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THE ROAD MAP OF
HYDRAULIC ENGINEERING IN IOWA

BY

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AND

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**ROAD MAP
OF
HYDRAULIC ENGINEERING
STATE OF IOWA**

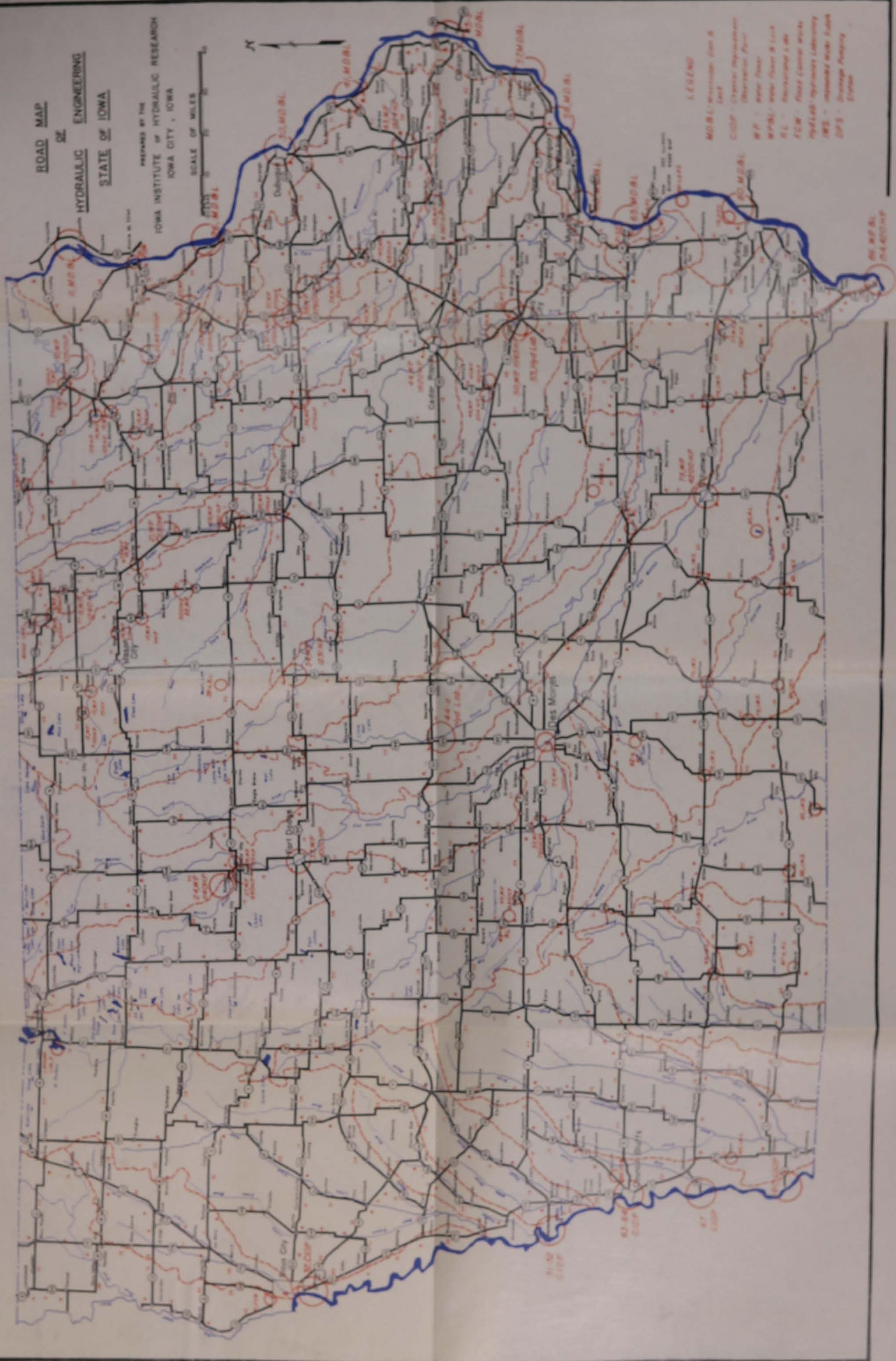
PREPARED BY THE
IOWA INSTITUTE OF HYDRAULIC RESEARCH
IOWA CITY, IOWA

SCALE OF MILES
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LEGEND

- MOBIL - Message Case & Deck
- COOP - Cooperator Improvement Organization Point
- WP - Water Power
- WPL - Water Power & Lock
- RL - Recreational Lake
- FCM - Flood Control Works
- HydLAB - Hydraulics Laboratory
- MS - Impounded Water Supply
- DPS - Drainage Pumping Station



MS, WP, RL, M-4-401018

THE ROAD MAP OF HYDRAULIC ENGINEERING IN IOWA

BY E. W. LANE¹ AND EDWARD SOUCEK²

INTRODUCTION

The traveler interested in hydraulic engineering frequently passes within a short distance of a structure or project which he would wish to inspect if he were aware of its nearness. For him the Road Map of Hydraulic Engineering in Iowa has been prepared.

On the map, cities and roads appear in black; rivers and lakes in blue; and watershed boundaries, road distances, and points of hydraulic interest in red. Although all important cities and principal connecting roads are shown, there has been no attempt to provide complete road information. Such data are always obtainable from other road maps.

Only the hydraulic interest feature requires explanation, since the map is otherwise conventional.

About one hundred points of interest are shown. Their location on the map is indicated by a red circle, the size of the circle being an indication of the magnitude of the project. For example, three sizes of circles are used to represent water power developments—the smallest, intermediate, and largest circles indicate, respectively, water power with less than 500 wheel horsepower, between 500 and 1000 horsepower, and over 1000 horsepower. Each red circle is accompanied by a key number and a group of two or more letters. The meanings of the letters are as follows:

NOTE — Edited by F. T. MAVIS. Published by the University, Iowa City, Iowa, 1938.

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<i>W.P.</i>	=	Water Power
<i>D.P.S.</i>	=	Drainage Pumping Station
<i>I.W.S.</i>	=	Impounded Water Supply
<i>F.C.W.</i>	=	Flood Control Works
<i>Hyd. Lab.</i>	=	Hydraulics Laboratory
<i>R.L.</i>	=	Recreational Lake
<i>W.P. & L.</i>	=	Water Power and Lock
<i>M.D.&L.</i>	=	Mississippi Dam and Lock
<i>C.I.O.P.</i>	=	Channel Improvement Observation Point

For the water power developments, the installed wheel horsepower is indicated on the map. The key number is for reference to a list in which the projects are briefly described. The descriptions provide some idea of the magnitude and other features of the projects, so that the user of the map may decide whether or not he wishes to visit them.

In general, the points of interest are numbered in accordance with their latitude, the low numbers being used along the northern boundary of the state and the high numbers along the southern boundary.

This arrangement will facilitate use of the map by one traveling in an easterly or westerly direction—the most common routes of travel through the State of Iowa.

ACKNOWLEDGMENTS

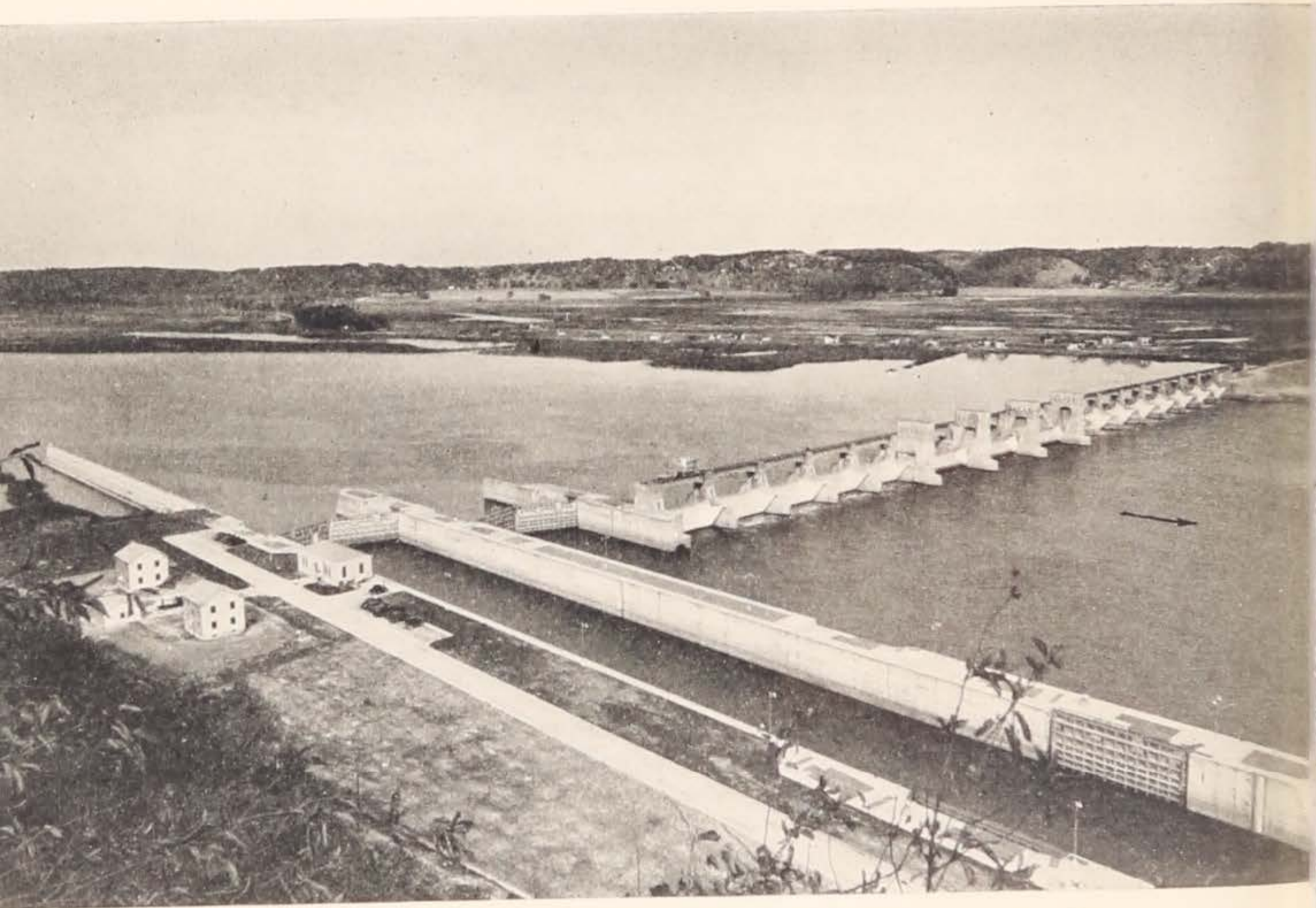
For assistance in compiling the data for the road map, thanks are due to the U. S. Engineer Office, War Department, Rock Island, Illinois; the U. S. Engineer Office, Omaha, Nebraska; the Iowa District Office of the Water Resources Branch, U. S. Geological Survey; the Interstate Power Company; the City of Ottumwa; and the City of Chariton. Various published sources of information were also used.

DESCRIPTION OF PROJECTS

The numbers at the left of each project refer to corresponding key numbers on the map.

1. OTRANTO Water Power. Timber and rock dam 136 ft. long. Head 7 ft. One 80 hp. wheel. Power used for grinding.
2. LAKESIDE LABORATORY. Biological laboratory operated by State University of Iowa. Measurements of evaporation and transpiration are made at the laboratory.
3. STACYVILLE Water Power. Concrete ogee dam 80 ft. long. Head 8 ft. One 38 hp. wheel. Power used for grinding.

4. LIME SPRINGS Water Power. Head 12 ft. Two wheels total 175 hp. Power used for grinding.
5. ST. ANSGAR Water Power. Concrete dam 148 ft. long. Head 8 ft. Two wheels total 165 hp. Generators 138 kva.
6. ST. ANSGAR Water Power. Concrete dam 180 ft. long, gates. Head 6.5 ft. Three wheels total 85 hp. Power used for grinding.
7. DECORAH Water Power (Upper). Concrete gravity dam, four 15 ft. by 25 ft. and one 10 ft. by 30 ft. tainter gates. Head 22 ft. One 750 hp. wheel. Generators 500 kva.
8. MITCHELL Water Power. Concrete dam 116 ft. long, gates. Head 19.5 ft. Two wheels total 1240 hp. Generators 1000 kva.
9. DECORAH Water Power. Head 10 ft. Two wheels total 100 hp. Flour and feed mill.
10. DECORAH Water Power (Lower). Concrete gravity dam with three 25 ft. by 10 ft. tainter gates. Head 29 ft. One 1050 hp. wheel. Generators 680 kva.
11. LYNXVILLE, Wisconsin, Mississippi Dam and Lock No. 9. See Table 1.
12. FERTILE Water Power. Concrete and timber dam 110 ft. long. Head 11 ft. Two wheels total 110 hp. Power used for grinding.
13. WHEELERWOOD Water Power. Concrete dam 98 ft. long. Head 7 ft. Two wheels total 35 hp. Power used for grinding.
14. SPILLVILLE Water Power. Concrete dam 140 ft. long. Head 9 ft. Three wheels total 105 hp. Power used for grinding.
15. FT. ATKINSON Water Power. Concrete dam 600 ft. long. Head 10 ft. Two wheels total 125 hp. Power used for grinding.
16. NORA SPRINGS Water Power. Concrete dam 110 ft. long. Head 10 ft. One 77 hp. wheel. Power used for grinding.
17. ROCKFORD Water Power. Concrete dam 175 ft. long. Head 8 ft. Two wheels total 120 hp. Power used for grinding.
18. CHARLES CITY Water Power. Concrete ogee dam 236 ft. long. Head 13 ft. One 230 hp. wheel. Generators 188 kva.
19. WAUCOMA Water Power. Not operating at present. Head 9 ft. Two wheels total 105 hp. Generators 37.5 kva.
- 19a. MCGREGOR Flood Control Works. Flood control for city of McGregor by use of retarding basin.
20. CLERMONT Water Power. Concrete gravity dam 192 ft. long. Head 16 ft. Two wheels total 790 hp. Generators 650 kva.
21. NASHUA Water Power. Concrete dam 158 ft. long, automatic flood gates. Head 17 ft. Four wheels total 1130 hp. Generators 576 kva. [C. W. OLDER, Concrete dam 17 ft. high has automatic flood gates, *Eng. News-Record*, v. 79, pp. 271-272, Aug. 9, 1917.]
22. GREENE Water Power. Concrete over timber crib dam 239 ft. long. Head 10.5 ft. Two wheels total 500 hp. Generators 400 kva.
23. ELKADER Water Power. Concrete gravity dam 134 ft. long with three 12 ft. tainter gates. Head 16 ft. Two wheels total 575 hp. Generators 528 kva.
24. RUTLAND Water Power. Concrete ogee dam 200 ft. long, 2 tainter gates. Head 13 ft. Two wheels total 1140 hp. Generators 1000 kva.
25. VOLGA CITY Water Power. Concrete dam 112 ft. long. One 12 ft. by 12 ft. steel tainter gate. Head 11 ft. Two wheels total 250 hp. Generators 212 kva.



KEY NO. 30. MISSISSIPPI RIVER LOCK AND DAM NO. 11 AT DUBUQUE, IOWA.

- 25a. BEED'S LAKE. Recreational lake formed by masonry dam.
26. GUTTENBERG Mississippi Dam and Lock No. 10. See Table 1.
27. HUMBOLDT Water Power. Concrete gravity dam 347 ft. long. Head 15 ft. Three wheels total 690 hp. Generators 525 kva.
28. DAKOTA CITY Water Power. Concrete gravity dam 312 ft. long. Head 9 ft. Two wheels total 125 hp. Power operates flour mill.
29. WAVERLY Water Power. Concrete dam 310 ft. long, gates. Head 13 ft. Three wheels total 660 hp. Generators 545 kva.
30. DUBUQUE Mississippi Dam and Lock No. 11. See Table 1.
31. SIOUX CITY Flood Control Works. Channel improvements on Floyd River and Perry Creek.
32. SIOUX CITY Channel Improvement Observation Point, Floyd Monument. South from this point the river has been confined to a single channel of fixed width, direction and curvature, designed to afford a minimum navigable depth of 6 ft. at all stages of the river. The regulating structures are pile dikes driven through a ballasted protection mattress on the bed of the river.

33. FT. DODGE Water Power. Concrete ogee dam 230 ft. long with five tainter gates. Head 18 ft. Two wheels total 1000 hp. Generators 800 kva.
34. IOWA FALLS Water Power. Concrete dam 80 ft. long, gates. Head 25 ft. Two wheels total 1231 hp. Generators 950 kva.
- 34a. PINE LAKE. Two recreational lakes formed by earth dams.
35. CEDAR FALLS Water Power. New dam and plant are being built (1938). Plans are for an 11 ft. head and two or three wheels to generate about 1000 kw.
36. INDEPENDENCE Water Power. Concrete gravity dam 225 ft. long. Head 11.5 ft. Two wheels total 670 hp. Generators 750 kva.
37. MANCHESTER Water Power. Concrete gravity dam 166 ft. long. Head 13 ft. One 370 hp. wheel. Generators 312 kva.
- 37a. QUAKER MILLS Water Power. Concrete gravity dam 105 ft. long with one 8 ft. by 16 ft. hand operated tainter gate. Head 10 ft. One 370 hp. wheel. Generators 330 kva.
38. DELHI Water Power. Concrete gravity dam 72 ft. long with three 25 ft. by 19 ft. motor lift gates. Head 35 ft. Two wheels total 1760 hp. Generators 1500 kva. This is a modern automatic station.
39. HOPKINTON Water Power. Concrete gravity dam 98 ft. long. Head 10 ft. One 290 hp. wheel. Generators 250 kva.
40. MONTICELLO Water Power. Concrete gravity and earth fill dam 280 ft. long with one 6 ft. by 8 ft. hand operated gate. Head 10 ft. Four wheels total 480 hp. Generators 349 kva.
41. BELLEVUE Mississippi Dam and Lock No. 12. See Table 1.
42. CENTRAL CITY Water Power. Concrete and earth fill dam with concrete core-wall, 148 ft. long. Head 12 ft. Four wheels total 400 hp. Generators 325 kva.
43. MAQUOKETA Water Power. Earth fill dam 144 ft. long with six tainter gates 24 ft. by 10.8 ft. Head 25 ft. Two wheels total 1824 hp. Generators 1500 kva. Wash out around dam occurred during 1937; not yet [1938] repaired.
44. CEDAR RAPIDS Water Power. Concrete dam 540 ft. long, gates. Head 10 ft. Three wheels total 1620 hp. Generators 1500 kva.
- 44a. AMES, Iowa State College, Hydraulics Laboratory. Laboratory primarily for instruction in hydraulics. Small artificial lake and an interesting by-pass for flood water. Iowa State College has made extensive and valuable studies of the loads which act on tile and culverts in different soils and under various bedding conditions. The strength of clay and concrete tile of all sizes has been investigated; also the reliability of various methods of applying test loads to determine the strength. The College has also been active in the study of farm drainage and soil erosion. Numerous bulletins dealing with the results of these investigations have been published.
45. OXFORD MILLS Water Power. Timber and rock crib dam 242 ft. long. Head 7 ft. One 360 hp. wheel. Generators 525 kva.
- 45a. CLINTON Mississippi Dam and Lock No. 13. See Table 1.
46. MIDDLE AMANA Water Power. Concrete slab dam 170 ft. long. Head 8 ft. Three wheels total 204 hp. Generators 10 kva. Manufacturing.
47. EAST AMANA Water Power. On power canal from Middle Amana. Head 14 ft. One 160 hp. wheel. Power for manufacturing.
48. LAKE MACBRIDE. Recreational lake formed by earth dam.

49. PANORA Water Power. Concrete and rock crib dam 96 ft. long. Head 13 ft. One 240 hp. wheel. Generators 175 kva.
- 49a. SPRINGBROOK. Recreational lake formed by earth dam.
50. CORALVILLE Water Power. Concrete gravity dam 283 ft. long. Head 10 ft. Two wheels total 1065 hp. Generators 800 kva.
51. MISSOURI VALLEY Channel Improvement Observation Point, Blair Bridge. Above and below the bridge are regulating works designed to confine the river into a fixed channel. Permeable pile dikes have been constructed to fair the sharp bend which formerly existed and to direct the channel into a bend of easy curvature which may be navigated by long barge tows.
52. MISSOURI VALLEY Channel Improvement Observation Point, U. S. Highway 30, 4 Miles East of Blair Bridge. South of U. S. Highway 30 are the regulating structures designed to fair the sharp bend which formerly existed and to confine the river to a fixed channel.
53. ADEL Water Power. Concrete dam 164 ft. long. Head 12 ft. One 760 hp. wheel. Generators 699 kva.
54. DES MOINES Water Power. Hollow, multiple arch dam about 500 ft. long. Head about 9 ft. Not operated since 1918.
55. IOWA CITY, State University of Iowa, Hydraulics Laboratory. See page 11. [Large addition being made to Iowa hydraulic laboratory, *Eng. News-Record*, v. 109, p. 411, Oct. 6, 1932. F. T. MAVIS, Hydraulic research at Iowa University, *Eng. News-Record*, v. 115, pp. 433-437, Sept. 26, 1935.]
56. IOWA CITY Water Power. Concrete ogee dam 300 ft. long. Head 8.5 ft. One 279 hp. wheel. Generators 250 kva.
57. LECLAIRE Mississippi Dam and Lock No. 14. See Table 1.
58. DAVENPORT Mississippi Dam and Lock No. 15. See Table 1. [Roller-gate dam erection at Rock Island, Ill., *Eng. News-Record*, v. 112, pp. 410-413, Mar. 29, 1934.]
59. WHAT CHEER Impounded Water Supply.* Impounding reservoir created by small earth dam to supplement deep well water supply.
60. MUSCATINE Mississippi Dam and Lock No. 16. See Table 1.
61. MUSCATINE-LOUISA COUNTY Drainage Pumping Station. Plant No. 1 drains 44,000 acres. Three steam driven pumps with a total capacity of 206,000 g.p.m.
- 61a. LAKE KEOMAH. Recreational lake formed by earth dam.
62. COUNCIL BLUFFS Flood Control Works. Channel Improvements of Indian Creek. [Flood protection project for Council Bluffs, *Eng. News-Record*, v. 85, pp. 596-598, Sept. 23, 1920. CHARLES B. BURDICK, Putting a creek in a conduit, *Eng. News-Record*, v. 120, pp. 471-474, Mar. 31, 1938.]
- 62a. LAKE AHQUABI. Recreational lake formed by earth dam.
63. COUNCIL BLUFFS Channel Improvement Observation Point, Douglas Street Bridge on U. S. Highway 30 S. Below Douglas Street Bridge is a series of permeable dikes constructed from the Iowa bank to confine the river to a single channel. When this work was begun in 1932 the main channel followed a wide arc far back along the Council Bluffs water front. A high fill has been formed between the dikes completely covering them and a heavy growth of willows has sprung up.



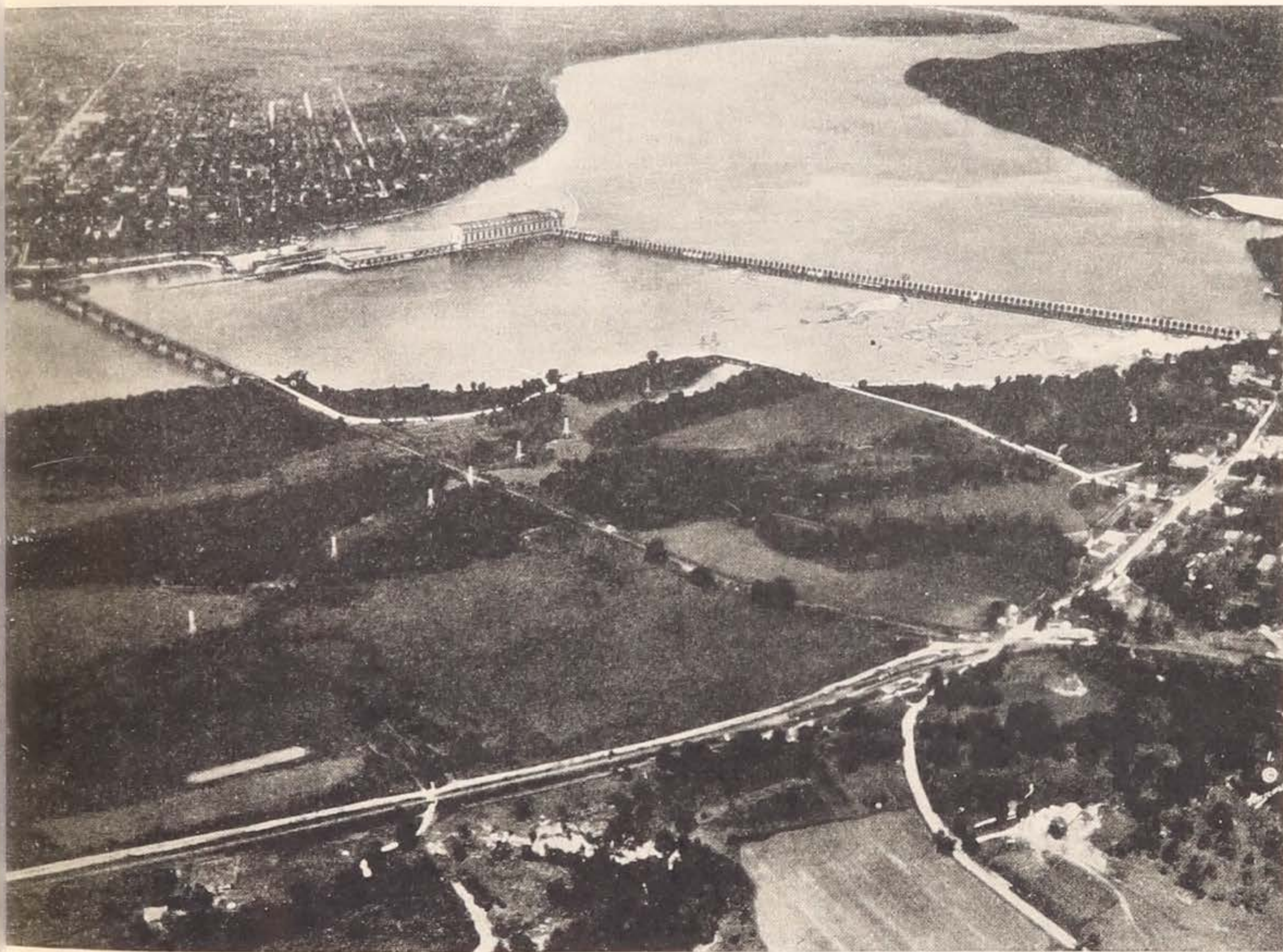
KEY NO. 64. MISSOURI RIVER CHANNEL IMPROVEMENT AT COUNCIL BLUFFS, IOWA.

64. COUNCIL BLUFFS Channel Improvement Observation Point, South Omaha Bridge on U. S. Highway 75. When the river regulation work was commenced in this area in 1933, the river followed the Iowa bank. When the navigation spans of this bridge were constructed in 1935 the main piers were built on dry land. Through the influence of the permeable dikes above and below the bridge, the river has been forced under the second navigation span. The Nebraska bank will be permitted to erode until the channel has reached a location approximately in line with the first bridge pier on the Nebraska side.
65. NEW BOSTON, ILL. (near) Mississippi Dam and Lock No. 17. See Table 1.
66. MUSCATINE-LOUISA COUNTY Drainage Pumping Station. Plant No. 2 drains 7,400 acres. Two electrically driven pumps with a total capacity of 52,000 g.p.m.
- 66a. LOUISA-DES MOINES COUNTY Drainage Pumping Station. Plant drains 20,000 acres. Two steam driven pumps, with a total capacity of 127,000 g.p.m.
67. GLENWOOD (near) Channel Improvement Observation Point, Plattsmouth Bridge on U. S. Highway 34. Above and below the Plattsmouth Bridge are

- the regulating structures designed to establish a channel capable of accommodating barge traffic at all stages of the river. Below the bridge the channel was formerly divided into two streams passing on either side of Tobacco Island. The river has now been confined to a single channel to the east of Tobacco Island.
68. TABOR Impounded Water Supply.* Impounding reservoir for water supply, earth dam.
 69. CORNING Impounded Water Supply.* Impounding reservoir for water supply, earth dam.
 70. LENOX Impounded Water Supply.* Impounding reservoir for water supply, earth dam.
 71. CRESTON Impounded Water Supply.* Impounding reservoir for water supply, earth dam.
 72. OSCEOLA Impounded Water Supply.* Impounding reservoir for water supply, earth dam.
 73. CHARITON Impounded Water Supply.* Two impounding reservoirs on same watershed for water supply, earth dams. Upper reservoir is recreational area.
 74. ALBIA Impounded Water Supply.* Two impounding reservoirs on same watershed for water supply, earth dams.
 75. OTTUMWA Water Power. Concrete dam with 4 tainter gates 25 ft. by 17 ft., motor operated. Head 13 ft. Three wheels total 4200 hp. Generators 3750 kva. Blade pitch of one turbine is adjustable while running.
 76. FAIRFIELD Impounded Water Supply.* Three impounding reservoirs for water supply, earth dams.
 77. OAKLAND MILLS Concrete ogee dam 257 ft. long, one tainter gate. Head 9 ft. Two wheels total 787 hp. Generators 950 kva.
 78. DES MOINES COUNTY Drainage Pumping Stations. *Lazwell station* drains 30,000 acres. One electric and two steam driven pumps with a total capacity of 240,000 g.p.m. *Tama station* drains 4700 acres. Two steam driven pumps with a total capacity of 23,500 g.p.m.
 79. HUMESTON Impounded Water Supply.* Impounding reservoir for water supply, earth dam.
 80. BURLINGTON Mississippi Dam and Lock No. 18. See Table 1.
 81. SYDNEY (near) Channel Improvement Observation Point, Nebraska City Bridge on Highway No. 3. The regulating structures above and below the bridge are designed to direct the river into a channel of restricted width and definite curvature. The channel formerly divided below the bridge, passing on either side of Frazers Island. The channel west of Frazers Island has been closed by permeable dikes leading off the Nebraska bank.
 82. MT. AYR Impounded Water Supply.* Impounding reservoir for water supply, earth dam.
 83. LAMONI Impounded Water Supply.* Impounding reservoir for water supply, earth dam.
 84. CORYDON Impounded Water Supply.* Impounding reservoir for water supply, earth dam.

*A. H. WIETERS, The effect of drouth on public water supplies in Iowa, *Journal Am. Water Works Assn.*, v. 27, pp. 154-163, Feb. 1935.

E. L. WATERMAN, F. T. MAVIS, AND EDWARD SOUCEK, Fundamental hydrologic considerations for the design of impounding reservoirs in the middle west, *Journal Am. Water Works Assn.*, v. 28, pp. 193-206, Feb. 1936.



KEY NO. 86. MISSISSIPPI RIVER POWER CO. DAM AT KEOKUK, IOWA.

85. CENTERVILLE Impounded Water Supply.* Two impounding reservoirs for water supply, earth dams.
86. KEOKUK Water Power and Lock. Concrete dam 4600 ft. long with 119 vertical lift gates each 32 ft. by 11 ft. Head 32 ft. Fifteen turbines total 150,000 hp. Two auxiliary wheels total 4,420 hp. Generators 135,000 kva. Lock 110 ft. by 400 ft. A larger lock is to be built soon. [Building the hydroelectric plant of the Mississippi River Power Company, *Engineering Record*, v. 64, n. 6, pp. 148-163, Aug. 5, 1911. Calculation of the Keokuk dam, *Engineering Record*, v. 66, n. 8, pp. 219-220, Aug. 24, 1912. The water wheels at Keokuk, *Engineering Record*, v. 66, n. 20, pp. 536-538, Nov. 16, 1912. C. W. LARNER, The 10,000-horsepower turbines at Keokuk, *Engineering Record*, v. 67, n. 11, pp. 294-297, Mar. 15, 1913. Lock and drydock at Keokuk, *Engineering Record*, v. 68, n. 4, pp. 88-92, July 26, 1913. B. H.

PARSONS, Mitering lock gate at Keokuk presents novel features, *Engineering Record*, v. 72, n. 12, pp. 344-349, Sept. 18, 1915. B. H. PARSONS, New type of submergible lock gate at Keokuk operated by compressed air, *Engineering Record*, v. 72, n. 15, pp. 446-450, Oct. 9, 1915. A project for developing the water power of the Des Moines Rapids, *Engineering News*, v. 46, n. 20, pp. 373-376, Nov. 14, 1901. Water power development on the Mississippi River at Keokuk, Iowa, *Engineering News*, v. 66, n. 12, pp. 355-364, Sept. 28, 1911. The turbines of the Mississippi River Power Co. at Keokuk, Iowa, *Engineering News*, v. 70, n. 8, pp. 340-343, Aug. 21, 1913. The Mississippi lock at Keokuk, *Engineering News*, v. 70, n. 20, pp. 964-972, Nov. 13, 1913. Work at the Keokuk dam across the Mississippi River, *Engineering News*, v. 71, n. 13, p. 703, Mar. 26, 1914.

87. LAKE WAPELLO. Recreational lake formed by earth dam.

87a. LAKE OF THREE FIRES. Recreational lake formed by earth dam.

MISSISSIPPI RIVER LOCKS AND DAMS

The dams in this table are a part of the Upper Mississippi navigation project which provides a 9 ft. channel from St. Louis to Minneapolis-St. Paul.³ A series of 26 locks and dams create pools during low stages. During high water periods the dams are opened, permitting the river to flow nearly unobstructed. Each dam consists of a lock, a movable gate section, and, in most cases, a long spillway at pool elevations and

TABLE I. SUMMARY OF DATA ON MISSISSIPPI RIVER LOCKS AND DAMS^a

Key No.	Location	Length of Dam in Feet			Number and Size of		Lock
		Total	Non- Overflow	Overflow	Roller Gates	Tainter Gates	
11	Lynxville Wis.	10,300	8,100	1,350	5- 80 × 20	3 ^b -35 × 15	600 × 110
26	Guttenburg	6,510	4,547	1,200	4- 80 × 20	8-40 × 15	600 × 110
30	Dubuque	4,818	3,540		3-100 × 20	13-60 × 20	600 × 110
41	Bellevue	8,819	6,700	1,200	3-100 × 20	7-64 × 20	600 × 110
45a	Clinton	14,467	11,723	1,750	3-100 × 20	9-64 × 20	600 × 110
57	LeClaire	2,676	1,250		3-100 × 20	15-64 × 20	600 × 110
58	Davenport				11-100 × 26		600 × 110
					2-100 × 21		600 × 110
60	Muscatine	3,940	415	2,426	4- 80 × 20	15-40 × 20	600 × 110
65	New Boston Ill. (near)	3,156	535	1,700	3-100 × 20	8-64 × 20	600 × 110
80	Burlington	8,000	4,165	2,290	3-100 × 20	14-60 × 20	600 × 110

³E. L. DALEY, Canalization of the Upper Mississippi, *Civil Engineering*, v. 6, pp. 104-108, February 1936.

^aOnly the dams in that reach of the Mississippi which forms the eastern boundary of Iowa are listed. See No. 86 for data on Keokuk dam.

^bTwo tainter gates are submergible.

a non-overflow earth dike. At some dams there is a second smaller lock in parallel with the first. At all other dams provision has been made for a second lock which will be completed if necessary. The movable sections consist of roller gates and tainter gates.

In general, the river bed is of sand. This requires special precautions to insure the safety of the dams. The dams in such locations are founded on wood piles and are protected from underseepage by steel sheet piling. Stilling basins with various types of sills and baffle piers are used to minimize scour below the dams. Extensive model studies of dams, stilling basins, locks, and reaches of the river have been conducted by the U. S. Engineer Department at the Iowa Hydraulics Laboratory.

HYDRAULIC ENGINEERING AT THE STATE UNIVERSITY OF IOWA

The State University of Iowa is well known for its work in hydraulic engineering. Students from China, Canada, Mexico, Argentina, Germany, Hungary, Turkey, and India, as well as from all parts of the United States, have come to Iowa for advanced study in hydraulics. Major co-operative work has been carried on with the Bureau of Agricultural Engineering, U. S. Department of Agriculture; the U. S. Engineer Office, U. S. War Department; and the Geological Survey, Water Resources Branch, U. S. Department of the Interior.

Demonstration, test, and educational work with the National Association of Master Plumbers; hydrologic studies with the Iowa State Planning Board; and tests of fishways with the State Conservation Commission may be mentioned as examples of non-federal co-operative work.

The hydraulics laboratory is on the right bank of the Iowa River at Iowa City. The University dam provides river water under a ten foot head in two large river channels for testing models and structures requiring high flows. One channel is 10 ft. wide and 300 ft. long; the other is 16 ft. wide and 100 ft. long. The flow in these channels may be gaged by weirs and current meters or, in the 16 ft. channel, by a side contraction meter in a 48 in. steel pipe line.

The building is a brick structure 44 ft. wide and 164 ft. long. It has five floors above the high ground on the right bank of the river, but there are actually eight levels in the building. The two upper floors do not extend the full length of the building but compose a tower section about 44 ft. square. This tower section is used for



KEY NO. 55. HYDRAULICS LABORATORY, STATE UNIVERSITY OF IOWA, AT IOWA CITY.

library and office space. The upper full-length floor contains a machine shop, a classroom, a silt analysis laboratory, two constant head tanks, storerooms, and additional office space. The remainder of the building is almost entirely devoted to testing space and to facilities for the circulation and measurement of water.

The circulating water system in the laboratory has a capacity of 6,000 g.p.m. When larger flows are required, the previously described river channels are used.

Two tank scales—each of 18,000 lb. capacity—are available for the

calibration of weirs and other measuring equipment. A three-way valve makes it possible to discharge from a hopper into either scale tank or to by-pass the flow directly into the sump. This valve and the dump valves on the scales are operated from a central control board from which the scales can be observed.

There are two steel flumes especially designed for the operation of river models, one a tiltable flume 10 ft. wide and 42 ft. long, and the other a fixed flume 25 ft. wide and 97 ft. long. There are three glass-sided steel flumes, one 12 in. wide, 24 in. deep, and 15 ft. long, another 30 in. wide, 36 in. deep, and 25 ft. long; and the third 30 in. wide, 36 in. deep, and 40 ft. long. Six wooden flumes varying in length from ten to eighty feet are also available.

A permanent plumbing demonstration set-up, arranged to show the dangers of water systems becoming polluted by self-induced vacuums is an interesting feature of the laboratory. Colored water and transparent pipes are used to aid the non-technical observer in understanding the various phenomena illustrated.

The work of the laboratory consists largely of experiments dealing with the behavior of water in motion. Some tests deal with small scale models of actual or proposed hydraulic structures and apparatus; others are pure research—experiments designed to observe, record, and make available information regarding the action of water under conditions for which mathematical theory is not sufficient.

The models and tests at the laboratory are changed frequently so no particular tests are described in this *Road Map of Hydraulic Engineering*. The results of many of the investigations have been published as bulletins in the University of Iowa Studies in Engineering and as articles in leading technical periodicals. The reports of unpublished researches are in some cases available on loan from the office of the Iowa Institute of Hydraulic Research.

The hydraulics laboratory is open to visitors during business hours and at other times by arrangement.

THE COLLEGE OF ENGINEERING
UNIVERSITY OF IOWA

Offers complete undergraduate courses in Civil, Electrical, Mechanical, Chemical, Commercial, and Hydraulic Engineering, also graduate courses in these fields leading to advanced degrees.

For detailed information application may be made to

H. C. DORCAS, Registrar
Iowa City, Iowa

INSTITUTE OF HYDRAULIC RESEARCH

The Iowa Institute of Hydraulic Research has been organized to afford an agency for the co-ordination of the talent, facilities, and the resources that may be made available at the University of Iowa for undertaking projects of unusual magnitude, scope, or complexity in the field of hydrology and hydraulic engineering.

The Institute affords a connection through which technical societies, governmental departments, industrial corporations, and other interested parties may effectively co-operate with the University in the field of hydraulic research. Correspondence regarding the work of the Institute should be addressed to

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