Appendix B
Inventory of Existing Locks

Section I
General

B-1. Contents

Existing locks operated by the Corps of Engineers are a broad spectrum of hydraulic design practice. The variation is due to historical development with regard to valves, gates, and manifolds; to increasing demands with regard to higher lifts, shorter operation times, and better chamber performance; and to a similarly broad variation in site-specific constraints. This discussion is a brief overview of materials available in greater detail in EC 1110-2-230, EP 1105-2-11, and CEWRC-NDC Bulletin Board updates.

Geometric details are also available for a more limited set of designs in the CE computer database CORPS H5300, "CE Lock Hydraulic Model Tests," as described in Chapter 5, main text, and Appendix C.

Section II
Valves and Gates

B-2. Valves

Valves control flow into and out of the lock chamber. Several different types have been used, but in recent years all locks with culvert systems have used reverse tainter valves. Recent end systems have used chamber sector gates. The side port flume system (Plate 3-2) uses slide valves. The following six types of valves are in use at existing projects:

a. Slide valve.

b. Wagon valve (wheeled vertical-lift valve).

c. Stoney valve.

d. Butterfly valve.

e. Tainter valve.

f. Reverse tainter valve.

A reverse tainter valve is shown in Figure B-1. Hydraulic design of lock valves is presented in EM 1110-2-1610.

B-3. Gates

Lock gates provide closure between the chamber and the upper and lower approaches during lock operation and opening for navigation passage at upper and lower pool elevations. Eight types of closure devices are being used for lock gates. Recent end-system design practice is to use vertical-axis sector gates. Other types of designs use (not exclusively) miter gates. The eight existing gate types are described briefly in *a*-*h* below.

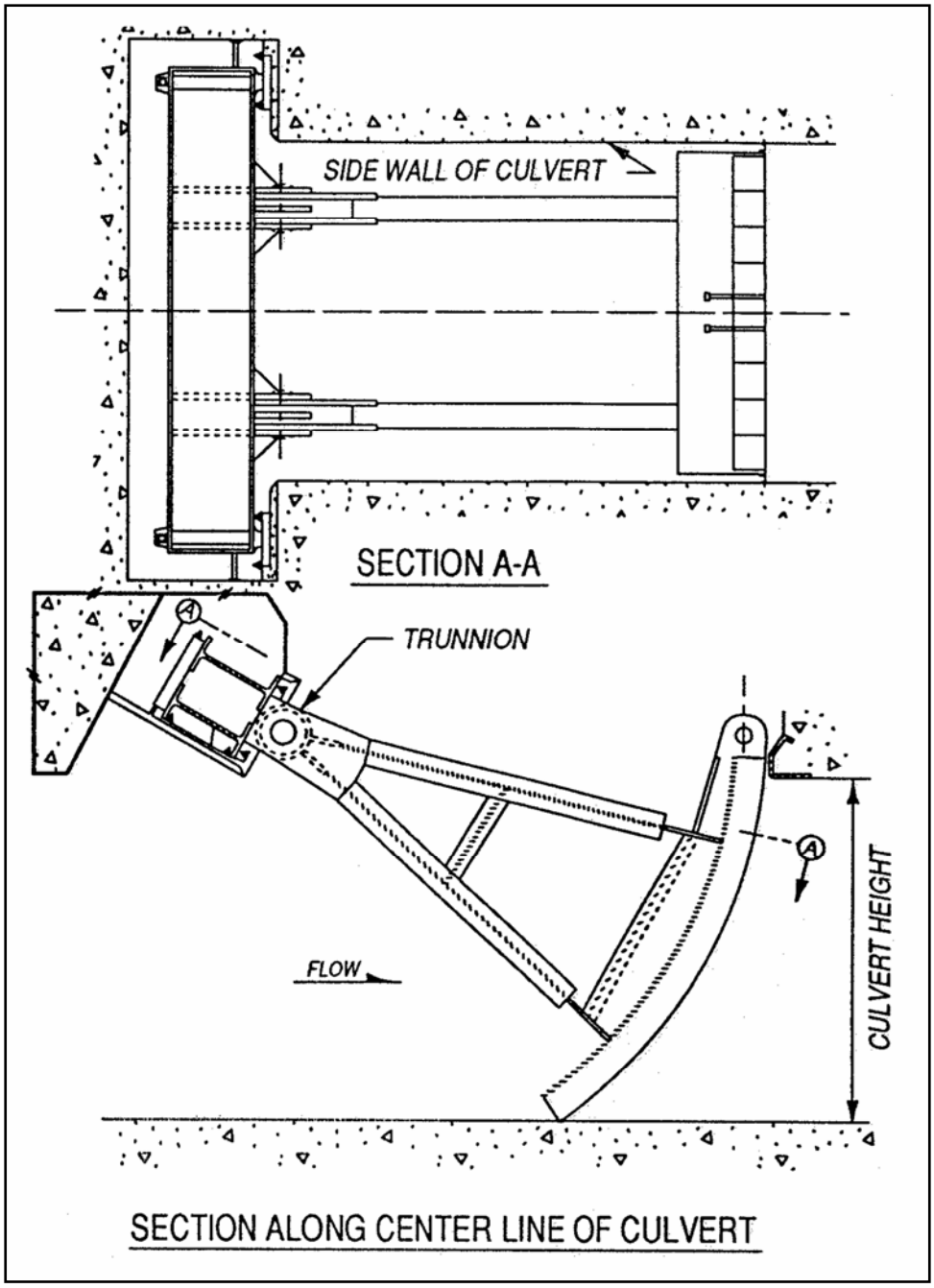

Figure B-1. Reverse tainter valve

a. Miter gates. A miter gate has two parts or leaves. The miter gate derives its name from the fact that the two leaves meet at an angle pointing upstream to resemble a miter joint. Horizontally framed miter gates possess many advantages over other types and have been used on more locks than any other kind. Miter gates are rugged, do not involve complicated construction problems, are easily serviced, and are fast operating. Drawbacks are their inability to operate under head and to withstand substantial reverse head. Figure B-2 illustrates a typical miter gate installation.

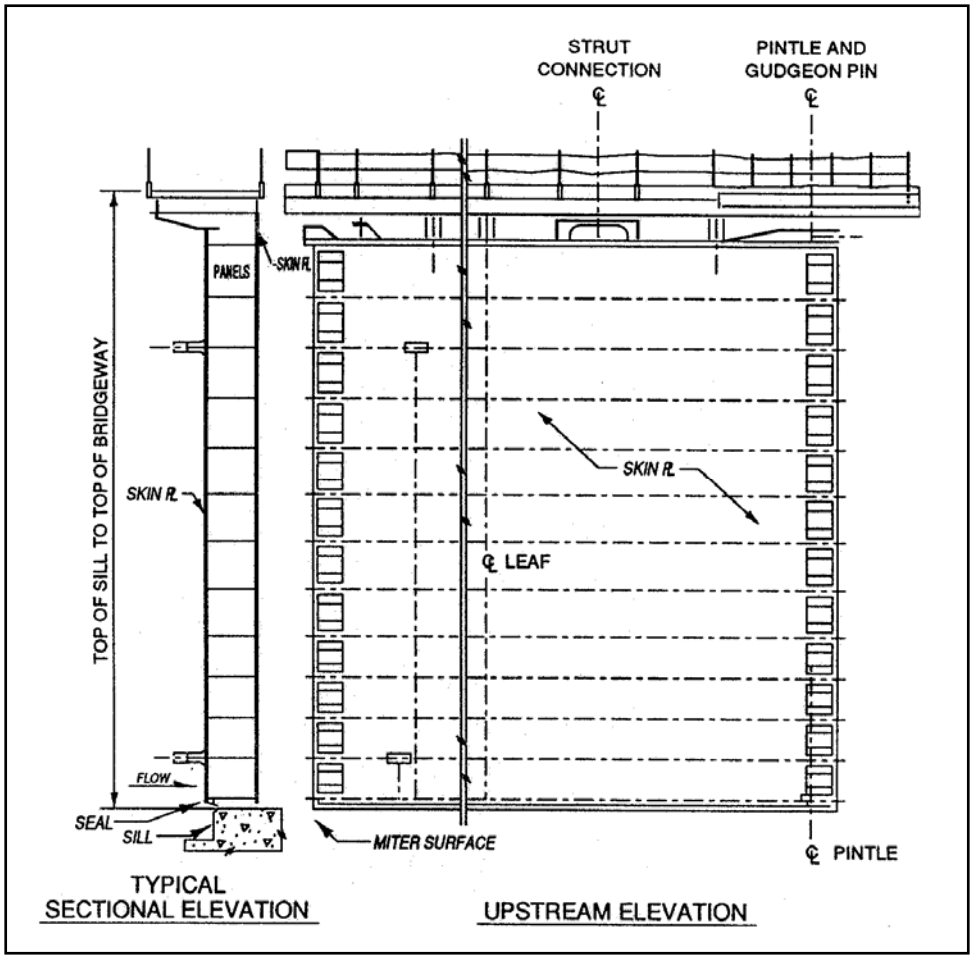

Figure B-2. Miter gate

b. Submergible vertical-lift gate. Submergible vertical-lift gates can sometimes be used to advantage at the upstream end of a lock. If the lift is high enough, a single leaf gate can be designed so that when it is lowered it drops down along the downstream vertical face of the upstream sill block. If the lift is not as great as the upstream sill depth, the gate may have two leaves that telescope together when they are lowered. It is not advisable to try to use a submergible vertical-lift gate in a situation where the leaf or leaves would have to rest in a bottom recess when the gate is lowered. Debris and silt would cause operation problems and lead to high maintenance costs. A vertical-lift gate can be designed to resist reverse head as well as direct head and can be designed to operate under either direct head or reverse head. The disadvantages are high maintenance and operation costs, difficulty in controlling skew and misalignment, and greater vulnerability to damage from collision than miter gates. Figure B-3 shows a typical submergible double-leaf, vertical-lift gate.

c. Overhead vertical-lift gate. The overhead vertical-lift gate has been used as the downstream gate at several locks where the lift is great enough to provide sufficient overhead clearance when the gate is in the raised position. This type of gate has been used at the downstream end of the John Day, Ice Harbor, and Lower Monumental Locks. Overhead lift gates at these locks are very rugged and heavy. They possess the same general advantages as the submergible lift gates, but require a longer operation time--2 to 3 min. Operation and maintenance problems are not as great with overhead lift gates as with submergible gates. Figure B-4 shows a typical overhead vertical lift gate.

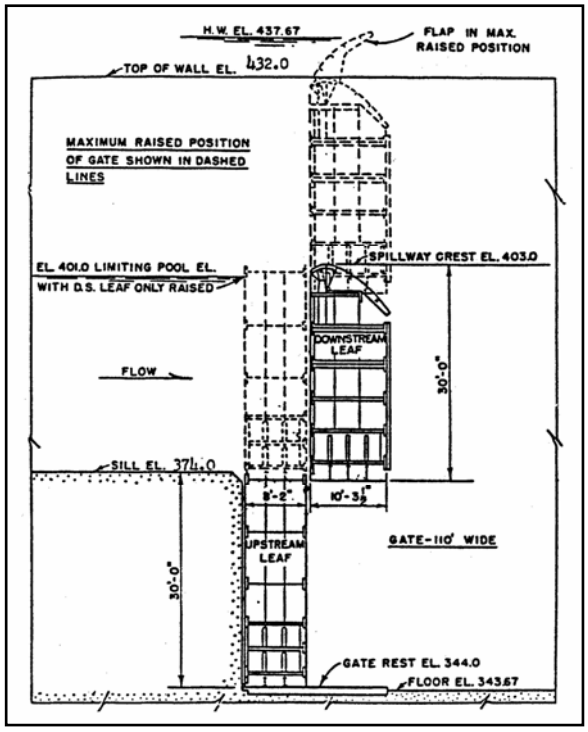

Figure B-3. Submergible vertical-lift gate

Figure B-4. Overhead vertical-lift gate

d. Submergible tainter gate. Submergible tainter gates have the same advantages as submergible lift gates, but are subject to the same limitations with regard to their use in a low- or medium-lift situation. The lift must be great enough to permit the gate to submerge to below the sill without resting directly on the lock floor. There are fewer operating and maintenance problems with submergible tainter gates than with vertical-lift gates. A typical submergible tainter lock gate is shown in Figure B-5.

e. Vertical axis sector gates. A vertical axis lock sector gate, like a miter gate, requires two gates at each end to effect closure of a lock chamber. Sector gates might be compared to a pair of tainter gates where the trunnions are mounted on a vertical axis. Sector gates are used in pairs and are designed to rotate around a vertical axis and meet at the center line of the lock chamber. Since the hydrostatic pressure is toward the gate axis, there is very little unbalanced hydraulic force opposing opening or closing under any condition of head. Figure B-6 shows a plan of a typical sector gate. Since sector gates can be opened or closed under a head, they can be used as a means of filling and emptying locks with very low lifts. Sector gates can be designed to withstand head from either direction and are very useful at a tidal lock or at any situation where reversal of head occurs. The two principal disadvantages are their cost and the amount of horizontal space required.

f. Rolling gate. A rolling gate consists of a structural steel frame with a skin plate, arranged to roll horizontally across the lock chamber from a recess in one lock wall. The structure moves on flanged wheels riding on rails embedded in the lock sill. When the gate is in the closed position, each end extends into a recess in each wall. When the gate is opened, it is pulled back into a recess in one wall that is long enough to receive the entire gate length. This type of gate was used in early canalization of the Ohio River before miter gates were developed that span 110-ft-wide locks. Several other early lock projects used this type of gate, but it has been entirely supplanted by other gate types in recent years. Rolling gates are still being used on recent large lock projects in Europe. Use of this type of gate complicates design of a filling system.

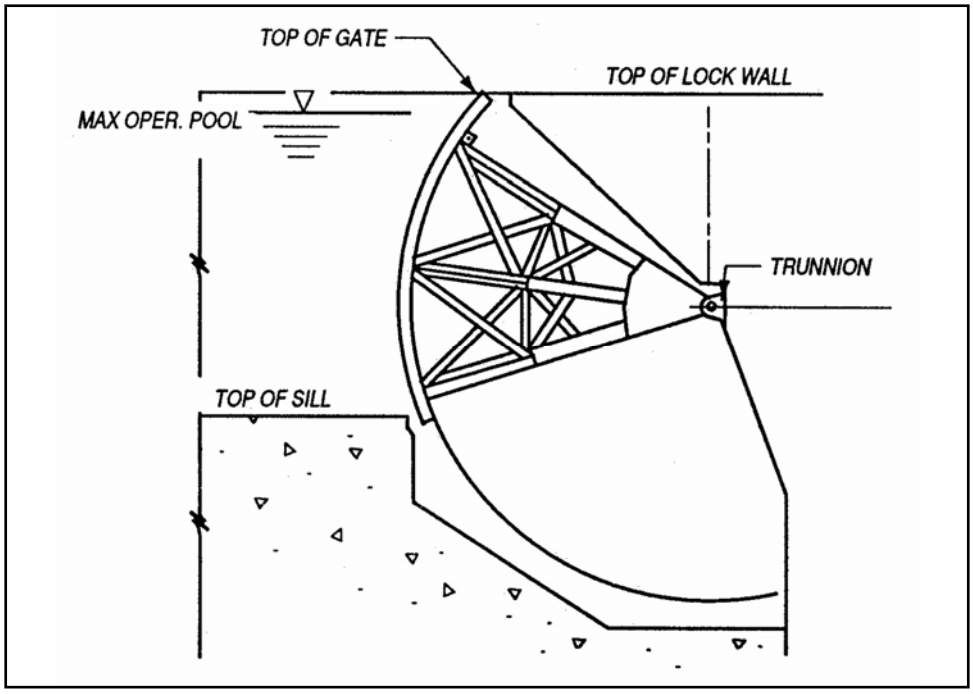

Figure B-5. Submergible tainter gate

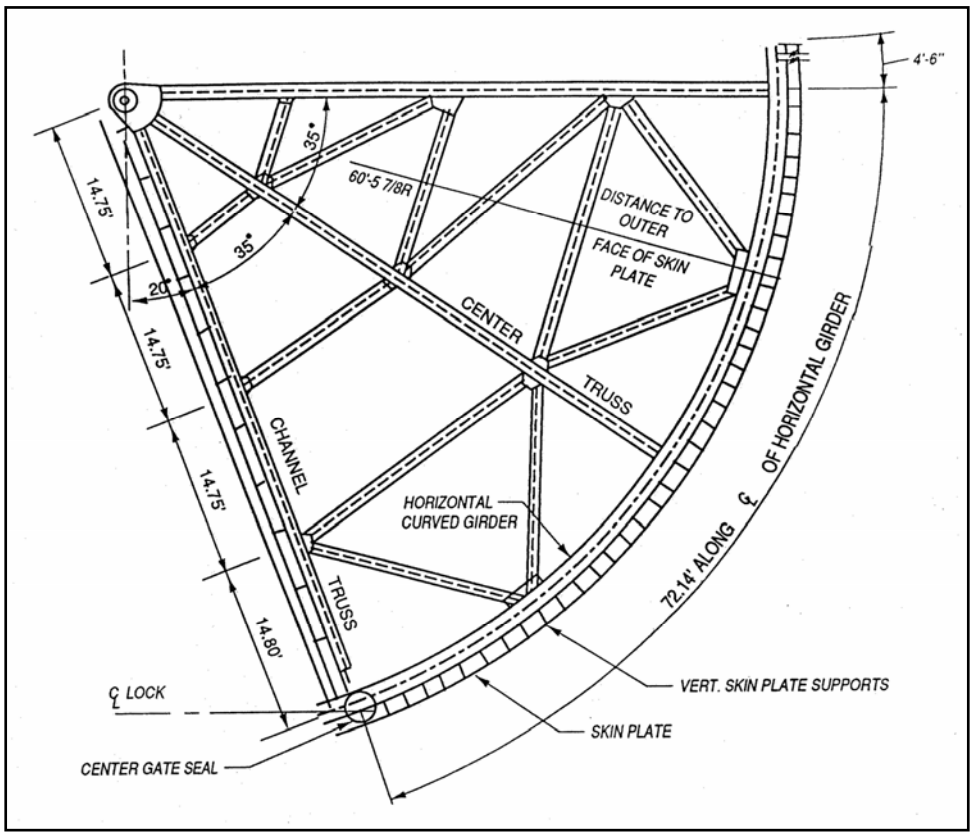

Figure B-6. Sector gate

g. Tumbler gate. A tumbler gate is a single gate leaf with a horizontal hinge across the lock sill. In the open position, the leaf lies flat on the bottom of the lock chamber. To close the gate, the free edge of the gate is pulled upward in an arc and is retained in the vertical position by a locking mechanism. There is only one CE lock that uses this type of gate, and this design is considered to be obsolete.

h. Rising sector gate. The rising sector gate is a relatively new gate design. It is currently being used in Europe for locks that are approximately 75 ft wide and also as a flood barrier gate in England. This type of gate is essentially a segment of a circle attached to horizontal axis trunnion arms mounted on pivots at each end. When the gate is in the raised position, the curved surface of the segment closes the space between the sill and the water surface. When the gate is lowered, it is rotated 90 deg so that the segment then occupies a recess in the sill. In this position the gate causes no obstruction to traffic. Since this gate is untried for large locks, its reliability, usefulness, and cost are unknown.

Section III
Culvert-to-Chamber Designs

B-4. General

The categories and descriptions presented here and referenced by acronym in Section IV are qualitative rather than detailed. Details are available from design memoranda and drawings retained at the pertinent CE District or Division office. The designs are first subdivided into Aend@ systems and Aculvert@ systems. For end systems the filling and emptying flow passages are independent and are normally located in or around the upper gate (filling) and lower gate (emptying). For culvert systems the flow passages are connected so that discharge ports for filling become intake ports for emptying. Within each of these two divisions, specific design concepts are identified, labeled by acronym, and briefly described.

B-5. End Systems

Six different types of end systems are used.

a. Valves in gates and lock walls. Ports through the chamber gates (miter, vertical lift, or rolling) or lock walls are equipped with valves (slide or butterfly) that can be opened to let water into or out of the chamber. Figure B-7 shows a view of a miter gate with butterfly valves. Acronyms are

(1) BG = butterfly valve(s) in gate

(2) VG = other type valve(s) in gate

(3) BW = butterfly valve(s) in wall

(4) CW = cylinder valve(s) in wall

b. Loop culverts. Culverts with valves, which conduct flow around the gates, are placed in the upper and lower gate blocks. The lock is filled or emptied by operating the valves. Locks with passageways and valves in the sill (below the gate) are also in operation. Acronyms are

(1) LC = loop culvert

(2) LCSG = loop culvert and sector gate (dual system)

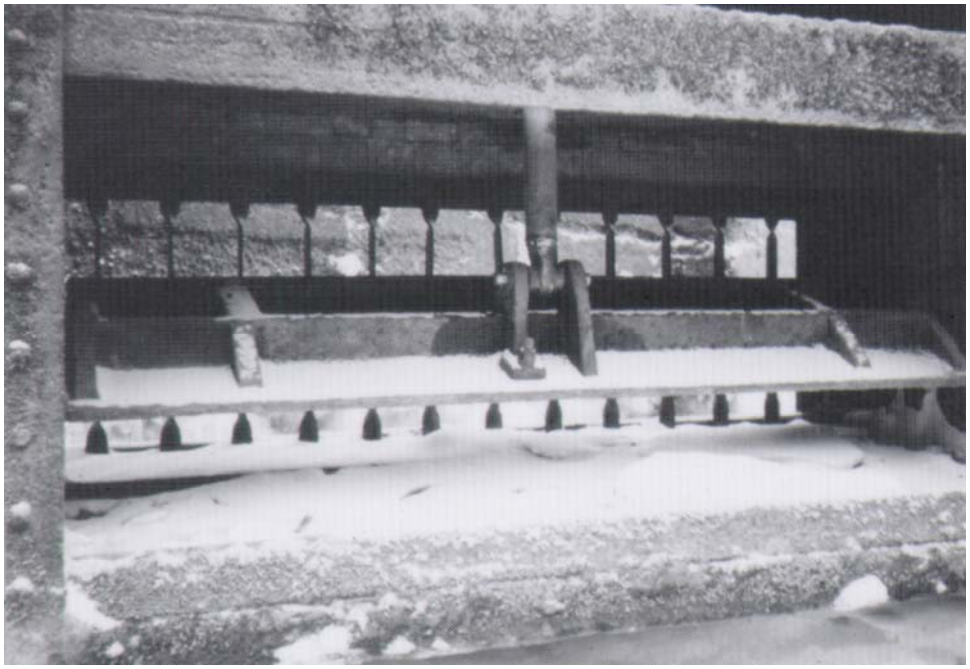

Figure B-7. Miter gate with butterfly valves

c. Sector gates. Sector gate locks have been used for recent very-low-lift lock projects. Vermilion Lock, currently under construction, is a suggested design option in the main text. The acronym is SG = sector gate. A dual loop culvert and sector gate system (LCSG) is shown in Figure B-8.

d. Submergible vertical-lift gate. Several locks have upper submergible vertical-lift gates. Their use for filling has not been found practical because of time and performance factors. Their use to augment filling and to pass ice and debris at high-lift projects has been of benefit. No acronym is required.

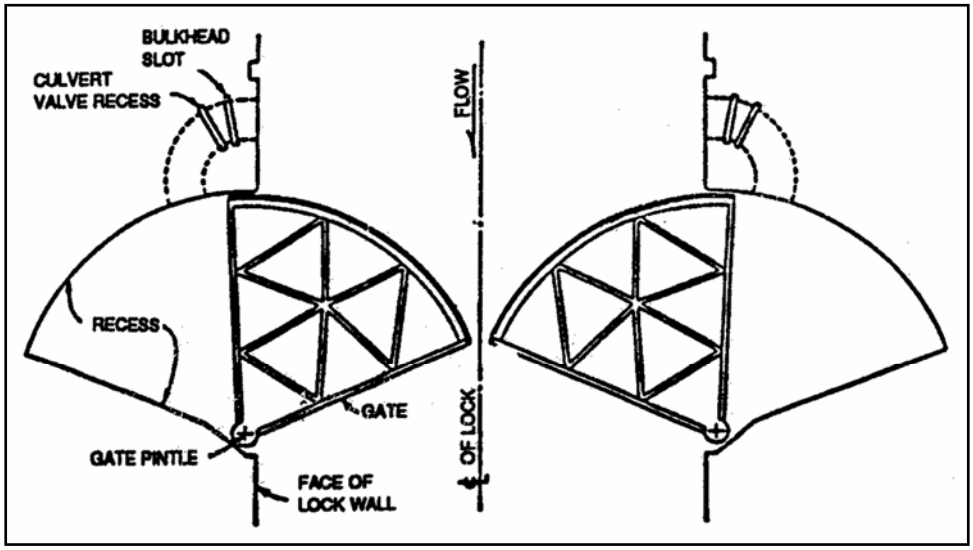

Figure B-8. Sector gate and loop culvert system

B-6. Culvert Systems

There are five general types of culvert lock designs in operation. The objective in each design is to distribute the flow into and out of the lock chamber evenly throughout the entire operation so that filling and emptying are smooth (minimum of surface turbulence and currents) and rapid.

a. Side port. This culvert-to-chamber system is the most common CE design and is used for lifts up to about 40 ft. Performance and details are presented in the main text as a suggested design type. The modification for temporary very-low-lift locks uses one flume (rather than culverts) along one side of the lock chamber. This expedient design is also a suggested type for very specific design constraints and is also discussed in the main text. Acronyms are

(1) SP = side-port system

(2) SPF = side ports with adjacent flume

b. Multiport system. This system was developed by the Tennessee Valley Authority and is very similar to a conventional wall culvert side-port system. It differs primarily in having much smaller sized and a much greater number of ports. The port flow during filling is into a trench below the lock floor. CE design and operational experience and hydraulic model tests indicate that this system is comparable to a wall culvert side-port system in that hydraulic chamber characteristics and costs are about the same. Maintenance problems associated with size and number of ports have resulted in multiport systems being rejected for recent designs. The acronym is mp = multiport system.

c. Centered lateral manifold systems. These systems have lateral manifolds extending transversely across the lock chamber floor centered near the midpoint in the chamber. Interlaced systems for two-culvert filling and single-culvert systems are recent designs. These two systems are suggested options for low-lift locks as are side-port systems (*a* above). Similar layouts have been used for high-lift locks but because of chamber oscillation, culvert boundary cavitation, and related problems, are not suggested for new designs. Large geometric variations in size and shape of baffles, ports, and culverts have been tested in unsuccessful attempts to make these types of systems function well for high-lift projects. Acronyms are

(1) BLC = centered lateral system modified for high lift

(2) BL2 = two-culvert centered lateral system

(3) BL1 = one-culvert centered lateral system

d. Split lateral manifold system. The transverse or lateral manifolds on the lock floor are not intermeshed. They are arranged so that one wall culvert connects with one group of laterals in one end of the lock; another group of laterals in the opposite end of the lock is connected to the opposite wall culvert. This system achieves a better distribution of flow than the intermeshed system, especially for medium and high lifts. The most dramatic operational disadvantage arises from the fact that any lack of synchronization of the filling valves causes unbalanced flow that creates dangerous surges. Two potentially serious accidents have occurred because of the failure of filling valves to open in unison. In these incidents, tows in the lock broke their mooring lines and only timely and immediate action by vessels' crews prevented serious consequences. Fail-safe devices have been developed that will stop movement of both valves if a difference in opening of more than 0.5 ft develops at any time during valve opening. Although these devices reduce nonsynchronous valving, unacceptable chamber oscillations still occur; and filling with one valve when the other is out of

service presents serious operational problems. For these reasons and because cost difference between a split lateral system and a bottom longitudinal system (*e* below) is not great, the split lateral system is no longer used. The acronym is SBLC = split bottom lateral manifold system.

e. Longitudinal manifold systems. Five arrangements are currently in operation; the two systems suggested for new designs are the four-manifold type (Plate 3-7), and the eight-manifold type (Plate 3-8). For these designs a horizontal pier causes a vertical bifurcation of the flow; the intent is to achieve equal flow at each manifold. Systems with vertical piers, such as shown in Figure B-9, are sensitive to pier location as far as flow division is concerned and are susceptible to cavitation damage at the short radius bends.

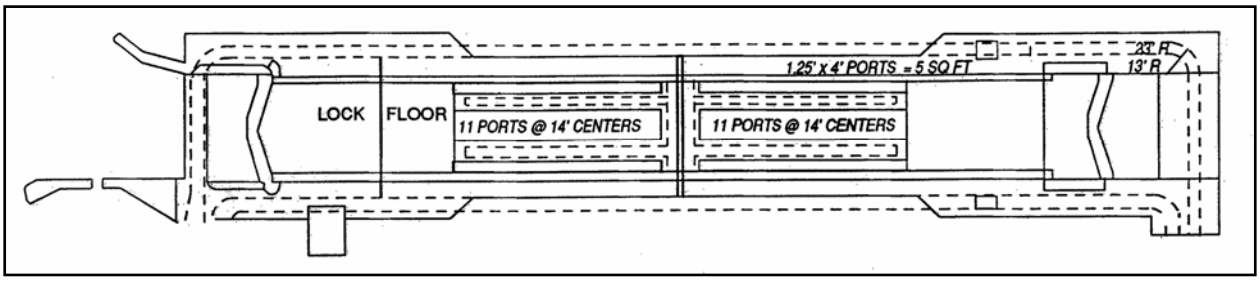

Figure B-9. Horizontally split bottom longitudinal system

Section IV
Existing Locks

B-7. Inventory

An inventory of existing CE locks is included in Table B-1; a computer-based listing is available as described in EP 1105-2-11. Two locks under construction are a replacement lock at Lock and Dam 26, Mississippi River, and Vermilion Lock, Gulf Intracoastal Waterway. A summary of acronyms for filling system type as used in Table B-1 follows; a preceding * represents recent design types.

a. G = butterfly valve(s) in gate

b. VG = other valve(s) in gate (slide valves normally)

c. BW = butterfly valve(s) in wall

d. CW = cylinder valve(s) in wall

e. LC = loop culvert(s)

f. LCSG = loop culvert(s) and sector gate

g. *SG = sector gates

h. *SP = side ports

i. *SPF = side ports with flume

j. MP = multiport system

k. *BL1 = centered lateral-manifolds; one culvert

l. *BL2 = centered lateral-manifolds; two culverts

m. BLC = centered lateral-manifolds; high-lift modified

n. SBLC =split lateral-manifolds

o. OC = longitudinal centered and ported culvert

p. VB4 = vertical flow dividers; four longitudinal manifolds

q. VB8 = vertical flow dividers; eight longitudinal manifolds

r. *HB4 = horizontal flow dividers; four longitudinal manifolds

s. *HB8 = horizontal flow dividers; eight longitudinal manifolds

B-9. Historical Development

A chart showing the historical change in design practice is included as Figure B-10.

Table B-1
U.S. Army Corps of Engineers Navigation Locks and Dams

Project	Community in Vicinity	Year Opened	Width Of Chamber ft	Locks Usable Length ft	Lift at Normal Pool ft	Filling System Acronym (Para B-7)
Alabama-Coosa Rivers, AL						
Claiborne Lock and Dam	Claiborne, AL	1973	84	600	30	VB4
Millers Ferry Lock and Dam	Camden, AL	1969	84	600	45	VB4
Jones Bluff Lock and Dam	Benton, AL	1974	84	600	45	VB4
Allegheny River, PA and NY						
Lock and Dam No. 2	Aspinwill, PA	1934	56	360	11	SP
Lock and Dam No. 3	Cheswick, PA	1934	56	360	13	SP
Lock and Dam No. 4	Natrona, PA	1927	56	360	10	SP
Lock and Dam No. 5	Freeport, PA	1927	56	360	12	SP
Lock and Dam No. 6	Clinton, PA	1928	56	360	12	SP
Lock and Dam No. 7	Kitanning, PA	1931	56	360	13	SP
Lock and Dam No. 8	Templeton, PA	1937	56	360	18	SP
Lock and Dam No. 9	Rimer, PA	1938	56	360	22	SP
Apalachicola, Chattahoochee, and Flint Rivers, GA and FL						
Jim Woodruff Lock and Dam	Chattahoochee, FL	1957	82	450	33	SP
George W. Andrews Lock and Dam	Columbia, GA	1963	82	450	25	SP
Walter F. George Lock and Dam	Fort Gaines, GA	1963	82	450	88	SBLC
Atlantic Intracoastal Waterway						
Albermarle and Chesapeake Canal Rt: Great Br. Lock	Great Bridge, VA	1932	75	600	3	LC
Dismal Swamp Canal Route: Deep Creek Lock	Deep Creek, VA	1940	52	300	12	VG
South Mills Lock	South Mills, NC	1941	52	300	12	VG
Bayou Teche, LA						
Berwick Lock	Berwick, LA	1951	45	300	7	SG
Keystone Lock	New Iberia, LA	1913	36	160	8	SP
Black Rock Channel and Tonawanda Harbor, NY						
Black Rock Lock	Buffalo, NY	1914	68	625	5	
Black Warrior, Warrior, and Tombigbee Rivers, AL						
Coffeeville (Jackson) Lock and Dam	Coffeeville, AL	1965	110	600	34	SP
Demopolis Lock and Dam	Demopolis, AL	1962	110	600	40	BL2
Warrior Lock and Dam	Eutaw, AL	1962	110	600	22	SP

(Sheet 1 of 10)

Table B-1 (Continued)

Project	Community in Vicinity	Year Opened	Width Of Chamber ft	Locks Usable Length ft	Lift at Normal Pool ft	Filling System Acronym (Para B-7)
Black Warrior, Warrior, and Tombigbee Rivers, AL (Cont.)						
Wm. Bacon Oliver Lock and Dam	Tuscaloosa, AL	1940	95	460	28	SP
Holt Lock and Dam	Holt, AL	1969	110	600	68	BLC
John Hollis Bankhead Lock and Dam	Adger, AL	1915	52	286	68	VB4
Gainesville Lock and Dam	Gainesville, AL		110	600		SP
Aliceville Lock and Dam	Aliceville, AL		110	600		SP
Columbus Lock and Dam	Columbus, MS		110	600		SP
Aberdeen Lock and Dam	Aberdeen, MS		110	600		SP
Lock and Dam A	Amory, MS		110	600		SP
Lock and Dam B	Amory, MS		110	600		SP
Lock and Dam C	Fulton, MS		110	600	25	SP
Lock and Dam D	Fulton, MS		110	600		SP
Lock and Dam E	Fulton, MS		110	600		SP
Bay Springs Lock and Dam	Fulton, MS		110	600		HB4
Canaveral Harbor, FL						
Canaveral Lock	Cocoa, FL	1965	90	600	3	
Cape Fear River, NC						
Lock and Dam No. 1	Kings Bluff, NC	1934	40	200	11	BG
Lock and Dam No. 2	Browns Landing, NC	1917	40	200	9	BG
William O. Huske Lock and Dam	Tolars Landing, NC	1935	40	300	9	BG
Central and Southern Florida						
S-61 Lock	St. Cloud, FL	1963	30	90	2	SG
S-65 Lock	Frostproof, FL	1964	30	90	6	SG
S-65A Lock	Avon Park, FL	1967	30	90	6	SG
S-65B Lock	Sebring, FL	1965	30	90	6	SG
S-65C Lock	Sebring, FL	1965	30	90	7	SG
S-65D Lock	Okeechobee, FL	1964	30	90	6	SG
S-65E Lock	Okeechobee, FL	1964	30	90	5	SG
Columbia River, OR and WA						
Bonneville Lock and Dam	Bonneville, OR	1938	76	500	65	OC
The Dalles Lock and Dam	The Dalles, OR	1957	86	675	88	SBLC
John Day Lock and Dam	Rufus, OR	1968	86	669	110	BLC
McNary Lock and Dam	Umatilla, OR	1953	86	683	75	BLC

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Table B-1 (Continued)

Project	Community in Vicinity	Year Opened	Width Of Chamber ft	Locks Usable Length ft	Lift at Normal Pool ft	Filling System Acronym (Para B-7)
Cross-Florida Barge Canal						
Inglis Lock, Dam and Spillway	Inglis, FL	1968	84	600	28	SP
Eureka Lock and Dam		1971	84	600	20	SP
Henry H. Buckman Lock	Palatka, FL	1972	84	600	20	SP
Cumberland River, KY and TN						
Lock and Dam	Kuttawa, KY	1964	110	800	57	SBLC
Cheatham Lock and Dam	Ashland City, TN	1959	110	800	26	SP
Old Hickory Lock and Dam	Old Hickory, TN	1957	84	400	60	MP
Cordell Hull Dam and Reservoir	Carthage, TN	1973	84	400	59	MP
Fox River, WI						
DePere Lock	DePere, WI	1936	36	146	9	MP
Little Kaukauna Lock	DePere, WI	1936	36	146	7	BG
Rapid Croche Lock	Wrightstown, WI	1934	36	146	8	BG
Kaukauna Fifth Lock	Kaukauna, WI	1898	36	144	9	BG
Kaukauna Fourth Lock	Kaukauna, WI	1879	37	144	10	BG
Kaukauna Third Lock	Kaukauna, WI	1879	37	144	10	BG
Kaukauna Second Lock	Kaukauna, WI	1903	35	144	11	BG
Kaukauna First Lock	Kaukauna, WI	1883	35	144	11	BG
Kaukauna Guard Lock	Kaukauna, WI	1891	40			
Little Ghute Combined Lock						
Lower	Little Chute, WI	1879	35	147	11	BG
Upper	Little Chute, WI	1879	36	144	11	BG
Little Chute, Second Lock	Little Chute, WI	1881	35	144	14	BG
Little Chute, First (Guard) Lock	Little Chute, WI	1904	35		7	BG
Cedars Lock	Little Chute, WI	1888	35	144	10	BG
Appleton Fourth Lock	Appleton, WI	1907	35	144	8	BG
Appleton Third Lock	Appleton, WI	1900	35	144	9	BG
Appleton Second Lock	Appleton, WI	1901	35	145	10	BG
Appleton First Lock	Appleton, WI	1884	35	145	10	BG
Menasha Lock	Menasha, WI	1899	35	144	8	BG
Freshwater Bayou Lock, LA	Intracoastal City, LA	1968	84	600		SG

(Sheet 3 of 10)

Table B-1 (Continued)

Project	Community in Vicinity	Year Opened	Width Of Chamber ft	Locks Usable Length ft	Lift at Normal Pool ft	Filling System Acronym (Para B-7)
Green and Barren Rivers, KY						
Green River:						
Lock and Dam No. 1	Spottsville, KY	1956	84	600	12	SP
Lock and Dam No. 2	Calhoun, KY	1956	84	600	14	SP
Lock and Dam No. 3	Rochester, KY	1836	36	138	17	VG
Lock and Dam No. 4	Woodbury, KY	1839	35	138	16	VG
Barren River:						
Lock and Dam No. 1	Greencastle, KY	1934	56	360	15	
Gulf Intracoastal Waterway						
Inner Harbor Navigation Channel Lock	New Orleans, LA	1923	75	640	9	
Harvey Lock	Harvey, LA	1935	75	425	10	SP
Algiers Lock	Algiers, LA	1956	75	800	10	SG
Bayou Boeuf Lock	Morgan City, LA	1956	75	1,156	6	SG
Bayou Sorrel Lock	Plaquemine, LA	1952	56	797	10	SG
Port Allen Lock	Port Allen, LA	1961	84	1,202	5	SP
Vermilion Lock	Abbeville, LA	1934	56	1,182	3	LCSG
Calcasieu Lock	Lake Charles, LA	1950	75	1,206	6	SG
Colorado River, TX						
East Lock	Matagorda, TX	1954	75	1,200	5	
West Lock	Matagorda, TX	1954	75	1,200	5	
Hudson River, NY						
Troy Lock and Dam	Troy, NY	1917	44	493	17	SP
Illinois Waterway, IL						
LaGrange Lock and Dam	Beardstown, IL	1939	110	600	10	
Peoria Lock and Dam	Peoria, IL	1939	110	600	11	SP
Starved Rock Lock and Dam	Utica, IL	1933	110	600	19	SP
Marseilles Lock	Marseilles, IL	1933	110	600	24	SP
Dresden Island Lock and Dam	Morris, IL	1933	110	600	22	SP
Brandon Road Lock and Dam	Joliet, IL	1933	110	600	34	SP
Lockport Lock	Lockport, IL	1933	110	600	40	SP
Thomas J. O'Brien Lock and Dam	Chicago, IL	1960	110	1,000	2	LCSG

(Sheet 4 of 10)

Table B-1 (Continued)

Project	Community in Vicinity	Year Opened	Width Of Chamber ft	Locks Usable Length ft	Lift at Normal Pool ft	Filling System Acronym (Para B-7)
Inland Route, MI						
Crooked River Lock and Weir	Alanson, MI	1967	17.8	66	66	
Kanawha River, WV						
Winfield Lock and Dam	Winfield, WV	1937	56	360	28	SP
Marmet Lock and Dam	Marmet, WV	1934	56	360	24	SP
London Lock and Dam	London, WV	1934	56	360	24	SP
Kentucky River, KY						
Lock and Dam No. 1	Carrolton, KY	1839	38	145	8	BG
Lock and Dam No. 2	Lockport, KY	1939	38	145	14	BG
Lock and Dam No. 3	Gest, KY	1844	38	145	13	BG
Lock and Dam No. 4	Frankfort, KY	1844	38	145	13	BG
Lock and Dam No. 5	Tyrone, KY	1844	38	145	15	BG
Lock and Dam No. 6	High Bridge, KY	1891	52	147	14	CW
Lock and Dam No. 7	High Bridge, KY	1897	52	147	15	BW
Lock and Dam No. 8	Camp Nelson, KY	1900	52	146	19	BW
Lock and Dam No. 9	Valley View, KY	1907	52	148	17	CW
Lock and Dam No. 10	Ford, KY	1907	52	148	17	CW
Lock and Dam No. 11	Irvine, KY	1906	52	148	18	CW
Lock and Dam No. 12	Ravenna, KY	1910	52	148	17	CW
Lock and Dam No. 13	Willow, KY	1915	52	148	18	CW
Lock and Dam No. 14	Heidelberg, KY	1917	52	148	17	CW
Lake Washington Ship Canal						
Hiram M. Chittenden Locks						
Large Lock	Seattle, WA	1916	80	760	26	SP
Small Lock	Seattle, WA		28	123	26	SP
McClellan-Kerr Arkansas River, AR and LA						
Norrell Lock and Dam	Arkansas Post, AR	1967	110	600	30	SP
Lock No. 2	Arkansas Post, AR	1967	110	600	20	SP
Lock and Dam No. 3	Grady, AR	1968	110	600	20	SP
Lock and Dam No. 4	Pine Bluff, AR	1968	110	600	14	SP
Lock and Dam No. 5	Redfield, AR	1968	110	600	17	SP
David D. Terry Lock and Dam	Little Rock, AR	1968	110	600	18	SP
Murray Lock and Dam	Little Rock, AR	1969	110	600	16	SP

(Sheet 5 of 10)

Table B-1 (Continued)

Project	Community in Vicinity	Year Opened	Width Of Chamber ft	Locks Usable Length ft	Lift at Normal Pool ft	Filling System Acronym (Para B-7)
McClellan-Kerr Arkansas River, AR and LA (Cont.)						
Toad Suck Ferry Lock and Dam	Conway, AR	1969	110	600	19	SP
Lock and Dam No. 9	Morrilton, AR	1969	110	600	19	SP
Lock and Dam No. 13	Fort Smith, AR	1969	110	600	19	SP
Dardanelle Lock and Dam	Russellville, AR	1969	110	600	54	HB4
Ozark Lock and Dam	Ozark, AR	1975	110	600	34	SP
W. D. Mayo Lock and Dam	Fort Smith, AR	1970	110	600	20	SP
Chouteau Lock and Dam	Muskogee, OK	1970	110	600	21	SP
Newt Graham Lock and Dam	Inola, OK	1970	110	600	21	SP
Robert S. Kerr Lock and Dam and Reservoir	Sallisaw, OK	1970	110	600	48	BLC
Webbers Falls Lock and Dam	Webbers Falls, OK	1970	110	600	30	SP
Mississippi River Between Ohio and Missouri Rivers						
Lock and Dam No. 27	Granite City, IL	1963	110	1,200	21	SP
			110	600	21	
Lock and Dam No. 26	Alton, IL	1938	110	600	24	SP
			110	360	24	SP
Lock and Dam No. 25	Cap Au Gris, MO	1939	110	600	15	SP
Lock and Dam No. 24	Clarksville, MO	1940	110	600	15	SP
Lock and Dam No. 22	Saverton, MO	1938	110	600	10	SP
Lock and Dam No. 21	Quincy, IL	1938	110	600	10	SP
Lock and Dam No. 20	Canton, MO	1936	110	600	10	SP
Lock and Dam No. 19	Keokuk, IA	1913	110	358	38	
		1957	110	1,200	38	
Lock and Dam No. 18	Burlington,IA	1937	110	600	10	SP
Lock and Dam No. 17	New Boston, IL	1939	100	600	9	SP
Lock and Dam No. 16	Muscatine, IA	1937	110	600	9	SP
Lock and Dam No. 15	Rock Island, IL	1934	110	600	16	SP
			110	360	16	SP
Lock and Dam No. 14	LeClaire, IA	1922	80	320	11	SP
	LeClaire, IA	1939	110	600	11	SP
Lock and Dam No. 13	Clinton, IA	1939	110	600	11	SP
Lock and Dam No. 12	Bellevue, IA	1938	110	600	9	SP
Lock and Dam No. 11	Dubuque, IA	1937	110	600	11	SP
Lock and Dam No. 10	Guttenberg, IA	1936	110	600	8	SP
Lock and Dam No. 9	Lynxville, WI	1938	110	600	9	SP
Lock and Dam No. 8	Genos, WI	1937	110	600	11	SP

(Sheet 6 of 10)

Table B-1 (Continued)

Project	Community in Vicinity	Year Opened	Width Of Chamber ft	Locks Usable Length ft	Lift at Normal Pool ft	Filling System Acronym (Para B-7)
Mississippi River Between Ohio and Missouri Rivers (Cont.)						
Lock and Dam No. 7	Dresbach, MN	1937	110	600	8	SP
Lock and Dam No. 6	Trempealeau, WI	1936	110	600	6	SP
Lock and Dam No. 5A	Winona, MN	1936	110	600	5	SP
Lock and Dam No. 5	Minneiska, MN	1935	110	600	9	SP
Lock and Dam No. 4	Alma, WI	1935	110	600	7	SP
Lock and Dam No. 3	Red Wing, MN	1938	110	600	8	SP
Lock and Dam No. 2	Hastings, MN	1930	110	600	12	SP
Lock and Dam No. 1	Minneapolis-St. Paul	1948	56	400	36	SP
		1932	56	400	36	SP
St. Anthony Falls Lower Lock and Dam	Minneapolis, MN	1917	56	400	27	BL2
St. Anthony Falls Upper Lock and Dam	Minneapolis, MN	1963	56	400	49	BLC
Monongehela River, PA and WV						
Lock and Dam No. 2	Braddock, PA	1951	56	360	9	SP
		1953	110	720	9	SP
Lock and Dam No. 3	Elizabeth, PA	1907	56	360	8	SP
		1907	56	720	8	SP
Lock and Dam No. 4	Monessen, PA	1932	56	360	17	SP
		1932	56	720	17	SP
Maxwell Locks and Dam	Maxwell, PA	1965	84	720	20	BL2
		1965	84	720	20	BL2
Lock and Dam No. 7	Greensboro, PA	1926	56	360	15	SP
Lock and Dam No. 8	Point Marion, PA	1959	56	360	19	SP
Morgantown Lock and Dam	Morgantown, WV	1960	84	600	17	SP
Hildebrand Lock and Dam	Morgantown, WV	1960	84	600	21	SP
Opekiska Lock and Dam	Morgantown, WV	1964	84	600	22	SP
Ohio River						
Lock and Dam No. 53	Mound City, IL	1970	110	1,200	13	SPF
Lock and Dam No. 52	Brookport, IL	1972	110	1,200	12	SPF
Smithland Lock and Dam	Bolconda, IL		110	1,200	22	SP
			110	1,200	22	SP
Uniontown Locks and Dam	Uniontown, KY	1975	110	1,200	22	BL2
			110	600	22	BL1
Newburgh Locks and Dam	Newburg, IN	1975	110	1,200	16	BL2
			110	600	16	BL1

(Sheet 7 of 10)

Table B-1 (Continued)

Project	Community in Vicinity	Year Opened	Width Of Chamber ft	Locks Usable Length ft	Lift at Normal Pool ft	Filling System Acronym (Para B-7)
Ohio River (Cont.)						
Cannelton Locks and Dam	Cannelton, IN	1972	110	1,200	25	SP
			110	600	25	BL1
McAlpine Locks and Dam	Louisville, KY	1961	110	1,200	37	BL2
		1921	110	600	37	SP
		1930	56	360	37	SP
Markland Locks and Dam	Markland, IN	1963	110	1,200	35	BL2
		1963	110	600	35	BL1
Capt. Anthony Meldahl Locks and Dam	Chilo, OH	1962	110	1,200	30	BL2
		1962	110	600	30	BL1
Greenup Locks and Dam	Greenup, KY	1962	110	1,200	30	BL2
			110	600	30	BL1
Gallipolis Locks and Dam	Hogsett, WV	1937	110	600	23	SP
			110	360	23	SP
Racine Locks and Dam	Letart Falls, OH	1970	110	1,200	22	SP
			110	600	22	BL1
Belleville Locks and Dam	Reedsville, OH	1969	110	1,200	22	BL2
			110	600	22	BL1
Willow Island Locks and Dam	Waverly, WV	1973	110	1,200	20	SP
			110	600	20	BL1
Hannibal Locks and Dam	New Martinsville, WV	1972	110	1,200	21	SP
			110	600	21	BL1
Pike Island Locks and Dam	Warwood, WV	1965	110	1,200	18	SP
			110	600	18	BL1
New Cumberland Locks and Dam	Stratton, OH	1961	110	1,200	21	SP
			110	600	21	BL1
Montgomery Island Locks and Dam	Industry, PA	1936	110	600	18	SP
			56	360	18	SP
Dashields Locks and Dam	Glenwillard, PA	1929	110	600	18	SP
			56	360	10	SP
Emsworth Locks and Dam	Emsworth, PA	1921	110	600	18	SP
			56	360	18	SP
Okeechobee Waterway, FL						
St. Lucie Lock and Dam	Stuart, FL	1941	50	250	13	SG
Moore Haven Lock	Moore Haven, FL	1953	50	250	2	

(Sheet 8 of 10)

Table B-1 (Continued)

Project	Community in Vicinity	Year Opened	Width Of Chamber ft	Locks Usable Length ft	Lift at Normal Pool ft	Filling System Acronym (Para B-7)
Okeechobee Waterway, FL (Cont.)						
Ortona Lock and Dam	LaBelle, FL	1937	50	250	11	
W. P. Franklin Lock and Control Structure	Fort Myers, FL	1965	56	400	3	
Old River, LA						
Old River Lock	Simmesport, LA	1963	75	1,200	35	SP
Ouachita and Black Rivers, AR						
Jonesville Lock and Dam	Jonesville, LA	1972	84	600	30	SP
Columbia Lock and Dam	Columbia, LA	1972	84	600	18	SP
Lock and Dam No. 6	Falsenthal, AR	1923	55	268	10	SP
Lock and Dam No. 8	Calion, AR	1926	55	268	14	SP
Pearl River, MS and LA						
Lock 1	Pearl River, LA	1951	65	310	17	LC
Lock 2	Bush, LA	1951	65	310	15	LC
Lock 3	Sun, LA	1951	65	310	11	LC
Sacramento River, CA						
Barge Canal Lock	West Sacramento, CA	1961	86	600	4	SG
Snake River, WA						
Ice Harbor Lock and Dam	Pasco, WA	1962	86	665	100	SBLC
Lower Monumental Lock and Dam	Walla Walla, WA	1969	86	666	98	SBLC
Little Goose Lock and Dam	Dayton, WA	1970	86	668	98	SBLC
Lower Granite Lock and Dam	Almota, WA	1975	86	674	100	HB8
St. Marys River, MI						
South Canal						
MacArthur Lock	Sault Ste. Marie, MI	1943	80	800	22	
Poe Lock	Sault Ste. Marie, MI	1968	110	1,200		SP
North Canal						
Davis Lock	Sault Ste. Marie, MI	1914	80	1,350	22	OC

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Table B-1 (Concluded)

Project	Community in Vicinity	Year Opened	Width Of Chamber ft	Locks Usable Length ft	Lift at Normal Pool ft	Filling System Acronym (Para B-7)
St. Marys River, MI (Cont.)						
Sabin Lock	Sault Ste. Marie, MI	1919	80	1,350	22	OC
Savannah River, GA						
Savannah River Lock and Dam	Augusta, GA	1936	56	360	15	SP
Tennessee River, TN, AL, MS, and KY	Gilbertsville, KY	1944	110	600	56	SP
Kentucky Lock and Dam	Hamburg, TN	1937	110	600	55	SP
Pickwick Landing Lock and Dam						
Wilson Lock and Dam:						
Main Lock	Florence, AL	1959	110	600	94	VB8
Auxiliary Lock	Florence, AL	1927	60	292	47	SP
			60	300	47	OC
General Joe Wheeler Lock and Dam						
Main Lock	Florence, AL	1963	110	600	48	SP
Auxiliary Lock	Florence, AL	1962	60	400	48	SP
Guntersville Lock and Dam						
Main Lock	Guntersville, AL	1965	110	600	39	SP
Auxiliary Lock	Guntersville, AL	1939	60	360	39	SP
Nickajack Lock and Dam	Chattanooga, TN	1967	110	600	39	SP
Chickamauga Lock and Dam	Chattanooga, TN	1940	60	360	49	SP
Watts Bar Lock and Dam	Breedenton, TN	1942	60	360	58	SP
Fort Loudon Lock and Dam	Lenoir City, TN	1943	60	360	72	MP
Melton Hill Lock and Dam (Clinch River)	Kingston, TN	1963	75	400	54	MP
Willamette River at Willamette Falls, OR						
Lock No. 1	Oregon City, OR	1872	37	175	20	VG
Lock No. 2	Oregon City, OR	1872	37	175	10	VG
Lock No. 3	Oregon City, OR	1872	37	175	10	VG
Lock No. 4	Oregon City, OR	1872	37	175	10	VG
Guard Lock	Oregon City, OR	1872	38	175	10	VG

(Sheet 10 of 10)

Suggested Designs; New Projects			Usable Chamber Dimensions		No. of
Project Lift	Symbol	Description	Width ft	Length(s) ft	Exist. Locks
Very low (0-10')	SG	Sector gate	30	90	7
			75	800, 1,200	4
			Other sizes		4
	SPF	Side-ports and flume (temporary locks)	110	1,200	2
Low (10'-30/40')	SP	Side-port	110	1,200	10
			110	600	63
			84	600	7
			56	360	20
			Other sizes		28
	BL2	Centered lateral manifolds	10	1200	8
	BL1	One-sided lateral manifolds	110	600	12
		Horizontal Flow Dividers			
High (Lift > 40')	HB4	Longitudinal 4 manifolds	110	600	1
	HB8	Longitudinal 8 manifolds	86	675	1

Designs Obsolete and/or Defective		Unsuitable Design	
Symbols	Description	Situations	
BG, VG, BW, CW	Valves in gates and walls	All existing	44
LC, LCSG	Loop culvert variations	All existing	6
BLC	Centered lateral manifolds	Lifts > 40'	4
SBLC	Split lateral manifolds	All existing	7
VB4, VB8	Vertical flow dividers	All existing	5

Other Locks:	Unreported/unusual sizes and types	19
	Non-CE designs	16
		Total listing = 268 Locks

Figure B-10. Historical development of CE lock designs