

Waterway Plan Proved in Miniature

Engineering

Model Testing May Help Solve Mississippi Problem

ON a scaled model of the Des Moines River at Ottumwa, Iowa, hydraulic engineers of the state university at Iowa City have accurately determined the effect of cut off canals around bends near the city and have advised a building program that has actually proved itself in miniature.

This was very probably the first attempt in the United States to determine with models in advance of actual field construction the benefits to be derived from straightening rivers. It was very successful.

In Europe, however, the use of miniature river valleys in hydraulics laboratories is common and has proved very beneficial. Observations of the similarity between configurations of large streams and those of like small ones were first made by M. Dubuat, the Frenchman who also gave the world the basic theories of this branch of engineering. Frague made the initial practical application of the idea in 1875 when he helped Bordeaux improve the channel of the Garonne of that city. Ten years later Professor Osborne Reynolds, of England, studied with models the problem of a canal for seagoing vessels between Liverpool and Manchester.

Ottumwa, a city of 27,000, has suffered often from floods. There are two big bends in the river, one just above and one just below it, and at the end of the first bend the city owns a power plant supplied with water by a canal across the neck of the bend.

The city wanted to enlarge this canal to increase the capacity of the power plant and at the same time wanted to know what effect this enlarged canal and a second one across the other bend would have on the height of flood waters.

The model was constructed of concrete reproducing exactly an area of the river valley 8,000 feet wide and 33,600 feet long containing the two bends and a part of the city. A horizontal scale of one to 800 and a vertical scale of one to 100 was used. Water was run through the miniature river at different heights, with and without the proposed canals cut, and accurate measurements of water flow and heights were taken.

The recommendations made, which will doubtless save Ottumwa both money and time, call for the construction of the two canals not more than 400 feet wide and as deep as the

river, and for the removal of a number of levees.

Pending expected legislative action by the present congress, two governmental hydraulic laboratories will be built; one by the U. S. Bureau of Standards, the other by the Board of Army Engineers.

These laboratories are to be devoted to closer study of river improvement and similar projects for which Uncle Sam spends his money. Very probably they will contain facilities for modeling and testing proposed waterways plans.

While congress is providing better laboratory methods for proving flood control measures before they are applied in the field, the administration has halted the spending of the authorized \$325,000,000 on the much-discussed Jadwin project of controlling the Mississippi. The halt comes so the legislature can do something about the troubles that have arisen.

Some work had actually been stopped by court action of owners of lands situated in proposed spillways. Then non-approval of the Jadwin plan by prominent engineers became more

pronounced at the annual meeting of the American Engineering Council in Washington recently.

Senator Frazier, North Dakota, wants a committee of nine, six of whom would be civilian engineers, to report promptly to the Senate on all plans now being considered. Civilian engineers declare that it would be impossible to give an adequate report during the present session.

Senator Hawes, of Missouri, is expected to introduce soon a modified resolution that will be more practicable in the eyes of the engineers.

And as the legislators consider how to tame him, the Father of Waters rises. He has been urged upward by excessive water coming from the Ohio and Arkansas river basins where flooding has occurred. Levees along the Wabash river and some on the lower Mississippi have broken. Much land has been flooded and highway traffic interrupted.

Little damage was done along the Mississippi, however, because the surplus water came from only a small part of its great basin.

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Decline of Pueblos Mysterious

Archæology

The Pueblo Indians, who were the most substantial residents of the Southwest for many centuries before the white man's era, were at the height of their development about the time of the Middle Ages, and their decline was sudden and mysterious, Earl H. Morris, archæologist of the Carnegie Institution of Washington, said in an address at the Institution.

During the Golden Age of Pueblo culture were built the great community houses which stand today in impressive ruins in the southwestern states. In these oldest American apartment houses thousands of people lived. The pueblos, as the settlements are called, were located for security against wandering tribes and for their nearness to water supplies and land suitable for farming. The inhabitants produced artistic and unusual pottery.

This Indian culture came very suddenly into flower after a long period of slow growth, Mr. Morris concludes. The most plausible explanation is that nomadic tribes became menacing to the scattered farming

Pueblos, and caused the settled people to gather for strength in dwellings that were literal fortresses. Ideas of efficient tribal organization were established, for the great irrigation systems and the building programs would have been possible only by consistent, cooperative effort.

It would seem that this tremendous expansion and building came to an abrupt termination, Mr. Morris declared. The latest timbers from the prehistoric sites in widely scattered localities of the San Juan region have been examined by Dr. A. E. Douglass, of the University of Arizona, and he has found that these trees were cut in the same year. No evidence of building activity later than this has been found. Whether drought, pestilence, or warfare put an end to the progress of these communities is one of the problems still to be solved by archæology. At the time the Spaniards arrived in the West the Pueblo Golden Age was at an end, and many of the settlements were abandoned.

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