

**Final**

**CENTRAL AND SOUTHERN FLORIDA PROJECT**

**WATER CONTROL PLAN FOR  
S-67, S-67X, S-68X, S-83X, S-84X, S-65DX1, and S-65DX2**

**JACKSONVILLE DISTRICT  
U.S. ARMY CORPS OF ENGINEERS  
March 2012**

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**WATER CONTROL PLAN**  
**S-67, S-67X, S-68X, S-83X, S-84X, S-65DX1, and S-65DX2**

**7-00. Introduction.** This Water Control Plan (WCP) will be incorporated into the Master Water Control Manual for the Kissimmee River - Lake Istokpoga Basin (WCM). This Section (7-00), includes a review of existing structures and operating criteria contained in the WCM (structures existing prior to construction of new structures) that are pertinent to the new structures in this WCP. A map of the Kissimmee River - Lake Istokpoga area is shown on Figure 7-1.

This WCP contains operating criteria for the following new features: Structure 67 (S-67) on Istokpoga Canal, Structure 67X (S-67X) at Istokpoga Creek, and Structure 68X (S-68X), Structure 83X (S-83X), Structure 84X (S-84X) in Canal 41A (C-41A), as well as Culvert 65DX1 (S-65DX1) and Structure 65DX2 (S-65DX2) in Pool D of the Kissimmee River. S-65DX1 replaces an existing culvert S-65DX, previously at the same location. S-65DX2 has been constructed between S-65DX1 and the S-65D spillway. S-67 replaces Structure G-85 in Istokpoga Canal. S-68X, S-83X, and S-84X have been constructed next to S-68, S-83, and S-84, respectively. S-67X, S-68X, S-83X, and S-84X have also been known as S-67X1, S-68A, S-83A, and S-84A, respectively. All elevations in this WCP are in feet, National Geodetic Vertical Datum of 1929 (ft., NGVD).

**a. Existing Features - General Objectives.** A general plan for flood damage prevention in the Kissimmee Basin was incorporated into the comprehensive plan that was presented to Congress in 1948. Project works in the basin were authorized for construction by Congress in 1954. The purpose of the general plan was to relieve flooding and minimize flood damages, largely in the upper Kissimmee basin. This was to be accomplished partially by flood storage in the lakes of the upper basin and partially by providing the capability to more rapidly remove the flood water from the basin when necessary. The report to Congress clearly stated that complete flood protection could not be provided, but that reasonable flood protection would result from such a plan. The Kissimmee Chain of Lakes (KCOL) and Lake Istokpoga regulation schedules were developed for flood control, navigation, agricultural water supply, and environmental enhancement.

Just like the Kissimmee Basin, the plan for flood damage prevention in the Lake Istokpoga Basin was incorporated into the comprehensive plan that was presented to Congress in 1948. Project works in the basin were authorized for construction by Congress in 1954. Prior to Central and Southern Florida (C&SF) Project improvements, existing improvements to Lake Istokpoga consisted of approximately 10 miles of low levee along the

northeast and southeast shores of Lake Istokpoga and the Istokpoga Canal. The Lake Istokpoga Project works were primarily designed to protect lands adjacent to the lake from flooding by lake waters and provide water supply for agricultural use in areas around the lake and in the Indian Prairie area. At the same time, project works are used to maintain the lake at a desirable level for fish and wildlife, navigation, and for recreational purposes.

**b. Existing Features - Lake Istokpoga Basin Operating Criteria.**

**1. General.** Project features to regulate water levels in Lake Istokpoga consist of a spillway (S-68), and Slough Canal (C-41A), and three associated downstream canals: Indian Prairie Canal (C-40), Harney Pond Canal (C-41), and State Road 70 Canal (C-39A), which connects C-41 to C-40. S-83 and S-84 are downstream of S-68 (Figure 7-1) and maintain optimum C-41A water levels. C-41A discharges into the Kissimmee River (C-38) which discharges to Lake Okeechobee. C-40, C-41, and C-38 discharge into Lake Okeechobee.

**2. Lake Istokpoga.** Lake Istokpoga is regulated in accordance with the Lake Istokpoga Regulation Schedule shown on Figure 7-2. S-68 discharges water from Lake Istokpoga into C-41A (Slough Canal). C-41, C-40, and C-39A provide secondary capacity for the regulation of floods in Lake Istokpoga. When the Lake Istokpoga water level is in Zone A of the regulation schedule (Figure 7-2), releases shall be made at S-68 with a firm capacity of 3,000 cfs with an additional or secondary capacity of up to 2,900 cfs (total capacity of 5,900 cfs) when there is no local runoff into C-41A. Firm capacity is the discharge available under any conditions.

The Istokpoga Canal has served as an additional outlet, used only when Lake Istokpoga was in Zone A of its regulation schedule (Figure 7-2). Flow in this canal and subsequent discharge from Lake Istokpoga has been controlled by G-85 (owned and operated by the South Florida Water Management District).

**3. C-41A Regulation.** Except when the Lake Istokpoga water level drops below canal regulation levels, C-41A is regulated in accordance with levels shown in Table 7-1. When local inflow conditions permit, up to 5,900 cfs can be discharged into C-41A from S-68. Of the 5,900 cfs, 3,800 cfs would be passed through S-83 to C-38. The remainder (2,100 cfs) would be passed through S-82 to C-39A, C-40, and/or C-41.

**Table 7-1**  
**Water Control Stages for Canals**  
**in the Lake Istokpoga Basin**

Canal	Canal Reach	Optimum Elevation (ft., NGVD)
C-41A	S-68 to S-83	31.8 to 32.2
	S-83 to S-84	24.3 to 25.2
C-41	S-68 to S-82	31.8 to 32.2

(a) S-83 maintains an optimum water level between 31.8 and 32.2 ft., NGVD, in C-41A upstream of the structure; passes all discharge up to 3,830 cfs without exceeding desirable stages; restricts discharges during floods to that which will not cause damaging velocities or stages downstream; and passes up to 300 cfs during low flow periods to maintain stages and satisfy irrigation demands downstream.

(b) S-84 maintains an optimum water level of between 24.3 and 25.2 ft., NGVD, upstream of the structure; passes all discharges up to 5,670 cfs without exceeding desirable stages; and restricts discharge during floods to that which will not cause damaging velocities or stages downstream.

**c. Existing Features - Kissimmee River Pool D Operating Criteria.**

1. **General.** Project features to regulate water levels in Pool D of the Kissimmee River (C-38) consist of a spillway (S-65D), navigation lock, and culvert structure (S-65DX). S-65D maintains optimum water levels in Pool D of C-38.

2. **S-65DX.** S-65DX, located in the S-65D tieback levee, conveys water from Pool D of the Kissimmee River (C-38) to the Old Kissimmee River.

**7-01. General Objectives.** In the 1992 Water Resources Development Act (WRDA), Congress jointly authorized the Kissimmee River Restoration Project and the Kissimmee River Headwaters Revitalization Project. These two projects have become known as the Kissimmee River Restoration Project. The Kissimmee River Restoration Project consists of numerous features including new and replacement structures for the management of restored Kissimmee River flows. G-85 and S-65DX were replaced by S-67 and S-65DX1, respectively. New structures S-67X and S-65DX2 were constructed to convey water at Istokpoga Creek and Kissimmee River (C-38), respectively. New structures S-68X, S-83X, and

S-84X were constructed to be operated in conjunction with S-68, S-83, and S-84, respectively. Structure descriptions for S-67, S-67X, S-68X, S-83X, S-84X, S-65DX1, and S-65DX2 can be found in Appendix A.

S-67, its associated tieback levee, and S-67X will prevent impacts to the Lake Istokpoga Basin from possible higher stages of the restored Kissimmee River. During Kissimmee River floods, water that would otherwise have exited Lake Istokpoga via the Istokpoga Canal would be rerouted downstream to C-41A by utilizing S-68, S-68X, S-83, S-83X, S-84, and/or S-84X. Water in Pool D would be conveyed downstream to C-38 by utilizing S-65D and S-65DX2. S-65DX1 can be utilized to convey water from Pool D to the Old Kissimmee River.

#### **7-02. Major Constraints.**

a. **Istokpoga Canal Limited Capacity.** The Istokpoga Canal was originally designed to convey up to 800 cfs; however, due to the natural state of the canal the capacity is reduced to approximately 400 cfs. This outlet was designed as an extra outlet from Lake Istokpoga, not as the primary outlet which has been S-68.

b. **Kissimmee River Water Level.** Under most conditions, Istokpoga Canal and Istokpoga Creek discharge into the Kissimmee River. However, high water levels in the Kissimmee River (Pool C) may limit these flows to the Kissimmee River.

c. **S-65D and S-65DX2 total discharge capacity.** The maximum total discharges for S-65DX2 and S-65D cannot exceed the existing design capacity of S-65D, 21,300 cfs, until Spillway 65EX1 (S-65EX1) is placed into operation.

d. **S-67 single gate operation.** In order to prevent an unbalanced flow from S-67, both gates must be operated at the same time, until the Corps performs further analyses. The Corps will notify SFWMD water managers both verbally and in writing of the analyses' results.

**7-03. Overall Plan for Water Management - Kissimmee River Basin.** This WCP does not change the optimum water levels in C-38 or other C&SF Project canals outlined in the WCM.

S-65DX1 is located adjacent to and approximately 1,500 ft. west of the S-65D spillway. S-65DX1 conveys water from Pool D of the Kissimmee River (C-38) to the Old Kissimmee River. S-65DX1, is capable of discharging up to 1,000 cfs. S-65DX1 has the same operating criteria as the structure it replaced, S-65DX.

S-65DX2 is located adjacent to and approximately 500 ft. west of the S-65D spillway. S-65DX2 conveys water from Pool D to Pool E. S-65DX2 is capable of discharging up to 8,600 cfs. S-65DX2 has the same operating criteria as S-65D; the operating agency has the flexibility to choose either one structure (S-65DX2 or S-65D) or both structures (S-65DX2 and S-65D) to make discharges. Note in Section 7-02c, the maximum discharge constraint for S-65D and S-65DX2.

**7-04. Overall Plan for Water Management - Lake Istokpoga Basin.**

This WCP does not change the Lake Istokpoga Regulation Schedule nor does it change optimum water levels in C-41A or other C&SF Project canals outlined in the WCM. However, the "Zone - Releases" text box on Figure 2, Lake Istokpoga Regulation Schedule, will be updated to incorporate the additional release capacity provided by the new structures. S-68X, S-83X, and S-84X have the same operating criteria as S-68, S-83, and S-84, respectively. The operating agency has the flexibility to choose which structure (S-68 or S-68X, S-83 or S-83X, S-84 or S-84X) will be utilized to make discharges based on the operating criteria for each structure. When the Lake Istokpoga water level is in Zone A or B of the Lake Istokpoga Regulation Schedule, releases can be made through S-68, S-68X, S-67, and S-67X. Table 7-2 contains a summary of water management operating criteria for S-67, S-67X, S-68, S-68X, S-83, S-83X, S-84, and S-84X.

S-67 is located on Istokpoga Canal, approximately 300 ft. west of the former location of G-85. When compared to G-85, S-67 allows additional discharge capability from Lake Istokpoga to the Kissimmee River (C-38). S-67X is a culvert structure located in the S-67 tieback levee, on the historic Istokpoga Creek. When water is available, S-67X allows flows into Istokpoga Creek. When Kissimmee River floodplain water levels restrict S-67 and S-67X discharges to the Kissimmee River, S-68X, S-83X, and S-84X provide the ability to transfer Lake Istokpoga discharges from the Istokpoga Canal (S-67) and Istokpoga Creek (S-67X) to C-41A. The normal or forward direction of flow through S-67 and S-67X is considered to be from the Lake Istokpoga side of these structures to the Kissimmee River side. Reverse flow is considered to be flow from the Kissimmee River side of these structures to the Lake Istokpoga side.

S-68X is located adjacent to and approximately 230 ft. north of S-68. S-83X is located adjacent to and approximately 240 ft. south of S-83. S-84X is located adjacent to and approximately 70 ft. north of S-84. When operated in conjunction with S-68, S-83, and S-84, respectively, S-68X, S-83X, and S-84X allow the ability for higher discharges from Lake Istokpoga when it is in Zone A of its regulation schedule. This is provided by additional discharge capability at Lake Istokpoga (S-68X) and C-41A (S-83X and S-84X). In addition, S-83X and S-84X provide additional discharge



a. **Lake Istokpoga Regulation Schedule - Zone A.** When the Lake Istokpoga water level is in Zone A, S-68, S-68X, S-67, and S-67X will be utilized to make discharges from Lake Istokpoga. However, when the S-67 tailwater is within 0.5 ft. of the S-67 headwater (water surface on the west or Lake Istokpoga side of S-67), water stage data from S-67 should be monitored closely. If it appears likely that, without gate closure, the S-67 tailwater will exceed the S-67 headwater, the gates of S-67 and S-67X should be closed, as needed, to prevent reverse flow. Reverse flow through S-67 and S-67X should be avoided when Lake Istokpoga is in Zone A. This criteria is intended to avoid exacerbating high water conditions in the Lake Istokpoga Basin and to avoid potential damage to these structures. Up to 400 cfs may be discharged through S-67 and up to 200 cfs may be discharged through S-67X. The Lake Istokpoga Regulation Schedule, this WCP, and the WCM will be utilized to determine S-68 and S-68X discharges from Lake Istokpoga.

**Lake Istokpoga Regulation Schedule - Zone B.** When the Lake Istokpoga water level is in Zone B, S-68, S-68X, S-67, and S-67X may be utilized to make discharges from Lake Istokpoga. However, when the S-67 tailwater is within 0.5 ft. of the S-67 headwater, water stage data from S-67 should be monitored closely. If it appears likely that, without gate closure, the S-67 tailwater will exceed the S-67 headwater, the gates of S-67 and S-67X should be closed, as needed, to prevent reverse flow. Reverse flow through S-67 and S-67X should be avoided when Lake Istokpoga is in Zone B. This criteria is intended to avoid potential damage to these structures.

When the Lake Istokpoga water level is in Zone B, water managers should attempt to avoid or minimize releases toward the Kissimmee River through S-67 and S-67X when it appears that water is needed southeast of Lake Istokpoga in C&SF Project canals in the Lake Istokpoga Basin.

The Lake Istokpoga Regulation Schedule, this WCP, and the WCM will be utilized to determine S-68 and S-68X discharges from Lake Istokpoga. Up to 400 cfs may be discharged through S-67 and up to 200 cfs may be discharged through S-67X to maintain downstream flows for water supply, navigation, and/or environmental purposes.

b. **Lake Istokpoga Regulation Schedule - Zone C.** When the Lake Istokpoga water level is in Zone C, no releases may be made through S-68X and/or S-68, S-67, and S-67X. Reverse flow through S-67 and S-67X should be avoided when Lake Istokpoga is in Zone C. This criteria is intended to avoid potential damage to these structures.

**Table 7-2**  
**Summary of Water Management Operating Criteria**

	<b>Lake Istokpoga Regulation Schedule</b>		
	<b>Zone A</b>	<b>Zone B</b>	<b>Zone C</b>
<b>S-67</b>	May discharge up to 400 cfs but avoid reverse flow	May discharge up to 400 cfs but avoid reverse flow (*)	No releases (*)
<b>S-67X</b>	May discharge up to 200 cfs but avoid reverse flow	May discharge up to 200 cfs but avoid reverse flow (*)	No releases (*)
<b>S-68 and S-68X (*)</b>	Discharge 3,000 cfs plus, if no local runoff into C-41A, up to an additional 3,900 cfs (total of 6,900 cfs)	May make releases to maintain downstream flows for water supply, navigation, and environmental purposes	No releases
<b>S-83 and S-83X</b>	Discharge up to 4,830 cfs to maintain upstream water level between 31.8 and 32.2 ft., NGVD	Discharge up to 4,830 cfs to maintain upstream water level between 31.8 and 32.2 ft., NGVD	Discharge up to 4,830 cfs to maintain upstream water level between 31.8 and 32.2 ft., NGVD
<b>S-84 and S-84X</b>	Discharge up to 6,670 cfs to maintain upstream water level between 24.3 and 25.2 ft., NGVD	Discharge up to 6,670 cfs to maintain upstream water level between 24.3 and 25.2 ft., NGVD	Discharge up to 6,670 cfs to maintain upstream water level between 24.3 and 25.2 ft., NGVD

(\*) In Zone B, water managers should attempt to avoid or minimize releases toward the Kissimmee River through S-67 and S-67X when it appears that water is needed southeast of Lake Istokpoga in C&SF Project canal(s) in the Lake Istokpoga Basin.

**7-05. Standing Instructions to Damtender.** The Kissimmee River - Istokpoga Basin works are designed to pass 30 percent of the Standard Project Flood (SPF) (approximately a 1-in-10 year flood) without exceeding damaging levels. The project would considerably reduce damages for floods greater than the 10-year flood up to the SPF. Spillways and culvert structures in the Kissimmee River-Istokpoga Basin can have four possible flow regimes resulting from the effects of gates and tailwater effects. The flow regimes are:

1. **Free Uncontrolled Flow.** The gates are fully opened and the discharge is unaffected by the tailwater stage.
2. **Submerged Uncontrolled Flow.** The gates are fully opened and the discharge is reduced by tailwater conditions.
3. **Free Controlled Flow.** The gates are partially opened

and the discharge is unaffected by the tailwater stage.

4. **Submerged Controlled Flow.** The gates are partially open and the discharge is reduced by the tailwater conditions.

The spillway and culvert structure discharge rating curves that are being used must be applicable to the particular flow regime encountered. Discharge rating curves for the structures are found in Appendix A. The gates should be opened and closed gradually to provide an even transition to the new flow regime and to minimize hydraulic effects downstream. The tailwater stage should be allowed to build up before the next gate opening operation takes place. Spillway and culvert structure gate openings should be checked against the Maximum Allowable Gate Opening (MAGO) Curve to ensure that the gate openings do not exceed the allowable gate opening for non-damaging operations. MAGO curves are based on retaining the hydraulic jump within the stilling basin and providing safe velocities over the riprap and exceeded in the "Apron Control" range to insure the safety of the structure. For large floods the MAGO curves may be exceeded in the "Riprap Control" range, however some damage to the riprap will likely occur. The MAGO Curves for the structures are found in Appendix A. The spillway gates should be operated at the same gate opening.

As a practical consideration the structure's spillway gates should not be adjusted such that the gate opening differs by more than one foot. Violation of this precaution could result in erosive action due to excessive velocities, turbulence, and return flow. The stilling basin reduces kinetic energy of the flow entering the downstream channel. The stilling basin and downstream riprap are intended to prevent scour downstream of the spillway from undermining or otherwise threatening the integrity of the structure. However, S-68X, S-83X, and S-84X are designed (e.g., riprap) to be able to function independently of S-68, S-83, and S-84, respectively. It is not necessary to operate the gates of S-68X, S-83X, and S-84X at the same gate opening as, or at gate openings within one foot of, the gate openings of S-68, S-83, and S-84, respectively.

**7-06. Flood Control.** The regulation schedules of the Kissimmee Chain of Lakes and Lake Istokpoga vary on a seasonal basis. These regulation schedules are designed to achieve advance evacuation of the flood control capacity prior to the wet season.

a. **Lake Istokpoga.** S-68, S-68X, S-67, and S-67X are operated for flood control consistent with the Lake Istokpoga Regulation Schedule. When the Lake Istokpoga water level is in Zone A of the regulation schedule, releases shall be made at S-68 and S-68X. S-68 has a firm capacity of 3,000 cfs while S-68X has a firm capacity of 1,000 cfs. S-68 has an additional or secondary capacity of up to 2,900 cfs (total capacity of 5,900 cfs) when there is no local runoff into C-41A. A total of up to 6,900 cfs

can be discharged to C-41A from Lake Istokpoga when both S-68 and S-68X are utilized. Firm capacity is the discharge available under any conditions. Up to 400 cfs may be discharged through S-67 and up to 200 cfs may be discharged through S-67X.

If Lake Istokpoga is in Zone A of its regulation schedule, and if it appears likely that, without gate closure, the S-67 tailwater will soon exceed the S-67 headwater, the gates of S-67 and S-67X should be closed as needed to prevent reverse flow. Reverse flow through S-67 and S-67X should be avoided when Lake Istokpoga is in Zone A. This criteria is intended to avoid exacerbating high water conditions in the Lake Istokpoga Basin and/or to avoid potential damage to these structures.

**b. C-41A Regulation.** S-83, S-83X, S-84, and S-84X are operated for flood control in C-41A by maintaining canal water levels in accordance with optimum levels (ranges) shown in Table 7-1. When local inflow conditions permit, up to 6,900 cfs can be discharged into C-41A from Lake Istokpoga when both S-68 and S-68X are utilized. Of the 6,900 cfs, 4,800 cfs would be conveyed downstream to S-84 and S-84X when both S-83 and S-83X are utilized. The remainder (2,100 cfs) would be passed through S-82 to C-39A, C-40, and/or C-41. S-84 and S-84X would be utilized to convey S-83 and S-83X discharges as well as local basin runoff to C-38.

**c. S-65DX1 and S-65DX2.** S-65DX1 can be operated for flood control by conveying flow to the Old Kissimmee River during high water conditions. S-65DX2 is operated for flood control in conjunction with S-65D; the operating agency has the flexibility to choose either one structure (S-65DX2 or S-65D) or both structures (S-65DX2 and S-65D) to make discharges. During extreme high water conditions upstream of S-65DX1, S-65DX2, and S-65D all of these structures will function together to convey water downstream. However, note in Section 7-02c, the S-65D and S-65DX2 discharge capacity constraint.

**d. Hurricane or Tropical Storm Regulations.** These regulations are supplemented by emergency action plans contained in CESAJ SOP 500-1-1 - Standard Operating Procedure. CESAJ SOP 500-1-1 should be consulted for related emergency preparation and actions. The SFWMD document "Major Storms Procedures, Structure Status Summary" indicates the status of structures during a storm and is updated periodically.

**7-07. Recreation.** Navigation usage in Lake Istokpoga is primarily recreational craft, mostly small fishing boats. Although there are no water management operations in this WCP specifically for recreation, a boat ramp has been constructed in

the Istokpoga Canal east of S-67 and U.S. Highway 98. The canal in the vicinity of the boat ramp has been widened and deepened.

**7-08. Water Quality.** Regulations for water quality are a function of the State of Florida. The SFWMD, acting on behalf of the state, petitions the USACE for changes in flood control and navigation regulations where it sees that water quality benefits may be achieved in the project area without loss of significant project benefits for the project's authorized purposes. Generally, no water management operations are made specifically for water quality in the Kissimmee River and Lake Istokpoga Basins.

**7-09. Fish and Wildlife.** When the Lake Istokpoga water level is in Zone B, S-68, S-68X, S-67, and S-67X may be utilized for the benefit of fish and wildlife. Releases from Lake Istokpoga may be made to maintain downstream flows for environmental purposes. When the Lake Istokpoga water level is in Zones B or C, S-67 and S-67X may be utilized for the benefit of fish and wildlife. S-65DX1 is operated for fish and wildlife enhancement by conveying flow to the Old Kissimmee River, consistent with previous operating criteria for S-65DX.

**7-10. Water Supply.** When the Lake Istokpoga water level is in Zone B, S-68, S-68X, S-67, and S-67X may be utilized to provide downstream flows for water supply purposes. When the Lake Istokpoga water level is in Zones B or C, S-67 and S-67X may be utilized for the benefit of water supply. .

**7-11. Navigation.** Navigation usage in Lake Istokpoga is primarily recreational craft, mostly small fishing boats. The Federal navigation project for the Istokpoga Creek is a three-foot depth project. Water levels downstream of S-67 and S-67X fluctuate with water levels in the restored Kissimmee River and local inflow.

**7-12. Deviation From Normal Regulation.** The Jacksonville District Engineer is occasionally requested to approve deviations from the normal regulation of the lakes. Prior approval for a deviation is to be obtained from the South Atlantic Division (SAD) except as noted below. Deviation requests usually fall into the following categories:

**a. Emergencies.** Some emergencies that can be expected are: drowning and other accidents, failure of operation facilities, and flushing of unexpectant pollutants when necessary. Necessary action under emergency conditions is taken immediately unless such action would create equal or worse conditions. The Jacksonville District Office (SAJ) shall be informed as soon as practicable. A written confirmation showing the deviation and conditions will be furnished to SAD after the

incident.

**b. Unplanned Minor Deviations.** There are unplanned instances that create a temporary need for minor deviation from normal regulation of the lakes, although they are not considered emergencies. Construction accounts for the major portion of these incidents. Change in releases are sometimes necessary for maintenance and inspection. Requests for changes of release rates are generally for a few hours or a few days. Each request is analyzed on its own merits. Consideration is given to upstream watershed conditions, potential flood threat, conditions of lakes, and possible alternative measures. In the interest of maintaining good public relations, the requests for minor deviations are generally granted, providing that these deviations will not have adverse effects on the ability of the project to achieve the authorized purposes. Approval for these minor deviations will normally be obtained from SAD by telephone. A written confirmation showing the deviation will be furnished to SAD after the deviation is complete.

**c. Planned Deviations.** Each condition will be planned on its own merits. Sufficient data on flood potential, watershed conditions, water management area stages, possible alternative measures, benefits to be expected, and probable effects on other authorized and useful purposes will be presented by letter, telephone, or telefacsimile to SAD along with recommendations for review and approval.

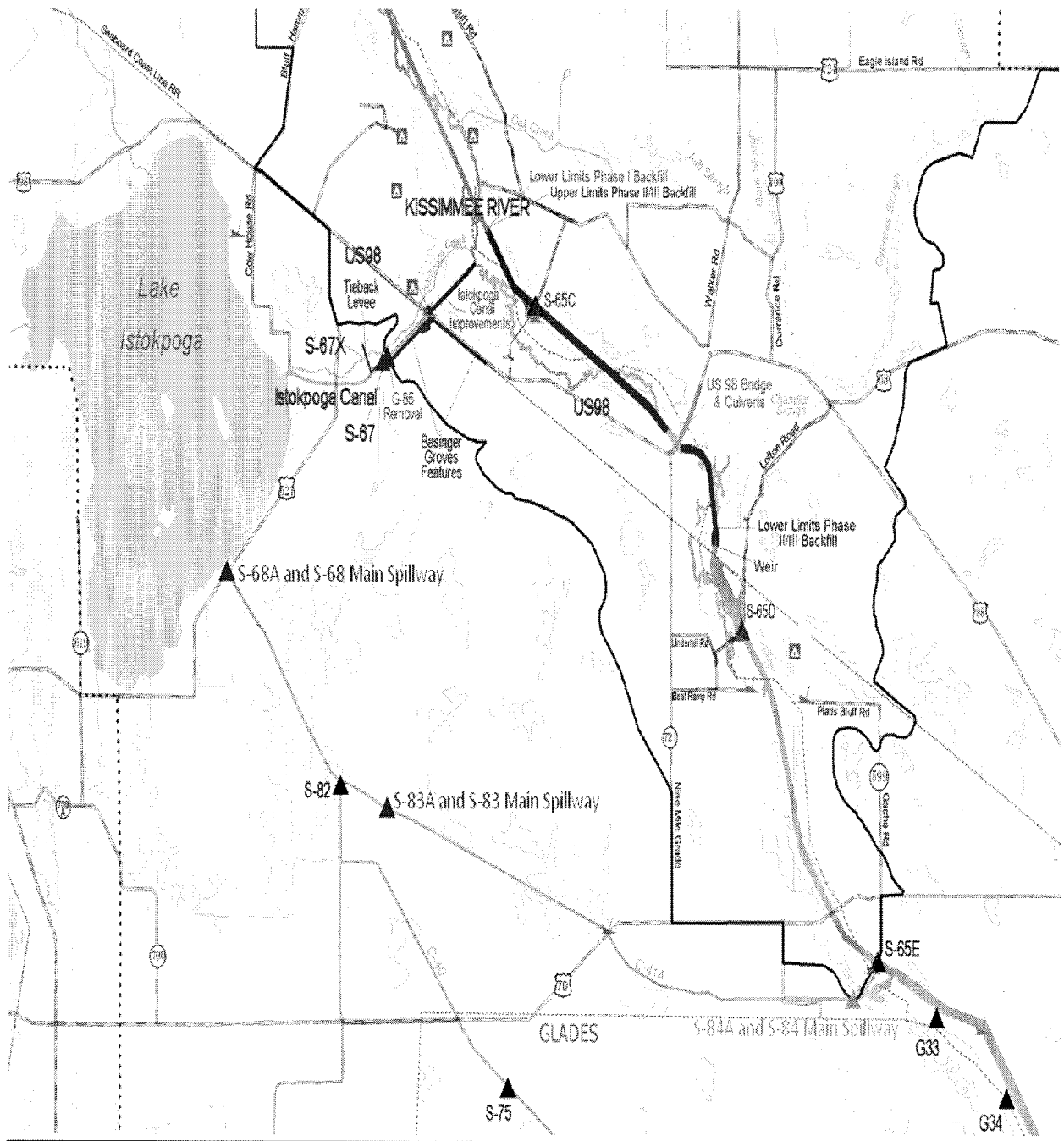
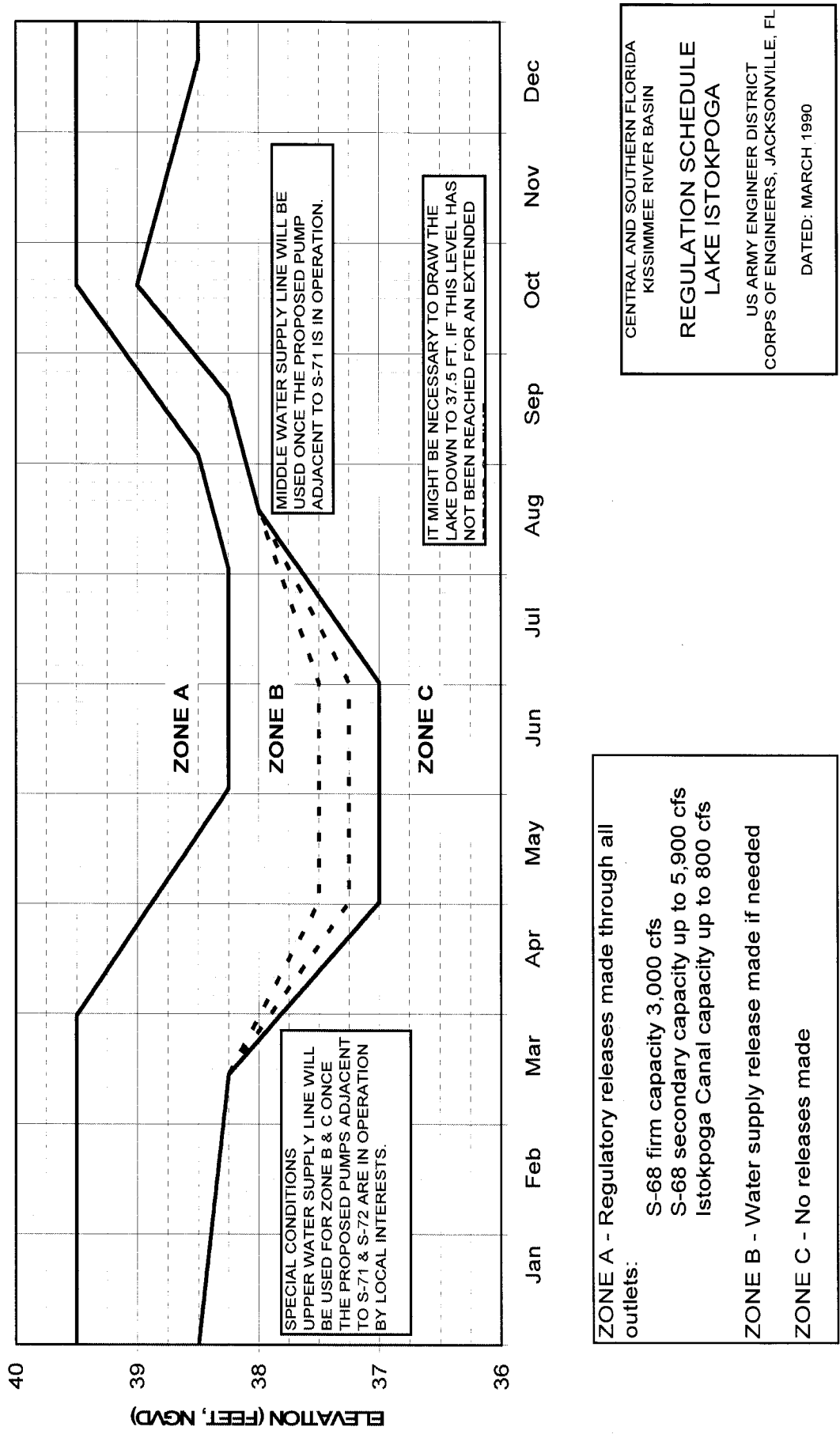


Figure 7-1



**ZONE A -** Regulatory releases made through all outlets:  
 S-68 firm capacity 3,000 cfs  
 S-68 secondary capacity up to 5,900 cfs  
 Istokpoga Canal capacity up to 800 cfs

**ZONE B -** Water supply release made if needed

**ZONE C -** No releases made

CENTRAL AND SOUTHERN FLORIDA  
 KISSIMMEE RIVER BASIN

**REGULATION SCHEDULE  
 LAKE ISTOKPOGA**

US ARMY ENGINEER DISTRICT  
 CORPS OF ENGINEERS, JACKSONVILLE, FL

DATED: MARCH 1990

Figure 7-2



**APPENDIX A**  
**Project Structures Descriptions**

### **Structure 65DX1 (S-65DX1)**

**Location.** S-65DX1 is located adjacent to and approximately 1,500 feet west of S-65D.

**Description.** S-65DX1 is a box culvert consisting of four 5ft x 5ft culverts with vertical slide gates. The total design flow is 1000 cfs.

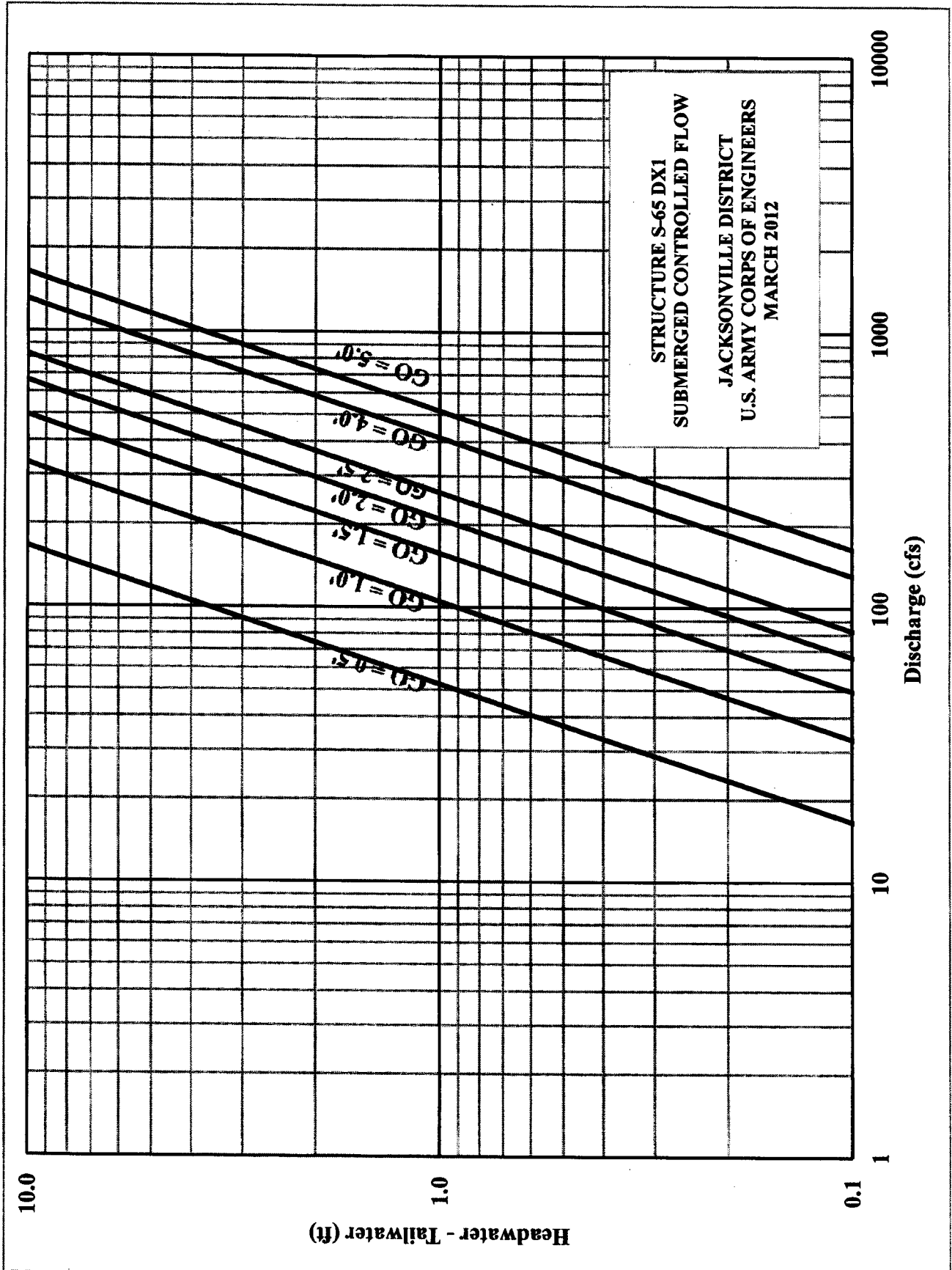
**Purpose.** S-65DX1 conveys water from Pool D of the Kissimmee River (C-38) to the Old Kissimmee River.

**Operation.** S-65DX1 has the same operating criteria as the structure it replaced, S-65DX. S-65DX1 is operated for fish and wildlife enhancement which is consistent with previous operating criteria for S-65DX. However, S-65DX1 can be operated for flood control by conveying flow to the historic Kissimmee River during high water conditions. During extreme high water conditions upstream of S-65DX1, Structure 65DX2 (S-65DX2), and Structure 65D (S-65D) will function together to convey water downstream.

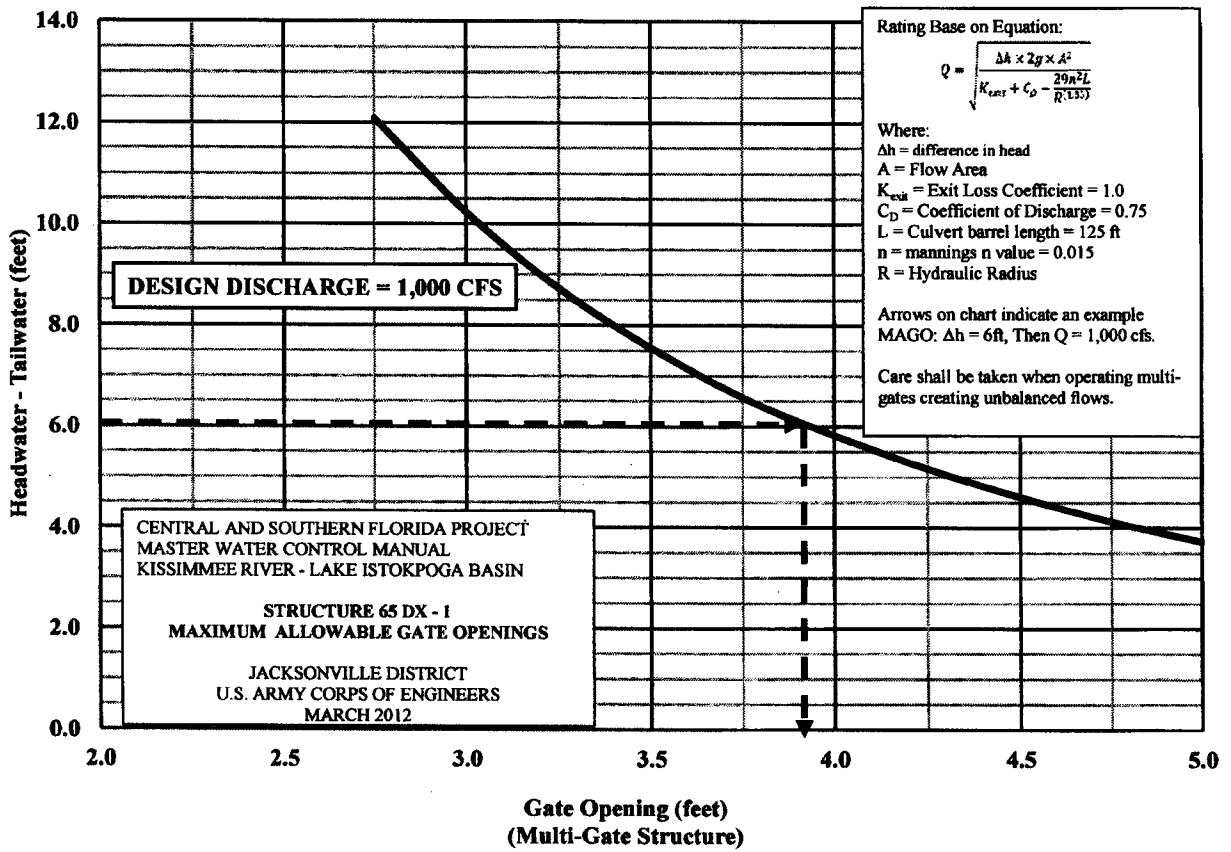
## Structure 65DX1

### Hydraulic Design Data

<u>Type of Structure</u>	Gated Culvert Reinforced Concrete Box
<u>Location</u>	
Canal .....	38
Station .....	N/A
<u>Discharge (cfs)</u>	
Design .....	1000
SPF .....	1000
Critical .....	N/A
<u>Headwater Elevation (feet)</u>	
Design .....	28.0
SPF .....	32.4
Critical .....	N/A
Maximum .....	32.4
Optimum (high/low) .....	26.8
Minimum .....	N/A
<u>Tailwater Elevation (feet)</u>	
Design .....	23.0
SPF .....	26.6
Critical .....	N/A
Maximum .....	26.2
Optimum (high/low) .....	21.0
Minimum .....	N/A
<u>Culvert</u>	
Number of Barrels .....	4
Culvert Dimensions (feet) .....	5 ft by 5 ft Box
Upstream Invert Elevation .....	18.0
Type of Control .....	Vertical Slide Gate
<u>Rip Rap</u>	
Size (D <sub>50</sub> ) (feet) .....	2.16
Extent (Downstream) (feet) .....	82.5
Specific Weight (pcf) .....	140
Max velocity rip rap can withstand (ft/s) .....	11.30
Thickness (inches) .....	24
Bedding stone layer thickness (inches) .....	6
Bedding stone D <sub>50</sub> (feet) .....	0.20



### Maximum Allowable Gate Opening Curve for S-65 DX 1



**Structure 65DX2 (S-65DX2)**

**Location.** S-68DX2 is located adjacent to and approximately 160 ft west of Spillway 65D (S-65D), on Canal 38 (C-38) i.e. the Kissimmee River.

**Description.** S-68DX2 is a two-bay Spillway with discharge controlled by 1 vertical slide gate. The total design flow is 8,600 cfs.

**Purpose.** S-65DX2 conveys water from Pool D to Pool E.

**Operation.** S-65DX2 has the same operating criteria as S-65D; the operating agency has the flexibility to choose either one structure (S-65DX2 or S-65D) or both structures (S-65DX2 and S-65D) to make discharges.

## Structure 65DX2

### Hydraulic Design Data

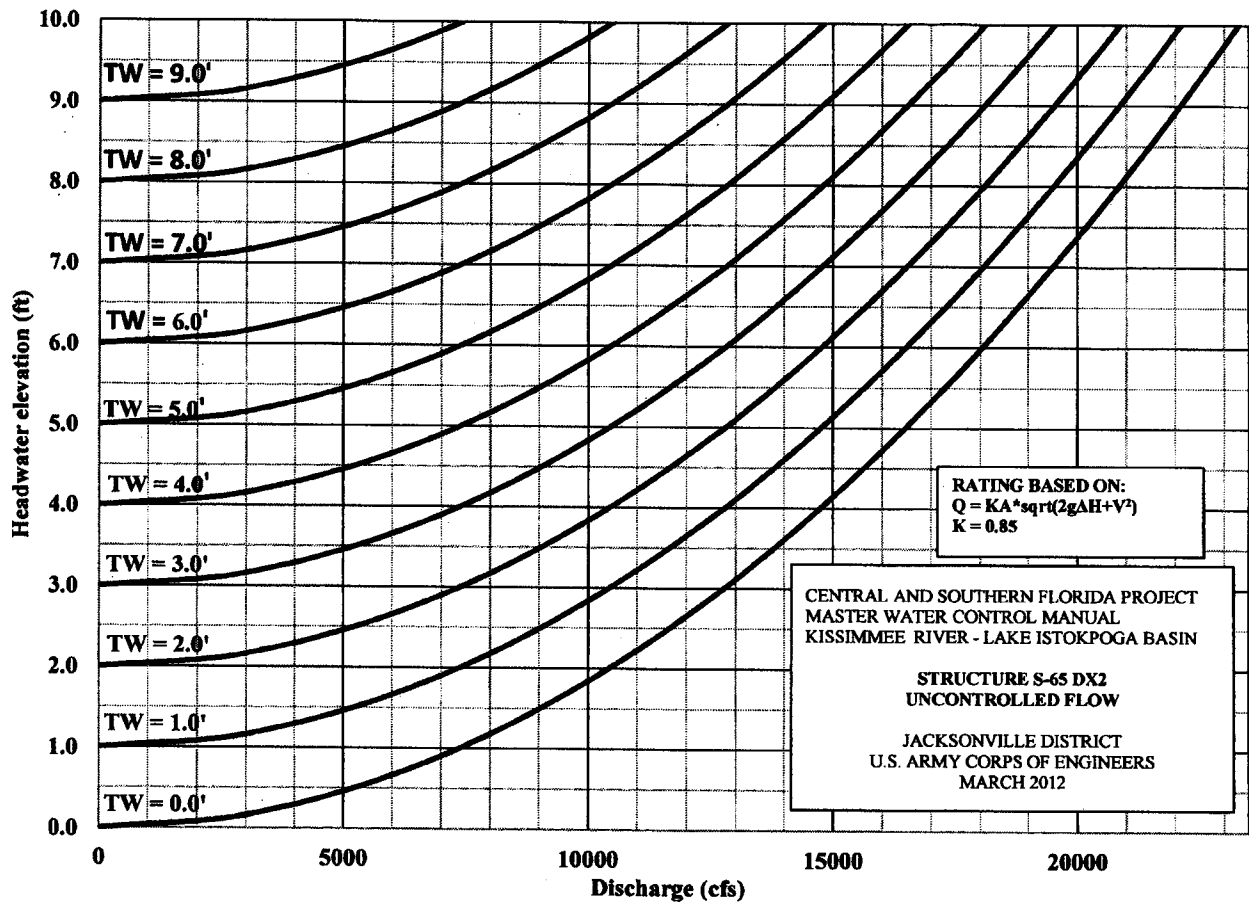
<u>Type of Structure</u> .....	Spillway
<u>Location</u>	
Canal .....	41A
Station .....	N/A
<u>Discharge (cubic feet per second)</u>	
Design .....	8,600
SPF .....	9,700
Critical .....	N/A
<u>Headwater Elevation (feet, NGVD)</u>	
Design .....	32.4
SPF .....	32.4
Critical .....	N/A
Maximum .....	32.4
Optimum (high/low) .....	26.80
Minimum .....	N/A
Maximum Permissible Head .....	13.8
<u>Tailwater Elevation (feet, NGVD)</u>	
Design .....	26.2
SPF .....	26.2
Critical .....	N/A
Maximum .....	26.2
Optimum .....	21.0
Minimum .....	N/A
<u>Crest</u>	
Shape .....	Ogee
Elevation .....	19.0
Net Crest Length (feet) .....	54.0
Number and width of piers (feet) .....	1 and 3.3
Approach Apron width (feet) .....	62.3
Upstream Approach Apron Elevation (feet) .....	10.0
<u>Gates</u>	
Weir Control .....	Vertical Slide Gates
Number of Gates .....	2
Gate Bay Width (feet) .....	27.0
Gate Height (feet) .....	14.4
Gate Clearance Elevation .....	32.5

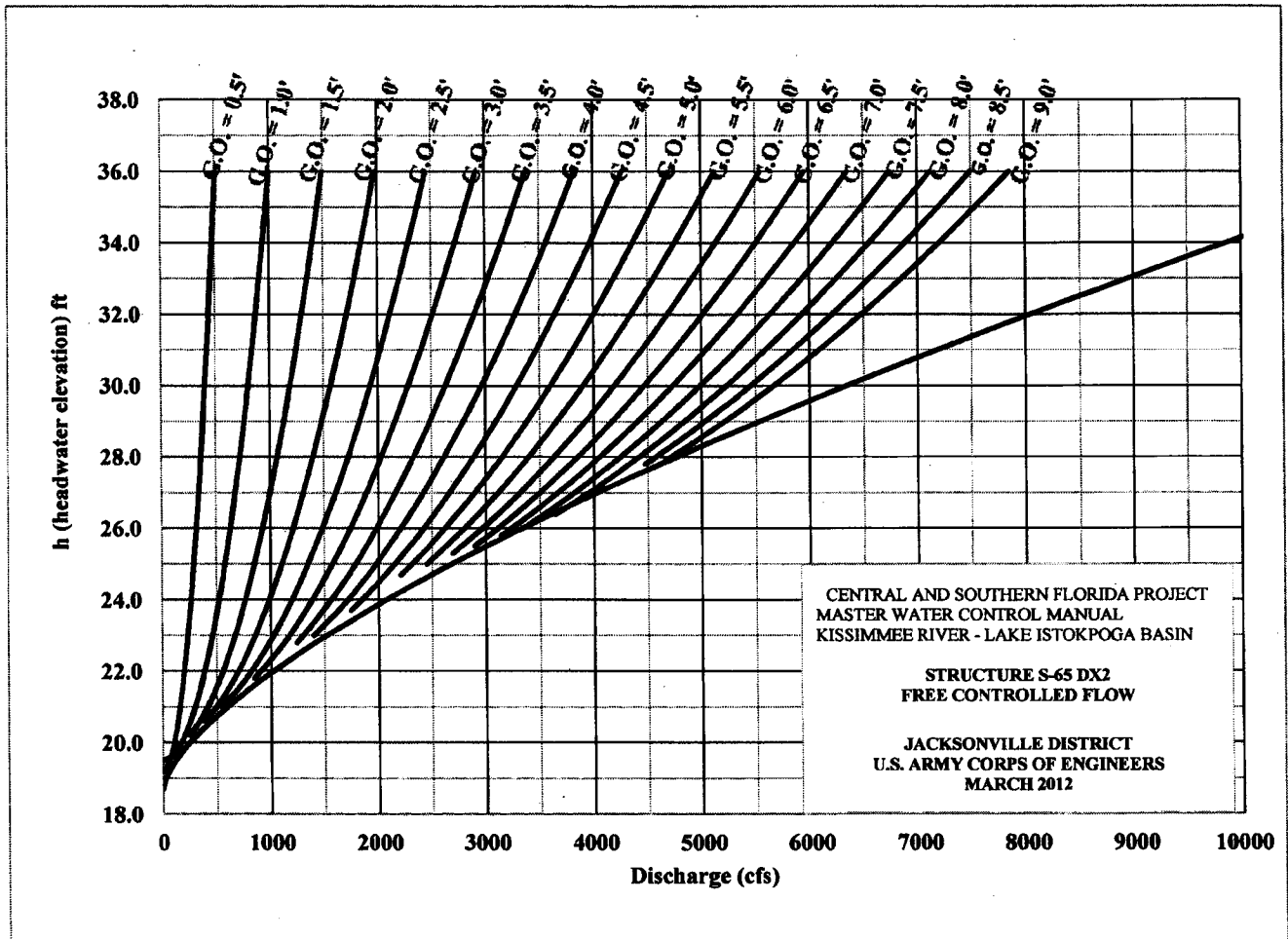
## Structure 65DX2

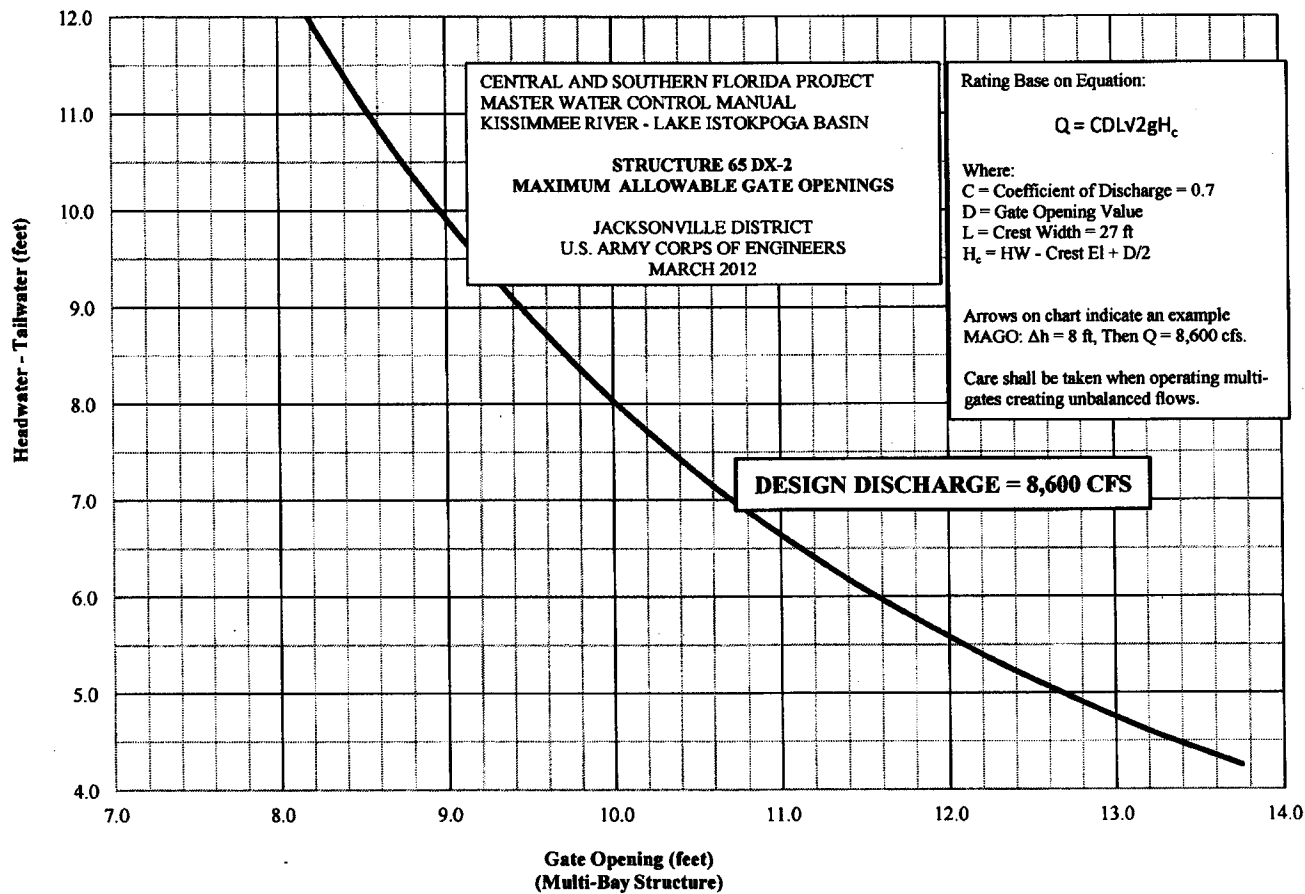
### Hydraulic Design Data (Continued)

Baffle Block Elevation .....	5.5
Baffle block Height (inches)/Width (feet) .....	50/3.0
Distance from Toe of Ogee to 1st Row of Baffle Blocks .....	31.3
Distance from Toe of Ogee to 2nd Row of Baffle Blocks .....	40.0
End Sill Elevation .....	4.0
Total Apron length from Ogee Toe to End of End Sill (feet) .....	68.0
Velocity over End Sill (feet/second) .....	12.8
<u>Stilling Basin</u>	
Apron Elevation .....	9.0
Apron length (feet) .....	70
Approach Apron width (feet) .....	11.0
Upstream Approach Apron Elevation (feet).....	4.0
End Sill Elevation (feet).....	4.0
Velocity over End Sill (tailwater=crest) (ft/s).....	10.0
<u>Rip Rap</u>	
Size (D <sub>50</sub> ) (feet) .....	2.16
Extent (Downstream) (feet) .....	500
Specific Weight (pcf) .....	140
Max velocity rip rap can withstand (f/s) .....	11.30
Thickness (inches) .....	24-42
Bedding stone layer thickness (inches) .....	6
Bedding stone D <sub>50</sub> (feet) .....	0.20









### Structure 67 (S-67)

**Location.** S-67 is located in the Istokpoga Canal approximately 300 ft west of the former location of G-85.

**Description.** S-67 is a concrete box culvert consisting of two 4 ft x 8 ft culverts with vertical slide gates. The design flow is 400 cfs.

**Purpose.** When Lake Istokpoga is in Zone A or B, S-67 may be operated to discharge up to 400 cfs to the Kissimmee River. Reverse flow through S-67 is to be avoided when Lake Istokpoga is in Zone A. Reverse flow is considered to be flow from the Kissimmee River.

**Operation.** When Lake Istokpoga is in Zone A, S-67 with S-67X, S-68, and S-68X will be operated to make discharges from Lake Istokpoga. However, when the tailwater is within 0.5 ft of the S-67 headwater, the water stage data should be monitored closely; if it appears that the tailwater will exceed the headwater, the gates will be closed.

**Structure 67**  
**Hydraulic Design Data**

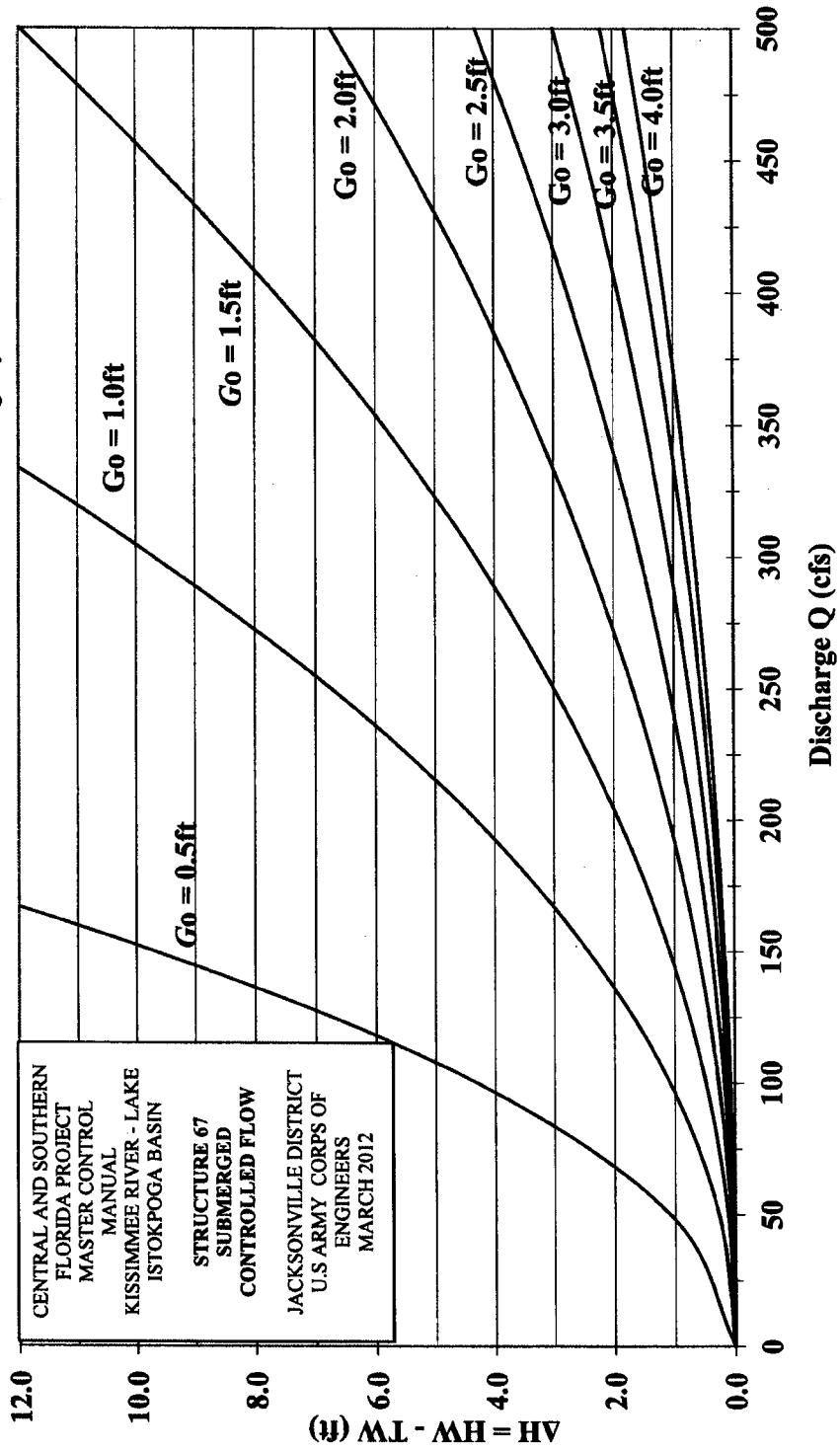
<u>Type of Structure</u> .....	Gated Culvert
<u>Location</u>	
Canal .....	Istokpoga
Station .....	N/A
<u>Discharge (cubic feet / second)</u>	
Design .....	400
SPF .....	N/A
Critical .....	N/A
<u>Headwater Elevation (feet, NGVD) (Lake Istokpoga side)</u>	
Design .....	39.4
SPF .....	N/A
Maximum .....	41.5
Critical .....	N/A
Optimum .....	39.4
Minimum .....	N/A
Maximum permissible Head .....	15
<u>Tailwater Elevation (feet, NGVD) (Kissimmee River side)</u>	
Design .....	38.0
SPF .....	N/A
Maximum .....	42.3
Critical .....	N/A
Optimum .....	38.1
Minimum .....	N/A
<u>Culvert</u>	
Number of Pipes .....	2
Size (feet) .....	4.0 x 8.0
Invert Elevation (feet, NGVD) .....	31.0
Type of Control .....	Vertical slide gate
<u>Rip Rap</u>	
Size (D <sub>50</sub> ) (feet) .....	0.6
Extent (Downstream) (feet) .....	80
Specific Weight (pound /cubic foot) .....	140

**Structure 67**

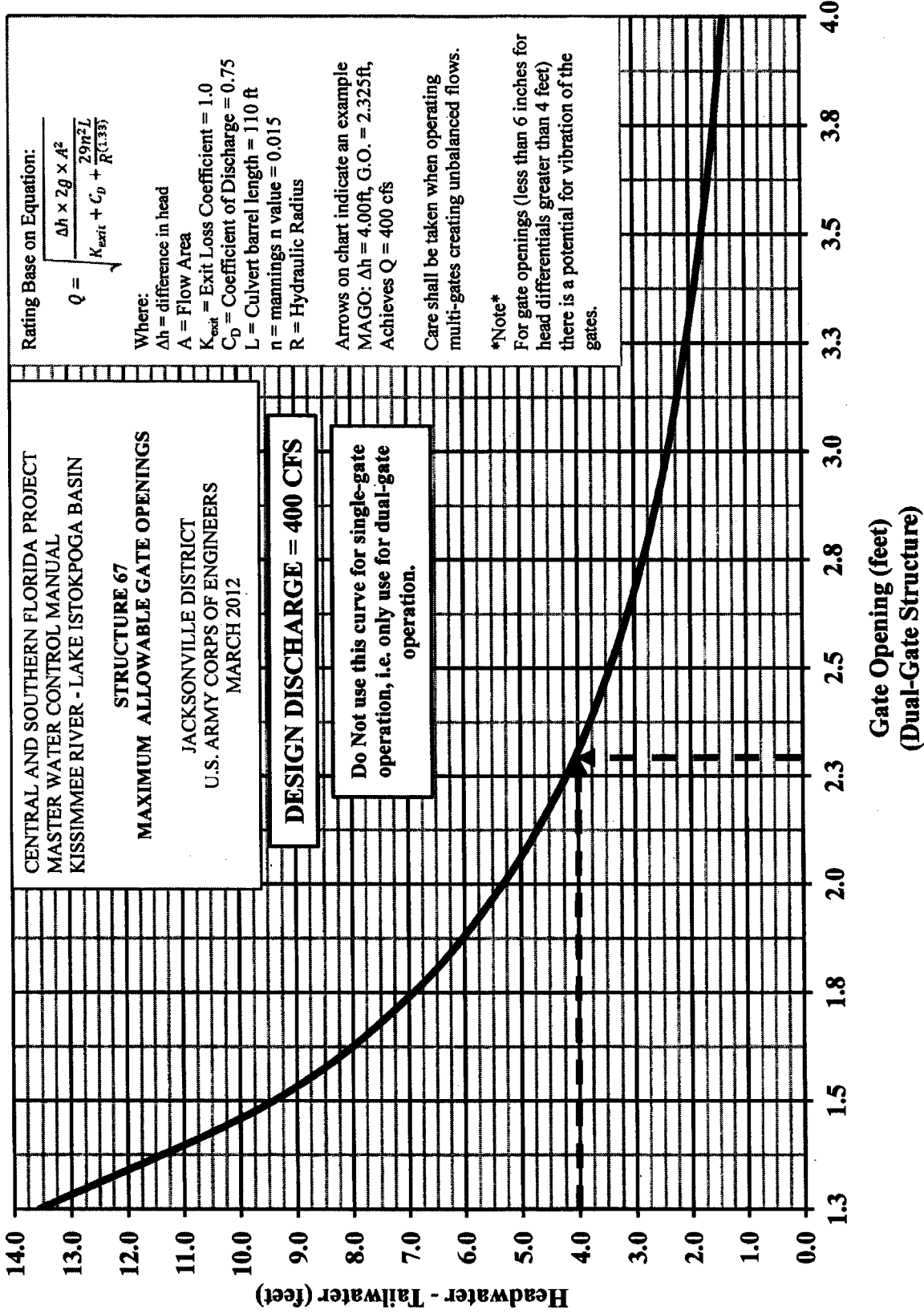
Hydraulic Design Data Continued

Max velocity rip rap can withstand (feet/second) .....	6.0
Thickness (inches).....	18
Bedding stone layer thickness (inches).....	9
Bedding stone D <sub>50</sub> (feet).....	0.115

2-4' High by 8' Wide Gates, Invert 31.0ft



**Maximum Allowable Gate Opening Curve for S-67**  
 (Use this curve when TW stage is 34 ft or greater)





### Structure 67X (S-67X)

**Location.** S-67X is located in the S-67X tieback levee, on the historic Istokpoga Creek.

**Description.** S-67X is a reinforced concrete pipe culvert consisting of four 4 ft diameter culverts with vertical slide gates. The total design flow is 200 cfs.

**Purpose.** When water is available, S-67X allows flows into Istokpoga Creek. When Lake Istokpoga is in Zone A or B, S-67X, with S-67, S-68, and S-68X may be operated to make discharges from Lake Istokpoga.

**Operation.** When Lake Istokpoga is in Zone A, S-67 with S-67X, S-68, and S-68X will be operated to make discharges from Lake Istokpoga. However, when the tailwater is within 0.5 ft of the S-67 headwater, the water stage data should be monitored closely; if it appears that the tailwater will exceed the headwater, S-67X will be closed.

## Structure 67X

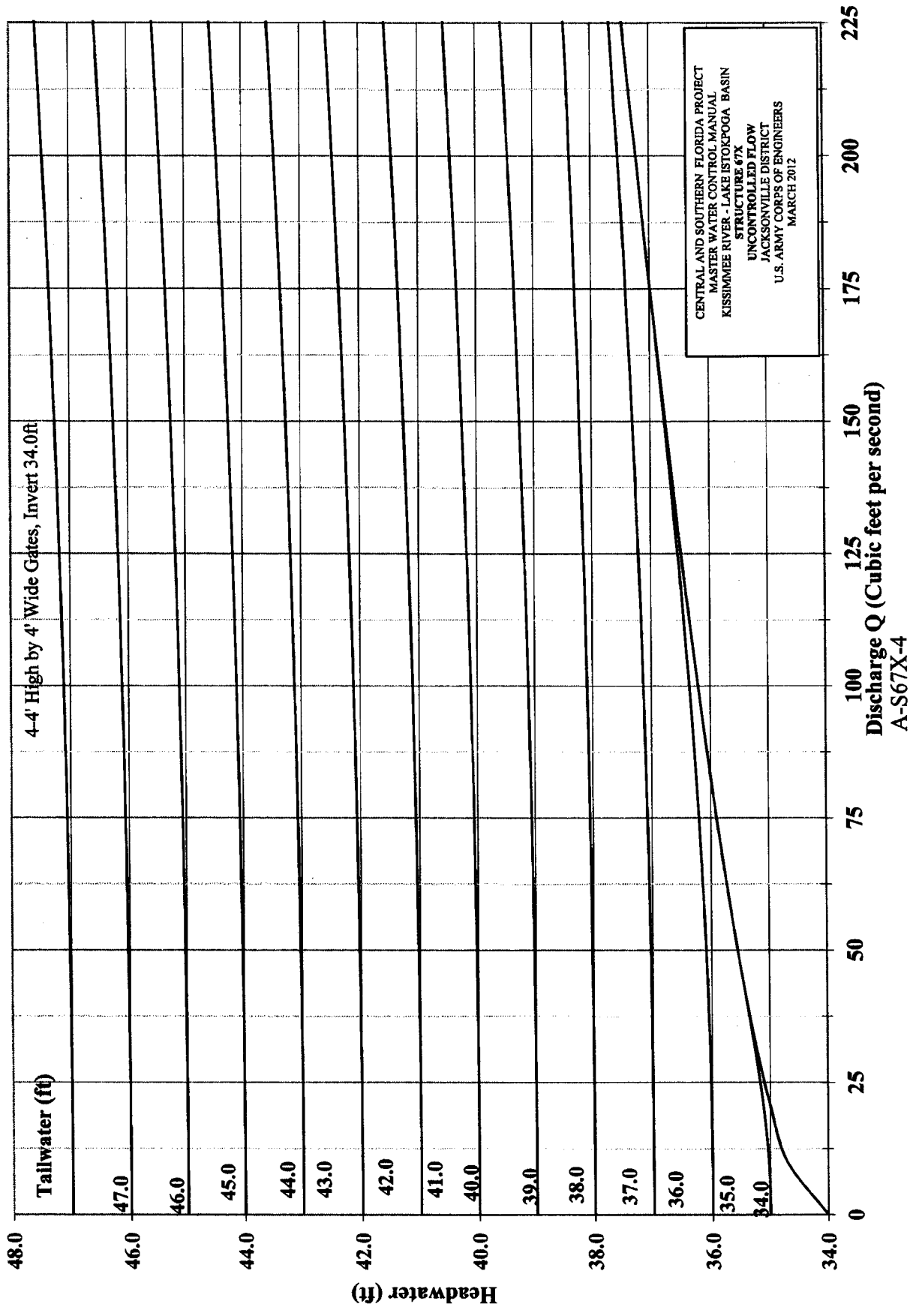
### Hydraulic Design Data

<u>Type of Structure</u> .....	Gated Culvert Reinforced concrete pipe
<u>Location</u>	
Canal .....	Istokpoga
Station .....	x = 596,418.2764 y = 1110392.1937
<u>Discharge (cubic feet second)</u>	
Design .....	200
SPF .....	N/A
Critical .....	N/A
<u>Headwater Elevation (feet, NGVD) (Istokpoga side)</u>	
Design .....	39.4
SPF .....	N/A
Maximum .....	41.5
Critical .....	N/A
Optimum .....	39.4
Minimum .....	N/A
Maximum permissible head .....	15.0
<u>Tailwater Elevation (feet, NGVD) (Kissimmee River side)</u>	
Design .....	38.0
Maximum .....	42.3
SPF .....	N/A
Critical .....	N/A
Optimum .....	38.1
Minimum .....	N/A
<u>Culvert</u>	
Number of Pipes .....	4
Diameter (feet) .....	4.0
Invert Elevation (feet, NGVD) .....	34.0
Type of Control-.....	Vertical slide gate
<u>Rip Rap</u>	
Size (D <sub>50</sub> ) (feet) .....	n/a
Extent (Downstream) (feet).....	n/a
Specific Weight (pounds/cubic foot).....	n/a

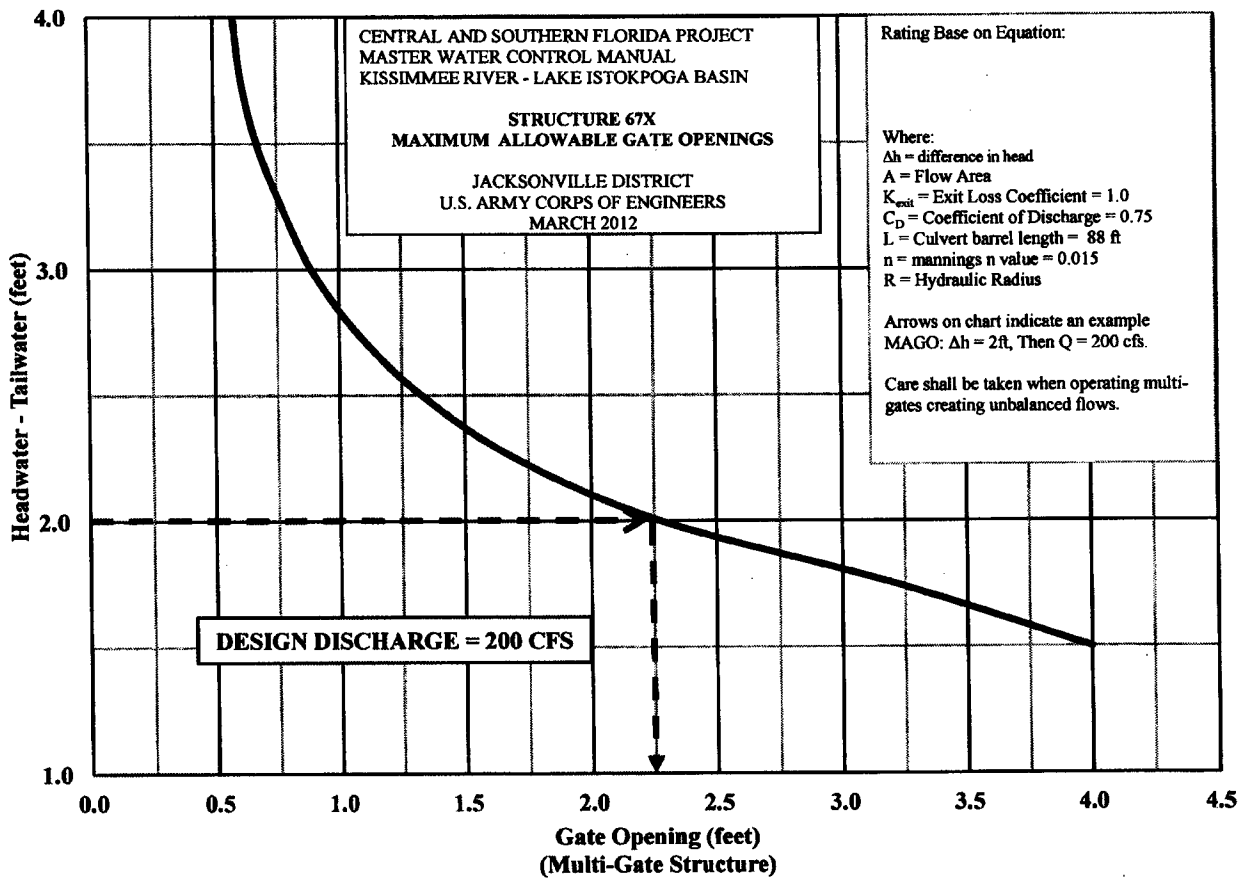
**Structure 67X**

Hydraulic Design Data Continued

Max velocity rip rap can withstand (feet/second)	.....	n/a
Thickness (inches)	.....	n/a
Bedding stone layer thickness (inches)	.....	n/a
Bedding stone D <sub>50</sub> (feet)	.....	n/a



**Maximum Allowable Gate Opening Curve for S-67X**



### Structure 68X (S-68X)

**Location.** S-68X is located adjacent to and approximately 230 ft north of S-68. on Canal 41A.

**Description.** S-68X is an Ogee Spillway with discharge controlled by 1 vertical slide gate. The total design flow is 1000 cfs.

**Purpose.** When Lake Istokpoga is in Zone A, and when operated with S-68, S-68X provides additional discharge capability for the lake

**Operation.** When Lake Istokpoga is in Zone A, , S-68 and S-68X may discharge up to 4,830 cfs to maintain upstream water levels between 31.8 and 32.2 feet, NGVD. When Lake Istokpoga is in Zone B, S-68 and S-68X may make releases to maintain downstream flows for water supply, navigation and environmental purposes. No releases are made when Lake Istokpoga is in Zone C. New structures on, S-68X, S-83X, and S-84X , provide additional release capacity from Lake Istokpoga to C-41A. The operating agency has the flexibility to choose which structure, (S-68 or S-68X, S-83 or S-83X, S-84 or S-84X, and S-84) will be utilized to make discharges based on the operating criteria for each structure

## Structure 68X

### Hydraulic Design Data

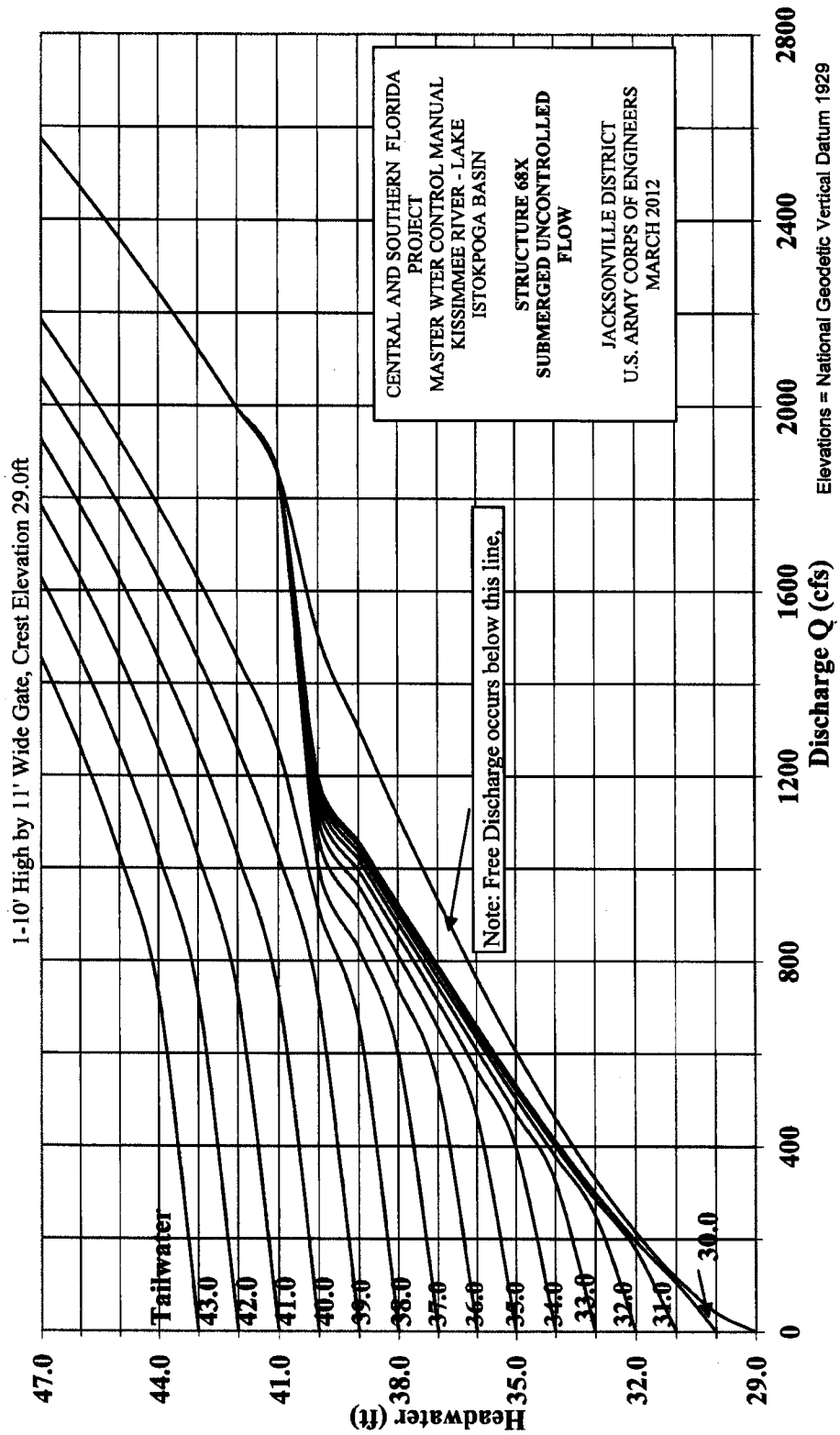
<u>Type of Structure</u> .....	Spillway
<u>Location</u>	
Canal .....	41A
Station .....	N/A
<u>Discharge (cubic feet/second)</u>	
Design .....	1000
SPF .....	1000
Critical .....	N/A
<u>Headwater Elevation (feet, NGVD)</u>	
Design .....	40.0
SPF .....	46.7
Critical .....	N/A
Maximum .....	46.7
Optimum .....	39.5
Minimum .....	N/A
Maximum permissible head .....	9.5
<u>Tailwater Elevation (feet, NGVD)</u>	
Design .....	34.2
SPF .....	40.0
Critical .....	N/A
Maximum .....	34.2
Optimum .....	34.2
Minimum .....	N/A
<u>Crest</u>	
Shape .....	Ogee
Design head (feet) .....	8.8
Net Crest length .....	11.0
Crest Elevation .....	29.0
Number and Width of piers .....	0 and 0 feet
Approach apron width (feet) .....	11.0
Upstream Approach Apron Length (feet) .....	25.0
Minimum Upstream Apron length (feet) .....	N/A
<u>Gates</u>	
Weir control .....	Vertical Slide Gate
Number of Gates .....	1
Gate Bay Width (feet) .....	11.0

## Structure 68X

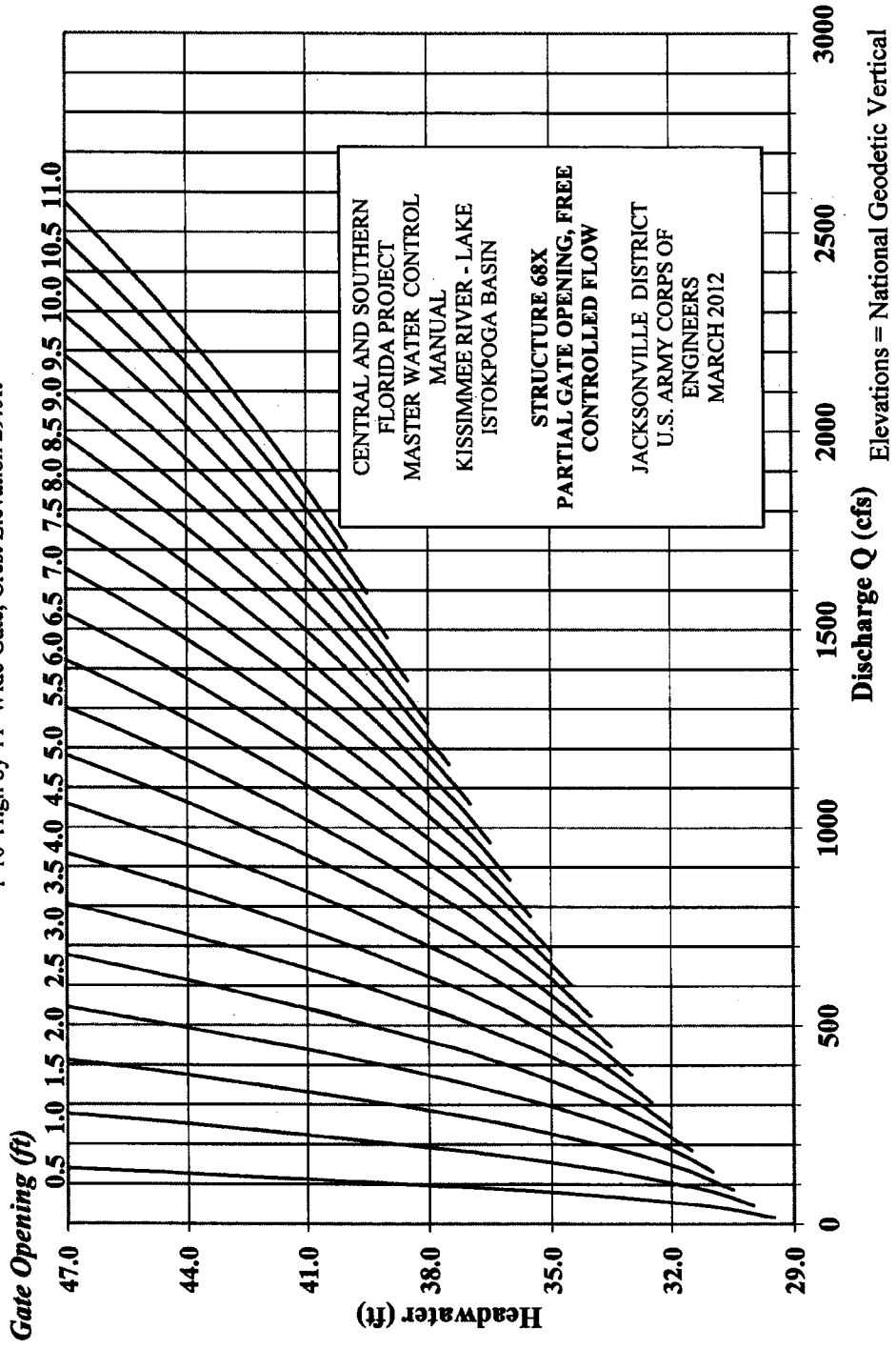
### Hydraulic Design Data Continued

Gate Height (feet) .....	12.0
Gate clearance Elevation .....	40.5
<u>Stilling Basin</u>	
Apron Length (feet).....	40
End Sill Elevation (feet, NGVD).....	19.0
Velocity over End Sill (Tailwater=crest) (feet/second).....	9.10
<u>Rip Rap</u>	
Size (D <sub>50</sub> ) (feet) .....	1.26
Extent (Downstream) (feet).....	160
Specific Weight (pound/cubic feet).....	140
Max velocity rip rap can withstand (feet/s).....	8.60
Thickness (inches).....	39
Bedding stone layer thickness (inches) .....	9
Bedding stone D <sub>50</sub> (feet).....	0.115





1-10' High by 11' Wide Gate, Crest Elevation 29.0ft

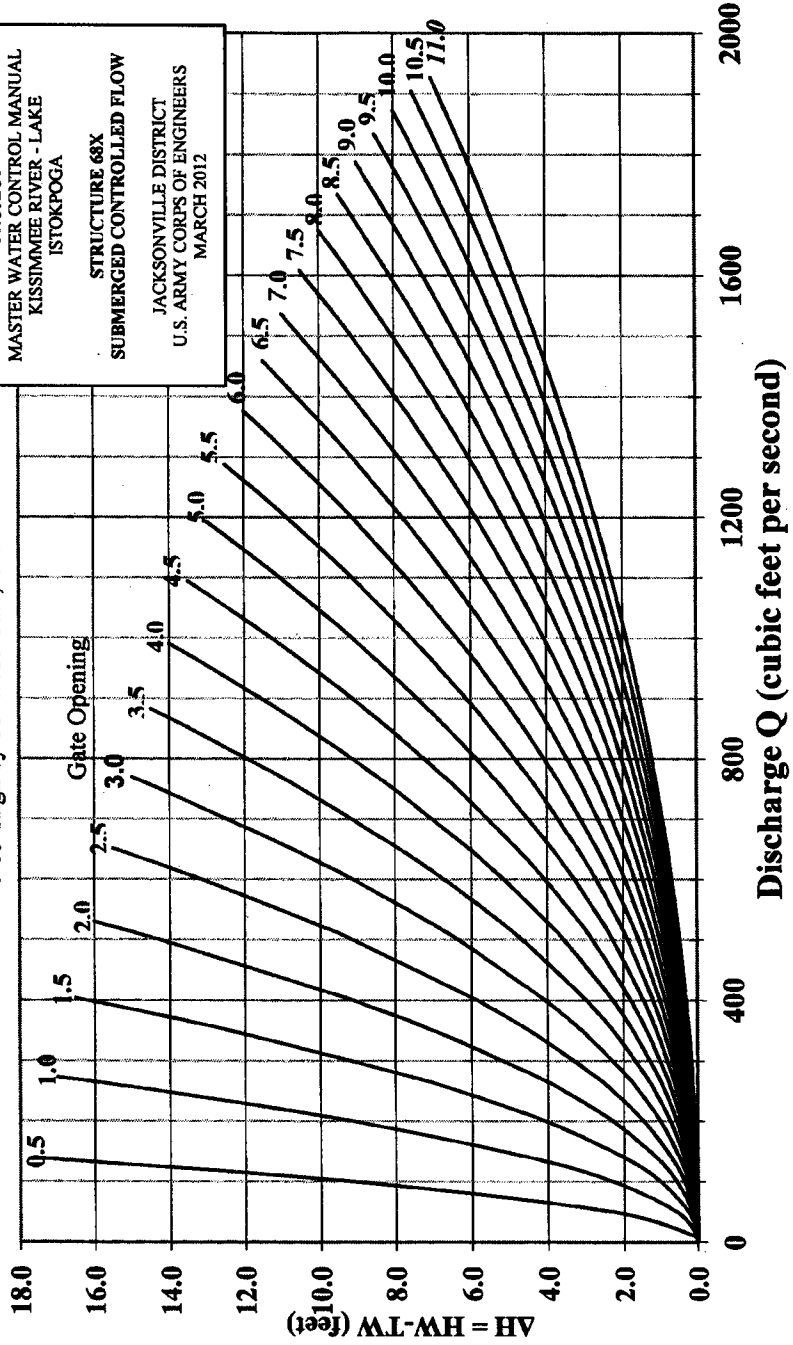


1-10' High by 11' Wide Gate, Crest

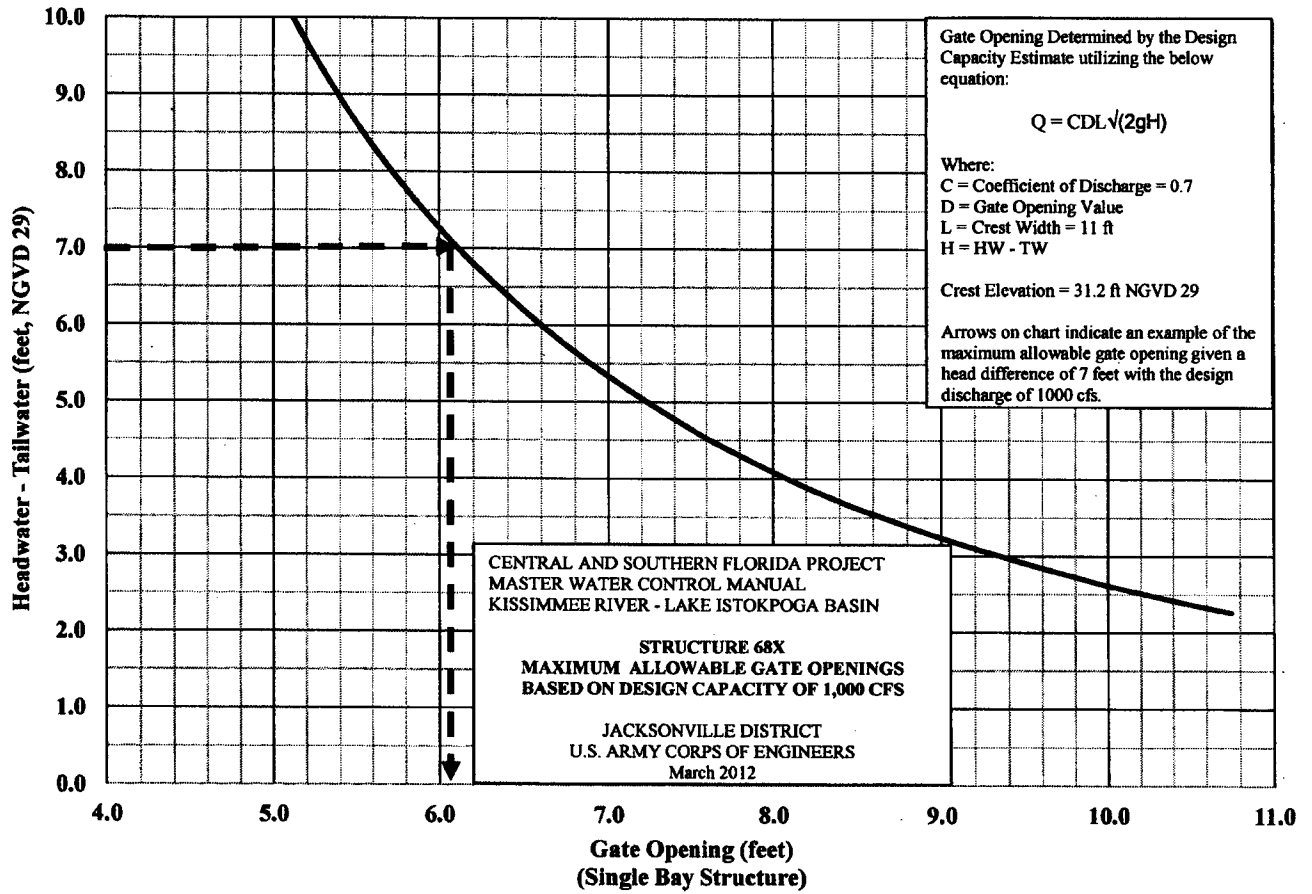
CENTRAL AND SOUTHERN FLORIDA  
PROJECT  
MASTER WATER CONTROL MANUAL  
KISSIMMEE RIVER - LAKE  
ISTOKPOGA

STRUCTURE 68X  
SUBMERGED CONTROLLED FLOW

JACKSONVILLE DISTRICT  
U.S. ARMY CORPS OF ENGINEERS  
MARCH 2012



**Maximum Allowable Gate Opening Curve for S-68X**



### Structure 83X (S-83X)

**Location.** S-83X is located adjacent to and approximately 240 ft. south of S-83

**Description.** S-83X is an Ogee Spillway with discharge controlled by 1 vertical slide gate. The total design flow is 1,000 cfs.

**Purpose.** S-83X allows for higher releases from Lake Istokpoga discharges (via S-68X) when it is in Zone A. In addition, S-83X with S-84X provide additional discharge ability of local runoff accumulating in the Canal 41A (C-41A).

**Operation.** S-83X has the same operating criteria as S-83. S-83 maintains an optimum upstream water level between 31.8 and 32.2 feet, NGVD in Canal 41A (C-41A); passes all discharges up to 3,830 cfs without exceeding desirable stages; restricts discharges during floods to that which will not cause damaging velocities or stages downstream; and passes up to 300 cfs during low flow periods to maintain stages and satisfy irrigation demands downstream. When Lake Istokpoga is in Zone A, B or C, S-83 and S-83X may discharge up to 4,830 cfs to maintain optimal upstream water levels between 31.8 and 32.2 feet, NGVD. New structures on, S-68X, S-83X, and S-84X, provide additional release capacity from Lake Istokpoga to C-41A. The operating agency has the flexibility to choose which structure, (S-68 or S-68X, S-83 or S-83X, S-84 or S-84X, and S-84) will be utilized to make discharges based on the operating criteria for each structure.

## Structure 83X

### Hydraulic Design Data

<u>Type of Structure</u> .....	Spillway
<u>Location</u>	
<u>Canal</u> .....	41A
<u>Station</u> .....	N/A
<u>Discharge (cubic feet/second)</u>	
Design .....	1000
SPF .....	1000
Critical .....	N/A
<u>Headwater Elevation (feet, NGVD)</u>	
Design .....	32.0
SPF .....	39.8
Critical .....	N/A
Maximum .....	39.8
Optimum .....	32.0
Minimum .....	N/A
Maximum permissible head .....	9.0
<u>Tailwater Elevation (feet, NGVD)</u>	
Design .....	28.4
SPF 33.7	
Critical .....	N/A
Maximum .....	33.7
Optimum .....	28.0
Minimum .....	N/A
<u>Crest</u>	
Shape .....	Ogee
Elevation (feet, NGVD) .....	22.0
Net Length (feet) .....	11.0
Number and width of piers (feet) .....	0 and 0
<u>Gates</u>	
Number of Gates .....	1
Gate Bay Width (feet) .....	11.0
Gate Height (feet) .....	10.0
Clearance Elevation .....	33.0
Base of Breastwall Elevation .....	N/A

## Structure 83X

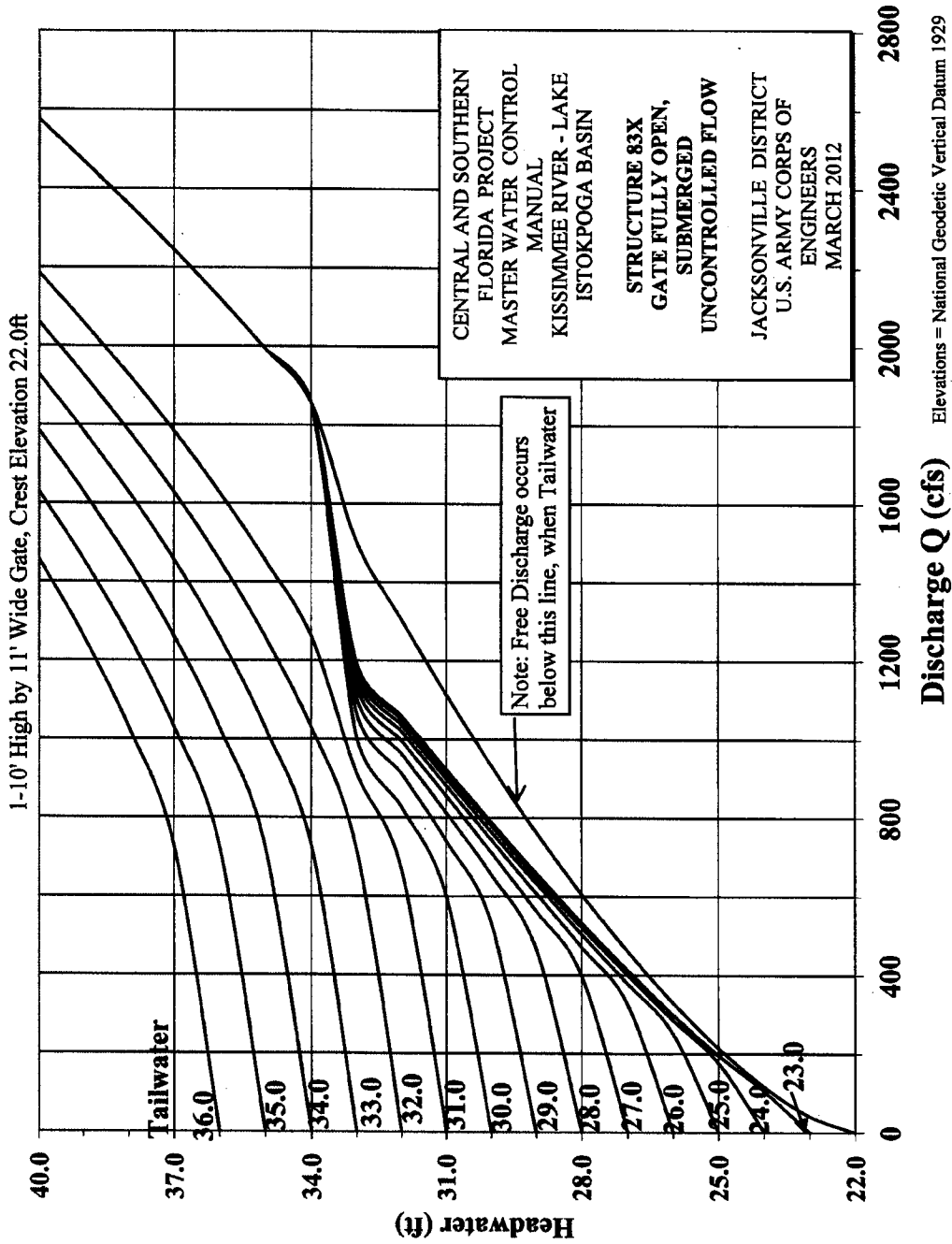
### Hydraulic Design Data Continued

#### Stilling Basin

Apron Elevation .....	9.0
Apron length (feet) .....	40
Approach Apron width (feet) .....	11.0
Upstream Approach Apron Elevation (feet) - .....	10.0
End Sill Elevation (feet).....	10.50
Velocity over End Sill (tailwater=crest) (feet/second).....	7.91
Baffle Block Elevation .....	12.0
Baffle Block Height/Width .....	3.0/2.5
Distance from Toe of Ogee to 1st Row of Baffle Blocks .....	17.0
Distance from Toe of Ogee to 2nd Row of Baffle Blocks .....	25.0
Total Apron length from Ogee Toe to end of End Sill .....	40.0

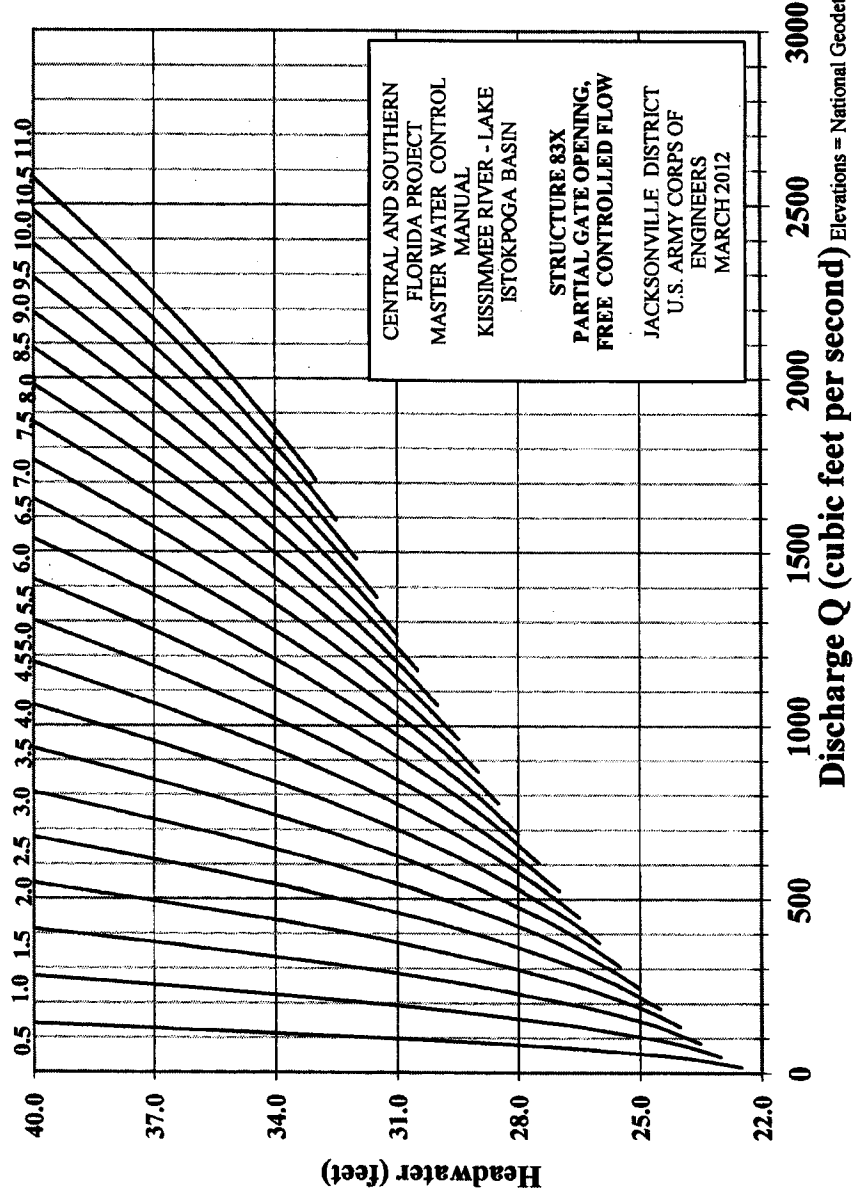
#### Rip Rap

Size (D <sub>50</sub> ) (feet) .....	1.10
Extent (Downstream) (feet).....	160
Specific Weight (pound/cubic foot).....	140
Max velocity rip rap can withstand (f/s).....	8.06
Thickness (inches) .....	39
Bedding stone layer thickness (inches).....	9
Bedding stone D <sub>50</sub> (feet).....	0.115

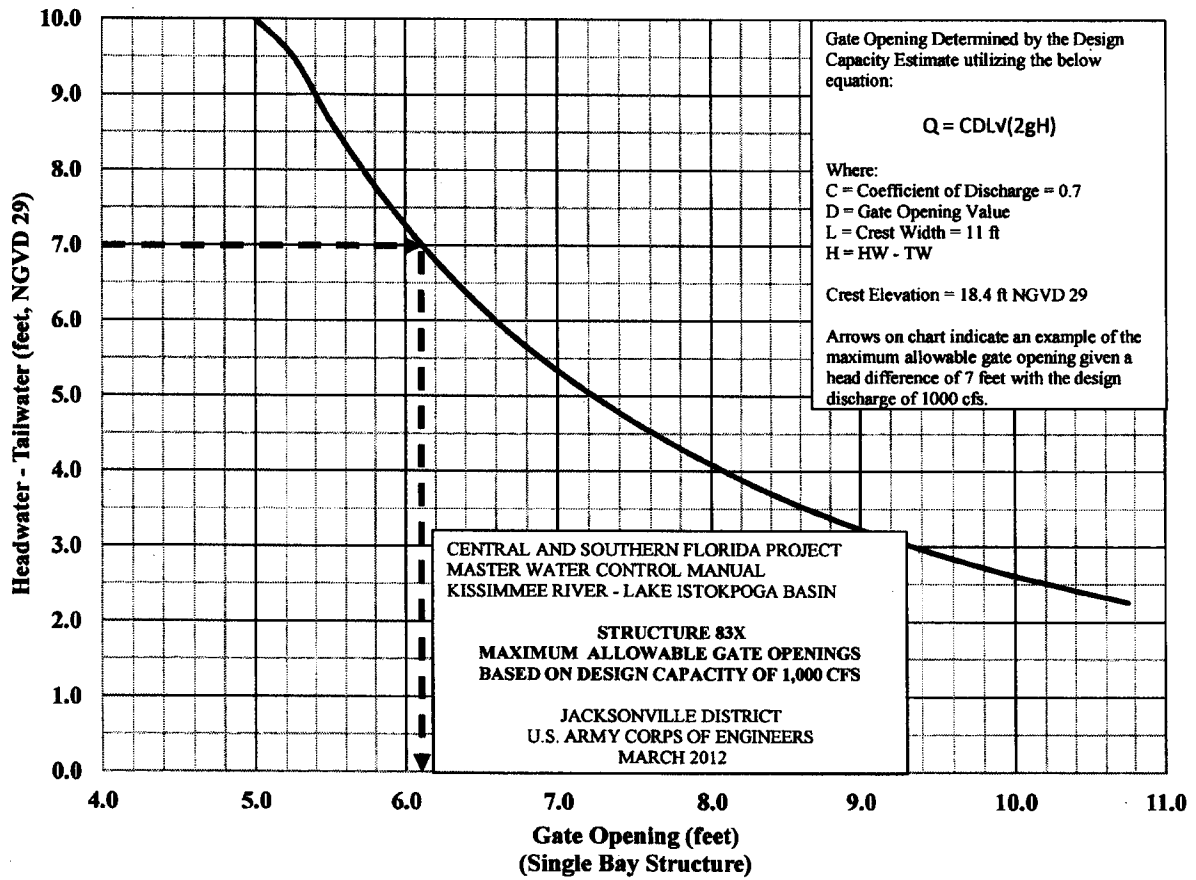




1-10' High by 11' Wide Gate, Crest Elevation 22.0ft



**Maximum Allowable Gate Opening Curve for S-83X**



## Structure 84X (S-84X)

**Location.** S-84X is located adjacent to and approximately 70 ft. north of S-84

**Purpose.** S-84X allows for higher Lake Istokpoga discharges when it is in Zone A. In addition, S-83 with S-84X provide the ability to provide additional discharge of local runoff accumulating in the Canal 41A (C-41A).

**Operation.** S-83X has the same operating criteria as S-83. The operating agency has the flexibility to choose which structure (S-68 or S-68X, S-83 or S-83X, S-84 or S-84X) will be utilized to make discharges based on the operating criteria for each structure. When Lake Istokpoga is in Zone A, S-84 and S-84X may discharge up to 6,670 cfs to maintain upstream water levels between 24.3 and 25.2 feet, NGVD. The operating agency has the flexibility to choose which structure (S-68 or S-68X, S-83 or S-83X, S-84 or S-84X) will be utilized to make discharges based on the operating criteria for each structure.

## Structure 84X

### Hydraulic Design Data

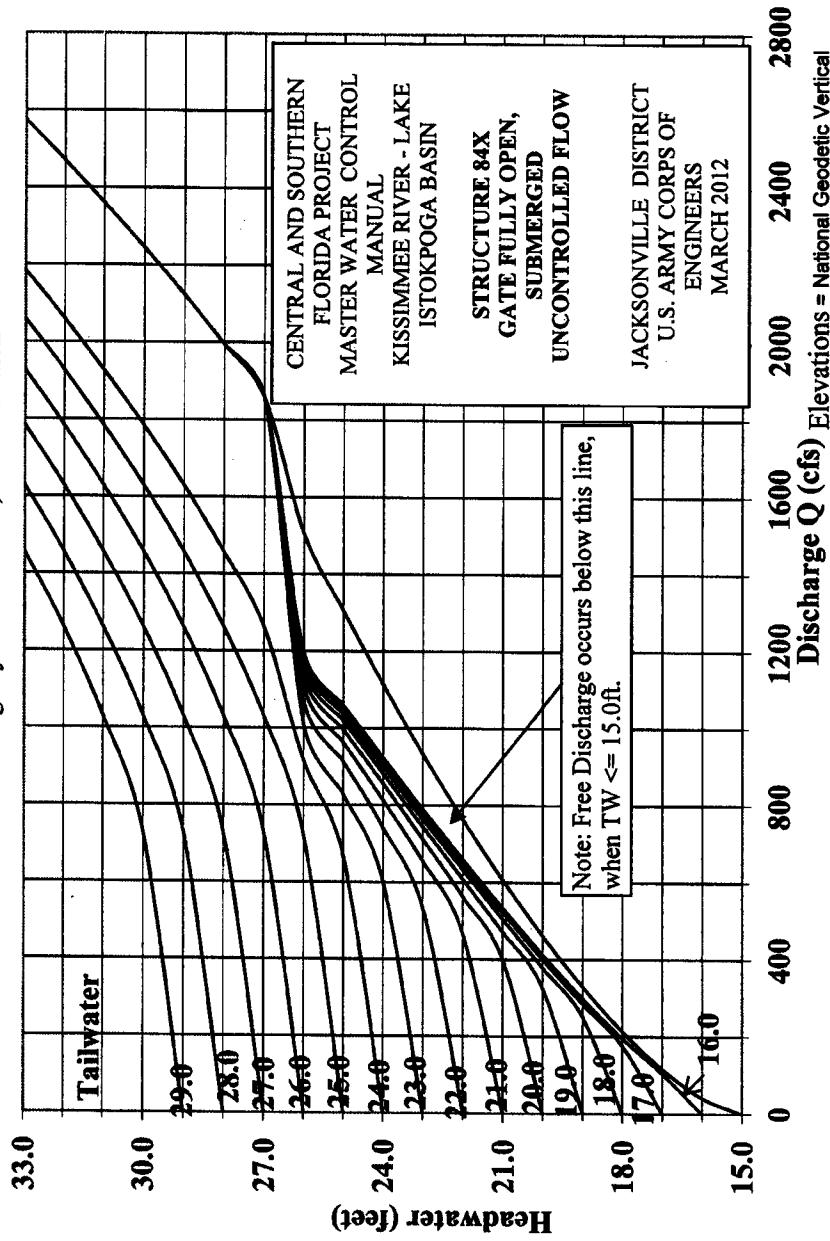
<u>Type of Structure</u> .....	Spillway
<u>Location</u>	
Canal .....	41A
Station .....	N/A
<u>Discharge (cfs)</u>	
Design .....	1000
SPF .....	1000
Critical .....	N/A
<u>Headwater Elevation (feet, NGVD)</u>	
Design .....	24.5
SPF .....	30.6
Critical .....	N/A
Maximum .....	30.6
Optimum .....	24.5
Minimum .....	N/A
Maximum permissible head .....	12.7
<u>Tailwater Elevation</u>	
Design .....	19.3
SPF .....	21.6
Critical .....	N/A
Maximum .....	21.6
Optimum .....	19.3
Minimum .....	N/A
<u>Crest</u>	
Shape .....	Ogee
Elevation .....	15.0
Net Crest Length (feet) .....	11.0
Number and Width of piers .....	0 and 0
Approach Apron width .....	11.0
Upstream Approach Apron Elevation .....	4.0
<u>Gate</u>	
Weir Control .....	Vertical Slide Gate
Number of Gates .....	1
Gate Bay Width (feet) .....	11.0
Gate Height (feet) .....	10.0

## Structure 84X

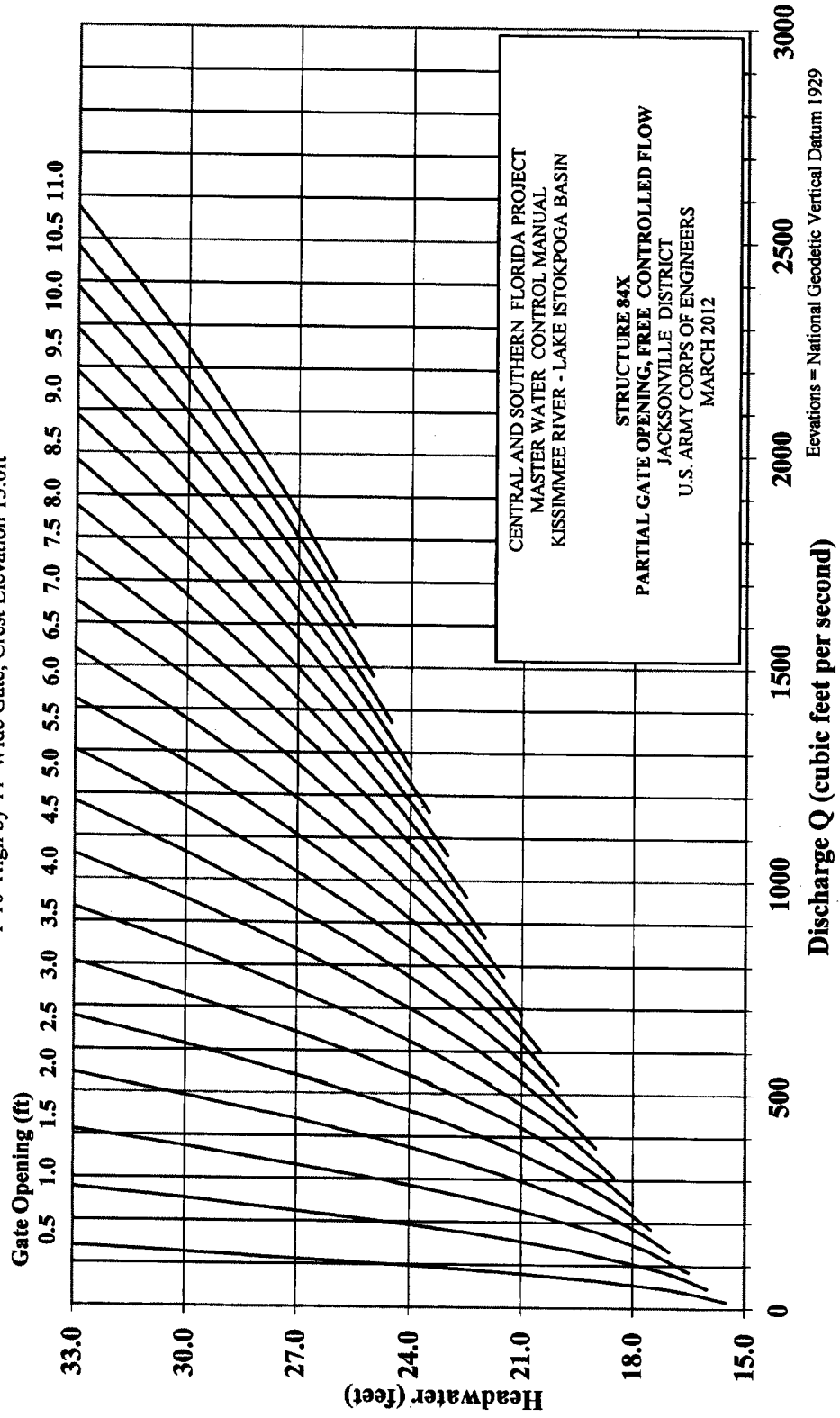
### Hydraulic Design Data (Continued)

Clearance Elevation .....	25.0
<u>Stilling Basin</u>	
Apron Elevation .....	9.0
Apron length (feet) .....	40
Approach Apron width (feet) .....	11.0
Upstream Approach Apron Elevation (feet) .....	4.0
End Sill Elevation (feet).....	2.5
Velocity over end sill (tailwater=crest) (ft/s).....	7.28
<u>Rip Rap</u>	
Size (D <sub>50</sub> ) (feet) .....	1.10
Extent (Downstream) (feet) .....	225
Specific Weight (pounds/cubic foot) .....	140
Max velocity rip rap can withstand (feet/second) .....	8.06
Thickness (inches) .....	36
Bedding stone layer thickness (inches) .....	9
Bedding stone D <sub>50</sub> (feet) .....	0.115
Baffle Block Elevation .....	4.0
Baffle block Height/Width .....	3.0/2.5
Distance from Toe of Ogee to 1st Row of Baffle Blocks .....	17.0
Distance from Toe of Ogee to 2nd Row of Baffle Blocks .....	25.0
End Sill Elevation .....	2.5
Total Apron Length from Ogee Toe to End of End Sill .....	40.0
Velocity over End Sill (fps) .....	8.2

1-10' High by 11' Wide Gate, Crest Elevation



1-10' High by 11' Wide Gate, Crest Elevation 15.0ft



**Maximum Allowable Gate Opening Curve for S-84X**

