics category" in Section 3).*

3.2.3 An AAD may be produced for individual structures or alternatively for a family of structures on a scheme, where relevant.

3.2.4 Where aspects are covered within documents already required by other standards/processes, a reference to the relevant, alternative source may be included in lieu of a detailed description.

NOTE *The AAD can be used to inform other formal procedures including technical approval, planning, consents and environmental assessments.*

3.3 Any amendments required as a result of the outcome of the consent process shall be recorded within the AAD.

Aesthetic category

3.4 The level of detail and extent of content within the AAD shall be commensurate to the aesthetic category (AC) of the structure.

NOTE 1 *The aesthetic category of the structure is based on the underlying characteristics identified in Table 3.4N1 for AC1, AC2, AC3.*

Table 3.4N1 Aesthetic category characteristics

Category	Characteristics
AC3	1) landmark structures that can generate significant local or national interest; 2) structures that have a significant visual effect (1) in locations with environmental, heritage, landscape and visual sensitivities. For example structures in sensitive areas as defined in LA 102 [Ref 3.N].
AC2	Structures that could be regarded as relatively widespread but are highly visible elements in themselves, within the highway network, which can include: 1) structures that form grade separated junctions; 2) structures in densely populated areas or that are adjacent to or cross roads that carry significant volumes of traffic; 3) structures that are adjacent to or cross recreational waterways; 4) structures that are adjacent to or cross routes used by walkers, horse riders and cyclists, and shared used paths; 5) bridges that provide access to recreational areas/parks.
AC1	All others.
Note (1): Guidance and requirements on assessing the significance of visual effects is provided in LA 107 [Ref 2.I].	

NOTE 2 *The initial aesthetic category of the structure in AAD1 is defined by the relevant Overseeing Organisation.*

NOTE 3 *The aesthetic category is not the same as the structure category for technical approval, see CG 300 [Ref 4.N].*

3.5 Any change to the initial aesthetic category from AAD1 shall be agreed with the relevant Overseeing Organisation.

3.6 An evidence base appropriate to the aesthetic category allocated shall be developed through the aesthetic evaluation process during the various design life-cycle stages.

Design outcome objectives

3.7 The design outcome objectives shall be defined no later than the AAD2 stage.

3.7.1 The design process should not start with any preconceptions about the aesthetics of the final solution.

NOTE *Different structure types have their own particular characteristics in terms of materials, components etc.*

3.7.2 The key objectives for the design outcome should be understood and defined through a multi-disciplinary design and review process, focusing on aspects such as:

1) proportion and integration of structure scale within the landscape;
2) options for contrast/harmony with surrounding environment;
3) proportions of spans/length and height;
4) symmetry/rhythm/line/order of principal elements;
5) materials and finishes;
6) parapets and other elements that contribute to rhythm;
7) lighting and signage;
8) managing the effects of water and weathering;
9) structure curtilage;
10) viewpoints from and to the structure;
11) potential for developing a family of structures along route.

4. Normative references

The following documents, in whole or in part, are normative references for this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Ref 1.N	Highways England. GG 103, 'Introduction and general requirements for sustainable development and design'
Ref 2.N	Highways England. GG 101, 'Introduction to the Design Manual for Roads and Bridges'
Ref 3.N	Highways England. LA 102, 'Screening projects for Environmental Impact Assessment'
Ref 4.N	Highways England. CG 300, 'Technical approval of highway structures'
Ref 5.N	Highways England. GG 142, 'Walking, cycling and horse-riding assessment and review'

5. Informative references

The following documents are informative references for this document and provide supporting information.

Ref 1.I	CIRIA. Soubry, MA. CIRIA C543, 'Bridge detailing guide'
Ref 2.I	Highways England. LA 107, 'Landscape and visual effects'
Ref 3.I	Highways England. LD 117, 'Landscape design'
Ref 4.I	NN NPS, 'National Networks National Policy Statement (NN NPS)'
Ref 5.I	The Concrete Society. CS 171, 'Visual concrete - planning and assessment'
Ref 6.I	Highways England. CD 361, 'Weathering steel for highway structures'

Appendix A. Aesthetics aspects that can influence the design process

The following values relating to both substance and process should be integral to the design approach in order to achieve structures of aesthetic merit:

1) commitment to aesthetics;
2) community/stakeholder engagement;
3) understanding of sensitivity of context;
4) balancing cost and aesthetics;
5) sustainability of outcomes;
6) rigour within the design process;
7) collaboration between all relevant disciplines.

A1 Commitment to aesthetics

All relevant parties should commit to achieving good aesthetics, including the client, the design team and the contractor during the design life-cycle.

A2 Community/stakeholder engagement

Early engagement and regular communication with local communities should form part of the design process.

Bridges in particular tend to be highly visible structures that are viewed not only by road users, but also by local community members. As such, they can impact visual amenity and sense of place. They can affect historic and cultural values or provide a sense of local identity.

A3 Understanding of sensitivity of context

The sensitivity to the way in which a structure sits within the landscape or built environment and its ecological and community context should be assessed.

It should be understood through all design stages that, whilst the structure itself is a unity, the site and the structure also represent a unity and therefore technical and aesthetic decisions should not be separated from each other. There should always be an interaction between them.

A clear understanding of the broader context within which the structure sits that can influence the designer's aesthetic response should be developed and documented. These may include:

1) topography;
2) function;
3) adjacent land use and infrastructure features;
4) the presence of other highway structures (either adjacent to or along route);
5) geotechnical and geological characteristics;
6) character of landscape or built environment;
7) ecology/biodiversity;
8) views of or in the case of bridges, from the structure;
9) community values and objectives.

A4 Cost and aesthetics

Cost and aesthetics should be balanced in order to develop an optimum solution.

Good design and aesthetics need not lead to an expensive outcome. Durability and build quality are often related and drive whole life costs in terms of maintenance and serviceable life.

A5 Sustainability

The sustainability of outcomes should be evaluated as they can directly influence the aesthetic outcome, insofar as they can be reflected by:

1) respect for heritage;
2) improved amenity for local communities;
3) connectivity of communities;
4) network resilience;
5) accommodation of inspection and maintenance;
6) longevity in terms of flexibility for future adaptation.

GG 103 [Ref 1.N] provides requirements and guidance for sustainable development and design.

A6 Coordination of disciplines within the design process

When the proposed solutions flow from an understanding of the fundamental design requirements, context and design outcome objectives, the rationale for selecting a single preferred concept becomes transparent.

It is particularly important that the highway design and structure design are well coordinated. The structure should properly relate to the road and decisions that can fix the alignment and the land-take requirements should not be made without the involvement of the structure designer.

The extent and shape of associated earthworks have a great effect on the structure design and on the general landscape context, and their inter-relationship should be coordinated between the highway designer, the structure designer and landscape architect. A predominant focus on earthworks and alignment aspects can have a detrimental impact on structure aesthetics.

A7 Collaboration between all relevant disciplines

A collaborative, multi-disciplinary approach should be adopted to explore a range of feasible design solutions and identify dependencies and wider opportunities. Collaboration between design professionals across the full range of necessary disciplines and engagement from the start of the design life-cycle should be facilitated to achieve a solution of aesthetic merit.

A highway structure is rarely designed by a single individual but will generally be the result of interactions between designers from multiple disciplines. This collaboration should begin at the earliest stage of design development in order to avoid outputs from one discipline becoming a constraint to others. These dynamic interactions are key to arriving at a balance and optimal solution. Conflicts that arise can be aired and resolved, resulting in a clearer path towards an optimal solution. For example, an open aspect structure, whilst potentially having a cost penalty relative to earthworks, can bring both aesthetic and environmental/ecological benefits and potentially reduce the costs of associated mitigation measures.

Input to the design team should ideally be provided by the client, structural and highway engineers, architect (where the aesthetic category merits this), landscape architect (where appropriate), with input from environmental, operation & maintenance and construction engineering specialists and others, as appropriate and identified in the AAD.

It is particularly important that the highway design and structure design are developed collaboratively between both disciplines. The structure should relate properly to the road and decisions which fix its alignment and associated land requirements should not be made without consulting the structure designer, particularly in the case of major structures such as bridges.

Appendix B. Approach to the design - general

B1 Scope of application

This appendix provides guidance for all highway structures on the approach to design incorporating an evaluation of all aspects that affect the aesthetic quality in general.

B2 Options development

It should be understood through all design stages that whilst a major highway structure such as a bridge in itself is a unity (i.e. in which structure, construction, materials, appearance and function are drawn together), the structure and its setting in the landscape are also a unity. Therefore technical and aesthetic decisions cannot be taken in isolation from each other. There will always be an interaction between them.

A highway structure will always become a component of its immediate environment. That environment will encompass many aspects, one of which is the immediate physical location (i.e. the site). The site will provide the most important influences with regard to what the appearance of the structure should be, or perhaps what it should not be. This will be a combination of technical, functional and aesthetic influences.

When approaching the design of any highway structure there will always be numerous options for solutions. The design process should therefore begin by developing a clear understanding of the full context within which the structure will sit, but keeping an open mind when developing options. Not all of these will be apparent at an early stage, and the most appropriate solutions may not become obvious until a good deal of effort has been expended.

Good design requires time and deep understanding of aesthetic, functional and technical considerations in order to fully understand and sensitively deal with potentially conflicting project requirements or constraints. Designers are normally expected to study alternative solutions undertaking preliminary analysis and cost estimates, to provide appropriate data to allow valid comparisons of solutions to be made. The first solution that comes to mind is rarely sufficiently developed to be considered as optimal; other options should be developed in parallel in order to identify the most appropriate solution that best satisfies the requirements of the client and users.

B3 The whole

A clear understanding of aspects of the broader context within which the structure sits that can influence the designer's aesthetic response should be developed and recorded. These can include:

1) topography;
2) function;
3) adjacent land use and infrastructure features;
4) the presence of other highway structures (either adjacent to or along the route);
5) geotechnical and geological characteristics;
6) character of landscape or built environment;
7) ecology/biodiversity;
8) views of or in the case of bridges, from the structure;
9) community values and objectives.

The design process should not start with any preconceptions about the final solution. The key objectives for the design outcome should be developed and defined through a multi-disciplinary review process, focusing on aspects such as:

1) integration of structure scale within the landscape;
2) proportions of spans and height;
3) symmetry/rhythm;

4) potential for developing a family of structures along a route.

Different structure types will have their own particular characteristics in terms of materials, components etc. The nature of use will significantly influence the structure type and form. For example, pedestrian/cycle bridges will be lighter and hence more flexible structures than highway or rail bridges.

In the case of highway structures, the shaping of abutting earthworks, whilst not part of the structure itself, should also be carefully considered. LD 117 [Ref 3.I] provides guidance on the interaction between bridges and landscape. Three dimensional graphics or simple physical models can be helpful in relating the embankment to the shape and scale of the structure within the landscape.

The structure itself should also be considered as a whole, not just an assemblage of parts. All elements should be related and all the parts be compatible with each other, serving the whole. For example, in the case of bridges, incompatibilities between approach viaducts (or ramps in the case of pedestrian structures) and the main structure should always be avoided through consideration of the whole.

Significant elements that have disparate angular arrangements within a structure can produce a disorganised effect, and truss type structures require particular care.

The form of the structure is what gives it its fundamental character. It is intimately connected with materials and the methods of construction as well as with safety and durability. Generally a structure should honestly and skilfully reflect the use of form and materials to achieve its aesthetic effect, by refinement of form and details.

Generally, forms and details that reflect the flow of internal forces are preferred to those which do not and therefore appear forced. For example, arches and suspension bridges reflect the flow of internal forces and are generally considered to be visually dramatic.This is equally as valid when designing contemporary structures as it was for historic ones.

B4 The parts

The form of the structure will encompass its external shape and overall appearance and how its individual elements are arranged and interrelate to one another in terms of scale and proportion. Structure specific guidance is given in Appendix C and D.

Appendix C. Approach to the design - bridges

C1 Scope of application

This appendix provides guidance specific to bridges on the approach to design incorporating an evaluation of all aspects that affect the aesthetic quality.

C2 The parts

The primary elements within a typical bridge can be grouped into:

1) superstructure;
2) substructure.

The following sections are not intended to be a comprehensive list of the parts to all types of bridge, but provide a brief commentary on the main elements that usually dominate aesthetic considerations. More detailed guidance may be found in the 1998 edition of BA 41 The Design and Appearance of Bridges.

C3 Superstructure

Superstructure elements can include:

1) above deck elements, for example pylons or arch ribs;
2) bridge deck;
3) parapets;
4) other deck furniture.

The bridge deck is usually the main visual organising element that links all other elements together and emphasises structural continuity.

C3.1 Bridge deck depth

By thoughtful shaping of the structure, the visual impact of the depth of the deck can be reduced (except in silhouette). These measures can help to lighten the appearance of the deck, which is usually positive but this may not necessarily always be the case.

Edge cantilevers overhanging the main structural elements can break up the visible depth of the deck, as the recession of the main structure and the shadow cast on it by the cantilever reduces the perceived overall depth.

C3.2 Bridge deck width

One of the challenges of modern highway bridges is that their decks can be very wide. Large areas of unbroken soffit tend to be visually dominant and potentially unpleasant, particularly where the soffit is relatively low and highly visible to users of the spaces beneath.

Edge cantilevers overhanging the main structural elements are usually, but not always, beneficial insofar as they reduce the visual impact of the width of the deck soffit, particularly where decks are set low within the landscape.

In the case of bridges carrying dual carriageways, the effects of large areas of unbroken soffit can be mitigated by accommodating the carriageways on separate decks with a gap between them that allows light to penetrate. Where this is not possible a main structure consisting of visibly separated beams or boxes may be favourable.

C3.3 Bridge deck length

Ideally the bridge deck should run throughout its length as cleanly as possible, i.e. sudden changes of depth or width should be avoided. If they are unavoidable, steps should be taken to minimise their effect, possibly by means of a strong dividing element as a transition.

An awkward effect is produced by an abrupt change of structure within a length of viaduct to accommodate a change in form, where structures of different sizes or types are juxtaposed without any transition element. If it is not possible to avoid an awkward junction at such a change in the structure, the two decks should be visually separated by another element.

C4 Substructure

Substructure elements can include:

1) piers;
2) pier head interface;
3) pilecap interface;
4) abutments.

C4.1 Piers

Generally, piers should be simple in form and where complex or elaborate solutions are adopted, the rational for departing from this approach should be recorded. If different forms of piers are adopted within the bridge they should be visually related to each other in some way.

C4.1.1 Pier form and placement

The form and placing of piers in relation to the deck should be carefully considered. Two examples of this are:

1) thin piers under a very thick deck can look discontinuous and visually awkward;
2) where the deck is of constant depth the piers can be inset from the edge in order to emphasise the visual flow of the deck and reduce the significance of the piers and their spacing.

C4.1.2 Pier shapes

Pier shapes should be carefully considered, not only in relation to each other but also in relation to the shape of the deck and how the two interact at their point of connection. There may also be situations where surrounding features dictate a specific visual response.

Piers with cross section that have a rectangular core with semi-circular ends tend to be less visually pleasing than those which have a cross section defined by a continuous curve, such as an ellipse.

C4.2 Abutments

Abutments provide a vital visual end stop to the bridge and create its transition into the landscape. Careful consideration is therefore needed in terms of how they frame the structure and interact with its form, rhythm and scale.

For rural bridges it is often preferable to have simple bank seats that are much less visually obtrusive and avoid the problems associated with large visible areas of concrete, but this may not always be possible.

From a road user's point of view, closed abutments provide more contained and focused views along the highway corridor, which can be an advantage in certain situations. The proportions of the opening then become particularly significant.

C5 The details

C5.1 Surfaces and weathering

An important factor in the appearance of surfaces is the way in which they weather.

All materials weather, including brick and stone, and can weather badly if not appropriately selected/specified or detailed. Careful consideration of the detailing between interfaces is necessary where combinations of different materials are used.

Concrete surfaces require the most attention, particularly large unrelieved concrete surfaces such as often found in large abutments or retaining walls, which are by their nature aesthetically challenging.

Edge cantilevers can help protect the main structure from the adverse effects of weathering.

C5.1.1 Effects of water flow

The majority of the undesirable visual consequences of weathering result from exposure to water through various mechanisms such as rain, condensation or spray created by moving vehicles, either through unevenly depositing dirt particles on a surface or by redistributing them through washing of the surface.

The designer should consider the way in which water will flow over the element surfaces and try to actively manage it as much as possible. In doing this it is necessary to think in three dimensions. For example, it is not uncommon to see cross sections with drips detailed on them where no provision has been made to cater for the resulting flow of water along the direction of the drip, at its termination.

C5.1.2 Drip details

Drips will inevitably slope in their longitudinal dimension and water may run, or be blown along them until it hits a surface that it can run down, such as a pier or abutment. If it can be sensitively accommodated, a vertical feature in the face of the pier or abutment may be employed to contain any potential streaking. Deck soffits often exhibit unsightly streaking from water driven onto girder webs.

Where edge cantilevers and properly detailed drip features are incorporated, the deck can generally be protected from water running from above.

If a fascia incorporates joints (as is common with precast elements) water may eventually penetrate the joint and bypass the drip. A secondary drip in the soffit of the slab behind the fascia can protect the main structure, not only from water which gets through the joint in the fascia, but also from water flowing over the edge of the deck before the fascia is constructed that may carry particles of rust or other debris from construction related materials and activities on the deck.

C5.1.3 Vertical faces

Elements with vertical faces such as fascia panels, piers and abutments are most vulnerable, particularly in urban environments. Careful detailing incorporating special finishes can help to control and minimise the effects of staining or streaking.

A projection from a vertical surface will inhibit water from washing over the surface immediately below it. A projection of limited length will have a darker unwashed area beneath it, which is likely to contrast with the rest of the surface.

C5.1.4 Concrete surfaces

Smooth concrete surfaces often weather badly, regardless of the surface quality achieved. No matter how uniform the surface appears to be, water may flow down in irregular paths resulting in random streaks.

Textured surfaces perform markedly better, for example when tooled or cast against sawn board formwork. Some proprietary form liners may also produce surfaces which avoid streaking, but many will incorporate a pattern that repeats in consecutive panels, which itself may be visually inappropriate.

Surfaces with closely spaced vertical ribs or grooves can work effectively to channel the water so that it cannot spread out to cause streaks.

Finishes that are used to prevent water runs from streaking concrete surfaces may also be considered as opportunities to give texture to the surface.

C5.1.5 Use of trial panels

There is often considerable merit in including the requirement for the production of full-scale trial panels when structures incorporate highly visible concrete surfaces or features. These should be constructed on site by the contractor as far in advance of the works to which they relate as can be reasonably

accommodated within the programme in order to allow modifications to be made if necessary based on their outcomes.

The trial panel will serve numerous functions from testing of the designer's decisions in terms of colour, surface textures and weathering behaviour as well as of the contractor's ability to deliver the designer's intent. They can also provide invaluable insights in terms of verifying the proposed construction methods, the suitability of the reinforcement detailing, the formwork finishes and the suitability of the concrete mix itself.

CS 171 [Ref 5.I] provides guidance on concrete trial panels.

C5.1.6 Weathering steel

The use of weathering steel poses particular challenges and water that has been in contact with it should be carefully managed such that it does not come into contact with any adjacent concrete surfaces.

Guidance on detailing of weathering steel can be found in CD 361 [Ref 6.I].

C5.2 Joints

The location and detailing of expansion joints should be carefully considered in the design. Generally these should be avoided as far as is possible to circumvent any associated durability or weathering problems. Joints will inevitably leak during their service life and the structure should therefore be detailed such that any leakage can be contained or managed in a way that does not result in unsightly staining.

Leakage of joints is far more straightforward to manage at abutments than over piers or within a span.

C5.3 Parapets

Parapets serve several core functions, including:

1) safely containing people or vehicles or other objects;
2) giving a sense of security to users of the bridge;
3) providing a visual edge to the deck as seen from off the bridge;
4) allowing bridge users to experience the landscape.

Too often only the first of these is given any significant degree of attention, both during design and when preparing and interpreting standards.

High containment parapets are difficult to accommodate visually and should be carefully considered, especially where (as is often the case), they are not continuous over the full length of the bridge. Where the related element proportions allow, it may be feasible to express the continuity of the bridge fascia by means of a shadow line and possibly a change of texture.

A parapet that is at least partly of concrete can provide a thicker element as part of the edge of the deck. The parapet is the most brightly lit part of the deck as seen from off the bridge and varying the height of this element can be an important tool in influencing perceptions of the scale or proportion of the bridge.

The top surface of the parapet upstand should be detailed with an inward fall to avoid streaking to the outer face as a result of water runoff focused at post positions. CIRIA C543 [Ref 1.I] provides guidance on this.

C5.4 Drainage

All water run-off should be fully managed, collected and controlled via positive, well designed and detailed drainage system to avoid unsightly staining of visible surfaces and finishes or deterioration of materials. Particular attention should be paid to managing leakage through movement joints.

C5.4.1 Drainage pipes

Where drainage pipes are exposed, they should be treated as any other design element as part of the whole. Pipe runs should be routed to minimise their visual impact arising from their line, scale and rhythm in relation to other elements of the structure. In addition, the effect of material and colour of the pipes should be considered.

Where it is not possible to avoid positioning pipe runs below edge cantilevers, they may be shielded behind parapet downstands, as long as this does not compromise the overall aesthetic of the deck itself.

C5.5 Lighting columns and other deck furniture

C5.5.1 Lighting columns

Lighting columns on bridges are best avoided on short-span structures by placing them outside the abutments. Where lighting columns have to be accommodated along a structure then they should be considered as an integral part of the aesthetic design. Their rhythm in relation to span lengths, height of the lighting columns and the integration of any necessary fixing corbels within the overall detailing of the deck can be critical visual factors.

C5.5.2 Wind shielding

When wind shielding is being considered, a range of aspects should be studied and tested, including:

1) the aerodynamic effects on the structure and traffic;
2) the effects on the appearance of the bridge;
3) the impact on the view from vehicles crossing the bridge.

C5.5.3 Effects of bridge details and surrounding landscape

Graphical methods can be used to study the combined effect of the bridge details interposed between occupants of vehicles and the surrounding landscape, i.e. wind shields, safety fences and parapets, but are no substitute for experiencing the real thing. This is a case where computer generated imagery can be extremely useful, but with the same proviso.

C5.6 Light and shade

Bridges are forms seen in light and by means of light. Differences of light intensity reveal the outlines of elements and the appearance of a structure can be modified by shaping its form such that one part attracts light or gives shade to another.

In daylight, where reflected light is usually of low intensity, the amount of light on a surface is dictated by its orientation and attitude relative to the sky.

Vertical surfaces will be better lit than soffits, and a sloping soffit which can be seen in elevation will appear darker than a vertical face. This is partly why a trapezoidal box deck with fairly shallow side slopes appears more recessive than a rectangular box of similar depth.

Where a bridge deck incorporates an edge cantilever, the most intensely lit element will be the face of the cantilever, which by its nature casts shadows on the surfaces beneath it.

Small projections from a vertical surface reveal their presence by shadows in the same way that the mouldings on a classical building are read. Vertical edges on projections can also reveal themselves in this way, depending on the direction from which the highest intensity light is coming. Surface textures such as vertical ribbing depend on this for their effect. A ribbed surface appears markedly different from a plain surface at a distance, even though it is not possible to distinguish individual ribs.

When a bridge crosses water, the underside can be lightened by reflection from the water. Sunlight reflected from waves or ripples can often produce a desirable visual outcome.

'Architectural' or 'feature lighting of bridges', where appropriate, should be considered in the whole and emphasise the basic geometric form of the structure. It can be particularly effective on structures that cross bodies of water. It should be integrated with any requirements for street lighting and ideally the

luminaires should be energy efficient, not result in light spill and be easily maintained. A mixture of colours of light can help emphasise the various elements of the structure but care should be taken to avoid distorting the visual balance of the structure.

C5.7 Colour and tone

Colour and tone influence our perception of aesthetics. They can be used to enhance definition, clarity and to accentuate or subdue the visual impact of elements. Their selection should always be given careful consideration within the predominant context of the bridge site.

For example, a light toned concrete bridge will stand out clearly against a background of dark foliage whereas a steel bridge painted in a darker tone would be less conspicuous. Light grey makes fine elements like balustrades less noticeable against a grey sky whereas using a dark tone for lamp posts may make them blend within a background of dark foliage. It should however be borne in mind of course that the sky is not always grey and many types of foliage changes with the seasons. A dark beam, whether achieved through painting or shadow, appears further recessed against a light edge cantilever than would a light one.

Colour schemes for painting trusses should emphasise the structural form and make a clear distinction between structure and ancillary items such as balustrades, handrails, lighting columns, infill panels, etc.

C6 Bridge specific challenges

C6.1 New structures sited adjacent to existing structures

When a new bridge is to be placed next to an existing one, it should respect the presence of the existing structure, the landscape and visual impact of the site. If possible, the new bridge should be located so that the two bridges are seen as separate elements in the landscape and can be designed as separate entities, for example, the various bridges over the River Tyne.

Ideally there should be space between the two bridges allowing sufficient separation for each structure to be viewed from the other. This can be achieved through collaboration with the highway engineers when developing the alignment design.

It is usually more appropriate to place an openly contemporary bridge beside an existing one. The proportions and rhythm of the existing structure should be respected as far as is possible; this does not mean that every pier of the older bridge should have a corresponding new one but the rhythm of the piers should be complementary. When siting a new bridge adjacent to an existing arched structure, the new structure should avoid cutting across the profile of the arch opening(s).

C6.2 Bridge widening

In general, it is difficult to widen an existing bridge in a way which is aesthetically acceptable, unless the option for future widening has been specifically considered during its original design. The widening of existing structures introduces risks and complications to both the design and construction phases.

Where site constraints mean that bridge widening is unavoidable, then it is important that the character of the existing structure is respected and maintained. This will usually mean maintaining the original materials and character as closely as possible but in some circumstances, a light and transparent addition to a structure of significant mass may be successful if sensitively detailed.

When widening an existing structure that is listed or of historic significance (e.g. scheduled ancient monument) this should be reflected in the AC allocated.

Wherever it is possible and it can be demonstrated to be reasonably cost effective, it is preferable to develop a highway design that will accommodate a second bridge or a complete replacement. Where the primary need is to provide additional space for walking, cycling and horse-riding users in accordance with GG 142 [Ref 5.N] then the provision of a new pedestrian bridge can often avoid the need for the invasive widening of an historic bridge.

C6.3 Alignment

It is important that there is close collaboration at the earliest stages of design between the highway and bridge designers with the aim of avoiding the need to accommodate slip lanes that result in plan tapers, excessive skew angles, high degrees of super-elevation or the need to accommodate pedestrian steps and ramps. All of these constraints will add visual clutter that may compromise aesthetics and complicate both the design and construction of the bridge.

C6.4 New materials

When new materials or construction methods are introduced, there is often a transition period during which structural forms and details emerge that are appropriate aesthetically as well as technically.

The use of new materials should be implemented rationally by experienced designers, with due regard for their individual properties, in order that they are honestly expressed within the form and detailing of the structure and appropriate to its function.

C6.5 Bridge enclosures

Where enclosures manufactured from GRP or other materials are provided to structural elements of bridges for durability or aesthetic purposes, they should be clearly shown as cladding elements, i.e. non-structural elements. Retrofitting of enclosure elements should be avoided.

C6.6 Decks curved in plan

Where horizontal alignment constraints results in a bridge deck to be curved in plan, the use of straight or faceted girders (comprising a series of short straight elements) should be avoided in preference for curved girders, unless the radius of curvature is so great that changes of line between successive spans are extremely small.

C6.7 Steel plate girder decks

Careful attention should be given to the detailing and visual impact of any splices, permanent bracing, exposed services or walkways on bridge decks which feature exposed plate girders.

Appendix D. Model AAD

A model AAD is shown in Table D.1

Table D.1 Model AAD

Initiation stage	
Structure name/reference	
Project Sponsor	
Aesthetic category and justification	
Structure location	
Function	
Site specific constraints and sensitivities	
Review panel requirements	
Design stage	
Design organisation	
Design team leader	
Changes to initiation stage information (aesthetic category etc.) and justification	
Key functional requirements	
Stakeholder consultation proposals	
Site context	
Design outcome objectives	
AAD update milestones	
Construction stage	
Changes to design stage information (e.g. as a result of value engineering proposals,site constraints or construction process requirements etc.)	
Post construction review	
Project Sponsor feedback	

Highway Structures & Bridges
Design

CD 351
England National Application Annex to CD 351
The design and appearance of highway structures

(formerly BA 41/98)

Revision 0

Summary
This National Application Annex sets out the Highways England-specific requirements for the design and appearance of highway structures.

Feedback and Enquiries
Users of this document are encouraged to raise any enquiries and/or provide feedback on the content and usage of this document to the dedicated Highways England team. The email address for all enquiries and feedback is: Standards_Enquiries@highwaysengland.co.uk

This is a controlled document.

Contents

Release notes

Version	Date	Details of amendments
0	Mar 2020	Highways England National Application Annex to CD 351.

Foreword

Publishing information

This document is published by Highways England.

This document supersedes part of BA 41/98, which is withdrawn.

Contractual and legal considerations

This document forms part of the works specification. It does not purport to include all the necessary provisions of a contract. Users are responsible for applying all appropriate documents applicable to their contract.

Introduction

Background

This National Application Annex sets out Highways England's specific requirements for the design and appearance of highway structures, and the relation to the principles of good road design as set out in the Road to Good Design [Ref 3.I] publication by Highways England.

Highway structures, and bridges in particular, are some of the largest and most visible man-made objects. Their appearance and how they sit within the landscape is therefore an important aspect of the design.

Assumptions made in the preparation of this document

The assumptions made in GG 101 [Ref 1.I] apply to this document.

Abbreviations

Abbreviations

Abbreviation	Definition
AAD	Aesthetic Appraisal Document
PCF	Project Control Framework
PRP	Project Review Panel (as established within CD 351 [Ref 2.I])
SDP	Strategic Design Panel
SRO	Senior Responsible Owner

Terms and definitions

Terms

Term	Definition
Design life-cycle	The period of time between the inception of design and the point at which the designed item no longer exists in its designed form. NOTE: Design life-cycle includes the stages of option identification, option selection, preliminary design and detailed design and is to include any design changes that occur during the construction and commissioning period.
Project Review Panel	A body which includes representation from the stakeholders in the project (e.g. from the Overseeing Organisation or users of the project deliverables), which helps ensure that the principles of good road design have been taken into account for an individual road scheme / project or a specific programme.
Senior Responsible Owner	The individual responsible for ensuring that a programme or project meets its objectives and delivers the projected benefits.
Strategic Design Panel	The independent panel supporting Highways England to make a step change in the design quality of the strategic as described in the Road to Good Design [Ref 3.I] publication by Highways England.

E/1. Aesthetic appraisal document (CD 351, 3)

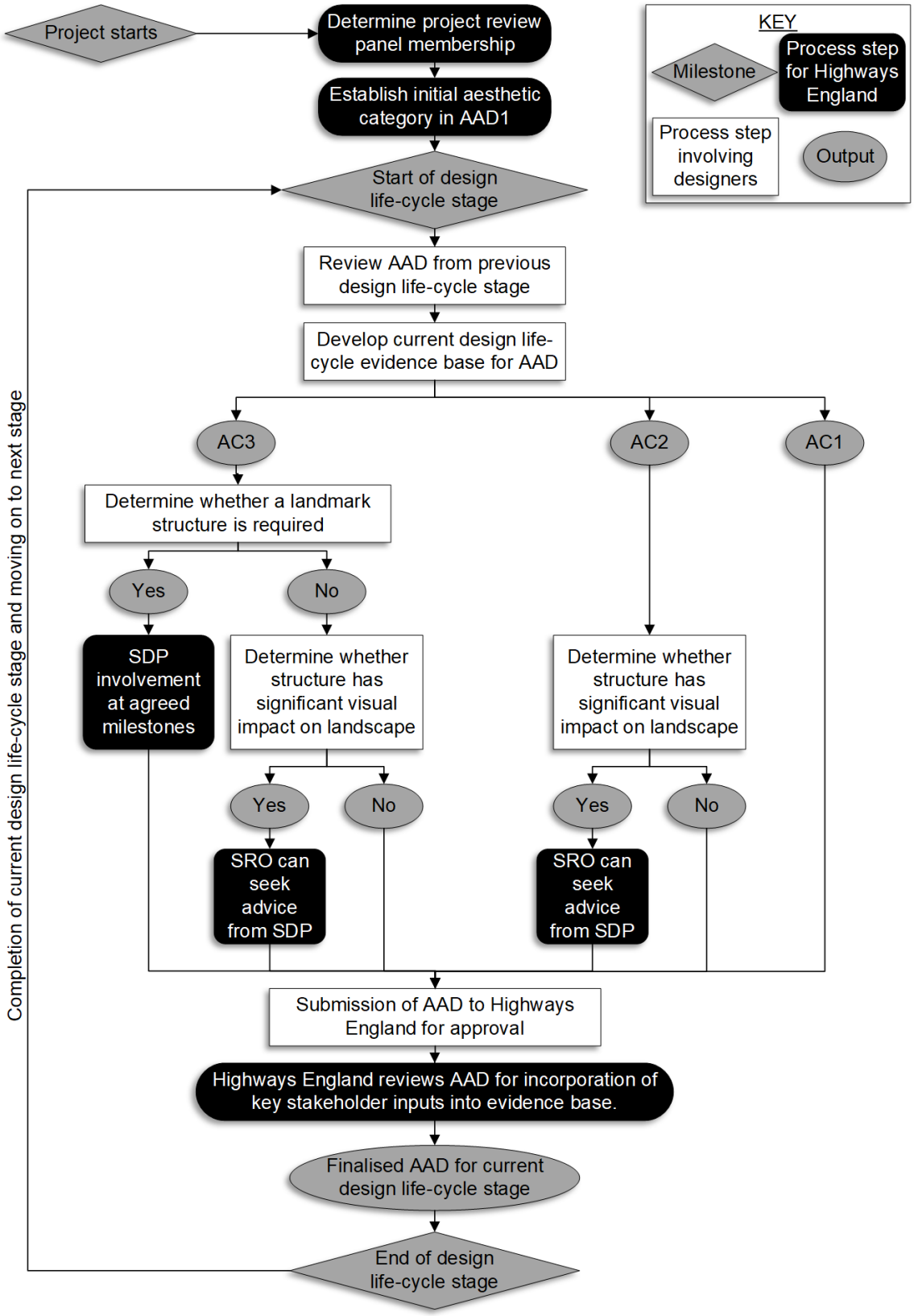
Demonstrating compliance with the principles of good road design

E/1.1 The aesthetic appraisal document (AAD) shall be developed and updated throughout the design life-cycle to demonstrate compliance with the principles of good road design.

NOTE 1 The principles of good road design are described in the Road to Good Design [Ref 3.I] publication by Highways England.

NOTE 2 The aesthetic evaluation process within the design life-cycle is shown in Figure E/1.1N2:

Figure E/1.1N2 Aesthetic evaluation process within the design life-cycle



NOTE 3 The Strategic Design Panel (SDP) is described in the Road to Good Design [Ref 3.I] publication by Highways England.

NOTE 4 For major projects, the design life-cycle stages of the AAD correspond to the PCF stages as shown in Table E/1.1N4:

Table E/1.1N4 AAD design life-cycle stage mapped to PCF stages

Design life-cycle stage	PCF stage
AAD1(1) - project initiation (prior to option finalisation)	PCF stage 2 - option selection
AAD2.1 - preliminary design	PCF stage 3 - preliminary design
AAD2.2 - detailed design	PCF stage 5 - construction preparation
AAD3 - construction	PCF stage 6 - construction
AAD4 - post construction review	PCF stage 7 - closeout
Note (1): AAD1 is developed by Highways England and typically forms part of the project brief. Subsequent versions of the AAD are outputs from the aesthetic evaluation process during the design life-cycle.	

Developing the AAD

E/1.2 The outcomes of actions that result from Highways England reviews shall be recorded in the AAD.

E/1.3 On completion of each stage of the design life-cycle, the AAD shall be submitted to Highways England for approval as part of the stage gate assessment review process.

E/2. Informative references

The following documents are informative references for this document and provide supporting information.

Ref 1.I	Highways England. GG 101, 'Introduction to the Design Manual for Roads and Bridges'
Ref 2.I	Highways England. CD 351, 'The design and appearance of highway structures'
Ref 3.I	Highways England. Road to Good Design, 'The Road to Good Design'

Department for Infrastructure
An Roinn Bonneagair

Highway Structures & Bridges
Design

CD 351
Northern Ireland National Application Annex to CD 351 The design and appearance of highway structures

(formerly BA 41/98)

Revision 0

Summary
There are no specific requirements for Department for Infrastructure, Northern Ireland supplementary or alternative to those given in CD 351.

Feedback and Enquiries
Users of this document are encouraged to raise any enquiries and/or provide feedback on the content and usage of this document to the dedicated team in the Department for Infrastructure, Northern Ireland. The email address for all enquiries and feedback is: dcu@infrastructure-ni.gov.uk

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Contents

Release notes

Version	Date	Details of amendments
0	Mar 2020	Department for Infrastructure Northern Ireland National Application Annex to CD 351.

Highway Structures & Bridges
Design

CD 351
Scotland National Application Annex to CD 351 The design and appearance of highway structures

(formerly BA 41/98)

Revision 0

Summary
There are no specific requirements for Transport Scotland supplementary or alternative to those given in CD 351.

Feedback and Enquiries
Users of this document are encouraged to raise any enquiries and/or provide feedback on the content and usage of this document to the dedicated Transport Scotland team. The email address for all enquiries and feedback is: TSStandardsBranch@transport.gov.scot

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0	Mar 2020	Transport Scotland National Application Annex to CD 351.

Llywodraeth Cymru
Welsh Government

Highway Structures & Bridges
Design

CD 351
Wales National Application Annex to CD 351
The design and appearance of highway structures

(formerly BA 41/98)

Revision 0

Summary
There are no specific requirements for Welsh Government supplementary or alternative to those given in CD 351.

Feedback and Enquiries
Users of this document are encouraged to raise any enquiries and/or provide feedback on the content and usage of this document to the dedicated Welsh Government team. The email address for all enquiries and feedback is: Standards_Feedback_and_Enquiries@gov.wales

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