

Seismic Performance Evaluation of an Existing Low-Rise RC Building after Strengthening using Nonlinear Static Procedure

Samard Buddee

FSE CONSULTANT CO., LTD.

Contact: samard@fseworld.org

Abstract

This paper evaluates the seismic performance of an existing reinforced concrete (RC) building after strengthening by using the nonlinear static analysis procedure (NSP). The comprehension gained from such an evaluation can be used to propose effective control measures or strengthening techniques for other existing low-rise RC buildings. In this case study, the approach was applied to an existing 4-storey banquet hall with a basement in Bangkok, Thailand. During construction in 1998, the 3rd floor slab was partly demolished. Strengthening was then carried out by adding new RC columns. As the building was constructed in 1998, the structure no longer meets the new Thai regulation. As a result, the building may have had significant deficiencies, and an assessment had to be conducted according to the Thai Ministerial Regulation B.E. 2564 (2021) and ASCE 41-17. A seismic safety evaluation was applied after the building had been strengthened by using the NSP, which was performed by using a software program. The results showed that, after strengthening, it complied with the regulation and standards. Therefore, it was proven that this building is able to resist the selected seismic forces along with other loads to provide sufficient performance.

Keywords: seismic performance evaluation; nonlinear static analysis procedures; strengthening.

1 Introduction

This paper evaluates the seismic performance of an existing RC building after strengthening by using the NSP. The comprehension gained from such an evaluation can be used to propose effective control measures or strengthening techniques for other existing low-rise buildings. In this case study, the approach was applied to an existing 4-storey banquet hall with a basement in Bangkok, Thailand. Figure (Fig.) 1 shows the interior banquet hall.

2 Aim of the Study

As the building was constructed in 1998, the structure no longer meets the new Thai regulation. As a result, the building may have had significant deficiencies, and an assessment had to be

conducted according to the Thai Ministerial Regulation B.E. 2564 (2021) [1], ASCE 41-17 [2], and ACI 318-14 [3]. The evaluation was applied after the building had been strengthened by using the NSP, which was performed by using the structural software program SeismoBuild 2021 [4].



Figure 1. The Interior Banquet Hall