An efficient seismic retrofit for the Capodichino viaduct

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Abstract

Built environment in Europe has become dense with infrastructures and buildings packed in a restricted space. In many countries the laws explicitly promote the cities densification to avoid further urban sprawl. For many years the densification was debated without taking into account the need for a general seismic update of infrastructure and the protection of the cultural heritage. The Capodichino viaduct is a remarkable case of seismic retrofitting in a highly urbanized, seismic area. This paper presents the concept and the installation of new piers cap system that allowed retrofitting of the bridge without any modification of the piers and foundations capacity, while the structure was in use.

Keywords: Pier caps, bridge engineering, construction process, urban construction

1 Introduction

Capodichino is a quarter of Naples and the site of an airport since 1910. In the 19th century it was a so-called “Campo di Marte”, a Field of Mars where military exercises and parades were held. At the beginning of the 20th century Capodichino was still mostly a farmland, in the 1970 a large suburb and, today, it is a highly urbanized area. In the years 1970-75 the A56 motorway was constructed to contour Naples suburbs along the Est-West axe. The Capodichino viaduct is part of the A56 motorway and was designed and constructed in the 1975 by the leading Italian bridge engineer Silvano Zorzi (Figure 1). Today 270’000 vehicles transit in the A56 motorway daily. Naples area is hazardous because it is subject to earthquakes, is close to an active volcano, is prone to geological phenomena such as bradyseism and the combined effect of these phenomena and their evolution are difficult to quantify accurately [1].

Figure 1. The viaduct close to piazza Ottocalli

The Capodichino viaduct is composed of two parallel 1360m long viaducts over 18 spans with lengths between 52m and 92m and is divided in 5 sections by 4 joints (Figure 2).

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