



## Analytical Study of Fatigue-crack Propagation on Web-Gap Plate

**Ryo Tobita**

*Metropolitan Expressway Company Limited, Tokyo, Japan*

**Hirohisa Suzuki**

*Metropolitan Expressway Company Limited, Tokyo, Japan*

**Contact:** [r.tobita158@shutoko.jp](mailto:r.tobita158@shutoko.jp)

### Abstract

The study describes behaviour of fatigue-cracks for evaluation of structural repair priority.

Around 65% of the total length of the Metropolitan Expressway in Japan is composed of viaducts made of steel. And fatigue crack problem has been occurred on the steel structures. In particular, around 30% of all the fatigue-cracks occurred at “Web-Gap Plate(WGP)” which is attached in plate girder bridges. This study focused on the fact that those cracks do not always induce collapse of the girder bridge immediately, even though the number of cracks, which are needed to repair, is becoming increasing.

As a result of the study, repair priorities of around 60% cracks on WGP can be lowered by analysing maintenance data accumulated since 2001.

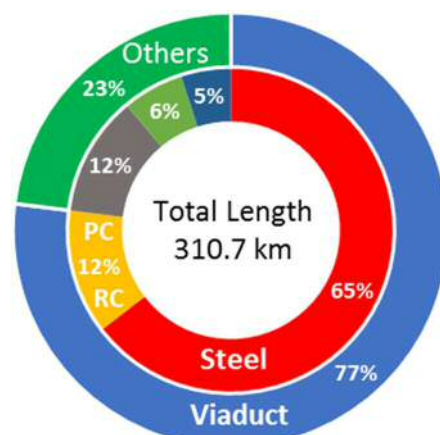
**Keywords:** repair priority; web-gap plate; plate girder bridge; fatigue-crack; propagation speed

## 1 Introduction

### 1.1 Maintenance of structures in Metropolitan Expressway

The Metropolitan Expressway (MEX) has provided services on length of 310.7km in greater Tokyo metropolitan area in Japan. And around 65% of the length is composed of viaducts made of steel, as illustrated in *Figure 1*.

The average of 24hours-traffic volume is around 1 million cars. And steel viaducts are carrying heavy traffic, as shown in *Figure 2*. Because of these heavy traffic and ageing of structure, a lot of fatigue-cracks have been occurred on steel viaducts.



*Figure 1. Proportion of Metropolitan Expressway in Japan* <sup>[1]</sup>