

**KING SAUD UNIVERSITY  
CIVIL ENGINEERING DEPARTMENT  
TRANSPORTATION ENGINEERING LABORATORY**

# Highway Engineering LABORATORY MANUAL

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## INTRODUCTION

Laboratory testing of materials used for highway construction and maintenance is an essential part of highway engineering. There are many agencies that determine the standards and specifications for these tests. Through experience, it was felt that most new students have great difficulty in following the test procedures for highway materials as presented in the international standards. This manual is developed to meet the need for students and technicians in highway engineering. It presents the most commonly used test procedures for highway materials in a simplified way and considering time limitations and student's convenience. The manual includes testing procedures of soil, aggregates, asphalts and mix design procedures in six main parts. Part one includes general instructions. Tests on soil and aggregates are presented in part two. Tests related to bituminous materials presented in part three. Marshall asphalt mix design procedure covered in part four. Part five covers Superpave binder tests and mix design procedure. Pavement surface friction tests included in part six. The test procedures were compiled in accordance with international and local standards and specifications. The tests are selected to provide knowledge of basic properties and methods of testing. To collect the test data systematically, data sheets are provided at the end of each test. Guidance for analysis of the data and discussion of results is given at the end of each test.

## GENERAL INSTRUCTIONS FOR LABORATORY WORK

Before coming to the laboratory, it is the responsibility of the student to familiarize himself with the objective, apparatus and procedure of the test. At the beginning of the class, there will be a lecture on the experiment and thereafter the students should conduct the test. All students are required to collect the data and submit the data sheet for approval by the instructor.

After completion of a test all the apparatus shall be left clean. Necessary precautions should always be taken to avoid any possible hazards.

One week after the completion of the test, each student should submit a written report. The report should consist of the following sections.

1. Cover Page
2. Aim, Apparatus and Procedures: An outline of aim and apparatus along with the test performed in accordance with applicable standards and simplified procedure should be given.
3. Experimental Data and Results: Data sheets given at the end of each test in this manual should be used to tabulate the results. Necessary analysis and graphs required is to be presented. The expected work to be carried out under this section is given in each test under the same heading as above.
4. Discussion and Conclusion: The test results should be examined and compared with pertinent data and definite conclusions should be drawn. Answers to the questions given at the end of each test and possible source of error should be given.

# **PART ONE**

## **GENERAL**

# **PART TWO**

## **SOIL AND AGGREGATES EXPERIMENTS**

# **PART THREE**

## **ASPHALT EXPERIMENTS**



# **PART FOUR**

## **MARSHALL MIX DESIGN**

# **PART FIVE**

## **SUPERPAVE BINDER TESTS AND MIX DESIGN**

**PART SIX**

**SURFACE FRICTION  
TESTS**