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ABOUT GOOD ROADS IN CAL

TO THE GOOD ROADS AS-SOCIATION OF COOS COUN-

TY, STATE OF OREGON

A Report of an Investigation of the California State Highway

System.

As Coos County is soon to vote on a bond issue of some \$440,000 for the construction of permanent main roads throughout the county, it is highly important that the voters throughout the county, before the election is called, inform themthe ejection is called, inform themselves as much as possible along these lines, with especial regard to what kind of road is to be constructed, how long it will last when properly constructed, the cost of con-struction and last, but not least, the cost of maintenance when com-

As County Surveyor, I am, of course, very much interested in the survey and construction of permanent roads, and to thoroughly familiarize myself with the most modern construction of permanent roads, I spent a month in the state of California, inspecting at close

range their state highways.

For the information of the members of the Good Roads Association and anyone who might be interested in the subject, I submit the follow-

ing brief report.

To begin with, the state of California in 1910 voted a bond issue of \$18,000,000 for the purpose of of \$18,000,000 for the purpose of building two trunk lines of highway practically the entire length of the state, with numerous branch lines and feeders connecting up all capitals of counties and the main towns, the approximate length of which is 2800 miles. These bonds were to bear four per cent interest and must not be sold below par. The Honorable Frank H. Gould. Surveyor General of California and Nevada, obtained for me a letter of

Nevada, obtained for me a letter of recommendation from Governor recommendation Johnson to the Highway Commis-sion, and I am indebted to the Highway Engineer, Mr. A. B. Fletch-er, for most of my information.

For a large portion of the roads the Commission has adopted a pavement consisting of a Portland cement concrete base of a minimum thickness of four inches and fifteen feet wide with shoulders at least three feet wide on each side of the concrete. The concrete base is covered with a thin coating of aspnaltic oil of special quality and stone screenings, forming a bituminous carpet from three-eighths to one-twelfth inch in tnickness to serve as a wearing surface to protect the concrete. In places where conditions warrant, the thickness of the slab is slightly increased, and where the traffic is extremely heavy the width is in-creased, in some locations to as wide as 24 feet. The concrete is compos-e. of one part cement 2 % parts fine aggregate and five parts coarse aggregate, a cubic yard of concrete containing 94 pounds of cement. Afcontaining 94 pounds of cement. After the concrete is thoroughly dry it is sprayed with a heavy asphaltic oil at the rate of from ½ to ½ gallon per square yard, the oil to be applied by a power spray at a temperature of about 250 degrees Fahrenheit. Upon this stone screenings are spread until all of the oil is absorbed, and left until thoroughly set before traffic is admitted. ly set before traffic is admitted.

The cost of per mile of this class of construction based upon 100 miles under contract is \$7600, as follow: Grading, culverts etc., per mile,

\$1.300; equals 17.1 per cent.
4-inch concrete base, per mile,
55,860.00; equals 77.1 per cent.
3-8-inch bituminous wearing surface per mile, \$440; equal 5.8 per

This is equivalent to \$6 per cubic This is equivalent to \$5 per cubic yard of concrete for the base, and 5 cents per square yard for the wearing surface. Taking this as a basis and supposing we were to build our roads nine feet and five inches thick, with the same wearing surface, the cost of our road would be as follows: as follows:

5-inch concrete base, 9 feet wide, per mile \$4400, 3-8-inch wearing surface, at five

cents per square yard, \$254, making a total of \$4664 per mile. Mr. Fletcher gives the life of this kind of wearing surface as about two years. As our traffic will not be nearly half as great as the traf-

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March is a trying month for the very young and for elderly people. Croup, bronchlai colds, la grippe and pneumonia are to be feared and avoided. Foley's Honey and Tar is a great family medicine that will quickly stop a cough, check the progress of a cold and relieve inflamed and congested air passages. It is safe, pure and always reliable. Owl Prescription Pharmacy. Frank Owl Prescription Pharmacy. Frank D. Cohan. Opposite Chandler Hotel. Phone 74. Central Avenue Drug Store, local agency.

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fic in California, it should be safe to say it would last at least three years without renewal. It would, therefore, cost \$88 per year per mue to renew entirely this wearing surface. However, we cannot expect to build concrete roads here as cheap as they can in Caufornia, but assuming that it costs up twenty per cent more, which ought to be a safe margin, the cost of the concrete base would be \$5280 per mile or one dollar per lineal foot, and the 3-8-inch wearing surface would cost \$316.80, making a total of practically \$5600 per mile for a 5-inch base 9 feet wide with a 3-8-inch bituminous wearing surface. inch bituminous wearing surface, and if this surface should require renewal every three years, it would cost \$105.60 per mile per year. Not very steep for keeping a road in condition so you can drive over it any day in the year. At this rate it would cost \$1056 to keep the road between Coquille and Myrtle Point in good condition for a year. while under our present system it costs thousands of dollars, and the road is never in good condition, and is practically impassible during the winter months. Even if the cost of maintenance was several times this amount it would still be

a paying proposition.

Practically all of the counties throughout the state have agreed to furnish all necessary right of way through their respective districts free of charge and to build practically all bdiges over 20 feet in span. The right of way in almost all cases has a minimum width of 60 feet, has a minimum width of 60 feet, and graded to a minimum width of 21 on all roads except in mountainous country, where a minimum width of 16 feet is allowed. A maximum grade of 7 per cent is allowed for the mountain roads, but this is allowed only in very mountainous localities. The crown of the concrete roadway is very flat, being not more than 2 3-4 inches.

As a rule the people, town and

not more than 2 3-4 inches.

As a rule the people, town and corporations, of the state have been very liberal with the Commission. The farmers along the routes have donated land for rights of way, local banks have bought up large amounts of bonds; companies are furnishing cement, sandstone, etc., at bedrock prices; the railroad companies of the state have entered inpanies of the state have entered in-to an agreement with the Commis-sion to haul all materials used for construction at practically 50 per cent of the standard rates. This means a saving of untold thousands of dollars to the Commission. Fol-lowing are the rates agreed upon for hauling all material including contractor's equipment.

Stone, gravel and san, 1/2 cent per ton per mile, with a \$6 per car minimum, exclusive of mountain hauls.

Road oil and bituminous rock, 3-4 cents per ton per mile, min-imum \$10 car.

Asphalt, 1 cent per ton per mile, whether in tank, cars, or packages, minimum, \$10 per car. All other commodities, (a) the lowest of any commercial rate, or (b) one-half of any class rate; minimum \$10 per car.

The Commission has a contract with one of the largest crushed rock concerns to supply 500,000 tons of crushed rock at 45 cents per ton. They also have a contract with var-

They also have a contract with various gravel concerns to supply the same at 27½ cents per ton.

The Commission has set a good precedent by standing between the small contractor and the powerful paving concerns who assume to do business under the so-called patent rights, and announced in no uncertain terms its intention of defending any and all suits for infringement of any and all suits for infringement of

said so-called patent rights. We, in Oregon, hear and read great deal of criticism of the of construction adopted by the Com-mission, and upon investigation I have found that a great deal of this have found that a great deal of this criticism originates from large paying contracting firms, who claim that the Commission should use from 1½ to 2 inches of sheet asphalt for a wearing surface, or something equivalent. Now practically all of such finishings are covered by patent, so that the cost is absolutely prohibitive. Again you will be told prohibitive. Again you will be told that 4 inches of concrete is abso-lutely insufficient to carry heavy

I personally examined about 200 miles of the highway and failed to find one single instance where the 4-inch concrete base had failed. I find that the pavement is cracked across the roadway about every 30 feet, due to contraction, but this would have occurred had the pavement been a foot thick. Just as soon as these cracks appear they are filled with a bituminous material, and after the wearing surface is applied these cracks cannot be found on the surface even by a close inspection, and the roadway is left perfectly smooth, while if expansion joints had been used there would be a rough place left, which would make more or less of a jar in rid-

ing over it.

I found several places where the concrete that had not received the wearing surface, where it had be-come pitted to considerable extent. I also found places where the wearing surface was flaking off of the concrete. I took this matter up with the engineer and he told me that they had got a bum job, due to an unfaithful contractor and unskilled inspector at the mixer and that the traffic was admitted to the

Continued on page Eight

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Foley Kidney Pills are so thoroughly effective for backache, rheumatism, swollen, aching joints, kidney and bladder ailments that they are recommended everywhere. A. A. Jeffords, McGrew, Nebr., says: "My druggist recommended Foley Kidney Pills for pains in my back and before I finished one bottle, my old trouble entirely disappeared." Owl Prescription Pharmacy, Frank D. Cohan. Opposite Chandler Hotel. Phone 74. Central Avenue Drug Store, local agency.