

Evaluation on Shear Capacity of Prestressed Concrete Bridge Girders

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ABSTRACT

Although there have been many studies on the shear performance of bridge girders, experimental studies on actual bridges are very rare. In this study, a shear test was performed by bringing 4 prestressed concrete girders from the Helperzoom Bridge in the Netherlands, which are scheduled to be demolished and replaced. The primary variable for the experiments were the shear span-to-depth, and the experimental results were analyzed with national design codes and compared with nonlinear finite element analysis results. The experimental results showed that the shear cracking pattern and shear failure mode were different depending on the shear span ratio, which means that the shear span-to-depth ratio has a very large effect on the shear behavior and strength of prestressed concrete members. It was also found that the Dutch RBK design provisions estimated the shear strength of the girders conservatively, while the ACI 318-19 provided very accurate estimation on both the shear cracking strength and shear capacity of the girders. In addition, the nonlinear finite element analysis very closely simulated the critical shear crack location, crack angle, and shear strength of the girders.

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