



Introduction

The project concerns the realisation of a new building in the centre of The Hague. It consists of a parking area in the basement, a shopping area on the first 3 floors, and 6 and 12 floors with apartments. Figure 1 gives an artist's impression.

The building has been designed by the architectural firm Bedaux de Brouwer in conjunction with IMd Raadgevend Ingenieurs, and was commissioned by the development company Kalvermarkt. It is currently (March 2013) under construction and is being built by Züblin Nederland, part of the construction group STRABAG.

Design

One of the main characteristics of the design is the fact that the new building is constructed on top of an existing foundation. A large part of the building site consisted of a 60-year-old building. This building has been completely demolished with the exception of its basement foundation.

The new complex is much larger than the previous structure. To be able to withstand the much heavier loads on the foundation on top of the floor slab of the old basement structure a new raft foundation has been designed.

The basis of the raft foundation consists of a 400 mm reinforced concrete slab that is continuous over the base of the structure. The raft is able to span any area of weaker soil and it spreads the loads over a wide area.

An exceptional part of the structure is the foundation of the very heavy loaded steel-concrete composite columns. The columns stand on top of walls which are located in the basement. Each wall carries 2 columns which are located at the outer ends.

What makes it special is that a large part of the reinforced concrete wall structure has been replaced by a steel frame. This appeared to be necessary because of the very high compression stresses that occur. Furthermore, it was required to strengthen the concrete

slabs underneath the walls by steel HEM beam frames to form a ribbed construction.

For the design of this atypical complex structural element a 3D Scia Engineer model has been made. The heavy point loads from the columns are transferred and spread by the walls into a uniform load on the basement slab. In return the steel floor frames spread the uniform loads per m1 from the walls into a uniform distribution soil pressure across the foundation. The structure has been designed on basis of the assumption that the soil has the maximum allowable bearing value of 500 kN/m².

In the Scia Engineer model, the steel parts of the construction are modelled by 1D bar members. The reinforcement wall and floor sections are included by use of 2D wall and plate elements.

Construction

The main advantage of using the existing basement was the enormous reduction of the building costs. On the other hand, it also required a relatively complex building process. First of all, the placement of the aforementioned steel frames is a relatively unique operation and requires an experienced and skilled building team.

Furthermore, the possible uplift of the basement during construction due to the groundwater pressure on the structure has to be prevented. To avoid this, the basement has to be temporarily filled with sand bags.

The presence of a tunnel for public transport nearby the building site has also placed additional requirements on the building operation.

Contact Heleen van den Berge
Address Piekstraat 77
3071 EL Rotterdam, The Netherlands
Phone +31 10 2012360
Email h.vandenberge@imdbv.nl
Website www.imdbv.nl



Since its inception in 1960 IMd Raadgevende Ingenieurs [consulting engineers] has remained totally independent and has had no commercial ties with manufacturers, subcontractors, contractors or developers who could influence the making of unbiased and unrestrained recommendations. The company dedicates its activities to making recommendations in the field of structural engineering.

The company has experience in working on projects in which the structural engineer is expected to do more than merely make calculations and drawings. An active input of the structural design in the design phase specifically leads to an economically feasible plan. IMd's aspiration is to ensure that the client gets a functional and beautiful building, the architect can realise 'his design', all the consultants achieve their best performances and the contractor can build quickly and easily.

Project information

Owner	Development Company Kalvermarkt, Den Haag
Architect	Bedaux de Brouwer Architecten, Goirle
General Contractor	Strabag Züblin, Vlaardingen
Engineering Office	IMd Raadgevende Ingenieurs, Rotterdam
Location	Den Haag, The Netherlands
Construction Period	08/2012 to 07/2014

Short description | Amadeus Kalvermarkt

The project concerns the implementation of a new building in the centre of The Hague. It consists of a parking area in the basement, a shopping area on the first 3 floors, and 6 and 12 floors with apartments.

One of the main characteristics of the design is the fact that the new building is constructed on top of an existing foundation. To be able to withstand the much heavier loads at the foundation on top of the floor slab of the old basement structure a new raft foundation has been designed. An exceptional part of the structure is the foundation of the very heavy loaded steel-concrete composite columns. These stand on top of walls which are located in the basement. What makes it special is that a large part of the reinforced concrete wall structure has been replaced by a steel frame. For the design of this atypical complex structural element a 3D Scia Engineer model has been used.

