Nuttapol Siwthaisong 2011: Estimation on Building Load Capacity without Load Test. Master of Engineering (Civil Engineering), Major Field: Civil Engineering, Department of Civil Engineering. Thesis Advisor: Mr. Songpol Charuvisit, Ph.D. 261 pages.

This research has been conducted to establish the simplify estimation method or procedure to estimate the building load capacity. The estimation is based on the variables in terms of structural sizing and dimensions which can be easily clarify from building visual inspection or directly from construction drawings such as beam span length and cross section, etc. Main objective is to obtain preliminary building capacity information for other decisions such as building cost evaluation for trading or insurance, which the estimation accuracy can be less than estimation for engineering purpose. The building information used in this study has been collected from actual construction drawings. The ultimate load capacity of the building components are then calculated and statistically analyzed and compared under Ultimate Strength Design assumptions.

For beam, relationships between beam section moment capacity and span length with section inertia are statistically determined using Multiple Regression Analysis. For column, relationship between steel reinforcement ratio of column section and the column load transfer floor area is statistically determined instead, using Linear Simple Regression Analysis. With the approximated reinforcement ratio, the column interaction diagram can be obtained for further analysis and to compare with real column capacity. For floor, the maximum ultimate load capacity (Wu) is statistically determined from the area of floor slab using Exponential Simple Regression Analysis. And for foundation, the allowable service pile capacity is used to estimate the maximum ultimate transferred load (Pu) of the footing. With the obtained estimation expressions of all building components, the estimation errors in terms of percentage of estimation difference for beam and column elements, or the ratio of estimated load capacity to the approximated load transferred for floor and footing are calculated and compared with capacity of real structures. The estimation consistency (Pf) of beam and column is also statistically calculated based on the statistic theory of probability of failure.

For beam and column, it is found that the estimation error is around 30% and the estimation consistency (pf) is about 0.40 and 0.57, respectively. For floor and footing, the ratio of estimated load capacity to approximated load transferred is larger than 1. The estimation was also compared with the results from computer modeling of buildings, which the estimation error is also found to be not more than 30%.

From all results of the estimation errors for beam and column or the ratio of load transferred for floor and footing, it can be concluded that the estimation accuracy obtained by using the proposed methods to estimate the capacity of building components is in the acceptable level for using to obtain the basic information for the purpose of building cost estimation (less than 30% error), in which if more database of the input building information is obtained, more estimation accuracy is also achievable even for the engineering purpose.

_____ _____ ___ / ___ / ___

Student's signature Thesis Advisor's signature