

routes, especially near the cities and larger towns, where the traffic is extremely heavy, have been reconstructed with some more permanent surface.

In a subsequent issue the part of the commission's report dealing with the traffic census will be summarized.

### CONCRETE ROADS IN WAYNE COUNTY, MICH.

**W**AYNE County, Michigan, in which Detroit is situated, is credited with having the finest system of concrete roadways in the world.

They are over 100 miles in length. The upkeep expense is less than \$5 per mile per year, which includes the cleaning of ditches and the cutting of weeds along the roadside; and they are always smooth and dustless.

Practically every government report that has been issued during the past five years has told of the failure of the ordinary macadam road to withstand the traffic of the present day. In New York State the maintenance expense has gone as high as \$1,000 per mile per year. And within a few years these highways have had to be completely rebuilt. The concrete highway, which originally costs a third more, is practically permanent. But several conditions govern the building of concrete roads which must be observed. In the first place they must be placed honestly as to the proportion of gravel, sand and cement; they must be "cured," that is, watered and allowed to stand for several weeks before being used; and they must be built under good weather conditions. When these features are complied with the concrete highway will generally last for many years without being touched.

"The Story of a Country Road" is the title of a booklet that Edward N. Hines, road commissioner of Wayne County, is distributing, and which explains clearly how the concrete road is made.

"We prepare and shape the subgrade, roll it hard with a 10-ton roller and lay the concrete right on the natural sub-soil," writes Mr. Hines. "Side rails are used and when the concrete has become sufficiently hard to remove the rail the finishers pare off the outer edges to prevent a sharp dividing line between the concrete and the gravel shoulders.

"Our trunk roads are built 16 feet wide with gravel shoulders four feet wide on each side. The lesser-travelled roads have 12 and 15 feet of concrete with a minimum width over-all of 24 feet. We have also built concrete roads from 10 to 18 feet wide. They are always wide enough to make passing of teams or automobiles going in the opposite or the same direction very easy.

"The concrete is put down wet so that no tamping is necessary after it is placed. When this is done no workman is permitted in anyway to disturb the concrete by stepping in it or throwing anything on it. Smoothing is done with simple wooden floats.

"Each day's work is finished up to an expansion joint and no more than 20 minutes is permitted to elapse between batches of concrete during the day. The work of the day is covered with canvass and the next day the canvass is removed and the concrete covered to a depth of about two inches with any sand or loose soil available to keep the concrete from drying too rapidly. The concrete is sprinkled continuously for eight days. Roads are not opened for traffic until at least two weeks after the last concrete is put in place.

"Machinery is used whenever the same or a better result can be secured and large hauling engines trail from two to four wagons each loaded with stone or gravel. Graders are also drawn by steam, doing the work of from 6 to 8 horses more efficiently and rapidly. Old roads are

rooted up with a scarifier or plow. Water is pumped in pipes for miles by gasoline engines. Stone and sand on some of the roads is unloaded with a grab bucket and many smaller and economical labor-saving devices are employed. Cement is mixed in a mechanical batch mixer.

"The cost of the roads averages from \$12,000 to \$16,000 per mile, as Wayne County has to have all materials shipped in. It would be higher if it were not for our labor-saving devices. When far from the city the men are boarded and given cots in tented cities. We have nearly 1,100 employees, and politics cut no figure in the employment of them."

### A NOTABLE PONTOON BRIDGE.

A wooden pontoon bridge to temporarily cross the Panama Canal at Paraiso, is briefly described in the Canal Record. The plans are based upon designs obtained from the Chicago, Milwaukee and St. Paul Railway, which has used pontoon bridges of this type for many years. One of the most notable of its bridges is that over the Mississippi River at Prairie du Chien, Wis., which has been in service 35 or 40 years. In the construction of the Canal pontoon bridge, a somewhat simpler design will be followed, consisting of a timber scow 55 feet wide, 378 feet long, and six feet deep. On top of this hull, a wooden trestle, following quite closely the ordinary type of construction, will be built to an elevation of about 113.5 feet, and on this will be placed a railroad track and a highway for vehicles. The spans will be 14 feet between centres, and at these points, a transverse wooden truss, with iron rods, will be placed in the hull to carry the concentrated loads. Lighter trusses, without rods, will be placed at 2-foot intervals between the heavier trusses. The sheathing on the hull will be four inches thick at the bottom and sides, and three inches on top. To minimize the bending and shearing stresses to which the structure will be subjected, the design includes two heavy stiffening trusses, the stringers under the rails being utilized as top chords, while the lower chords are placed at the bottom of the hull. In addition, there will be heavy longitudinal keelsons.

The bridge is designed for a train load of 4,000 pounds per running foot. In order to reduce the expense of the approaches as much as possible, it is proposed to use as a connection between the bridge and the shore some of the spare lock gate girders, supported on rockers. These rocking approaches will have a downward grade when the water is at a low level, and an upward grade when it is at a high level. The pontoon will turn about a fixed pivot, and to avoid its projecting into the fairway of the canal, a recess will be excavated in the east bank, so that when the bridge is opened, it will leave the canal channel unobstructed. About 600,000 feet B.M. of yellow pine, or fir, timber, and 375,000 pounds of steel and iron, will be required.

Mr. Harry Crosswell, surveyor and prospector, after a visit to the Sibola Creek goldfields, B.C., gave it as his opinion that immense wealth in gold, copper, lead, iron and zinc lies buried in British Columbia awaiting the opening up of railways and other means of transportation to make it possible for prospectors and miners to penetrate to the heart of the province. At present owing to natural obstructions, it is impossible to reach the wild districts where these minerals undoubtedly abound.