



Behavior of Precast Prestressed Concrete Segmental Beams

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Abstract

The structural behavior of Segmental Precast Post-tensioned Reinforced Concrete (SPPRC) beams largely depends on the behavior of the joints that connect between the segments. In this research, series of static tests were carried out to investigate the behavior of full-scale SPPRC beams with different types of epoxy-glued joint configurations; multi-key joint, single key, and plain key joint. The reference specimen was monolithically casted beam and the other specimens were segmental beams with five segments for each one. The general theme from the experimental results reflects an approximate similarity in the behavior of the four beams with slight differences. Due to the high tensile strength of the used epoxy in comparison to concrete, cracks at joints occurred in the concrete cover which was attached to the epoxy mortar.

Keywords: Concrete Beam; Epoxy Joint; Key Joint; Post-Tensioning; Segmental Beam.

1. Introduction

A segmental beam can broadly be defined as that beam which consists of a number of small segments fabricated either in their final position or in some other location, and then assembled to form the beam.

Two methods are commonly used in segmental construction, depending on the particular application. The first method uses cast-in-place concrete, and the second method uses precast concrete units. Pre-tensioning and post-tensioning is common practice in the two methods.

The prestressed segmental construction method for reinforced concrete (RC) bridges is rapid, safe, and economical and has been widely used in the construction of long-span RC bridges in different countries around the world.

Joints between adjacent segments can be dry or epoxy-coated, with or without shear keys. The selection of the joint type depends mainly on the prevalent conditions under which the system is to be utilized.

In this research, series of static tests were carried out to investigate the behavior of full-scale Segmental Precast Post-tensioned Reinforced Concrete (SPPRC) beams with different types of epoxy-glued joint configurations; multi-key joint, single key, and plain key joint. The reference specimen was a monolithically casted beam and the other specimens were segmental beams with five segments for each one.

2. Literature Review

A description of the construction of a post-tensioned segmental beam and a comparison between the experimental

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