Investigation on Construction Quality Indices for Concrete Box Girders

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Summary

Based on three bridge dismantlement, two construction quality indices were investigated in-situ ,which consisted of duct grouting compaction of prestressing tendons, excess concrete rate in box girder. The result indicated that the excess concrete rate in box-girders, varied between 10% to 20% and the concrete excess centred at the top slab and bottom slab. The duct for prestressing tendons were only partially grouted, with over 50% ungrouted for longitudinal tendons and over 70% ungrouted for transverse tendons. Obviously, this would increased the prestress loss in the tendons,and increased the possibility of structure cracking. It was helpful for realising the true performance of box-girders.

Key word Bridge; construction quality; concrete box girder; duct grouting; concrete excess

1. Introduction

Construction of PC box-girder bridge have achieved a great success in the developed countries. For instance, the structural defect ive rate was lower in USA. The defective rate for highway bridges in USA is given in table 1-1. It shows that defective rate for PC box girder bridge was comparatively low [1]. In China it was obvious by the investigation result that the about 100% of large span PC box-girder bridge started to crack between 3-6 years, in particular for bridges built since 1990s,and bridges with a span length between 100m – 150m also cracked significantly[2].

Table1-1 Defect rate of highway bridge in USA

Bridge type	Total No	Defective amount	Defective rate /%
RC bridge	91886	6027	6.6
PC bridge	88304	3212	3.3
Steel bridge	118424	22928	19.4
Timber bridge	27817	13199	47.4
Other bridge	1309	211	16.3
Total	327829	45587	13.9

In order to understand the reason for cracking, studies were in progress by more and more Chinese experts and Engineers. However, the research was based only on the original design diagram of box girders and ideal construction conditons, the deviation of member size and construction quality have not been considered, because the true construction quality of PC box girders was difficult to detect clearly once the bridge is built. Therefore, the structural behavior of PC box girders cannot be fully understood, leading to some deviation from understanding the true reason for box girder cracking.

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