MASTER'S DISSERTATION AT STRUCTURAL MECHANICS

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STRATEGY FOR STRUCTURAL DESIGN OF HIGH-RISE BUILDINGS

Göteborg City Gate (CTBUH, 2016)

BACKGROUND

For high-rise structures problems can occur from horizontal wind loads in terms of sway that can lead to, for example, discomfort for people in the buildings. To evaluate this in the early stages too detailed models are often used that may lead to inaccurate and unreliable results. In addition, the section forces and stresses in these advanced models can be difficult to interpret. This is due to the fact that the building is statically undetermined and the force distribution may vary a lot depending on how the model is idealised and composed. A method for evaluation in the idealisation step between the physical and the mathematical model is needed.

These kind of problems are mainly found when designing precast concrete buildings. This is due to the complexity of modelling the realistic behaviour of the precast concrete elements. Hollow-core slabs, for example, cannot handle negative moments and it is difficult to determine interaction forces between the elements.

PURPOSE

The purpose of the thesis is to develop a strategy to be used in the early stages of designing high-rise structures. The strategy will focus on generating a trustworthy idealised finite element model both in terms of geometry and in the choice of finite elements. The model should represent the physical behaviour of the structure and handle both static and dynamic loads. In order to achieve this a literature study and comparison between calculations by hand and finite element simulations will be performed on the high-rise structure 'Göteborg City Gate' to be built in Gothenburg.

REFERENCES

CTBUH. (2016, February 18). Goteborg City Gate Tower 1. Retrieved from The Skyscraper Center: http://skyscrapercenter.com/building/goteborg-city-gate-tower-1/19457

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