PRINCIPLES AND PRACTICE OF MECHANICAL AND WATERPROOFED MECHANICAL SOIL STABILIZATION

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A highway or airport runway usually consists of three interdependent structural units, the subgrade, the base course, and the wearing surface.

The subgrade furnishes the primary foundation for a roadway or runway, and is usually constructed of naturally occurring soil materials. Few subgrades in themselves have sufficient bearing capacity to carry modern wheel loads, and base courses of gravel, crushed stone, stabilized soils, or other inexpensive materials must therefore be constructed over the subgrade in sufficient thickness to provide the necessary additional load supporting capacity not inherent in the subgrade itself. The wearing surface requires the most expensive materials, and its primary function is to provide a road or runway surface which will withstand the intensity of traffic to which it is or will be subjected.

Mechanically stabilized and waterproofed mechanically stabilized mixtures are generally employed for the construction of base courses, although the former may also serve as a wearing surface for light traffic in some localities if treated with an oil or deliquescent chemical to prevent dusting.

For this paper, "mechanical stabilization" might be defined as a scientifically designed mixture of gravel, sand, clay binder, and water, in which as a result of the addition of a suitable binder, whereby the resulting mixture will have inherent load-supporting capacity apart from lateral support. That is, an unconfined cylinder of the mixture would have a measurable load supporting capacity, whereas a cylinder of confined gravel has none.

CLAY AS A BINDER

The cheapest binders for granular materials available to highway and airport engineers are clays. The great cementing power of clays is well known. When clay binder is mixed with gravel and sand in the proper proportions, the resulting mixture is known as a "mechanically stabilized mixture." A 6 x 6-inch cylinder of such a clay-bound mixture depending on moisture content and other properties, will actually carry from 1 to 12 tons—quite a different material from the gravel, the great cementing power of clays is well known.

Two detrimental characteristics of clays must always be kept in mind when using them as binders. First, their tendency to shrink and swell, and their unsuitability to be kept in mind when using them as binders. First, their tendency to shrink and swell, and their unsuitability to highway and airport engineers are clays. The great cementing power of clays is well known. When clay binder is mixed with gravel and sand in the proper proportions, the resulting mixture is known as a "mechanically stabilized mixture." A 6 x 6-inch cylinder of such a clay-bound mixture depending on moisture content and other properties, will actually carry from 1 to 12 tons—quite a different material from the gravel, the great cementing power of clays is well known.

When designing mechanically stabilized base courses, bearing capacity apart from the lateral support supplied by the confining influence of adjacent material. At the same time, it should be remembered that bearing capacity derived from the confining influence of lateral support is common to every base course material in place on a roadway or runway.

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