

INTISARI

Pada perencanaan awal (DED 2012), Gedung Laboratorium Bahan Bangunan DTSL FT UGM direncanakan akan dibangun dengan lima lantai dengan atap pelat beton bertulang untuk *greenroof* dengan mengacu pada peraturan tahun 2002. Demi meningkatkan kapasitas bangunan, gedung direncanakan ulang dengan menambah satu buah lantai 6 dan *semibasement* dengan atap berupa limasan yang mengacu pada peraturan terbaru yaitu SNI 1727:2013, SNI 1726:2012, dan SNI 2847:2013. Pada Tugas Akhir ini, dilakukan analisis ulang untuk mengetahui kemampuan elemen struktural hasil DED 2012 terhadap perubahan sistem struktur akibat peningkatan jumlah lantai dan memberikan rekomendasi desain apabila elemen tersebut tidak memenuhi peraturan terbaru. Selain itu, dilakukan pula perancangan detail penampang elemen-elemen struktural yang belum terdapat pada DED 2012 dalam perencanaan ulang struktur gedung ini (DED 2016).

Berdasarkan analisis menggunakan peraturan SNI terbaru, bangunan gedung memiliki kategori risiko IV dan berada pada kategori desain seismik D. Sistem struktur yang diterapkan pada bangunan adalah Sistem Rangka Pemikul Momen Khusus (SRPMK). Analisis ulang dan perancangan elemen struktural meliputi struktur balok dan kolom dengan mengikuti persyaratan untuk SRPMK, serta struktur fondasi. Beban yang dianalisis berupa beban mati, beban hidup, beban angin, beban hujan, beban lateral tanah, dan beban gempa. Analisis pembebanan gempa menggunakan metode analisis ragam respons spektrum.

Hasil analisis terhadap beberapa elemen struktural baru yang belum terdapat pada DED 2012 menunjukkan peningkatan dimensi penampang harus dilakukan. Pada struktur balok peningkatan dimensi penampang rata-rata 80,208%, pada struktur kolom peningkatan dimensi rata-rata 66,945%. Sedangkan, dari analisis ulang elemen struktural hasil DED 2012, diketahui pada struktur balok B1 perlu dilakukan penambahan tulangan longitudinal sampai dengan 27,273%. Namun pada beberapa balok lainnya dapat dilakukan pengurangan jumlah tulangan longitudinal rata-rata 20,740%. Pada seluruh tipe balok perlu dilakukan peningkatan tulangan sengkang rata-rata 51,274%. Sedangkan untuk struktur kolom, diketahui aman meskipun dilakukan peningkatan jumlah lantai. Namun, pada seluruh tipe kolom diperlukan peningkatan tulangan sengkang rata-rata 56,169%. Sedangkan pada struktur fondasi, dilakukan peningkatan jumlah tiang pada beberapa tipe fondasi. Khusus pada AS' C4, digunakan susunan kelompok tiang yang baru, yaitu tipe F7 dengan jumlah 5 tiang.

Kata kunci: Perancangan ulang, Gedung Laboratorium Bahan Bangunan DTSL FT UGM, Struktur Rangka Pemikul Momen Khusus (SRPMK), SNI 1727:2013, SNI 1726:2012, SNI 2847:2013

ABSTRACT

On the first designing (DED 2012), Structure Material Laboratory Building DTSL FT UGM was designed to be build consisting 5 stories and reinforced concrete roof for greenroof by referring to old regulations (2002). To improve the structure capacity, the building was redesigned by adding a sixth story and a semibasement with pyramid roof which refers to the new regulations; SNI 1727:2013, SNI 1726:2012, dan SNI 2847:2013. In this final project, re-analysis is done to measure the structural element capability against structure system changes as the cause of increasing number of story and to give a design recommendation if the element doesn't fulfill the new regulations. Furthermore, the design of structural elements section detail which is not available in DED 2012 about the redesigning of this building structure, is done as well (DED 2016).

Based on an analysis using the new SNI regulation, the building has the risk category of IV and is on the seismic design category of D. The structure system which is applied to the building called Special Moment Resisting Frame (SMRF). Re-analysis and design of the structural element includes beam and column structures by following the SMRF provision and foundation structures. The analyzed load includes dead load, live load, wind load, rain load, lateral ground load, and earthquake load. The earthquake load analysis is done by using response spectrum analysis method.

The result of the analysis of structural elements which is not yet included on DED 2012 shows that, to several structural elements an enhancement of section dimension is needed to be done. On the beam structure, average enhancement of the dimension is 80,208%. On the column structure, average enhancement is up to 66,945%. Meanwhile, from the DED 2012 structural element re-analysis, it is known that several beams structures need an addition of longitudinal bars up to 27,273%. However, to B1 beams structures, an average reduction of longitudinal bars up to 20,740% could be done as well. On every type of beam structures, an average addition to the number of transversal bar up to 51,274% is done. As for column structure, is known safe as it is despite an addition of story being done. However, on every type of column structures, an average addition to the number of transversal bar up to 56,169% is needed to be done as well. On the structure foundation, addition on the number of piles is done on some foundation types. Specifically on AS' C4, a new pile group composition, the F7 type supported with 5 piles, is used.

Keywords: *Redesign, structural elements, loading analysis, Special Moment Resisting Frame (SMRF), SNI 1727:2013, SNI 1726:2012, SNI 2847:2013*