

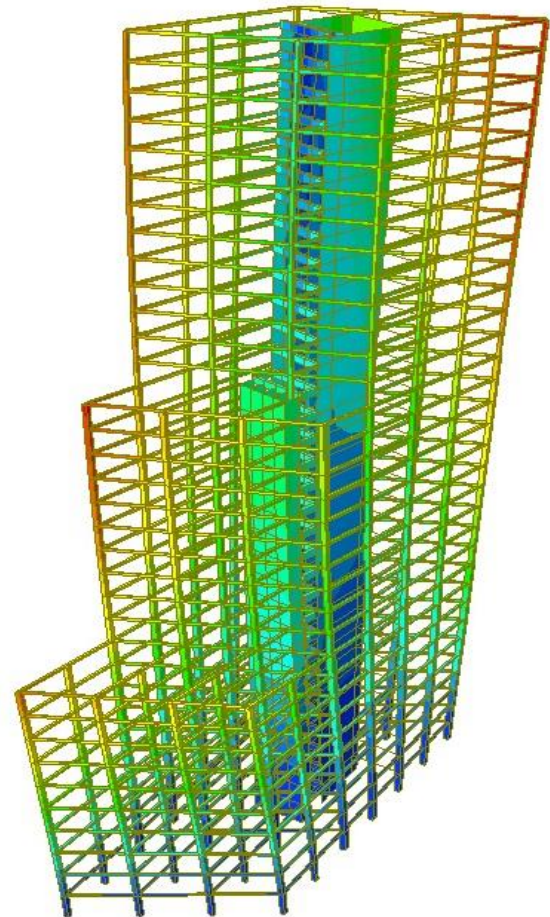
Methodology for preliminary design of high-rise buildings

High-rise building, or skyscrapers, as they are known to most people have fascinated people for the last century. When designing high-rise buildings, challenges are faced which can often be disregarded when designing lower buildings. The purpose of this dissertation is to give a structural engineer a better understanding of analysis methods to use in the early stages of design.

Construction of high-rise buildings has previously been limited in Sweden. Changes in society in recent years, related to urbanisation, economics and architectural standards have resulted in a greater interest for the construction of high-rise buildings. The structural engineer's job is to design the buildings load bearing system. The additional challenges that arise when designing high-rise buildings puts extra demands on the structural engineer's knowledge. Due to the limited experience of designing and constructing high-rise buildings in Sweden, most structural engineer's lack this knowledge.

The dissertation highlights the different phenomena related to high-rise buildings which needs to be considered in the preliminary stage, or later, in the design process. This includes, among other things, comfort requirements for occupants and wind induced accelerations. To take these phenomena into account, a methodology for structural engineers to follow has been developed. The dissertation also describes calculation methods to use on the building. These calculation methods are idealised, meaning that they are relatively easy to perform which means that they can be repeated without too much effort. The report will describe how these calculations can be used to make the preliminary design of high-rise building and still obtain reasonable results.

The design process of a building is an iterative process, this means that the size of structural elements must first be estimated before calculations can be performed. If the



size of the structural elements are insufficient, the size needs to be changed and the calculations needs to be redone. This process needs to be repeated until the building meets all requirements. The methodology describes this iterative process for high-rise buildings in the preliminary stages of design.

An ongoing project called the Gothenburg City Gate has been studied in the dissertation. The methodology is followed and the idealised calculations are performed. The results are compared to computer models of the building to verify their accuracy.