



Effect of sliding pendulum isolator bearing to the structural performance of Becakayu Ahmad-Yani continuous span bridge

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Abstract

Structural assessment is an important procedure to be done for checking and reviewing the realization of the expected structural performance level. In a normal circumstance, it is common that the bridge is designed with life-safety performance that implies undamaged superstructures and foundations, and damaged substructures. This design philosophy is normally known as “ductile substructure and elastic superstructure” concept. The location of the damages shall be predefined to allow easy access for future repairs after earthquake events. Nowadays, a different design approach is introduced through the use of passive control devices. One of the most common technology for bridges is the seismic isolation system using sliding pendulum isolator bearing as the seismic controlling device. Ahmad Yani Continuous Span Bridge in Becakayu Toll Road Project is designed with pendulum isolator bearings. Through non-linear time history analysis, the structural performance of Ahmad Yani Bridge will be evaluated. It is expected that all the dissipation mechanism occurs in the pendulum bearings, with both superstructure and substructures are still in elastic and essentially elastic conditions.

Keywords: structural performance; performance-based design; seismic isolation system; passive control device; sliding pendulum isolator; continuous span bridge

1 Introduction

Seismic isolation is an approach to modify structural response by limiting the seismic actions using properly installed devices on the structure. These devices are commonly known also as passive control devices. For bridges, seismic isolator bearings are very popular among other passive control devices such as viscous dampers and tuned mass dampers. Seismic isolator bearings are used based on these three characteristics:

- a) Flexibility to provide enough shifting in period of vibration to reduce seismic forces
- b) Energy dissipation to limit relative seismic displacements between superstructure and substructure
- c) Adequate rigidity for service loads such as wind and vehicle loads

As an alternative to conventional ductility approach for bridge design, seismic isolation system offers different design perspectives. Using