

Experimental Study on Reinforced Single-column under Eccentric Load

Wurong Fu

e-mail: fuwurong@126.com

Shanghai Highway & Bridge (Group) Co., Ltd

Shanghai, China

Ruigen Zhou

e-mail: ZRG@tongji.edu.cn

Department of Bridge Engineering

Tongji University

Shanghai, China

Xinguo Zhang

e-mail: 675856571@qq.com

Shanghai Highway & Bridge (Group) Co., Ltd

Shanghai, China

Ye Xia

e-mail: yxia@tongji.edu.cn

Department of Bridge Engineering

Tongji University

Shanghai, China

ABSTRACT

In recent years, accidents of overall lateral overturning of simply-supported and continuous girder bridges have occurred in the world. Since 2018, Shanghai has carried out overturning design verification and risk identification for such girder bridges. Based on the calculation results and the actual bridge inspection results, the paper proposes a reinforcement method for the bridges with single-column. An additional steel bent beam is connected to the column, and additional auxiliary bearings on the lateral sides of the original bearings are arranged. By this method the steel bent beam is connected to the original columns through studs, which can reduce the construction time and

guarantee the behaviour between the single-column and the bent beam. A full-size test specimen was designed and tested to investigate the behaviour and capacity of the reinforced method. Through the

test results, load-displacement curved was obtained and cracks were observed and recorded. The joint between UHPC and the column cracked and was the unfavourable design section for the method.

This method can guarantee the force state of bridges under service time, and the anti-overturning capacity is increased by the additional steel bent beam and bearings under extreme loading conditions.

Keywords: steel bent beam, bearing, overturning, load-displacement, cracks, UHPC joint

1 INTRODUCTION

In recent years, with rapid development of traffic, the number of vehicles and the corresponding the load grow rapidly in China[Karagiozova and Alves (2004), Shi et al. (2010), Jiang and Yang (2013)]. Thus, several accidental collapses of girder bridges have occurred under the influence of eccentric heavy vehicles in China[Shi et al. (2016), Zhou et al. (2014)]. For example, in October