

ABSTRAK

STUDI KOMPARASI METODE PERKUATAN ELEMEN BALOK AKIBAT PENAMBAHAN LANTAI (Studi Kasus: Gedung Direktorat Jenderal Peraturan Perundang-Undangan Jakarta Selatan)

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Penambahan lantai pada bangunan eksisting dapat menyebabkan peningkatan beban yang bekerja pada struktur dan berpotensi menurunkan kinerja elemen struktur apabila tidak diikuti dengan evaluasi terhadap kondisi struktur. Permasalahan tersebut terjadi pada Gedung Direktorat Jenderal Peraturan Perundang-Undangan Jakarta Selatan yang pada awalnya dirancang sebagai bangunan empat lantai dengan dak beton pada bagian paling atas. Dak beton tersebut kemudian dimodifikasi menjadi lantai lima dan difungsikan sebagai ruang perkantoran, sehingga menyebabkan bertambahnya beban mati dan beban hidup yang bekerja pada struktur. Kondisi tersebut mengakibatkan terjadinya deformasi pada elemen balok yang kemudian ditandai dengan munculnya retakan pada beberapa balok bangunan. Penelitian ini bertujuan untuk mengevaluasi kondisi kerusakan pada elemen balok serta membandingkan dan menentukan alternatif metode perkuatan yang paling sesuai terhadap kondisi tersebut. Ruang lingkup penelitian difokuskan pada elemen balok yang mengalami keretakan akibat deformasi setelah penambahan lantai. Alternatif metode perkuatan yang dikaji meliputi *Concrete Jacketing*, *Steel Jacketing*, dan *Fiber Reinforced Polymer (FRP)*. Pemilihan alternatif dilakukan menggunakan metode *Analytical Hierarchy Process (AHP)* dengan mempertimbangkan kriteria teknis berbasis kinerja, konstruktabilitas, ekonomi, pemeliharaan dan operasional, serta risiko dan keandalan. Hasil analisis AHP digunakan untuk memperoleh urutan prioritas alternatif metode perkuatan sehingga dapat ditentukan metode yang paling sesuai dengan kondisi elemen balok pada bangunan studi kasus. Penelitian ini diharapkan dapat memberikan rekomendasi dalam pemilihan metode perkuatan balok pada bangunan eksisting yang mengalami penurunan kinerja akibat penambahan lantai.

Kata kunci: penambahan lantai, balok, deformasi, keretakan, perkuatan struktur, AHP, *Concrete Jacketing*, *Steel Jacketing*, FRP.

ABSTRACT

COMPARATIVE STUDY OF STRENGTHENING METHODS FOR BEAM ELEMENTS DUE TO THE ADDITION OF A FLOOR (Case Study: Directorate General of Legislation Building, South Jakarta)

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The addition of floors to an existing building can increase the loads acting on the structure and potentially reduce the performance of structural elements if it is not accompanied by an evaluation of the existing structural condition. This issue occurred at the Directorate General of Legislation Building in South Jakarta, which was originally designed as a four-story building with a concrete roof slab at the top. The concrete roof slab was subsequently modified into a fifth floor and utilized as office space, resulting in an increase in both dead and live loads acting on the structure. This condition caused deformation of the beam elements, which was subsequently indicated by the occurrence of cracks in several building beams. This study aims to evaluate the damage condition of the beam elements and to compare and determine the most appropriate structural strengthening method for the existing conditions. The scope of the study is focused on beam elements that experienced cracking due to deformation following the addition of the fifth floor. The strengthening alternatives considered in this study include Concrete Jacketing, Steel Jacketing, and Fiber Reinforced Polymer (FRP). The selection of the most appropriate alternative was carried out using the Analytical Hierarchy Process (AHP), considering performance-based technical criteria, constructability, economic aspects, maintenance and operational considerations, as well as risk and reliability. The AHP analysis results were used to establish the priority ranking of the strengthening alternatives and to determine the most suitable method for the beam elements under the conditions of the case study building. This study is expected to provide a recommendation for selecting an appropriate beam strengthening method for existing buildings experiencing reduced structural performance due to floor addition.

Keywords: floor addition, beam, deformation, cracking, structural strengthening, AHP, Concrete Jacketing, Steel Jacketing, FRP.