SUBMISSION FOR VOLUME 1, 2 AND 3 DEPARTURE FROM STANDARDS

DEPARTURE FROM STANDARDS

(Bridges and other Highway Structures)

Name of Works:

Strengthening of End Link Brackets For N.E & S.E Towers

Name of Bridge or Structure: Forth Road Bridge

Structure Reference Number: N/A

OVERSEEING ORGANISATION NAME: Transport Scotland

APPLICATION FOR DEPARTURE FROM STANDARDS – DMRB Vol 1 Section 3 Part 14 BD 37/01

APPLICANT: Fairhurst

PROJECT TITLE: Strengthening of End Link Brackets For N.E & S.E Towers

DEPARTURE No: 002

STRUCTURE REF: Forth Road Bridge

SUBMISSION DATE: 19/11/15

1. List of supporting documentation

Standards: Design Manual For Roads and Bridges (DMRB) Volume 1 Section 3 Part 14 DB 37/01

Drawings: None

Other: None

2. Description of proposed departure
(Include details of DMRB / Eurocode Standards and Clause numbers which are being departed from)

A reduced load factor of 1 and 1.2 for SLS and ULS respectively will be used in the model for the superimposed dead load carriageway surfacing in accordance with Clause 5.2.2.1 of BD 37/01.

3. Designer / Assessor justification
(Include reasons why existing DMRB / Eurocode Standards are inappropriate)

The total weight of asphalt surfacing on the bridge is controlled by Amey through management of resurfacing operations on the bridge. Where resurfacing is undertaken, overlays are not permitted and the existing surfacing is removed before a replacement surface is laid with measurement controls placed on the thickness. We have also undertaken a detailed assessment of the thickness of surfacing across the bridge spans through site measurements during resurfacing operations. The actual weight adopted in the assessment is based on the mean thickness of surfacing recorded on site. On this basis the load factor applied to the weight of the surfacing can be reduced in accordance with the Assessment Standards.

4. Cost implications
(Include an estimate of cost savings to Transport Scotland as well as the effect on future maintenance costs)

4.1. Construction costs

Adopting standard loading and load factors for the assessment of the bridge and design of strengthening works will lead to significant works across the bridge structure to achieve code compliance. Reducing the load factor for the bridge reduces the extent of interventions required. The approach proposed by this departure is considered a pragmatic response to the assessed structural issues

4.2. Maintenance costs
NA

5. Applicant design of the Works Team Leader Declaration:

I declare that reasonable professional skill and care have been exercised in the preparation of this Departure submission.

Signed: [redacted]

Name: C. A. Clark

Date: 19TH Nov 2015

6. Overseeing Organisation Bridges Branch Comments and Recommendation:

Please refer to attached BD37 CL 5.2.2.1

Surfacing on bridge is strictly controlled.

I recommend that the above departure should be accepted / ~~rejected~~

Signed: [redacted]

Name:

Date: 23-11-15.

7. Overseeing Organisation Recommendation

The above Departure is approved / ~~rejected.~~

Signed: [redacted]

Name: J. W. Hinoshaw

Date: 24 Nov 2015

5.2.2 **Design load.** The factor γ_{fL}, to be applied to all parts of the superimposed dead load, irrespective of whether these parts have an adverse or relieving effect, shall be taken for all five load combinations as follows:

	For the ultimate limit state	For the serviceability limit state
deck surfacing	1.75	1.20
other loads	1.20	1.00

exept as specified in 5.2.2.1 and 5.2.2.2 (Note also the requirements 4.5.2).

NOTE The term "other loads" here includes non-structural concrete infill, services and any surrounding fill, permanent formwork, parapets and street furniture.

5.2.2.1 **Reduction of load factor.** The value of γ_{fL} to be used in conjunction with the superimposed dead load may be reduced to an amount not less than 1.2 for the ultimate limit state and 1.0 for the serviceability limit state, subject to the approval of the appropriate authority which shall be responsible for ensuring that the nominal superimposed dead load is not exceeded during the life of the bridge.

5.2.2.2 **Alternative load factor.** Where the structure or element under consideration is such that the application of γ_{fL} as specfied in 5.2.2 for the ultimate limit state causes a less severe total effect (see 3.2.6) than would be the case if γ_{fL}, applied to all parts of the superimposed dead load, had been taken as 1.0, values of 1.0 shall be adopted. However, the γ_{fL} factors to be applied when considering overturning shall be in accordance with 4.6.

5.3 Wind loads

5.3.1 **General.** The wind pressure on a bridge depends on the geographical location, the terrain of the surrounding area, the fetch of terrains upwind of the site location, the local topography, the height of the bridge above ground, and the horizontal dimensions and cross-section of the bridge or element under consideration. The maximum pressures are due to gusts that cause local and transient fluctuations about the mean wind pressure.

The methods provided herein simulate the effects of wind actions using static analytical procedures. They shall be used for highway and railway bridges of up to 200m span and for footbridges up to 30m span. For bridges outside these limits consideration should be given to the effects of dynamic response due to turbulence taking due account of lateral, vertical and torsional effects; in such circumstances specialist advice should be sought.

Wind loading will generally not be significant in its effect on many highway bridges, such as concrete slab or slab and beam structures of about 20m or less in span, 10m or more in width and at normal heights above ground.

In general, a suitable check for such bridges in normal circumstances would be to consider a wind pressure of 6 kN/m^2 applied to the vertical projected area of the bridge or structural element under consideration, neglecting those areas where the load would be beneficial.

Design gust pressures are derived from a product of the basic hourly mean wind speed, taken from a wind map (Figure 2), and the values of several factors which are dependent upon the parameters given above.

5.3.2 **Wind Gust Speed.** Where wind on any part of the bridge or its elements increases the effect under consideration (adverse areas) the maximum design wind gust speed V_d shall be used.