

Appendix 7D – AIP Guidance Notes

Name of Project _____
 Name of Bridge or Structure _____
 Structure Ref No _____

1. HIGHWAY DETAILS

- 1.1 Type of highway
Please provide the type of highway as per the descriptions in CD 109, e.g. Dual two lane All Purpose Road.
- 1.2 Permitted traffic speed
For a bridge please provide the permitted speed of the road over and/or under.
- 1.3 Existing restrictions
For a bridge please provide the existing restrictions of the road over and/or under. This should include; weight, height, width and any environmental restrictions at or adjacent to the bridge.

2. SITE DETAILS

- 2.1 Obstacles crossed
For a bridge or culvert please provide the road over and the obstacle (Road or Water Course) under.

3. PROPOSED STRUCTURE

- 3.1 Description of structure and design working life
Provide a simple physical description of the structure, its constituent principal elements and geometry.
For bridges, this will include: the type of bridge, the no. of spans, skew, deck span and width between parapets, details of the deck construction, principal materials, support conditions and geometry of principal elements, the principal materials used and geometry of abutments and intermediate piers and wingwalls.
For retaining walls, headwalls and wingwalls, this will include: the type of wall, principal materials, the retained height and dimensions for embedment depth/cantilever base, etc.
For culverts and pipes, this will include the type of pipe/culvert, its length and internal dimensions, slab and/or wall thickness the depth of cover beneath the highway.
Provide a statement of the design working life.
Provide a General Arrangement Drawing with the appendices.
- 3.2 Structural type
A detailed technical description of the structure, which informs how it is to be modelled at design stage,
- 3.3 Foundation type
A detailed technical description of the foundations, which informs how they will be modelled at design stage.
- 3.4 Span arrangements
Only applicable to bridges and culverts. A detailed technical description of each span, their clear and square elevations, including variations according to skew and curvature.
- 3.5 Articulation arrangements
Only relevant to bridges. Provide a detailed description of the support conditions for the superstructure, including bearing arrangements, fixed-ends and details of movement joints.

3.6 Classes and levels

3.6.1 Consequence class

Consequence Class should be in accordance with Table B1 of BS EN 1990:2002, cl. NA 3.2.1 from the associated UK National Annex and Table 7.2 of CD 350. This should be stated in this section.

3.6.2 Reliability class

Reliability Class should be in accordance with Table B2 of BS EN 1990:2002 and Table 7.2 of CD 350. This should be stated in this section.

3.6.3 Inspection level

The Inspection Level should be in accordance with Table B5 of BS EN 1990:2002 and Table 7.2 of CD 350. This should be stated in this section.

3.7 Road restraint systems requirements

This should include the road restraint system requirements for the permanent state. It should be determined through a Road Restraint Risk Assessment Process (RRRAP) in accordance with CD 377. A detailed technical description of the restraint system transitions and terminals should be provided, including the principal materials, height, containment class and working width.

3.8 Proposals for water management

Outline how water management will be integrated within the design of the structure and individual components, in accordance with CD 350.

3.9 Proposed arrangements for future maintenance and inspection

3.9.1 Traffic management

The Traffic Management (TM) should be that required to gain access for future maintenance and inspection only, not during construction. It should include the type and location of the TM e.g. single lane closure of lane 1. Where appropriate, the TM arrangements should consider specific maintenance activities, e.g. replacement of parapets and waterproofing, concrete/masonry repairs and replenishing the steel corrosion protection system.

3.9.2 Arrangements for future maintenance and inspection of structure. Access arrangements to structure.

This should discuss how to gain access for future maintenance and inspection. It should include the type e.g. access to all parts of the structure can be obtained by foot. If specialist equipment is needed e.g. the soffit can be inspected through the use of a mobile elevated working platform (MEWP) then it needs to be stated. If the access requires specialist equipment this needs to be discussed with the Bridge Maintenance team and may need to be reflected in the commutative sum e.g. if the structure is a confined space and should be inspected by a suitably trained team, or, the inspection should be carried out by CCTV or drones.

3.10 Environment and sustainability

A summary of the features of the design which improve the sustainability of the structure. This might include use of recycled/recyclable materials, prefabricated elements, durability and ease of maintenance and ecological features and protections.

3.11 Durability. Materials and finishes

A detailed description of component materials, their properties and quality of finishes.

3.12 Risks and hazards considered for design, execution, maintenance and demolition.

Consultation with and/or agreement from CDM co-ordinator

A list of the risks and hazards to be considered in the design. Alternatively, the CDM Designer's Risk Register can be appended to the AIP Document.

- 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)

This is the Estimated Construction Cost the structural elements subject to Technical Approval. This will also be used as the basis for calculating Commuted Sums for Future Maintenance, where the structure is to be adopted by the Highway Authority.

For Category 0 and 1 Structures, provide a simple physical description of any alternative options considered and summary of the options appraisal. For Category 2 and 3 Structures refer to the Feasibility Report approved by the Highway Authority.

- 3.14 Proposed arrangements for construction

3.14.1 Construction of structure

An outline construction sequence, including utility diversions, traffic management phasing and temporary works. This is for the purposes of establishing buildability. It is understood that a contractor may employ a different methodology.

3.14.2 Traffic management

An outline description of the envisaged traffic management, road closures and diversions

3.14.3 Service diversions

A simple description of temporary and permanent service diversions

3.14.4 Interface with existing structure

The extents of any modifications and/or protection to existing structures that could be affected by the works

- 3.15 Resilience and security

A description of any design features which will improve the resilience and security of the structure i.e. How will the structure be designed to resist and recover from deliberate damage which may arise from the actions of vandals, thieves and terrorists.

4. DESIGN CRITERIA

4.1 Actions

4.1.1 Permanent actions

All permanent actions should be in accordance with BS EN 1991-1-1:2002 and its associated National Annex. Typical densities for materials should be listed here as well, e.g.:

Normal weight reinforced concrete = 25 kN/m³

Carriageway and pavement surfacing = 23 kN/m³

Compacted granular fill = 19 kN/m³

4.1.2 Snow, Wind and Thermal actions

Live load surcharge effects will be considered using the same vehicle in accordance with clause NA2.34.3 of the UK National Annex to BS EN 1991-2:2003, or with the loading recommended by clause 7.6 of PD 6694-1:2011.

4.1.3 Actions relating to normal traffic under AW regulations and C&U regulations

This should focus on the application of Load Models 1 and 2 (vehicular traffic) in accordance with BS EN 1991-2:2003.

Live load surcharge effects associated with the Load Models in Figure NA.6 as defined by clause NA2.34.2 of NA to BS EN 1991-2, or with the loading recommended by clause 7.6 of PD 6694-1:2011.

4.1.4 Actions relating to General Order traffic under STGO regulations

This should focus on the application of Load Model 3 will be represented by special vehicle type SV80, SV100 and SV196 will be considered. Application to be in accordance with Table 7.6.2 of CD 350 based on the proposed residential streets being classified as 'other public road'.

Live load surcharge effects will be considered using the same vehicle in accordance with clause NA2.34.3 of the UK National Annex to BS EN 1991-2:2003, or with the loading recommended by clause 7.6 of PD 6694-1:2011.

4.1.5 Footway or footbridge variable actions

This should focus on the application of Pedestrian (Load Model 4) to BS EN 1991-2:2003, and its UK NA for use in load group gr1a.

4.1.6 Actions relating to Special Order traffic, provision for exceptional abnormal indivisible loads including location of vehicle track on deck cross-section

Consult with the Highway Authority in advance to agree the assumptions and parameters used to model Special Order Traffic and Exception Abnormal Load Effects.

4.1.7 Accidental actions

Focus on such actions including;

Presence of accidental vehicle on the verges will be considered in accordance with BS EN 1991-2:2003 Cl.4.7.

4.1.8 Action during construction

Provide a technical description of the construction stages where critical load effects need to be modelled which differ from those included in the permanent design, for example

- *Staged backfill of bridge abutments prior to deck construction*
- *Supporting wet concrete prior to forming an integral connection between abutment and deck*
- *Support of temporary falsework*

4.1.9 Any special action not covered above

Such actions might include seismic action, atmospheric icing, floating debris etc.

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

Consult with the Highway Authority in advance for advice about known existing or future heavy or high load requirements or plans for future widening of the highway.

4.3 Proposed minimum headroom to be provided

Describe the clearance criteria above the obstacle crossed where this is a highway, railway canal or public right of way. Similarly, where the structure includes overhead bracing or a roof, the headroom provided shall be stated here.

4.4 Authorities consulted and any special conditions required

Organisations such as Local Authorities, Statutory Undertakers, Highways England, the Canal and Rivers Trust, Network Rail, Environment Agency etc, with assets which could be potentially affected by the scheme should be consulted prior to submitting the AIP document. Any requirements stipulated by those Authorities such as clearances, protective measures and design details should be recorded here and where appropriate they should be visible on the drawings supplementing the AIP document.

4.5 Standards and documents listed in the Technical Approval Schedule

The Technical Approval Schedule can be provided as an appendix based upon the standard Highways England schedule, which is freely available online

4.6 Proposed Departures relating to departures from standards given in 4.5

It is recommended that the Highway Authority is consulted on any potential Departures from Standard before submitting an Approval in Principle document. Typically Departures are only approved where site constraints prohibit compliance with current technical standards. A simple summary of the necessary Departure and its justification are provided here.

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

As Section 4.6

4.8 Proposed safety critical fixings

Provide a description of the fixture supports, the location on the structure, the design working life of the fixing, and the future maintenance arrangements.

5. STRUCTURAL ANALYSIS

5.1 Methods of analysis proposed for superstructure, substructure and foundations

The Technical Approval Schedule can be provided as an appendix based upon the standard Highways England schedule, which is freely available online

5.2 Description and diagram of idealised structure to be used for analysis

The description and appended diagram shall describe the geometry, loading criteria and support conditions of the critical structural section(s) to be designed.

5.3 Assumptions intended for calculation of structural element stiffness

Describe the simplified material and section properties to be assumed in the models for different structural elements

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

The appropriate range of soil parameters will depend upon the type of structure being designed. Typically these will include: the bearing capacity, angle of friction, lateral earth pressure coefficients, spring coefficients and any other variable property or parameter needed for the design process. As well as site specific soil strata, the properties of engineering fill materials incorporated into the works may also be relevant.

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

A statement accepting the recommendations of the GDR providing its unique reference number will suffice. Alternatively, if the GDR is not yet available, provide reference to a Ground Investigation Report supplemented by recommendations based upon interpretations of factual geotechnical data.

6.2 Summary of design for highway structure in the Geotechnical Design Report

Summarise the available geotechnical design information presented in the GDR. Alternatively if a GDR is not yet available

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

Describe the simplified material and section properties to be assumed for different structural elements

6.4 If the Geotechnical Design 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

Describe the simplified material and section properties to be assumed for different structural elements

7. CHECK

7.1 Proposed Category and Design Supervision Level

The Proposed Category shall be determined using the geometric criteria set out in CG 300. The Design Supervision Level shall be in accordance with Table B.4 of BS EN 1990:2002 + A1:2005 & Corr. April 2010 and Table 7.2 of CD 350.

7.2 If Category 3, name of proposed Independent Checker

Where applicable, please provide details of the proposed Independent Checker including their name, job title, employer and professional qualifications

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

Provide a simple physical description of any Temporary Works which will affect or support the Public Highway including the carriageway, footways and verges or any Public Right of Way and which will require Technical Approval to CG 300.

8. DRAWINGS AND DOCUMENTS

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

Include, without limitation:

- a) *Technical Approval Schedule (TAS).*
- b) *General Arrangement Drawing.*
- c) *Relevant extracts from the Ground Investigation Report or Geotechnical Design Report.*
- d) *Departures.*
- e) *Relevant correspondence and documents from consultations.*

9. THE ABOVE IS SUBMITTED FOR ACCEPTANCE

Signed	_____
Name	_____
	Design Team Leader
Engineering	_____
Qualifications	_____
Name of Organisation	_____
Date	_____

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

Signed	_____
Name	_____
Position held	_____
Engineering	_____
Qualifications	_____
TAA	_____
Date	_____

APPENDIX A – TECHNICAL APPROVAL SCHEDULE (TAS)

A basic template for the TAS is available on the Standards for highways website, link below. However this is only a template, it is the responsibility of the author of the AIP to ensure the TAS is up to date and includes all the relevant dates and parts, together with the amendments. Advice for compiling the TAS is also available in Appendix H of CG 300.

Link: <http://www.standardsforhighways.co.uk/ha/standards/dmr/vol1/section1.htm>

APPENDIX B – LOCATION MAP

A general location map identifying the location of the structure in relation to nearby road, towns and cities, together with eastings and northings (preferred).

APPENDIX C – AIP DRAWINGS

The AIP drawings should be sufficient to give an idea of how the structure will look at the materials used. Generally there would consist of the General Arrangement Drawings. unless It may include existing as-built drawing information which can be requested by the Reinforcement Drawings are general not required

APPENDIX D – IDEALISED MODEL

The idealised model should show how the structure will be analysis, either by hand or on a computer analysis software. It should include the application of all key loads, the assignment of section properties and the idealisation of the boundary conditions.

APPENDIX E – GEOTECHNICAL INFORMATION

The geotechnical information should only include that which is relevant to the structure discussed in the AIP.