

CHAPTER 9

CONCLUDING REMARKS

The structural behavior of a steel-concrete composite bridge, Rama III–Sathu Pradit Bridge located in Bangkok, is investigated. The following observations have been made in this study.

1. The design analysis consistently overestimates both of the longitudinal stress and the vertical displacement measured in the loading test. The differences at the mid-span of Girder G4, where the largest values were obtained, are as much as 20.5 N/mm² or 58% in the stress and 6 mm or 25% in the vertical displacements.
2. Although in the design analysis, concrete barriers are treated as non-structural members and thus the contribution to the structural behavior of the bridge is ignored, they are indeed influences the structural behavior. This fact partly accounts for the discrepancy of the design values from the loading-test results.
3. The interaction between the superstructure and the bridge piers is neglected in the design analysis. However, the bridge piers actually deform and influence the structural behavior of the bridge. The interaction may be even more important if a bridge is continuous, i.e. a statically indeterminate structure.
4. The influence of the variation of Young's modulus of concrete on the structural behavior of a steel-concrete composite bridge is very small and may be neglected in the design analysis.
5. The finite element analysis can simulate the structural behavior of a steel-concrete composite bridge very well: the results would be in good agreement with those of loading test, provided that a finite element model takes account of all the contributing factors such as concrete barriers and bridge piers.
6. The real reactions can be quite different from those obtained in the design analysis. Not only magnitude but also the directions of those forces can be different. Moreover, the horizontal reactions, which are neglected in the design analysis of a simply-supported girder, are present. Caution must be used for the design of the bearings.
7. The inclusion of the concrete barriers and the bridge piers in the analysis is important in the evaluation of reactions, since the negligence of these factors can yield smaller reactions. Therefore, the design of the bearings may be not only wrong but also unsafe if the whole bridge is not modeled appropriately.