

Lessons from collapse of a 3-storey building in Sweden

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Abstract

The Swedish system for public quality control of structural design of buildings is one of the most liberal in the world. The full responsibility for this is given to the client in a building project. Consequences of this system are discussed in this paper via a case study of a recent collapse of a three-storey building. A number of gross errors in design and execution are described followed by a discussion about what went wrong in the design and construction process. The event can also be used to evaluate the efficiency of current requirements for robust design of buildings. The learnings drawn from this event are summarized.

Keywords: Forensic investigation, collapse, quality control, prefabricated concrete, robustness.

1 Introduction

The Building Regulations in Sweden state that the client has the main responsibility for quality control of structural design and execution in a building project [8]. Unlike in most other countries Swedish authorities do not perform any control of structural design in building projects. Neither are there any public requirements of certification of engineers working with building design. This liberal strategy was implemented about 25 years ago with the hope to simplify the building process and cut costs. In spite of this, the building cost has continued to increase at a rate which is approximately twice the increase in consumer price index.

Before 1990 Sweden had an established system and organisation for public quality control, and during the first decade with new rules it seems that the building sector continued to behave more or less as before. But with time it appears that the situation has changed to the worse. During later years there are clear indications of inferior quality

in building design in an increasing number of projects. A recent quality problem is frequent moisture damage in the building envelope caused by poor design of facade systems. During two snowy winters in 2009-2011 hundreds of roofs collapsed in Sweden, mainly due to design errors and lack of bracing [1].

Some spectacular cases of structural collapse due to gross errors have also occurred during the last decade, in some cases associated with loss of human lives. One of these cases, which occurred in 2012, will be described in detail in the present paper. The experience and conclusions drawn from this case regarding the design and construction process will be discussed. The feasibility of current Eurocode requirements [2] for robust design as a method to mitigate the effects of unspecified accidental exposure (which includes gross errors in design) will also be evaluated on the basis of this particular case.