SUMMARY REPORT 37-1(S)

AN EVALUATION OF THE MOISTURE AND DENSITY ROAD LOGGER UNIT

SUMMARY REPORT
of
Research Report Number 37-1
Project 1-6-62-37

Cooperative Research Study of the
Texas Highway Department, and U. S.
Bureau of Public Roads

October, 1965

Construction Division
TEXAS HIGHWAY DEPARTMENT
Austin, Texas

AN EVALUATION OF THE MOISTURE AND DENSITY ROAD LOGGING UNIT

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INTRODUCTION

This research, involving the Lane-Wells Road Logger, was a part of a program to evaluate nuclear methods of measurement of in-place moisture content and density in compacted roadway materials. The Road Logger, a self-contained nuclear logging unit which provides an instant recording of moisture content and density as it travels over the roadway, was evaluated during two periods of study in Texas. The evaluation began in June, 1964 and was concluded in February, 1965.

OBJECTIVES

The major objectives of these studies were to determine the capabilities of the Road Logger in Measuring moisture content and density of in-place roadway materials on a construction control basis, and to investigate the feasibility of using the Road Logger unit to calibrate the small source nuclear type surface density gauges being used on a limited basis by the Texas Highway Department.

EVALUATION PROCEDURE

The evaluation procedure consisted of the following studies:

1. Correlation studies involving Road Logger measurements of moisture content and wet density taken in a stationary position, moisture measurements as determined by the oven-drying procedure, and density measurements as determined by the rubber balloon volumeter and core displacement methods. Several different types of materials were tested, including some that had been treated with Portland cement and/or hydrated lime.

2. Commercial nuclear surface-type density gauge calibration studies for establishing the relationship between the surface gauge count-ratio values and Road Logger wet density.

3. Studies in which the Road Logger was used to determine the moisture content and density of base courses and subgrades on a construction project control basis. Factors such as Road Logger mobility, maneuverability and cost of operation were investigated in an area of the State containing more than the average number of construction projects. The location provided for maximum use of the Road Logger under conditions which appeared to be ideal for this type of construction control operation.

RESULTS

The following results were obtained from the studies:

1. Road Logger measurements of moisture content and density correlated with those of the oven-dry, volumeter and core test methods.

2. In most of the materials that were tested, Road Logger moisture content generally exceeded oven-dry moisture content by 2 to 3 pounds per cubic foot, and Road Logger values of wet density were generally 1 to 5 pounds per cubic foot higher than volumeter values. Road Logger dry density values generally agreed with core dry density values obtained in testing cement-treated layers of granular materials.

3. Attempts to develop calibration curves for use in the field with the nuclear surface gauges were only partially successful. Even though correlation to some extent was obtained between count-ratio of the surface gauge and Road Logger wet density, differences in sample size and variations in wet density in the compacted materials very possibly contributed to the observed spread in test results and made it difficult to establish accurate reference curves for use with the surface gauges. The data did support previous laboratory and field results concerning calibration of the surface gauges.

4. During the construction control study, a total of 81.1 miles were surveyed on twenty projects at an average unit cost of approximately $0.021 per foot. A breakdown of costs indicated that the Road Logger was used for checking the compaction of base courses and subgrades on eleven of these projects located within a 48 mile radius at approximately the same average unit cost. During these operations, 35 miles or 185,300 feet of roadway were logged. The Road Logger model used for this work could travel between projects at maximum allowable speed and was sufficiently maneuverable to do the required testing. Embankment construction was not tested because of the lack of smoothness exhibited by most of the embankment layers.