Ghlin water tower

Rue des Ayettes, Ghlin dans la province du Hainaut (BE)

Complete stability mission

Owner	Architect	Cost of the works	Studies
IDEA	V+ (Vers plus de bien-être)	€ 4,4 M excl. VAT of which € 2,6 M for the structure	2011 - 2015

Execution
2012 - 2015

ST

The water tower is built to store 2,000 m³ of water 40 m above the ground.

The unusual geometrical shape was not the result of chance but of a combination of various architectural and structural considerations. Vertical loads are essentially supported on the four upper parts of the X and V reinforced concrete columns. Under the dead weight of the structure and the tank, whether full or empty, the symmetry of these columns provides a perfect balance of the horizontal loads generated by the sloping form of the columns. Thus, only strictly vertical loads remain at ground level and these are taken up by 150 ton piles set into firm soil around 10 metres below the natural ground level.

Under non-symmetrical loading mainly due to the structure's wind and earthquake resistance, the two diagonal planes, formed by the X and V providing the two main bracing planes, have to be accompanied by a third stabilising plane or fixed point provided by the corner column (which incorporates a staircase and pipes) and a diagonal which undergoes extension or compression according to the direction and extent of the loading.

The 11 m tall water tank has a capacity of 2,000 m³. It is set on a 20 m square concrete slab made up of a grid of prestressed concrete girders. This grid is suspended from a metal frame comprised of two arcs in the diagonal planes of the slab. The tensile forces in the arcs are taken up by post-stressing in the tank support slab. This slab assembly rests on the columns described above. Additional framework supports the façade surrounding the tank.

The design of this exceptional structure called for a highly creative approach for the static analyses, and also many complex calculations: 3-D, linear, non-linear, dynamic (earthquake) and assembly.