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BÁO CÁO TỐT NGHIỆP

Đề tài

Phân tích một số yếu tố ảnh hưởng đến cường độ nén nở hông của cọc xi măng đất tại công trình đường liên cảng Cái Mép – Thị Vải và đánh giá hiệu quả của phụ gia muội silic.

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CỘNG HOÀ XÃ HỘI CHỦ NGHĨA VIỆT NAM
Độc lập – Tự do – Hạnh phúc

TP. Hồ Chí Minh, ngày ..... tháng ..... năm …..

NHIỆM VỤ LUẬN VĂN TỐT NGHIỆP

Khoa: Kỹ thuật Địa Chất và Dầu Khí

Bộ môn: Địa Kỹ Thuật

Họ và tên: **NGUYỄN VĂN CƯỜNG** MSSV: **30600264**

Chuyên nghành: **ĐỊA KỸ THUẬT** Lớp: **DC06KT**

1. Đề tài luận văn:

FACTORS AFFECT ON UNCONFINED COMPRESSIVE STRENGTH OF SOIL CEMENT COLUMN IN THI VAI – CAI MEP INTER-PORT ROAD AND ASSESSING EFFECT OF SILICA FUME ADMIXTURE

2. Nhiệm vụ luận văn:
   - Tiến hành trộn, bảo dưỡng, nén mẫu xi măng đất trong phòng thí nghiệm.
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   - Tiến hành so sánh sự khác biệt giữa cường độ cọc đất xi măng thực tế so với mẫu trộn trong phòng thí nghiệm.
   - Trình bày, luận giải các yếu tố ảnh hưởng đến cường độ cọc xi măng đất.

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5. Cán bộ hướng dẫn: ThS. Nguyễn Thanh Nhàn, TS Nguyễn Minh Trung.

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Nguyen Van Cuong

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TÓM TẮT

Đề tài LVTN: "Phân tích một số yếu tố ảnh hưởng đến cường độ nén nở hông của cọc xi măng đất tại công trình đường liên cảng Cái Mép – Thị Vải và đánh giá hiệu quả của phụ gia muội silic."

Tuyến đường liên cảng Cái Mép – Thị Vải nối liền hệ thống cảng và các khu công nghiệp chạy dọc sông Cái Mép - Thị Vải với tổng vốn đầu tư 6300 tỉ đồng. Hiện đang thi công đoạn số 3 (từ km 7 + 199 – km 9 + 612). Vị trí công trình nằm trên khu vực đất yếu thuộc trầm trích sông biển hỗn hợp có tính chất phức tạp. Do đó để đảm bảo khả năng khai thác của tuyến đường tải trọng cao đòi hỏi phải có một giải pháp nền móng hợp lý và kinh tế. Với những ưu điểm trong công tác xử lý nền đất yếu, công nghệ cột xi măng đất được xem như giải pháp tối ưu cần phải được xem xét và ứng dụng rộng rãi.

Để góp phần thực hiện điều này, trong luận văn này tác giả đã tập trung vào nghiên cứu các vấn đề sau:

- Tìm hiểu cơ sở lý thuyết của phương pháp cọc xi măng đất.
- Tiến hành trộn mẫu trong phòng để phân tích một số yếu tố ảnh hưởng đến cường độ nén nở hông, đánh giá hiệu quả của phụ gia muội silic và đưa ra hàm lượng tối ưu.
- Nghiên cứu ảnh hưởng của môi trường xung quanh:
  - Chịu ảnh hưởng của nước (điều kiện nước ngầm)
  - Sự thay đổi hàm lượng muối trong đất.
  - Môi trường đất tự nhiên xung quanh cọc
- So sánh sự khác biệt giữa cường độ cọc đất xi măng thực tế so với mẫu trộn trong phòng thí nghiệm.

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ABSTRACT

The graduation thesis: “Factors affect on unconfined compressive strength of soil cement column in Thi Vai – Cai Mep inter-port road and assessing effect of silica fume admixture.”

The Cai Mep-Thi Vai inter-port road system connects to the ports system and industrial zones along the Cai Mep - Thi Vai River, total of initial investment equals 6300 billions VND. The component project No.3 (Km 7+199 to Km 9+612) is being executed at present. The construction is located on weak soil foundation of near shore marine – alluvial deposit which has complex properties. Therefore, to ensure the effectively using of the super-weight construction needs to have a reasonable and economical geological solution. With the specific advantage in weak soil foundation treatment, the soil cement column is considered a most optimal solution needs to research and apply.

To contribute to execute above matter, in this research (composition), the author has researched and analyzed some matter as follows:

- To understand theory of soil cement column.
- Preparing, mixing, testing specimens in laboratory in order to analysis factors affecting on unconfined compressive strength of soil cement samples, assessing effect of silica fume admixture and outputting optimum mixture ratio.
- Researching effect of curing environment:
  - The effect of water to strength of soil cement columns
  - The effect of salt content in water to strength of soil cement columns.
  - The effect of natural soil around columns.
- Research the correlation of unconfined compressive strength between laboratory mixed specimens and core samples of soil cement columns.

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INTRODUCTION

1. General

In recent years, out country is entering the period of industrialization and modernization. National economy is more and more growing nowadays. The growing demand of centralizing industrial parks, expanding markets, urban infrastructure rehabilitations and new urban developments, highways, sports, etc have created very active. The constructions are usually concentrated in places where convenient economic condition and traffic, but engineering geological condition is unfavorable such as Mekong river delta, Ho Chi Minh City, Can Gio, some where in Baria - Vung Tau province, etc. Here, geologic structure is complex, including many layers of soft soil. It is large and different thickness, surface distribution. The characteristics of soft soil are most of all: low shear strength, high compressibility and low permeability, which create difficulties in the design and construction over it.

The task of geotechnics and civil engineers find different methods to treat soft soil foundation such as: prefabricated concrete pile, sand pile, sand well, geotechnical material (vertical artificial drain, geotextile fabric),… Each of methods has specific strengths and weaknesses. When construction will have been built, engineers often select method to improve soft soil very difficultly, especially super-weight of constructions. The most suitable method for each project is usually selected considering technical quality and economical benefit. Prefabricated concrete pile is high strength but expensive, vertical artificial drain may be break, time-long construction. Depend on each of projects, they maybe not economical and technological.

The way of solving that problem, people tried applying improvement of soft soil by soil-cement column in many countries. This method has been applied in the world for a long time, but it has been approached newly in Viet Nam. So that, the researches about this method in Vietnam hasn't been much, especially with concrete ground areas. The research of Nozu,M in Fudo Construction Co. Ltd, Japan showed that the

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soil cement column method is considered to be more suitable than vertical drain method. The strength of soil cement column depend on many factors.

This study will research in Cai Mep – Thi Vai International Port Zone in Ba Ria – Vung Tau province where soil salinity (soil salinity is the salt content in the soil) and high organic content. Recently, the research for soil salinity showed following:

> With soil salinity, when low level of salt in the soil (<0.3%) isn't affect on soil characteristics. However, level of salt in the soils is higher than 0.3%, soil characteristics are noticeable chance. Research results for Binh Thuan clay showed that soil inner friction angle decrease 4 degree, soil cohesion decrease around 0.5 time when soil salinity increase from 0-1%. (MSc graduation thesis of Ly Huynh Anh Ly, HCMUT,2007)

So that, research for affecting by soil salinity, soil pH and water environment around soil-cement column on strength of soil-cement column is necessary. Thence, application of soil-cement columns achieves higher effect when stabilizing soft soil in Cai Mep – Thi Vai International Port Zone.

2. Purpose and scope of research

The main goal of this research understand particular detail of factors affect on unconfined compression strength of soil-cement stabilization method in Thi Vai – Cai Mep internal road and assessment of the affect by silica fume admixture.

This graduation thesis includes 4 chapters, which were summarized as follows:

- The opening chapter, student introduced urgency of the research. To explain purpose and scope of this research. To show methodology, innovation and limitations of the research.
- Chapter 1: Basing on literature review, author presented the general working of soil-cement column to improve the soft soil. Author described briefly the factors affecting on unconfined compression strength of soil-cement column. To find out using for admixture for increase strength of soil-cement columns.
- The main purpose of chapter 2 focus on describing soil testing, methods of making, curing specimens and testing unconfined compression strength

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specimens of soil-cement columns in laboratory. Specimens are made of different cement content, water/cement ratio, silica fume/cement ratio and it is cured on different environment.

- Chapter 3: Summarizing, analyzing and comparing test results on specimens from Lab and Field. Assessing effect of silica fume admixture.
- The end chapter summarized the previous chapters and showed the final conclusions and future works.

4. Methodology of study

Research on theory:

Theoretical basic of reaction in soil-cement mixtures for unconfined compressive strength gain of soil cement column.

Experimental research:

Test on physical-mechanical properties of undisturbed soil.

Author tested unconfined compressive strength of field mixed and laboratory mixed specimens.

Basing on test result author summarized, analyzed and compared test results on specimens from laboratory mixed specimens and core sample of soil cement column.

Tài liệu chỉ xem được một số trang đầu. Vui lòng download file gốc để xem toàn bộ các trang

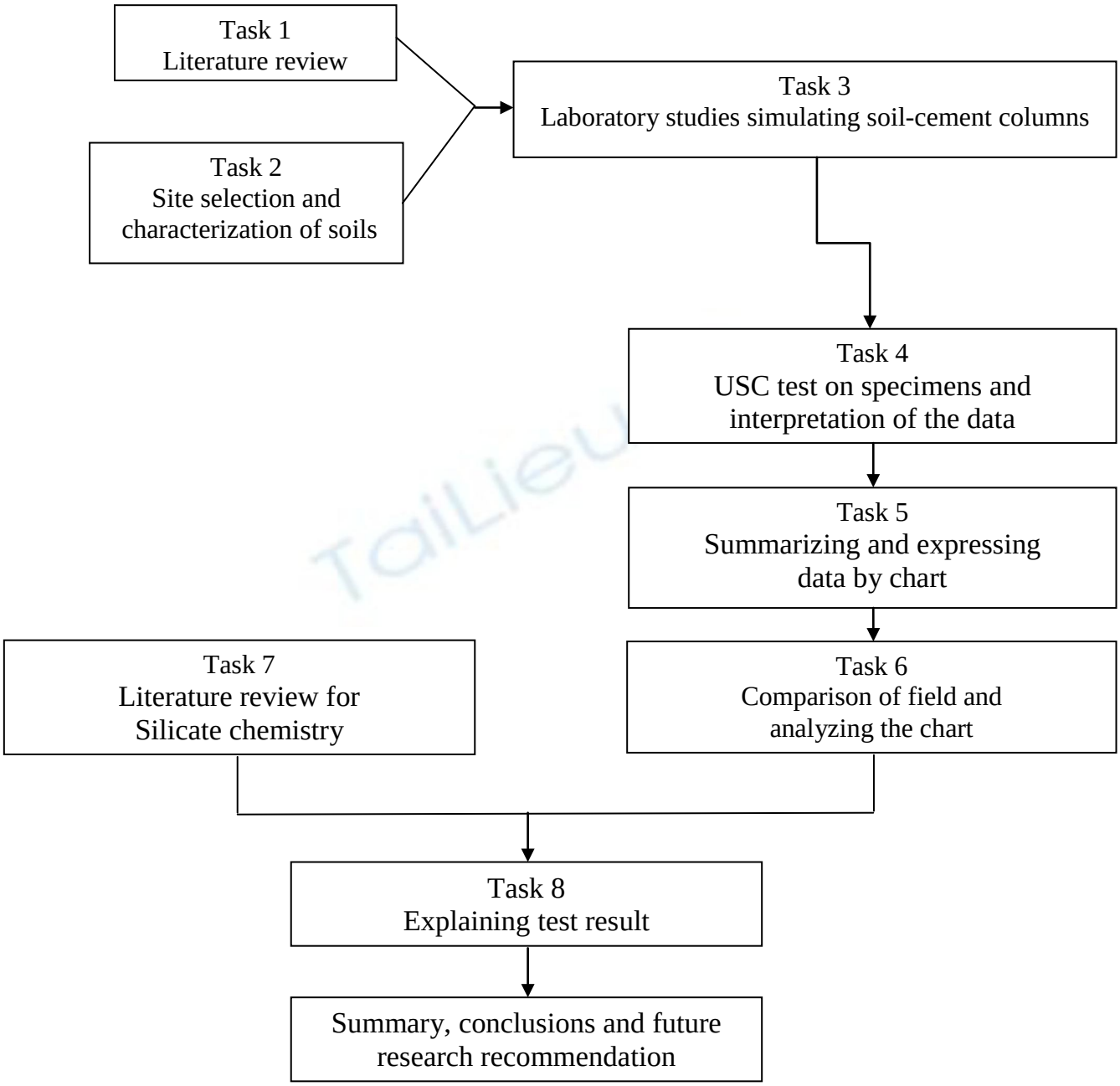

Figure 0.1: Schematic of tasks performed in this research

Tài liệu chỉ xem được một số trang đầu. Vui lòng download file gốc để xem toàn bộ các trang

5. Scientific significance of research

Author defined factors affect on unconfined compression strength of soil-cement column. Assessing effect of silica fume admixture.

6. Practical significant of research

Determining optimal ratio of binder, water/cement ratio for Thi Vai -Cai Mep Inter-port road project. Besides, applying the test result to pre-design projects, which use silica fume admixture for soil cement column.

7. Innovation of the research

This study is practiced at concrete ground areas (littoral – alluvial deposit of Thi Vai – Cai Mep inter-port road, Ba Ria –Vung Tau province).

Scope of the study include 4 curing environments, 3 cement contents, 3 water/cement ratio, 3 admixture ratio.

Formation of USC strength is explained by combining of test result in laboratory, in field and terms of silicate chemistry.

8. Limitations of research

The research performed a short-time (60 days), so that the result didn't show clearly to affect of curing environment, silica fume admixture.

The research only examined unconfined compressive strength test. It was not mentioned to direct shear test, unconsolidated undrained test. There are many factors affect on unconfined compressive strength of soil-cement column but this research only examining some factors following: cement content, water/ cement ratio, silica fume/cement ratio, curing environment, curing time.