

INTISARI

Masjid Raya Kota Surakarta merupakan salah satu fasilitas umum yang berfungsi sebagai tempat ibadah dimana harus dijamin keamanannya dari terjadinya bencana seperti gempa bumi. Guna mengantisipasi adanya kerusakan struktur akibat gaya gempa yang terjadi, maka diperlukan perencanaan bangunan tahan gempa yang berpedoman pada standar terbaru diantaranya SNI 1726:2019, SNI 2847:2019, dan SNI 1727:2019. Struktur gedung Masjid Raya Kota Surakarta yang terdiri dari 4 lantai utama dan 1 lantai *basement* dianalisis Software SAP2000 v22 sehingga diperoleh gaya-gaya dalam pada setiap elemen struktur meliputi dinding penahan tanah, pelat, balok, dan kolom akan dievaluasi kapasitas penampangnya menggunakan Software Microsoft Excel dan spColumn (khusus kolom). Evaluasi dilakukan terhadap persyaratan SRPMK dan pemenuhan dalam menahan gaya-gaya dalam. Selain itu, dinding penahan tanah pada area *basement* dievaluasi stabilitas guling, geser, dan keruntuhan terhadap daya dukung tanahnya Serta, analisis biaya pekerjaan beton terhadap standar Analisis Harga Satuan Pekerjaan (AHSP) dan Standar Harga Bahan dan Jasa (SHBJ) yang relevan dan berlaku di Kota Surakarta untuk kemudian diperoleh rasio harga terhadap harga penawaran kontraktor.

Evaluasi didasarkan data yang ada meliputi DED, RKS, dan hasil penyelidikan tanah. Sehingga perlu dilakukan asumsi-asumsi guna simplifikasi pemodelan dan analisis dalam tugas akhir ini. Hasil evaluasi diperoleh bahwa semua tipe elemen pelat aman terhadap lentur ultimit. Pada elemen balok diperoleh seluruh tipe elemen balok aman terhadap lentur ultimit, sedangkan terhadap kombinasi geser-torsi ultimit terdapat 5 tipe balok tidak memenuhi tulangan longitudinal yang diperlukan dan 7 tipe balok tidak memenuhi tulangan transversal yang diperlukan. Selain itu, terdapat 8 tipe balok tidak memenuhi terhadap lendutan izin. Pada elemen kolom dapat dinyatakan 2 tipe kolom tidak memenuhi terhadap analisis uniaksial, sedangkan pada analisis biaksial terdapat 3 tipe kolom tidak memenuhi. Lalu, pada analisis kolom kuat balok lemah terdapat 7 tipe kolom tidak memenuhi, sedangkan terhadap kombinasi geser-torsi terdapat 7 tipe kolom tidak memenuhi tulangan transversal yang diperlukan dan semua tipe kolom sudah memenuhi tulangan longitudinal yang diperlukan. Pada analisis stabilitas dinding penahan tanah dinyatakan memenuhi terhadap penggulingan ($SF_{guling} = 9,179 > 2,00$), penggeseran ($SF_{geser} = 1,59 > 1,50$), dan keruntuhan daya dukung tanah ($SF_{daya.dukung} = 5,077 > 3,00$). Serta, analisis biaya pekerjaan beton diperoleh sebesar Rp 62.721.890.000,00 dengan rasio harga kontraktor terhadap biaya tersebut adalah 51,39%.

Kata kunci: evaluasi struktur, SRPMK, *basement*, stabilitas dinding penahan tanah, analisis biaya, AHSP.

ABSTRACT

The Grand Mosque of Surakarta City is one of the public facilities that functions as a place of worship where safety must be guaranteed from disasters such as earthquakes. In order to anticipate structural damage due to earthquake forces, it is necessary to plan earthquake-resistant buildings based on the latest standards including SNI 1726: 2019, SNI 2847: 2019, and SNI 1727: 2019. The structure of the Grand Mosque of Surakarta City which consists of 4 main floors and 1 basement floor is analyzed by SAP2000 v22 software so that the internal forces on each structural element including retaining walls, plates, beams, and columns will be evaluated using Microsoft Excel software and spColumn (column only). Evaluation is carried out on the requirements of the SRPMK and the fulfillment in resisting internal forces. In addition, the retaining wall in the basement area is evaluated for overturning, shearing, and failure stability against the carrying capacity of the soil. As well as an analysis of the cost of concrete works against the standards of Analysis of Work Unit Prices (AHSP) and Standards of Prices of Materials and Services (SHBJ) which are relevant and applicable in Indonesia. Surakarta City and then obtained the ratio of the price to the contractor's bid price.

The evaluation is based on available data including DED, RKS, and the results of soil investigations. So it is necessary to make assumptions for simplification of modeling and analysis in this final project. The evaluation results obtained that all types of plate elements are safe against ultimate bending. For beam elements, all types of beam elements are safe against ultimate bending, while for the ultimate shear-torque combination there are 5 types of beams that do not meet the required longitudinal reinforcement and 7 types of beams that do not meet the required transverse reinforcement. In addition, there are 8 types of beams that do not meet the allowable deflection. In the column element, it can be stated that 2 types of columns do not meet the uniaxial analysis, while in the biaxial analysis there are 3 types of columns that do not meet. Then, in the analysis of the weak beam strength column there are 7 types of columns that do not meet, while for the shear-torque combination there are 7 types of columns that do not meet the required transverse reinforcement and all column types have met the required longitudinal reinforcement. In the analysis of the stability of the retaining wall, it was stated that it complied with overturning ($SF_{roll} = 9,179 > 2.00$), shear ($SF_{shear} = 1.59 > 1.50$), and the failure of the bearing capacity of the soil ($SF_{bearing\ capacity} = 5.077 > 3.00$). In addition, the analysis of the cost of concrete work is obtained at Rp. 62,721,890,000.00 with the ratio of the contractor's price to the cost of 51.39%.

Keywords: *structure evaluation, SRPMK, basement, retaining wall stability, cost analysis, AHSP.*