Scanning Electron Microscope (SEM) Tests X-Ray Defraction Analysis

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Project Information of Client
Subject Laboratory Testing of Penetron Waterproofing System

Report No.: 95-387 Date: 01/24/95

Reference is made to our report No. 94-6175, dated December 21, 1994. In that report, effects of Penetron coating on the properties of concrete were reported. As indicated in that report, the depth of penetration of some of the components of Penetron were as deep as 50 mm, although most penetrations were down to 10 mm depths of the concrete surface.

At the Client's request, additional studies were performed to determine and photograph the type of materials penetration or diffusing into the concrete from the Penetron coating. In order to perform these tests, the test techniques used were scanning electron microscopy and energy dispersive x-ray diffraction methods.

TEST RESULTS

1. Scanning Electron Microscope (SEM) Tests

The concrete core section tested, was coated with a minimum of gold in order to provide a surface which could be studied by light microscopy and compared to the SEM images.

The photograph taken under SEM are presented on Attachment I.

2. X-Ray Diffraction Analysis

According to the attached four spectrums of x-ray diffraction, there is a calcium accumulation in the concrete below the Penetron coating to 25 to 50 mm depths. Calcium appears to be in the form of

Ca(OH)2 and calcium-silicate gel. Obviously, these crystalline growths are the diffusion products of the components of the Penetron coating on the concrete surface. Below 50 mm depths Ca(OH) is less while the silica content (from the cement) becomes dominant.

CONCLUSIONS

Based on these test results, it is our opinion that Penetron coated concrete surfaces develop improved concrete microstructure and waterproofing properties.