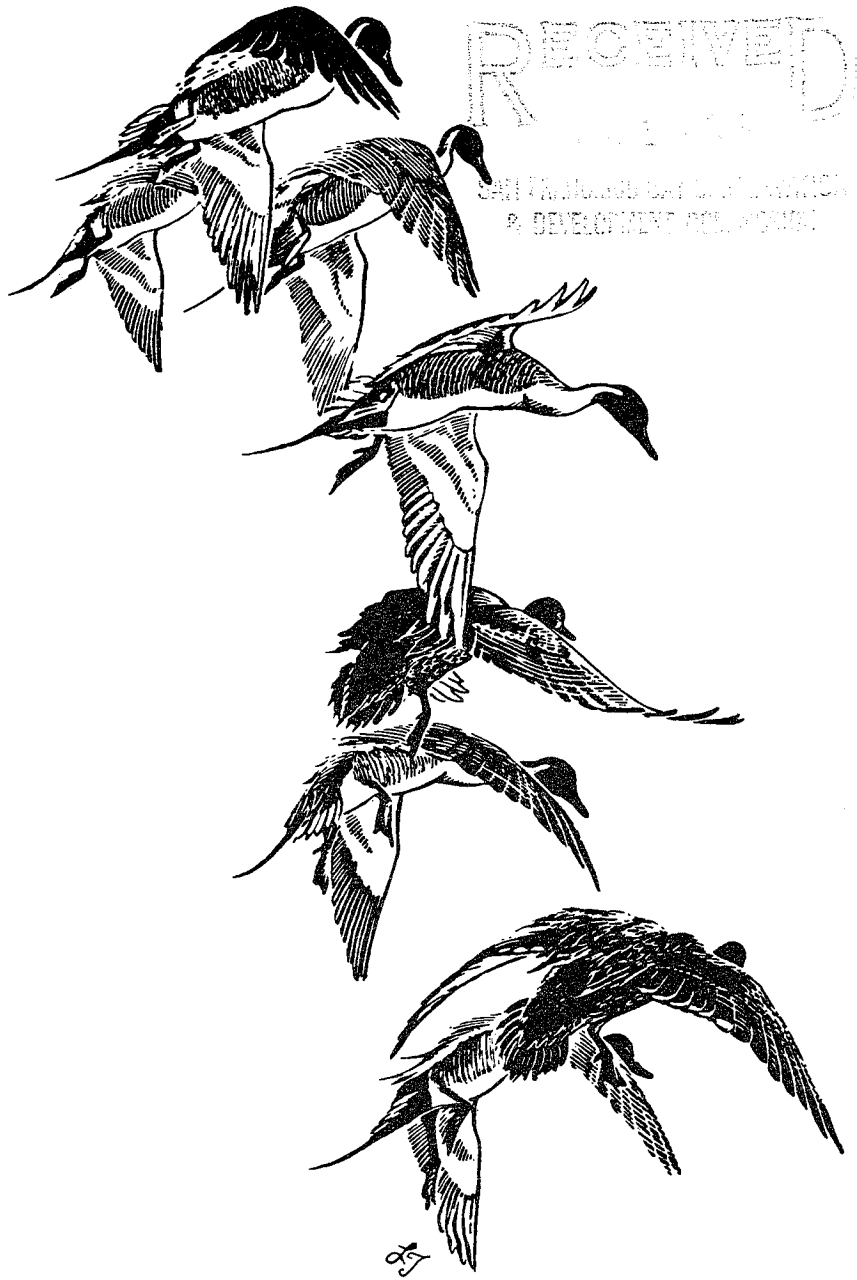


**SUISUN**  
**r e s o u r c e**  
**c o n s e r v a t i o n**  
**d i s t r i c t**



**The Suisun Marsh  
Management Program**



Exhibit "C"

SUISUN RESOURCE CONSERVATION DISTRICT STANDARDS  
COVERING  
DIKING, FLOODING, DRAINING, FILLING AND DREDGING  
OF  
TIDAL WATERS, MANAGED WETLANDS AND TIDAL MARSH WITHIN  
THE PRIMARY MANAGEMENT AREA OF THE SUISUN MARSH AS  
PROVIDED FOR BY SECTION 2900 et seq,  
OF THE PUBLIC RESOURCES CODE

Section I - Title:

These standards shall be known as the Suisun Resource Conservation District (SRCDD) Standards for diking, flooding, draining, filling and dredging of tidal waters, managed wetlands and tidal marshes within the Primary Management Area (PMA) of the Suisun Marsh (Marsh). These standards are established in accordance with the provisions of Section 29401(d) of the Public Resources Code (PRC).

Section II - Definition:

- 1) Tidal waters are defined as open water areas within the PMA which are subject to daily tidal action.
- 2) Managed wetlands are defined as leveed areas within the PMA in which water inflow and outflow is artificially controlled, or in which waterfowl food plants are cultivated, or both, to enhance habitat conditions for waterfowl and other water-associated birds and wildlife.
- 3) Tidal marshes are defined as vegetated areas within the PMA which are subject to daily tidal action.

### Section III - Purpose:

The purposes of these Standards covering diking, flooding, draining, filling and dredging are to preserve, protect and enhance the plant and wildlife communities within the PMA. By doing so, they will serve to protect the public interest through the development of wildlife habitat and prevention of mosquitoes. The improvement of the present water management practices called for by Sections 29003(b) and 29401(d) of the Suisun Marsh Preservation Act and the policies of the Land Use and Marsh Management Section of the Suisun Marsh Protection Plan will require the improvement of the water management facilities and procedures within the PMA. The standards and requirements of this element of the SRCD's component of the Local Protection Program specify how such improvements shall take place. They also meet the objective of minimizing activities in tidal marshes and waters.

### Section IV - Scope:

These standards shall apply to all private activities undertaken on privately owned land within the PMA and are intended to supplement the provisions of any Solano County Grading and Erosion Control Ordinance within the PMA.

### Section V - General Principles and Standards:

Diking, flooding, draining, filling and dredging activities shall be conducted so as to minimize any adverse effects on desirable plant and wildlife communities and to minimize the

potential for erosion and sedimentation. The following basic principles and standards shall serve as the minimum guidelines for the protection of plant and wildlife communities and the control of erosion and sedimentation:

- 1) Stripping or burning of vegetation, or other soil disturbance shall be done in a manner which will minimize adverse impacts on desirable plant and wildlife communities and control erosion and sedimentation.
- 2) Existing native vegetation shall be retained, protected, and supplemented wherever practical. Development shall be accomplished so that existing trees will be preserved whenever practical.
- 3) Exposure of soil to erosion by removal of vegetation shall be limited to the smallest area practical and for the shortest time practical. Soil exposure shall not exceed an area in which work can be completed during a single season to insure that soil stability is established well in advance of the rainy season. In general, relatively large scale soil disturbance such as disking, vegetation clearing by mechanical or chemical means, or pond bottom re-shaping shall be limited to not more than 30% of the area of an individual private ownership between April 1st and June 30th of a given year. Smaller projects such as structure removal or installation,

levee repair, or emergency projects may be done at any time.

- 4) Permanent control structures should be installed and final vegetation established as soon as practical.
- 5) Facilities shall be constructed in a manner which will minimize erosion and sediment deposition in adjacent waterways and wetlands.
- 6) Slopes, both cut and fill, shall not be steeper than 2:1 unless a thorough geological and engineering analysis indicates that steeper slopes are safe and appropriate erosion control measures are specified.
- 7) Cuts and fills shall not encroach upon existing watercourses, or constructed channels in a manner so as to adversely affect adjacent properties or the carrying capability of the watercourse.
- 8) Disposal of cleared vegetation and excavated materials shall be done in a manner which reduces the risk of erosion and sedimentation and shall conform to the provisions of these standards.
- 9) Diking, filling and dredging activities shall be conducted so as to minimize interference with critical wildlife activities such as nesting and breeding.

## Section VI - Specific Principles and Standards:

### A. TIDAL WATERS

- 1) Diking - before 1900 major areas of the PMA were leveed to isolate them from tidal action and to permit

the managed application of tidal waters for agricultural purposes. Under the policies of the Suisun Marsh Protection Plan, residual areas of tidal waters will remain in their current state. To assure that this happens, no new levee shall be constructed which isolates a water area, or portion thereof, that is currently subject to daily tidal action except in accordance with the provisions of a certified individual ownership management plan, or with the permission of the appropriate permitting authorities.

- 2) Flooding and Draining - except as otherwise provided in this section, there shall be no action which interferes with unimpeded natural tidal action in any water area, or portion thereof, currently subject to it.
- 3) Filling - no filling of a water area, or portion thereof, which is currently subject to unimpeded natural tidal action shall be undertaken except in accordance with the provisions of a certified individual ownership management plan, or with the permission of the appropriate permitting authorities.
- 4) Dredging - no dredging of a water area, or portion thereof, which is currently subject to unimpeded natural tidal action shall be undertaken except as a source of material for levee maintenance or to keep open access channels to water inlet and outlet structures. Any dredging shall be performed in accordance

with the provisions of a certified individual ownership management plan, or with the permission of the appropriate permitting authorities. When dredging is undertaken it shall be done as provided in Section VI B 4, and all practical measures shall be used to minimize the loss of intertidal tule berms.

B. MANAGED WETLANDS

1) Diking -

a) new levee construction shall be limited to that specified in certified individual ownership management plans and shall conform to the specifications contained in Attachment "A". Proposals for other new levee construction shall be approved by separate marsh development permits as provided for in Section 29500 et seq. of the PRC.

b) renovation, restoration, repair and maintenance of existing levees shall conform to the specifications contained in Attachment "A".

2) Flooding and Draining - flooding and draining of managed wetlands within the PMA shall be done in accordance with one or more of the five water management schedules contained in Attachment "D" and identified more specifically in each certified individual ownership management plan. Alternative or modified water management schedules may be employed if approved

by SRCD after review by the Solano County Mosquito Abatement District (SCMAD), the California Department of Fish and Game (CDF&G) and the U.S. Soil Conservation Service (SCS), except that existing agricultural practices involving modified water management practices shall be permitted to continue. Any new ditches which are constructed in accordance with the provisions of a certified individual ownership management plan shall comply with the specifications contained in Attachment "B". Any new water control structures which are constructed in accordance with the provisions of a certified individual ownership management plan shall comply with the specifications contained in Attachment "C". Renovation and improvement of existing facilities shall be performed in accordance with the same specifications.

- 3) Filling - filling shall be limited to low areas that are presently deeply flooded and shall only be done to allow establishment and growth of emergent vegetation. Any filling to be done shall be included as an item or an addendum in a certified individual ownership management plan.
- 4) Dredging -
  - a) Dredge spoils from the construction of new ditches:



i) Main ditches - where practical, dredge spoil material shall be used for the maintenance of existing levees. Spoil material shall be deposited either on the crown or inboard side of the levee. Where the use of spoil material for existing levee maintenance is not practical, dredge spoils shall be considered as a source of material for filling low spots. If neither of the above disposal techniques is practical, spoil materials shall be sidecast along the edge of the ditch at a distance of not less than 4 feet from the edge of the ditch. Side cast soil material shall be placed in such a manner that it does not prevent water flow into or out of the ditch from the surrounding lands. To encourage the establishment of desirable vegetation, the height of the deposits of spoil material shall not exceed the water depth when the area is flooded to its normal depth.

ii) Spreader ditches - no special requirements.

b) Dredge spoils from the renovation or improvement of existing ditches:

i) Main ditches - spoil material shall be disposed of in the same manner prescribed in Section a) i above.

ii) Spreader ditches - no special requirements.

C. TIDAL MARSHES:

- 1) Diking - the policies of the Suisun Marsh Protection Plan provide that disturbance of tidal marsh shall be minimized. Therefore, there shall be no diking of tidal marsh areas except in conformance with the findings of the Protection Plan and the provisions of a certified individual ownership management plan, or with the permission of the appropriate permitting authorities.
- 2) Flooding and Draining - the policies of the Suisun Marsh Protection Plan provide that disturbance of tidal marsh shall be minimized. Therefore, activities which would affect the natural daily flooding and draining of existing tidal marshes shall be undertaken only in conformance with the findings of the Protection Plan and the provisions of a certified individual ownership management plan, or with permission of the appropriate permitting authorities.
- 3) Filling - in accordance with the policies of the Suisun Marsh Protection Plan, disturbance of tidal marsh shall be minimized. Therefore, filling of tidal marsh areas shall not be done except in conformance with the findings of the Protection Plan and the provisions of a certified individual ownership management plan, or with the permission of the appropriate permitting agencies.

- 4) Dredging - in accordance with the policies of the Suisun Marsh Protection Plan, disturbance of tidal marsh shall be minimized. Therefore, dredging of tidal marsh areas shall not be done except in conformance with the findings of the Protection Plan and the provisions of a certified individual ownership management plan, or for mosquito control as authorized by the SCMAD, or with the permission of the appropriate permitting authorities. Where practical, dredge spoils shall be used for the maintenance of existing levees. In other cases, dredge spoils should be disposed of in open waters.

## ATTACHMENT "A"

### SUISUN MARSH LEVEE SPECIFICATIONS

#### SCOPE

This specification covers the design, construction and maintenance of levees in the PMA of the Suisun Marsh. Levees are embankments which protect managed wildlife habitat areas in the Suisun Marsh from uncontrolled flooding.

#### DEFINITIONS

1. Exterior Levees - embankments which prevent uncontrolled flooding of marshland due to tidal action. The crown of these levees is normally about 9 feet above zero tide with a 12 foot top width.
2. Interior Levees - embankments which allow for management of water inside exterior levees. They are not exposed to tidal action. The crown of these levees is normally less than 4 feet above the natural ground with a top width of 10 feet.
3. Core - locally available material which is placed in a trench dug along the longitudinal axis of the levee.

#### PURPOSE

1. Exterior Levees - the purpose of exterior levees is to facilitate water storage and control in order to promote wildlife habitat in the Marsh. Exterior levees are used to control tidal flow onto managed wetlands and prevent their uncontrolled flooding. They are used in conjunction

with interior levees, ditches, and water control structures to supply to or drain water from the land which they surround.

2. Interior Levees - the purpose of interior levees is to isolate specific areas within exterior levees for the purpose of providing those areas with individual control of water. They contain and control water used for ponding during the duck season and for leaching afterwards.
3. Cores - the purpose of installing a core is to eradicate existing animal channels in a levee and reduce water seepage through it.

#### CONDITIONS WHERE THESE STANDARDS APPLY

Levees are usually built from spoil excavated from the inboard side of the levee or dredged from channels. The levee standards defined in this section should be used only on sites where:

- 1) The normal maximum water depth against an exterior levee does not exceed 7 feet above zero tide.
- 2) The maximum water depth against an interior levee does not exceed 3 feet above the natural ground.
- 3) The damage which is likely to result from a levee failure is low.
- 4) The area to be protected is used for wildlife habitat or agriculture and has minimal structural improvements.

Where one or more of the above conditions is exceeded, special design levee standards are required.

## DESIGN CRITERIA

- A. Material - levee material shall be mineral or peat soils free of consolidated sod, roots, brush and other vegetative matter.
- B. Placement - fill shall be placed so as to permit free drainage of surface water. The maximum fill height from the surface of the ground at start of construction for any one construction stage shall be five feet. If the designed height is greater than 5 feet, the levee shall be built in two lifts. Lumps and clods of earth shall be broken up by shaping or discing.
- C. Cross Section -
- 1) New levees - the minimum standards for the construction of new levees shall be as follows:
    - a) Exterior levees:
      - i) The foundation shall be cleared and stripped of brush, trees, roots and other vegetation and debris. In soils containing excessive amounts of organic materials, a core trench shall be excavated to a minimum depth of 2 feet.
      - ii) The minimum top width shall be 12 feet.
      - iii) The minimum design water height (Hw in Figure 1) shall be 9 feet at zero tide.
      - iv) The minimum design side slope shall be 2:1 on both sides.

v) The minimum freeboard ( $H_f$  in Figure 1) shall be 2 feet; where wave action is expected, the freeboard shall be at least 3 feet.

vi) Existing tule berms on the outboard side of the levee shall be retained to the maximum extent practical.

vii) The minimum berm width between the inboard toe of the levee and the edge of any borrow ditch shall be 10 feet (See Figure 1). For levees having a design water depth of greater than 5 feet, a line drawn between the design water surface ( $H_w$  on Figure 1) and the toe of the levee shall not intersect the borrow ditch. In areas of organic soils, the minimum berm width shall be 25 feet.

viii) The minimum allowance for settlement ( $H_s$  in Figure 1) shall be 30% of the design height. If the levee must be in place and functional before natural settlement can take place, it shall be shaped or compacted by mechanical means. The levee shall be inspected to assure that the design cross section is obtained after settling.

ix) All new levees shall be constructed with a core.

x) Outboard faces shall be riprapped only in areas which are exposed to major wave action and are not protected by vegetative berms.

b) Interior levees:

i) The minimum top width shall be 10 feet.

ii) The maximum designed water height (HW in Figure 1) shall be 3 feet.

iii) The minimum design side slopes shall be 2:1 both sides.

iv) The minimum freeboard (Hf in Figure 1) shall be 1 foot. If the water depth is greater than 1 foot, the minimum freeboard shall be equal to the depth of the water.

v) The minimum allowance for settlement (Hs in Figure 1) shall be 30% of the design height. If a levee must be in place and functioning before natural settlement can take place, it must be shaped or compacted by mechanical means. The levee shall be inspected to assure that the design cross section is obtained after settling.

vi) All new levees shall be constructed with a core.

vii) No interior levees shall be riprapped.

2) Existing Levees - the minimum standards for the repair and maintenance of existing levees shall be as follows:

a) Exterior levees:

i) Exterior levee contours shall be restored to match the previously existing section. If the



previously existing cross section is not equal to or better than that described in (1), upgrading the levee to that standard should be considered.

ii) If the existing side slope is eroded beyond 1.5:1, the slope should be rebuilt to 2:1.

iii) Coring should be done only where required to repair damage from animal channels or eliminate seepage.

b) Interior levees:

i) Interior levee contours shall be restored to match the previously existing section. If the previously existing cross section is not equal to or better than that described in (1), upgrading the levee to that standard should be considered.

ii) If the existing side slope is eroded beyond 1.5:1, the slope should be rebuilt to 2:1.

iii) Coring should be done only where required to repair animal channel damage or eliminate seepage.

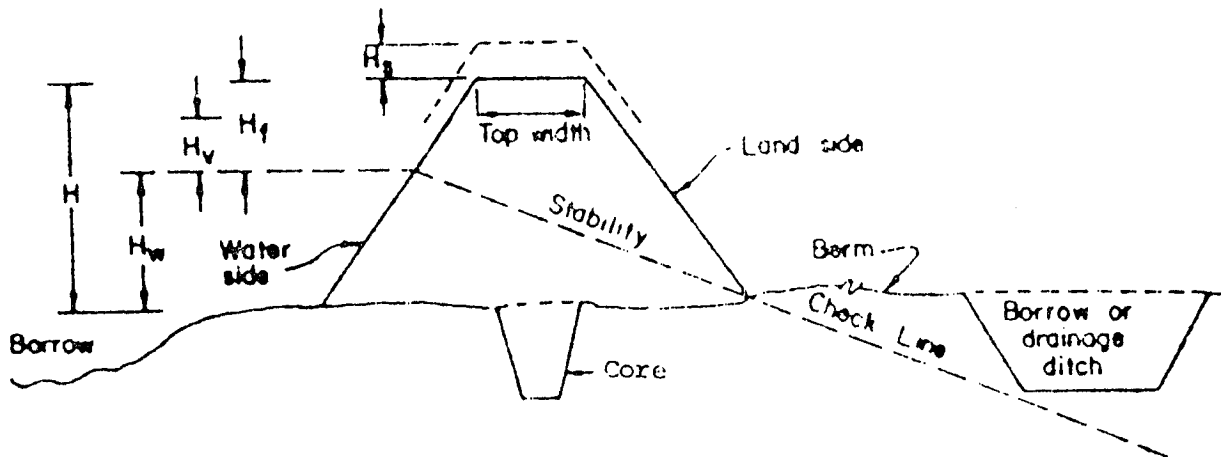
D. Repair of Leaking Levees and Restoration of Settled Levees -

1) Levee disturbance shall be held to the minimum consistent with correcting the problems and special care shall be taken not to disturb levee footings.

2) Cores shall be a minimum of 2 feet deep, measured from the crown of the levee.

3) In areas where settling is known to be a problem, the height and width of the levee shall be minimized to reduce settling problems.

FIGURE I  
SECTION THROUGH NEW LEVEES



The design height of the levee ( $H$ ) will be the sum of the design high water storage ( $H_w$ ), the added height ( $H_v$ ) for wave action, if any, and the freeboard ( $H_f$ ). The constructed height will include an allowance for settlement ( $H_s$ ), which will depend on the foundation and material used in construction. The actual design high water stage should be based on the water surface profile.

## ATTACHMENT "B"

### SUISUN MARSH DITCH SPECIFICATIONS

#### SCOPE

This specification covers the design, construction and maintenance of the ditches in the PMA of the Suisun Marsh.

#### DEFINITIONS

- 1) Main ditches - (also called supply or circulation ditches) are water conveyance facilities whose purpose is to deliver water from intake structures located at the exterior levees to the ponds or to remove water from the ponds to the outlet structures located at the exterior levees. They include any spurs leading to the individual ponds.
- 2) Spreader ditches - (also called lateral or collector ditches) are water conveyance facilities whose purpose is to connect low spots within the ponds to the main ditches.
- 3) Ponds are any area that is under water when a managed wetland is flooded to normal shooting level. Ponds are not limited to open water areas or to a mowed (or otherwise intensively managed) area around an established blind.
- 4) Shooting level is the depth of water maintained in a managed wetland during the hunting season. Ideally it means a water depth of 8-12" which is preferred by most of the waterfowl using the Suisun Marsh.

### PURPOSE

The purpose of the ditch system is to permit pond water application and drainage within a 30-day period. They are used in conjunction with levees and water control structures to supply and drain water from the managed wetlands.

### DESIGN CRITERIA

- 1) Main ditches shall have:
  - a) A minimum width of 2 feet.
  - b) A minimum depth of 2 feet below the natural ground level.
  - c) A side slope of 1.5:1 or flatter.
- 2) Spreader ditches shall have:
  - a) A minimum width of 18 inches.
  - b) A minimum depth of 12 inches below the ground level at the lowest portion of the service area in order to assure complete drainage.

### CONSTRUCTION CRITERIA

- 1) Construction shall be done in such a manner as to minimize its impact on plant and wildlife communities.
- 2) Spoils shall be disposed of as provided for in Section V B 4.

### MAINTENANCE CRITERIA

- 1) Obstruction by vegetation, debris and siltation shall be controlled so that the service area can be flooded and drained in no more than 30 days.

## ATTACHMENT "C"

### SUISUN MARSH WATER CONTROL SPECIFICATION GUIDE

#### SCOPE

This specification covers the design, construction and maintenance of water control structures in the PMA of the Suisun Marsh.

#### DEFINITIONS

- 1) Culvert - a corrugated steel pipe placed in a levee for the purpose of conveying water from one side of the levee to the other.
- 2) Flap Gate - A hinged wood or metal cover installed on the end of a culvert or redwood box designed to allow free water flow in one direction and prevent back flow in the other direction. In the free flow direction the size of the opening is controlled by the water pressure against the flap.
- 3) Lift Flap Gate - similar to a flap gate but with a winch and chain or other mechanism added to permit mechanical lifting of the flap and allowing a controlled amount of backflow to occur.
- 4) Slide Gate (also called a Screw Gate) - a wooden or metal cover which slides up and down in a frame attached to the end of a culvert or redwood box. It is raised and lowered by a screw mechanism which is

usually turned by hand. Water flow is equal in either direction and volume is determined by the degree of opening.

- 5) Slide/Flap Gate (also called a Screw/Flap Gate) - similar to a slide gate but with a flap gate added to prevent back flow.
- 6) Flashboard Box or Weir Box - a wooden box with grooved runs for inserting wood planks. The planks are placed, one on top of the other, to obtain the desired water height. Any excess water above this height will overflow over the boards and out through the box. The boards can be removed for complete water drainage.
- 7) Flashboard Riser - a length of corrugated metal pipe cut in half longitudinally and placed vertically on top of the inlet or outlet of a culvert. The riser is fitted with wood planks that can be placed, on top of the other, to the desired height. These function the same as that of a weir box.

#### PURPOSE

The purpose of the water control structures is to admit water to, distribute water within, and remove water from the service area at the discretion of the landowner. They are used in conjunction with levees and ditches to supply and drain water from the managed wetlands.

## DESIGN CRITERIA

- 1) These structures shall be adequate in size, number, type and location to:
  - a) Permit flooding and draining of the service area within a 30 day period.
  - b) Permit maintenance of water depths not exceeding 12" above natural ground level during the hunting season.
  
- 2) Water control structures, except risers and weir boxes, shall be constructed of one or more of the following materials or their equivalent:
  - a) Stainless steel.
  - b) Plastic coated galvanized or alclad steel meeting the requirements of Interim Federal Specification WW-P-405.
  - c) Asphalt coated galvanized or alclad steel meeting the requirements of Interim Federal Specification WW-P-405.
  
- 3) Exterior culverts shall be 12 gauge steel or heavier. Interior culverts shall be 14 gauge steel or heavier.
  
- 4) The bottom of an outlet structure shall be no higher than the bottom of the ditch which brings water to it, but not lower than 1.5 feet below 0.0 tide.
  
- 5) Outlet gates generally should have flashboard risers on the inboard side and a flapgate on the outboard side.

- 6) Inlet gates shall be of the sliding or screw type located on the outboard side and generally should have a flapgate on the inboard side.
- 7) Flashboard and weir boxes shall be constructed of any suitable rot resistant material.

#### CONSTRUCTION CRITERIA

- 1) Excavation for any culvert shall conform to the lines and grades shown on any available drawings or as staked in the field, and as necessary for safe installation.
- 2) Culverts shall be installed in accordance with the manufacturer's recommendations unless otherwise specified. The culvert sections shall be joined with standard coupling bands unless otherwise specified. The culvert shall be firmly and uniformly bedded throughout its entire length. Back fill shall be accomplished in a manner that will not displace the culvert from the design grade or elevations shown on any drawings. Damaged coatings shall be repaired by appropriate methods.
- 3) Water control gates shall be installed according to the manufacturer's recommendations.
- 4) Backfill shall be to the lines and grades of the associated levees.



MAINTENANCE CRITERIA

- 1) All water control structures shall be maintained in good working order, free of debris and silt.
- 2) Leakage shall be kept at the minimum practical and necessary repairs shall be made promptly.
- 3) Water passage capacities shall be maintained at levels which will permit a 30 day flood and drain cycle to be achieved.