

## MARYLAND'S MOBILE SOILS LABORATORY

BY GEORGE H. DENT

*Maryland State Roads Commission*

### SYNOPSIS

After being in service well over a year, the trailer laboratory of the Maryland State Roads Commission has proved its value beyond question. Built at a cost of about \$3200 on a standard 23-ft. chassis, the trailer includes a stove, oven, sink, light plant, compressor, sieve shaker, ventilating and drying fans, etc. The trailer is so equipped that all field tests may be made on soils, such as grading, density, moisture content, plasticity, organic matter, and others. While such determinations are not so accurate or so detailed as would be obtainable in the main laboratory, the results are much superior to what might be obtained in the usual field laboratory housed in some temporary field "shack." With this portable laboratory it is possible to make tests in an hour that would consume two days if test samples had to be submitted to the main laboratory.

The State Roads Commission of Maryland began soil studies in 1932 and since that time the personnel of the soils department has grown from one man to seven who devote their full time to soils work.

Since the beginning, the demand for quick results has been so great that in 1938 it was decided that much would be accomplished if a mobile laboratory could be set up that would be practical, economical, and efficient. With these thoughts in mind, bids were asked on a trailer laboratory of our own design. This trailer has been in service for about 14 months and it has surpassed our fondest dreams.

The need for such equipment was first apparent when stabilization work demanded frequent grading, density and moisture content determinations. A shelter or frame shack costing from \$100 to \$500, seldom level, or water-proof and never theft-proof was usually built to serve as a laboratory. These shacks were unhandy to move and each new project usually required a new one.

The trailer unit was built to fill this need. It was built on a standard 23-ft. chassis with interior of our own design. The total cost, including equipment, was \$3,237. The trailer alone, inclusive of stationary equipment such as the stove,

oven, sink, and light plant, etc. cost \$2,185.

The laboratory unit is fitted with a self-contained electric light and power plant, but is also provided with an attachment so that commercial electricity may be used when obtainable. The elec-

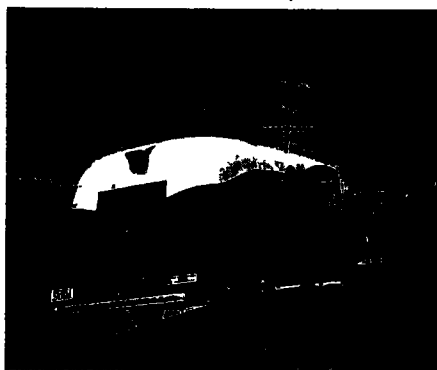


Figure 1. Maryland Mobile Soils Laboratory

tricity provides not only light, but operating power for such equipment as the sieve shaker, soil dispersion apparatus, ventilating and drying fans, etc. A running water supply of 36 gal. is forced through the system by compressed air. At present the air is furnished by a hand pump, but an electric compressor is to be installed in the near future.

A rigid plate holding a two-way level is mounted inside the trailer to insure

that all working surfaces are level. The leveling is accomplished by means of four jacks.

The oven and stove are gasoline fired and highly efficient, as well as compact. The heater uses kerosene for fuel.

The trailer contains equipment for the determination of the organic matter in topsoil by the Thomas Rapid Test Method. With this mobile laboratory, it is possible to go into a field, sample, test and give the results in less than an hour. This is a saving in time of at least two days.

of acceptable materials can usually be set up by means of a series of tests. We do not attempt to obtain all the details or to attain the degree of accuracy given by the main laboratory. In many cases it is sufficient to find the sand, or clay content, the liquid limit or plasticity index. With this information, we offer the contractor the choice of the immediate approval of a material well within the specifications, or the necessary delay incidental to complete analysis by the Baltimore laboratory. The contractor has always welcomed the immediate

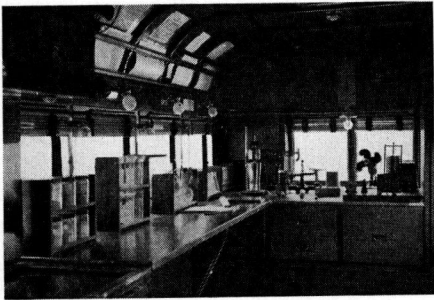


Figure 2. Interior

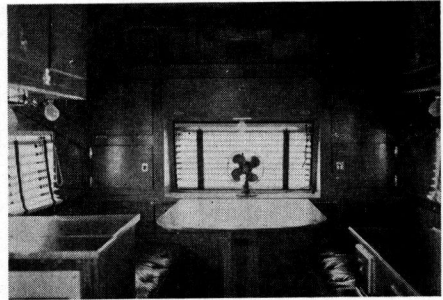


Figure 3. Office Section

Maryland is fortunate in having a background of test constants on some 3,000 soil samples. An experienced soils man, familiar with the geology and soil types of a territory and given such information, can in many cases, by a few simple operations, such as wash grading, or a quick plasticity index test, identify the material and determine its suitability.

The convenience of resampling encourages the securing of a more comprehensive picture of a source of supply. This added to the elimination of lost motion incidental to transporting samples, and the necessary correspondence, makes for a degree of efficiency and promptness seldom found in materials testing.

When unsuitable materials appear in gravel or borrow pits definite boundaries

approval which causes him no delay and results in our obtaining a superior product.

The trailer was first used in a gravel pit where difficulty in obtaining a uniform material was experienced. The laboratory moved on the job one afternoon. Twenty-four hours later, the material had been sampled, tests had been made, results tabulated, the contractor notified and construction work was again moving smoothly. In this particular case use of the Baltimore laboratory would have required a week to obtain the same results owing to the distance between the pit and the main laboratory.

In another instance, the borrowing of large quantities of soil for embankment was delayed due to the presence of some questionable soil. This project was more

than 100 miles from our main laboratory, but by moving the trailer to the spot, results were obtained in a few hours.

The field testing on a recent soil-cement project was carried on in the trailer. Owing to the type of soil and to the quantity of material larger than a No. 4 screen, the project was somewhat involved. It was necessary to make numerous screen analyses in order to obtain a void-free mixture. Frequent moisture-density determinations were made as well. These tests and others were made more accurately, economically and efficiently than would have been possible without the mobile laboratory.

Our trailer makes frequent trips to

bituminous stabilization jobs to check the coarse and fine grading of materials, and to make any necessary adjustment in the mix. Density and depth checks are routine. A weekly or semi-weekly schedule has worked most satisfactorily on projects of this type.

Aside from the trouble shooting on excavation, borrow and gravel pits, and the constant use on stabilization work, we are finding the trailer laboratory indispensable on soil surveys in some localities.

Due to its efficient operation, from the viewpoint of both contractor and State, we feel the mobile laboratory is one of the best tools in a highway department's kit.