

# Automobiles and Good Roads

A Department Designed to Help Farmers With Progressive Road Ideas.

Our agricultural colleges, East and West, North and South, are realizing the importance of good roads for the farmer. Not of necessity the concrete road that permits the automobile to go tearing along, but those that will allow the farmer to haul his produce economically and easily to the railroad station or market. The accompanying article tells something about the work of highway engineering at Washington State College, Pullman, Washington.

**T**HE PRINCIPLES of highway construction have been taught to students of the Civil Engineering department of the State College for years. Four years ago, however, the statewide interest in good roads led to the establishing of a good roads laboratory at the college, equipped with such machinery and facilities as are necessary to train specialists in this profession. At the present writing seven students are specializing in road construction—these distinguished from the other students of the civil engineering department, who are interested in other phases of engineering.

On the college campus, a roadway has been reserved for an experiment with some fifteen different kinds of road surface. The roadway reaches from the dairy building on the front campus, out east to the college farm, and will be surfaced with different types of road material, put down in sections, and all subjected to the same amount of wear. Early reports will be made as to the way in which the different sections are holding up under the traffic, which is heavy, including automobiles, light vehicles, and the heavy loads occasioned by the hauling of building material into the college grounds, and the hauling of crop products.

### Surfaces Are Varied

Among the surfaces to be used are, brick with cement ground filler, brick with bituminous filler, sheet asphalt, sections of bituminous concrete constructed under different specifications, concrete thinly topped with tar, bituminous macadam, and several different kinds of patented pavements.

The materials testing laboratory is equipped with the machinery necessary for determining the values of road building material. With reference to stone, this includes resistance to wear, hardness, toughness, cement values, and so on.

In the abrasion tests, the rock is broken up in small pieces and put in cylinders which are revolved slowly for some time. The percentage of the "rock dust" which has been eroded from the pieces of rock in the revolving cylinder is then computed, and with this as a basis is calculated the resistance to wear of the particular stone. Wide differences are found in different types of rock; and, what is still more confusing, wide differences of resistance to abrasion are found in stone of the same type, and of almost similar appearance.

### Machinery Is Needed.

The machinery necessary to determine the cement values of stone is included in the equipment of the good roads laboratory, and consists of the ball machine, which prepares the stone dust; the molding machine, in which are made small brickettes of the stone dust; and the impact machine, in which the brickettes are knocked to pieces. The number of blows required to knock the brickettes to bits constitutes the basis for determining of the cementing value of the rock.

The cement value of stone in road surface is very important. For example, the heavy wheels that strike upon basaltic stone in a road surface, knock from the stone at each blow a certain amount of dust. This dust settles in the road bed. If its cementing qualities are good, when wet by dew or rain, it will stick together in the road bed, and thus prolong the

life of the road. If the cementing quality is not good, the dust will dry out and blow away. Thus, in the latter instance, the road would soon be found in "broken down" condition.

Basalt, which is plentiful in most sections of the Pacific Northwest, usually is a fairly good road stone. But not always, as herein lies a stumbling block for many builders of roads. In the early times of creation, basalt, in a lava-like form, oozed through fissures in the earth's surface, and spread out, in later ages, cooling. Perhaps the biggest "Basaltic Overflow" in the world exists in the Pacific Northwest. It reaches from the Canadian boundary to California, and eastward to the foothills of the Rockies. Although preserving a general similarity of appearance, the quality of basalt with reference to roadmaking varies. The only sure way to determine is to make a careful and scientific tests; and if the basalt is found to be defective, the roadmaker must take this into consideration, or a state or county will, a few years later, be found to have expended whole fortunes in the building of practically worthless roads.

### Civil Engineer, Too

The above is cited only as an example of the many problems which arise in roadmaking, but which exist to a greater or less extent in practically every type of road material used. Even when well informed, and with the best of testing machinery and laboratory facilities at hand, the good roads' engineer often runs amuck of new and puzzling problems.

Sandstone usually is not very good, though some of it is all right. Basalt usually is good. So is diorite, diabase, dolomite, and granite, though, for reasons above indicated, it is unsafe to say that any rock is good or bad till it has been subjected to tests for cement value, hardness, toughness, absorption, and so on.

While the interest of the highway engineer in roadmaking materials is always keen, his knowledge limited to this field would not make him a highway engineer by any means. He must be a civil engineer—must understand

how to establish grades for streets or roadways, must understand bridge construction, the more thoroughly the better; must have a certain amount of legal knowledge, insofar as the laws of the state touch upon highway construction, and establish rules by which assessments are made upon abutting property owners. These and many other things pertinent to his profession he must know; so that the four years which the student spends in the good roads laboratories and class rooms of the State College are crowded with hard and serious study.

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