ROAD IMPROVEMENT IN AMERICA: BY J. B. STONE-KING, M. E.

There is such a heavy increase of traffic on all roads in this country, more especially on the main trunk highways between cities and towns of importance and the roads leading from the more populous country districts into the markets, that a very necessary and radical change has been forced in road building and improvement methods. Not many years ago plain graveled and water-bound macadamized roads stood the wear and tear of the then comparatively light and slow-moving vehicles. Light surfacing was the rule and materials which would stand up under that traffic were found to be inadequate when subjected to the abrasion and hard pounding of our heavier and rapid-moving vehicles of the present day.

Since the development and perfecting of the auto truck for hauling and delivery purposes, the slow, wide-tired wagon has been largely replaced. This type of traffic has spelled the doom of earth roads, and tears holes in lighter, more easily worn surfacing with amazing ease and rapidity. It has also caused a cry to be raised for easier grades. The lighter pleasure automobile is almost as hard on road surface as the truck, and the higher speed has increased the number of bad accidents on sharp curves and steep grades. These causes have not only made a heavy, wear-resisting road surface necessary, but in the rebuilding and improvement now being done the roads are widened, grades reduced, sharp turns and dangerous curves eliminated.

The vast amount of work to be done, coupled with the high cost and shortage of labor, has led to the development of successful labor-saving road machinery of many different and highly specialized types. One of the labor savers adopted from quarry, railroad and mining work and applied with success to road building, is the low-freezing, slow-acting, heaving, low-grade dynamite for earth work in deepening and widening cuts, widening curves around hillsides and points, blasting out stumps, boulders and trees, and in making side and outfall ditches for drainage. Considerable saving is accomplished by its use in loosening material in conjunction with steam shovels, graders, scrapers and other machinery.

Each type of road has its particular advantages and disadvantages, and local conditions must govern the selection, frequently combining parts of each type. Standard types, although more or less interrelated, are macadam in its different forms, bituminous or asphaltic, brick or stone paved, wooden block, and concrete roads.

Macadamizing is probably the oldest and most widely used method of surfacing, having more modifications than any other type. It consists primarily of crushed stone or gravel held together with some form of applied “binder.” This type of road is most generally the cheapest in first cost and holds up well under the lighter traffic. Heavy traffic, however, soon breaks through, making a high maintenance cost, hence it is not suitable for use as city paving nor on main roads near the larger cities and markets.

Crushed stone having sharp edges is a more satisfactory material than rounded-edged gravel, for it compacts with less “creeping” and gives a better binding. Trap rock, diabase, basalt, porphyry and other fine-grained rock are very good on account of their hardness and wearing qualities, although somewhat low in “cementing” quality. Granite is usually too coarse-grained, and limestone too soft for a first-class road surface. A small amount of limestone is frequently mixed with the harder rocks to increase their cementing effect. The binders used are fine stone screenings and water, sand and water, limestone screenings and water, or clay and water.

Upon the compacted earth foundation is spread a layer of broken stone of sizes between one or two and one-half inches in diameter. This is rolled and re-rolled until it is well compacted; a thin coat of binder material is spread over this and rolled into the interstices of the larger stone. Next a coating of finer material of one-half inch to three-quarter inch is rolled, on top of which is spread and rolled very thoroughly a finishing coat of binder, using water freely. The finished sub-base of coarser stone is usually about four inches thick and the surface coat two inches, thus making a six-inch pavement.

In bituminous or asphaltic roads, the crushed stone sub-base is coated with a small quantity, approximately one gallon per square yard, of asphalt cement or tar, then the surface course, consisting of three-quarter to one-inch stone, which has been

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