CHAPTER 3

METHODOLOGY

3.1 INTRODUCTION

This chapter shows that the techniques used so that the objectives of the study can be accomplished. The methodology of the study is crucial in addition to focus on the main activities like the determinations of the physical properties of the soils tested and further apply these parameters to find the strength of kaolin mixed with lime and silica fume. A series of laboratory experiments will be conducted to accomplish the project final objectives. The laboratory experiments are divided into two parts. The first part is the determinations of the physical properties of kaolin and the mixtures of kaolin mixed with 6% of silica fume and various percentages (3 %, 5 %, 7 % and 9 %) of lime. The tests conducted for kaolin and the mixture were sieve analysis, fine analysis, specific gravity, Atterberg limit, standard proctor test, falling head permeability test. The second part was the unconfined compression tests have been carried out on the kaolin and the mixtures of soil-lime-silica fume to investigate the effect of lime stabilization with silica fume additives on the unconfined compressive strength of the mixture. All the laboratory testing on kaolin and the mixtures were carried out in accordance with BS1377 (1990): Part 2, 4 and 5 and ASTM D2166. The overview of the overall study is presented in Figure 3.1.
Figure 3.1: Overview of experimental studies

- Literature Review, Reading Journals and Discussion with Supervisor
- Laboratory Tests
- Physical Properties
  - Atterberg Limit Test
  - Specific Gravity Test
  - Fine Analysis
  - Sieve Analysis
- Mechanical Test
  - Falling Head Permeability Test
  - Standard Compaction Test
- Data Analysis, Results and Discussions
- Undrained Shear Strength of Kaolin and the Mixtures of Kaolin mixed with 6% of Silica Fume with Various Percentages of Lime (3%, 5%, 7% and 9%)
  - Preparation of specimen
  - Unconfined Compression Test
- Conclusion and Recommendations
- End
3.2 LABORATORY TESTS AND STANDARDS

In this study, there were five types of soil samples tested in order to get their physical properties before proceeding to the main test, unconfined compression test. Thirty physical properties tests for kaolin and the mixtures of kaolin with 6 % silica fume with various percentages of lime: Sieve analysis, hydrometer test, specific gravity test, standard proctor test, Atterberg limit test and falling head permeability test. Five (5) main tests for kaolin and the mixtures of kaolin with 6 % silica fume with various percentages of lime: unconfined compression test. The summary of laboratory works and standards was stated in Table 3.1.

Table 3.1: Overview of Laboratory Works

<table>
<thead>
<tr>
<th>Determination of Physical properties on Kaolin and the Mixtures of Kaolin mixed with 6 % Silica Fume and Various Percentages of Lime</th>
<th>Determination of Unconfined Shear Strength on Kaolin and the Mixtures of Kaolin mixed with 6 % Silica Fume and Various Percentages of Lime</th>
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<tbody>
<tr>
<td>- Sieve analysis (BS 1377: Part 2: 1990: 9.3)</td>
<td>- Unconfined Compression Test (ASTM D 2166)</td>
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<td>- Hydrometer analysis (BS 1377: Part 2 1990: 9.5)</td>
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<td>- Specific gravity test (BS 1377: Part 2: 1990: 8.3)</td>
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<td>- Standard proctor test (BS 1377: Part 4: 1990: 3.3)</td>
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<td>- Falling head permeability test (BS 1377: Part 5: 1990)</td>
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