

Analytical Study on Curved Box Girder Bridges with Minimum Horizontal Stiffeners

Junichi Adachi

Graduate Student
Osaka City University

Osaka, Japan
adachi@brdg.civil.eng.osaka-cu.ac.jp

Junichi ADACHI, born 1997, B.S. in Civil Engineering from Osaka City University. He belongs to Bridge Engineering Laboratory.



Takashi YAMAGUCHI

Professor
Osaka City University

Osaka, Japan
yamaguti-t@osaka-cu.ac.jp

Takashi YAMAGUCHI, born 1968, Ph. D. in Civil Engineering from Kyoto University, Japan. He is specialized in steel structure and bridge engineering.



Kohei FUNAYAMA

JFE Engineering Corporation
Tokyo, Japan
funayama-kohei@jfe-eng.co.jp

Kohei FUNAYAMA, born 1994, M. S. in Civil Engineering from Osaka City University.

Shintaro ARAI

JFE Engineering Corporation
Tokyo, Japan
arai-shintaro@jfe-eng.co.jp

Shintaro ARAI, born 1990, M. S. in Civil Engineering from The University of Tokyo.

Michiaki TAKAO

JFE Engineering Corporation
Tokyo, Japan
takao-michiaki@jfe-eng.co.jp

Michiaki TAKAO, born 1965, M. S. in Civil Engineering from Kyoto University.

Contact: adachi@brdg.civil.eng.osaka-cu.ac.jp

1 Abstract

Curved box girder bridges are widely used in viaducts in urban areas, as well as highway junctions. In fabricating curved box girders, automatic welding robots cannot be applied to welding of horizontal stiffeners to the web panel due to the girder curvature and manufacturing costs increase. Elimination or reduction of the number of horizontal stiffeners is desirable. In this study, FE analysis was carried out varying the curvature and the width-thickness ratio of the structural components as structural parameters to propose the curved box girder bridges without horizontal stiffeners in the web panel. In order to evaluate the ultimate strength, the collapse mode (buckling of lower flange, web panel or stiffeners) has been clarified considering the design sectional forces such as torsional moment, bending moment and shearing force.

From the results, it was found that the curvature has little influence on the bending buckling strength of the web panels. Even if the horizontal stiffeners are eliminated, the ultimate strength doesn't decrease until compressive flange buckling occurs. It is concluded that the ultimate strength is governed by the buckling of the compressive flange, even when the bending buckling occurs in the web panel.

Keywords: curved box girder bridges; horizontal stiffeners; ultimate strength