
Appendix E

Maps and Additional Study

Information

Appendix E
Maps and Additional Study Information

Table of Contents

	Page
1. Prior Studies and Reports	E-2
2. Description of Existing Federal Project	E-4
3. Existing Channel Structures (Dikes/Revetments).....	E-6
4. New and Modified Channel Structures.....	E-13
5. Notched Dikes/Revetments.....	E-22
6. Maintenance Dredging History	E-24
7. Future Anticipated Dredging Needs.....	E-25
8. Existing Levees in the Study Area.....	E-26

List of Tables

Table E-1	Navigation Pools of the MKARNS	E-4
Table E-2	Eleven Principal Upstream Storage Reservoirs in the Arkansas River Basin	E-5
Table E-3	Existing Channel Structures in Oklahoma.....	E-6
Table E-4	Existing Channel Structures on the MKARNS in Arkansas by Pool	E-7
Table E-5	Structures to be Raised, Extended, or Added in Arkansas.....	E-14
Table E-6	Notched Dikes/Revetments.....	E-22
Table E-7	Maintenance Dredging History on the Verdigris River	E-24
Table E-8	Maintenance Dredging History on the Arkansas River	E-24
Table E-9	Future Anticipated Dredging on the Verdigris River	E-25
Table E-10	Future Anticipated Dredging on the Arkansas River	E-25
Table E-11	Levees Within the ARNS study area.....	E-26

Maps

Arkansas River Navigation Study Maps, Sheets 1-95

1. Prior Studies and Reports

Listed below are some prior reports about the study area in Arkansas:

- (1) McClellan-Kerr Arkansas River Navigation System (MKARNS), Potential for Increased Channel Depths, Initial Appraisal Report, U.S. Army Corps of Engineers, Little Rock District, Operation and Maintenance Funds, October 1998. The report recommendation was for a reconnaissance study to be conducted to determine the economic feasibility of increasing the channel depth of the MKARNS. The report was approved in November 1998 for a proposed new reconnaissance start beginning with FY 2001.
- (2) Rice-Carden Levee, Fort Smith, Arkansas, Section 205, Detailed Project Report and Environmental Assessment, U.S. Army Corps of Engineers, Little Rock District, June 1993. The report was never approved because it was found to be in violation of Executive Order (E.O.) 11988; the study was terminated in 1994.
- (3) May Branch, Fort Smith, Arkansas, Section 205, Reconnaissance Report, U.S. Army Corps of Engineers, Little Rock District, March 1992. The feasibility study cost sharing agreement (FCSA) was signed in November 1998, and the feasibility study is scheduled for completion in September 2001. Total feasibility study cost is \$1,480,000; the city's share is \$740,000.
- (4) Arkansas River Basin, Arkansas and Oklahoma, Feasibility Report, U.S. Army Corps of Engineers, Little Rock District, May 1991. Several operating plans on the MCKARNS were investigated, and the report recommended further investigations. However, the issues associated with those operating plans were never resolved due to the impacts of those plans on floodplain lands and improvements along the Arkansas River.
- (5) Arkansas River Basin, Arkansas and Oklahoma, Feasibility Study, Operational Plans Review Status Report, U.S. Army Corps of Engineers, Little Rock District, March 1988. This report was part of the Arkansas River Basin Feasibility Study and presented a status of the navigation studies and identified and compared the impacts of three operating plans on the MKARNS.
- (6) Arkansas River Basin, Arkansas and Oklahoma, Reconnaissance Report, U.S. Army Corps of Engineers, Little Rock District, August 1986. The purpose of this report was to evaluate the need and opportunities for reducing flood damages and for developing additional municipal, industrial, and water supplies in the Arkansas River Basin. Later on the objectives were expanded to evaluate the potential for improvements to the MKARNS. The report recommended that feasibility studies be conducted.
- (7) Mill Creek, Fort Smith, Arkansas, Section 205, Detailed Project Report, U.S. Army Corps of Engineers, Little Rock District, June 1985. The report recommended a channel improvement project that was constructed in 1992 at a total cost of almost \$9,000,000.
- (8) Little Massard Creek, Fort Smith, Arkansas, Section 205, Detailed Project Report, U.S. Army Corps of Engineers, Little Rock District, June 1983. The report recommended a channel widening and bridge alteration project that was constructed in 1988 at a total cost of \$191,000.

(9) Reconnaissance Report Fort Smith-Van Buren Study, General Investigation, U.S. Army Corps of Engineers, Little Rock District, November 1980. The report recommended that the flooding problems be separated into individual Section 205 studies.

Listed below are some prior reports about the study area in Oklahoma:

(1) Bank and Channel Stabilization of the Arkansas River from Keystone Lake to Webbers Falls Lock & Dam, Oklahoma / Feasibility Report, U.S. Army Corps of Engineers (Tulsa District), December 1977.

(2) The waterway: a report on the Arkansas River navigation system and regional growth, Kerr Foundation: Economic Studies Division - (Oklahoma City), 1977.

(3) Feasibility Report for Extending Navigation from the Port of Catoosa to Vicinity of Wichita, KS, U.S. Army Corps of Engineers (Tulsa District), January 1975.

(4) Coal Electricity and Navigation for the Mid Arkansas Region (1990-2040), Richard J. Bigda & Associates, February 1974

(5) Lock and Dam No. 14, Oklahoma: Design Memorandum No. 10, Navigation Channel, Pools 13 and 14, U.S. Army Corps of Engineers (Tulsa District), July 1967.

(6) Towboats A' Commin' [Motion Picture], U.S. Army Corps of Engineers - Released by National Audiovisual Center, 1967.

(7) Extension of Arkansas River Navigation to S. Central KS, Mid Arkansas Valley Development Association, Inc. (Wichita, KS), 1966.

(8) Survey Report on Central Oklahoma Project - Special Economic Studies, U.S. Army Corps of Engineers (Tulsa District), March 1965.

(9) Central Oklahoma Project, U.S. Army Corps of Engineers (Tulsa District), March 1965.

(10) Lock and Dam No.16, Webbers Falls, Arkansas River, Oklahoma: Design Memorandum No.10, Navigation Lock, U.S. Army Corps of Engineers (Tulsa and Buffalo Districts), November 1964.

(11) Lock and Dam No.15, Robert S. Kerr, Arkansas River, Oklahoma: Design Memorandum No.14, Navigation Lock, U.S. Army Corps of Engineers (Tulsa and Buffalo Districts), May 1964.

(12) Navigation and Sedimentation Conditions at Typical Lock and Dam, Arkansas River, Arkansas and Oklahoma: Hydraulic Model Investigation, U.S. Army Engineer Waterways Experiment Station, Corps of Engineers, Vicksburg, MS., 1963.

(13) The Effect of Proposed Extensions of the Arkansas River Navigation Project on Utilization of Southeastern OK & West AR Coals, Arthur D. Little Inc., October 1962.

2. Description of Existing Federal Project

Within each reservoir, three zones of water storage are present consisting of the flood control pool, the conservation pool, and the inactive pool. The flood control pool is the upper pool and is reserved for retaining floodwaters. It is used only during flood control periods. The conservation pool in the middle zone provides water for power generation, flow regulation, and water supply. The bottom pool or inactive pool provides water pressure for water release and power generation as well as sediment trapping. Water storage is measured in acre-feet, which is the amount of water available to cover 1 acre to a depth of 1 foot.

Table E-1 summarizes the characteristics of each navigation pool.

Table E-1					
Navigation Pools of the MKARNS					
Navigation Pool (NP)	Length (miles)	Surface Area	Capacity	Navigation Mile	Elevation
Oklahoma Pools					
Newt Graham NP	23.2	1,490	2,500	421.6	532 to 511
Chouteau NP	20.2	2,270	23,340	401.4	511 to 490
Webbers Falls Lake	32.5	11,640	170,100	368.9	490 to 460
Robert S. Kerr Lake	32.7	32,800	525,700	336.2	460 to 412
W.D. Mayo NP	16.6	1,595	15,800	319.6	412 to 392
Arkansas Pools					
Hammerschmidt Lake (J.W. Trimble)	26.8	6,820	59,100	292.8	392 to 372
Ozark Lake (Ozark-Jeta Taylor)	36.0	10,600	148,400	256.8	372 to 338
Dardanelle Lake	51.3	34,300	486,200	205.5	338 to 284
Rockefeller Lake (Arthur V. Ormond)	28.6	5,660	64,600	176.9	284 to 265
Toad Suck Ferry NP	21.0	4,130	33,000	155.9	265 to 249
Murray NP	30.5	9,700	87,100	125.4	249 to 231
David D. Terry NP	17.3	4,710	49,500	108.1	231 to 213
Lock & Dam No. 5 NP	21.8	6,680	61,300	86.3	213 to 196
Emmett Sanders NP	20.3	5,680	70,400	66.0	196 to 182
Joe Hardin NP	15.8	3,670	46,400	50.2	182 to 162
No. 2	36.9	10,600	110,080	13.3	162 to 142
Norrell	3.1	140	1,510	10.2	142 to WR

Table E-2 lists the 11 upstream reservoirs and their corresponding flood control storage.

Table E-2		
Eleven Principal Upstream Storage Reservoirs in the Arkansas River Basin		
Project	River	Flood Storage (Acre-Feet)
Keystone	Arkansas	1,180,000
Oologah	Verdigris	965,600
Pensacola	Grand (Neosho)	525,000
Hudson	Grand (Neosho)	244,200
Fort Gibson	Grand (Neosho)	919,200
Tenkiller	Illinois	576,700
Eufaula	Canadian	1,510,800
Kaw	Arkansas	919,400
Hulah	Caney	257,900
Copan	Little Caney	184,300
Wister	Poteau	386,800
Total		7,669,900

3. Existing Channel Structures

Table E-3 summarizes the existing channel structures in Oklahoma.

Table E-3		
Existing Structures in Oklahoma		
Location	Estimated Number	Type of Structure
Left RM 308.6-RM309	8	Dikes/Revetments
Left RM 309.6-RM10.3	3	Dikes/Revetments
Left RM 315.4-RM-317.3	9	Dikes/Revetments
Left RM 317.3-318.0	9	Dikes/Revetments
Right RM 319.2-319.5	3	Dikes/Revetments
Left RM320-321.1	6	Dikes/Revetments- backwater areas
Left RM 321.2-RM323.3	7	Dikes/Revetments- backwater areas
Right RM 321.8.2-323.5	9	Backwater area
Left RM 326.3 -328.0	1	Backwater area
Left RM 328.5-328.8	1	Dikes/Revetments
Right RM 330.4-330.7	1	Dikes/Revetments
Right RM 332.4-332.7	1	Four Dikes/Revetments
Right RM 355.4-RM356.4	1	Dikes/Revetments Confluence with Canadian
Canadian River	1	Long Dikes/Revetments
Left RM363.3-RM364	3	Dikes/Revetments
Left RM367.7-370.9	1	Rip Rap
RM393.2-RM395	1	Dikes/Revetments Field (Muskogee-3 Forks Area)
Right RM394.0-RM394.4	3	Dikes/Revetments
Right up Arkansas Confluence	8	Dikes/Revetments
Left up Arkansas Confluence	8	Dikes/Revetments
Left RM433.7-RM434.2	1	Dikes/Revetments

Table E-4 summarizes the existing channel structures in Arkansas.

Table E-4		
Existing Structures on the MKARNS in Arkansas by Pool		
Pool	Navigation Mile*	Number of Structures
Arkansas In-Stream Structures		
2	19.2-20.18R	4
2	22.6R	1
2	23.0-28.28L	13
2	27.78-33.32R	20
2	31.65-36.60L	21
2	35.05R	2
2	37.20-40.01R	17
2	37.55-40.1L	22
2	41.85-44.17L	9
2	42.84-43.78R	8
2	45.37-45.72L	5
2	45.55-46.73R	8
2	46.66-50.05L	14
2	47.9R	1
2	48.5-50.2R	14
3	50.42-50.88L	6
3	50.65-54.37R	14
3	53.58L	1
3	54.52-56.23R	16
3	55.12L	1
3	56.62-56.67L	2
3	57.2R	1
3	58.25L	1
3	58.52-59.35R	4

Table E-4		
Existing Structures on the MKARNS in Arkansas by Pool		
Pool	Navigation Mile*	Number of Structures
3	60.12-62.15L	16
3	60.12-61.14R	9
3	62.62-63.6R	6
3	63.61-65.38L	8
3	64.36-65.7R	7
4	68.88-71.1R	7
4	69.5-70.7L	14
4	73.75-74.42R	6
4	75.26-75.55L	4
4	76.8R	1
4	78.82-82.57L	13
4	78.47-81.4R	9
4	82.88-86.19R	21
4	86.0-86.08C	1
5	88.55-89.15L	5
5	91.6-92.34R	5
5	91.7-92.4L	4
5	93.2-93.6L	5
5	94.3-95.9L	5
5	98.7-99.5R	5
5	99.8-108.0L	44
5	102.4-104.7R	8
5	107.3-107.8R	3
6	108.5-110.0R	11
6	111.5L	1
6	112.27-112.9R	9

Table E-4		
Existing Structures on the MKARNS in Arkansas by Pool		
Pool	Navigation Mile*	Number of Structures
6	112.9-115.82L	13
6	114.55-118.7R	21
6	117.55-121.6L	13
6	120.16-120.92R	6
6	122.5-124.8L	8
6	122.95-125.05R	12
7	125.5-126.25R	10
7	126.5-128.14L	10
7	128.05-133.0R	20
7	129.6-130.85L	4
7	133.0-136.4L	13
7	133.92-138.0R	8
7	136.98-139.12L	8
7	139.7-143.2R	14
7	145.7-151.3L	22
7	146.13-149.28R	11
7	151.2-155.7R	21
7	153.0-155.6L	7
8	156.05-156.3L	6
8	156.7-156.92R	3
8	158.13-160.15L	11
8	158.9-160.85R	5
8	161.2-167.0L	18
8	162.82-163.48R	5
8	165.4-169.4R	11
8	169.27-176.33L	23
8	171.08-176.6R	25

Table E-4		
Existing Structures on the MKARNS in Arkansas by Pool		
Pool	Navigation Mile*	Number of Structures
9	178.2-185.3R	21
9	179.75-180.25L	3
9	186.1-186.5L	3
9	186.95-193.42R	24
9	188.9-190.28L	9
9	193.48-196.92L	11
9	196.45-198.15R	7
9	198.7-203.37L	17
9	201.54-205.1R	16
Lake Dardanelle (Pool 10)	234.0-236.3R	5
10	236.42-241.05L	13
10	241.5-244.53R	10
10	244.25-246.91L	12
10	247.1-249.64R	14
10	250.75-256.15R	16
10	251.7-256.2L	16
Ozark Lake (Pool 12)	274.78-276.5R	8
12	275.15-276.75L	5
12	279.3-280.48L	5
12	279.58-280.35R	5
12	282.18-283.46L	4
12	282.25-283.57R	9
12	285.4-287.13R	7
12	285.65-289.88L	24
12	289.35-291.56R	11
12	292.05-292.35L	3

Table E-4		
Existing Structures on the MKARNS in Arkansas by Pool		
Pool	Navigation Mile*	Number of Structures
13	293.15-294.23L	5
13	294.35-295.05R	5
13	296.4-297.42L	6
13	297.74-300.35R	8
13	300.65-301.16L	3
13	301.4-305.08R	19
13	302.45-308.65L	18
13	305.98-306.65R	5
Oklahoma In-stream Structures		
13	308.7L	1
13	309.4-311.4L	11
13	309-310R	4
13	311.4L	1
13	313.7-314L	2
13	315-319L	27
13	313.6-315.2R	7
13	316.2-317.8R	8
13	318.4-319.5R	8
13	319.3L	1
W.D. Mayo Lake (Pool 14)	319.8-322.2 L	11
14	320.1-320.8R	6
14	321.3-323.9R	14
14	322.7-324.3L	9
14	324.8-325.4L	2
14	326.3-329L	6
14	330-335.2L	19

Table E-4		
Existing Structures on the MKARNS in Arkansas by Pool		
Pool	Navigation Mile*	Number of Structures
14	326-328.7R	13
14	330.7-331.2R	9
14	332.4-332.7R	4
Robert S. Kerr Lake (Pool 15)	340.6-341.1L	3
15	345L	1
15	358.9-359.6L	1
15	360.5-360.6L	2
15	363.2-364L	3
15	355.8-358.3R	4
15	360.6-361.1R	6
Webber Falls (Pool 16)	392.2-392.9R	12
16	394.3-394.9R	4
16	400.2-400.3R	1
16	366.7-367.7L	2
16	393.4-393.9L	4
Newt Graham Lake (Pool 18)	433.7-434.1L	1
* Navigation miles upstream from the mouth of the White River (WR). Source: MKARNS Navigation Charts, 1997 and USACE, 2004.		

4. New and Modified Channel Structures

Table E-5 lists the structures to be raised, extended, or added to support a 12-foot channel in Arkansas. Refer to Table C-4 in Appendix C, Engineering – Design & Cost, for a list of the new structures needed to support a 12-foot channel in Oklahoma.

**Table E-5
Structures to be Raised, Extended, or Added in Arkansas
To Support a 12-Foot Navigation Channel**

Navigation Mile	Structure Number	Existing Type (*1)	Construction Activity	Typical Section (*2) (Type #) Description	Existing Ground Elevation FT-NGVD	Existing Top Elevation FT-NGVD	Proposed Top Elevation FT-NGVD	Delta Length FT
POOL 2 – REACH 1								
24.2-24.7	47.3L	R	Raise	(1) Dike	146.0	163.0	164.0	0
28.1-28.5	50.2L	R	Extend	(2) Pile Dike	148.0	156.4	166.0	750
27.9	49.8R	D	Raise	(1) Dike	147.0	162.0	166.0	0
28.2	50.1R	D	Raise	(1) Dike	155.0	162.0	166.0	0
28.6	50.5R	D	Raise	(1) Dike	154.0	159.0	166.0	0
31.8-33.2	53.7-54.7L	R	Raise	(1) Dike	158.0	163.0	167.0	0
33.2	54.7L	D	Raise	(1) Dike	157.0	162.5	167.0	0
36.15	57.4L	D	Extend	(1) Dike	155/145	164.0	168.5	100
36.3	57.6L	D	Extend	(2) Pile Dike	155/145	160.0	168.5	100
36.5	57.7L	D	Extend	(2) Pile Dike	155/145	160.0	168.5	100
37.4-38.45	58.85-59.5L	D	Raise	(1) Dike	148.0	153.0	169.0	0
39.15-39.55	60.7L	R	Raise	(1) Dike	155.0	163.5	169.5	0
39.55-39.8	60.9L	R	Raise	(1) Dike	155.0	165.0	169.5	0
39.8	60.9L	D	Raise	(1) Dike	155.0	165.0	169.5	0
39.8-40.25	60.9R	R	Raise	(4) Trench Fill Revt.	155.0	165.0	169.5	0
42.7-43.05	62.93R	R	Raise	(1) Dike	160.0	165.0	171.0	0
43.1-43.4	62.97-63.62R	D	Raise	(1) Dike	160.0	165.0	171.5	0
43.65	63.50R	D	Extend	(1) Dike	160.0	160.0	172.0	250
43.8	63.62R	D	Extend	(1) Dike	160.0	160.0	172.0	300
44	NEW-R	D	NEW	(3) New Dike Const.	160.0	N/A	165.0	460
44.2	NEW-R	D	NEW	(3) New Dike Const.	160.0	N/A	165.0	460
44.4	NEW-R	D	NEW	(3) New Dike Const.	160.0	N/A	165.0	520
44.6	NEW-R	D	NEW	(3) New Dike Const.	160.0	N/A	165.0	600
46.25	68.8R	D	Extend	(1) Dike	155.0	155.0	173.0	225
46.35	69.8R	R	Extend	(1) Dike	150.0	150.0	173.0	365
46.6	68.6L	D	Extend	(1) Dike	155.0	155.0	173.0	275
46.9	68.8L	D	Extend	(1) Dike	155.0	155.0	173.0	300
48.2-48.8	72.0L	R	Extend	(4) Trench Fill Revt.	158.0	172.0	173.5	300
48.7	70.78R	D	Extend	(1) Dike	155.0	155.0	173.5	200
48.8	70.91R	D	Extend	(1) Dike	155.0	155.0	173.5	200
48.9	71.03R	D	Extend	(1) Dike	155.0	155.0	173.5	200
49	71.17R	D	Extend	(1) Dike	155.0	155.0	173.5	200
49.15	71.37R	D	Extend	(1) Dike	155.0	155.0	173.5	50
POOL 3 – REACH 1								
61.18	83.06L	D	Raise	(1) Dike	170.0	180.0	185.4	0

*1 D-Dike; R-Revetment; D/P-Pile Dike; LH-L Head; BW-Bendway Weir.

*2 See Plate 1 “Typical Sections of River Training Structures” for details (Type #).

Table E-5 (Continued)
Structures to be Raised, Extended, or Added in Arkansas
To Support a 12-Foot Navigation Channel

Navigation Mile	Structure Number	Existing Type (*1)	Construction Activity	Typical Section (*2) (Type #) Description	Existing Ground Elevation FT-NGVD	Existing Top Elevation FT-NGVD	Proposed Top Elevation FT-NGVD	Delta Length FT
POOL 4 – REACH 2								
79.3	NEW-L	D	NEW	(3) New Dike Const.	180.0	N/A	200.0	250
79.49	NEW-L	D	NEW	(3) New Dike Const.	180.0	N/A	200.0	250
79.68	NEW-L	D	NEW	(3) New Dike Const.	180.0	N/A	200.0	250
79.87	NEW-L	D	NEW	(3) New Dike Const.	180.0	N/A	200.0	250
POOL 5 – REACH 2								
96.2 - 98.4	NEW-R	R	NEW	(5) Dumped Stone	205.0	N/A	219.0	11900
96	NEW-R	D	NEW	(3) New Dike Const.	205.0	N/A	215.5	350
96.1	NEW-R	D	NEW	(3) New Dike Const.	205.0	N/A	215.5	350
96.2	NEW-R	D	NEW	(3) New Dike Const.	205.0	N/A	215.5	350
96.3	NEW-R	D	NEW	(3) New Dike Const.	205.0	N/A	215.5	350
96.4	NEW-R	D	NEW	(3) New Dike Const.	205.0	N/A	215.5	350
96.5	NEW-R	D	NEW	(3) New Dike Const.	205.0	N/A	215.5	350
96.6	NEW-R	D	NEW	(3) New Dike Const.	205.0	N/A	215.5	350
96.7	NEW-R	D	NEW	(3) New Dike Const.	205.0	N/A	215.5	350
96.8	NEW-R	D	NEW	(3) New Dike Const.	205.0	N/A	215.5	350
96.9	NEW-R	D	NEW	(3) New Dike Const.	205.0	N/A	215.5	350
97	NEW-R	D	NEW	(3) New Dike Const.	205.0	N/A	215.5	350
97.1	NEW-R	D	NEW	(3) New Dike Const.	205.0	N/A	215.5	350
97.2	NEW-R	D	NEW	(3) New Dike Const.	205.0	N/A	215.5	350
97.3	NEW-R	D	NEW	(3) New Dike Const.	205.0	N/A	215.5	350
97.4	NEW-R	D	NEW	(3) New Dike Const.	205.0	N/A	215.5	350
97.5	NEW-R	D	NEW	(3) New Dike Const.	205.0	N/A	215.5	350
97.6	NEW-R	D	NEW	(3) New Dike Const.	205.0	N/A	215.5	350
97.7	NEW-R	D	NEW	(3) New Dike Const.	205.0	N/A	215.5	350
97.8	NEW-R	D	NEW	(3) New Dike Const.	205.0	N/A	215.5	350
97.9	NEW-R	D	NEW	(3) New Dike Const.	205.0	N/A	215.5	350
100.76	NEW-R	BW	NEW	(6) Bendway Weir	185.0	N/A	195.0	300
100.85	NEW-R	BW	NEW	(6) Bendway Weir	185.0	N/A	195.0	300
100.95	NEW-R	BW	NEW	(6) Bendway Weir	185.0	N/A	195.0	300
101.4	NEW-R	BW	NEW	(6) Bendway Weir	188.0	N/A	195.0	300
101.14	NEW-R	BW	NEW	(6) Bendway Weir	190.0	N/A	195.0	300
101.23	NEW-R	BW	NEW	(6) Bendway Weir	190.0	N/A	195.0	200
101.7	148.1L	LH	Raise	(1) Dike	193.0	212.0	217.8	0
101.9	148.3L	LH	Raise	(1) Dike	194.0	208.5	217.8	0
102.1	148.4L	LH	Raise	(1) Dike	190.0	204.5	217.8	0
102.4	148.7L	LH	Raise	(1) Dike	191.6	209.3	217.9	0

*1 D-Dike; R-Revetment; D/P-Pile Dike; LH-L Head; BW-Bendway Weir.

*2 See Plate 1 “Typical Sections of River Training Structures” for details (Type #).

Table E-5 (Continued)
Structures to be Raised, Extended, or Added in Arkansas
To Support a 12-Foot Navigation Channel

Navigation Mile	Structure Number	Existing Type (*1)	Construction Activity	Typical Section (*2) (Type #) Description	Existing Ground Elevation FT-NGVD	Existing Top Elevation FT-NGVD	Proposed Top Elevation FT-NGVD	Delta Length FT
POOL 7 – REACH 3								
126.9	173.2L	D	Extend	(1) Dike	235.2	242.9	251.0	150
127.1	173.4L	LH	Raise	(1) Dike	214.8	239.3	251.0	0
127.3	173.6L	LH	Raise	(1) Dike	206.3	236.3	251.0	0
127.45	173.7L	LH	Raise	(1) Dike	220.6	236.3	251.0	0
142.51	188.0R	LH	Raise	(1) Dike	239.3	251.4	254.3	0
142.51	188.0R	D	Extend	(1) Dike	239.3	245.4	254.3	50
142.69	NEW-R	D	NEW	(3) New Dike Const.	238.0	N/A	256.2	500
142.9	188.4R	D	Extend	(1) Dike	229.0	252.9	254.6	400
143.05	188.6R	D	Extend	(1) Dike	229.3	252.6	254.6	300
143.2	188.7R	D	Extend	(1) Dike	241.6	250.0	254.6	200
145.09	NEW-L	D	NEW	(3) New Dike Const.	240.0	N/A	255.3	375
145.25	NEW-L	D	NEW	(3) New Dike Const.	240.0	N/A	255.3	375
145.4	NEW-L	D	NEW	(3) New Dike Const.	240.0	N/A	255.3	400
145.55	NEW-L	D	NEW	(3) New Dike Const.	240.0	N/A	255.3	400
145.7	191.2L	D	Extend	(1) Dike	240.5	252.7	255.5	200
145.9	191.4L	D	Extend	(1) Dike	241.5	251.2	255.6	200
146.2	191.7L	D	Extend	(1) Dike	239.6	251.7	256.0	300
146.52	191.9L	D	Extend	(1) Dike	229.7	252.7	256.0	300
146.88	192.3L	D	Extend	(1) Dike	239.8	245.7	256.0	300
147.1	192.6L	D	Extend	(1) Dike	240.7	244.7	256.0	200
147.28	192.8L	D	Extend	(1) Dike	239.6	244.7	256.1	200
147.52	193.0L	D	Extend	(1) Dike	239.7	245.7	256.2	200
POOL 8 – REACH 3								
164.6	209.4L	D	Raise	(1) Dike	255.8	266.5	270.0	0
164.9	209.7L	LH	Raise	(1) Dike	230.1	250.1	270.0	0
169.27	217.3L	D	Extend	(1) Dike	253.8	260.8	273.0	100
169.4	217.4L	D	Extend	(1) Dike	250.8	260.8	273.0	100
169.5	217.5L	D	Extend	(1) Dike	257.9	260.9	273.0	50
169.6	217.6L	D	Extend	(1) Dike	256.9	260.9	273.0	150
169.8	217.7L	D	Extend	(1) Dike	260.0	271.9	273.0	250
170.1	218.1L	D/P	Extend	(2) Pile Dike	260.4	268.4	273.0	250

*1 D-Dike; R-Revetment; D/P-Pile Dike; LH-L Head; BW-Bendway Weir.*2 See Plate 1 “Typical Sections of River Training Structures” for details (Type #).

*2 See Plate 1 “Typical Sections of River Training Structures” for details (Type #).

Table A-10 (Continued)
Structures to be Raised, Extended, or Added in Arkansas
To Support a 12-Foot Navigation Channel

Navigation Mile	Structure Number	Existing Type (*1)	Construction Activity	Typical Section (*2) (Type #) Description	Existing Ground Elevation FT-NGVD	Existing Top Elevation FT-NGVD	Proposed Top Elevation FT-NGVD	Delta Length FT
POOL 9 – REACH 3								
181.5	229.4R	D	Extend	(1) Dike	266.7	284.4	288.0	150
181.8	229.7R	D	Extend	(1) Dike	265.5	283.5	288.0	150
182.2	230.0R	D	Extend	(1) Dike	273.0	282.0	288.0	150
184.6	232.1R	D	Extend	(1) Dike	278.3	282.3	288.0	100
184.9	232.4R	D/P	Extend	(2) Pile Dike	270.8	284.3	288.0	100
185.2	232.7R	D/P	Extend	(2) Pile Dike	273.8	284.3	288.0	100
185.3	232.8R	D/P	Extend	(2) Pile Dike	261.3	282.1	288.0	100
186.95 - 187.05	234.5R	VD	Raise	(1) Dike	275.0	286.0	289.0	0
187.3	234.9R	D	Raise	(1) Dike	272.6	286.0	289.0	0
189.8 - 190.5	237.9L	R	Raise	(1) Dike	279.0	287.0	290.2	0
DARDANELLE – REACH 4								
236.3	288.4R	D	Extend	(1) Dike	330.3	338.7	340.0	100
236.75 - 237.42	290.0R	R	Raise	(4) Trench Fill Revet.	317.4	339.0	340.0	0
238.95	291.3L	D	Raise	(1) Dike	326.0	336.3	340.0	0
239.28	291.6L	D	Extend	(1) Dike	329.3	336.5	340.0	50
239.8	292.3L	D	Extend	(1) Dike	329.6	338.3	340.0	50
240.15	292.5L	D	Extend	(1) Dike	321.4	335.0	340.0	100
240.46	292.9L	D	Extend	(1) Dike	333.0	339.0	340.0	100
240.78	293.1L	D	Extend	(1) Dike	335.6	337.9	340.3	100
241.05	293.4L	D	Extend	(1) Dike	327.6	337.3	340.5	100
241.05 - 241.5	293.7L	R	Extend	(4) Trench Fill Revet.	325.5	335.5	340.5	100
241.5	293.7R	D	Extend	(1) Dike	328.6	337.0	340.5	100
241.73	293.9R	D	Extend	(1) Dike	327.5	340.8	342.0	200
242	294.1R	D	Extend	(1) Dike	330.9	337.8	342.0	200
242.12	294.3R	D	Extend	(1) Dike	330.0	339.8	342.0	200
242.28	294.4R	D	Extend	(1) Dike	330.8	342.5	342.0	200

Table E-5 (Continued)
Structures to be Raised, Extended, or Added in Arkansas
To Support a 12-Foot Navigation Channel

Navigation Mile	Structure Number	Existing Type (*1)	Construction Activity	Typical Section (*2) (Type #) Description	Existing Ground Elevation FT-NGVD	Existing Top Elevation FT-NGVD	Proposed Top Elevation FT-NGVD	Delta Length FT
OZARK – REACH 4								
275.15	327.6L	D	Raise	(1) Dike	361.3	373.3	374.5	0
275.25	327.7R	D	Raise	(1) Dike	354.8	364.2	374.5	0
275.3	327.9L	D	Raise	(1) Dike	356.0	357.0	374.5	0
275.49	328.0L	D/R	Raise	(1) Dike	355.8	364.8	374.5	0
275.55	328.0R	D	Raise	(1) Dike	362.7	366.8	374.6	0
275.85	328.4R	D	Raise	(1) Dike	356.8	357.0	374.8	0
276.2	328.7R	D	Raise	(1) Dike	356.8	369.0	375.0	0
279.58	333.6R	D	Extend	(1) Dike	352.8	373.3	376.0	200
279.8	333.8R	D	Extend	(1) Dike	361.8	373.2	376.3	200
280.05	333.9R	D	Extend	(1) Dike	357.8	373.8	376.8	200
278.9 - 280.25	334.0L	R	Raise	(1) Dike	362.1	371.8	376.5	0
280.2	334.0R	D	Extend	(1) Dike	358.8	373.6	376.6	100
280.3 - 280.6	334.3R	R	Extend	(4) Trench Fill Revet.	361.3	374.0	376.7	400
280.48	334.3L	D	Extend	(1) Dike	356.8	372.2	376.7	100
280.67	NEW-L	D	NEW	(3) New Dike Const.	365.0	N/A	376.9	700
280.86	NEW-L	D	NEW	(3) New Dike Const.	365.0	N/A	377.0	450
283.76	NEW-R	D	NEW	(3) New Dike Const.	365.0	N/A	378.3	100
283.35 - 283.8	337.5L	R	Raise	(1) Dike	359.6	374.0	378.3	0
283.95	NEW-R	D	NEW	(3) New Dike Const.	365.0	N/A	378.5	100
284.1	NEW-R	D	NEW	(3) New Dike Const.	365.0	N/A	378.5	100
285.4	339.4R	LH	Raise	(1) Dike	360.6	375.2	381.0	0
285.4	NEW-L	D	NEW	(3) New Dike Const.	365.0	N/A	379.0	400
285.65	339.5L	D	Raise	(1) Dike	357.5	374.6	379.1	0
285.9	339.7L	D	Raise	(1) Dike	359.5	373.0	379.2	0

*1 D-Dike; R-Revetment; D/P-Pile Dike; LH-L Head; BW-Bendway Weir.

*2 See Plate 1 “Typical Sections of River Training Structures” for details (Type #).

5. Notched Dikes/Revetments

Table E-6 shows the location of the notched dikes and revetments along the MKARNS.

Table E-6		
Notched Dikes/Revetments		
Arkansas River Notching Projects Completed as of 2/22/02		
Project Type	Navigation Mile	River Pool
Dike Notch	78.7 left bank	Pool 4
Revetment Notch*	91.0 left bank	Pool 5
Revetment Notch	98.5 left bank	Pool 5
Revetment Notch*	104.1 right bank	Pool 5
Dike Notch	106.5 left bank	Pool 5
Revetment Notch	107 left bank	Pool 5
Revetment Notch	107.2 left bank	Pool 5
Dike Notch	116 right bank	Pool 6
Dike Notch	116.3 right bank	Pool 6
Dike Notch	116.6 right bank	Pool 6
Dike Notch	116.8 right bank	Pool 6
Dike Notch	117.1 right bank	Pool 6
Dike Notch	117.25 right bank	Pool 6
Dike Notch	117.4 right bank	Pool 6
Dike Notch	117.55 right bank	Pool 6
Dike Notch	117.7 right bank	Pool 6
Dike Notch	120.3 right bank	Pool 6
Dike Notch	120.4 left bank	Pool 6
Dike Notch	120.5 right bank	Pool 6
Dike Notch	120.65 right bank	Pool 6
Dike Notch	120.8 right bank	Pool 6
Dike Notch	120.8 left bank	Pool 6
Revetment Notch	122.7 left bank	Pool 6
Dike Notch	125.7 right bank	Pool 7
Dike Notch	146.15 right bank	Pool 7
Dike Notch	146.3 right bank	Pool 7
Dike Notch	146.6 right bank	Pool 7
Dike Notch	150.9 left bank	Pool 7
Dike Notch	151.3 left bank	Pool 7
Dike Notch	151.9 right bank	Pool 7
Dike Notch	152.1 right bank	Pool 7
Dike Notch	152.4 right bank	Pool 7
Dike Notch	152.6 right bank	Pool 7

Table E-6		
Notched Dikes/Revetments		
Arkansas River Notching Projects Completed as of 2/22/02		
Project Type	Navigation Mile	River Pool
Dike Notch	152.9 right bank	Pool 7
Dike Notch	153.2 right bank	Pool 7
Dike Notch	153.45 right bank	Pool 7
Dike Notch	154 right bank	Pool 7
Dike Notch	154.2 right bank	Pool 7
Dike Notch	154.5 right bank	Pool 7
Revetment Notch*	156.75 right bank	Pool 8
Revetment Notch*	156.9 right bank	Pool 8
Revetment Notch*	157 right bank	Pool 8
Dike Notch	241.1 left bank	Pool 10
Revetment Notch*	241.2 left bank	Pool 10
* Indicates shallow, narrow notch for fish passage only, not boats		

6. Maintenance Dredging History

Tables E-7 and E-8 show the historic maintenance dredging quantities on the Verdigris and Arkansas Rivers in Oklahoma.

Table E-7			
Maintenance Dredging History on the Verdigris River			
Navigation Mile	Site No.	Quantities (cy)	Location
444.6 – 445	18A	957,050	Bird Creek/Verdigris River & Port of Catoosa Area, NM 444 to 445
444 - 445	18B		Bird Creek/Verdigris River & Port of Catoosa Area, NM 444 to 445
421.6 - 422.2	18C	61,570	Above L&D 18, NM 421 to 422
420.8 -421.6	17A	387,400	Below L&D 18 Good Hope Area, NM 420 to 421
401.6 - 402.6	17B	292,960	Above L&D 17, NM 401 to 403
400.5 - 401	16A & A-1	384,720	Below L&D 17 & Confluence of Spillway Channel, NM 400 to 401
395 - 395.5	16B & C	621,950	Three Forks, Verdigris River Area

Table E-8			
Maintenance Dredging History on the Arkansas River			
Navigation Mile	Site No.	Quantities (cy)	Location
394 - 395	16B, C & 16D	392,410	Three Forks, Arkansas River Area
393 - 395	16E & G	-----	Three Forks, Arkansas River Area
392.8 - 393.3	16F & G	104,892	Three Forks, Highway 62 Bridge Area
353 - 356	15A & A-1	117,210	Stoney Point & Confluence of Canadian River Area, NM 353 to 357
348 - 349.5	15B & B-1	-----	Sandtown Bottom, Tamaha Area, NM 348 to 350
6.5 - 7.5 SBC	15C & C-1	-----	Sans Bois Creek
8 - 11 SBC	15D, E & 15F	-----	Sans Bois Creek
318.3 - 319.1	13A	379,445	Below L&D 14, NM 318 to 319
315 - 317.2	13B		Pool 13 Peno Point Area, NM 315 to 317
311.8 - 313.9	13C	513,227	Pool 13 Camp Creek Area, NM 312 to 314
308.8 - 311	13D	288,400	Right descending Ark River @ Poteau River
0.0 – 2.0 PR	13E	-----	Adjacent to Poteau River Turning Basin

7. Future Anticipated Dredging Needs

Tables E-9 and E-10 show the future anticipated dredging needs on the Verdigris and Arkansas rivers in Oklahoma from 2003 to 2023.

Table E-9			
Future Anticipated Dredging on the Verdigris River			
Navigation Mile	Site No.	Quantities (cy)	Location
444.6 - 445	18A	600,000	Bird Creek/Verdigris River & Port of Catoosa Area
444 - 445	18B		Bird Creek/Verdigris River & Port of Catoosa Area
421.6 - 422.2	18C	100,000	Above L&D 18
420.8 -421.6	17A	500,000	Below L&D 18 Good Hope
401.6 - 402.6	17B	300,000	Above L&D 17
400.5 - 401	16A & A-1	400,000	Below L&D 17 & Confluence of Spillway Channel
395 - 395.5	16B & C	900,000	Three Forks, Verdigris River Area

Table E-10			
Future Anticipated Dredging on the Arkansas River			
Navigation Mile	Site No.	Quantities (cy)	Location
393 - 395	16D & E	1,300,000	Three Forks, Arkansas River Area
393 - 395	16G		Three Forks, Arkansas River Area
392.8 - 393.3	16F & G	500,000	Three Forks, Highway 62 Bridge Area
353 - 356	15A & A-1	100,000	Stoney Point & Confluence of Canadian River Area
348 - 349.5	15B & B-1	100,000	Sandtown Bottom, Tamaha Area
6.9 - 7.4 SBC	15C & C-1	200,000	Sans Bois Creek
8 - 11 SBC	15D, E & 15F	300,000	Sans Bois Creek
318.3 - 319.1	13A	200,000	Below L&D 14
315 - 317.2	13B	500,000	Pool 13 Peno Point Area
311.8 - 313.9	13C	500,000	Pool 13 Camp Creek Area
308.6 - 312	13D	300,000	Right descending Ark River @ Poteau River
0.0 - 2.0 Poteau River	13E	200,000	Adjacent to Poteau River Turning Basin

Beginning dredging in or around any areas described in this document depends on actual conditions. Unexpected high flows may dictate when actual dredging is required for any given site. Sediment load varies and bed load displacement may require dredging sooner than anticipated.

8. Existing Levees

Table E-11 summarizes the levees located within the study area.

Table E-11. Levees within the Arkansas River Navigation Study Area	
MKARNS POOL	LEVEE
White River	Levee Mile 7, 8.5, and 9.2
Pool 1	Levee Mile 11
Pool 2	Pendleton Levee
Pool 2	South Bend Levee
Pool 2	Farely Lake Levee District
Pool 2	North Bank Levee Below Plum Bayou
Pool 2	Jefferson County Levee District No. 3
Pool 2	Southeast Arkansas Levee District
Pool 3	Jefferson County Levee District No. 3
Pool 3	Southeast Arkansas Levee District
Pool 3	North Bank Levee Below Plum Bayou
Pool 3	New Gascony Levee District
Pool 3	Linwood - Auburn Levee District
Pool 4	Linwood - Auburn Levee District
Pool 4	Non-Overflow Structure (USACE)
Pool 4	Tucker Lake Levee & Drainage District
Pool 4	Plum Bayou Levee District
Pool 5	T. A. Gibson Private Levee
Pool 5	Plum Bayou Levee District
Pool 5	Old River Drainage District
Pool 5	Woodson Levee District
Pool 5	Fourche Island Drainage District No. 2
D. D. Terry Lake	Fourche Island Drainage District No. 2
D. D. Terry Lake	Little Rock – Pulaski Drainage District No. 2
D. D. Terry Lake	North Little Rock Levee & Floodwall
D. D. Terry Lake	W. D. Cammack Private Levee
Pool 7	Roland Drainage District Levee
Pool 7	Faulkner County Levee District No. 2
Pool 7	Perry County Levee No. 1
Pool 7	Faulkner County Levee District No. 1
Pool 8	Conway County Levee District Nos. 1, 6, 8 and 10
Winthrop Rockefeller Lake	Conway County Levee District No. 1, 3 and 7
Winthrop Rockefeller Lake	Pope County Levee & Drainage District No. 2
Winthrop Rockefeller Lake	Galla Creek Levee
Winthrop Rockefeller Lake	Carden Bottoms Drainage District No. 2
Winthrop Rockefeller Lake	Holla Bend Levee District No. 1
Winthrop Rockefeller Lake	Point Bar Levee
Winthrop Rockefeller Lake	Flagg Lake Levee
Winthrop Rockefeller Lake	Dardanelle Drainage District Levee
Lake Dardanelle	Lower Hartman Bottom Levee
Lake Dardanelle	McLean Bottom Levee District No. 3
Ozark Lake	Crawford County Levee District
Pool 13	Crawford County Levee District
Pool 13	Van Buren Levee District No. 1
Pool 13	Southern Enterprises Private Levee
Pool 13	Fort Smith Levee Improvement District No. 1

Table E-11. Levees within the Arkansas River Navigation Study Area	
MKARNS POOL	LEVEE
Chouteau Lake	Highway 51
Chouteau Lake	Oxbow Island Park
Newt Graham	Rogers Point Park
Source: MKARNS Navigation Charts, 1997	