



One-sided repair of corroded steel girder end with high-strength bolted doubler plate and evaluation of its resiliency after the repair

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Abstract

Repair of steel girder end is sometimes conducted from one side when work space is restricted or corrosion extent is small. This study focuses on repair with high-strength bolted doubler plate as effective and quick one-sided repair method of corroded girder end. FEA was conducted to evaluate the resistance of intact, corroded and repaired girder and to investigate geometrical dimensions of the doubler plate for enhancing its resiliency. From obtained results, both high repair effect and resiliency can be secured with one-sided bolted and small plate, if the web plate and bearing stiffener is prevented from buckling. As contact force between doubler plate and lower flange is the most important to resisting mechanism, they should be touched with each other. Regarding bolt arrangement, it'd be desirable to reduce the distance between lower flange and end bolt. Finally, the repair work such as jack-up and perforation has almost no influence on the ultimate strength.

Keywords: Resiliency, Corrosion, Bolted Connection, Doubler Plate Repairs

1 Introduction

Infrastructures have been required resiliency in addition to safety and durability. Resilient Structures is what can recover its performance quickly and easily by the resisting mechanism of its member and structural system. As for a steel girder bridge, the girder end is deteriorated by the corrosion, and deeply related to the safety of the bridge. Repair of the girder end is sometimes conducted from one side when the work space is restricted or the corrosion extent is small. We are investigating effective and quick one-sided repair method of corroded girder end with high-strength bolted doubler plate to recover its resistance to

initial sound state. In this study, FEA was conducted to evaluate the resistance of intact, corroded and repaired girder. And also, comparing the difference in their resistance, various structural configurations such as geometrical dimensions of the doubler plate, repairing locations and bolt arrangement are investigated to enhance resiliency of the girder end.

2 Numerical analysis

2.1 Targeted bridge

Fig. 1 shows dimensions of FE model made as half of an I-girder. Modelling range is part of 4 main I-girder bridge described as a design example in Ref.