

Design Concept of Steel-Concrete Composite Slab Using an Adhesive

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Summary

A steel-concrete composite slab using an adhesive has been developed in our previous study. The composite system may be designed simply and provide economical advantage compared with conventional systems having mechanical shear connectors. This paper describes a design method for the composite slab conforming to Japanese design code. Effectiveness of the system is discussed from an economic point of view. By employing the composite system, the construction cost of bridge deck can be decreased to 86-94 % of the cost of conventional system.

Keywords: Steel-Concrete Composite Slab, Adhesive, Design, Cost Performance

1. Introduction

Steel-concrete composite slabs have been used for bridge deck construction because of several advantages; safety construction, decreased construction time, and high fatigue durability. On the other hand, most of composite slabs have some problems, such as troublesome construction and increasing cost and weight, because the composite structures need to use many mechanical shear connectors, e.g. headed studs (see Fig. 1a). In addition, the shear connector is a possible cause of concrete cracking at early age because it restricts the volume change of concrete.

A simplified composite slab using a special adhesive, which consists of cementitious material and emulsion emulsion, has been developed in our previous study [1] to solve the problem in bridge deck construction. The proposed system shown in Fig. 1b is a composite structure of ribbed steel plate and expansive concrete. To improve ductility of the structure, the lateral ribs welded to the plate have holes like Perfobond rib. According to direct shear test in the previous research, the

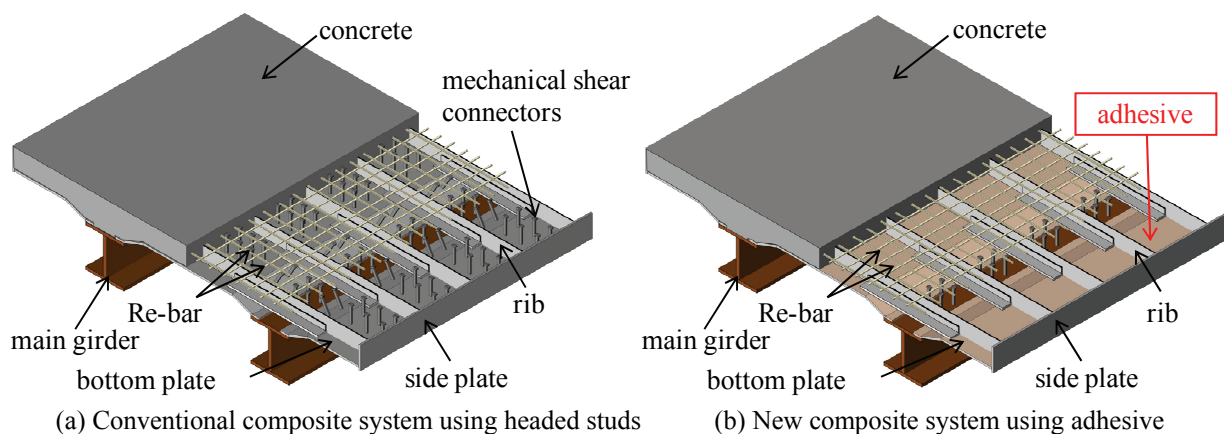


Fig. 1: Steel-concrete composite slab