SYNOPSES OF U. S. ENGINEER OFFICE REPORTS

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Laboratory Tests on Hydraulic Model of Lock and Dam No. 22, Mississippi River, Hannibal, Missouri. (Final Report No. 33), 77 pp., May, 1939. Tests on hydraulic models of Mississippi River Dam No. 22 were made to obtain data for stilling basin and Tainter gate hoisting machinery design and for gate operation. A total of 157 tests were made on 19 models. A gate sill with 6 ft. drop in 15.5 ft., and a stilling basin 40 ft. long with a single row of 7 baffle piers 3 ft. high, 17 ft. from the end of the apron, and a solid end sill 5 ft. high were found to be satisfactory.

Laboratory Tests on Hydraulic Model of Filling and Emptying System of the General Joe Wheeler Lock, Tennessee River, near Florence, Alabama. (Final report No. 34), 84 pp., July, 1939. Tests were made on a model of the General Joe Wheeler Lock to determine operating time, hydraulic system coefficients, and flow distribution. Limited, comparable data, obtained at the prototype, are presented to show the degree of similarity between model and prototype. The model structure, tests, and analyses are described, and illustrated with photographs and drawings.

Permeability Tests on St. Peter Sandstone Specimens. (Final Report No. 35), 49 pp., July, 1939. Permeability tests were made on four specimens of St. Peter sandstone obtained from the Ford sand mine near the Twin City Dam at four different elevations comparable to the foundation elevation of the proposed lower locks at St. Anthony Falls, Mississippi River, Minneapolis, Minnesota. The results indicate the variation in percolation rates in sandstone at the four elevations, in each of three mutually normal directions, and in samples having fracture planes of different magnitudes. In many tests, gradients were gradually increased until failure of the sandstone obtained. Permeability tests were made also

on sand obtained by crushing the sandstone. The data are presented in this report in graphical and tabular form. Comments based on observations during the tests are also presented. Difficulties encountered in evolving a test technique and the conditions that led to the adopted testing methods are explained.

Laboratory Tests on Hydraulic Models of Roller Gate Stilling Basins. (Final Report No. 36), 279 pp., August, 1939. This report covers comprehensive tests on models of non-submergible and submergible roller gates to determine shapes and dimensions of stilling basins adequate to protect Mississippi River dams operated under emergency conditions required in the discharge of ice from the pools. Water pressures on the roller gates and sills were also observed in the model for the purpose of determining water loads and chain pulls on prototype gates under various conditions of operation.

Laboratory Tests on Hydraulic Models of Submergible Tainter Gates. (Final Report No. 37), 271 pp., October, 1939. Part I — Stilling Basin Studies and Determination of Water Loads on the Submergible Tainter Gate. Tests made on models of submergible Tainter gates to determine the hydraulic characteristics of a truss-type and a drum-type gate when operated in various submerged positions are discussed in this report. Models were built to scale ratios of 1:28.87 and 1:4, model: prototype. The design of the proposed stilling basin was checked and discharge coefficients were determined for flow over the gates. Water pressures on the downstream faces of the submerged gates, and loads on the hoisting chains were determined. Aeration of the nappe, vibration tendencies of the gate, and the effect of extending the end shields above the water surface were also studied.

Part II — Tainter Gate Discharge Coefficients. The discharge capacities of several Tainter gate models were determined for gate openings ranging from 2 to 18 ft., under variable upper pool and lower pool water surface elevations. The effect on discharge capacity was noted for the following variations in the models: Recessed and non-recessed gate piers; angle Theta varying from 22°-50′ to 70°-33′; variations in the shape of the gate sill; stilling basins with and without baffle piers; various lengths of apron; and gate radii of 30 and 40 ft. Two nomographs were developed for empirical discharge coefficients, one for a Tainter gate with recessed gate piers

and submergible gate sill and the other for a Tainter gate on an ogee spillway.

Laboratory Tests on Hydraulic Model of Lower Approach to Proposed Landward Lock, Lock and Dam No. 2, Mississippi River, Hastings, Minnesota. (Final Report No. 38), 104 pp., December, 1939. A model of the Mississippi River in the vicinity of Lock and Dam No. 2, Hastings, Minnesota, in which a problem of navigation in the lower approach to a proposed new lock was studied, is the subject of this report. A number of approach channel schemes excavated in the existing right bank were studied to determine their effects on current conditions and on sedimentation in the navigation channel. The tests indicated that the most satisfactory arrangement was one in which the excavation was carried from the existing right bank of the river to a line prolonged from the right wall of the new lock, with a 500-ft. guard wall constructed as an extension of the river wall of the existing lock, and the left river bank straightened so as to approximately parallel the right bank.

Laboratory Tests on Hydraulic Model to Determine Roller Gate Coefficients for upper Mississippi River Navigation Dams. (Report No. 39 — Appendix to Final Report No. 13; see last paragraph on page 77, Bulletin 19), 72 pp., January, 1940. The tests described in this appendix were made on a model of the type of submergible roller gate installed in Mississippi River navigation dams 11, 12, 13, 14, 17, 18, and 21. The results of these tests are presented by a set of discharge curves for the range of conditions which will be encountered at these dams. Similar curves are included also to present in more usable form calibration data for other types of roller and Tainter gates in the Rock Island District.

Laboratory Tests on Hydraulic Model of Lock and Dam No. 11, Mississippi River, Dubuque, Iowa. (Final Report No. 40), 111 pp., April, 1940. Part One of this report describes model tests made to indicate the best combination of gates and overflow spillway sections to be included in Dam No. 11, and the most suitable modifications of the piers and approach of the highway bridge immediately downstream. Part Two describes tests made on a hydraulic model of the structure to indicate the most desirable dis-

tribution of flow through the gates of the dam as constructed, with the objectives of reducing scour in the river bed which might endanger the stability of the structures and of avoiding the deposition of material in the navigation channel.

Laboratory Tests on Hydraulic Model of Diversion Channel and Stilling Basin, Dry Run Flood Control Project, Decorah, Iowa. (Final Report No. 43), 37 pp., October, 1940. The Dry Run diversion channel is a proposed project for flood protection at Decorah, Winneshiek County, Iowa. Tests on a model of the diversion channel were made to observe the performance of the channel as designed, and to develop a stilling basin for the outlet. A stilling basin 75 ft. long, 130 ft. wide, with a solid end sill 9 ft. high, was found to be satisfactory. This report is the preliminary presentation of the test data and the conclusions drawn from them. It contains the information essential to an understanding of the prototype problem, describes the model arrangement, gives the procedure of the tests, and conclusions with recommendations on hydraulic features of the design.

Laboratory Tests on Hydraulic Model to Determine Navigation Conditions in Approaches to St. Anthony Falls Locks, Mississippi River, Minneapolis, Minnesota. (Final Report No. 44), 143 pp., November, 1940. The St. Anthony Falls Navigation Project requires the construction of a new dam, consisting of three submergible Tainter gates; two locks, one with a lift of 50 ft. at St. Anthony Falls and the other with a lift of 25 ft. at the new dam; guide fences; a dredged navigation channel; and alterations to certain existing bridges. A hydraulic model of this project was built and tested to determine the navigation conditions in the Mississippi River and the lock approaches, to study the operation of the proposed locks and dam, and to develop any corrective measures found necessary. In general, the project was found to be entirely feasible. Possibly the most valuable result obtained from the model was the successful development of a training wall in the middle pool to eliminate dangerous cross currents in the navigation channel and lock approaches.

Laboratory Tests to Determine Discharge Coefficients for Obstructions to Super-Flood Flows. (Final Report No. 45), 55 pp., December, 1940. This report describes a model study con-

ducted for the purpose of determining coefficients of obstruction for bridges subject to floods which would result under the most critical combination of heavy storm run-off and saturated ground conditions that could occur on any watershed in the Rock Island District. Chapter II describes the basic model and accessories, Chapter III the testing procedure in the general studies, including the computation methods and results obtained from the bridge coefficient studies, and Chapter IV describes a series of tests in which existing conditions in the vicinity of the junction of the Des Moines and Raccoon Rivers at Des Moines, Iowa, were approximately simulated. The water surface profile of the Des Moines River, the bridge coefficients determined for this set-up, and the backwater effect of the Scott Street bridge and dam are included.