 SENIOR ENGINEER STRUCTURES CIRCULAR

 SES 02/07

 SHEAR LOAD RATING FOR FLAT SLABS

| No. Sketches Following | - | No. Appendix Sheets Following | - |

1. Effective Width for slab shear

Background

MRWA regularly requests design engineers to provide load ratings for bridges. In the instances of load rating of reinforced concrete flat slabs in shear, it has been observed that there are variations in the determination of the effective width of slab utilised for the design shears. Grillage and other models indicate a shear concentration at the support nodes and there is little guidance within the code as to how a width of slab can be determined across which the shear is effectively distributed. Conservative assumptions have led to situations wherein the slab shear strength became the controlling limitation, even though that is considered highly improbable from research testing and observed performance.

MRWA has undertaken a review of previous design practice, consultation with local bridge design experts and analysis of the results of the Baandee Lakes bridge which was loaded to failure. As a consequence of this, MRWA has determined that conservative ‘rule of thumb’ effective widths can be used for the analysis of slab shear on flat slab reinforced concrete bridges.

Qualifying Assumptions

a. The bridge is a standard MRWA design with well-detailed reinforcing in longitudinal and transverse directions.

b. The bridge is not showing evidence of shear cracking or block-cracking and is generally in good condition.

Action

In load rating reinforced concrete flat slab bridges, the effective width for slab shear may be taken as 3m for a single vehicle and 6m for two design vehicles.

For overwidth vehicles, the effective width of the slab may be taken as the width of the vehicle under consideration.

2. Punching Shear for Flat Slab Bridges

After consideration of the punching shear results obtained from the Baandee lakes bridge tests, it is clear that there is potential additional capacity over and above the theoretical value obtained from the code, which may be considered in
load rating at least some flat slab bridges. The qualifying assumptions listed above in section 1 would apply.

However, due to the limited number of tests and the variability between flat slab bridges, a ‘rule of thumb’ guide is not provided. Approval should instead be obtained from the SES for consideration of increasing the allowable punching shear capacity and to what limit.

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