Evaluation of Seismic Coefficient Value for Bridge Design in Malaysia

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1.0   Introduction

Due to a lack of ground motion data in low seismicity countries, such as Malaysia, the provision for seismic design may be best represented in terms of the seismic coefficient value C.

2.0   Methodology

The methodology adopted for the evaluation of the seismic coefficient value C is as shown in Figure 1.
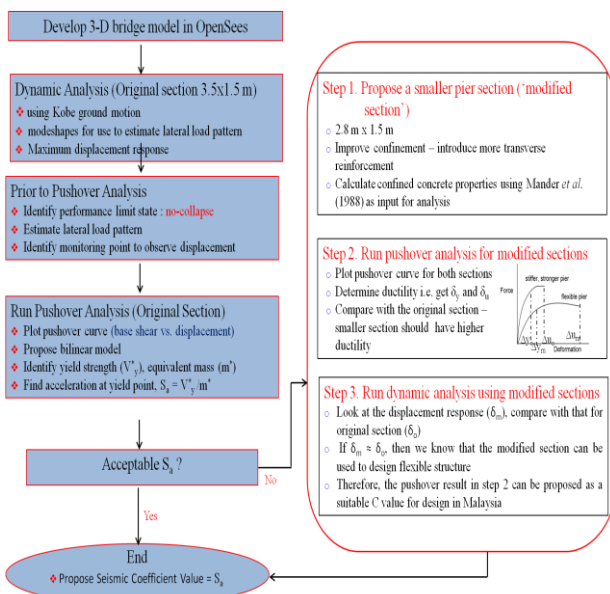

Figure 1 Methodology to evaluate seismic coefficient value for bridge design

3.0   Result

A first trial at estimating the seismic coefficient value C, using the original pier section of 3.5x1.5m, resulted in a C value of 0.52. For a low seismicity region, application of this value in seismic design would result in uneconomical and unbelievably strong structures. Naturally, a smarter option is to revise the stronger original pier section into flexible and more ductile section. Thus, a modified section, 2.8x1.5m, is proposed.

Figure 2 illustrates the moment-curvature plots for both the original and modified sections, indicating a more ductile modified section. Dynamic analysis of both sections further shows that they recorded approximate displacement responses: 202 mm and 248 mm, respectively. Thus, it is justified that the modified section can be used to estimate a C value for use in bridge design in Malaysia.
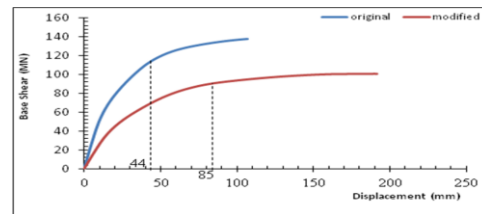

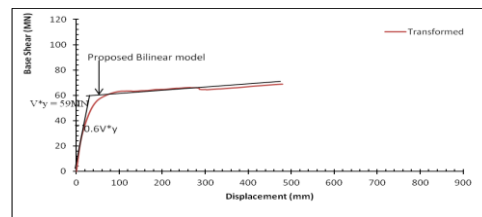**Figure 2**   Moment-curvature plots of the original and modified pier sections

Figure 3 Pushover curve of the modified section transformed into the bilinear model to estimate C value

4.0   Conclusions

Two trials were conducted in an attempt to evaluate an acceptable seismic coefficient value C for bridge design in Malaysia. The method incorporated both the dynamic and nonlinear static pushover analyses. It can be concluded that by employing the proposed method, an acceptable C value of 0.3 can be proposed for seismic resistant design of bridges in Malaysia.