The assistance furnished by the application of soil mechanics to highway foundation engineering has provided the means of closing an important gap in the science of highway construction. The maintenance design and construction of modern highways in an intelligent manner demands a thorough knowledge of natural subsoils and their practical application to highway problems.

No. L-5

SOIL PROFILE FIELD METHODS IN NEW HAMPSHIRE

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Upon completion of the engineer's survey, the soil profile is made. Occasionally a preliminary soil profile precedes the engineer's survey. This is to investigate swamp and ledge areas or conditions that have a direct bearing on the proposed alignment.

The following equipment is used for soil profile surveys: 1. Soil auger $3\frac{1}{2}$' long with extensions to permit soundings up to 50' in depth (Fig. 1). 2. Picks. 3. Shovels. 4. Light bars. 5. Two pipe wrenches. 6. Roll of 20 inch cross-section paper, ten divisions to the inch. 7. Drawing board. 8. One 100 foot metallic tape. 9. One hand level. 10. Sample bags. 11. Sample cans. 12. Notebooks. 13. Keel. 14. Camera and films. Figure 2 provides a picture of New Hampshire field equipment.

Location and depth of test pits and borings depend upon soil conditions encountered and layout presented by the survey. When the new center line is on the old road surface, soundings are taken on the 100 foot stations and are located on the side that shows the deepest cut or thinest fill. Examination of the old road surface indicates weak points in the subgrade that require a more careful investigation. On new locations, borings are made every 50 feet. Changes in soil types require borings at shorter intervals to locate transition points. Extreme un-uniform conditions require borings on the survey cross-section line. When possible, borings are made to a depth of 4' below proposed finished grade or the average depth of frost penetration. Soundings must show the total depth of swamp areas. From borings it is difficult to differentiate between boulders and solid ledge when these formations are encountered 3 feet or more below the ground surface. Reconnaisance of adjacent exposed cuts and general terrane, together with the use of large test pits, form the basis of reliable information on such formations.

Soils are classified by feel and visual inspection. Success in soil profile work depends on the ability to recognize and classify soils during field operations. A man trained in soil classification will readily recognize most soil types to the extent that permits group classification. Occasional soils, called border line materials, require laboratory testing for accuracy. To aid classification, field tests may be developed. The degree of plasticity determined by visual inspection aids field classification. Placing a soil sample in suspension in a small bottle of water has proven helpful for field classification. This allows a rough check to be made on the time required for settlement of the fine grained particles and permits visual inspection of the separated soil layers. Soils high in natural water content can be placed on small boards and allowed to dry, being checked at a time when their condition permits a better inspection. Feel of the auger when boring and observation of ground formations, with the type and growth of vegetation, will indicate variations in soil conditions.

For average conditions, a man trained in soil classification with the assistance of two laborers, can map one-half a mile of road per day. Over sections of rough terrane that require the use of large test pits, an increase in the number of laborers helps maintain the speed of operations. Generally, two laborers can operate at a speed that equals the ability of the engineer to map and record the information.

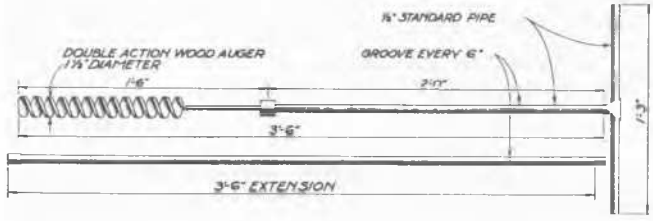

FIG. 1. SOIL AUGER AND EXTENSION

Fig. 2
Soil Survey Equipment