

HIGHER TECHNICAL INSTITUTE

CIVIL ENGINEERING DEPARTMENT

DIPLOMA PROJECT

**THE EFFECT OF WATER TO CEMENT RATIO ON
CONCRETE PERMEABILITY FOR ONE TYPE OF
AGGREGATES**

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June 2001



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Project report
Submitted to
The department of civil engineering
Of the higher technical institute
Nicosia Cyprus

In partial fulfillment of the
Requirements for the diploma of

TECHNICIAN ENGINEER
IN
CIVIL ENGINEERING

JUNE 2001



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Acknowledgment

Mr. Andreou developed through his teaching our interest in concrete technology. Through his assistance and inspiration as our project supervisor, he helped us to make this project a success and we would like to express our sincere gratitude to him.

We would like to extend further our warm and sincere gratitude to Mr. Pelekanos for his valuable help during the preparation of this project.

Lastly we would like to thank Tsirco Ltd and express our appreciations to Mr. Tsiridis for providing us guidance and information's.

SUMMARY

The objective of this experiment was to measure by penetration the permeability of concrete and also to find the effect of w/c in one type of aggregates.

Introduction:

In a world where resources are becoming increasingly scarce, it is highly important that the best use be made of available materials. For the construction industries this means that structures must be designed to last longer and be constructed with materials that will be durable throughout their increased service lives.

Concrete is the most widely used and versatile construction material. Therefore the durability of this material is of great importance if low maintenance long-lasting structures are to build.

The permeability of concrete to liquids, ions and gases is of direct relevance to both durable concrete and to leak-resistant concrete for containment. Corrosion protection of steel reinforcing bars and the resistance of concrete to environmental/chemical attack are receiving increasing attention, yet there appears to be no readily available summary of how permeability of concrete can be measured and what typical results are achieved.

As it was mention above it is essential that concrete can withstand the effects of the environment and provide long term protection to embedded steel reinforcement if corrosion is to be avoided. One of the main features of durable concrete is low permeability and this can be measured using different test methods, which are categorized under two headings

absorption and capillary effects;

pressure differential permeability.

Ideally a permeability test should be selected which models the critical degradation process in any particular concrete environment. So for a dense and, hence low permeability concrete and for the reason that sufficient time was available the depth of penetration method it is a more practical proposition.

The basic procedure for such a test is to apply water under pressure to one surface of a specimen for a specific time and then to split the specimen perpendicular to the injected face and determine visually the depth of penetration.

The method is included in the German Standard DIN 1048 on test methods for concrete and is also covered in draft international Standard ISO/DIS 7031.

However, it has not yet, been implemented as a British Standard because the British Standards Institution express doubt as to the accuracy with which the water penetration front can be located on the face of the split specimen.