Consolidation works for a historic building

Consolidation Works for a Historic Building

Augustin POPA
Professor
Technical University
Cluj Napoca , Romania

Augustin Popa, born 1940, receiver his civil engineering degree from Technical University Cluj Napoca in 1963 and Ph.D in 1981. He is professor of Geotechnical Engineering at the Technical University of Cluj.

Summary

The paper presents consolidation works used for the historic monument. The consolidation of the foundation ground was carried out by injections of cement suspension. The consolidation of the deteriorated masonry was also injected in order to make it regain its monolith character.

Keywords: Consolidation, injections, ground, electrodraining, cement paste, building, sodium silicate, respiration, rehabilitation, foundation.

Consolidation Work

Among the buildings existing in the area of the town of Cluj Napoca, historic patrimony buildings are the ones with special problems. Some of these buildings are situated in the historical centre of the town. Such is the building erected in 1789 – 1810, on the remains of an older building, recorded in 1607 as " the Redoubt" and used as an inn, later on as barracks and more recently as the premises for some institutions and art centre.

The historical monuments witnessed important events such as the works of the Transylvanian Diet (1849 - 1865) the Trial of The Memorandum Writers (1894), concerts held by Franz Liszt (1846, 1847), J. Brahms (1879) and George Enescu. The front was built in 1789, then it was modified, completed and finally renovated in 1959. At present, the building shelters the Ethnographical Museum of Transylvania, a prestigious cultural institution in Romania.
The building had to be consolidated due to numerous structural damages. The works carried out intended to regain the performance required under normal operation and the provide the stiffness of the building as a whole and its components.
The building is made up of a basement, ground floor, upstairs and penthouse. Its structure consists of brick walls. The foundations and basement walls are from 80 –

100 cm thick stone masonry with lime mortar. The foundation is at 4.10 – 5.60 m and the basement level at 3.40 – 5.10 m compared to the ground.

The foundation ground is made up of a earth landfill layer, 3.00 m thick, then a layer of fine, loose, grey – yellowish clay sand, 3.40 – 3.80 m thick, deposited above a grey sand gravel layer.

The underground water is at 3.5 – 6.0 m depth and its fluctuations are up to 2.0 m in intervals full of rains.

The foundations rests on the fine, loose clay sand. The basement and ground floors are made from brick cylindrical vaults. The ground-floor walls contain both brick and stone masonry with lime mortar. The upstairs floor has wooden beams of 20 x 40 cm; the framework is wooden, while the roof is of tiles.

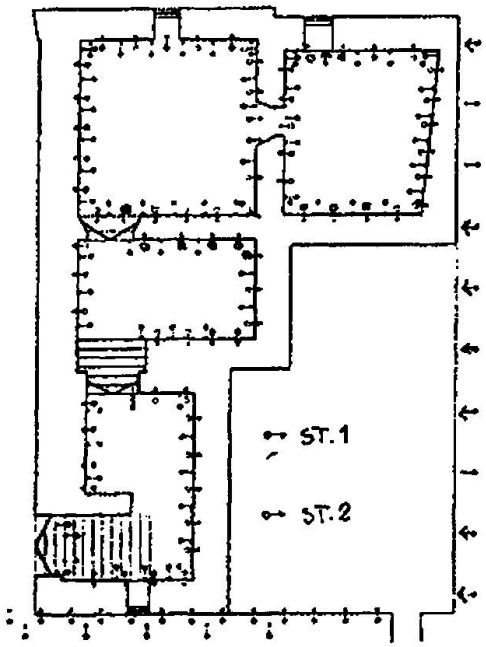

Fig.1 The consolidation of the foundation in two stages

As time went on, the building underwent structural defects whose repair was much delayed. Fissures and cracks appeared in the basement, ground and upper floor walls, in the cylindrical vault of the floor over the ground-floor and the entrance vault.

The size and intensity of these deteriorations required consolidation measures for the foundation ground and structural members.

The consolidation of the foundation ground was carried out by injections of cement suspension, made in tow stages. (Fig. 1)

In the first stage – the precints were injected to insulated the area and to prevent potential leakage leading to fracture pressure in the second stage.