



Experimental study on precast segmental box girders with corrugated steel webs

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Abstract

Precast segmental bridge with corrugated steel webs has good popularization value, for the advantages of precast segmental construction and box girder with corrugated steel webs. In order to study the mechanical behavior of this structure,6 simply-supported scale model beams with corrugated steel webs were tested with the forming process, ratio of internal tendons to external tendons, shear-span ratio, number of joint, connection type of corrugated steel web,etc.,as the parameters. Stress variations in the concrete, web and tendon and deflection during loading are described, the crack generation and failure mode are also explained, the effects of parameters on the mechanical behavior of beams are analyzed. The study indicates that segmental beams have equal stiffness with monolithic beam in elastic stage, the joint affects the failure mode and causes decrease in the flexural bearing capacity, segmental beams with mixed post-tensioning or flange connector show better mechanical behavior than other segmental beams.

Keywords: Precast segmental bridge; corrugated steel web; scale model;mechanical behavior; experimental study

1 Introduction

In recent years, box girder bridge with corrugated steel webs, which can take advantage of mechanical properties of the two materials, reduce the weight of the structure, improve the efficiency of prestressing, has got rapid development in China. Generally, box girder bridge with corrugated steel webs use in-situ construction technology by foot-hold and cantilever, which has some deficiencies, such as complex process and difficult to control quality.

Aim at improving the quality and efficiency of construction, reducing the influence to site environment, realizing assembly, standardization construction, this paper presents medium span box girder bridge with corrugated steel webs by precast segmental technology.

Two problems need to be studied for precast segmental girder bridges with corrugated steel webs:

(1) For precast segmental concrete bridge, the joints tend to weaken its ULS. Also, it is necessary to assess the weaken degree of precast segmental girder bridges by theoretical and experimental re-