

Forth Road Bridge
Strengthening of End Link Brackets For N.E. /
S.E. Towers
Application for Departures from Standards

FAIRHURST

SUBMISSION FOR VOLUME 1, 2 AND 3 DEPARTURE FROM STANDARDS

DEPARTURE FROM STANDARDS

Name of Works:

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

(Bridges and other Highway Structures)

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: 003 Rev01

STRUCTURE REF: Forth Road Bridge

SUBMISSION DATE: 26/11/15

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: Fairhurst. '2010 Bridge Specific Assessment Live Loading + Addendum reports'. (2011)

2. Description of proposed departure

(Include details of DMRB / Eurocode Standards and Clause numbers which are being departed from)

Amended lane factors from those recommend by Fairhurst in the 2010 BSALL report.

Adopted lane factors of 1, 0.46, 0.14, and 0.14 for lanes 1, 2, 3, and 4 respectively.

3. Designer / Assessor justification

(Include reasons why existing DMRB / Eurocode Standards are inappropriate)

Assessment of the main tower link arrangement has previously shown that elements of the links are overstressed under the application of recommended 2010 BSALL loading. Please refer to Fairhurst's 2010 Bridge Specific Assessment Live Loading + Addendum reports (provided with this submission) for the derivations of BSALL based on traffic survey (WIM) data. The initial recommended lane factors as suggested by Fairhurst are discussed and provided in section 3.4 and 3.5.

In order to prioritise essential maintenance and upgrading works FETA requested that Fairhurst review the assessment of the link arrangements for a lower level of 2010 BSALL. The review determined the lowest levels of stress indices associated with a 2010 BSALL which can be safely accepted thereby limiting the extent of any upgrading required to the brackets in the short term. It was accepted that amended lane factors based on Weigh In Motion (WIM) calculations of 1, 0.46, 0.14, and 0.14 can be adopted for lanes 1, 2, 3, and 4 respectively

Queuing is assumed to occur only in response to specific incidents. Therefore in practice it would not be unreasonable to assume that queuing is unlikely to develop on the second carriageway concurrent with queuing on the first carriageway. However there are indications that incidents on both lanes of a dual carriageway are linked. This may be due to the traffic slowing down and being distracted in the second carriageway by an incident in the first carriageway, alternatively this may also occur as a result of poor weather conditions. Based on consideration of the above, the characteristic loading in the southbound carriageway was assumed to equal the mean traffic queue loading that was simulated during the three week survey period in 2010. The mean traffic loadings for the second carriageway slow and fast lanes (lanes 3 and 4) relative to the first carriageway slow lane were 0.14.

There is a risk that the lane factors calculated from the three week sample of WIM data does not reflect all loading scenarios therefore larger initial lane factors of 1, 0.67, 0.33, 0.33 were recommended in the 2010 BSALL assessment. The BSALL loadings for this works are based on the 5% probability of occurring in a period of 10 years therefore as the new Queens Ferry Crossing will be opened shortly where traffic will be diverted away from the Bridge, we consider the likelihood of the loadings ever being achieved to be minimal and amended lane factors can be adopted.

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 Lane factors as set out in Fairhurst's 2010 BSALL report 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 lane 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 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:



Name: C. A. CLARK

Date: 26/11/15

6. Overseeing Organisation Bridges Branch Comments and Recommendation:

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

Signed:




Name:

Date: 10/12/15

7. Overseeing Organisation Recommendation

The above Departure is approved / rejected.

Signed:



Name: CANON/B CLARK, BSc(Hon), CEng, MICE, MInstE

Date:

11/12/15

