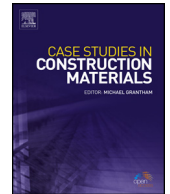




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Case Study

Renovation of an alkali–aggregate reaction damaged swimming pool



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ABSTRACT

The alkali–aggregate reaction (AAR) is an expansion reaction of the aggregate in concrete caused by the alkalinity of hydrated cement, which may disintegrate concrete. The alkali–silica reaction (ASR) is the most general form of AAR which only rarely causes degradation in Finland. The pool at Tampere Swimming Centre was only the third such case in the country. Condition assessment by several parallel methods was used to determine the existence and extent of ASR. A total of 34 samples were drilled from the concrete structures of the swimming pool. The samples were examined by scanning electron microscopy (SEM) and an X-ray diffractometer as well as by thin section analyses and tensile and compressive strength tests of concrete.

Based on the assessment, it was decided to repair the damaged concrete and stop the ASR by proper waterproofing. Tensile and compressive strength tests on the concrete indicated that a relatively light renovation method was sufficient because the deterioration of the concrete was still incipient and the target service life of the repairs was only 20–25 years. Self-compacting concrete was determined to be a good solution for concreting the narrow spaces between dense reinforcement. Self-compacting concrete was used also for concreting the splash canals and supporting consoles. The renovation was based on installing proper waterproofing between the concrete surface and the ceramic tiling.

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1. Introduction

Tampere Swimming Centre, completed in 1979, has three separate swimming pools: the main pool, a children's pool and a so-called paddling pool, see Fig. 1. The main pool is 50 m long and has eight lanes. It can also be divided into two shorter pools with a hydraulic lift bridge. The extension completed in 2007 contains a 25 m swimming pool and a diving pool.

The major renovation of the Tampere Swimming Centre started in May 2013. It involved improving the HVAC systems and water treatment as well as some new space arrangements. All changing rooms and showers as well as surfaces of the pool area were also renovated. After the renewal of the hydraulic lift bridge it is also possible to stage official 25 m swimming competitions. The extension remains as it is.

Disintegration of concrete due to alkali–aggregate reaction (AAR) was detected in the concrete structures of the swimming pools during the renovation. None of the pools had ever been waterproofed. The propagation of AAR requires a

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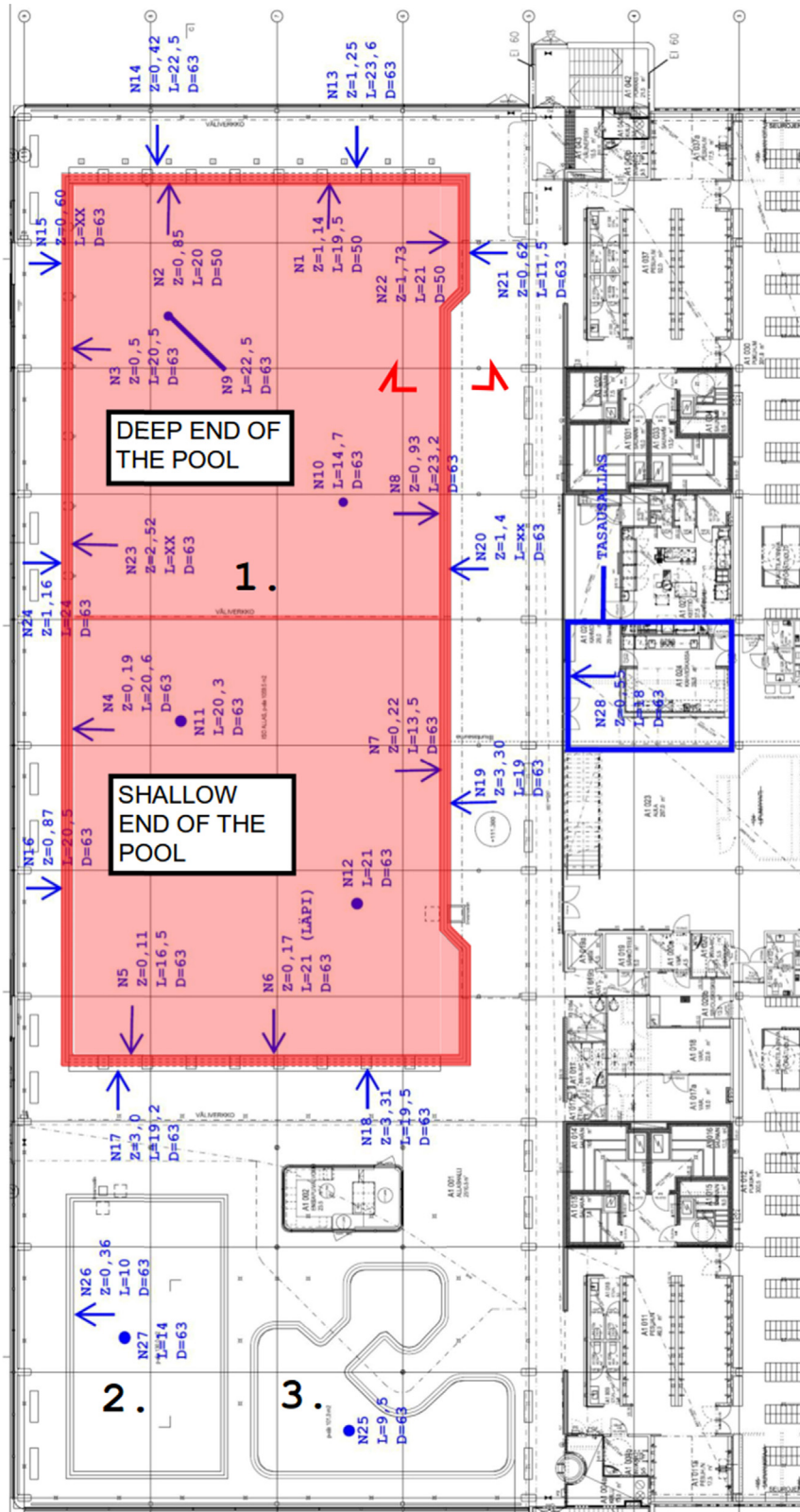


Fig. 1. Plan view of the pool complex and locations of taken concrete samples. The main pool is highlighted.

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