

# Forth Estuary Transport Authority Forth Road Bridge

## Approval In Principle For Design of Replacement of Foot / Cycleway Deck Movement Joints

**Date: August 2014**

### Notice

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### Document History

JOB NUMBER: 5127603			DOCUMENT REF: 5127603/003			
C	Second Draft- Issued for FETA Review					25/08/14
B	Issued for FETA Review					19/02/14
A	First Draft					14/02/14
Revision	Purpose Description	Originated	Checked	Reviewed	Authorised	Date

Plan Design Enable

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# Location Plan and Photograph



REPRODUCED FROM THE 1993 ORDNANCE SURVEY LANDLINE DATA  
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*Figure 1 - Forth Road Bridge*



*Figure 2 - Existing Foot / Cycleway Joint*

## 1. Highway details

### 1.1 Type of highway

Over: Footways and Dual 2 lane carriageway – A90 road (D2AP)

Under: Firth of Forth

### 1.2 Permitted traffic speed

Over Structure: 80 kph (50 mph) on carriageway

Under Structure: N/A

### 1.3 Existing restrictions

None

## 2. Site details

### 2.1 Obstacles crossed

Foot/cycleway movement joints exist at 4 No locations across the bridge, they span the movement gaps between the main towers and the main and side suspended spans; and within the approach viaducts.

## 3. Existing and Proposed structure

### 3.1.1 Description of Existing Structure

These joints are located in the foot/cycleways on both sides of the bridge where the roller shutter and cantilever comb joints exist in the carriageways, namely adjacent to the main suspension towers (2 No joints in each foot/cycleway at each tower); between the north approach viaduct and the north side suspension span; and at Pier S3 in the south approach viaduct. In addition to pedestrians and cyclists the joints are subject to loading from maintenance vehicles. At Pier S3 a similar type of joint exists in the central reserve.

The bridge was commissioned in 1964 and the joints are largely original to the construction of the bridge. The joints adjacent to the comb joints and the small roller shutter joints (side span side of main towers) comprise pairs of steel plates, one of which slides over the other. The lower plate is fixed, and the upper plate is held down by bolts against the lower plate. The joints adjacent to the large roller shutter joints (main span side of main towers) comprise a pair of bolted down expansion plates which move across a central sliding tray plate. The top surfaces of the plates form a smooth surface for pedestrians and cyclists, although there is a step between the upper and lower plates

The joints are still functioning as designed, but, since the original construction they have become worn from general trafficking and movement of the joints themselves, resulting in a loss of plate thickness.

In addition, the steps between the upper and lower plates have the potential to be a tripping hazard to pedestrians, and the smooth surfaces can be slippery particularly when wet.

#### Description of Proposed Structure and Design Life

It is proposed that the replacement works of the existing joints should be restricted to the replacement of the upper plates. The replacement plates would include the following features to improve safety and performance:

- Tapers at the free edges would be increased to reduce the step between the upper and lower plates;

- Stainless steel plate bonded to top surface of worn sliding tray rails.
- Top surfaces would be rebated to accommodate the anti-slip treatment;
- Phosphor bronze inserts would be incorporated into the underside of the plates to reduce friction and allow replaceable wear pad.

Replacement of the fixed lower plates and sliding tray plates is not proposed although local repairs may be required to make good worn contact surfaces.

In addition to replacing the upper plates, the works should include:

Replacing the original “Dowpac” liquid spring units fitted to the large expansion plates.

Replacing all spring loaded holding down bolts;

Refurbishing the drainage system;

Maintenance painting of steelwork, as necessary.

The proposed design life of the replacement joint is 50 years (Design Working Life Category 2).

### **3.2 Structural type**

The structure type is a sliding plate expansion joint.

### **3.3 Foundation type**

It is proposed to re-use the existing supporting structure of the joint.

### **3.4 Span arrangements**

The refurbished joint will be designed to accommodate the same movement range as the existing joint.

### **3.5 Articulation arrangements**

The articulation of the joint is as described in section 3.1.1.

### **3.6 Classes and levels**

#### **3.6.1 Consequence class**

CC2

#### **3.6.2 Reliability class**

RC2

#### **3.6.3 Inspection level**

IL2

### **3.7 Road restraint systems requirements**

No changes to the existing road restraint system are proposed.

### **3.8 Proposed arrangements for future maintenance and inspection**

#### **3.8.1 Traffic management**

The proposals will not affect the existing arrangements for traffic management.

#### **3.8.2 Arrangements for future maintenance and inspection. Access arrangements to structure Traffic management**

The proposals will not affect the existing arrangements for traffic management.

#### **Access**

The proposals will not affect the existing arrangements for access.

#### **Replacement Units**

Spare plates are not considered necessary due to the addition of the phosphor bronze wear pads on the plates.

### **3.9 Environment and sustainability.**

The bridge is a listed structure therefore consultation will be undertaken with the planning authorities to confirm the proposals for the joint. The existing joint is virtually all steel and can be recycled. Replacing the joint extends the working life of the structure. Record drawings indicate the presence of an asbestos containing material in the existing joints. This would need to be disposed of appropriately.

### **3.10 Durability. Materials and finishes**

<b>Materials</b>	<b>Type / Description</b>
Mastic asphalt surfacing	SHW Series 700
Resin bonded anti-skid surfacing	SHW Series 700 (maximum aggregate size to be 6mm)
Steel plates	Grade S355 J2 G3 to BS EN 10025
Bonded Stainless Steel slide rail plates	Grade 1.4401 (316).700 to BS EN 10088-3
Steelwork painting	SHW Series 1900
Bridge Deck Waterproofing	SHW Series 2000
Bedding mortar	SHW Series 2600
Epoxy adhesives	SHW Series 2600
Maintenance Painting of Steelwork	SHW Series 5000

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

- Steelwork fabrication (cutting; welding, blasting, painting, lifting, and manual handling);
- Traffic Management, access for non-motorised users and maintenance vehicles;
- Working at height in an aggressive environment;
- Gaps in structure once plates are removed, provide temporary plates, protective barriers and screens;
- Lifting operations;
- Siteworks (welding; grinding, blasting, painting and manual handling);
- Working adjacent to existing services.
- Asbestos containing material in existing joint.

For full details of the Design Risk Assessment refer to Appendix C

### **3.12 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)**

Two options for repair or replacement of the joints were considered and these have been discussed in detail in Atkins report '*Forth Road Bridge - Options Report for Bridge Deck Joints* (Atkins doc. ref. 5088419/001 Rev A)'. In summary the options were:

**Option 1** Continue with current maintenance regime. This option is viable, but does have the disadvantage that an existing slipping and tripping hazard remains. Also the joint plates will continue to wear thin taking less load from maintenance vehicles.

**Option 2** Completely refurbish the existing joint. This option uses a proven system, with minimum modification to the supporting structure, but has the advantage of improving the slip and trip hazard.

An option to completely replace the joint with another type was also considered, but none was identified that be suitable for the location, given the construction of the deck, that would offer any advantages over the existing type of joint.

The cost to refurbish all the joints is approximately £300,000 excluding traffic management costs.

### **3.13 Proposed arrangements for construction**

#### **3.13.1 Construction of structure**

It is proposed to replace all the joints to one side of the bridge at a time under a full closure of the foot / cycleway. This allows pedestrians and cyclists to cross the bridge on the opposite side of the deck. Once one side is done works and users can swop sides. Consideration will need to be given for access to maintenance vehicles in case of emergency.

#### **3.13.2 Traffic management**

As the foot / cycle ways are separate from the main carriageway the works will not affect the carriageway. The foot / cycle way being worked on will need to be temporarily closed to users (see 3.13.1). For arrangements to divert users, consult standard FETA procedures.

#### **3.13.3 Service diversions**

None

#### **3.13.4 Interface with existing structures**

None. The proposed works will not change the supporting structure to the joint.

## **4. Design criteria**

### **4.1 Actions:**

#### **4.1.1 Permanent actions**

The following permanent actions will be considered in accordance with BS EN 1991-1-1 and the associated UK National Annex:

Steel self weight (to be taken as  $78.5\text{kN/m}^3$ )

Superimposed dead load – Surfacing (to be taken as  $23\text{kN/m}^3$  +/- 40%)



**4.1.2 Snow, Wind and Thermal actions**

Wind loads will be in accordance with BS EN 1991-1-4 and the associated UK National Annex (mean return period of 50 years)

Thermal effects will be in accordance with BS EN 1991-1-5 and the associated UK National Annex.

The effects of snow loads, braking and acceleration forces will be ignored. Wind actions and thermal effects will be combined by considering effects the position of the plates at opposing thermal and wind movement ranges.

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

Service vehicle to be checked as per clause 4.1.5.

**4.1.4 Actions relating to General Order Traffic under STGO regulations**

Not applicable.

**4.1.5 Footway or footbridge variable actions**

Load model 4 (Crowd loading) will be considered in accordance with BS EN 1991-2:2003 and corrigenda December 2004 and February 2010 and the associated UK National Annex with Corrigendum no 1.

The service vehicle as specified in cl 5.3.2.3 of BS EN 1991-2: 2003 and corrigenda December 2004 and February 2010 and the associated UK National Annex with Corrigendum no 1 will be superseded by a 3.5 tonne service vehicle as specified by FETA requirements. A maximum axle load of 3.5 tonnes will be applied in this 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**

None

**4.1.7 Accidental actions**

None

**4.1.8 Action during construction**

None

**4.1.9 Any special action not covered above**

Allowance for any vertical movement will be allowed through the use of spring loaded holding down bolts on each of the plates in the movement joint.

**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**

Not applicable.

**4.3 Minimum headroom provided**

Not applicable.

**4.4 Authorities consulted and any special conditions required**

Planning authorities and Listed Building authorities will be consulted.

**4.5 Standards and documents listed in the Technical Approval Schedule**

See Appendix A.

**4.6 Proposed Departures relating to departures from standards given in 4.5**

A Departure from Standards will be raised for the use of replacement clauses of MCHW Volume 1 Series 1800 to align with Eurocodes execution standards.

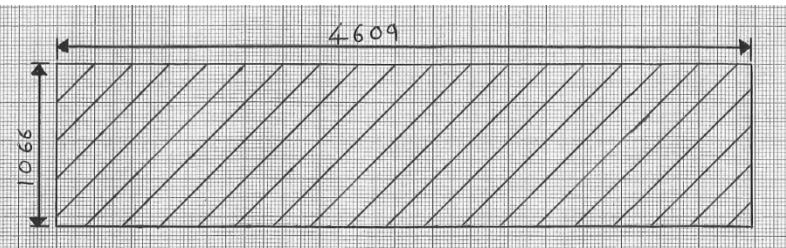

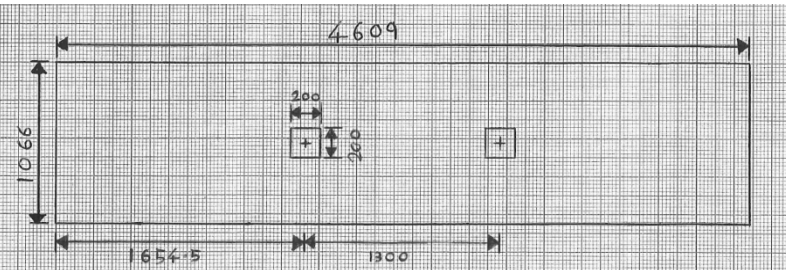


**4.7 Proposed Departures relating to methods of dealing with aspects not covered by standards in 4.5**

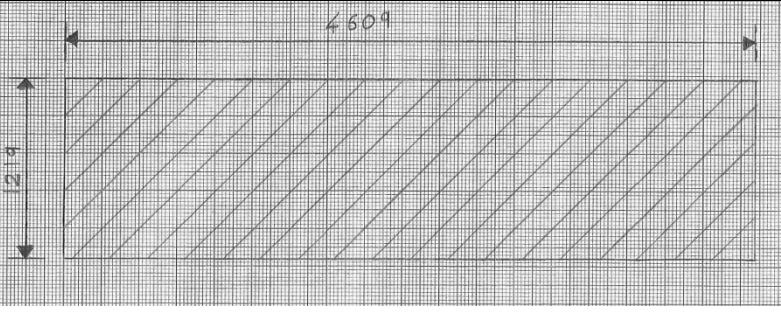
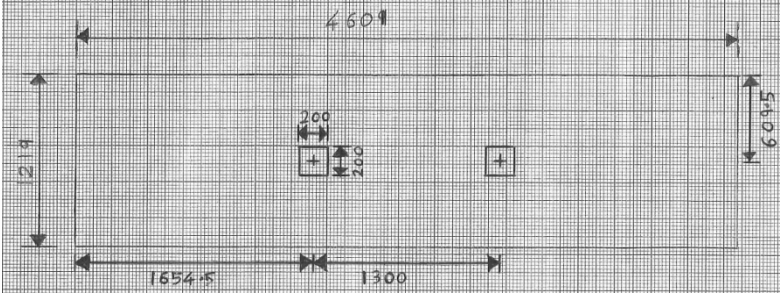

None

**5. Structural analysis****5.1 Methods of analysis proposed for superstructure, substructure and foundations**

The expansion plates shall be designed using simple finite element analysis. The plates shall be geometrically designed to consider the requirement to reduce the trip hazard presented by the existing plates. Improved ride quality is to be achieved with the proposed expansion plate layout.

The load cases to be applied to the three different plates at each of the joints are shown below:

<b>Load Case 1 – Plate Type 1 &amp; 2</b> 	<b>Load Model 4 – Crowd loading applied to plate type 1</b>  <ul style="list-style-type: none"> <li>5kN/m<sup>2</sup> nominal crowd loading</li> </ul>
<b>Load Case 2 – Plate Type 1 &amp; 2</b> 	<b>Footway Service Vehicle</b> <ul style="list-style-type: none"> <li> 17.16kN total load distributed over wheel area</li> </ul>
<b>Load Case 3 – Plate Types 3</b>	<b>Load Model 4 – Crowd loading applied to plate types 2 &amp; 3</b>  <ul style="list-style-type: none"> <li>5kN/m<sup>2</sup> nominal crowd loading</li> </ul>

	
<p><b>Load Case 4 – Plate Types 3</b></p> 	<p>Footway Service Vehicle</p> <ul style="list-style-type: none"> <li>  17.16kN total load distributed over wheel area </li> </ul>

The new spring units fixed to the plate units are to replace the original “Dowpac” liquid spring units fitted to the large expansion plates. The springs are to be designed as compression springs in accordance with BS EN 13906 – 1: 2002 Cylindrical Helical Springs made from Circular Section Wire and Bar – Guide to Calculation and Design – Part 1: Compression Springs.

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

Not applicable.

## 5.3 Assumptions intended for calculation of structural element stiffness

Gross cross section areas of the steel will be used to calculate section properties with reference to ‘Steel Designers Manual’ by Buick Davidson & Graham Owens.

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

Not 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

Not applicable

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

Not applicable

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

Not applicable

## 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

Not applicable.

## 7. Checking

### 7.1 **Proposed Category and Design Supervision level**

Category 2.

### 7.2 **If Category 3, name of proposed Independent Checker**

Not applicable.

### 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**

Temporary works may be necessary for access around the joints (in addition to the existing access arrangements) and also to prevent any material or components falling. Temporary works will be considered as Type S as during the works the foot / cycle way will be closed to the public.

## 8. Drawings and documents

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

Footway Joints General Arrangement – 5127603-ATK-SSP-BR-DR-S-040 Rev B

## 9. The above is submitted for acceptance

Signed: \_\_\_\_\_

Name: Stephen Jones

Design Team Leader

Engineering Qualifications BSc CEng MICE

for and on behalf of

Atkins Consultants Ltd

Date: \_\_\_\_\_

## 10. The above is rejected / agreed subject to the amendments and conditions shown below

Signed: \_\_\_\_\_

Name: \_\_\_\_\_

Position held: \_\_\_\_\_

Engineering Qualifications: \_\_\_\_\_

TAA

Date: \_\_\_\_\_



## A.1 Appendix A Technical Approval Schedule (TAS)

**Technical Approval Schedule (TAS)****Schedule of Documents Relating to Design of Highway Bridges and Structures****Eurocodes and associated UK National Annexes**

	<b>Eurocode part</b>	<b>Title</b>	<b>Amendment / Corrigenda</b>
	<b>Eurocode 0</b>		
✓	BS EN 1990 +A1:2005	Eurocode 0: Basis of structural design	+A1:2005 Corrigenda December 2008 and April 2010
✓	NA to BS EN 1990:2002 + A1:2005	UK National Annex to Eurocode 0 Basis of structural design	National Amendment No.1
	<b>Eurocode 1</b>		
✓	BS EN 1991-1-1:2002	Eurocode 1: Actions on structures. General Actions. Densities, self-weight, imposed load for buildings	Corrigenda December 2004 and March 2009
✓	NA to BS EN 1991-1-1:2002	UK National Annex to Eurocode 1: Actions on structures. General Actions. Densities, self-weight, imposed load for buildings	-
✓	BS EN 1991-1-3:2003	Eurocode 1: Actions on structures. General Actions. Snow loads	Corrigenda December 2004 and March 2009
✓	NA to BS EN 1991-1-3:2003	UK National Annex to Eurocode 1: Actions on structures. General Actions. Snow loads	Corrigendum No.1
✓	BS EN 1991-1-4:2005	Eurocode 1: Actions on structures. General Actions. Wind actions	+A1:2010 Corrigenda July 2009 and January 2010
✓	NA to BS EN 1991-1-4:2005 + A1:2010	UK National Annex to Eurocode 1: Actions on structures. General Actions. Wind actions	National Amendment No.1
✓	BS EN 1991-1-5:2003	Eurocode 1: Actions on structures. General Actions. Thermal actions	Corrigenda December 2004 and March 2009
✓	NA to BS EN 1991-1-5:2003	UK National Annex to Eurocode 1: Actions on structures. General Actions. Thermal actions	-
✓	BS EN 1991-1-6:2005	Eurocode 1: Actions on structures. General Actions. Actions during execution	Corrigendum July 2008, November 2012 and February 2013.
✓	NA to BS EN 1991-1-6:2005	UK National Annex to Eurocode 1: Actions on structures. General Actions. Actions during execution	-
✓	BS EN 1991-1-7:2006	Eurocode 1: Actions on structures. General Actions. Accidental actions	Corrigendum February 2010
✓	NA to BS EN 1991-1-7:2006	UK National Annex to Eurocode 1: Actions on structures. Part 1-7 : Accidental actions	-
✓	BS EN 1991-2:2003	Eurocode 1: Actions on structures. Traffic loads on bridges	Corrigenda December 2004 and February 2010

✓	NA to BS EN 1991-2:2003	UK National Annex to Eurocode 1: Actions on structures. Traffic loads on bridges	Corrigendum No.1 (May 2008)
	<b>Eurocode 2</b>		
	BS EN 1992-1-1:2004	Eurocode 2: Design of concrete structures – Part 1-1: General rules and rules for buildings	Corrigendum January 2008 and November 2010
	NA to BS EN 1992-1-1:2004	UK National Annex to Eurocode 2: Design of concrete structures – Part 1-1: General rules and rules for buildings	National Amendment No.1
	BS EN 1992-2:2005	Eurocode 2: Design of concrete structures – Part 2: Concrete bridges – Design and detailing rules	Corrigendum July 2008
	NA to BS EN 1992-2:2005	UK National Annex to Eurocode 2: Design of concrete structure – Part 2: Concrete bridges – Design and detailing rules	-
	BS EN 1992-3:2006	Eurocode 2: Design of concrete structures – Part 3: Liquid retaining and containment structures	-
	NA to BS EN 1992-3:2006	UK National Annex to Eurocode 2: Design of concrete structure – Part 3: Liquid retaining and containment structures	-
	<b>Eurocode 3</b>		
✓	BS EN 1993-1-1:2005	Eurocode 3: Design of steel structures – Part 1-1 General rules and rules for buildings	Corrigenda February 2006 and April 2009
✓	NA to BS EN 1993-1-1:2005	UK National Annex to Eurocode 3: Design of steel structures – Part 1-1 General rules and rules for buildings	-
	BS EN 1993-1-3:2006	Eurocode 3: Design of steel structures – Part 1-3 General rules – Supplementary rules for cold-formed members and sheeting	Corrigendum November 2009
	NA to BS EN 1993-1-3:2006	UK National Annex to Eurocode 3: Design of steel structures – Part 1-3 Supplementary rules for cold-formed members and sheeting	-
	BS EN 1993-1-4:2006	Eurocode 3: Design of steel structures – Part 1-4 General rules – Supplementary rules for stainless steels	-
	NA to BS EN 1993-1-4:2006	UK National Annex to Eurocode 3: Design of steel structures – Part 1-4 Supplementary rules for stainless steels	-
✓	BS EN 1993-1-5:2006	Eurocode 3: Design of steel structures – Part 1-5 Plated structural elements	Corrigendum April 2009
✓	NA to BS EN 1993-1-5:2006	UK National Annex to Eurocode 3: Design of steel structures – Part 1-5 Plated structural elements	-
✓	BS EN 1993-1-6:2007	Eurocode 3: Design of steel structures – Part 1-6 Strength and stability of shell structures	Corrigendum April 2009
✓	BS EN 1993-1-7:2007	Eurocode 3: Design of steel structures – Part 1-7 Plated structures subject to out of plane loading	Corrigendum April 2009
✓	BS EN 1993-1-8:2005	Eurocode 3: Design of steel structures – Part 1-8 Design of joints	Corrigenda December 2005, September 2006, July 2009 and August 2010
✓	NA to BS EN 1993-1-8:2005	UK National Annex to Eurocode 3: Design of steel structures – Part 1-8 Design of joints	-

✓	BS EN 1993-1-9:2005	Eurocode 3: Design of steel structures – Part 1-9 Fatigue	Corrigenda December 2005, September 2006 and April 2009
✓	NA to BS EN 1993-1-9:2005	UK National Annex to Eurocode 3: Design of steel structures – Part 1-9 Fatigue	-
✓	BS EN 1993-1-10:2005	Eurocode 3: Design of steel structures – Part 1-10 Material toughness and through-thickness properties	Corrigenda December 2005, September 2006 and March 2009
✓	NA to BS EN 1993-1-10:2005	UK National Annex to Eurocode 3: Design of steel structures – Part 1-10 Material toughness and through thickness properties	-
✓	BS EN 1993-1-11:2006	Eurocode 3: Design of steel structures – Part 1-11 Design of structures with tension components	Corrigendum April 2009
✓	NA to BS EN 1993-1-11:2006	UK National Annex to Eurocode 3: Design of steel structures – Part 1-11 Design of structures with tension components	-
✓	BS EN 1993-1-12:2007	Eurocode 3: Design of steel structures – Part 1-12 Additional rules for the extension of EN 1993 up to steel grades S 700	Corrigendum April 2009
✓	NA to BS EN 1993-1-12:2007	UK National Annex to Eurocode 3: Design of steel structures – Part 1-12 Additional rules for the extension of EN 1993 up to steel grades S 700	-
✓	BS EN 1993-2:2006	Eurocode 3: Design of steel structures – Part 2 Steel bridges	Corrigendum July 2009
✓	NA + A1:2012 to BS EN 1993-2:2006	UK National Annex to Eurocode 3: Design of steel structures – Part 2 Steel bridges	+ A1:2012
	BS EN 1993-5:2007	Eurocode 3: Design of steel structures – Part 5 Piling	Corrigendum May 2009
	NA + A1:2012 to BS EN 1993-5:2007	UK National Annex to Eurocode 3: Design of steel structures – Part 5 Piling	+ A1:2012
	<b>Eurocode 4</b>		
	BS EN 1994-1-1:2004	Eurocode 4: Design of composite steel and concrete structures – Part 1-1 General rules and rules for buildings	Corrigendum April 2009
	NA to BS EN 1994-1-1:2004	UK National Annex to Eurocode 4: Design of composite steel and concrete structures – Part 1-1 General rules and rules for buildings	-
	BS EN 1994-2:2005	Eurocode 4: Design of composite steel and concrete structures – Part 2 General rules and rules for bridges	Corrigendum July 2008
	NA to BS EN 1994-2:2005	UK National Annex to Eurocode 4: Design of composite steel and concrete structures – Part 2 General rules and rules for bridges	-
	<b>Eurocode 5</b>		
	BS EN 1995-1-1:2004 + A1:2008	Eurocode 5: Design of timber structures – Part 1-1 General – common rules and rules for buildings	+ A1:2008 Corrigendum June 2006
	NA to BS EN 1995-1-1:2004 + A1:2008	UK National Annex to Eurocode 5: Design of timber structures – Part 1-1 General – common rules and rules for buildings	+ A1:2008 National Amendment No. 2
	BS EN 1995-2:2004	Eurocode 5: Design of timber structures – Part 2 Bridges	-

	NA to BS EN 1995-2:2004	UK National Annex to Eurocode 5: Design of timber structures – Part 2 Bridges	-
	<b>Eurocode 6</b>		
	BS EN 1996-1-1:2005 + A1:2012	Eurocode 6: Design of masonry structures – Part 1-1 General rules for reinforced and unreinforced masonry structures	Corrigenda February 2006 and July 2009
	NA to BS EN 1996-1-1:2005 + A1:2012	UK National Annex to Eurocode 6: Design of masonry structures – Part 1-1 General rules for reinforced and unreinforced masonry structures	-
	BS EN 1996-2:2006	Eurocode 6: Design of masonry structures – Part 2 Design considerations, selection of materials and execution of masonry	Corrigendum September 2009
	NA to BS EN 1996-2:2006	UK National Annex to Eurocode 6: Design of masonry structures – Part 2 Design considerations, selection of materials and execution of masonry	Corrigendum No.1
	BS EN 1996-3:2006	Eurocode 6: Design of masonry structures – Part 3 Simplified calculation methods for unreinforced masonry structures	Corrigendum October 2009
	NA to BS EN 1996-3:2006	UK National Annex to Eurocode 6: Design of masonry structures – Part 3 Simplified calculation methods for unreinforced masonry structures	-
	<b>Eurocode 7</b>		
	BS EN 1997-1:2004	Eurocode 7: Geotechnical design – Part 1 General rules	Corrigendum February 2009
	NA to BS EN 1997-1:2004	UK National Annex to Eurocode 7: Geotechnical design – Part 1 General rules	Corrigendum No.1
	BS EN 1997-2:2007	Eurocode 7: Geotechnical design – Part 2 Ground investigation and testing	Corrigendum June 2010
	NA to BS EN 1997-2:2007	UK National Annex to Eurocode 7: Geotechnical design – Part 2 Ground investigation and testing	-
	<b>Eurocode 8</b>		
	BS EN 1998-1:2004 + A1:2013	Eurocode 8: Design of structures for earthquake resistance – Part 1 General rules, seismic actions and rules for buildings	Corrigendum June 2009, January 2011 and March 2013
	NA to BS EN 1998-1:2004	UK National Annex to Eurocode 8: Design of structures for earthquake resistance – Part 1 General rules, seismic actions and rules for buildings	-
	BS EN 1998-2:2005+A2:2011	Eurocode 8: Design of structures for earthquake resistance – Part 2 Bridges	Corrigenda February 2010 and February 2012
	NA to BS EN 1998-2:2005	UK National Annex to Eurocode 8: Design of structures for earthquake resistance – Part 2 Bridges	-
	BS EN 1998-5:2004	Eurocode 8: Design of structures for earthquake resistance – Part 5 Foundations, retaining structures and geotechnical aspects	-
	NA to BS EN 1998-5:2004	UK National Annex to Eurocode 8: Design of structures for earthquake resistance – Part 5 Foundations, retaining structures and geotechnical aspects.	-



	<b>Eurocode 9</b>		
	BS EN 1999-1-1:2007 + A1:2009	Eurocode 9: Design of aluminium structures– Part 1-1 General structural rules	+ A1:2009
	NA to BS EN 1999-1-1:2007 + A1:2009	UK National Annex to Eurocode 9: Design of aluminium structures – Part 1-1 General structural rules	National Amendment No.1 Corrigendum No.1
	BS EN 1999-1-3:2007 + A1:2011	Eurocode 9: Design of aluminium structures – Part 1-3 Structures susceptible to fatigue	+ A1:2011
	NA to BS EN 1999-1-3:2007 + A1:2011	UK National Annex to Eurocode 9: Design of aluminium structures – Part 1-3 Structures susceptible to fatigue	+ A1:2011
	BS EN 1999-1-4:2007 + A1:2011	Eurocode 9: Design of aluminium structures – Part 1-4 Cold formed structural sheeting	+ A1:2011 Corrigendum November 2009
	NA to BS EN 1999-1-4:2007	UK National Annex to Eurocode 9: Design of aluminium structures – Part 1-4 Cold formed structural sheeting	-

**Bsi Published Documents*****For guidance only unless clauses are otherwise specified in IAN 124/11 Annex B.***

	<b>Document Number</b>	<b>Title</b>
✓	PD 6688-1-1:2011	Recommendations for the design of structures to BS EN 1991-1-1
✓	PD 6688-1-2:2007	Background paper to the UK National Annex to BS EN 1991-1-2
✓	PD 6688-1-4:2009	Background paper to the UK National Annex to BS EN 1991-1-4
✓	PD 6688-1-7:2009	Recommendations for the design of structures to BS EN 1991-1-7
✓	PD 6688-2:2011	Recommendations for the design of structures to BS EN 1991-2
✓	PD 6687-1:2010	Background paper to the UK National Annexes to BS EN 1992-1 and BS EN 1992-3
✓	PD 6687-2:2008	Recommendations for the design of structures to BS EN 1992-2:2005
✓	PD 6695-1-9:2008	Recommendations for the design of structures to BS EN 1993-1-9
✓	PD 6695-1-10:2009	Recommendations for the design of structures to BS EN 1993-1-10
✓	PD 6695-2:2008 + A1:2012 and corrigendum no 1 February 2013.	Recommendation for the design of bridges to BS EN: 1993
✓	PD 6696-2:2007 + A1:2012	Background paper to BS EN 1994-2 and the UK National Annex to BS EN 1994-2
✓	PD 6694-1:2011	Recommendations for the design of structures subject to traffic loading to BS EN 1997-1
	PD 6698:2009	Recommendations for the design of structures for earthquake resistance to BS EN 1998
	PD 6703:2009	Structural bearings – Guidance on the use of structural bearings
✓	PD 6705-2:2010 + A1:2013	Recommendations for the execution of steel bridges to BS EN 1090-2
	PD 6705-3:2009	Recommendations on the execution of aluminium structures to BS EN 1090-3
	PD 6702-1:2009	Structural use of aluminium. Recommendations for the design of aluminium structures to BS EN 1999

**Execution Standards referenced in British Standards or Eurocodes**

	<b>Execution Standard</b>	<b>Title</b>
✓	BS EN 1090-1:2009+A1:2011	Execution of steel structures and aluminium structures - Part 1: Requirements for conformity assessment of structural components
✓	BS EN 1090-2:2008+A1:2011	Execution of steel structures and aluminium structures – Part 2: Technical requirements for the execution of steel structures
	BS EN 1090-3:2008	Execution of steel structures and aluminium structures – Part 3: Technical requirements for aluminium structures
	BS EN 13670:2009	Execution of concrete structures

**Product Standards referenced in British Standards or Eurocodes**

	<b>Product Standard</b>	<b>Title</b>
	BS EN 206:2013	Concrete – Specification, performance, production and conformity
	BS EN 1317-1:2010	Road Restraint Systems – Part 1 – Terminology and general criteria for test methods
	BS EN 1317-2:2010	Road Restraint Systems – Part 2 – Performance classes, impact test acceptance criteria and test methods for safety barriers.
	BS EN 1317-3:2010	Road Restraint Systems – Part 3 – Performance classes, impact test acceptance criteria and test methods for crash cushions.
	DD ENV 1317-4:2002	Road Restraint Systems – Part 4 – Performance classes, impact test acceptance criteria and test methods for terminals and transitions of safety barriers.
	BS EN 1317-5:2007+A1:2008 and corrigendum August 2012	Road Restraint Systems – Part 5 - Product requirements and evaluation of conformity for vehicle restraint systems
✓	BS EN 1337-1:2000	Structural bearings – Part 1: General Design Rules
	BS EN 1337-2:2004	Structural bearings – Part 2: Sliding elements
	BS EN 1337-3:2005	Structural bearings – Part 3: Elastomeric bearings
✓	BS EN 1337-4:2004 and corrigendum no 1 March 2007	Structural bearings – Part 4: Roller bearings
	BS EN 1337-5:2005	Structural bearings – Part 5: Pot bearings
	BS EN 1337-6:2004	Structural bearings – Part 6: Rocker bearings
	BS EN 1337-7:2004	Structural bearings – Part 7: Spherical and cylindrical PTFE bearings
	BS EN 1337-8:2007	Structural bearings – Part 8: Guide bearings and restraint bearings
	BS EN 1337-9:1998	Structural bearings – Part 9: Protection
	BS EN 1337-10:2003	Structural bearings – Part 10: Inspection and maintenance
	BS EN 1337-11:1998	Structural bearings – Part 11: Transport, Storage and Installation.
✓	BS EN 10025-1:2004	Hot rolled products of structural steels Part 1: General technical delivery conditions.
✓	BS EN 10025-2:2004	Hot rolled products of structural steels Part 2: Technical delivery conditions for non-alloy structural steels.
✓	BS EN 10025-3:2004	Hot rolled products of structural steels Part 3: Technical delivery conditions for normalized/normalized rolled weldable fine grain structural steels.

✓	BS EN 10025-4:2004	Hot rolled products of structural steels Part 4: Technical delivery conditions for thermomechanical rolled weldable fine grain structural steels.
✓	BS EN 10025-5:2004	Hot rolled products of structural steels – Part 5: Technical delivery conditions for structural steels with improved atmospheric corrosion resistance
	BS EN 10025-6:2004+A1:2009	Hot rolled products of structural steels – Part 6: Technical delivery conditions for flat products of high yield strength structural steels in the quenched and tempered condition.
	BS EN 10080:2005	Steel for the reinforcement of concrete – Weldable reinforcing steel - General
	BS EN 10248-1:1996	Hot rolled sheet piling of non alloy steels. Technical delivery conditions
	BS EN 10248-2:1996	Hot rolled sheet piling of non alloy steels. Tolerances on shape and dimensions
	BS EN 12063:1999	Execution of special geotechnical work. Sheet pile walls.
	BS EN 15050:2007 + A1:2012	Precast concrete products – Bridge elements

**British Standards**

	British Standard	Title
	BS 4449:2005+A2:2009	Steel for the reinforcement of concrete
	BS 5896:2012	Specification for high tensile steel wire and strand for the pre-stressing of concrete
	BS 8006-1:2010	Code of practice for strengthened/reinforced soils and other fills
	BS 8500-1:2006 +A1:2012 Incorporating Corrigendum No.1	Concrete – Complementary British Standard to BS EN 206-1 – Part 1: Method of specifying and guidance for the specifier.
	BS 8500-2:2006 +A1:2012 Incorporating Corrigendum No.1	Concrete – Complementary British Standard to BS EN 206-1 – Part 2: Specification for constituent materials and concrete.

**The Manual Contract Document for Highway Works (MCHW)**

	Volume Number	Title
✓	MCHW Volume 1: November 2009	Specification for Highway Works
✓	MCHW Volume 2: November 2009	Notes for guidance on the Specification for Highway Works
✓	MCHW Volume 3: November 2008	Highway Construction Details

**The Design Manual for Roads and Bridges (DMRB)**

	Volume Number	Title
✓	BD 2/12	Technical Approval of Highway Structures
	BD 7/01	Weathering steel for highway structures
	BD 10/97	Design of highway structures in areas of mining subsidence
	BD 12/01	Design of corrugated steel buried structures with spans greater than 0.9 metres and up to 8.0 metres
	BD 29/04	Design criteria for footbridges
✓	BD 33/94	Expansion joints for use in highway bridge decks
✓	BD 35/06	Quality assurance scheme for paints and similar protective coatings

✓	BD 36/92	Evaluation of maintenance costs in comparing alternative designs for highway structures
	BD 43/03	The impregnation of reinforced and prestressed concrete highway structures using hydrophobic pore-lining impregnants
	BD 45/93	Identification markings of highway structures
	BD 47/99	Waterproofing and surfacing of concrete bridge decks
	BD 51/98	Portal and cantilever signs/signal gantries
✓	BD 57/01	Design for durability
✓	BD 62/07	As built, operational and maintenance records for highway structures
	BD 65/97	Design criteria for collision protection beams
	BD 67/96	Enclosure of bridges
	BD 68/97	Crib retaining walls
	BD 78/99	Design of road tunnels
	BD 82/00	Design of buried rigid pipes
	BD 90/05	Design of FRP bridges and highway structures
	BD 94/07	Design of minor structures
✓	BA 26/94	Expansion joints for use in highway bridge decks
	BA 28/92	Evaluation of maintenance costs in comparing alternative designs for highway structures
	BA 36/90	The use of permanent formwork
	BA 41/98	The design and appearance of bridges
	BA 42/96	The design of integral bridges
	BA 47/99	Waterproofing and surfacing of concrete bridge decks
✓	BA 57/01	Design for durability
	BA 59/94	Design of highway bridges for hydraulic action.
	BA 67/96	Enclosure of bridges
	BA 68/97	Crib retaining walls
	BA 82/00	Formation of continuity joints in bridge decks
	BA 84/02	Use of stainless steel reinforcement in highway structures
✓	BA 85/04	Coatings for concrete highway structures & ancillary structures
	BA 92/07	Use of recycled concrete aggregates in structural concrete
	TD 19/06	Requirement for road restraint systems
	TD 27/05	Cross-sections and headrooms
	HD 22/08	Managing geotechnical risk
	HA 66/95	Environmental barriers

### Transport Scotland Interim Amendments (TS IA Series)

	TS IA Number	Title
✓	TS IA 11	Model Contract Documents for Highway Works
✓	TS IA 12	Specification for Highway Works Mar 98
✓	TS IA 13	Model Contract Documents for Highway Works (For use in Scotland) Aug 94
✓	TS IA 14	Model Contract Documents for Highway Works (For use in Scotland) Aug 94
	TS IA 15	
	TS IA 16	Methods of Measurement for Highway Works Aug 94

	TS IA 17	
✓	TS IA 18	Notes for Guidance on the Specification for Highway Works May 05
	TS IA 19	
	TS IA 20	Concrete Half Joint Deck Structures Apr 06
	TS IA 21	Principal and General Inspection of Sign / Signal Gantries, and Gantries with low Handrails or Open Mesh Flooring – Oct 06
	TS IA 22	Implementation of New Reinforcement Standards (BS 4449:2005, BS 4483:2005, BS 8666:2005) Oct 06
	TS IA 23	Implementation of BS8500-1:2006 Concrete – Complementary British Standard to BS EN 206-1 – Jun 07
✓	TS IA 24	Guidance on implementing results of research on bridge deck waterproofing – July 07
	TS IA 25	Assessment and Upgrading of Existing Vehicle Parapets Aug 07
	TS IA 26	The Anchorage of Reinforcement & Fixings in Hardened Concrete – Feb 08
	TS IA 27	Implementation of the Construction (Design and Management) regulations 2007 and the withdrawal of SD 10/05 and SD 11/05 - May 08
	TS IA 28	Certification of Combined Kerb and Drainage Products - Dec 08
	TS IA 29	Identification of 'Particularly at Risk' Supports - June 09
	TS IA 30	The Use of Foamed Concrete - Oct 09
	TS IA 31	The use of Eurocodes for the design of bridges and road related structures – April 10
	TS IA 32	Clarification on the deflection of permanent formwork during the construction of trunk road bridges – Oct 10
	TS IA 33	Guidance on the use of various documents relating to General & Principal Inspections for Trunk Road Structures – Oct 10
	TS IA 34	Guidance on the use of High Friction Surfacing at Signalised Pedestrian Crossings on single carriageway Trunk Roads – Nov 10
✓	TS IA 35	Guidance on the Introduction of Transport Scotland TS 2010 surface course specification – Dec 10

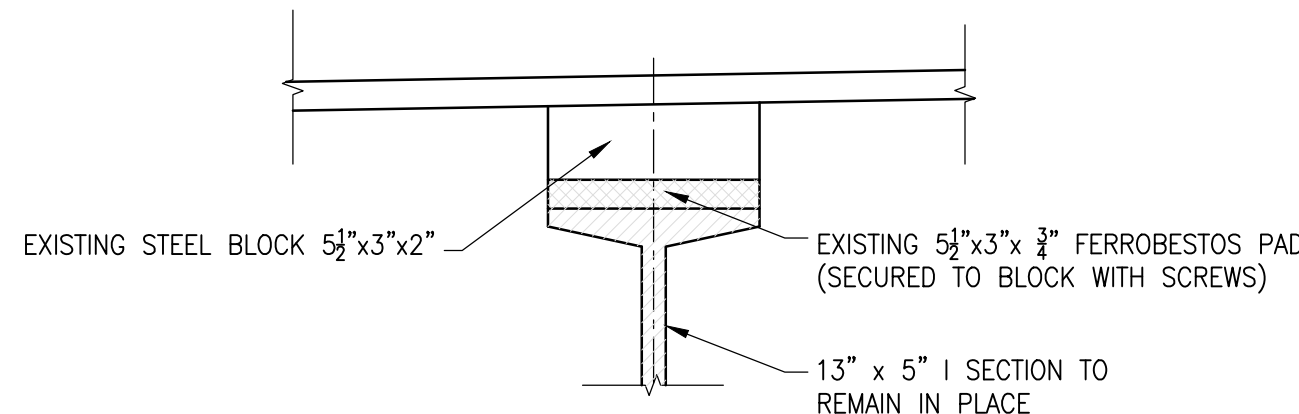
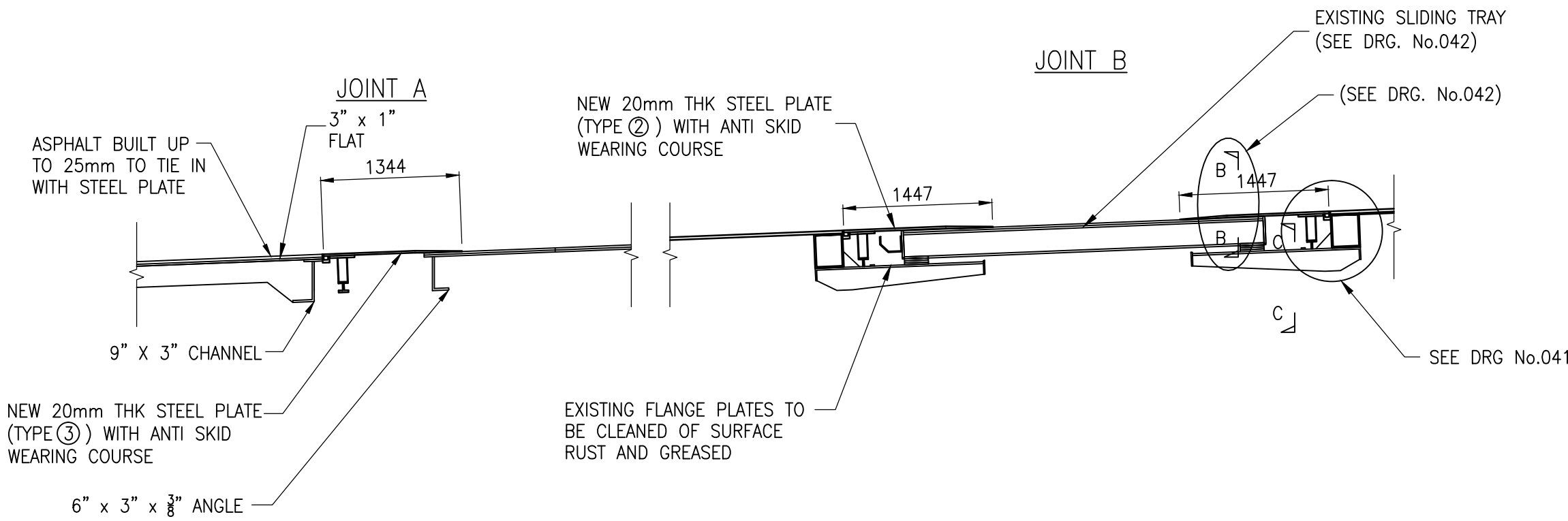
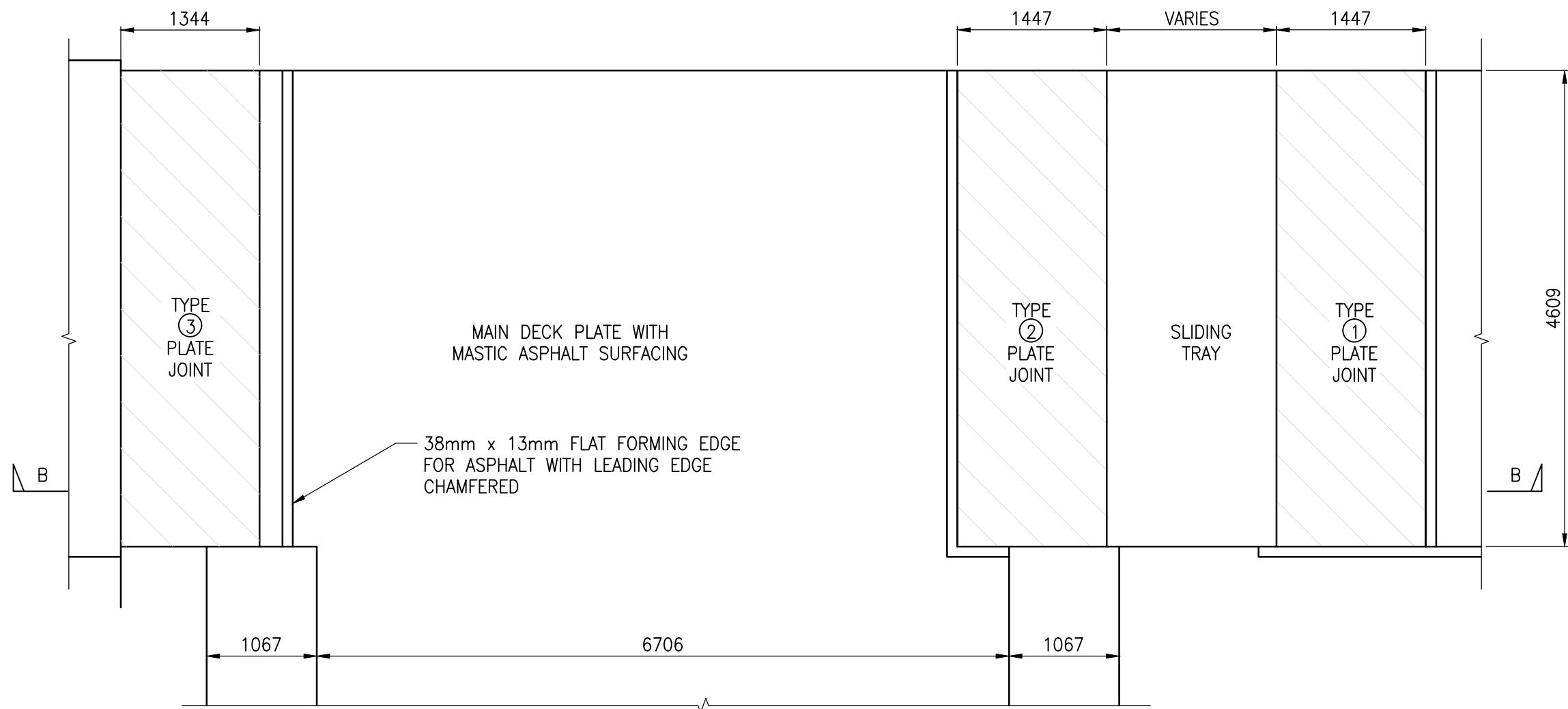
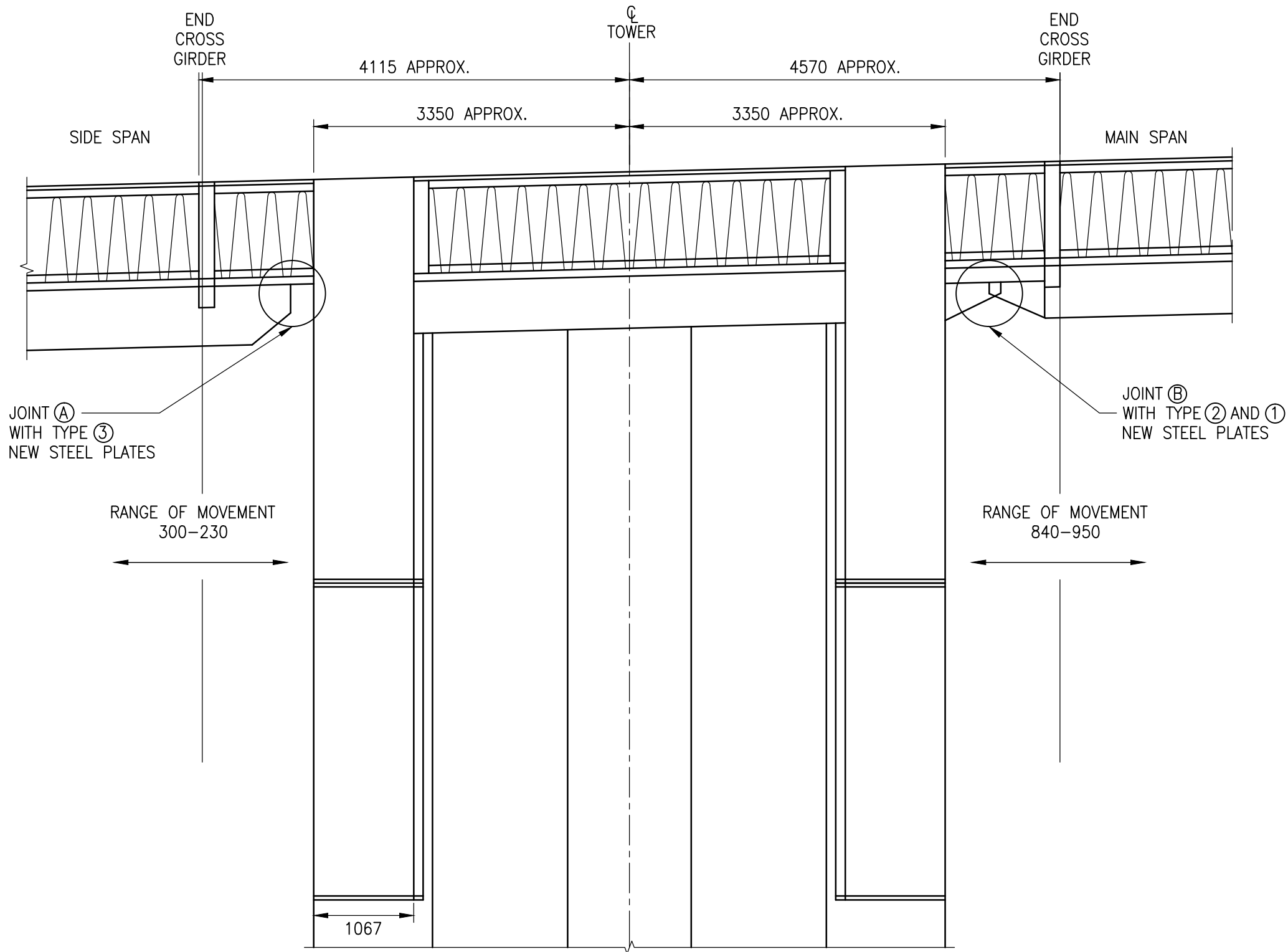
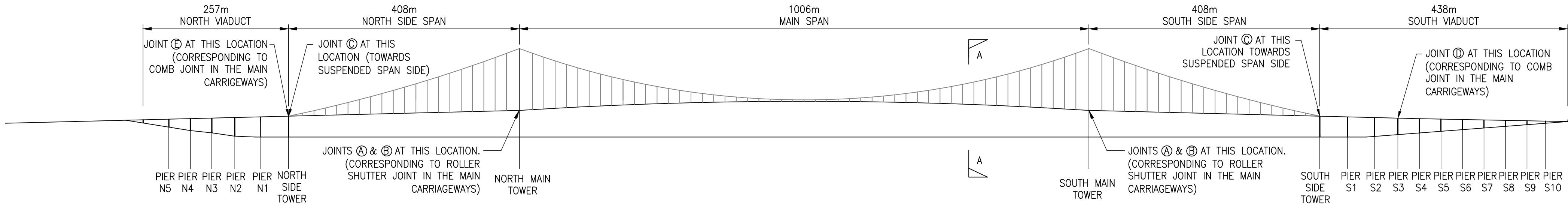


	TS IA 36	Guidance on structural safety reporting relating to the Scottish Trunk Road Network – Dec 10
	TS IA 37	Design of Single 2+1 single roads – Dec 10
	TS IA 38	Temporary Barrier Decision Tool (TBDT) – May 11
✓	TS IA 39	Use of Eurocodes for the design of bridges and road related structures – Aug 11
	TS IA 40	Road Safety Auditor Certification – Compliance with EC Directive 2008/96/EC – Dec 2011
	TS IA 42	Temporary Cover Plates Over Bridge Expansion Joints – Aug 2013
	TS IA 43	Strategy for the Repair/Replacement of Joints

**Miscellaneous**

	<b>Document</b>	<b>Title</b>
	BRE Special Digest 1: 2005: Third Edition	Concrete in aggressive ground.
	CHE Memorandum 227/08	The Impregnation of Reinforced and Pre-stressed Concrete Highway Structures using Hydrophobic Pore Lining Impregnants
	CIRIA C543	Bridge Detailing Guide
	CIRIA C660	Early-age Thermal Crack Control in Concrete
	CIRIA C686	Safe Access for Maintenance and Repair

## A.2 Appendix B General Arrangement Details of Structure



SCHEDULE OF JOINTS (WEST FOOTWAY)								
LOCATION	JOINT (B)		JOINT (A)		JOINT (C)		JOINT (D)	
	PLATE (1)	PLATE (2)	PLATE (3)	PLATE (4)	PLATE (5)	PLATE (6)	PLATE (7)	PLATE (8)
SOUTH MAIN TOWER	1 No.	1 No.	1 No.	-	-	-	-	-
NORTH MAIN TOWER	1 No.	1 No.	1 No.	-	-	-	-	-
SOUTH SIDE TOWER	-	-	-	1 No.	-	-	-	-
SOUTH SIDE TOWER (PIER S3)	-	-	-	-	1 No.	-	-	-
NORTH SIDE TOWER	-	-	-	1 No.	-	-	1 No.	-

SCHEDULE OF JOINTS (EAST FOOTWAY)								
LOCATION	JOINT (B)		JOINT (A)		JOINT (C)		JOINT (D)	
	PLATE (1)	PLATE (2)	PLATE (3)	PLATE (4)	PLATE (5)	PLATE (6)	PLATE (7)	PLATE (8)
SOUTH MAIN TOWER	1 No.	1 No.	1 No.	-	-	-	-	-
NORTH MAIN TOWER	1 No.	1 No.	1 No.	-	-	-	-	-
SOUTH SIDE TOWER	-	-	-	1 No.	-	-	-	-
SOUTH SIDE TOWER (PIER S3)	-	-	-	-	-	1 No.	-	-
NORTH SIDE TOWER	-	-	-	1 No.	-	-	-	1 No.

NOTES

1. ROLLER SHUTTER JOINTS AND OTHER ITEMS OMITTED FROM DRAWING FOR CLARITY.
2. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE STATED. EXISTING SECTION SIZES SHOWN IN IMPERIAL UNITS.
3. ALL DIMENSIONS TO BE VERIFIED ON SITE PRIOR TO FABRICATION WORKS COMMENCING.
4. SLIDING PLATE JOINTS EXIST IN THE FOOTWAYS AT ALL ROLLER SHUTTER AND COMB JOINTS.
5. DRAWING TO BE READ IN CONJUNCTION WITH DRAWING No's 5127603-ATK-SSP-BR-DR-S-041 - 043.
6. ALL STRUCTURAL STEEL ON THIS DRAWING TO BE GRADE S355 J2 G3 IN ACCORDANCE WITH BS EN 10025.
7. CONTRACTOR TO USE NEW HSFG BOLTS. BOLTS TO BE HIGH STRENGTH FRICTION GRIP BOLTS GRADE 8.8 TO BS EN 1993-1-8 IN ACCORDANCE WITH APPENDIX 18/1.
8. EXISTING EXPANSION JOINT STEEL PLATES TO BE REMOVED IN ACCORDANCE WITH APPENDIX 2/3.
9. NEW STEEL PLATES TO BE INSTALLED TO SUIT EXISTING JOINT DIMENSIONS AND SLIDING TRAY.
10. EXISTING DRAINAGE TO BE CLEANED OUT.
11. JOINT A HOLDING DOWN ARRANGEMENT INDICATIVE ONLY

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING SIGNIFICANT RESIDUAL RISKS

CONSTRUCTION
LEAD PAINT
MAINTENANCE/CLEANING
(ENTER 'NONE' IF APPLICABLE)
USE
(ENTER 'NONE' IF APPLICABLE)
DECOMMISSIONING/DEMOLITION
(ENTER 'NONE' IF APPLICABLE)

B	FIRST ISSUE	08/14	SHJ
A	FOR CATEGORY 2 CHECK	06/14	-

Stat	Rev	Purpose of Issue	Date	Auth
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B	INCORPORATED CHECKER'S COMMENTS	MR	08/14	CM	SHJ
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A	UPDATED TO EUROCADES STANDARDS	BM	04/14		
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Rev	Description	By	Date	Chk'd	Auth
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FORTH ESTUARY TRANSPORT AUTHORITY

Project  
FORTH ROAD BRIDGE  
EXPANSION JOINT REPLACEMENT

Title  
FOOTWAY JOINTS  
GENERAL ARRANGEMENT

Sheet Size	Original Scale	Designed/Drawn	Checked	Authorised
A1	As Shown	BM	CM	SHJ
		Date 04/14	Date 08/14	Date 08/14

Status	Drawing Number	Rev
P1	5127603-ATK-SSP-BR-DR-S-040	B

# Appendix C      Hazard Identification and Risk Assessments



Scheme Title: Forth Road Bridge  
Refurbishment of Foot / Cycleway Joints  
CDM Hazard Log

- Notes:  
1. This CDM Hazard Log does not use conventional risk scoring. In its place is a requirement to determine whether the residual risk is "Significant" as ACOP 131-134  
2. The CDM Hazard Log should be used in conjunction with the RAG List dated November 2008 (See "RAG List" sheet)  
3. The provision of items on the Red and Amber Lists does not remove from the designer any obligation to identify and assess hazards and risks specific to the project  
4. Refer also to Guidance Worksheet  
5. Risks not on the RAG list should be compared with Red and Amber items on the list to help judge their risk rating

PART A - RISK IDENTIFICATION							PART B - RISK ELIMINATION / REDUCTION				PART C - RESIDUAL RISK INFORMATION							
Ref	Date	Designer (Name)	Element or Location	Hazard (For examples, hover over this cell. Also use "Activity List" sheet to prompt hazards from work situations)	RAG Item No. and abbreviated description (Click here to see list and full description)	Risk Rating Red - Extreme, Amber - Significant or Not Significant	Project Stage	Date design measure suggested	Can the risk be eliminated	If a Green RAG list item employed to significantly reduce risk, list it here. (Click here to see green list of preferred materials, elements and processes)	Designer measures taken and considered to eliminate or reduce risk	Risk Rating Red - Extreme, Amber - Significant or Not Significant	Residual risk information to pass onto Contractor	Means of communicating significant residual risk (RED and Amber items will go into PCI and drawings)	Further Comments / Record of communication to Project Director for sign off if a Red List item	Is the residual risk significant and not obvious to those who will use the design?	Contractor accepts issues	Status Active/ Closed
001	21 Jan '14	D Timby	General	Activity Time Constraints - in terms of contract period and carriageway closures Hazard Potential for accidents to rush job within time limits	None applicable	Amber - Significant	C/D		No	G16 - Ensure use of right people for the right job at the right time to reduce risk, paperwork and encourage teamwork.	Programme work. Discuss with Contractor to ensure sufficient time available at start of work	Not Significant	None, but review contractors programme.	N/A	N/A	No		
002	21 Jan '14	D Timby	General	Activity High noise levels from work activities and passing traffic. Hazard Potential hearing damage. Could affect both work force and residential properties	A14 - Specify work which exceed Noise at Work Regulations.	Amber - Significant	C/D		No	None applicable	Avoid anti-social hours. Residential properties sufficiently far enough away. Ear protection on site if necessary.	Not Significant	None, but permitted noise levels and times to be included in contract specification.	N/A	N/A	No		
003	21 Jan '14	D Timby	General	Activity Access for future maintenance - can the joints be designed to allow easier access Hazard Poor access could lead to lack of inspection and maintenance. Risk of injury to personnel in reaching inaccessible areas.	None applicable	Not Significant	M		No	None applicable	Improvements have been made for access to joints. Limited scope for further changes	Not Significant	None	N/A	N/A	No		
004	21 Jan '14	D Timby	General	Activity Dismantling existing joints Hazard Risk of injury to operatives	A13 - Require manual work with Musculoskeletal Disorder potential (eg. Drilling)	Amber - Significant	D		No	G12 - Encourage use of mechanical means instead of manual handling	Use of experienced contractor with suitable equipment.	Not Significant	None specific, but advise on drawings.	N/A	N/A	No		
005	21 Jan '14	D Timby	General	Activity Temporary closure of foot / cycle way. Hazard Risk of injury to users trying to use footway during works from work activities or unsafe area.	R7 - TM design not using all information available	Red - Extreme	C/O/M		Yes	G13 - Consult with all interested parties for TM scheme	Use FETA standard procedures	Not Significant	Specify FETA standard procedures	N/A	N/A	No		
006	21 Jan '14	D Timby	General	Activity Difficult access around joints Hazard Risk of falling (people or materials)	R3 - Design prevents fall prevention systems	Red - Extreme	C		Yes	G2 - Provision for maintenance / replacement access	Use of experienced contractor. Available means to fix safety harnesses. Design joints so that they can be assembled on site in easily managed sized components.	Not Significant	Advise that will be working at height.	N/A	N/A	No		
007	21 Jan '14	D Timby	General	Activity Lifting in / out components / joints Hazard Damage to other parts of bridge lifting in / out joints	None applicable	Not Significant	C		Yes	G19 - Designer to consider lifting operation feasibility of and risks	Joints can be dismantled or cut into parts to limit lifting weight and size	Not Significant	None.	N/A	N/A	No		
008	21 Jan '14	D Timby	Steelwork	Activity Maintenance painting of existing components - removal of unsound paint. Hazard Potential lead in paint which is hazardous to health	None applicable	Amber - Significant	C		Yes	None applicable	Test for lead prior to start of works. Consult existing records.	Amber - Significant	Advise Contractor if records or tests show that lead may be present	Indicate risk on drawings and contract specification	N/A	No		
009	21 Jan '14	D Timby	General	Activity Working at height Hazard Falls from height	R9 - Design at height without provision for suitable working platform	Red - Extreme	C		Yes	G2 - Provision for maintenance / replacement access	Also use harnesses for work force. Avoid working in high winds / bad weather	Not Significant	Advise that will be working at height.	N/A	N/A	No		
010	21 Jan '14	D Timby	General	Activity Working over water Hazard Pollution of water course from work activities (e.g. Painting, grit blasting)	None applicable	Not Significant	C		Yes	None applicable	Painting off site. Existing components, if fell, would not significantly pollute	Not Significant	None	N/A	N/A	No		
011	21 Jan '14	D Timby	General	Activity Working on highway Hazard Working close to traffic - risk of conflict with vehicles	R7 - TM design not using all information available	Red - Extreme	C		Yes	G13 - Consult with all interested parties for TM scheme	Use FETA standard procedures for footway closure	Not Significant	Use of FETA standard procedures for footway closures as these tried and tested. Details in contract documentation.	N/A	N/A	No		
012	21 Jan '14	D Timby	General	Activity General Hazard Limited working space. Potential of injury from adjacent activities, plant movements.	A10 - Site layout without space for delivery / storage of materials	Amber - Significant	C		Yes	G14 - Provision for safe Plant / Materials storage areas away from c'way	Consider use of FETA depot	Not Significant	Advise contractor of suitable storage areas in contract documentation	N/A	N/A	No		
013	21 Jan '14	D Timby	General	Activity All Hazard Bridge contains services (water, communications) for maintenance. These do not need to be diverted, but there is a risk of damage and loss of service.	R8 - Relevant services information not obtained	Red - Extreme	C		Yes	None applicable	No service diversions will be necessary, but consult FETA records.	Not Significant	Advise contractor of any nearby services in contract documentation.	N/A	N/A	No		
014	21 Jan '14	D Timby	General	Activity General access between various joint locations Hazard Conflict between passing plant moving from one area to another	A9 - Safe site traffic routes prevented (one way / segregation systems)	Amber - Significant	C		Yes	G13 - Consult with all interested parties for TM scheme	Use FETA standard procedures for carriageway closure	Not Significant	Use of FETA standard procedures for carriageway closures as these tried and tested. Details in contract documentation.	N/A	N/A	No		
015	21 Jan '14	D Timby	General	Activity Access for vehicles Hazard Foot / cycleway not designed to accept heavy vehicles. Lifting equipment will be required.	None applicable	Amber - Significant	C		Yes	G19 - Designer to consider lifting operation feasibility of and risks	Use FETA standard procedures for carriageway closure	Not Significant	Use of FETA standard procedures for carriageway closures as these tried and tested. Details in contract documentation.	N/A	N/A	No		
016	21 Jan '14	D Timby	General	Activity Unauthorised access by operatives or members of the public Hazard Risk of personal injury to those unfamiliar with site.	R6 - Design prevents segregation of public from site.	Red - Extreme	C		Yes	None applicable	Existing CCTV cameras available to monitor	Not Significant	Contractor to take security measures such as fencing, locking away equipment, etc	N/A	N/A	No		
017	21 Jan '14	D Timby	Steelwork	Activity Site Welding. Hazard Fire resulting from falling hot welding slag or sparks on the passing ships or oil tankers below the bridge deck.	A17 - New structures requiring on-site welding.	Amber - Significant	C		Yes	G10 - Construction sequence considered to minimize the workforce exposure to live traffic.	Trial erection off site to minimise any fabrication on site. May have some repairs / modification to supporting structure.	Not Significant	Some site welding may be unavoidable but design site connections to be bolted where possible.	N/A	N/A	No		
018	21 Jan '14	D Timby	General	Activity Manual handling Hazard Musculoskeletal Disorders (MSD)	A4 - Materials weighing > 20kgs requiring manual handling	Amber - Significant	C		Yes	G12 - Encourage use of mechanical means instead of manual handling	Crane can be positioned on carriageway for lifting. FETA have standard procedures. Consider new components to have lifting points.	Not Significant	None	N/A	N/A	No		
019	21 Jan '14	D Timby	Foot / cycleway	Activity General working on joints, inc access plant Hazard Potential conflict between site operations and users of foot / cycleway. Risk of personal injury.	R6 - Design prevents segregation of public from site.	Red - Extreme	C		Yes	None applicable	Avoid use of foot / cycleway for construction uses. Consider screens (avoid wind loads)	Not Significant	Contractor to be advised that foot / cycleway not available to him in contract documents	N/A	N/A	No		
020	21 Jan '14	D Timby	General	Activity Weather conditions - site exposed to wind, rain and temperature. Hazard Potential sickness, increased risk of falling in high winds.	None applicable	Amber - Significant	C/O/M		Yes	G21 - Consider minimum welfare facilities needed for contract.	Also avoid poor weather, consult forecasts.	Not Significant	None	N/A	N/A	No		