



Software: Scia Engineer

Project

A new community school along Duurstedelaan in the suburb of Hoograven in Utrecht will be occupied halfway through 2013. The plan, designed by VVKH architecten, offers space to three schools (the Ariëns School, the Da Costa School and De Hoge Raven), as well as out-of-school care facilities and a 'sports box' with two gym halls.

The three schools and the out-of-school care facilities are individual free-standing buildings that surround a sports box. This sports box has been designed as a kind of box on legs above the central entrance area (the village square) and its particular structure is explained in this entry in more detail.

Design

Both of the end walls of the sports box project over the set back fronts of the village square, whereas the end walls, as the longitudinal sides of the gym halls, must be floor-bearing. It was therefore obvious that these end walls had to be implemented in a façade-high steel lattice girder (with the span of more than 21 m), in which the lattice girder also bends around the corner thus creating the verge.

The upper floor of the gym hall has a clear span of approximately 12.5 m and is made up of a hollow-core beam floor 320 mm thick and a structural compression layer of 60 mm. Because of the restricted height, for the inside of the sports box the choice was made for integrated steel Top Hat Q (THQ) beams, supported by Ø219.1 mm round steel pipe columns. At the positioning of a single internal bearing line with a span of approximately 10 m, a floor-to-ceiling steel lattice girder was also applied, onto which the 1st floor has been suspended using a suspension column.

The roof comprises a steel structure with perforated profiled steel roof sheets. The stability is guaranteed by a number of wind bracings with columns placed at an angle.

Subsequent to the call for tender and at the request of the building contractor, the method of construction was changed from steel to prefab concrete, in which

the floor-to-ceiling steel lattice girders of the sports box were altered to be constituted prefab concrete wall beams. In addition, the integrated steel THQ beams on the steel columns, at the place of the four internal bearing lines, had to be replaced with prefab concrete wall beams with various large openings. For this purpose, these walls have been subdivided and connected to each other by means of ridge and joggle pieces so that they can transfer the load from the upper-level floors to the steel columns. The lintels above the various openings ensured an adequate coherence.

Construction

For the first design of the sports box in steel, use was made of Scia Engineer to produce a 3D calculation model in order to obtain a sound perception about the transfer of force. To achieve this, all the data of the vertical and horizontal loads on the structure were entered into the model. When the transition was made to prefab concrete, the same calculation model was used to determine the greater column forces because of its increased own weight.

The individual prefab concrete wall beams were then calculated as a 2D slab in which the reinforcement was determined on the basis of the sectional forces.

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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	Gemeente Utrecht
Architect	VVKH architecten Leiden
General Contractor	Slingerland Bouw Nijkerk
Engineering Office	IMd Raadgevende Ingenieurs B.V. Rotterdam
Location	Utrecht, The Netherlands
Construction Period	09/2011 to 05/2013

Short description | **New Community "Brede" School**

A new community school along Duurstedelaan in the suburb of Hoograven in Utrecht will be occupied halfway through 2013. The plan, designed by VVKH architecten, offers space to three schools (the Ariëns School, the Da Costa School and De Hoge Raven), as well as out-of-school care facilities and a 'sports box' with two gym halls.

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