Annex A1a

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

Name of Project **16 Avenue Rd, NW8**

Name of Bridge or **New Basement structure**

Structure Ref No. …….

1. HIGHWAY DETAILS

1.1 Type of Highway **Two-way London local distributor road.**

1.2 Permitted Traffic Speed **32 km/h (20 mph)** 1

1.3 Existing Restrictions **None.** 2

2. SITE DETAILS

2.1 Obstacles Crossed **None**

3. PROPOSED STRUCTURE

3.1 Description of structure and design working life

The new structure shall comprise of a new dwelling house arranged over lower basement, upper basement, ground, first and second floors. The entire sub and superstructure shall be formed of insitu reinforced concrete. The basement shall be formed within a contiguous piled walled enclosure. The piled wall will have an insitu reinforced concrete liner wall cast internally. 3

3.2 Structural type

The superstructure shall be formed of insitu reinforced concrete flat soffit slabs supported on concrete columns and walls.

3.3 Foundation type

The building will be supported on bored piled foundations. The piles are located around the entire perimeter of the basement and under the basement raft slab

3.4 Span arrangements

The contiguous piled wall and retaining walls are designed as propped at ground floor and intermediate basement. The piled wall will have pinned propped connections; the liner walls are cast monolithic with the basement raft and designed as propped "cantilevers".

T

3.5 Articulation arrangements

It is intended the new reinforced concrete walls are monolithic with the raft foundation and designed as a propped cantilever for horizontal loads arising from retained earth and surcharge.
In the temporary condition the front wall will have the ground floor slab cast prior to excavation. This will provide a stiff lateral prop to the top of the wall consistent with "top-down" construction. Temporary lateral props will be provided just above the intermediate level.

3.6 Classes and Levels

3.6.1 Consequence class

Consequence Class CC2 (medium) in accordance with NA to BS EN 1990 4

3.6.2 Reliability class **Reliabilty Class shall be RC2**

3.6.3 Inspection level **DSL2**

3.7 Road restraint systems requirements
These remain unaffected by the proposals

3.8 Proposed arrangements for future maintenance and inspection

3.8.1 Traffic management
None Proposed

3.8.2 Arrangements for future maintenance and inspection of structure
No restrictions.

3.9 Environment and sustainability

Reinforced concrete material specification will permit the use of recycled aggregates as well as cement replacement products such as GGBS and PFA to reduce embedded carbon. An efficiently designed, low maintenance structure is proposed to minimise the embodied energy of the structure including in construction and operation

3.10 Durability. Materials and finishes. 5

The structure is classed as Category 4 in accordance with BS EN 1990 to give a design working life in excess of 50 years. CONCRETE

All concrete surface finishes are to be in accordance with the Specification for Highways Works, Appendix 1700.

Element	**Durability**	**Strength**	**Class of formed finish**
Ground Floor	XD3	C40/50	F2 (soffit)
Walls	XD3	C40/50	F4 – exposed to view
			F2 – buried
Base slab	XC3/4	C40/50	U3

Unformed concrete finishes:

Class U1: to basement slab

Class U2: to ground floor slab

REINFORCEMENT BARS

High Yield Steel reinforcement bars B500B or B500C with a characteristic tensile strength of 500 MPa to BS EN 10080 and BS 4449.

WATERPROOFING TO STRUCTURE

Waterproofing to structure to be in accordance with BS 8102:2009 for a Grade 3 environment using Type A and C measures: Watertight concrete and drained cavity to the internal face.

3.11 Risks and hazards considered for design. Execution, maintenance and demolition. Consultation with and/or agreement from CDM co-ordinator 6

In accordance with the CDM Regulations 2015, an Hazard Design Risk Assessment has been prepared and included in the CDM file prepared by the principal designer Jackson Coles.
Specific risks and hazards are:

Activity	**Risk**	**Action**
Demolition	**Structural collapse**	**Erect crash decks, maintain adequate support of partially demolished structures.**
Live services	**Electric shock, punctured gas main**	**Locate and isolate all below ground services**
Piling	**Rig stability**	**Design and install piling mat**
Excavation	**Soil and perimeter wall Stability**	**Perimeter wall to be temporarily propped prior to excavation. Full Temp works design and RAMS required.**
Open excavations	**Falling**	**Provide perimeter guarding to all excavations**
Excavation	**Unexploded ordinance**	**Considered low risk after referring to London Bomb Maps**

3.12 Estimated cost of proposed structure, together with other forms considered (including where appropriate proprietary manufactured structure), and the

reasons for their rejection (including comparative whole life costs with dates of estimates)

The form of structure was adopted for the following benefits:

- **Contiguous piled wall is an economic and well established method of forming basements in dense urban areas it; and, with temporary propping, provides stiff earth support as per CIRIIA 760.**
- **The structure is durable**
- **The structure is economic**

The sub and superstructure costs are circa £4m

3.13 Proposed arrangements for construction

3.13.1 Construction of structure

Construction of the structure will take place wholly within the confines of 16 Avenue Road and does not affect existing pedestrian and vehicular traffic. The broad sequence of construction is as follows (further information is provided on drawings):

- **Carry out bored piling to the perimeter of the site to form a contiguous piled wall.**
- **Form RC capping beam to the top of the wall and ground floor slab at the front of the site.**
- **Install temporary props at ground floor level**
- **Excavate in horizontal layers to second level of props**
- **Install second level props**
- **Continue excavation to formation**
- **Form below ground drainage, raft slab**
- **Form rc walls columns to intermediate slab**
- **Form intermediate slab**
- **Remove second level props**
- **Form walls and columns to ground floor**
- **Form ground floor slabs and beams**
- **Remove ground floor temporary props.**

3.13.2 Traffic management

All works are within the confines of the site and do not affect existing vehicular or pedestrian traffic. No traffic management is proposed or required

3.13.3 Service diversions

Not required

3.13.4 Interface with existing structures

The new structure is fully detached from other structures and set back from the public footpath.

4 DESIGN CRITERIA

4.1 Actions

4.1.1 Permanent actions

The design permanent actions are taken as:

- **the self weight of the concrete structure and applied finishes.**
- **Earth pressure arising from the retained soil**
- **Hydrostatic pressure arising from a theoretical head of water acting at 1m below ground level.**

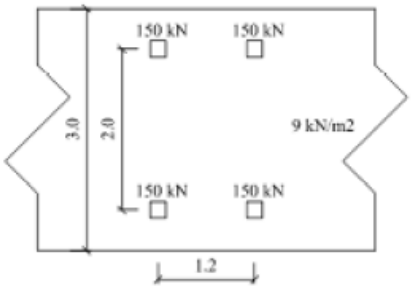
4.1.2 Snow, wind and thermal actions

Snow, and wind actions are applied in accordance with BS EN 1990-1-3 and BS EN 1991-4 respectively. These apply to the above ground superstructure only.

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

7

The carriageway is positioned 6.5m away from the structure and outside a 45^0 line of influence from the bottom of the wall. Pedestrian loading should be 5.0KN/m^2 . Carriageway loading should be Traffic Load LM1 in accordance with BS EN 1991-2 Table 4.2. However for Global design purposes a UDL of 9KN/m^2 will be applied as the variable surcharge load applied to the backfill behind the retaining wall.



4.1.4 Actions relating to General Order Traffic under STGO regulations

Not Applicable

8

4.1.5 Footway or footbridge variable actions

Pedestrian Loads at 5.0 KN/m^2 are less onerous than the applied load case

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

Not Applicable

9,10

4.1.7 Accidental actions

The permanent boundary wall will prevent the entry of large vehicles vehicles behind the backfill. An Hydrostatic action will be

applied equating to represent ground water at 1m below ground level.

4.1.8 Actions during construction
Sequence of construction requires temporary supports and the full actions above are included in the design

4.1.9 Any special action not covered above
None

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.
Avenue Road is of a fixed width and unlikely to ever be widened

4.3 Minimum headroom provided
Not applicable

4.4 Authorities consulted and any special conditions required
London Borough of Camden have been consulted and stipulated lateral deflection at the top of the retaining wall is to be no more than 25mm. The predicted deflections from the ground movement analysis are considerably less.

4.5 Standards and documents listed in the Technical Approval Schedule

4.6 Proposed Departures relating to departures from standards given in 4.5
None

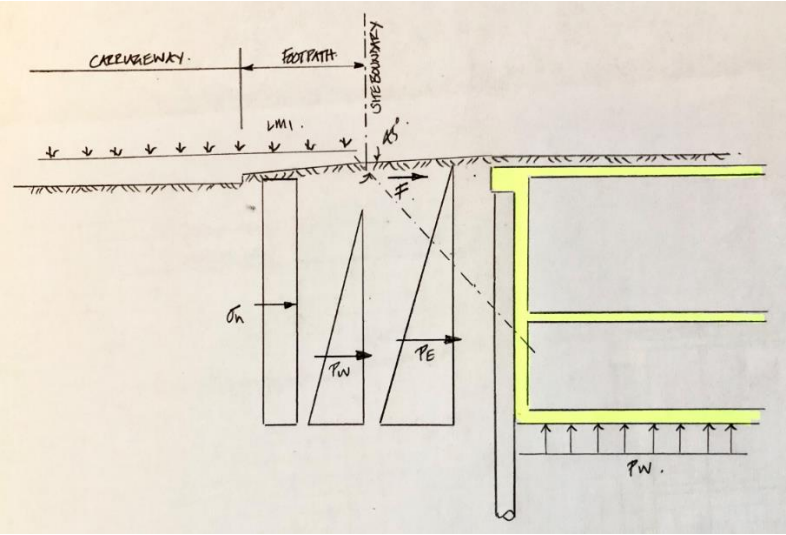
4.7 Proposed departures relating to methods for dealing with aspects not covered by standards in 4.5

5. STRUCTURAL ANALYSIS

5.1 Methods of analysis proposed for superstructure, substructure and foundations.
The Sub and superstructure analysis has been carried out using Tekla structural designer. The software carries out a 3D Finite Element structural analysis and performs design calculations in accordance with the latest Eurocodes and the UK NA.
Contiguous Piles and bearing piles have been designed using WALLAP geotechnical design software.

5.2 Description and diagram of idealised structure to be used for analysis
The diagram below illustrates the relationship between the below ground structure and the highway. The wall is set approximately 3.5m from the

back of the pedestrian footpath and 6.5m to 7m back from the highway kerb.



P_w = Hydrostatic Pressure
P_e = Earth Pressure
σ_h = UDL due to LM1 based upon the recommendations PD 6694-1:2011 "Recommendations for the design of structures subject to traffic loading to BS EN 1997-1:2004.
F = Horizontal line loads applied at ground level over a width of 1.0m due to LM1 based upon the recommendations PD 6694-1:2011 "Recommendations for the design of structures subject to traffic loading to BS EN 1997-1:2004.

5.3 Assumptions intended for calculation of structural element stiffness

Structural element stiffness values will be those specified within EN 1992-2.

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

Material	ϕ'_k (°)	c' (KPa)	C_u (KPa)	γ (kN/m³)	Eu (MPa)	E' (MPa)
Made Ground	**28**	**0**	**0**	**19**	**0**	**15**
London Clay	**24**	**5**	**90 + 8.67z**	**20**	**$1000C_u$**	

At rest earth pressure coefficients adopted where applicable.

6. GEOTECHNICAL CONDITIONS

6.1 Acceptance of recommendations of the Geotechnical Design Report to be used in the design and reasons for any proposed changes.
A site specific geotechnical report is available and will be adhered to. The ground conditions accord with public records and comprise broadly of Made Ground Deposits and Head Deposits over the solid geometry of the London Clay

6.2 Summary of design for highway structure in Geotechnical Design Report.
N/A

6.3 Differential settlement to be allowed for in the design of the structure.
N/A

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. 13
N/A

7. CHECK

7.1 Proposed Category and Design Supervision Level. **Category 2**

7.2 If Category 3, name of proposed independent Checker **N/A**

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
None

8. DRAWINGS AND DOCUMENTS

8.1 List of Drawings (including numbers) and documents accompanying the submission. 14

Drawings:	**11940-00-B1/ S200**	**Sub Basement GA**
	11940-00-B1/ S201	**Sub Basement Pool GA**
	11940-00-B1/ S202	**Basement GA**
	11940-00-B1/ S202	**Ground Floor GA**
	11940/XX/ZZ/S-402	**Section**

TECHNICAL APPROVAL SCHEDULE "TAS"
SCHEDULE OF DESIGN DOCUMENTS RELATING TO DESIGN OR ASSESSMENT OF HIGHWAY BRIDGES AND STRUCTURES (All documents are taken to include revisions current at date of this TAS)

A.1.1 BRITISH STANDARDS

~~BS 5268: Part 2: 2002~~	~~Structural Use of Timber. Code of Practice for Permissible Stress Design, Materials and Workmanship [Amendment No. 1 December 2007] Replaced by BS EN 1995-1-1:2004+A1:2008~~
~~BS 5400~~	~~Steel Concrete and Composite Bridges~~
~~Part 1: 1988~~	~~General Statements (see BD 15 (DMRB 1.3.2)) [AMD14179] Replaced by BS EN 1991-1-7:2006, BS EN 1990:2002+A1:2005~~
~~2: 2006~~	~~Specification for Loads Replaced by BS EN 1991-1-7:2006, BS EN 1990:2002+A1:2005~~
~~Part 3: 2000~~	~~CP for Design of Steel Bridges (see BD 13 (DMRB 1.3)) AMD13200 AMD16480. AMD 16404 May 2006. Replaced by BS EN 1993-1-1:2005, BS EN 1993-1-5:2006, BS EN 1993-1-10:2005, BS EN 1993-2:2006, BS EN 1993-1-8:2005~~
~~Part 4: 1990~~	~~CP for Design of Concrete Bridges (see BD 24 (DMRB 1.3.1)) Replaced by BS EN 1992-2:2005~~
~~5: 2005~~	~~CP for Design of Composite Bridges Replaced by BS EN 1994-2:2005~~
~~Part 9-1: 1983~~	~~CP for design of Bridge Bearings (see BD 20 (DMRB 2.3.1)). AMD16749. Replaced by BS EN 1337 Parts 2 to 8.~~
~~Part 9-2: 1983~~	~~Specification for materials, manufacture and installation of bridge bearings. Replaced by BS EN 1337 Parts 2 3 5 7 and 8.~~
~~Part 10: 1980~~	~~CP for Fatigue (see BD 9 (DMRB 1.3)) [AMD9352] Replaced by BS EN 1993-1-9:2005~~
~~BS 5628: Part 1: 2005~~	~~Unreinforced Masonry [Corrigendum January 2009] Replaced by BS EN 1996-1-1:2005, BS EN 1996-3:2006, BS EN 1996-2:2006~~
~~BS 5930: 1999+ A2:2010~~	~~Site Investigations [Amendment No. 1 December 2007 and amd 2 Aug 2010]. Partially replaced by BS EN ISO 22475-1:2006, BS EN ISO 14688-1:2002, BS EN ISO 14689-1:2003, BS EN 1997-2:2007, BS EN ISO 14688-2:2004+A1:2013, BS EN ISO 22476-2:2005+A1:2011, BS EN ISO 22476-3:2005+A1:2011, BS EN ISO 22282-1:2012, BS EN ISO 22282-2:2012, BS EN ISO 22282-3:2012, BS EN ISO 22282-4:2012, BS EN ISO 22282-5:2012, BS EN ISO 22282-6:2012, BS EN ISO 22476-1:2012, BS EN ISO 22476-5:2012, BS EN ISO 22476-7:2012, BS EN ISO 22476-4:2012~~
~~BS 5950-1: 2000~~	~~Structural Use of Steelwork in Building: CP for Design [AMD13199 AMD 17137 August 2007. Corrigendum No. 2 March 2008. Replaced by BS EN 1993-1-1:2005, BS EN 1993-1-5:2006, BS EN 1993-1-10:2005, BS EN 1993-5:2007, BS EN 1993-6:2007, BS EN 1993-1-8:2005~~
~~BS 6031: 2009~~	~~Code of practice for earthworks [Corrigendum August 2010]~~

~~BS 7818: 1995~~	~~Specification for Pedestrian Restraint Systems in Metal AMD15047, AMD16540~~
~~BS 8002: 1994~~	~~Earth Retaining Structures [AMD8851, AMD12062 AMD13386] Replaced by BS EN 1997-1:2004~~
~~BS 8004: 1986~~	~~Foundations Replaced by BS EN 1997-1:2004~~
~~BS 8006: 1995~~	~~Strengthened / Reinforced Soils and Other Fills AMD10252 (*Replaced By* : BS EN 14475:2006, BS EN 14490:2010, BS 8006-1:2010, **BS 8006-2:2011**~~
~~BS 8006-1:2010~~	~~Code of practice for strengthened/reinforced soils and other fills Corrigendum June 2012~~
~~BS 8006-2: 2011~~	~~Code of practice for strengthened/reinforced soils Soil nail design~~
~~BS 8007: 1987~~	~~Design of Concrete Structures for Retaining Aqueous Liquids Replaced by BS EN 1992-3:2006~~
~~BS 8110: Part 1 : 1997~~	~~Structural Use of Concrete: CP for Design and Construction [AMD9882, AMD 13468, AMD 16016 November 2005. AMD 17307, August 2007.] Replaced by BS EN 1992-1-1:2004.~~
~~BS 8118: Part 1: 1991~~	~~The Structural Use of Aluminium. Code of Practice for Design [AMD 10485 July 1999] Replaced by BS EN 1999-1-3:2007, BS EN 1999-1-1:2007+A1:2009, BS EN 1999-1-4:2007~~

A.1.2 EUROCODES (National Annexes and PDs not Listed)

~~BS EN 1317-1: 2010~~	~~Road Restraints Systems Terminology and General Criteria for Test Methods~~
~~BS EN 1317-2: 2010~~	~~Road Restraints Systems Performance Classes, Impact Test Acceptance Criteria and Test Methods for Safety Barriers~~
~~BS EN 1317-3: 2010~~	~~Road Restraints Systems Performance Classes, Impact Test Acceptance Criteria and Test Methods for Crash Cushions~~
~~DD ENV 1317-4: 2002~~	~~Performance Classes, Impact Test Acceptance Criteria and Test Methods for Terminals and Transitions of Safety Barriers~~
~~BS EN 1317-5: 2007+A2:2012~~	~~Road restraint systems Product requirements and evaluation of conformity for vehicle restraint systems~~
BS EN 1990:2002	Eurocode - Basis of structural design (+A1:2005) AMD 16226 March 2006. Amends and replaces BS EN 1990:2002. Corrigendum June 2009. Corrigendum July 2010.
BS EN 1991	**Eurocode 1: Actions on structures**
BS EN 1991-1.1:2002	Eurocode 1: Actions on structures. General actions - Densities, self-weight, imposed loads for buildings (AMD Corrigendum 15507 and Corrigendum February 2010.
~~BS EN 1991-1.2:2002~~	~~Eurocode 1: Actions on structures. General actions – Actions on structures exposed to fire (incorporating corrigendum May 2009 and Corrigendum, February 2013.~~
~~BS EN 1991-1.3:2003~~	~~Eurocode 1 – Actions on structures. General actions – Snow loads (incorporating corrigenda December 2004 and March 2009) AMD15509 (COR1 TO BSEN1991-1-3 : 2003) AMD 15509 is a Corrigendum. Corrigendum June 2009.~~

~~BS EN 1991-1.4:2005 +A1:2010~~	~~Eurocode 1: Actions on structures. General actions - Wind actions Corrigendum December 2009. Corrigendum August 2010. Amendment January 2011~~
BS EN 1991-1.5:2003	Eurocode 1 - Actions on structures. General actions - Thermal actions AMD 15510 is a Corrigendum. Corrigendum, February 2010
BS EN 1991-1.6:2005	Eurocode 1: Actions on structures. General actions - Actions during execution Corrigendum February 2010. Corrigendum, February 2013
BS EN 1991-1.7:2006	Eurocode 1: Actions on structures. General actions - Accidental actions Corrigendum April 2010.
BS EN 1991-2:2003	Eurocode 1: Actions on structures. Traffic loads on bridges (AMD Corrigendum 15508)
~~BS EN 1991-4:2006~~	~~Eurocode 1 - Actions on structures. Silos and tanks Corrigendum, February 2013 Corrigendum, March 2013 Corrigendum, July 2013~~
~~BS EN 1992-1.1:2004~~	~~Eurocode 2: Design of concrete structures. General rules and rules for buildings Corrigendum June 2008. Corrigendum August 2011~~
~~BS EN 1992-1.2:2004~~	~~Eurocode 2: Design of concrete structures. General rules - Structural fire design Corrigendum February 2010.~~
BS EN 1992-2:2005	Eurocode 2: Design of concrete structures. Concrete bridges - Design and detailing rules Corrigendum February 2010.
~~**BS EN 1993**~~	~~**Eurocode 3: Design of steel structures**~~
~~BS EN 1993-1.1:2005~~	~~Eurocode 3: Design of steel structures. General rules and rules for buildings (AMD Corrigendum 16568 Corrigendum, February 2010~~
~~BS EN 1993-1.2:2005~~	~~Eurocode 3: Design of steel structures. General rules - Structural fire design (AMD Corrigendum 16290) (AMD Corrigendum 16572 Corrigendum, February 2010)~~
~~BS EN 1993-1.4:2006~~	~~Eurocode 3: Design of steel structures. General rules - Supplementary rules for stainless steels~~
BS EN 1993-1.5:2006	Eurocode 3 - Design of steel structures. Plated structural elements Corrigendum February 2010.
~~BS EN 1993-1.6:2007~~	~~Eurocode 3 - Design of steel structures. Strength and stability of shell structures - Corrigendum February 2010.~~
~~BS EN 1993-1.7:2007~~	~~Eurocode 3 - Design of steel structures. Plated structures subject to out of plane loading - Corrigendum February 2010~~
~~BS EN 1993-1.8:2005~~	~~Eurocode 3: Design of steel structures. Design of joints (AMD Corrigendum 16291) (AMD Corrigendum 16571) - Corrigendum, February 2010. Corrigendum, August 2010.~~
~~BS EN 1993-1.9:2005~~	~~Eurocode 3: Design of steel structures. Fatigue (AMD Corrigendum 16292) (AMD Corrigendum 16570) - Corrigendum, February 2010~~
~~BS EN 1993-1.10:2005~~	~~Eurocode 3: Design of steel structures. Material toughness and through-thickness properties (AMD Corrigendum 16293) (AMD Corrigendum 16569) Corrigendum, February 2010~~
~~BS EN 1993-1.11:2006~~	~~Eurocode 3 - Design of steel structures. Design of structures with tension components Corrigendum February 2010.~~
~~BS EN 1993-1.12:2007~~	~~Eurocode 3 - Design of steel structures. Additional rules for the extension of EN 1993 up to steel grades S 700 Corrigendum April 2010.~~

~~BS EN 1993-2:2006~~	~~Eurocode 3: Design of steel structures. Steel bridges~~ ~~Corrigendum January 2010.~~
~~BS EN 1993-5:2007~~	~~Eurocode 3 - Design of steel structures. Piling~~ ~~Corrigendum August 2009.~~
~~BS EN 1993-6:2007~~	~~Eurocode 3: Design of steel structures. Crane supporting structures~~ ~~Corrigendum April 2010~~
~~**BS EN 1994**~~	~~**Eurocode 4: Design of composite steel and concrete structures**~~
~~BS EN 1994-1-1:2004~~	~~Eurocode 4: Design of composite steel and concrete structures. General rules and rules for buildings~~ ~~Corrigendum October 2009.~~
~~BS EN 1994-1-2:2005~~	~~Eurocode 4: Design of composite steel and concrete structures. General rules - Structural fire design~~ ~~Corrigendum February 2010.~~
~~BS EN 1994-2:2005~~	~~Eurocode 4: Design of composite steel and concrete structures. General rules and rules for bridges~~ ~~Corrigendum February 2010.~~
~~**BS EN 1995**~~	~~**Eurocode 5: Design of timber structures**~~
~~BS EN 1995-1-1:2004 +A1:2008~~	~~Eurocode 5: Design of timber structures. General - Common rules and rules for buildings (+A1:2008) (incorporating corrigendum June 2006)~~ ~~AMD 16499 is a Corrigendum. Amendment January 2009. Amends and replaces BS EN 1995-1-1:2004.~~
~~BS EN 1995-1-2:2004~~	~~Eurocode 5: Design of timber structures. General - Structural fire design (AMD Corrigendum 16498) Corrigendum, August 2009~~
~~BS EN 1995-2:2004~~	~~Eurocode 5: Design of timber structures. Bridges~~
~~**BS EN 1996**~~	~~**Eurocode 6: Design of masonry structures**~~
~~BS EN 1996-1-1:2005 +A1:2012~~	~~Eurocode 6 - Design of masonry structures. General rules for reinforced and unreinforced masonry structures (AMD Corrigendum 16209) Corrigendum, December 2009. Amendment, April 2013. Amends and replaces BS EN 1996-1-1:2005.~~
~~BS EN 1996-1-2:2005~~	~~Eurocode 6: Design of masonry structures. General rules - Structural fire design~~ ~~Corrigendum July 2011~~
~~BS EN 1996-2:2006~~	~~Eurocode 6 - Design of masonry structures. Design considerations, selection of materials and execution of masonry~~ ~~Corrigendum March 2010.~~
~~BS EN 1996-3:2006~~	~~Eurocode 6 - Design of masonry structures. Simplified calculation methods for unreinforced masonry structures~~ ~~Corrigendum March 2010.~~
BS EN 1997	**Eurocode 7: Geotechnical design**
BS EN 1997-1:2004	Eurocode 7: Geotechnical design. General rules Corrigendum January 2010.
BS EN 1997-2:2007	Eurocode 7: Geotechnical design. Ground investigation and testing Corrigendum October 2010.
~~**BS EN 1998**~~	~~**Eurocode 8: Design of structures for earthquake resistance**~~
~~BS EN 1998-1:2004 +A1:2013~~	~~Eurocode 8: Design of structures for earthquake resistance. General rules, seismic actions and rules for buildings~~ ~~Corrigendum February 2010.~~ ~~Corrigendum January 2011~~ ~~Amendment, May 2013. Amends and replaces BS EN 1998-1:2004.~~

~~BS EN 1998-2:2005 +A2 :2011~~	~~Eurocode 8: Design of structures for earthquake resistance. Bridges Amendment August 2009. Amends and replaces BS EN 1998-2:2005. Corrigendum May 2010. Amendment December 2011. Amends and replaces BS EN 1998-2:2005+A1:2009. Corrigendum February 2012.~~
~~BS EN 1998-5:2004~~	~~Eurocode 8: Design of structures for earthquake resistance. Foundations, retaining structures and geotechnical aspects~~
~~BS EN 14388: 2005~~	~~Road Traffic Noise Reducing Devices Specifications [Corrigendum February 2009]~~

A.2 DEPARTMENT OF TRANSPORT LOCAL GOVERNMENT AND THE REGIONS (DTLR)

~~Simplified Tables of External Loads on Buried Pipelines, 1986, (published by TSO)~~

~~Traffic Management Act 2004~~

A.3 MISCELLANEOUS

~~Circular Roads No 61/72 – Routes for Heavy and High Abnormal Loads~~

A.4 THE MANUAL OF CONTRACT DOCUMENTS FOR HIGHWAY WORKS (MCDHW)

Volume 1: Specification for Highway Works, 1998 (with revisions, latest amendment Nov 2009)

Volume 2: Notes for Guidance on the Specification for Highway Works, 1998 (with revisions, latest amendment Nov 2009)

~~Volume 3: Highway Construction Details, 1998 (with revisions, latest amendment Nov 2008)~~

A.5 THE DESIGN MANUAL FOR ROADS & BRIDGES (DMRB)

A.5.1 Advice Notes – Bridges and Structures (BA Series)

~~BA 9/81~~	~~The Use of BS 5400: Part 10: 1980. Code of Practice for Fatigue~~	~~Dec 1981~~	~~1.3~~
	~~Amendment No. 1~~	~~Nov 1983~~	
~~BA 16/97~~	~~The Assessment of Highway Bridges and Structures~~	~~May 1997~~	~~3.4.4~~
	~~Amendment No. 1~~	~~Nov 1997~~	
	~~Amendment No. 2~~	~~Nov 2001~~	
~~BA 19/85~~	~~The Use of BS 5400: Part 3: 1982~~	~~Jan 1985~~	~~1.3~~
BA 24/87	Early Thermal Cracking of Concrete	Jul 1987	1.3
	Amendment No. 1	Aug 1989	
~~BA 26/94~~	~~Expansion Joints for Use in Highway Bridge Decks~~	~~Nov 1994~~	~~2.3.7~~
~~BA 28/92~~	~~Evaluation of Maintenance Costs in Comparing Alternative Designs for Highway Structures~~	~~Aug 1992~~	~~1.2.2~~
~~BA 30/94~~	~~Strengthening of Concrete Highway Structures using Externally Bonded Plates~~	~~Feb 1994~~	~~3.3.1~~

~~BA 35/90~~	~~Inspection and Repair of Concrete Highway Structures~~	~~Jun 1990~~	~~3.3~~
~~BA 36/90~~	~~The Use of Permanent Formwork~~	~~Feb 1991~~	~~2.3~~
~~BA 37/92~~	~~Priority Ranking of Existing Parapets (superseded by IAN 97/07)~~	~~Oct 1992~~	~~2.3.2~~
~~BA 38/93~~	~~Assessment of the Fatigue Life of Corroded or Damaged Reinforcing Bars~~	~~Apr 1993~~	~~3.4.5~~
~~BA 39/93~~	~~Assessment of Reinforced Concrete Half-joints~~	~~Apr 1993~~	~~3.4.6~~
~~BA 40/93~~	~~Tack Welding of Reinforcing Bars~~	~~Apr 1993~~	~~1.3.4~~
~~BA 41/98~~	~~The Design and Appearance of Bridges~~	~~Feb 1998~~	~~1.3.11~~
~~BA 42/96~~	~~The Design of Integral Bridges [Incorporating Amendment No. 1 dated May 2003]~~	~~Nov 1996~~	~~1.3.12~~
~~BA 43/94~~	~~Strengthening, Repair and Monitoring of Post-tensioned Concrete Bridge Decks~~	~~Dec 1994~~	~~3.3.2~~
~~BA 44/96~~	~~Assessment of Concrete Highway Bridges and Structures~~	~~Nov 1996~~	~~3.4.15~~
~~BA 47/99~~	~~Waterproofing and Surfacing of Concrete Bridge Decks~~	~~Aug 1999~~	~~2.3.5~~
~~BA 50/93~~	~~Post-tensioned Concrete Bridges: Planning, Organisation and Methods for Carrying Out Special Inspections~~	~~Jul 1993~~	~~3.1.3~~
~~BA 51/95~~	~~The Assessment of Concrete Structures Affected by Steel Corrosion~~	~~Feb 1995~~	~~3.4.13~~
~~BA 52/94~~	~~The Assessment of Concrete Structures Affected by Alkali Silica Reaction~~	~~Nov 1994~~	~~3.4.10~~
~~BA 53/94~~	~~Bracing Systems and the Use of U-frames in Steel Highway Bridges~~	~~Dec 1994~~	~~1.3.13~~
~~BA 54/94~~	~~Load Testing for Bridge Assessment~~	~~Apr 1994~~	~~3.4.8~~
~~BA 55/06~~	~~The Assessment of Bridge Substructures and Foundations, Retaining Walls and Buried Structures~~	~~May 2006~~	~~3.4.9~~
BA 57/01	Design for Durability	Aug 2001	1.3.8
~~BA 58/94~~	~~Design of Bridges and Concrete Structures with External Unbonded Prestressing~~	~~Nov 1994~~	~~1.3.10~~
~~BA 59/94~~	~~Design of Highway Bridges for Hydraulic Action~~	~~May 1994~~	~~1.3.6~~
~~BA 67/96~~	~~Enclosure of Bridges~~	~~Aug 1996~~	~~2.2.8~~
~~BA 68/97~~	~~Crib Retaining Walls~~	~~Feb 1997~~	~~2.1.4~~
~~BA 72/03~~	~~Maintenance of Road Tunnels~~	~~May 2003~~	~~3.2.3~~
~~BA 80/99~~	~~Use of Rock Bolts~~	~~Feb 1999~~	~~2.1.7~~
~~BA 82/00~~	~~Formation of Continuity Joints in Bridge Decks~~	~~Nov 2000~~	~~2.3.7~~
~~BA 83/02~~	~~Cathodic Protection for Use in Reinforced Concrete Highway Structures [correction issued Nov 2002]~~	~~Feb 2002~~	~~3.3.3~~
~~BA 84/02~~	~~Use of Stainless Steel Reinforcement in Highway Structures~~	~~Feb 2002~~	~~1.3.15~~
BA 85/04	Coatings for Concrete Highway Structures & Ancillary Structures	May 2004	2.4.3

~~BA 86/06~~	~~Advice Note on the Non-Destructive Testing of Highway Structures~~	~~Aug 2006~~	~~3.1.7~~
~~BA 87/04~~	~~Management of Corrugated Steel Buried Structures [correction 1 Feb 2006 and correction 2 issued Nov 2009]~~	~~Aug 2004~~	~~3.3.4~~
~~BA 88/04~~	~~Management of Buried Concrete Box Structures~~	~~Aug 2004~~	~~3.3.5~~
~~BA 92/07~~	~~Use of recycled concrete aggregates in structural concrete~~	~~May 2007~~	~~2.3.9~~
~~BA 93/09~~	~~Structural assessment of Bridges with Deck Hinges~~	~~Feb 2009~~	~~3.1.5~~

A.5.2 Bridges and Structures, Standards (BD Series)

BD 2/12	Technical Approval of Highway Structures	May 2012	1.1.1
~~BD 7/01~~	~~Weathering Steel for Highway Structures~~	Nov 2001	2.3.8
~~BD 9/81~~	~~Implementation of BS 5400, Pt 10: 1980. Code of Practice for Fatigue~~	~~Dec 1981~~	~~1.3~~
~~BD 10/97~~	~~Design of Highway Structures in Areas of Mining Subsidence~~	~~May 1997~~	~~1.3.14~~
~~BD 12/01~~	~~Design of Corrugated Steel Buried Structures with Spans Greater than 0.9 metres and up to 8.0 metres~~	~~Nov 2001~~	~~2.2.6~~
~~BD 13/06~~	~~Design of Steel Bridges. Use of BS 5400-3: 2000~~	~~May 2006~~	~~1.3~~
~~BD 15/92~~	~~General Principles for the Design and Construction of Bridges Use of BS 5400: Part 1: 1988~~	~~Dec 1992~~	~~1.3.2~~
~~BD 16/82~~	~~Design of Composite Bridges. Use of BS 5400: Part 5: 1979~~ ~~Amendment No. 1~~	~~Nov 1982~~ ~~Dec 1987~~	~~1.3~~
~~BD 20/92~~	~~Bridge Bearings. Use of BS 5400: Part 9: 1983~~	~~Oct 1992~~	~~2.3.1~~
~~BD 21/01~~	~~The Assessment of Highway Bridges and Structures~~	~~May 2001~~	~~3.4.3~~
~~BD 24/92~~	~~Design of Concrete Bridges. Use of BS 5400: Part 4: 1990~~	~~Nov 1992~~	~~1.3.1~~
~~BD 27/86~~	~~Materials for the Repair of Concrete Highway Structures~~	~~Nov 1986~~	~~3.3~~
BD 28/87	Early Thermal Cracking of Concrete Amendment No. 1	Jul 1987 Aug 1989	1.3
~~BD 29/04~~	~~Design Criteria for Footbridges~~	~~Aug 2004~~	~~2.2.8~~
~~BD 30/87~~	~~Backfilled Retaining Walls and Bridge Abutments~~	~~Aug 1987~~	~~2.1~~
BD 31/01	The Design of Buried Concrete Box and Portal Frame Structures	Nov 2001	2.2.12
~~BD 33/94~~	~~Expansion Joints for Use in Highway Bridge Decks~~	~~Nov 1994~~	~~2.3.6~~
~~BD 35/06~~	~~Quality Assurance Scheme for Paints and Similar Protective Coatings~~	~~May 2006~~	~~2.4.1~~
~~BD 36/92~~	~~Evaluation of Maintenance Costs in Comparing Alternative Designs for Highway Structures~~	~~Aug 1992~~	~~1.2.1~~
~~BD 37/01~~	~~Loads for Highway Bridges~~	~~Aug 2001~~	~~1.3.14~~
~~BD 41/97~~	~~Reinforced Clay Brickwork Retaining Walls of Pocket Type and Grouted Cavity Type Construction. Use of BS 5628: Part 2: 1995~~	~~May 1997~~	~~2.1.1~~
BD 42/00	Design of Embedded Retaining Walls and Bridge Abutments	May 2000	2.1.2

~~BD 43/03~~	~~The Impregnation of Reinforced and Prestressed Concrete Highway Structures using Hydrophobic Pore-Lining Impregnants~~	~~Feb 2003~~	~~2.4.2~~
~~BD 44/95~~	~~Assessment of Concrete Highway Bridges and Structures~~	~~Jan 1995~~	~~3.4.14~~
~~BD 45/93~~	~~Identification Marking of Highway Structures~~	~~Aug 1993~~	~~3.1.1~~
BD 47/99	Waterproofing and Surfacing of Concrete Bridge Decks	Aug 1999	2.3.4
~~BD 48/93~~	~~The Assessment and Strengthening of Highway Bridge Supports~~	~~Jun 1993~~	~~3.4.7~~
~~BD 49/01~~	~~Design Rules for Aerodynamic Effects on Bridges~~	~~May 2001~~	~~1.3.3~~
~~BD 51/98~~	~~Portal and Cantilever Sign / Signal Gantries~~	~~May 1998~~	~~2.2.4~~
~~BD 53/95~~	~~Inspection and Records for Road Tunnels~~	~~Jul 1995~~	~~3.1.6~~
~~BD 54/93~~	~~Post-tensioned Concrete Bridges Prioritisation of Special Inspections~~	~~Apr 1993~~	~~3.1.2~~
~~BD 56/10~~	~~The Assessment of Steel Highway Bridges and Structures~~	~~Jun 2010~~	~~3.4.11~~
BD 57/01	Design for Durability	Aug 2001	1.3.7
~~BD 58/94~~	~~The Design of Concrete Highway Bridges and Structures with External And Unbonded Prestressing~~	~~Nov 1994~~	~~1.3.9~~
~~BD 60/04~~	~~Design of Highway Bridges for Vehicle Collision Loads~~	~~May 2004~~	~~1.3.5~~
~~BD 61/10~~	~~The Assessment of Composite Highway Bridges and Structures~~	~~Jun 2010~~	~~3.4.16~~
~~BD 62/07~~	~~As Built, Operational & Maintenance Records for Highway Structures~~	~~Feb 2007~~	~~3.2.1~~
BD 63/07	Inspection of Highway Structures	Feb 2007	3.1.4
~~BD 65/97~~	~~Design Criteria for Collision Protector Beams~~	~~Feb 1997~~	~~2.2.5~~
~~BD 67/96~~	~~Enclosures of Bridges~~	~~Aug 1996~~	~~2.2.7~~
~~BD 68/97~~	~~Crib Retaining Walls~~	~~Feb 1997~~	~~2.1.3~~
~~BD 70/03~~	~~Strengthened / Reinforced Soils and Other Fills for Retaining Walls and Bridge Abutments Use of BS 8006: 1995, incorporating Amendment No. 1 (issue 2 March 1999)~~	~~May 2003~~	~~2.1.5~~
BD 74/00	Foundations	May 2000	2.1.8
~~BD 78/99~~	~~Design of Road Tunnels~~	~~Aug 1999~~	~~2.2.9~~
~~BD 79/13~~	~~The Management of Sub-standard Highway Structures~~	~~Feb 2013~~	~~3.4.18~~
~~BD 81/02~~	~~Use of Compressive Membrane Action in Bridge Decks~~	~~May 2007~~	~~3.4.20~~
~~BD 82/00~~	~~Design of Buried Rigid Pipes~~	~~Aug 2000~~	~~2.2.10~~
~~BD 84/02~~	~~Strengthening of Concrete Bridge Supports Using Fibre Reinforced Polymers~~	~~Aug 2002~~	~~1.3.16~~
~~BD 85/08~~	~~Strengthening highway structures using externally bonded fibre reinforced polymer~~	~~Nov 2008~~	~~1.3.18~~
~~BD 86/11~~	~~The Assessment of Highway Bridges and Structures for the Effects of Special Types General Order (STGO) and Special Order (SO) Vehicles~~	~~Nov 2011~~	~~3.4.19~~
~~BD 87/05~~	~~Maintenance Painting of Steelwork~~	~~May 2005~~	~~3.2.2~~

~~BD 89/03~~	~~The Conservation of Highway Structures~~	~~Nov 2003~~	~~3.2.4~~
~~BD 90/05~~	~~Design Of FRP Bridges and Highway Structures~~	~~May 2005~~	~~1.3.17~~
~~BD 91/04~~	~~Unreinforced Masonry Arch Bridges~~	~~Nov 2004~~	~~2.2.14~~
~~BD 94/07~~	~~Design of Minor Structures~~	~~Feb 2007~~	~~2.2.1~~
~~BD 95/07~~	~~Treatment of existing structures on highway widening schemes~~	~~Aug 2007~~	~~1.2.3~~
~~BD 97/12~~	~~Assessment of scour and other hydraulic actions at highway structures~~	~~May 2012~~	~~3.4.21~~
~~BD 101/11~~	~~Structural review and assessment of highway structures~~	~~Nov 2011~~	~~3.4.22~~

A.5.3 Bridges, Technical Memoranda (BE Series)

~~BE 13~~	~~Fatigue Risk in Bailey Bridges~~	~~Apr 1968~~	~~3.4~~
~~BE 23~~	~~Shear Key Decks~~	~~Nov 1970~~	~~1.3~~
	~~Amendment No 1 to Annex~~	~~Jun 1971~~	
~~BE 5/75~~	~~Rules for the Design and Use of Freyssinet Concrete Hinges in Highway Structures~~	~~Mar 1975~~	~~1.3~~
~~BE 7/04~~	~~Departmental Standard (Interim) Motorway Sign / Signal Gantries~~	~~Aug 2004~~	~~2.2~~

A.5.4 Traffic Engineering and Control, Standards (TD Series)

~~TD 9/93~~	~~Highway Link Design~~	~~Jun 1993~~	~~6.1.1~~
	~~Amendment No 1~~	~~Feb 2002~~	
~~TD 19/06~~	~~Requirements for Road Restraint Systems [correction 1 Feb 2008]~~	~~Aug 2006~~	~~2.2.8~~
~~TD 27/05~~	~~Cross Sections and Headroom~~	~~Feb 2005~~	~~6.1.2~~
~~TD 36/93~~	~~Subways for Pedestrians and Pedal Cyclists, Layout and Dimensions~~	~~Jul 1993~~	~~6.3.1~~
~~TD89/08~~	~~Use of passively safe signposts, lighting columns and traffic signal posts to BS EN 12767~~	~~May 2008~~	~~8.2.2~~

A.5.5 Highways, Advice Notes (HA Series)

~~HA 59/92~~	~~Mitigating Against Effects on Badgers~~	~~Feb 1997~~	~~10.4.2~~
~~HA 66/95~~	~~Environmental Barriers Technical Requirements~~	~~Sep 1995~~	~~10.5.2~~
~~HA 80/99~~	~~Nature Conservation Advice in Relation to Bats~~	~~May 1999~~	~~10.4.3~~
~~HA 81/99~~	~~Nature Conservation Advice in Relation to Otters~~	~~May 1999~~	~~10.4.4~~
~~HA 84/01~~	~~Nature Conservation and Biodiversity~~	~~Feb 2001~~	~~10.4.1~~
~~HA 97/01~~	~~Nature Conservation Management Advice in Relation to Dormice~~	~~Feb 2001~~	~~10.4.5~~
~~HA 98/01~~	~~Nature Conservation Management Advice in Relation to Amphibians~~	~~Feb 2001~~	~~10.4.6~~

A.5.6 Highways, Standards (HD Series)

HD 22/08	Managing Geotechnical Risk	Aug 2008	4.1.2

A.6 Interim Advice Notes (IAN)

~~IAN 05~~	~~BD 24/92 The Design of Concrete Highway Bridges and Structures. Use of BS 5400: Part 4:1990~~	~~Jul 1996~~
IAN 70	Implementation Of New Reinforcement Standards (BS 4449:2005, BS 4482:2005, BS 4483:2005 and BS 8666:2005)	Jan 2006
IAN 95	Revised guidance regarding the use of BS8500(2006) for the design and construction of structures using concrete	May 2007
~~IAN 96 r1~~	~~Guidance on Implementing Results of Research on Bridge Deck Waterproofing~~	~~Aug 2007~~
~~IAN 97~~	~~Assessment and Upgrading of Existing Vehicle Parapets~~	~~Aug 2007~~
IAN 124	Use of Eurocodes for the design of Highway Structures	Jul 2011

A.7 ~~RAILWAY SAFETY AND STANDARDS BOARD DOCUMENTS~~

~~GC/RT5112~~	~~Issue 2~~	~~Dec 2008~~	~~Rail Traffic Loading Requirements for the Design of Railway Structures~~
~~GC/RT5212~~	~~Issue 1~~	~~Feb 2003~~	~~Requirements for defining and maintaining clearances [plus amendment AM002]~~
~~GM/RT2149~~	~~Issue 3~~	~~Feb 2003~~	~~Requirements for defining and maintaining the size of railway vehicles [plus amendment AM002]~~
~~GO/RT3413~~	~~Issue 1~~	~~Aug 2008~~	~~Provision of Information and Signs for Access on the Railway [Supersedes GCRT5203 Iss 3]~~
~~NR/L3/CIV/020~~	~~Issue 1~~	~~Jun 2011~~	~~Design of Bridges [Replaces RT/CE/S/007 Issue 1]~~
~~NR/L3/CIV/140~~	~~Various Issues~~	~~Various dates~~	~~Model clauses for specifying civil engineering work (Various Sections, on different topics)~~
~~NR/L3/CIV/151~~	~~Issue 6~~	~~March 2012~~	~~Engineering Assurance of Standard Designs & Details for Building & Civil Engineering Works~~
~~NR/GN/CIV/025~~	~~Issue 3~~	~~Jun 2006~~	~~Structural assessment of underbridges~~
~~NR/L2/CIV/003~~	~~Issue 4~~	~~June 2012~~	~~Engineering Assurance of Building and Civil Engineering Works~~
~~NR/L2/TRK/2049~~	~~Issue 12~~	~~Mar 2010~~	~~Track design handbook~~
~~NR/L2/TRK/2102~~	~~Issue 6~~	~~Mar 2010~~	~~Track construction standards~~

A.8 OTHER RELEVANT SUPPLEMENTARY STANDARDS & REFERENCES

BRE Special Digest 1, 2005 Concrete in Aggressive Ground [3rd Edition]

9. THE ABOVE IS SUBMITTED FOR ACCEPTANCE

We confirm that details of the temporary works design will be/have been[15] passed to the permanent works Designer for review. 16

Signed 

Name Michael O'Regan
Design Team Leader

Engineering Qualifications BSc C Eng MIStructE 17

Name of Organisation Ross and Partners

Date 28 April 2020

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

Signed 

Name G Natkunan

Position held Structures Team Leader

Engineering Qualifications BSc (Hons) CEng MICE 17

TAA London Borough of Camden

Date 28.04.2020

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 should be given. They
should be expressed as a number of years rather than a range of years. A design working life should 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. 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.
5. For concrete structures, give applicable exposure classes for particular structural elements. For all material strengths given, list the
relevant codes/standards.
6. Designers should name the CDM co-ordinator and confirm that the CDM co-ordinator has reviewed the risks and hazards identified
in the AIP and is satisfied. Also see clause 2.12(i), (ii) and (iii).
7. e.g. Load Models 1 and 2, BS EN 1991-2.
8. e.g. SV model vehicle in Load Model 3, BS EN 1991-2.
9. e.g. SOV model vehicle in Load Model 3, BS EN 1991-2 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.
10. If in doubt, the heavy or high load route requirements should be confirmed by the relevant administration e.g. Abnormal Indivisible
Load team in HA. Initial indication can be found from the route maps which are available from Circular Roads No 61/72 – Routes for
heavy and high abnormal loads, and also from the website http://www.esdal.com or in Scotland
http://www.transportscotland.gov.uk/
reports/road/j12054-00.htm
11. e.g. seismic action, atmospheric icing, floating debris etc.
12. 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. 2.22 and 2.42.
13. When the Geotechnical Design Report becomes available, an addendum to the AIP, covering section 6, must be submitted to the TAA.
The addendum must have its own sections 8, 9 and 10 to provide a list of drawings, documents and signatures.
14. Include, without limitation:
a) Technical Approval Schedule (TAS).
b) General Arrangement Drawing.
c) Relevant extracts from the Geotechnical Design Report.
d) Departures.
e) Relevant correspondence and documents from consultations.
15. Delete as appropriate.
16. This statement is applicable to temporary works design AIP only.
17. CEng, MICE, 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 must be re-submitted to the TAA for review.