Maintenance and repair of slab anchors on a curved non composite steel box-girder bridge

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Abstract

Fractures of slab anchors were detected on a curved non-composite steel box-girder bridge on the Metropolitan Expressway. Fractographic investigation concluded that the fractures were caused by metallic fatigue. Because of fractures of slab anchors, a gap originated due to bond deterioration around the boundaries of the RC slab and the steel girder, and also closure behavior of the gaps due to traffic of over-sized vehicles was confirmed. Maintenance and repair was implemented to integrate once again the RC slab and the steel girder. As means of construction, post-installed anchor was used since traffic regulation is unnecessary and construction is possible from beneath the road surface.

Therefore, a FEM analysis and a local load carrying test was carried out intended for curved box girders of a maximum transverse slope of 9%. Reviews considering deformation behavior and acting force of the damage were conducted and was reflected in the repair design.

Keywords: curved bridge, non-composite girder, FEM, RC slab, slab anchor, fatigue, post-installed anchor.

1 Introduction

In general, for non-composite bridges that do not expect composition effect of the RC slab, the RC slab and steel girder sets a slab anchor as a shear connector, with the aim of integration against alteration of temperature and desiccation shrinkage, and also to secure predetermined adhesion against horizontal force due to acceleration of vehicles, braking and earthquakes. By regulations, the structure must be installed within 1m interval, and also by bending the bar steel of over Φ13 at a 45°angle. [1] This is an empirically determined structure, where external force that acts on the slab anchor, allowable shear force, and fatigue strength are not clearly defined. This paper reports the cause of subsidiary fractures obtained from fractographic investigations of the slab

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