Flood Control—Continued

	Page
17. Stringtown—Fort Chartres and Ivy Landing, Illinois	1412
18. Fort Chartres and Ivy Landing drainage district No. 5, Illinois	1414
19. Harrisonville and Ivy Landing drainage and levee district No. 2, Illinois	1415
20. Columbia drainage and levee district No. 3, Illinois	1417
21. Wilson and Wenkel and Prairie du Pont drainage and levee districts, Illinois	1418
22. East St. Louis and vicinity, Illinois	1420
23. Chouteau, Nameoki, and Venice drainage and levee district, Illinois	1422
24. Wood River drainage and levee district, Illinois	1423
25. Upper Mississippi River Basin, St. Louis district	1426
26. Emergency flood-control work under authority of the Flood Control Act approved August 18, 1941	1428

Flood Control—Continued

	Page
27. Emergency flood-control work under authority of Public Laws 138 and 318, Seventy-eighth Congress, Public Law 75, Seventy-ninth Congress, and Public Law 102, Eightieth Congress	1429
28. Emergency protection for certain highway and railroad facilities from flood damage in the vicinity of Price Landing, Mo. (sec. 12, Flood Control Act approved December 22, 1944)	1430
29. Preliminary examinations, surveys, and contingencies for flood control	1431
30. Snagging and clearing under authority of section 2 of the Flood Control Act approved August 28, 1937, as amended	1431
31. Inactive flood-control projects	1432

1. MISSISSIPPI RIVER BETWEEN THE OHIO AND MISSOURI RIVERS

Location.—The Mississippi River rises in Lake Itasca, Minn., and, from that lake flows in a southerly direction about 2,350 miles and empties into the Gulf of Mexico. The portion included in this report embraces the 195-mile section known as the middle Mississippi, between the tributary Ohio and Missouri Rivers, about 984 to 11,179 miles from the Gulf.

Previous projects.—The original project for the improvement of the Mississippi River between the Ohio and Missouri Rivers was recommended by a board of engineers in a report, dated April 13, 1872, and concurred in by the Chief of Engineers. For further details see page 1879 of the Annual Report for 1915 and page 1014 of the Annual Report for 1938.

Existing project.—This provides for obtaining and maintaining a minimum channel depth of not less than 9 feet, a minimum width of not less than 300 feet at low water, with additional width in bends from the mouth of the Ohio River (about 984 miles from the Gulf) to the northern boundary of the city of St. Louis, 191 miles; thence 200 feet wide, with additional width in bends to the mouth of the Missouri River, 4 miles; to be obtained: First, by regulating works, for closing sloughs and secondary channels, and narrowing the river; by building new banks where the natural width is excessive and protecting new and old banks from erosion where necessary to secure permanency; second, by dredging or

other temporary expedients to maintain channels of project dimensions; third, by construction of works authorized for the Chain of Rocks reach in the River and Harbor Act of March 2, 1945, which approved a comprehensive plan for development of the Mississippi River at Chain of Rocks so as to provide for construction of a lateral canal at an estimated first cost to the United States of approximately $10,290,000, with annual maintenance and operation cost of $70,000, subject to such modification as the Chief of Engineers may find necessary when the project is undertaken; and to authorize the relocation of the river channel and reclamation of the area in Sawyer Bend for airport, park, recreational, and similar purposes at a cost to local interests of approximately $17,555,000; provided that any modification of the present river channel required by the civic development be deferred until completion of the lateral canal in the interest of navigation and that the river diversion work connected with such civic development be under the supervision of the Chief of Engineers in order to insure that the interests of interstate and foreign commerce be properly protected; and further provided that local interests hold and save the United States free from any claims for damages that might be incurred due to the construction, maintenance, or operation of such civic development or any part thereof (H. Doc. 231, 76th Cong., 1st sess.).

The estimated cost of new work, revised in 1950, is $95,603,000, with $1,370,000 for annual maintenance.

The existing project was authorized by the following river and harbor acts:

Acts	Work authorized	Documents
----------	Project for regulating works adopted in 1881. (To obtain a minimum depth of 8 feet.)	Annual Report, 1881, p. 1536.
June 3, 1896 June 13, 1902 Mar. 2, 1907	Dredging introduced as part of the project	
Mar. 3, 1905[1] Mar. 2, 1907[1]	These acts practically abrogated that part of the project for the middle Mississippi which proposed regulating works.	
June 25, 1910	Regulating works restored to the project and appropriations begun with a view to the completion of the improvement between the Ohio and Missouri Rivers within 12 years at an estimated cost of $21,000,000, exclusive of amounts previously expended.	H. Doc. 50, 61st Cong., 1st sess. and H. Doc. 168, 58th Cong., 2d sess.[2]
Jan. 21, 1927	For a depth of 9 feet and width of 300 feet from the Ohio River to the northern boundary of the city of St. Louis, with the estimated cost of maintenance increased to $900,000 annually.	Rivers and Harbors Committee Doc. 9, 69th Cong., 2d sess.
July 3, 1930	Project between the northern boundary of the city of St Louis and Grafton (mouth of Illinois River) modified to provide for a channel 9 feet deep and generally 200 feet wide with additional width around bends, at an estimated cost of $1,500,000, with $125,000 annually for maintenance.	Rivers and Harbors Committee Doc. 12, 70th Cong., 1st sess.
Mar. 2, 1945	Modified to provide for construction of a lateral canal with lock at Chain of Rocks, at an estimated first cost to the United States of about $10,290,000, with $70,000 annually for maintenance and operation.	H. Doc. 231, 76th Cong., 1st sess.

[1] Also joint resolution, June 29, 1906.
[2] Contains latest published map.

See House Document 669 (76th Cong., 3d sess.) for report of Chief of Engineers dated February 27, 1940, containing a general

plan for improvement of the Mississippi River between Coon Rapids Dam and the mouth of the Ohio River for purposes of navigation, power development, the control of floods, and the needs of irrigation.

Terminal facilities.—Most of the water terminal and transfer facilities of the district are described in volumes 1 and 4 of the four-volume report of the Board of Engineers for Rivers and Harbors, entitled "Survey of Terminals and Landings on the Inland Waterways of the United States."

Operations and results during fiscal year.—Construction works were carried on by contract and by hired labor work with Government plant, with weather and river stages suitable for construction about 10 months of the year. Regulating works were maintained and project dimensions of channels were secured by dredging. Location, quantities, and costs of open river regulating works were as follows:

Class of work and locality	Miles above mouth of Ohio River	Dikes (burdles)		
		Number	Linear feet	Cost
New work by contract:				
Powers Island-Schenimann	63-65	2	1,115	$89,049.25
Crain Island-Chester	105			15,414.06
Fish Bend	141			22,824.62
Total		2	1,115	107,287.93
New work by United States plant and hired labor:				
Cairo Protection	5	2	375	39,571.52
Seventy Six [1]	91	2	855	36,842.74
Chesley Island	159	1	230	23,135.23
Total		5	1,460	99,549.49
Maintenance by United States plant and hired labor			9,050	[2]324,981.61

[1] Solid dikes.
[2] Includes cost of screening 11,315 linear feet of dikes with mattress lumber.

Class of work and locality	Miles above mouth of Ohio River	Bank protection (revetment)					Cost
		Number	Linear feet bank protection	Squares (100 square feet)		Toe piles bank protection	
				Mattress	Paving		
New work by contract:							
Cape Girardeau-Wilkinson	49				299		$20,360.86
Liberty	101	2	1,840	1,840	412		47,858.83
Kaskaskia Island	112	1	1,505	1,505	293		40,956.83
Total		3	3,345	3,345	1,004		$109,176.52
Maintenance by United States plant and hired labor			2,475	494	1,026	145	64,374.24

New Work: A total of 407,025 cubic yards of material was handled by a United States hydraulic dredge in preparing two localities for new regulating works at a cost of $65,754.55. Two dikes, totaling 1,115 feet in length, were built under contract at a cost

of $107,287.93. Three revetments, consisting of 4,349 squares of mattress and paving, were completed under contract at a cost of $109,176.52. Three pile dikes and two solid dikes, totaling 1,460 feet in length, were built by hired labor with Government plant, at a cost of $99,549.49; and cost of model studies was $6,000. Costs of $11,325.058.77 were incurred on the improvement at Chain of Rocks as follows: By contract, construction of locks, $7,256,868.63; relocation of utilities, $641,445.83; abstracts of title to land, $76.69; power control and lighting, $78,577.83; and construction of canal and levees, $2,973,377.33; by hired labor, advance planning, $1,601.89; real estate expense (management), appraisals, condemnation, mapping and surveying, and legal expense, $36,592.03; purchase of 46.3 acres of land (minus sale of structures), $92,175.87; design for power control and lighting, $25,752.22; design of lock, $24,286.97; miscellaneous construction surveys, $89,222.54; model studies, $85,810.15; and design of canal and levees, $19,270.79. The total cost of new work was $11,712,-827.26, of which $546,016.50 was by hired labor. Total expenditures were $11,220,273.82.

Maintenance: Dikes and revetments were repaired at a cost of $389,355.85. The required 9-foot channel was maintained by two United States hydraulic dredges. During the year 38 shoals developed, of which 32 were dredged once and 6 were dredged twice, removing 2,970,381 cubic yards of sand and gravel at a cost of $383,789.43. The channels dredged had a combined length of 1.6 miles, an average width of 290 feet, and an average gain in depth of 5.2 feet; 199,812 cubic yards of material were removed in outside-the-channel dredging at a cost of $17,723.25. The total cost of maintenance dredging was $401,512.68.

Hydropgraphic surveys were made covering 60 miles of river, costing $29,985.59, of which $681.98 was by contract. Aids to navigation were installed at a cost of $35,421.55. Other miscellaneous costs by hired labor were snagging, $3,335.27; gages, $16,882.78; discharge observations at miscellaneous localities, $1,184.59; cooperative stream gaging, $14,821.89; and stream flow forecasting, $5,308.12; all charged to maintenance. The total cost of all maintenance was $897,808.32 and the expenditures were $975,000.00. The total costs for the fiscal year were $12,610,635.58 and the expenditures were $12,195,273.82, all from regular funds.

Condition at end of fiscal year.—Work under this project (including the Chain of Rock canal), is about 68 percent complete. The quantities required to complete the project are estimated at 133,880 linear feet of dikes, 135,360 linear feet of revetment, 500,-000 cubic yards of construction dredging, 280,000 cubic yards of rock removal, and the canal, locks, levees, etc., at Chain of Rocks, as authorized by the River and Harbor Act of March 2, 1945. Dikes and revetments are now in good repair and the channel has been greatly improved by the work that has been done. Dredging is required at low stages to remove temporary shoals and maintain the required channel depths.

In recent years, the project dimensions of channels have generally been maintained throughout the navigation season. The navi-

gation season formerly extended from the middle of February to the middle of December, the river being generally closed by ice the remainder of the year. However, in recent years increased demands of commerce and the use of steel-hull boats have combined to extend the navigation season throughout the year except when blocked by heavy running ice or gorges. The river is generally above the 10-foot stage, St. Louis gage, for 6 months of the year, latter part of February to latter part of August, during which time project channel depths generally prevail without dredging. The mean stage of the river, St. Louis gage, was 9.25 feet for the fiscal year 1949 and 10.43 feet for the fiscal year 1950.

The costs and expenditures under the existing project to June 30, 1950 have been as follows:

Kind of funds	Costs			Expenditures
	New work	Maintenance	Total	
Regular	$60,821,169.74	$32,136,389.06	$92,957,558.80	$91,421,803.07
Public works	3,462,154.46		3,462,154.46	3,462,154.46
Emergency relief	996,747.95		996,747.95	996,747.95
Total	$65,280,072.15	$32,136,389.06	$97,416,461.21	$95,880,705.44

Proposed operations.—The unexpended balance June 30, 1950, $3,147,155.33, plus accounts receivable $109,949.13 and $9,540,-300.00 allotted in fiscal year 1951, a total of $12,797,404.46, will be applied as folows:

Accounts payable, June 30, 1950	$1,645,704.90
New work:	
Regulating works:	
By contract (completion of existing contracts):	
Piling dikes, July 1950 to May 1951:	
Powers Island-Schenimann	234,100.00
Fish Bend	64,900.00
Bank protection, July 1950 to May 1951:	
Liberty	61,100.00
Kaskaskia Island	51,300.00
Bank protection (future award): Ste. Genevieve, Mo. (October 1950 to May 1951)	190,500.00
By hired labor:	
Piling dikes (November to December 1950) Cairo protection	35,000.00
Dredging with United States dredge in connection with new bank protection by contract (November 1950)	98,113.97
Chain of rocks improvement:	
Lock, continuing contract, July to September 1950	3,775,948.00
Canal and levees, continuing contract, July 1950 to June 1951	4,030,238.00
Power control and lighting, continuing contract July 1950 to March 1951	691,062.00
Bank protection (future award) Nov. 1950 to June 1951	566,772
Relocation of electrical distribution lines (existing contract) July 1950 to June 1951	57,518.00
Relocation and inspection of 54 inch waterline (existing contract) July 1950 to June 1951	58,715.00
Relocation of telephone lines (existing contract) July 1950 to June 1951	9,259.00

Underseepage remedial works—East levee	100,000.00
By hired labor with United States plant, July 1950 to June 1951:	
Planning	185,000.00
Engineering and design after award of contracts (lock, power control and lighting and levees)	34,510.46
Access channel dredging	38,250.00
Construction surveys	20,000.00
Land acquisition	76,298.00
Relocation of power facilities	3,066.00
Total for new work	10,331,030.87
Maintenance:	
By hired labor (July 1950 to June 1951):	
Dikes and bank protection	$326,500.00
Project channel dredging	362,000.00
Surveys, gages and studies	42,000.00
Aids to navigation	34,000.00
Snagging	10,000.00
Cooperative stream gaging	10,000.00
Discharge observations	2,000.00
Stream flow forecasting	6,000.00
Planning	9,749.13
Total maintenance	802,249.13
Maintenance (operating and care):	
Lock No. 27:	
Operation	12,000.00
Ordinary maintenance and repair	3,000.00
Improvement and reconstruction	3,000.00
Total, operating and care	18,000.00
Total for all work	12,797,404.46

The additional sum of $6,738,000 is needed to be appropriated for the following schedule of work during the fiscal year 1952:

New work by contract (July 1951 to June 1952):	
Chain of Rocks improvement:	
Canal and levees	$2,546,495
Bank protection	2,535,367
By hired labor:	
Advance planning	41,228
Construction surveys	24,910
Land acquisition	150,000
Regulating works, by contract:	
Dikes	200,000
Bank protection	77,000
By hired labor:	
Dikes	187,000
Bank protection	86,000
Total for new work	5,798,000
Maintenance, by hired labor:	
Dikes and bank protection	360,000
Project channel dredging	855,000
Surveys, gages and studies	50,000
Aids to navigation	30,000
Snagging	10,000
Cooperative stream gaging	18,000
Discharge observations	3,000
Stream flow forecasting	7,000
Establishment of third order triangulation	7,000

Planning	10,000
Total maintenance	850,000
Operating and care, lock 27:	
Operation	62,000
Ordinary maintenance and repairs	10,000
Improvements and reconstruction	18,000
Total operating and care	90,000
Total for all work	6,738,000

Cost and financial summary

	Fiscal year ending June 30					Total to June 30, 1950, including fiscal years prior to 1946
	1946	1947	1948	1949	1950	
New work:						
Appropriated	3,742,000.00	$ 704,000.00	$4,500,000.00	$9,000,000.00	$9,750,000.00	[1]66,781,522.58
Cost	1,546,976.35	2,026,078.17	5,794,331.58	6,700,933.68	11,712,827.26	[1]65,280,072.15
Expenditures	1,367,711.50	2,094,294.37	5,198,496.28	6,139,702.61	11,220,273.82	[1]63,634,367.25
Maintenance:						
Appropriated	765,000.00	24,000.00	1,027,000.00	860,000.00	975,000.00	32,246,338.19
Cost	903,858.93	735,730.45	1,091,298.19	892,884.69	897,808.32	32,136,389.06
Expenditures	1,186,216.89	584,183.57	936,893.24	950,106.76	975,000.00	32,246,338.19

[1] Existing project.

Other new work data:

Unobligated balance, June 30, 1950	.....
Appropriated for fiscal year ending June 30, 1951	$8,830,000.00
Unobligated balance available for fiscal year 1951	8,830,000.00
Estimated additional amount needed to be appropriated for completion of existing project	19,991,500.00

2. MISSISSIPPI RIVER BETWEEN THE MISSOURI RIVER AND MINNEAPOLIS, MINN. (ST. LOUIS DISTRICT)

See report, "Mississippi River between the Missouri River and Minneapolis, Minn.," page 1437.

3. ILLINOIS WATERWAY, ILL. (ST. LOUIS DISTRICT)

See report, "Illinois Waterway, Ill.," page 2099.

4. EXAMINATIONS, SURVEYS AND CONTINGENCIES (GENERAL)

The cost of work during the fiscal year was $84,473.82 and the expenditures were $75,307.

An anticipated allotment of $70,000 for the fiscal year 1951, plus $23,207.47 accounts receivable, a total of $93,207.47, will be applied as needed during the fiscal year 1951 to payment of expenses incurred under this heading.

The additional sum of $45,000 can be profitably expended during the fiscal year 1952 for contingencies.

Flood Control—Continued

	Page
19. Harrisonville and Ivy Landing drainage and levee district No. 2, Ill.	1205
20. Columbia drainage and levee district No. 3, Ill.	1207
21. Wilson and Wenkel and Prairie du Pont drainage and levee districts, Ill.	1208
22. East St. Louis and vicinity, Ill.	1209
23. Chouteau, Nameoki, and Venice drainage and levee district, Ill.	1211
24. Wood River drainage and levee district, Ill.	1213
25. Upper Mississippi River Basin, St. Louis district	1215
26. Emergency flood-control work under authority of the Flood Control Act approved August 18, 1941	1217

Flood Control—Continued

	Page
27. Emergency flood-control work under authority of Public Laws other than the Flood Control Act approved August 18, 1941, as amended	1217
28. Snagging and clearing under authority of section 2 of the Flood Control Act approved August 28, 1937, as amended	1218
29. Preliminary examinations, surveys, and contingencies for flood control	1219
30. Inspection of completed works, flood control projects	1219
31. Inactive flood-control projects	1220

1. MISSISSIPPI RIVER BETWEEN THE OHIO AND MISSOURI RIVERS

Location. The Mississippi River rises in Lake Itasca, Minn., and, from that lake flows in a southerly direction about 2,350 miles and empties into the Gulf of Mexico. The portion included in this report embraces the 95-mile section known as the middle Mississippi, between the tributary Ohio and Missouri Rivers, about 984 to 1,179 miles from the Gulf.

Previous projects. The original project for the improvement of the Mississippi River between the Ohio and Missouri Rivers was recommended by a board of engineers in a report, dated April 13, 1872, and concurred in by the Chief of Engineers. For further details see page 1879 of the Annual Report for 1915 and page 1014 of the Annual Report for 1938.

Existing project. This provides for obtaining and maintaining a minimum channel depth of not less than 9 feet, a minimum width of not less than 300 feet at low water, with additional width in bends from the mouth of the Ohio River (about 984 miles from the Gulf) to the northern boundary of the city of St. Louis, 191 miles; thence 200 feet wide, with additional width in bends to the mouth of the Missouri River, 4 miles; to be obtained: First, by regulating works, for closing sloughs and secondary channels, and narrowing the river; by building new banks where the natural width is excessive and protecting new and old banks from erosion where necessary to secure permanency; second, by dredging or other temporary expedients to maintain channels of project dimensions; third, by construction of works authorized for the Chain of Rocks reach in the River and Harbor Act of March 2, 1945, which approved a comprehensive plan for development of the Mississippi River at Chain of Rocks so as to provide for construction of a lateral canal at an estimated first cost to the United States of approximately $10,290,000, with annual maintenance and operation cost of $70,000, subject to

such modification as the Chief of Engineers may find necessary when the project is undertaken; and to authorize the relocation of the river channel and reclamation of the area in Sawyer Bend for airport, park, recreational, and similar purposes at a cost to local interests of approximately $17,555,000; provided that any modification of the present river channel required by the civic development be deferred until completion of the lateral canal in the interest of navigation and that the river diversion work connected with such civic development be under the supervision of the Chief of Engineers in order to insure that the interests of interstate and foreign commerce be properly protected; and further provided that local interests hold and save the United States free from any claims for damages that might be incurred due to the construction, maintenance, or operation of such civic development or any part thereof (H. Doc. 231, 76th Cong., 1st sess.).

The estimated cost of new work, revised in 1951, is $100,080,000, with $1,370,000 for annual maintenance.

The existing project was authorized by the following river and harbor acts:

Acts	Work authorized	Documents
----------	Project for regulating works adopted in 1881. (To obtain a minimun depth of 8 feet.)	Annual Report, 1881, p. 1636.
June 3, 1896 June 13, 1902 Mar. 2, 1907	Dredging introduced as part of the project	
Mar. 3, 1905[1] Mar. 2, 1907[1]	These acts practically abrogated that part of the project for the middle Mississippi which proposed regulating works.	
June 25, 1910	Regulating works restored to the project and appropriations begun with a view to the completion of the improvement between the Ohio and Missouri Rivers within 12 years at an estimated cost of $21,000,000, exclusive of amounts previously expended.	H. Doc. 50, 61st Cong., 1st sess. and H. Doc. 168, 58th Cong., 2d sess.[2]
Jan. 21, 1927	For a depth of 9 feet and width of 300 feet from the Ohio River to the northern boundary of the city of St. Louis, with the estimated cost of maintenance increased to $900,000 annually.	Rivers and Harbors Committee Doc. 9, 69th Cong., 2d sess.
July 3, 1930	Project between the northern boundary of the city of St. Louis and Grafton (mouth of Illinois River) modified to provide for a channel 9 feet deep and generally 200 feet wide with additional width around bends, at an estimated cost of $1,500,000, with $125,000 annually for maintenance.	Rivers and Harbors Committee Doc. 12, 70th Cong., 1st sess.
Mar. 2, 1945	Modified to provide for construction of a lateral canal with lock at Chain of Rocks, at an estimated first cost to the United States of about $10,290,000, with $70,000 annually for maintenance and operation.	H. Doc. 231, 76th Cong., 1st sess.

[1] Also joint resolution, June 29, 1906.
[2] Contains latest published map.

See House Document 669 (76th Cong., 3d sess.) for report of Chief of Engineers dated February 27, 1940, containing a general plan for improvement of the Mississippi River between Coon Rapids Dam and the mouth of the Ohio River for purposes of navigation, power development, the control of floods, and the needs of irrigation.

Terminal facilities. Most of the water terminal and transfer facilities of the district are described in volumes 1 and 4 of the four-volume report of the Board of Engineers for Rivers and Harbors, entitled "Survey of Terminals and Landings on the Inland Waterways of the United States."

Operations and results during fiscal year. Construction works were carried on by contract and by hired labor work with Government plant, with weather and river stages suitable for construction about 8 months of the year. Regulating works were maintained and project dimensions of channels were secured by dredging. Locations, quantities, and costs of open river regulating works were as follows:

Class of work and locality	Miles above mouth of Ohio River	Dikes (hurdles)		
		Number	Linear feet	Cost
New work by contract:				
Power Island—Schenimann	34–65	6	3,275	$151,474
Fish Bend	141–143	3	1,445	64,898
Total		9	4,720	216,372
New work by United States plant and hired labor:				
Cairo protection	5–6	3	630	38,748
Total		3	630	38,748
Maintenance by United States plant and hired labor			7,600	[1] 241,763

[1] Includes 100 linear feet of solid dikes at a cost of $2,473.

Class of work and locality	Miles above mouth of Ohio River	Bank protection (revetment)					Cost
		Number	Linear feet bank protection	Squares (100 square feet)		Toe piles bank protection	
				Mattress	Paving		
New work by contract:							
Liberty	101				1,308		$ 60,104
Kaskaskia Island	111.9				596		51,319
Ste. Genevieve	122	1	5,655	5,655	3,159		192,701
Total		1	5,655	5,655	5,063		304,124
Maintenance by United States plant and hired labor			3,460				89,955

New work: A total of 856,800 cubic yards of material was handled by a United States hydraulic dredge in preparing one locality for new regulating works at a cost of $102,653. Nine dikes, totaling 4,720 feet in length, were built under contract at a cost of $216,372. Three revetments, consisting of 5,655 squares of mattress and 5,063 squares of paving, were completed under contract at a cost of $304,124. Three pile dikes, totaling 630 feet in length, were built by hired labor with Government plant, at a cost of $38,748. Costs of $7,787,228 were incurred on the improvement at Chain of Rocks as follows: By contract, construction of locks, $2,994,926; construction of canal and levees, $3,878,920; power control and lighting, $512,654; and relocation of utilities, 109,945; by hired labor, model studies, $85,000; lock design, canal and levee design, power control and lighting design, $85,198; preliminary engineering and surveys for construction, $79,203; relocation of utilities, legal expense, maps and drawings and

dredging for relocation of existing oil pipe line, $15,665; real estate expense, management, appraisals, condemnations, mapping and surveying, $25,717. The total cost of new work was $8,449,126.21, of which $432,184.15 was by hired labor. Total expenditures were $8,721,019.58.

Maintenance: Dikes and revetments were repaired at a cost of $331,718. The required 9-foot channel was maintained by three United States hydraulic dredges. During the year 21 shoals developed, of which 15 were dredged once, 2 were dredged twice, 2 were dredged three times, 1 was dredged four times and 1 was dredged five times, removing 3,839,255 cubic yards of sand and gravel at a cost of $365,559. The channels dredged had a combined length of 22.6 miles, an average width of 290 feet, and an average gain in depth of 4.9 feet. The total cost of maintenance dredging was $365,559.

Hydrographic surveys were made covering 57.5 miles of river, costing $28,816. Aids to navigation were installed at a cost of $21,438. Other miscellaneous costs by hired labor were, snagging, $1,202; gages, $15,876; discharge observations at miscellaneous localities, $1,585; cooperative stream gaging, $12,565; stream flow forecasting, $6,504; and engineering planning, $12,647; all charged to maintenance. The cost of operation and care of lock No. 27 was $9,010.33. The total cost of all maintenance including operation and care was $806,920.22, and the expenditures were $697,991.00. The total costs for the fiscal year were $9,256,046.43 and the expenditures were $9,419,010.58, all from regular funds.

Condition at end of fiscal year. Work under this project (including the Chain of Rocks canal), is about 74 percent complete. The quantities required to complete the project are estimated at 129,160 linear feet of dikes, 129,705 linear feet of revetment, 280,000 cubic yards of rock removal, and the canal, locks, levees, etc., at Chain of Rocks, as authorized by the River and Harbor Act of March 2, 1945. Dikes and revetments were in poor condition along some reaches at the close of the fiscal year due to critical damage inflicted by heavy ice flows during the winter of 1950–51 and by floods in spring and summer of 1951. The channel as a whole, has been greatly improved by the work that has been completed to date. Dredging is required at low stages to remove temporary shoals and maintain the required channel depths.

In recent years, the project dimensions of channels have generally been maintained throughout the navigation season. The navigation season formerly extended from the middle of February to the middle of December, the river being generally closed by ice the remainder of the year. However, in recent years increased demands of commerce and the use of steel-hull boats have combined to extend the navigation season throughout the year except when blocked by heavy running ice or gorges. The river is generally above the 10-foot stage, St. Louis gage, for 6 months of the year, latter part of February to latter part of August, during which time project channel depths generally prevail without dredging. The mean stage of the river, St. Louis gage, was 10.43 feet for the fiscal year 1950 and 11.51 feet for the fiscal year 1951.

The costs and expenditures under the existing project to June 30, 1951, have been as follows:

	Regular funds	Public Works funds	Emergency relief funds	Total
Costs:				
New work	$69,270,295.95	$3,462,154.46	$996,747.95	$73,729,198.36
Maintenance	32,934,298.95			32,934,298.95
Operation and care	9,010.33			9,010.33
Total costs	102,213,605.23	3,462,154.46	996,747.95	106,672,507.64
Expenditures	100,840,813.61	3,462,154.46	996,747.95	105,299,716.02

Proposed operations. The unexpended balance June 30, 1951, $3,459,944.75, plus $5,583.61 advanced to plant account, accounts receivable $489.67 and $6,196,000 allotted in fiscal year 1952, a total of $9,662,018.03 will be applied as follows:

Accounts payable, June 30, 1951	1,378,864.90
New work:	
Regulating works—by contract (completion of existing contracts): Piling dikes, July 1, 1951–Jan. 1, 1952: Powers Island-Schenimann	73,116.16
Chain of Rocks improvement:	
By contract (completion of existing continuing contracts):	
Lock, continuing contract, July 1, 1951–May 30, 1952	876,528.45
Canal and levees, continuing contract, July 1, 1951–Apr. 30, 1952	1,114,991.70
Power control and lighting, continuing contract, July 1, 1951–May 1, 1952	183,137.03
By contract (continuation of existing continuing contracts): Bank protection above locks, July 1, 1951–June 30, 1952	1,489,523.82
By contract (future awards):	
Excavation of canal and bank protection below the locks, Sept. 25, 1951–June 30, 1952	1,383,093.00
Incoming power line for source of electrical power, Dec. 15, 1951–Mar. 1, 1952	20,000.00
Seepage relief wells along east canal levee, Dec. 15, 1951–June 30, 1952	480,000.00
Completion of seepage remedial works, Mar. 1, 1952–June 30, 1952	240,000.00
Bridge pier protection, Jan. 1, 1952–Apr. 15, 1953	109,000.00
By hired labor with United States plant, July 1, 1951–June 30, 1952:	
Planning	90,615.40
Engineering and design after award of contracts (lock, power control and lighting and levees)	28,905.66
Construction surveys	42,401.26
Land acquisition	538,760.49
Miscellaneous additions to lock structure	17,000.00
Model studies	125,049.66
Repairs prior to completion	70,201.59
Total for new work	6,882,324.22
Maintenance:	
By contract (completion of existing contract): Piling dikes, July 1, 1951–June 1, 1952, Devils Island-Willard-Schenimann	249,497.02

Maintenance—Continued	
By contract (future awards):	
Piling dikes July 1, 1951–June 30, 1952, Brooks Point	198,050.00
Bank protection, July 1, 1951–June 30, 1952, Price Landing	282,200.00
By hired labor July 1, 1951–June 30, 1952:	
Dikes and bank protection	237,000.00
Project channel dredging	200,000.00
Surveys, gages, and studies	40,000.00
Dredging required in connection with repair of bank protection	62,500.00
Removal of stone in connection with repair of bank protection	3,000.00
Aids to navigation	30,000.00
Snagging	4,000.00
Discharge observations	1,500.00
Stream flow forecasting	6,000.00
Planning	3,500.00
Cooperative stream gaging	11,000.00
Total maintenance	1,323,247.02
Maintenance (operating and care):	
Lock No. 27, July 1, 1951 to June 30, 1952:	
Operation	62,000.00
Ordinary maintenance and repair	15,000.00
Total operating and care	77,000.00
Unallocated balance	581.89
Total for all work	9,662,018.03

The sum of $2,401,600 can be profitably expended for the following schedule of work during the fiscal year 1953:

New work by contract:	
Chain of Rocks improvement:	
Future award: Remedial works at lower entrance of canal, July 1, 1952, to June 30, 1953	$962,000
Completion of existing continuing contract: Bank protection above locks, July 1, 1952 to September 1, 1952	158,000
By hired labor, July 1, 1952, to June 30, 1953:	
Advance planning	20,000
Construction surveys	10,000
Repairs prior to completion	147,000
Total for new work	1,297,000
Maintenance, by hired labor:	
Dikes and bank protection	400,000
Project channel dredging	474,100
Surveys, gages, and studies	37,500
Aids to navigation	25,000
Snagging	2,000
Discharge observations	1,500
Stream flow forecasting	6,000
Establishment of third order triangulation	10,000
Cooperative stream gaging	10,000
Planning	8,500
Total maintenance	974,600

Maintenance, by hired labor—Continued
Operating and care, lock No. 27:

Operation	75,000
Ordinary maintenance and repairs	30,000
Improvements and reconstruction	25,000
Total operating and care	130,000
Total for all work	2,401,600

Cost and financial summary

	Fiscal year ending June 30—					Total to June 30, 1951, including fiscal years prior to 1947
	1947	1948	1949	1950	1951	
New work:						
Appropriated	$704,000.00	$4,500,000.00	$9,000,000.00	$9,750,000.00	$8,830,000.00	$75,611,522.58
Cost	2,020,078.17	5,794,331.58	6,700,933.08	11,712,827.26	8,449,126.21	73,729,198.36
Expenditures	2,094,294.37	5,198,490.28	6,139,792.61	11,220,273.82	8,721,019.58	72,355,380.83
Maintenance:						
Appropriated	24,000.00	1,027,000.00	860,030.00	975,000.00	901,800.00	33,148,138.19
Cost	735,730.45	1,091,298.19	892,884.69	897,808.32	800,920.22	32,943,309.28
Expenditures	584,183.57	930,893.24	950,106.76	975,000.00	697,991.00	32,944,329.19

Other new work data:

Appropriated for fiscal year ending June 30, 1952	$5,000,000.00
Unobligated balance available for fiscal year 1952	5,000,000.00
Estimated additional amount needed to be appropriated for completion of existing project	19,468,477.42

2. MISSISSIPPI RIVER BETWEEN THE MISSOURI RIVER AND MINNEAPOLIS, MINN. (ST. LOUIS DISTRICT)

See report, "Mississippi River between the Missouri River and Minneapolis, Minn.," page 1225.

3. ILLINOIS WATERWAY, ILL. (ST. LOUIS DISTRICT)

See report, "Illinois Waterway, Ill.," page 1824.

4. EXAMINATION, SURVEYS, AND CONTINGENCIES (GENERAL)

The cost of work done during the fiscal year amounted to $44,292.89 and the expenditures were $46,300.

The amount of $25,214.58 due from accounts receivable, less an anticipated revocation of $7,016.21, a total of $18,198.37 will be applied as needed during the fiscal year 1952 to payment of expenses incurred under this heading.

The additional sum of $14,829 can be profitably expended during the fiscal year 1953 for payment of expenses under this heading as incurred.

Cost and financial summary

	Fiscal year ending June 30—					Total to June 30, 1951, including fiscal years prior to 1947
	1947	1948	1949	1950	1951	
Maintenance:						
Appropriated	$44,900.00	$302,500.00	$75,000.00	$75,307.00	$46,300.00	$1,525,330.41
Cost	121,771.22	202,046.21	143,492.00	84,473.82	44,292.89	1,500,115.83
Expenditures	121,083.54	295,026.23	172,886.27	75,307.00	46,300.00	1,525,330.41

Flood control—Continued

	Page
22. Wilson and Wenkel and Prairie du Pont drainage and levee districts, Ill.	1148
23. East St. Louis and vicinity, Ill.	1149
24. Chouteau, Nameoki, and Venice drainage and levee district, Ill.	1151
25. Wood River drainage and levee district, Ill.	1152
26. Upper Mississippi River Basin, St. Louis District	1154
27. Preliminary examinations, surveys, and contingencies for flood control	1156
28. Inspection of completed works, flood-control projects	1156
29. Inactive flood-control projects	1157
30. Miscellaneous activities	1157
31. Emergency flood-control work under authority of the Flood Control Act approved August 18, 1941	1160
32. Emergency flood-control work under authority of public laws other than the Flood Control Act approved August 18, 1941 as amended	1161
33. Emergency bank protection in the vicinity of Chester Bridge, Mississippi River, mile 109.9 (sec. 12, Flood Control Act approved Dec. 22, 1944)	1162

1. MISSISSIPPI RIVER BETWEEN THE OHIO AND MISSOURI RIVERS

Location.—The Mississippi River rises in Lake Itasca, Minn., and, from that lake flows in a southerly direction about 2,350 miles and empties into the Gulf of Mexico. The portion included in this report embraces the 195-mile section known as the middle Mississippi, between the tributary Ohio and Missouri Rivers, about 984 to 1,179 miles from the Gulf.

Previous projects.—The original project for the improvement of the Mississippi River between the Ohio and Missouri Rivers was recommended by a board of engineers in a report, dated April 13, 1872, and concurred in by the Chief of Engineers. For further details see page 1879 of the Annual Report for 1915 and page 1014 of the Annual Report for 1938.

Existing project.—This provides for obtaining and maintaining a minimum channel depth of not less than 9 feet, a minimum width of not less than 300 feet at low water, with additional width in bends from the mouth of the Ohio River (about 984 miles from the Gulf) to the northern boundary of the city of St. Louis, 191 miles; thence 200 feet wide, with additional width in bends to the mouth of the Missouri River, 4 miles; to be obtained: First, by regulating works, for closing sloughs and secondary channels, and narrowing the river; by building new banks where the natural width is excessive and protecting new and old banks from erosion where necessary to secure permanency; second, by dredging or other temporary expedients to maintain channels of project dimensions; third, by construction of works authorized for the Chain of Rocks reach in the River and Harbor Act of March 2, 1945, which approved a comprehensive plan for development of the Mississippi River at Chain of Rocks so as to provide for construction of a lateral canal at an estimated first cost to the United States of approximately $10,290,000, with annual maintenance and operation cost of $70,000, subject to such modification

as the Chief of Engineers may find necessary when the project is undertaken; and to authorize the relocation of the river channel and reclamation of the area in Sawyer Band for airport, park, recreational, and similar purposes at a cost to local interests of approximately $17,555,000; provided that any modification of the present river channel required by the civic development be deferred until completion of the lateral canal in the interest of navigation and that the river diversion work connected with such civic development be under the supervision of the Chief of Engineers in order to insure that the interests of interstate and foreign commerce be properly protected; and further provided that local interests hold and save the United States free from any claims for damages that might be incurred due to the construction, maintenance, or operation of such civic development or any part thereof (H. Doc. 231, 76th Cong., 1st sess.).

The estimated cost of new work (1952) is $101,936,000. The estimated cost of annual maintenance (1952) is $1,370,000.

The existing project was authorized by the following river and harbor acts:

Acts	Work authorized	Documents
.....	Project for regulating works adopted in 1881. (To obtain a minimum depth of 8 feet.)	Annual Report, 1881, p. 1536.
June 3, 1896 June 13, 1902 Mar. 2, 1907	Dredging introduced as part of the project.....	
Mar. 3, 1905[1] Mar. 2, 1907[1]	These acts practically abrogated that part of the project for the middle Mississippi with proposed regulating works.	
June 25, 1910	Regulating works restored to the project and appropriations begun with a view to the completion of the improvement between the Ohio and Missouri Rivers within 12 years at an estimated cost of $21,000,000, exclusive of amounts previously expended.	H. Doc. 50, 61st Cong., 1st sess., and H. Doc. 166, 58th Cong., 2d sess.[2]
Jan. 21, 1927	For a depth of 9 feet and width of 300 feet from the Ohio River to the northern boundary of the city of St. Louis, with the estimated cost of maintenance increased to $900,000 annually.	Rivers and Harbors Committee Doc. 9, 69th Cong., 2d sess.
July 3, 1930	Project between the northern boundary of the city of St. Louis and Grafton (mouth of Illinois River) modified to provide for a channel 9 feet deep and generally 200 feet wide with additional width around bends, at an estimated cost of $1,500,000, with $125,000 annually for maintenance.	Rivers and Harbors Committee Doc. 12, 70th Cong., 1st sess.
Mar. 2, 1945	Modified to provide for construction of a lateral canal with lock at Chain of Rocks, at an estimated first cost to the United States of about $10,290,000, with $70,000 annually for maintenance and operation.	H. Doc. 231, 76th Cong., 1st sess.

[1] Also joint resolution, June 29, 1906.
[2] Contains latest published map.

See House Document 669 (76th Cong., 3d sess.) for report of Chief of Engineers dated February 27, 1940, containing a general plan for improvement of the Mississippi River between Coon Rapids Dam and the mouth of the Ohio River for purposes of navigation, power development, the control of floods, and the needs of irrigation.

Terminal facilities.—Most of the water terminal and transfer facilities of the district are described in volumes 1 and 4 of the four-volume

report of the Board of Engineers for Rivers and Harbors, entitled "Survey of Terminals and Landings on the Inland Waterways of the United States."

Operations and results during fiscal year.—Construction works were carried on by contract and by hired labor work with Government plant, with weather and river stages suitable for construction about 8 months of the year. Regulating works were maintained and project dimensions of channels were secured by dredging. Locations, quantities, and costs of open river regulating works were as follows:

Class of work and locality	Miles above mouth of Ohio River	Dikes (hurdles)			Bank protection (revetment), linear feet	Cost
		Number	Linear feet	Cost		
New work by contract: Powers Island-Schenimann	34-65	3	580	$46,461		
Total			580	46,461		
Maintenance by United States plant and hired labor			1,400	133,495	3,035	$204,513
Maintenance by contract			570	164,493	4,310	281,550
Total			1,970	297,988	7,345	486,063

New work: Three dikes, totaling 580 feet in length, were built under contract at a cost of $46,461. Costs of $2,217,414 were incurred on the improvement at Chain of Rocks as follows: By contract, construction of locks, $494,185; construction of canal and levees, $1,284,213; power control and lighting, $143,790; by hired labor, model studies, $129,842; lock design, canal and levee design, power control and lighting design, $44,794; preliminary engineering and surveys for construction, $39,257; miscellaneous addition to locks, $1,485; claims, studies and justifications, $9,604; legal expense, surveys, $7,865; repairs prior to completion, $14,120; real estate expense, management, appraisals, condemnations, mapping and surveying, $48,259. The total cost of new work was $2,263,874.05 of which $295,226 was by hired labor. Total expenditures $3,113,348.59.

Maintenance: Dikes and revetments were repaired at a cost of $784,051. The required 9-foot channel was maintained by two United States hydraulic dredges. During the year nine shoals developed, of which all were dredged once, removing 1,815,079 cubic yards of sand and gravel at a cost of $324,633. The channels dredged had a combined length of 6.9 miles, an average width of 280 feet, and an average gain in depth of 8.2 feet. The total cost of maintenance dredging was $1,108,684.

Hydrographic surveys were made covering 57.5 miles of river, costing $21,452. Aids to navigation were installed at a cost of $22,330. Other miscellaneous costs by hired labor were gages, $17,690; discharge observations at miscellaneous localities, $1,555; cooperative stream gaging, $14,125; stream flow forecasting, $3,690; engineering planning, $3,456; and repairs to gaging car track—Thebes railroad bridge, $288; all charged to maintenance. The cost of operation and care of

lock No. 27 was $76,292.74. The total cost of all maintenance including operation and care was $1,269,562.32, and the expenditures were $1,232,579.55. The total costs for the fiscal year were $3,533,436.37 and the expenditures were $4,345,928.14, all from regular funds.

Condition at end of fiscal year.—Work under this project (including the Chain of Rocks canal), is about 74.5 percent complete. The quantities required to complete the project are estimated at 128,580 linear feet of dikes, 129,705 linear feet of revetment, 280,000 cubic yards of rock removal, and the canal, locks, levees, etc., at Chain of Rocks, as authorized by the River and Harbor Act of March 2, 1945. Dikes and revetments were in poor condition along some reaches at the close of the fiscal year due to critical damage inflicted by heavy ice floes during the winter of 1950–51 and by floods in spring and summer of 1951. The channel as a whole, has been greatly improved by the work that has been completed to date. Dredging is required at low stages to remove temporary shoals and maintain the required channel depths.

In recent years, the project dimensions of channels have generally been maintained throughout the navigation season. The navigation season formerly extended from the middle of February to the middle of December, the river being generally closed by ice the remainder of the year. However, in recent years increased demands of commerce and the use of steel-hull boats have combined to extend the navigation season throughout the year except when blocked by heavy running ice or gorges. The river is generally above the 10-foot stage, St. Louis gage, for six months of the year, latter part of February to latter part of August, during which time project channel depths generally prevail without dredging. The mean stage of the river, St. Louis gage, was 11.51 feet for the fiscal year 1951 and 17.79 feet for the fiscal year 1952.

The costs and expenditures under the existing project to June 30, 1952, have been as follows:

	Regular funds	Public Works funds	Emergency Repair funds	Total
Costs:				
New work	$71,534,170.00	$3,462,154.46	$996,747.95	$75,993,072.41
Maintenance	34,127,568.53			34,127,568.53
Operation and care	85,303.07			85,303.07
Total costs	105,747,041.60	3,462,154.46	996,747.95	110,205,944.01
Expenditures	105,186,741.75	3,462,154.46	996,747.95	109,645,644.16

Proposed operations.—The unexpended balance June 30, 1952, $5,479,216.61, plus $13,419.19 accounts receivable, and $2,145,250 allotted for fiscal year 1953, a total of $7,637,885.80, will be applied as follows:

Accounts payable, June 30, 1952	$573,719.04
New work:	
Regulating works: By contract (completion of existing contracts): Piling dikes, July 1, 1952, to Jan. 1, 1953: Powers Island-Schenimann	26,656.00

New work—Continued	
Chain of Rocks improvement:	
By contract (completion of existing continuing contracts):	
Lock, continuing contract, July 1, 1952, to May 30, 1953	$383,178.00
Canal and levees, continuing contract, July 1, 1952, to Apr. 30, 1953	674,020.00
Excavation of canal and bank protection, July 1 to Oct. 1, 1952	1,121,945.00
Canal and levees (seepage relief wells), July 1 to Oct. 1, 1952	153,068.00
Bridge pier protection, July 1 to Sept. 1, 1952	60,424.00
Reserve for claim on contract No. 1220	428,120.00
Reserve for claim on contract No. 1572	60,800.00
Supply contracts numbered 2961 and 3027	7,950.00
Power control and lighting, continuing contract, July 1, 1952, to May 1, 1953	75,543.00
By contract (continuation of existing continuing contracts): Bank protection above locks, July 1, 1952, to June 30, 1953	1,396,794.00
By contract (future awards):	
Installation of radio facilities (erection of tower), July 31 to Sept. 1, 1952	8,700.00
Impounding levees and drainage facilities, Dec. 1, 1952, to June 30, 1953	240,000.00
By hired labor with United States plant, July 1, 1952, to June 30, 1953:	
Planning	71,359.00
Engineering and design after award of contracts (lock, power control and lighting and levees)	7,112.00
Preparation of completion report	25,050.00
Construction surveys	42,537.00
Land acquisition	490,501.00
Claims, studies and investigations	40,396.00
Miscellaneous additions to lock structure	23,515.00
Model studies	49,208.00
Repairs prior to completion	184,746.00
Contingencies	244,833.00
Total for new work	5,761,450.00
Maintenance:	
By contract (completion of existing contracts):	
Piling dikes, July 1, 1952, to June 30, 1953, Devils Island-Willard-Schenimann	143,012.00
Repair of gaging car tracks, Thebes railroad bridge, July 1, 1952, to June 30, 1953	18,400.00
Piling dikes, July 1, 1952, to June 30, 1953, Brooks Point	108,023.00
Bank protection, July 1, 1952, to June 30, 1953, Price Landing	29,834.00
By hired labor, July 1, 1952, to June 30, 1953:	
Dikes and bank protection	440,250.00
Miscellaneous inspection and reports (contingencies)	14,250.00
Surveys, gages and studies	44,500.00
Project channel dredging	325,000.00
Aids to navigation	26,000.00
Snagging	4,000.00
Discharge observations	1,500.00
Stream flow forecasting	5,000.00
Planning	5,000.00
Cooperative stream gaging	15,000.00
Total maintenance	1,179,769.00

Maintenance (operation and care): Lock No. 27, July 1, 1952, to June 30, 1953:	
Operation	$65,000.00
Land management leases, permits and cooperative activities	3,000.00
Ordinary maintenance and repair	54,947.76
Total operation and care	122,947.76
Total for all work	7,637,885.80

The sum of $1,542,500 can be profitably expended for the following schedule of work during fiscal year 1954:

New work: None.	
Maintenance by hired labor:	
Miscellaneous inspection and reports (contingencies)	$14,000
Project channel dredging	500,000
Repairs to dikes and bank protection	540,000
Surveys, gages, and studies	57,500
Aids to navigation	25,000
Snagging	2,000
Discharge observations	1,500
Cooperative stream gaging	15,000
Stream flow forecasting	6,000
Establishment of third order triangulation	75,000
Planning	9,000
Total maintenance	1,245,000
Operation and care, lock No. 27:	
Operation	75,000
Land management leases, permits and cooperative activities	5,000
Ordinary maintenance and repairs	182,500
Improvements and reconstruction	35,000
Total operation and care	297,500
Total for all work	1,542,500

Cost and financial summary

	Fiscal year ending June 30—					Total to June 30, 1952, including fiscal years prior to 1948
	1948	1949	1950	1951	1952	
New work:						
Appropriated	$4,500,000.00	$9,000,000.00	$9,750,000.00	$8,830,000.00	$5,000,000.00	[1] $82,028,142.24
Cost	5,794,331.56	6,700,933.68	11,712,827.26	8,449,126.21	2,263,874.05	[1] 77,409,692.07
Expenditures	5,198,496.28	6,139,792.61	11,220,273.82	8,721,019.56	3,113,348.59	[1] 76,885,355.08
Maintenance:						
Appropriated	1,027,000.00	860,000.00	975,000.00	901,800.00	1,365,200.00	34,513,338.19
Cost	1,091,298.19	892,584.69	897,805.32	806,920.22	1,269,562.32	34,212,871.60
Expenditures	936,893.24	950,106.76	975,000.00	897,991.00	1,232,579.55	34,176,908.74

Other new work data:	
Unobligated balance, June 30, 1952	$405,356.97
Appropriated for fiscal year ending June 30, 1953	1,143,000.00
Unobligated balance available for fiscal year 1953	1,548,356.97
Estimated additional amount needed to be appropriated for completion of existing project	20,181,477.42

[1] Includes $1,416,619.66 for previous project.

2. MISSISSIPPI RIVER BETWEEN THE MISSOURI RIVER AND MINNEAPOLIS, MINN. (ST. LOUIS DISTRICT)

See report, "Mississippi River between the Missouri River and Minneapolis, Minn.," page 1163.

Flood control—Continued

	Page
25. Chouteau, Nameoki, and Venice drainage and levee district, Illinois	1022
26. Wood River drainage and levee district, Illinois	1023
27. Upper Mississippi River Basin, St. Louis district	1025
28. Preliminary examinations, surveys, and contingencies for flood control	1026
29. Inspection of completed works, flood control projects	1026
30. Inactive flood control projects	1027
31. Miscellaneous activities	1027

Flood control—Continued

	Page
32. Emergency flood control work under authority of the Flood Control Act approved Aug. 18, 1941, as amended	1030
33. Emergency flood control work under authority of public laws other than the Flood Control Act approved Aug. 18, 1941, as amended	1031
34. Snagging and clearing under authority of sec. 2 of the Flood Control Act approved Aug. 28, 1937, as amended	1032

1. MISSISSIPPI RIVER BETWEEN THE OHIO AND MISSOURI RIVERS

Location. The Mississippi River rises in Lake Itasca, Minn., and, from that lake flows in a southerly direction about 2,350 miles and empties into the Gulf of Mexico. The portion included in this report embraces the 95-mile section known as the middle Mississippi, between the tributary Ohio and Missouri Rivers, about 984 to 1,179 miles from the Gulf.

Previous projects. The original project for the improvement of the Mississippi River between the Ohio and Missouri Rivers was recommended by a board of engineers in a report, dated April 13, 1872, and concurred in by the Chief of Engineers. For further details, see page 1879 of the Annual Report for 1915, and page 1014 of the Annual Report for 1938.

Existing project. This provides for obtaining and maintaining a minimum channel depth of not less than 9 feet, a minimum width of not less than 300 feet at low water, with additional width in bends from the mouth of the Ohio River (about 984 miles from the Gulf) to the northern boundary of the city of St. Louis, 191 miles; thence 200 feet wide, with additional width in bends to the mouth of the Missouri River, 4 miles; to be obtained: First, by regulating works, for closing sloughs and secondary channels, and narrowing the river; by building new banks where the natural width is excessive and protecting new and old banks from erosion where necessary to secure permanency; second, by dredging or other temporary expedients to maintain channels of project dimensions; third, by construction of works authorized for the Chain of Rocks reach in the River and Harbor Act of March 2, 1945, which approved a comprehensive plan for development of the Mississippi River at Chain of Rocks so as to provide for construction of a lateral canal at an estimated first cost to the United States of approximately $10,290,000, with annual maintenance and operation cost of $70,000, subject to such modification as the Chief of Engineers may find necessary when the project is undertaken; and to authorize the relocation of the river channel and reclamation of the area in Sawyer Bend for airport, park, recreational, and similar purposes at a cost to local interests of approximately $17,555,000: *Provided*, That any modifica-

tion of the present river channel required by the civic development be deferred until completion of the lateral canal in the interest of navigation and that the river diversion work connected with such civic development be under the supervision of the Chief of Engineers in order to insure that the interests of interstate and foreign commerce be properly protected: *And further provided*, That local interests hold and save the United States free from any claims for damages that might be incurred due to the construction, maintenance, or operation of such civic development or any part thereof (H. Doc. 231, 76th Cong., 1st sess.).

The estimated cost of new work (1953) is $102,694,000. The estimated annual cost of maintenance (1952) is $1,370,000.

The existing project was authorized by the following River and Harbor Acts:

Acts	Work authorized	Documents
.....	Project for regulating works adopted in 1881. (To obtain a minimum depth of 8 feet.)	Annual Report, 1881, p. 1536.
June 3, 1896 June 13, 1902 Mar. 2, 1907	Dredging introduced as part of the project.....	
Mar. 3, 1905[1] Mar. 2, 1907[1]	These acts practically abrogated that part of the project for the middle Mississippi which proposed regulating works.	
June 25, 1910	Regulating works restored to the project and appropriations begun with a view to the completion of the improvement between the Ohio and Missouri Rivers within 12 years at an estimated cost of $21,000,000, exclusive of amounts previously expended.	H. Doc. 50, 61st Cong., 1st sess., and H. Doc. 168, 58th Cong., 2d sess.[2]
Jan. 21, 1927	For a depth of 9 feet and width of 300 feet from the Ohio River to the northern boundary of the city of St. Louis, with the estimated cost of maintenance increased to $300,000 annually.	Rivers and Harbors Committee, Doc. 9, 69th Cong., 2d sess.
July 3, 1930	Project between the northern boundary of the city of St. Louis and Grafton (mouth of Illinois River) modified to provide for a channel 9 feet deep and generally 300 feet wide with additional width around bends, at an estimated cost of $1,500,000, with $125,000 annually for maintenance.	Rivers and Harbors Committee, Doc. 12, 70th Cong., 1st sess.
Mar. 2, 1945	Modified to provide for construction of a lateral canal with lock at Chain of Rocks, at an estimated first cost to the United States of about $10,290,000, with $70,000 annually for maintenance and operation.	H. Doc. 231, 76th Cong., 1st sess.

[1] Also joint resolution, June 29, 1906. [2] Contains latest published map.

See House Document 669 (76th Cong., 3d sess.) for report of Chief of Engineers dated February 27, 1940, containing a general plan for improvement of the Mississippi River between Coon Rapids Dam and the mouth of the Ohio River for purposes of navigation, power development, the control of floods, and the needs of irrigation.

Terminal facilities. Most of the water terminal and transfer facilities of the district are described in volumes 1 and 4 of the four-volume report of the Board of Engineers for Rivers and Harbors, entitled "Survey of Terminals and Landings on the Inland Waterways of the United States."

Operations and results during fiscal year. Construction works were carried on by contract and by hired labor work with Government plant, with weather and river stages suitable for construction about 8 months of the year. Regulating works were maintained and

project dimensions of channels were secured by dredging. Locations, quantities, and costs of open river regulating works were as follows:

Class of work and locality	Miles above mouth of Ohio River	Dikes (hurdles)		
		Number	Linear	Cost
New work by contract:				
Powers Island-Schenimann	24-65	1	800	$26,656
Total				26,656
Maintenance by United States plant and hired labor			9,010	469,965
Maintenance by contract			4,995	302,782
Total				783,747

Class of work and locality	Miles above mouth of Ohio River	Bank protection (revetment)					
		Number	Linear feet bank protection	Squares (100 square feet)		Toe piles bank protection	Cost
				Mattress	Paving		
Maintenance by United States plant and hired labor			8,700				$132,130
Maintenance by contract			260				55,988
Total							188,118

New work: One dike, totaling 800 feet in length, was built under contract at a cost of $26,656. Costs of $4,266,482 were incurred on the improvement at Chain of Rocks as follows: By contract, construction of locks, $154,674; construction of canal and levees, $3,300,521; power control and lighting, $49,985; bridge over canal, $18,590; by hired labor, model studies, $76,754; design of locks, canal, levee, and power control lighting, $22,302; preliminary engineering and surveys for construction, $35,086; miscellaneous additions to locks, $56,705; radio installation, $14,298; underseepage control system, $272,105; claims, studies, and investigations, $12,398; construction surveys, $5,041; repairs prior to completion, $55,624; real estate expense, management, appraisals, condemnations, mapping, and surveying, $192,399. The total cost of new work was $4,293,137.31, of which $596,412.30 was by hired labor. Total expenditures were $4,813,599.52.

Maintenance: Dikes (14,005 linear feet) and revetments (8,960 linear feet) were repaired at a cost of $971,865. The required 9-foot channel was maintained by two United States hydraulic dredges. Channel dredging was performed at 44 localities with Government plant and hired labor, removing 4,112,071 cubic yards of sand and gravel at a cost of $567,413. The channels dredged had a combined length of 20.8 miles, an average width of 290 feet, and an average gain in depth of 4.5 feet. The total cost of channel maintenance was $1,539,278.

Hydrographic (dredge) surveys were made covering 175 miles of river, costing $17,933. Aids to navigation were installed at a cost of $29,868. Other miscellaneous costs by hired labor were: Snagging,

$663; gages, $17,021; discharge observations at miscellaneous localities, $1,035; cooperative stream gaging, $21,531; streamflow forecasting, $2,071; engineering planning, $5,122; repairs to gaging car track—Thebes railroad bridge, $14,126; and miscellaneous contingencies amounting to $12,571; all charged to maintenance. The cost of operation and care of lock No. 27 was $95,547. The total cost of all maintenance, including operation and care, was $1,756,766.41, and the expenditures were $1,792,729.27. The total costs of all work for the fiscal year were $6,049,903.72 and the expenditures were $6,606,328.79, all from regular funds.

Condition at end of fiscal year. Construction on the existing project was initiated in 1881, and the project has been in beneficial use practically from its inception. Work under the project (including the Chain of Rocks canal) is about 74 percent complete. The quantities required to complete the project are estimated at 125,440 linear feet of dikes, 129,705 linear feet of revetment, 280,000 cubic yards of rock removal, and the canal, locks, levees, etc., at Chain of Rocks, as authorized by the River and Harbor Act of March 2, 1945. Dikes and revetments were in poor condition along some reaches at the close of the fiscal year due to critical damage inflicted by heavy ice flows during the winter of 1950–51 and by floods in spring and summer of 1951. The channel as a whole has been greatly improved by the work that has been completed to date. Dredging is required at low stages to remove temporary shoals and maintain the required channel depths.

In recent years, the project dimensions of channels have generally been maintained throughout the navigation season. The navigation season formerly extended from the middle of February to the middle of December, the river being generally closed by ice the remainder of the year. However, in recent years increased demands of commerce and the use of steel hull boats have combined to extend the navigation season throughout the year except when blocked by heavy running ice or gorges. The river is generally above the 10-foot stage, St. Louis gage, for 6 months of the year, latter part of February to latter part of August, during which time project channel depths generally prevail without dredging. The mean stage of the river, St. Louis gage, was 17.79 feet for the fiscal year 1952 and 7.64 feet for the fiscal year 1953.

The costs and expenditures under the existing project to June 30, 1953, have been as follows:

	Regular funds	Public works funds	Emergency repair funds	Total
Costs:				
New work	$75,827,307.31	$3,462,154.46	$996,747.95	$80,286,209.72
Maintenance	35,788,788.19			35,788,788.19
Operation and care	180,849.82			180,849.82
Total costs	111,796,945.32	3,462,154.46	996,747.95	116,255,847.73
Expenditures	111,793,070.54	3,462,154.46	996,747.95	116,251,972.95

Cost and financial summary

	Fiscal year ending June 30					Total to June 30, 1953, including fiscal years prior to 1949 [1] [2]
	1949	1950	1951	1952	1953	
New work:						
Appropriated	$9,000,000.00	$9,730,000.00	$5,591,000.00	$5,000,000.00	$1,142,000.00	$83,171,142.34
Cost	6,700,932.65	11,712,827.26	3,449,126.21	2,303,874.05	4,298,137.31	31,702,820.36
Expenditures	6,139,792.61	11,220,273.82	3,721,019.[illegible]	3,112,348.39	4,312,[illegible]	81,686,954.60
Maintenance:						
Appropriated	960,000.00	975,000.00	901,800.00	1,365,200.00	1,457,980.00	35,971,[illegible].19
Cost	892,864.60	897,808.32	806,920.22	1,209,562.32	1,799,756.41	35,960,[illegible].61
Expenditures	980,106.76	975,000.00	697,991.00	1,282,570.55	1,702,729.27	35,909,[illegible].61

[1] Includes $1,416,619.66 for new work for previous projects.
[2] In addition, $67,063.31 for new work and $31,416.69 for maintenance was expended from contributed funds.

Other new work data:

Unobligated balance, June 30, 1953	$1,288,209.18
Unobligated balance available for fiscal year 1954	1,288,209.18
Estimated additional amount needed to be appropriated for completion of existing project	19,522,857.76

2. MISSISSIPPI RIVER BETWEEN THE MISSOURI RIVER AND MINNEAPOLIS, MINN. (ST. LOUIS DISTRICT)

See report, "Mississippi River between the Missouri River and Minneapolis, Minn.," page 1033.

3. ILLINOIS WATERWAY, ILL. (ST. LOUIS DISTRICT)

See report, "Illinois Waterway, Ill.," page 1512.

4. EXAMINATION, SURVEYS, AND CONTINGENCIES (GENERAL)

The cost of work done during the fiscal year amounted to $4,613.68, and the expenditures were $1,100.

Cost and financial summary

	Fiscal year ending June 30					Total to June 30, 1953, including fiscal years prior to 1949 [1] [2]
	1949	1950	1951	1952	1953	
Maintenance:						
Appropriated	$75,000.00	$75,307.00	$46,300.00	$5,900.00	$1,100.00	$1,532,330.41
Cost	143,492.00	84,473.82	44,292.89	27,600.90	4,613.68	1,532,330.41
Expenditures	172,886.27	75,307.00	46,300.00	5,900.00	1,100.00	1,532,330.41

[1] All funds are for existing project since there is no previous project.
[2] There are no contributed funds.

1. MISSISSIPPI RIVER BETWEEN THE OHIO AND MISSOURI RIVERS

Location. The Mississippi River rises in Lake Itasca, Minn., and, from that lake flows in a southerly direction about 2,350 miles and empties into the Gulf of Mexico. The portion included in this report embraces the 95-mile section known as the middle Mississippi, between the tributary Ohio and Missouri Rivers, about 984 to 1,179 miles from the Gulf.

Previous projects. The original project for the improvement of the Mississippi River between the Ohio and Missouri Rivers was recommended by a board of engineers in a report, dated April 13, 1872, and concurred in by the Chief of Engineers. For further details, see page 1879 of the Annual Report for 1915, and page 1014 of the Annual Report for 1938.

Existing project. This provides for obtaining and maintaining a minimum channel depth of not less than 9 feet, a minimum width of not less than 300 feet at low water, with additional widths in bends from the mouth of the Ohio River (about 984 miles from the Gulf) to the northern boundary of the city of St. Louis, 191 miles; thence 200 feet wide, with additional width in bends to the mouth of the Missouri River, 4 miles; to be obtained: First, by regulating works, for closing sloughs and secondary channels, and narrowing the river; by building new banks where the natural width is excessive and protecting new and old banks from erosion where necessary to secure permanency; second, by dredging or other temporary expedients to maintain channels of project dimensions; third, by construction of works authorized for the Chain of Rocks reach in the River and Harbor Act of March 2, 1945, which approved a comprehensive plan for development of the Mississippi River at Chain of Rocks so as to provide for construction of a lateral canal at an estimated first cost to the United States of approximately $10,290,000, with annual maintenance and operation cost of $70,000, subject to such modification as the Chief of Engineers may find necessary when the project is undertaken; and to authorize the relocation of the river channel and reclamation of the area in Sawyer Bend for airport, park, recreational, and similar purposes at a cost to local interests of approximately $17,555,000: *Provided,* That any modification of the present river channel required by the civic development be deferred until completion of the lateral canal in the interest of navigation and that the river diversion work connected with such civic development be under the supervision of the Chief of Engineers in order to insure that the interests of interstate and foreign commerce be properly protected: *And further provided,* That local interests hold and save the United States free from any claims for damages that might be incurred due to the construction, maintenance, or operation of such civic development or any part thereof (H. Doc. 231, 76th Cong., 1st sess.).

The estimated cost of new work (1954) is $97,713,000. The estimated annual cost of maintenance (1954) is $1,370,000.

The existing project was authorized by the following River and Harbor Acts:

Acts	Work authorized	Documents
.....	Project for regulating works adopted in 1881. (To obtain a minimum depth of 8 feet.)	Annual Report, 1881, p. 1536.
June 3, 1896 June 13, 1902 Mar. 2, 1907	Dredging introduced as part of the project.....	
Mar. 3, 1905[1] Mar. 2, 1907[1]	These acts practically abrogated that part of the project for the middle Mississippi which proposed regulating works.	
June 25, 1910	Regulating works restored to the project and appropriations begun with a view to the completion of the improvement between the Ohio and Missouri Rivers within 12 years at an estimated cost of $21,000,000, exclusive of amounts previously expended.	H. Doc. 50, 61st Cong., 1st sess., and H. Doc. 168, 58th Cong., 2d sess.[2]
Jan. 21, 1927	For a depth of 9 feet and width of 300 feet from the Ohio River to the northern boundary of the city of St. Louis, with the estimated cost of maintenance increased to $900,000 annually.	Rivers and Harbors Committee, Doc. 9, 69th Cong., 2d sess.
July 3, 1930	Project between the northern boundary of the city of St. Louis and Grafton (mouth of Illinois River) modified to provide for a channel 9 feet deep and generally 200 feet wide with additional width around bends, at an estimated cost of $1,500,000, with $125,000 annually for maintenance.	Rivers and Harbors Committee, Doc. 12, 70th Cong., 1st sess.
Mar. 2, 1945	Modified to provide for construction of a lateral canal with lock at Chain of Rocks, at an estimated first cost to the United States of about $10,290,000, with $70,000 annually for maintenance and operation.	H. Doc. 231, 76th Cong., 1st sess.

[1] Also joint resolution, June 29, 1906.

[2] Contains latest published map.

See House Document 669 (76th Cong., 3d sess.) for report of Chief of Engineers dated February 27, 1940, containing a general plan for improvement of the Mississippi River between Coon Rapids Dam and the mouth of the Ohio River for purposes of navigation, power development, the control of floods, and the needs of irrigation.

Recommended modifications of project. By letter dated July 28, 1952, the Chief of Engineers recommended that the existing project be modified to provide for a small-boat harbor opposite Chester, Ill., consisting of a basin with a project depth of 6 feet, 250 feet wide, 650 feet long with an approach channel of the same depth, 50 feet wide and approximately 1,200 feet long. The estimated cost of construction to the United States (1950) is $57,700. First costs to be borne by local interests are estimated at $58,700, including a cash contribution estimated at $29,000. (H. Doc. No. 230, 83d Cong., 1st sess.)

Terminal facilities. Most of the water terminal and transfer facilities of the district are described in volumes 1 and 4 of the four-volume report of the Board of Engineers for Rivers and Harbors, entitled "Survey of Terminals and Landings on the Inland Waterways of the United States."

Operations and results during fiscal year. Construction works were carried on by contract and by hired labor with Government plant, weather conditions and river stages being favorable for construction during most of the year. Regulating works were maintained, and project dimensions of channels were secured by dredging.

New work: Costs of $747,429 were incurred on the improvement

at Chain of Rocks as follows: By contract, construction of locks, $41,334; construction of canal, $382,404; construction of levees, $132,889; pumping plants and drainage facilities, $5,000; permanent operating equipment, $8,169; engineering and design, $80,940; miscellaneous costs, $75,338; real estate expense, management, appraisals, condemnations, mapping, and surveying, $25,349, and pending adjustment, –$3,994.

Maintenance: Dikes (14,745 linear feet) and revetments (3,350 linear feet) were repaired at a cost of $682,281. The required 9-foot channel was maintained by two United States hydraulic dredges. Channel dredging was performed at 69 localities with Government plant and hired labor, removing 6,054,721 cubic yards of sand and gravel at a cost of $984,177, and pending adjustment $8,667. The channels dredged had a combined length of 34.35 miles, an average width of 307.1 feet, and an average gain in depth of 7.02 feet.

Hydrographic (dredge) surveys were made covering 208 miles of river, costing $23,300. Aids to navigation were installed at a cost of $39,631. Other miscellaneous costs by hired labor were: gages, $19,000; commercial statistics, $6,000; cooperative stream gaging, $24,700; discharge observations, $2,400 and engineering planning, $1,000, all charged to maintenance. The cost of operation and care of lock No. 27 was $85,956. The total cost of all maintenance, including operation and care, was $1,877,112. The total costs of all work for the fiscal year were $2,624,541, all from regular funds.

Condition at end of fiscal year. Construction on the existing project was initiated in 1881, and the project has been in beneficial use practically from its inception. Work under the project (including the Chain of Rocks canal) is about 84 percent complete. The quantities required to complete the project are estimated at 125,440 linear feet of dikes, 129,705 linear feet of revetment, 280,000 cubic yards of rock removal, and minor items of work at Chain of Rocks. Dikes and revetments were in poor condition along some reaches of river due to critical damage inflicted by heavy ice flows during the winter of 1950-51 and by floods in spring and summer of 1951. The channel as a whole has been greatly improved by the work that has been completed to date. Dredging is required at low stages to remove temporary shoals and maintain the required channel depths.

The project dimensions of channels have generally been maintained throughout the navigation season. The navigation season formerly extended from the middle of February to the middle of December, the river being generally closed by ice the remainder of the year. However, in recent years increased demands of commerce and the use of steel hull boats have combined to extend the navigation season throughout the year except when blocked by heavy running ice or gorges. The river is generally above the 10-foot stage, St. Louis gage, for 6 months of the year, latter part of February to latter part of August, during which time project channel depths generally prevail without dredging. The mean stage of the river, St. Louis gage, was 7.64 feet for the fiscal year 1953 and 4.56 feet for the fiscal year 1954.

The costs and expenditures under the existing project to June 30, 1954 have been as follows:

	Regular funds	Public works funds	Emergency repair funds	Total
New work	$76,574,736	$3,462,154	$996,748	$81,033,639
Maintenance	37,579,945			37,579,945
Operation and care	266,805			266,805
Total	144,421,486	3,462,154	996,748	118,880,389

Cost and financial summary

	Fiscal year ending June 30					Total to June 30, 1954, including fiscal years prior to 1950
	1950	1951	1952	1953	1954	
New work:						
Appropriated	$9,750,000	$8,830,000	$5,000,000	$1,143,000		[1] [2] $83,171,142
Cost	11,712,827	8,449,126	2,263,874	4,293,137	$747,429	82,450,259
Maintenance:						
Appropriated	975,000	901,800	1,365,200	1,457,950	1,994,072	37,965,360
Cost	897,808	806,920	1,269,562	1,756,766	1,877,112	37,846,750

[1] Includes $1,416,620 for new work for previous projects.
[2] In addition $87,083 for new work and $31,417 for maintenance were expended from contributed funds.

Other new work data:
Unobligated balance, fiscal year ending June 30, 1954 ..... $29,222
Estimated additional amount needed to be appropriated for completion of existing project 15,958,478

2. MISSISSIPPI RIVER BETWEEN THE MISSOURI RIVER AND MINNEAPOLIS, MINN. (ST. LOUIS DISTRICT)

See report, "Mississippi River between the Missouri River and Minneapolis, Minn.," page 742.

3. ILLINOIS WATERWAY, ILL. (ST. LOUIS DISTRICT)

See report, "Illinois Waterway, Ill.," page 1130.

4. INACTIVE NAVIGATION PROJECTS

Name of project	For last full report, see annual report for—	Cost to June 30, 1954		Estimated amount required to complete
		Construction	Operation and maintenance	
1. Cuivre River, Mo.[1] [2]	1883	$12,000		Inactive.
2. Kaskaskia River, Ill.[2] [3]	1896	10,461		Completed, inactive.

[1] River declared nonnavigable by act of Mar. 23, 1900.
[2] No commerce reported.
[3] By authority of the Chief of Engineers, dated Dec. 12, 1895, this work was dropped from the duties in charge of the St. Louis district (Annual Report, Chief of Engineers, 1896, p. 1761).

5. EAST CAPE GIRARDEAU AND CLEAR CREEK DRAINAGE DISTRICT, ILLINOIS

Location. This project is in the north end of Alexander County, Ill., on the left bank of Mississippi River between river miles 46 and 57 above the Ohio River. The district includes the bottom lands

1. MISSISSIPPI RIVER BETWEEN THE OHIO AND MISSOURI RIVERS

Location. The Mississippi River rises in Lake Itasca, Minn., and, from that lake flows in a southerly direction about 2,350 miles and empties into the Gulf of Mexico. The portion included in this report embraces the 195-mile section known as the middle Mississippi, between the tributary Ohio and Missouri Rivers, about 984 to 1,179 miles from the Gulf. See folder by Corps of Engineers, U. S. Army, of Navigation Charts Middle and Upper Mississippi River, Cairo to Minneapolis.

Previous projects. The original project for the improvement of the Mississippi River between the Ohio and Missouri Rivers was recommended by a board of engineers in a report, dated April 13, 1872, and concurred in by the Chief of Engineers. For further details, see page 1879 of the Annual Report for 1915, and page 1014 of the Annual Report for 1938.

Existing project. This provides for obtaining and maintaining a minimum channel depth of not less than 9 feet, a minimum width of not less than 300 feet at low water, with additional widths in bends from the mouth of the Ohio River (about 984 miles from the Gulf) to the northern boundary of the city of St. Louis, 191 miles; thence 200 feet wide, with additional width in bends to the mouth of the Missouri River, 4 miles; to be obtained: First, by regulating works, for closing sloughs and secondary channels, and narrowing the river; by building new banks where the natural width is excessive and protecting new and old banks from erosion where necessary to secure permanency; second, by dredging or other temporary expedients to maintain channels of project dimensions; third, by construction of works authorized for the Chain of Rocks reach in the River and Harbor Act of March 2, 1945, which approved a comprehensive plan for development of the Mississippi River at Chain of Rocks so as to provide for construction of a lateral canal at an estimated first cost to the United States of approximately $10,290,000, with annual maintenance and operation cost of $70,000, subject to such modification as the Chief of Engineers may find necessary when the project is undertaken; and to authorize the relocation of the river channel and reclamation of the area in Sawyer Bend for airport, park, recreational, and similar purposes at a cost to local interests of approximately $17,555,000: *Provided*, That any modification of the present river channel required by the civic development be deferred until completion of the lateral canal in the interest of navigation and that the river diversion work connected with such civic development be under the supervision of the Chief of Engineers in order to insure that the interests of interstate and foreign commerce be properly protected: *And further provided*, That local interests hold and save the United States free from any claims for damages that might be incurred due to the construction, maintenance, or operation of such civic development or any part thereof (H. Doc. 231, 76th Cong., 1st sess.); and a small boat harbor opposite Chester, Ill. at estimated first costs of $57,000 to the United States and $58,700 to local interests.

The estimated cost of new work (1955) is $98,100,000. The estimated annual cost of maintenance (1955) is $1,800,000.

The existing project was authorized by the following River and Harbor Acts:

Acts	Work authorized	Documents
----------	Project for regulating works adopted in 1881. (To obtain a minimum depth of 8 feet.)	Annual Report, 1881, p. 1536.
June 3, 1896 June 13, 1902 Mar. 2, 1907	Dredging introduced as part of the project----------	
Mar. 3, 1905[1] Mar. 2, 1907[1]	These acts practically abrogated that part of the project for the middle Mississippi which proposed regulating works.	
June 25, 1910	Regulating works restored to the project and appropriations begun with a view to the completion of the improvement between the Ohio and Missouri Rivers within 12 years at an estimated cost of $21,000,000, exlusive of amounts previously expended.	H. Doc. 50, 61st Cong., 1st sess., and H. Doc. 168, 58th Cong., 2d sess.[2]
Jan. 21, 1927	For a depth of 9 feet and width of 300 feet from the Ohio River to the northern boundary of the city of St. Louis, with the estimated cost of maintenance increased to $900,000 annually.	Rivers and Harbors Committee, Doc. 9, 69th Cong., 2d sess.
July 3, 1930	Project between the northern boundary of the city of St. Louis and Grafton (mouth of Illinois River) modified to provide for a channel 9 feet deep and generally 200 feet wide with additional width around bends, at an estimated cost of $1,500,000, with $125,000 annually for maintenance.	Rivers and Harbors Committee, Doc. 12, 70th Cong., 1st sess.
Mar. 2, 1945	Modified to provide for construction of a lateral canal with lock at Chain of Rocks, at an estimated first cost to the United States of about $10,290,000, with $70,000 annually for maintenance and operation.	H. Doc. 231, 76th Cong., 1st sess.
Sept. 3, 1954	Modified to provide for construction of a small-boat harbor opposite Chester, Ill., at an estimated first cost to the United States of $57,700, and to local interests of $58,700.	H. Doc. 230, 83d Cong., 1st sess.

[1] Also joint resolution, June 29, 1906.
[2] Contains latest published map.

See House Document 669 (76th Cong., 3d sess.) for report of Chief of Engineers dated February 27, 1940, containing a general plan for improvement of the Mississippi River between Coon Rapids Dam and the mouth of the Ohio River for purposes of navigation, power development, the control of floods, and the needs of irrigation.

Terminal facilities. Most of the water terminal and transfer facilities of the district are described in volumes 1 and 4 of the four-volume report of the Board of Engineers for Rivers and Harbors, entitled "Survey of Terminals and Landings on the Inland Waterways of the United States."

Operations and results during fiscal year. Construction works were carried on by contract and by hired labor with Government plant, weather conditions and river stages being favorable for construction during the year. Regulating works were maintained, and project dimensions of channels were secured by dredging.

New work: Costs of $375,572 were incurred on the improvement at Chain of Rocks as follows: By contract, construction of canal, $190,052; construction of guide wall and locks (including claim), $97,198; construction of relief wells, $1,568; purchase of portable pumps, $8,046; purchase of land, −$2,280; and liquidated damages, −$27,400. By hired labor, engineering and design, $32,530; other distributive costs, $34,072; claims, investigations and studies, $4,783; real estate expense, appraisals, condemnations, mapping and surveying, $10,621; miscellaneous work, $22,367; and adjustment, $4,014.

Maintenance: Dikes (11,660 linear feet) and revetments (3,300 linear feet) were repaired by hired labor at a cost of $554,909; and 4,500 linear feet of dikes were repaired by contract at a cost of $143,569. The required 9-foot channel was maintained by two United States hydraulic dredges. Channel dredging was performed at 27 localities, removing 3,223,829 cubic yards of material from the main channel at a cost of $703,525. The channels dredged had a combined length of 17.94 miles, an average width of 289.7 feet, and an average gain in depth of 6.64 feet.

Hydrographic (dredge) surveys were made covering 165 miles of river and costing $18,648. Aids to navigation were installed at a cost of $32,273. Other miscellaneous costs were cooperative hydroclimatic network (rain gages), $3,868; gages, $19,022; cooperative stream gaging, $16,573; miscellaneous, $37,607; and adjustment, −$8,667, all charged to maintenance. The cost of operation and care of locks No. 27 (and the canal) was $129,221. The total cost of all maintenance, including operation and care, was $1,650,548.

Condition at end of fiscal year. Construction on the existing project was initiated in 1881, and the project has been in beneficial use practically from its inception. Work under the project (including the Chain of Rocks canal) is about 83 percent complete. The quantities required to complete the project are estimated at 125,440 linear feet of dikes, 129,705 linear feet of revetment, 280,000 cubic yards of rock removal, and minor items of work at Chain of Rocks. Dikes and revetments were in poor condition along some reaches of river due to critical damage inflicted by heavy ice flows during the winter of 1950–51 and by floods in spring and summer of 1951. The channel as a whole has been greatly improved by the work that has been completed to date. Dredging is required at low stages to remove temporary shoals and maintain the required channel depths.

The project dimensions of channels have generally been maintained throughout the navigation season. The navigation season formerly extended from the middle of February to the middle of December, the river being generally closed by ice the remainder of the year. However, in recent years increased demands of commerce and the use of steel hull boats have combined to extend the navigation season throughout the year except when blocked by heavy running ice or gorges. The river is generally above the 10-foot stage, St. Louis gage, for 6 months of the year, latter part of February to latter part of August, during which time project channel depths generally prevail without dredging. The mean stage of the river, St. Louis gage, was 4.56 feet for the fiscal year 1954 and 6.94 feet for the fiscal year 1955.

The costs and expenditures under the existing project to June 30, 1955, have been as follows:

	Regular funds	Public Works funds	Emergency repair funds	Total
New work	$76,950,308	$3,462,154	$996,748	$81,409,210
Maintenance	39,101,273			39,101,273
Operation and care	396,026			396,026
Totals	116,447,607	3,462,154	996,748	120,906,509

Cost and financial summary

	Fiscal year ending June 30					Total to June 30, 1955, including fiscal years prior to 1951 [1] [2]
	1951	1952	1953	1954	1955	
New work:						
Appropriated	$8,830,000	$5,000,000	$1,143,000		$280,500	$83,457,042
Cost	8,449,126	2,203,874	4,293,137	$747,429	375,572	82,825,830
Maintenance:						
Appropriated	901,800	1,365,200	1,457,950	1,904,072	1,533,000	39,498,360
Cost	806,920	1,269,562	1,756,766	1,877,112	1,050,548	39,497,299

[1] Includes $1,416,620 for new work in previous project.
[2] In addition $87,083 for new work and $31,417 for maintenance were expended from contributed funds.

Other new work data:
Appropriated for succeeding fiscal year ending June 30, 1956 [3] $359,000
Estimated additional amount needed to be appropriated for completion of existing project [4] 14,283,358

[3] Of this amount $321,700 is for claims; this would complete Chain of Rocks Canal.
[4] Needed to complete regulating works.

2. MISSISSIPPI RIVER BETWEEN THE MISSOURI RIVER AND MINNEAPOLIS, MINN. (ST. LOUIS DISTRICT)

See report, "Mississippi River between the Missouri River and Minneapolis, Minn.," page 1075.

3. ILLINOIS WATERWAY, ILL. (ST. LOUIS DISTRICT)

See report, "Illinois Waterway, Ill.," page 1137.

4. OTHER AUTHORIZED NAVIGATION PROJECTS

Name of project	For last full report see Annual Report for—	Cost to June 30, 1955		Estimated amount required to complete
		Construction	Operation and maintenance	
1. Culvre River, Mo. [1]	1883	$12,000		Inactive.
2. Kaskaskia River, Ill. [2] [3]	1896	10,461		Completed, inactive.

[1] River declared nonnavigable by act of Mar. 23, 1900.
[2] No commerce reported.
[3] By authority of the Chief of Engineers, dated Dec. 12, 1895, this work was dropped from the duties in charge of the St. Louis district (Annual Report, Chief of Engineers, 1896, p. 1701).

5. EAST CAPE GIRARDEAU AND CLEAR CREEK DRAINAGE DISTRICT, ILLINOIS

Location. This project is in the north end of Alexander County, Ill., on the left bank of Mississippi River between river miles 46 and 57 above the Ohio River. The district includes the bottom lands between the river on the west and south, the old channel of Clear Creek on the north, and the Illinois Central Railroad on the east. (See folder by Corps of Engineers, U. S. Army, of Navigation Charts, Middle and Upper Mississippi River, Cairo to Minneapolis.)

Existing project. This provides for raising and enlarging the entire levee system consisting of 10 miles of riverfront levee and 0.9 mile of back levee, all of which was previously constructed by the

1. MISSISSIPPI RIVER BETWEEN THE OHIO AND MISSOURI RIVERS

Location. The Mississippi River rises in Lake Itasca, Minn., and, from that lake flows in a southerly direction about 2,350 miles and empties into the Gulf of Mexico. The portion included in this report embraces the 195-mile section known as the middle Mississippi, between the tributary Ohio and Missouri Rivers, about 984 to 1,179 miles from the Gulf. See folder by Corps of Engineers, U. S. Army, of Navigation Charts Middle and Upper Mississippi River, Cairo to Minneapolis.

Previous projects. The original project for the improvement of the Mississippi River between the Ohio and Missouri Rivers was recommended by a board of engineers in a report, dated April 13, 1872, and concurred in by the Chief of Engineers. For further details, see page 1879 of the Annual Report for 1915, and page 1014 of the Annual Report for 1938.

Existing project. This provides for obtaining and maintaining a minimum channel depth of not less than 9 feet, a minimum width of not less than 300 feet at low water, with additional widths in bends from the mouth of the Ohio River (about 984 miles from the Gulf) to the northern boundary of the city of St. Louis, 191 miles; thence 200 feet wide, with additional width in bends to the mouth of the Missouri River, 4 miles; to be obtained: First, by regulating works, for closing sloughs and secondary channels, and narrowing the river; by building new banks where the natural width is excessive and protecting new and old banks from erosion where necessary to secure permanency; second, by dredging or other temporary expedients to maintain channels of project dimensions; third, by construction of works authorized for the Chain of Rocks reach in the River and Harbor Act of March 2, 1945, which approved a comprehensive plan for development of the Mississippi River at Chain of Rocks so as to provide for construction of a lateral canal at an estimated first cost to the United States of approximately $10,290,000, with annual maintenance and operation cost of $70,000, subject to such modification as the Chief of Engineers may find necessary when the project is undertaken; and to authorize the relocation of the river channel and reclamation of the area in Sawyer for airport, park, recreational, and similar purposes at a cost to local interests of approximately $17,555,000: *Provided,* That any modification of the present river channel required by the civic development be deferred until completion of the lateral canal in the interest of navigation and that the river diversion work connected with such civic development be under the supervision of the Chief of Engineers in order to insure that the interests of interstate and foreign commerce be properly protected: *And further provided,* That local interests hold and save the United States free from any claims for damages that might be incurred due to the construction, maintenance, or operation of such civic development or any part thereof (H. Doc. 231, 76th Cong., 1st sess.); and a small boat harbor opposite Chester, Ill. at estimated first costs of $57,000 to the United States and $58,700 to local interests.

The estimated cost of new work (1956) is $97,140,000. The estimated annual cost of maintenance (1956) is $1,800,000.

The existing project was authorized by the following River and Harbor Acts:

Acts	Work authorized	Documents
.....	Project for regulating works adopted in 1881. (To obtain a minimum depth of 8 feet.)	Annual Report, 1881, p. 1536.
June 3, 1896 June 13, 1902 Mar. 2, 1907	Dredging introduced as part of the project.....	
Mar. 3, 1905[1] Mar. 2, 1907[1]	These acts practically abrogated that part of the project for the middle Mississippi which proposed regulating works.	
June 25, 1910	Regulating works restored to the project and appropriations begun with a view to the completion of the improvement between the Ohio and Missouri Rivers within 12 years at an estimated cost of $21,000,000, exclusive of amounts previously expended.	H. Doc. 50, 61st Cong., 1st sess., and H. Doc. 168, 58th Cong., 2d sess.[2]
Jan. 21, 1927	For a depth of 9 feet and width of 300 feet from the Ohio River to the northern boundary of the city of St. Louis, with the estimated cost of maintenance increased to $900,000 annually.	Rivers and Harbors Committee, Doc. 9, 69th Cong., 2d sess.
July 3, 1930	Project between the northern boundary of the city of St. Louis and Grafton (mouth of Illinois River) modified to provide for a channel 9 feet deep and generally 200 feet wide with additional width around bends, at an estimated cost of $1,500,000, with $125,000 annually for maintenance.	Rivers and Harbors Committee, Doc. 12, 70th Cong., 1st sess.
Mar. 2, 1945	Modified to provide for construction of a lateral canal with lock at Chain of Rocks, at an estimated first cost to the United States of about $10,290,000, with $70,000 annually for maintenance and operation.	H. Doc. 231, 76th Cong., 1st sess.
Sept. 3, 1954	Modified to provide for construction of a small-boat harbor opposite Chester, Ill., at an estimated first cost to the United States of $57,700, and to local interests of $58,700.	H. Doc. 230, 83d Cong., 1st sess.

[1] Also joint resolution, June 29, 1906.
[2] Contains latest published map.

See House Document 669 (76th Cong., 3d sess.) for report of Chief of Engineers dated February 27, 1940, containing a general plan for improvement of the Mississippi River between Coon Rapids Dam and the mouth of the Ohio River for purposes of navigation, power development, the control of floods, and the needs of irrigation.

Terminal facilities. Most of the water terminal and transfer facilities of the district are described in volumes 1 and 4 of the 4-volume report of the Board of Engineers for Rivers and Harbors, entitled "Survey of Terminals and Landings on the Inland Waterways of the United States."

Operations and results during fiscal year. Construction works were carried on by contract and by hired labor with Government plant, weather conditions and river stages being favorable for construction during the year. Regulating works were maintained, and project dimensions of channels were secured by dredging.

New work: Costs of $16,457 were incurred on the improvement at Chain of Rocks as follows: By contract, construction of canal, $2,781; pressure relief wells, —$162; purchase of land, $2,701; Government costs on liquidated damages, $14,700; liquidated damages, —$7,530. By hired labor, engineering and de-

sign, $16,080; other distributive costs, —$25,014; mapping, surveying, appraising, title evidence, and condemnation, $2,625; claims, investigations, and studies, $4,771; erosion control measures, $5,500; and Government-furnished materials, $4.

Maintenance: Dikes (13,630 linear feet) and revetments (13,400 linear feet) were repaired by hired labor at a cost of $532,650. The required 9-foot channel was maintained by two United States hydraulic dredges. Channel dredging was performed at 36 localities, removing 4,022,283 cubic yards of material from the main channel at a cost of $1,042,185. The channels dredged had a combined length of 24.27 miles, an average width of 284 feet, and an average gain in depth of 5.2 feet.

Hydrographic surveys were made covering 130 miles of river costing $47,559. Aids to navigation were installed at a cost of $54,129. Other miscellaneous costs were flood forecasting and discharge observations, $5,393; cooperative hydroclimatic network (rain gages), $858; river gages, $18,553; cooperative stream gaging, $16,325; lock 27 lift gate chains, $4,957; miscellaneous, $34,459; all charged to maintenance. The cost of operation and care of locks No. 27 (and canal) was $168,684. The total cost of all maintenance, including operating and care, was $1,925,791.

Condition at end of fiscal year. Construction on the existing project was initiated in 1881, and the project has been in beneficial use practically from its inception. Work under the project, including the Chain of Rocks Canal is about 84 percent complete. The quantities required to complete the project are estimated at 125,440 linear feet of dikes, 129,705 linear feet of revetment, 280,000 cubic yards of rock removal, and minor items of work at Chain of Rocks. Dikes and revetments were in poor condition along some reaches of river due to critical damage inflicted by heavy ice flows during the winter of 1950–51 and by floods in spring and summer of 1951. The channel as a whole has been greatly improved by the work that has been completed to date. Dredging is required at low stages to remove temporary shoals and maintain the required channel depths.

The project dimensions of channels have generally been maintained throughout the navigation season. The navigation season formerly extended from the middle of February to the middle of December, the river being generally closed by ice the remainder of the year. However, in recent years increased demands of commerce and the use of steel hull boats have combined to extend the navigation season throughout the year except when blocked by heavy running ice or gorges. The river is generally above the 10-foot stage, St. Louis gage, for 6 months of the year, latter part of February to latter part of August, during which time project channel depths generally prevail without dredging. The mean stage of the river, St. Louis gage, was 6.94 feet for the fiscal year 1955 and 1.90 feet for the fiscal year 1956.

The costs and expenditures under the existing project to June 30, 1956, have been as follows:

	Regular funds	Public works funds	Emergency repair funds	Total
New work	$76,966,765	$3,462,154	$996,748	$81,425,667
Maintenance	41,027,064			41,027,064
Operation and care	564,710			564,710
Total	118,558,539	3,462,154	996,748	123,017,441

Cost and financial summary

	Fiscal year ending June 30					Total to June 30, 1956
	1952	1953	1954	1955	1956	
New work:						
Appropriated	$5,000,000	$1,143,000		$286,500	$359,000	[1] [2] $83,816,642
Cost	2,203,874	4,293,137	$747,429	375,572	16,457	82,842,287
Maintenance:						
Appropriated	1,365,200	1,457,950	1,994,072	1,533,000	1,937,924	41,436,284
Cost	1,269,562	1,756,766	1,877,112	1,650,548	1,925,791	41,423,091

[1] Includes $1,410,020 for new work in previous project.
[2] In addition $87,003 for new work and $31,417 for maintenance were expended from contributed funds.

Other new work data:

Unobligated balance, fiscal year ending June 30, 1956	$357,896
Appropriated for succeeding fiscal year ending June 30, 1957	200,000
Estimated additional amount needed to be appropriated for completion of existing project	14,539,978

2. MISSISSIPPI RIVER BETWEEN THE MISSOURI RIVER AND MINNEAPOLIS, MINN. (ST. LOUIS DISTRICT)

See report, "Mississippi River between the Missouri River and Minneapolis, Minn.," page 1243.

3. ILLINOIS WATERWAY, ILL. (ST. LOUIS DISTRICT)

See report, "Illinois Waterway, Ill.," page 1305.

4. OTHER AUTHORIZED NAVIGATION PROJECTS

Name of project	For last full report see Annual Report for—	Cost to June 30, 1956		Estimated amount required to complete
		Construction	Operation and maintenance	
1. Cuivre River, Mo [1] [2]	1883	$12,000		Inactive.
2. Kaskaskia River, Ill. [2] [3]	1896	10,461		Completed, inactive.

[1] River declared nonnavigable by act of Mar. 23, 1900.
[2] No commerce reported.
[3] By authority of the Chief of Engineers, dated Dec. 12, 1895, this work was dropped from the duties in charge of the St. Louis District (Annual Report, Chief of Engineers, 1896, p. 1701).

5. WABASH RAILROAD BRIDGES, ILLINOIS RIVER, MEREDOSIA AND VALLEY CITY, ILL.

Location. The bridges to be altered on Illinois Waterway are located at Valley City, in Pike County, Ill., about 62 miles above the mouth, and at Meredosia in Morgan County, Ill. about 71

1. MISSISSIPPI RIVER BETWEEN THE OHIO AND MISSOURI RIVERS

Location. The Mississippi River rises in Lake Itasca, Minn., and, from that lake flows in a southerly direction about 2,350 miles and empties into the Gulf of Mexico. The portion included in this report embraces the 195-mile section known as the middle Mississippi, between the tributary Ohio and Missouri Rivers, about 984 to 1,179 miles from the Gulf. See folder by U. S. Army Corps of Engineers of Navigation Charts Middle and Upper Mississippi River, Cairo to Minneapolis.

Previous projects. The original project for the improvement of the Mississippi River between the Ohio and Missouri Rivers was recommended by a board of engineers in a report, dated April 13, 1872, and concurred in by the Chief of Engineers. For further details, see page 1879 of the Annual Report for 1915, and page 1014 of the Annual Report for 1938.

Existing project. This provides for obtaining and maintaining a minimum channel depth of not less than 9 feet, a minimum width of not less than 300 feet at low water, with additional widths in bends from the mouth of the Ohio River (about 984 miles from the Gulf) to the northern boundary of the city of St. Louis, 191 miles; thence 200 feet wide, with additional width in bends to the mouth of the Missouri River, 4 miles; to be obtained: First, by regulating works, for closing sloughs and secondary channels, and narrowing the river; by building new banks where the natural width is excessive and protecting new and old banks from erosion where necessary to secure permanency; second, by dredging or other temporary expedients to maintain channels of project dimensions; third, by construction of works authorized for the Chain of Rocks reach in the River and Harbor Act of March 2, 1945, which approved a comprehensive plan for development of the Mississippi River at Chain of Rocks so as to provide for construction of a lateral canal at an estimated first cost to the United States of approximately $10,290,000, with annual maintenance and operation cost of $70,000, subject to such modification as the Chief of Engineers may find necessary when the project is undertaken; and to authorize the relocation of the river channel and reclamation of the area in Sawyer for airport, park, recreational, and similar purposes at a cost to local interests of approximately $17,555,000: *Provided,* That any modification of the present river channel required by the civic development be deferred until completion of the lateral canal in the interest of navigation and that the river diversion work connected with such civic development be under the supervision of the Chief of Engineers in order to insure that the interests of interstate and foreign commerce be properly protected: *And further provided,* That local interests hold and save the United States free from any claims for damages that might be incurred due to the construction, maintenance, or operation of such civic development or any part thereof (H. Doc. 231, 76th Cong., 1st sess.); and a small boat harbor opposite Chester, Ill. at estimated first costs of $96,900 to the United States and

$83,300 to local interests. The Federal cost includes $900 expenditure by the United States Coast Guard for navigation aids.

The estimated cost of new work (1957) is $99,040,000. The estimated annual cost of maintenance (1957) is $1,800,000.

The existing project was authorized by the following:

Acts	Work authorized	Documents
----------	Project for regulating works adopted in 1881. (To obtain a minimum depth of 8 feet.)	Annual Report, 1881, p. 1536.
June 3, 1896 June 13, 1902 Mar. 2, 1907	Dredging introduced as part of the project----------	
Mar. 3, 1905[1] Mar. 2, 1907[1]	These acts practically abrogated that part of the project for the middle Mississippi which proposed regulating works.	
June 25, 1910	Regulating works restored to the project and appropriations begun with a view to the completion of the improvement between the Ohio and Missouri Rivers within 12 years at an estimated cost of $21,000,000, exclusive of amounts previously expended.	H. Doc. 50, 61st Cong., 1st sess., and H. Doc. 168, 58th Cong., 2d sess.[2]
Jan. 21, 1927	For a depth of 9 feet and width of 300 feet from the Ohio River to the northern boundary of the city of St. Louis, with the estimated cost of maintenance increased to $900,000 annually.	Rivers and Harbors Committee, Doc. 9, 69th Cong., 2d sess.
July 3, 1930	Project btween the northern boundary of the city of St. Louis and Grafton (mouth of Illinois River) modified to provide for a channel 9 feet deep and generally 200 feet wide with additional width around bends, at an estimated cost of $1,500,000, with $125,000 annually for maintenance.	Rivers and Harbors Committee, Doc. 12, 70th Cong., 1st sess.
Mar. 2, 1945	Modified to provide for construction of a lateral canal with lock at Chain of Rocks, at an estimated first cost to the United States of about $10,290,000, with $70,000 annually for maintenance and operation.	H. Doc. 231, 76th Cong., 1st sess.
Sept. 3, 1954	Modified to provide for construction of a small-boat harbor opposite Chester, Ill., at an estimated first cost to the United States of $57,700, and to local interests of $58,700.	H. Doc. 230, 83d Cong., 1st sess.

[1] Also joint resolution, June 29, 1906.
[2] Contains latest published map.

See House Document 669 (76th Cong., 3d sess.) for report of Chief of Engineers dated February 27, 1940, containing a general plan for improvement of the Mississippi River between Coon Rapids Dam and the mouth of the Ohio River for purposes of navigation, power development, the control of floods, and the needs of irrigation.

Terminal facilities. Most of the water terminal and transfer facilities of the district are described in volumes 1 and 4 of the 4-volume report of the Board of Engineers for Rivers and Harbors, entitled "Survey of Terminals and Landings on the Inland Waterways of the United States".

Operations and results during fiscal year. Construction works were carried on by contract and by hired labor with Government plant, weather conditions and river stages being favorable for construction during the year. Regulating works were maintained, and project dimensions of channels were secured by dredging.

New work: Costs of $29,682 were incurred on the improvement at Chain of Rocks as follows: $1,852 for distributive costs and by contract, $27,830 for payment of claim. By hired labor, engineering and design, $2,568; and other distributive costs, $17,425.

By contract $52,957 for revetment, and $175,046 for dikes. Total costs of new work were $277,678.

Maintenance: Dikes (13,870 linear feet) and revetments (5,050 linear feet) were repaired by United States plant and hired labor at a cost of $520,189. The required 9-foot channel was maintained by two United States hydraulic dredges. Channel dredging was performed at 68 localities, removing 4,154,214 cubic yards of material from the main channel at a cost of $956,224. The channels dredged had a combined length of 26.42 miles, an average width of 285 feet, and an average gain in depth of 5.9 feet.

Hydrographic surveys were made covering 143 miles of river, costing $35,316. Aids to navigation were installed at a cost of $46,912. Other costs were: flood forecasting and discharge observations, $8,616; cooperative hydro-climatic network (rain gages), $340; cooperative stream gaging (river gages), $15,941; non-cooperative stream gaging (river gages), $9,447; lock 27 lift gate chains, $3,037; payment of damage to Government structures by others, $5,047; distributive costs, $21,724; miscellaneous, $11,023; and damages to Government property and building and improvement credit, —$5,179. Work by contract consisted of $13,511 for stream gage repair. The cost of operating and care of lock No. 27 (and canal) was $172,256. Total costs $1,814,404.

Deferred maintenance: For the rehabilitation of dikes, $50,846; and for dredging, $120,258. Work by contract consisted of $166,831 for rehabilitation of dikes. Total deferred maintenance costs were $377,935.

Total cost of maintenance including operating and care was $2,152,339.

Condition at end of fiscal year. Construction on the existing project was initiated in 1881, and the project has been in beneficial use practically from its inception. Work under the project, including the Chain of Rocks Canal is about 82 percent complete. The quantities required to complete the project are estimated at 97,995 linear feet of dikes, 104,275 linear feet of revetment, 280,000 cubic yards of rock removal, and minor items of work at Chain of Rocks. Dikes and revetments were in poor condition along some reaches of river due to critical damage inflicted by heavy ice flows during the winter of 1950–51 and by floods in spring and summer of 1951. The channel as a whole has been greatly improved by the work that has been completed to date. Dredging is required at low stages to remove temporary shoals and maintain the required channel depths.

The project dimensions of channels have generally been maintained throughout the navigation season. The navigation season formerly extended from the middle of February to the middle of December, the river being generally closed by ice the remainder of the year. However, in recent years increased demands of commerce and the use of steel hull boats have combined to extend the navigation season throughout the year except when blocked by heavy running ice or gorges. The river is generally

above the 10-foot stage, St. Louis gage, for 6 months of the year, latter part of February to latter part of August, during which time project channel depths generally prevail without dredging. The mean stage of the river, St. Louis gage, was 1.90 feet for the fiscal year 1956 and 3.44 feet for the fiscal year 1957.

Cost and financial statement

	Fiscal year ending June 30					Total to June 30, 1957
	1953	1954	1955	1956	1957	
New work:						
Appropriated	$1,143,000		$286,500	$359,000	−$991,299	$82,825,343
Cost	4,293,137	$747,429	375,572	16,457	−22,321	82,819,966
Maintenance:						
Appropriated	1,457,950	1,994,072	1,533,000	1,937,924	2,256,300	43,692,584
Cost	1,756,766	1,877,112	1,650,548	1,925,791	2,152,339	43,575,429

Other new work data:	
Unobligated balance, fiscal year ending June 30, 1957:	
New Work	$5,377
Maintenance	17,994
Appropriated for succeeding fiscal year ending June 30, 1958	500,000
Estimated additional amount needed to be appropriated for completion of existing project	16,831,277

2. MISSISSIPPI RIVER BETWEEN THE MISSOURI RIVER AND MINNEAPOLIS, MINN. (ST. LOUIS DISTRICT)

See report, "Mississippi River between the Missouri River and Minneapolis, Minn.," page 1203.

3. ILLINOIS WATERWAY, ILL. (ST. LOUIS DISTRICT)

See report, "Illinois Waterway, Ill.," page 1265.

4. OTHER AUTHORIZED NAVIGATION PROJECTS

Name of project	For last full report see Annual Report for—	Cost to June 30, 1957		Estimated amount required to complete
		Construction	Operation and maintenance	
1. Cuivre River, Mo.[1 2]	1883	$12,000		Inactive.
2. Kaskaskia River, Ill.[2 3]	1896	10,461		Completed, inactive.

[1] River declared nonnavigable by act of Mar. 23, 1900.
[2] No commerce reported.
[3] By authority of the Chief of Engineers, dated Dec. 12, 1895, this work was dropped from the duties in charge of the St. Louis District (Annual Report, Chief of Engineers, 1896, p. 1761).

IMPROVEMENT OF RIVERS AND HARBORS IN THE ST. LOUIS, MO., DISTRICT

This district comprises those portions of southwestern Illinois and eastern Missouri embraced in the drainage basin of the Mississippi River and its western tributaries, exclusive of the Missouri River, between the mouth of the Ohio River and mile 300 above the same, and of its eastern tributaries to Hamburg Bay at mile 261 on the left bank, exclusive of the tributary basin of the Illinois Waterway upstream of the new La Grange lock and dam at mile 80.15 above the confluence of the Illinois and Mississippi Rivers. The district also includes the drainage basin in Missouri tributary to the Little River diversion channel. Report on Mississippi River between the Missouri River and mile 300 included in the report on Mississippi River between Missouri River and Minneapolis, Minn. Report on that portion of the Illinois River downstream of the new La Grange lock and dam is included in report on Illinois Waterway, Ill., contained in the report of the district engineer, Chicago, Ill.

IMPROVEMENTS

Navigation

	Page
1. Mississippi River between the Ohio and Missouri Rivers	611
2. Mississippi River between the Missouri River and Minneapolis, Minn. (St. Louis District)	615
3. Illinois Waterway, Ill. (St. Louis District)	615
4. Other authorized navigation projects	615

Alteration of Bridges

5. Wabash Railroad bridges, Illinois River, Meredosia and Valley City, Ill	615

Flood Control

6. East Cape Girardeau and Clear Creek drainage district, Ill	616
7. Cape Girardeau, Mo	617
8. Clear Creek drainage and levee district, Ill	619
9. Preston drainage and levee district, Ill	620
10. Grand Tower drainage and levee district, Ill	621
11. Degognia and Fountain Bluff levee and drainage district, Ill	622

Flood Control—Continued

	Page
12. Perry County drainage and levee districts Nos. 1, 2, and 3, Mo	623
13. Prairie du Rocher and vicinity, Ill	624
14. Fort Chartres and Ivy Landing drainage district No. 5, Ill	625
15. Columbia drainage and levee district No. 3, Ill	626
16. Wilson and Wenkel and Prairie du Pont drainage and levee districts, Ill	627
17. Mississippi River at St. Louis, Mo	628
18. East St. Louis and vicinity, Ill.	630
19. Wood River drainage and levee district, Ill	631
20. Urban areas at Alton, Ill	632
21. Carlyle Reservoir, Upper Mississippi River Basin, Ill	633
22. Upper Mississippi River Basin, St. Louis District	635
23. Other authorized flood-control projects	636
24. Inspection of completed flood-control works	637
25. Flood-control work under special authorization	638

General Investigations

26. Examinations and surveys	638
27. Research and development	638

1. MISSISSIPPI RIVER BETWEEN THE OHIO AND MISSOURI RIVERS

Location. The Mississippi River rises in Lake Itasca, Minn., and, from that lake flows in a southerly direction about 2,350

miles and empties into the Gulf of Mexico. The portion included in this report embraces the 195-mile section known as the middle Mississippi, between the tributary Ohio and Missouri Rivers, about 984 to 1,179 miles from the Gulf. See folder by U. S. Army Corps of Engineers of Navigation Charts Middle and Upper Mississippi River, Cairo, Ill. to Minneapolis, Minn.

Previous projects. The original project for the improvement of the Mississippi River between the Ohio and Missouri Rivers was recommended by a board of engineers in a report, dated April 13, 1872, and concurred in by the Chief of Engineers. For further details, see page 1879 of the Annual Report for 1915, and page 1014 of the Annual Report for 1938.

Existing project. This provides for obtaining and maintaining a minimum channel depth of not less than 9 feet, a minimum width of not less than 300 feet at low water, with additional widths in bends from the mouth of the Ohio River (about 984 miles from the Gulf) to the northern boundary of the city of St. Louis, 191 miles; thence 200 feet wide, with additional width in bends to the mouth of the Missouri River, 4 miles; to be obtained: First, by regulating works, for closing sloughs and secondary channels, and narrowing the river; by building new banks where the natural width is excessive and protecting new and old banks from erosion where necessary to secure permanency; second, by dredging or other temporary expedients to maintain channels of project dimensions; third, by construction of works authorized for the Chain of Rocks reach in the River and Harbor Act of March 2, 1945, which approved a comprehensive plan for development of the Mississippi River at Chain of Rocks so as to provide for construction of a lateral canal at an estimated first cost to the United States of approximately $10,290,000, with annual maintenance and operation cost of $70,000, subject to such modification as the Chief of Engineers may find necessary when the project is undertaken; and to authorize the relocation of the river channel and reclamation of the area in Sawyer for airport, park, recreational, and similar purposes at a cost to local interests of approximately $17,555,000: *Provided,* That any modification of the present river channel required by the civic development be deferred until completion of the lateral canal in the interest of navigation and that the river diversion work connected with such civic development be under the supervision of the Chief of Engineers in order to insure that the interests of interstate and foreign commerce be properly protected: *And further provided,* That local interests hold and save the United States free from any claims for damages that might be incurred due to the construction, maintenance, or operation of such civic development or any part thereof (H. Doc. 231, 76th Cong., 1st sess.); and a small boat harbor opposite Chester, Ill. at estimated first costs of $105,300 including $8,400 preauthorization cost (1957 prices) to the United States and $83,300 to local interests. The Federal cost includes $900 expenditure by the United States Coast Guard for navigation aids.

The estimated cost of new work (1958) is $102,828,000. The estimated annual cost of maintenance (1958) is $1,800,000.

The existing project was authorized by the following:

Acts	Work authorized	Documents
.....	Project for regulating works adopted in 1881. (To obtain a minimum depth of 8 feet.)	Annual Report, 1881, p. 1536.
June 3, 1896 June 13, 1902 Mar. 2, 1907	Dredging introduced as part of the project.....	
Mar. 3, 1905 [1] Mar. 2, 1907 [1]	These acts practically abrogated that part of the project for the middle Mississippi which proposed regulating works.	
June 25, 1910	Regulating works restored to the project and appropriations begun with a view to the completion of the improvement between the Ohio and Missouri Rivers within 12 years at an estimated cost of $21,000,000, exclusive of amounts previously expended.	H. Doc. 50, 61st Cong., 1st sess., and H. Doc. 168, 58th Cong., 2d sess.[2]
Jan. 21, 1927	For a depth of 9 feet and width of 300 feet from the Ohio River to the northern boundary of the city of St. Louis, with the estimated cost of maintenance increased to $900,000 annually.	Rivers and Harbors Committee, Doc. 9, 69th Cong., 2d sess.
July 3, 1930	Project between the northern boundary of the city of St. Louis and Grafton (mouth of Illinois River) modified to provide for a channel 9 feet deep and generally 200 feet wide with additional width around bends, at an estimated cost of $1,500,000, with $125,000 annually for maintenance.	Rivers and Harbors Committee, Doc. 12, 70th Cong., 1st sess.
Mar. 2, 1945	Modified to provide for construction of a lateral canal with lock at Chain of Rocks, at an estimated first cost to the United States of about $10,290,000, with $70,000 annually for maintenance and operation.	H. Doc. 231, 76th Cong., 1st sess.
Sept. 3, 1954	Modified to provide for construction of a small-boat harbor opposite Chester, Ill., at an estimated first cost to the United States of $57,700, and to local interests of $58,700.	H. Doc. 230, 83d Cong., 1st sess.

[1] Also joint resolution, June 29, 1906.
[2] Contains latest published map.

See House Document 669 (76th Cong., 3d sess.) for report of Chief of Engineers dated February 27, 1940, containing a general plan for improvement of the Mississippi River between Coon Rapids Dam and the mouth of the Ohio River for purposes of navigation, power development, the control of floods, and the needs of irrigation.

Terminal facilities. Most of the water terminal and transfer facilities of the district are described in volumes 1 and 4 of the 4-volume report of the Board of Engineers for Rivers and Harbors, entitled "Survey of Terminals and Landings on the Inland Waterways of the United States".

Operations and results during fiscal year. Construction works were carried on by contract and by hired labor with Government plant, weather conditions and river stages being favorable for construction during the year. Regulating works were maintained, and project dimensions of channels were secured by dredging.

New work: Costs incurred were $21,559 for engineering and design and $40,216 for other distributive costs. Work by contract consisted of $216,969 for revetment and $195,645 for permeable pile dikes. Total costs of new work were $474,389.

Maintenance: Pile dikes (11,210 linear feet) and revetments (601 linear feet) were repaired by United States plant and hired labor at a cost of $568,959. Channel dredging was performed at

35 localities, removing 3,931,620 cubic yards of material from the main channel at a cost of $827,444. The channels dredged had a combined length of 20.5 miles, an average width of 300 feet, and an average gain in depth of 5.4 feet.

Hydrographic surveys were made covering 175 miles of river costing $32,472. Channel was patrolled and aids to navigation were inspected at a cost of $65,204. Other costs were: flood forecasting and discharge observations, $23,368; cooperative hydroclimatic network (rain gages), $166; cooperative stream gaging (river gages), $17,254; noncooperative stream gaging (river gages), $7,717; Lock No. 27 lift gate chains, $11,475; distributive costs, $88,453; damage claim, $107; damage to government structure, $416; sale of buildings, —$420; stores, $3,592; and miscellaneous $10,436.

The cost of operating and care of Lock No. 27 and canal was $189,831.

Costs of maintenance including operating and care were $1,846,474.

Deferred maintenance: $6,677 for distributive costs and $2,275 for painting Chain of Rocks Bridge. Work by contract consisted of rehabilitation of dikes, $86,269. Total deferred maintenance costs were $95,221.

Total costs of maintenance for the fiscal year were $1,941,695.

Condition at end of fiscal year. Construction on the existing project was initiated in 1881, and the project has been in beneficial use practically from its conception. Work under the project, including the Chain of Rocks Canal, is about 82 percent complete. The quantities required to complete the project are estimated at 95,265 linear feet of pile dikes, 100,415 linear feet of revetment, 280,000 cubic yards of rock removal, and minor items of work at Chain of Rocks. Dikes and revetments were in poor condition along some reaches of the river due to critical damage inflicted by heavy ice flows during the years of 1950–51, 1957–58, and by floods in spring and summer of 1951. The channel as a whole has been greatly improved by the work that has been completed to date. Dredging is required at low stages to remove temporary shoals and maintain the required channel depths.

The project dimensions of channels have generally been maintained throughout the navigation season. The navigation season formerly extended from the middle of February to the middle of December, the river being generally closed by ice the remainder of the year. However, in recent years increased demands of commerce and the use of steel hull boats have combined to extend the navigation season throughout the year except when blocked by heavy ice or gorges. The river is generally above the 10-foot stage, St. Louis gage, for 6 months of the year, latter part of February to latter part of August, during which time project channel depths generally prevail without dredging. The mean stage of the river, St. Louis gage, was 3.44 feet for the fiscal year 1957 and 5.48 feet for the fiscal year 1958.

Cost and financial statement

	Fiscal year ending June 30					Total to June 30, 1958
	1954	1955	1956	1957	1958	
New work:						
Appropriated		$286,500	$359,000	−$691,299	$496,626	[1] [2] $83,801,869
Cost	$747,429	375,572	16,457	277,678	474,389	[1] 83,774,254
Maintenance:						
Appropriated	1,994,072	1,533,000	1,937,924	2,256,300	1,901,450	45,594,034
Cost	1,877,112	1,650,548	1,925,791	2,152,339	1,941,695	45,517,123

[1] Includes preauthorization costs of $179,900.
[2] Includes $1,416,620 for new work in previous project and $87,083 for new work and $31,417 for maintenance expended from contributed funds.

Other new work data:

Unobligated balance, fiscal year ending June 30, 1958:	
New work	−$885
Maintenance	76,911
Appropriated for succeeding fiscal year ending June 30, 1959	1,820,000
Estimated additional amount needed to be appropriated for completion of existing project	17,206,131

2. MISSISSIPPI RIVER BETWEEN THE MISSOURI RIVER AND MINNEAPOLIS, MINN. (ST. LOUIS DISTRICT)

See report, "Mississippi River between the Missouri River and Minneapolis, Minn.," page 1169.

3. ILLINOIS WATERWAY, ILL. (ST. LOUIS DISTRICT)

See report, "Illinois Waterway, Ill.," page 1234.

4. OTHER AUTHORIZED NAVIGATION PROJECTS

Name of project	For last full report see Annual Report for--	Cost to June 30, 1957		Estimated amount required to complete
		Construction	Operation and maintenance	
1. Cuivre River, Mo.[1] [2]	1883	$12,000		Inactive.
2. Kaskaskia River, Ill.[2] [3]	1896	10,461		Completed, inactive.

[1] River declared nonnavigable by act of Mar. 23, 1900.
[2] No commerce reported.
[3] By authority of the Chief of Engineers, dated Dec. 12, 1895, this work was dropped from the duties in charge of the St. Louis District (Annual Report, Chief of Engineers, 1896, p. 1761).

5. WABASH RAILROAD BRIDGES, ILLINOIS RIVER, MEREDOSIA AND VALLEY CITY, ILL.

Location. The bridges to be altered on Illinois Waterway are located at Valley City, in Pike County, Ill., about 62 miles above the mouth, and at Meredosia in Morgan County, Ill. about 71 miles above the mouth. See folder by U. S. Army Corps of Engineers, of Charts, Illinois Waterway, Grafton, Ill., to Lake Michigan.

Previous projects. None.

Existing project. This provides for constructing a new railroad bridge for the Wabash Railroad Co. at Valley City, Ill., and

IMPROVEMENT OF RIVERS AND HARBORS IN THE ST. LOUIS, MO., DISTRICT

This district comprises those portions of southwestern Illinois and eastern Missouri embraced in the drainage basin of the Mississippi River and its western tributaries, exclusive of the Missouri River, between the mouth of the Ohio River and mile 300 above the same, and of its eastern tributaries to Hamburg Bay at mile 261 on the left bank, exclusive of the tributary basin of the Illinois Waterway upstream of the new La Grange lock and dam at mile 80.15 above the confluence of the Illinois and Mississippi Rivers. The district also includes the drainage basin in Missouri tributary to the Little River diversion channel. Report on Mississippi River between the Missouri River and mile 300 is included in the report on Mississippi River between Missouri River and Minneapolis, Minn. Report on that portion of the Illinois River downstream of the new La Grange lock and dam is included in report on Illinois Waterway, Ill., contained in the report of the district engineer, Chicago, Ill.

IMPROVEMENTS

Navigation

	Page
1. Mississippi River between the Ohio and Missouri Rivers	639
2. Mississippi River between the Missouri River and Minneapolis, Minn. (St. Louis district)	643
3. Illinois Waterway, Ill. (St. Louis district)	643
4. Other authorized navigation projects	643

Alteration of Bridges

5. Wabash Railroad bridges, Illinois River, Meredosia and Valley City, Ill	644

Flood Control

6. East Cape Girardeau and Clear Creek drainage district, Illinois	644
7. Cape Girardeau, Mo	645
8. Clear Creek drainage and levee district, Illinois	647
9. Preston drainage and levee district, Illinois	648
10. Grand Tower drainage and levee district, Illinois	649
11. Degognia and Fountain Bluff levee and drainage district, Illinois	650

Flood Control—Continued

	Page
12. Perry County drainage and levee districts Nos. 1, 2, and 3, Missouri	651
13. Prairie du Rocher and vicinity, Illinois	652
14. Columbia drainage and levee district No. 3, Illinois	653
15. Wilson and Wenkel and Prairie du Pont drainage and levee districts, Illinois	654
16. Mississippi River at St. Louis, Mo	655
17. East St. Louis and vicinity, Illinois	657
18. Wood River drainage and levee district, Illinois	658
19. Urban areas at Alton, Ill	659
20. Kaskaskia River, Ill	660
21. Upper Mississippi River basin, St. Louis district	663
22. Other authorized flood-control projects	664
23. Inspection of completed flood-control works	665
24. Flood-control work under special authorization	665

General Investigations

25. Examinations and surveys	665
26. Research and development	666

1. MISSISSIPPI RIVER BETWEEN THE OHIO AND MISSOURI RIVERS

Location. The Mississippi River rises in Lake Itasca, Minn., and, from that lake flows in a southerly direction about 2,350 miles and empties into the Gulf of Mexico. The portion included

in this report embraces the 195-mile section known as the middle Mississippi, between the tributary Ohio and Missouri Rivers, about 984 to 1,179 miles from the Gulf. See folder by U. S. Army Corps of Engineers of Navigation Charts Middle and Upper Mississippi River, Cairo, Ill. to Minneapolis, Minn.

Previous projects. The original project for the improvement of the Mississippi River between the Ohio and Missouri Rivers was recommended by a board of engineers in a report, dated April 13, 1872, and concurred in by the Chief of Engineers. For further details, see page 1879 of the Annual Report for 1915, and page 1014 of the Annual Report for 1938.

Existing project. This provides for obtaining and maintaining a minimum channel depth of not less than 9 feet, a minimum width of not less than 300 feet at low water, with additional widths in bends from the mouth of the Ohio River (about 984 miles from the Gulf) to the northern boundary of the city of St. Louis, 191 miles; thence 200 feet wide, with additional width in bends to the mouth of the Missouri River, 4 miles; to be obtained: First, by regulating works, for closing sloughs and secondary channels, and narrowing the river; by building new banks where the natural width is excessive and protecting new and old banks from erosion where necessary to secure permanency; second, by dredging or other temporary expedients to maintain channels of project dimensions; third, by construction of works authorized for the Chain of Rocks reach in the River and Harbor Act of March 2, 1945, which approved a comprehensive plan for development of the Mississippi River at Chain of Rocks so as to provide for construction of a lateral canal at an estimated first cost to the United States of approximately $10,290,000, with annual maintenance and operation cost of $70,000, subject to such modification as the Chief of Engineers may find necessary when the project is undertaken; and to authorize the relocation of the river channel and reclamation of the area in Sawyer for airport, park, recreational, and similar purposes at a cost to local interests of approximately $17,555,000: *Provided,* That any modification of the present river channel required by the civic development be deferred until completion of the lateral canal in the interest of navigation and that the river diversion work connected with such civic development be under the supervision of the Chief of Engineers in order to insure that the interests of interstate and foreign commerce be properly protected: *And further provided,* That local interests hold and save the United States free from any claims for damages that might be incurred due to the construction, maintenance, or operation of such civic development or any part thereof (H. Doc. 231, 76th Cong., 1st sess.); fourth, by construction of a fixed-crest rockfill dam, authorized by the Flood Control Act of July 3, 1958, approximately 900 feet below Chain of Rocks Bridge at an estimated cost to the Federal Government of $6,649,000, including $9,000 for aids to navigation; and a small boat harbor opposite Chester, Ill. at estimated first costs of $115,000 including $8,400 preauthorization cost (1959 prices) to the United States and

$92,000 to local interests. The Federal cost includes $1,000 expenditure by the U.S. Coast Guard for navigation aids.

The estimated cost of new work (1959) is $109,364,000. The estimated annual cost of maintenance (1959) is $1,800,000.

The existing project was authorized by the following:

Acts	Work authorized	Documents
.....	Project for regulating works adopted in 1881. (To obtain a minimum depth of 8 feet.)	Annual Report, 1881, p. 1536.
June 3, 1896 June 13, 1902 Mar. 2, 1907	Dredging introduced as part of the project.....	
Mar. 3, 1905 [1] Mar. 2, 1907 [1]	These acts practically abrogated that part of the project for the middle Mississippi which proposed regulating works.	
June 25, 1910	Regulating works restored to the project and appropriations begun with a view to the completion of the improvement between the Ohio and Missouri Rivers within 12 years at an estimated cost of $21,000,000, exclusive of amounts previously expended.	H. Doc. 50, 61st Cong., 1st sess., and H. Doc. 168, 58th Cong., 2d sess.[2]
Jan. 21, 1927	For a depth of 9 feet and width of 300 feet from the Ohio River to the northern boundary of the city of St. Louis, with the estimated cost of maintenance increased to $900,000 annually.	Rivers and Harbors Committee, Doc. 9, 69th Cong., 2d sess.
July 3, 1930	Project between the northern boundary of the city of St. Louis and Grafton (mouth of Illinois River) modified to provide for a channel 9 feet deep and generally 200 feet wide with additional width around bends, at an estimated cost of $1,590,000, with $125,000 annually for maintenance.	Rivers and Harbors Committee, Doc. 12, 70th Cong., 1st sess.
Mar. 2, 1945	Modified to provide for construction of a lateral canal with lock at Chain of Rocks, at an estimated first cost to the United States of about $10,290,000, with $70,000 annually for maintenance and operation.	H. Doc. 231, 76th Cong., 1st sess.
Sept. 3, 1954	Modified to provide for construction of a small-boat harbor opposite Chester, Ill., at an estimated first cost to the United States of $57,700, and to local interests of $58,700.	H. Doc. 230, 83d Cong., 1st sess.
July 3, 1958	Modified to provide for construction of a fixed-crest rockfill dam 900 feet below Chain of Rocks Bridge at a first cost to the United States of $5,810,000, including $8,000 for aids to navigation.	S. Doc. 7, 85th Cong., 1st sess.

[1] Also joint resolution, June 29, 1906.
[2] Contains latest published map.

See House Document 669 (76th Cong., 3d sess.) for report of Chief of Engineers dated February 27, 1940, containing a general plan for improvement of the Mississippi River between Coon Rapids Dam and the mouth of the Ohio River for purposes of navigation, power development, the control of floods, and the needs of irrigation.

Terminal facilities. Most of the water terminal and transfer facilities of the district are described in volumes 1 and 4 of the 4-volume report of the Board of Engineers for Rivers and Harbors, entitled "Survey of Terminals and Landings on the Inland Waterways of the United States".

Operations and results during fiscal year. Construction works were carried on by contract and by hired labor with Government plant, weather conditions and river stages being favorable for construction during the year. Regulating works were maintained, and project dimensions of channels were secured by dredging. Construction was initiated on dam No. 27, Mississippi River, Chain of Rocks, in February 1959.

New work: Regulating works—costs incurred were $15,690 for engineering and design, and $80,456 for other distributive costs. Work by contract consisted of $108,545 for revetment and $897,163 for construction of dikes. Total costs of regulating works were $1,101,854. Dam No. 27—costs incurred were $37,792 for engineering and design, $21,280 for other distributive costs, $8,521 for acquisition of lands, and $672 for real estate management. Work by contract consisted of $38,365 for engineering and design, $300,000 for revetment, and $158 for acquisition of lands. Total costs for dam No. 27 were $406,788. Total costs for new work were $1,508,642.

Maintenance: Dikes (8,065 linear ft.) and revetment (3,890 linear ft.) were repaired by U.S. plant and hired labor at a cost of $616,284. Channel dredging was performed at 43 localities, removing 3,575,349 cubic yards of material from the main channel at a cost of $915,748. The channels dredged had a combined length of 23.7 miles, an average width of 285 feet, and an average gain in depth of 3 feet.

Hydrographic surveys were made covering 197.9 miles of river costing $72,865. Channel was patrolled and aids to navigation were inspected at a cost of $63,237. Other costs were: Distributive costs, $20,746; flood forecasting and discharge observations, $15,137; cooperative hydroclimatic network (rain gages), $80; cooperative stream gaging (river gages), $21,909; noncooperative stream gaging (river gages), $7,838; lock No. 27 lift-gate chains, $1,461; cathodic protection lock gates, $2,878; collection of damages to Government structures, —$2,669; damage repairs, $2,253; stores, —$3,592; other credits to operation, —$4,133; inspection and reports, $1,207; and miscellaneous reports and programing, $14,438.

The cost of operating and care of lock No. 27 and canal was $203,673.

Costs of maintenance including operating and care were $1,954,360.

Deferred maintenance: $1,963 for distributive costs. Work by contract consisted of $25,875 for painting bridges. Total deferred maintenance costs were $27,838.

Total costs of maintenance for the fiscal year were $1,982,198.

Condition at end of fiscal year. Construction on the existing project was initiated in 1881, and the project has been in beneficial use practically from its conception. Work under the project is about 78 percent complete. The quantities required to complete the project are estimated at 86,400 linear feet of pile dike, 93,465 linear feet of revetment, 280,000 cubic yards of rock removal, construction of rockfill dam, and minor items of work at Chain of Rocks. Dikes and revetments were in poor condition along some reaches of the river due to critical damage inflicted

by heavy ice flows during the years 1950–51, 1957–58, and by floods in spring and summer of 1951. The channel as a whole has been greatly improved by the work that has been completed to date. Dredging is required at low stages to remove temporary shoals and maintain the required channel depths.

The project dimensions of channels have generally been maintained throughout the navigation season. The navigation season formerly extended from the middle of February to the middle of December, the river being generally closed by ice the remainder of the year. However, in recent years increased demands of commerce and the use of steel-hull boats have combined to extend the navigation season throughout the year except when blocked by heavy ice or gorges. The river is generally above the 10-foot stage, St. Louis gage, for 6 months of the year, latter part of February to latter part of August, during which time project channel depths generally prevail without dredging. The mean stage of the river, St. Louis gage, was 5.48 feet for the fiscal year 1958 and 8.10 feet for the fiscal year 1959.

Cost and financial statement

	Fiscal year ending June 30					Total to June 30, 1959
	1955	1956	1957	1958	1959	
New work:						
Appropriated	$286,500	$359,000	−$691,299	$496,626	$1,880,000	[1] $85,703,382
Cost	375,572	16,457	277,678	474,389	1,508,642	[1] 85,304,408
Maintenance:						
Appropriated	1,533,000	1,937,924	2,256,300	1,901,450	[2] 1,913,450	47,507,484
Cost	1,650,548	1,925,791	2,152,339	1,941,695	1,982,198	47,499,321

[1] Preauthorization study cost of $201,412 included.
[2] Includes $1,450 of advance procurement funds recorded in column b on fiscal year 1959 Eng. Form 3011 per TT ENGOB 105, dated Oct. 24, 1958.

Other new work data:

Unobligated balance, fiscal year ending June 30, 1959	$359,117
Appropriated for succeeding fiscal year ending June 30, 1960	3,500,000
Estimated additional amount needed to be appropriated for completion of existing project	22,060,618

2. MISSISSIPPI RIVER BETWEEN THE MISSOURI RIVER AND MINNEAPOLIS, MINN. (ST. LOUIS DISTRICT)

See report, "Mississippi River between the Missouri River and Minneapolis, Minn.," page 1257.

3. ILLINOIS WATERWAY, ILL. (ST. LOUIS DISTRICT)

See report, "Illinois Waterway, Ill.," page 1314.

4. OTHER AUTHORIZED NAVIGATION PROJECTS

Name of project	For last full report see Annual Report for—	Cost to June 30, 1957		Estimated amount required to complete
		Construction	Operation and maintenance	
1. Cuivre River, Mo.[1] [3]	1883	$12,000	----------	Inactive.
2. Kaskaskia River, Ill.[2] [3]	1890	10,461	----------	Completed, inactive.

[1] River declared nonnavigable by act of Mar. 23, 1900.
[2] No commerce reported.
[3] By authority of the Chief of Engineers, dated Dec. 12, 1895, this work was dropped from the duties in charge of the St. Louis District (Annual Report, Chief of Engineers, 1896, p. 1761).

IMPROVEMENT OF RIVERS AND HARBORS IN THE ST. LOUIS, MO., DISTRICT

This district comprises those portions of southwestern Illinois and eastern Missouri embraced in the drainage basin of the Mississippi River and its western tributaries, exclusive of the Missouri River, between the mouth of the Ohio River and mile 300 above the same, and of its eastern tributaries to Hamburg Bay at mile 261 on the left bank, exclusive of the tributary basin of the Illinois Waterway upstream of the new La Grange lock and dam at mile 80.15 above the confluence of the Illinois and Mississippi Rivers. The district also includes the drainage basin in Missouri tributary to the Little River diversion channel. Report on Mississippi River between the Missouri River and mile 300 included in the report on Mississippi River between Missouri River and Minneapolis, Minn. Report on that portion of the Illinois River downstream of the new La Grange lock and dam is included in report on Illinois Waterway, Ill., contained in the report of the district engineer, Chicago, Ill.

IMPROVEMENTS

Navigation

	Page
1. Mississippi River between the Ohio and Missouri Rivers	629
2. Mississippi River between the Missouri River and Minneapolis, Minn. (St. Louis District)	633
3. Illinois Waterway, Ill. (St. Louis District)	633
4. Other authorized navigation projects	633

Alteration of Bridges

5. Wabash Railroad bridges, Illinois River, Meredosia and Valley City, Ill.	634

Flood Control

6. Cape Girardeau, Mo.	634
7. Clear Creek drainage and levee district, Ill.	636
8. Perry County drainage and levee districts Nos. 1, 2, and 3, Mo.	637
9. Wilson and Wenkel and Prairie du Pont, drainage and levee districts, Ill.	638
10. Mississippi River at St. Louis, Mo.	639
11. East St. Louis and vicinity, Ill.	641
12. Wood River drainage and levee district, Ill.	642
13. Urban Areas at Alton, Ill.	643
14. Kaskaskia River, Ill.	644
a. Carlyle Reservoir	646
b. Shelbyville Reservoir	647
15. Upper Mississippi River Basin, St. Louis District	648
16. Other authorized flood control pprojects	650
17. Inspection of completed flood control works	651
18. Flood control work under special authorization	651

General Investigations

19. Examination and surveys	652
20. Research and development	652

1. MISSISSIPPI RIVER BETWEEN THE OHIO AND MISSOURI RIVERS

Location. The Mississippi River rises in Lake Itasca, Minn., and, from that lake flows in a southerly direction about 2,350 miles and empties into the Gulf of Mexico. The portion included in this report embraces the 195-mile section known as the middle

Mississippi, between the tributary Ohio and Missouri Rivers, about 984 to 1,179 miles from the Gulf. See folder by U.S. Army Corps of Engineers of Navigation Charts Middle and Upper Mississippi River, Cairo, Ill. to Minneapolis, Minn.

Previous projects. The original project for the improvement of the Mississippi River between the Ohio and Missouri Rivers was recommended by a board of engineers in a report, dated April 13, 1872, and concurred in by the Chief of Engineers. For further details, see page 1879 of the Annual Report for 1915, and page 1014 of the Annual Report for 1938.

Existing project. This provides for obtaining and maintaining a minimum channel depth of not less than 9 feet, a minimum width of not less than 300 feet at low water, with additional widths in bends from the mouth of the Ohio River (about 984 miles from the Gulf) to the northern boundary of the city of St. Louis, 191 miles; thence 200 feet wide, with additional width in bends to the mouth of the Missouri River, 4 miles; to be obtained: First, by regulating works, for closing sloughs and secondary channels, narrowing the river by building new banks where the natural width is excessive and protecting new and old banks from erosion where necessary to secure permanency at an estimated construction cost (July 1960 prices) of $63,300,000; second, by dredging or other temporary expedients to maintain channels of project dimensions; third, by construction of works authorized for the Chain of Rocks reach in the River and Harbor Act of March 2, 1945, which approved a comprehensive plan for development of the Mississippi River at Chain of Rocks so as to provide for construction of a lateral canal at an estimated construction cost (July 1960 prices) of $40,150,000; and to authorize the relocation of the river channel and reclamation of the area in Sawyer Bend for airport, park, recreational, and similar purposes at a cost to local interests of approximately $17,555,000 (1939 prices); *Provided,* That any modification of the present river channel required by the civic development be deferred until completion of the lateral canal in the interest of navigation and that the river diversion work connected with such civic development be under the supervision of the Chief of Engineers in order to insure that the interests of interstate and foreign commerce be properly protected: *And further provided,* That local interests hold and save the United States free from any claims for damages that might be incurred due to the construction, maintenance, or operation of such civic development or any part thereof (H. Doc. 231, 76th Cong., 1st sess.); fourth, by construction of a fixed-crest rockfill dam approximately 900 feet below the Chain of Rocks Bridge, authorized by the Rivers and Harbors Act of 3 July 1958, at an estimated construction cost (July 1960 prices) of $4,647,000, including $7,000 costs to the U.S. Coast Guard for aids to navigation; and fifth, by the construction of a small boat harbor opposite Chester, Ill. at estimated construction cost of $176,000 (July 1960 prices) including $8,400 preauthorization cost and $55,000 non-Federal contribution. The Federal cost

includes $1,000 expenditure by the United States Coast Guard for navigation aids.

The estimated cost of new work (1960) is $108,218,000. The estimated annual cost of maintenance (1960) is $1,800,000.

The existing project was authorized by the following:

Acts	Work authorized	Documents
.....	Project for regulating works adpoted in 1881. (To obtain a minimum depth of 8 feet.)	Annual Report, 1881, p. 1536.
June 3, 1896	.	
June 13, 1902	.Dredging introduced as part of the project.....	
Mar. 2, 1907	.	
Mar. 3, 1905[1]	.These acts practically abrogated that part of the	
Mar. 2, 1907[1]	. project for the middle Mississippi which proposed	
	. regulating works	
June 25, 1910	Regulating works restored to the project and appropriations begun with a view to the completion of the improvement between the Ohio and Missouri Rivers within 12 years at an estimated cost of $21 million, exclusive of amounts previously expended.	H Doc. 50, 61st Cong., 1st sess., and H. Doc. 168, 58th Cong., 2d sess.[2]
Jan. 21, 1927	For a depth of 9 feet and width of 300 feet from the Ohio River to the northern boundary of the city of St. Louis, with the estimated cost of maintenance increased to $900,000 annually.	Rivers and Harbors Committee, Doc. 9 69th Cong., 2d sess.
July 3, 1930	Project tetween the northern boundary of the city of St. Louis and Grafton (mouth of Illinois River) modified to provide for a channel 9 feet deep and generally 200 feet wide with additional width around bends, at an estimated cost of $1,500,000, with $125,000 annually for maintenance.	Rivers and Harbors Committee, Doc. 12, 70th Cong., 1st sess.
Mar. 2, 1945	Modified to provide for construction of a lateral canal with lock at Chain of Rocks, at an estimated first cost to the Unitd States of about $10,290,000, with $70,000 annually for maintenance and operation.	H. Doc. 231, 76th Cong. 1st sess.
Sept. 3, 1954	Modified to provide for construct on of a small-boat harbor opposite Chester, Ill., at an estimated first cost to the United States of $57,700, and to local interests of $58,700.	H. Doc. 230, 83d Cong., 1st sess.
July 3, 1958	Modified to provide for construction of a fixed-crest rock fill dam 900 feet below Chain of Rocks Bridge at a first cost to the United States of $5,810,000, including $8,000 for aids to navigation.	S. Doc. 7, 85th Cong., 1st sess.

[1] Also joint resolution, June 29, 1906.
[2] Contains latest published map.

See House Document 669 (76th Cong., 3d sess.) for report of Chief of Engineers dated February 27, 1940, containing a general plan for improvement of the Mississippi River between Coon Rapids Dam and the mouth of the Ohio River for purposes of navigation, power development, the control of floods, and the needs of irrigation.

Terminal facilities. Most of the water terminal and transfer facilities of the district are described in volumes 1 and 4 of the 4-volume report of the Board of Engineers for Rivers and Harbors, entitled "Survey of Terminals and Landings on the Inland Waterways of the United States."

Operations and results during fiscal year. Construction works were carried on by contract and by hired labor with Government plant, weather conditions and river stages being favorable for construction during the year except for the high stages which occurred April through June. Regulating works were maintained, and project dimensions of channels were secured by dredging.

New work: Regulating works—contract work consisted of $877,500 for pile-dike construction and $37,000 for bank revet-

ment. In addition, costs of $25,894 for engineering and design and $91,624 for supervision and administration were incurred. Total costs for the year were $1,032,018. Dam No. 27—Work by contract consisted of $58,088 for completion of bank revetment, $10,000 for initiation of construction of rock dam and $40,985 for engineering and design. Additional costs were $8,196 for land acquisition, $54,001 for engineering and design, $250 for travel advance, and $15,849 for supervision and administration. Total costs for the year were $187,369. Chain of Rocks Canal—Costs incurred were $126,615 for completion of Phase 1 of gate alteration by contract, $13,638 for Government-furnished material, $7,976 hired-labor costs, $29,959 for engineering and design, and $19,364 for supervision and administration. Total costs for the year were $197,552.

Maintenance: During the year U.S. plant and hired labor repaired 14,545 linear feet of dikes at a cost of $678,706 and 13,401 linear feet of revetment at a cost of $121,135. Channel dredging was performed at 24 localities, removing 2,923,842 cubic yards of material from the main channel at a cost of $726,382. The channels dredged had a combined length of 13.1 miles, an average width of 300 feet, and an average gain in depth of 4 feet. Other maintenance costs were $61,968 for purchase of new lift-gate chains for main lock, $4,046 for design of cathodic protection, and $5,920 for rehabilitation of river gages. Condition and operation studies costs for the year were $170,922. This amount included $72,816 for aids to navigation, $34,544 for hydrographic surveys, $50,974 for stream-gaging program, $515 for rainflall data, and $12,073 for miscellaneous reports and programming. Other fiscal year costs were $1,199 for inspections and reports, $12,360 for supervision and administration, and $86 damage to Government structures. Total collections during the year were $12,773. The costs of operations and care of Lock No. 27 were $247,705. Total costs for the year were $2,017,656.

Condition at end of fiscal year. Construction on the existing project was initiated in 1881, and the project has been in beneficial use practically from its conception. Work under the project is about 79 percent complete. The quantities required to complete the project are estimated at 76,360 linear feet of pile dike, 93,465 linear feet of revetment, 280,000 cubic yards of rock removal, construction of rockfill dam, minor items of work at Chain of Rocks, and construction of a small boat harbor opposite Chester, Ill. Dikes and revetments were in poor condition along some reaches of the river due to critical damage inflicted by heavy ice-flows during the years 1950–51, 1957–58, and by floods in spring and summer of 1951. The channel as a whole has been greatly improved by the work that has been completed to date. Dredging is required at low stages to remove temporary shoals and maintain the required channel depths.

The project dimensions of channels have generally been maintained throughout the navigation season. The navigation season formerly extended from the middle of February to the middle of December, the river being generally closed by ice the remainder

of the year. However, in recent years increased demands of commerce and the use of steel-hull boats have combined to extend the navigation season throughout the year except when blocked by heavy ice or gorges. The river is generally above the 10-foot stage, St. Louis gage, for 6 months of the year, latter part of February to latter part of August, during which time project channel depths generally prevail without dredging. The mean stage of the river, St. Louis gage, was 8.10 feet for the fiscal year 1959 and 10.99 feet for the fiscal year 1960.

Cost and financial statement

	Fiscal year ending June 30					Total to June 30, 1960
	1956	1957	1958	1959	1960	
New work:						
Appropriated	$359,000	—$691,299	$496,626	$1,880,000	$2,186,000	[1] [2] $86,472,747
Cost	16,457	277,678	474,389	1,508,642	1,416,939	[1] [2] 85,304,712
Maintenance:						
Appropriated	1,937,924	2,256,300	1,901,450	1,913,450	2,009,493	49,516,977
Cost	1,925,791	2,152,339	1,941,695	1,982,189	2,017,656	49,516,977

[1] Excludes previous project costs of $1,416,620.
[2] Includes preauthorization costs of $201,397.
[3] Includes $8,000 U.S. Coast Guard costs.

Other new work data:
Unobligated balance for year ending June 30, 1960 ..... $ 28,675
Appropriated for year ending June 30, 1961 5,554,300
Estimated additional amount needed to complete project .... [3] 18,624,253

2. MISSISSIPPI RIVER BETWEEN THE MISSOURI RIVER AND MINNEAPOLIS, MINN. (ST. LOUIS DISTRICT)

See report, "Mississippi River between the Missouri River and Minneapolis, Minn.," page 1247.

3. ILLINOIS WATERWAY, ILL. (ST. LOUIS DISTRICT)

See report, "Illinois Waterway, Ill.," page 1311.

4. OTHER AUTHORIZED NAVIGATION PROJECTS

Name of project	For last full report see Annual Report for—	Cost to June 30, 1960		Estimated amount required to complete
		Construction	Operation and maintenance	
1. Cuivre River, Mo. [1] [2]	1883	$12,000	.....	Inactive.
2. Kaskaskia River, Ill. [2] [3]	1896	10,461	.....	Completed, inactive.

[1] River declared nonnavigable by act of Mar. 23, 1900.
[2] No commerce reported.
[3] By authority of the Chief of Engineers, dated Dec. 12, 1895, this work was dropped from the duties in charge of the St. Louis District (Annual Report, Chief of Engineers, 1896, p. 1761.

IMPROVEMENT OF RIVERS AND HARBORS IN THE ST. LOUIS, MO., DISTRICT

This district comprises those portions of southwestern Illinois and eastern Missouri embraced in the drainage basin of the Mississippi River and its western tributaries, exclusive of the Missouri River, between the mouth of the Ohio River and mile 300 above the same, and of its eastern tributaries to Hamburg Bay at mile 261 on the left bank, exclusive of the tributary basin of the Illinois Waterway upstream of the new La Grange lock and dam at mile 80.15 above the confluence of the Illinois and Mississippi Rivers. The district also includes the drainage basin in Missouri tributary to the Little River diversion channel. Report on Mississippi River between the Missouri River and mile 300 is included in the report on Mississippi River between Missouri River and Minneapolis, Minn. Report on that portion of the Illinois River downstream of the new La Grange lock and dam is included in report on Illinois Waterway, Ill., contained in the report of the district engineer, Chicago, Ill.

IMPROVEMENTS

Navigation

	Page
1. Mississippi River between the Ohio and Missouri Rivers	701
2. Mississippi River between the Missouri River and Minneapolis, Minn. (St. Louis District)	705
3. Illinois Waterway, Ill. (St. Louis District)	705
4. Other authorized navigation projects	705

Alteration of Bridges

5. Wabash Railroad bridges, Illinois River, Meredosia and Valley City, Ill	705

Flood Control

6. Cape Girardeau, Mo	706
7. Clear Creek drainage and levee district, Ill	707
8. Perry County drainage and levee districts Nos. 1, 2, and 3, Mo	709

Flood control—continued

	Page
9. Wilson and Wenkel and Prairie du Pont drainage and levee districts, Ill	710
10. Mississippi River at St. Louis, Mo	711
11. East St. Louis and vicinity, Ill	712
12. Wood River drainage and levee district, Ill	713
13. Kaskaskia River, Ill	715
a. Carlyle Reservoir	716
b. Shelbyville Reservoir	718
14. Upper Mississippi River Basin, St. Louis District	719
15. Other authorized flood-control projects	721
16. Inspection of completed flood control works	721
17. Flood control work under special authorization	722

General Investigations

18. Examination and surveys	722
19. Research and development	723

1. MISSISSIPPI RIVER BETWEEN THE OHIO AND MISSOURI RIVERS

Location. The Mississippi River rises in Lake Itasca, Minn., and, from that lake flows in a southerly direction about 2,350 miles and empties into the Gulf of Mexico. The portion included in this report embraces the 195-mile section known as the middle Mississippi, between the tributary Ohio and Missouri Rivers,

about 984 to 1,179 miles from the Gulf. See folder by U.S. Army Corps of Engineers of Navigation Charts Middle and Upper Mississippi River, Cairo, Ill., to Minneapolis, Minn.

Previous projects. The original project for the improvement of the Mississippi River between the Ohio and Missouri Rivers was recommended by a board of engineers in a report, dated April 13, 1872, and concurred in by the Chief of Engineers. For further details, see page 1879 of the Annual Report for 1915, and page 1014 of the Annual Report for 1938.

Existing project. This provides for obtaining and maintaining a minimum channel depth of not less than 9 feet, a minimum width of not less than 300 feet at low water, with additional widths in bends from the mouth of the Ohio River (about 984 miles from the Gulf) to the northern boundary of the city of St. Louis, 191 miles; thence 200 feet wide, with additional width in bends to the mouth of the Missouri River, 4 miles; to be obtained: First, by regulating works, for closing sloughs and secondary channels, narrowing the river by building new banks where the natural width is excessive and protecting new and old banks from erosion where necessary to secure permanency at an estimated construction cost (July 1961 prices) of $63,600,000; second, by dredging or other temporary expedients to maintain channels of project dimensions; third, by construction of works authorized for the Chain of Rocks reach in the River and Harbor Act of March 2, 1945, which approved a comprehensive plan for development of the Mississippi River at Chain of Rocks so as to provide for construction of a lateral canal at an estimated construction cost (July 1961 prices) of $42,210,000; and fourth, by construction of a fixed-crest rock fill dam approximately 900 feet below the Chain of Rocks Bridge, authorized by the Rivers and Harbors Act of July 3, 1958, at an estimated construction cost (July 1961 prices) of $4,547,000, including $7,000 costs to the U.S. Coast Guard for aids to navigation.

The estimated cost of new work (1961) is $110,357,000. The cost of a small boat harbor opposite Chester, Illinois, which is deferred, is excluded from the foregoing cost estimate. The cost of this portion was last revised in July 1960 and was estimated to be $176,000, including $55,000 non-Federal contribution, $8,400 preauthorization cost, and $1,000 U.S. Coast Guard cost. The estimated annual cost of maintenance (1961) is $1,800,000.

The existing project was authorized by the following

Acts	Work authorized	Documents
.....	Project for regulating works adopted in 1881. (To obtain a minimum depth of 8 feet.)	Annual Report, 1881, p. 1536.
June 3, 1896 June 13, 1902 Mar. 2, 1907	Dredging introduced as part of the project.....	
Mar. 3, 1905 [1] Mar. 2, 1907 [1]	These acts practically abrogated that part of the project for the middle Mississippi which proposed regulating works.	
June 25, 1910	Regulating works restored to the project and appropriations begun with a view to the completion of the improvement between the Ohio and Missouri Rivers within 12 years at an estimated cost of $21,000,000, exclusive of amounts previously expended.	H. Doc. 50, 61st Cong., 1st sess., and H. Doc. 168, 58th Cong., 2d sess.[2]

Acts	Work authorized	Documents
Jan. 21, 1927	For a depth of 9 feet and width of 300 feet from the Ohio River to the northern boundary of the city of St. Louis, with the estimated cost of maintenance increased to $900,000 annually.	Rivers and Harbors Committee, Doc. 9, 69th Cong., 2d sess.
July 3, 1930	Project between the northern boundary of the city of St. Louis and Grafton (mouth of Illinois River) modified to provide for a channel 9 feet deep and generally 200 feet wide with additional width around bends, at an estimated cost of $1,500,000, with $125,000 annually for maintenance.	Rivers and Harbors Committee, Doc. 12, 70th Cong., 1st sess.
Mar. 2, 1945	Modified to provide for construction of a lateral canal with lock at Chain of Rocks, at an estimated first cost to the United States of about $10,290,000, with $70,000 annually for maintenance and operation.	H. Doc. 231, 76th Cong., 1st sess.
Sept. 3, 1954 [3]	Modified to provide for construction of a small-boat harbor opposite Chester, Ill., at an estimated first cost to the United States of $57,700, and to local interests of $58,700.	H. Doc. 230, 83d Cong., 1st sess.
July 3, 1958	Modified to provide for construction of a fixed-crest rockfill dam 900 feet below Chain of Rocks Bridge at a first cost to the United States of $5,810,000, including $8,000 for aids to navigation.	S. Doc. 7, 85th Cong., 1st sess.

[1] Also joint resolution, June 29, 1906.
[2] Contains latest published map.
[3] Deferred.

See House Document 669 (76th Cong., 3d sess.) for report of Chief of Engineers dated February 27, 1940, containing a general plan for improvement of the Mississippi River between Coon Rapids Dam and the mouth of the Ohio River for purposes of navigation, power development, the control of floods, and the needs of irrigation.

Terminal facilities. Most of the water terminal and transfer facilities of the district are described in volumes 1 and 4 of the 4-volume report of the Board of Engineers for Rivers and Harbors, entitled "Survey of Terminals and Landings on the Inland Waterways of the United States."

Operations and results during fiscal year. Construction works were carried on by contract and by hired labor with Government plant, weather conditions and river stages being favorable for construction during the year, except for the high stages which occurred during May. Regulating works were maintained, and project dimensions of channels were secured by dredging.

New work. Regulating Works—Contract work consisted of $1,396,509 for pile dike construction and $427,683 for bank revetment. In addition, costs of $34,451 for engineering and design and $104,394 for supervision and administration were incurred. Total costs for the year were $1,963,037.

Dam 27—Work by contract consisted of $1,490,000 for construction of rock dam, and $35,000 for construction of navigation warning signs. Additional costs were $2,665 for hired labor, $45,438 for engineering and design, $118,286 for supervision and administration, $1,028 for operating equipment and expense, and —$250 for travel advance. Total costs for the year were $1,692,167.

Chain of Rocks Canal—Costs incurred were $258,303 for completion of phase 2 of gate alteration, $9,261 for engineering and design, and $12,808 for supervision and administration. Total costs for the year were $280,372.

Maintenance: Work by contract during the year included $187,979 for repair of 3,900 linear feet of dikes, and $67,377 for purchase of new lift gate chains for the main lock. U.S. plant and hired labor repaired 11,935 linear feet of dikes at a cost of $756,264; and 83,400 square feet of revetment at a cost of $51,054. U.S. plant and hired labor performed channel dredging at 38 localities, removing 3,709,778 cubic yards of material from the main channel at a cost of $1,009,427. The channels dredged had a combined length of 11.4 miles, an average width of 300 feet, and an average gain in depth of about five feet. Condition and operation studies costs for the year were $220,153. This amount included $104,208 for aids to navigation $36,910 for hydrographic surveys, $50,895 for stream gaging program, $652 for rainfall data, $23,347 for miscellaneous reports and programming, and $4,141 for lock and dam replacement studies. Other fiscal year costs were: $13,369 for repair of gages, $1,872 for inspection and reports, $12,540 for supervision and administration, and $1,411 damages to Government structures. The costs of operation and care of Lock No. 27 were $368,085, which includes $150,574 for repair of 828,920 square feet of canal revetment. Net collections during the year were $1,411. Total costs for the year were $2,688,120.

Rehabilitation: Preconstruction planning on pile dikes and revetment rehabilitation was initiated. A General Design Memorandum was completed. Upon completion of the General Design Memorandum this work was removed from the rehabilitation program and work was suspended. Total costs for the year were $3,109.

Condition at end of fiscal year. Construction on the existing project was initiated in 1881, and the project has been in beneficial use practically from its inception. Work under the project is about 81 percent complete. Work required to complete the project includes; construction of 71,900 linear feet of pile dike, 82,880 linear feet of revetment, removal of 280,000 cubic yards of rock, removal of 681,000 cubic yards by dredging, construction of rock fill dam, and minor items of work at Chain of Rocks. Dikes and revetments were in poor condition along some reaches of the river due to critical damage inflicted by heavy ice flows during the years 1950–51, 1957–58, and by floods in spring and summer of 1951. The channel as a whole has been greatly improved by the work that has been completed to date. Dredging is required at low stages to remove temporary shoals and maintain the required channel depths.

The project dimensions of channels have generally been maintained throughout the navigation season. The navigation season formerly extended from the middle of February to the middle of December, the river being generally closed by ice the remainder of the year. However, in recent years increased demands of commerce and the use of steel hull boats have combined to extend the navigation season throughout the year except when blocked by heavy ice or gorges. The river is generally above the 10-foot stage, St. Louis gage, for 6 months of the year, latter part of February to

latter part of August, during which time project channel depths generally prevail without dredging. The mean stage of the river, St. Louis gage, was 10.99 feet for the fiscal year 1960 and 7.95 feet for the fiscal year 1961.

Cost and financial statement

Fiscal year	1957	1958	1959	1960	1961	Total to June 30, 1961
New work:						
Appropriated	—$691,299	$496,626	$1,880,000	$2,186,000	$3,340,924	[1] [2] $89,805,247
Cost	277,678	474,389	1,508,642	1,416,939	3,935,576	[1] [2] [3] 89,231,864
Maintenance:						
Appropriated	2,256,300	1,901,450	1,913,450	2,009,493	2,693,300	52,210,277
Cost	2,152,339	1,941,695	1,962,189	2,017,656	2,688,120	52,205,097
Rehabilitation:						
Appropriated					3,109	3,109
Cost					3,109	3,109

Other new work data:

Unobligated balance for year ending June 30, 1961	$67,980
Appropriated for year ending June 30, 1962	5,424,500
Unobligated balances available for year ending June 30, 1962	
Estimated additional amount needed to complete project	[3] 17,651,753

[1] Excludes previous project costs of $1,416,620.
[2] Includes preauthorization costs of $192,974.
[3] Includes $7,000 U.S. Coast Guard costs.

2. MISSISSIPPI RIVER BETWEEN THE MISSOURI RIVER AND MINNEAPOLIS, MINN. (ST. LOUIS DISTRICT)

See report, "Mississippi River between the Missouri River and Minneapolis, Minn.," page 1319.

3. ILLINOIS WATERWAY, ILL. (ST. LOUIS DISTRICT)

See report, "Illinois Waterway, Ill." page 1380.

4. OTHER AUTHORIZED NAVIGATION PROJECTS

Name of project	For last full report see Annual Report for—	Cost to June 30, 1961		Estimated amount required to complete
		Construction	Operation and maintenance	
1. Cuivre River, Mo.[1] [2]	1883	$12,000		Inactive.
2. Kaskaskia River, Ill.[2] [3]	1896	10,461		Completed, inactive.

[1] River declared nonnavigable by act of Mar. 23, 1900.
[2] No commerce reported.
[3] By authority of the Chief of Engineers, dated Dec. 12, 1895, this work was dropped from the duties in charge of the St. Louis District (Annual Report, Chief of Engineers, 1896, p. 1761).

5. WABASH RAILROAD BRIDGES, ILLINOIS RIVER, MEREDOSIA AND VALLEY CITY, ILL.

Location. The bridges are on the Illinois Waterway at Valley City, in Pike County, Ill., about 62 miles above the mouth, and at Meredosia in Morgan County, Ill., about 71 miles above the mouth. See folder by U.S. Army Corps of Engineers, of Navigation Charts, Illinois Waterway, Grafton, Ill., to Lake Michigan.

IMPROVEMENT OF RIVERS AND HARBORS IN THE ST. LOUIS, MO., DISTRICT

This district comprises those portions of southwestern Illinois and eastern Missouri embraced in the drainage basin of the Mississippi River and its western tributaries, exclusive of the Missouri River, between the mouth of the Ohio River and mile 300 above the same, and of its eastern tributaries to Hamburg Bay at mile 261 on the left bank, exclusive of the tributary basin of the Illinois Waterway upstream of the new La Grange lock and dam at mile 80.15 above the confluence of the Illinois and Mississippi Rivers. The district also includes the drainage basin in Missouri tributary to the Little River diversion channel. Report on Mississippi River between the Missouri River and mile 300 is included in the report on Mississippi River between Missouri River and Minneapolis, Minn. Report on that portion of the Illinois River downstream of the new La Grange lock and dam is included in report on Illinois Waterway, Ill., contained in the report of the district engineer, Chicago, Ill.

IMPROVEMENTS

	Page
Navigation	
1. Mississippi River between the Ohio and Missouri Rivers	709
2. Mississippi River between the Missouri River and Minneapolis, Minn. (St. Louis District)	713
3. Illinois Waterway, Ill. (St. Louis District)	713
4. Other authorized navigation projects	713
Alteration of Bridges	
5. Authorized bridge alterations	714
Flood Control	
6. East Cape Girardeau and Clear Creek Drainage District, Ill.	715
7. Cape Girardeau, Mo.	716
8. Clear Creek Drainage and Levee District, Ill.	717
9. Perry County Drainage and Levee Districts Nos. 1, 2, and 3, Mo.	718
10. Wilson and Wenkel and Prairie du Pont Drainage and Levee Districts, Ill.	719
Flood control—continued	
11. Mississippi River at St. Louis, Mo.	720
12. East St. Louis and vicinity, Ill.	721
13. Wood River Drainage and Levee Districts, Ill.	723
14. Kaskaskia River, Ill.	724
a. Carlyle Reservoir	725
b. Shelbyville Reservoir	727
c. Village of New Athens, Ill.	728
15. Upper Mississippi River Basin, St. Louis District	729
16. Other authorized flood control projects	731
17. Inspection of completed flood control works	732
18. Flood control work under special authorization	732
General Investigations	
19. Examination and surveys	733
20. Collection and study of basic data	733
21. Research and development	733

1. MISSISSIPPI RIVER BETWEEN THE OHIO AND MISSOURI RIVERS

Location. The Mississippi River rises in Lake Itasca, Minn., and, from that lake flows in a southerly direction about 2,350 miles and empties into the Gulf of Mexico. The portion included

in this report embraces the 195-mile section known as the middle Mississippi, between the tributary Ohio and Missouri Rivers, about 984 to 1,179 miles from the Gulf. See folder by U.S. Army Corps of Engineers of Navigation Charts Middle and Upper Mississippi River, Cario, Ill., to Minneapolis, Minn.

Previous projects. The original project for the improvement of the Mississippi River between the Ohio and Missouri Rivers was recommended by a board of engineers in a report, dated April 13, 1872, and concurred in by the Chief of Engineers. For further details, see page 1879 of the Annual Report for 1915, and page 1014 of the Annual Report for 1938.

Existing project. This provides for obtaining and maintaining a minimum channel depth of not less than 9 feet, a minimum width of not less than 300 feet at low water, with additional widths in bends from the mouth of the Ohio River (about 984 miles from the Gulf) to the northern boundary of the city of St. Louis, 191 miles; thence 200 feet wide, with additional width in bends to the mouth of the Missouri River, 4 miles; to be obtained: First, by regulating works, for closing sloughs and secondary channels, narrowing the river by building new banks where the natural width is excessive and protecting new and old banks from erosion where necessary to secure permanency at an estimated construction cost (July 1962 prices) of $63,800,000; second, by dredging or other temporary expedients to maintain channels of project dimensions; third, by construction of works authorized for the Chain of Rocks reach in the River and Harbor Act of March 2, 1945, which approved a

The existing project was authorized by the following:

Acts	Work authorized	Documents and reports
	Project for regulating work adopted in 1881. (To obtain a minimum depth of 8 feet).	Annual Report, 1881, p. 1536.
June 3, 1896 June 13, 1902 Mar. 2, 1907	Dredging introduced as part of the project.....	
Mar. 3, 1905[1] Mar. 2, 1907[1]	These acts practically abrogated that part of the project for the middle Mississippi which proposed regulating works.	
June 25, 1910	Regulating works restored to the project and appropriations begun with a view to the completion of the improvement between the Ohio and Missouri Rivers within 12 years at an estimated cost of $21 million, exclusive of amounts previously expended.	H. Doc. 50, 61st Cong., 1st sess., and H. Doc. 168, 58th Cong., 2d sess.[2]
Jan. 21, 1927	For a depth of 9 feet and width of 300 feet from the Ohio River to the northern boundary of the city of St. Louis, with the estimated cost of maintenance increased to $900,000 annually.	Rivers and Harbors Committee, Doc. 9, 69th Cong., 2d sess.
July 3, 1930	Project between the northern boundary of the city of St. Louis and Grafton (mouth of Illinois River) modified to provide for a channel 9 feet deep and generally 200 feet wide with additional width around bends, at an estimated cost of $1,500,000, with $125,000 annually for maintenance.	Rivers and Harbors Committee, Doc. 12, 70th Cong., 1st sess.
Mar. 2, 1945	Modified to provide for construction of a lateral canal with lock at Chain of Rocks, at an estimated first cost to the United States of about $10,200,000, with $70,000 annually for maintenance and operation.	H. Doc. 231, 76th Cong., 1st sess.
Sept. 3, 1954[3]	Modified to provide for construction of a small-boat harbor opposite Chester, Ill., at an estimated first cost to the United States of $57,700, and to local interests of $58,700.	H. Doc. 230, 83d Cong., 1st sess.
July 3, 1958	Modified to provide for construction of a fixed-crest rock-fill dam 900 feet below Chain of Rocks Bridge at a first cost to the United States of $5,810,000, including $8,000 for aids to navigation.	S. Doc. 7, 85th Cong., 1st sess.

[1] Also joint resolution, June 29, 1906.
[2] Contains latest published map.
[3] Deferred.

comprehensive plan for development of the Mississippi River at Chain of Rocks so as to provide for construction of a lateral canal at an estimated construction cost (July 1962 prices) of $42,300,000; and fourth, by construction of a fixed-crest rock fill dam approximately 900 feet below the Chain of Rocks Bridge, authorized by the Rivers and Harbors Act of July 3, 1958, at an estimated construction cost (July 1962 prices) of $4,520,000, excluding $7,000 costs to the U.S. Coast Guard for aids to navigation.

The estimated cost of new work (1962) is $110,620,000. The cost of a small boat harbor opposite Chester, Ill., which is deferred, is excluded from the foregoing cost estimate. The cost of this portion was last revised in July 1960 and was estimated to be $176,000, including $55,000 non-Federal contribution, $8,400 preauthorization cost, and $1,000 U.S. Coast Guard cost. The average annual maintenance cost during the past 5 years was $2,330,000.

See House Document 669 (76th Cong., 3d sess.) for report of Chief of Engineers dated February 27, 1940, containing a general plan for improvement of the Mississippi River between Coon Rapids Dam and the mouth of the Ohio River for purposes of navigation, power development, the control of floods, and the needs of irrigation.

Terminal facilities. Most of the water terminal and transfer facilities of the district are described in volumes 1 and 4 of the 4-volume report of the Board of Engineers for Rivers and Harbors entitled "Survey of Terminals and Landings on the Inland Waterways of the United States."

Operations and results during fiscal year. Construction works were carried on by contract and by hired labor with Government plant, weather conditions and river stages being favorable for construction during the year, except for high stages which occurred during March and April. Construction was also delayed in January due to heavy ice flows and to ice gorge between mile 3 to 36. Regulating works were maintained, and project dimensions of channels were secured by dredging.

New work, regulating works: Contract work consisted of $1,547,565 for pile dike construction and $401,292 for bank revetment. In addition, costs of $41,835 for engineering and design and $104,137 for supervision and administration were incurred. Total costs for the year were $2,094,829.

Dam 27—Work by contract consisted of $1,246,700 for continuation of construction of rock dam and $9,981 for construction of navigation warning signs. Additional costs were $245 for hired labor, $5,120 for engineering and design, $80,115 for supervision and administration, $2,386 for operation and maintenance expense during construction. Total costs for the year were $1,344,547.

Chain of Rocks Canal—No costs were incurred during fiscal year 1962. Work on the project will be resumed in fiscal year 1963.

Maintenance: Work by contract during the year included $669,056 for repair of 15,400 linear feet of dikes and $47,500 for repair of 4,550 linear feet of revetment. U.S. plant and hired labor repaired 19,500 linear feet of dikes at a cost of $927,103 and

10,280 linear feet of revetment at a cost of $103,160. U.S. plant and hired labor performed channel dredging at 16 localities removing 1,427,809 cubic yards of material from the main channel at a cost of $505,006. The channel dredged had a combined length of 11 miles, an average width of 300 feet, and an average gain in depth of about 3 feet. Condition and operation study costs for the year were $268,709. This amount included $130,345 for aids to navigation, $58,025 for hydrographic surveys, $56,304 for stream gaging program, $678 for rainfall data, $23,090 for miscellaneous reports and programing, and $267 for lock and dam replacement studies. Other fiscal year costs were: $2,148 for repair of gages, $2,060 for inspection and reports, and $227,311 for supervision and administration, and $15,183 for engineering and design. The cost of operation and care of lock No. 27 was $259,366, which includes $135,698 operating expenses, $48,227 for levee and drainage facilities, $15,034 for service facilities, $6,966 for real estate management, $902 for recreational facilities, $12,295 for paving of access road and parking lot, $4,515 for installation of lift gate chains, $6,355 for replacement of electrical and mechanical equipment, $3,334 for restoration of structural components, $1,317 for replacement of tools and equipment, $2,377 restoration of building grounds and utilities, $56 for damages to Government structures, and $22,290 for supervision and inspection. Net undistributed cost during the year amounted to minus $7,330. Total cost for the year was $3,019,272.

Rehabilitation: No rehabilitation was performed during the year.

Condition at end of fiscal year. Construction on the existing project was initiated in 1881, and the project has been in beneficial use practically from its inception. Work under the project is about 84 percent complete. Work required to complete the project includes: construction of 56,020 linear feet of pile dike, 78,080 linear feet of revetment, removal of 280,000 cubic yards of rock, removal of 681,000 cubic yards by dredging, construction of rock fill dam, raising of the west wall of the auxiliary lock at the Chain of Rocks lock, and repair of Chain of Rocks canal revetment. Dikes and revetments were in poor condition along some reaches of the river due to critical damage inflicted by heavy ice flows during the years 1950–51, 1957–58, and 1962 and by floods in spring and summer of 1951. The channel as a whole has been greatly improved by the work that has been completed to date. Dredging is required at low stages to remove temporary shoals and maintain the required channel depths.

The project dimensions of channels have generally been maintained throughout the navigation season. The navigation season formerly extended from the middle of February to the middle of December, the river being generally closed by ice the remainder of the year. However, in recent years increased demands of commerce and the use of steel hull boats have combined to extend the navigation season throughout the year except when blocked by heavy ice or gorges. The river is generally above the 10-foot stage, St. Louis gage, for 6 months of the year, latter part of

February to latter part of August, during which time project channel depths generally prevail without dredging. The mean stage of the river, St. Louis gage, was 7.95 feet for the fiscal year 1961 and 12.89 feet for the fiscal year 1962.

Cost and financial statement

Fiscal year	1958	1959	1960	1961	1962	Total to June 30, 1962
New work:						
Appropriated	$496,626	$1,880,000	$2,186,000	$3,340,024	$2,098,495	[1] [2]$92,803,742
Cost	474,389	1,508,642	1,416,039	3,935,576	3,439,376	[1] [2]92,671,241
Maintenance:						
Appropriated	1,901,450	1,913,450	2,009,493	2,693,300	3,019,500	55,229,777
Cost	1,941,695	1,982,189	2,017,656	2,688,120	3,019,272	55,224,368
Rehabilitation:						
Appropriated	.....	.....	.....	3,109	.....	3,109
Cost	.....	.....	.....	3,109	.....	3,109

Other new work data:
Unobligated balance for year ending June 30, 1962 ..... $30,849
Appropriated for year ending June 30, 1963 3,188,488
Estimated additional amount needed to complete project 14,627,770

[1] Excludes previous project costs of $1,416,620.
[2] Includes preauthorization costs of $192,974.

2. MISSISSIPPI RIVER BETWEEN THE MISSOURI RIVER AND MINNEAPOLIS, MINN. (ST. LOUIS DISTRICT)

See report, "Mississippi River between the Missouri River and Minneapolis, Minn.," page 1347.

3. ILLINOIS WATERWAY, ILL. (ST. LOUIS DISTRICT)

See report "Illinois Waterway, Ill." page 1409.

4. OTHER AUTHORIZED NAVIGATION PROJECTS

Name of project	For last full report see Annual Report for—	Cost to June 30, 1962		Estimated amount required to complete
		Construction	Operation and maintenance	
1. Cuivre River, Mo.[1] [3]	1883	$12,000	.....	Inactive.
2. Kaskaskia River, Ill.[2] [3]	1896	10,461	.....	Completed, inactive.

[1] River declared nonnavigable by act of Mar. 23, 1900.
[2] No commerce reported.
[3] By authority of the Chief of Engineers, dated Dec. 12, 1895, this work was dropped from the duties in charge of the St. Louis District (Annual Report, Chief of Engineers, 1896, p. 1761).

1. MISSISSIPPI RIVER BETWEEN OHIO AND MISSOURI RIVERS

Location. Mississippi River rises in Lake Itasca, Minn., and, from that lake flows in a southerly direction about 2,350 miles and empties into the Gulf of Mexico. Portion included in this report embraces the 195-mile section known as middle Mississippi, between tributary Ohio and Missouri Rivers, about 984 to 1,179 miles from the gulf. See folder by U.S. Army Corps of Engineers of Navigation Charts Middle and Upper Mississippi River, Cario, Ill., to Minneapolis, Minn.

Previous projects. Original project for improvement of the Mississippi River between Ohio and Missouri Rivers was recommended by a board of engineers in a report dated April 13, 1872, and concurred in by the Chief of Engineers. For further details, see page 1879 of Annual Report for 1915, and page 1014 of Annual Report for 1938.

Existing project. Provides for obtaining and maintaining a minimum channel depth of not less than 9 feet, a minimum width of not less than 300 feet at low water, with additional widths in bends from mouth of Ohio River (about 984 miles from gulf) to northern boundary of city of St. Louis, 191 miles; thence 200 feet wide, with additional width in bends to mouth of Missouri River, 4 miles; to be obtained: First, by regulating works, for closing sloughs and secondary channels, narrowing river by building new banks where natural width is excessive and protecting new and old banks from erosion where necessary to secure permanency at an estimated construction cost (July 1963 prices) of $64,400,000; second, by dredging or other temporary expedients to maintain channels of project dimensions; third, by construction of works authorized for Chain of Rocks reach in River and Harbor Act of March 2, 1945, which approved a comprehensive plan for development of the Mississippi River at Chain of Rocks so as to provide for construction of a lateral canal at an estimated construction cost (July 1963 prices) of $43,000,000; and fourth, by construction of a fixed-crest rock fill dam approximately 900 feet below Chain of Rocks Bridge, authorized by Rivers and Harbors Act of July 3, 1958, at an estimated construction cost (July 1963 prices) of $4,514,000, excluding $7,000 costs to U.S. Coast Guard for aids to navigation.

Estimated cost of new work (1963) is $111,914,000. Cost of a small-boat harbor opposite Chester, Ill., is deferred, and excluded from foregoing cost estimate. Cost of this portion last revised in July 1960 was estimated to be $166,000, including $55,000 non-Federal contribution, excluding $8,400 preauthorization cost, and $1,000 U.S. Coast Guard cost. Average annual maintenance cost for past 5 years was $2,660,000.

Existing project was authorized by the following:

Acts	Work authorized	Documents and reports
	Project for regulating work adopted in 1881. (To obtain a minimum depth of 8 feet).	Annual Report, 1881, p. 1536.
June 3, 1896 June 13, 1902 Mar. 2, 1907	Dredging introduced as part of the project	
Mar. 3, 1905[1] Mar. 2, 1907[1]	These acts practically abrogated that part of the project for middle Mississippi which proposed regulating works.	
June 25, 1910	Regulating works restored to project and appropriations begun with a view to completion of improvement between Ohio and Missouri Rivers within 12 years at an estimated cost of $21,000,000, exclusive of amounts previously expended.	H. Doc. 50, 61st Cong., 1st sess., and H. Doc. 168, 58th Cong., 2d sess. (contains latest published map).
Jan. 21, 1927	For a depth of 9 feet and width of 300 feet from Ohio River to northern boundary of city of St. Louis, with estimated cost of maintenance increased to $900,000 annually.	Rivers and Harbors Committee Doc. 9, 69th Cong., 2d sess.
July 3, 1930	Project between northern boundary of city of St. Louis and Grafton (mouth of Illinois River) modified to provide a channel 9 feet deep and generally 200 feet wide with additional width around bends, at an estimated cost of $1,500,000, with $125,000 annually for maintenance.	Rivers and Harbors Committee, Doc. 12, 70th Cong., 1st sess.
Mar. 2, 1945	Modified to provide for construction of a lateral canal with lock at Chain of Rocks, at an estimated first cost to United States of about $10,290,000, with $70,000 annually for maintenance and operation.	H. Doc. 231, 76th Cong., 1st sess.
Sept. 3, 1954[2]	Modified to provide for construction of a small-boat harbor opposite Chester, Ill., at an estimated first cost to United States of $57,700, and to local interest of $58,700.	H. Doc. 230, 83d Cong., 1st sess.
July 3, 1958	Modified to provide for construction of a fixed-crest rock-fill dam 900 feet below Chain of Rocks Bridge at a first cost to United States of $5,810,000, including $8,000 navigation aids.	S. Doc. 7, 85th Cong., 1st sess.

[1] Also joint resolution, June 29, 1906.
[2] Deferred.

See House Document 669 (76th Cong., 3d sess.) for report of Chief of Engineers dated February 27, 1940, containing a general plan for improvement of Mississippi River between Coon Rapids Dam and mouth of Ohio River for purposes of navigation, power development, flood control, and needs of irrigation.

Terminal facilities. Facilities are considered adequate for existing commerce.

Operations and results during fiscal year. Construction works were carried on by contract and by hired labor with Government plant, weather conditions and river stages being favorable for construction during the year, except for high stages which occurred during March 1963. Construction was also delayed in January and February 1963 due to heavy ice flows and to ice gorge between miles 3 and 36.

Regulating works were maintained and project dimensions of channels secured by dredging.

New work, regulating works: Contract work consisted of $1,881,003 for pile dike construction and $640,366 for bank revetment. In addition, costs of $44,951 for engineering and design and $134,808 for supervision and administration were incurred. Total costs for the year were $2,701,128.

Dam 27—Work by contract consisted of $294,077 for continuation of construction of rock dam, $351,353 for construction of stone dikes and $930 for navigation warning sign. Additional costs by

hired labor were $7,292 for maintenance during construction, $7,814 for engineering and design, $44,448 for supervision and administration, and $442 for operation and maintenance expense during construction. Total cost for the year was $706,356.

Chain of Rocks—Work on project was resumed in fiscal year 1963 for raising of west wall and miter gate. Total costs for the year were $53,764, of which $49,598 was for advanced engineering and design, and $4,166 for supervision and administration.

Maintenance: Work by contract during the year included $487,429 for repair of 2,960 linear feet of dikes and $485,882 for repair of 205,500 square yards of canal revetment. U.S. plant and hired labor repaired 10,394 linear feet of dikes for $545,214 and 1,995,400 linear feet of revetment for $352,939. U.S. plant and hired labor performed channel dredging at 52 localities, removing 5,075,494 cubic yards o material from main channel at a cost of $891,549. Channel dredged had a combined length of 15.7 miles, an average width of 300 feet, and an average gain in depth of 5 feet. Conditions and operation studies costs for the year were $281,451 (includes $144,374 for aids to navigation, $43,048 for hydrographic surveys, $60,004 for stream gaging program, $175 for rainfall data, and $33,850 for miscellaneous reports and programming). Other fiscal year costs were: $11,043 for repair of gages, $3,012 for inspection and reports, $288,586 for supervision and administration, and $13,982 for engineering and design. Cost of operation and care of lock No. 27 was $240,993, which included $129,826 for operating expenses; $38,583 for levee and drainage facilities; $15,245 for service facilities; $6,675 for real estate management; $1,967 for recreational facilities; $331 for roads, railroads, and bridges; $3,225 for replacement of electrical and mechanical equipment; $18,099 for restoration of structural components; $1,594 for replacement of tools and equipment; $4,393 for restoration of building, grounds, and utilities; $2,114 for damages to Government structures; and $18,941 for supervision and administration. Net undistributed cost for the year was minus $4,479. Total cost for the year was $3,597,601.

Condition at end of fiscal year. Construction on existing project was initiated in 1881, and project has been in beneficial use practically from its inception. Work on project is about 86 percent complete. Work required to complete project includes construction of 43,120 linear feet of pile dike, 75,330 linear feet of revetment, removal of 280,000 cubic yards of rock, removal of 681,000 cubic yards by dredging, completion of rock filled dam (temporary delay, awaiting higher river stage to permit completion of seeding of small stones on dam), raising of west wall and miter gate of auxiliary lock at Chain of Rocks lock, and repair of Chain of Rocks canal revetment.

Dikes and revetments were in poor condition along some reaches of river due to critical damage inflicted by heavy ice flows during 1950–51, 1957–58, 1962–63 and by floods in spring and summer of 1951. Channel as a whole has been greatly improved by the work that has been completed to date. Dredging is required at low stages to remove temporary shoals and maintain required channel depths.

Project dimensions of channels have generally been maintained throughout navigation season. Navigation season formerly extended from middle of February to middle of December, the river being

generally closed by ice remainder of year. However, in recent years increased demands of commerce and use of steel hull boats have combined to extend navigation season throughout the year except when blocked by heavy ice or gorges. River is generally above 10-foot stage, St. Louis gage, for 6 months of the year, latter part of February to latter part of August, during which time project channel depths generally prevail without dredging. Mean stage of river, St. Louis gage was 12.89 feet for fiscal year 1962 and 5.46 feet for fiscal year 1963.

Cost and financial statement

Fiscal year	1959	1960	1961	1962	1963	Total to June 30, 1963
New work:						
Appropriated	$1,880,000	$2,186,000	$3,340,924	$2,998,495	$3,508,232	[1] $96,119,000
Cost	1,508,642	1,416,939	3,935,576	3,439,376	3,461,248	[1] 95,939,514
Maintenance:						
Appropriated	1,913,450	2,009,493	2,693,300	3,019,500	4,728,200	59,957,977
Cost	1,982,189	2,017,658	2,688,120	3,019,272	3,597,601	58,821,969
Rehabilitation:						
Appropriated			3,109			3,109
Cost			3,109			3,109

Other new work data:
Unobligated balance for year ending June 30, 1963 ..... $119,596
Appropriated for year ending June 30, 1964 2,230,000
Estimated additional amount needed to complete project 13,565,000

[1] Excludes previous project costs of $1,416,620 and preauthorization cost.

2. MISSISSIPPI RIVER BETWEEN MISSOURI RIVER AND MINNEAPOLIS, MINN. (ST. LOUIS DISTRICT)

See report, "Mississippi River between Missouri River and Minneapolis, Minn.," page 1199

3. ILLINOIS WATERWAY, ILL. (ST. LOUIS DISTRICT)

See report, "Illinois Waterway, Ill." page 1254

4. KASKASKIA RIVER, ILL.

Location. Rises in Champaign County, Ill., about 5 miles northwest of Urbana, in east-central part of the State. It flows in a general southwesterly direction approximately 325 miles and empties into the Mississippi River about 8 miles above Chester, Ill., or approximately 118 miles above mouth of the Ohio River. (See Cincinnati sheet of map of United States, published by Army Map Service, scale 1:500,000.)

Previous project. Work was dropped from duties of St. Louis District by authority of Chief of Engineers (see Annual Report for 1896, p. 1761).

Existing project. Improvement of Kaskaskia River, Ill., for navigation will provide a channel 9 feet deep and 200 feet wide from mouth to Fayetteville, Ill. Improvement would consist of enlarging present channel where required, making overbank cutoffs to eliminate sharp bends, and construction of a dam at approximately mile 0.7 with a single lock 84 feet wide and 600 feet long, at an estimated construction cost (July 1963 prices) of $63,800,000. Project was authorized by River and Harbor Act of October 23, 1962.

4. MISSISSIPPI RIVER BETWEEN OHIO AND MISSOURI RIVERS

Location. Mississippi River rises in Lake Itasca, Minn., and from that lake flows in a southerly direction about 2,350 miles and empties into the Gulf of Mexico. Portion included in this report embraces the 195-mile section known as middle Mississippi, between tributary Ohio and Missouri Rivers about 984 to 1,179 miles from the gulf. See folder by U.S. Army Corps of Engineers of Navigation Charts Middle and Upper Mississippi River, Cario, Ill., to Minneapolis, Minn.

Previous projects. For details see page 1879 of Annual Report for 1915, and page 1014 of Annual Report for 1938.

Existing project. Provides for obtaining and maintaining a minimum channel depth of not less than 9 feet, a minimum width of not less than 300 feet at low water, with additional widths in bends from mouth of Ohio River (about 984 miles from gulf) to northern boundary of city of St. Louis, 191 miles; thence 200 feet wide, with additional width in bends to mouth of Missouri River, 4 miles; to be obtained: First, by regulating works, for closing sloughs and secondary channels, narrowing river by building new banks where natural width is excessive and protecting new and old banks from erosion where necessary to secure permanency at an estimated construction cost (July 1964) of $64,900,000; second, by dredging or other temporary expedients to maintain channels of project dimensions; third, by construction of works authorized for Chain of Rocks reach in River and Harbor Act of March 2, 1945, which approved a comprehensive plan for development of the Mississippi River at Chain of Rocks so as to provide for construction of a lateral

Existing project was authorized by the following:

Acts	Work authorized	Documents and reports
	Project for regulating work adopted in 1881. (To obtain a minimum depth of 8 feet).	Annual Report, 1881, p. 1536.
June 3, 1896 June 13, 1902 Mar. 2, 1907	Dredging introduced as part of the project.....	
Mar. 3, 1905[1] Mar. 2, 1907[1]	These acts practically abrogated that part of project for middle Mississippi which proposed regulating works.	
June 25, 1910	Regulating works restored to project and appropriations begun with a view to completion of improvement between Ohio and Missouri Rivers within 12 years at an estimated cost of $21 million, exclusive of amounts previously expended.	H. Doc. 50, 61st Cong., 1st sess., and H. Doc. 168, 58th Cong., 2d sess. (contains latest published map).
Jan. 21, 1927	For a depth of 9 feet and width of 300 feet from Ohio River to northern boundary of city of St. Louis, with estimated cost of maintenance increased to $900,000 annually.	Rivers and Harbors Committee Doc. 9, 69th Cong., 2d sess.
July 3, 1930	Project between northern boundary of city of St. Louis and Grafton (mouth of Illinois River) modified to provide a channel 9 feet deep and generally 200 feet wide with additional width around bends, at an estimated cost of $1,500,000, with $125,000 annually for maintenance.	Rivers and Harbors Committee, Doc. 12, 70th Cong., 1st sess.
Mar. 2, 1945	Modified to provide for construction of a lateral canal with lock at Chain of Rocks, at an estimated first cost to United States of about $10,290,000, with $70,000 annually for maintenance and operation.[2]	H. Doc. 231, 76th Cong., 1st sess.
Sept. 3, 1954	Modified to provide for construction of a small-boat harbor opposite Chester, Ill., at an estimated first cost to United States of $57,700, and to local interest of $58,700.	H. Doc. 230, 83d Cong., 1st sess.
July 3, 1958	Modified to provide for construction of a fixed-crest rock-fill dam 900 feet below Chain of Rocks Bridge at a first cost to United States of $5,810,000, including $8,000 navigation aids.	S. Doc. 7, 85th Cong., 1st sess.

[1] Also joint resolution, June 29, 1906.
[2] Deferred.

canal at an estimated construction cost (July 1964) of $43 million; and fourth, by construction of a fixed-crest rockfill dam approximately 900 feet below Chain of Rocks Bridge, authorized by River and Harbor Act of July 3, 1958, at an estimated construction cost (July 1964) of $4,353,000, excluding $7,000 costs to U.S. Coast Guard for aids to navigation.

Estimated cost of new work (1964) is $112,253,000. Cost of a small-boat harbor opposite Chester, Ill., is deferred, and excluded from foregoing cost estimate. Estimated cost of this portion, last revised in July 1960, was $166,000, including $55,000 non-Federal contribution, excluding $1,000 U.S. Coast Guard cost.

See House Document 669 (76th Cong., 3d sess.) for report of Chief of Engineers dated February 27, 1940, containing a general plan for improvement of Mississippi River between Coon Rapids Dam and mouth of Ohio River for purposes of navigation, power development, flood control, and needs of irrigation.

Terminal facilities. Considered adequate for existing commerce.

Operations and results during fiscal year. Construction works were carried on by contract and hired labor with Government plant, weather conditions and river stages being favorable for construction during the year, except for periods of low stages.

Regulating works were maintained and project dimensions of channels secured by dredging.

New work, regulating works: Contract work consisted of $660,000 for stone dike construction and $382,661 for bank revetment. In addition, $54,025 for engineering and design; $80,120 for supervision and administration; and $168 for lands and damages. Total costs for year were $1,176,974.

Dam 27—Work consisted of $675 for completion of main dam, $2,200 for installation of a gage; $3,387 for maintenance during construction; $3,310 for permanent operating equipment; $3,626 for engineering and design, $1,549 for supervision and administration; and $191 undistributive cost. Total costs for the year were $14,938.

Chain of Rocks—Contract work consisted of $330,000 for initiation of contract for raising the west wall of the auxiliary lock. Additional costs were $4,034 for hired labor work; $49,645 for engineering and design, and $17,808 for supervision and administration. Total costs for year were $401,487.

Maintenance: Work during the year consisted of $1,323,716 for repair of 69,284 linear feet of dikes, $610,645 for 46,056 linear feet of revetment; and $592,441 for 323,000 square yards of canal revetment. U.S. plant and hired labor performed channel dredging at 75 localities, removing 5,403,000 cubic yards of material from main channel at a cost of $989,793. Channels dredged had a combined length of 32 miles, an average width of 300 feet, and an average gain in depth of 4.4 feet. Other costs were $315,913 for condition and operation studies; $208,566 for operation and care of lock No. 27; $34,816 for maintenance and repairs of lock No. 27; $20,455 for gage repairs; $22,212 for engineering and design; $2,914 for inspection and reports; $401,-

782 for supervision and administration; and minus $3,040 for undistributed cost.

Condition at end of fiscal year. Construction on existing project was initiated in 1881, and project has been in beneficial use practically from its inception. Work on project is about 87 percent complete. Work required to complete project includes construction of 130,000 linear feet of dikes; 50,000 linear feet of revetment; removal of 250,000 cubic yards of rock; removal of 100,000 cubic yards by dredging; repair of canal revetment; completion of contract underway; and raising west wall of auxiliary lock.

Dikes and revetments were in poor condition along some reaches of river due to critical damage inflicted by heavy ice flows during 1950–51, 1957–58, 1962–63 and by floods in spring and summer of 1951. Channel as a whole has been greatly improved by the work completed to date. Dredging is required at low stages to remove temporary shoals and maintain required channel depths.

Project dimensions of channels generally maintained throughout navigation season. Navigation season formerly extended from middle of February to middle of December, the river being generally closed by ice remainder of year. However, in recent years increased demands of commerce and use of steel hull boats have combined to extend navigation season throughout the year except when blocked by heavy ice or gorges. River is generally above 10-foot stage, St. Louis gage, for 6 months of the year, latter part of February to latter part of August, during which time project channel depths generally prevail without dredging. Mean stage of river, St. Louis gage was 5.46 feet for fiscal year 1963 and 2.23 feet for fiscal year 1964.

Low stages during past 2 years increased dredging requirements to maintain project depths. Recent low-water periods made many docks in St. Louis Harbor inoperative due to inadequate depth of water and increased dredging requirements at lower entrance of the Chain of Rocks Canal, which is in upper portion of harbor.

Cost and financial statement

Fiscal year	1960	1961	1962	1963	1964	Total to June 30, 1964
New work:						
Appropriated	$2,186,000	$3,340,924	$2,998,495	$3,508,232	$1,439,000	[1]$97,558,000
Cost	1,416,939	3,935,576	3,439,376	3,461,248	1,593,399	[1]97,532,914
Maintenance:						
Appropriated	2,009,493	2,693,300	3,019,500	4,728,200	3,390,000	63,348,677
Cost	2,017,658	2,683,120	3,019,272	3,597,601	4,520,213	63,342,182
Rehabilitation:						
Appropriated		3,109				3,109
Cost		3,109				3,109

[1] Excludes previous project cost of $1,416,620.

5. MOCCASIN SPRINGS, MO.

Location. On right bank of Mississippi River 66.6 miles above Ohio River at eastern edge of Trail of Tears State Park in Cape Girardeau County, Mo. (See folder by U.S. Army Corps of Engineers of Navigation Charts, Middle and Upper Mississippi River Cairo, Ill., to Minneapolis, Minn.)

west of Urbana, in east-central part of the State. It flows generally southwesterly approximately 325 miles and empties into Mississippi River about 8 miles above Chester, Ill., or approximately 118 miles above mouth of Ohio River. (See Cincinnati sheet of map of United States, published by Army Map Service, scale 1:500,000.)

Previous project. For details see Annual Report for 1896, page 1761.

Existing project. Improvement for navigation will provide a channel 9 feet deep and 200 feet wide from mouth to Fayetteville, Ill. Improvement will consist of enlarging present channel where required, making overbank cutoffs to eliminate sharp bends, and construction of a dam at approximately mile 0.8 with a single lock 84 feet wide and 600 feet long, at an estimated construction cost of $66,615,000 (July 1965) including $1,015,000 local contribution. Project was authorized by 1962 River and Harbor Act.

Local cooperation. State of Illinois passed legislation authorizing Illinois Department of Public Works and Buildings to enter into assurances of local cooperation with the United States. State appropriated funds to initiate land acquisition.

Terminal facilities. Local interests are to provide private loading docks on the waterway and mooring dolphins on the Mississippi at mouth of Kaskaskia River adequate to meet needs of commerce. In addition, local interests will provide adequate public terminal facilities open to all on equal terms.

Operations and results during fiscal year. Preconstruction planning continued. Work on general design memorandum and economic reevaluation report was completed. Preparation of plans and specifications for first canal construction item was initiated. Costs were $331,031 for engineering and design and $27,236 for supervision and administration.

Condition at end of fiscal year. Preconstruction planning is 94 percent complete.

Cost and financial statement

Fiscal year	1961	1962	1963	1964	1965	Total to June 30, 1965[1]
New work:						
Appropriated			$100,000	$345,000	$400,000	$845,000
Cost			86,390	346,007	358,267	790,664

[1] Excludes $10,461 expended on previous project.

3. MISSISSIPPI RIVER BETWEEN MISSOURI RIVER AND MINNEAPOLIS, MINN. (ST. LOUIS DIST.)

See section of this annual report entitled "Mississippi River between Missouri River and Minneapolis, Minn."

4. MISSISSIPPI RIVER BETWEEN OHIO AND MISSOURI RIVERS

Location. Mississippi River rises in Lake Itasca, Minn., and from that lake flows southerly about 2,340 miles and empties into the Gulf of Mexico. Portion included in this report embraces the

195-mile section known as middle Mississippi, between tributary Ohio and Missouri Rivers about 974 to 1,169 miles from the gulf. See folder by Corps of Engineers of Navigation Charts Middle and Upper Mississippi River, Cario, Ill., to Minneapolis, Minn.

Previous projects. For details see page 1879 of Annual Report for 1915, and page 1014 of Annual Report for 1938.

Existing project. Provides for obtaining and maintaining a minimum channel depth of not less than 9 feet, a minimum width of not less than 300 feet at low water, with additional widths in bends from mouth of Ohio River (about 974 miles from gulf) to northern boundary of city of St. Louis, mile 191; thence 200 feet wide, with additional width in bends to mouth of Missouri River, mile 195; to be obtained: First, by regulating works, for closing secondary channels, contracting river by building new banks where river width is excessive and protecting new and old banks from erosion where necessary to secure permanency at an estimated construction cost (July 1965) of $65,400,000; second, by dredging to maintain project channels; third, by construction of works authorized for Chain of Rocks reach in 1945 River and Harbor Act, which approved a comprehensive plan for development of the river at Chain of Rocks to provide for construction of a lateral canal at an estimated construction cost (July 1965) of $43,100,000; and fourth, by construction of a fixed-crest rockfill dam approximately 900 feet below Chain of Rocks Bridge, authorized by 1958 River and Harbor Act, at an estimated construction cost (July 1965) of $4,353,000, excluding $7,000 costs to Coast Guard for aids to navigation. Estimated cost of new work (1965) is $112,853,000. Cost of a small-boat harbor opposite Chester, Ill., is

Existing project was authorized by the following:

Acts	Work authorized	Documents and reports
	Project for regulating work adopted in 1881. (To obtain a minimum depth of 8 feet.	Annual Report, 1881, p. 1536.
June 3, 1896 June 13, 1902 Mar. 2, 1907	Dredging introduced as part of the project.....	
Mar. 3, 1905[1] Mar. 2, 1907[1]	These acts practically abrogated that part of project for middle Mississippi which proposed regulating works.	—
June 25, 1910	Regulating works restored to project and appropriations begun with a view to completion of improvement between Ohio and Missouri Rivers within 12 years at an estimated cost of $21 million, exclusive of amounts previously expended.	H. Doc. 50, 61st Cong., 1st sess., and H. Doc. 168, 58th Cong., 2d sess. (contains latest published map).
Jan. 21, 1927	For 9 feet deep and 300 feet wide from Ohio River to northern boundary of city of St. Louis, with estimated cost of maintenance increased to $900,000 annually.	Rivers and Harbors Committee Doc. 9, 69th Cong., 2d sess.
July 3, 1930	Project between northern boundary of city of St. Louis and Grafton (mouth of Illinois River) modified to provide a channel 9 feet deep and generally 200 feet wide with additional width around bends, at an estimated cost of $1,500,000, with $125,000 annually for maintenance.	Rivers and Harbors Committee, Doc. 12, 70th Cong., 1st sess.
Mar. 2, 1945	Modified to provide construction of a lateral canal with lock at Chain of Rocks, at an estimated first cost to United States of about $10,200,000, with $70,000 annually for maintenance and operation.	H. Doc. 231, 76th Cong., 1st sess.
Sept. 3, 1954[2]	Modified to provide construction of a small-boat harbor opposite Chester, Ill., at an estimated first cost to United States of $57,700, and to local interest of $58,700.	H. Doc. 230, 83d Cong., 1st sess.
July 3, 1958	Modified to provide construction of a fixed-crest rockfill dam 900 feet below Chain of Rocks Bridge at a first cost to United States of $5,810,000, including $8,000 navigation aids.	S. Doc. 7, 85th Cong., 1st sess.

[1] Also joint resolution, June 29, 1906.
[2] Deferred.

deferred and excluded from foregoing cost estimate. Estimated cost (July 1960) of this portion is $166,600, including $55,000 non-Federal contribution, excluding $1,000 Coast Guard cost. See House Document 669 (76th Cong., 3d sess.) for report of Chief of Engineers dated February 27, 1940, containing a general plan for improvement of Mississippi River between Coon Rapids Dam and mouth of Ohio River for purposes of navigation, power development, flood control, and needs of irrigation.

Local cooperation. None required.

Terminal facilities. Considered adequate for existing commerce.

Operations and results during fiscal year. New work, regulating works: Contract work consisted of $1,306,030 for stone dike construction. Hired labor costs were $284,002 for rock removal at Grand Tower, Ill., $74,967 for engineering and design, and $122,741 for supervision and administration. In addition, costs of $3,326 for lands and damages and $789 undistributed costs were incurred.

Dam 27. Work consisted of $82 for maintenance during construction, $600 for engineering and design, minus $54 for supervision and administration, and minus $322 undistributed costs.

Chain of Rocks. Contract work consisted of $1,254,360 for raising west wall of auxiliary lock. Additional costs were $2,548 for hired labor work, $16,124 for engineering and design, $85,841 for supervision and administration, and $203 for undistributed costs.

Maintenance: Work consisted of $1,050,057 for 21,680 linear feet of dikes, $188,000 for repair of 16,500 linear feet of revetment, and $194,835 for repair of 28,900 feet of canal revetment. U.S. plant and hired labor performed channel dredging at 69 localities, removing 5,819,034 cubic yards of material from main channel at a cost of $1,013,825. Channels dredged had a combined length of 29 miles, an average width of 300 feet, and an average gain in depth of 3 feet. Other costs were $280,081 for condition and operation studies; $203,691 for operation and care of lock No. 27, dam No. 27, and Chain of Rocks canal; $44,561 for maintenance and repair of lock No. 27; $9,046 for recreational planning; $3,192 for inspection and reports; $30,888 for engineering and design; $340,875 for supervision and administration; and minus $13,828 undistributed cost.

Condition at end of fiscal year. Construction on existing project was initiated in 1881, and project has been in beneficial use practically from its inception. Work on the project is about 89 percent complete. Work required to complete project includes construction of 125,000 linear feet of dikes; 50,000 linear feet of revetment; removal of 100,000 cubic yards of rock; removal of 100,000 cubic yards by dredging; upper and lower guide walls at lock No. 27; alterations to sills; purchase of culvert bulkheads; and completion of raising west wall of auxiliary lock. Dikes and revetments were in poor condition along some reaches of river due to critical damage inflicted by heavy ice flows during 1950–51, 1957–58, 1962–63 and by floods in spring and summer of 1951. Channel as a whole has been greatly improved by the work com-

pleted to date. Dredging is required at low stages to remove temporary shoals and maintain required channel depths. Navigation season formerly extended from mid-February to mid-December, the river generally closed by ice remainder of year. However, in recent years increased demands of commerce and use of steel hull boats have combined to extend navigation season throughout the year except when blocked by heavy ice or gorges. River is generally above 10-foot stage, St. Louis gage, from latter part of February to latter part of August, during which time project channel depths generally prevail without dredging. Mean stage of river, St. Louis gage was 2.23 feet for fiscal year 1964 and 7.82 feet for fiscal year 1965. Low stages during past several years increased dredging requirements to maintain project depths. Recent low-water periods made many docks in St. Louis Harbor inoperative due to inadequate depth of water and increased dredging requirements at lower entrance of the Chain of Rocks Canal, which is in upper portion of harbor.

Cost and financial statement

Fiscal year	1961	1962	1963	1964	1965	Total to June 30, 1965
New work:						
Appropriated	$3,340,924	$2,998,495	$3,508,232	$1,439,000	$3,775,700	[1]$101,333,700
Cost	3,935,576	3,439,376	3,461,248	1,593,399	3,151,237	[1]100,684,151
Maintenance:						
Appropriated	2,693,300	3,019,500	4,728,200	3,390,000	3,364,000	66,712,677
Cost	2,688,120	3,019,272	3,597,601	4,520,213	3,345,223	66,687,405
Rehabilitation:						
Appropriated	3,109	.....	.....	.....	.....	3,109
Cost	3,109	.....	.....	.....	.....	3,109

[1] Excludes previous project costs of $1,416,620.

5. OTHER AUTHORIZED NAVIGATION PROJECTS

Name of project	For last full report see Annual Report for—	Cost to June 30, 1965	
		Construction	Operation and maintenance
Cuivre River, Mo.[1]	1883	$12,000	.....

[1] Inactive. River declared nonnavigable by act of March 23, 1900.

6. AUTHORIZED BRIDGE ALTERATIONS

Name of project	For last full report see Annual Report for—	Cost to June 30, 1965	
		Construction	Operation and maintenance
Wabash Railroad bridges, Illinois River, Meredosia and Valley City, Ill.[1]	1961	$2,653,194	.....

[1] Completed.

7. CAPE GIRARDEAU, MO.

Location. In Cape Girardeau County, Mo., on right bank of Mississippi River between river miles 51.6 and 52.8, above Ohio River. Area to be protected includes low lying lands along river-

2. KASKASKIA RIVER, ILL.

Location. Rises in Champaign County, Ill., about 5 miles northwest of Urbana, in east-central part of the State. It flows generally southwesterly about 325 miles and empties into Mississippi River about 8 miles above Chester, Ill., or about 118 miles above mouth of Ohio River. (See Cincinnati sheet of map of United States, published by Army Map Service, scale 1:500,000.)

Previous project. For details see Annual Report for 1896, page 1761.

Existing project. Improvement for navigation will provide a channel 9 feet deep and 225 feet wide from mouth to Fayetteville, Ill. Improvement will consist of enlarging present channel where required, making overbank cutoffs to eliminate sharp bends, and construction of a dam at about mile 0.8 with a single lock 84 feet wide and 600 feet long, at an estimated construction cost of $69,068,000 (July 1966) including $1,068,000 local contribution. Project was authorized by 1962 River and Harbor Act.

Local cooperation. State of Illinois passed legislation authorizing Illinois Department of Public Works and Buildings to enter into assurances of local cooperation with the United States. These assurances have been furnished and were accepted November 23, 1965. The State has appropriated funds and initiated land acquisition.

Operations and results during fiscal year. Plans and specifications for first canal construction item were completed. Highway relocation memorandum and availability of materials memorandum were completed. Work was initiated on lock and dam memorandum, railroad relocation memorandum, and on plans and specifications for second and third canal construction items. Costs were $1,163 for permanent operating equipment, $478,688 for engineering and design, and $20,969 for supervision and administration.

Condition at end of fiscal year. Contract was awarded for first canal construction item.

Cost and financial statement

Fiscal year	1962	1963	1964	1965	1966	Total to June 30, 1966[1]
New work:						
Appropriated		$100,000	$345,000	$400,000	$1,000,000	$1,845,000
Cost		86,390	346,007	358,267	500,820	1,291,484

[1] Excludes $10,461 expended on previous project.

3. MISSISSIPPI RIVER BETWEEN MISSOURI RIVER AND MINNEAPOLIS, MINN. (ST. LOUIS DIST.)

See section of this annual report entitled "Mississippi River between Missouri River and Minneapolis, Minn."

4. MISSISSIPPI RIVER BETWEEN OHIO AND MISSOURI RIVERS

Location. Mississippi River rises in Lake Itasca, Minn., and from that lake flows southerly about 2,340 miles and empties into

the Gulf of Mexico. Portion included in this report embraces the 195-mile section known as middle Mississippi, between tributary Ohio and Missouri Rivers about 974 to 1,169 miles from the gulf. See folder by Corps of Engineers of Navigation Charts Middle and Upper Mississippi River, Cairo, Ill., to Minneapolis, Minn.

Previous projects. For details see page 1879 of Annual Report for 1915, and page 1014 of Annual Report for 1938.

Existing project. Provides for obtaining and maintaining a minimum channel depth of not less than 9 feet, a minimum width of not less than 300 feet at low water, with additional widths in bends from mouth of Ohio River (about 974 miles from gulf) to northern boundary of city of St. Louis, mile 191; thence 200 feet wide, with additional width in bends to mouth of Missouri River, mile 195; to be obtained: First, by regulating works, for closing secondary channels, contracting river by building new banks where river width is excessive and protecting new and old banks from erosion where necessary to secure permanency at an estimated construction cost (July 1966) of $65,800,000; second, by dredging to maintain project channels; third, by construction of works authorized for Chain of Rocks reach in 1945 River and Harbor Act, which approved a comprehensive plan for development of the river at Chain of Rocks to provide for construction of a lateral canal at an estimated construction cost (July 1966) of $49,000,000; and fourth, by construction of a fixed-crest rockfill dam about 900 feet below Chain of Rocks Bridge, authorized by 1958 River and Harbor Act, at an estimated construction cost (July 1966) of $4,353,000, excluding $7,000 costs to Coast Guard for aids to navigation. Estimated cost of new work (1966) is

Existing project was authorized by the following:

Acts	Work authorized	Documents and reports
June 3, 1896 June 13, 1902 Mar. 2, 1907	Project for regulating work adopted in 1881. (To obtain a minimum depth of 8 feet.) Dredging introduced as part of the project.....	Annual Report, 1881, p. 1536.
Mar. 3, 1905[1] Mar. 2, 1907[1]	These acts practically abrogated that part of project for middle Mississippi which proposed regulating works.	
June 25, 1910	Regulating works restored to project and appropriations begun with a view to completion of improvement between Ohio and Missouri Rivers within 12 years at an estimated cost of $21 million, exclusive of amounts previously expended.	H. Doc. 50, 61st Cong., 1st sess., and H. Doc. 168, 58th Cong., 2d sess. (contains latest published map).
Jan. 21, 1927	For 9 feet deep and 300 feet wide from Ohio River to northern boundary of city of St. Louis, with estimated cost of maintenance increased to $900,000 annually.	Rivers and Harbors Committee Doc. 9, 69th Cong., 2d sess.
July 3, 1930	Project between northern boundary of city of St. Louis and Grafton (mouth of Illinois River) modified to provide a channel 9 feet deep and generally 200 feet wide with additional width around bends, at an estimated cost of $1,500,000, with $125,000 annually for maintenance.	Rivers and Harbors Committee Doc. 12, 70th Cong., 1st sess.
Mar. 2, 1945	Modified to provide construction of a lateral canal with lock at Chain of Rocks, at an estimated first cost to United States of about $10,290,000, with $70,000 annually for maintenance and operation.	H. Doc. 231, 76th Cong., 1st sess.
Sept. 3, 1954[2]	Modified to provide construction of a small-boat harbor opposite Chester, Ill., at an estimated first cost to United States of $57,700, and to local interest of $58,700.	H. Doc. 230, 83d Cong., 1st sess.
July 3, 1958	Modified to provide construction of a fixed-crest rockfill dam 900 feet below Chain of Rocks Bridge at a first cost to United States of $5,810,000, including $8,000 navigation aids.	S. Doc. 7, 85th Cong., 1st sess.

[1] Also joint resolution, June 29, 1906.
[2] Deferred.

$119,153,000. A small-boat harbor opposite Chester, Ill., is deferred and excluded from foregoing cost estimate. Estimated cost (July 1960) of this portion is $166,600, including $55,000 non-Federal contribution, excluding $1,000 Coast Guard cost. See House Document 669 (76th Cong., 3d sess.) for report of Chief of Engineers dated February 27, 1940, containing a general plan for improvement of Mississippi River between Coon Rapids Dam and mouth of Ohio River for purposes of navigation, power development, flood control, and needs of irrigation.

Local cooperation. None required.

Terminal facilities. Considered adequate for existing commerce.

Operations and results during fiscal year. Regulating works: Contract work consisted of $2,224,525 for stone dike construction, and $465,000 for revetment. Hired labor costs were $120,209 for engineering and design, $127,321 for supervision and administration, and $121 undistributed cost. Chain of Rocks: Contract work consisted of $77,356 for raising west wall of auxiliary lock. Hired labor costs were $41,896 for engineering and design, $17,692 for supervision and administration, and $7,039 for maintenance during construction. Dam 27: No cost incurred. Maintenance: Work consisted of $1,776,494 for 24,600 linear feet of dike repairs and 12,500 linear feet of revetment repairs, and $92,168 for repair of 5,600 feet of canal revetment. U.S. plant and hired labor performed channel dredging at 52 localities, removing 9,160,940 cubic yards of material from main channel at a cost of $1,385,847. Channels dredged had a combined length of 52.0 miles, an average width of 300 feet, and an average gain in depth of 3.0 feet. Other costs were $312,818 for condition and operation studies; $210,056 for operation and care of lock No. 27, dam No. 27, and Chain of Rocks canal; $9,951 for maintenance and repair of lock No. 27; $5,399 for recreational planning; $22 for replacement of tools and equipment; $2,445 for restoration of buildings, grounds, and utilities; $3,133 for inspection and reports; $45,927 for engineering and design; $369,702 for supervision and administration; and minus $7,034 for collections for damages to Government structures.

Condition at end of fiscal year. Construction on existing project began in 1881 and project has been in beneficial use practically from its inception. Work on the project is about 87 percent complete. Work required to complete the project includes construction of 98,000 linear feet of dikes; 40,000 linear feet of revetment; removal of 100,000 cubic yards of rock; removal of 100,000 cubic yards by dredging; upper and lower guidewalls at lock No. 27; and alterations to sills. Dikes and revetments were in poor condition along some reaches of river due to critical damage inflicted by heavy ice flows during 1950–51, 1957–58, 1962–63 and by floods in spring and summer of 1951. Channel as a whole has been greatly improved by the work completed to date. Dredging is required at low stages to remove temporary shoals and maintain required channel depths. Navigation season formerly extended from mid-February to mid-December, the river generally closed by ice remainder of year. However, in recent

years increased demands of commerce and use of steel hull boats have combined to extend navigation season throughout the year except when blocked by heavy ice or gorges. River is generally above 10-foot stage, St. Louis gage, from latter part of February to latter part of August, during which time project channel depths generally prevail without dredging. Mean stage of river, St. Louis gage, was 7.82 feet for fiscal year 1965 and 11.61 feet for fiscal year 1966. A study is underway to determine whether project criteria need to be revised in order to assure a dependable 9-foot project depth.

Cost and financial statement

Fiscal year	1962	1963	1964	1965	1966	Total to June 30, 1966
New work:						
Appropriated	$2,998,495	$3,508,232	$1,439,000	$3,775,700	$3,006,000	[1]$104,339,700
Cost	3,439,376	3,461,248	1,593,399	3,151,237	3,081,159	[1]103,765,310
Maintenance:						
Appropriated	3,019,500	4,728,200	3,390,000	3,364,000	4,220,000	70,932,677
Cost	3,019,272	3,597,601	4,520,213	3,345,223	4,206,928	70,894,333
Rehabilitation:						
Appropriated	.....	.....	.....	.....	.....	3,109
Cost	.....	.....	.....	.....	.....	3,109

[1] Excludes previous project costs of $1,416,620.

5. OTHER AUTHORIZED NAVIGATION PROJECT

Name of project	For last full report see Annual Report for—	Cost to June 30, 1966	
		Construction	Operation and maintenance
Cuivre River, Mo.[1]	1883	$12,000	.....

[1] Inactive. River declared nonnavigable by act of March 23, 1900.

6. AUTHORIZED BRIDGE ALTERATIONS

Name of project	For last full report see Annual Report for—	Cost to June 30, 1966	
		Construction	Operation and maintenance
Wabash Railroad bridges, Illinois River, Meredosia and Valley City, Ill.[1]	1961	$2,653,194	.....

[1] Completed.

7. COLUMBIA DRAINAGE AND LEVEE DISTRICT NO. 3, ILLINOIS

Location. In Monroe County, Ill., on left bank of Mississippi River between river miles 156 and 166 above mouth of Ohio River. (See St. Louis, Mo., map published by Army Map Service, scale 1:250,000.)

Previous project. For details, see page 653 of Annual Report for 1959.

Existing project. Project area contains about 13,600 acres protected from major floods of the Mississippi River, Columbia Creek, and Fountain Creek by levees. However, when Mississippi

1. ILLINOIS WATERWAY, ILL. (ST. LOUIS DIST.)

See report on Illinois Waterway, Ill. and Ind., under Chicago District.

2. KASKASKIA RIVER, ILL.

Location. Rises in Champaign County, Ill., about 5 miles northwest of Urbana, in east-central part of the State. It flows generally southwesterly about 325 miles and empties into Mississippi River about 8 miles above Chester, Ill., or about 118 miles above mouth of Ohio River. (See Cincinnati sheet of map of United States, published by Army Map Service, scale 1:500,000.)

Previous project. For details see Annual Report for 1896, page 1761.

Existing project. Improvement for navigation will provide a channel 9 feet deep and 225 feet wide from mouth to Fayetteville, Ill. Improvement will consist of enlarging present channel where required, making overbank cutoffs to eliminate sharp bends, and construction of a dam at about mile 0.8 with a single lock 84 feet wide and 600 feet long, at an estimated construction cost of $75,081,000 (July 1967) including $1,281,000 local contribution. Project was authorized by 1962 River and Harbor Act.

Local cooperation. State of Illinois passed legislation authorizing Illinois Department of Public Works and Buildings to enter into assurances of local cooperation with the United States. These assurances have been furnished and were accepted 23 November 1965. The State is continuing with land acquisition.

Operations and results during fiscal year. Costs incurred by contract were $550,042 for channels and canals, $927 for permanent operating equipment, $966,990 for engineering and design, $100,381 for supervision and administration and $8,163 for construction facilities.

Condition at end of fiscal year. Construction was initiated on the first canal construction item and a contract was awarded for the second canal construction item. Contract for construction of lock and dam was advertised. Planning was continued on additional canal construction items, highway relocations, and railroad relocations. Project is about 6 percent complete.

Cost and financial statement

Fiscal year	1963	1964	1965	1966	1967	Total to June 30, 1967 [1]
New work:						
Appropriated	$100,000	$345,000	$400,000	$1,000,000	$2,267,000	$4,122,000
Cost	86,390	346,007	358,267	500,820	1,626,503	2,917,987

[1] Excludes $10,461 expended on previous project.

3. MISSISSIPPI RIVER BETWEEN MISSOURI RIVER AND MISSISSIPPI, MINN. (ST. LOUIS DIST.)

See section of this annual report entitled "Mississippi River between Missouri River and Minneapolis, Minn."

4. MISSISSIPPI RIVER BETWEEN OHIO AND MISSOURI RIVERS

Location. Mississippi River rises in Lake Itasca, Minn., and from that lake flows southerly about 2,340 miles and empties into the Gulf of Mexico. Portion included in this report embraces the

195-mile section known as middle Mississippi, between tributary Ohio and Missouri Rivers about 974 to 1,169 miles from the gulf. See folder by Corps of Engineers of Navigation Charts Middle and Upper Mississippi River, Cairo, Ill., to Minneapolis, Minn.

Previous projects. For details see page 1879 of Annual Report for 1915, and page 1014 of Annual Report for 1938.

Existing project. Provides for obtaining and maintaining a minimum channel depth of not less than 9 feet, a minimum width of not less than 300 feet at low water, with additional widths in bends from mouth of Ohio River (about 974 miles from gulf) to northern boundary of city of St. Louis, mile 191; thence 200 feet wide, with additional width in bends to mouth of Missouri River, mile 195; to be obtained: (1) by regulating works, for closing secondary channels, contracting river by building new banks where river width is excessive and protecting new and old banks from erosion where necessary to secure permanency at an estimated construction cost (July 1967) of $71,500,000; (2) by dredging to maintain project channels; (3) by construction of works authorized for Chain of Rocks reach in 1945 River and Harbor Act, which approved a comprehensive plan for development of the river at Chain of Rocks to provide for construction of a lateral canal at an estimated construction cost (July 1967) of $49,500,000; and (4) by construction of a fixed-crest rockfill dam about 900 feet below Chain of Rocks Bridge, authorized by 1958 River and Harbor Act, at an estimated construction cost (July 1967) of $4,353,000, excluding $7,000 costs to Coast Guard for aids to navigation. Estimated cost of new work (1967) is $125,353,000.

Existing project was authorized by the following:

Acts	Work authorized	Documents and reports
	Project for regulating work adopted in 1881. (To obtain a minimum depth of 8 feet.)	Annual Report, 1881, p. 1536.
June 3, 1896 June 13, 1902 Mar. 2, 1907	Dredging introduced as part of the project	
Mar. 3, 1905 [1] Mar. 2, 1907 [1]	These acts practically abrogated that part of project for middle Mississippi which proposed regulating works.	
June 25, 1910	Regulating works restored to project and appropriations begun with a view to completion of improvement between Ohio and Missouri Rivers within 12 years at an estimated cost of $21 million, exclusive of amounts previously expended.	H. Doc. 50, 61st Cong., 1st sess., and H. Doc. 168, 58th Cong., 2d sess. (contains latest published map).
Jan. 21, 1927	For 9 feet deep and 300 feet wide from Ohio River to northern boundary of city of St. Louis, with estimated cost of maintenance increased to $900,000 annually.	Rivers and Harbors Committee Doc. 9, 69th Cong., 2d sess.
July 3, 1930	Project between northern boundary of city of St. Louis and Grafton (mouth of Illinois River) modified to provide a channel 9 feet deep and generally 200 feet wide with additional width around bends, at an estimated cost of $1,500,000, with $125,000 annually for maintenance.	Rivers and Harbors Committee Doc. 12, 70th Cong., 1st sess.
Mar. 2, 1945	Modified to provide construction of a lateral canal with lock at Chain of Rocks, at an estimated first cost to United States of about $10,290,000, with $70,000 annually for maintenance and operation.	H. Doc. 231, 76th Cong., 1st sess.
Sept. 3, 1954 [2]	Modified to provide construction of a small-boat harbor opposite Chester, Ill., at an estimated first cost to United States of $57,700, and to local interest of $58,700.	H. Doc. 230, 83d Cong., 1st sess.
July 3, 1958	Modified to provide construction of a fixed-crest rockfill dam 900 feet below Chain of Rocks Bridge at a first cost to United States of $5,810,000, including navigation aids.	S. Doc. 7, 85th Cong., 1st sess.

[1] Also joint resolution, June 29, 1906.
[2] Deferred.

A small-boat harbor opposite Chester, Ill., is deferred and excluded from foregoing cost estimate. Estimated cost (July 1960) of this portion is $166,000, including $55,000 non-Federal contribution, excluding $1,000 Coast Guard cost. See House Document 669 (76th Cong., 3d sess.) for report of Chief of Engineers dated February 27, 1940, containing a general plan for improvement of Mississippi River between Coon Rapids Dam and mouth of Ohio River for purposes of navigation, power development, flood control, and needs of irrigation.

Local cooperation. None required.

Terminal facilities. Considered adequate for existing commerce.

Operations and results during fiscal year. Regulating works: Contract work consisted of $1,035,920 for stone dike construction, and $451,290 for revetment. Hired labor costs were $91,466 for engineering and design, and $71,612 for supervision and administration.

Chain of Rocks: Contract work consisted of $37,842 for culvert bulkheads, $10,378 for raising west wall of auxiliary lock, $24,910 for tie down of lower sill of main lock. Hired labor costs were $58,769 for engineering and design, $11,766 for supervision and administration, $5,959 for maintenance during construction, and $122 for surveys and layouts.

Dam 27: $51 for design of warning sign.

Maintenance: Work consisted of $1,855,584 for 32,540 feet of dike repair and 28,734 feet of revetment repairs. U.S. plant and hired labor performed channel dredging at 69 localities, removing 5,811,569 cubic yards of material from main channel at a cost of $1,139,766. Channels dredged had a combined length of 27.6 miles, an average width of 300 feet and an average gain in depth of 3.5 feet. Other costs were $319,598 for condition and operation studies; $224,919 for operation and care of Lock No. 27; Dam No. 27, and Chain of Rocks Canal; $589 for recreational planning; $148,323 for maintenance of Lock No. 27; $31,701 for engineering and design; $357,661 for supervision and administration; and minus $530 for collections for damages to Government structures.

Condition at end of fiscal year. Construction on existing project began in 1881 and project has been in beneficial use practically from its inception. Work on the project is about 84 percent complete. Work required to complete the project includes construction of 80,000 linear feet of dikes; 35,000 linear feet of revetment; removal of 100,000 cubic yards of rock; removal of 100,000 cubic yards by dredging; upper and lower guidewalls at Lock No. 27; and alterations to sills. Channel as a whole has been greatly improved by the work completed to date. Dredging is required at low stages to remove temporary shoals and maintain required channel depths. Navigation season formerly extended from mid-February to mid-December, the river generally closed by ice remainder of year. However, in recent years increased demands of commerce and use of steel hull boats have combined to extend navigation season throughout the year except when blocked by heavy ice or gorges. River is generally above 10-foot stage, St. Louis gage, from latter part of February to latter part of August, during which time project channel depths generally prevail with-

out dredging. Mean stage of river, St. Louis gage, was 11.61 feet for fiscal year 1966 and 6.39 feet for fiscal year 1967. A study is underway to determine whether project criteria need to be revised in order to assure a dependable 9-foot project depth.

Cost and financial statement

Fiscal year	1963	1964	1965	1966	1967	Total to June 30, 1967
New work:						
Appropriated	$3,508,232	$1,439,000	$3,775,700	$3,006,000	$1,456,000	$105,795,700 [1]
Cost	3,461,248	1,593,399	3,151,237	3,081,159	1,800,085	105,565,394 [1]
Maintenance:						
Appropriated	4,728,200	3,390,000	3,364,000	4,220,000	4,252,600	75,185,277
Cost	3,597,601	4,520,213	3,345,223	4,206,928	4,077,611	74,971,944
Rehabilitation:						
Appropriated						3,109
Cost						3,109

[1] Excludes previous project cost of $1,416,620.

5. OTHER AUTHORIZED NAVIGATION PROJECTS

Name of project	For last full report see Annual Report for—	Cost to June 30, 1967	
		Construction	Operation and maintenance
Cuivre River, Mo.[1]	1883	$12,000	
Moccasin Springs, Mo.[2]	1964	19,829	

[1] Inactive. River declared nonnavigable by act of March 23, 1900.
[2] Authorized by OCE under authority of Sec. 107, 1960 River and Harbor Act, as amended.

6. AUTHORIZED BRIDGE ALTERATIONS

Name of project	For last full report see Annual Report for—	Cost to June 30, 1967	
		Construction	Operation and maintenance
Wabash Railroad bridges, Illinois River, Meredosia and Valley City, Ill.[1]	1961	$2,653,194	

[1] Completed.

7. COLUMBIA DRAINAGE AND LEVEE DISTRICT NO. 3, ILLINOIS

Location. In Monroe County, Ill., on left bank of Mississippi River between river miles 156 and 166 above mouth of Ohio River. (See St. Louis, Mo., map published by Army Map Service, scale 1:250,000.)

Previous project. For details, see page 653 of Annual Report for 1959.

Existing project. Project area contains about 13,600 acres protected from major floods of the Mississippi River, Columbia Creek, and Fountain Creek by levees. However, when Mississippi River stage exceeds 20 feet on the St. Louis, Mo., gage, substantial damage results from impoundment of precipitation which falls on the area, runoff from adjacent hill land, and Mississippi River seepage. The 1962 Flood Control Act (H. Doc. 543, 87th Cong., 2d sess.) provides for construction of two pumping stations to reduce interior flooding. Estimated cost (July 1967) is $1,320,000.

Local cooperation. Local interests must provide lands, easements, and right-of-way for construction; hold the United States free from damages; maintain and operate project after completion; prevent encroachment on improved channels and ponding areas and, if ponding area and capacities are impaired, provide substitute storage capacity or equivalent pumping capacity

miles and empties into Mississippi River about 8 miles above Chester, Ill., or about 118 miles above mouth of Ohio River. (See Cincinnati sheet of map of United States published by Army Map Service, scale 1:500,000.)

Previous project. For details see Annual Report for 1896, page 1761.

Existing project. Improvement for navigation will provide a channel 9 feet deep and 225 feet wide from mouth to Fayetteville, Ill. Improvement will consist of enlarging present channel where required, making overbank cutoffs to eliminate sharp bends, and construction of a dam at about mile 0.8 with a single lock 84 feet wide and 600 feet long, at an estimated construction cost of $83,560,000 (July 1968) including $2,000,000 local contribution. Project was authorized by 1962 River and Harbor Act.

Local cooperation. State of Illinois passed legislation authorizing Illinois Department of Public Works and Buildings to enter into assurances of local cooperation with the United States. These assurances have been furnished and were accepted 23 November 1965. The State is continuing with land acquisition.

Operations and results during fiscal year. Costs incurred by contract were $75,000 for roads, $674,385 for dams, $1,216,002 for locks, $870,987 for channels and canals, $13,500 for access road. Other costs incurred were $526 for maintenance during construction, $15,154 for permanent operating equipment, $498,435 for engineering and design, $261,301 for supervision and administration, and $22,395 undistributed cost.

Condition at end of fiscal year. Construction was continued on the first canal construction item and was initiated on the second canal construction item. Contract for construction of lock and dam was awarded and construction initiated. Planning was continued on additional canal construction items, highway relocations, and railroad relocations. Project is about 8 percent complete.

3. "MISSISSIPPI RIVER BETWEEN MISSOURI RIVER AND MINNEAPOLIS, MINN." (ST. LOUIS DIST.)

See section of this annual report entitled -Mississippi River between Missouri River and Minneapolis, Minn.-

4. MISSISSIPPI RIVER BETWEEN OHIO AND MISSOURI RIVERS

Location. Mississippi River rises in Lake Itasca, Minn., and from that lake flows southerly about 2,340 miles and empties into the Gulf of Mexico. Portion included in this report embraces the 195-mile section known as middle Mississippi, between tributary Ohio and Missouri Rivers about 974 to 1,169 miles from the gulf. See folder by Corps of Engineers of Navigation Charts Middle and Upper Mississippi River, Cairo, Ill., to Minneapolis, Minn.

Previous projects. For details see page 1879 of Annual Report for 1915, and page 1014 of Annual Report for 1938.

Existing project. Provides for obtaining and maintaining a minimum channel depth of not less than 9 feet, a minimum width of not less than 300 feet at low water, with additional widths in bends from mouth of Ohio River (about 974 miles from gulf) to northern boundary of city of St. Louis, mile 191; thence 200 feet wide, with additional width in bends to mouth of Missouri River, mile 195; to be obtained: First, by regulating works, for closing secondary channels, contracting river by building new banks where river width is excessive and protecting new and old banks from erosion where necessary to secure permanency at an estimated construction cost (July 1968) of $72,200,000; second, by dredging to maintain project channels; third, by construction of works authorized for Chain of Rocks reach in 1945 River and Harbor Act, which approved a comprehensive plan for development of the river at Chain of Rocks to provide for construction of a lateral canal at an estimated construction cost (July 1968) of $52,300,000 and fourth, by construction of a fixed-crest rockfill dam about 900 feet below Chain of Rocks Bridge, authorized by 1958 River and Harbor Act, at an estimated construction cost (July 1968) of $4,353,000, excluding $7,000 costs to Coast Guard for aids to navigation. Estimated cost of new work (1968) is $128,853,000. A small-boat harbor opposite Chester, Ill., is inactive and excluded from foregoing cost estimate. Estimated cost (July 1960) of this portion is $166,600 including $55,000 non-Federal contribution, excluding $1,000 Coast Guard cost. See House Document 669 (76th Cong., 3d sess.) for report of Chief of Engineers dated February 27, 1940, containing a general plan for improvement of Mississippi River between Coon Rapids Dam and mouth of Ohio River for purposes of navigation, power development, flood control, and needs of irrigation.

Local cooperation. None required.

Terminal facilities. Considered adequate for existing commerce.

Operations and results during fiscal year. Regulating works: Contract work consisted of $911,501 for

stone dike construction. Hired labor costs were $7 for lands and damages, $66,380 for engineering and design, and $64,122 for supervision and administration.

Chain of Rocks: Contract work consisted of $156,335 for raising west wall of auxiliary lock. Hired labor costs were $66,614 for engineering and design, $6,985 for supervision and administration, and minus $325 for surveys and layouts.

Dam 27: Costs were $430 for stone and $50 supervision and administration.

Maintenance. Work consisted of $946,509 for 12,245 feet of dike repair and 29,311 feet of revetment repairs. U. S. plant and hired labor performed channel dredging at 46 locations, removing 5,495,987 cubic yards of material from main channel at a cost of $1,220,923. Channels dredged had a combined length of 24.8 miles, an average width of 218 feet and an average gain in depth of 5.2 feet.

Other costs were $344,629 for condition and operation studies; $247,419 for operation and care of Lock No. 27; Dam No. 27; and Chain of Rocks canal; $2,665 for recreational planning; $2,400 for maintenance of Lock No. 27; $11,973 for engineering and design; $399,119 for supervision and administration; and minus $30,267 undistributed cost.

Condition at end of fiscal year. Construction on existing project began in 1881 and project has been in beneficial use practically from its inception. Work on the project is about 83 percent complete. Work required to complete the project includes construction of 64,000 linear feet of dikes; 35,000 linear feet of revetment; removal of 100,000 cubic yards of rock; removal of 100,000 cubic yards by dredging; upper and lower guidewalls at Lock No. 27; and alterations to sills. Channel as a whole has been greatly improved by the work completed to date. Dredging is required at low stages to remove temporary shoals and maintain required channel depths. Navigation season formerly extended from mid-February to mid-December, the river generally closed by ice remainder of year. However, in recent years increased demands of commerce and use of steel hull boats have combined to extend navigation season throughout the year except when blocked by heavy ice or gorges. River is generally above 10-foot stage, St. Louis gage, from latter part of February to latter part of August, during which time project channel depths generally prevail without dredging. Mean stage of river, St. Louis gage, was 6.39 feet for fiscal year 1967 and 7.61 feet for fiscal year 1968. A study is underway to determine whether project criteria need to be revised in order to assure a dependable 9-foot project depth.

5. MOCCASIN SPRINGS, MO.

Location. On right bank of Mississippi River 66.6 miles above Ohio River at eastern edge of Trail of Tears State Park in Cape Girardeau County, Missouri. (See folder by U. S. Army Corps of Engineers of Navigation Charts, Middle and Upper Mississippi River, Cairo, Ill. to Minneapolis, Minn.)

Existing project. Provides for construction of a small boat harbor. Project was authorized by the Chief of Engineers, December 17, 1963, under authority of section 107, River and Harbor Act of July 1960. Estimated cost (July 1968) is $326,000.

Local cooperation. Fully complied with.

Operations and results during fiscal year. Plans and specifications were completed. Costs incurred were $4,869 for engineering and design and $540 for supervision and administration.

Condition at end of fiscal year. Contract was awarded for construction of facilities. On the basis of the favorable bid received, the project cost will be substantially reduced.

6. OTHER AUTHORIZED NAVIGATION PROJECT

(See table at end of Chapter.)

7. AUTHORIZED BRIDGE ALTERATIONS

(See table at end of Chapter.)

8. COLUMBIA DRAINAGE AND LEVEE DISTRICT NO. 3, ILL.

Location. In Monroe County, Ill., on left bank of the Mississippi River between river miles 156 and 166 above mouth of the Ohio River. (See St. Louis, Mo., map published by Army Map Service, scale 1:250,000.)

Previous project. For details, see page 653 of Annual Report for 1959.

Existing project. Project area contains about 13,600 acres protected from major floods of the Mississippi River, Columbia Creek, and Fountain Creek by levees. However, when Mississippi River stage exceeds 20 feet on the St. Louis, Mo., gage, substantial damage results from impoundment of precipitation which falls on the area, runoff from adjacent hill land, and Mississippi River seepage. The 1962 Flood Control Act (H. Doc. 543, 87th Cong., 2d sess.) provides for construction of two pumping stations to reduce interior flooding. Estimated cost (July 1968) is $1,410,000.

Local cooperation. Local interests must provide lands, easements, and right-of-way for construction; hold the United States free from damages; maintain and operate project after completion; prevent encroachment on improved channels and ponding

Existing project. Improvement for navigation will provide a channel 9 feet deep and 225 feet wide from mouth to Fayetteville, Ill. Improvement will consist of enlarging present channel where required, making overbank cutoffs to eliminate sharp bends, and construction of a dam at about mile 0.8 with a single lock 84 feet wide and 600 feet long, at an estimated construction cost of $92,360,000 (July 1969) including a $1,500,000 local contribution. Project was authorized by 1962 River and Harbor Act.

Local cooperation. State of Illinois passed legislation authorizing Illinois Department of Public Works and Buildings to enter into assurances of local cooperation with the United States. These assurances have been furnished and were accepted November 23, 1965. The State is continuing withland acquisition.

Operations and results during fiscal year. Costs incurred by contract were $125,051 for road relocation; $1,734,992 for dams; $4,489,963 for locks; $4,070 for access roads; and $1,521,288 for channels and canals. Other costs were $3,037 for building, grounds, and utilities; $32,624 for permanent operating equipment; $617,671 for engineering and design; $527,524 for supervision and administration; and $3,975 undistributed cost.

Condition at end of fiscal year. Construction was continued on the first and second canal construction items, the lock and dam, and initiated on relocation of Highway 154. Planning was continued on additional canal construction items, highway relocation, and railroad relocations. Project is about 17 percent complete.

3. MISSISSIPPI RIVER BETWEEN MISSOURI RIVER AND MINNEAPOLIS, MINN. (ST. LOUIS, DIST.)

See section of this annual report entitled 'Mississippi River between Missouri River and Minneapolis, Minn.

4. MISSISSIPPI RIVER BETWEEN OHIO AND MISSOURI RIVERS

Location. Mississippi River rises in Lake Itasca, Minn., and from that lake flows southerly about 2,340 miles and empties into the Gulf of Mexico. Portion included in this report embraces the 195-mile section known as middle Mississippi, between tributary Ohio and Missouri Rivers about 974 to 1,169 miles from the gulf. See folder by Corps of Engineers of Navigation Charts Middle and Upper Mississippi River, Cairo, Ill., to Minneapolis, Minn.

Previous projects. For details see page 1879 of Annual Report for 1915, and page 1014 of Annual Report for 1938.

Existing project. Provides for obtaining and maintaining a minimum channel depth of not less than 9 feet, a minimum width of not less than 300 feet at low water, with additional widths in bends from mouth of Ohio River (about 974 miles from gulf) to northern boundary of city of St. Louis, mile 191; thence200 feet wide, with additional width in bends to mouth of Missouri River, mile 195; to be obtained: (1) by regulating works, for closing secondary channels, contracting river by building new banks where river width is excessive and protecting new and old banks from erosion where necessary to secure permanency at an estimated construction cost (July 1969) of $73,900,000; (2) by dredging to maintain project channels; (3) by construction of works authorized for Chain of Rocks reach in 1945 River and Harbor Act, which approved a comprehensive plan for development of the river at Chain of Rocks to provide for construction of a lateral canal at an estimated construction cost (July 1969) of $53,300,000 and (4) by construction of a fixed-crest rockfill dam about 900 feet below Chain of Rocks Bridge, authorized by 1958 River and Harbor Act, at cost of $4,353,000, excluding $7,000 costs to Coast Guard for aids to navigation. Estimated cost of new work (1969) is $131,553,000. A small-boat harbor opposite Chester, Ill., is inactive and excluded from foregoing cost estimate. Estimated cost (July 1960) of this portion is $166,600 including $55,000 non-Federal contribution, excluding $1,000 Coast Guard cost. See House Document 669 (76th Cong., 3d sess.) for report of Chief of Engineers dated February 27, 1940, containing a general plan for improvement of Mississippi River between Coon Rapids Dam and mouth of Ohio River for purposes of navigation, power development, flood control, and needs of irrigation. (See table 14-B.)

Local cooperation. None required.

Terminal facilities. Considered adequate for existing commerce.

Operations and results during fiscal year.

Regulating Works: Contract work consisted of $757,568 for stone dike construction. Hired labor costs were $96,386 for engineering and design, and $70,338 for supervision and administration.

Chain of Rocks: Costs incurred were $77,297 for engineering and design, $8,556 for supervision and administration, and $26 undistributed cost.

Dam 27: Project is complete.

Maintenance. Work consisted of $1,654,691 for 23,650 feet of dike repair and 22,100 feet of revetment repair. U. S. plant and hired labor performed channel dredging at 19 locations, removing 3,662,888 cubic yards of material from main channel at a cost of $810,008. Channels dredged had a combined length of 11.74 miles, an average width of 290 feet and an average gain in depth of 5.5 feet.

Other costs were $353,260 for condition and operation studies; $266,664 for operation and care of Lock No. 27; Dam No. 27; and Chain of Rocks canal; $6,095 for recreational planning; $3,587 for maintenance of Lock No. 27; $814 for permanent operating equipment; $2,774 for building, grounds, and utilities; $55,753 for engineering and design; $396,714 for supervision and administration, and minus $1,469 undistributed cost.

Condition at end of fiscal year. Construction on existing project began in 1881 and project has been in beneficial use practically from its inception. Work on the project is about 82 percent complete. Work required to complete the project includes construction of 64,765 linear feet of dikes; 35,000 linear feet of revetment; removal of 100,000 cubic yards of rock; removal of 100,000 cubic yards by dredging; upper and lower guidewalls at Lock No. 27; and alterations to sills. Channel as a whole has been greatly improved by the work completed to date. Dredging is required at low stages to remove temporary shoals and maintain required channel depths. Navigation season formerly extended from mid-February to mid-December, the river generally closed by ice remainder of year. However, in recent years increased demands of commerce and use of steel hull boats have combined to extend navigation season throughoutthe year except when blocked by heavy ice or gorges. River is generally above 10-foot stage, St. Louis gage, from latter part of February to latter part of August, during which time project channel depths generally prevail without dredging. Mean stage of river, St. Louis gage, was 7.61 feet for fiscal year 1968 and 13.23 feet for fiscal year 1969. A study is underway to determine whether project criteria need to be revised in order to assure a dependable 9-foot project depth.

5. MOCCASIN SPRINGS, MO.

Location. On right bank of Mississippi River 66.6 miles above Ohio River at eastern edge of Trail of Tears State Park in Cape Girardeau County, Missouri. (See folder by U. S. Army Corps of Engineers of Navigation Charts, Middle and Upper Mississippi River, Cairo, Ill. to Minneapolis, Minn.)

Existing project. Provides for construction of a small boat harbor. Project was authorized by the Chief of Engineers, December 17, 1963, under authority of section 107, River and Harbor Act of July 1960. Total cost was $133,041 of which $56,605 was contributed funds.

Local cooperation. Fully complied with.

Operations and results during fiscal year. Costs incurred were $107,801 for construction of harbor.

Condition at end of fiscal year. Project is complete.

6. COLUMBIA DRAINAGE AND LEVEE DISTRICT NO. 3, ILL.

Location. In Monroe County, Ill., on left bank of the Mississippi River between river miles 156 and 166 above mouth of the Ohio River. (See St. Louis, Mo., map published by Army Map Service, scale 1:250,000.)

Previous project. For details, see page 653 of Annual Report for 1959.

Existing project. Project area contains about 13,600 acres protected from major floods of the Mississippi River, Columbia Creek, and Fountain Creek by levees. However, when Mississippi River stage exceeds 20 feet on the St. Louis, Mo., gage, substantial damage results from impoundment of precipitation which falls on the area, runoff from adjacent hill land, and Mississippi River seepage. The 1962 Flood Control Act (H. Doc. 543, 87th Cong., 2d sess.) provides for construction of two pumping stations to reduce interior flooding. Estimated cost (July 1969) is $1,640,000.

Local cooperation. Local interests must provide lands, easements, and right-of-way for construction; hold the United States free from damages; maintain and operate project after completion; prevent encroachment on improved channels and ponding areas and, if ponding area and capacities are impaired, provide substitute storage capacity or equivalent pumping capacity promptly without cost to the United States. Local interests indicated their willingness to provide necessary requirements.

Operations and results during fiscal year. Preconstruction planning continued. Costs incurred were $867 for engineering and design, and $97 for supervision and administration.

Condition at end of fiscal year. General design memorandum is being revised in accordance with recommendations of higher authority.

empties into Mississippi River about 8 miles above Chester, Ill., or about 118 miles above mouth of Ohio River. (See Cincinnati sheet of maps of United States published by Army Map Service, scale 1:500,000.)

Previous project. For details see Annual Report for 1896, page 1761.

Existing project. Improvement for navigation will provide a channel 9 feet deep and 225 feet wide from mouth to Fayetteville, Ill. Improvement will consist of enlarging present channel where required, making overbank cutoffs to eliminate sharp bends, and construction of a dam at about mile 0.8 with a single lock 84 feet wide and 600 feet long, at an estimated construction cost of $105,560,000 (1970) including a $1,500,000 local contribution.

Local cooperation. State of Illinois passed legislation authorizing Illinois Department of Public Works and Buildings to enter into assurances of local cooperation with the United States. These assurances have been furnished and were accepted November 23, 1965. The State is continuing with land acquisition.

Operations and results during fiscal year. Construction of the canal, roads, and lock and dam continued. Work was initiated on railroad alterations. Engineering and design continued on remaining construction items.

Condition at end of fiscal year. Project is about 22 percent complete.

3. MISSISSIPPI RIVER BETWEEN MISSOURI RIVER AND MINNEAPOLIS, MINN. (ST. LOUIS DIST.)

See section of this annual report entitled "Mississippi River between Missouri River and Minneapolis, Minn."

4. MISSISSIPPI RIVER BETWEEN OHIO AND MISSOURI RIVERS

Location. Mississippi River rises in Lake Itasca, Minn., and from that lake flows southerly about 2,340 miles and empties into the Gulf of Mexico. Portion included in this report embraces the 195-mile section known as middle Mississippi, between tributary Ohio and Missouri Rivers about 974 to 1,169 miles from the gulf. See folder by Corps of Engineers of Navigation Charts Middle and Upper Mississippi River, Cairo, Ill., to Minneapolis, Minn.

Previous projects. For details see page 1879 of Annual Report for 1915, and page 1014 of Annual Report for 1938.

Existing project. Provides for obtaining and maintaining a minimum channel depth of not less than 9 feet, a minimum width of not less than 300 feet at low water, with additional widths in bends from mouth of Ohio River (about 974 miles from gulf) to northern boundary of city of St. Louis, mile 191; thence 200 feet wide, with additional width in bends to mouth of Missouri River, mile 195; to be obtained: (1) by regulating works, for closing secondary channels, contracting river by building new banks where river width is excessive and protecting new and old banks from erosion where necessary to secure permanency at an estimated construction cost (1970) of $76,800,000; (2) by dredging to maintain project channels; (3) by construction of works authorized for Chain of Rocks reach in 1945 River and Harbor Act, which approved a comprehensive plan for development of the river at Chain of Rocks to provide for construction of a lateral canal at an estimated construction cost (1970) of $55,200,000 and (4) by construction of a fixed-crest rockfill dam about 900 feet below Chain of Rocks Bridge, authorized by 1958 River and Harbor Act, at cost of $4,353,000, excluding $7,000 costs to Coast Guard for aids to navigation. Estimated cost of new work (1970) is $136,353,000. A small boat harbor opposite Chester, Ill., is inactive and excluded from foregoing cost estimate. Estimated cost (July 1960) of this portion is $166,600 including $55,000 non-Federal contribution, and excluding $1,000 Coast Guard cost. See House Document 669 (76th Cong., 3d sess.) for report of Chief of Engineers dated February 27, 1940, containing a general plan for improvement of Mississippi River between Coon Rapids Dam and mouth of Ohio River for purposes of navigation, power development, flood control, and needs of irrigation.

Local cooperation. None required.

Terminal facilities. Considered adequate for existing commerce.

Operations and results during fiscal year.

Regulating Works: Contract work continued on stone dike construction as did engineering and design and supervision and administration.

Chain of Rocks: Engineering and design for guidewalls and tie-down of upper sill continued.

Dam 27: Project is complete.

Maintenance: Work consisted of 19,155 feet of dike repair and 5,550 feet of revetment repair. U. S. plant hired labor performed channel dredging at 20 locations, removing 4,230,400 cubic yards of material from main channel. Channels dredged had a combined length of 13.6 miles, an average width of 290 feet, and an average gain in depth of 5.5 feet. Condition and operation studies, recreation planning, engineering and design, and operation and maintenance of Lock 27 and Dam 27 continued.

Condition at end of fiscal year. Construction on existing project began in 1881 and project has been in beneficial use practically from its inception. Work on the project is about 80 percent complete. Work required to complete the project includes construction

of 48,095 linear feet of dikes; 35,000 linear feet of revetment; removal of 100,000 cubic yards of rock; removal of 100,000 cubic yards by dredging; upper and lower guidewalls at Lock No. 27; and alterations to sills. Channel as a whole has been greatly improved by the work completed to date. Dredging is required at low stages to remove temporary shoals and maintain required channel depths. Navigation season formerly extended from mid-February to mid-December, the river generally closed by ice remainder of year. However, in recent years increased demands of commerce and use of steel-hull boats have combined to extend navigation season throughout the year except when blocked by heavy ice or gorges. River is generally above 10-foot stage, St. Louis gage, from latter part of February to latter part of August, during which time project channel depths generally prevail without dredging. Mean stage of river, St. Louis gage, was 13.23 feet for fiscal year 1969 and 12.16 feet for fiscal year 1970. A study is underway to determine whether project criteria need to be revised in order to assure a dependable 9-foot project depth.

5. OTHER AUTHORIZED NAVIGATION PROJECTS.

See table 14-E at end of text.

FLOOD CONTROL

6. EAST ST. LOUIS AND VICINITY, ILL.

Location. In St. Clair and Madison Counties, Ill., on the left bank of the Mississippi River between river miles 175 and 195 above the Ohio River. Project includes all bottom lands between bluffs on the east and Mississippi River and Chain of Rocks Canal on the west, and extends from Cahokia diversion channel on the north to Prairie du Pont Creek on the south. (See Corps of Engineers Navigation Charts, Middle and Upper Mississippi River, Cairo, Ill., to Minneapolis, Minn.)

Existing project. The 1936 Flood Control Act authorized raising and enlarging existing levee system by construction or reconstruction of 19.8 miles of levee, including 3.1 miles of floodwall, together with necessary appurtenant works consisting of gravity drainage structures, highway and railroad closure structures, alterations and reconstruction of existing pumping plants, alterations to railroad bridges and approaches at levee crossings, service roads on levee crown, and seepage control measures. Work under this authorization will provide the area protection against a flood of about 200-year frequency. The completed 10 miles of levee along Chain of Rocks Canal and Lock 27 provides flood protection on the landward side integral with and to the same degree as the East St. Louis levee. Estimated cost of work under this authorization is $21,955,000 (1970). The Flood Control Act of 1965 modified existing project to provide for channel improvements, diversion ditches, flood plain detention areas, a reservoir on Little Canteen Creek, and a pumping plant to considerably reduce damages resulting from interior flooding. This act also authorized reconstruction of a channel stabilization dam in Cahokia Creek diversion channel to provide protection to adjacent levees and bridges from scour and eventual loss. Estimated Federal cost of work under this authorization is $11,100,000 (1970).

Local cooperation. Fully complied with for work under 1936 authorization. For work authorized by Flood Control Act of 1965, local interests must provide lands, easements, and rights-of-way for construction; hold the United States free from damages due to the construction works; make relocations of and modifications to highway bridges, streets, roads, sewers, and utilities; maintain and operate all the works after completion including removal of silt and debris from impoundment areas and channels in accordance with regulations prescribed by the Secretary of the Army; prevent encroachment on improved channels, ponding areas, and detention areas including the reservoir, and if encroachment occurs or capacities are impaired, provide substitute storage or equivalent pumping capacity promptly without cost to the United States; and at least annually notify interests affected that the project provides only partial protection from the larger floods. East Side Levee and Sanitary District, the potential sponsor, has legal authority to execute assurances for the project, but does not have financial capability at this time. The low water dam has been designated as a separable and usable segment of the project for the purpose of obtaining local assurances. The Wood River Drainage and Levee District and East Side Levee and Sanitary District are able to furnish the requirements of local cooperation (Section 3, Flood Control Act of 1936) for the channel stabilization dam. The State of Illinois is currently studying the feasibility of sponsoring the interior drainage project.

Operations and results during fiscal year. Preconstruction planning was continued on project modifications authorized by Flood Control Act of 1965.

Condition at end of fiscal year. Project constructed under authority of Flood Control Act of 1936 is essentially complete. Construction has not started on modifications authorized by Flood Control Act of 1965.

7. HARRISONVILLE AND IVY LANDING DRAINAGE AND LEVEE DISTRICT NO. 2, ILL.

Location. In Monroe County, Ill., on left bank of the Mississippi River between river miles 141 and 156 above the mouth of Ohio River. (See St. Louis, Mo., map published by Army Map Service, scale 1:250,000.)

Previous project. For details, see page 676 of Annual Report for 1957.

construction cost of $110,500,000 (1971) including a $1,500,000 local contribution.

Local cooperation. State of Illinois passed legislation authorizing Illinois Department of Public Works and Buildings to enter into assurances of local cooperation with the United States. These assurances have been furnished and were accepted November 23, 1965. The State is continuing with land acquisition.

Operations and results during fiscal year. Construction of the canal, roads, and lock and dam continued. Work was continued on railroad alterations. Engineering and design continued on remaining construction items.

Condition at end of fiscal year. Project is about 35 percent complete.

3. MISSISSIPPI RIVER BETWEEN MISSOURI RIVER AND MINNEAPOLIS, MINN. (ST. LOUIS DIST.)

See section of this annual report entitled "Mississippi River between Missouri River and Minneapolis, Minn."

4. MISSISSIPPI RIVER BETWEEN OHIO AND MISSOURI RIVERS, MO. AND ILL.

Location. Mississippi River rises in Lake Itasca, Minn., and from that lake flows southerly about 2,340 miles and empties into the Gulf of Mexico. Portion included in this report embraces the 195-mile section known as middle Mississippi, between tributary Ohio and Missouri Rivers about 974 to 1,169 miles from the gulf. See folder by Corps of Engineers of Navigation Charts Middle and Upper Mississippi River, Cairo, Ill., to Minneapolis, Minn.

Previous projects. For details see page 1879 of Annual Report for 1915, and page 1014 of Annual Report for 1938.

Existing project. Provides for obtaining and maintaining a minimum channel depth of not less than 9 feet, a minimum width of not less than 300 feet at low water, with additional widths in bends from mouth of Ohio River (about 974 miles from gulf) to northern boundary of city of St. Louis, mile 191; thence 200 feet wide, with additional width in bends to mouth of Missouri River, mile 195; to be obtained: (1) by regulating works, for closing secondary channels, contracting river by building new banks where river width is excessive and protecting new and old banks from erosion where necessary to secure permanency at an estimated construction cost (1971) of $78,300,000; (2) by dredging to maintain project channels; (3) by construction of works authorized for Chain of Rocks reach in 1945 River and Harbor Act, which approved a comprehensive plan for development of the river at Chain of Rocks to provide for construction of a lateral canal at an estimated construction cost (1971) of $56,600,000 and (4) by construction of a fixed-crest rockfill dam about 900 feet below Chain of Rocks Bridge, authorized by 1958 River and Harbor Act, at cost of $4,353,000, excluding $7,000 costs to Coast Guard for aids to navigation. Estimated cost of new work (1971) is $139,253,000. A small boat harbor opposite Chester, Ill., is inactive and excluded from foregoing cost estimate. Estimated cost (July 1960) of this portion is $166,600 including $55,000 non-Federal contribution, and excluding $1,000 Coast Guard cost. See House Document 669 (76th Cong., 3d sess.) for report of Chief of Engineers dated February 27, 1940, containing a general plan for improvement of Mississippi River between Coon Rapids Dam and mouth of Ohio River for purposes of navigation, power development, flood control, and needs of irrigation.

Local cooperation. None required.

Terminal facilities. Considered adequate for existing commerce.

Operations and results during fiscal year. Regulating Works: Contract work continued on stone dike construction as did engineering and design and supervision and administration. *Chain of Rocks:* Engineering and design for guidewalls and tie-down of upper sill was completed. *Dam 27:* Project is complete.

Maintenance: Work consisted of 11,800 feet of dike repair and 39,600 feet of revetment repair. U. S. plant hired labor performed channel dredging at 28 locations, removing 4,831,600 cubic yards of material from main channel. Channels dredged had a combined length of 12.2 miles, an average width of 290 feet, and an average gain in depth of 7.0 feet. Condition and operation studies, recreation planning, engineering and design, and operation and maintenance of lock and dam 27 continued.

Condition at end of fiscal year. Construction on existing project began in 1881 and project has been in beneficial use practically from its inception. Work on the project is about 79 percent complete. Work required to complete the project includes construction of 34,285 linear feet of dikes; 35,000 linear feet of revetment; removal of 100,000 cubic yards of rock; removal of 100,000 cubic yards by dredging; upper and lower guidewalls at Lock No. 27; and alterations to sills. Channel as a whole has been greatly improved by the work completed to date. Dredging is required at low stages to remove temporary shoals and maintain required channel depths. Navigation season formerly extended from mid-February to mid-December, the river generally closed by ice remainder of year. However, in recent years increased demands of commerce and use of steel-hull boats have combined to extend navigation season throughout the year except when blocked by heavy ice or gorges. River is generally above 10-foot stage, St. Louis gage, from latter part of February to latter part of August, during which time project channel depths generally prevail without dredging. Mean stage of river, St. Louis gage, was 12.16 feet for fiscal year 1970 and 11.58 feet for fiscal year 1971. A study is underway to determine whether project

criteria need to be revised in order to assure a dependable 9-foot project depth.

5. OTHER AUTHORIZED NAVIGATION PROJECTS.

See table 14-C.

FLOOD CONTROL

6. EAST ST. LOUIS AND VICINITY, ILL.

Location. In St. Clair and Madison Counties, Ill., on the left bank of the Mississippi River between river miles 175 and 195 above the Ohio River. Project includes all bottom lands between bluffs on the east and Mississippi River and Chain of Rocks Canal on the west, and extends from Cahokia diversion channel on the north to Prairie du Pont Creek on the south. (See Corps of Engineers Navigation Charts, Middle and Upper Mississippi River, Cairo, Ill., to Minneapolis, Minn.)

Existing project. The 1936 Flood Control Act authorized raising and enlarging existing levee system by construction or reconstruction of 19.8 miles of levee, including 3.1 miles of floodwall, together with necessary appurtenant works consisting of gravity drainage structures, highway and railroad closure structures, alterations and reconstruction of existing pumping plants, alterations to railroad bridges and approaches at levee crossings, service roads on levee crown, and seepage control measures. Work under this authorization will provide the area protection against a flood of about 200-year frequency. The completed 10 miles of levee along Chain of Rocks Canal and Lock 27 provides flood protection on the landward side integral with and to the same degree as the East St. Louis levee. Estimated cost of work under this authorization is $21,955,000 (1971). The Flood Control Act of 1965 modified existing project to provide for channel improvements, diversion ditches, flood plain detention areas, a reservoir on Little Canteen Creek, and a pumping plant to considerably reduce damages resulting from interior flooding. This act also authorized reconstruction of a channel stabilization dam in Cahokia Creek diversion channel to provide protection to adjacent levees and bridges from scour and eventual loss. Estimated Federal cost of work under this authorization is $12,320,000 (1971).

Local cooperation. Fully complied with for work under 1936 authorization. For work authorized by Flood Control Act of 1965, local interests must provide lands, easements, and rights-of-way for construction; hold the United States free from damages due to the construction works; make relocations of and modifications to highway bridges, streets, roads, sewers, and utilities; maintain and operate all the works after completion including removal of silt and debris from impoundment areas and channels in accordance with regulations prescribed by the Secretary of the Army; prevent encroachment on improved channels, ponding areas, and detention areas including the reservoir, and if encroachment occurs or capacities are impaired, provide substitute storage or equivalent pumping capacity promptly without cost to the United States; and at least annually notify interests affected that the project provides only partial protection from the larger floods. East Side Levee and Sanitary District, the potential sponsor, has legal authority to execute assurances for the project, but does not have financial capability at this time. The low water dam has been designated as a separable and usable segment of the project for the purpose of obtaining local assurances. The Wood River Drainage and Levee District and East Side Levee and Sanitary District are able to furnish the requirements of local cooperation (Section 3, Flood Control Act of 1936) for the channel stabilization dam. The State of Illinois is currently studying the feasibility of sponsoring the interior drainage project.

Operations and results during fiscal year. Preconstruction planning was continued on project modifications authorized by Flood Control Act of 1965.

Condition at end of fiscal year. Project constructed under authority of Flood Control Act of 1936 is essentially complete. Construction has not started on modifications authorized by Flood Control Act of 1965.

7. FT. CHARTRES AND IVY LANDING DRAINAGE AND LEVEE DISTRICT NO. 5 AND STRINGTOWN DRAINAGE AND LEVEE DISTRICT NO. 4, ILL.

Location. In Monroe and Randolph Counties, Ill. on left bank of the Mississippi River between river miles 130 and 141 above the mouth of the Ohio River. (See folder by Corps of Engineers of Navigation Charts Middle and Upper Mississippi River, Cairo, Ill. to Minneapolis, Minn.)

Previous projects. For details see page 625 of Annual Report for 1958 and page 674 of Annual Report for 1957.

Existing project. Project area contains about 18,700 acres protected from floods of the Mississippi River by levees. However, when Mississippi River stage exceeds 15 feet on the St. Louis, Mo., gage, substantial damage has occurred due to blocked interior drainage. The 1965 Flood Control Act provides for construction of three pumping stations to reduce interior flooding. Estimated cost (1971) is $2,600,000.

Local cooperation. Local interests must provide lands, easements, and rights-of-way for construction; hold the United States free from damages; maintain and operate the project after completion; rehabilitate Kidd Lake Ditch; and maintain existing ditches to provide unrestricted flow to the pumping stations.

Operation and results during fiscal year. Project not yet funded.

NAVIGATION

1. ILLINOIS WATERWAY, ILL. (ST. LOUIS DIST.)

See report on Illinois Waterway, Ill. and Ind., under Chicago District.

2. KASKASKIA RIVER, ILL.

Location. Rises in Champaign County, Ill. about 5 miles northwest of Urbana, in east-central part of the State. It flows southwesterly about 325 miles and empties into Mississippi River about 8 miles above Chester, Ill., or about 118 miles above mouth of Ohio River. (See Cincinnati sheet of maps of United States published by Army Map Service, scale 1:500,000.)

Previous project. For details see Annual Report for 1896, page 1761.

Existing project. Improvement for navigation will provide a channel 9 feet deep and 225 feet wide from mouth to Fayetteville, Ill. Improvement will consist of enlarging present channel where required, making overbank cutoffs to eliminate sharp bends, and construction of a dam at about mile 0.8 with a single lock 84 feet wide and 600 feet long, at an estimated construction cost of $111,500,000 (1972) including a $1,500,000 local contribution.

Local cooperation. State of Illinois passed legislation authorizing Illinois Department of Public Works and Buildings to enter into assurances of local cooperation with the United States. These assurances have been furnished and were accepted November 23, 1965. The State is continuing with land acquisition.

Operations and results during fiscal year. Construction of the canal, roads, and lock and dam continued. Work was continued on highway and railroad alterations. Engineering and design continued on remaining construction items.

Maintenance: Hired labor forces performed operation and maintenance of the project.

Condition at end of fiscal year. Project is about 58 percent complete.

3. MISSISSIPPI RIVER BETWEEN MISSOURI RIVER AND MINNEAPOLIS, MINN. (ST. LOUIS DIST.)

See section of this annual report entitled "Mississippi River between Missouri River and Minneapolis, Minn."

4. MISSISSIPPI RIVER BETWEEN OHIO AND MISSOURI RIVERS, MO. AND ILL.

Location. Mississippi River rises in Lake Itasca, Minn., and from that lake flows southerly about 2,340 miles and empties into the Gulf of Mexico. Portion included in this report embraces the 195-mile section known as middle Mississippi, between tributary Ohio and Missouri Rivers about 974 to 1,169 miles from the gulf. See folder by Corps of Engineers of Navigation Charts Middle and Upper Mississippi River, Cairo, Ill., to Minneapolis, Minn.

Previous projects. For details see page 1879 of Annual Report for 1915, and page 1014 of Annual Report for 1938.

Existing projects. Provides for obtaining and maintaining a minimum channel depth of not less than 9 feet, a minimum width of not less than 300 feet at low water, with additional widths in bends from mouth of Ohio River (about 974 miles from gulf) to northern boundary of city of St. Louis, mile 191, thence 200 feet wide, with additional width in bends to mouth of Missouri River, mile 195; to be obtained: (1) by regulating works, for closing secondary channels, contracting river by building new banks where river width is excessive and protecting new and old banks from erosion where necessary to secure permanency at an estimated construction cost (1972) of $80,100,000; (2) by dredging to maintain project channels; (3) by construction of works authorized for Chain of Rocks reach in 1945 River and Harbor Act, which approved a comprehensive plan for development of the river at Chain of Rocks to provide for construction of a lateral canal at an estimated construction cost (1972) of $59,800,000 and (4) by construction of a fixed-crest rockfill dam about 900 feet below Chain of Rocks Bridge, authorized by 1958 River and Harbor Act, at cost of $4,353,000, excluding $7,000 costs to Coast Guard for aids to navigation. Estimated cost of new work (1972) is $144,253,000. A small boat harbor opposite Chester, Ill., is inactive and excluded from foregoing cost estimate. Estimated cost (July 1960) of this portion is $166,600 including $55,000 non-Federal contribution, and excluding $1,000 Coast Guard cost. See House Document 669 (76th Cong., 3d sess.) for report of Chief of Engineers dated February 27, 1940, containing a general plan for improvement of Mississippi River between Coon Rapids Dam and mouth of Ohio River for purposes of navigation, power development, flood control, and needs of irrigation.

Local cooperation. None required.

Terminal facilities. Considered adequate for existing commerce.

Operations and results during fiscal year.

Regulating Works: Contract work continued on stone dike construction as did engineering and design and supervision and administration.

Chain of Rocks: Engineering and design for guidewalls and tie-down of upper sill are complete, and contract work is in progress.

Dam 27: Project is complete.

Maintenance: Work consisted of 6,840 feet of dike repair and 82,813 feet of revetment repair. U.S. plant hired labor performed channel dredging at 24 locations, removing 3,850,800 cubic yards of material from main channel. Channels dredged had a combined length of 11.8 miles, an average width of 290 feet, and an average gain in depth of 6.5 feet. Condition and operation studies, recreation planning, engineering and design, and operation and maintenance of lock and dam 27 continued.

Condition at end of fiscal year. Construction on existing project began in 1881 and project has been in beneficial use practically from its conception. Work on the project is about 79 percent complete. Work required to complete the project includes construction of 31,170 linear feet of dikes; 35,000 linear feet of revetment; removal of 100,000 cubic yards of rock; removal of 100,000 cubic yards by dredging; upper and lower guidewalls at Lock No. 27; and alterations to sills. Channel as a whole has been greatly improved by the work completed to date. Dredging is required at low stages to remove temporary shoals and maintain required channel depths. Navigation season formerly extended from mid-February to mid-December, the river generally closed by ice remainder of year. However, in recent years increased demands of commerce and use of steel-hull boats have combined to extend navigation season throughout the year except when blocked by heavy ice or gorges. River is generally above 10-foot stage, St. Louis gage, from latter part of February to latter part of August, during which time project channel depths generally prevail without dredging. Mean stage of river, St. Louis gage, was 11.58 feet for fiscal year 1971 and 9.04 feet for fiscal year 1972. A study is underway to determine whether project criteria need to be revised in order to assure a dependable 9-foot project depth.

5. OTHER AUTHORIZED NAVIGATION PROJECTS

See table 14-C.

Alteration of Bridges

6. AUTHORIZED BRIDGE ALTERATIONS

See table 14-D.

FLOOD CONTROL

7. EAST ST. LOUIS AND VICINITY, ILL.

Location. In St. Clair and Madison Counties, Ill., on the left bank of the Mississippi River between river miles 175 and 195 above the Ohio River. Project includes all bottom lands between bluffs on the east and Mississippi River and Chain of Rocks Canal on the west, and extends from Cahokia diversion channel on the north to Prairie du Pont Creek on the south. (See Corps of Engineers Navigation Charts, Middle and Upper Mississippi River, Cairo, Ill., to Minneapolis, Minn.)

Existing project. The 1936 Flood Control Act authorized raising and enlarging existing levee systems by construction or reconstruction of 19.8 miles of levee, including 3.1 miles of floodwall, together with necessary appurtenant works consisting of gravity drainage structures, highway and railroad closure structures, alterations and reconstruction of existing pumping plants, alterations to railroad bridges and approaches at levee crossings, service roads on levee crown, and seepage control measures. Work under this authorization will provide the area protection against a flood of about 200-year frequency. The completed 10 miles of levee along Chain of Rocks Canal and Lock 27 provides flood protection on the landward side integral with and to the same degree as the East St. Louis levee. Estimated cost of work under this authorization is $22,050,900. The Flood Control Act of 1965 modified existing project to provide for channel improvements, diversion ditches, flood plain detention areas, a reservoir on Little Canteen Creek, and a pumping plant to considerably reduce damages resulting from interior flooding. This act also authorized reconstruction of a channel stabilization dam in Cahokia Creek diversion channel to provide protection to adjacent levees and bridges from scour and eventual loss. Estimated Federal cost of work under this authorization is $24,070,000 (1972), $14,400,000 for Cahokia Creek Dam, and $9,670,000 for Interior Flood Control.

Local cooperation. Fully complied with for work under 1936 authorization. For work authorized by Flood Control Act of 1965, local interests must provide lands, easements, and rights-of-way for construction; hold the United States free from damages due to the construction works; make relocations of and modifications to highway bridges, streets, roads, sewers, and utilities; maintain and

ST. LOUIS, MO., DISTRICT

TABLE 14-B — AUTHORIZING LEGISLATION

Acts	Work Authorized	Documents
	KASKASKIA RIVER, ILL. (See Section 2 of Text)	
Oct. 23, 1962	Construct canal, lock and dam to provide a nine-foot navigation channel from mouth to Fayetteville, Illinois.	S. Doc. 44, 87th Cong., 1st sess.
	MISSISSIPPI RIVER BETWEEN OHIO AND MISSOURI RIVERS (See Section 4 of Text)	
	Project for regulating works adopted in 1881. (To obtain a minimum depth of 8 feet).	Annual Report, 1881, p. 1536.
June 3, 1896	Dredging introduced as part of the project.	
June 13, 1902 Mar. 2, 1907[1]		
Mar. 3, 1905[1] Mar. 2, 1907[1]	These acts practically abrogated that part of project for middle Mississippi which proposed regulating works.	
June 25, 1910	Regulating works restored to project and appropriations begun with a view to completion of improvement between Ohio and Missouri Rivers within 12 years at an estimated cost of $21 million, exclusive of amounts previously expended.	H. Doc. 50, 61st Cong., 1st sess., and H. Doc. 168, 58th Cong., 2d sess.[2]
Jan. 21, 1927	For 9 feet deep and 300 feet wide from Ohio River to northern boundary of City of St. Louis.	Rivers and Harbors Committee Doc. 9, 69th Cong., 2d sess.
July 3, 1930	Project between northern boundary of St. Louis and Grafton (mouth of Illinois River) modified to provide a channel 9 ft. deep and generally 200 feet wide with additional width around bends.	Rivers and Harbors Committee Doc. 12, 70th Cong., 1st sess.
Mar. 2, 1945	Modified to provide construction of a lateral canal with lock at Chain of Rocks.	H. Doc. 231, 76th Cong., 1st sess.
Sept. 3, 1954[3]	Modified to provide construction of a small-boat harbor opposite Chester, Ill.	H. Doc. 230, 83d Cong., 1st sess.
July 3, 1958[4]	Modified to provide construction of a fixed crest rockfill dam 900 feet below Chain of Rocks Bridge.	S. Doc. 7, 85th Cong., 1st sess.
	EAST ST. LOUIS AND VICINITY, ILL. (See Section 7 of Text)	
June 22, 1936	Raise and enlarge existing levee.	Special report on record in OCE.
Oct. 22, 1965	Construct pumping plant and other modifications to reduce interior flooding.	H. Doc. 329, 88th Cong., 2d sess.
	KASKASKIA RIVER, ILL. (See Section 8 of Text)	
July 3, 1958	Deletes Carlyle Reservoir and levees from New Athens to Carlyle from Upper Mississippi River Basin Plan and reauthorizes them as part of the Kaskaskia River plan. Construct dam at Shelbyville and six levee projects between Cowden and Vandalia and a local protection project at New Athens.	H. Doc. 232, 85th Cong., 1st sess.
Oct. 27, 1965	Deleted requirement that local interests make a cash contribution to cost of levees between Cowden and Vandalia. Requires that local interests make a cash contribution equal to full cost of acquisition of flowage easements in those lands acquired by the United States which, upon completion of the levee in District No. 22, will not be required for construction, operation and maintenance of Carlyle Lake.	H. Doc. 351, 88th Cong., 2d sess.
	HARRISONVILLE AND IVY LANDING DRAINAGE AND LEVEE DISTRICT NO. 2, ILL. (See Section 9 of Text)	
Oct. 23, 1962	Construct pumping plants and other modifications to reduce interior flooding.	H. Doc. 542, 87th Cong., 2d sess.
	MC GEE CREEK DRAINAGE AND LEVEE DISTRICT, ILL. (See Section 10 of Text)	
Oct. 23, 1962	Reconstruct existing levee and construct pumping plant to reduce flooding.	H. Doc. 472, 87th Cong., 2d sess.

1. ILLINOIS WATERWAY, ILL. (ST. LOUIS DIST.)

See report on Illinois Waterway, Ill. and Ind., under Chicago District.

2. KASKASKIA RIVER, ILL.

Location. The river rises in Champaign County, Ill., about 5 miles northwest of Urbana, in east-central part of the State. It flows southwesterly about 325 miles and empties into Mississippi River about 8 miles above Chester, Ill., or about 118 miles above mouth of Ohio River. (See Cincinnati sheet of maps of United States published by Army Map Service, scale 1:500, 000.)

Previous project. For details see Annual Report for 1896, page 171.

Existing project. Improvement for navigation will provide a channel 9 feet deep and 225 feet wide from mouth to Fayetteville, Illinois. Improvement will consist of enlarging present channel where required, making overbank cutoffs to eliminate sharp bends, and construction of a dam at about mile 0.8 with a single lock 84 feet wide and 600 feet long, at an estimated total Federal project cost (1973) of $112,060,000. Non-Federal cost is $7,665,000, of which $1,-500,000 is local contribution.

Local cooperation. State of Illinois passed legislation authorizing Illinois Department of Public Works and Buildings to enter into assurances of local cooperation with the United States. These assurances have been furnished and were accepted November 23, 1965. The State is continuing with land acquisition.

Operations and results during fiscal year. Construction of the canal and lock and dam was continued. Work was continued on highway and railroad alterations. Engineering and design was continued on remaining construction items.

Maintenance: Hired labor performed operation and maintenance of the project.

Condition at end of fiscal year. Project is about 64 percent complete.

3. MISSISSIPPI RIVER BETWEEN MISSOURI RIVER AND MINNEAPOLIS, MINN. (ST. LOUIS DIST.)

See section of this annual report entitled "Mississippi River between Missouri River and Minneapolis, Minn."

4. MISSISSIPPI RIVER BETWEEN OHIO AND MISSOURI RIVERS, MO. AND ILL.

Location. Mississippi River rises in Lake Itasca, Minn., and from that lake flows southerly about 2,340 miles and empties into the Gulf of Mexico. Portion included in this report embraces the 195-mile section known as middle Mississippi, between tributary Ohio and Missouri Rivers about 974 to 1,169 miles from the gulf. See folder by Corps of Engineers of Navigation Charts Middle and Upper Mississippi River, Cairo, Ill., to Minneapolis, Minnesota.

Previous projects. For details see page 1879 of Annual Report for 1915, and page 1014 of Annual Report for 1938.

Existing projects. The existing project provides for obtaining and maintaining a minimum channel depth of not less than 9 feet, a minimum width of not less than 300 feet at low water, with additional widths in bends from mouth of Ohio River (about 974 miles from gulf) to northern boundary of city of St. Louis, miles 191, thence 200 feet wide, with additional width in bends to mouth of Missouri River, mile 195; to be obtained: (1) by regulating works, for closing secondary channels, contracting river by building new banks where river width is excessive and protecting new and old banks from erosion where necessary to secure permanency at an estimated total Federal cost (1973) of $81,000,000; (2) by dredging to maintain project channels; (3) by construction of works authorized for Chain of Rocks reach in 1945 River and Harbor Act, which approved a comprehensive plan for development of the river at Chain of Rocks to provide for construction of a lateral canal at an estimated total Federal project cost (1973) of $57,700,000 and (4) by construction of a fixed-crest rockfill dam about 900 feet below Chain of Rocks Bridge, authorized by 1958 River and Harbor Act, at cost of $4,353,000, excluding $7,000 costs to Coast Guard for aids to navigation. Estimated total Federal project cost (1973) is $143,053,000. A small boat harbor opposite Chester, Ill., is inactive and excluded from foregoing cost estimate. Estimated cost (July 1960) of this portion is $166,600 including $55,000 non-Federal contribution, and excluding $1,000 Coast Guard cost. See House Document 669 (76th Cong., 3d sess.) for report of Chief of Engineers dated February 27, 1940, containing a general plan for improvement of Mississippi River between Coon Rapids Dam and mouth of Ohio River for purposes of

navigation, power development, flood control, and needs of irrigation.

Local cooperation. None required.

Terminal facilities. Existing facilities are considered adequate for existing commerce.

Operations and results during fiscal year. Regulating Works: Contract work was continued on stone dike construction as was engineering and design and supervision and administration. Chain of Rocks: Engineering and design for guidewalls and tie-down of upper sill are complete, and contract work is in progress for the construction of these items. Dam 27: Project is complete.

Maintenance: Work consisted of 4,240 feet of repair and 29,800 feet of revetment dike repair. U.S. plant and hired labor performed channel dredging at 31 locations, removing 4,500,000 cubic yards of material from main channel. Channels dredged had a combined length of 12.4 miles, an average width of 290 feet, and an average gain in depth of 6.4 feet. Condition and operation studies, recreation planning, engineering and design, and operation and maintenance of lock and dam 27 continued.

Condition at end of fiscal year. Construction on existing project began in 1881 and project has been in beneficial use practically from its conception. Work on the project is about 81 percent complete. Work required to complete the project includes construction of 21,060 linear feet of dikes; 35,000 linear feet of revetment; removal of 100,000 cubic yards of rock;romoval of 100,000 cubic yards by dredging; upper and lower guidewalls at Lock No. 27; and alterations to sills. Channel as a whole has been greatly improved by the work completed to date. Dredging is required at low stages to remove temporary shoals and maintain required channel depths. Navigation season formerly extended from mid-February to mid-December, the river generally closed by ice remainder of year. However, in recent years increased demands of commerce and use of steel-hull boats have combined to extend navigation season throughout the year except when blocked by heavy ice or gorges. River is generally above 10-foot stage, St. Louis gage, from latter part of February to generally prevail without dredging. Mean stage of river, St. Louis gage, was 9.04 feet for fiscal year 1972 and 20.43 feet for fiscal year 1973. A study is under way to determine whether project criteria need to be revised in order to assure a dependable 9-foot project depth.

5. OTHER AUTHORIZED NAVIGATION PROJECTS

See table 14-C.

6. ALTERATION OF BRIDGES

See table 14-D.

Flood Control

7. EAST ST. LOUIS AND VICINITY, ILL.

Location. Project is in St. Clair and Madison Counties, Ill., on the left bank of the Mississippi River between river miles 175 and 195 above the Ohio River. Project includes all bottom lands between bluffs on the east and Mississippi River and Chain of Rocks Canal on the west, and extends from Cahokia diversion channel on the north to Prairie du Pont Creek on the south. (See Corps of Engineers Navigation Charts, Middle and Upper Mississippi River, Cairo, Ill., to Minneapolis, Minn.)

Existing project. The 1936 Flood Control Act authorized raising and enlarging existing levee, systems by construction or reconstruction of 19.8 miles of levee, including 3.1 miles of floodwall, together with necessary appurtenant works consisting of gravity drainage structures, highway and railroad closure structures, alterations and reconstruction of existing pumping plants, alterations to railroad bridges and approaches at levee crossings, service roads on levee crown, and seepage control measures. Work under this authorization will provide the area protection against a flood of about 200-year frequency. The completed 10 miles of levee along Chain of Rocks Canal and Lock 27 provides flood protection on the landward side integral with and to the same degree as the East St. Louis levee. Estimated cost of work under this authorization is $22,050,900. The Flood Control Act of 1965 modified existing project to provide for channel improvements, diversion ditches, flood plain detention areas, a reservoir on Little Canteen Creek, and a pumping plant to considerably reduce damages resulting from interior flooding. This act also authorized reconstruction of a channel stabilization dam in Cahokia Creek diversion channel to provide protection to adjacent levees and bridges from scour and eventual loss. Estimated total Federal project cost of work under this authorization is $26,100,000 (1973), $15,400,000 for Cahokia Creek Dam, and $10,700,000 for Interior Flood Control. Non-Federal cost is $9,470,000

Local cooperation. Local interests have fully complied with the requirements of local cooperation for work under the 1936 authorization. For work authorized by Flood Control Act of 1965, local interests must provide lands, easements, and rights-of-way for construction; hold the