

ABSTRACT

This study compares the influence of using Lead Rubber Bearings (LRB) and Friction Pendulum Bearings (FPB) on the behavior of bridge structures in Jakarta, particularly those with curved geometric alignments on one of the ramps in an interchange area. It has been well-established that the geometric alignment of bridges significantly impacts structural performance. Moreover, the choice of bridge bearing types like LRB and FPB can enhance structural performance, particularly during seismic events.

The research employs spectral response analysis and nonlinear time history analysis to examine structural responses, including displacement, base shear forces, moment forces, and axial forces. Factors such as geometric alignment, pier height, and the type of bearings (LRB or FPB) are taken into consideration in this study. The dimensions of LRB and FPB are designed according to the AASHTO Guide Specification for Seismic Isolation Design and Technical Report MCEER-13-0010. Structural modeling and analysis are carried out using the CSI Bridge24 software.

The study's findings reveal that curved geometric alignment on bridges significantly affects structural responses. The use of LRB reduces structural displacement responses by 81%, base shear forces by 52%, moment forces by 45%, and axial forces by 8%. On the other hand, the use of FPB reduces structural displacement responses by 84%, base shear forces by 58%, moment forces by 48%, and axial forces by 10%. Overall, FPB proves to be more effective than LRB in reducing spectral response values, with greater reductions of approximately 2%-6%.

Keywords:

Skew Bridge, Lead Rubber Bearing, Friction Pendulum Bearing, Seismic Isolator, Spectral Response Analysis, Time-History Analysis, CSI Bridge.

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ABSTRAK

Penelitian ini membandingkan pengaruh penggunaan *Lead Rubber Bearing* (LRB) dan *Friction Pendulum Bearing* (FPB) terhadap perilaku struktur jembatan di Kota Jakarta dengan geometrik alinyemen berbelok pada salah satu *ramp* di area *interchange*. Geometrik alinyemen jembatan telah terbukti mempengaruhi kinerja struktur. Pemilihan jenis perletakan jembatan seperti LRB dan FPB juga dapat meningkatkan kinerja struktur terutama saat terjadi gempa.

Penelitian ini menggunakan analisis respon spektra dan analisis nonlinear riwayat waktu untuk memeriksa respon struktur seperti perpindahan, gaya geser dasar, gaya momen, dan gaya normal. Faktor-faktor seperti geometrik alinyemen, ketinggian pilar, serta jenis perletakan (LRB atau FPB) menjadi pertimbangan dalam penelitian ini. Desain dimensi LRB dan FPB mengikuti pedoman *AASHTO Guide Specification for Seismic Isolation Design* dan *Technical Report MCEER-13-0010*. Pemodelan dan analisis struktur menggunakan perangkat lunak CSI Bridge24.

Hasil penelitian menunjukkan bahwa alinyemen berbelok pada jembatan berpengaruh signifikan terhadap respon struktur. Penggunaan LRB mengurangi nilai respon struktur perpindahan 81%, gaya geser dasar 52%, gaya momen 45%, dan gaya normal 8%. Sementara penggunaan FPB mengurangi nilai respon struktur perpindahan 84%, gaya geser dasar 58%, gaya momen 48%, dan gaya normal sebesar 10%. Secara keseluruhan, FPB lebih efektif daripada LRB dalam mengurangi nilai respon spektra, dengan pengurangan lebih besar, yaitu sekitar 2%-6%.

Kata Kunci:

Skew Bridge, *Lead Rubber Bearing*, *Friction Pendulum Bearing*, *Seismic Isolator*, Analisis Respon Spektra, Analisis Riwayat Waktu, CSI Bridge.

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