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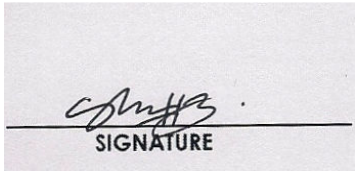

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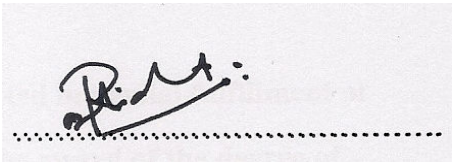
Signature	:	
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THE STUDY OF POSITION OF OUTRIGGER TO MINIMISE THE BENDING MOMENT INDUCED BY WIND LOAD

MOHD SHAH KHAIRI BIN MOHD SUHAIMI

A project report submitted in partial fulfillment of

the requirement for the award of the degree of

Master of Engineering (Civil – Structure)

Faculty of Civil Engineering

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May, 2011

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TO MY BELOVED PARENTS

AND MY FAMILY,

WHOM UNWAVERING SUPPORTS

HAS TREMENDOUSLY

INSPIRED ME.

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ABSTRACT

Nowadays, many types of super high tall buildings are being constructed around the world, especially in the Middle East. It used to be not more than 300 m high, but recently more buildings are built beyond this range. The current world tallest building is "Burj Khalifah" or "Burj Dubai" which exceeds more than 800 m. When the horizontal loading or wind load acts on normal building, it will generate a large lateral deflection and moment in the core wall. Therefore, for high rise building, the column-restrained outriggers are effective to resist the bending of the core wall as well as to decrease the moment and lateral deflection. The parabolic wind load is applied to the analysis since many researchers assumed a uniform distribution of the wind load that acts to the building. Thus, this study is conducted to verify the optimum location of outrigger when the actual wind load is applied in order to determine the differences in the bending moment and deflection values of core wall. In this project, the restraining moment of core wall and deflection of building for two places which are Kuala Lumpur and New York are measured by using STAADPRO 2005. The design wind speeds for both locations are 33.5 m/s (Kuala Lumpur) and 49 m/s (New York). The uniform wind load (UWL) is calculated based on CP3 and the parabolic wind load (PWL) is determined from ASCE 7-05, while the numbers of outriggers used are up to four with different combinations. From the modeling done in this project, the restraining moment of core wall and deflection are influenced by each position of outrigger in the building. Consequently, the best position of outrigger is obtained when it has large restraining moment of the core wall and reduction of displacement in the analysis.

ABSTRAK

Terdapat banyak bangunan pencakar langit telah dibina di serata dunia terutama di Asia Tengah. Kebiasaanya, bangunan yang dibina tidak melebihi 300 m, tetapi pada zaman kini, banyak bangunan yang dibina melebihi had ketinggian ini. Bangunan tertinggi di dunia, iaitu "Burj Khalifah" atau "Burj Dubai" yang melebihi 800 m. Apabila daya mengufuk atau daya daripada angin bertindak pada bangunan, ia akan membentuk lenturan yang besar dan momen pada teras dinding. Oleh yang demikian, untuk bangunan pencakar langit, "outrigger" adalah efektif untuk menentang bengkokkan teras dinding dan pada masa yang sama mengurangkan momen dan pesongan. "Parabolic wind load" digunakan untuk analysis kerana ramai pengkaji menganggap "Uniform wind load" bertindak pada bangunan. Oleh itu, kajian ini dilakukan adalah untuk menentukan kedudukan yang terbaik bagi "outrigger" apabila "parabolic wind load" bertindak pada bangunan untuk menentukan perbezaan pada bengkokan dan pesongan teras dinding. Pada masa yang sama, momen tahanan dan pesongan pada teras dinding untuk dua kawasan di Kuala Lumpur dan New York dapat diperolehi dengan menggunakan STAADPro 2005. Daya angin yang dikenakan pada kedua-dua kawasan adalah 33.5 m/s (Kuala Lumpur) dan 49 m/s (New York). "Uniform wind load" diperolehi melalui CP3 dan "Parabolic wind load" daripada ASCE 7-05 dan bilangan "outrigger" digunakan sehingga empat dengan pelbagai kombinasi. Momen tahanan dan pesongan teras dinding dipengaruhi oleh kedudukan "outrigger". Oleh itu, kedudukan terbaik "outrigger" dapat diperolehi apabila nilai momen tahanan teras dinding dan pengurangan pesongan adalah besar dalam analisis.

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