بسم الله الرحمن الرحيم

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EVALUATION OF DOLIME FINE PERFORMANCE IN MITIGATING THE EFFECTS OF AN EXPANSIVE SOIL

By

Aymen Hasan Naser

A Thesis Submitted to the
Faculty of Engineering at Cairo University
in Partial Fulfillment of the
Requirements for the Degree of

MASTER OF SCIENCE

In

CIVIL ENGINEERING - PUBLIC WORKS

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
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EVALUATION OF DOLIME FINE PERFORMANCE IN MITIGATING THE EFFECTS OF AN EXPANSIVE SOIL.

Key Words:
Swelling soil, Swelling pressure, Dolime fine, Bentonite, Clay characterization.

Summary:
Expansive clays are considered problematic soils as they exhibit significant volume changes with the change in moisture content. Mixing swelling clays with dolime fine has been used as an improvement technique. Dolomite chips are obtained by crushing dolomite stones; while crushing a substantial solid waste is produced, it is called dolime fine. Dolime fine has very high percentage of CaO. It has been recommended as a binding agent that can replace pure lime. So dolime fines can be utilized to stabilize expansive soil. Their strength and availability characterize dolomite chips. An industrial swelling soil has been prepared by mixing bentonite with a natural clay soil to use it in this study, the mixing proportion was 75% Bentonite and 25% natural clay soil. Dolime chips were brought from Erbil city (northern Iraq), while bentonite was brought from Samawa city (southern Iraq), as natural soil was brought from the marshes of Basra city (southern Iraq).
Samples were prepared in the laboratory by mixing the swelling soil with (0%, 4%, 8%, and 12%) of the dolime fine relative to the weight of the soil for 0, 14, 28 curing days.
The test results showed that the addition of dolime fine, in different percentages, reduces the MDD, SP, L.L and I_p. Simultaneously, the MOC, CBR, UCS, and P.L were increased with increasing the percentage of dolime fine and the curing period.

Disclaimer

I hereby declare that this thesis is my own original work and that no part of it has been submitted for a degree qualification at any other university or institute.

I further declare that I have appropriately acknowledged all sources used and have cited them in the references section.

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List of Symbols

A	Activity of Clay
ASTM	American Standard for Testing and Materials
C	Clay Content
CBR	California Bearing Ratio
D	Diameter
e_o	Initial Void Ratio
F.S.	Free Swell
γ	Unit Weight
G_s	Specific Gravity
γ_d	Dry Unit Weight
$\gamma_{d\cdot max.}$	Maximum Dry Unit Weight
MDD	Maximum Dry Density
GSD	Grain Size Distribution
L.L	Liquid Limit
P.L	Plasticity Limit
S.L	Shrinkage Limit
I_p	Plasticity Index
OMC	Optimum Moisture Content
P	Load
P_{sw}	Swelling Pressure
S	Swelling Percent
SP	Swelling Potential
UCS	Unconfined Compressive Strength
W_c	Water content