

could have been avoided at a saving of nearly \$4,000 and a better road secured.

In some of the counties we have found conditions for which the county boards alone are responsible, yet, in the majority of cases the state is a partner with the county boards in the mismanagement of our highway funds, owing to the fact that inadequate laws and an insufficient organization have been provided for handling the work. Road building is a business and not a side issue to the management of a large farm, or extensive business enterprise. It is hardly fair to a farmer or business man to elect him to the office of county supervisor where he has the spending of thousands of dollars annually in a kind of work with which he is not familiar, and then not provide him with the assistance of men trained in that particular line.

Before we can expect to secure the best results from the money spent on our public roads, we must provide an efficient engineering organization to work with our board of supervisors. We must give our county supervisors the assistance of the technical training and years' of experience which go to make a finished road engineer.

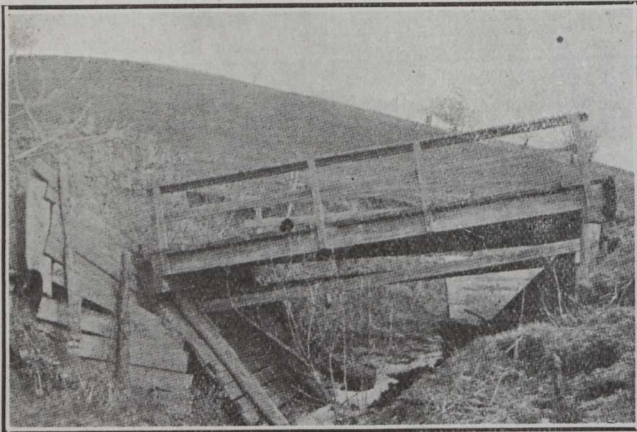


Fig. 4.—Not the Result of a Flood but Lack of Proper Pile Driving.

The legislature recognized this fact when, in 1910, it passed the bill creating the present State Highway Commission. The appropriation for carrying on the work was, however, pitifully small, and although increases in the appropriation have been made from time to time, yet the demands for assistance from the commission have increased at a much faster rate than have the appropriations, and the commission is at present unable to carry on the work properly on account of a lack of funds.

One of the most difficult parts of the work of the commission has been to get the bridge and road work constructed in the field exactly as shown on the plans. In the majority of cases the work has been constructed without any adequate inspection or engineering supervision in the field. At times, carefully prepared plans have been practically ignored, and in one instance a very inferior arch bridge was built from carefully prepared plans for a flat-top bridge.

To properly handle the work and prevent such miscarriage of plans as shown above, each county should employ a highway engineer whose duties would be:—

To survey the roads and prepare profiles and estimates giving proper attention to drainage, traffic, surfacing, etc.

To relocate roads so as to avoid expensive bridges and excessive cuts and fills.

To prepare detailed plans, specifications and estimates for each bridge built.

To survey the drainage areas and plan the bridges with due consideration to the waterway required.

To inspect the work frequently and see that it is done according to the plans and specifications.

To keep a complete and accurate record of the amount and locations of the work done.

Such an engineer working in connection with the State Highway Commission would complete the organization and would render invaluable service to the cause of "good roads."

DISTRIBUTING SYSTEM OF NEW YORK'S WATER SUPPLY.

The waters of the new aqueduct which is being constructed from the Catskill Mountains to New York, will empty into the Hill View Reservoir before their final plunge into the heart of the city.

The problem of admitting so large a flood into the metropolis is no small one, particularly when the chief demand for the water will come from those sections of Greater New York which lie many miles away. For the present, at least, little if any of the Catskill water will be used in Manhattan and the Bronx, but most of it will be consumed by the boroughs of Brooklyn, Queens, and Richmond. The water waste campaign which has been carried on for the past few years has so far reduced the consumption of water that the Croton system, which can furnish steadily 350,000,000 gallons of water per day, can easily take care of the immediate wants of Manhattan and the Bronx as well as the demand from these two boroughs for many years to come. It is not likely that the population in Manhattan will increase much unless it undergoes a marked vertical growth, for now there are practically no more vacant lots to be built upon. So that in estimating the future demands upon the Croton system we must consider chiefly the growth of population in the Bronx. In the other three boroughs of the city, however, there is a present demand for water and the probability of large increases in population in coming years.

To conduct the Catskill water into Brooklyn and Queens, it was decided to build a trunk line, so far beneath the surface that there would always be 150 feet of good solid rock for the roof of the tunnel, and provide a course for a subterranean river which could be tapped as needed for the city's supply, and which, at the same time, would be so completely buried that it would never menace the safety of structures above it. When this tunnel is completed it will be one of the most durable pieces of work ever constructed by man; for practically nothing but an earthquake can destroy it; and even this possibility is very remote, for the rock underlying New York is of very early formation and not at all liable to seismic disturbance. And so the city tunnel of the Catskill aqueduct is being bored through the rock on the average of 200 to 250 feet below the surface except in places where the nature of the rock is of such a character as to call for a much greater depth.

The first dip takes place just above the Harlem River, where the tunnel drops down 362 feet below the ground level. Then it runs practically horizontally until it passes the dip in the rock under 125th Street. Thence it rises again and maintains a practically constant level of 200 feet under the city, until it arrives at the ancient bed of the East River. A glance at the map of New York city will show that the East River makes a decided turn about the lower east side or "heel" of Manhattan. In pre-glacial times, the East River had no elbow in its course, but ran directly across the heel of Manhattan, and it wore away the rock in its bed to considerable depths. However, the large deposits of earth